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THE NEW ENCYCLOPÆDIA

THE BALKAN QUESTION.

THE Balkan peninsula, which has for centuries been the theatre of turmoil and strife, may be taken as the territory enclosed between the northern boundaries of Bosnia, Servia, and Rumania, the western boundary of Bosnia and Hertzegovina and the sea. The readjustments of 1913, which need not be taken as final, are, for the moment, the last of a series of changes in the fates of the Balkan countries: Bosnia, Servia, Rumania, Montenegro, Albania, Greece, Bulgaria, and European Turkey.

The history of the Balkans since the early part of last century has been the history of a gradual shrinkage in Turkish power and (with one exception, Bosnia and Hertzegovina) the gradual liberation of the different States. Greece secured her independence in 1829, but, with the exception of Greece, the Turkish power was paramount in the Balkan peninsula until 1878. The Russo-Turkish War was concluded by the *Treaty of San Stefano* (March 1878), which would have left Turkey only Albania and Thrace. Bulgaria was to hold Macedonia and Eastern Rumelia as a practically independent state, Servia and Montenegro were to be enlarged and become absolutely independent.

The terms of the Treaty of San Stefano were considerably modified by the *Treaty of Berlin* (July 1878), which recognized the independence of Montenegro and gave her a strip of coast-line, recognized the independence of Servia and Rumania, and granted to Austria-Hungary the occupation and administration of Bosnia and Hertzegovina, with the right to keep garrisons and have military and commercial roads in the Sanjak of Novi-bazaar. Bulgaria became an autonomous but tributary principality, with the Balkans as boundary. The province of Eastern Rumelia became part of Bulgaria in 1885; on October 5, 1908, Austria-Hungary proclaimed her sovereignty over Bosnia-Hertzegovina and Bulgaria declared her independence. Turkey had shrunk to Albania, Macedonia, and Thrace, with the Sanjak of Novi-bazaar separating Servia and Montenegro in the north-west.

Such was the condition of the Balkan peninsula when the Turko-Balkan War broke out. When early in the war Albania seemed to be imperilled, the two Powers most interested—Austria-Hungary and Italy—made it clear that none of the Balkan States would be allowed to take the province as a whole, and that Servia would not be allowed even a port on the Adriatic. A conference of Ambassadors met, at the suggestion of Sir Edward Grey, in London

(December 1912), to consider the future of that province, and it was announced on August 11, 1913, that the southern boundary of the future autonomous Albania had been fixed as a line drawn south of Cape Stylos to Lake Ochrida, leaving the district of Koritza to Albania, but giving part of Albania to Greece.

The other crux of the new Balkan settlement was the Turko-Bulgarian frontier, which had been settled broadly by the *Treaty of London* (May 30) as a line from Enos on the Ægean to Midia on the Black Sea. When Bulgaria was beaten in her ambitious bid for the lion's share of the spoils of the Turko-Balkan War, and compelled to accept terms at the point of the sword of her former allies and Rumania, Turkey chose to place a more than liberal interpretation on the Enos-Midia agreement, suggesting that the boundary should follow the Maritza River from Enos to Adrianople, cross to Kirk-Kilisse (including both fortresses) and so to Midia. It seems probable that the final Turko-Bulgarian boundary will be something like this, and the map given in the *Turko-Balkan War* article must be changed accordingly.

According to the *Treaty of Bukharest*, the other boundaries agreed upon are as follows: The Servo-Bulgarian boundary rises from the old frontier of the Partarica Mountains, follows the old Turko-Bulgarian frontier and the watershed between the Vardar and the Struma (leaving, however, the upper valley of the Strumnitza to Servia), and terminates on the crest of Mt. Belashictza, on the Greco-Bulgarian frontier. This starts from the Servo-Bulgarian frontier and terminates at the mouth of the Mesta, *i.e.* some distance to the east of Kavala. The Rumano-Bulgarian boundary starts at the Danube above Turtukai, and ends on the Black Sea south of Ekrene. The area of Bulgaria, 37,000 sq. miles before the war, has increased by between one-third and one-fourth.

The Servo-Grecian boundary runs south-west from the Mt. Belashictza to the Vardar at Gyevgeli, and, continuing south-west a little farther, then bends almost due west to the northern end of Lake Presba and the Greco-Albanian boundary. The Sanjak of Novi-bazaar thus falls to Servia and the lion's share of the spoil. Her territory, 18 650 sq. miles before the Turko-Balkan War, is now almost doubled.

The boundaries of Greece are the Servo-Grecian and Albanian southern limits. Salonika and Kavala she has gained despite all protests, and her seaboard, already great, is considerably increased.

Montenegro apparently has gained prestige only.

THE NEW ENCYCLOPÆDIA

EDITED BY H. C. O'NEILL
EDITOR OF 'THE PEOPLE'S BOOKS'
ASSISTED BY A STAFF
OF SPECIALISTS

LONDON: T. C. & E. C. JACK, 67 LONG ACRE, W.C.
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EDITOR'S NOTE

EVERY encyclopædia consists of two elements, one ready-made and the other creative. It is impossible to evolve the framework, manufacture the categories of understanding, or create the labels which are fixed to departments of knowledge. The work of an encyclopædia is to take all these hot from the mint of current thought and appraise them at their just valuation. This appraisal is the creative element, and in the wisdom with which it is carried out lies the claim of an encyclopædia to exist.

Of course one might blunder in employing an old currency. Georgian coins are still seen, but they have an interest and value quite other than those of daily use. An encyclopædia would be of little value indeed if it did not deal with the terms which daily emerge in speech and writing. It is hoped that even in this respect *The New Encyclopædia* marks an advance by the inclusion of terms which represent questions of the moment even though they be of but temporary interest.

Granting that *The New Encyclopædia* has fulfilled its initial task of choosing its labels aright, there remain two opposite tendencies which must be adjusted in the treatment of them. There is the tendency to keep subjects whole and the tendency to dismember them to facilitate reference. An attempt has been made in this volume to drive a somewhat shrewder bargain between them. The subdivisions of a subject, each with its separate heading, are generally arranged under the title of the main article, but cross references are inserted where a reader might naturally expect to find the subdivision. Thus life and its processes, growth and reproduction, are expounded under the general heading 'Animals'; but there is a cross reference to 'Life' in its proper position in the book, and the subdivisions of the main article are marked out by bold headings, only less arresting than the title of the article.

The articles have been written by a numerous band of specialist contributors, not the least part of whose work has been the compression of vast subjects into narrow limits. The most recondite subjects could be represented by a series of formulæ, if a sufficiently rigid set of symbols could be agreed upon; and it is certain that the effective part of knowledge or valid hypothesis in any given subject might be represented by an extremely small proportion of the words generally spent on expressing it.

Compression, and very rigid compression, has thus a decided advantage which has naturally been laid under fee. Words in *The New Encyclopædia* have generally been hoarded with miserly care, the only provision being that at no time should clearness be sacrificed. It would have been easy to compress still more if this provision had not been enforced. The Editor has striven, and he thinks successfully, to use no abbreviation the meaning of which is not at once obvious. At the same time a host of connecting words of which exponents are usually so spendthrift have been suppressed.

Another source of wastage of space which has been avoided in *The New Encyclopædia* is excessive reduplication. An invention which justifies the inclusion of a biography may thus be described several times: under the inventor's name, under the branch of the subject which it advances, under the general heading of the subject, etc. A wide use of cross references has done away with this wholly unnecessary waste.

Specialist and contracted treatment have both been bent to this one end, to present a clear story to the reader; so that while the student will find the articles inspired by the most careful scholarship, the uninitiated will be able to read with interest and understanding. Science and philosophy, in which the 'average man' is legitimately so intensely interested, are both expounded so far as is possible in the language of ordinary speech.

By the employment of a very large body of specialist contributors and a wide editorial control it is hoped that a greater than usual modernity of treatment has been secured. Thus, scientific developments the most recent have been chronicled side by side with the events which have but now happened.

The system of employing specialists has been carried to its legitimate conclusion, by employing them for articles which usually form the subject of controversy. Thus it has seemed fairer and a nearer approach to the objective treatment of the scientific articles to have the article on 'Free Churches' written by a Free Church clergyman, and the article on 'Roman Catholicism' by a Roman Catholic priest. The criticisms of such subjects are fairly obvious, while the point of view can only be justly given by the specialist, in this case the believer. But where it has been possible, the purely objective point of view has been maintained.

Illustrations have been given where necessary or where they effected a saving in space; but since no maps could pretend to give all the places to which reference has been made—as many as in most large gazetteers—the latitude and longitude of places have been given so that any one can see on referring to a map exactly where the place lies.

Names are such as are generally used, except where, in foreign names, another and equally simple but more correct transliteration has been found. The common English version has in such cases been cross-referenced. 'Mahomet' in this way has been abandoned in favour of the more correct 'Muhammad.' But where a name or a system of transliteration has established a sort of prescriptive right to survive, it has been used with the more correct version given as an alternative. The advantage of consistency has been sacrificed where its maintenance would have lessened the availability of the encyclopædia.

The numerous hands through which *The New Encyclopædia* has passed have added much to its general efficiency in suggesting to the Editor points of view not sufficiently elucidated, or given differently in different articles, and to all his editorial assistants the Editor owes a debt of gratitude.

Though a distinct and very high ideal has inspired the choice of articles, arrangement, and method of *The New Encyclopædia*, the Editor feels confident that this has met with a measure of realisation.

H. C. O'NEILL.

ABBREVIATIONS USED IN THIS WORK

abp., archbishop.
Amer., American.
anat., anatomy.
app., appointed.
Arab., Arabian.
arch., architecture.
astron., astronomy.

b., born.
biol., biology.
bot., botany.
B.P., Boiling-point.
bp., bishop.
Brit., British.
bro., brother.

c., about (Lat. *circa*).
cent., century.
cf., compare.
chem., chemistry.
Chin., Chinese.
class., classical.
coll., college.
cr., created.

d., died.
Dan., Danish.
dau., daughter.

E., East.
e., eldest.
ed., educated.
edit., editor, edited, edition.
e.g., for example.
Eng., English.

f., father.
fl., flourished.

Flem., Flemish.
Fr., French.

geol., geology.
geom., geometry.
Ger., German.
Gk., Greek.
gov., governor.
gov.-gen., governor-general.
grad., graduated.

hist., historical.

Ind., Indian.
in., inches.
Ital., Italian.

Jap., Japanese.

Lat., Latin.
lieut.-gen., lieutenant-general.
lit., literature.

m., married.
M.E., Middle English.
M.P., Member of Parliament, Melting-point.
maths., mathematics.
med., medicine.
min., mineralogy.
mts., mountains.
myth., mythology.

N., North.
Norweg., Norwegian.

O.E., Old English.

Pers., Persian.
Pop., Population.
Portug., Portuguese.
Pres., President.
prof., professor.
Prot., Protestant.
Pruss., Prussian.
pub., published.

q.v., which see.

R.C., Roman Catholic.
Rom., Roman.
Russ., Russian.

S., South.
s., son.
Scot., Scottish.
sec., secretary.
S.G., Specific Gravity.
Soc., Society.
Span., Spanish.
sq., square.
succ., succeeded.
Swed., Swedish.

theol., theology.
trans., translation, translated
Turk., Turkish.

U.K., United Kingdom.
univ., university.

vols., volumes.

W., West.

zool., zoology.

THE NEW ENCYCLOPÆDIA

A, initial letter of Eng. alphabet, corresponding to *Alpha* in Greek and *Aleph* in Hebrew. In O.E. it was sounded long and short only, as 'balm' and 'ask.' Nowadays it has eight sounds, as in 'balm,' 'ask,' 'pale,' 'rare,' 'flat,' 'fall,' 'was,' 'many.'

AA, numerous European rivers: 1 (50° 47′ N., 2° 13′ E.), N. France; 2 (40° 52′ N., 8° 23′ E.), Switzerland; 3 (51° 38′ N., 5° 32′ E.), Holland; 4 (57° 15′ N., 24° 45′ E.), Russia; others in Germany and Russia.

AACHEN, AIX-LA-CHAPELLE (50° 40′ N., 6° 8′ E.), town, Prussia; capital of empire of Charlemagne, who is buried there; treaties signed at A., 1668 (giving Flanders to France) and 1748 (ending War of Austrian Succession); coal-fields and manufactures; sulphur baths. Pop. (1910) 156,000.

AAL, AL, Hindustani for plant *Morinda citrifolia*, and for the reddish dye obtained from its roots.

AALBORG (57° 2′ N., 9° 52′ E.), seaport, Denmark; exports fish, grain. Pop. (1911) 33,500.

AALEN (48° 50′ N., 10° 5′ E.), town, Württemberg; ironworks. Pop. (1910) 11,500.

AALESUND (62° 28′ N., 6° 5′ E.), seaport, Norway; herring fisheries. Pop. (1910) 14,000.

AALI PASHA (1815–71), Turk. politician; five times grand vizier.

AALSMEER (52° 14′ N., 4° 44′ W.), town, Holland.

AAR(E) (47° 30′ N., 8° 13′ E.), large Swiss river; joins Rhine at Coblenz; nearly 200 miles long.

AARAU (47° 24′ N., 8° 2′ E.), capital of Aargau, Switzerland; foundries. Pop. 8000.

AARD-VARK (earth-pig), Dutch name for African edentate mammal of genus *Orycteropus*, burrowing in ground and feeding on ants, which it catches with its slimy, extensile tongue.

AARD-WOLF (earth-wolf), Dutch name for *Proteles cristata*, a S. African hyena-like mammal with an erectile mane, of burrowing habits, feeding on carrion and white ants.

AARGAU (47° 25′ N., 8° 10′ E.), N. Swiss canton; area, 542 sq. miles; admitted Swiss Confederation, 1803; capital, Aarau. Pop. (1910) 230,000.

AARHUUS (56° 11′ N., 10° 12′ W.), Dan. seaport; old Gothic cathedral. Pop. (1911) 62,000.

AARON, the bro. of Moses, is prominent in some parts of the narrative of the Exodus and Wanderings, but his importance varies considerably in different strata of the tradition. In the earlier narrative, J and E, he is represented as acting with Moses, but in such a way that some think his name is an editorial insertion. A. stays with the Israelites when Moses and Joshua go up the mountain for the tablets and the Law, and A. makes the Golden Calf (under which form Jahweh was probably worshipped in early times). In the later traditions, those of the Priestly Code, A. is much more prominent. Like his bro., he receives the divine commands, and he appears definitely as high priest, performing all the ceremonies of his office. This characterisation of him must be post-exilic, when the priestly system was established. It is very difficult, if not impossible, to say what amount of hist. information we really have about him, but in any case he is more shadowy than Moses. One authority thinks he is a 'traditional head of the priesthood and cult of Bethel.' He is certainly connected with the priesthood, and the Aaronites and the rest of the Levites are distinguished. The etymology of the name is obscure, and may have been taken over by the Hebrews from some of their Canaanitish or N. Arab. neighbours.

AARON'S BEARD, popular name for several plants having some fanciful resemblance to a beard, *e.g.* strawberry geranium, rose of Sharon, Kenilworth ivy, etc.

AARON'S ROD, name for various tall flowering plants, like the golden rod; (arch.) rounded moulding with scrollwork or leafage.

A.B., see ABBREVIATIONS.

AB, 11th month of Jewish civil year. See CALENDAR.

ABA, coarse goat- or camel-hair homespun of Near East; loose, sleeveless outer garment made from this cloth, worn by Arabs; an altazimuth instrument.

ABABDA, large tribe of Arab nomads in Egypt and Nubia, chiefly occupied in carrying trade, and, from earliest times, as caravan guides.

ABABDEH (27° 43′ N., 30° 56′ E.), town, Egypt.

ABACA (*Musa textilis*), native name of plant from which manila hemp is produced.

ABACO, GREAT (26° 30′ N., 77° 10′ W.), one of Bahama Islands. Pop. 4500.

ABACTINAL, see ACTINAL.

ABACUS, upper part of capital of a column, supporting architrave; also from Rom. times frame with beads running on wires, used for calculating.

ABADDON, Apollyon, angel of the underworld; also Hell itself.

ABADEH (31° 10′ N., 52° 35′ E.), town, Persia; noted for wood-carving. Pop. 4000.

ABAE, ancient town, Phocis, Greece; had oracle; ruined.

ABAKANSK (54° 20′ N., 91° 40′ E.), town, Siberia. Pop. 2000.

ABALONE, Californian name for Haliotis, or ear-shell, a shell-fish known in Channel Islands as *ormer* (*oreille de mer*).

ABAMA, genus of bog plants. See ASPHODEL.

ABANA (Barada), river in plain of Damascus.

ABANO BAGNI (45° 22′ N., 11° 46′ E.), town, Italy; hot springs. Pop. 5000.

ABANO, PIETRO DI (1250–1316), Ital. physician and astrologer; tried by Inquisition but d. before sentence.

ABANTO (43° 20′ N., 3° 10′ W.), town, Spain; iron-ore mines. Pop. 7000.

ABARBANEL (1437–1508), name assumed by Isaac ben Jehudah, Span. Jew, diplomatist, philosopher, and commentator; diplomatic agent of Alfonso V. (Portugal).

ABARIM (31° 40′ N., 35° 40′ E.), mountain chain, Palestine.

ABARIS, priest of Apollo, from whom he is supposed to have received a magic arrow giving him powers of locomotion; lived either VIII. or VI. cent. B.C.

ABASIA, lack of power to control muscles in walking.

ABATED, ancient term applied to sunk portions of masonry; also blunted, as 'a. arms.'

ABATEMENT, act of mitigation, reduction, removal, etc.; heraldic mark of dishonour.

ABAT-JOUR (Fr.), shade, screen, or other contrivance over windows, etc., for throwing light downwards.

ABAT-SONS (Fr.), contrivance for throwing sound downwards.

ABATTIS, rampart of felled trees, with branches extending outwards.

ABATTOIR, public slaughter-house (*q.v.*).

ABAT-VENT (Fr.), contrivance for keeping out wind on belfries, chimney-cans, etc.

ABAUZIT, FIRMIN (1679–1767), Fr. philosopher and scholar and Prot. theologian; b. Uzès, Languedoc; sought refuge in Geneva after Revocation of Edict of Nantes.

ABBA, see ABBOT.

ABBADIDES, Muhammadan dynasty in Spain (1023–91); founded by Abd-ul-Qasim Muhammad, Cadi of Seville, head of Arab family long settled there.

ABBADIE, ANTOINE THOMSON D' (1810–97), and **ARNAUD MICHEL D'** (1815–93), two brothers, b. Dublin of French-Irish parentage, famous for their travels in Abyssinia (1837–48).

ABBADIE, JACQUES (1658–1727), Prot. theologian, minister of Fr. Church in London; then Dean of Killaloe.

ABBAS, see ABBASIDES.

ABBAS I. (1557–1628), 'the Great'; Shah of Persia, constitutional reformer.

ABBAS I. (1813–54), Egyptian pasha; murdered.

ABBAS II. (1874–), Khedive of Egypt; succ. f. when eighteen; progressive ruler.

ABBASIDES (Caliphs of Bagdad from 750–1258), second of the two great dynasties of the Muhammadan Empire; claimed descent from Abbas (A.D. 566–652), Muhammad's uncle.

ABBAS-TUMAN (41° 40′ N., 42° 30′ E.), watering-place in Russ. Transcaucasia; sulphur baths.

ABBATE, NICCOLO DELL', 'MESSER NICCOLO,' (1515–71), Ital. fresco painter; assisted in decorating Fontainebleau.

ABBAZIA (45° 20′ N., 14° 18′ E.), town, Istria, Austria; popular resort.

ABBE, CLEVELAND (1838–), Amer. meteorologist; inaugurated daily weather forecasts based on telegraphic reports (*c.* 1869); official govt. meteorologist, 1870; commenced official *Monthly Weather Review*, 1873; wrote *Treatise on Meteorological Apparatus and Methods* (1887).

ABBESS, feminine of 'abbot'; one who presides over abbey or nunnery. See MONASTERY.

ABBEVILLE (50° 5′ N., 1° 48′ E.), town, N. France; has old churches; manufactures cloth. Pop. 19,000.

ABBEY, conventual establishment with an abbot or abbess at the head. See MONASTERY.

ABBEY, EDWIN AUSTIN, R.A. (1852–1911), Amer. artist; b. Philadelphia; painter of dramatic subjects, and book-illustrator.

ABBEYFEALE (52° 25′ N., 9° 23′ W.), village, County Limerick, Ireland.

ABBEYLEIX (52° 55′ N., 7° 21′ W.), village, S. Queen's County, Ireland; flour mills.

ABBIATEGRASSO (45° 25′ N., 8° 54′ E.), town, Lombardy, Italy; silk. Pop. 11,000.

ABBON (850–923), Fr. monk of St. Germain-des-Prés; wrote valuable account in Latin verse of siege of Paris by Normans.

ABBON OF FLEURY (d. 1004), Fr. chronicler.

ABBOT, derived from Syriac *Abba*, signifying Father, though originally a title of much more extended meaning, has come now to represent the superior of an autonomous community of monks. Elected in most cases by his community, he possesses, usually for life, the supreme rule of the abbey. The importance of the office was so far evident that A's attended General Councils of the Church and sat in national Assemblies of England, France, Germany, etc. Their powers are quasi-episcopal; and, though they are not consecrated, at the ceremony of their blessing they receive from their diocesan bp. the mitre, crozier, ring, etc., as the formal insignia of their office.

ABBOT OF MISRULE or **UNREASON** (*q.v.*).

ABBOT, EZRA (1819–84) Amer. Biblical scholar; Bussey Prof. of New Testament Criticism at Harvard, 1872–84.

ABBOT, GEORGE (1562–1633), Abp. of Canterbury; b. Guildford; one of translators of the Bible (1604); ardent Calvinist, and enemy of Laud, his successor.

ABBOT, GEORGE (1603–48), Eng. Puritan author and scholar.

ABBOT, WILLIAM (1789–1843), Eng. actor and dramatist.

ABBOTS-BROMLEY (52° 45′ N., 1° 50′ W.), village, Staffordshire, England.

ABBOTSFORD, residence of Sir Walter Scott, on Tweed, near Melrose.

ABBOTSHALL (56° 15′ N., 3° 10′ W.), parish, Kirkcaldy, Fifeshire.

ABBOTS-LANGLEY (51° 40′ N., 0° 25′ W.), hamlet, Hertfordshire, England.

ABBOTT, EDWIN ABBOTT (1838–), Eng. scholar and theologian; *Shakespearian Grammar*, and other works.

ABBOTT, EMMA (1849–91), Amer. operatic singer; studied Milan and Paris, made début as Maria in *La Fille du Regiment* at Covent Garden; sang later in U.S.A. with *English Opera Company*.

ABBOTT, EVELYN (1843–1901), classical scholar.

ABBOTT, LEMUEL FRANCIS (1760–1803), Eng. painter.

ABBOTT, LYMAN (1835–), Amer. author and Congregationalist divine; editor of *Outlook*.

ABBOTTABAD (34° 7′ N., 73° 12′ E.), town, India; military cantonment. Pop. 7764.

ABBREVIATIONS, the list of abbreviations or contractions used in this volume will be found in the Introduction. The following 'A's' are in common use:—

A.B. (L. *Artium Baccalaureus*), Bachelor of Arts (also *B.A.*); able-bodied seaman.
Abp., Archbishop.
A.C. (L. *ante Christum*), before Christ.
a/c., account.
A.C.A., Associate of Chartered Accountants.
A.C.P., Associate of the College of Preceptors.
A.C.S., Additional Curates' Society; Anglo-Continental Society.
A.D. (L. *anno Domini*), in the year of our Lord.
A.D.C., Aide-de-camp.
Ad lib. (L. *ad libitum*), at pleasure.
æt. (L. *ætatis*), in the year of his age.
A.F.A., Associate of the Faculty of Actuaries.
A.G., Adjutant-General.
Ag. (L. *argentum*), silver.
A.H. (L. *anno Hegiræ*), in the year of the Hegira (the Muhammadan era).

A.I.A., Associate of the Institute of Actuaries.
A.I.C., Associate of the Institute of Chemistry,
Assoc.Inst.C.E., Associate of the Institute of Civil Engineers.
Ala., Alabama, U.S.A.
Alas., Alaska, U.S.A.
A.L.S., Associate of the Linnæan Society.
A.M. (L. *anno mundi*), in the year of the world; (L. *ante meridiem*) before noon; see also *M.A.*
A.M.Inst.C.E., Associate Member of the Institution of Civil Engineers.
A.M.S., Army Medical Staff.
Anon., anonymous.
A.O.D., Ancient Order of Druids.
A.O.F., Ancient Order of Foresters.
A.O.H., Ancient Order of Hibernians.
A.P.U.C., Association for the Promotion of the Unity of Christendom.
Aq. (L. *aqua*), water.
A.Q.M.G., Assistant Quartermaster-General.
A.R.A., Associate of the Royal Academy.
A.R.A.M., Associate of the Royal Academy of Music.
A.R.C.E., Academical rank of Civil Engineers.
Arch., Archdeacon.
A.R.C.S., Associate of the Royal College of Science.
A.R.H.A., Associate of the Royal Hibernian Academy.
A.R.I.B.A., Associate of the Royal Institute of British Architects.
Ariz., Arizona, U.S.A.
Ark., Arkansas, U.S.A.
A.R.S.A., Associate of the Royal Scottish Academy.
A.R.S.M., Associate of the Royal School of Mines.
A.S., Anglo-Saxon; in the year of our salvation.
A/S., account sales.
A.S.C., Army Service Corps.
A.,T.&S.F.Ry., Atchison, Topeka, and Santa Fé Railway.
Atty.-Gen., Attorney-General.
A.U.C. (L. *ab urbe condita*), from the building of Rome.
A.V., Authorised Version of the Bible.
A.V.D., Army Veterinary Department.

B.A., Bachelor of Arts (also *A.B.*).
B.&F.B.S., British and Foreign Bible Society.
B.&O.R.R.Co., Baltimore and Ohio Railway Co.
B.A.O., Bachelor of the Art of Obstetrics.
Bart., or Bt., Baronet.
B.C., before Christ; British Columbia.
B.Ch., Bachelor of Surgery.
B.Ch.D., Bachelor of Dental Surgery.
B.C.L., Bachelor of Civil Law.
B.C.S., Bengal Civil Service.
B.D., Bachelor of Divinity.
B.D.S., Bachelor of Dental Surgery.
B.Eng., Bachelor of Engineering.
B.LL., Bachelor of Laws (also *LL.B.*).
b/l., bill of lading.
B.M., Bachelor of Medicine.
B.Met., Bachelor of Metallurgy.
B.Mus., Bachelor of Music (also *Mus.Bac.*)
Bp., Bishop.
Brig.-Gen., Brigadier-General.
Brit., Britain, Britannia, Briton, British.
B.S., Bachelor in Surgery.
B.Sc., Bachelor of Science.
B.S.L., Botanical Society, London.
Bt., Baronet.
B.Th., Bachelor of Theology.
B.Th.U., British Thermal Unit.
B.T.U., Board of Trade Unit.
B.V.M. (L. *Beata Virgo Maria*), Blessed Virgin Mary.

C., cent, centigrade, centime; (L. *circa*) about.
C.A., Chartered Accountant.
Cal., California, U.S.A.
C.&N.W.Ry., Chicago and North-Western Railway.
Cantab. (L. *Cantabrigiensis*), of Cambridge.
Cantuar. (L. *Cantuariensis*), of Canterbury. (The Primate of all England uses *Cantuar* as his surname.)
C.Ass., Church Association.
C.Aug.F., Curates' Augmentation Fund.
C.B., Companion of the Bath.
C.,B.&Q.Ry.Co., Chicago, Burlington, and Quincy Railway Company.
C.B.F., Colonial Bishoprics Fund.
C.C., County Councillor; County Council.
C.E., Civil Engineer.
Cel., Celsius (thermometer).
cent. (L. *centum*), a hundred.
C.E.T.S., Church of England Temperance Society.
C.E.W.H.S., Church of England Women's Help Soc.
C.E.W.M.S., Church of England Working Men's Soc.
C.E.Z.M.S., Church of England Zenana Missionary Society.
cf. or cp. (L. *confer*), compare.
C.G., Coast-guard; Commissary-General.
C.G.S., the units of length, mass, and time (centimetre, gramme, second) used in scientific work.
C.G.U., Church Guilds Union.
C.I., Order of the Crown of India.
C.I.D., Criminal Investigation Department.
C.I.E., Companion of the Order of the Indian Empire.
C.I.V., City Imperial Volunteers.
C.L.B., Church Lads' Brigade.
C.L.C.R., Cheshire Lines Committee Railway.
C.L.R., Central London Railway.
cm., centimetres.
C.M., Certificated Master; (L. *Chirurgiæ Magister*) Master in Surgery; common metre.
C.,M.&St.P.Ry., Chicago, Milwaukee, and St. Paul Railway.
C.M.G., Companion of the Order of St. Michael and St. George.
C.M.S., Church Missionary Society.
Co., Company; county.
C.O., Commanding Officer; Colonial Office.
c/o, care of.
C.O.D., cash on delivery.
Col., Colonel.
Coll., College.
Colo., Colorado, U.S.A.
Com., Commander; Commissioner; Commodore.
con. (L. *contra*), against.
Conn., Connecticut.
Cor. Mem., Corresponding Member.
Cor. Sec., Corresponding Secretary.
C.O.S., Charity Organisation Society.
C.P., Clerk of the Peace; Common Pleas.
C.P.A.S., Church Pastoral Aid Society.
C.P.R., Canadian Pacific Railway.
C.P.S. (L. *Custos Privati Sigilli*), Keeper of the Privy Seal.
cr., credit, creditor.
C.R. (L. *Custos Rotulorum*), Keeper of the Rolls; Caledonian Railway; Cambrian Railway.
Cres., Crescendo (Musical).
C.,R.I.&P.Ry., Chicago, Rock Island, and Pacific Railway.
C.S., Chemical Society; Civil Service; Clerk to the Signet; Court of Session.
C.S.I., Companion of the Star of India.
C.S.L.R., City and South London Railway.
C.S.U., Christian Social Union.
C.T., Certificated Teacher.
C.T.C., Cyclists' Touring Club.
C.T.S., Catholic Truth Society.
curt., current; the present month.
C.V.O., Commander of the Royal Victorian Order.
cwt. (c=L. *centum*; and wt.=Eng. *weight*), a hundredweight.

d. (L. *denarius*), a penny.
D.A.R., Daughters of the American Revolution.
D.C. (It. *da capo*), from the beginning; again (Musical); District of Columbia, U.S.A.

D.C.L., Doctor of Civil Law.
D.D. (L. *Divinitatis Doctor*), Doctor of Divinity.
D.D.D. (L. *Dat, donat. dicatque*), 'he—the donor—gives this, presents and dedicates it.' Letters often written after the name of a donor, on a flyleaf.
Deft., Defendant.
Del., Delaware; (L. *delineavit*) he (or she) drew it.
D.Eng., Doctor of Engineering.
D.F., Dean of the Faculty; Defender of the Faith (also *F.D.*).
D.G. (L. *Dei Gratia*), by the Grace of God.
D.Hy., Doctor of Hygiene.
Dim., Diminuendo (Musical).
dis., discount.
D.L., Deputy-Lieutenant.
D.Lit., Doctor of Literature.
D.L.O., Dead Letter Office.
D.M. (L. *Dis Manibus*), 'to the Divine Manes.' Letters at the head of a Roman tombstone.
D.Met., Doctor of Metallurgy.
D.Mus., Doctor of Music. (See *Mus.D.*)
Do. (It. *Ditto*), the same.
D.O., District Office (Postal).
Dols., dollars.
D.O.M. (L. *Deo optimo maximo*), 'to God the best and greatest.'
Doz., dozen.
D.P.H., Diploma of Public Health.
Dr., debtor; doctor.
dr., dram.
D.S. (It. *dal segno*), from the sign.
D.Sc., Doctor of Science.
D.S.O., Companion of the Distinguished Service Order.
D.S.Sc., Diploma in Sanitary Science.
D.T. (L. *Doctor Theologiæ*), Doctor of Theology.
D.T's, Delirium Tremens.
Dunelm. (L. *Dunelmensis*), of Durham.
D.V. (L. *Deo volente*), God willing.
D.V.H., Diploma in Veterinary Hygiene.
dwt. (d = L. *denarius*, and wt. = Eng. *weight*), a pennyweight.

Eblan. (L. *Eblanensis*), of Dublin.
Ebor. (L. *Eboracensis*), of York. (The Archbishop of York uses *Ebor* as his surname.)
E.C., Established Church.
E.C.U., English Church Union.
Ed., Editor.
E.D.S., English Dialect Society.
E.E., Errors excepted.
E.E.T.S., Early English Text Society.
e.g. (L. *exempli gratia*), for example.
Eng., England or English.
Env. Ext., Envoy Extraordinary.
eq., equal.
E.R. (L. *Edvardus Rex*), King Edward.
Esq., Esquire.
E.T., English Translation.
et al. (L. *et alibi*), and elsewhere; (L. *et alii*) and others.
etc. (L. *et cæteri, cæteræ*, or *cætera*), and others; and so on.
et seq. (L. *et sequentes*), and the following.
Ex.div., exclusive of dividend.
Exec., executor.
Execx., executrix.
Exon. (L. *Exoniensis*), of Exeter. (The Bishop of Exeter uses *Exon* as his surname.)
E.&O.E., Errors and omissions excepted.

F., Fahr., Fahrenheit (thermometer).
f., franc.
F.A., Football Association.
F.A.M., Free and Accepted Mason.
F.A.S., Fellow of the Antiquarian Society.
F.A.S.E., Fellow of the Antiquarian Society (Edinburgh).
F.A.S.L., Fellow of the Antiquarian Society (London).
F.B.A., Fellow of the British Academy.
F.B.S., Fellow of the Botanical Society.
F.B.S.E., Fellow of the Botanical Society (Edinburgh).
F.C. (L. *fieri curavit*), 'He directed this to be done.' Letters put at the end of a monumental inscription, after the donor's name.
F.C.A., Fellow of Chartered Accountants.
Fcp., foolscap.
F.C.P., Fellow of the College of Preceptors.
F.C.P.S., Fellow of the Cambridge Philosophical Society.
F.C.S., Fellow of the Chemical Society.
F.D. (L. *Fidei Defensor*), Defender of the Faith (also *D.F.*).
Fec. (L. *fecit*), he (or she) did it.
F.E.I.S., Fellow of the Educational Institute of Scotland.
F.F.A., Fellow of the Faculty of Actuaries.
F.F.P.S., Fellow of the Faculty of Physicians and Surgeons (Glasgow).
F.G.S., Fellow of the Geological Society.
F.H.S., Fellow of the Horticultural Society.
F.I.A., Fellow of the Institute of Actuaries.
F.I.C., Fellow of the Institute of Chemistry.
F.I.Inst., Fellow of the Imperial Institute.
F.J.I., Fellow of the Institute of Journalists.
F.K.Q.C.P.I., Fellow of King's and Queen's College of Physicians, Ireland.
Fla., Florida.
F.L.S., Fellow of the Linnæan Society.
F.M., Field-Marshal.
F.O., Foreign Office; field-officer.
fo., folio.
f.o.b., goods bought (or sold) to be delivered 'free on board.'
F.P.S., Fellow of the Philological Society.
F.R.A.S., Fellow of the Royal Astronomical Society.
F.R.C.I., Fellow of the Royal Colonial Institute.
F.R.C.P., Fellow of the Royal College of Physicians.
F.R.C.P.E., Fellow of the Royal College of Physicians (Edinburgh).
F.R.C.S., Fellow of the Royal College of Surgeons.
F.R.C.S.Eng., Fellow of the Royal College of Surgeons (England).
F.R.C.S.E., Fellow of the Royal College of Surgeons (Edinburgh).
F.R.C.S.I., Fellow of the Royal College of Surgeons (Ireland).
F.R.C.V.S., Fellow of the Royal College of Veterinary Surgeons.
F.R.G.S., Fellow of the Royal Geographical Society.
F.R.H.S., Fellow of the Royal Horticultural Society.
F.R.Hist.S., Fellow of the Royal Historical Society.
F.R.I.B.A., Fellow of the Royal Institute of British Architects.
F.R.M.S., Fellow of the Royal Microscopical Society.
F.R.Met.Soc., Fellow of the Royal Meteorological Society.
F.R.P.S., Fellow of the Royal Photographic Society.
F.R.S., Fellow of the Royal Society.
F.R.S.E., Fellow of the Royal Society (Edinburgh).
F.R.S.L., Fellow of the Royal Society of Literature.
F.S.A., Fellow of the Society of Antiquaries.
F.S.A.Scot., Fellow of the Society of Antiquaries (Scotland).
F.S.I., Fellow of the Surveyors' Institution.
F.S.S., Fellow of the Statistical Society.
F.T.C.D., Fellow of Trinity College, Dublin.
F.Z.S., Fellow of the Zoological Society.

Ga., Georgia (United States).
G.A.R., Grand Army of the Republic.
G.B., Great Britain.
G.B.&I., Great Britain and Ireland.
G.C.B., Grand Cross of the Bath.
G.C.H., Grand Cross of the Guelphs of Hanover.

G.C.I.E., Knight Grand Commander of the Indian Empire.
G.C.L.H., Grand Cross of the Legion of Honour.
G.C.M.G., Grand Cross of St. Michael and St. George.
G.C.R., Great Central Railway.
G.C.S.I., Grand Commander of the Star of India.
G.C.V.O., Knight Grand Cross of the Royal Victorian Order.
G.D., Grand Duke (or Duchess).
G.E.R., Great Eastern Railway.
G.F.S., Girls' Friendly Society.
Gib., Gibraltar.
G.L., Grand Lodge.
gm., grammes.
G.M., Grand Master.
G.M.K.P., Grand Master of the Knights of St. Patrick.
G.N.R., Great Northern Railway; and Great Northern Railway, U.S.A.
Gov.-Gen., Governor-General.
G.P.O., General Post Office.
G.R. (L. *Georgius Rex*), King George.
gr., grain.
Gr., Greek.
G.S.W.R., Glasgow and South-Western Railway; Great Southern and Western Railway (Ireland).
G.W.R., Great Western Railway.

H.A.C., Honourable Artillery Company.
H.B.M., His (or Her) Britannic Majesty.
H.C., House of Commons; Heralds' College.
h.e. (L. *hoc est*), that (or this) is.
H.E., His Eminence; His Excellency.
Heb., Hebrew.
H.G., Horse Guards.
H.H., His (or Her) Highness; His Holiness (the Pope).
hhd., hogshead.
H.I.H., His (or Her) Imperial Highness.
Hil., Hilary.
H.I.M., His Imperial Majesty.
H.J. (L. *hic jacet*), here lies.
H.J.S. (L. *hic jacet sepultus*), here lies buried.
H.L., House of Lords.
h.l. (L. *hoc loco*), in this place.
H.L.I., Highland Light Infantry.
H.M., His (or Her) Majesty.
H.M.C., His (or Her) Majesty's Customs.
H.M.I.S., His Majesty's Inspector of Schools.
H.M.S., His Majesty's Service; His Majesty's Ship.
Hon., Honourable.
H.P., half-pay; horse-power.
H.R.H., His (or Her) Royal Highness.
H.R.I.P. (L. *hic requiescit in pace*), here rests in peace.
H.S.H., His (or Her) Serene Highness.
H.S.S., (L. *Historiæ Societatis Socius*), Fellow of the Historical Society.
H.W.M., High-water mark.

Ia., Iowa.
ib. or ibid. (L. *ibidem*), in the same place.
I.C.R.R., Illinois Central Railroad.
I.C.S., Indian Civil Service.
id. (L. *idem*), the same.
Ida., Idaho, U.S.A.
I.D.B., Illicit Diamond Buying.
i.e. (L. *id est*), that is.
I.H.S. (more properly IHS or IHC) the first three letters of the name Jesus in Greek.
Ill., Illinois.
I.L.P., Independent Labour Party.
I.M., Isle of Man.
I.M.D., Indian Medical Department.
Imp. (L. *Imperator*), Emperor; Imperial.
I.M.S., Indian Medical Service.
in., inch.
Incog. (It. *incognito, incognita*), unknown.
Ind., Indiana.
inst. (L. *instante*), instant; of the present month.
Int., interest.
in trans. (L. *in transitu*), on the way.
inv. (L. *invenit*), he designed.
I.O.C.I., the Imperial Order of the Crown of India.
I.O.G.T., Independent Order of Good Templars.
I.O.O.F., Independent Order of Oddfellows.
I.O.U., I owe you.
I.P.D. (L. *in præsentia Dominorum*), in presence of the Lords (of Session), Edinburgh.
i.q. (L. *idem quod*), the same as.
I.R.O., Inland Revenue Office.
I.R.R., Irish Royal Rifles.
I.S.O., Imperial Service Order.
It., Italian.
I.W., Isle of Wight.
I.W.W., Industrial Workers of the World.
I.Y., Imperial Yeomanry.

J.A., Judge-Advocate.
J.C., Jesus Christ.
J.C.D. (L. *Juris Civilis Doctor*), Doctor of Civil Law.
J.D. (L. *Jurum Doctor*), Doctor of Laws.
J.G.W., Junior Grand Warden.
J.P., Justice of the Peace.
J.U.D. (L. *Juris Utriusque Doctor*), Doctor of both Civil and of Canon Law.

Kans., Kansas.
K.B., Knight of the Bath; King's Bench.
K.C., King's Counsel.
K.C.B., Knight Commander of the Bath.
K.C.H., Knight Commander of the Guelphs of Hanover.
K.C.I.E., Knight Commander of the Indian Empire.
K.C.M.G., Knight Commander of St. Michael and St. George.
K.C.S., Knight of the Order of Charles III. (Spain).
K.C.S.I., Knight Commander of the Star of India.
K.C.V.O., Knight Commander of the Victorian Order.
K.D.G., King's Dragoon Guards.
K.E., Knight of the Eagle (Prussia).
K.G., Knight of the Garter.
K.G.C., Knight of the Grand Cross.
K.G.C.B., Knight of the Grand Cross of the Bath.
K.G.C.M.G., Knight of the Grand Cross of St. Michael and St. George.
K.G.F., Knight of the Golden Fleece (Spain).
K.G.H., Knight of the Guelphs of Hanover.
K.H., Knight of Hanover.
kilog., kilogramme.
kilom., kilometre.
K.L.B., Knight of Leopold of Belgium.
K.L.H., Knight of the Legion of Honour.
K.M., Knight of Malta.
K.Mess., King's Messenger.
K.N.S., Knight of the Royal Northern Star (Sweden).
K.O.S.B., King's Own Scottish Borderers.
K.P., Knight of St. Patrick.
K.R.R., King's Royal Rifles.
K.S., Knight of the Sword (Sweden).
K.T., Knight of the Thistle; Knight Templar.
Kt., Knight.
Ky., Kentucky, U.S.A.

L (L. *libra*), pound (sterling); Latin.
L.A., Legislative Assembly; Law Agent; Literate in Arts.
La., Louisiana.
L.A.H., Licentiate of Apothecaries' Hall (Ireland).
L.&N.R.R., Louisville and Nashville Railroad.
L.A.S., Licentiate of the Apothecaries' Society (also *L.S.A.*).
Lat., Latitude.
lb. (L. *libra*), pound.
L.B.S.C.R., London, Brighton, and South Coast Railway.
L.C., Lord Chamberlain; Lord Chancellor.
l.c., lower case (type).
L.C.C., London County Council.
L.Ch., Licentiate in Surgery.
L.C.D.R., London, Chatham, and Dover Railway.

L.C.P., Licentiate of the College of Preceptors.
L.D., Lady Day.
L.D.S., Licentiate of Dental Surgery.
L.F.P.S., Licentiate of the Faculty of Physicians and Surgeons.
L.G., Life Guards.
L.I., Long Island; Light Infantry.
lib. (L. *liber*), book.
Lic.Med., Licentiate in Medicine.
Lieut., Lieutenant.
Lieut. Col., Lieutenant-Colonel.
Lieut. Gen., Lieutenant-General.
Lieut. Gov., Lieutenant-Governor.
Linn., Linnæan.
L.L.A., Lady-literate in Arts.
LL.B. (L. *Legum Baccalaureus*), Bachelor of Laws (the double letter L is used to denote the plural) (also *B.L.*).
LL.D. (L. *Legum Doctor*), Doctor of Laws.
LL.M. (L. *Legum Magister*), Master of Laws.
L.L.I., Lord-Lieutenant of Ireland.
L.M., Long Metre; Licentiate in Midwifery.
L.N.W.R., London and North-Western Railway.
loc. cit. (L. *loco citato*), in the place quoted.
Long., Longitude.
loq. (L. *loquitur*), speaks.
L.O.S., Licentiate of the Obstetrical Society.
L.P., Lord Provost.
L.R.C., Labour Representative Committee.
L.R.C.P., Licentiate of the Royal College of Physicians.
L.R.C.P.E., Licentiate of the Royal College of Physicians (Edinburgh).
L.R.C.S., Licentiate of the Royal College of Surgeons.
L.S., Linnæan Society; (L. *locus sigilli*) the place of the seal.
L.S.A., Licentiate of the Society of Apothecaries (also *L.A.S.*).
L.S.D. (L. *libræ, solidi, denarii*), pounds, shillings, pence.
L.S.Sc., Licentiate in Sanitary Science.
L.S.W.R., London and South-Western Railway.
L.T.S.R., London, Tilbury, and Southend Railway.
L.W.M., Low water mark.
LXX (70), Septuagint version.

M., Monsieur.
M.A. (L. *Artium Magister*), Master of Arts (also *A.M.*).
Maj. Gen., Major-General.
M.A.O., Master of the Art of Obstetrics.
Mass., Massachusetts.
M.Ast.S., Member of the Astronomical Society.
M.B. (L. *Medicinæ Baccalaureus*), Bachelor of Medicine (also *B.M.*).
M.C., Master in Surgery (also *C.M.*); Master of Ceremonies; Member of Congress.
M.C.C., Marylebone Cricket Club.
M.Ch.D., Master of Dental Surgery.
M.Comm., Master of Commerce.
M.C.P., Member of the College of Preceptors.
M.D. (L. *Medicinæ Doctor*), Doctor of Medicine.
Md., Maryland.
Mdlle., Mademoiselle.
Mdme., Madame.
M.D.R., Metropolitan District Railway.
M.D.S., Master of Dental Surgery.
M.E., Mechanical, Military, or Mining Engineer; Methodist Episcopal; Middle English.
Me., Maine.
Mem., Memorandum.
M.Eng., Master of Engineering.
Messrs., Messieurs, Gentlemen.
M.F.H., Master of Foxhounds.
Mgr., Monsignor.
M.H.A., Member of House of Assembly.
M.Hon., Most Honourable.
M.H.R., Member of House of Representatives.
M.Inst.C.E., Member of the Institution of Civil Engineers.
Mich., Michigan.
M.I.E.E., Member of the Institution of Electrical Engineers.
M.I.Mech.E., Member of the Institution of Mechanical Engineers.
M.Inst.M.E., Member of Institution of Mining Engineers.
Mid., Midshipman.
Minn., Minnesota.
Min. Plen., Minister Plenipotentiary.
Miss., Mississippi.
M.L.A., Member of the Legislative Assembly.
M.L.C., Member of the Legislative Council.
M.M., Their Majesties; Messieurs.
mm., millimetres.
M.Met., Master of Metallurgy.
M.N.S., Member of the Numismatical Society.
Mo., Missouri.
M.O., Money Order (postal).
Mod. (L. *moderato*), moderately (musical).
M.O.H., Medical Officer of Health.
Mont., Montana, U.S.A.
M.O.O., Money Order Office.
Mo.P.Ry., Missouri Pacific System.
M.P., Member of Parliament; Melting Point.
M.P.S., Member of the Pharmaceutical Society; Member of the Philological Society.
Mr. (L. *Magister*), Mister.
M.R., Master of the Rolls; Midland Railway.
M.R.A.S., Member of the Royal Academy of Science; Member of the Royal Asiatic Society.
M.R.C.P., Member of the Royal College of Physicians.
M.R.C.S., Member of the Royal College of Surgeons.
M.R.C.V.S., Member of the Royal College of Veterinary Surgeons.
M.R.G.S., Member of the Royal Geographical Society.
M.R.I., Member of the Royal Institution.
M.R.I.A., Member of the Royal Irish Academy.
M.R.S.L., Member of the Royal Society of Literature.
M.S., Master in Surgery; (L. *memoriæ sacrum*) sacred to the memory.
M.S.H., Master of Staghounds.
MS., Manuscript; plural, MSS.
M.S.S., Member of the Statistical Society.
Mus.B. (L. *Musicæ Baccalaureus*), Bachelor of Music (also *B.Mus.*).
Mus.D. (L. *Musicæ Doctor*), Doctor of Music (also *D.Mus.*).
M.V.O., Member of the Victorian Order.
M.W.G.M., Most Worthy Grand Master.

N.B., New Brunswick; (incorrectly) North Britain, *i.e.* Scotland; (L. *nota bene*) note well.
N.B.R., North British Railway.
N.C., North Carolina.
N.C.U., National Cyclists' Union.
N.D., no date.
N.Dak., North Dakota.
N.E., New England.
Neb., Nebraska.
nem. con. (L. *nemine contradicente*), no one contradicting.
nem. dis. (L. *nemine dissentiente*), no one dissenting.
N.E.R., North-Eastern Railway.
net (It. *netto*), lowest; price subject to no deduction whatever.
Nev., Nevada.
N.F., Newfoundland.
N.G., New Granada.
N.H., New Hampshire.
N.J., New Jersey.
N.L., North Latitude.
N.M., N. Mex., New Mexico.
N.O., New Orleans.
No. (L. *numero*), number.
non obst. (L. *non obstante*), notwithstanding.
non pros. (L. *non prosequitur*), he does not prosecute.
non seq. (L. *non sequitur*), it does not follow.
N.P., Notary-public; New Providence.
N.P.Ry., Northern Pacific Railway.

N.R.A., National Rifle Association.
N.S., New Style; Nova Scotia.
N.S.W., New South Wales.
N.T., New Testament.
N.U.T., National Union of Teachers.
N.W.P., North-West Passage.
N.W.T., North-West Territories.
N.Y., New York.
N.Y.C.&H.R.R.R., New York Central and Hudson River Railroad.
N.Y.,N.H.&H.R.R., New York, New Haven, and Hartford Railroad.
N.Z., New Zealand.
N.Z.C., New Zealand Cross.

O., Ohio.
o/a, on account of.
ob. (L. *obiit*), died.
O.E., Old English.
O.F., Oddfellows.
O.H.G., Old High German.
O.H.M.S., On His Majesty's Service.
Okla., Oklahoma, U.S.A.
O.M., old measurement; Order of Merit.
O.O.O., stand for the three anthems; *O sapientia, O radix, O Adonai*, sung in the Roman Catholic Church for nine days before Christmas.
O.P., Order of Preachers (Dominicans); out of print; Opposite Prompter.
Op. cit. (L. *opere citato*), in the work referred to.
Ore., Oreg., Oregon.
O.S., old style; out of stock; Ordinary Seaman.
O.S.B., Order of St. Benedict.
O.T., Old Testament.
Oxon. (L. *Oxoniensis*), of Oxford.
Oz., ounces.

P., Princeps (attached to the signature of the Prince of Wales); president.
Pa., Pennsylvania, U.S.A.
Pa.R.R., Pennsylvania Railroad.
P.A.S.I., Professional Associate of the Surveyors' Institution.
P.B. (L. *Philosophiæ Baccalaureus*), Bachelor of Philosophy (also *Ph.B.*).
P.C., Privy Council, Privy Councillor; Perpetual Curate; Police Constable.
p.c., post-card; per cent.
P.D. (L. *post diluvium*), after the flood; (L. *Philosophiæ Doctor*) Doctor of Philosophy (also *Ph.D.*).
P.E., Protestant Episcopal.
P.E.I., Prince Edward Island.
Penn., Pennsylvania.
per an. (L. *per annum*), yearly.
per cent. (L. *per centum*), by the hundred.
P.G.M., Past Grand Master.
Ph.B., see *P.B.*
Ph.D., see *P.D.*
pinx. (L. *pinxit*), he (or she) did it. (Put with the artist's name or initials on a painting.)
P.M. (L. *post meridiem*), after noon; Past Master; Postmaster.
P.M.G., Postmaster-General.
P.O., Post Office; postal order.
P.&O., Peninsular and Oriental.
P.O.O., Post Office Order.
Pop., population.
P.O.S.B., Post Office Savings Bank.
pp., pages.
P.P., Parish Priest; Parcels Post.
P.P.C. (Fr. *pour prendre congé*), to take leave.
P.P.S., Additional Postscript.
Pr., Prince, Priest.
P.R., Prize Ring.
P.R.A., President of the Royal Academy.
P.R.C. (L. *post Romam conditam*), after the building of Rome.
Preb., Prebend.
P.R.I.B.A., President of the Royal Institute of British Architects.
Prof., Professor.
pro tem. (L. *pro tempore*), for the time being.
prox. (L. *proximo*), in the next month.
P.R.S., President of the Royal Society.
P.R.S.A., President of the Royal Scottish Academy.
P.S. (L. *post scriptum*), postscript; Privy Seal.
Ps., Psalms.
P.T., Pupil Teacher.
P.T.C., Pupil Teachers' Centre.
P.T.O., please turn over.
Pub., Published, Publisher, Publication.
Pub. Doc., Public Documents.
P.W.D., Public Works Department.

Q., query or question.
Q.A.B., Queen Anne's Bounty.
Q.C., Queen's College; Queen's Counsel.
q.d. (L. *quasi dicat*), as if he should say.
q.e. (L. *quod est*), which is.
Q.E.D. (L. *quod erat demonstrandum*), which was to be demonstrated.
Q.E.F. (L. *quod erat faciendum*), which was to be done.
Q.E.I. (L. *quod erat inveniendum*), which was to be found out.
q.l. (L. *quantum libet*), as much as you please.
Q.M., Quartermaster.
Q.M.G., Quartermaster-General.
q.p. (L. *quantum placet*), as much as you please.
qr., quire.
Q.S., Quarter Sessions.
q.s. (L. *quantum sufficit*), enough.
qt., quart.
q.v. (L. *quod vide*), which see.
Q.V.C.S.F., Queen Victoria's Clergy Sustentation Fund.

R. (L. *Rex*), King; (L. *Regina*), Queen.
R., Réaumur (thermometer).
R.A., Royal Academy; Royal Academician; Rear-Admiral; Royal Arch; Royal Artillery.
R.A.M., Royal Academy of Music.
R.A.M.C., Royal Army Medical Corps.
R.A.S., Royal Asiatic Society; Royal Astronomical Society.
R.B., Rifle Brigade.
R.B.A., Royal Society of British Artists.
R.B.R.I., Royal British Radium Institute.
R.C., Roman Catholic.
R.C.P., Royal College of Physicians.
R.C.S., Royal College of Surgeons.
R.D., Rural Dean; Royal Dragoons; Rural District (Postal).
R.D.C., Rural District Council.
R.E., Royal Exchange; Royal Engineers.
Ref. Ch., Reformed Church.
Reg., Registrar; Regent.
Reg. Prof., Regius Professor.
Rep., Report; Representative; Republic.
R. of I., King and Emperor (of India).
Rev., Reverend.
R.F.A., Royal Field Artillery.
R.G.G., Royal Grenadier Guards.
R.G.R., Royal Garrison Regiment.
R.G.S., Royal Geographical Society.
R.H., Royal Highlanders (Black Watch).
R.H.A., Royal Horse Artillery; Royal Hibernian Academy.
R.H.S., Royal Horticultural Society; Royal Humane Society.
R.I., Rhode Island.
R.I.B.A., Royal Institute of British Architects.
R.I.C., Royal Irish Constabulary.
R.I.M., Royal Indian Marine.
R.I.P. (L. *Requiescat in pace*), may he rest in peace.
R.L.O., returned letter office (Postal).
R.M., Royal Mail; Royal Marines.
R.M.A., Royal Marine Artillery; Royal Military Asylum.

R.M.L.I., Royal Marine Light Infantry.
R.M.S., Royal Mail Steamer.
R.N., Royal Navy.
R.N.R., Royal Naval Reserve.
R.R.C., Royal Red Cross (for zeal and devotion in nursing sick and wounded soldiers and sailors).
Rs., Rupees.
R.S., Royal Society.
R.S.A., Royal Scottish Academy.
R.S.E., Royal Society of Edinburgh.
R.S.M., Royal School of Mines.
R.S.N.A., Royal Society of Northern Antiquities.
R.S.O., Railway Sub-office (for letters).
R.S.S. (L. *Regiæ Societatis Socius*), Member of the Royal Society.
R.S.V.P. (Fr. *Répondez s'il vous plaît*), please reply.
Rt. Hon., Right Honourable.
Rt. Rev., Right Reverend.
R.T.S., Religious Tract Society.
Rt. Wp., Right Worshipful.
R.U.I., Royal University, Ireland.
R.V., Revised Version; Rifle Volunteers.
R.W.D.G.M., Right Worshipful Deputy Grand Master.
R.W.G.M., Right Worshipful Grand Master.
R.W.G.R., Right Worthy Grand Representative.
R.W.G.S., Right Worthy Grand Secretary.
R.W.G.T., Right Worthy Grand Treasurer; Right Worthy Grand Templar.
R.W.G.W., Right Worshipful Grand Warden.
R.W.S., Royal Society of Painters in Water Colours.
R.W.S.G.W., Right Worshipful Senior Grand Warden.
R.Y.S., Royal Yacht Squadron.

S., Saint.
s., shilling.
S.A., South Africa; South America; South Australia.
Salop, Shropshire.
S.A.M.C., South American Missionary Society.
S.A.R., Sons of the American Revolution.
Sarum, Salisbury.
S.B.A., Society of Biblical Archæology.
S.C., South Carolina; (L. *Senatus Consultum*) a decree of the Senate.
sc. (L. *sculpsit*), he engraved it.
sc. (L. *scilicet*), that is to say.
Sc.B. (L. *Scientiæ Baccalaureus*), Bachelor of Science (also *B.Sc.*).
Sc.D. (L. *Scientiæ Doctor*), Doctor of Science (also *D.Sc.*).
scr., scruple.
S.Dak., South Dakota.
S.D.F., Social Democratic Federation.
S.D.U.K., Society for the Diffusion of Useful Knowledge.
Sec., Secretary.
Sec. Leg., Secretary of Legation.
Sen., Senate, Senator.
seq. (L. *sequentia*), the following.
S.E.C.R., South-Eastern and Chatham Railway.
s.f. (L. *sub fine*), towards the end.
S.F.T.C.D., Senior Fellow of Trinity College, Dublin.
S.G., Solicitor-General.
s. in. (L. *sub initio*), towards the beginning.
S.J., Society of Jesus (Jesuits).
Skr., Sanskrit.
S.L., Solicitor at Law.
S.M., Sergeant-Major.
Sm. Caps., Small Capitals.
S.O., Sub-office (Postal).
Sp., Spain, Spanish.
s.p. (L. *sine prole*), without offspring.
S.P.C.A., Society for the Prevention of Cruelty to Animals.
S.P.C.C., Society for the Prevention of Cruelty to Children.
S.P.C.K., Society for the Promotion of Christian Knowledge.
S.P.Co., Southern Pacific Company.
S.P.G., Society for the Propagation of the Gospel.
S.P.Q.R. (L. *Senatus Populusque Romanus*), the Roman Senate and People.
sq. (L. *sequens*), the following.
sq., square—sq. ft., square foot, etc., etc.
S.R.C., Students' Representative Council.
S.R.S. (L. *Societatis Regiæ Socius*), Member of the Royal Society.
SS., Saints; Steamship.
S.S., Sunday School.
S.S.C., Solicitor before the Supreme Courts (Scotland).
St., Saint.
S.T.D. (L. *Sacræ Theologiæ Doctor*), Doctor of Theology.
S.T.P. (L. *Sacræ Theologiæ Professor*), Professor of Theology.
sub., substitute.
suff., suffix.
Supt., Superintendent.
sup. (L. *supra*), above.
Sur. Gen., Surgeon-General.
Surv. Gen., Surveyor-General.
s.v. (L. *sub voce*), under the word or heading.
S.W., South Wales; Senior Warden.
Sw., Sweden, Swedish.
Swit., Switzerland.
Syn., Synonym, Synonymous.

T.C.D., Trinity College, Dublin.
temp. (L. *tempore*), in the time of (musical).
Tenn., Tennessee.
Teut., Teutonic.
Tex., Texas.
T.M.O., Telegraph Money Order (Postal).
T.O., turn over; telegraph-office.
tonn., tonnage.
Tr., Translator, Translation.
tr., transpose (used in correcting printers' proofs); treasurer; trustee.
T.R.H., Their Royal Highnesses.
T.T.L., to take leave.
Typo., Typographer.

U.C. (L. *urbis conditæ*), from the building of the city of Rome.
U.D.C., Urban District Council.
U.F.C., United Free Church.
U.K., United Kingdom.
U.K.A., Ulster King-at-Arms.
ult. (L. *ultimo*), in the last month.
Unit., Unitarian.
Up., Upper.
U.P., United Presbyterian; under proof.
U.P.R.R., Union Pacific Railroad.
U.S., United States; (L. *ut supra*), as above.
U.S.A., United States of America; United States Army.
U.S.M., United States Mail.
U.S.N., United States Navy.
U.S.S., United States Senate; United States Ship.
Ut., Utah.

V., Victoria; (L. *versus*) against; (L. *vide*) see.
V.A., Vicar-Apostolic; Vice-Admiral; Royal Order of Victoria and Albert.
Va., Virginia.
Vat., Vatican.
V.C., Vice-Chancellor; Victoria Cross.
V.D., Volunteer Decoration.
V.D.L., Van Diemen's Land.
V.D.M. (L. *Verbi Dei Minister*), Minister of the Word of God.
Ven., Venerable.
Vet., Veterinary.
V.G., Vicar-General.
v.g. (L. *verbi gratia*), for example.
V.I., Vancouver Island.
Vis., Viscount.
viz. (L. *videlicet*), namely.
vol., volume.

V.P., Vice-President; (L. *vita patris*) in his father's lifetime.
V.R. (L. *Victoria Regina*), Queen Victoria.
V.S., Veterinary Surgeon.
Vt., Vermont.

W., Wales, Welsh.
Wash., Washington.
W.C.L.,, White Cross League.
W.C.R., Waterloo and City Railway.
W.C.T.U., Women's Christian Temperance Union.
w.f., wrong fount (used in correcting printers' proofs).
W.I., West Indies.
Wis., Wisconsin, U.S.A.
W. Lon., West Longitude.
W.M., Worshipful Master.
W.O., War Office.
W.S., Writer to the Signet.
W.S.P.U., Women's Social and Political Union.
wt., weight.
W.Va., West Virginia.
Wyo., Wyoming, U.S.A.

X, Christ (the X is the same as the Greek letter Chi, the first letter of Christ's name).
Xmas, Christmas.
Xn., Christian.

Y.M.C.A., Young Men's Christian Association.
Y.W.C.A., Young Women's Christian Association.

Zoo, Zoological Gardens.
Z.S., Zoological Society.

ABBREVIATORS, those who drew up papal writs before they were formally copied out.

ABDAHRAHMAN, Moorish gov. in Spain; defeated by Charles Martel, 732.

ABDALLAH (545–70), f. of Muhammad.

ABDALLATIF (1162–1231), Eastern traveller; MS. of his *Account of Egypt* in Bodleian.

ABDALS, Muslim fanatics in Persia.

ABD-AR-RAHMAN, five Omayyad princes of Cordova: A. I. (756–88), founded Omayyad dynasty in Spain. A. II. (822–52), weak ruler. A. III. (912–61), attained caliphate. A. IV., caliph in 1017; murdered. A. V., caliph, 1023–24; murdered.

ABD-EL-AZIZ IV. (1880–), ex-Sultan of Morocco. See MOROCCO.

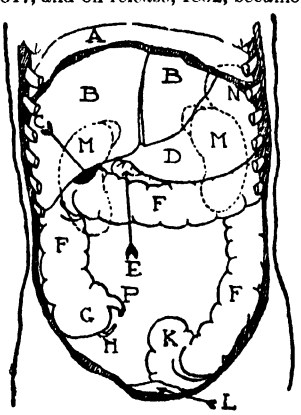
ABD-EL-KADER (1807–83), Amir of Mascara; for fifteen years opposed the conquest of Algeria by France, surrendered 1847, and on release, 1852, became friend of France.

ABDERA.—(1) Old seaport, S. Spain; Carthaginian trading centre. (2) Ruined town, Thracian coast.

ABDIAS, Gk. form of Obadiah (*q.v.*).

ABDICATION, voluntary surrender of an office of trust; particularly of kings or heads of States. Important a's of later times are — James II., 1688, Napoleon I., 1814 and 1815, Louis Philippe, 1848, Milan of Servia, 1889.

ABDOMEN, the part of the trunk of the human body below the diaphragm (which divides the cavity of the trunk into the abdominal cavity and the thoracic cavity); further divided into the a. proper above and the pelvis below, the former containing the stomach, small and large intestine, liver, pancreas, spleen, and kidneys, and the latter the lower part of the large intestine, the urinary bladder, and the internal genital organs. Internally the a. is lined with a serous membrane called the peritoneum, which covers the free surfaces of the abdominal organs and holds the intestine in place by means of a fold called the mesentery, while another fold, the great omentum, covers like an apron the front of the greater part of the abdominal contents. Owing to the modern advances of medicine, and chiefly to the introduction of anæsthetics and antiseptic and aseptic surgery, opening the a. for the relief of disease is an everyday procedure, and one which, with due care, involves very little risk; and, as an aid to diagnosis in obscure cases, opening the a. by incision for the purpose of examining its contents is by no means unusual.



ABDOMEN, WITH FRONT ABDOMINAL WALL (INCLUDING THE RIBS) AND THE SMALL INTESTINES REMOVED. *A*, diaphragm; *B*, liver; *C*, gall-bladder; *D*, stomach; *E*, pancreas; *F*, *F*, *F*, large intestine; *G*, cæcum; *H*, appendix; *K*, rectum; *L*, bladder; *M*, *M*, kidneys (behind); *N*, spleen (behind); *P*, junction of small with large intestine.

ABDUCTION is the act of any person who unlawfully takes, or causes to be taken, any unmarried girl under the age of sixteen years out of the possession, and against the will, of her parents or guardians; liable to two years' imprisonment, whether the girl consents or not, and whether the person charged believed her to be over the age of sixteen.

ABDUCTOR MUSCLES, those which pull away or aside.

ABD-UL-AZIZ (1830–76), Sultan of Turkey; s. of Mahmud II.; succ. his bro. Abd-ul-Mejid in 1861; assassinated.

ABD-UL-HAMID I. (1725–88), Sultan of Turkey; s. of Ahmed III.; succ. bro., Mustafa III., in 1773.

ABD-UL-HAMID II. (1842–), ex-Sultan of Turkey; succ. to throne (1876) on deposition of his bro. Murad V. His reign opened with a prospect of constitutional reforms which was not fulfilled. He was deposed April 27, 1909, in favour of a younger bro. Reshid Effendi (Muhammad V.).

ABDUL-KADIR (1078–1166), Muhammadan author, revered as saint.

ABDULLAH-EL-TEISHA-ES-SAYYID (1830–99), Sudanese 'Khalifa'; succ. Mahdi, 1885; defeated at *Omdurman*, 1898; fell in battle.

ABD-UL-MEJID (1823–61), Sultan of Turkey; succ. f., Mahmud II., 1839; concluded peace with Mehemit Ali, 1841; Crimean War undertaken by England and France in his defence.

ABDUR-RAHMAN KHAN, Amir of Afghanistan (1844–1901); noted for political sagacity; improved social conditions of country, and, by grasp of affairs, materially increased its power. His rule consisted of a military despotism, and he succeeded in imposing an organised form of government upon a most unruly people; succ. by c. s., Habibullah.

ABECEDARIAN, a beginner; contemptuous name for an Anabaptist sect; a. psalms, those subdivided under letters of alphabet (*e.g.* cxix.).

A BECKETT, ARTHUR WILLIAM (1844–1909), Eng. journalist, author, and war correspondent.

A BECKETT, GILBERT ABBOTT (1811–56), f. of preceding; Eng. comic writer and journalist; author of the *Comic Blackstone*.

A BECKET, THOMAS, incorrect version of Thomas Beckett. See BECKET, THOMAS.

ABEL (Hebrew 'breath'), second s. of Adam; killed by bro. Cain; perhaps originally South Judæan demigod.

ABEL, SIR FREDERICK AUGUSTUS, Bart. (1827–1902), Eng. chemist, famous for researches in explosives; invented new method of manufacturing gun-cotton and cordite (jointly with Prof. J. Dewar); carried out researches with Sir A. Noble on explosion of black powder; invented apparatus for determination of flashpoint of petroleum; chemist to War Department; pres. Institution of Electrical Engineers, 1877; first director of the Imperial Institute, 1887.

ABEL, NIELS HENRIK (1802–28), Nor. mathematician of exceptional ability and promise, known for researches in theory of functions.

ABEL, THOMAS, ABELL (d. 1540), Eng. priest; supporter of Katharine of Aragon; denied royal supremacy and was executed.

ABÉLARD, PIERRE (1079–1142), Fr. scholar and theologian; in early manhood became canon of Notre Dame, Paris, in which city he achieved great success as teacher and lecturer. He was made tutor to Héloïse, niece of Canon Fulbert, and an affection sprang up between them. They were afterwards separated, and an act of violence was committed upon A. at the instance of Fulbert. Subsequently A. became a monk, and Héloïse took the veil. In his later years A. resumed teaching at the Paraclete hermitage, where he was buried, and Héloïse was afterwards laid in the same tomb. The remains of the lovers were, in 1817, removed to Père Lachaise, Paris.

ABELIN, JOHANN PHILIPP (d. *c.* 1636), Ger. historian.

ABELITES, religious sect, time of St. Augustine; married but continent.

ABELLI (1603–91), Dominican confessor of Catherine de Medici.

ABELMOSK, West Indian evergreen with musky seeds.

ABENCERRAGES, rival faction to the Zegris during XV. cent. Moorish rule in Granada.

ABENDANA, two Jewish theologians—(1) JACOB (1630–95), rabbi of Span. Jews in London; (2) ISAAC (*c.* 1650–1710), taught Hebrew at Cambridge and Oxford.

ABENDBERG (46° 40′ N., 7° 50′ E.), town, Switzerland.

ABENEZRA, IBN EZRA (1090–1168), Jewish man of letters and Scriptural commentator; b. Toledo; a great traveller.

ABENSBERG (48° 45′ N., 11° 50′ E.), town, Bavaria; sulphur baths.

ABEOKUTA (7° 8′ N., 3° 25′ E.), town, Brit. W. Africa, capital of Egba, Southern Nigeria protectorate; trades in rubber, etc. Pop. *c.* 60,000.

ABERAERON (52° 15′ N., 4° 16′ W.), seaport, Cardiganshire, Wales.

ABERAVON (51° 36′ N., 3° 47′ W.), town, Glamorganshire, Wales; municipal borough; engineering, tin, copper, and steel works. Pop. 10,506.

ABERBROTHOCK or **ARBROATH,** see latter.

ABERCARN (51° 40′ N., 3° 10′ W.), town, Monmouthshire, England. Pop. 16,445.

ABERCORN (9° S., 31° 40′ E.), trading station, N.E. Rhodesia.

ABERCORN, JAMES HAMILTON, 1st Earl of (*c.* 1575–1618), promoted Union of Eng. and Scot. Crowns.

ABERCROMBIE, JAMES, Brit. gen., defeated by Montcalm in Canada, 1758.

ABERCROMBIE, JOHN (1780–1844), Scot. physician and writer upon medical and philosophical subjects.

ABERCROMBY, DAVID (XVII. cent.), Scot. physician and philosopher, author of works well known in his time, some having been translated into French.

ABERCROMBY, PATRICK (1656 to *c.* 1720), Scot. physician and historian; studied at St. Andrews and Paris; sometime physician to James II.; engaged in controversy with Defoe; author of *Martial Achievements of the Scots Nation* and other works.

ABERCROMBY, SIR RALPH (1734–1801), Brit. General; e. s. of George A., of Tullibody; commander-in-chief in West Indies (1795); fatally wounded at Alexandria (1801); held in universal respect for bravery and uprightness.

ABERDARE (51° 43′ N., 3° 26′ W.), town, Glamorgan, Wales; principal industry, coal trade; iron trade has decreased since 1875; tinworks, brickworks, breweries. Pop. (1911) 50,844.

ABERDARE, HENRY AUSTIN BRUCE, 1st Baron (1815–95), Eng. statesman; Home Sec., 1869; Pres. of Council, 1873.

ABERDARON, parish, Carnarvonshire, Wales. Pop. 3371.

ABERDEEN (59° 9′ N., 2° 6′ W.), seaport, royal, parliamentary, and municipal burgh, Scotland. Town built chiefly of grey granite (the 'Granite City'); consists of Old and New A.; Univ. (1494), including Marischal and King's Colleges (united, 1860); R.C. Cathedral, many churches; market cross, original structure dating from 1682, rebuilt 1842; numerous public buildings and hospitals; three parks, four bridges over Dee; chief northern seaport of Scotland; industries include granite-quarrying, deep-sea fisheries, textile paper and jute manufactures, flax-spinning, brewing, distilling, jam manufacture; returns two members. A. obtained charter from William the Lion, 1179, in confirmation of David I.'s grant of corporate rights; burned by Edward III., 1336; rebuilt and enlarged; well fortified; looted by both Royalists and Covenanters; Old Pretender declared king here, 1715. Pop. (1911) 163,084.

W. Robbie, *Aberdeen: its Traditions and History.*

ABERDEEN.—(1) (47° N., 123° 57′ W.), city, Wash., U.S.A. Pop. (1910) 13,660. (2) (45° 26 N., 98° 50′ W.), city, S. Dakota, U.S.A. Pop. (1910) 10,753.

ABERDEEN (32° 30′ S., 24° 3′ E.), district and town, S. Africa. Pop. 9500 (4800 white).

ABERDEEN, GEORGE GORDON, 1st Earl of (1637–1720), Lord Chancellor of Scotland; s. of Sir John Gordon, of Haddo, Aberdeenshire.

ABERDEEN, GEORGE HAMILTON GORDON, 4th Earl of (1784–1860), statesman; e. s. of George Gordon, Lord Haddo; b. Edinburgh; held offices of Foreign Sec. and Colonial Sec., and in 1852 became Prime Minister; a distinguished scholar, possessed an extensive knowledge of lit. and art; in politics noted for his generosity to opponents.

ABERDEEN, JOHN CAMPBELL GORDON, 7th Earl of (1847–), grandson of 4th Earl; succ. 1870; ed. St. Andrews and Oxford; Lord-Lieut. of Ireland, and P.C., 1886; Gov.-Gen. of Canada, 1893–98; again app. Lord-Lieut. of Ireland, 1905; friend of Gladstone's. His wife, ISHBEL MARIA (1857–), dau. of Lord Tweedmouth, is an energetic social worker.

ABERDEENSHIRE (57° 18′ N., 2° 33′ W.), N.E. county, Scotland; area, 1971 sq. miles; has five districts —Mar, Formartine, Buchan, Garioch, Strathbogie; includes several branches of Grampians, among chief peaks being Ben Macdhui, Cairntoul, Lochnagar; principal rivers, Dee and Don, noted for salmon; largest lake, Loch Minch. Peterhead, Fraserburgh, Pannanich have chalybeate springs; geological formation, mainly crystalline schists; grouse, partridges, red deer abundant; has ash, fir, larch trees. Agriculture most important industry; oats and barley grown; cattle fattened. Many coast villages engaged in fishing. Other industries include granite quarrying, brickmaking, brewing, distilling. A. sends two representatives to Parliament, besides two for Aberdeen town. Original inhabitants Picts; after Norman Conquest Malcolm Canmore defeated Celts here; temporarily Bruce's headquarters; feuds carried on by great families for many years; was long episcopal stronghold; scene of various engagements between Cavaliers and Covenanters, and of Jacobite risings of 1715 and 1745. Pop. (1911) 311,350.

Watt, *History of Aberdeen and Banff* (1900).

ABERDOUR (56° 3′ N., 3° 17′ W.), Fife village, Scotland; excellent bathing. Pop. 2000.

ABERDOVEY (52° 33′ N., 4° 4′ W.), village, Merionethshire, Wales; health resort.

ABERFELDY (56° 37′ N., 3° 52′ W.), village, Perthshire, Scotland. Pop. 1592.

ABERFOYLE (56° 20′ N., 4° 21′ W.), village, Perthshire, Scotland; pop. 1147.

ABERGAVENNY (51° 49′ N., 3° W.), town, Monmouthshire, England; was Rom. fort, *Gobannium*

nium; often involved in Border struggles, XII.–XIII. cent's; had Benedictine priory. Pop. (1911) 8511.

ABERGELE (53° 20′ N., 3° 35′ W.), watering-place, Denbighshire, Wales. Pop. 2121.

ABERNETHY (56° 19′ N., 3° 18′ W.), village and parish, Perth, Scotland; Pictish royal residence.

ABERNETHY, JOHN (1764–1831), Eng. surgeon; assistant-surgeon at St. Bartholomew's Hospital, London, and founder of the medical school; known for his treatment of aneurism.

ABERRANCY (geom.), curve's deviation from its characteristic curvature.

ABERRATION, deviation of mind from the normal; of light, see LIGHT.

ABERYSTWITH (52° 25′ N., 4° 5′ W.), seaport, Cardiganshire; popular seaside resort; educational centre; has Univ. Coll. of Wales. Pop. (1911) 8412.

ABESHR (14° 8′ N., 21° 2° E.), capital, Wadai, Fr. Equatorial Africa.

ABEYANCE, a state of suspension; a law term meaning that a freehold, or dignity, is not vested in a person, but is in suspension until the real owner establishes his claim.

ABGAR, title borne by a line of kings whose capital was Edessa (Mesopotamia). A. XIV., it is said, corresponded with Jesus.

ABHIDHAMMA, one of traditional baskets in which the Buddhist Scriptures are divided.

ABIATHAR, s. of Ahimelech; helped king David (1 *Sam.* 22^{20}, $23^{6,9}$; 2 *Sam.* 15^{24}, 20^{25}); confused with Ahimelech (*Mark* 2^{26}).

ABICH, WILHELM HERMANN VON (1806–86), Ger. geologist; prof. at Dorpat; retired to Vienna; authority on geol. and min. of Russia; undertook researches on volcanic products.

ABIES, see FIR.

ABIGAIL, wife of king David (1 *Sam.*); in Elizabethan times and later colloquial name for waiting-woman.

ABILENE (32° 25′ N., 99° 36′ W.), town, Texas, U.S.A.; flour-mills.

ABIMELECH, Philistine king; took Sarah into his harem, Abraham having represented her as his sister, not his wife. She was restored in response to a divine command given in a dream.

ABINGDON (51° 40′ N., 1° 15′ W.), town, municipal borough, parliamentary division, Berkshire; ruins of Benedictine abbey. Pop. (1911) 6810.

ABINGER, JAMES SCARLETT, 1st Baron (1769–1844), Eng. judge; b. Jamaica; Attorney-General under Canning and Wellington (1827–35).

ABIOGENESIS, spontaneous generation; the origination of living animals and plants from non-living matter, has been more and more discredited by modern biological research and finally disproved by Pasteur's experiments on sterilisation. This, of course, does not bear on the question whether protoplasm may be created from inorganic matter.

ABIPONES, extinct S. Amer. Ind. tribe; inhabited La Plata region.

ABKHASIA (43° N., 41° E.), district, Russ. Caucasia; produces wheat, fruits. Pop. 43,000.

ABLATION (med.), operative removal of a diseased part; (geol.), wearing away, especially of a glacier.

ABLAUT, or '*vowel gradation*,' is the modification of the root vowel in same word to mark change of meaning; best illustrated in 'strong' *verbs*, *e.g.* *sing*, *sang*, *sung*.

ABLEGATE, temporary legate (*q.v.*).

ABLUTION, an act of cleansing; a religious ceremonial symbolising the purification of the spirit. In the R.C. Church the term refers to the washing of the chalice and the priest's hands after COMMUNION.

ABNAKI, tribe of N. Amer. Indians.

ABNER, Old Testament character; defended Ishbaal, Saul's s., against David; killed at Hebron.

ABNEY, SIR WILLIAM DE WIVELESLIE (1844–), Eng. astronomer and physicist.

ABNORMAL (law), of persons such as minors, insane, illegitimate, differentiated by some abnormality. See also PSYCHOLOGY.

ABO (60° 28′ N., 22° 15′ E.), seaport, Finland; chief town, government of A.-Björneberg; Treaty of A. (1734) gave Russia S. Finland. Pop. *c.* 43,000.

ABO (5° 30′ N., 6° 30′ E.), town on Niger, W. Africa.

ABOLITIONISTS, those who, before Amer. Civil War, urged immediate abolition, *i.e.*, of slavery (*q.v.*), as opposed to those who favoured legal (and hence slower) procedure.

ABOLLA, a Rom. cloak.

ABOMA, serpents of S. American boa type.

ABOMASUM, the fourth or digesting 'rennet'; stomach of ruminants.

ABOMEY (7° 25′ N., 2° E.), capital, Dahomey, W. Africa. Pop. *c.* 15,000.

ABONDANCE (46° 25′ N., 6° 40′ E.), town, Haute Savoie, France; cheese. Pop. *c.* 1500.

ABONY (47° 10′ N., 20° E.), market town, Pest, Hungary.

ABORIGINES, legendary people of Latium; name applied to original inhabitants of any country.

ABORS, frontier hill tribe of N.E. India; twice subject of punitive expeditions.

ABORTION, premature expulsion of the human fœtus from the uterus or womb; the term is applied in medicine to such an expulsion before the sixth month of intra-uterine life, 'premature labour' being the term applied to later expulsion; popularly 'miscarriage' is the name given to accidental premature expulsion, a. being confined to expulsion induced for medical reasons or performed criminally. With the advance of obstetrical science a. and inducement of premature labour are being abandoned to a great extent as medical procedures. Criminal a., or attempt to procure criminal a., is a felony punishable in Britain by penal servitude or imprisonment.

ABOUKIR (31° 18′ N., 30° 5′ E.), small town, Egypt; Nelson destroyed Fr. fleet in A. Bay, 1798; Bonaparte defeated Turks, 1799; captured by Sir Ralph Abercromby, 1801.

ABOUT, EDMOND (1828–85), Fr. novelist and journalist; b. Dienze (Lorraine); correspondent of the *Soir* during Franco-Ger. War; member Fr. Academy (1884); fame rests chiefly upon his novels.

ABRA (17° 30′ N., 120° 30′ E.), mountainous province, Luzon, Philippine Islands.

ABRABANEL=Abarbanel (*q.v.*).

ABRACADABRA, word much used as spell by early necromancers; now term of contempt, rubbish.

ABRAHAM, the patriarch and ancestor of the Jews, according to tradition was originally called Abram. The stories of A. in *Genesis* are found in J, E, and P, the component documents of the Hexateuch, and are not always consistent (*e.g.* the age of Ishmael). Modern criticism has left it very doubtful to what extent these narratives can claim to be hist.; A. may have been a real person, or a traditional ancestor. It is quite probable that the Israelites as a tribe came from Haran as A. is represented as doing, and before that from Ur in Babylonia, but the detailed historicity of the narrative is quite unproven.

Driver, *Genesis*; Carpenter and Harford Battersby, *The Hexateuch*.

'ABRAHAM'S BOSOM,' denotes Paradise; at ancient feasts each guest reclined with his head on his neighbour's breast, hence application of term.

ABRAHAM A SANCTA CLARA (1644–1709), Austrian monk; court preacher in Vienna, 1669; denounced all classes.

ABRAHAM, PLAINS OR HEIGHTS OF (46° 46′ N., 71° 10′ W.), beside Quebec, above St. Lawrence; where Wolfe defeated Montcalm, 1759; now public park.

ABRAHAMITES, XVIII. cent., Bohemian deists.

ABRAHAM-MEN, lunatics allowed out of restraint to beg; impostors who pretended lunacy.

ABRANTES (39° 29′ N., 8° 11′ W.), town, Portugal, taken by Junot (later Duc d'A.), 1807. Pop. 6000.

ABRASION (med.), superficial excoriation; (geol.), wearing of rocks by moving ice; (commercial), of coin, loss in weight due to wear and tear of circulation.

ABRAUM SALTS, deposit of potassium, sodium, and magnesium salts above the rock salt of Stassfurt (Prussia).

ABRAXAS, mystical numbers on ancient charms.

ABRIDGMENT, a short, condensed version of a book, case, play, etc.; an epitome.

ABROGATION, act of repealing a law.

ABRUZZI, DUKE OF THE (1873–), Ital. Royal Prince, explorer, and scientist.

ABRUZZI E MOLISE (42° N., 14° E.), mountainous provinces, Italy, including Teramo, Aquila, Chieti, Campobasso; largely pastoral; many inhabitants emigrate. Pop. (1911) 1,428,000.

ABSALOM, 3rd and favourite s. of David, k. of Israel; famed for handsome looks; caught by long hair in branches of tree, and killed by Joab.

'ABSALOM AND ACHITOPHEL,' allegorical satire of Dryden's (1681), in which the Duke of Monmouth, natural s. of Charles II., figures as Absalom, Shaftesbury as Achitophel, and the king as David.

ABSALON, AXEL (1128–1201), abp. of Lund (Denmark); chief counsellor of Valdemar I.; founded town, now Copenhagen.

ABSAROKAS, CROWS, Sioux Indian tribe.

ABSCESS, a localised collection of necrosed and liquefied material in the tissues of the body, due to bacterial infection and inflammation; wherever possible it should at once be opened and the contents allowed to escape, and then healing will ensue.

ABSCISSA.—When a point is referred to two intersecting axes, one of them called the axis of **X** and the other the axis of **Y**, the *abscissa* of the point is the distance cut off from the axis of **X** by a line drawn through it and parallel to the axis of **Y**.

ABSENTEEISM, term applied to landed proprietors who derive their income from one country, and spend it in another, in which they live; long prevalent in Ireland.

ABSINTHE, alcoholic liqueur flavoured with wormwood and other herbs; use forbidden in Fr. army and navy, and all traffic in it against Belgian law. See SPIRITS.

ABSOLUTE, condition which is unrestricted, unlimited, or complete; also free from mixture. In logic, that which is independent of reference to something else.

ABSOLUTE TEMPERATURE, see THERMOMETERS.

ABSOLUTE VELOCITY, see VELOCITY.

ABSOLUTION, term used in ecclesiastical law for 'acquittal' from either guilt of sin or penalty of it; generally granted after confession.

ABSOLUTISM, metaphysical doctrine of non-relative existence, possible to be known.

ABSOLVITOR (Scots law), acquittal of defendant.

ABSORBENTS, substances, such as chalk, which absorb (strictly *neutralise*) acids, or absorb discharges; vessels which absorb and convey fluid within the organism, such as lymphatics. See LYMPHATIC SYSTEM.

ABSORPTION, the transformation of light into another form of energy, such as heat, when passing through a medium. A body which absorbs all the incident radiations is called black, as lamp-black or platinum black. See LIGHT.

ABSTEMII, Calvinistic sect who objected to use of fermented wine in Eucharist.

ABSTINENCE, practice of refraining from various forms of self-indulgence, especially of food and drink. See TEMPERANCE.

ABSTRACT OF TITLE, legal document epitomising a purchaser's rights in real property.

ABSTRACTION, a mental operation in which an idea is stripped of its concrete circumstances so that it may be considered alone.

ABSURDUM, REDUCTIO AD, indirect method of proving a proposition by showing that, were it not true, the consequence would be absurd; or of disproving a proposition by showing that, if true, the conclusion would be ridiculous.

ABT, FRANZ (1819–85), Ger. composer of song music.

ABTHAIN, ABTHANE (Scotch), abbacy.

ABU, prefix in Arab. proper names, denoting a 'father' or 'owner.'

ABU, MOUNT, peak of Aravalli range in Rajputana, India; health station; fine temples.

ABU HAMMED (19° 28′ N., 33° 13′ E.), Sudanese town, on Nile.

ABU KLEA (17° 10′ N., 33° 20′ E.), town, Sudan.

ABŪ NUWÂS, Arab. poet of age of Harūn er-Rashid (*q.v.*).

ABU SIMBEL, IPSAMBUL, name of group of three rock-hewn temples constructed by Rameses II. (*c.* 1250 B.C.), on bank of Nile, in Nubia; principal one discovered by Burckhardt (1812), opened by Belzoni (1817).

ABU 'UBAIDA, distinguished Arab. scholar during rule of Harūn er-Rashid.

ABU ZEID, town on White Nile, Egypt.

ABU-BEKR ('Father of the Virgin') (573–634), 1st Muhammadan Caliph; the name is derived from the marriage of his youthful daughter Ayesha with Muhammad.

ABUL ATA EL MA'ARRI (973–1057), Arab. poet and philosopher; blind from childhood.

ABULFARAJ, called BARHEBRÆUS (b. 1226), bp. of Aleppo; wrote Syriac history of the world and Bible commentary.

ABUL-FARAJ (897–967), Arab. poet and antiquary.

ABUL-FAZEL (1551–1602), historiographer to Akbar, Mogul emperor; assassinated.

ABUL-FEDA (1273–1331), Arab. historian and geographer; fought against Crusaders.

ABULIA, loss of will power; symptom of insanity.

ABU-L-QASIM, ABULCASIS (*c.* 950 A.D.), Arab. physician, flourished at Cordova; author of once famous works on med. and surgery.

ABULUG (18° 15′ N., 121° 20′ E.), town, Luzon, Philippine Islands; tobacco, rice.

ABUNDANTIA (classical myth), Latin female personification of abundance.

ABURI (5° 42′ N., 0° 15′ W.), town, Brit. Protectorate, Gold Coast.

ABUSE, misuse, ill-treat, revile, violate; self-a., masturbation; a. of process, malicious unreasonable legal proceedings of frivolous and vexatious nature, which Court may stop in self-defence.

ABU-THALEB, Muhammad's uncle and protector against the Koreish plots.

ABU-THUBI (24° 32′ N., 51° 50′ E.), coast town of Oman, Persian Gulf.

ABU-TIG (27° 2′ N., 31° 23′ E.), town, Nile, Egypt.

ABUTILON, large genus of tropical shrubby plants, order *Malvaceæ*, cultivated in greenhouses as Ind. mallows.

ABUTMENT, in arch., part of arch, pier, etc., which bears pressure.

ABYDOS (40° 7′ N., 26° 28′ E.), ancient town, Asia Minor; on Hellespont; where Xerxes crossed into Europe by bridge of boats, 480 B.C.; home of Leander, whose story Byron tells in 'Bride of A.'

ABYDOS (26° 10′ N., 31° 55′ E.), town, Upper Egypt; founded by pre-Menite kings; temples, forts, tombs built from 1st to 30th dynasty, 5500–500 B.C.; declined from Ptolemaic period; ruins of Seti I.'s Great Temple, tombs, and forts still remain; place sacred to Osiris, whose cult began here in 12th dynasty.

ABYSSAL ANIMALS, carnivorous animals living near bed of deep ocean, with distensible throat and stomach, large gills, and feelers or phosphorescent organs to suit their habitat; many discovered and described by *Challenger* expedition.

ABYSSINIA (10° N., 40° E.), empire in N.E. Africa; bounded N.E. by Erithrea and Fr. and Brit.

Somaliland, E. and S.E. by Somaliland, S. by Brit. E. Africa, and W. by the Sudan; includes the provinces Tigré, Amhara, Gojam, Shoa, and Harrar. It forms part of the great African plateau, and has an average height of some 8000 ft., falling abruptly towards the Red Sea, and more gradually towards the Nile. The whole surface is cut up by deep gorges (sometimes 4000 ft. deep), and in the N.W. the Samen mountains, also steep and bare rock, reach a height of 15,000 ft. The drainage is carried off mostly by the Blue Nile and Atbara, and the former takes its rise in Lake Tsana (60 by 20 miles). The lower portions of the country up to 5000 ft. (known as Kolla) have a tropical climate, but the district known as the Woina Dega, from 5000 to 8000 ft., has a warm temperate climate. This is the chief seat of population, and the pastures support large herds of cattle. The higher region, the Dega, has horses and long-woolled sheep. The rainy season is from April to Sept. There are practically no roads, and goods are mostly carried by mules, horses, donkeys, and camels. A railway has been constructed from Jibuti, or Jibutil, in Fr. Somaliland, to Dire Dawa (240 miles) in E. A. The official capital, at Adis Abbeba near the centre of the western part of the country, is changed from time to time as the supplies of firewood in the neighbourhood become exhausted.

History.—Ancient Ethiopia embraced part of A., and Sheba is supposed to have been an Abyssinian queen from whose s. by Solomon the kings of A. claim descent. The Axumite dynasty, which ruled from the I. to the X. cent., was strong enough in the VI. cent. to conquer Yemen in Arabia; but in the following cent. the Abyssinians were expelled from Arabia. A. was discovered in the XV. cent. by the Portuguese, who helped them to rout the Muhammadans in 1543. The Royal family, early in the XVII. cent., became Roman Catholics; but in 1633 the king was forced to resign, and his son expelled the alien priests. Fierce and protracted struggles between the chiefs (*ras*) of the various provinces occupied the XVIII. and part of the XIX. cent.; but in 1853 Kassa defeated his father-in-law, Ras Ali, ruler of Amhara and virtual emperor, and proclaimed himself 'king of kings' of Ethiopia as Theodore III. The Brit. Consul and his suite were thrown into prison at Magdala in 1864, and after abortive negotiations to obtain their release Sir R. Napier stormed that fortress in 1868 when Theodore was found to have committed suicide within. Kassai of Tigré now proclaimed himself 'king of kings' and was crowned in 1872 as Johannes II. Italy had established a colony at Assab in 1882, and the Abyssinians looked with suspicion on the extension of the foreign settlement. In 1887 the Abyssinians attacked and almost destroyed a small Ital. force at *Dogali*. A year later a force of 20,000 men engaged the Abyssinians, but both sides retired. In 1889 Johannes was killed in an engagement with the dervishes, and Menelek of Shoa became emperor. Peace with Italy was kept for some years, but in 1896 Menelek completely overcame a large Ital. force at *Adowa*, and Italy subsequently recognised the complete independence of A. Gt. Britain, France, and Italy in 1906 undertook to preserve the integrity of A.

The dominant race in A. and the official language are of Semitic origin, but there are also Hamitic Gallas and Somalis, negroes and Jewish Falashas, and a few Europeans. The Abyssinians are deep brown in colour, well-formed and handsome, intelligent and fond of gaiety. They eat and drink heavily. Marriage is easily dissoluble and polygamy common. Abyssinian houses are rough circular stone huts, thatched with grass.

Christianity was introduced in the IV. cent. by Frumentius, and the Abuna or head bp. is still appointed by the Coptic Patriarch of Alexandria, and in ritual, etc., Abyssinian Christianity resembles Coptic. The Abyssinians still remain Monophysites. Since 1907 education has been compulsory upon all male children over twelve. The regular army is drawn from the several provinces, and numbers about 150,000 men. Upon the old feudal government is now grafted some imitation of European civilisation, a council of ministers having been appointed in 1908.

Abyssinia is rich in minerals, but only a little gold is exported to India. Other exports are ivory, coffee, civet, myrrh and other gums, and wax; the chief imports are cottons (Amer., Brit., and Ind.), woollen fabrics, cutlery and hardware, Ital. and Swed. matches. Brit. consul-gen. at Adis Abbeba. Area probably about 370,000 sq. miles. Pop. *c.* 5,000,000. See EGYPT, SOMALILAND.

Wylde, *Modern Abyssinia* (1901).

ACACIA, genus of shrubs and trees of the sub-family *Mimoseæ*, comprising about 450, chiefly Australian and Polynesian species, having compound pinnate leaves or flattened leaf-stalks (*phyllodes*) and clusters of small flowers. Some species produce gum-arabic, catechu, wattle-bark, and valuable timber.

ACADEMY, a gymnasium, near Athens,—named after Academus, presented to the Athenians by Cimon,—where Plato taught for some fifty years up to time of his death (348 B.C.). Its system of teaching was continued by other philosophers, its various periods being known as the 'old,' 'middle,' and 'new' academies.

The name A. is given in modern times to seats of learning, societies devoted to the advancement of lit., the Sciences, art, music, etc.; also to high-class schools, such as the Edinburgh Academy, and to riding, dancing, fencing schools and the like. The most famous of modern A's is the *Académie française*, founded in 1635 by Cardinal Richelieu, the immediate object of which was to set a standard of taste in language and lit., to produce a great national dictionary, and to prepare treatises in poetry and rhetoric. The number of members was fixed at forty. The Fr. A. still remains one of the most flourishing institutions of its kind, and has numbered amongst its members some of the greatest names in Fr. lit. By a system of prizes the Fr. A. encourages lit. and learning in France; and it has exercised no small control over the Fr. language and Fr. style. Together with four other A's it now forms the *Institut de France*. These are the *Académie des Inscriptions et Belles Lettres* (founded by Louis XIV. in 1663); the *Académie des Sciences* (1666); the *Académie des Beaux Arts* (1648); and the *Académie des Sciences Morales et Politiques*. The word 'académie' also applies to each of the 17 Univ. divisions in France.

The foundation of a literary A. in England has often been suggested, but never carried out; in 1902, however, was founded the *Brit. A.* for the Promotion of Historical, Philosophical, and Philological Studies. Other A's are the *Royal A. of Arts* (below), the *Royal Scot. A.*, and the *Royal A. of Music*, founded 1822. The most notable Amer. A's are the *National A. of Design* (New York), the *Amer. A. of Arts and Sciences* (Boston), the *A. of Natural Sciences* (Philadelphia), the *Peabody A. of Sciences* (Salem, Mass.), and many others. In Germany the *Akademie der Wissenschaften* was established in 1700; and most continental countries have one or more A's of kindred type. The International Association of A's was founded in 1899 on the initiative of the Royal Society, and represents a score of European and Amer. A's and learned Societies.

Academy, Royal, Burlington House, London; founded 1768, under the patronage of George III., 'for the purpose of cultivating and improving the arts of painting, sculpture, and architecture.' Sir Joshua Reynolds was the first pres., and there were thirty-six original members, nominated by the King. Each academician, upon election, presents an approved example of his work, before his diploma can be submitted to the King for signature. Academicians, since 1867, have been elected by members and associates together. The associate class, about thirty in number, was founded in 1769, and from its ranks academicians are chosen. An annual exhibition is held, which is open to all professional artists. The A. schools

provide training in the arts of painting, sculpture, and architecture.

ACADIAN (geol.), middle subdivision of N. Amer. Cambrian, consisting of shales, slates, and limestones.

ACADIE, or **ACADIA**, see NOVA SCOTIA.

ACAJOU, cashew (*q.v.*) or mahogany (*q.v.*) tree.

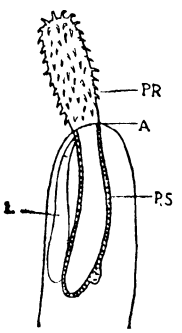
ACAJUTLA (30° 39′ N., 89° 45′ W.), seaport town, Salvador, Central America.

ACALEPHÆ, see SCYPHOMEDUSÆ.

ACALYPHA, genus of Euphorbiaceous plants (*q.v.*).

ACANTHITE, a dimorphous form of argentite (*q.v.*) which crystallises in the ortho-rhombic system.

ACANTHOCEPHALA, class of parasitic 'worms' whose larvæ live in crustaceans or beetles and the adults in vertebrates. They have an anterior retractile proboscis armed with hooks for attachment to the intestinal tissues of the host. They have no alimentary canal, food being absorbed through the skin. *Echinorhynchus proteus* of trout, pike, etc., the habitat of the larvæ being the Amphipod *Gammarus pulex*, and *Gigantorhynchus gigas* of the pig, sometimes in man, the habitat of the larvæ being the cockchafer (*Melolontha*), are typical representatives.



Anterior End of an Acanthocephalan. *PR*, protruded proboscis covered with recurved hooks; *A*, anterior end of body; *PS*, proboscis sheath; *L*, an organ known as lemniscus.

ACANTHOPTERI, or **ACANTHOPTERYGII**, large family of fish with spiny dorsal fin, *e.g.* perch, mackerel.

ACANTHUS, genus of Mediterranean and Asiatic plants with prickly leaves, which have served as a model for architectural ornamentation, *e.g.* on Corinthian capitals.

A CAPPELLA, in chapel style, *i.e.* voices singing without accompaniment or with instruments in unison.

ACAPULCO (16° 50′ N., 99° 50′ W.), seaport, Mexico; good harbour. Pop. 5000.

ACARINA, ACARIDA (zool.), order of Arachnida (*q.v.*), including mites and ticks.

ACARNANIA (38° 45′ N., 21° 30′ E.), region, ancient Greece; now joined with Ætolia. Pop. *c.* 150,000.

ACARUS FOLLICULORUM, see ARACHNIDA.

ACASTUS (classical myth.), s. of King Pelias of Iolcus; shared in expedition of Argonauts.

ACATALECTIC, verse complete in all its syllables; antonym, catalectic.

ACATALEPSY, synonymous term for incomprehensibility.

ACAULESCENT (bot.), having no apparent stem, as the dandelion.

ACCA LARENTIA, fabled foster-mother of Romulus and Remus.

ACCELERATION, rate of increase or decrease of the velocity of a body; a. of gravity, the increase in the velocity of a freely falling body, being 980·6 centimetres per second at sea-level in Lat. 45°.

ACCENT (1), stress or emphasis put upon one syllable of a word, *e.g.* em'phasis. In long words a second subordinate a. may occur. In Eng. language, a. tends towards initial syllables. A. sometimes distinguishes nouns from verbs, *e.g.* con'vert (noun), convert' (verb). In prosody (*q.v.*), a. plays leading part. (2) Stress on certain notes in music, generally 1st and 3rd notes in bar. (3) Grammatical sign to indicate different kinds of pitch or vowel sound. The *acute* a.' marks a stressed syllable, a raised tone, or a 'closed e' in French; the *grave* a.` denotes a lowered pitch, or an 'open e' in French; the *circumflex* a.^ is a compound of the acute and grave, and in Fr. signifies a prolonged vowel. (4) Peculiar pronunciation or intonation, *e.g.* Glasgow a., French a.

ACCEPTANCE, legal instrument by which a person agrees to the terms of a bill of exchange.

ACCEPTATION of a term is its generally recognised meaning.

ACCEPTILATION, verbal discharge of obligation.

ACCESSION, to succeed to a dignity, or the possession of property.

ACCESSORY, one participating in a crime, either before, or afterwards, but not present at its commission.

ACCIACCATURA, a short 'grace-note,' immediately preceding a principal note in music.

ACCIAJUOLI, DONATO (1428–78), Ital. historian and philosopher.

ACCIDENCE, grammatical term relating to inflections of words; rudiments of grammar.

ACCIDENT, unforeseen or unexpected misadventure (see EMPLOYERS' LIABILITY ACTS, and INSURANCE); in logic a fortuitous quality of a thing, not inherent in, or necessarily to be inferred from, a generic term.

ACCIDENTAL, an alteration of the pitch of a note by sharp, flat, or natural; effect limited to bar in which it occurs.

ACCIDENTALISM, theory that events are not the result of direct cause.

ACCIPITER, variety of hawk. See HAWK FAMILY.

ACCIPITRINES (order *Accipitres*), diurnal birds of prey, order of birds containing the day-flying birds of prey, characterised by their great powers of flight, hooked talons and beak, laterally-directed eyes, and carnivorous or carrion-feeding habit. A skeletal point of interest is that the fourth toe is not reversible as in nocturnal birds of prey. The sexes are found in pairs, which mate for life.

ACCIUS (XVI. cent.), Latin poet; paraphrased Æsop.

ACCLIMATIZATION, see CLIMATE.

ACCOLADE, blow on neck or shoulder with flat of sword in ceremony of conferring knighthood; a brace in music.

ACCOLTI, PIETRO (1455–1532), Ital. cardinal; drafted Papal Bull against Luther.

ACCOMMODATION, theological term used in several allied senses: (1) the use of a Biblical passage in a sense other than originally intended; (2) symbolic or parabolic language; (3) esoteric 'reservation' of Christian truth.

ACCOMMODATION BILL, one to which a person puts his name to oblige another without receiving any return for so doing.

ACCORAMBONI, VITTORIA (1557–85), Ital. lady, renowned for beauty and tragic fate.

ACCORDION, small free reed, wind instrument with keys; like concertina; invented (1829) by Damian, a Vienna maker.

ACCOUCHEMENT, delivery of a child. See OBSTETRICS.

ACCOUNT, statement, reckoning, reason, etc. Stock Exchange a. is the periodical settlement of transactions between buyers and sellers.

ACCOUNTANT, an expert bookkeeper; one skilled in the preparation of balance-sheets, profit-and-loss accounts, etc.; an indentured apprenticeship of five years is necessary to qualify as a chartered a., during which period the pupil undergoes three examinations. Auditors of accounts are referred to in the Westminster Statutes in Edward I.'s reign.

ACCRA (5° 35′ N., 0° 15′ W.), seaport, Gold Coast; originated in three forts; exports rubber, ivory. Pop. *c.* 20,000.

ACCRETION, growth, addition; extension of land by natural process, *e.g.* silting, retreating watermark, and the like.

ACCRINGTON (53° 45′ N., 2° 21′ W.), town, Lancashire; cotton works. Pop. (1911) 45,000.

ACCUM, FRIEDRICH (1769–1838), Ger. chemist, first promoter of gas-lighting.

ACCUMULATION, in law, the increase of capital by the continuous addition of interest to principal.

ACCUMULATOR, see BATTERY.

ACE, old Roman unit of coinage (*as*); card with single spot; a very small quantity.

ACELDAMA, *Acts* 1^{19}, field bought by Judas, probably 'field of blood,' possibly 'field of sleep.'

ACENAPHTHENE ($C_{12}H_{10}$), crystalline coal-tar product derived from naphthalene. M.P. 95°; B.P. 278°.

ACEPHALI, sects without a leader, or clergy without benefice or title; fabulous headless beings.

ACEPHALOUS, headless; (zool.), pertaining to the Acephala (Lamellibranchiata (*q.v.*)) or bivalve mollusca (*q.v.*); (bot.), having an ovary with a style at the base, instead of at apex.

ACERACEÆ, maple (*q.v.*) family of trees.

ACERENZA (40° 47′ N., 15° 58′ E.), cathedral town, Italy. Pop. 4500.

ACERNUS, SEBASTIAN FABIAN (1545–1602), Latin form of Polish poet Klonowicz's name.

ACEROSE, needle-shaped, as the leaves of the pine.

ACERRA, Rom. incense box.

ACERRA (40° 55′ N., 14° 22′ E.), cathedral town, Italy. Pop. 16,443.

ACETABULUM, small Rom. cup for vinegar, etc.; socket in pelvis which receives head of femur or thigh bone.

ACETAMIDINE, see AMIDINES.

ACETANILIDE, ANTIFEBRINE, a febrifuge; consisting of shining plates; M.P. 112° C.; prepared by boiling aniline with glacial acetic acid.

ACETIC ACID ($CH_3CO.OH$), colourless pungent liquid, B.P. 118°, obtained by the oxidation of alcohol. It congeals at 16·7° (glacial a. a.). Vinegar is impure a. a. The salts are termed acetates; potassium and lead acetate are used in medicine. A by-product in the manufacture of a. a. from wood spirit is **Acetone**, DIMETHYL KETONE ($CH_3CO.CH_3$), a colourless volatile liquid, B.P. 56·5°, used in the manufacture of chloroform, iodoform, sulphonal, and cordite, and as a solvent; occasionally used in medicine for asthma. Another ketone is **Acetophenone**, PHENYL-METHYL KETONE ($C_6H_5CO.CH_3$); crystallises in colourless plates; M.P. 20°, B.P. 202°. It is the simplest aliphatic-aromatic ketone.

ACETO-ACETIC ESTER ($CH_3CO.CH_2CO.OC_2H_5$), colourless liquid of pleasant smell, B.P. 181°; of great importance in the preparation of quinolines, pyridines, pyrrols, uric acid, and many other compounds.

ACETYLENE, ETHINE (C_2H_2), colourless, inflammable gas having a faint odour resembling garlic. The pungent smell usually noticeable is due to impurities; liquefies at −82°; solidifies *c.* −91°. Liquid and solid a. are explosive, developing a pressure up to 100,000 lb. per sq. inch, so that their manufacture and use is prohibited in Great Britain. Compressed a. and several of its compounds, especially with copper and silver, are explosive. A. polymerises under the influence of heat, and an immense number of organic compounds can be built up from it. It can be prepared by the direct union of carbon and hydrogen under the influence of the electric arc, but it is now universally generated by the action of water on calcium carbide (CaC_2). The latter, a crystalline, semi-metallic, frequently iridescent solid, is manufactured by the fusion of a mixture of ground limestone and anthracite in an electric furnace, carbide works being erected in localities where electricity is cheap owing to the presence of water power, *e.g.* Niagara, Switzerland, Falls of Foyers. Various kinds of a. generators have been designed, the main feature being the method by which the water is brought into contact with the carbide. The safest are those in which carbide is dropped into an excess of water, as the dropping of the latter on to carbide creates a great amount of heat, causing the gas to decompose into compounds which choke the burner. As under low pressure and without a small admixture of air the gas burns with a very sooty flame, and a large amount of air not only produces great heat (utilised in the oxy-acetylene blowpipe), but is highly dangerous, the necessary air for a brilliant flame is obtained from small openings just below the burner tip. It yields 35–45 candle hours per cubic ft. Owing to its many advantages a. is being increasingly used for the lighting of vehicles, streets, and buildings.

ACHÆA, ACHAIA (38° N., 22° E.), narrow coast region, Peloponnesus; chief town, Patras; produces currants; A. also applied to whole Peloponnesus or Greece.

ACHÆANS, fair-complexioned warrior race, who invaded Greece under Pelops, seized territory of dark-haired Pelasgians, and subsequently became the dominant race. **Achæan League**, ancient Gk. confederation of A. towns; probably first formed for protection against pirates; became important in IV. cent.; took part in wars against Philip and Antipater; dissolved, 288 B.C.; revived, 280; subsequently became chief power in Greece; warred against Rome; finally crushed by Romans, 146 B.C.

ACHÆMENES (Hakhamani), reputed ancestor of ancient Persian royal family (Achæmenides).

ACHÆUS, nephew of Hellen (*q.v.*), mythical ancestor of Achæans (*q.v.*).

ACHARD, FRANZ CARL (1753–1821), Prussian chemist, applied Marggraf's discovery of sugar in beet to the foundation of beet-sugar industry.

ACHARIUS, ERIK (1757–1819), Swed. botanist and physician.

ACHATES (classical myth.), friend of Æneas; proverbial for fidelity (*fidus A.*).

ACHELOUS, river, Greece; rises Mt. Pindus; enters Ionian Sea; modern Aspropotamo.

ACHELOUS (classical myth.), god of river A.; e. s. of Oceanus and f. of Sirens.

ACHENE (bot.), term for dry, indehiscent one-seeded fruit with a thin pericarp, *e.g.* the fruit of the buttercup.

ACHENSEE, or L. ACHEN (47° 30′ N., 11° 45′ E.), in N. Tyrol, source of Achen River.

ACHERNAR, one of the brightest stars in the S. hemisphere, is *a Eridani*, a straggling constellation, known since V. cent. B.C., which extends from near Orion to the boundaries of Cetus and then down to S. hemisphere.

ACHERON (classical myth.), a river of hell; name of several rivers in Greece suggestive of it.

ACHIEVEMENT, exploit, accomplishment; heraldic hatchment (*q.v.*) or escutcheon.

ACHILL (53° 58′ N., 10° W.), island, Irish coast; area, 57 sq. miles; mountainous. Pop. 4929.

ACHILLAS, Egyptian general; one of Pompey's (*q.v.*) murderers.

ACHILLES, legendary Gk. hero; s. of Peleus and Thetis; his quarrel with Agamemnon forms the chief subject of Homer's *Iliad*. A. is represented as the typical Gk. hero—handsome, brave, compassionate. After slaying Hector, and other Trojan chiefs, he himself fell by the hand of Paris, receiving an arrow in the heel. As a babe A. was dipped by his mother in the Styx and thus rendered invulnerable except in heel by which he was held. *A.'s heel* is used generally to denote one vulnerable spot.

ACHILLES TATIUS (V. cent. A.D.), Gk. rhetorician.

ACHILLES TENDON, prominent tendon of calf muscles inserted in heel bone. See ACHILLES.

ACHILLINI, ALESSANDRO (1463–1512), Ital. philosopher.

ACHIMENES, genus of tropical Amer. herbaceous perennials, cultivated in greenhouses for their beautiful flowers which resemble gloxinias.

ACHIN, ATCHIN or ATJEH (4° 10′ N., 96° 45′ E.), district, Sumatra; area, 20,500 sq. miles; principal town, Kota Raja; long remained independent; successfully resisted Portuguese, XVII. cent.; captured by Dutch, 1874; subdued, 1881; again rebelled, 1896; surrendered, 1901; important trading centre from XVII. cent.; exports pepper. Pop. *c.* 580,000.

ACHITOPHEL, see 'Absalom and Achitophel,' Ahitophel.

ACHLAMYDEÆ, see Apetalæ.

ACHMED, ACHMET, see Ahmed, Ahmet.

ACHORION, group of fungi. See Oidium.

ACHRAS, see Sapota.

ACHRAY (56° 13′ N., 4° 25′ W.), small loch in Trossachs, Perthshire.

ACHROANTHES, large genus of orchids (*q.v.*).

ACHROITE, a colourless tourmaline (*q.v.*).

ACHROMATIC, free from colour (in optics); applied to lens (*q.v.*); free from accidentals (in music); antonym of chromatic (*q.v.*).

ACHROMATISM, the property of refracting light without decomposing it into its constituent colours. See Light.

ACID, a chemical compound containing hydrogen, which can be replaced by electro-positive elements or radicals (cations), or which, dissociating in aqueous solution, produces hydrogen ions (*q.v.*). Most a's contain oxygen, but this is by no means a necessary condition, as was formerly held by Lavoisier and others. Davy and Dulong were the first to state that hydrogen was the acidifying principle, and Liebig added final proof by showing that a's containing more than one atom of hydrogen (polybasic a.) can either have the entire hydrogen replaced by a metal (cation) to form normal salts, or only partially to form a. salts, or by different metals to form compound salts. Organic a's are compounds containing one or more monovalent CO.OH groups called carboxyl, forming salts when hydrogen is replaced by a metal, and esters when replaced by alkyl radicals. A characteristic quality of a's is to redden vegetable blues like litmus. **Acidimetry**, measurement of the percentage of acid in a solution. If no other substances are present it may be determined by the specific weight; in other cases the usual methods are either by titration or by determining the quantity of an insoluble salt precipitated, or by calculating the amount of carbon dioxide liberated by the addition of a carbonate. See Base.

ACIDALIUS, VALENS (1567–95), Ger. critic and philologist.

ACINETA, ciliated and free-swimming infusorians when young; adults fixed and enclosed in a sheath, provided with suctorial 'tentacles' for feeding on other Protozoa.

ACINIFORM, like grape clusters.

ACINUS (bot.), drupelet or single berry of a multiple fruit, as in the raspberry or bramble, or a grape berry; (anat.), alveolar or sac-like part of certain glands.

ACIPENSER, see Sturgeon.

ACIREALE (37° 34′ N., 15° 8′ E.), town, Sicily; thermal springs. Pop. 35,418.

ACIS (classical myth.), Sicilian shepherd, beloved by Galatea; slain by Polyphemus; changed into river A.

ACKERMANN, KONRAD ERNST (1712–71), Ger. actor; reformed Ger. stage.

ACKERMANN, LOUISE VICTORINE—*née* Choquet—(1813–90), Fr. poetess.

ACKERMANN, RUDOLPH (1764–1834), Ger. publisher of annuals and topographical works in London; promoted lithography and engraving.

ACKLIN ISLAND (22° 30′ N., 74° W.), one of Crooked Island group, S. Bahamas.

ACKNOWLEDGMENT, an admission, recognition; law term, as a. of debt (*q.v.*), etc.

ACLAND, SIR CHARLES THOMAS DYKE (1842–), 12th Bart., Parliamentary Sec. to Board of Trade and Ecclesiastical Commissioners, 1886.

ACLAND, LADY HARRIET (1750–1815), wife of Major A.; displayed great bravery during Amer. War.

ACLAND, SIR HY. WENTWORTH, Bart. (1815–1900), Eng. physician; introduced study of natural science in Oxford curriculum.

ACLINIC LINE, line joining places on earth of no magnetic inclination or dip.

ACMITE, Ægirite, $NaFe(SiO_3)_2$, mineral akin to pyroxene, monoclinic crystals, occurring in igneous rocks.

ACNE, skin disease consisting of inflammation of sebaceous glands, which are plugged by comedones or 'blackheads,' and pimples, which may suppurate; usually affects face, shoulders, and back, and occurs most frequently soon after puberty; believed to be caused by the a. bacillus; indigestion and constipation aggravate the disease. Treatment is general hygiene, and application of sulphur ointment; a vaccine of the a. bacillus has been prepared.

ACŒMETI (Gk. *akoimetos*, sleepless), order of monks, who, by relieving each other, offered ceaseless divine worship.

ACOLYTE, lowest of four R.C. minor orders; first mentioned in III. cent., but only at Rome; then in Gallican Church. A.'s functions are to light the lamps, carry the candlesticks or thurible, and assist the priest to wash his hands; a. functions now generally carried out by laymen. See Orders.

ACOMINATUS, MICHAEL, Akominatos (c. 1140–1220), Byzantine ecclesiastic and writer; b. Chonæ (Colossæ). Nicetas (Niketas), younger bro., a politician.

ACONCAGUA.—(1) (32° 38′ S., 70° W.) Volcanic peak in S. Andes, highest mountain in American continent (23,080 ft.); (2) a province of Chili; chief town, San Felipe; area, 5485 sq. miles. Pop. 129,000.

ACONITE (*Aconitum*), genus of plants of the buttercup family, with tall stems and blue or yellow flowers, including about 60 species, e.g. *A. napellus*, common monkshood, wolfsbane (*A. lycoctonum*), cultivated in gardens. The roots are poisonous, containing aconitine ($C_{34}H_{47}O_{11}N$) and other alkaloids, used in med. externally as a chloroform liniment to relieve neuralgic pains, and internally in small doses to steady and slow the action of the heart in fevers.

ACORN, nut of oak (*q.v.*).

ACORN SHELLS, see Entomostraca.

ACORUS CALAMUS, the sweet-flag, rush-like plant of the order *Araceæ* (*q.v.*), allied to cuckoo-pint (*Arum*), with a tapering spike of closely packed flowers; found in wet situations in temperate regions. The roots have been used medicinally and for flavouring.

ACOSTA, JOSÉ DE (*c.* 1539–1600), Span. author and Jesuit missionary; b. Medina del Campo.

ACOSTA, URIEL, Gabriel (fl. 1635), Portug. Jew; ed. in R.C. faith, which he renounced.

ACOTYLEDONES, term for flowerless plants, now replaced by cryptogams (*q.v.*).

ACOUSTICS, the science of sound (*q.v.*). The acoustic (hearing) qualities of a hall are increased by rough surfaces (draperies, audience), as an empty room confuses the sound owing to echoes (*q.v.*).

ACOYAPA (11° 55′ N., 85° 0′ W.), town, Chontales, Nicaragua.

ACQUAPENDENTE (42° 40′ N., 11° 40′ E.), small town, Italy; bp.'s see.

ACQUAVIVA (40° 53′ N., 16° 49′ E.), town, Bari, S. Italy.

ACQUAVIVA, CLAUDIO, see Aquaviva.

ACQUI (44° 41′ N., 8° 29′ E.), cathedral town, Piedmont, Italy; sulphur springs. Pop. 13,786.

ACQUIESCENCE, compliance, without opposition, but not necessarily with approval.

ACQUITTAL, setting free, absolving in a judicial verdict (*q.v.*).

ACQUITTANCE, discharge from debt or like liability.

ACRASIA, Circe-like enchantress, representing Intemperance, in Spenser's *Faerie Queene*.

ACRASPEDA, see Scyphomedusæ.

ACRE, land measure, originally area ploughed by a yoke of oxen in a day; now legally equal to 160 sq. rods (4840 sq. yds. = 4047 sq. metres). See Measures.

ACRE (32° 55′ N., 35° 5′ E.), town, Palestine;

renamed *Ptolemais* by Ptolemy I. (*q.v.*); taken by Crusaders and retaken by Saracens in first and third crusades; seized by Turks, 1517; unsuccessfully besieged by Napoleon, 1799; captured by Ibrahim Pasha, 1831; taken by Austrian, Brit. and Turk. allies, 1840. Pop. *c.* 11,000.

ACRÉ, AQUIRY (11° S., 68° 20′ W.), river, Brazil; joins Purús.

ACRI (39° 28′ N., 16° 23′ E.), town, S. Italy.

ACRIDINE ($C_{13}H_9N$), colourless, crystalline, basic compound occurring with anthracene in coal-tar. The solutions of its salts are fluorescent.

ACRISIUS (Gk. myth.), king of Argos, f. of Danæ; killed accidentally by grandson Perseus.

ACRO, HELENIUS (fl. II. cent. A.D.), Rom. commentator and grammarian.

ACROCERAUNIAN ('Thunder-struck') **MOUNTAINS** (40° 15′ N., 20° E.), Albania; highest peak, 6300 ft.

ACROGENÆ (bot.), erroneous and obsolete term for higher cryptogams, such as ferns, mosses, and liverworts, with apical growth of stem.

ACROGRAPHY, stereotyping from designs traced on chalk surface.

ACROLEIN ($CH_2CH.COH$), colourless, strongly refracting liquid, B.P. 52·4°, with pungent irritating vapours, distillation product of glycerine and fats, smell of smouldering candle wick due to a.

ACROLITHS, ancient statues, the trunk being of wood, the rest of marble or other stone.

ACROLOGY, the study of alphabetic symbols and initial sounds and syllables; cf. Acrophony (*q.v.*).

ACROMEGALY, chronic disease characterised by enlargement of head, chest, hands, and feet, associated with disease or derangement of pituitary gland (*q.v.*), extracts of which are used in treatment of A.

ACROMION, process of shoulder-blade to which collar-bone is attached.

ACROPHONY, representation of a sound in ancient times by a picture or symbol which in still earlier times was used to signify an object of which that sound is the initial syllable or letter.

ACROPOLIS, fortified height above Gk. city; within walls were temples and public buildings. See ATHENS.

ACROPOLITA, GEORGE, AKROPOLITES (1217–82), Byzantine historian, diplomatist; wrote *Annales.*

ACROSE, kind of sugar (*q.v.*).

ACROSTIC, verse composition in which the initials of the lines form a word, or phrase; used by the Greeks and Latins, and later by Boccaccio. In a double a. the final letters also form words.

ACROTERIUM, in arch., angle of pediment, also ornament placed thereon.

ACT, a deed performed; division of a play; in law, a written instrument completing a transaction; also, *act of God,* an unforeseen unpreventable occurrence; *act of grace,* granting of a privilege.

ACT OF CONGRESS, statutes of U.S.A. Legislation, except for revenue, may be initiated in either House (Executive have seats in neither). Bills are first considered by appropriate Standing Committee. In House of Representatives these number 48, are appointed by Speaker, controlled by party in power, and discuss and arrange bills, their action being rarely challenged by House. Senate legislates more as a whole. Bills may be amended by other house; but, after passing both, become law by President's assent, or without it, if not returned within 10 days, or if after his veto each house passes them anew with two-thirds majority.

ACT OF PARLIAMENT, name given to decree of legislative body. A's of P. are divided into chapters (*capitula*). Procedure is as follows:—

A. PUBLIC BILLS.—Member moves for leave to introduce bill, and, leave being granted, brings it to table. Clerk of House reads out title; motion (never opposed) that bill be read first time and printed; first reading followed by order of House for second reading on appointed day. In second reading there are three stages: general debate (time for proposals to shelve or amend), reading in Committee, report of Committee. Bill may be returned to Committee, added to or amended. Motion for third reading is not usually opposed; after reading, Clerk ordered to carry bill to Lords 'and desire their concurrence,' endorsing it '*soit baillé aux seigneurs.*' Read in Lords first time; notice for second reading given within twelve days or bill dropped for session; if much amended sent back endorsed '*a ceste bille avesque des amendemens les seigneurs sont assentus*'; Commons may accept or reject amendments; failure to agree leads to appeal to country (procedure before *Parliament Act,* 1911; see PARLIAMENT). After passing both Houses and receiving Assent (*q.v.*) of sovereign bill becomes Act. Few bills are now introduced by private members.

B. MONEY BILLS.—These must originate in Commons, and cannot be amended or rejected by Lords.

C. Procedure in case of PRIVATE BILLS differs, and is largely judicial in character.

ACTA DIURNA, ancient daily news-letter, instituted by Julius Cæsar.

ACTA SANCTORUM, lives of saints in 62 folio vols., begun in XVII. cent. by the Jesuit, Rosweyde (d. 1629), and carried on by Bollandists (*q.v.*).

ACTA SENATUS, proceedings of Rom. Senate; first pub. by Julius Cæsar.

ACTÆON (classical myth.), hunter who surprised Diana whilst bathing, and was changed into stag.

ACTINAL, belonging to mouth end of radiate animal; *abactinal,* pertaining to opposite end.

ACTING, see THEATRE.

ACTINIA, genus of sea-anemones (*q.v.*).

ACTINIC RAYS, rays in the blue, violet, and ultra-violet part of the spectrum which are strongly chemically active.

ACTINISM, property of solar rays by which chemical changes are effected, *e.g.* in photography.—**Actinology,** science dealing with this property.

ACTINIUM, a radioactive element, discovered by Debierne. See RADIOACTIVITY.

ACTINOLITE, a grey-green kind of amphibole (*q.v.*).

ACTINOMETER, instrument for measuring the chemical and heating effects of light.

ACTINOMYCOSIS (STREPTOTRICHOSIS), chronic infectious disease of cattle and of man caused by the *streptothrix actinomyces* and allied organisms. The region of the mouth and jaw is the commonest site of a.; in animals there are tumour-like masses of granulation tissue; and in man there is usually swelling and chronic suppuration; it may spread to the lungs, brain, and other internal organs. Treatment is to remove affected tissues by operation; X-rays and potassium iodide are used where this is impossible.

ACTINOPODA, sub-class of HOLOTHURIANS (*q.v.*).

ACTINOZOA, term originally used for all radially symmetric animals, then restricted to a group of cœlentera (*q.v.*) synonymous with Anthozoa (*q.v.*).

ACTION, term referring to a civil proceeding taken in a law court for the adjudication of rights.

ACTIUM (38° 55′ N., 20° 40′ E.), promontory and village, ancient Greece; Octavian defeated Mark Antony, 31 B.C.

ACTON (51° 31′ N., 0° 6′ W.), suburb of London. Pop. (1911) 57,523.

ACTON, CHARLES JANUARIUS EDWARD (1803–47), ed. Cambridge; cardinal, 1842.

ACTON, JOHN EMERICH, 1ST BARON (1834–1902), Eng. historian; nephew of above; a zealous R.C.; opposed doctrine of Papal Infallibility in 1870, but did not secede from Catholic Church; raised to peerage (1869); app. prof. of Modern History at Cambridge (1895); literary output small, but work all marked by deep scholarship.

ACTON, SIR JOHN F. E., Bart. (1736–1811), politician; s. of an Eng. physician at Besançon; grand-uncle of above; became Prime Minister to Ferdinand IV., king of Naples.

ACTS OF THE APOSTLES, a unique book in the New Testament giving the history of the Church from the Ascension of Christ till the imprisonment of St. Paul in Rome. The A. is traditionally the work of St. Luke, being the continuation of his Gospel. External evidence for this is strong, and there is no contrary tradition. Much controversy has arisen over the so-called 'we' passages. Many critics have thought that these might be by St. Luke and were incorporated with the A. by the author (whoever he was). Recent investigation by Harnack and others makes it probable that all the book is by St. Luke. As regards the 'we' passages, the change from 3rd to 1st person may be due either to incorporation of his own diary or to vivid recollection of personal experience. The earlier part is concerned with the work of the Apostles as a whole, the later with St. Paul. It is probable that the historicity of the work is greater in the later part than in the earlier, for which the author may have been dependent on oral tradition. The speeches, like those of other ancient authors, can hardly claim to be the actual words spoken. There is also an important textual problem: possibly the author himself issued a second edition. The date must be before the end of the I. cent., Harnack now thinks before 70 A.D. Recent investigation tends on the whole to support its historicity.

Harnack, *Luke the Physician, Acts of the Apostles, Date of the Gospels and Acts*; commentaries in *Expositor's Greek Testament*, etc.

ACTUARY, originally registrar or clerk; now official calculator to insurance company. Actuarial work has now become a science, and the a. can, when furnished with the proper statistics with regard to any person, assess with sufficient accuracy the chances of his living a given time. The material for such a decision is provided by statistics of the general population, which are now reduced mathematically. The security of Insurance work, hence, depends upon as large a selection as possible of the general population being included among its clients. The a. errs, however, on the side of security.

ACULEATA, bees, wasps, ants, and other Hymenoptera (*q.v.*) with stings.

ACUMINATE (bot.), tapering to a sharp point, *e.g.* leaves.

ACUÑA, CHRISTOVAL DE (1597–1676), Span. explorer and Jesuit missionary.

ACUNHA, D', see CUNHA, DA.

ACUPRESSURE, stopping bleeding by closing the blood vessel with a needle.

ACUPUNCTURE, pricking an affected part of the body with a needle as a remedy for disease.

ADA (45° 50′ N., 20° 9′ E.), town, on Theiss, Hungary. Pop. 12,000.

ADABAZAR (40° 43′ N., 30° 25′ E.), town, Asia Minor; textile industries. Pop. 18,000.

ADAGIO, musical term indicating slow time; also slow movement in a composition.

ADALBÉRON (fl. 975), abp. of Rheims; Chancellor of Lothaire and Louis XV.; consecrated Hugh Capet.

ADALBERT, ADALBERT (*c.* 1000–1072), abp. of Hamburg-Bremen; said to have refused papal chair; made legate by Leo. IX.; extended Christianity in North.

ADALBERT, ST. (*c.* 950–997), bp. of Prague; later missionary in N. Germany and Poland; martyrised in Prussia.

ADALIA (36° 53′ N., 30° 46′ E.), port, Asia Minor, at head of gulf of A.; founded by Attalus II. (*Attalia*); SATALIA of Crusaders; exports grain, cattle, and horses; coast trade. Pop. 25,000.

ADAM, the first man according to *Genesis*. The derivation of the name is obscure, probably from a root also found in Assyrian 'to make, produce,' possibly from another 'to be red,' but A. means in Hebrew also 'man, mankind' in general. The more primitive account of the creation of man is in chap. ii. 4*b*–8: that in i.–ii. 4*a* (the Priestly Code) is later. Some think that originally the narrative was merely mythological and has been 'toned down' by the editor. The creation of man in 'the image of God' and some later traditions seem to show that the position of A. was exalted. Several Babylonian legends offer some, but none a very complete parallel to the story of A.; according to one, a hero Etana is cast down from heaven, which suggests the Fall. There are not many references to A. in the other books of the Old Testament, and the conception of original sin as resulting from the Fall is hardly found. Various legends about him are found in later Jewish lit., and works exist bearing his name in Ethiopic and Armenian.

Driver, *Genesis*; Tennant, *Sources of the Doctrine of the Fall and of Original Sin*.

ADAM OF BREMEN, XI. cent., geographer and historian; earliest references to Vinland (*q.v.*) found in his works.

ADAM DE LA HALLE, ADAN (d. *c.* 1288), Fr. trouvère; the 'Hunchback of Arras' (*le Bossu d'Arras*); wrote *Jeu de Robin et Marion* (oldest known comic opera).

ADAM, ADOLPHE (1803–56), Fr. composer of comic operas; best, *Le Postillon de Longjumeau*.

ADAM, ALEXANDER (1741–1809), Scot. scholar and antiquary; 40 years rector of Edinburgh High School; Scott and Jeffrey among pupils; pub. *Roman Antiquities* (1791); *Latin Dictionary* (1805).

ADAM, SIR FREDERICK (1781–1853), Brit. General; served in Egypt, Mediterranean, and Catalonia; his brigade with the Guards repulsed the Old Guard at Waterloo; Lord High Commissioner, Malta and Ionian Islands; gov. of Madras, 1832–37; general, 1846.

ADAM, JEAN (1710–65), Scot. poetess; schoolmistress and hawker; religious verses; *There's nae Luck aboot the Hoose* ascribed to her with little probability.

ADAM, JOHN (1779–1825), acting Gov.-Gen. of India, 1823.

ADAM, JULIETTE, *née* LAMBER (1836–), Fr. novelist and miscellaneous writer.

ADAM, LAMBERT SIGISBERT (1700–59), Fr. sculptor of distinction; member of Academy.

ADAM, PAUL (1862–), Fr. novelist; wrote novel sequence on Napoleonic campaigns.

ADAM, ROBERT (1728–92), Scot. architect; b. Kirkcaldy; app. architect to King and Board of Works, 1762; designed the Adelphi buildings; Admiralty gateway; Register House, St. George's Church, and Univ. buildings, Edinburgh; Glasgow Infirmary, and many private houses; buried in Westminster Abbey.

ADAM SCOTUS, XII.-cent. mystic and theologian; abbot of Candida Casa (sometimes called Whithorn).

ADAM, WILLIAM, OF BLAIR ADAM (1751–1839), Brit. politician and lawyer.

ADAMANT, figurative term applied to something extremely hard; a diamond, loadstone, or emery stone.

ADAMASTOR, phantom haunting Cape of Storms (now Cape of Good Hope); appears in Camoens' *Lusiads*.

ADAMAWA (8° N., 13° E.), country, W. Africa; conquered by Adama Fula emir, early XIX. cent.; under Brit. and Ger. control since 1900.

ADAMITES, sect who copied Adam in going without clothes.

ADAMNAN, ST. (625–704), Irish abbot of Iona; wrote life of St. Columba and the first work on the Holy Places.

ADAMS (42° 38′ N., 73° 8′ W.), town, Massachusetts; cotton factories. Pop. (1910) 13,026.

ADAMS, CHARLES FRANCIS (1807–86), Amer. diplomatist; s. of John Quincy A. (*q.v.*); sometime ambassador to Great Britain; sat on tribunal of Arbitration at Geneva which settled the *Alabama* claims.

ADAMS, CHARLES KENDALL (1835–1902), Amer. educationist and historian; pres. of Univ. of Wisconsin.

ADAMS, HENRY CARTER (1852–), Amer. statistician and economist.

ADAMS, HERBERT (1858–), Amer. sculptor; vice-pres., National Academy of Design, New York.

ADAMS, HERBERT BAXTER (1850–1901), Amer. educationist and historian; prof. of Amer. History, Johns Hopkins Univ., Baltimore.

ADAMS, JOHN (1735–1826), second Pres. of U.S.A.; s. of a farmer; grad. Harvard Univ.; obtained large practice as barrister in Boston; sat in Philadelphia Congress, 1774; chairman of Board of War, 1776–77; Commissioner to the Court of France, 1778; Ambassador to Gt. Britain, 1785; Vice-Pres. of the Union, 1789; succ. Washington as Pres., 1796.

ADAMS, JOHN COUCH (1819–92), Eng. astronomer; b. Cornwall; ed. Cambridge, where eventually became prof. of Astronomy and director of Observatory; chiefly remembered for share in discovery of the planet Neptune (1846), whose existence became known about same time to Fr. astronomer, Leverrier.

ADAMS, JOHN QUINCY (1767–1848), sixth Pres. of U.S.A.; e. s. of Pres. John A.; barrister, 1791; app. Minister to Netherlands, 1794; Berlin, 1797; elected to Massachusetts Senate, 1802; member of U.S. Senate, 1803; Minister to Russia, 1809; Great Britain, 1815; Sec. of State, 1817; Pres. 1825–29; Wrote series of papers controverting Paine's doctrines in the *Rights of Man*.

ADAMS, SAMUEL (1722–1803), Amer. statesman; b. Boston; took active part in municipal politics; was member of Caucus (Caulker's) Club, with which the word 'Caucus' is said to have originated; Lieut.-Gov. State of Massachusetts, 1789; Gov., 1794.

ADAMS, THOMAS (d. *c.* 1655), Eng. scholar and divine.

ADAMS, WILLIAM (d. 1620), Eng. navigator; held captive many years in Japan; made voyages to Siam and Cochin-China (1616–18).

ADAM'S APPLE, popular name for projection of thyroid cartilage of larynx on front of the neck; tradition says that when Adam tried to swallow the apple it stuck in his throat, hence swelling in necks of adult men.

ADAM'S BRIDGE (9° 4′ N., 79° 30′ E.), sandbank chain, off Ceylon.

ADAM'S PEAK (6° 51′ N., 80° 27′ E.), mountain, Ceylon (7420 ft.); a foot-like depression on top is ascribed by Muhammadans to Adam, who is said to have stood here on one foot doing penance until forgiven by God.

ADAMSON, PATRICK (1537–92), abp. of St. Andrews; pub. numerous Latin works; accused of heresy and deprived of revenue of his see; in later years supported by charity.

ADAMSON, ROBERT (1852–1902), Scot. philosopher; ed. Edinburgh and Heidelberg; app. to chair of Logic, Owens Coll., Manchester, 1876; went to Aberdeen, 1893; held chair of Logic at Glasgow from 1895; wrote volumes on Kant and Fichte.

ADANA (37° 40′ N., 36° 10′ E.), province, Asia Minor; fruit, cereals; chief town, ADANA (37° 1′ N., 35° 18′ E.). Pop. *c.* 50,000.

ADANSON, MICHEL (1727–1806), Fr. naturalist; spent five years in Africa collecting specimens; compiled grammars and dictionaries of Senegal languages.

ADAPTATION, in a literary sense, to prepare a play from a published novel, or to derive a novel from a play; in evolution, the process by which organisms are adjusted to their environment (*q.v.*).

ADDA (45° 10′ N., 9° 49′ E.), river, Italy; joins Po.

ADDAH (5° 46′ N., 0° 42′ E.), town, on Volta, Gold Coast, Brit. W. Africa.

ADDAMS, JANE (1860–), Amer. sociologist; founder of Hull House, Chicago.

ADDAX, genus of light-coloured antelopes (*q.v.*) with twisted horns, living in N. African, Arabian, and Syrian deserts.

ADDER, the common viper (*Vipera berus*); the African puff-a. (*Bitis arietans*); the death-a. (*Acanthophis antarcticus*) of the Moluccas; name also applied to several non-poisonous snakes of N. America.

ADDISON, JOSEPH (1672–1719), Eng. essayist and poet; b. Milston (Wilts); ed. Charterhouse and Oxford; some of his early verses and translations brought him to the notice of Jacob Tonson, who introduced him to men of rank and fashion. He sought the patronage of King William, and was awarded a pension of £300, upon the strength of which he travelled in France and Italy, and later accompanied Prince Eugene, as Sec. Upon the King's death A. lost his pension and found himself without employment. He now spent some time in Germany, where he wrote his classical play *Cato*, and *Dialogues on Medals*. Later, on the recommendation of Lord Halifax, he was commissioned to celebrate the victory of Blenheim in verse, which resulted in *The Campaign* (1704), and A. received a commissionership of Appeal in Excise. In 1706 he was made Under-Sec. of State, and produced his opera, *Rosamond*, in same year. A comedy from his pen, *The Drummer*, was produced at Drury Lane in 1716, but without success. A.'s chief passport to fame consists in the charming essays, satirising men and manners, which he contributed to *The Spectator*; in this branch of lit. he stands unrivalled; *Life*, by Courthope (1884).

ADDISON'S DISEASE, usually affects middle-aged males, and is characterised by progressive loss of strength, pigmentation of the skin in patches, and gastro-intestinal disturbances. The disease resembles tuberculosis of the suprarenal capsules (*q.v.*). It is treated with suprarenal extract, rest, tonics, etc., but it invariably ends fatally, sometimes after a prolonged course of several years.

ADDLED PARLIAMENT, summoned April, dissolved June 1614 by James I. to whom it refused supplies.

ADDO BUSH (33° 40′ S., 26° E.), stunted forest, Cape Province Coast.

ADDRESS, THE, reply of Houses of Parliament to the Sovereign's speech at opening of new session.

ADDUCTOR, muscle that pulls limb towards middle line of body; or in bivalves (*q.v.*) pulls shells together.

ADELAAR, CORT SIVERSEN (1622–75), Norse seaman; ennobled for distinguished service as Dan. Admiral; fought with Venetians against Turks.

ADELAIDE (34° 50′ S., 138° 35′ E.), capital, S. Australia; founded, 1837; named after Queen A.; Univ., Government House, two cathedrals, parks, viceregal summer residence; woollen goods, hardware, soap. Pop. (1911), with suburbs, *c.* 192,000.

ADELAIDE, town and district, Cape Province, S. Africa. Pop. (district) *c.* 10,000 (2300 white).

ADELAIDE (d. 999), queen of Italy; m. (1) Lothair, s. of Hugh, king of Italy; (2) Otto I. of Germany, who, in her right, laid claim to the kingdom of Italy. A. wielded important influence in Germany, and was crowned in Rome (962) by Pope John XII.

ADELAIDE, QUEEN (1792–1849), consort of William IV.; charitable and virtuous, she greatly purified Eng. Court.

ADELARD OF BATH (XII. cent.), Eng. savant; travelled seven years in France, Spain, Italy, Africa, and Asia Minor, acquiring wide knowledge of various schools of philosophy; translated Euclid's Elements.

ADELER, MAX (1841–), Amer. humorist; pseudonym of Charles Heber Clark.

ADELSBERG (45° 46′ N., 14° 20′ E.), town, Carniola, Austria; stalactite caves and subterranean river. Pop. 3600.

ADELUNG, JOHANN CHRISTOPH (1732–1806), Ger. philologist and grammarian; pub. dictionary, grammars, and works on style.

ADEMPTION, legal term, meaning to revoke a gift.

ADEN (12° 50′ N., 45° E.), seaport on Gulf of A.,

and Brit. territory forming rocky peninsula, Arabia; town fortified; important coaling station; a free port; trading centre; captured by Romans, *c.* 24 B.C., by Turks, 1538; Brit. since 1839; subject to Bombay Government. Pop. 46,165.

ADEN, GULF OF (12° 30′ N., 48° E.), between Somaliland and Arabia.

ADENINE ($C_5H_5N_5$), crystalline organic compound obtained as a decomposition product of nucleins, and from glandular organs. It has also been prepared synthetically.

ADENOIDS, soft velvety masses, due to overgrowth of the lymphoid tissue, projecting down from the back of the nose and throat; the child affected has usually a stupid, open-mouthed expression, and may be the subject of asthma, deafness, or may micturate involuntarily during the night; nutrition is interfered with, and the child is often backward and languid. Treatment is removal of the a. by a slight surgical operation, and respiratory exercises afterwards.

ADEPHAGA (*i.e.* voracious), predatory Coleoptera (*q.v.*) such as tiger beetles.

ADERNO (37° 37′ N., 14° 51′ E.), town, Sicily. Pop. 25,859.

ADHÉMAR DE MONTEIL (d. 1098), crusader, bp. of Puy en Velay, who accompanied Raymond, Count of Toulouse, and d. of plague at Antioch.

ADHERBAL (d. 113 B.C.), king of Numidia; murdered at cousin Jugurtha's order.

ADHERENCE, adhesion (*q.v.*) in figurative but not physical sense.

ADHESION, the state of adhering or sticking to anything; used generally as meaning an attachment to a party or policy, or technically in physics, mechanics, botany, pathology, in regard to the union of parts or surfaces.

ADIABATIC, applied in thermodynamics to such processes as are carried out without any gain or loss of heat to a body.

ADIANTUM, MAIDENHAIR, large genus of graceful ferns, native of tropical America.

ADIAPHORON (indifferent), point not defined by Church, or subject to injunction of moral law.

ADIGE (45° 6′ N., 11° 40′ E.), river, Italy; enters Adriatic.

ADIGERAT, ADIGHERAT or ADIGHAT (14° 10′ N., 39° 30′ E.), town, Tigré, Abyssinia; sandstone.

ADIPOCERE, waxy, brownish substance into which the tissues of dead bodies are sometimes converted under certain conditions, usually after long immersion in water or burial in moist earth; it consists mainly of fatty acids.

ADIRONDACKS (44° 10′ N., 74° 20′ W.), mountains, New York, U.S.A.; many isolated peaks; highest, Mount Marcy (5344 ft.); district well wooded; lakes, streams; health resort; produces magnetic iron ore, graphite, etc.

ADIS ABABA, ADIS ABEBA (9° 1′ N., 38° 56′ E.), capital, Abyssinia; founded, 1892. Pop. *c.* 35,000.

ADJUDICATION, act of pronouncing judgment; in Eng. bankruptcy law the process by which a person is made, or 'adjudged,' bankrupt.

ADJUNCT, word or words which modify others (gram.); a non-essential or subordinate attribute (metaphysics) or person (general).

ADJUTANT, military term for officer who assists commander of a corps or regiment, and has charge of correspondence, drill, and discipline.—**Adjutant-General**, departmental head on army general staff, in charge of discipline, efficiency of troops, etc.

ADJUTANT (*Leptoptilus argala*), large East Indian stork with a bare pouch on the breast, living on carrion and snakes, and, therefore, protected by law in India. See STORKS.

ADLER, FELIX (1851–), Amer. educationist; prof. of Political and Social Ethics, Columbia Univ.; author of *Creed and Deed, Life and Destiny, Religion of Duty*, etc.

ADLER, NATHAN MARCUS (1803–90), chief rabbi of Brit. Empire; succ. by s., HERMAN ADLER (1839–1911).

ADLERCREUTZ, KARL JOHAN (1757–1815), Swed. general; promoter of Revolution of 1809 which dethroned Gustavus IV.

ADLERSHOF, village, near Potsdam, Prussia.

ADLINGTON (53° 36′ N., 2° 38′ W.), parish, N. Lancashire; cotton-spinning. Pop. 4500.

ADMETUS (classical myth.), king of Thessaly; one of Argonauts; served by Apollo as shepherd; m. Alcestis (*q.v.*).

ADMINISTRATION, term referring to management of a deceased person's estate; act of administrato.

ADMINISTRATION or **EXECUTIVE**, Boards entrusted with government of country. Crown freely chose its ministers until close of XVIII. cent.; since then they have been selected by sovereign from predominant party in Parliament by advice of Premier (*q.v.*). Majority are members of Lower House; if principal Sec. of State sits in Lords, under-sec. of his department is usually member of Commons and replies to questions concerning his department; less than half are members of Cabinet (*q.v.*). Chief departments of a. are Treasury, Home Office, Board of Trade, Colonial Office, India Office, Foreign Office, War Office, Admiralty, Local Government Office; lesser departments are Board of Agriculture and Fisheries, Board of Education, Board of Works, and Revenue Department (includes Customs, Inland Revenue, and Post Office). In U.S.A., A. comprises President and Cabinet app. by him (subject to Senate's confirmation). Ministers' powers are direct over their depts., but purely consultative as a Cabinet.

ADMIRABLE CRICHTON, see CRICHTON.

ADMIRAL, name, of Arab. origin, and now applied to highest officers in the navy, thus: Admiral, Vice-A., Rear-A., and A. of the Fleet, which latter carries the highest distinction; in XVI. and XVII. cent's the name (sometimes spelt 'Ammiral') was used for the ship carrying the chief naval officer; in XVI.-cent. France the title was borne by A. de Coligny, who was a military commander; grades of A. in Red, White and Blue squadrons abolished in Brit. navy in 1864.

ADMIRALTY, THE, is the administrative body, under the direction of the Government, whose business is the maintenance of the Brit. navy and all that relates thereto. In the infancy of the navy its affairs were conducted by a council under the direction of the sovereign; then from the early part of the XV. cent. until well into the XVII. cent. it was controlled by successive lords high admirals. Naval administration, as it is now understood, owes its inception to Henry VIII., who added two separate councils, known as the Admiralty Board and the Navy Board, which had charge of different departments relating to naval affairs. The office of Lord High Admiral was subsequently abolished, and the various Boards and departments joined under one administration.

The present organisation dates from the early part of the XIX. cent. It consists primarily of six naval commissioners, the 'First Lord' holding Cabinet rank. The supreme administration is in the hands of the First Naval Lord, and he is assisted by Second, Third, and Junior Naval Lords, a Civil Lord, and Parliamentary Sec. Thus, while the First Lord supervises generally all naval business, and advises upon matters relating to maritime defence; the Second Lord is charged with all that concerns the manning and *personnel* of the Fleet; the Third Lord with the management and control of dockyards and kindred affairs; the Junior Lord with naval hospitals, coaling, victualling, etc.; the Civil Lord with naval buildings and works; and the Parliamentary Sec. who has charge of accounts and all naval expenditure. There is also a Permanent Sec. who conducts correspondence and has the care of naval documents. By the creation (January 1912) of a new 'War Staff' certain additions have been made to the naval ad-

visory body. The staff is divided into three divisions: (1) War Intelligence; (2) Operations (plans); and (3) Mobilisation (war arrangements). The War Staff discharges no administrative duties, and its functions are entirely of an advisory character, but it is hoped that by providing accurate information the work of the First Naval Lord will be greatly assisted. Moreover the arduous work of the Third and the Junior Naval Lords has been lightened by the creation of an additional permanent Civil Lord, who has taken over the business of supplying stores, ammunition, etc., hitherto conducted by the two Lords named.

ADMIRALTY COURT, for the trial of maritime causes is believed to have existed in some form, so far back as Edward I.'s reign. It certainly existed as a civil court, with officers and functionaries, in Edward III.'s days. The original purpose in the institution of the court was to deal generally with cases of piracy, crimes at sea, and the distribution of prize-money. During times of war there was a special Prize Court (abolished in 1865). The functions of the High Court of A. are now exercised by the Probate, Divorce, and A. Division of the High Court of Justice, which has jurisdiction over cases of damage to cargo, salvage, bottomry (mortgage of ship) and wages; crimes committed on board Brit. ships; acts of piracy; also prizes taken in time of war.

ADMIRALTY GULF (13° S., 126° E.), large inlet, Kimberley division, W. Australia.

ADMIRALTY ISLAND (57° 30′ N., 134° 30′ W.), off Alaskan coast; belongs U.S.A.

ADMIRALTY ISLANDS (2° S., 147° E.), islands, New Guinea; largest, Manus; Ger. protectorate.

ADMONITIONISTS, upholders of a Puritan manifesto, 1572.

ADOBE, clay used for unburnt, sun-dried bricks in Span. America.

ADOLESCENCE, period between childhood and maturity; in males from about fourteen to twenty-four years of age; in females, twelve to twenty-one, during which time character is formed and physical development takes place.

ADOLPH OF NASSAU (d. 1298), Ger. king; subsidised by Edward I. of England to attack France, but left compact unfulfilled; deposed and killed in battle.

ADOLPHUS FREDERICK (1710–71), king of Sweden; s. of Christian Augustus, Duke of Schleswig-Holstein-Gottorp.

ADOLPHUS, JOHN LEYCESTER (1795–1862), Eng. judge; wrote *Letters to Reginald Heber* (1821); *Letters from Spain* (1858).

ADONAI ('Lord'), Jewish substitute for sacred name of Jehovah (*q.v.*).

ADONAIS, Shelley's poetic name for Keats (*q.v.*).

ADONI (15° 38′ N., 77° 12′ E.), town, India. Pop. 30,416.

ADONIJAH, 4th s. of King David; slain by Solomon.

ADONIS (classical myth.), youth of marvellous beauty, beloved by Aphrodite (Venus). He was killed by a boar whilst hunting, but such was Aphrodite's grief that he was permitted to leave the under-world for a portion of each year. From his blood sprang the ADONIS, a genus of European and Asiatic ranunculaceous plants with yellow or red flowers; known as pheasant's eye in England.

ADOPTION, act of taking a person into relationship which he or she does not naturally occupy; especially a. of children as sons or daughters; a. was common amongst Greeks and Romans and was subject to strict and well-defined laws.

ADOPTIONISTS, heretics who in VIII. cent. maintained that Christ was the Son of God, not by birth, but by *adoption*, and as being one with Him in character and will.

ADORF (50° 20′ N., 12° 15′ E.), town, Saxony. Pop. 5000.

ADORNO, plebeian family to which belonged several Doges of Genoa, XIV.–XVI. cent's.

ADOUR (43° 32′ N., 1° 32′ W.), river, France; flows through Hautes-Pyrénées, Gers, Landes, to Bay of Biscay.

ADOWA, ADUA (14° 20′ N., 38° 50′ E.), town, Abyssinia; trading centre; Italians defeated, 1896. Pop. *c.* 3000.

ADRA (36° 45′ N., 2° 59′ W.), port, Spain. Pop. 11,188.

ADRAR (20° 30′ N., 12° W.), various oases and hilly districts, Sahara.

ADRASTUS (classical myth.), s. of Talaus, king of Argos; leader in war of 'Seven against Thebes.'

ADRIA (45° 3′ N., 12° 13′ E.), town, Italy; in olden times a flourishing seaport; now 14 miles inland owing to silting of river Po; gave name to Adriatic (*q.v.*). Pop. 15,678.

ADRIAN (41° 57′ N., 84° 3′ W.), town, Michigan; wire-fence factories. Pop. (1910) 10,763.

ADRIAN, or HADRIAN (*q.v.*), Roman emperor.

ADRIAN, name of six popes; the first three of Roman birth; A. IV., Nicholas Breakspear (*q.v.*) (1154–59), only Englishman ever elected Pope.

ADRIAN, SAINT (d. *c.* 300 A.D.), whilst serving as Prætorian guard under Emperor Galerius Maximian was converted to Christianity and suffered martrydom for his faith; patron of soldiers; festival, Sept. 8.

ADRIANOPLE (41° 20′ N., 27° E.), vilayet, Turkey; area, 15,000 sq. miles; mountainous; silk industry. Pop. *c.* 1,000,000.

ADRIANOPLE (41° 40′ N., 26° 37′ E.), capital, A., Turkey; fortress; commercial centre; silk and textile manufactures; exports opium, scent, fruits; fine mosque, palace, bazaar; took name from Emperor Hadrian, who embellished it; Ottoman capital till fall of Constantinople, 1453; besieged by Russians (1878); taken by Balkan Allies, March 26, 1913, after siege of 155 days. Pop. *c.* 80,000.

ADRIATIC SEA (43° N., 15° E.), arm of Mediterranean (*c.* 450 miles long) between Italy and shores of Austria-Hungary, Montenegro, Albania; little tidal motion; for Queen of A., see VENICE.

ADULLAM (*c.* 31° 36′ N., 35° 1′ E.), town, Canaan; twice refuge of David.

ADULLAMITES, the 'cave' or group of Liberals who seceded in 1866 on Franchise Bill; so named by John Bright (see *1 Samuel* 22).

ADULTERATION OF FOOD.—Under the Sale of Food and Drugs Act (1875), and its amending Acts (1879 and 1899), it is an offence to knowingly adulterate any article of food, intended for sale, with any ingredient or material that would render it injurious to health, or in the case of a drug, that would affect its quality or potency. It is likewise an offence to sell to the prejudice of the purchaser any article of food or any drug which is not of the nature, substance, and quality of the article demanded.

The a. of foods is by no means a merely modern offence. There are references in ancient Latin writers to the admixture of white clay with flour; and in England, as far back as the XII. cent., public proclamations were made regarding the a. of bread. Yet the practice continued, and not only were bakers the offenders, but vintners, pepperers, and other tradesmen. Then, at a later date, after the introduction into England of tea, coffee, and cocoa, these articles were adulterated with foreign ingredients on a very large scale. As late as the early years of the XIX. cent. it was customary to adulterate beer with molasses, vitriol, and numerous other substances.

In the early fifties of the XIX. cent. Dr. Hassall was commissioned by the *Lancet* to undertake investigations into the composition of food-stuffs, and the results were found to be so alarming that a commission was appointed to inquire into the subject further. The recommendations of this commission resulted in the passing of the Adulteration of Food and Drugs Act (1860), which, however, was found non-operative,

and it became necessary to pass an additional Act which prescribed a penalty of £50 for a., with imprisonment with hard labour for a second offence. By the existing Sale of Food and Drugs Act (1899) the use of sugar and chemical preservatives is allowed (provided they are not injurious). To produce the greenness in tinned peas sulphate of copper is now generally used. For a long period butter was largely adulterated with foreign fatty matter, but by the passing of the Margarine Act (1887) it was made compulsory that every package of this substance be branded on top, bottom, and sides with the word 'Margarine' in capital letters at least three quarters of an inch square. If exposed for sale by retail it must bear a label with letters at least an inch and a half square. Foreign wines for the Eng. market were at one time largely adulterated, with the result that the trade languished and the growers suffered considerable loss thereby. It may be noted that whisky was formerly manufactured entirely by means of pot-still distillation, but since the introduction of the patent-still it has been found that a stronger spirit can be produced; and the admixture of malt whisky with crude spirit has produced a liquor which the public finds more palatable than pure malt whisky. Since 1879 it has been illegal to offer brandy, whisky, or rum for sale at a greater reduction than twenty-five degrees below proof, or gin below thirty-five degrees. A. sometimes takes place without the knowledge of the manufacturer. Thus in the summer of 1900 upwards of 5000 persons (beer-drinkers) were found to be suffering from arsenical poisoning, and a number of deaths occurred. This was found to have arisen from the use of a glucose preparation in which the ingredients supplied to the brewers were of an inferior quality and contained a large percentage arsenic.

In U.S.A. food is inspected in most States. There are laws defining purity in certain foods, and by the *Pure Food Act*, 1906, penalties are imposed upon any who convey from State to State, or to foreign countries, foods, liquors, confectionery, drugs, etc., which are adulterated or misbranded (as judged by specific definitions).

ADULTERY, illicit sexual intercourse of married person with another than his or her spouse; the Eng. law is that wife's a. constitutes ground for divorce (*q.v.*), but in the husband's case it must be shown to have been bigamous or incestuous, or be otherwise complicated by cruelty, or two years' desertion. In Scotland a. is ground for divorce, irrespective of sex.

AD VALOREM (Lat. 'according to value'), duty levied by custom authorities on goods at their estimated value; opposed to specific duty which is according to the weight or size of goods.

ADVENT, solemn season of preparation for the Christmas festival, which has been observed by the Western Churches since VI. cent.

ADVENTISTS, SECOND, Amer. religious sects, followers of William Miller (1781–1849), who look to near future for the Second Coming of Christ. The millennium was expected in 1843. An offshoot, the 'seventh-day adventists,' fix no particular time for the Second Coming, observe Saturday as the Sabbath, and abstain from alcohol, tobacco, pork, tea, and coffee.

ADVENTURER, a mercenary soldier; an impostor or rogue. A merchant a. was a merchantman who boldly sought fortune in foreign parts in XVI. and XVII. cent's.

ADVERTISEMENT, the wholesale manner of obtaining publicity by means of notices in periodicals and newspapers, and by posters on public hoardings, is of comparatively recent date, but it has grown to such dimensions that colleges have been established for the purpose of training people as a. writers, and many well-known artists' works now figure as illustrated posters. Yet the custom of advertising in news-sheets dates back to the Cromwellian period. According to a writer in the *Edinburgh Review*, Feb. 1843, the *first* a. appeared in the *Mercurius Politicus*, Jan. 1652, but later research has shown that similar notices appeared in London newspapers during the years 1647 and 1648. These early a's referred chiefly to books or nostrums. An Act of 1712 imposed a duty on all newspaper a's, which was reduced in 1838 from 3s. 6d. to 1s. 6d. in Gt. Britain, and from 2s. 6d. to 1s. in Ireland. The tax, in 1851, is said to have produced over £175,000. The duty was abolished in 1853. France, Italy, Belgium, some of the Swiss cantons and certain States of America still impose a tax by means of licence charges on billposters and agencies.

Grant, *Newspaper Press* (1871) and articles in *Quarterly Review*, June 1855, and *Edinburgh Review*, Feb. 1843.

ADVOCATE, one who pleads a cause, particularly in a court of law; as a legal term the name is now only used in France, Scandinavia, and Scotland, the Scot. a. being equivalent to the Eng. barrister.—**Advocate, Lord**, Chief Counsel for the Crown and public prosecutor in Scotland and a member of the administration in power.—**Advocates, Faculty of**, collective term for the advocates practising at the Scot. bar; it is necessary to pass two examinations before admission to the body can be obtained, one in general scholarship and one in law; the first is dispensed with if applicant has taken the M.A. degree in a Brit. Univ.; fees about £330, devoted chiefly to the upkeep of the **Advocates' Library**, Edinburgh (founded, 1682), belonging to the Faculty of Advocates; over 500,000 books; entitled to a copy of every book pub. in United Kingdom.

ADVOCATUS DIABOLI, 'devil's advocate,' official (formally called *promotor fidei*, promoter of faith) app. by R.C. Church to state objections to any proposed act of canonisation, as opposed to the supporter, *advocatus Dei*; hence the modern colloquial use of the phrase for one who trumps up a case, or brings forward an untruthful accusation against another.

ADVOWSON, the right of presentation to an Eng. ecclesiastical benefice vested in the holder and heirs for ever; a's are either *presentative* or *collative*. In the former the patron presents his nominee to the bp. with the request that he be instituted to the vacant living; in the latter case the bp. is himself the patron. Before the passing of the Benefices Act (1898) there existed *donative* a's in gift of sovereign or other patron, without reference to bp.; these are now merged in the *presentative*.

ADYE, SIR JOHN MILLAR (1819–1900), Eng. general; served in Crimea and throughout Ind. Mutiny; wrote *Defence of Cawnpore*, *Review of Crimean War*, *Frontier Campaign in Afghanistan*, and other books.

ADYTUM, sanctuary in ancient temples to which only priests were admitted; most famous in temple of Delphic Apollo.

Æ, a letter invented by the Anglo-Saxons to represent the sounds of *a* in Mod. E. *hat* and *care*. It disappeared after the Norman Conquest, and its sounds are now represented by *a* or *e* (cf. *Alfred* for O.E. *Ælfred*, *there* for O.E. *thær*). In such words as *æsthetic* to-day, *æ* stands for the Greek *ai*, which is commonly represented in modern English by *e* (cf. esthetic for æsthetic).

ÆACUS (classical myth.), king of Ægina, s. of Zeus and Ægina; famed for justice; app. one of 3 judges of Hades.

ÆCLANUM (c. 41° 2′ N., 15° E.), ancient Samnite town, Italy; ruins remain.

ÆDILES, EDILES, Rom. magistrates having charge of buildings, baths, aqueducts, food supplies, and public games.

ÆETES (classical myth.), king of Colchis, f. of Medea (*q.v.*).

ÆGADIAN ISLANDS (38° N., 12° 15′ E.), off Sicily; largest, Favignana. Pop. c. 7000.

ÆGEAN SEA (38° N., 25° E.), portion of Mediterranean, archipelago between Greece, Asia Minor, and Turkey. Islands include Samos, Chios, Cyclades, Cos, Lesbos. See ÆGEUS.

ÆGEUS (classical myth.), king of Athens, s. of Pandion and f. of Theseus; when Theseus returned from Crete after death of Minotaur, he forgot to hoist white sails as signal of his success, and A., at sight of black sails, concluding his s. was dead, threw himself into sea, which has since been called the Ægean.

ÆGINA (37° 45′ N., 23° 30′ E.), island, Greece; ruins of old temple to Aphæa. A. was originally subject to Epidaurus; inhabited by Dorians from c. IX. cent. B.C.; became commercial state; introduced valuable coinage system; apparently joined Eretrian league; warred against Samos, VII. cent. B.C.; war with Athens broke out, 488, lasted till 481; Athenians worsted. After first Peloponnesian war, A. surrendered and became subject to Athens, c. 456 B.C.; Æginetans expelled, 431 B.C., when Athens founded cleruchy in A.; old inhabitants restored by Lysander at end of war; island was Spartan base of operations in Corinthian war; henceforward historically unimportant; dominated successively by Macedonians, Ætolians, Attalus of Pergamum and Rome; subsequently became Venetian colony; plundered by Barbarossa, 1537; ceded to Turks, 1718; town was capital of Greece, 1826-28. A. has sponge fisheries; chief town, Ægina. Pop. 4300.

ÆGINA (Zool.), see HYDROMEDUSÆ.

ÆGIR (Norse myth.), a sea giant.

ÆGIS (literally a goat skin), the shield of Zeus (Jupiter) made of the skin of the goat Amalthea; also applied to the breastplate or protection of Athene bearing the Gorgon's head; hence 'under the a.' is used figuratively for protection.

ÆGISTHUS (classical myth.), king of Argos; lived in adultery with Clytemnestra. Both were slain by Orestes (*q.v.*), s. of Agamemnon, whom they murdered.

ÆGIUM (38° 30′ N., 22° 5′ E.), coast town, Achæa, ancient Greece.

ÆGLE (classical myth.), one of Hesperides (*q.v.*).

ÆGOSPOTAMI (c. 40° 30′ N., 26° to 27° E.), river, Asia Minor; flows into Hellespont.

ÆGROTAT (Lat. 'he is ill'), term used at Universities to denote that a student is absent through illness.

ÆGYPTUS, s. of Belus; king of Arabia.

ÆHRENTHAL, COUNT ALOIS VON (1854-1912), Austro-Hungarian statesman; engaged in Diplomatic Service, 1877-1906; Foreign Minister, 1906-12; effected annexation of Bosnia and Herzegovina, 1908.

ÆKEN, HIERONYMUS VAN—known as BOSCH—(*c.* 1460-1518), Flemish painter, sculptor, and engraver.

ÆLFGAR (fl. 1050), Earl of Mercia; s. of Leofric and Lady Godiva.

ÆLFRED ÆTHLING (d. 1036), younger s. of Æthelred and Emma; claimed Eng. throne, but defeated and blinded by Earl Godwin.

ÆLFRED THE GREAT, see ALFRED.

ÆLFRIC (fl. 1000), early Eng. author; abbot of Eynsham, near Oxford; wrote *Homilies, Grammar and Glossary*, and *Lives of Saints*; called *The Grammarian*.

ÆLIA CAPITOLINA (31° 47′ N., 35° 15′ E.), town built on site of Jerusalem by Hadrian.

ÆLIAN (II. cent. A.D.), Gk. writer on military subjects; wrote treatise on drill and tactics, often translated.

ÆLIANUS, CLAUDIUS (fl. 200 A.D.), Rom. rhetorician; wrote on natural history, etc.; valuable quotations from prior writers.

ÆLLA (d. 588), king of Deira.

ÆLTRE (51° 56′ N., 3° 48′ E.), village, E. Flanders, Belgium.

ÆMILIA VIA, ÆMILIAN WAY (44° 30′ N., 8° 52′ E.), high road constructed by Romans, 187 B.C., from Rimini to Piacenza.

ÆNEAS (classical myth.), s. of Anchises and Aphrodite; m. Creusa, dau. of Priam, king of Troy. When Troy was in flames he carried away his f. and his household gods upon his shoulders, leading his s. Ascanius by the hand. His exploits, wanderings, and adventures are narrated in Vergil's *Æneid*. He is the legendary forefather of Romulus and Remus and the Julian *gens* in Rome, and is proverbial for his filial devotion (*pius Æneas*).

ÆNEAS SILVIUS, see PIUS II. and PICCOLOMINI.

ÆNEAS TACTICUS (IV. cent. B.C.), Gk. writer on military subjects, particularly fortifications.

ÆNESIDEMUS (I. cent. B.C.), Gk. sceptic philosopher; wrote *Pyrrhonian Principles*.

AENG (19° 40′ N., 93° 53′ E.), river and frontier town, Lower Burma.

ÆOLIAN HARP, musical instrument, consisting of strings of gut or silk stretched on box of thin deal or pine, on which the wind is allowed to play; name derived from Æolus (*q.v.*).

ÆOLIAN ISLANDS, Lipari Islands (*q.v.*).

ÆOLIANS, branch of Gk. race founded by Æolus (*q.v.*); originated in Thessaly, whence spread N. and S. and emigrated into Asia Minor.

ÆOLIS (39° N., 27° E.), Gk. colony, Asia Minor.

ÆOLOTROPIC, property of a body by which it reacts unequally to heat, light, electricity, and elasticity in different directions.

ÆOLUS (classical myth.), god of winds who dwelt in Æolian isle where he kept winds confined in caves; (2) king of Thessaly, s. of Hellen (*q.v.*); legendary ancestor of Æolians.

ÆON, infinite length of time; hence the tautological phrase, 'endless æons of time.' Among Gnostics (*q.v.*) one of a succession of powers conceived as emanating from God and presiding over successive creations and transformations of being.

ÆPINUS, FRANZ ULRICH THEODOR (1724-1802), Ger. natural philosopher; spent many years as prof. in St. Petersburg; made researches in electricity and magnetism, and wrote treatises on mechanics, optics, and astronomy.

ÆPYORNIS, gigantic fossil bird of Madagascar; eggs over a foot long.

ÆQUI, ancient Ital. people, N.E. Latium, subdued after long struggles by Romans, 302 B.C.

ÆRARII, inferior class of Rom. citizens, who had no vote, could not serve in army, nor fill office of magistrate.

ÆRARIUM, Rom. public treasury where accounts and moneys were kept, also brass tablets of the laws, and public documents.

AERATED BREAD, bread made without yeast; charged with carbonic acid gas; claims to be more nutritive and digestible than ordinary bread.

AERATED WATERS are charged with carbon dioxide at high pressure, occurring naturally in springs together with salts in solution, and frequently of medicinal value. They may be artificially prepared either through the effervescence produced by sodium bicarbonate and tartaric acid, with various flavourings, or by forcing compressed carbon dioxide from a steel cylinder into water, which is sold in bottles or syphons. See MINERAL WATERS.

W. Kirkby, *Evolution of Artificial Mineral Waters* (Manchester, 1902).

AERATION, process of charging with air, *e.g.* venous blood and plants. In plants the leaf is the organ by which a. is carried on, oxygen being taken in and carbonic acid gas expired in breathing, while in daylight there is another process of a., carbon being extracted from the carbonic acid in the atmosphere and oxygen being exhaled.

AERIAL, or antenna, or air wire, the elevated conductor or detector in wireless telegraphy (*q.v.*).

AEROBES, see BACTERIOLOGY.

AERODROME, course for aviation. See FLIGHT.

AERODYNAMICS, science of air in motion.

AEROLITES, see METEORITES.

AERONAUT, a balloonist; the word AIRMAN has been suggested for an aeroplanist.

AEROPHORE, a vessel carried by firemen and divers which renews expired air.

AEROPLANE, see FLIGHT.

AEROSCOPE, instrument through which air is drawn to extract dust, bacteria, etc., suspended in it.

AEROSTATICS, science of equilibrium under air pressure.

AEROTHERAPEUTICS, the treatment of disease by air or other gases. Pure air, under ordinary conditions, is of the greatest value in the treatment of phthisis, while it has a stimulating and tonic effect in all debilitated conditions. Cold, dry air is particularly beneficial in chronic catarrhal conditions of the lungs, and hot air, applied locally, has had good results in the treatment of lupus, and in inflammatory conditions of the nasal and laryngeal passages. Compressed air, when carefully regulated, is valuable in early tuberculosis, emphysema, anæmia, and heart disease because of its therapeutic and tonic effects, but in undue amount, as, for example, in the case of workers in caissons under compressed air, it has harmful results (see CAISSON DISEASE). Rarefied air, produced by exhausting glass bells, is employed locally to relieve congestion and inflammation by drawing blood to the surface of the body (the passive hyperæmia treatment), while the value of mountain air, which is, of course, rarefied, is well known. Oxygen is employed to relieve dyspnœa, cyanosis, and heart failure, and amyl nitrite specially for the spasm of angina pectoris; nitrous oxide, and the vapours of chloroform and ether are widely used as anæsthetics; while the vapours of sulphur and of mercury, absorbed by the skin, are used in the treatment of syphilis and of parasitic skin diseases.

AERSCHOT (50° 57′ N., 4° 49′ E.), village, on Demer, S. Brabant, Belgium.

AERTSZEN, PIETER (1507?–1575), 'Pietro Longo,' 'Lange Pier,' Dutch artist; painted famous Kitchen-pictures.

AESCHI (46° 39′ N., 7° 42′ E.), small town, Switzerland.

ÆSCHINES (IV. cent. B.C.), Gk. orator and statesman; speeches rank next to those of his rival Demosthenes; member of embassy sent to Philip of Macedon (347), whose policy he defended against Demosthenes; exiled to Rhodes.

ÆSCHINES (V. cent. B.C.), Athenian philosopher; friend of Socrates; wrote dialogues on virtue, riches, death, etc.

ÆSCHYLUS (525–456 B.C.), father of Gk. tragedy; b. Eleusis; fought in Grecian wars against Persia, and present at battles of Marathon, Salamis, Artemisium, and Platæa; began writing for theatre at an early age, and produced about seventy dramas, of which only seven survive: *The Suppliants*, *Persæ*, *Seven against Thebes*, *Prometheus*, *Agamemnon*, *Choephoræ*, and *Eumenides*. He was the greatest of Gk. tragic poets and differed from his rival Sophocles in that his plays deal with the larger issues of fate, and by their grandeur of conception, while Sophocles deals more particularly with the personal amenities of human life. Tradition tells that he was warned he would meet his death by the fall of a house, whereupon he retired to the fields and was killed by an eagle letting a tortoise fall on his bald head.

Eng. trans. by Lewis Campbell, and Robert and E. B. Browning.

ÆSCULACEÆ, family of trees including horse-chestnut (*q.v.*).

ÆSCULAPIUS (classical myth.), god of medicine; s. of Apollo and Coronis; f. of HYGEIA (health) and PANACEA (all-healing). A. searched out the hidden powers of plants and herbs, and discovered cures for the various diseases which afflict mankind. He was slain by Zeus with a flash of lightning for having restored several persons to life.

ÆSERNIA, ancient Samnite town, Italy; ruins remain.

ÆSIR (Scandinavian myth.), children of Odin, Thor, Freyr, etc., who figure in the Eddas (*q.v.*).

ÆSOP, Æsopus (VI. cent. B.C.), Phrygian fabulist and philosopher; originally a slave, but received his freedom from his master, Iadmon; travelled through Greece and Egypt, and resided chiefly at court of Crœsus, king of Lydia. The Delphians accused him of having stolen a sacred vessel from temple of Apollo, and put him to death by hurling him from a high rock, 561 B.C.; famous for the fables, which were narrated by him on various occasions, but never committed to writing.

ÆSOPUS, CLODIUS, celebrated Roman tragic actor; friend of Cicero, and of comedian, Roscius; amassed large fortune; last appearance, 55 B.C.

ÆSTHESIOMETER, instrument to measure sensibility of body to touch.

ÆSTHETICISM, generally applied to the pose of complete attachment to æsthetical principles, whose apostle was Wilde (*q.v.*); an absurd and ephemeral side-issue of the æsthetic movement represented by Keats, Tennyson, Rossetti, and Morris; cleverly burlesqued in Gilbert and Sullivan's opera, *Patience* (1881).

ÆSTHETICS (Gk. *aisthetikos*, perceptible by senses), applied by Baumgarten, XVIII. cent., to science of taste or beauty, though used more nearly in Gk. meaning in Kant's 'Transcendental Æsthetic,' dealing with the conditions of sensuous perception.

Plato, following his ideal theory, affirmed an absolute beauty, from which was derived the beauty of particular things; Beauty not clearly separated from the Good and the True. Aristotle defined the beautiful as a mean between extremes, and resolved it into order, symmetry, definiteness, and a certain magnitude relative to the perceptive capacity. Art aimed at immediate pleasure, with no ethical purpose. In modern times Baumgarten limited æsthetics to the confused conceptions from the senses; the clear conceptions of truth were apprehended by reason, the higher intellectual power. Lessing (*Laocoön*) distinguished the provinces of poetry and painting, and excluded from the plastic art the representation of the repulsive. Kant affirmed the subjectivity of beauty and defined it according to his categories; the beauty of art inferior to that of nature. According to Schelling, the identity of subject and object is clearly seen only in artistic perception. Hegel affirmed the beautiful to be the realisation of the abstract ideal; the appearance of the Idea in a sensuous medium. Schiller, Winckelmann, Fichte, and Herbart have also written on the subject. In Britain inquiry has been mainly concerned with the æsthetic emotion, regarding beauty either as objective, a single unanalysable attribute, or as a complex growth by association from simpler elements. The principal writings are those of Shaftesbury, Hutcheson, Burke, Reynolds, Alison, Reid, Stewart, Ruskin, and Spencer.

Æsthetic experience is characterised by a passive contemplative attitude, pure enjoyment free from painful elements of conflict or fatigue, detachment from practical interests and from arduous mental activity. Æsthetic judgments appear uncertain and subjective, yet on comparison show a certain degree of uniformity. In constructing a science of æsthetics, beauty is not to be taken as, like colour, an inherent physical quality, but as external to the sum of physical properties. It is derived from at least three sources, sense experience, form or relation of parts, ideal content. Allied to it are the conceptions of gracefulness, prettiness, the ludicrous and the sublime. Hence æsthetics must not assume an objective quality of beauty, but, returning to Kant, merely examine the æsthetic qualities of objects, *i.e.* their power to affect us in a certain desirable way. This involves the investigation of such problems as æsthetic

effect, the æsthetic attitude of mind as a whole, the relation of intellectual to æsthetic enjoyment, the importance of sight and hearing in æsthetic experience, and the part taken by the other senses. Examination must be made of æsthetic experiences, the rudimentary ones of children and savages, and those of artists and critics of specially developed tastes. The analysis of æsthetic objects is the work of the psychologist. Taking each source of beauty in turn, the sensuous factor requires the investigation of the æsthetic characteristics of sensations of sight and hearing, of fine gradations of colour and tones, and of their capacity for combination while retaining their separate individuality. The analysis of form deals with all combinations of elements yielding pleasing relations, with harmonies of colour, with symmetry, and with the influence of the feeling tones of combining elements on the pleasing character of the whole. Lastly, all that imagination adds to our æsthetic enjoyments must be examined, the concrete experiences associated with objects, the poetic contemplation which attaches fanciful meanings to natural objects, the variation of this factor among different peoples and individuals.

Closely connected with the æsthetic feeling are the complex sentiments of the sublime and the ridiculous. The feeling of the sublime is a peculiar emotion, aroused by the presentation to sense or imagination of immeasurable vastness in space or time, or of transcendent physical or moral power. It involves at first a vague bewilderment, then a kind of religious awe, a wondering pleasure in the immensity contemplated, a feeling of personal elevation. The feeling of the ludicrous is based on a sense of one's own superiority; in matters more purely intellectual it is excited by the incongruous or grotesque. Humour contains this feeling blended with sympathy.

Bosanquet, *History of Æsthetics*.

ÆSTIVATION (zool.), state of torpor undergone by some animals, *e.g.* snails, during the hot season, contrasted with hibernation; (bot.) folded arrangement of a flower bud before summer.

ÆTHELFLÆD, dau. of Alfred the Great; m. Æthelred, Earl of Mercia; sent expedition against Welsh; constantly in conflict with vikings.

ÆTHELFRITH (fl. 600), king of Northumbria; s. of Æthelric; m. dau. of Ælla, king of Deira; won great victory over Welsh at Chester, 614.

ÆTHELING, Anglo-Saxon term applied to those of noble or kingly birth, almost exclusively confined to sons of royal family of Wessex.

ÆTHELRED (d. 716), king of Mercia; ravaged Kent, and destroyed abbeys and churches; afterwards abdicated (704), and became abbot of Bardney.

ÆTHELRED I. (866–71), king of West Saxons; s. of Æthelwulf; won great victory over Danes at Ashdoun; succ. by bro., Ælfred the Great.

ÆTHELRED II., 'THE UNREADY' (968–1016), king of the English; succ. 979; 'unready' or 'redeless' means lacking in counsel; adopted foolish policy of buying off Danish invaders; m. Emma, dau. of Richard, Duke of Normandy, thus paving way for Norman Conquest.

ÆTHELSTAN (895–941), Saxon king; s. of Edward the Elder; grandson of Ælfred the Great; succ. 925; won brilliant victory at *Brunanburh* over allied Celts and Danes; praised by chroniclers as wise and vigorous ruler.

ÆTHELWEARD (c. 991), Anglo-Saxon historian; wrote Latin chronicle of Saxon kings to reign of Edgar, abridged from Bede's *Ecclesiastical History* and *Anglo-Saxon Chronicle*.

ÆTHER, ETHER.—From early times philosophers have recognised the necessity of the existence of some medium filling all apparently empty space; hence various 'æthers' have been supposed to exist, the properties of which varied according to the physical phenomena for whose explanation they were necessary. The only æ. theory to survive is the one invented by Huygens to explain the propagation of light. More recent work has shown that the properties necessary for the propagation of light are just those required for the explanation of electro-magnetic phenomena. The modern view is that the whole universe consists of a perfectly continuous, incompressible medium, as a whole completely at rest, frictionless and unresisting to the ordinary motion of matter through it. The medium possesses considerable rigidity, which property might be conferred on it if throughout the whole medium there exists a system of vortex filaments or rings of exceedingly small dimensions. The elasticity of the æ. is regarded as 'perfect.' The property of the æ. analogous to rigidity is probably electric in its origin, and it is accompanied by a quasi-inertia, which has to do with magnetism. The two properties together enable transverse electro-magnetic waves to be transmitted through it at a definite speed. The inertia of the æ. corresponds to density in the case of ordinary matter, and it is possible that the inertia or density of the æ. is exceedingly great, much greater than that of any known material.

IS THE ÆTHER AT REST?—The theory of a motionless æ. was at first unable to explain the negative results of Michelson and Morley's experiment (*Phil. Mag.* xxiv. [1887], p. 449), which seemed to show that the æ. near the earth was carried along with it; but FitzGerald's hypothesis overcame the difficulty. He supposed that the dimensions of material bodies are slightly altered when they are in motion relative to the æ. The idea has gradually extended, and is now generally taken as the basis of all theoretical investigations on the motion of ponderable bodies through the æ.

J. Larmor, *Æther and Matter*; O. Lodge, *Modern Views of Electricity*; Whittaker, *History of Theories of Æther and Electricity*.

ÆTIOLOGY, the philosophy of CAUSATION (*q.v.*).

ÆTION (*c.* 350 B.C.), Gk. painter; exhibited at Olympic games; referred to by Cicero and Pliny.

AETIUS.—(1) (fl. 350 A.D.) Founder of Anomœan sect of Arians. (2) (d. 454 A.D.) Rom. general; long defended Empire against Barbarians; defeated Attila at Châlons, 451; assassinated by Emperor Valentinian III., through jealousy.

ÆTNA, see ETNA.

ÆTOLIA (38° 35′ N., 21° 45′ E.), region, Greece. Central plain is agricultural district; N. and E. mountainous; highest peak, Kiona (8240 ft.). Inhabitants in IV. cent. B.C. formed **Ætolian League**, which was joined by several northern cities and attained control of central Greece; aided Syria against Rome; subsequently came under Rom. control; later held successively by Venetians, Turks, Greeks; A. with Acarnania (*q.v.*) forms department of modern Greece.

ÆTOLIKON, ANATOLIKON, coast town, Ætolia, Greece; currants.

AFAR, see DANAKIL.

AFFIDAVIT, declaration upon oath, in the form of a signed statement, affirmed before a magistrate or commissioner to administer oaths.

AFFILIATION, action taken by mother of a bastard child to secure support from its putative father; an order is usually made for an allowance of 5s. per week until child reaches age of thirteen; see Lushington, *Law of Affiliation and Bastardy*.

AFFINITY.—(1) Relationship of husband to wife's blood relations or of wife to husband's blood relations; distinguished from kinship (consanguinity); certain degrees prevent intermarriage; *Prayer Book* table of proscribed degrees confirmed for England by Act, 1835; modified by Deceased Wife's Sister Act, 1907.—(2) Metaphysical term for occult relationship.—(3) Chemical attraction of elements tending to formation of compounds.

AFFINITY, CHEMICAL, the attraction between certain elements to form compounds. See CHEMISTRY.

AFFIRMATION, solemn declaration by those (*e.g.* Quakers) who, on a point of conscience, refuse to take an oath (*q.v.*).

AFFORESTATION, see FORESTRY.

AFFRE, DENIS AUGUSTE (1793-1848), abp. of Paris; moderate man, killed at 'barricades' in appealing for peace.

AFFREIGHTMENT, contract by which a shipowner undertakes to carry goods for a merchant, or other person, at a fixed charge, called *freight*, and deliver same in good condition to port of destination, subject to such reservations as 'act of God,' shipwreck, attack of pirates, etc. The particulars of agreement are set forth in a Bill of Lading (B/L), furnished by the shipowner to the shipper.

AFFRONTÉ, heraldic term—facing the front.

AFGHANISTAN, country, Central Asia, extends from 30° to 38° 20′ N., from 60° 30′ to 74° 30′ E.; greatest length from E. to W. *c.* 600 miles; from N. to S. *c.* 500; area, *c.* 230,000 sq. miles; bounded on W. by Persia, N. by Russ. Turkestan, E. by tribes under Brit. influence and India, S. by Baluchistan. Main features are sand, rocks, hills, snow-topped mountains; surface rugged, much of it covered by offshoots from Hindu Kush, Koh-i-baba, Safed Koh, Siah Koh, and Sulaiman Mountains; plateaus between vary from 4000 to 7000 ft.; temperature depends on elevation; climate in higher districts very hot in summer, very severe in winter; N. drained by Oxus and tributaries, N.W. by Murghab and Hari-Rud, S. and S.W. by Helmand and Argandab, S.E. by Kabul, Kuram, and Gumal. Rainfall is slight; many valleys fertile, producing fruits and grain; two harvests every year; castor-oil plant, madder, and gum-yielding plants abound. Fauna includes leopards, jackals, tigers, bears, gazelles.

History.—In V. cent. B.C. A. was occupied by Sarangians, Arians, and other peoples. In IV. cent. Kabul valley invaded by Alexander the Great; in III. cent. Gk. dynasty founded at Bactria, power probably extending throughout Afghanistan; country under Rom. control for time, subsequently passing to Parthians, Persians, Saracens in succession. In X. cent. A.D. Kabul was owned by Turk, Sabuktagin, who made Ghaznai capital, descendants ruling till XII. cent., when another dynasty, said to be first of Afghan race, was founded by Alanddin. A. was for short time subject to Khwarizm; conquered by Jenghiz Khan, middle of XII. cent.; remained under Mongol control for over cent.; conquered towards end of XIV. cent. by Timur, Oriental conqueror, remaining in hands of his descendant till 1501; another descendant, Baber, took Kandahar, 1522; from 1526 Kabul and Kandahar formed part of Mogul Empire of Delhi founded by Baber. In 1738 Nadir Shah conquered A.; after his murder, 1747, Ahmad Khan became king; founded Durani dynasty. In first half of XIX. cent. Dost Mahommed of Kabul tried to obtain Brit. aid against Persia; but British, suspecting him of treachery, waged war against him, dethroned him, and restored Durani ruler, Shah Shuja. This led to conspiracy; massacre of British occurred, 1841; British had to make treaty with Afghans and evacuate country. Second Afghan war broke out, 1878, in consequence of Amir Shere Ali's refusal to receive Brit. mission; British invaded A., Nov.; Amir soon fled; treaty made with s., Yakub Khan, whereby Britain attained control of Afghan foreign policy and stipulated for residence of envoy at Kabul. Soon afterwards Brit. resident, Cavagnari, and others were massacred; troops again sent; Kabul, Kandahar, and Ghaznai taken, Yakub Khan imprisoned. British recognised Abdur-Rahman as Amir, 1880; almost immediately, Ayub Khan, bro. of Yakub Khan, raised army, defeating British at Maiwand; routed by Roberts, and subsequently by Abdur-Rahman, 1881. Following years were marked by differences between Russia and Britain concerning Afghan northern boundary; settled by diplomacy, 1885. Abdur-Rahman remained loyal to Britain; succ. by Habibullah, 1901.

Mineral resources await development. Chief industries are manufactures of silk, carpets, woollen cloth, postins (sheepskins made for soft pelisses), camel- and goat-hair fabrics; exports silk, carpets, madder, gums, fruits, grain, cattle; imports cotton fabrics, dyes, sugar, tea, etc.; large transit trade from Persia, Turkestan, India, to Herat and Kabul. Transport is by camels and horses; no good roads except Brit. military roads; short railway at Kabul; rivers not navigable. Chief towns: Kabul, Kandahar, Herat, Ghanzi. Pop. *c.* 4,000,000, of whom *c.* 3,000,000 are Pathans. Prevailing language is Pushtu; Persian is spoken by many of non-Pathan inhabitants, and is court language. Religion is Muhammadan. Education is still in elementary state. Government is in hands of hereditary absolute monarch, called the Amir, whose council consists of sirdars, khans, and mullahs. Country is politically divided into five provinces, Kabul, Turkestan, Herat, Kandahar, Badakshan, each under gov. Army consists of about 50,000 regular troops. See PERSIA.

Hamilton, *Afghanistan* (1906).

AFGHAN TURKESTAN (36° N., 66° E.), province, Afghanistan; area, *c.* 57,000 sq. miles; chief town, Mazar-i-Sharif; dependency of Kabul. Pop. *c.* 750,000.

AFIUM-KARA-HISSAR (38° 46′ N., 30° 29′ E.), town, Asiatic Turkey. Pop. 18,000.

A FORTIORI (L.), from more conclusive reasoning; still more.

AFRAGOLA (40° 45′ N., 14° 25′ E.), town, near Naples, Italy; straw hats. Pop. 22,000.

AFRANIUS, LUCIUS (fl. 100 B.C.), Latin comic poet; introduced national scenes on Rom. stage.

AFRANIUS NEPOS, Rom. general and consul (60 B.C.), supporter of Pompey.

AFRICA, most southerly and second largest continent of Old World, extends from 37° 21′ N. to 34° 51′ S., and from 51° 27′ E. to 17° 33′ W.; greatest length, *c.* 5000 miles; greatest breadth, *c.* 4500 miles; area, *c.* 11,800,000 sq. miles. A. approaches Europe at Strait of Gibraltar, N.W. corner, and touches Asia at Isthmus of Suez in N.E. corner. Off S.E. coast is large island, Madagascar; Canaries off N.W. coast; coast-line singularly unbroken, length about 16,000 miles; principal inlets, Gulfs of Cabes and Sidra on N., Gulf of Guinea with Bights of Benin and Biafra on W. Land rises rapidly from coast; from fairly continuous outer rim of mountains greater part of surface spreads inwards in two tablelands, of which the southern has mean elevation of over 3500 ft. and slopes down to northern, which has mean height of *c.* 1300 ft.; latter in some parts falls still lower, part of N.E. Sahara being below sea-level. Higher plateau has number of ridges, and in equatorial regions are many craters of extinct volcanoes, such as Kilima-Njaro (20,000 ft.) and Mount Kenia (18,500). Chief mountain ranges near coast are Atlas on N. and Drakensberg, S.E. Along eastern part of plateau are many large lakes: Lake Rudolf, Albert Nyanza, Albert Edward Nyanza, Victoria Nyanza, Tanganyika, Mœro, Bangweolo, Nyasa.

N.E. is drained by Nile and tributaries, S.W. by Zambesi, Shiré, Limpopo, etc.; principal W. coast rivers, Senegal, Gambia, Volta, Niger, and Benue, Ogowe, Congo, Kwanza, Kumene, Orange, Vaal.

Rainfall is slight except near Equator and parts of coast; rainiest region, W. of Mount Kamerun; interior exposed to dry winds, known variously as *sirocco*, *khamsin*, *harmattan*; tropical districts unhealthy. Typical flora: date-palm in Sahara; mangrove on coast; india-rubber trees, copper plants; many orchids, and in S. heaths. Fauna includes lions, leopards, panthers, jackals, hyænas, elephants, rhinoceri, hippopotami, giraffes, camels, buffaloes, zebras and antelopes, baboons, gorillas, crocodiles, pythons, ostriches, secretary birds, locusts, and tsetse flies, many of which are peculiar to A.

Geologically, A. is old, and its stability is disturbed neither by great earthquakes nor by volcanic eruptions. Slight earthquakes at times disturb the (comparatively

new) Atlas regions, and volcanic eruptions the coast-lands round the Bight of Biafra, and an eastern belt from Kilima-Njaro to the Red Sea. A vast connected but irregular area (the bulk towards the east) is covered by archean rocks, gneisses, schists, and granites; recent deposits cover the greater part of Fr. W. A., and parts of Algeria, Tunis, and Tripoli; and Cretaceous rocks bulk largely on the Moroccan coast and parts of Tripoli and Egypt.

Political Divisions.—Africa has been parcelled out among Britain, France, Germany, Belgium, Italy, Portugal, Spain. Britain possesses Basutoland, Bechuanaland, East Africa Protectorate, Gambia, Gold Coast, Lagos, Nigeria, Nyasaland, Rhodesia, Sierra Leone, Somaliland, Swaziland, Uganda, Union of South Africa (Provinces of Cape of Good Hope, Natal, Orange Free State, and Transvaal), Walfish Bay, Zanzibar, and has in her sphere of influence Egypt and Egyptian Sudan; total area about 3,600,000 sq. miles. France has Algeria, Fr. East Africa, Fr. Equatorial Africa, Fr. West Africa, Madagascar, Sahara, Tunis, and Protectorate in Morocco, in all *c.* 4,000,000 sq. miles. Germany has Ger. East. Africa, Ger. South-West Africa, Kamerun, and Togoland (Upper Guinea), about 1,000,000 sq. miles. Belgium has Bel. Congo (formerly Congo Free State), 900,000 sq. miles. Italy has Erythrea, Tripoli, and Italian Somaliland, about 600,000 sq. miles. Portugal has Angola, Portug. East Africa, and Guinea, about 790,000 sq. miles. Spain has Rio de Oro and Muni River Settlement, about 90,000 sq. miles. Abyssinia with 370,000 sq. miles, Liberia with 52,000 sq. miles, are independent states. Total pop. *c.* 164,000,000.



Peoples. — Majority of inhabitants are negroes, of whom two main groups occur—negroes proper in northern half and Bantus in S. of continent. Negroes proper have many different languages, while Bantus all speak Bantu dialects. Other inhabitants include Bushmen, Eastern Hamites, Libyans, Semites, while intermingling has resulted in large number of tribes of mixed race. Bushmen are brown nomadic race of hunters, and with the Hottentots, who are said to be racially akin to them, formerly inhabited Cape Colony, but were driven north to Kalahari desert; Libyans, or Berbers, white race, occupy Algeria and Morocco; and Semites, or Arabs, are found in E. and N.E. Semito-Hamites chiefly inhabit Abyssinia. Equatorial regions from Uganda to the Gabun are inhabited by Pygmy people, dark brown race of hunters concerning whom little is known. Original African stocks are generally supposed to have been negroes and bushmen, of whom former probably had original home near the large lakes, while latter have been put down as primeval inhabitants of southern regions. Hamites apparently spread from Horn of Africa, and enforced emigration of negroes whose subsequent mingling with Bushmen probably produced Hottentots. Libyans coming from N. also intermingled with negroes, which resulted in production of Fulas. A most important migration was that of Zulu tribes towards N., chief tribes being Matabele and Angoni. Madagascar was early occupied by Malayo-Indonesian race known as Hova, who are still chief group of its pop., others being Malagasy and Negroid tribes.

History — Ancient Times. — When the Greeks visited the southern continent they found the two civilised states of Egypt and Ethiopia planted at the corner of a vast country which they named LIBYA; they drew their knowledge of Libya principally from Egyptians and Carthaginians. Herodotus relates that an Egyptian king was said to have sent out an expedition, *c.* 610 B.C., which circumnavigated Africa. The Romans named this country AFRICA, adopting the Carthaginian word, which may have meant colony or been derived from *pharikia*, country of fruit, or from name of Berber tribe of Aouraghen, formerly *Aouragha* pronounced Africa).

A., excepting the northern strip, is a continent without a history; ethnology goes to prove that primitive population consisted of pigmies, who still remain in Central Africa; negroes believed to be immigrants who entered from Arabia; immigrants from Asia are supposed to have conquered original population of Upper Egypt before being subdued themselves by Negada dynasty in IV. millennium B.C. Egyptians, Phœnicians, and Greeks established first settlements known to history. EGYPT conquered by Persians, 525, submitted to Alexander the Great, 332, and remained under Macedonian rule till 30, when it was conquered by Rome and became province of Egypt. Greeks founded famous city of Cyrene, near Egyptian frontier, in VII. cent. B.C.; it became head of district CYRENAICA, over which Ptolemies of Egypt established suzerainty, 322; leadership of African civilisation passed from Cyrene to Alexandria; district annexed by Rome, *c.* 95; revolts quelled, 67, after which it was formed into province with Crete; 200,000 Greeks and Romans in Cyrenaica massacred by Jews in time of Trajan, who laid waste country; consequently Hadrian founded new colony, Adrianopolis, there.

PHŒNICIANS, Semitic race so named by Greeks, made settlements in North-West Africa in III. millennium B.C. Utica, their early capital, was flourishing about 2000, and CARTHAGE ('New Town') was built towards close of IX. cent. B.C.; opposed Gk. commercial and colonial encroachment; aided Persians, but received defeat by Gelo at *Himera*, 480; won hegemony over North African tribes about this time; made treaties in IV. cent. with Rome, which recognised Carthaginian rule in Libya and Sardinia; First Punic War, 264–241, by which Carthage lost Sicily; Rome established suzerainty by Second Punic War, 218–201; Third Punic War, 149–146, resulted in destruction of Carthage and formation of Roman province of AFRICA, 146. West of the Carthaginian state were nomad Ethiopian settlement of NUMIDIA (now Algeria), whose monarchs claimed descent from Hercules, and, west of Numidia, the nomad state of Mauretania (now Morocco); eastern Numidia was annexed by Rome and named AFRICA NOVA, 46, but Mauretania remained independent; habit grew of calling all North Africans *Mauri* or Moors.

North Africa.—The history of northern Africa can now for several cent's be divided into periods of rule by different conquerors—

(1) *Roman Rule.* — The African province was governed by a prætor or pro-prætor; after establishment of New Africa, a proconsul governed both countries; Caligula divided them, 37 A.D., giving charge of frontier harassed by Moors to *legatus pro prætore* and leaving east with proconsul; district formed into four provinces by Diocletian under gov's of different standing; these four with Mauretania Sitifensis and Mauretania Cæsariensis became diocese of Africa under rule of legate of pretorian prefect of Italy; most completely Romanised of all Roman provinces; Christianised; large cities were heads of many bishoprics and produced famous fathers, Tertullian, Augustine, etc., who moulded Latin Christianity, and philosophers such as Apuleius; home of numerous sects which split Early Church; notorious also for luxury and vice.

(2) N. Africa was easily conquered by VANDALS, who landed in great numbers, 429; treaty by which only Mauretania and western Numidia remained to Rome, 442; invaders hated as Arians, never fused with conquered, and were finally overthrown by East Roman (Byzantine) armies under Belisarius, 534; province placed under prætorian prefect, who was also *magister militiæ*.

(3) *Arabian Rule.* — Egypt conquered, 641, by Muhammadans, who drove Byzantines from N. Africa by end of cent. and extended empire into Spain, 712; they were absorbed by conquered population and made permanent home; many Berbers remained distinct, accepted Muhammadanism, and became rivals of Arabs; conquest of Spain largely due to Arabicised Berbers and Mauretania (Morocco) shared in brilliant Moorish civilisation of Spain; invaders were nomads and pressed farther south than Romans had done, trading with Sudan. Arab empire soon broke up; Morocco, preponderatingly Berber, became separate Arab state with capital at Fez (founded 806), and other districts followed; reunited under Zeirites of Egypt at close of X. cent., but there were frequent risings, especially of Morocco. NORMANS captured coast-line from Cape Bon to Tripoli, 1146–48, but all Christian inhabitants were expelled, 1159; Tunis became finally independent, 1206, TLEMCEN (nucleus of future Algeria), 1248, Morocco, 1269; Christian crusaders repelled by fleets of these 'Barbary States' until XVI. cent.; capitulation of Granada to Spain, 1491, led to great influx of Moors, who continued war from their new homes and were punished by Span. invasions; Algiers and Tripoli were conquered by Spain, 1510; Tunis sacked, 1535.

(4) *Turkish Conquest.*—The Turks had already taken from Arabs leadership of Islam and seized many of their states; Egypt fell, 1517, and they subsequently established regencies of Algeria, Tunis, and Tripoli; Morocco continued independent development as purely African state, extending south, 1588, and occupying Timbuctoo. North Africa lost prosperity during Turk. occupation, but Span. inroads were stopped and Barbary states freely exercised daring piracy until XIX. cent.

(5) *French Conquests.*—N. Africa was object of Christian concern from VII. to XIX. cent. Napoleon heralded occupation by conquest of Egypt; French invaded Algeria, 1827, subdued province after 30 years' fighting, and occupied Tunisia, 1881; in 1904 Britain recognised Fr. pre-eminence in Morocco; Germany refused to do so, but at last followed suit, in return for part of Fr. Congo, 1911; Spain also secured several ports and districts in Morocco. Franco-Turkish Boundary Commission, 1910–11, surveyed western frontier of Tripoli. France has extended influence south over Sahara, and recently M. Bonnel de Mézières has discovered grave of Major Gordon Laing, who reached Timbuctoo, but was murdered there, 1826. Egypt after Napoleonic conquest and Brit. occupation again became a Turkish state and extended S. in eastern Sudan; Britain and France established, 1882, a Dual Control, abolished 1883; since occupied by Great Britain. The Turco-Italian War, 1912, gave Italy Tripoli and Cyrenaica.

Central and South Africa.—The history of the DARK CONTINENT is that of exploration and colonisation.

(1) *Egyptian.*—Egyptians had knowledge of Ethiopia; not certain how far they progressed up Nile; expedition sent by Red Sea, *c.* 1200 B.C., to 'Punt.' Expedition, *c.* 610 B.C., round African Continent remains doubtful. (2) *Phœnician.*—It is suggested that gold-country called *Ophir* in Bible was that of Zambesi; west coast explored to south of Sierra Leone. (3) *Alexandrian.*—Under Ptolemies, Abyssinia was explored; map of Ptolemy the astronomer, *c.* 140 A.D., shows increased knowledge of E. coast and sources of Nile; he drew the great lakes and the Nile rising in Mountains of the Moon; possibly explorers of that date possessed knowledge lost until

late XIX. cent. (4) *Arabs* founded cities in Abyssinia and Sudan, and traded as far as mouth of Zambesi.

(5) *Portuguese*, 1415–1580. — Prince Henry the Navigator captured Ceuta, 1415, and Portuguese began to descend west coast; endowed by pope with country between Cape Bojador and Indies, 1443, when gold and slave trades began; equator crossed, 1471; Portug. sovereign assumed title 'lord of Guinea'; first colony, 1482; Congo reached, 1484; Cape of Good Hope doubled by Diaz, 1488; Abyssinia explored by Covilham; Vasco da Gama sailed by Cape to India, 1498; east coast from Delagoa Bay to Gulf of Aden settled, 1505–20; alleged cession of mining rights by 'Emperor of Monomotapa,' 1630 (?), but Portug. trade decayed after annexation by Spain, 1580; power destroyed by Arab risings, etc.

(6) *European Powers* to 1876. — First English reached Gold Coast, 1552; Eng. African Co., chartered 1588, sent several expeditions to Gambia in search of Timbuctoo; British Co. received charter, 1662, Royal African Co., 1672, African Company of Merchants, 1750. Holland established forts on west coast from 1595 and became deadly rival of all other powers in XVII. cent.; chief settlement at Cape Town, 1652; French spread up Senegal; Prussians established forts on W. coast, Austrians on east. Great change brought about at close of XVIII. cent. by anti-slavery agitation; trade forbidden to Dan. subjects, 1792, to British, 1807; quickly abandoned by other powers; Republic of Liberia founded for freed slaves and natives, 1820.

Modern SCIENTIFIC EXPLORATIONS commenced with Bruce's journey up Blue Nile, 1770–72; London 'African Association' (absorbed by Royal Geographical Soc., 1831), founded 1788, sent out Mungo Park, who reached Niger, 1795; Dutch finally ceded Cape Colony to Britain, 1814; unsuccessful expedition to Congo, 1816; brothers Lander discovered mouth of Niger, 1830; Brit. influence established there; Dutch from Cape Colony founded Transvaal, 1852, Orange Free State, 1854; Natal became separate Brit. colony, 1856. Missionary enterprise started modern 'scramble' for Africa; Burton, Speke, Grant, and Baker found traditional great lakes of interior, 1858–64, but it was David Livingstone who opened up Central Africa, 1849–73, reaching Lualaba.

(7) *Partition of Africa* dates from *Brussels Conference*, 1876. Lead in new development was taken by Leopold II., king of the Belgians, whose name will always be connected with opening up of Congo. Conference resulted in foundation of International African Association; headquarters, Brussels; practically a private enterprise of King Leopold. Stanley's journey to find Livingstone resulted in his reaching the Congo; sent out by I.A.A. Committee for Exploring the Upper Congo, 1879; established Leopoldville and other stations; Brazza, sent out by French, commenced marking out Fr. stations on Congo, 1880; Portugal revived ancient claim to this region, 1882, and obtained guarantee of part from Britain, 1884; Lord Granville, however, was compelled to repudiate this treaty; international *Berlin Congress* resolved upon.

Relation of powers, 1884: France held Algeria and Tunis; France and Germany were attempting to oust Britain on Niger; France won upper, but Britain kept lower, stream. Britain had consolidated rule in S. Africa; Bechuanaland secured, 1884; influence supreme in Nyassaland, Matabeleland, Zanzibar. Ger. African societies founded in the eighteen-seventies concentrated ambitions on Niger and Congo, west coast trading stations, and trade with Zanzibar; encroachment in S. Africa; annexation of Angra Pequena, 1884, first important step of Ger. colonisation; Ger. protectorate of Togoland and Kamerun established 1884. *Berlin Congress*, 1884–85, agreed on: (1) free trade to all nations in Congo basin, on W. coast 2° 30′ N. to 8° S., on E. coast 5° N. to Zambesi, and along certain route from Zambesi to Congo. (2) Free navigation of Niger. (3) Occupation to be valid must be effective.

Leopold II. became king of Congo Free State, 1885, and bequeathed it to Belgium, 1889; it was annexed by Belgium, 1908; Portugal on W. and Britain on S. at first disputed present boundary; Belg. aggression to N. resulted in Belg., Fr., and Brit. struggle for Upper Nile; Germany (in return for concessions in S. Africa) recognised western watershed of Upper Nile as western frontier of Brit. influence, 1890; Leopold II. confirmed this, 1894, in return for leases to which Germany and France objected; France occupied Fashoda, 1898; Egyptian government assisted by British obtained abandonment of Fr. claims, 1899, when boundary between Fr. and Brit. spheres of influence was agreed on; Belgium surrendered lease of Bahr-el-Ghazal, 1906. Growing rivalry of Germany showed itself; secret mission of Peters, 1885, when he founded German East Africa Co. and annexed Zanzibar with approval of Britain. Britain established colony of British East Africa, 1888–95, Uganda, 1890. British South Africa Co. chartered 1889 for development of territory now known as Rhodesia. After Boer War broke out, 1899, Orange Free State and South African Republic were annexed (1900) by Britain, becoming Orange River Colony and Transvaal Colony. These two colonies with Cape of Good Hope and Natal form UNION OF SOUTH AFRICA under South African Act passed by Parliament (September 20, 1909), the names of constituent provinces standing as Cape of Good Hope, Natal, The Transvaal, and Orange Free State.

Italy established influence over Eretrea and Somaliland, 1870–91; France established colonies of Fr. Somaliland, 1856–87; Brit. Somaliland dates from 1884; Italy forced to recognise Abyssinian independence, 1896. Division of Guinea Coast between Portugal, Britain, and France was settled by treaties, 1885, 1886, 1892, 1907. Brit. Royal Niger Co. received charter, 1886; Britain recognised Fr. influence on Upper Niger, 1890; new agreement, 1899, granting concessions to France on Niger; Brit. Southern and Northern Nigeria formed, 1900.

LATER EXPLORATIONS. — After Stanley's travels Central Africa was explored by Hungarian scientist Holub, Keith Johnston, Thompson, Portug. Major Pinto and his assistants, Ivens and Capello, who explored Upper Zambesi (1877–84), and by Ger. expeditions under Pogge and Wissmann (1880–5), which have contributed much to knowledge of sources of Congo, also explored by Giraud, 1884, Grenfell, 1885, Lemaire, 1895–1900. Major Gibbons carried out surveys of upper and middle Zambesi, 1895–1900; district north of Zambesi and east of Congo explored by Thomson, 1878–84, and Giraud, 1882–84. Equatorial Nile region was explored by Meyer, 1887, Teleki and Höhnel, 1887–89, Emin Pasha and Dr. Stuhlmann, 1891, Götzen, 1893–94, Dr. Gregory, 1893, Scott Elliot, 1893–94, Hobley, 1896, Wollby, 1898–99, Mackinder, 1899, Donaldson Smith, 1899–1900, Austin, 1899–1901, Johnston, 1900, David and Behrens, 1903, Whitehouse and Powell-Cotton, 1904–6, Major Darley, Lieut. Aylmer, Dr. Kirchstein recently. Foucauld explored Morocco, 1883–84, and French have sent expeditions from Algeria and Senegal across Sahara to Upper Nigeria, etc., 1887–89 (Binger), 1890–92 (Monteil, Mizon, Crampel), 1896 (Gentil), 1900 (Foureau), 1903–7 (Lenfant). Brit. commission under Lieut. Boyd Alexander crossed from Niger to Nile, 1904–6; his death followed by expedition of Miss M'Leod and Mr. and Mrs. Talbot, 1910–11. Abyssinia, Somaliland, etc., were explored by the James brothers, 1883, Bottego, 1892, Donaldson Smith, 1894–95. The African Continent was first crossed from S. to N. (Cape to Cairo) by E. S. Grogan, 1898–1900. See also SOUTH AFRICA and articles on separate states.

Sir H. H. Johnston, *History of Colonisation of Africa* (1899); Keltie, *Partition of Africa* (1895); Brown, *Story of Africa and its Explorers* (1892–94); Stanford's Compendium, *Africa*; Stewart, *Dawn in the Dark Continent* (History of Missions); Lucas, *Historical Geography of British Colonies*; Colvin, *Africa* (Romance of Empire Series).

SOCIAL AND ECONOMIC CONDITIONS.—A. long remained isolated from great world trade, partly because there was no way of communicating with interior of continent, but also because of unhealthy districts round coast, and inactivity of natives. Of these drawbacks first hardly exists any longer, and second has been greatly ameliorated. Progress of civilisation has led to increase of trade. A.'s chief resources are: jungle products, such as indiarubber, oil, timber of various kinds, gums, and nuts; fruits; cultivated plants, such as coffee, cotton, sugar, cereals, and tobacco; ivory, hides, wool, ostrich feathers, and other animal products; and minerals, such as gold, diamonds, tin, copper, iron, antimony, phosphates, lead. Means of communication have improved, and railways have been greatly extended. A trans-continental railway from Cape to Mediterranean is in process of construction. Telegraphic system is also well developed.

Africa, Rom. Province of, province formed from African empire of Carthage, annexed by Rome, 146 B.C.

AFRICAN LILY (*Agapanthus umbellatus*), belonging to the order Liliaceæ, native of S. Africa, is cultivated in a number of varieties for its umbel of blue or white funnel-shaped flowers.

AFRICANUS, JULIUS (III. cent.), Christian historian and chronologist.

AFRIDIS, Afghan and Pathan mountain race commanding Khyber and Kohat passes; formidable rising following Brit. annexation of their territory put down in Tirah campaign, 1897–98.

AFRIKANDER, AFRICANDER, person born in S. Africa of European descent; term sometimes monopolised by Dutch-speaking people of S. Africa.

AFRIT, AFREET (Arab. myth.), a powerful evil spirit.

AFTERGLOW, rosy or white glow in the western sky long after sunset, due to refraction by fine dust suspended in the higher regions of the atmosphere.

AFZALGARH (*c.* 29° 25′ N., 79° E.), town, N.W. Provinces, India. Pop. *c.* 10,000.

AFZELIUS, ADAM (1750–1837), Swed. botanist; pupil of Linnæus.

AFZELIUS, ARVID AUGUST (1785–1871), Swed. poet; trans. *Edda* and collected folk-lore.

AGA KHAN I., HIS HIGHNESS (1800–81), descended from royal house of Persia; gov. of Kerman under Shah Fateh Ali, whose jealousy he aroused; fled to India and sought Brit. protection; very helpful to Napier and to Brit. Government, from whom he received large pension.

AGA MUHAMMAD (1720–97), Shah of Persia; founder of Kajar dynasty.

AGADES (17° N., 8° 2′ E.), capital of Air (or Asben), Sahara; formerly large city; grain.

AGADIR (30° 26′ N., 9° 32′ W.), town, Morocco, North Africa; best harbour on coast; decayed port. Germany in 1911 sent a cruiser to A., nominally to protect Ger. interests; Franco-Ger. crisis ensued. See MOROCCO.

AGAG, king of Amalekites; conquered by Saul and hewn in pieces by Samuel's order.

AGALMATOLITE, soft compact yellowish or greenish stone used by the Chinese for carving into figures, miniature pagodas, etc., hence also known as figure-stone or pagodite.

AGAMEDES, and **TROPHONIUS,** his bro. (classical myth.), celebrated architects; built temple of Apollo at Delphi.

AGAMEMNON, king of Mycenæ; bro. of Menelaus; m. Clytemnestra; commander of Greeks in Trojan War; sacrificed his dau. Iphigenia (*q.v.*); murdered by Ægisthus (*q.v.*).

AGAÑA (13° 30′ N., 144° 38′ E.), capital, Guam Island, N. Pacific; naval station.

AGAPANTHUS, see AFRICAN LILY.

AGAPE (Gk. 'love'), love feast of the early Church. At first intimately connected, if not identical, with the Eucharist, but became quite separate and finally extinct. It is described by Tertullian, Clement of Alexandria, pseudo-Athanasius, and Socrates. Sometimes it degenerated into mere feasting, if not debauchery. It was sometimes followed by the Eucharist. In the Georgian and Armenian Churches pagan sacrificial feast was taken over into the Church as an a.

AGAPEMONITES, sect founded by Rev. Henry James Prince, an Anglican curate, in 1846, on the idea that marriage should be purely spiritual. It was joined by Rev. Samuel Starkey (Prince's rector) and others, a church and an 'Abode of Love' built. There was much scandal, and Prince d. 1899. Rev. T. H. Smyth Pigott, his successor, proclaimed himself Messiah, 1902.

AGAR, AUGGUR (23° 44′ N., 76° 4′ E.), fortified town, Gwalior, Central India. Pop. 30,000.

AGAR, see BACTERIOLOGY.

AGARDH, KARL ADOLF (1785–1859), and **JAKOB GEORG** (1813–1901), his s., Swed. naturalists, authorities on *algæ*.

AGASSIZ, ALEXANDER EMANUEL (1835–1910), Amer. scientist; s. of Louis A. (*q.v.*); voluminous writer on marine zoology.

AGASSIZ, JEAN LOUIS RODOLPHE (1807–73), Swiss naturalist; settled in America (1846); prof. of Zool. and Geol. at Harvard; achieved great success as lecturer on scientific subjects; pub. *Natural History of the Fresh-Water Fishes of Central Europe* (1839); *Contributions to Natural History of United States* (1857–62); *Journey in Brazil* (1868).

AGATE, siliceous mineral, being variegated chalcedony, occurring in rounded nodules, which are formed in cavities of igneous rocks by the deposition of silica in layers from percolating water. Iron or other oxides may produce red, brown, and other tints. On account of its hardness and the high polish it can take on, a. has been used as an ornamental stone, and for laboratory appliances, such as mortars and pestles and knife edges for delicate balances. The colours of a. articles for sale are frequently artificially produced.

AGATHA, ST. (d. 251), Christian martyr who resisted the overtures of Prefect Quintilianus sent by Emperor Decius to govern Sicily, and was by him cruelly tortured and put to death; festival, Feb. 5.

AGATHIAS (*c.* 536–82), Gk. poet and historian; composed love poems and wrote contemporary history of Justinian's reign.

AGATHO, ST., Pope (678–82).

AGATHOCLES (361–289 B.C.), tyrant of Syracuse; made war with Carthage; famous leader of mercenaries.

AGATHON (447–400 B.C.), Athenian tragic poet, rival of Euripides.

AGAVE, genus of tropical and W. Amer. plants, order *Amaryllidaceæ*, with fleshy, pointed, spine-margined leaves; they are very slow in attaining maturity and have a panicle of flowers on a tall stem growing from the centre of the leaf rosette. In Mexico sisal hemp is obtained from the leaves of fibrous species, and pulque, a fermented drink, is prepared from the juice of *A. americana* and other species.

AGDE (43° 18′ N., 3° 28′ E.), port, France, on Hérault, near sea; Synod of A., 506. Pop. *c.* 10,000.

AGE, period of time, from birth to given moment, as in stating age of person. Four ages of man: infancy, youth, manhood, old age. Infancy in Eng. law lasts till 14 years of age, though there is distinction between infants under and over 7 years, those under 7 being incapable of committing crime; 25 used to be considered termination of adolescence, now often placed at 28 or 30; old age commences, 55–60; legal majority, 21st birthday.

World has been divided on different systems into periods of time or 'ages'; great historical division in Palæolithic, Neolithic, Bronze, Copper, and Iron ages, the advance to use of iron tools being last step of civil-

isation. Greeks used metallic terms to symbolise moral changes in world since its commencement: Hesiod divided time into Gold Age, or Age of Cronos, time of virtue, happiness, and plenty, to which later ages looked wistfully back; Silver Age when, Zeus having overthrown realm of Cronos, virtue and happiness lost their first splendour; the Brazen Age of Poseidon, wild, turbulent period; the Heroic Age of Homer, from which Hesiod conceived that his own cruel and evil Iron Age had declined. Latin poets wrote much of Golden Age, which they called Age of Saturn.

Time is divided into different geological periods, as Glacial Age, and into zoological periods, as Age of Fishes, following scheme of evolution of animal forms ending with arrival of vertebrates. Chief historical division now used is that of Ancient History (*q.v.*) and Modern History, but early modern history is generally treated as two periods of Dark and Middle Ages (*q.v.*).

AGEN (44° 12′ N., 0° 37′ E.), cathedral town, France; agricultural market; appeal and assize courts. Pop. 22,000.

AGENAIS, AGENOIS (44° 20′ N., 0° 25′ E.), old province, France; often taken by English; now part of Lot-et-Garonne.

AGENT-GENERAL, representative in England of a Brit. colony whose business is to safeguard the financial and political interests of his colony in the Mother Country; the term 'High Commissioner' is used in the case of the Self-Governing Dominions.

AGESANDER (I. cent. B.C.), sculptor of Rhodes; executed part of Laocoon group.

AGESILAUS II. (*c.* 445–360 B.C.), king of Sparta; reigned forty-one years; a great military commander; defeated Persians in Asia, allied Athenians and Thebans at *Coronea* (394); defeated by Epaminondas at *Mantinea* (362), but saved Sparta.

AGGLOMERATE (geol.), accumulations of coarse volcanic fragments occurring near a crater, consisting of rocks, often weighing many tons, dislodged from its walls, of large ashes and volcanic bombs created by rotation in the air of molten lava. Arthur's Seat, Edinburgh, is an example of a. in Britain. See VOLCANO.

AGGLUTINATION, in philology, forming a compound from two distinct roots, *e.g.* cowherd.—**Agglutinative Languages,** those in which words are formed by aggregation of roots which may be detrited into mere suffixes and prefixes, as A.S. *like* becomes suffix *ly* in Eng. words; Turk. and Santali are perfect examples; different from inflectional languages, in which change of meaning is given by modification of word without addition of another.

AGGTELEK (48° 30′ N., 20° 30′ E.), village, Hungary; stalactite caves.

AGINCOURT, AZINCOURT (50° 27′ N., 2° 9′ E.), village, France; here Henry V. of England with small force, mostly archers, defeated Fr. army under d'Albret, Oct. 25, 1415, after three hours' fighting; French suffered heavy losses.

AGIRA (37° 40′ N., 14° 30′ E.), town, Sicily. Pop. 18,000.

AGIS, name of three or four Spartan kings (V.–III. cent. B.C.). **Agis III.** (338–331) rebelled against Macedonian supremacy during Alexander the Great's absence. **Agis IV.** (245–241 B.C.) sought by land and other reforms to save Sparta from impending ruin due to luxury, unequal distribution of wealth, etc.; thwarted and murdered.

AGITATORS.—In 1647, when Long Parliament wished to disband certain regiments whose pay was in arrear, the men, objecting to such treatment, elected 'agitators' or 'adjutators' from their ranks to lay their grievances before the authorities.

AGLAIA, see GRACES.

AGNADELLO, Ital. village near Cremona, where Louis XII. defeated Venetians, 1509.

AGNANO, LAGO DI (40° 50′ N., 14° 13′ E.), lake in volcanic basin, near Naples; drained, 1870.

AGNATES, relatives on paternal side, as distinguished from *cognates,* relatives on maternal side; in Rome, agnate meant one related through males and males only.

AGNELLO, COL D', pass between France and Italy, S. of Monte Viso, connecting Durance and Po valleys.

AGNES, ST. (d. 303), according to tradition, Christian maiden (aged 13) of Rom. birth who suffered martyrdom at hands of Prefect Sempronius (during reign of Diocletian) because she refused to marry his heathen son; patron saint of virgins; symbol, a lamb; festival, Jan. 21.

AGNESI, MARIA GAETANA (1718–99), Ital. mathematician; Lady-Prof. of Math's and Natural Philosophy at Bologna (1750); later entered sisterhood of Blue Nuns, Milan.

AGNEW, DAVID HAYES (1818–92), Amer. surgeon; during Civil War noted for operations in cases of bullet wounds.

AGNI, Hindu fire-god; with Soma (*q.v.*) and Indra (*q.v.*) forms Vedic trinity.

AGNOIOLOGY, the study of ignorance with regard to its conditions and extent.

AGNOLO, ANDREA D', see SARTO.

AGNOMEN, additional name conferred by Romans on noteworthy persons, *e.g.* Scipio *Africanus.*

AGNONE (41° 48′ N., 14° 22′ E.), town, Campobasso, Italy; copper. Pop. 10,000.

AGNOSTICISM, the belief of those who hold that there is no proof of the existence of a God, and that, if there is a God, His nature is unknowable; the term agnostic was first used by Huxley in 1869; distinguished from *atheism,* which denies God's existence.

AGNUS DEI ('Lamb of God'), figure of lamb bearing cross; discs or cakes of wax, silver, or gold employed by R.C. Church, bearing this figure, are so styled; name of prayer in Mass commencing, 'O Lamb of God, that takest away the sins of the world, have mercy upon us.'

AGOBARD (d. 840), abp. of Lyons; prominent figure of Carolingian period; opposed many superstitions, including belief in witchcraft and trial by ordeal.

AGONE, seaport, Dahomey, Slave Coast, W. Africa.

AGONIC LINES, imaginary lines on the surface of the earth connecting points where the magnetic needle points to the geographical poles; the line of no magnetic declination.

AGORA, in early times, an assembly of Gk. people; later their place of assembly, usually the market, or forum.

AGORDAT (16° 10′ N., 37° 16′ E.), fortified town, Eritrea, N.E. Africa; Italian victory, 1893.

AGOULT, MARIE CATHERINE, COMTESSE D' (1805–76), Fr. authoress (*nom de plume,* 'Daniel Stern'), friend of Heine, de Vigny, Sainte-Beuve, Chopin, George Sand, and others; became mistress of Franz Liszt, their dau. Cosima afterwards marrying Richard Wagner; author of drama, *Jeanne d'Arc* (1857), and hist. and political works.

AGOUTI (*Dasyprocta aguti*), terrestrial rodents of the size of a rabbit, in tropical America; of nocturnal habits, dwell in forests and are destructive to banana and sugar-cane plantations.

AGRA.—(1) (27° 15′ N., 77° 59′ E.) Town, on Jumna, United Provinces, India; captured by Baber (*q.v.*) in 1526, the loot including the famous Koh-i-noor diamond; fort built by Baber's grandson Akbar, and completed, 1665; contains many fine buildings including the exquisite *Taj Mahal,* a mausoleum in white marble erected (1632) by Shah Jehan (*q.v.*) for his favourite wife—the nobility and beauty of the structure well merit the encomium, 'designed by Titans and finished by jewellers.' Pop. (1911) 185,500. (2) Also the name of a district, a division, and a province in the United Provinces. The Province has an area of 83,198 sq. miles. Pop. (1911) 34,624,000. See UNITED PROVINCES.

AGRAM, ZAGRAB (45° 50′ N., 15° 59′ E.), capital, Croatia, Hungary; archiepiscopal see; Univ.; linen, carpets, leather. Pop. (1910) 61,000.

AGRAPHA, sayings ascribed to Jesus which are not found in the Gospels.

AGRAPHIA, nervous disorder involving loss of power to express ideas in writing; akin to aphasia (*q.v.*).

AGRARIAN LAWS, ancient Rom. laws governing the use of state lands for pasturage or other purposes; purpose was to give every citizen his fair share in the public domain and prevent patricians from monopolising it. One of most important was the *Licinian law*, introduced by the tribune, Licinius Stolo (367 B.C.), which provided that every Rom. citizen should, by payment of a tax to the public treasury, have the right to graze 100 head of large, or 500 head of small, cattle upon unallotted state lands. A later law, introduced by Tiberius Sempronius Gracchus (*q.v.*) and known as the *Sempronian law*, provided that every f. of a family should have the right to occupy 500 jugera (acres), and 250 jugera additional for each of his sons. The passing of this law aroused the patricians' jealousy, which resulted in the assassination of Tiberius and his bro. Caius.

AGRARIAN PARTY, Ger. political party, advocating agricultural protection.

AGRAVAIN, SIR, knight of Round Table; bro. of Gawain.

AGRICOLA, GEORG, or BAUER (1494–1555), Ger. scientist; wrote on mining and metallurgy.

AGRICOLA, GNÆUS JULIUS (37–93 A.D.), Rom. general and statesman; gov. of Britain, 78–85; subdued large part of Great Britain, winning many victories, including one over Caledonians as far north as the Grampians; established line of forts between Forth and Clyde; implanted Roman civilisation and customs; his successes aroused the jealousy of Domitian, and his later years were spent in retirement; life written by his son-in-law, Tacitus.

AGRICOLA, JOHANN, or SCHNITTER (1492–1566), Ger. Prot. reformer; at first strong supporter of Luther, but later quarrelled over Antinomian controversy.

AGRICOLA, RUDOLPHUS, or ROELOF HUYSMAN (1443–85), Dutch scholar; b. in Friesland; hence sometimes called *Frisius*; friend of Erasmus; laid foundations of humanism in Germany; wrote *Dialectics*.

AGRICULTURE is the science and art of producing plants and animals useful to man and, to a certain extent, the further preparation of these products. After hunting, it is the most primitive of human professions, and at first consisted in driving a herd to a suitable pasturage, and raising crops on a patch of ground till the soil became exhausted or other reasons caused the nomads to migrate elsewhere. This *extensive* husbandry gave way to a more economical or *intensive* culture with the widening of experience, on the discovery of the value of manures, of the fallow, of the advantages of a rotation of crops and the improvement in implements. It is a matter of course that the fertile land watered by rivers like the Hoang-ho, Ganges, Tigris, Euphrates, Nile, should have been cultivated and used for pasture from time immemorial. The Chinese, Babylonians, Egyptians, and Jews were noted for their pastoral husbandry and tillage before the Greeks and, to a far greater extent, the Romans brought farming to a high state of development. The latter people, as recorded by many authors, such as Vergil and Pliny, by the remains of irrigative works and other indications of agricultural industry, had expert knowledge of the value of different soils, manures, and crops, of stock-breeding, plant diseases, of bee-keeping, fruit-growing, and horticulture (*q.v.*). After the decline of the Rom. Empire the Saracens in Spain were most influential in promoting the progress of a., and in the restless Middle Ages the scattered monastic communities did much to foster the science and art of farming.

Varying social conditions, acting on different physical environments, make the development of present-day a. one of the most interesting and intricate of sociological problems. Legislation, the advance of science, industry and means of transport, the growth of the idea of co-operation are potent factors which are controlling the evolution of a. The opening up of new countries for wheat-growing, the decline of the rural population in industrialised countries, and the growing interdependence of different nations on one another are but a few of the phenomena of human history of importance to the present-day agriculturist, who has to be a scientist and political economist as well as a 'practical man.'

One of the earliest treatises on Eng. a., by Walter of Henley, describes the two- and three-field system prevailing in the XIII. cent. During the following cents. the increase in the demand for wool caused a rural depopulation in England owing to the conversion of arable land into pasture for sheep, and the growing enclosure of waste land. A great improvement is recorded from Elizabethan times, a number of writers (Fitzherbert, Tusser) on husbandry drawing attention to drainage, irrigation, rational manuring, and the value of clover and root crops. The increase of closed farms, together with the practice of liming and marling and the use of new implements and methods, indicated a growing prosperity in the first half of the XVII. cent., enhanced by the security following the union of the crowns of Scotland and England. During the civil wars, however, and the political disturbances which followed, Eng. husbandry suffered a severe depression. Scot. a. seems to have been on a low level until the end of the XVII. cent., kail, barley, and oats being the staple crops. After the Union (1707) a. progressed steadily both N. and S. of the Tweed. A Berkshire farmer, Tull, introduced the system of sowing crops in drills and demonstrated the value of horse-hoeing; Lord Townshend (1676–1738) advocated the growing of turnips and the four-course system which made the summer fallow unnecessary; and the Earl of Leicester (1752–1842) was responsible for the use of bone-manure and oil-cake and the rational utilisation of grasses. Owing to the activities of Robert Maxwell and the 'Society of Improvers in the Knowledge of A. in Scotland,' a more rational cropping was introduced, and grain crops began to be alternated with clover and turnips. The system prevailing in Scotland of letting land on long leases offered every inducement to both landlords and tenants to improve the land and share in the general prosperity of Brit. agriculturists consequent on the introduction of improved implements (*e.g.* Meikle's threshing-machine), better draining, and especially the extraordinary rise of prices during the Napoleonic wars. During the latter half of the XVIII. cent., too, stock-breeding was not neglected, and the names of Bakewell and Collins are associated with the improvement of the *Longhorn* and *Shorthorn* breeds of cattle, and a new race of sheep (*Leicesters*). A period of agricultural depression set in after European peace was restored, and lasted until about 1840, though much progress was made as regards farming machines and the introduction of new manures like bones and Peruvian guano.

The year 1843 is noteworthy because of the establishment of the Rothamsted agricultural experiment station by Sir J. B. Lawes, which has since gained world-wide appreciation. The Royal Agricultural Society had been incorporated a few years previously. A period of prosperity set in and lasted till 1848, the development of railways having the effect of opening up new markets. A depression followed; characterised by a drop in wheat prices, but after 1853 the country enjoyed a steady development and increase in agricultural prosperity for twenty years, though marred by an outbreak of rinderpest brought to England by Russ. cattle. New field crops (Ital. rye-grass, alsike, winter-beans, etc.) were introduced, and the

employment of steam power on farms became more general. Irish a. was still suffering from the effects of the failure of the potato crop in 1845 and the consequent reduction of the population by 2½ millions. The last quarter of the XIX. cent. was marked by bad seasons, excessive cold, rainfall or drought, a reduction of the wheat-growing area, and loss of stock owing to disease. On the other hand, much pioneer work was done, in spite of the depression, for instance, the introduction of Thomas's phosphate powder (basic slag) as a dressing for pasture lands, of copper sulphate solutions for destroying parasites and weeds, and other improvements affecting the crops, besides the employment of numerous tools and implements introduced chiefly from America. The creation of the Board of A. (*q.v.*) for Great Britain (1889) was a vital step affecting the development not only of the art but of the science of a. The Taxation of Land Values, the tendency towards co-operation between small holders, the increasing demand for dairy products, the introduction of highly intensive cultivation of vegetables (Fr. gardening), and the application of Mendel's law by breeders are but a few of the problems affecting a. at the present time and for many years to come.

Agricultural Colleges and Schools.—Special scientific training in a. dates from the establishment of the Royal Veterinary College in Copenhagen (1773). Forty-four agricultural high schools have been founded in Denmark since then which have greatly contributed to the prosperity not only of dairy-farming, but of the entire country. In the other Scandinavian states agricultural education has obtained a very high level, and by means of travelling instructors and experts the farmer in those countries can always profit by the intimate relations thus established between science and practice. Holland has a first-class agricultural coll. at Wageningen, and a fair amount of research work is carried on at the univ's. In Belgium and France agricultural education is extremely well organised, and special cheese-making, silk-worm, and horse-breeding schools have been established. Switzerland, 'the sociological laboratory of Europe,' is provided with numerous schools for a., dairying, fruit-growing, and forestry, and the Polytechnicum at Zurich has flourishing departments for a. and forestry. The Ger. Empire provides agricultural instruction of all grades, and besides at many of the univ's and technical colleges agricultural training of univ. rank is provided at the High Schools of Berlin and Poppelsdorf. The six forestry schools are admitted to be the best in the world.

In Great Britain the first chair of a. was founded at Edinburgh Univ. in 1790, and a chair of rural economy at Oxford in 1796. Besides numerous smaller centres the chief agricultural colleges and institutes in England are at Cirencester, Tamworth, Carlisle, Preston, Uckfield, Wye, Holme Chapel (Cheshire), Kingston (Derby), Newport (Monmouth), Ridgmont (Beds.), Chelmsford, and at the Univs. or Univ. Colleges at Cambridge, Reading, Leeds, Bangor, Aberystwyth, and Newcastle-on-Tyne. The Board of A. and the County Councils also provide for instruction, and subsidise some of the departments mentioned. In Scotland flourishing agricultural colleges provide higher instruction at Edinburgh, Glasgow, and Aberdeen in addition to special departments at the Univ's of Edinburgh and St. Andrews. In Ireland higher education is provided at Dublin, Glasnevin, and Cork, and is supervised by the Department of A. and Technical Instruction for Ireland, which also supports four experiment stations and organises a number of winter schools and lectures. On the whole, it may be said that however high the standard of instruction is at many of the colleges, agricultural education in the United Kingdom shows a lack of co-ordination detrimental to the country as a whole. Canada, Australia, New Zealand, and South Africa are showing great energy in applying modern science to a., and the professional education is rising to a high standard. In India instruction in a. and forestry is making rapid progress. The Department of A. of the United States as well as the States themselves maintain experiment stations at which not only research is carried on in bot., zool., chem., bacteriology, meteorology, and practical farming, but which act as centres of information to all who desire to profit by it. Besides instruction at many schools, the agricultural colleges and departments of the State Univ's provide for both research and teaching. In S. America, cattle-breeding in Argentina and Uruguay has been developing very rapidly, and agricultural education is at a high level in Brazil and Chile. Japan is coming to the fore in scientific a. and fishery, and already provides excellent facilities for higher education in those subjects. In Egypt an agricultural school was established in 1898. See CATTLE, DAIRY, FORESTRY, IRRIGATION, etc.

C. E. Green and D. Young, *Encyclopædia of Agriculture* (Edinburgh, 1907–8); *Journal of the Royal Agricultural Society*; L. H. Baily, *Cyclopædia of American Agriculture* (New York and London, 1907–8); Stephens, *Book of the Farm*, 3 vols. (Edinburgh, 1908); H. Rider Haggard, *Rural England*, 2 vols. (1902).

AGRICULTURE, BOARD OF (of Great Britain), was established by an Act in 1889, control of the Fisheries being added in 1893. It consists of a Pres. holding cabinet rank and *ex-officio* members including the majority of cabinet ministers, and a permanent staff under a sec. The chief functions of the Board are: to prevent introduction or spread of disease among certain animals; to administer any Act in connection with the holding of land, or with Fisheries; to promote the science of and education in a., horticulture, and forestry; and to supervise the Ordnance Survey of the United Kingdom.

AGRIGENTUM (37° 20′ N., 13° 40′ E.), ancient town, Sicily; founded by Gk. colonists from Gela, c. 582 B.C.; quickly rose in importance; had many famous buildings, including temple to Jupiter, of which ruins remain; ruled by tyrants, Phalaris (*q.v.*) and Theron (488–472); latter's s. Thrasydæus banished 472 B.C. when democracy established; destroyed by Carthage, 405 B.C.; recolonised by Timoleon, 338 B.C.; sacked by Romans, 261, Carthaginians, 225; again by Romans, 210 B.C.; henceforth subject to Rome; held by Saracens, 828–1086; birthplace of Empedocles; modern Girgenti (*q.v.*).

AGRIMONY (*Agrimonia*), genus of perennial herbs, order *Rosaceæ*, with yellow flowers and fruits with bristly hooked hairs causing them to adhere to, and be transported by, animals. The name has also been applied to several unrelated plants.

AGRIMORI, VRACHORI (38° 35′ N., 21° 25′ E.), small town, Acarnania, Greece; tobacco.

AGRIPPA, sceptic who lived after the age of Cicero; went so far as to dispute the evidence of all truth whatsoever.

AGRIPPA, HEROD, see HEROD.

AGRIPPA, MARCUS VIPSANIUS (63–12 B.C.), Rom. soldier, statesman, and patron of arts; favourite of Emperor Augustus, whose dau. Julia he m.; served with distinction at *Actium* and elsewhere; had Roman Pantheon built.

AGRIPPA, MENENIUS LATANUS, Rom. consul (503 B.C.); associated with famous fable of 'the belly and the members.'

AGRIPPA VON NETTESHEIM, HENRY CORNELIUS (1486–1535), Ger. alchemist and philosopher; reputed magician; in early life entered service of Maximilian I. of Germany; later historiographer of Charles Quint.

AGRIPPINA, THE ELDER (d. 33), dau. of M. V. Agrippa (*q.v.*) and Julia; wife of Germanicus (*q.v.*); exiled by Emperor Tiberius, and starved to death; of high moral character; mother of Caligula.

AGRIPPINA, THE YOUNGER (d. 59 A.D.), mother of Nero; poisoned her third husband, Emperor Claudius

(*q.v.*), to secure throne for Nero, who eventually, resenting her domination, had her murdered.

AGUADA (18° 20′ N., 66° 10′ W.), seaport, Porto Rico; coffee.

AGUADA, AGUADAS (5° 35′ N., 75° 35′ W.), town, Antioquia, Colombia. Pop. *c.* 13,000.

AGUADILLA (18° 31′ N., 67° 43′ W.), town, Porto Rico. Pop. 6425.

AGUADO, ALEXANDRE MARIE, Viscount de Monte Ricco (1784–1842), Span. Jewish soldier, banker, merchant, and art collector; naturalised Frenchman; acquired, amongst other estates, Château Margaux (vineyards); left great wealth.

AGUASCALIENTES (22° 2′ N., 102° 30′ W.), state, Mexico; warm springs. Pop. (1900) 102,000. Capital, **Aguascalientes** (21° 57′ N., 102° 30′ W.). Pop. 35,052.

AGUE, popular name for the paroxysm of intermittent malarial disease characterised by cold, hot, and sweating stages. See MALARIA.

AGUESSEAU, HENRI FRANÇOIS D', DAGUESSEAU (1668–1751), Fr. Chancellor; famous for learning and integrity, and held to be greatest master of legal eloquence of his period.

AGUILAR, AGUILAR DE LA FRONTERA (37° 30′ N., 4° 37′ W.), town, Spain; wine, olives. Pop. 13,236.

AGUILAS (37° 25′ N., 1° 35′ W.), port, Spain; exports esparto. Pop. 15,868.

AGUILERA, VENTURA RUIZ (1820–81), Span. poet; wrote elegies and satires of considerable charm.

AGUINALDO, EMILIO, leader of Philippine revolt against Spaniards; and after Span. Amer. War (1898) resisted Americans till capture in 1901.

AGULHAS, CAPE (34° 40′ S., 20° E.), most southerly point of Africa; rocky and stormy; lighthouse; A. means the 'Needles' in Portuguese.

AHAB (*c.* 918–896 B.C.), king of Israel; m. Jezebel, dau. of king of Sidon, and by her influence introduced worship of Baal, priests of which were reproved by Elijah; killed by arrow in war with Syria.

AHASUERUS, name of the legendary Wandering Jew (*q.v.*).

AHASUERUS, title given to certain Median and Persian kings, of whom one was the husband of Esther.

AHAZ, king of Judah (741–*c.* 724 B.C.); Jerusalem being besieged, he called in aid of king of Assyria, who forced him to do homage and pay tribute.

AHAZIAH, king of Judah; s. of Jehoram; slain by Jehu.

AHENOBARBUS, Roman family, period of Julius Cæsar, whose name means 'red-bearded'; Gnæus Domitius Ahenobarbus was the Enobarbus of Shakespeare's *Antony and Cleopatra.*

AHLEN (51° 15′ N., 7° 55′ E.), town, on Werse, Westphalia, Prussia. Pop. *c.* 6000.

AHLWARDT, WILHELM (b. 1828), Ger. Oriental scholar; author of books on Arabic poetry.

AHMED I., Sultan of Turkey (1603–17).—**Ahmed II.,** Sultan (1691–95).—**Ahmed III.,** Sultan (1703–30); wars with Russia, Venice, Austria, and Persia; deposed.

AHMED IBN HAUBAL, see HAUBAL.

AHMED SHAH (1724–73), Afghan chief; founder of Durani dynasty; captured Lahore and Naishapur, and made himself master of Kashmir and the Punjab; was possessor of Koh-i-noor diamond.

AHMED VEFIK, Pasha (1819–91), Turk. prime minister and educationalist.

AHMEDABAD, AHMADABAD (23° 5′ N., 72° 32′ E.), town, Bombay, India; founded, 1411; flourished during Mogul Empire; magnificent Great Mosque and Ivory Mosque and modern Jain temple; silk, gold, and cotton industries. Pop. (1911) 216,000.

AHMEDNAGAR, ADMADNAGAR (19° 7′ N., 74° 45′ E.), town, Bombay, India; silk and cotton, carpets, metal work. Pop. 43,032.

AHMEDPUR (29° 10′ N., 71° 15′ E.), town, Bahawalpur State, India. Pop. *c.* 30,000.

AHN, JOHANN FRANZ (1796–1865), Ger. educationist; improved modern language teaching.

AHR (50° 31′ N., 7° 2′ E.), river, Germany; joins Rhine.

AHRENS, FRANC. HEINRICH LUDOLF (1809–81), Ger. philologist; wrote studies of Gk. dialects.

AHRIMAN, the Zoroastrian Satan, or evil spirit; opposed to Ormazd (*q.v.*).

AHRWEILER (50° 33′ N., 7° 4′ E.), town, Prussia; exports wine. Pop. 5700.

AHUACHAPÁN (13° 50′ N., 89° 50′ W.), town, Salvador, Central America; sugar, coffee. Pop. *c.* 14,000.

AHWAZ (31° 18′ N., 49° E.), village, Persia; ruins of ancient Parthian capital, Artabanus.

AI, HAI, ancient city, Canaan; site unknown; near Bethel.

AIBONITO (18° 7′ N., 66° 25′ W.), town, Porto Rico; coffee, tobacco.

AICARD, VICTOR FRANÇOIS JEAN (1848–), Fr. poet, novelist, and dramatist; b. Toulon; *Le Père Lebonnard,* 1890; some of his poems crowned by the Academy.

AIDAN, ST. (d. 651 A.D.), came from Iona on Oswald's invitation and became 'Apostle of Northumbria'; founded Lindisfarne monastery.

AÏDÉ, CHARLES HAMILTON (1830–1906), Eng. novelist and poet, author of *Eleonore and Other Poems* and *Songs without Music.*

AIDE-DE-CAMP (Fr.), fixed officer on personal staff of commander, also acts as sec.; post of *aide* to king is generally conferred for distinguished military service.

AIDIN (38° N., 28° 30′ E.), vilayet (see SMYRNA), Asia Minor.—**Aidin** (37° 51′ N., 27° 51′ E.), town; tanneries.

AIDONE (37° 23′ N., 14° 26′ E.), town, Sicily. Pop. 8548.

AIDS, sums due by vassals to feudal lords on specified occasions (knighting of e. s., dowering of e. dau., and ransoming of lord if captured); grant-in-aid, Parliamentary subsidy to king for special purposes; sheriff's 'aid,' fixed sum paid for his service.

AIGLE (46° 19′ N., 6° 58′ E.), town, Switzerland; black marble quarries.

AIGRETTE, the tufted plumes of the egret, used as ornaments for head-dresses and the like; the name egret includes the various herons on which such plumes grow in the breeding season.

AIGUES-MORTES (43° 34′ N., 4° 11′ E.), town in Rhône delta, Gard, France; fine mediæval ramparts; St. Louis sailed for Crusades from A.-M., 1248 and 1270; now several miles from sea; A.-M. means 'dead waters.' Pop. 4500.

AIGUILLON, EMMANUEL ARMAND, DUC D' (1720–82), Fr. statesman; app. Gov. of Brittany, 1753; sometime Minister of Foreign Affairs under Louis XV. in notorious *Triumvirate*; intriguing and incompetent.

AIGUILLON, MARIE MADELINE, DUCHESSE D' (1604–75), niece of Cardinal Richelieu; patroness of Corneille; after retirement from Court devoted to works of charity; assisted St. Vincent de Paul.

AIGUN (50° N., 127° 18′ E.), town, China. Pop. *c.* 20,000.

AIKAWA (38° 5′ N., 138° 10′ E.), coast town, Sado Island, Japan.

AIKEN (33° 34′ N., 81° 40′ W.), town, S. Carolina; health resort; cotton mills. Pop. (1910) 3911.

AIKIN, JOHN (1747–1822), Eng. doctor and writer; wrote, with sister, Mrs. Barbauld, *Evenings at Home* (6 vols.); *General Biography* (10 vols.), etc. His dau., **Lucy A.** (1781–1864), wrote on hist. and literary subjects.

AIKMAN, WILLIAM (1682–1731), Scot. artist; executed portraits of poets, Gay and Thomson; friend of Swift and Pope.

AILANTHUS (tree of heaven), genus of East Indian and Chinese tree of the order *Simarubaceæ,* with large compound leaves and malodorous greenish

flowers. A silk-spinning moth (*Bombyx cynthia*) lives on the leaves.

AILLY, PIERRE D' (1350–1420), Fr. cardinal; legate at Avignon; presided at Council of Constance which condemned Huss.

AILSA CRAIG (55° 15′ N., 5° 7′ W.), small precipitous island (1114 ft. high), Firth of Clyde, Scotland; lighthouse.

AIMARD, GUSTAVE (1818–83), Fr. novelist; pseudonym of Olivier Gloux; popular stories of adventure of Fenimore Cooper type.

AIN, river, France; rises Jura range; joins Rhône above Lyons.

AIN (46° 7′ N., 5° 22′ E.), department, France; area, 2248 sq. miles; crossed by river Ain; east, mountainous; west, flat; capital, Bourg; mills, textile and paper manufactures, agricultural exports. Pop. (1911) 342,482.

AIN SEFRA (32° 57′ N., 0° 25′ W.), province, S. Algeria. Pop. 147,000.

AINGER, CANON ALFRED (1837–1904), Eng. clergyman and author; master of Temple; canon of Bristol; brilliant preacher; distinguished writer on Charles Lamb.

AINMULLER, MAXIMILIAN EMMANUEL (1807–70), Ger. glass-painter and artist; much of his glass-work is in Cologne, Glasgow, and St. Paul's cathedrals.

AINOS, Ainu, aborigine race, living in parts of Yezo and Sakhalin, N. Japan; distinct from Japanese whom they probably preceded; short, robust, and hairy; face European rather than Mongolian in type; hunters and fishers; semi-civilised, polygamous; dying out; number 15,000–20,000.

AINSWORTH, HENRY (1571–1622), Nonconformist preacher and student of Hebrew; settled in Amsterdam; annotated Old Testament books.

AINSWORTH, ROBERT (1660–1743), Eng. schoolmaster; author of once famous Latin-English Dictionary (1736).

AINSWORTH, WILLIAM FRANCIS (1807–96), Eng. geologist, geographer, and traveller.

AINSWORTH, WILLIAM HARRISON (1805–82), Eng. novelist; b. Manchester; wrote about forty novels (hist. and antiquarian), which acquired immense vogue and made their author formidable rival to Dickens; little read now; his style is often stilted and artificial.

AINTAB (37° 2′ N., 37° 25′ E.), town, Aleppo, N. Syria; noted for bazaars. Pop. 45,000.

AIR, see Atmosphere.

AÏR, Asben (18° 30′ N., 9° E.), oasis, Sahara, Fr. Sudan; capital, Agades; caravan centre; dates, millet, indigo; inhabitants of mixed race. Pop. *c.* 50,000.

AIR, FIXED=Carbon dioxide. See Carbon.

AIRD (7° 35′ S., 144° 17′ E.), river entering Gulf of Papua, Brit. New Guinea.

AIRD, THOMAS (1802–76), Scottish poet and journalist; poetical work unimportant, but secured him the friendship of Carlyle, De Quincey, Lockhart, Hogg, and others.

AIRDRIE (55° 52′ N., 3° 59′ W.), municipal burgh, Lanarkshire; collieries, brass and iron works. Pop. 24,388.

AIRE (43° 43′ N., 0° 20′ W.), cathedral town, Landes, France; Alaric's capital.

AIRE, a Yorkshire river; joins Ouse. Also a tributary of Aisne in France.

AIREDALE (53° 40′ N., 1° 50′ W.), valley, W. Riding, Yorkshire.

AIR-ENGINE, see Engines.

AIRE-SUR-LYS (50° 38′ N., 2° 22′ E.), fortified town, Pas de Calais, France; breweries. Pop. 8500.

AIREY, RICHARD AIREY, Baron (1803–81), Brit. officer, quartermaster-general under Lord Raglan throughout Crimean campaign; cr. peer, 1876.

AIRLIE, 8TH EARL OF, David Stanley William Drummond Ogilvy (1856–1900), served in Egypt, 1884–85; killed in Boer War.

AIRLIE, JAMES OGILVY, EARL OF (*c.* 1593–1648), distinguished leader with Montrose against Covenanters, 1644–45; cr. earl, 1639.

AIRMAN, see Aeronaut.

AIROLA (41° 10′ N., 14° 30′ E.), village, Beneventa, Italy.

AIROLO (46° 32′ N., 8° 34′ E.), village, canton Ticino, Switzerland; at mouth of St. Gothard Tunnel.

AIR-SHIP, see Flight, Balloon.

AIRY, SIR GEORGE BIDDELL (1801–92), Eng. astronomer; brilliant career at Trinity Coll., Cambridge; app. Lucasian prof. of Math's, 1824, and Plumian prof. of Astron., 1825; organised the observatory and created admiration by the punctuality with which his observations were published. He introduced far-reaching improvements in the solar and lunar tables, and after being app. Astronomer-Royal in 1835 he conducted numerous laborious astronomical and meteorological researches that brought him universal recognition. He entirely reorganised the Royal Observatory, Greenwich, and brought it up to an unrivalled standard of usefulness. After resigning in 1881 he still worked, in spite of feebleness, revising previous computations; *Autobiography* (1896).

AISLABIE, JOHN (1670–1742), Eng. politician; member of Privy Council (1716); Chancellor of Exchequer (1718). Supported South Sea Company, for which, on its collapse, he was expelled the House.

AISMUNDERBY (54° 10′ N., 1° 30′ W.), township, parish of Ripon, W. Riding, Yorkshire.

AISNE (49° 25′ N., 3° 30′ E.), department, France; area, 2866 sq. miles; mountainous in N.E.; remainder, plains and valleys; agriculture well developed; timber, textile, and iron manufactures; capital, Laon. Pop. (1911) 530,226.

AISNE, river, France; 150 miles long; joins Oise near Compiègne.

AÏSSÉ, MLLE (d. 1733), Fr. letter writer; sold as child to Fr. ambassador at Constantinople; of Circassian birth; her romantic history and great beauty brought her considerable fame in Paris; letters edited by Voltaire and others.

AITON, WILLIAM (1731–93), Scot. botanist; (first) director of the botanical gardens at Kew, from 1759 to his death.

AITUTAKI (19° 55′ S., 159° 20′ W.), one of Cook Islands, belonging to New Zealand. Pop. 1200.

AITZEMA, LIEUWE VAN (1600–69), Dutch historian; wrote *History of Netherlands* (from 1621–68).

AIVALIK (39° 18′ N., 26° 45′ E.), seaport, Asia Minor; exports fish. Pop. *c.* 30,000.

AIVAZOVSKI, IVAN (1817–1900), Russ. marine painter.

AIX, Aix-en-Provence (43° 31′ N., 5° 27′ E.), cathedral town, S.E. France; ancient capital of Provence; famous mediæval univ.; founded by Romans, 123 B.C.; Marius defeated Teutons, 102 B.C.; thermal springs; trades in olive oil. Pop. 19,433.

AIX (45° 55′ N., 1° 10′ W.), small island, France; near mouth of Charente.

AIX, genus of fresh-water ducks including N. Amer. wood duck and Chinese mandarin duck.

AIX-LA-CHAPELLE, see Aachen.

AIX-LES-BAINS (45° 51′ N., 5° 55′ E.), town, Savoy, France; near Lake Bourget; favourite health resort; hot springs. Pop. 4741.

AJACCIO (41° 55′ N., 8° 44′ E.), capital of Corsica, lying on Gulf of A.; classical *Adjacium*; seat of ancient bishopric; birthplace of Napoleon; exports wood, charcoal, wine, fruit, coral, sardines, chiefly to France. Pop. 21,779.

AJAIGARH (24° 50′ N., 80° 20′ E.), native state, India; principal town, Naushahr. Pop. 78,000.

AJALON (31° 51′ N., 35° 3′ E.), town, ancient Palestine (see *Joshua* 10); modern Yâlo.

AJANTA (20° 32′ N., 75° 48′ E.), village, Nizam's Dominions, India; famous caves, dwellings, and meeting halls, used by Buddhists; earliest date from 200 B.C.

AJAX (1) *the Great*; s. of Telamon, king of Salamis; after Achilles, principal hero of Trojan War; contended with Ulysses for Achilles' arms, and on failure went mad and committed suicide; subject of tragedy by Sophocles. (2) *The Less*; s. of Oileus, king of Locrians; renowned for swiftness of foot; wrecked and drowned on way home, because of outrage on Cassandra.

AJMERE, AJMER (26° 31′ N., 74° 35′ E.), town, Rajputana, India, on Taragarh Hill; famous Muhammadan tomb and old Jain temple, part used as mosque; trades in salt, oil, opium. Pop. (1911) 86,000.

AJMERE-MERWARA (26° 10′ N., 74° 40′ E.), province, India; capital, Ajmere; area, 2710 sq. miles; cotton, wheat, oil-seeds. Pop. (1911) 501,000.

AJODHYA (26° 48′ N., 82° 12′ E.), ancient town, on Gogra, Oudh, India; once great religious centre; now ruined; Jain temples and fair attract annually 500,000 pilgrims; modern town on site. Pop. 8000.

AJURUOCA (22° 20′ S., 42° 25′ W.), town, Minas Geraes, Brazil; tobacco, sugar-cane.

AKA HILLS (27° 10′ N., 93° E.), district, N. India, inhabited by Akas.

AKABA, GULF OF (28° 40′ N., 35° E.), eastern arm of Red Sea.—**Akaba** (29° 30′ N., 35° 20′ E.), town, near head of gulf.

AKALKOT (17° 18′ N., 75° 56′ E.), native state, India. Pop. 82,047.—**Akalkot** (17° 31′ N., 76° 15′ E.), town. Pop. 8348.

AKASHI (34° 40′ N., 134° 56′ E.), summer resort, Hondu Island, Japan; meridian regulates Japanese time.

AKASSA (4° 15′ N., 6° 15′ E.), transhipment station, mouth of Nun, S. Nigeria.

AKBAR, THE GREAT, JELLALADIN MUHAMMAD (1542–1605), Mogul Emperor of India; succ., 1556; a great conqueror and most enlightened ruler; extended dominion over N. India; generous patron of lit.; promoted education of both Muslims and Hindus; his minister, Abul Fazl, wrote a valuable record of A.'s reign.

AKCHA (37° N., 66° 15′ E.), town, Turkestan. Pop. *c.* 8000.

À KEMPIS, THOMAS, see KEMPIS.

AKEN (51° 51′ N., 12° 2′ E.), town, Germany; cloth and chemical manufactures. Pop. 7358.

AKENSIDE, MARK (1721–70), Eng. poet and physician; studied theol. and med. at Edinburgh; chief poetical work, *Pleasures of the Imagination*, in blank verse (1744); stilted, little originality; in later life successful physician; pedantic doctor in Smollett's *Peregrine Pickle*.

AKERSHÜS, AGGERSHUS (59° 55′ N., 11° 5′ E.), old fortress and county, Norway, around Christiania.

AKHAL-TEKKE (39° N., 58° E.), oasis in Russ. Transcaspia; cereals, fruit trees.

AKHALTSIKH (41° 40′ N., 43° 1′ E.), town, Transcaucasia; noted for silver filigree. Pop. 15,387.

AK-HISSAR (38° 54′ N., 27° 50′ E.), town, Smyrna. Pop. *c.* 20,000.

AKHLAT, KHELAT (38° 47′ N., 42° 13′ E.), small town, Asiatic Turkey; see of Armenian bp.

AKHMIM (26° 32′ N., 31° 49′ E.), town, Upper Egypt; textiles. Pop. *c.* 25,000.

AKHTYRKA (50° 18′ N., 34° 56′ E.), cathedral town, Russia. Pop. 25,965.

AKIBA, BEN JOSEPH (fl. II. cent.), Jewish rabbi, authority on Jewish tradition; flayed by Romans for part in a revolt of 135.

AKITA (39° 35′ N., 139° 55′ E.), town, Hondo I., Japan; silk, rice.

AKKA, race of African pygmies dwelling in Congo forest, rarely 4 feet in height; live chiefly by hunting, but collect ivory and prepare poisons which they exchange for grain and manufactured goods.

AKKAD, ACCAD, one of the cities which constituted Nimrod's kingdom of Shinar.—**Akkadian, ACCADIAN**, inhabitant of Akkad; language of such people.

AKKERMAN (46° 20′ N., 30° 20′ E.), town on Black Sea, Russia. Pop. 32,470.

AKMOLINSK (50° 5′ N., 70° E.), province and town, Siberia, Russia. Pop. of province (1910), *c.* 1,047,000.

AKOLA (20° 41′ N., 76° 50′ E.), town, Berar, India. Pop. 30,000; district pop. 755,000.

AKOT (21° 6′ N., 77° 6′ E.), town, N. Akola, India; cotton.

AKRA, see ACCRA.

AKRON (41° 6′ N., 81° 31′ W.), town, Ohio; manufacturing and traffic centre. Pop. (1910) 69,070.

AKSAKOV, IVAN SERGEIVITCH (1823–86), Russ. writer and advocate of Panslavism.

AK-SHEHR (38° 25′ N., 31° 25′ E.), town, Asia Minor.

AKSU (41° 7′ N., 79° 7′ E.), town, Chinese Turkestan; caravan centre.

AKUREYRI (65° 40′ N., 18° W.), trading town, Iceland coast.

AKYAB (20° 10′ N., 93° E.), seaport, Burma, in A. district; exports rice, oil. Pop. 31,687; district, 482,000.

ALABAMA (30° 13′ to 35° N., 84° 51′ to 88° 31′ W.), state, U.S.A.; bounded by Tennessee on N., Georgia on E., Florida and Gulf of Mexico on S., Mississippi on W.; area, 52,250 sq. miles; surface flat, except in N.E., where are Appalachian mountains; chief rivers, Alabama, Mobile, Tennessee. A. has temperate climate; soil of coastal plain sandy; further N. rich black soil gives name to 'Black Prairie,' where cotton is grown; N. again are mineral and cereal-producing regions. A. was originally inhabited by Indians; French made first settlement, 1702, at Mobile; at end of Fr. occupation, 1763, northern part was joined to Illinois; southern part to W. Florida, was held for time by Spaniards; portions subsequently claimed by Georgia and other states; Ind. risings suppressed by Jackson, 1813; territory organised, 1817; admitted to Union, 1819; one of first states to secede from Union, 1861; Mobile and Selma captured by Federalists, 1865; after war, state convention revoked secession ordinance, abolished slavery; readmitted to Union, 1868; Democratic party has been in power since 1874.

GOVERNMENT.—Senate and House of Representatives; offices of state held four years; gov. has full power, but his veto can be overruled by majority vote; State represented by 10 members in Congress.

EDUCATION.—School system for whole state introduced, 1854; separate schools for whites and blacks established, 1875; schools kept up by taxation; State Univ. and Southern Univ. (Greensboro); Tuskegee Institute (for negroes), various colleges, normal schools, etc.

Chief industry is agriculture; large quantities of cotton, Indian corn, and other cereals produced; tobacco and sugar; chief minerals, iron and coal, of which rich deposits exist; gold, silver, lead, etc., also found; produces timber; iron and steel manufactures, cotton mills, coke and turpentine factories; chief towns, Montgomery (capital), Mobile, Birmingham. Pop. (1910) 2,138,093.

Pickett, *History of A.* (1900).

ALABAMA (31° 50′ N., 87° 30′ W.), river, A., U.S.A.; joins Tombigbee, forming Mobile and Tensas Rivers.

'ALABAMA' CASE.—*Alabama* was Confederate boat, built in Birkenhead, which in Amer. Civil War captured many Federal vessels, injuring shipping trade of America; Union claimed damages from Britain for breach of neutrality in allowing Confederate boats to be built and fitted out in Britain, and to use Brit. colonial ports; international tribunal of five arbitrators, app. respectively by U.S.A., Britain, Italy, Switzerland, and Brazil, met at Geneva, 1872; awarded indemnity of $15,500,000.

ALABASTER, name applied to two species of mineral extensively used as a white translucent decorative stone in arch., and for figures, vases, etc. The ancients employed a carbonate of lime deposited from calcareous water for sarcophagi, jars, perfume vases, etc. It is worked chiefly in Egypt and Mexico. At the present day the term is used for a fine-grained variety of gypsum, out of which are carved the figures, clocks, vases, and divers ornaments which are a characteristic feature of the shops in Florence, Pisa, and other Tuscan towns.

ALACOQUE, MARIE (1647–90), Fr. nun and mystic; founded the popular devotion to the Sacred Heart; beatified, 1864.

ALADDIN, character in *Arabian Nights*, who became possessed of lamp and ring by rubbing which two genii were summoned to do his will.

ALAGOAS (9° 30′ S., 36° 30′ W.), state, Brazil. Pop. 800,000.

ALAGOINHAS (12° 10′ S., 38° 20′ W.), small town, Bahia, Brazil.

ALAGON (41° 45′ N., 1° 9′ W.), town, Saragossa, Spain. Pop. *c.* 5000.

ALAGOZ, ALAGHEZ (40° 28′ N., 44° 15′ E.), mountains, Transcaucasia; volcanic origin.

ALAI MOUNTAINS (39° 55′ N., 72° E.), lofty mts., Central Asia; extension of Tian-Shan mts.

ALAIN DE LILLE, ALANUS AB INSULIS (1114–1202), Fr. theologian, poet, and scholar, called *Doctor Universalis*; wrote Latin satire on vice, and treatise on morals.

ALAIS (44° 6′ N., 4° 4′ E.), town, Gard, France; glass, coal, and iron. Pop. 25,000.

ALAIS, PEACE OF, treaty (1629) by which Richelieu ended Huguenot wars.

ALAJUELA (9° 58′ N., 84° 18′ W.), province and small town, Costa Rica. Pop. (province) 90,000.

ALA-KUL (46° 21′ N., 81° 27′ E.), lake, Russ. Turkestan.

ALAMANNI, see ALEMANNI.

ALAMANNI, LUIGI (1495–1556), Ital. poet and statesman; served Francis I. and Henry II. of France as ambassador; wrote several plays and much verse.

ALAMEDA (37° 40′ N., 122° 13′ W.), town, California. Pop. (1910) 23,383.

ALAMOS (27° 10′ N., 109° 5′ W.), town, Sonora, Mexico; gold and silver mines.

ALAND ISLANDS (60° 10′ N., 20° E.), about 300 islands, Gulf of Bothnia; 80 inhabited; taken from Sweden by Russia, 1809; cereals, cattle. Pop. *c.* 19,000.

ALANI, nomadic tribe from Caucasus; invaded Europe IV. and V. cents.

ALAOTRA (17° 30′ S., 49° E.), large but diminishing lake, Madagascar.

ALAPAYEVSK (58° N., 61° 50′ E.), town, on Neiva, Perm, Russia; ironworks.

ALARCÓN, HERNANDO DE (XVI. cent.), Span. navigator; explored coast of California (1540) and constructed correct map of same.

ALARCÓN, PEDRO ANTONIO DE (1833–91), Span. author; journalist in early life; wrote account of his adventures in Moroccan War, which secured wide circulation, several popular novels, and poems.

ALARCÓN Y MENDOZA, JUAN RUIZ DE (d. 1639), Span. dramatist; b. Mexico; wrote many plays, including *La Verdad Sospechosa* (imitated in Corneille's *Le Menteur*) and *El Tejedor de Segovia*; depreciated by contemporaries, but now recognised as one of greatest Span. dramatists.

ALARIC (d. 410 A.D.), king of the Visigoths b. near the Danube; made his first appearance a general under Emperor Theodosius in war with Eugenius. After Theodosius' death A. was proclaimed king of the Goths, and his life thereafter is one long chapter of conquests; ravaged Greece, invaded Italy, besieged, captured, and pillaged (410) Rome, the mistress of the world; d. shortly afterwards at Cosenza.

ALARIC II. (d. 507), king of Visigoths; slain in war with Clovis, the Frankish king.

ALARODIAN LANGUAGES, name sometimes given to Georgian and kindred tongues.

ALA-SHAN, LITTLE GOBI (43° N., 105° E.), sandy desert, S. Mongolia; only inhabitants, Togod Mongols.

ALA-SHEHR (38° 22′ N., 28° 32′ E.), town, Asia Minor. Pop. 22,000.

ALASKA (54° 40′ to 71° 30′ N., 141° to 168° W.), peninsula, N. America, territory of U.S.A.; bounded by Arctic Ocean on N., Arctic Ocean and Bering Strait on W., Pacific on S., Canada on E.; area *c.* 590,884 sq. miles; traversed by many mountain ranges. Aleutian range near coast and Alaskan mountains farther inland, of which principal peaks are Mts. M'Kinley and Foraker, have many active volcanoes; hot springs found in district; Coast range crosses south-eastern district; Rockies extend from Yukon to north-east of Alaska. Coast is much indented; chief islands: Aleutian and Kodiak Islands in S.W., Alexander Archipelago in S.E.; first and third are remains of submerged mountain ranges; principal river, Yukon; large forests. Climate is damp and very severe; fauna includes moose, caribou, sables, otters, seals, wolves, bears, beaver, ermine, foxes, minks; flora includes balsam, fir, cedars, hemlock, spruce.

HISTORY.—Region was discovered by Russ. officer, Vitus Bering, 1728; explored by him and Chirikov, 1741; traders followed, and in 1763 Kodiak was discovered; Russians cruelly abused natives. Captain Cook made survey, 1778; Vancouver surveyed S.E. coast, 1793–94; Russo-Amer. company formed to regulate affairs, 1799; Sholikof company also established, early administrator of which, Baranov, founded Sitka; treaties with U.S., 1824, Britain 1825, fixed Russ. boundaries; territory sold by Russia to U.S., 1867, for £1,440,000; boundary dispute settled, 1903.

GOVERNMENT.—Governed by U.S. officials; administration exercised by resident gov., surveyor gen., and others; sends delegate to Congress, since 1906.

Principal industries are fisheries, fish-packing; produces furs; principal minerals, gold and lignite; great gold district at Klondike (*q.v.*); silver, platinum, copper also found. Communications greatly developed since 1896; larger towns all in telegraphic communication with States, mails regularly delivered; one railway crosses interior, and others have been planned; good supply of schools. Pop. (1910) 64,356. Principal towns, Nome, Juneau (capital), Skagway, Sitka.

Higginson, *Alaska* (1909).

ALASSIO (44° N., 8° 11′ E.), town, Italy. Pop. 5630.

ALASTOR, an avenging spirit.

ALA-TAU, six mountain chains, Russia in Asia.

ALATRI (41° 44′ N., 13° 21′ E.), manufacturing town, S. of Rome, Italy; remains of Cyclopean walls. Pop. 16,000.

ALATYR (54° 52′ N., 46° 32′ E.), town, Simbirsk, Russia; grain.

ALAUDA, genus of song-birds including lark (*q.v.*).

ALAVA (42° 50′ N., 2° 40′ W.), province, Spain; cereals, timber, salt; capital, Vitoria. Pop. (1910) 96,500.

ÁLAVA, DON MIGUEL RICARDO DE (1770–1843), Span. general and ambassador; serving first in navy, was present at Trafalgar; later, one of Wellington's aides-de-camp at Waterloo, and gazetted brigadier-general.

ALB (Lat. *albus*, white), ecclesiastical vestment, reaching to feet, worn specially at celebrations of Eucharist; generally of white linen, and in Middle Ages often embroidered, but now in Rom. Church generally plain (except in religious orders); revived in England by ritual movement, and worn under chasuble by celebrating priest, and sometimes by lay servers.

ALBA (44° 43′ N., 8° 5′ E.), town, Italy. Pop. 13,900.

ALBA FUCENS (42° 8′ N., 13° 22′ E.), ancient town, Italy; belonged originally to Aequi; taken by Romans, 304 B.C.; fortifications remain.

ALBA LONGA (41° 43′ N., 12° 40′ E.), ancient Latin town, on shore of Albanus Lacus, near Rome; traces of necropolis remain.

ALBACETE (38° 52′ N., 1° 50′ W.), province, Spain; cereals, fruits, wine; sulphur springs. Pop. (1910) 259,000.

ALBACETE (38° 59′ N., 1° 50′ W.), capital, A., Spain. Pop. 21,512.

ALBACORE, large fish of mackerel (*q.v.*) family; also the tunny (*q.v.*).

ALBAN, ST. (III. cent.), first Brit. martyr; b. at Verulam; put to death during persecution of Christians by Diocletian; church built on scene of his martyrdom by Offa of Mercia, from which the abbey and town of St. Albans arose.

ALBANI, famous Roman family, members of which attained highest dignities in Church, one being Clement XI.

ALBANI, FRANCESCO (1578–1660), Ital. artist; b. Bologna; pupil of Caracci; graceful paintings; mythological and idyllic subjects; 'Anacreon of painting.'

ALBANI, MADAME, *née* MARIE EMMA LA JEUNESSE (1847–), Canadian vocalist, of Fr. descent; one of leading operatic and oratorio sopranos.

ALBANIA (41° 30′ N., 47° 30′ E.), district, Caucasus; invaded successively by Alani, Khazars, Huns, Parangians, Mongols.

ALBANIA (40° 45′ N., 20° 14′ E.), district in W. of European Turkey; borders on Adriatic and Ionian Seas, whence it stretches eastward to Shar Dagh mountains; extends between Montenegro and Greece. A. comprises vilayets of Scutari and Janina and part of Monastir and Kossovo; area, *c.* 20,000 sq. miles. Surface generally consists of high plains and mountain ridges which trend N.W. and S.E.; drained by Drin, Voyussa, Boyana, and other rivers. Chief lakes are Scutari, Janina, Okhrida. Chief towns are Scutari, Prizren, Janina. Climate is healthy.

Ancient Illyria and Epirus, now included in A., were provinces of Byzantine Empire and were frequently ravaged by barbarians. Bulgarians established kingdom in S. in IX. cent., which long resisted emperors of Constantinople. Early in XV. cent., when Turk. aggression began, Albanians offered stout resistance, and under great leader Scanderbeg defeated Turk. armies on many occasions. In 1477 Muhammad II. began siege of Scutari, which fell after fifteen months, when treaty was concluded whereby Turk. authority was recognised. Till 1770 history was one of ceaseless warfare, both internal and against Montenegrins. A. took no part in Russo-Turkish War of 1877–78, nor in Gk. War of Independence. Revolts against Turkey continually took place.

Inhabitants include Turks, Serbs, Rumanians, Greeks, besides Albanians themselves, who are warlike race descended from ancient Illyrians; they have retained their own language, of which there are two principal dialects, Gheg in N. and Tosk in S. Intertribal struggles are continually going on, robbery and brigandage are common, and vendetta is established custom. Chief religion is Muhammadanism, but there are numbers belonging to Gk. and R.C. Churches. Resources include forests of oak, beech, ash, and other trees; maize, wheat, rice, tobacco, olives, oranges, vines, and mulberries are cultivated; cattle raised; exports fish, salt, cattle, agricultural produce, silk, olive oil, tobacco, sugar, coffee, skins, etc. Pop. *c.* 1,500,000.

With invasion of A. by Montenegro and Servia in 1912 the question of A.'s future came into prominence. Servia, desiring an outlet on the sea, naturally wished to retain the ports she had taken; her claims were covertly supported by Russia, while Austria and Italy demanded autonomy for the original A. See TURKO-BALKAN WAR.

Durham, *High A.* (1909); Galanti, *L'Albania* (1901).

ALBANO (41° 44′ N., 12° 39′ E.), summer resort, Via Appia; site of Pompey's villa.

ALBANUS LACUS (41° 43′ N., 12° 41′ E.), lake near Rome.

ALBANUS MONS (41° 42′ N., 12° 41′ E.), hill, near Rome.

ALBANY (42° 40′ N., 73° 45′ W.), town, New York; fine examples of Dutch arch.; public buildings include State Capitol, white marble structure, many halls, banks, etc.; R.C. and Prot. cathedrals, medical and other colleges, hospitals; one of earliest settlements in Union; French established trading port, *c.* 1540; Dutch emigrants settled here early XVII. cent., Eng. settlers, XVIII. cent.; capital, New York State, since 1797; railway and trading centre; manufactures iron and brass goods, beer, cigars, aniline dyes, etc. Pop. (1910) 100,253.

ALBANY (51° 30′ N., 83° W.), river, Canada; flows into James Bay.

ALBANY (31° 35′ N., 84° 10′ W.), town, Georgia. Pop. (1910) 8190.

ALBANY (35° S., 117° 50′ E.), seaport, W. Australia. Pop. 3650.

ALBANY (33° 20′ S., 26° 30′ E.), district, Cape Province, S. Africa. Pop. (1911) 32,000 (11,000 white).

ALBANY (Celtic form of Albion), old name for Scot. Highlands.

ALBANY, DUKEDOM OF.—King Robert of Scotland, in 1398, created his 2nd s., Robert Stuart, 1st Duke of A. He was succ. by his s. Murdoch, executed 1425, and the dukedom became extinct. It was revived by James II. and conferred on his s. Alexander, who transmitted it to his s. John, Regent of Scotland (1515–23). Having again become extinct, it was revived (1565) in favour of Lord Darnley, Queen Mary's husband, and in infancy was conferred both on Charles I. and James II. (of England). Later, in conjunction with other titles, it was granted to Ernest Augustus, bro. of George I.; Edward Augustus, bro. of George III.; Frederick, 2nd s. of George III.; and to Prince Leopold, 4th s. of Queen Victoria; present Duke: Charles Edward, Duke of Saxe-Coburg-Gotha, b. and succ. 1884.

ALBANY, LOUISE, COUNTESS OF (1752–1824), dau. of Prince Gustavus Adolphus of Stolberg-Gedern; m. (1772) Charles Edward Stuart ('Young Pretender'), who dubbed himself Count of A. The Prince's violence and drunkenness compelled her to seek flight, and she lived for many years with the Ital. poet Vittorio Alfieri (*q.v.*); see Vernon Lee, *Countess of Albany.*

ALBATEGNIUS (*c.* 850–930), Muhammad ibn-gebir al Batani, the foremost Arab astronomer; compiled exact tables of the planets and introduced sines into trigonometrical calculations.

ALBATROSS (*Diomedea*), genus of large seabirds of the order Tubinares, related to the petrels, occurring in the Southern Ocean. The common a. (*D. exulans*) measures from 10 to 15 ft. between tips of extended wings; one of the most indefatigable flyers known; according to superstition it is unlucky to shoot an a. (cf. *The Ancient Mariner*).

ALBAY (13° 5′ N., 123° 40′ E.), town, Philippines. Pop. 41,950.

ALBEDO, degree of light reflected from a rough surface, *e.g.* sunlight from the moon.

ALBEMARLE, DUKEDOM AND EARLDOM OF (Fr. Aumale), title first conferred upon Odo of Champagne, bro.-in-law of William the Conqueror, and with it the isle of Holderness, Yorkshire. Having become extinct, it was revived again, as an earldom, in favour of Richard Beauchamp, Earl of Warwick (1423); raised to a dukedom, it was conferred upon General Monk by Charles II. William III. bestowed it as an earldom on Arnold Joost van Keppel, by whose descendants it is still held.

ALBEMARLE, GEORGE MONCK, DUKE OF (1608–70), Eng. general; captured by Fairfax at

Nantwich, and imprisoned, 1644–46; entered Commonwealth service for Irish wars; commanded infantry brigade at Dunbar, 1650; commander-in-chief in Scotland after Cromwell's departure, and achieved its conquest; one of three generals of the fleet, 1652–53, and defeated Dutch; kept order in Scotland, 1654–59; remained faithful to Cromwell and, until he 'forsook himself,' to his son; peacefulness of Restoration due to his firmness.

Life, by Guizot (1851), Corbett (1889).

ALBENDORF (50° 26′ N., 16° 39′ E.), small town, Silesia, Prussia.

ALBENGA (44° 4′ N., 8° 14′ E.), town, Italy. Pop. 6248.

ALBERICH, legendary king of dwarfs and head of Nibelungs (*q.v.*).

ALBERONI, GIULIO (1664–1752), Span. cardinal (1717); s. of a gardener; rose to high position in Church and State; Philip V.'s chief minister; sought to revive Spain's power; dismissed (1719) after failure of foreign policy, owing to quadruple alliance (England, France, Austria, Holland).

ALBERT.—(1) (45° 50′ N., 64° 50′ W.) Town and county, New Brunswick, Canada. (2) (30° S., 27° E.) Division, Cape Province, S. Africa. (3) (50° 20′ N., 2° 37′ E.) Small town (formerly Ancre), Somme, France. (4) (17° 38′ S., 139° 53′ E.) River, Queensland, enters Gulf of Carpentaria.

ALBERT (1490–1545), Elector of Mainz; abp. of Magdeburg; s. of Elector of Brandenburg; strenuous efforts were made to secure his help for the reformed faith, but he definitely ranged himself on the side of Catholicism; granted power to sell indulgences by Leo X.; generous patron of learning; friend of Erasmus.

ALBERT (1490–1568), last Grand Master of Teutonic Order; 1st Duke of Prussia; very friendly towards Luther, and did much to further his doctrines.

ALBERT, ALCIBIADES (1522–57), Margrave of Brandenburg, Prince of Bayreuth; joined Emperor Charles V. against France (1543); later served under Maurice of Saxony; ravaged Franconia; d. under the Imperial ban.

ALBERT I. (1875–), King of Belgium; succ. his uncle, Leopold II., 1909.

ALBERT I., THE BEAR (1100–70), Margrave of Brandenburg; conducted campaigns against the Wends; did much to further Christianity and civilisation.

ALBERT III. (1414–86), Elector of Brandenburg; succ. on abdication of bro., Frederick II.; by his energy and ambition made himself one of most powerful princes of his time; called the Ger. Achilles or Ulysses.

ALBERT I. (1250–1308), Ger. king (1298); s. of Rudolph I. of Hapsburg; murdered by his nephew, John, whom he had disinherited.

ALBERT II. (1397–1439), Ger. king (1438); Albert V., Duke of Austria; king of Bohemia and Hungary; fought with King Sigismund against Hussites.

ALBERT III. (1443–1500), Duke of Saxony; in campaign against Charles the Bold, Duke of Burgundy (1475); famous for strength and feats of arms; founded royal House of Saxony.

ALBERT, FRANCIS CHARLES AUGUSTUS (1819–61), Prince Consort of Britain; s. of Duke of Saxe-Coburg-Gotha; m. Queen Victoria, Feb. 10, 1840. The title of Consort was conferred in 1842; that of Prince Consort in 1857. He d. of typhoid fever at Windsor, Dec. 14, 1861. Of a handsome person, possessed of great tact, the Prince Consort by the purity and usefulness of his life endeared himself to all classes.

Life, by Sir Theodore Martin, 1874–80.

ALBERT, FREDERICK AUGUSTUS (1828–1902), king of Saxony; succ. 1873; at age of twenty-one was engaged in campaign of Schleswig-Holstein against the Danes, and took prominent part in later wars of period.

ALBERT, FRIEDRICH RUDOLF (1817–95), Archduke of Austria; field-marshal; e. s. of Archduke Charles; bred to arms from his early years, he took a prominent part in Italian Wars (1848–70), and won reputation as a brilliant general.

ALBERT, ST., bp. of Liège; assassinated at Henry VI.'s instigation, 1195.

ALBERT, THE PIOUS (1559–1621), archduke of Austria; cardinal, abp. of Toledo, Viceroy of Portugal, and Stadtholder of Netherlands.

ALBERTA (52° 40′ N., 114° 20′ W.), was one of N.W. territories of Canada until 1905, when it became separate province; area, 251,180 sq. miles; surface generally level in N. and S.E., mountainous in W., which is occupied by Rockies (*q.v.*); much of S. is prairie land; watered by Smoky, Peace, Athabasca, Saskatchewan, and other streams; chief towns, Edmonton, Calgary; climate healthy; administered by lieut.-gov.; has separate Parliament of one chamber with 41 members.

In N. are forests; S.W. is important ranching district, raising great numbers of cattle, horses, and sheep; dairying carried on. Fish abound in rivers and lakes, and game is plentiful. Wheat and other grains cultivated; fruits and tobacco grown. Minerals include coal, lignite, petroleum, iron, gold, silver, copper; at Banff, which is part of Canadian National Park, there are hot sulphur springs. A. is crossed by Canadian Pacific main and branch lines. Pop. (1911) 375,000.

Thwaite, *Alberta* (1912).

ALBERT EDWARD NYANZA (0° 20′ S., 29° 45′ E.), lake, upper Nile basin, in Belgian Congo; greatest length, 44 miles; breadth, 32 miles; discovered by Stanley, 1889.

ALBERT LEA (43° 37′ N., 93° 20′ W.), town, Minnesota. Pop. (1910) 6192.

ALBERT NYANZA (1° 30′ N., 31° E.), lake, Nile basin, British Uganda; greatest length, *c.* 100 miles; width, over 20 miles; receives Semliki River from Albert Edward Nyanza at S.W. end; northern outlet, White Nile; first discovered by Sir Samuel Baker, 1864; circumnavigated by Gessi Pasha, 1876, Emin Pasha, 1884.

ALBERTI, LEONE BATTISTA (1404–72), Ital. architect and scholar; wrote works on sculpture and painting.

ALBERTITE, variety of asphalt found in the county of Albert, New Brunswick.

ALBERTUS MAGNUS (*c.* 1206–80), theologian, teacher of Thomas Aquinas; one of most learned men of his time, student of Aristotle, and of natural science; wrote commentaries on Peter Lombard and Aquinas, and much else; studied by Dante.

ALBERTVILLE (45° 42′ N., 6° 21′ E.), town, Savoie, France; silver-lead mines.

ALBERTVILLE (6° 4′ S., 29° E.), settlement, Belgian Congo, W. of Tanganyika.

ALBERUS, ERASMUS (1500–53), Ger. theologian; one of Luther's most active supporters.

ALBI (43° 55′ N., 2° 8′ E.), town, France; cathedral and abp.'s palace. Pop. 15,000.

ALBIAN, the lowest stage of the Upper Cretaceous rocks, including Upper Greensand and Gault in England; continental geologists use the term for the youngest stage of the Lower Cretaceous. It is well developed in the Department of Aube (France), corresponding formations being Flammenmergel (Germany), Fredericksburg beds (N. America), and Upper Sandstones of Nubia. See CRETACEOUS.

ALBIGENSES, name applied about 1200 to religious sect of southern France, offshoot of a movement in both Eastern and Western Christendom. Their exact beliefs are uncertain, but they certainly disbelieved in the sacramental system of Catholicism and protested against clerical abuses. Many were Catharists. St. Bernard and St. Dominic tried to

convert them, and they were finally crushed as heretics with great cruelty in XIII. cent.

ALBINISM, the lack of pigmentation in plants and animals which are normally pigmented. In certain cases, however, as in certain flowering plants and in arctic animals, this character has become specific. It may be complete or partial. In man the hair and skin may be white, and the eyes are extremely sensitive to light, and appear pink owing to the iris being devoid of pigment and the blood of the capillaries shining through retina, iris, and cornea. Negroes, in whom a. is particularly obvious, sometimes show irregular white patches all over the body, giving it a piebald appearance, and it is probable that partial a. occurs in Europeans, but is not so noticeable on account of the pale skin. Seasonable a. in animals, such as hares and ptarmigans, which have white fur or feathers during winter, is not complete, as the pigmentation of the eye is maintained, the unpigmented state being obviously disadvantageous. Lack of pigment in other animals, *e.g.* worms, beetles, fishes, frogs, is often due to the absence of the stimulus of light, and is especially noticeable in cave animals. True a. is not acquired, and, therefore, not curable, but is inherited. It seems that a mendelian transmission takes place, and this is evidently corroborated by the occurrence of albinotic offspring from marriages of first cousins. A., whether in man or animals, may be regarded as a 'recessive' character. See HEREDITY.

K. Pearson, *Albinism in Man*, Biometric series, Draper's Company Research Memoirs, 1910.

ALBINUS (WEISS), **BERNHARD SIEGFRIED** (1697–1770), Ger. anatomist; gained a European reputation as a teacher of anat. and med. at Leiden, where he succ. his f. and was succ. by his two bro's.

ALBION ('White Hill'), oldest name for Great Britain.

ALBION (42° 18′ N., 84° 47′ W.), town, Michigan. Pop. (1910) 5833.

ALBION (43° 15′ N., 78° 15′ W.), town, New York. Pop. (1910) 5016.

ALBISTAN (38° 6′ N., 37° 8′ E.), village, on Jihan, Asiatic Turkey.

ALBITE ($NaAlSi_3O_8$), white plagioclase felspar occurring as a constituent of acid igneous rocks and in twinned anorthic crystals in fissures of granites and schists.

ALBOIN (d. 573), king of Lombards; conquered Italy; murdered at instance of his wife, Rosamund, whom he had forced to drink wine from cup made from her f.'s skull; favourite subject of poets and dramatists.

ALBONA (45° 6′ N., 14° 7′ E.), ancient town, Istria, Austria.

ALBONI, MARIETTA (1823–94), Ital. prima donna; contralto.

AL BORAK, winged steed on which Muhammad, according to Muslim tradition, journeyed through the heavens.

ALBORNOZ, GIL ALVAREZ DE (d. 1367), Span. cardinal (1350); fought against Moors; smoothed way for pope's return to Rome from Avignon.

ALBRECHTSBERGER, JOHANN GEORG (1736–1809), Austrian composer and teacher; taught Beethoven.

ALBRET, ancient region of Gascony. The lords of A. were a powerful family in Middle Ages. Charles A., Constable of France, was slain at *Agincourt*.—**Jeanne d'A.** (1528–72), Queen of Navarre, was mother of Henry IV., who united A. to Fr. Crown.

ALBRIGHT, JACOB (1759–1808), Amer. preacher, of German descent; founder of dissenting sect known as 'New Methodists.'

ALBRUN PASS (46° 22′ N., 8° 16′ E.), Alpine bridle path (7907 ft.), by Binn and Devero valleys from Switzerland into Italy.

ALBUERA, LA (38° 44′ N., 6° 46′ W.), village, Spain; Soult defeated by Anglo-Spanish force under Beresford, May 16, 1811.

ALBUFERA DE VALENCIA (39° 19′ N., 0° 18′ W.), lagoon, Spain; British defeated (1812) by Suchet, who was cr. Duke of A.

ALBUGO, see LEUCOMA.

ALBULA PASS (46° 35′ N., 9° 47′ E.), pass and railway, Switzerland.

ALBUMAZAR, ABU MAASCHAR (805–85), prominent Arab astrologer, flourished at Bagdad.

ALBUMIN, term for very complex organic compounds containing carbon, hydrogen, nitrogen, oxygen, and sulphur varying within certain limits of ercentage and possibly conforming to the formula $C_{720}H_{1184}N_{218}S_6O_{248}$. Albumins are formed in plants, especially in seeds, from simple compounds, and form an essential part of the animal organism. The white of egg (albumen) is a well-known a. The a. solutions are characterised by rotating the plane of polarised light, and they are colloids, *i.e.* do not diffuse through animal or vegetable membranes. Many coagulate on being boiled with water or treated with certain acids. The following outline of classification is convenient. 1. *A. proper:* egg-a., milk-a., serum-a., globulins, plant-globulins, myosin, fibrinogen, nucleo-a., caseins, vitellins, histones, protamins. 2. *Transformation products:* acid a., alkali albuminates, halogen a., albumoses, peptone. 3. *Proteids:* nucleo-proteids, hæmoglobin, glyco-proteid. 4. *Albuminoids:* collagen, keratin, elastin, fibroin, spongin, amyloid, albumoid, and colouring matters derived from a. (*e.g.* melanins). The synthesis of a's is one of the most interesting problems of physiological chem., and has attracted many workers, Cohnheim, Kossel, E. Fischer being a few of the more prominent investigators.

ALBUMINURIA (med.), presence of albumen in the urine, occurring as a symptom of kidney disease, or in healthy persons as the result of albuminous diet, or over-exertion. See BRIGHT'S DISEASE.

ALBUÑOL (36° 46′ N., 3° 11′ W.), town, Granada, Spain; wine.

ALBUQUERQUE.—(1) (35° 5′ N., 106° 40′ W.) Town, New Mexico; univ.; railway centre. Pop. (1910) 11,020. (2) Town, Badajos, Spain. Pop. 9000.

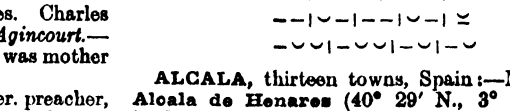
ALBUQUERQUE, ALPHONSO D', THE GREAT (1453–1515), Portug. explorer; sent in charge of expeditions to India, Persian Gulf, and Malabar; captured Goa (1510), and Malacca; established Portug. power in India; revered by natives, but recalled through jealous rivals, and d. of broken heart.

ALBURNUM, SAPWOOD, SPLINTWOOD, young wood of dicotyledonous trees, outside of the duramen or heartwood.

ALBURY (36° 4′ S., 146° 57′ E.), town, New South Wales; agricultural and sheep-breeding centre. Pop. (1910) 7000.

ALCÆUS OF MYTILENE (600 B.C.), Gk. lyrical poet of great fame; wrote love-songs, martial lyrics, and hymns to the gods; contemporary of Sappho; imitated by Horace; only fragments of his works extant.

ALCAICS, verse in measure named from Alcæus, Gk. lyric poet of Mitylene (fl. *c.* 600 B.C.), formed thus—



ALCALA, thirteen towns, Spain:—Most famous is **Alcala de Henares** (40° 29′ N., 3° 18′ W.), near Madrid; birthplace of Cervantes; had famous Univ. removed to Madrid, 1836. Pop. 9000.—**Alcala de los Gazules**, Cadiz (36° 28′ N., 5° 40′ W.). Pop. 8877.—**Alcala de Guadaira**, Sevilla (37° 21′ N., 5° 51′ W.). Pop. 8198.—**Alcala del Jucar**, Albacete (39° 9′ N., 1° 25′ W.). Pop. 2968.—**Alcala de Chisbert** (40° 17′ N.,

0° 18′ E.). Pop. 6293.—**Alcala la Real** (37° 28′ N., 3° 55′ W.). Alfonso XI. captured fortress from Moors; hence name, the 'Royal Castle.' Pop. 15,973.—**Alcala del Rio** (37° 30′ N., 5° 57′ W.), or Guadalquivir. Pop. 3006.—**Alcala de la Selva**, in Teruel. Pop. 1490.—**Alcala de la Vega**, in Cuença. Pop. 712.—**Alcala de Gurrea**, in Huesca. Pop. 632.—**Alcala del Obispo**, in Huesca. Pop. 432.—**Alcala del Ebro**, in Saragossa. Pop. 388.—**Alcala de Moncavo**, in Saragossa. Pop. 367.

ALCAMO (37° 59′ N., 12° 56′ E.), town, Sicily. Pop. (1911) 51,798.

ALCANIZ (41° 1′ N., 0° 7′ W.), walled town, Teruel, Spain.

ALCANTARA (39° 43′ N., 6° 52′ W.), town, Spain; has Rom. bridge.—**Order of A.** (religious and military), established 1156, for defence against Moors; several times suppressed and revived. (2) (2° 20′ S., 44° 20′ W.), seaport, Brazil.

ALCARAZ (38° 40′ N., 2° 35′ W.), range of mountains, Spain; loftiest peak, Sierre de A. (5900 ft.).

ALCARRIA, LA (40° 50′ N., 2° 30′ W.), fertile tract of land, Guadaljara, Spain.

ALCAUDETE (37° 37′ N., 4° 10′ W.), town, Jaen, Spain; dried fruits.

ALCAVALA, extortionate tax imposed in Spain, up to period of Napoleon's invasion, upon all raw or manufactured goods, amounting to 14 % on market price, and operative each time the property changed hands.

ALCAZAR, name of Moorish palaces in Spain.

ALCAZAR DE SAN JUAN (39° 23′ N., 3° 11′ W.), town, Spain; soap manufactures. Pop. 11,499.

ALCEDO, the kingfisher (*q.v.*).

ALCESTER (52° 13′ N., 1° 51′ W.), town, Warwickshire; site of Rom. camp. Pop. (1911) 7314.

ALCESTER, FREDERICK BEAUCHAMP PAGET SEYMOUR, Baron (1821–95), Eng. admiral; commander at bombardment of Alexandria, for which service was raised to peerage; died unmarried, and title became extinct.

ALCESTIS, ALCESTE (classical myth.), wife of Admetus, who gave herself up to death to save husband; brought back from lower world by Hercules; subject of tragedy by Euripides (*q.v.*).

ALCHEMY was the forerunner of chemistry, much in the same way as astrology preceded astronomy. The alchemists undertook the quest for the 'philosopher's stone' with which they hoped to convert the baser metals into gold and silver, the 'alkahest' or universal solvent, and the 'elixir vitæ' by which life might be prolonged. The 'magisterium' was sought for after the action of various drugs had been investigated, and was supposed to cure all diseases. A. flourished in the Middle Ages, and, based on the work of Hermes Trismegistus and Geber, was eagerly pursued by Albertus Magnus, Lully, Roger Bacon, Paracelsus, and many others; and modern chem. is indebted to them for many discoveries and ideas. Perhaps the recent researches in radioactivity and the growing conviction of the unity of matter will, in a sense, make some of the dreams of the alchemists come true.

ALCIBIADES (*c.* 450–404 B.C.), Athenian statesman and general; most brilliant figure of age of Pericles, whose nephew he was; of high birth, great wealth, every personal and mental distinction. A. led anti-Lacedæmonian party; commanded expedition against Sicily; recalled and impeached for alleged mutilation of statues of Hermes; fled to Sparta and proved dangerous enemy to Athens; Spartans became jealous; fled to Persian satrap Tissaphernes; later won great victories over both Persians and Spartans; captured Cyzicus, Chalcedon, and Byzantium for Athens; invited to return, 407, but speedily superseded; murdered in Phrygia.

ALCIDES (classical myth.), descendant of Alceus; designation of Hercules.

ALCINDUS, AL-KINDI (fl. IX. cent.), Arab. philosopher; commentator on Aristotle; reputed founder of Arab. philosophy.

ALCINOUS (classical myth.), king of Phæacians; f. of Nausicaa; host of shipwrecked Odysseus.

ALCIPHRON (II. cent. B.C.), Gk. rhetorician and brilliant epistle writer.

ALCIRA (39° 8′ N., 0° 26′ W.), town, Spain; produces silk. Pop. 20,572.

ALCMÆON (Gk. myth.).—(1) Went mad after murdering his mother, Eriphyle (*q.v.*); killed in attempting to secure fatal necklace of Harmonia for his second wife, Callirrhoe. (2) Son of Syllus, grandson of Nestor; who left Messenia when the Heraclidæ conquered Peloponnesus, and founded at Athens the **Alcmæonidæ**, a family who were prominent at time of Peloponnesian War, of which Pericles and Alcibiades were members.

ALCMÆON (VI. cent. B.C.), Gk. philosopher, anatomist, and physiologist.

ALCMAN, ALCMÆON (fl. VII. cent. B.C.), Gk. poet; Lydian slave; enfranchised and lived at Sparta; fragments of lyrics alone remain; first poet, it is said, to sing of love; inventor of choral ode; hence term Alcmanian, applied in Greece to lyric verse.

ALCMENA (classical myth.), wife of Amphitryon and mother by Zeus of Hercules.

ALCOBAÇA (39° 32′ N., 8° 58′ W.), town, Portugal; famous old Cistercian convent.

ALCOCK, JOHN (d. 1500), Eng. scholar; dean of Westminster (1461); ambassador to Castile (1470); and successively bp. of Rochester, Worcester, and Ely; twice Lord Chancellor; founder of Jesus College, Cambridge.

ALCOCK, SIR RUTHERFORD (1809–97), Eng. doctor and diplomatist; surgeon during Carlist War (1836); afterwards did valuable consular work in China and Japan.

ALCOFORADO, MARIANNA (1640–1723), Franciscan nun; b. Beja, Portugal; famous as writer of passionate *Letters of a Portuguese Nun* (translated into Eng. by Edgar Prestage), addressed to her betrayer.

ALCOHOLISM, see TEMPERANCE.

ALCOHOLS, a group of organic compounds consisting of a hydrocarbon radical or group combined with one or more hydroxyl groups. According to the number of hydroxyl (a group consisting of an atom of oxygen and one of hydrogen—HO) groups present, monatomic, diatomic, triatomic, etc., a. may be distinguished, *e.g.* ordinary a. (ethyl a. CH_3CH_2OH), glycol (ethylene alcohol $CH_2OH.CH_2OH$), glycerin (glycerol $CH_2OH.CHOH.CH_2OH$). Primary a's contain the group CH_2OH, and are oxidised to form a corresponding aldehyde or acid with the same number of carbon atoms. Secondary a's contain the group CHOH combined with two hydrocarbon radicals, and form ketones on oxidation and acids with a lesser number of carbon atoms on further oxidation. Tertiary a's are characterised by the group C.OH combined with three hydrocarbon radicals, and yield simpler compounds on oxidation.

'Spirits of wine' or ethyl alcohol is a colourless, mobile, inflammable liquid, B.P. 78°, M.P. 112°, S.G. ·79, and is formed by the fermentation of saccharine liquids, the raw materials being grapes, barley and other cereals, potatoes, molasses, sugar, honey, apples, cherries, etc. It is used in beverages, in med., and for industrial purposes as a solvent or as fuel. In the latter case it is 'denaturised,' to avoid the high excise duty, by different agents according to the purpose for which it is required, methyl a. and pyridine being most commonly applied. Absolute a. contains only 1 % of water.

The physiological effects of a. on animal organisms are mainly depressant after a period of stimulation, and toxic effects appear when a. is taken in large quantities, causing diseases of stomach, liver, kidneys, heart, blood-vessels, and nervous system. As regards the hereditary consequences of chronic alcoholism

it may be said that alcoholism is in most cases not so much the cause as the effect of a disordered nervous system.—**Alcoholometry**, estimation of amount of a. in liquid either by HYDROMETER (*q.v.*) when a. diluted by water only, or in other cases by distilling it off.

ALCORAN, see KORAN.

ALCOTT, AMOS BRONSON (1799–1888), Amer. educationalist; was associated much with Emerson, and lectured on Transcendentalism; author of *Tablets* (1868), *Concord Days* (1872), and other books.

ALCOTT, LOUISA MAY (1832–88), Amer. authoress; popular writer for girls, her best-known books being *Little Women* and *Little Men*; dau. of above.

ALCOY (38° 42′ N., 0° 26′ W.), town, Spain; manufactures linen, paper. Pop. (1910) 34,000.

ALCUIN (b. 735), Eng. ecclesiastic and scholar; b. York; spent much time at court of Charlemagne, in whose realm he spread civilisation and learning; presided over famous school and abbey of St. Martin at Tours. A. wrote numerous graceful letters, several poems, and some theological treatises.

Gaskoin, *Alcuin: his Life and his Work* (London, 1903).

ALCYONARIA, see ANTHOZOA.

ALCYONE, HALCYONE (classical myth.), dau. of Æolus, who on her husband's death by drowning threw herself into sea and was changed, with him, into a kingfisher (halcyons). The birds are thought to calm the sea during the ('halcyon') days of their nesting.

ALDABRA (9° 30′ S., 46° 20′ E.), Brit. islands, Ind. Ocean; part of Seychelles colony. Grande Terre or South Island is largest, noted for giant tortoises, crustacea, and rare birds; chief industry, fishing. Pop. 127.

ALDAN (58° 30′ N., 130° E.), navigable river, Siberia.

ALDBOROUGH (53° 50′ N., 0° 6′ W.), village, Yorkshire; Roman remains. Pop. 1839.

ALDEBARAN, *α* Tauri, red first-magnitude star having a brilliancy 27 times that of the sun, brightest star in the Hyades.

ALDEBURGH (52° 10′ N., 1° 36′ E.), town, Suffolk; Crabbe's birthplace. Pop. 2374.

ALDEGREVER, HEINRICH, ALDEGRAF (1502–58), Ger. artist and engraver; school of Dürer; ranks high among 'Little Masters.'

ALDEHYDES, organic compounds of the general formula R.CHO, in which R is an aryl or alkyl (*q.v.*), derived from alcohols by oxidation, and yielding acids when oxidised themselves, *e.g.* methyl alcohol (CH_3OH) yields formaldehyde (H.CHO) which may be oxidised to formic acid (H.COOH).

ALDEIA GALLEGA (38° 42′ N., 8° 56′ W.), small town, Portugal; mineral springs.

ALDEN, JOHN (d. 1687), Amer. settler; sailed in *Mayflower* (1620); romance of his life told in Longfellow's *The Courtship of Miles Standish*.

ALDER (*Alnus*), genus of shrubs or trees of the order Betulaceæ, growing in moist places, often in thickets, in the N. temperate zone and W. South America. The wood is used by turners, and, owing to its durability under water, for piles in building (*e.g.* in Venice and Amsterdam), and the bark in tanning and dyeing.

ALDER-FLY (*Sialidæ*), neuropterous (*i.e.* with net-veined wings) insects related to the ant-lions, with aquatic larvæ.

ALDERMAN (A.S. *Ealdorman*), literally, 'older man'; hence counsellor and magistrate; in modern England, municipal officer advanced from ranks of city- or town-councillors; the Scot. equivalent is 'Bailie.'

ALDERNEY (49° 43′ N., 2° 10′ W.), most northerly of Channel Islands (*q.v.*); area, 1962 acres; coast outlined by rocks and reefs; 'Caskets' especially dangerous in bad weather; Race of A. separates island from Normandy; surface is level tableland; vegetables, grain; once famous breed of cattle; capital, the picturesque town St. Anne; harbour at Braye. Pop. *c.* 2000.

ALDERSHOT (51° 14′ N., 0° 46′ W.), urban district, Hampshire. CAMP established, 1855; [illegible]ment buildings erected, 1881; reconstruction [illegible], 1890. Marlborough Lines have field artillery and five infantry barracks; Stanhope Lines, Royal Engineers, Army Service Corps, and five infantry barracks. Pop. (1911) 35,175.

ALDHELM, EALDMAN (c. 640–709), bp. of Sherborne; studied under Hadrian, abbot of St. Augustine's, Canterbury, and became one of most learned men in England; wrote Latin verse and said to have known Gk. and Hebrew; abbot of Malmesbury, 675; bp. of newly created see of Sherborne, 705; his Latin works preserved, but his Old Eng. poetry has perished.

Wildman, *Life of St. Ealdhelm* (1905).

ALDINE PRESS, see MANUZIO.

ALDINI, GIOVANNI (1762–1834), Ital. physicist, nephew of L. Galvani; undertook researches in galvanism and introduced improvements in life-saving appliances and lighthouses.

ALDOBRANDINI, SILVESTRO (1499–1558), Ital. jurist belonging to famous Florentine family. His s. IPPOLITO reigned as Pope Clement VIII. (1592–1605). Clement's nephew PIETRO (1572–1621) became cardinal and owned the villa whither was taken the antique fresco, discovered in Rome, 1606, and called the *Aldobrandinish Wedding*.

ALDRED, or EALDRED (d. 1069), Eng. ecclesiastic; made bp. of Worcester (1044); abp. of York (1060), crowned William the Conqueror; first Eng. bp. to make pilgrimage to Jerusalem.

ALDRICH, HENRY (1647–1710), Eng. theologian, wit, philosopher, musician, and architect; Vice-Chancellor of Oxford Univ. (1692); his *Compendium Artis Logicæ* was used in Oxford until recent times.

ALDRICH, THOMAS BAILEY (1836–1907), Amer. novelist and poet; editor *Atlantic Monthly* (1881–90); author of *Prudence Palfrey* (1874), *Queen of Sheba* (1877), *The Stillwater Tragedy* (1880), and others; also several volumes of verse.

ALDRIDGE, IRA (1805–67), negro tragedian; took Shakespearian rôles, especially Othello, in London and abroad.

ALDRINGER, JOHANN, COUNT VON, or ALDRINGEN (1588–1634), Austrian commander; performed brilliant service under Tilly and Wallenstein; killed at defence of Landshut.

ALDROVANDI, ULISSE (1522–1605), Ital. naturalist, prof. of philosophy and med. at Bologna, where he founded a botanical garden. He compiled an interesting work which was to include the entire zoological knowledge of his time, and was also the author of botanical and pharmacological treatises.

ALDUS MANUTIUS, see MANUZIO.

ALE, fermented malt liquor; term now usually applied to a beer brewed by the surface fermentation process. See BREWING.

ALEANDER, HIERONYMUS (1480–1542), Ital. cardinal; sometime librarian of Vatican; one of Luther's fiercest opponents.

ALEARDI, ALEARDO, Count (1812–78), patriotic Ital. poet; author of *Arnaldo da Rocca* (1842); *Lettere a Maria* (1848).

ALEATORY CONTRACTS (Lat. *aleator*, a gambler), include bets, wagers, bottomry, insurance, and others depending on an uncertain event.

ALE-CONNER, old English official, appointed by Court leet, whose duty it was to examine all ales and beers offered for public consumption.

ALECSANDRI, VASILE, ALEXANDRI (1821–90), Rumanian poet and statesman; wrote and adapted several plays, and pub. volumes of original verse; popularised Rumanian folk-songs; Minister, Foreign Affairs (1859); Minister to France (1885).

ALECTO (classical myth.), one of Erinyes (*q.v.*) or Furies.

ALEMÁN, MATEO (b. 1547), Span. novelist, author of picaresque novel, *Guzman de Alfarache* (1599).

ALEMANNI, ALAMANNI, Latinised form of name assumed by Teutonic horde formed from various tribes (All-men); began to encroach on Rom. empire, III. cent. A.D.; Caracalla opposed them on Maine, 211; forced south by Burgundians and made permanent settlements in S.E. Gaul in IV. cent.; defeated by Clovis, 496; formed into Frankish duchy Alemannia; one of their tribes, the Suevi, gave name to Swabia; from these invaders French called all Germans *Allemands*.

ALEMBERT, JEAN LE ROND D' (1717–83), Fr. philosopher and mathematician; b. Paris; s. of Chevalier Destouches and Madame de Tencin; brought up as a foundling, afterwards successively studied theol., law, and med., but then devoted himself wholly to math's. He published researches on the integral calculus, on the equilibrium and the motion of fluids, on the nutation of the axis of the earth, and other physical problems. After having been associated with Diderot in the compilation of the *Dictionnaire Encyclopédique* he published several literary and philosophical works. He acquired great fame during his lifetime, and was noted for his simple, generous, and independent character. He declined magnificent offers from Frederick the Great and Catherine of Russia of positions in Berlin and St. Petersburg, preferring to work for the Academy in his native city.

ALEMBIC, glass or metal apparatus formerly used by chemists in distillation; in a stricter sense the cap receiving the vapour and connected by a tube with the receiving vessel.

ALEMTEJO (38° 25′ N., 7° 50′ W.), old province, Portugal; crossed by several low mountain chains; chief rivers, Tagus, Guadiana; largest towns, Elvas, Evora; produces olive oil; medicinal springs. Pop. 416,000.

ALENÇON (48° 25′ N., 0° 5′ E.), town, Orne, France; gave name to famous point or lace. Pop. 14,378.

ALENÇON, COUNTSHIP AND DUKEDOM OF, title derived from the family of Yves, Lord of Bellesme, who in X. cent. held town of A., and was subsequently borne by various members of the house of Valois, including Charles of V., killed at Crecy (1346); John IV., who fell at Agincourt (1415); John V., the comrade of Joan of Arc (1409–76); Charles IV., who m. Marguerite of Valois, sister of Francis I. (d. 1525); Francis, s. of Henry II. (1554–84), who became Duke of Anjou. In later times the title has been held by Ferdinand of Orleans, grandson of Louis-Philippe.

ALENIO, GIULIO (1582–1649), Ital. Jesuit missionary; spent thirty years in China, where he died; wrote *Life of Christ* in Chinese, which is still used.

ALEPPO (36° 30′ N., 37° E.), vilayet, Asiatic Turkey; fertile plains; seaport, Alexandretta. Pop. c. 1,500,000.—**Aleppo** (36° 12′ N., 37° 7′ E.), capital of above; very important trade centre before discovery of sea-route to India; conquered by Saracens, 638 A.D.; taken by Saladin, 1183; subsequently by Mamelukes; conquered by Turks, 1517; suffered earthquakes, 1170, 1822; plague, 1827, cholera, 1832. Manufactures carpets, leather goods, silk, cotton, and woollen materials; produces cereals, fruit. Pop. c. 200,000.

ALESHKI (46° 35′ N., 32° 45′ E.), town, on Dnieper, Russia; fruit, fisheries.

ALESIA (47° 32′ N., 4° 30′ E.), hill, France; modern, Alise Ste Reine. See JULIUS CÆSAR.

ALESIUS, ALEXANDER (1500–65), Scot. preacher; b. Edinburgh; converted to Protestantism by Patrick Hamilton; imprisoned and found guilty of heresy, but escaped to Germany where he met Melanchthon and Luther and cast in his lot with the Reformers; prof. at Frankfort-on-the-Oder and Leipzig.

ALESSANDRIA.—(1) (44° 54′ N., 8° 39′ E.) Cathedral town, fortress, and railway centre, Italy; called after Pope Alexander III.; near field of *Marengo*. Pop. (1911) 76,000. (2) Province, N. Italy. Pop. 807,000.

ALESSI, GALEAZZO (1512–72), Ital. architect; designed palaces in Genoa, parts of Escurial, etc.

ALETHIOLOGY, the science which treats of truth and error.

ALETSCHHORN (46° 29′ N., 8° E.), second highest point (13,720 ft.), Bernese Alps; overlooks Aletsch glacier, greatest glacier in Europe.

ALEURITES, genus of Eastern and Polynesian trees, order Euphorbiaceæ, cultivated for its fruit, which yields seeds rich in oil, used for candle-making and varnishes.

ALEURONE, albuminoid grains found in ripe seeds.

ALEUTIAN ISLANDS (52° N., 175° E.), long series of islands, Pacific; extend over 1000 miles towards Kamchatka from Alaska Peninsula; many are volcanic; largest Unimak, has two volcanoes; principal industries, fishing, hunting, sealing; Unalaska is sealing and whaling centre; discovered by Russ. explorers, Chirikov and Bering, 1741. Inhabitants (Aleuts) are of Eskimo origin; peace-abiding; converted to Gk. Church. Pop. *c.* 2000.

ALEWIFE (or Gaspereau), a fish of herring family, frequenting N. Amer. coast rivers.

ALEXANDER (1461–1506), King of Poland; s. of Casimir IV.; owing to his poverty was unable to resist incursions of Tartars who overran Poland during his reign.

ALEXANDER, name of eight Popes.

ALEXANDER II., Pope (1061–73); deposed by Council of Mantua. ALEXANDER III., Pope (1159–81); antagonist of Frederick Barbarossa; presided at Lateran Council, 1179, which decreed a two-thirds majority of cardinals requisite for papal elections; very powerful in the Europe of his day. ALEXANDER IV., Pope (1254–61); tried to reconcile Eastern and Western Churches. ALEXANDER V., Pope (1409–10); elected by Council of Pisa, a scholar and theologian. ALEXANDER VI. (Rodrigo Borgia), Pope (1431–1503); nephew of Calixtus III. He was early promoted in the Church, and showed signs of worldliness and immorality. He won his election by bribery, and during his pontificate his one great aim was to provide handsomely for his natural children; the best known of these were Giovanni, Duke of Gandia, Cesare and Lucrezia Borgia. The Duke of Gandia was murdered, probably by his bro. Cesare, who was made gov. of the Papal States. A. lived an utterly worldly life and has a worse reputation than any other Pope, and was very bad, even judged by the standard of a corrupt age. ALEXANDER VIII., Pope (1689–91); refused to recognise liberties of the Gallican Church.

ALEXANDER ARCHIPELAGO (55° N., 133° W.), islands (over 1100) stretching along coast, Brit. Columbia.

ALEXANDER I. (1078–1124), King of Scotland; s. of Malcolm Canmore and St. Margaret; founded abbeys of Scone and Inchcolm.

ALEXANDER II. (1198–1249), King of Scotland; succ. f., William the Lion; commenced warlike operations against Norsemen, to whom the Western Isles were subject; a good and wise king.

ALEXANDER III. (1241–85), King of Scotland; s. of above; renewed hostilities against King Haakon, whom he defeated in a sea-fight at Largs. Finally the Western Isles and Isle of Man were ceded to Scotland, Orkney and Shetland still being held by Norsemen; gave Scotland unprecedented peace and prosperity.

ALEXANDER I. (1777–1825), Tsar of Russia; s. of Paul I. who was murdered (1801). He commenced his reign with the warmest desire to promote his people's welfare, and to improve the administration

of Russia. Napoleon made strenuous efforts to secure A.'s friendship and adherence, and dazzled him with extravagant promises. But their amiable relations gradually changed to a settled hatred which culminated in Napoleon undertaking the disastrous invasion of Russia, the final downfall of the Fr. Emperor leaving A. the most powerful European sovereign. The brilliant promise of the Tsar's youth with regard to his country's internal progress was not realised, for he left an administration of veiled tyranny; a disaffected army; a worthless educational system; and an exhausted treasury. At the same time it should be stated that A. had many attractive personal qualities which served to render him very popular.

ALEXANDER II. (1818–81), Tsar of Russia; s. of Nicholas I.; nephew of Alexander I.; m. Princess Marie of Hesse (1841); succ. 1855, during progress of Crimean War; emancipated 23,000,000 serfs, 1861; extended Russian Empire in Central Asia and the Caucasus; waged war on Turkey on behalf of Slavs, 1877–78; much of latter part of his reign was taken up with efforts to suppress the revolutionary party; assassinated by bombs (March 13).

ALEXANDER III. (1845–94), Tsar of Russia; s. of Alexander II.; m. Princess Dagmar of Denmark, 1866; spent most of life in seclusion of palace; favoured reactionary policy in internal affairs; cultivated friendship of France.

ALEXANDER I. (342 B.C.), King of Epirus; bro. of Olympias, Alexander the Great's mother; m. Cleopatra, Philip of Macedon's dau.

ALEXANDER (III.) THE GREAT (356–323 B.C.), King of Macedon; s. of Philip II. of Macedon, and Olympias, sister of Alexander I. of Epirus. Educated under the direction of Aristotle, he was left in charge of the kingdom at the age of sixteen when his f. advanced against Byzantium. During this period he displayed remarkable courage when leading the charge which broke the Sacred Band of Thebans at *Chæronea* (338). Two years later Philip was assassinated, and A. succeeded to the throne. His first business was to put down risings of the Illyrians and Triballians, but scarcely had order been restored when news came that the Thebans had taken up arms, and that the Athenians were about to join them. A. then, by a rapid march, took the Thebans by surprise, conquered and razed their city, sparing only the house which had been occupied by the poet Pindar. Many thousands of the inhabitants were slain, and 30,000 sold into slavery. This severity reduced Greece to obedience.

The king next prepared for a war against Persia; crossed the Hellespont (334) with 35,000 men, and won a brilliant victory over the Persians at the river *Granicus*. As a consequence many of the cities of Asia Minor opened their gates to the victor, though some of the fortresses made a brave show of resistance, and it was during this campaign that A. severed the 'Gordian knot' (*q.v.*), which, it was fabled, could only be done by the conqueror of Asia. He next marched against the army of Darius, whom he completely overthrew at *Issus* (333), when the immense treasures of the Persian, as well as the family of Darius, fell into his hands, though the leader himself escaped. A. next subdued the principal cities of Syria; marched victoriously through Palestine; overran Egypt, and founded the city of Alexandria (331). Marching through the Libyan desert to consult the oracle of Ammon, he was hailed by the priest as the offspring of Zeus. Inspired with this thought of invincibility he again marched against Darius, whom he routed at *Arbela*, though far outnumbered by the Persians. Darius escaped, but Babylon and Susa surrendered their vast treasures to the conqueror, who soon afterwards marched triumphantly into Persepolis, the Persian capital. A.'s next great undertaking was the invasion of India (326), when, having conquered the Punjab, he was compelled to return to Persia through a spirit of unrest which had taken hold of his troops. During one of the battles in India the king's famous charger, Bucephalus (*q.v.*), was killed. Upon his return to Babylon A. was suddenly smitten with fever, dying in eleven days, in his thirty-second year. He was buried in a golden coffin at Alexandria, and received divine honours. Great as were most of the actions of A., he appears to have become intoxicated with success, and fell into habits of debauchery. In one of his drunken fits he set fire to and destroyed Persepolis at the bidding of one of his courtesans.

Wheeler, *Life* (1900); Mahaffy, *A.'s Empire* (1887).

ALEXANDER OF BATTENBERG (1857–93), 1st Prince of Bulgaria (elected, 1879); 2nd s. of Prince Alexander of Hesse, and nephew of Tsar Alexander II.; was deposed (1886) and handed over to Russian authorities, but was recalled, and voluntarily resigned immediately afterwards.

ALEXANDER I., OBRENOVICH (1876–1903), King of Servia; succ. his f., King Milan, who abdicated, 1889; A. and Queen Draga were murdered in palace, June 11.

ALEXANDER, ARCHIBALD (1772–1851), Amer. Presbyterian preacher and author; first prof. of Theol. at Princeton; wrote *Brief Outline of the Evidences of the Christian Religion* (1825), which has passed through many editions.

ALEXANDER, BOYD (1873–1910), Eng. explorer, killed in Central Africa.

ALEXANDER, SIR GEORGE (1858–), Eng. actor; family name, Samson; first appearance, 1879; knighted, 1911.

ALEXANDER, SIR JAMES EDWARD (1803–85), Brit. general and traveller; served in Africa, Canada, Crimea, and Maori War; wrote numerous books of travel.

ALEXANDER, JOHN, CUZA (1820–73), Prince of Rumania, 1861; dethroned, 1866.

ALEXANDER NEVSKY, ST. (1220–63), Grand-Duke of Vladimir; defeated Swedes on banks of Neva, 1240; devoted his whole life to service of Russia and Russian Church, for which he was canonised.

ALEXANDER SEVERUS (222–35 A.D.), Rom. Emperor; Syrian prince by birth; proclaimed Emperor at fourteen by the Prætorians, after murder of Heliogabalus; dominated by his mother, Julia Mamæa, and others; slain in Gaul by mutinous troops; possessed many excellent qualities as emperor.

ALEXANDER, WILLIAM (1824–1911), late Prot. abp. of Armagh and primate of all Ireland; also well known as a poet, being author of *St. Augustine's Holiday and Other Poems* (1887). His wife was a noted hymn writer.

ALEXANDER, WILLIAM LINDSAY (1808–84), Scot. Congregational preacher and Biblical scholar.

ALEXANDER OF APHRODISIAS (II. cent. A.D.), celebrated Gk. commentator on Aristotle; opposed the doctrine of immortality.

ALEXANDER OF HALES, 'DOCTOR IRREFRAGABILIS' (XIII. cent.), Eng. Franciscan theologian; wrote *Summa Universæ Theologiæ*, which was extensively used as a manual of religious instruction.

ALEXANDERS, ALISANDER (*Smyrnium Olusatrum*), European herbaceous umbelliferous plant sometimes cultivated and used as celery; the name is applied to *Thaspium aureum* in U.S.A.

ALEXANDRA (30° 20′ S., 30° 30′ E.), division, S.E. coast, Natal. Pop. 53,000 (1300 white).

ALEXANDRA NILE, KAGERA (1° S., 32° E.), headstream of Nile, navigable 70 miles.

ALEXANDRA, QUEEN (1844–), eldest dau. of Christian IX. of Denmark, wife of Edward VII. (m. 1863), and mother of George V.

ALEXANDRETTA, ISKANDERUN (36° 34′ N., 36° 10′ E.), town, North Syria; port for Aleppo. Pop. *c.* 10,000.

ALEXANDRI, VASILE, see ALECSANDRI.

ALEXANDRIA (31° 12′ N., 29° 54′ E.), seaport, Egypt. Modern city is built on peninsula between Mediterranean and Lake Mareotis, and on isthmus joining Pharos (*q.v.*) to mainland; fine harbour; floating dock; graving dock (opened, 1905); torpedo station; to S. are Pompey's Pillar, catacombs cut out of hills, and Arab cemetery; well provided with railway and telegraphic communications; exports raw cotton, , sugar, etc.; imports coal, textiles, machinery. city consisted of Brucheum (Gk. quarter) in E., Rhacotis (Egyptian quarter) in W., and Jews' quarter in N.E. In first were Museum with famous library, royal residence, Cleopatra's needles, Ptolemaic palaces, Poseideion; in second were Pompey's Pillar, Serapeum, Necropolis.

History.—Founded by Alexander the Great, 332 B.C.; became great intellectual and commercial centre under Ptolemies; taken by Julius Cæsar, 48 B.C.; suffered persecution under Caracalla, 215 A.D.; taken by Persians, 616; by Arabs under Amr, 640; twice taken by Greeks; retaken by Amr, who destroyed fortifications; city henceforth declined; taken by Turks, 1517, under whose misrule further decayed; prosperity revived under Mehemet Ali, in XIX. cent.; taken by Napoleon, 1798; by British, 1801; bombarded by British during Arabi Pasha's rebellion, 1882. Pop. 332,246.

Alexandrian School, name given to that later phase of Gk. culture whose centre was at Alexandria, which lasted from IV. cent. B.C. to the Muhammadan conquest of Egypt in the VII. cent. A.D. The best days of Hellenic civilisation were over, and the spirit of freshness had gone out of Gk. life, but there was still an 'afterglow.' The Alexandrians were learned rather than original. Most of their work was philosophical or religious; there was a large Jewish population in Alexandria, and Gk. philosophy and Jewish monotheism approached each other, meeting in Philo. Neoplatonism, an amalgam of Platonic, Stoic, and Oriental elements, was evolved, and through Origen and Clement of Alexandria influenced Christian Theology.

Kingsley, *Alexandria and the Schools*; Bigg, *Christian Platonists of Alexandria*; Kiepert, *Zur Topographie des alten Alexandria* (1872).

The Alexandrian Libraries were formed by the Ptolemies in buildings known as Brucheum and Serapeum; that in former said to have perished on occasion of Cæsar's attack, 47; latter destroyed by Theodosius, *c.* 389 A.D.

ALEXANDRIA.—(1) (40° 14′ N., 85° 40′ W.) town, Indiana. Pop. (1910), 5096. (2) (31° 20′ N., 92° 26′ W.) town, Louisiana; occupied by Union, 1863, 1864. Pop. (1910) 11,213. (3) (43° 56′ N., 25° 20′ E.) town, Rumania. Pop. 13,675. (4) (55° 59′ N., 4° 35′ W.) town, Dumbartonshire. Pop. *c.* 10,000. (5) (38° 47′ N., 77° 3′ W.) town, Virginia; many XVIII.-cent. buildings; manufactures fertilisers, shoes, beer, bottles, leather; occupied by Federalists in Civil War. Pop. (1910) 15,329.

ALEXANDRIA TROAS (39° 46′ N., 26° 10′ E.), ancient town, Troad; ruined.

ALEXANDRIAN CODEX, Codex Alexandrinus, copy of Gk. New Testament (almost complete) with 1 and 2 *Clement*; compiled in uncial script of V. cent. (Brit. Mus.).

ALEXANDRINA, LAKE (35° 27′ S., 139° 10′ E.), S. Australia, at mouth of Murray River.

ALEXANDRINE, Iambic Hexameter, verse of 6 feet (with cæsura usually after third foot). Named from metre used in O. Fr. poems on Alexander the Great; example: 'Of făn | oȳ, rēas | ŏn, vīr | tŭe, nought | căn mē | bereave.'

ALEXANDRISTS, philosophers of Renaissance period who repudiated the possibility of immortality.

ALEXANDRITE, green gemstone, a variety of (*q.v.*), appearing red in transmitted or t, found in the Urals, also in Ceylon and Tasmania.

ALEXANDRIYA (48° 40′ N., 33° 20′ E.), chief town, Kherson, Russia.

ALEXANDROPOL (40° 47′ N., 43° 45′ E.), town, Transcaucasia. Pop. 32,735.

ALEXANDROV (56° 30′ N., 38° E.), manufacturing town, Vladimir, Russia; steel, cotton. Pop. 7000.

ALEXANDROVSK.—(1) (47° 49′ N., 35° 7′ E.) town, S. Russia. Pop. 16,393. (2) (69° 10′ N., 33° 20′ E.) town, N. Russia. (3) (51° 18′ N., 143° E.) principal town, Russian district, Sakhalin Island.

ALEXANDROVSK-GRUSHEVSKI (48° N., 40° 30′ E.), small town, Don Cossacks, Russia; coal.

ALEXANDROVSKY (59° 46′ N., 30° 20′ E.), manufacturing town, S.E. of St. Petersburg, Russia; cotton mills.

ALEXEI, MICHAILOVICH, Alexis or Alexius (1629–76), Tsar of Russia; f. of Peter the Great; a progressive ruler.

ALEXEI, PETROVICH (1690–1718), Russ. Tsarevich; s. of Peter the Great; was of a studious, unheroic disposition, and held in the greatest contempt by his f. After leading a life of terror for a number of years, A. fled to Vienna and sought the protection of Charles VI. This escapade increased his f.'s hatred, and, it having been discovered that he desired Peter's death, he was put to torture, and died.

ALEXEYEVKA (50° 40′ N., 38° 45′ E.), small town, Voronezh, Russia.

ALEXINATZ (43° 32′ N., 21° 43′ E.), town and province, Servia; tobaçco.

ALEXIS, WILLIBALD, pseudonym of Georg Wilhelm Heinrich Häring (1798–1871), Ger. hist. novelist and poet. His *Walladmor* (1823) imitated Scott's novels.

ALEXISBAD (51° 35′ N., 11° E.), town, Germany. Pop. 1000.

ALEXIUS I., Comnenus (1048–1118), Byzantine emperor; succ., 1081; reformed administration; besought help of West against Turks, and so brought about First Crusade.

ALEXIUS II. (1167–83), Byzantine emperor; deposed by Andronicus Comnenus, and afterwards strangled.

ALEXIUS III., Angelus (*c.* 1195), Byzantine emperor; in 1203 the Crusaders, led by Dandalo, besieged Constantinople and carried it by storm. A., a weak and debauched ruler, fled into Thrace, but afterwards surrendered, and d. in a monastery at Nicæa.

ALEXIUS V., Ducas (*c.* 1204), Byzantine emperor; put to death by the Crusaders for murder of Alexius IV.

ALEYN, SIMON, see Bray.

ALFALFA, Span. name for lucerne (*q.v.*).

ALFANI, DOMENICO (*c.* XV. cent.), contemporary and friend of Raphael.

ALFARABI (*c.* 870–950), distinguished Arab. philosopher; first to attempt encyclopædic work.

ALFELD (51° 59′ N., 9° 49′ E.), town, Germany. Pop. 4900.

ALFIERI, VITTORIO, COUNT (1749–1803), Ital. poet; b. at Asti; becoming independent by the death of his f. and uncle, lacked any systematic training, but was interested in lit. and had a passion for travel. He had a series of love affairs, one of which got him into trouble in London. His tragedy, *Cleopatra*, was staged at Turin, 1775. He formed an attachment with the Countess of Albany (*q.v.*), lived with her in Paris and latterly in Florence. He wrote several more tragedies, which have earned for him a great reputation. His characterisation is more effective than his style.

ALFÖLD, extensive productive plain, Hu

ALFONSINE (44° 28′ N., 12° 2′ E.), Ravenna, N. Italy.

ALFONSO, Castilian form of Alphonso, a name borne by many kings in Spain and Portugal.

ALFONSO VIII. (1158–1214), of Castile, was the most noted of the Spanish line; destroyed power of

Almohades (1212) with body of Crusaders; founded first Span. university, Palencia.

ALFONSO X., 'The Learned' (1252–84), encouraged letters and the study of astronomy.

ALFONSO XI., 'The Avenger' (1312–50), achieved brilliant victory over African invaders.

ALFONSO XII. (1857–85), established peace at home and abroad; won love of people by his kindness d. of phthisis, Nov. 24; was succ. by s.

ALFONSO XIII. (1886–), b. May 17, after f.'s death, his m., Maria Christina, acting as regent during his minority; m. Princess Ena of Battenberg, May 31, 1906.

ALFONSO I. (1094–1185), first of Portuguese line, famous for his battles with Moors; revered as saint by Portuguese.

ALFORD, HENRY (1810–71), Eng. divine, poet, and scholar; Dean of Canterbury (1875); first editor *Contemporary Review*; edit. Gk. Testament.

ALFRED COUNTY (30° 40′ S., 30° 15′ E.), division, S. Natal. Pop. 27,000 (400 white).

ALFRED ERNEST ALBERT, DUKE OF SAXE-COBURG AND GOTHA (1844–1900), 2nd s. of Queen Victoria; trained for navy; cr. Duke of Edinburgh (1865); Admiral of the Fleet (1893); succ. his uncle, Ernest II., as Duke of Saxe-Coburg (1893).

ALFRED THE GREAT (848–c. 900), King of England; b. at Wantage; began campaign against Danes in Æthelred's reign; fought nine battles, 870–1; successful at Englefield and Ashdown; succ., 871; twice defeated by Danes, 871; made peace. Danes again invaded Wessex, 878, when A. retired temporarily to Athelney; raised army and defeated Danes at Edington, 878; cleared Wessex and Mercia of invaders by 879; struggle renewed, 893; after four years of varying success A. finally liberated country, and Danes gave up struggle. During peace, A. enlarged navy, founded schools, introduced juridical reforms; translated works by Orosius, Bede, and Gregory.

Plummer, *Life and Times* (1902).

ALFRETON (53° 6′ N., 1° 23′ W.), town, Derbyshire, England. Pop. (1911) 19,000.

ALFUROS, name of uncertain origin, applied by Malays to all the primitive non-Muhammadan tribes of the eastern islands of the Malay Archipelago.

ALGÆ, group of cryptogamous plants including the seaweeds, characterised by the absence of a differentiation into root, stem, and leaf, and by the presence of chlorophyll (*q.v.*) with or without an additional colouring matter to utilise, in the presence of sunlight, the carbon contained in the carbonic acid gas (CO_2) of the atmosphere. They vary in size from microscopic forms consisting of one cell (Protophyta) (*q.v.*) to the *Macrocystis* of southern seas with fronds 700 ft. in length. The a. are a group difficult to define. Some of the simplest types are sometimes classified as Protozoa (*q.v.*), and as no line of demarcation can be drawn between them, it seems expedient to adopt Haeckel's term *Protista* to include both unicellular plants and animals. On the other hand, certain a. closely resemble a group of fungi, called *Phycomycetes* in consequence. It is established that all fungi are derived from the a. One of the most interesting discoveries in bot. was that of the lichens being found to consist of a. and fungi in close nutritive relationship or symbiosis. Owing to their heterogeneous character and the present lack of knowledge concerning many genera and their relationships, it is not possible to construct a genealogical tree for the a.; however, the following classification will facilitate a survey of the group.

Chlorophyceæ (green a.) occur in fresh and salt water and multiply both sexually and asexually. *Pleurococcus* is a round green cell abundant on damp surfaces and multiplies by division. Other forms (*e.g. Euglena*) are provided with flagella with which they swim about freely. The fresh-water *volvox* (*q.v.*) consists of a spherical colony of flagellate cells connected by strands of protoplasm, or it may be regarded as an individual animal which is differentiated into nutritive and reproductive cells. In the forms possessing a multicellular thallus the latter is frequently branched, and the *Characeæ* show a differentiation of parts resembling the morphology of higher plants. Over 3000 species are known.

Cyanophyceæ (blue a.) contain a blue colouring matter in addition to chlorophyll, and show a great variety of different shades, from yellow green to red and violet. The cells are mostly small, and the *Bacteriaceæ*, though much modified owing to parasitism, are closely allied to the unicellular types. Multicellular species are common in fresh water. Over 900 species are known.

Phæophyceæ (brown a.) contain brown colouring matter (phycophæin) in addition to chlorophyll, and include such types as the common seaweeds *Fucus vesiculosus* and *F. serratus*, the gigantic *Macrocystis*, and the unicellular *Peridiniaceæ* and *Diatomaceæ*, the latter being important constituents of the plankton forming the diet of many marine animals. Both sexual and asexual reproduction occur in the P., and show interesting modifications in different species. Over 6200 species, fossil and recent, are known, about 5000 of which are Diatomaceæ.

Rhodophyceæ, or **Florideæ** (red a.), contain a red colouring matter (phycoerythrin) in addition to chlorophyll, and are all multicellular. They are very highly specialised, especially their modes of reproduction, and comprise about 1400 species. Some species are used as manure, and the ash—kelp in Scotland, varec or vraic on the coasts of Brittany—is used as a source of iodine.

ALGARDI, ALESSANDRO (1602–54), It. sculptor; executed bronze statue of Innocent X., and gigantic alto-rilievo of Pope Leo and Attila; friend of Velasquez.

ALGAROBA, see CAROB.

ALGAROTH, POWDER OF ($Sb_4Cl_2O_5$?), precipitate of antimony trichloride in solution with excess of water, formerly used as an emetic and purgative.

ALGAROTTI, FRANCESCO, COUNT (1712–64), Ital. philosopher, poet, and art critic; patronised by Frederick the Great.

ALGARVE (37° 5′ N., 8° W.), southernmost province, Portugal; area, 1937 sq. miles; mountain ranges in N.; fruit and fisheries. Pop. 255,000.

ALGAU (47° 40′ N., 10° E.), district, Bavaria; noted for cattle.

ALGEBRA, a branch of math's covering a great variety of subjects, many of which are symbolic extensions of arithmetic, while others involve such special ideas that they may be regarded as practically distinct subjects.

History.—The invention of a. probably dates back to at least 1700 B.C., but the a. of the Egyptians (among whom it probably originated) was of course very elementary. The beginnings of a. are found in the work of Diophantus of Alexandria (IV. cent.), of which only Gk. and Lat. translations remain, the original being lost. This work, probably based on those of still earlier writers, is almost the only evidence that a. was known to the Greeks. Little progress in math's was made by the Romans, but among the Hindus and Arabs many notable advances were made. The latter introduced a. into Spain, and Cordova, the capital of the Moorish empire, became famous for its learning. The first Arabian treatise on a. was that of Muhammad Ben Musa (IX. cent.). This work was subsequently translated into Italian, and as the Moorish empire waned, Italy became the leader in mathematical investigation.

The first printed work (1494) dealing with a. (also with arithmetic, etc.) was that of Luca Pacioli da Bergo, a monk of Venice. Much was done by Tartalea, Cardano, and others in extending the knowledge of the solution of equations, the *Ars Magna* (1545) of

Cardano containing Tartalea's method of solving cubic equations. Progress was also made in Germany, France, and England, the chief improvement being the introduction of a more complete system of notation. Stifel invented the signs +, −, $\sqrt{}$, and Recorde the sign =. François Vieta, a Fr. mathematician (1540–1603), was the first to use general symbols for known as well as for unknown quantities, thus beginning the great extensions of modern algebra. Up to the XVII. cent. a. and geometry had been practically independent, but in 1637 Descartes united the two sciences. His *Geometria* is a treatise on the algebraic representation of geometrical theorems, but he was not the first to apply a. to geometry, that having previously been done, though not to such an extent, by Vieta. The XVII. cent. saw tremendous advances in all branches of scientific work, and in mathematics many new fields were opened up. Among the names of those who took a leading part are those of Newton, John Wallis, Euler, the Bernoullis, Fermat, Leibnitz. In later years a. has been developed on more and more specialised lines.

Principles of Algebra (see also ARITHMETIC).

PRELIMINARY NOTIONS.—The elementary operative symbols, +, −, ×, ÷, have the same functions as in arithmetic. When these symbols occur in compound expressions some convention is needed to avoid confusion. Thus, in the expression $a+b\div c\times d-e$, we should get totally different results if we perform the operations (i.) from left to right, (ii.) from right to left, (iii.) taking the division sign first, etc. It is convenient to regard the multiplication sign × as being the closest bond between two quantities, next in order coming the sign of division ÷, and the symbols + and − being taken in order from left to right. Thus in the above example we should first multiply the value of c by that of d, then divide b by the result, add the quotient to a, and finally subtract e from the result of the latter operation; but unless this convention is adopted, the meaning of such an expression must be made clear by means of brackets, thus: $[a+\{b\div(c\times d)\}]-e$, the brackets being taken in the order (), {}, []. For simplicity and convenience the sign × is often replaced by a dot, or is omitted altogether. Thus $3\times a\times b\times c$ may be written $3.a.b.c$ or $3abc$. Again, if a number be multiplied by itself any number of times it is usual to express the continued product (P) in the form x^n, where x is the quantity dealt with, and n the number of such quantities multiplied together. Thus p^5 is an abbreviation for $p\times p\times p\times p\times p$. The number n is called the *index*, and the *result* P ($=x^n$) is the nth *power* of x.

A NEGATIVE QUANTITY may be defined as a quantity such that if a positive quantity of equal magnitude be added to it the result is zero. The idea is made clearer by illustration. Thus, if a person has to receive £10 and pay £3, his gain would be +£7. If he pays first he then has −£3; this may be regarded as a debt of £3 which will require £3 of the £10 he is to receive to liquidate it, leaving a net gain of £7. If, on the other hand, the man is to receive £3 and has to pay £10, the net result is a debt of £7, so the man may be regarded as having −£7.

Any number of positive and negative quantities may be grouped together, and the result obtained after all the addition and subtraction operations have been performed is known as the *algebraic sum* of these quantities.

COMMUTATIVE LAW.—(*a*) Additions and subtractions, (*b*) Multiplications, may be made in any order. Thus—

$$p+q-r-s+t=p+q+t-r-s=p-r+q-s+t$$
$$p\,.\,q\,.\,r\,.\,s\,.\,t=p\,.\,q\,.\,t\,.\,r\,.\,s=p\,.\,r\,.\,q\,.\,s\,.\,t.$$

ASSOCIATIVE LAW.—The terms of an expression may be grouped in any manner. Thus—

$$p+q-r-s+t=(p+q)+(t-s)-r=p+(q-s)+t-r$$
$$p\,.\,q\,.\,r\,.\,s\,.\,t=(p\,.\,q)\times(t\,.\,s)\times r=p\times(q\,.\,s)\times(t\,.\,r).$$

DISTRIBUTIVE LAW.—The product of a compound expression by a single factor is the algebraic sum of the partial products of each term of the compound expression by that factor.

Thus $(a+b)c=ac+bc$; and $(a-b+c)d=ad-bd+cd$.

RULE OF SIGNS.—In multiplying together algebraic expressions, products occur of positive and negative quantities. If two positive or two negative quantities are multiplied together, the resulting product is in both cases positive. If a positive and a negative quantity are multiplied together, the result is negative.

Elementary Algebra (REAL QUANTITIES).—As a general rule, it is better to consider particular numerical examples before proceeding to general formulæ. The verification of such formulæ as $(a\pm b)^2=a^2\pm 2ab+b^2$ is of considerable value in fixing them in the student's mind, and examples such as the above lead to a better understanding of the commutative and distributive laws.

DEFINITIONS.—An expression consisting of the product of a number of quantities (e.g. $5xy^4z^3$) is known as a *monomial* expression, and the quantities multiplied together are *factors* of the expression. The number of the quantities is the *degree* of the expression; thus $5xy^4z^3$ is of degree 8, since it is the product of 1 x, 4 y's, and 3 z's. In considering the degree of an expression, it must be remembered that only the letters are considered, the numerical factor, or *coefficient*, not being included.

An expression consisting of several monomial expressions, or *terms*, connected by + and − signs is a *polynomial* or *multinomial*. An expression of two terms is thus a *binomial*, one of three terms a *trinomial*, and so on.

The *degree of a polynomial expression* is the degree of the term of highest degree in the expression. Thus, $3abx^4+4cx^3+d$ is of the 6th degree. But often such expressions are regarded with respect to only one quantity; the expression above is thus of the 4th degree in x, and of the 1st degree in either a, b, c, or d.

LAW OF INDICES.—The product of a^m and a^n is a^{m+n}, for a^m is the continued product of m a's, a^n is the continued product of n a's, and so in the final result we have the continued product of $(m+n)$ a's, which by definition is a^{m+n}. Similarly the quotient $a^m\div a^n=a^{m-n}$. The processes can obviously be extended to any number of processes of multiplication and division of powers of a single quantity.

Fractional and Negative Indices.—Since, by the above rules, $a^{\frac{1}{3}}\times a^{\frac{1}{3}}\times a^{\frac{1}{3}}=a^1=a$; and also $\sqrt[3]{a}\times\sqrt[3]{a}\times\sqrt[3]{a}=a$; we identify $a^{\frac{1}{3}}$ with $\sqrt[3]{a}$.

So $a^{\frac{4}{3}}=(a^{\frac{1}{3}})^4=(\sqrt[3]{a})^4$ or $=(a^4)^{\frac{1}{3}}=\sqrt[3]{a^4}$.

Again, in the quotient $a^m\div a^n=a^{m-n}$, if n is greater than m, $m-n$ is negative; e.g. $a^3\div a^5=a^{-2}$.

But it is easy to see that $\frac{a^3}{a^5}=\frac{1}{a^2}$. Hence $a^{-2}=1/a^2$.

Similarly, $a^{-n}=\frac{1}{a^n}$.

A particular case of this is when $m=n$, when we have $a^m\div a^m=a^0=1$.

All these results are of importance in the theory of *logarithms* (q.v.).

The *least common multiple* and *highest common factor* of monomial expressions can be written down at once, for the L.C.M. must contain every factor of every expression, and so is the continued product of the highest powers of all the quantities which occur in the expressions.

EQUATIONS.—Algebraical statements of equality between two expressions are known as equations. They may be divided into two classes—(i.) *Identities*, (ii.) *Equations of condition*. An *identity* simply states equality of numerical results. Thus, when we say that $x^2-a^2=(x+a)(x-a)$, we mean that if x and a have definite numerical values, then the result of performing the operations denoted by x^2-a^2 is the same as the result of multiplying the value of $(x+a)$ by that of $(x-a)$.

An *equation of condition* is only true for certain definite values of the quantity or quantities concerned. Thus the equation $5ax-3a^2=3ax+5a^2$ is only true when x is numerically equal to $4a$. The process of finding the values of the unknown quantity occurring in any such equation which make that equation true is known as the solution of the equation. This is effected by transformation. The rules for such transformation may be derived from a general theorem, which may be stated thus: 'The results of operating in any and the same manner on both sides of an equation are equal.' This general theorem should be verified first by numerical examples. From this we at once derive the *rule of transposition*, that any term may be transposed from either side of an equation to the other, providing we change its sign. For if $A+B-C+D=X-Y$, we have, subtracting D from both sides, $A+B-C+D-D=X-Y-D$, *i.e.* $A+B-C=X-Y-D$, so that the D term appears now on the right-hand side with its sign changed. Similarly, if $\frac{P}{Q}=\frac{R}{S}$, we have, multiplying both sides by QS, $\frac{P}{Q}\cdot QS=\frac{R}{S}\cdot QS$, which gives $PS=QR$, and hence we deduce the rule for *cross-multiplication*.

The solution of *simple equations*, i.e. equations involving only the first power of the unknown quantity, is easily effected by the use of the above principles. *Quadratic equations* (which contain no higher powers of the unknown quantity than the second), and equations of higher degree, are more difficult. For further information, see EQUATIONS.

BINOMIAL THEOREM.—The binomial theorem gives a formula by which any binomial can be raised to any assigned power. Particular simple cases are $(x+a)^2=x^2+2ax+a^2$, $(x+a)^3=x^3+3ax^2+3a^2x+a^3$. The general result is that—

$$(x+a)^n=x^n+{}^nC_1ax^{n-1}+{}^nC_2a^2x^{n-2}+\ldots +{}^nC_ra^rx^{n-r}+\ldots+a^n,$$

which is true when n is a positive integer. ${}^nC_r$ denotes the number of ways in which a group of r things can be selected from a set of n things, and is given by the formula ${}^nC_r=\frac{n(n-1)(n-2)\ldots(n-r+1)}{1.2.3\ldots r}$.

Proof.—The expansion of $(x+a)^n$ is the product of n factors, each equal to $x+a$, and every term in the expansion is of n dimensions, being a product formed by multiplying together n letters, *one* taken from each of the n factors. Thus each term involving a^rx^{n-r} is obtained by taking a out of any r of the factors, and x out of the remaining $n-r$ factors. So the number of terms involving a^rx^{n-r} must equal the number of ways in which r things can be selected out of n, and by giving to r the values 0, 1, 2, 3 . . . n in succession, we obtain the coefficients of all the terms.

By writing $-a$ for a in the above we get the expansion of $(x-a)^n$.

PERMUTATIONS AND COMBINATIONS.—The coefficients of the various terms in the expansion of $(x+a)^n$ give the number of *combinations* of n things taken 1, 2, 3 . . . at a time, a *combination* being a group or selection which can be made by taking some or all of the things considered.

A *permutation* is a linear arrangement. The number of permutations of n dissimilar things taken r at a time is denoted by ${}^nP_r$, and it is easy to show that—

$${}^nP_r=n(n-1)(n-2)\ldots(n-r+1).$$

Hence ${}^nP_n$, the number of permutations of n things all at a time, is equal to—

$$n(n-1)(n-2)\ldots 3.2.1,$$

which is written $\underline{|n}$ or $n/$ and read as '*factorial n*.' The number of combinations of n dissimilar things taken r at a time (${}^nC_r$) is quickly found from the formula for ${}^nP_r$, for ${}^nC_r\times\underline{|r}$ is the number of *arrangements* of n things r at a time.

Hence ${}^nC_r=n\frac{(n-1)(n-2)\ldots(n-r+1)}{\underline{|r}}$. This subject is further dealt with in '*Combinatorial Analysis*.'

SERIES.—The most frequently occurring series are arithmetical and geometrical progressions, and combinations of these. (i.) A series is in *arithmetical progression* when the terms increase or decrease by a common difference. The sum s of n terms of the series a, $a+d$, $a+2d$, $a+3d$ . . . is given by $s=n/2\{2a+(n-1)d\}$. This result is easily obtained by writing the series in the reverse order and adding to the original series. (ii.) Quantities are in *geometrical progression* when they increase or decrease by a constant factor.

The sum of n terms of the series is obtained thus—

Let $s=a+ar+ar^2+\ldots+ar^{n-2}+ar^{n-1}$.

Then $rs=ar+ar^2+\ldots+ar^{n-2}+ar^{n-1}+ar^n$.

Whence, by subtraction, etc.—

$$s=\frac{a(r^n-1)}{r-1}\text{ or }\frac{a(1-r^n)}{1-r}.$$

The second of these is to be used in all cases except where r is positive and greater than 1. If r is less than 1, we have for the sum of an infinite number of terms of the series $s=\frac{a}{1-r}$, for the term $\frac{ar^n}{1-r}$ can be made as small as we please by making n large enough.

Recurring decimals furnish good examples of infinite geometrical progressions, *e.g.*—

$$0\dot{3}\dot{2}\dot{5}=0\cdot3+\frac{25}{10^3}\left\{1+\frac{1}{10^2}+\frac{1}{10^4}+\ldots\right\}$$
$$=0\cdot3+\frac{25}{10^3}\cdot\frac{1}{1-\frac{1}{10^2}}=\frac{322}{990}.$$

The subject is further dealt with in *Series*.

Higher Algebra.—It can be shown that the Binomial Theorem is valid when the index n has any value, integral or fractional, positive or negative. But it is only in certain cases that the expansion can be made of an expression such as $(1+x)^n$. A full consideration shows that the expansion has an intelligible arithmetical meaning only when x is less than 1 (see SERIES). Applications of the binomial theorem lead to the result—

$$a^x=1+x\log_e a+\frac{x^2(\log_e a)^2}{\underline{|2}}+\frac{x^3(\log_e a)^3}{\underline{|3}}+\ldots$$

which is known as the *Exponential Theorem*, and further to the expansion—

$$\log_e(1+x)=x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}+\ldots$$

which is the *Logarithmic Series*.

The number e is defined by the above expression for a^x, for on writing e for a, we have, when $x=1$,

$$e=1+1+\frac{1}{\underline{|2}}+\frac{1}{\underline{|3}}+\frac{1}{\underline{|4}}+\ldots$$

This number is the base of the *Napierian* or *Natural* system of logarithms.

IMAGINARY AND COMPLEX QUANTITIES.—From the rule of signs it is obvious that a negative quantity cannot have a real square root, but *imaginary* expressions of the form $\sqrt{-a}$ occur frequently in the theory of equations, and their use leads to valuable results. *Complex* numbers are of the form $a\pm b\sqrt{-1}$, where a and b are real.

The interpretation of various theorems in the light of these conceptions leads to important developments in analytical trigonometry.

See (i.) *Elementary*: H. S. Hall and S. R. Knight, W. M. Baker, and A. A. Bourne; (ii.) *Advanced*: G. Chrystal, C. Smith; (iii.) *Special*: T. J. I'A. Bromwich, *Theory of Infinite Series*; H. S. Carslow, *Theory of Fourier's Series*; W. R. Hamilton and C. J. Joly, *Elements of Quaternions*; A. N. Whitehead, *Universal Algebra*.

ALGECIRAS (36° 8′ N., 5° 24′ W.), seaport, Spain; in Moorish possession, VIII. to XIV. cent.; Brit. naval victory over Fr. and Span. fleets, July 12, 1801; International Morocco Conference held at A., 1906. Pop. 13,000.

ALGEMESI (39° 12′ N., 0° 30′ W.), small town, Spain; oranges.

ALGERIA (33° 55′ N., 3° 30′ E.) is the principal oversea possession of France and is situated in N. Africa; bounded N. by Mediterranean, E. by Tunisia, S. by Sahara, W. by Morocco; area, *c.* 195,000 sq. miles, or including Sahara, 1,120,000. Part of surface is occupied by plateau of Barbary, which separates the Little Atlas from the Great Atlas; in S. is the Sahara Desert. The undulating N. district which contains the Little Atlas is generally known as the Tell, and is the only part of the country which can be cultivated without irrigation. The S. desert region is divided into the Lower and Upper Sahara, the former a great clayey depression, the latter a rocky plateau; it contains innumerable oases producing dates, olives, etc. The principal river is the Shelif, which rises in the Sahara and flows to the Mediterranean; other rivers are the Issur, Zowah, Oued el Kebir, and Seybuse. There are many salt lakes, called Chotts, in the Sahara, largest being Chott-el-Chergui and Chott-el-Melghir. Capital, Algiers (*q.v.*). Climate is generally temperate in N., bracing on coast, hot in Sahara; sirocco blows in spring and summer.

History.—After having been conquered in turn by the Romans, Vandals, and Byzantines, A. was invaded by the Arabs in the VIII. cent., from which time dates the establishment of Islamism. The country was ruled by Arab princes till the XII. cent., and then for a time by the Almohades. The Moors settled here in late XV. cent., after they had been banished from Spain by Ferdinand the Catholic; they applied for aid against Spain to the pirate Barbarossa, who subsequently took possession of the country. After his defeat and death his bro. succeeded him, and A. became a Turk. province in 1519. Later in the same cent. great struggle took place between Spain and Turkey; but the defeat of Charles V. in 1541 ended this, and the Turks continued their career of piracy. In 1669 the Turk. gov. was banished by the corsairs, who then chose a dey for themselves, Turkey perforce acknowledging Algerian independence. From time to time attempts were made by various European powers to suppress the system of piracy carried on by the corsairs, who nevertheless continued to flourish until 1830. In that year the French sent an expedition against them and seized the town of Algiers, after which the whole country gradually came under Fr. control. A rising which broke out in 1864 was finally suppressed in 1871.

A. is administered by a gov. gen. who represents Fr. Republic and is assisted in matters of finance and taxation by a Superior Council and Delegations. There is also a consulting council. A. is divided for administrative purposes into three Provinces, the northern portions of which form the 'Departments' of Algeria, Oran, and Constantine (together making up the 'Northern Territory'); the southern portions being called the 'Southern Territory.' The three Departments are administered as an integral part of France, like Fr. departments, and each sends two deputies and a senator to Paris.

A. has great forests on the mountain slopes, containing oaks, cedars, junipers, and other trees. Cultivated plants include cereals, vast quantities of wheat, oats, and barley being grown in the Tell, flax and tobacco. Vines, olives, oranges, and other fruits are cultivated, and various vegetables grown. Olive oil is largely produced, and there are important fisheries, while horses, mules, cattle, and sheep are raised in large numbers. Minerals include iron, lead, copper, zinc, phosphates, salt, petroleum. Among exports are sheep, wool, hides, cereals, cattle, horses, fruit, olive oil, metals, phosphates, tobacco; imports textiles, machinery, paper, coal, sugar, coffee, etc. Railway mileage is over 2000; good postal and telegraphic communications.

Inhabitants include French, Jews, Moroccans, etc. Pop. (1911) 5,500,000, of whom 750,000 were Europeans.

Maurice Wahl, *L'Algérie* (1908); Simpson, *Algiers and Beyond*.

ALGHERO (40° 35′ N., 8° 19′ E.), seaport, Sardinia; cathedral. Pop. 10,779.

ALGIERS (36° 43′ N., 3° E.), capital, Algeria, N. Africa; modern town along shore, ancient city on hill behind; good harbour. Principal public buildings: Kasbah (fortress), gov.'s and abp.'s palaces, Grand Mosque dating from XI. cent., New Mosque (from XVII. cent.), R.C. Cathedral; important coaling station and health resort; trades in wine and grain; court of appeal, observatory, univ., museum. A. was founded (X. cent.) by Arabs; headquarters of Barbary pirates from XVI. cent.; Emperor Charles V. attempted unsuccessfully to take city, 1541; often attacked by European nations; bombarded by British, 1816; taken by French, 1830. Pop. 154,000.

ALGIERS (29° 57′ N., 90° W.), suburb of New Orleans, Louisiana, U.S.A.; shipyards.

ALGIN, the sodium salt of alginic acid, obtained by boiling seaweed with sodium carbonate solution; resembles gelatine, used as gum.

ALGOA BAY (33° 47′ S., 25° 51′ E.), bay, S. Africa; harbour, Port Elizabeth; Algoa means 'on the way to Goa' (*q.v.*), in India.

ALGOL, fixed star, β Persei, in Medusa's head, with a remarkable periodic fluctuation in brightness, which may be due to eclipses by a dark satellite. The brightness has been estimated as being seventy times that of the solar photosphere.

ALGOMA, town and district, W. Ontario; minerals, forests.

ALGONKIAN PERIOD, a group of widely distributed rocks, including all formations younger than archæan and older than palæozoic.

ALGONQUINS, remnant of great N. Amer. Indian family, which once occupied vast territory in Canada and U.S.A.

ALGUM, see ALMUG.

ALHAMA DE GRANADA (37° 4′ N., 3° 57′ W.), town, Spain; hot sulphur springs. Pop. 7679.

ALHAMBRA, THE ('red castle'), gorgeous palace of the ancient Moorish kings of Granada (Southern Spain); begun by Ibn-l-Ahmar (1248) and completed by Muhammad III. (1314). It is surrounded by a fortified wall, strengthened by defensive towers. The most magnificent parts remaining are the famous Hall of Ambassadors, Court of the Lions, and Court of the Fishpond. The scheme of decoration is carried out in the three primary colours, and the marvellously beautiful mosaic work, the elegant lightness of the arches and columns, and the elaborate richness of its ornamentation have served to make this ruined palace one of the wonders of the world, notwithstanding that it has suffered greatly from the effects of earthquake, from Fr. vandalism (*c.* 1811), and from the merciless hand of Time.

ALHAZEN, ALHASAN (XI. cent.), Arab. physicist; author of a treatise on optics; discovered that vision is not due to emission of rays by the eye, and explained phenomena of atmospheric refraction, such as the twilight.

ALHUCEMA ISLANDS (35° 17′ N., 3° 45′ W.), islands off coast of Morocco, North Africa.

ALI BEN ABÛ TALIB (d. 661 A.D.), cousin of Muhammad; succ. as Caliph, 656; m. the prophet's dau. Fatima; assassinated.

ALI PASHA (1741–1822), Albanian chief, surnamed Arslan 'the Lion.' His f., the Bey of Tepeleni, was murdered when A. was fourteen, and his territories seized. He eventually recovered his f.'s possessions, and gained the favour of the Porte; app. Pasha of Jannina (1788), he became one of the most influential

viziers under the Turk. rule. He was insatiably ambitious, and committed great enormities to further his ends. Having aroused the jealousy of the Sultan, Mahmud II., he was eventually assassinated. His court at Jannina attracted many travellers: Byron introduces him in *Childe Harold's Pilgrimage*.

ALIAGA (15° 25′ N., 120° 45′ E.), town, Philippines; rice, tobacco. Pop. 11,950.

ALIAS (in full, *alias dictus*), legal term referring to a person who has assumed a false name.

ALIBI, in law, 'to prove an alibi' is to produce evidence that the person charged with a crime was in another place at the time it was committed.

ALICANTE (38° 32′ N., 0° 35′ W.), province, Spain; agriculture and viticulture. Pop. (1910) 484,000.

ALICANTE (38° 21′ N., 0° 26′ W.), capital, A. province, Spain; fortified harbour; manufactures cotton, linen, cigars. Pop. (1910) 51,000.

ALICE (32° 45′ S., 26° 52′ E.), town, Cape Province, S. Africa; near Lovedale mission station.

ALICE MAUD MARY, Grand-Duchess of Hesse-Darmstadt (1843-78), 2nd dau. of Queen Victoria; m. Grand Duke Louis IV., 1862; d. of diphtheria caught while nursing her dau. 'May'; a devoted and talented wife and mother.

ALIEN, person belonging to another country; one not entitled to rights of citizenship. In James I.'s reign it was held that natives of Scotland b. before the Union were aliens. Since the Naturalisation Act (1870) an a. may now become naturalised by applying to the Home Sec. and producing evidence of having lived in the U.K. for not less than five years. The Aliens Act (1905) makes it possible for immigration officers to prevent the landing in the U.K. of lunatics, idiots, or persons suffering from any disease or infirmity which renders them likely to become a charge upon the rates. They may also be excluded if they cannot show that they have in their possession, or are in a position to obtain, means of decently supporting themselves and their dependants; or if they have been expelled from the U.K., or have been sentenced for an extradition crime in a foreign country. The alien immigrants from Europe to the U.K. during the year 1910 numbered nearly half a million. See NATURALISATION.

ALIENATION, estrangement; in law, transference of property by deed; condition of insanity.

ALIEN-HOUSES, English religious houses controlled by foreign ecclesiastics, like Abbot of Cluny.

ALIENIST, psychiatrist, specialist in mental diseases. See INSANITY.

ALIGARH (27° 55′ N., 78° 6′ E.), town, United Provinces, India; Muhammadan Coll. Pop. (1911) 65,000.

ALIGNMENT, term used in archæology, engineering, military matters, etc., meaning an arrangement in line. It is applied to a row of monoliths; a railway ground plan; a military formation; and in several other ways.

——— (1° 30′ S., 16° E.), navigable tributary of Congo, Africa.

ALIMENT, an allowance for maintenance (Scots law); used synonymously with alimony (*q.v.*).

ALIMENTARY CANAL, see DIGESTION.

ALIMONY.—On the commencement of divorce proceedings it is usual for the wife to apply for an order on her husband for maintenance during and after the suit. The former is called *alimony pendente lite*, and continues until the *decree absolute*; the latter, *permanent alimony*. An order will not be made where the husband has little or no means, and if he is destitute and his wife has means, he may apply for an order on her.

ALIN, OSCAR JOSEPH (1846-1900), Swed. historian; prof. of Political Economy at Upsala; many works on history of Sweden.

ALIPHATIC, name applied to organic compounds such as the fatty acids and other derivatives of the methane series and unsaturated compounds like the acetylene and ethylene series.

ALIQUOT PART, or submultiple, a quantity dividing another quantity without a remainder; thus, 7 is an a. p. of 21.

ALIRAJPUR (22° N., 74° E.), native state, India; 836 sq. miles. Pop. 50,000.

ALISMACEÆ, order of monocotyledonous water- and marsh-plants, including about 70 species, *e.g.* the water plantain (*Alisma Plantago*), flowering rush (*Butomus*), and arrow-head (*Sagittaria*), which occur in Britain.

ALISON, ARCHIBALD (1757-1839), Scot. episcopal clergyman and author; s. of Lord Provost of Edinburgh; wrote *Nature and Principles of Taste* (1790), etc. His e. s., **William Pulteney A.** (1790-1859), was prof. of Medicine in Edinburgh University (1822-56); 2nd s., **Sir Archibald A., Bart.** (1792-1867), was a distinguished historian and legal writer; Lord Rector of Glasgow University (1851); created a baronet (1852); wrote *History of Europe* (10 vols., 1833-42) and (9 vols., 1852-59) *Lives* of Marlborough, Castlereagh, and others; *Principles of Population*, *Principles of the Criminal Law of Scotland*, etc. **Sir Archibald A.**, 2nd Bart. (1826-1907), s. of the last-named, was a distinguished Brit. general; served in the Indian Mutiny, Ashanti War, and Egyptian War (1882-83).

ALIWAL (31° N., 75° 31′ E.), village, India; Sikhs defeated by Sir Harry Smith, 1846.

ALIWAL NORTH (30° 55′ S., 26° 53′ E.), town, and district, Cape Province, S. Africa; sulphur springs. District pop. (1911) 16,000 (7000 white).

ALIZARIN ($C_6H_4(CO)_2C_6H_3(OH)_2$[1·2.]), dyestuff formerly prepared from madder root, now synthetically from anthracene; crystallises in red prisms, M.P. 290°, produces Turkey reds, purpurin, and other dyes (*q.v.*) with different mordants.

ALJUBARROTA (39° 35′ N., 8° 55′ W.), town, Estremadura, Portugal; by defeat of Castilians, 1385, Portugal gained independence.

ALKAHEST, the imaginary 'universal solvent' of the alchemists.

ALKALI, a chemical compound, such as soda and potash and the caustic hydroxides of the 'alkali metals,' sodium, potassium, lithium, cæsium, rubidium, having the property of neutralising an acid. A's turn a red litmus solution blue and phenolphthalein red.

Manufacture.—The term a. was originally employed for the ashes of vegetable substances which had a soapy feel when dissolved in water, and is now applied particularly to the hydroxide (caustic soda) and carbonate of sodium. The latter is manufactured by three different methods. The *Leblanc process* essentially consists of three stages: (*a*) The formation of salt-cake (sodium sulphate) and hydrochloric acid by heating common salt and sulphuric acid in iron pots in furnaces of varying construction. The hydrochloric acid is condensed in coke-towers or stoneware receivers and afterwards used in the manufacture of chlorine and bleaching-powder. (*b*) The salt-cake is mixed with an equal quantity of limestone or chalk and two-thirds of slack and heated in a revolving furnace, forming 'black ash' which contains sodium carbonate, calcium sulphate, and impurities. (*c*) The black ash is leached with water and the soda crystallised out by boiling down the liquor, washing soda, refined soda, and soda ash or a. (NO_2CO_3), being the three grades of strength (*i.e.* percentage of carbonate) obtained. Caustic soda (NaOH) is manufactured from the liquor by boiling it with slaked lime and solidifying the caustic after filtering it from the chalk deposit. Except as regards the manufacture of chlorine the *ammonia-soda or solvay process* is much more efficient and economical than the Leblanc process, and has largely superseded it. Purified brine (NaCl solution) is saturated with ammonia and then with carbon dioxide which is brought into contact with the ammoniacal salt solution in a 'solvay' tower.

Ammonium bicarbonate results, which acts on the salt solution to form sodium bicarbonate and ammonium chloride. The crystals of sodium bicarbonate are filtered and dried, and by heating converted into soda and carbon dioxide. The latter is used again in the carbonating tower, while ammonia is recovered from the ammonium chloride solution by heating it with milk of lime ($CaOH)_2$. The manufacture of caustic a's is best carried on by one of the *electrolytic processes*. If an electric current be passed through a solution of common salt, sodium and chlorine are formed; the former immediately reacting with the water gives rise to the hydroxide (caustic soda solution). The chlorine can either be collected or made to act within the liquid to form bleach-liquors or, at a higher concentration and temperature, sodium chlorate. This process holds good for the corresponding potassium salts.

Alkalimetry, the estimation of alkalis by titrating their solutions with standard acid.

G. Lunge, *Sulphuric Acid and Alkali Manufacture*, 1902; Lomas, *Manual of the Alkali Trade*.

ALKALINE EARTHS, originally, the oxides of barium, calcium, magnesium, strontium, and beryllium; the term is frequently applied to the metals themselves. The chlorides and nitrates are soluble in water, while the carbonates, sulphates, and phosphates are usually insoluble.

ALKALOID, a basic vegetable substance with poisonous and medicinal properties, considered chemically as a derivative of quinoline, isoquinoline, or pyridine. The more important a's are: nicotine, atropine, cocaine, ecgonine, strychnine, brucine, veratrine, morphine, papaverine, codeine, etc.

ALKAN, CHARLES HENRI VALENTIN MORHANGE (1813–88), Fr. musician and composer.

ALKANNA, ALKANET, boraginaceous plant, also known as bugloss or orcanet in Mediterranean countries, the roots of which yield red colouring matter.

AL KASR AL KEBIR (34° 59′ N., 5° 50′ W.), town, Morocco. Pop. *c.* 10,000.

AL-KENDI, see ARABIAN PHILOSOPHY.

AL-KINDI, see ALCINDUS.

ALKMAAR (52° 39′ N., 4° 47′ E.), port, Holland; cheese trade centre. Pop. (1910) 20,500.—**Alkmaar, Convention of**, treaty (1799) by which Anglo-Russian army, under Duke of York, evacuated Netherlands.

ALKYL, any aliphatic radical such as methyl, ethyl, propyl, amyl, etc., which in organic compounds behave somewhat similar to the metals in inorganic compounds.

ALL FOOLS' DAY, no satisfactory explanation of the term is known, but it has long been a popular custom in England and other countries to attempt to make fools of one's acquaintances on April 1. The 'April fool' in Scotland is called a 'gowk,' in France a *poisson d'Avril*, in Germany, *April-narr*.

ALL SAINTS, FESTIVAL OF, is observed in the Catholic Church on Nov. 1. Its origin is uncertain. All Martyrs and Saints were commemorated the Sunday after Pentecost at Antioch in the IV. cent. At Rome, on May 13, the festival of the Blessed Virgin and the Martyrs was celebrated by order of Boniface IV. in 609 or 610, but the modern commemoration probably does not arise from this but rather from the consecration of a chapel in St. Peter's for the apostles, saints, martyrs, and confessors in 731. Its observance in the West has been general since c. 800, and it was made a feast of obligation by Gregory IV. in 835. It is observed in the Church of England (though that of All Souls on Nov. 2 is not). Most Prot. Churches do not observe it, though it was formally in the Lutheran calendar.

ALL SOULS' DAY, feast to commemorate all faithful dead, celebrated by R.C. Church on Nov. 2; feast of general intercession instituted in XI. cent.

ALLACCI, LEONE, LEO ALLATIUS (1586–1669), Gk. theologian and scholar; librarian of the Vatican.

ALLADA (6° 30′ N., 2° 10′ E.), town, Dahomey, W. Africa; ancient capital. Pop. 10,000.

ALLAH, Arabic term for God, used by Muslims. See MUHAMMADANISM.

ALLAHABAD (25° 26′ N., 81° 50′ E.), capital, United Provinces, India; at confluence of Jumna and Ganges; fort built by Akbar, 1575; univ.; great annual fair and centre of pilgrimage. Pop. (1911) 172,000.—ALLAHABAD (25° 45′ N., 80° 15′ E.), district; produces grain, cotton. Pop. 1,489,358.

ALLAMANDA, genus of tropical Amer. evergreen climbing shrubs, order *Apocynaceæ*, with large funnel-shaped yellow or purple flowers and leaves arranged in whorls; cultivated in hothouses.

ALLAN, DAVID (1744–96), Scot. artist; illustrated *Gentle Shepherd*; called the 'Scottish Hogarth.'

ALLAN, SIR HUGH (1810–82), Scots-Canadian financier; organised Allan Line of steamships between Montreal, Liverpool, and Glasgow.

ALLAN, SIR WILLIAM, A.R.A. (1782–1850), Scot. hist. painter; b. Edinburgh; painted *John Knox admonishing Mary Queen of Scots* (1823); *Mary Q. of Scots signing her Abdication* (1824); portraits of Scott and Byron.

ALLANTOIN ($C_4H_6O_3N_4$), crystalline oxidation product of uric acid, found in the allantoic liquid of the cow.

ALLARIZ (42° 10′ N., 7° 45′ W.), walled town, Orense, Spain.

ALLEGHANY, THE ALLEGHANIES (38° 10′ N., 80° W.), mountains, Pennsylvania, Maryland, and Virginia. See APPALACHIANS.

ALLEGHENY (40° 30′ N., 80° W.), part of Pittsburg, Pennsylvania; univ. and observatory; great manufacturing centre; meat packing, pickles, and preserves, iron foundries. Pop. (1910) 145,000.

ALLEGHENY, river rising Potter Co., Pa., U.S.A.; joins Monongahela at Pittsburg, forming Ohio.

ALLEGIANCE, the duty which a subject owes to his Sovereign, or liege. Until the passing of the Naturalisation Act (1870) Brit. subjects could not renounce their a. Self-expatriation in the U.S. has long been allowed.

ALLEGORY is an extended metaphor. Notable examples of the a. are Spenser's *Faërie Queen* and Bunyan's *Pilgrim's Progress*.

ALLEGRI, GREGORIO (b. abt. 1560), Ital. priest and composer; one of earliest writers for stringed instruments; famous setting of the *Miserere*.

ALLEGRO (mus. term), quick, lively time; name of piece of music; also of movement in a composition. *Allegretto* is diminutive of a., and denotes somewhat slower movement.

ALLEINE, JOSEPH (1634–68), Nonconformist divine, held in much veneration; ejected from his pulpit, he suffered terms of imprisonment for itinerant preaching; wrote *Sure Guide to Heaven*.

ALLEINE, RICHARD (1611–81), Puritan divine; wrote *The Godly Man's Portion* (1663); *Heaven Opened* (1666); *The World Conquered* (1668).

ALLELUIA, see HALLELUJAH.

ALLEMANDE, a Ger. national dance; a movement in musical suites.

ALLEN, BOG OF, series of bogs, Kildare, King's County, Queen's County, Westmeath, Ireland.

ALLEN, ETHAN (1739–89), Amer. soldier; took part in taking of Ticonderoga (1775); captured during raid in Canada; wrote *Narrative of Colonel Ethan Allen's Captivity* (1779).

ALLEN, GRANT (1848–99), Canadian scientific author and novelist; wrote *The Evolutionist at Large* (1881); *The Evolution of the Idea of God* (1897); *The Woman who Did* (1895); and many other novels.

ALLEN, JAMES LANE (1849–), Amer. novelist; author of about ten novels, of which *The Choir Invisible* (1897) is best known.

ALLEN, JOHN (1771–1843), Brit. author; wrote *Rise and Growth of the Royal Prerogative in England* (1830); frequent contributor to *Edinburgh Review*; master of Dulwich Coll.

ALLEN, RALPH (1694–1764), Eng. philanthropist; friend of Fielding and Pope.

ALLEN, THOMAS, ALLEYN (1542–1632), Eng. mathematician, collector of rare scientific manuscripts which were afterwards presented to the Bodleian Library.

ALLEN, WILLIAM (1532–94), Eng. cardinal; canon of York during Mary's reign; established a coll. at Douai (1568) for training of R.C. priests, and became closely associated with Jesuits; strongly encouraged Philip II. to invade England, and was promised the highest offices if the project succeeded; made cardinal by Sixtus V. (1587); after the Armada's failure A. passed into obscurity.

ALLEN, WILLIAM FRANCIS (1830–89), Amer. scholar; text-books on classical lit.; edited *Collection of Slave Songs* (1867).

ALLENSTEIN (53° 46′ N., 20° 26′ E.), town, Prussia; iron foundries. Pop. 27,500.

ALLENTOWN (40° 36′ N., 75° 27′ W.), town, Pennsylvania; two colleges; iron foundries, silk. Pop. (1910) 51,913.

ALLEPPEY, ALLEPPI (9° 29′ N., 76° 14′ E.), seaport, Travancore, India. Pop. 25,000.

ALLERION, heraldic figure of an eagle, or eaglet, with wings outspread, but lacking beak and claws.

ALLESTREE, RICHARD (1619–81), Eng. divine; fought on Royalist side at Edgehill (1642); after war became univ. tutor; canon of Christ Church (1660); regius prof. of Divinity (1663); provost of Eton (1665), in which position was very successful.

ALLEYN, EDWARD (1566–1626), Eng. actor; s. of innkeeper; foremost actor of his time; received warm praise from Ben Jonson; had large holdings in theatres; founded Dulwich Coll., where his portrait hangs.

ALL-HALLOW, see ALL SAINTS' DAY.

ALLIA, eastern tributary of Tiber, Italy; Gauls under Brennus defeated Romans, 390 B.C.

ALLIACEOUS PLANTS, those of genus ALLIUM (*q.v.*).

ALLIANCE, an act of combination between States, parties, and others, for their general defence or benefit. Notable examples of international a's have been: The Triple Alliance (1688) between Gt. Britain, the Netherlands, and Sweden against Louis XIV.; the Grand Alliance (1689); the Quadruple Alliance (1814) directed against the power of Napoleon; the Holy Alliance (*q.v.*) between Russia, Austria, and Prussia (1815); the Triple Alliance (1872) organised by Bismarck between Germany, Austria, and Russia, from which Russia withdrew in 1886, its place being taken by Italy; and the Balkan Alliance (Bulgaria, Servia, Greece, and Montenegro), 1912.

ALLIANCE (40° 56′ N., 81° 6′ W.), town, Ohio; iron manufactures. Pop. (1910) 15,083.

ALLIARIA, genus of cruciferous white-flowered biennial plants; *sisymbrium* a. or *A. officinalis* is popularly known as Jack-by-the-hedge or sauce-alone.

ALLIBONE, SAMUEL AUSTIN (1816–89), Amer. author; compiled *Critical Dictionary of English Literature*, 1854–71.

ALLIER (46° 45′ N., 3° 5′ E.), river, France; joins Loire.

ALLIER (46° 23′ N., 3° 10′ E.), department, France; fertile plains, with forests in N.; agriculture highly developed; coal and manganese mines; capital, Moulins. Pop. (1911) 406,000.

ALLIES, THE, the Confederate Powers (Britain, Russia, Prussia, Austria, etc.) who restored the Bourbons in France (1814–15).

ALLIES, THOMAS WILLIAM (1813–1903), Eng. hist. writer; Church of England clergyman for many years; became R.C. (1850); chief work, *The Formation of Christendom* (1865–95).

ALLIGATION, arith. rule for finding price of a mixture given the price of its ingredients; or for finding the amounts of ingredients at given prices to be mixed to produce a mixture of given price.

ALLIGATOR, animal living in Amer. rivers, resembling the crocodile (*q.v.*) except in having a more stumpy head and the fourth tooth of the lower jaw fitting into a pit, not a notch, in the upper jaw. The largest a., attaining a length of 20 ft., is the caiman of the Amazon. The small *A. sinensis* occurs in Chin. rivers.

ALLIGATOR FISH, found in N. Pacific, is covered with hard overlapping plates; European variety is the Sea Poacher.

ALLINGHAM, HELEN, *née* **PATERSON** (1848–), Eng. painter; rural scenes; wife of W. A. (*q.v.*).

ALLINGHAM, WILLIAM (1824–89), poet and journalist; b. Ireland; *Day and Night Songs* (1855), *Lawrence Bloomfield in Ireland* (1864); edited *Fraser's Magazine.*

ALLITERATION, in prosody, is the recurrence of words or syllables beginning with the same letter, as in the well-known line, 'By apt alliteration's artful aid' (Churchill). Anglo-Saxon and Icelandic poetry were entirely alliterative, and Langland's *Vision of Piers Plowman* is of the same character. It did not fall into general disuse until about the middle of the XIV. cent., and still occurs. Tennyson has: 'his heavy-shotted, hammock-shroud,' and Swinburne used it often to great effect.

ALLIUM, genus of bulbous plants of the order *Liliaceæ* with flowers in dense heads or umbels, including onion, leek, garlic, chives, shallot, etc.

ALLMAN, GEORGE JAMES (1812–98), Irish biologist, prof. of Bot., Dublin Univ. (1844–56); afterwards regius prof. of Natural History, Edinburgh; known for monograph on gymnoblastic hydroids and introduction of the terms *endoderm* and *ectoderm*; pres. of the Linnæan Society, and of the Brit. Association (1879).

ALLMERS, HERMAN (1821–1902), Ger. poet and writer; collected works—lyric, dramatic, narrative, etc.—pub. in 6 vols., 1891–95.

ALLOA (56° 7′ N., 3° 48′ W.), town, Scotland; yarn factories, breweries, distilleries, brass, pottery, and glass works; exports coal. Pop. 11,893.

ALLOBROGES, a Celtic tribe occupying what is now Dauphiné and Savoy; took part with Hannibal in invasion of Italy.

ALLOCUTION, formal address of Pope to cardinals and clergy.

ALLODIUM, early form of land tenure in which the property was held entirely free of any feudal superior. The system still obtains in Shetland and Orkney.

ALLOMERISM (chem. and min.), property of changing chemical constitution without variation in crystalline form.

ALLON, HENRY (1818–92), Eng. Nonconformist divine; editor, *British Quarterly Review*; associated with Gladstone, Arnold, Maurice, and Dean Stanley.

ALLONG, HALONG (20° 58′ N., 107° E.), bay, Gulf of Tong-King.

ALLOPHANE ($Al_2SiO_5.5H_2O$), amorphous glassy mineral of various colours, decomposition product of various silicates, such as felspar, occurring in fissures of ore-bearing and other rocks.

ALLORI, ALESSANDRO, BRONZINO (1535–1607), portrait painter of Florentine school; f. of CHRISTOFANO A. (1577–1621), portrait and altar painter; fine *Judith with Head of Holofernes.*

ALLOTMENTS, see SMALL HOLDINGS.

ALLOTROPY (chem.), the faculty of existing in several conditions with different properties, *e.g.* carbon occurs as diamond and graphite as well as in an amorphous condition. Different forms of *organic* substances of the same constituents are termed *isomeric.*

ALLOWAY (55° 26′ N., 4° 39′ W.), hamlet, on Doon, Ayrshire, Scotland; birthplace of Burns; famous 'haunted kirk' and 'Auld Brig'; Burns' cottage and monument.

ALLOXAN, MESOXALYL UREA ($C_4H_2O_4N_2$), crystalline oxidation product of uric acid.

ALLOXURIC BASES, in physiological chem., substances containing the radicals alloxan and urea, such as adenine, xanthine, guanine, and other derivatives of purine.

ALLOYS, substances with metallic properties formed by the intimate union, usually by fusion, of different metals in varying proportions, or of a metal and a non-metal. They are more fusible and harder, but less malleable and inferior conductors of electricity than their components. Modern metallographical methods, especially aided by microphotography, show that most alloys must be regarded as solid solutions of the constituents in each other, or as conglomerations of the simple constituents and their chemical compounds. The better-known a's are: *bronze, gun-metal* (copper and tin), *brass* (copper and zinc, sometimes with tin), *steel* (iron and carbon, with nickel, chromium, tungsten, etc.), *type-metal* (lead and antimony, often with tin, copper, or nickel), *pewter* (tin with a little copper), *German silver* (copper, zinc, and nickel), *Britannia metal* (tin, antimony, and copper), *magnalium* (aluminium and magnesium). A's of mercury are called *amalgams.*

ALLPORT, SIR JAMES JOSEPH (1811-92), Eng. railway manager; for 27 years manager of the Midland Railway; improved passenger accommodation and cheapened fares; introduced Pullman car on Brit. railways.

ALLPORT, SAMUEL (1816-97), Eng. geologist, bro. of above; one of pioneers of microscopic petrology.

'ALL-RED' ROUTE is the name given to a proposed accelerated service to New Zealand and Australia, *via* Canada, brought forward by Sir Wilfred Laurier at the Imperial Conference (1907). It was contended that, besides the advantages of a quicker carriage of passengers and mails, it would result in securing a considerable amount of Canadian traffic which now goes by New York; it would give Gt. Britain the control of the Pacific trade; would strengthen her position both in the Atlantic and Pacific; and would furnish a means of protecting her trade in time of war. It was at first stated that the subsidy required would be £400,000; but this estimate was later increased to £1,000,000. The proposed subsidy would be provided jointly by Gt. Britain, Canada, New Zealand, and Australia. At the Imperial Conference (1911) an attempt to carry the proposal was unsuccessful. Mr. Asquith remarked that the opening of the Panama Canal might affect the scheme; while Mr. Lloyd George suggested that the difficulties in the way were almost insuperable, and suggested reference to the Royal Commission on Imperial Trade.

ALLSTON, WASHINGTON (1779-1843), Amer. poet and artist; became intimate with S. T. Coleridge, whose portrait he painted (National Gallery); pictures chiefly on religious subjects.

ALLUVION, the gradual formation and extension of land by action of water.

ALLUVIUM, soil deposited by running water. The deltas of rivers like the Mississippi, Nile, Ganges, Hwang-Ho, consist of a. Alluvial soils are extremely fertile, while some contain gem-stones or gold.

ALLYL ALCOHOL ($CH_2CH.CH_2OH$), colourless, volatile, pungent liquid, B.P. 97°, occurring in wood spirit. It oxidises into glycerin.

ALMA (44° 45′ N., 33° 30′ E.), river, Crimea, Russia; enters Black Sea; gave name to Russ. defeat by Fr. and Brit. allies in Crimean War, 1854.

ALMA MATER ('kindly mother'), term applied by Romans to goddesses, Ceres, Cybele, etc.; by students to their univ. or college.

ALMACK'S, suite of assembly rooms, built in 1765, by a tavern-keeper in King St., St. James's. Admission to the dances and other functions held there was a mark of high social rank. The place was afterwards known as 'Willis's Rooms'; closed, 1890.

ALMADA (38° 40′ N., 9° 10′ W.), small town, Estremadura, Portugal.

ALMADEN, ALMADEN DEL AZOGUE (38° 47′ N., 4° 47′ W.), town, Spain; quicksilver mines. Pop. 7375.

ALMAGEST, Arab name for great astronomical work of Claudius Ptolemy (*q.v.*).

ALMAGRO (38° 55′ N., 3° 44′ W.), town, Ciudad Real, Spain; lace.

ALMAGRO, DIEGO D' (1475-1538), Span. military adventurer; leading member of the Darien colony; was associated with Pizarro in scheme for conquest of Peru; subsequently coming into conflict with Pizarro, he was captured and put to death.

ALMANAC, tables or books containing a calendar, together with astronomical and statistical data, such as the times of the rising and setting of the sun and moon, of eclipses and the tides, and market days, terms of courts, ecclesiastical and other holidays, economic statistics of different countries, also genealogical and literary matter, etc. Many a's contain prophecies as to meteorological phenomena and political events. Primitive a's were compiled by the ancients, but the earliest manuscript a. probably originated in the XII. cent. Among modern Eng. a's, some of which show an interesting development from older astrological calendars, are *Old Moore's A.*, the *British A.*, *Whitaker's A.*; *Ephemeris and Nautical A.* issued by the chief governments.

ALMANDITE, ALMANDINE, gem-stone, deep red to purple, a kind of garnet; found in Ceylon, Australia (at first mistaken for rubies), N. America, and Tyrol.

ALMANSA (38° 53′ N., 1° 4′ W.), town, Albacete, Spain. Pop. 11,000.

ALMANSUR (fl. 754–775), second caliph of Abbasides dynasty; of a cruel and treacherous nature, but a patron of learning; persecuted the Egyptian and Syrian Christians; had Euclid's *Elements* trans. into Syriac.

ALMANZA, see BERWICK, JAMES FITZ-JAMES.

ALMAS (46° 8′ N., 19° 21′ E.), town, Bacsbodrog, Hungary.

ALMA-TADEMA, SIR LAWRENCE (1836–1912), naturalised Brit. artist; b. Dronrip, Netherlands; studied at Antwerp; subjects taken largely from classical and mediæval sources; also many portraits; A.R.A. (1876); R.A. (1879); knighted (1899); O.M. (1905).

ALMEIDA (40° 44′ N., 6° 57′ W.), town, Portugal; old fortress.

ALMEIDA, DOM FRANCISCO DE (c. 1450–1510), Portug. Viceroy of the Indies; fought against the Moors for Ferdinand and Isabella; superseded in India by Albuquerque (*q.v.*); killed by natives at Table [Saldanha] Bay. His s. Lorenzo discovered Madagascar.

ALMEIDA-GARRET, JOÃO BAPTISTA DA LEITÃO D' (1799–1854), Portug. dramatist, poet, and statesman.

ALMEIRIM (39° 12′ N., 8° 27′ W.), small town, Santarem, Portugal; wine.

ALMELO (52° 22′ N., 6° 40′ E.), town, Holland; manufactures damask. Pop. 10,000.

ALMENDRALEJO (38° 42′ N., 6° 22′ W.), town, Spain. Pop. 12,500.

ALMERIA (37° 17′ N., 2° 25′ W.), province, Spain; area, 3360 sq. miles; silk, grapes; iron and lead mines. Pop. (1910) 354,000.

ALMERIA (36° 51′ N., 2° 31′ W.), cathedral town and seaport, Spain; formerly flourishing Moorish town and pirate headquarters; exports fruit. Pop. (1910) 45,000.

ALMISSA (43° 26′ N., 16° 41′ E.), seaport, Dalmatia, Austria; wine.

ALMODOVAR DEL CAMPO (38° 43′ N., 4° 9′ W.), town, Spain; mining centre. Pop. 12,500.

ALMOGÁVARES (*c.* XIII. and XIV. cent's), Span. frontier soldiers of hardy, reckless character; wore no armour, and carried javelin, sword, and shield.

ALMOHADES, name given to line of Muhammadan princes, started by Muhammad ibn Tumart in XII.

cent., in revolt from current Muhammadan anthropomorphism. After his death, 1128, the movement was carried on by 'Abd-el-Mumin. The A. conquered Spain and N. Africa, and lasted till XIII. cent.

ALMON, JOHN (1737–1805), Eng. political pamphleteer and publisher; did much to secure freedom of the Press; his sentence by Lord Mansfield to pay a fine inspired one of the letters of 'Junius'; edited Wilkes' Correspondence, with Memoir (1805); published edition of 'Letters' of Junius, 1806.

ALMOND (*Amygdalus communis*), small tree closely allied to plum, cherry, and peach, the pulpy exocarp of the latter fruits being replaced by a tough dry coat, the kernel representing the stone or seed. Bitter, Jordan a's, and other varieties have developed from the same species. Both the sweet and the bitter a's contain a fixed oil and a ferment emulsion which acts on the glucoside amygdalin to form prussic acid. The chief medicinal value of a's is that they may be converted into flour for palatable cakes, replacing starchy food in cases of diabetes.

ALMOND.—(1) (55° 56′ N., 3° 27′ W.) river, enters Firth of Forth, Cramond, Scotland. (2) (56° 26′ N., 3° 38′ W.) river, joins Tay near Perth, Scotland.

ALMONDBURY (53° 38′ N., 1° 45′ W.), town, West Riding, Yorkshire. Pop. (1911) 24,734.

ALMONER, officer in an almshouse; a title of dignity in old Fr. court. In England now there is a hereditary Grand A., lord high a., sub-a. **Almonry**, place in church or elsewhere where alms were given. The royal a. in England is an official of King's household.

ALMONTE (37° 15′ N., 6° 35′ W.), small town, Huelva, Spain.

ALMONTE (45° 15′ N., 76° 15′ W.), town, County Lanark, Ontario; iron works, factories.

ALMORA (29° 36′ N., 79° 37′ E.), town, United Provinces, India. Pop. 8596.—**Almora**, district, produces tea. Pop. 465,893.

ALMORAVIDES, Berber tribe from the Sahara, which reigned over N. Africa and Southern Spain during XI. and XII. cent's; they conquered the kingdom of Morocco; Ibn Tashfin was one of their most noted chiefs.

ALMQVIST, KARL JONAS LUDWIG (1793–1866), Swed. writer; pub. many novels, poems, and educational treatises; of very unstable character; charged with forgery and murder (1851), and fled to America. Wrote series of novels, *The Book of the Thorn-Rose* (1832–35).

ALMS (Gk. *eleëmosyni*, 'mercy'), gift to the poor. Adjective, 'eleemosynary.'—**Almshouse**, a place for the aged poor, generally endowed.

ALMUCANTAR (astron.), circle of altitude parallel to the horizon; instrument for observing heavenly bodies crossing a certain a.

ALMUCE, AMICE, a cap, sometimes with hood attached, worn by clergy as a choir vestment in the Middle Ages; it is now only worn on a few days; to be distinguished from the liturgical amice, worn as a mass vestment.

ALMUG, ALGUM, tree with valuable wood supposed to be red sandal-wood, mentioned in 1 *Kings* 10^{11-12}, and 2 *Chron.* 2^8, 9^{10-11}.

ALMUÑECAR (36° 45′ N., 3° 46′ W.), seaport town, Granada, Spain; sugar, fruit. Pop. 8000.

ALNWICK (55° 24′ N., 1° 43′ W.), town, Northumberland; early became borough and market town; old gateway and Norman arch; often besieged by Scots, XI.–XV. cent's; castle held six cent's by Percies (*q.v.*); breweries, tobacco trade. Pop. 7041.

ALOADÆ, ALOIDÆ, the giants Otus and Ephialtes (twin sons of Poseidon and Iphimedia), who tried to pile Mt. Pelion upon Olympus; their reputed f. was Alœus.

ALOE, genus of African plants, order *Liliaceæ*, with a rosette of large juicy pointed spine-margined leaves, cultivated as ornamental plants. Preparations of the juice are used medicinally as a purgative and an emmenagogue. Its principle is aloin ($C_{16}H_{16}O$ $3H_2O$).

ALOPECIA (Gk. *alopex*, a fox), baldness (*q.v.*); foxes being subject to loss of hair.

ALOPECURUS, foxtail (*q.v.*), a kind of grass.

ALORA (36° 49′ N., 4° 40′ W.), town, Spain; hot sulphur springs. Pop. 10,000.

ALOSNO (37° 32′ N., 7° 9′ W.), town, Huelva, Spain; copper mines.

ALOST, AALST (50° 57′ N., 4° 3′ E.), town, Belgium; hops, linen. Pop. (1910) 34,000.

ALOYSIA, see VERBENA.

ALOYSIUS, ST., see GONZAGA, LUIGI.

ALP ARSLAN ('brave lion'), or MUHAMMAD BEN DA'UD (1029–72), 2nd Sultan of Seljuk dynasty; through brilliant military operations made himself sole ruler of Persia, and extended his dominions in various parts of Asia.

ALPACA, breed of camel-like ungulates, like the llama and vicuña, probably derived from the guanaco, with fine long, woolly hair, domesticated in Peru and Bolivia. The name is applied both to the hair and the cloth manufactured from it. The latter often contains silk or cotton, and much of the fabric sold as a. is mohair.

ALPENA (45° 4′ N., 83° 27′ W.), town, Michigan. Pop. (1910) 12,716.

ALPES MARITIMES (43° 49′ N., 7° 10′ E.), department, France; area, 1482 sq. miles; Fr. Riviera; many health resorts—Nice, Cannes, etc.; produces fruit. Pop. (1911) 356,338.

ALPHA (chem.), first of group of compounds; (astron.), prefixed to Constellation, one of brightest stars therein.

ALPHA and **OMEGA**, the first and the last letters of Gk. alphabet.

ALPHA RAYS, see RADIOACTIVITY.

ALPHABET, term applied to collection of symbols used to express various sounds that occur in a language. It is derived from *alpha beta*, the two first letters of the Gk. language. There can be no doubt that pictures were first employed to indicate words; that these pictures became indistinct with the lapse of time, and that at a later period the sounds of words were reduced to their simplest forms or symbols. Even at the present day some languages have symbols only for words—the Chinese, for example. The Egyptian hieroglyphics were also pictorial, and indicated words. Whatever people the a. may have originated with, there can be little doubt that it evolved a form much as we now know it with the Phœnicians, and passed from them to the Greeks. The earliest alphabetic evidence to which a date can be assigned belongs to the earlier part of the IX. cent. B.C. This is the 'Moabite Stone,' recording the exploits of Mesha, King of Moab. It was discovered in 1868, and is now in the Louvre.

The Phœnician names given to the letters were not representative of the sounds, and these names were adopted by the Greeks. The Romans appear to have been the first to name the letters from the sounds. The vowels they called *a, e, i, o, u*. To *f, l, m, n, r, s, x*, they prefixed the *e* sound, and added the vowel *e* to *c, g, p, b, t, d*. The Anglo-Saxons had now obsolete letters *Æ* (*q.v.*) and ð or þ ('th'; called 'thorn').

'AL-PHASI, ISAAC (1013–1103), Jewish rabbi; wrote *Halakhoth* or *Decisions*, a digest of the Talmud.

ALPHEGE, ÆLFHEAH, ST. (954–1023), abp. of Canterbury, 1006; killed by Danes.

ALPHEUS (37° 35′ N., 21° 52′ E.), river, Peloponnesus; flows into Ionian Sea; in Gk. myth. A. was a river god who pursued Arethusa (*q.v.*).

ALPHONSE, Count of Toulouse and Poitiers (1220–71); brother of 'St. Louis'; s. of Louis VIII.

ALPHONSINE TABLES, astronomical tables drawn up under superintendence of Alphonso X. of Castile (1226–84).

ALPHONSO, see ALFONSO.

ALPHONSUS A SANCTA MARIA, ALPHONSO

DE CARTAGENA (1396–1456), Span. historian; wrote history of Spain down to his own times.

ALPHONSUS, ST., see LIGUORI, ALPHONSO DE.

ALPINE CLUB, London, founded, 1857, for organisation of Alpine climbing; *Alpine Journal* started, 1863, followed by clubs in Germany, Austria (amalgamated, 1874), Italy, Switzerland, France, and U.S.A.

ALPINI, PROSPERO (1553–1617), Ital. botanist; practised med.; for some time physician to Andrea Doria; prof. of Bot. at Padua from 1593; studied the flora of Egypt and discovered the bisexual nature of date-palms and other plants.

ALPS (46° N., 7° E.), crescent-shaped mountain system, N. Italy, Switzerland, France, Bavaria, Austria, Bosnia; total length, c. 700 miles; width, 30–160 miles; area, c. 80,000 sq. miles; divided according to height into *Fore* A., *Middle* A., *High* A. Snow-line varies from 8900 ft. on S. side to 9200 on N.; glaciers of upper valleys descend to 4000–5000 ft. above sea-level—Aletsch, 4400 ft., Gorner-Boden, 5250. Topographically divided into *Western* A., extending N. and S. from Mont Blanc to Col dell'Altare; *Middle* A., from E. of Mont Blanc to line drawn from Upper Adige to Inn at Innsbruck; *Eastern* A., from this line eastward. Best-known peaks of Western A.—Gran Paradiso (13,320 ft.), Mont Blanc (15,775), Dent du Midi (10,690); of Middle A., Matterhorn (14,775), Monte Rosa (15,215), Strahlhorn (13,745), Mischabelhörner (14,935), Aletschhorn (13,770), Jungfrau (13,670), Mönch (13,460), Finsteraarhorn (14,020), and Schreckhorn (13,380). Drained by Rhine and tributaries, Them, Aar, Reuss, Limmat; Danube and tributaries, Iller, Lech, Isar, Inn, etc.; Po and tributaries, Dora Riparia, Ticino, Mincio, Adige, etc.; Rhone with Arve, Isère, Durance; and smaller streams flowing to Adriatic and Ligurian Sea.

Chief PASSES: from Turin, Coll del Altare to Savona; Col di Genevra, by Dora Riparia to Durance; Little St. Bernard by Dora Baltea and Aosta to Isère, S. of Mont Blanc; Great St. Bernard, E. of Mont Blanc to Rhone; Mont Cenis, by Dora Riparia N.W. to Arc and Isère. From Milan, Simplon from Maggiore to Brieg; St. Gothard, from Ticino to Upper Reuss valley; Bernardino, from Ticino to Rhine; Splügen, from Como to Rhine; Maloja, from Como to Upper Inn; Julier, from Upper Rhine to Inn; Stelvio, from Como to Upper Adige. Others are Arlberg from Upper Rhine to Ill; Brenner from Adige to Innsbrück; Semmering, S.W. of Vienna, between Upper Mur and Upper Leitha; Furka between Upper Rhone and Upper Reuss. There are RAILWAYS crossing by Col dell' Altare; Mont Cenis, tunnel over 7½ miles long, opened 1871; Simplon, two parallel tunnels, opened 1906; St. Gothard, tunnel over 9¼ miles long, opened 1882; Arlberg, opened 1884; Brenner, opened 1867, series of twenty-seven tunnels; Semmering, opened 1853. Highest villages, Juf (6998 ft.) in Grisons, L'Écot (6713) in Savoy, St. Véran (6726) in Dauphiné, Trépalle in Ital. A. (6788), Ober Gurgl (6322) and Fend (6211) in Tirolese A.

Geology.—Eastern A. composed of central zone of crystalline and schistose rocks, with Mesozoic bands on either side, and outer zone of Tertiary deposits to N. Latter divided into outer band of Molasse and inner band of Flysch; former composed of conglomerates and sandstones, latter of sandstones and shales. In Bavarian and Austrian A., Mesozoic zone composed chiefly of Trias, with Jurassic and Cretaceous beds; all three composed largely of limestone. Central crystalline zone composed mainly of gneiss and schist, but has Paleozoic beds dividing it. In Swiss A. Molasse is practically same as in Eastern A., but Flysch is incorporated with Mesozoic; Trias is almost non-existent, Mesozoic being largely composed of Jurassic and Cretaceous beds. Remarkable masses of different formation occasionally occur, known as *Klippen*, consisting of Jurassic and Triassic beds like those of Eastern A. In Western ranges, Molasse is found; patches of Eocene occur in Mesozoic belt, which here is most important, composed chiefly of Jurassic and Cretaceous beds. Chief chain composed of schist and crystalline. Chief mineral products, iron, lead, rock-salt, mercury; gold, silver, copper, etc., also found.

Climate naturally varies with altitude. A. may be divided according to climate into six regions. (1) At base of mountains in N. Italy are sheltered districts producing olives, which require mean temperature of 42° F. in winter, and in summer continuous heat of at least 75° F. (2) In deep valleys and farther up on sunny slopes are regions producing vines, which require mean temperature in summer of 68° F. (3) Mountainous or deciduous, the region extends to about 4000 ft. above sea-level on northern side and sometimes to 5500 on S.; snow lies several months, spring and summer warmer than in England. (4) Sub-alpine or coniferous tree region, from 4000 to 5500 or 6000 ft. above sea-level on north, to 7000 ft. on south. (5) Alpine region, between tree limit and permanent snow. (6) Glacial region of permanent snow, where there is intense frost at night, and often temperature of 80° F. by day.

Flora.—Distinctive Alpine plants include gentians, saxifrages, rhododendrons, primulas, edelweiss; general characteristics are dwarfish woody stems, large flowers, woolly texture. FAUNA includes bouquetin, chamois, marmot, white hare, fox, lynx, wild cat, wolf, bear; vultures, eagles, ptarmigan, grouse, etc., are found.

History.—Little known of early inhabitants except names of few tribes conquered by Augustus; various Teutonic tribes invaded and occupied district in V. and VI. cent's, and Franks also occupied them transiently. History becomes traceable only in X. and XI. cent's with break-up of Carolingian empire. Struggle for Western Alps was carried on between Savoy, Dauphiné, and Provence; subsequently between Savoy and France, latter ultimately obtaining whole of western slope. In central region occurred gradual establishment of Swiss Confederation, 1291–1815. Eastern district was connected historically with Hapsburgs, who obtained northern slope of East A. in XV. cent., and subsequently gained Ampezzo Valley (1517), Venetia (1797), and other districts on southern slopes; but lost Milanese and Bergamasca to Savoy in 1859, and Venetia in 1866, now possessing only Trentino on southern slope. Italy holds in non-Ital. A., Livigno Valley, Tenda, and some hunting districts of Maritime A.

The A. have been very thoroughly explored since beginning of XIX. cent. Previous to that, Mont Blanc had been ascended and about sixty-five glaciers were known. Jungfrau and Finsteraarhorn were conquered in 1811 and 1812 respectively; and henceforth mountaineering greatly increased, many Alpine clubs being established.

Sir Martin Conway, *The Alps* (1904).

ALPUJARRAS (37° N., 3° 15′ E.), mountainous region, Granada, Spain.

ALQUIFOU (same Arab. root as alcohol), a lead ore found in Cornwall, used in pottery to give a green glaze.

ALRUNA, a witch of old Teutonic tradition; figure carved from a mandrake.

ALSACE, ELSASS (48° 20′ N., 7° 20′ E.), former Fr. province, taken by Germany, 1871; formed part of Empire from VII. cent.; great part ceded to France, 1648; chief river, Ill; wooded hills; produces corn, fruits, flax, tobacco, silver, copper, lead, coal, iron; manufactures textiles. Principal towns, Mülhausen, Colmar, Strassburg.

ALSACE-LORRAINE, ELSASS-LOTHRINGEN (48° 50′ N., 7° 3′ E.), province, Germany; area, 5600 sq. miles; Northern part is portion of Rhine plain; W. is occupied by Vosges Mountains; produces cereals, potatoes, tobacco, flax, hops; manufactures glass, porcelain, textiles; coal, iron, and salt mines; chief towns, Strassburg, Metz, Mülhausen; ceded by

France, 1871; constitution granted, 1911, conferring three votes in Federal Council and local self-government by Diet of two chambers. Pop. (1910) 1,872,000. See FRANCO-GERMAN WAR.

ALSATIA (48° 20′ N., 7° 20′ E.), old name for Alsace. It was also the name given to the Whitefriars district, London, which, till 1697, was a debtors' sanctuary and haunt of thieves.

ALSEN (55° N., 9° 55′ E.), Prussian island, Baltic. Pop. 25,000.

AL-SIRAT, the perilous bridge over Hell to Muslim Paradise.

ALSIUM (41° 56′ N., 12° 6′ E.), old city, Etruria; modern Palo.

ALSTADEN (51° 27′ N., 6° 50′ E.), village, Rhine province, Prussia; coal.

ALSTÄTTEN (47° 22′ N., 9° 25′ E.), village, St. Gall, Switzerland; sulphur springs.

ALSTER (53° 37′ N., 10° 1′ E.), river, Holstein, Germany; enters Elbe at Hamburg.

ALSTON (54° 48′ N., 2° 27′ W.), town, Cumberland. Pop. (1911) 3075.

ALSTON, CHARLES (1683–1760), Scot. botanist; lecturer on materia medica and bot. at Edinburgh; pub. a plant catalogue and criticisms of Linnæus' system of classification.

ALSTRÖMER, JONAS (1685–1761), Swed. reformer; lived some time in London, and introduced Eng. industrial methods to his own country; author of book on sheep-breeding.

ALT DAMM (53° 23′ N., 14° 43′ E.), town, Pomerania, Prussia.

ALTAI (50° 50′ N., 85° E.), mountains, Siberia and Mongolia, Asia; separate Semiryechensk, Russia, from E. Turkestan, and outline Gobi Desert on N. Kolyvan A. or Sailughem chain extends N.E. from A. proper to Sayan range. A. proper stretch E. in two parallel ranges to Gobi. Latter constituted chiefly of gneiss and Archæan rocks; former of granites, schists, slate, with Carboniferous and Devonian deposits. Flora includes alpine and herbaceous plants. Minerals include gold, silver, copper, zinc, lead. Inhabitants engage in agriculture. Chief town, Barnaul. Pop. *c.* 800,000.

ALTAIR, name in astronomy for α Aquilæ, the brightest star in constellation of *Aquila*.

ALTAMAHA (31° 40′ N., 81° 54′ W.), navigable river, Georgia, U.S.

ALTAMURA (40° 49′ N., 16° 33′ E.), town, Italy. Pop. 22,729.

ALTAR.—Wherever sacrifice has been offered a's are found; they exist, therefore, in most of the world's religions. Catholicism has its sacrifice of the mass, but in Protestantism, especially where, as in Calvinism, its eucharistic theory is furthest removed from Catholicism, there is no a. In ancient Egypt a large block, often granite, served as an a. According to *Exodus* 20[24], 'In every place where I record my name I will come unto thee, and I will bless thee.' An a. was not to be of hewn stone. When the Temple was built its sacrificial ritual required an a. for burnt-offering and an a. of incense. In Greece and Rome a's were places of sanctuary. In the Christian Church wooden tables were used at first for the Holy Communion. More elaborate a's appear only in the III. cent. In the R.C. Church the a. consists of supports, the super-a. or slab, and a cavity for relics. The a. or a.-stone (a stone let into the super-a.) must be consecrated.

In the Eng. Church the term a. was expunged from the Prayer Book of 1552; but it has always been retained in the Coronation service, and since the Oxford movement it has come into use again.

ALTAZIMUTH (Lat. *altus*, high; Arabic, *as-sumuth*, a way, a road), an instrument used for finding the altitude and azimuth of a celestial body. The eye-piece of the instrument contains a micrometer, made by stretching spider web across the field of view.

ALTDORF (46° 52′ N., 8° 39′ E.), town, Lake Lucerne, Switzerland; cradle of Swiss liberty; associated with William Tell (*q.v.*). Pop. 3117.

ALTDORFER, ALBRECHT (b. 1480), Ger. artist and engraver; his work as engraver ranks only below that of his teacher Dürer; one of the 'Little Masters.'

ALTEN, KARL AUGUST, COUNT OF (1764–1840), Brit. and Hanoverian commander; served under Wellington in Peninsular War; commanded 3rd Division at Waterloo.

ALTENA (51° 18′ N., 7° 40′ E.), town, Prussia; manufactures hardware. Pop. *c.* 13,000.

ALTENBURG (50° 59′ N., 12° 25′ E.), cathedral town, capital of Duchy of Saxe-A., Germany; scene of Prinzenraub. Pop. 40,000.

ALTENDORF, suburb of Essen (*q.v.*), Germany, with dwellings of Krupp employees.

ALTENSTEIN, castle near Eisenach, Saxe-Meiningen, Germany. Luther seized in neighbourhood, 1521.

ALTENSTEIN, KARL, BARON VON STEIN ZUM (1770–1840), Ger. statesman and writer; greatly promoted Prussian schools and universities.

ALTHÆA (classical myth.), wife of Deneus, King of Calydon; mother of Meleager (*q.v.*).

ALTHEN (1709–74), Persian refugee, who introduced the cultivation of madder into France.

ALTHING, Parliament of Iceland (*q.v.*).

ALTHORN, tenor valved bugle, sometimes used in place of the Fr. horn.

ALTHORP LIBRARY, THE, formed by 2nd Earl Spencer, probably most valuable private library ever collected; ultimately sold to Mrs. Rylands, and formed nucleus of the *John Rylands Library*, Manchester. It is particularly rich in rare early printed books.

ALTINUM (45° 34′ N., 12° 24′ E.), old town, Venetia; modern, Altino.

ALTITUDE, perpendicular elevation of a point above a given level; (astron.), the apparent angular elevation of a heavenly body above the horizon, called true a. when it is corrected for refraction and dip of the horizon; (geom.), the perpendicular distance from the base of a figure to the summit or vertex, as in a triangle, pyramid, etc.

ALTMÜHL (49° 2′ N., 11° 30′ E.), river, Germany; joins Danube.

ALTO, mus. term; highest male voice, counter tenor; female voice of like range is *contralto*.

ALTON (38° 55′ N., 90° 15′ W.), town, Illinois, U.S.; military academy and Baptist coll.; manufactures glass, hardware, tools. Pop. (1910) 17,528.

ALTON (51° 9′ N., 0° 58′ W.), town, Hampshire. Pop. (1911) 5555.

ALTONA (53° 34′ N., 9° 57′ E.), town, Germany, on Elbe, close to Hamburg; fine docks; trades with Britain, France, America; burnt by Swedes, 1713; Prussian since 1866; joined Zollverein, 1888. Pop. (1910) 172,500.

ALTOONA (40° 31′ N., 78° 25′ W.), town, Pennsylvania; centre of railway work. Pop. (1910) 52,127.

ALTO-RELIEVO, ALTO-RILIEVO, in sculpture, high relief (*q.v.*), in contrast to *basso-relievo*, which is shallow; figures project from surface by at least half their thickness.

ALTÖTTING (48° 12′ N., 12° 44′ E.), town, Bavaria; resort of pilgrims. Pop. 4344.

ALTRANSTÄDT (51° 18′ N., 12° 10′ E.), village, Prussia; by treaty of A. (1706) August II. of Saxony lost Poland to Charles XII. of Sweden.

ALTRINCHAM (53° 24′ N., 2° 20′ W.), town, Cheshire, England. Pop. (1911) 17,816.

ALTRUISM, ethical term used by Comte, meaning regard for, and devotion to, the interests of others; opposed to individualism or egoism. See ETHICS.

ALTWASSER (50° 50′ N., 16° 18′ E.), town, Prussia. Pop. 15,000.

ALTYN-TAGH (39° N., 89° E.), mountains, range of Kuen-lun, Central Asia.

ALUM ($K_2SO_4.AL_2(SO_4)_324H_2O$), potash alum, is a colourless salt crystallising in octahedra, used as a mordant in dyeing and in medicine as an astringent and styptic. The term is also applied to salts in which potassium may be replaced by any of the other alkali metals or ammonium, and aluminium by ferric iron or chromium. The most important minerals from which a. is obtained are a. schist, alunite, bauxite, and cryolite.

ALUMINA (Al_2O_3), oxide of aluminium, occurring naturally as corundum, ruby, and sapphire.

ALUMINIUM (Al=27), bluish silver-white, malleable, ductile trivalent metallic element of low specific gravity (*c.* 2·6) and high conductivity of heat and electricity, M.P. about 700°. It is widely distributed, but only in compounds, constituting about 7 per. cent. of the earth's crust. Its principal minerals are the silicates kaolin, felspar, and mica, and cryolite (Na_3AlF_6), corundum (Al_2O_3), bauxite ($Al_2O_3.2H_2O$), alunite ($K(AlO)_3(SO_4)_3H_2O$), diaspore (AlO.OH). Davy was able to obtain an iron alloy by the electric decomposition of alumina with an iron wire in 1809 and called the element 'alumium,' but it was first isolated by Wöhler in 1827, by reducing the chloride with potassium. With the cheapening of electric power it has become possible to obtain a. on a commercial scale. The Hall-Héroult process, now in general use, consists of electrolysing cryolite or a corresponding mixture of alumina and sodium fluoride in an iron 'cell' lined with carbon, the cast-iron bottom and the already reduced a. forming the cathode connected with the negative pole of the dynamo, and adjustable carbon rods dipping into the mixture forming the anode. Large a. works have been established at the Falls of the Rhine (Neuhausen and Rheinfelden), Niagara Falls, and the Falls of Foyers. Owing to its qualities and the reduction in its price, the metal is becoming used more and more extensively for parts of engines, in boat-building, for cooking utensils, parts of airships and aeroplanes, for various electrical and scientific apparatus, as a substitute for lithographic stone, and together with powdered iron oxides in the thermite (*q.v.*) process of welding and soldering. Numerous alloys of a. have been manufactured, which are being increasingly employed on account of their greater strength and hardness, *e.g.* magnalium (a. and magnesium) and a. bronzes (copper and 2·5 to 10 per cent. a.).

J. W. Richards, *Aluminium*, 3rd ed., London, 1896.

ALUMNUS, originally foster-son, or male pupil; graduate of coll. or univ.

ALUNITE, ALUMSTONE ($KAl_3(SO_4)_2(OH)_6$), colourless or white mineral occurring in volcanic rocks in Hungary, Italy, and New S. Wales, sometimes crystallised in rhombohedra.

ALURE, VALUBE, in arch., name for passage behind parapet.

ALURED OF BEVERLEY (d. 1129), Eng. chronicler; sacrist of Beverley minster; his *Annales* begin with the Brit. period and extend to his own time.

ALVA (56° 9′ N., 3° 48′ W.), burgh, Clackmannanshire, Scotland. Pop. 4332.

ALVA or **ALBA, DUKE OF,** FERNANDO ALVAREZ DE TOLEDO (1508–83), Span. statesman and soldier; fought at *Pavia*, in Hungary, Algiers; commander-in-chief when thirty; cr. duke as reward for defence of N. Spain; fought in Italy against pope and French, 1556. A. is notorious for his Netherlands campaign (1567–73); set up the 'Bloody Council' and boasted of executing 18,000 men. He had unlimited power; imposed heavy taxes; executed Counts Egmont and Horn, Prot. leaders. Holland and Zealand destroyed his fleet, and he left for Spain; d. after fierce campaign against Don Antonio of Portugal.

Motley, *Dutch Republic*.

ALVARADO, PEDRO DE (1495–1541), Span. conquistador; chief officer under Cortes in conquest of Mexico; gov. of Guatemala.

ALVAREZ, DON JOSÉ (1768–1827), leading Span. sculptor; statue of Ganymede, in Prado, fine example of his work; court-sculptor to Ferdinand VII.

ALVAREZ, FRANCISCO (*c.* 1465–1540), Portug. explorer and missionary; spent six years in Abyssinia; pub. an account of his travels.

ALVAREZ, LUIS (1841–1901), Span. artist; highly successful in hist. and genre pictures; works: *Philip II., Isabella the Catholic, The Charity Bazaar.*

ALVENSLEBEN, CONSTANTIN VON (1809–92), Pruss. general, distinguished service in Franco-German War; received order of Black Eagle (1892).

ALVEOLUS (zool.), pit or cavity, as the socket of a tooth, the terminating part of a gland, or a cell of a honeycomb.

ALVERSTONE, RICHARD EVERARD WEBSTER, 1ST BARON (1842–), Lord Chief-Justice of England (since 1900); thrice Attorney-General under Lord Salisbury; represented Gt. Britain in Bering Sea arbitration (1893) and the Alaska Boundary Commission (1903); engaged in Parnell Commission (1888–89); Master of the Rolls (1900); raised to peerage (1900).

ALVINCZY, JOSEPH, BARON VON (1735–1810), Austrian general; Ital. commander-in-chief; defeated by French at *Arcole* (1796) and *Rivoli* (1797); subsequently gov. of Hungary; made field-marshal (1808).

ALWAR (27° 40′ N., 76° 30′ E.), state, Rajputana, India; area, 3200 sq. miles. Pop. (1911) 792,000, Capital, **Alwar** (27° 34′ N., 76° 35′ E.), has palaces. Pop. 57,000.

ALYATTES (609–560 B.C.), King of Lydia and founder of its empire.

ALYPIUS (IV. cent.), Gk. musical writer; his *Introductio Musica* has been edit. by Jans (1895).

ALYTES OBSTETRICANS, the midwife toad of central and S.W. Europe, the male of which winds the strings of eggs about his hind legs and shelters them in dark and moist places and enters the water when the time for hatching the tadpoles has come.

ALYTH (56° 38′ N., 3° 14′ W.), town and parish, E. Perthshire, Scotland; linen weaving.

ALZEY (49° 46′ N., 8° 6′ E.), town, Rhenish Hesse. Pop. 8000.

ALZOG, JOHANN BAPTIST (1808–78), Ger. theologian; wrote *Manual of Church History.*

AMADEO, GIOVANNI ANTONIO (1447–1522), Ital. sculptor and arch.; famed for statues in the Colleoni chapel, Bergamo; was also engaged in designing Milan cathedral.

AMADEUS I. (1845–90), Span. king, elected, 1870; Duke of Aosta, 2nd s. of King Victor Emmanuel, Italy; tried to rule constitutionally and failed because of factions; almost assassinated, 1872; abdicated, 1873.

AMADEUS V., THE GREAT (1249–1323), Count of Savoy; famed for his wisdom and military exploits.

AMADEUS VIII. (1383–1451), Duke of Savoy; extended his dominions, but subsequently retired to monastery; elected pope as Felix V., but was not recognised by Church.

AMADEUS, LAKE (24° 30′ S., 130° 30′ E.), shallow salt lake in S.W. Australia, discovered by Ernest Giles (1872).

AMADIS OF GAUL, famous mediæval cycle of romance, especially popular in Iberian Peninsula, and similar in style to the Arthurian and Charlemagne cycles; earliest existing version is by Vasco de Lobeira (early XV. cent.); Eng. version by Southey. Amadis, 'the Knight of the Lion,' represents the type of the devoted lover and knight-errant who is caricatured in *Don Quixote.*

AMADOU (Fr.), spongy substance obtained from species of the fungus *Polyporus*; used as tinder after having been soaked in a solution of saltpetre.

AMAGER (55° 40′ N., 12° 38′ E.), small island, off Zeeland, Denmark; market produce.

AMAKUSA (32° 20′ N., 130° 5′ E.), island, Japan; coal, kaolin.

AMALARIC (d. 531), King of Visigoths; m. Clotilda, dau. of Clovis, King of Franks.

AMALEKITES, tribe inhabiting district to S. of Judah; hereditary foes of Israelites; crushed by Saul and David.

AMALFI (40° 38′ N., 14° 36′ E.), port and abp.'s see on N. of Gulf of Salerno, Italy; of great importance in Middle Ages, ruled by its own Doges, and a formidable rival to Venice, Genoa, and Pisa; much injured by sea in XII. and XIV. cent's; now of little commercial importance. Pop. 6700.

AMALGAM, alloy of mercury with other metals, which is liquid or solid according to the proportion of mercury; A's are used for silvering mirrors, and for tooth-cements; also in process of extracting gold and silver from ore, and for frictional machines.

AMALIA, ANNA, DUCHESS OF SAXE-WEIMAR-EISENACH (1739–1807), Ger. patron of lit. and art; friend of Goethe.

AMALRIC I., King of Jerusalem (1162–74), continued long and fierce struggle for the possession of Egypt, of which Saladin ultimately became king.

AMALRIC II., King of Jerusalem (1197–1205); reign likewise disturbed by frequent conflicts with Muhammadans.

AMALRIC OF BENA (d. *c.* 1204), Fr. theologian and dialectician; his views led to conflict with the religious authorities; his body was burnt after death.

AMALTHEIA (classical myth.), goat which suckled the infant Zeus. One of its horns, which was broken off, was known as the *Cornucopia*, or horn of plenty.

AMANA (41° 44′ N., 91° 51′ W.), township, Iowa, U.S.; site of A. Society, Ger. communistic religious association, founded 1885.

AMANITA, widely distributed genus of mushrooms of which the fly agaric (*A. muscaria*), the death-cup (*A. phalloides*), and the destroying angel (*A. verna*) are well-known poisonous representatives in Brit. autumn woods.

AMAPALA (13° 3′ N., 87° 9′ W.), seaport, Pacific, Honduras. Pop. *c.* 4000.

AMARA (31° 50′ N., 47° E.), town, on Tigris, Basra, Asiatic Turkey.

AMARA SIMHA (375 A.D.), Hindu grammarian, compiled the *Amara-Kosha*, Sanskrit vocabulary of ten thousand words, in metre.

AMARANTH, AMARANT (*Amarantus*), genus of plants with purplish flowers clustered on spikes, which, owing to their not withering soon, have been represented in mythology and poetry as symbols of immortality. Love-lies-bleeding (*A. caudatus*) and prince's feather (*A. hypochondriacus*) are well-known garden flowers.

AMARAPURA (21° 50′ S., 96° 8′ E.), former capital of Burma; destroyed by fire, 1810, earthquake, 1839; near Mandalay.

AMARAR, tribe of four great families of Arab descent dwelling in Etbai, on Red Sea.

AMARGOSA (36° N., 116° 30′ W.), river, flows into A. Desert, S. California.

AMARI, MICHELE (1806–89), Ital. scholar and patriot; prof. of Arabic at Florence; wrote on Sicilian Vespers; trans. Scott's *Marmion*; friend of Mazzini.

AMARYLLIS, a shepherdess in classical poetry.

AMASIA (40° 37′ N., 35° 54′ E.), town, Asia Minor; once capital of Pontus. Pop. 30,000.

AMASIS I. (XVI. cent. B.C.), King of Egypt, founder of XVIII. dynasty; successful warrior. **Amasis II.** (570–526 B.C.), last king to retain the crown of Egypt; an able ruler; his s., Psammetichus III., was dethroned by the Persians.

AMATEUR, one who engages in an art, game, or physical exercise, for pleasure and not for gain. The A. Athletic Association defines an a. as 'one who has never competed for a money prize or staked bet, either with or against a professional for any prize, or who has never taught, pursued, or assisted in the practice of athletic exercises as a means of obtaining a livelihood.'

AMATHUS (34° 41′ N., 33° 7′ E.), ancient town, Cyprus; ruined; old tombs, antiquities.

AMATI, ANDREA (*c.* 1530–1611), founder of the Cremona school of violin-makers; his bro., Nicola, and his sons, Antonio and Girolamo, were also distinguished makers. The most famous craftsman of the family was **Nicola A.** (1596–1684), s. of Girolamo; maker of the 'grand Amati' violin; one of his pupils was Antonius Stradivarius; Nicola's violins are valued at anything up to £500.

AMATITLAN (14° 24′ N., 90° 34′ W.), town and district, Guatemala; cochineal industry.

AMATONGALAND (27° S., 33° E.), coast district, Natal, S. of Lorenzo Marques; separated from Zululand by Kosi River; now part of Natal; inhabitants —Tongas—belong to Bantu race. Pop. *c.* 42,000.

AMAUROSIS, term applied to blindness which is not caused by actual disease of the eye; may be due to brain disease, Bright's disease, diabetes, or excess of tobacco, alcohol, etc.

AMA-XOSA, AMAKOSA, branch of S. African Kaffirs.

AMAZON, AMAZONS, chief river of S. America, rising in the Peruvian Andes in two great branches, the Ucayali and the Marañon, which unite at Nauta, in N.E. of Peru, after which the river flows over 3200 miles right across Brazil, entering the Atlantic at the equator. The width increases from under two miles at the Brazilian boundary to fifty at the principal mouth; it is navigable for ocean steamers for about 2300 miles, and for smaller vessels about 180 miles farther. Trade is carried on by the A. Steam Navigation Company and by numbers of small steamers employed by rubber companies. The region it drains, an area of over 2,700,000 sq. miles, produces rubber, cotton, indigo, nuts, sugar, cacao, coffee, tobacco; and its course leads through vast impenetrable forests, where there are many natural channels which unite the different affluents. It is a rapid river, especially in times of flood; its waters abound in hundreds of kinds of fish, and great numbers of turtles are found. A great deal of silt is carried down, and has formed many islands, particularly near the mouth.

The principal ports are Tabatinga, on Peruvian boundary, Teffe, Manaos, Obidos, Santarem, Macapa, in Brazil; and the chief trading city is Para, near the mouth. The A. has about 200 tributaries, many of which are navigable. Besides Ucayali and Marañon the principal affluents are the Napo, Putumayo, Yapura, Negro from the N., and the Javary, Jurua, Purus, Madeira, Tapajos, and Xingu from the S. Napo rises on N. side of Cotopaxi; its affluents include the Coca and Aguarico. Putumayo, or Ica, rises near Pasto and joins A. at São Antonio. Yapura flows parallel to Putumayo, rises in Colombian Andes, and joins A. by several natural channels.

Negro is principal northern affluent of A., rises in Colombia, is joined by Branco, Uaupes, and other streams, and unites with A. below Manaos. Javary forms part of boundary between Brazil and Peru, and unites with Marañon at Tabatinga. Jurua rises in Peru and is sluggish stream. Purus also rises in Peru, is joined by Aore or Aquiry, and unites with A. in lat. 4° S. Madeira is largest tributary of A.; its head waters, the Beni and Marmoré, rise in Bolivia and unite in lat. 10° 30′ S.; in the upper reaches are many rapids; its affluents include the Blanco, Guapore, Mayutata, and it joins A. near Serpa. Tapajos is formed by confluence of Juruena and Alta Tapajos in Matto Grasso, and joins A. near Santarem. Xingu rises in Matto Grasso, has many falls and rapids, and forms lake near the mouth, uniting with A. by multitude of streams. Of the smaller tributaries, the Trombetas, Nanay, Tigre, Pastaza, and Morona may be mentioned, all on the S. side. The Tocantins is sometimes called a tributary of the A., but is not so in reality.

Wallace, *Travels on the Amazon and Rio Negro*; Bates, *A Naturalist on the River Amazon* (1873); Wallace, *Travels on the River Amazon and Rio Negro* (1889).

AMAZON ANT, see SLAVE-MAKING A.

AMAZONAS (6° S., 78° W.), department, Peru. Pop. 53,000.

AMAZONAS (1° 15′ N., 65° 50′ W.), district, S. Venezuela.

AMAZONAS (2° 30′ S., 61° W.), state, Brazil; capital, Manãos; rubber, cacao, nuts. Pop. 380,000.

AMAZONITE, AMAZON STONE, green microcline-felspar, found in pegmatite in U.S.A. and Madagascar, occasionally used polished as an ornament stone.

AMAZONS (*i.e.* breastless), legendary race of warlike women dwelling in Pontus; said to have cut or burnt off right breast that they might use their weapons more freely; men were not admitted to their dominions, but once yearly they met with the Gargareans in the mountains for the propagation of their race; male offspring were destroyed, or sent back to their fathers. See PENTHESILEA, HIPPOLYTA, and ANTIOPE.

AMBACA (9° 12′ S., 15° 28′ E.), town, Angola, W. Africa; coffee, sugar-cane.

AMBALA, see UMBALLA.

AMBARVALIA, ancient Roman festival, help in May, to propitiate the deities who watched over crops.

AMBASSADOR, Minister of State sent by a sovereign, or other power, as representative at a foreign court. The 'ambassador ordinary' is the bearer of sealed letters of credence, having (in Gt. Britain) the royal signature, in which the sovereign confirms any engagement undertaken in his name by the representative. He cannot, however, sign treaties or enter finally into any important arrangements without referring the matter to the home Government. An 'ambassador plenipotentiary,' on the other hand, possesses these higher privileges. 'Ambassador extraordinary' is a title which implies a representative of somewhat higher dignity, and is usually held for a limited period.

AMBATO (1° 10′ S., 78° 50′ W.), town, Ecuador. Pop. *c.* 10,000.

AMBER ($C_{10}H_{16}O$), yellow, brown, or reddish translucent resin becoming electrically charged by friction, in Oligocene strata in E. Prussia, Miocene deposits in Sicily, Burma, and elsewhere, widely distributed evidence of extinct pine forests, and washed up by the sea on the foreshores of the Baltic, North Sea, and Mediterranean. It has formed an article of commerce from the earliest times, and is extensively cut and polished for mouthpieces of pipes, etc., beads, and other ornaments.

AMBERG (49° 28′ N., 11° 50′ E.), town, Bavaria. Pop. (1910) 25,000.

AMBERGER, CHRISTOPH (1500–61), Nuremberg artist; follower of Holbein; portraits and scriptural subjects.

AMBERGRIS, a grey or blackish odorous fatty substance, volatilising as a white vapour at *c.* 100°, found as a morbid concretion in the intestines of the sperm whale, or in masses from ½ oz. to 150 lb. in weight floating in tropical seas; extensively used in the East for perfumery and pharmaceutical purposes.

AMBERT (45° 32′ N., 3° 44′ E.), town, Puy-de-Dôme, France. Pop. 3889.

AMBIORIX (fl. 54 B.C.), chief of Eburones, tribe of Belg. Gaul; fought against Quintus Cicero, who was relieved by Cæsar.

AMBLESIDE (54° 26′ N., 2° 58′ W.), town, near Windermere, Westmoreland, England.

AMBLYGONITE ($Li(AlF)PO_4$), white or greenish yellow cleavable mineral occurring in pegmatite veins in Germany, France, Spain, and California.

AMBLYPODA, sub-order of extinct Ungulate mammals found in Eocene rocks of N. America and Europe. They are characterised by a small brain-cavity in comparison with the large body (size of rhinoceros); some species were provided with horns and tusks.

AMBLYSTOMA, N. American tailed amphibian, of Salamander family; larval form, AXOLOTL, sometimes persists and is fertile.

AMBO, reading-desk of the Early Church; superseded in later times by lectern and pulpit.

AMBOISE (47° 45′ N., 1° E.), town, Indre-et-Loire, France; famed for its historic castle, where Charles VIII. was b. and d., and Abd-el-Kader imprisoned, 1848–52; also for the Huguenot conspiracy directed against Francis II., when 1200 of the inhabitants lost their lives; and for the 'Edict of A.,' 1563, by which Catherine de' Medici made concessions to the Protestants. Pop. 4632.

AMBOISE, GEORGES D' (1460–1510), Fr. cardinal; Prime Minister under Louis XII.; Church reformer; patron of art and letters.

AMBOYNA (3° 45′ S., 128° 15′ E.), town, island, and residency, Dutch E. Indies; town has fishing and agricultural industries. Pop. 8000. Island (most important of Moluccas), volcanic; produces cloves, spices, cocoa, fruit. Pop. 39,000. Residency includes numerous islands. Pop. 296,000.

AMBRACIA (39° 3′ N., 21° 2′ E.), old Corinthian colony, Greece.

AMBRIZ (7° 55′ S., 13° 10′ E.), seaport and division, Angola. Pop. *c.* 2500.

AMBROS, AUGUST WILHELM (1816–76), Austrian musician; famed for his *History of Music*.

AMBROSE (*c.* 1190), Norman poet; accompanied Richard I. to Holy Land, and wrote a rhyming (but reliable) chronicle of Third Crusade.

AMBROSE, ST. (*c.* 340–97), Father of the Church; s. of prefect of Gallia Narbonensis; b. at Trèves; rose to be consular prefect of Liguria and Emilia; not yet baptized, he was made bp. of Milan, 374, on death of Auxentius; episcopate marked by Gothic inroad and brief flight to Illyricum; pres. of synod at Aquileia, 381, to consider Arian heresy; controversy with Rom. Symmachus (*q.v.*), who was one of last pagans; resisted Valentinian's effort to enforce Arianism on Rome; remained under usurpation of Maximus; rebuked Emperor Theodosius for bloodshed at Thessalonica, 390; fled on success of Eugenius, 392; gifts of administration and strenuous ascetic ideals; great writer of hymns, but *Te Deum* wrongly ascribed to him. AMBROSIAN or MILANESE LITURGY, which differs in several points from Rom., was traditionally drawn up for Milan by St. Barnabas. Ambrosian Chant, method of antiphonal singing in W. Church, is ascribed to St. A. **Ambrosian Library** (*Biblioteca Ambrosiana*) founded at Milan by Cardinal Borromeo, 1602; among its 8400 MSS. is a Vergil.

AMBROSE THE CAMALDULIAN, AMBROGIO TRAVERSARI (1386–1439), Ital. priest; became general of the Camaldolese Order (*q.v.*).

AMBROSIA (classical myth.), the food of the gods, conferring immortality; also an unguent or perfume.

AMBROSIA BEETLES, see RHYNCHOPHORUS BEETLES.

AMBROSIANS, mediæval religious brotherhood established in neighbourhood of Milan; also name of Anabaptist sect in XVI. cent.

AMBROSIASTES, commentary, long attributed to St. Ambrose, on St. Paul's Epistles, but authorship disputed by Erasmus and others.

AMBROSINI, BARTOLOMEO (1588–1657), Ital. naturalist; pupil of Aldrovandi; successively prof. of Philosophy, Bot., and Med. at Bologna; fought the plague in 1630.

AMBROSIUS (V. cent.), leader of Britons against the invading Saxons.

AMBRY, AUMBRIE, AUMERY, or ALMERY, term in arch. for a recess, niche.

AMBULANCE, a moving hospital following an army in the field, and treating the wounded and sick until they can be removed back to more permanent establishments. The term is also commonly applied to wagons for the conveyance of sick and wounded. Military a's were introduced to a certain extent by Napoleon I., but those according to modern ideas

were instituted in the American Civil War, and have proved of the greatest value in every subsequent war. In war, according to the Brit. organisation, the wounded are collected by regimental bearers at the firing line and carried to the collecting station, whence they are taken to the dressing station by bearers of the Royal Army Medical Corps, and then if necessary to the field hospital. Operations are carried out both at the dressing station (if urgent) and at the field hospital. The Red Cross Society and other charitable societies are associated with the military authorities in modern warfare. Numerous civil a. associations have been founded in Britain, the Brit. colonies, U.S.A., and abroad, the St. John of Jerusalem Association being probably the most important.

AMBUR (12° 45′ N., 78° 40′ E.), small town, Madras, India; fort.

AMELAND, peninsula, province of Friesland, Holland. Pop. *c.* 2000.

AMELIA (42° 33′ N., 12° 26′ E.), town, Umbria, Italy.

AMÉLIE-LES-BAINS (42° 27′ N., 2° 37′ E.), small town, Eastern Pyrenees, France; hot springs known in Roman times.

AMELOT DE LA HOUSSAYE (1634–1706), Fr. historian; sent to Venice as sec. to an Embassy, he published a criticism of the administration of the republic which drew a protest from the Venetian ambassador; author was sent to the Bastille.

AMEN, Hebrew word, equivalent to 'so let it be,' used in Christian worship at close of prayers and hymns.

AMÊNDE HONORABLE, originally a mode of punishment in France; the offender, stripped to his shirt and led into court with a rope round his neck by the public executioner, had to beg pardon on his knees of God, of his king, and his country; now used for a satisfactory apology.

AMENHOTEP, AMENOPHIS, name of three Egyptian kings about XVII.–XV. cent. B.C.

AMENORRHŒA, see GYNECOLOGY.

AMENTHES, the nether world of the ancient Egyptians where Osiris delivered judgment, from which the Gk. Hades was derived.

AMENTIFERÆ, AMENTACEÆ, obsolescent term used for a class of plants having flowers in catkins and including willow, poplar, oak, beech, birch, plane, walnut, hazel, etc.

AMERBACH, JOHANN (d. 1515), printer of Basel; first to use Roman type instead of Gothic and Italian.

AMERCEMENT, discretionary penalty imposed by a court of law, differing from a fine in that the sum was not fixed by statute. As an Eng. legal process it was in use as early as the XIII. cent., and its regulation was provided for in Magna Carta.

AMERIA (42° 34′ N., 12° 25′ E.), town, Italy; Roman remains.

AMERICA (71° N. to 54° S., 35° to 170° W.), two continents (connected by isthmus), Western hemisphere; comprises North, South, and Central America; total area, *c.* 16,000,000 sq. miles; total p., *c.* 170,000,000; named after the navigator, nerigo Vespucci (*q.v.*), who followed up Columbus.

North America (15° to 85° N., 55° to 170° W.) is bounded N. by Arctic Ocean, N.E. by Smith Sound, Baffin Bay, Davis Strait; S.E. by Atlantic; S. by Caribbean Sea, Gulf of Mexico, and Central A.; W. and S.W. by Bering Strait, Bering Sea, Pacific. Extreme length is *c.* 4500 miles; width, *c.* 3300 miles; area, *c.* 8,300,000 sq. miles. Continent expands broadly in N. and tapers to the S. Coast-line is much indented. Surface consists of great lowland region in centre, drained by large rivers; in E. are highlands and in W. high mountain ranges. Principal MOUNTAINS in W. are the Rockies, and a parallel range known as Sierra Nevada in California and as Cascade range farther north; chief peak of Rockies, Mt. Blanca, of Sierra Nevada, Mt. Whitney; and in E. Appalachian Mountains, highest peak, Mount Mitchell. Principal RIVERS are St. Lawrence in E., Yukon, Fraser, Columbia, Colorado in W., Mississippi-Missouri, Peace-Mackenzie, Saskatchewan-Nelson draining central plains and flowing respectively to Gulf of Mexico, Arctic, and Hudson Bay. Chief LAKES are Great Bear, Great Slave, Athabasca, Deer, Wollaston, Winnipeg, in Canada; Superior, Michigan, Huron, Erie, Ontario, between Canada and U.S.A. Chief ISLANDS are Newfoundland, Cape Breton, Anticosti, Prince Edward's Island, off Quebec and New Brunswick; Vancouver, Queen Charlotte Islands, Prince of Wales Island, Aleutians, off W. coast; some of West Indies in S.

Climate varies; has great extremes. There are vast forests of pine, beech, oak, hickory, ash, sycamore, chestnut, and other trees; enormous quantities of wheat, maize, barley, millet, rice, potatoes, peas produced; many fruits cultivated; sugar, coffee, cotton, cocoa, vanilla grown. Minerals include coal, iron, gold, silver, copper, lead, salt, petroleum.

Political divisions are GREENLAND in N.E., Dan. colony; Dominion of CANADA, which includes all British North American possessions except NEWFOUNDLAND, in northern half; UNITED STATES OF AMERICA and MEXICO in southern half; Alaska (*q.v.*) in N.W. corner belongs to U.S.A. Pop. *c.* 120,000,000.

Central America (8° to 21° 30′ W., 77° 30′ to 92° 50′ W.), unites North and South A.; extreme length, *c.* 1000 miles; breadth, 70 to over 300 miles; area, *c.* 210,000 sq. miles; bounded N. by Mexico, E. by Caribbean Sea, S. and W. by Pacific. Northern part is mountainous, with steep slope to Pacific, and tableland, intersected by valleys, sloping more gradually to Atlantic; narrow southern part is mountain from sea to sea. Chief MOUNTAINS are the Sierra Madre in Guatemala, Cordillera de Yolaina in Nicaragua, Sierra de Tilaran in Costa Rica, Chiriqui range in Panama; many volcanoes, including Fuego, Tacana in Guatemala, Cosequina in Nicaragua, Chiriqui in Costa Rica. Principal RIVERS are Segovia, Patuca, Ulua, Grande, Motagua, San Juan. Chief LAKES are Nicaragua, Amatitlan, Atitlan, Managua, Izabal. Political divisions are BRITISH HONDURAS in N.E. and the independent states of GUATEMALA, HONDURAS, SALVADOR, NICARAGUA, COSTA RICA, and PANAMA. Climate varies according to elevation; earthquakes frequent. In tropical belt, rubber, mahogany, cacao occur; coffee and grain are largely produced; other products are sarsaparilla, tortoise-shell, fruits, indigo, hides. The people are of Indian or mixed Span. and Ind. race. Pop. *c.* 5,000,000.

The WEST INDIES lie to the E. of Central A., between North and South A. They include CUBA and HAITI, which are independent republics, the Bahamas, Barbados, Trinidad, Jamaica, Leeward, and Windward Islands, which belong to Britain.

South America (12° 25′ N. to 56° S., 35° 15′ to 81° 20′ W.) is bounded N. by Caribbean Sea, N.E. by N. Atlantic, E.S.E. by S. Atlantic, W. by Pacific. Extreme length is *c.* 4750 miles; breadth, *c.* 3200 miles; area, 7,500,000 sq. miles. Whole of W. side is occupied by mountains, upland valleys, and plateaus of Andes (*q.v.*) from the N. of which an offshoot curves round by the N. side of the Orinoco. Along the S. side of the lower Orinoco, and eastward, is the plateau of Guiana; and in E., between mouth of Amazon and Rio de la Plata, is Plateau of Brazil. Rest of surface consists of great plains—wooded selvas and grassy pampas. N. is drained by Colombian Magdalena and Orinoco, N. centre by Amazon and its tributaries and Tocantins; extreme E. projection by San Francisco River; S. centre by Paraguay, Parana, Uruguay, and their tributaries. Coast-line little broken except at river mouths and along S. part of W. side. Chief lake is, TITICACA, in Bolivia and Peru.

Climate is generally temperate and equable. There are enormous forests, those in tropical regions having magnificent trees and flowering plants. Fruits grown include oranges, pine-apples, guavas, mangoes,

bananas; quassia, cinchona, tapioca, vanilla, indigo, cacao, sugar-cane also produced. Minerals include gold, silver, diamonds, copper, iron.

Political divisions are the republics of COLOMBIA, VENEZUELA, ECUADOR, BRAZIL, PERU, BOLIVIA, CHILI, ARGENTINA, PARAGUAY, URUGUAY; colonies of British, Dutch, and French GUIANA in N.E.; FALKLAND ISLANDS in S.E. belong to Britain. Pop. c. 45,000,000.

Geology of America.—Rocky Mountains in North A. and Andes in South A. were formed by upheavals of Tertiary period, and are thus comparatively recent; Appalachians in North A. are of Palæozoic or early Mesozoic formation; E. Brazilian highlands in South A. and Adirondacks in North A. belong to Archæan period. From similarity between rocks on eastern coasts of A. and those on western coasts of Europe and Africa, and from existence of submerged mountain range running through Atlantic, it is believed that the Atlantic was formed by a rift valley.

Races.—Arctic regions of North A. are inhabited by ESKIMOS, a yellow race, who live chiefly by fishing and seal-hunting; they are short, fat, with black hair and brown skin. Their origin has not been authoritatively established. Aboriginal inhabitants of remainder of continent were INDIANS; these are generally tall and well developed, with black hair and high cheek-bones. They are called 'red Indians' from the copper-coloured skin of certain tribes. Best-known tribes are the Sioux in the western plains, the Iroquois in Canada and elsewhere, the Araucanians and Patagonians in South A. In Mexico and Central A. the people are chiefly creoles and half-breeds; in Brazil are large numbers of negroes and mulattoes, while the South American pampas are the home of a mixed race called the Gauchos. There are many negroes in U.S.A. The European inhabitants of North A. are chiefly of Brit., Ger., and Scandinavian descent, those in South A. of Span. and Portug. descent.

NATIVE CUSTOMS, etc.—Aborigines, both Eskimos and Indians, lived by hunting; former had underground huts or tents made of hides, latter inhabited skin wigwams; had only stone and wooden weapons, metal tools being unknown before coming of white men. Tribes were generally governed on clan system; most tribes practised polygamy, and women had considerable amount of power. Art was not unknown, and in intervals between hunting expeditions some tribes executed fine carvings on ivory. Women did sewing with sinew for thread, with which they made skin garments. Eskimos wore trousers and upper garments; in warmer regions short skirts were worn by women and breech cloths by men. They ornamented themselves by tattooing and painting, and warriors often had fringe of scalps adorning their garments.



General History.—Norsemen reached Greenland about X. cent., and visited the adjacent coast of America. No trace of their occupation remains, and America may be said to have been first discovered by Columbus, who reached the Bahamas in 1492. He afterwards made further discoveries, 1493–1504, in SOUTH AMERICA and the West Indies, but the further development of these regions was carried on principally by Span. and Portug. explorers. Brazil was discovered and annexed by the Portuguese in 1500; and

the Spaniards conquered Peru in 1524-33, Chili in 1540-53, and eventually became masters of practically whole of South A., except Brazil. Struggles occurred intermittently with other European powers, the English, Dutch, and French all making attempts to acquire territories in the South; the only dominions they permanently acquired, however, were the colonies of British, French, and Dutch Guiana. Brazil remained under Portug. control until 1822, when it established itself as an independent empire; it became a republic in 1890. The Span. dominions were controlled by the mother country till XIX. cent., but they rose in revolt in 1810; long struggles ensued, but by 1826 they had all attained independence, and the Span. forces were finally expelled from the country in that year.



CENTRAL AMERICA was discovered by Columbus in 1502, and the whole region was subdued by Spain by 1525, remaining under Span. rule as the Captaincy-General of Guatemala until 1821, when independence was declared. The five states, Guatemala, Salvador, Nicaragua, Costa Rica, and Panama, united as the federal republic of Central A. in 1823, which, however, only lasted until 1839. All except Costa Rica were reunited for three years, from 1842 to 1845; and since then several unsuccessful attempts at union have been made. British Honduras became a Brit. colony in 1850.

In NORTH AMERICA Newfoundland was probably discovered by John Cabot, who in 1497 commanded an expedition to the eastern shores of North A. About 1500 Labrador was reached by Corte-real, Florida in 1513 by Leon, Mexico and Central America were subdued by Spaniards in 1521-23. French made colonies in Canada, and English along E. coast, in XVII. cent. Settlement was made by English in Virginia in 1607; others were established in Maryland, Pennsylvania, and Massachusetts, where the Pilgrim Fathers settled in 1620. By 1750 all the seaboard between Florida and Canada belonged to England, who further acquired Canada from France in 1759. Amer. colonies rebelled in 1775, and became independent as U.S.A. in 1783.

Winsor, *Narrative and Critical Discovery of America* (Boston, 1884-89); Keane, *Ethnology* (1896); *Central and South America* (1901); Dawson and Gannett, *North America* (1898, 2 vols.); Bryce, *South America* (1912); Enock, *Secret of the Pacific* (1912).

AMERICA CUP, see YACHTING.

AMERICA ISLANDS (0° to 6° N., *c.* 160° W.), islands, Pacific. Pop. *c.* 300.

AMERICAN, Civil War, Law, Literature, Union, War of Independence. See UNITED STATES.

AMERICAN INDIANS, see INDIANS.

AMERICAN INTERNATIONAL CONFERENCES, gatherings of representatives of all Amer. states to discuss matters of common interest. First, 1824, was convoked by Span. colonies to Panama, with idea of obtaining guarantee by the U.S.A. of their independence from Spain; invitation eagerly accepted by U.S.A., whose government, though not intending to violate peace with Spain, was anxious to acquire leadership of Amer. continent. Second, 1901, at Mexico, agreed to international arbitration

and established International Bureau of Amer. Republics.

AMERICAN ORGAN, see HARMONIUM.

AMERICANISMS are words or phrases current in the U.S. of America, but not in Britain. These may be divided under two headings, viz. words which were common to both countries before the Separation of 1783, but which have since become obsolete in England; and words which have come into use in America since that event. Among the former class may be placed: *chore*, trifling job, or errand; *creek*, small stream; *deck*, pack of cards; and *fall*, autumn. In the latter class may be indicated: *elevator*, for 'lift'; *section*, for district; *exposition*, for exhibition; *Dutchman*, for German; *candy*, any kind of sweetstuff; *biscuit*, hot roll; *cracker*, biscuit; *the cars*, a train; *depôt*, railway station; *gums* or *rubbers*, goloshes, overshoes; *store*, shop; *railway*, tramway; *mail*, to post letters; *vine*, any climbing plant, and many others.

AMERICUS (32° 5′ N., 84° 15′ W.), town, Georgia. Pop. (1910) 8063.

AMERIND (contracted form of American Indian), term to describe primitive races of America.

AMERSFOORT (52° 10′ N., 5° 24′ E.), town, Holland. Pop. (1910) 24,000.

AMERSHAM (51° 39′ N., 0° 36′ W.), town, Buckinghamshire. Pop. (1911) 9600.

AMES (42° N., 93° 38′ W.), town, Iowa, U.S.A. Pop. (1910) 4233.

AMES, FISHER (1758–1808), Amer. statesman; took prominent part in political life during Washington's administration.

AMES, JOSEPH (1689–1759), Eng. author; his *Typographical Antiquities* (1749) deals with Eng. printing from 1471 to 1600.

AMES, WILLIAM (1576–1633), Puritan clergyman; fellow of Ch. Coll., Cambridge; stripped of his honours because of his denunciation of loose behaviour of the students; went to Holland, and by the fervour of his preaching obtained wide popularity; exercised considerable influence on the thought of his time.

AMESBURY (51° 11′ N., 1° 46′ W.), town, Wiltshire; old Brit. camp. Pop. 7000.

AMESBURY (42° 52′ N., 70° 57′ W.), town, Massachusetts; manufactures iron and cotton goods. Pop. 9000.

AMETABOLIC, term describing insects which do not undergo metamorphosis.

AMETHYST, clear violet or purple variety of quartz (*q.v.*) occurring in cavities in granitic rocks and mineral veins or in agate geodes (*q.v.*); used as a gem-stone, and formerly as an amulet to protect its wearer from intoxicating drink.

AMGA (60° N., 130° E.), river (460 miles long), Yakutsk, Siberia.

AMHARA (10° 35′ N., 39° E.), province, Abyssinia; principal town, Gondar; Theodore, King of A., overthrown by British, 1868.

AMHERST (16° 2′ N., 97° 35′ E.), town and district, Burma.

AMHERST (42° 23′ N., 72° 32′ W.), village and township, Massachusetts; coll., with library, museum, observatory; also Agricultural Coll. Pop. 5313.

AMHERST (45° 52′ N., 64° 5′ W.), town, Nova Scotia. Pop. 5000.

AMHERST, BARON, JEFFREY AMHERST (1717–97), Brit. general; performed brilliant service in conquest of Canada; gov. of Virginia (1763); gov. of Guernsey (1770); cr. peer (1776).

AMHERST, EARL, WILLIAM PITT AMHERST (1773–1857), gov.-gen. of India; nephew of Baron A., to whose title he succ.; cr. earl, 1826.

AMIA, see BOWFINS.

AMIANTHUS, fine silky asbestos found in Cyprus, Eubœa, Savoy, and elsewhere.

AMICE, priestly linen vestment of Western Church, worn about neck and shoulders, generally under the alb; upper central border in Middle Ages decorated with band of embroidery ('apparel'), a custom still continued in many religious orders. When a. is turned down the apparel preserves it in hood shape. See ALMUCE.

AMICI, GIOVANNI BATTISTA (1786–1863), Ital. astronomer; director of Florence observatory; invented immersion system and other improvements in microscope, and a new reflecting system in telescopes.

AMICIS, EDMONDO DE (1846–1908), Ital. writer; commenced life as soldier and fought at Custozza, 1866; published book of military sketches, 1867; retired from army, 1870, and wrote books on travel, some poetry, and several novels.

AMICUS CURIÆ, legal term referring to a person supplying special information during hearing of a case.

AMIDES, organic compounds derived from ammonia by the replacement of one (primary a.), two (secondary a. or imide), or three atoms of hydrogen (tertiary a.) by univalent acid radicals, *e.g.* Benzamide, $C_6H_5CONH_2$; Diacetamide $(C_2H_3O)_2NH$; Triacetamide $(C_2H_3O)_3N$.

AMIDINES, organic compounds which are monacid bases of the general formula $R.C(NH)NH_2$, *e.g.* in Acetamidine R is equivalent to CH_3, in Benzamidine to C_6H_5. The same carbon atom is, therefore, in union with an amidogen and an imido group.

AMIEL, HENRI FREDERIC (1821–81), professor of Æsthetics, later Ethics, at Geneva, whose published selections from his Journal, 1882–84, teem with suggestive thoughts on the vital issues of the day; translated by Mrs. Humphry Ward.

AMIENS (49° 53′ N., 2° 18′ W.), Fr. town, on Somme, old capital of Picardy; large manufacturing centre, producing silk, velvet, wool, hosiery; a bishopric; celebrated for its cathedral (1220–88), the finest example of Gothic arch. in France; birthplace of Peter the Hermit; also memorable for the *Treaty of A.*, by which peace was concluded between France and Britain in 1802. Pop. (1911) 93,200.

AMIIDÆ, see BOWFINS.

AMINAH, mother of Muhammad (*q.v.*).

AMINES, organic compounds derived from ammonia (NH_3) by the replacement of one or more of the hydrogen atoms by hydrocarbon radicals (alkyls or aryls). According to the number of hydrogen atoms replaced, primary, secondary, and tertiary a. may be distinguished. *Aniline* ($C_6H_5NH_2$) is an example of an aromatic primary a. *Trimethylamine* ($(CH_3)_3N$) occurs as a by-product in beet-sugar manufacture. A. act as bases, forming salts with mineral acids.

AMINO-ACIDS, series of compounds like aminoacetic acid $[CH_2(NH_2).COOH]$, which collectively make up the molecules of albuminoid and protein substances.

AMIOT, JEAN JOSEPH MARIE (1718–93), Fr. Jesuit and Oriental scholar; went (1750) as missionary to China where he spent the rest of his life.

AMIR, AMEER, EMIR, Arabic name given to high officials in the East.

AMITERNUM (42° 27′ N., 13° 30′ E.), ancient Sabine town, Italy.

AMJHERA (22° 33′ N., 75° 9′ E.), town and district, Central India; thinly populated.

AMLWCH (53° 24′ N., 4° 20′ W.), town, Wales. Pop. 2720.

AMMAN, JOHANN CONRAD (1669–1724), Swiss physician; lived in Amsterdam; invented oral method of instructing the deaf and dumb (*q.v.*); explained in *Surdus loquens*, first pub. 1692.

AMMAN, JOST (1539–91), Swiss painter and wood engraver; executed woodcuts for Feierabend's Frankfort Bible.

AMMANATI, BARTOLOMEO (1511–92), Florentine architect and sculptor; built *Ponte della Trinita* over the Arno, and made additions to Pitti Palace, Florence.

AMMER SEE (48° N., 11° 8′ E.), lake (10 miles long), Bavaria.

AMMETER, see AMPÈREMETER.

AMMIANUS, MARCELLINUS (*c.* 330–400 A.D.), Roman historian; valuable narrative of contemporary events.

AMMIRATO, SCIPIONE (1531–1601), Ital. historian and ecclesiastic; famed for his accurate *Istorie Fiorentine* (1600).

AMMON, AMON, principal god of ancient Egyptians, generally represented as a man with ram's horns, or with ram's head. There was a temple of A. in Thebes and one in the Libyan Desert, to which Alexander the Great made a pilgrimage. The worship of A. spread to Greece and Rome.

AMMON, CHRISTOPH FRIEDRICH VON (1766–1850), Ger. theologian; wrote on Christian ethics and Church history.

AMMON, OTTO (1842–), Ger. anthropologist; propounder of theory, known by his name, that amongst human types the fair-complexioned and round-skulled display business and industrial qualities, and the dark and long-skulled a proclivity for learning and the higher professions.

AMMONIA (NH_3), colourless gas which does not support combustion, with characteristic pungent smell, occurring naturally in minute quantities in the atmosphere, in water, and in decomposition of nitrogenous organic matter; liquefied a. boils −33·7° C. and solidifies −75° C. It is readily soluble in water, forming ammonia water (NH_4OH), which may be regarded as containing the ionised radicals, ammonium (NH_4) and hydroxyl (OH), and, owing to the latter, has a strongly alkaline reaction. The group ammonium has not been isolated, but behaves chemically very much in the same way as the alkali metals. The most important salts largely obtained in the manufacture of coal gas are ammonium sulphate, used for the preparation of the numerous other salts and as a fertiliser, ammonium carbonate (sal volatile), and ammonium chloride (sal ammoniac, *q.v.*). The preparation of ammonia from the nitrogen of the air is an important, but hitherto unsolved, economical problem. Ammonia is used in pharmacy, in dyeing, in the soda-manufacturing process, and in ice-making.

AMMONIACUM, gum exuded from the stem of *Dorema ammoniacum*, a herb of the order *Umbelliferæ* of Persia and the Punjab; collected in brownish tears of a faint odour and bitter taste; used medicinally as an expectorant in cases of chronic bronchial affections.

AMMONITE, name for the more or less spirally coiled shell of the *Ammonoidea*, fossil *Cephalopoda* (*q.v.*) of the Silurian to Cretaceous era, reaching their greatest development both in numbers and complexity of forms in the Mesozoic.

AMMONITES, Semitic race living E. of the Jordan, who were at continual feud with the Jews until finally subdued by Judas Maccabæus; principal city was Rabbath-Ammon.

AMMONIUM, the radical NH_4, which acts like the basic elements sodium and potassium. See AMMONIA.

AMMONIUS, HERMIÆ (V. cent. A.D.), Gk. philosopher; wrote commentaries on Aristotle, Plato, and Ptolemy.

AMMONIUS, SACCAS (III. cent. B.C.), Gk. philosopher of Alexandria; founded Neo-Platonist School; teacher of Plotinus.

AMMONIUS OF ALEXANDRIA (V. cent.), Egyptian commentator; wrote on the *Psalms* and *St. John's Gospel*, and an exposition on *Acts*.

AMMUNITION, military term for explosives, propellants, projectiles, cartridges, igniting apparatus, and accessories for ordnance and small arms. Machine-gun and small arms a. essentially consists of a drawn brass cylindrical cartridge containing the propellant (*e.g.* cordite), the elongated, rounded, or conical bullet of lead, sometimes covered with nickel, and the percussion cap containing fulminating powder ($Hg(ONC)_2$. $\frac{1}{4}H_2O$) in the centre of the cartridge base (*central fire*). The latter is provided with a rim to keep it in place in the breech and to facilitate the withdrawal or ejection of the case after firing. For shot-guns the case is usually made of a special kind of paper, only the base being of brass. The *rim-fire* cartridge is now practically obsolete. The development of ordnance, a., and armour-plates has proceeded hand in hand, and the introduction of rifling in guns has considerably modified the character of projectiles.

Cannon-balls have been superseded by shells and armour-piercing projectiles, and grape-shot and chain-shot are no longer used. Spherical shells of cast-iron filled with slow-burning powder ignited by a fuse ignited before being fired from a mortar were abandoned after the Franco-Prussian War, and their place taken by the elongated *common shell*. The latter are now made of forged steel, and contain a high explosive, *e.g.* lyddite, which makes them highly destructive on impact, breaking up into large pieces flying forward, and are used chiefly for the attack of buildings. *High explosive shells* are generally filled with lyddite and are fitted with a nose-fuse and exploder, and break up into fine pieces on detonation, which is terribly effective within 25 yds. of the striking-point. *Armour-piercing projectiles* are provided with heads specially hardened. Frequently the point is provided with a cap of soft iron to reduce the 'biting angle' (*q.v.*). As an example of their penetrating power it may be mentioned that a 46-ton 12-in. gun can drive a shot of 850 lb. through a plate of iron 28·6 in. thick. A *shrapnel shell* has part of its interior filled with bullets, which fly forward when it bursts, and is very effective against troops. Numerous designs of shrapnel, *e.g.* Krupp's and Ehrhardt's, are now in use in the different armies and navies, mostly fitted with a highly complicated percussion, time combination, or electric fuse. A smoke-producing charge is generally fitted so that the position of the burst can be plainly seen. '*Shooting shrapnels*' have a large bursting charge which increases the velocity of the bullets and makes the distribution of the fragments of the shell more dangerous. The principle of packing lead or iron shot in bags contained in an iron case has been used from the early XV. cent. (*case-shot*).

The supply of a. in the field is the function of the a. column which supplies the brigade and regimental reserves. Small arms a. of the infantry soldier is carried in bandoliers or pouches, the number of rounds depending on the calibre of the rifle (100 rounds for the ·303 Lee-Metford), and is supplemented from the regimental reserve. See ARTILLERY, RIFLE.

AMNESIA, loss of MEMORY (*q.v.*).

AMNESTY, an Act of the Crown, or the Government, granting a general pardon for rebellion or other offence. Such an Act was passed in Britain after the Jacobite rising of 1745.

AMŒBA, genus of rhizopod Protozoa (*q.v.*), occurring widely in stagnant water, the best-known species being *A. proteus*. It is one of the simplest animals, diameter about $\frac{1}{150}$ in., consisting of a nucleated mass of protoplasm densest in its outer part (ectosarc), and moves, changing its shape, by protruding parts of itself called pseudopodia, which also serve for engulfing food (minute organisms, etc.). Respiration and excretion are carried on by contractile vacuoles. Divided into two sub-orders, *Proteomyxa* (q.v.) and *Lobosa* (q.v.).

AMŒBÆAN VERSES, verses in the form of a dialogue, the persons speaking alternately, as in some of Vergil's *Eclogues*.

AMOL (36° 28′ N., 52° 20′ E.), town, Persia. Pop. *c.* 10,000.

AMONTILLADO, superior quality of light, dry sherry wine.

AMONTONS, GUILLAUME (1663–1705), Fr. scientist; invented a hygrometer, and improved the working of various instruments.

AMOR (classical myth.), another name for the Rom. Cupid, god of love; equivalent to the Gk. Eros.

AMORA, Hebrew term, meaning one who dis-

courses; was applied originally to the rabbis who compiled the Talmud.

AMORITES, Israelitish name applied to early natives of Palestine.

AMORPHOUS, having no definite form; (min.), having no crystalline structure.

AMORT, EUSEBIUS (1692–1775), Ger. theologian and author; a literary Admirable Crichton; said to have been most learned man of his age, and was a writer upon a great variety of subjects.

AMORTISATION, originally the disposal of lands in mortmain; latterly the cancelling of a debt within a specified time.

AMORY, THOMAS (d. 1788), Eng. author and eccentric; wrote the *Life of John Buncle, Esquire* (1756), a medley of fiction, theol., and autobiography.

AMOS (VIII. cent. B.C.), Hebrew 'minor prophet'; shepherd by occupation; believed to have been the first prophet to commit his prophecies to writing.

AMOY (24° 34′ N., 118° 10′ E.), town and island, China; fortified; fine harbour; open to foreigners; trading centre; exports tea, sugar, etc. Pop. (town) *c.* 120,000.

AMPELIUS, LUCIUS (III. cent. A.D.), compiled history of the world to reign of Trajan.

AMPELOPSIS, VIRGINIA CREEPER, ornamental climbing plant related to the grape-vine, with tendrils ending in adhesive disks.

AMPÈRE, ANDRÉ MARIE (1775–1836), Fr. physicist; b. Lyons; prof. of Physics at Bourg, Lyons, the Polytechnic School at Paris, and the Collège de France; discovered the relations between electricity and magnetism and developed the science of electro-dynamics (electro-magnetism). The unit of electrical current is called after him, the **Ampère.** See AMPÈREMETER.

AMPÈRE, JEAN JACQUES (1800-64), Fr. scholar; s. of André Marie A.; wrote on Scandinavian and Ger. poetry, etc.

AMPÈREMETER, AMMETER, instrument for measuring the amount of electric currents in ampères; an ampère being the current of one volt under resistance of one ohm, or depositing 0·001118 grams of silver per second from a standard solution of silver nitrate. The thermal a. essentially depends on the registration of the sag of a wire owing to its increase of length due to the increase of temperature created by the current. Electro-dynamic a., or electro-dynamometer, is constructed on the principle that a fixed wire coil carrying an electric current will displace a second coil suspended by twisted silk fibres. The angle of torsion indicates the strength of the current passed through the coils, the apparatus being standardised by passing through known currents. Another type of a. depends on the influence of a magnetic field on a charged coil of wire, and is generally termed an electro-magnetic ammeter. Lord Kelvin's ampère balance has also found extensive use, and many different types are constructed for different purposes.

AMPHIARAUS (classical myth.), famous seer of Argos; joined Argonauts and Seven against Thebes; saved from death by Zeus, and immortalised.

AMPHIBIA (zool.), term introduced by Linnæus for a class of animals including snakes, turtles, frogs, salamanders, and lizards, modified by Cuvier and Brongniart, who recognised the differences between frogs and salamanders and the Reptilia. Huxley united amphibians (Batrachia) and fishes in the division Ichthyopsida, and reptiles and birds as Sauropsida. The term A. is now usually replaced by Batrachia (*q.v.*).

AMPHIBOLE, group of rock-forming minerals allied to the pyroxene group, but differing from the latter in cleavage and optical characters. The amphiboles are calcium, magnesium, or aluminium silicates with iron or other metals; and they include hornblende, tremolite, actinolite, glaucophane, crocidolite, and other minerals.

AMPHIBOLITE, term for a metamorphic rock consisting essentially of amphibole (hornblende), when schistose called hornblende schist, containing divers accessory minerals, *e.g.* felspars, iron oxide, biotite, etc. Owing to its different modes of origin and structural character representing different stages of metamorphism, a. cannot be strictly defined.

AMPHIBRACH, metrical foot of one long between two short syllables, thus: ∪ – ∪.

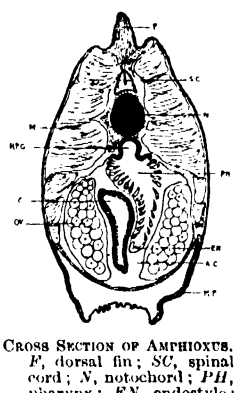
AMPHICTYONY, celebrated federal council of ancient Greece, associated with a shrine, the temporal affairs of which were in its charge. The members were chosen from the principal neighbouring tribes, and there were such councils at Delos, Argos, and, most famous of all, at Delphi.

AMPHILOCHUS (classical myth.), famous seer; took part in Trojan War; part-founder of oracle of Mallos.

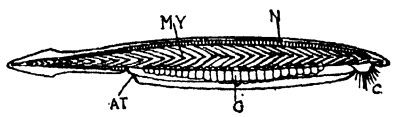
AMPHIMACER, metrical foot of one short between two long syllables, thus: – ∪ –.

AMPHION AND ZETHUS (classical myth.), twin sons of Zeus and Antiope; Amphion became king of Thebes, and was devoted to music and poetry. When he was engaged in enclosing the city, huge stones moved into their proper places at the sound of his lyre. Zethus was devoted to archery and the chase.

AMPHIOXUS, LANCELET, widely distributed marine animal between 1½ and 3 in. in length, somewhat fish-like in appearance, and inhabiting shallow water (*c.* 2 fathoms) with a sandy bottom. Its structure is of extreme interest, as it exhibits numerous affinities with vertebrates, of whom it may be regarded as a primitive, though degenerate offshoot. About sixteen species are included in the subphylum Cephalochorda (Acrania, Pharyngobranchii) of the phylum Chordata. A. is faintly flesh-coloured and translucent, pointed at both ends with a dorsal median fin and two metapleural folds ventrally, and has 62 V-shaped muscular segments (myotomes). The rigidity of the body is maintained by a dorsal rod notochord composed of turgid cells surrounded by a sheath running from tip to tip. A dorsal tubular nerve-cord without a definite brain lies above it. The mouth is overhung by a hood bearing a fringe of 'cirri' and a 'velum' for wafting in the food. The walls of the gullet are perforated by numerous gill slits, and the water is ejected through the 'atriopore' in the 36th myotome, while the food is wafted along ciliated grooves through the straight intestine to the anus situated near the atriopore. The only known sense-organs are sensory cells in the epidermis. There is a rhythmically contractile branchial artery with colourless blood, instead of a heart. Excretion is carried on by a complex arrangement of about 90 pairs of 'nephridia' situated in the wall of the pharynx. The sexes are separate and the ductless gonads (ovaries and testes) are arranged in 26 pairs of sacs along the ventral side of the body. The development is of great theoretical interest. See ANIMALS.—*Cambridge Natural History,* vol. vii.



CROSS SECTION OF AMPHIOXUS. *F*, dorsal fin; *SC*, spinal cord; *N*, notochord; *PH*, pharynx; *EN*, endostyle; *AC*, atrial cavity; *MF*, metapleural folds; *OV*, ovary; *C*, cæcum; *HPG*, hyperpharyngeal groove; *M*, muscles.



EXTERNAL VIEW OF AMPHIOXUS. *C*, cirri round entrance to mouth; *G*, gonads; *AT*, atriopore; *MY*, myotomes; N, notochord.

AMPHIPODA, see MALACOSTRACA.

AMPHIPOLIS (40° 55′ N., 23° 58′ E.), ancient town, Macedonia, mentioned in *Acts* 17; modern Yeni Keni.

AMPHISBÆNA, Gk. name of fabulous serpent, supposed to have head at both ends of body.

AMPHISSA, SALONA (38° 32′ N., 22° 10′ E.), town, capital of Phocis, Greece.

AMPHITHEATRE (Gk. *amphi*, all round), spacious building, generally oval in form, used by the Romans for gladiatorial combats and other spectacles, the interior being encircled by tiers of seats; open space in centre was called the *arena* (name derived from the sand with which it was strewn). The most famous a. is the Colosseum at Rome, begun by Vespasian, and finished by Titus 80 A.D. It covers five acres of ground; held 87,000 spectators; and is the largest structure of its kind, and the best preserved. Other fine Roman a's are to be seen at Verona, Nîmes, Arles, etc.

AMPHITRITÉ (classical myth.), dau. of Nereus (Oceanus) and wife of Poseidon; name also used for sea.

AMPHITRYON, king of Tiryns, husband of Alcmene, who became the mother of Iphicles and Hercules.

AMPHORA, large two-handled vessel, usually of earthenware, used by Greeks and Romans for holding wine, oil, etc.

AMPLEPUIS (45° 55′ N., 4° 18′ E.), town, Rhône, France; thread. Pop. 7000.

AMPLITUDE (physics), the extent of a vibratory movement (*e.g.* wave or pendulum) measured from the mean position to an extreme; (math's), angle determining the value of elliptic functions; (astron.), the complement of azimuth; also the arc of the horizon between the *magnetic* west or east point and a heavenly body.

AMPTHILL (52° 2′ N., 0° 29′ W.), town, Bedfordshire, England.

AMPTHILL, ARTHUR OLIVER VILLIERS RUSSELL, 2ND BARON (1869–), Eng. statesman; noted Oxford rowing man; private sec. to Mr. Chamberlain when Colonial Sec.; gov. of Madras (1899–1906); acting Indian Viceroy during Lord Curzon's absence (1904).

AMPTHILL, 1ST BARON, ODO WILLIAM LEOPOLD RUSSELL (1829–84), diplomatist; attaché to embassies of Paris, Vienna, Constantinople; Sec. of Legation at Rome for twelve years; Assistant Under-Sec. of State for Foreign Affairs (1870); late ambassador at Berlin; cr. Baron A. (1881).

AMPULLA, small vase for holding oils or perfumes used in rituals, coronation ceremonies, etc.

AMRAOTI (20° 55′ N., 77° 45′ E.), town, Berar, India; cotton. Pop. 34,216; district, 800,000.

AMRAVATI (16° 30′ N., 80° 18′ E.), ruined town, Madras, India.

AMRELI (21° 36′ N., 71° 15′ E.), walled town, Baroda, Gujaret, India.

'AMR-IBN-EL-ASS (d. 664), famous Saracen warrior; served under Abu Bekr during invasion of Syria; besieged Jerusalem, Cæsarea, and Babylon: sometime gov. of E...

AMRILKAIS, IMRU UL KAIS (*c.* VI. cent.), most noted Arabian poet of pre-Islamic period; see Ahlwardt's *Six Ancient Arabic Poets* (London, 1870).

AMRITSAR (31° 43′ N., 74° 53′ E.), town, Punjab, India; religious centre of Sikhs; has Golden Temple; ivory work; silks, shawls, etc. Pop. (1911) 152,866. District produces cereals. Pop. 1,023,828.

AMROHA (28° 55′ N., 78° 26′ E.), town, United Provinces, India. Pop. 40,077.

AMRUM (54° 40′ N., 8° 20′ E.), island, North Sea, Germany. Pop. 900.

AMSDORF, NICOLAUS VON (1483–1565). Ger. Prot. reformer; friend of Luther; did much to further the Reformation; was associated with foundation of Jena Univ.

AMSLER, SAMUEL (1791–1849), Swiss engraver; very successful in reproducing work of Raphael.

AMSTAG (46° 46′ N., 8° 39′ E.), village, Uri, Switzerland; ruined castle.

AMSTELODAMUM (52° 22′ N., 4° 53′ E.), 'dam of the Amstel,' Latinised form of Amsterdam.

AMSTERDAM (52° 22′ N., 4° 53′ E.), capital, Netherlands; situated at junction of Amstel and Ij; great commercial centre; connected with North Sea by Canal, opened 1876; intersected by numerous canals; houses built on piles; extensive harbour. A. has palace, two univ's, fine library, many churches, zoological and botanical gardens. Museums have important art collections. Originally fishing village, A. developed from XVI. cent., especially after closing of Scheldt by Treaty of Westphalia, 1648, which destroyed trade of Antwerp; became capital of Netherlands under Louis Bonaparte, 1808. A. exports Dutch produce, butter, cheese, oil, etc.; industries include diamond-cutting, sugar, soap, and tobacco works, shipbuilding, distilling, brewing, glass-works. Pop. (1909) 570,000.

AMSTERDAM (37° 47′ S., 77° 34′ E.), island, Ind. Ocean; uninhabited; French.

AMSTERDAM (42° 57′ N., 74° 15′ W.), town, New York. Pop. (1910) 31,267.

AMU DARIA, JIHUN (41° N., 62° E.), large river, Russ. Turkestan; rises in Pamir plateau; enters Sea of Aral; irrigates Khiva plains; ancient OXUS.

AMULET, charm, or talisman, generally worn round neck to protect wearer against sickness, witchcraft, or other evils; of very ancient use; herbs, animal-matter, and various substances are used.

AMUNDSEN, ROALD (1870–), Nor. explorer; conducted oceanographical investigations in North Atlantic; first man to navigate N.W. Passage, 1906; projected new seven years' Arctic expedition, with Nansen's ship *Fram*, but made dash instead for South Pole, which was reached for first time, Dec. 14–16, 1911; see Amundsen, *The South Pole* (2 vols., 1912).

AMUR, AMOOR (51° 30′ N., 126° 45′ E.), the 'Great River' (about 3000 miles), Siberia and China; enters Sea of Okhotsk; fertile basin; partly navigable.

AMUR (52° 30′ N., 129° 15′ E.), province, E. Siberia; crossed by Great and Little Khingan and Stanovoi ranges; produces gold; town, Blagovyeshchensk. Pop. *c.* 200,000.

AMURNATH, cave in mountains of N.E. Cashmere; place of pilgrimage; said to be the dwelling-place of the deity, Siva.

AMYCLÆ, ancient town, Laconia; legendary seat of Tyndareus, reputed f. of Castor and Pollux.

AMYGDALIN ($C_{20}H_{27}O_{11}N$), white crystalline glucoside isolated from bitter almonds.

AMYGDALITES, see TONSILLITIS.

AMYGDALOID (anat. and geol.), having the shape of an almond.

AMYL ALCOHOLS, eight isomeric liquid compounds of the formula $C_5H_{11}OH$. *Iso amyl alcohol* is a constituent of fusel oil.

AMYL NITRITE ($C_5H_{11}NO_2$), yellow, oily liquid with characteristic odour, B.P. *c.* 96°. The inhalation of the vapour causes flushing of the face and palpitation of the heart in consequence of vascular dilatation. Used medicinally to relieve pain in cases of angina pectoris, and to lower the blood pressure in certain other affections.

AMYLOID, a colloidal modification of cellulose, produced by dissolving it in sulphuric acid mixed with half its volume of water, and precipitating with water. So called because it gives blue colour with iodine.

AMYNTAS II. (*c.* 393 B.C.), king of Macedonia; patron of the arts; f. of Philip of Macedon.

AMYOT, JACQUES (1513–93), Fr. author; became prof. of Gk. and Latin at Bourges; Great Almoner of Charles IX. and bp. of Auxerre; chiefly remembered for fine version of Plutarch's *Lives*,

which was rendered into Eng. by Sir Thomas North, and is supposed to have been used by Shakespeare.

AMYRAUT, MOSES (1596–1664), Fr. Prot. theologian; prof. of Theology at Saumur (1633); shared in the chief controversies on Arminianism and predestination; pub. many controversial and religious books.

ANA (pl.), collection of memorable sayings; anecdotes; literary gossip; first memorable collection of *Ana* was made by Poggio Bracciolini, papal sec. during XV. cent.; among modern collections are Walpoliana, Baconiana, Selden's *Table Talk*.

ANABAPTISTS, name loosely used of several sects which arose in Europe at and after the Reformation. They first appeared at Wittenberg, 1521. Their tenets were partly religious (the rejection of current doctrine Catholic or Reformed) and partly social. They became all-powerful in Münster, 1532–35, and were then cruelly put down. The term 'Anabaptist' was applied later to various reformers, who often did not follow the teaching of those of Münster. Like some mediæval heretics they sought a primitive ideal of apostolic simplicity, and perhaps they can best be described as Christian Socialists.

ANABASIS (401 B.C.), name of Xenophon's narrative of the expedition of Cyrus the younger against Artaxerxes.

ANABLEPS, see under KILLIFISHES.

ANABOLISM, constructive metabolism (*q.v.*), process by which foodstuffs are built up into the living matter of the cell. See ANIMALS.

ANACHARSIS (600 B.C.), Scythian philosopher; friend of Solon; reputed to have invented the two-fluked anchor.

ANACHRONISM, error in computing time; referring an object or event to a particular period which really belongs to another.

ANACLETUS, or **CLETUS** (78–90), 3rd pope; in some lists of popes the name is made to represent two persons, Cletus and Anacletus, who reigned 3rd and 5th in papal series.

ANACOLUTHON, grammatical term for a sentence in which the construction does not follow an orderly sequence, *i.e.* in which the latter part does not strictly correspond to the earlier.

ANACONDA (*Eunectes murinus*), S. Amer. snake, of the boa family, said to attain a length of over 30 ft.; inhabits swampy forests, and hides in water to catch mammals or birds.

ANACONDA (46° 3′ N., 113° W.), town, Montana, U.S.A. Pop. (1910) 10,134.

ANACREON (b. 560 B.C.), Gk. lyric poet of Teos; friend of Simonides; patronised by Hipparchus; wrote hymns to Artemis and Dionysus, but is chiefly famous for his amatory and bacchanalian lyrics. **Anacreontics,** love lyrics, or drinking songs, supposed to follow the style of A.

ANADYOMENE (Gk. = 'rising from sea'), epithet applied to Aphrodite, who was said to have sprung from the sea-foam.

ANADYR (64° N., 178° 45′ W.), gulf, Siberia.

ANADYR (66° 5′ N., 168° 50′ E.), river, Siberia.

ANÆMIA, a general term applied to blood diseases in which there is either a diminution in the normal number of the corpuscles of the blood (*q.v.*) or in the amount of hæmoglobin in each corpuscle. A's are classed as primary a's or secondary a's, the first including chlorosis and pernicious a., of which causes have not yet been discovered, and the secondary a's due to excessive bleeding, malignant growths, intestinal parasites, etc., which cause derangement of the normal supply or destruction of red blood corpuscles.

Chlorosis occurs in young women from 15 to 25, with headache, difficulty in breathing on slight exertion, palpitation, and often menstrual disturbances. The skin usually has a greenish colour, and the lips, gums, and conjunctivæ of the eyes are pale. There is not any diminution in the number of red blood corpuscles, but the hæmoglobin they contain is greatly decreased and the corpuscles are pale in colour. The cause has been suggested to be congenital narrowing of the aorta, chronic constipation, and a variety of other things. The treatment is to correct constipation or other digestive disorders, take gentle exercise and plenty of fresh air, and iron increasing in amount weekly, for three months at least.

Pernicious anæmia is a very fatal disease, affecting males rather than females. There is general weakness, tiredness, palpitation, difficulty in breathing, sometimes irregular rise of temperature; pains in the stomach, vomiting and diarrhœa; bad teeth and suppurating gums are often associated; there may be little hæmorrhages into the skin and other organs; while the whole of the skin is of a characteristic lemon-yellow colour. The blood corpuscles are much reduced in number and exhibit diverse changes in shape, while very large nucleated red corpuscles are present in the blood. Progress is slow, the patient rallies from time to time, but the end is almost invariably fatal in about a year and a half. The cause is now believed to be connected with a septic condition of the gastro-intestinal tract, due, *e.g.*, to bad teeth or a similar reason. The treatment is complete rest, milk foods, arsenic in increasing quantity, and perhaps intestinal antiseptics, *e.g.* salol. Blood transfusion and antistreptococcic serum have been tried with some success.

ANÆROBES, see BACTERIOLOGY.

ANÆSTHESIA, a state of insensibility to pain, either general or local, produced in med. by substances termed *anæsthetics*. Anæsthetics of one kind or another seem to have been employed from very early times. In 1844 Wells, an Amer. dentist, introduced nitrous oxide as an anæsthetic in dentistry, and two years later Morton, another Amer. dentist, commenced the use of ether as an anæsthetic. The modern development of anæsthetics dates from 1847 when Sir James Young Simpson of Edinburgh first employed ether and later in the same year chloroform in the practice of midwifery.

At the present day a variety of anæsthetics are in use. *Nitrous oxide* or nitrous oxide mixed with oxygen has a short induction period and is usually unaccompanied by nausea; and it is employed most usually in dentistry. *Chloroform* and *Ether* are commonly used in surgical operations, either by themselves or mixed, and it is a matter of discussion which is better. Ether, which is used either by the 'close' or 'open' method, is more apt to cause nausea and vomiting on recovery, but it is generally a safer anæsthetic with a less experienced anæsthetist; in operations about the face where a closely fitting mask is impracticable, in children and elderly people, and also in midwifery, chloroform is the better.

Ethyl chloride is a useful anæsthetic in minor operations, and to induce anæsthesia before chloroform, and is becoming more and more used. In operations covering a limited and superficial area local a. may be applied, by spraying the part to be operated upon, with ether or ethyl chloride, or by injecting a local anæsthetic into the subcutaneous tissues, into a nerve trunk, or into the sub-arachnoid space of the spine. *Cocain* and its preparations, *eucain, tropacocain, novocain, stovain,* are commonly thus employed.

ANAGLYPTICS, low relief carving, or embossing.

ANAGNIA (41° 45′ N., 13° 10′ E.), ancient city, Italy; modern ANAGNI; fine old cathedral.

ANAGRAM, word or sentence formed by transposing the letters to form other words; thus, 'file' may be transposed into 'life'; a.-making is of great antiquity.

ANAH, 'ĀNA (34° 25′ N., 42° E.), town, Mesopotamia; on Euphrates; produces fruit; manufactures cloth; ruined castle on neighbouring island; early history unknown; taken by Emperor Julian, 363; ruled by amir in XVII. cent.; often attacked by desert Arabs.

ANAHEIM (33° 48′ N., 117° 54′ W.), town, California. Pop. (1910) 2628.

ANAHUAC (*c.* 19° 35′ N., 100° W.), district, Mexico; formerly had many lakes.

ANAKIM (Sons of Anak), race of giants descended from Arba, who dwelt in S. Canaan; chief city, Hebron (*Numbers* 13 and *Joshua* 11).

ANALCITE ($NaAlSi_2O_6+H_2O$), colourless to opaque pinkish white mineral of the zeolite group occurring in cavities of basic igneous rocks (*e.g.* N. Ireland); crystallises in the cubic system.

ANALEMMA, a scale on a terrestrial globe giving sun's declination on any day; in shape a figure 8, reaching across torrid zone.

ANALEPTIC, a restorative.

ANALYST, one skilled in chemical analysis. Public a's are app. by local authorities in connection with the Brit. Food and Drugs Acts.

ANAM, see ANNAM.

ANAMALAI HILLS (10° 27′ N., 76° 52′ E.), mountains, Madras, India.

ANAMBAS ISLANDS (3° 15′ N., 106° 20′ E.), group of small islands, Malay Archipelago.

ANAMORPHOSIS, a distortion, or deformation, of an image or appearance; such as is produced by reflection in curved mirror.

'ANAN BEN DAVID (VIII. cent.), Persian Jew; founder of Karaites sect, which opposed the rabbinic tradition.

ANANAS, see PINE-APPLE.

ANANDA, first cousin and chief disciple of Buddha.

ANANIAS, husband of Sapphira; both punished by Peter with sudden death because of their lying and hypocrisy (*Acts* v. 1-10).

ANANIEV (47° 47′ N., 29° 59′ E.), small town, Kherson, Russia.

ANANTAPUR (14° 37′ N., 77° 20′ E.), town, Madras, India. Pop. 7938. Also district. Pop. 788,254.

ANAPA (44° 50′ N., 37° 5′ E.), port, Russia. Pop. 6676.

ANAPEST, ANAPÆST, metrical foot of two short syllables followed by one long; thus *intĕrfīre*.

ANARCHISM (Gk. 'without rule'), name given to that form of political theory which objects to all government. 'Anarchist' generally suggests a certain violent type of revolutionary, one of whose methods of bringing about the millennium is to put to a violent death all kings and rulers, and it is this type which, working by means of secret societies, constitutes a menace to society. It is thus theoretically diametrically opposed to Socialism, which would increase rather than diminish the scope of government; but extreme Socialists and anarchists may (and do) for the time join hands to overthrow the existing system which they both consider evil. A., however, may be quite different. Tolstoi was an anarchist in the strict sense. All government according to him was evil, though he advocated non-resistance to evil. A modern state as such was directly tyrannical. In objecting to all organised government he followed some earlier thinkers, though it would seem impossible to reconstruct society (if one could then speak of society at all) on such a basis. Violent a. can almost be called a disease in the body politic, for anarchists seem to be bred in countries which have for cents. suffered from misgovernment, especially, *e.g.*, in Italy. In recent years they have murdered Pres. Carnot, the Empress of Austria, Pres. M'Kinley, and King Humbert of Italy, besides attempting to kill others. A similar kind of revolutionary in Russia is called 'Nihilist.'

Parsons, *Anarchism*.

ANASTASIUS, 4 popes: I. (399-401); II. (496-08); III. (911-13); IV. (1153-54).

ANASTASIUS I. (*c.* 430-518), Byzantine emperor; m. Zeno's widow, Ariadne; progressive ruler; excommunicated.

ANASTASIUS II. (d. 721), Byzantine emperor, dethroned by Theodosius.

ANASTOMOSIS (Biol.), the joining of vessels or of several branches of one vessel, frequently forming a network, as in blood-vessels, insect-wings, or leaves.

ANATA (31° 49′ N., 35° 15′ E.), village, Palestine; birthplace of Jeremiah.

ANATASE, OCTAHEDRITE (TiO_2), blue-black or yellowish brown mineral occurring in octahedral or prismatic crystals in cavities in granite, gneiss, and mica-schists of the Western Alps. It is converted into rutile by heating.

ANATHEMA, originally an offering or sacrifice; later an ecclesiastical curse.

ANATOLIA (39° 30′ N., 30° E.), province of Asiatic Turkey; former Gk. name for whole of Asia Minor as land of sunrise; A. railway to Persian Gulf is in process of construction. See ASIA MINOR.

ANATOMY, term (Gk.) originally meaning dissection or cutting up, now applied to the study of the structure of animals (*zootomy*) and plants (*phytotomy*). *General A.* treats of the structure of the tissues of which the different parts of the body and the organs are composed. *Histology* deals with the study of their microscopical appearances. *Special* or *Descriptive A.* treats of the different organs and parts in regard to form, special structure, and relations to each other. *Osteology* deals with the bones, *Arthrology* with the ligaments and joints, *Myology* with the muscles, *Neurology* with the brain, spinal cord, and nerves, *Angeiology* with the heart, blood-vessels, and lymphatics, *Splanchnology* with the special organs of the body. *Surgical* or *Topographical A.* refers to the relations of the different regions of the body with special regard to surgical and medical diagnosis and surgical operations, and *Surface* and *Artistic A.* to the marks on the surface of the body corresponding to the deeper structures, the effects on the superficial appearance of internal structures, and the proportions of the different parts. *Comparative A.* is the study of the relations of the structure of the different animals to one another and to man.

History.—In very ancient times no doubt the priests and others had some knowledge of the structure of animals and human beings, yet even the ideas of Hippocrates (b. 460 B.C.), the father of med., regarding the subject of A. are very vague and incorrect, and the descriptions of human A. in the works of his disciple, Polybus, are quite fanciful and inaccurate. The real founder of the sciences of A. and Zoology was Aristotle (b. 384 B.C.), whose knowledge was considerable and wonderfully accurate, although he seems to have dissected the bodies of animals only, and not of human beings. Erasistratus (*c.* 350 B.C.) was the first to dissect human bodies, Herophilus gained an extensive knowledge of human A. from dissections, while Celsus (*c.* 60 B.C.) wrote exhaustively on the subject in his work, *De Medicina*.

Galen (b. 130 A.D.) was the greatest anatomist of ancient times, and he described anatomical structures at length and with much accuracy, gaining his knowledge mainly from the dissection of animals. He was followed by Soranus, Oribasius, and others, but they did not add much to his discoveries. After the time of Galen until the XII. or XIII. cent. the study of A. fell into abeyance, except to a modified extent among Arabian physicians, whose religion, however, would not allow them to touch dead bodies, until the rise of the school of med. at Bologna in the XIII. and XIV. cents., with Mondino as teacher of A. (1315), along with the schools at Padua and Salerno. After Mondino, who is the founder of the modern science of A., came Guy de Chauliac, Matthew de Gradibus (1480), Gabriel de Zerbis (1490), Achillini of Bologna (1512), and Berenger of Carpi (1500), who made many important observations. The Fr. school of anatomists followed the Italian, Dubois or Sylvius (1555), Etienne (1564), and Vesalius (1564) being its leaders, the last-named being one of the greatest of modern anatomists. Eustachius (1552) made important discoveries, which unfortunately were not

communicated to the world until two centuries later; while Columbus, Fallopius, Massa, Aranzi, Variolius, Fabricius, and Servetus are all illustrious anatomists of this period.

The science of A. made great progress in the XVII. cent., Harvey, in 1619, discovering the circulation of the blood, Aselli, in 1627, the lacteal vessels, the difference between which and the lymphatics was shown by Joyliffe and Rudbeck about 1652. Willis conducted valuable researches on the brain and nerves, while Wharton, Malpighi, Ruysch, and Duverney investigated different important organs and structures. In the succeeding cent. there was no diminution of the labours of anatomists, and attention was now given to the science of Comparative A., which had been neglected when anatomists began to be able to conduct dissections on the human body as well as upon animals, Perrault, Pecquet, and Duverney in France, and Tyson, Grew, and Collins in England, doing valuable work in this branch of science. Italy began again to produce eminent anatomists, Valsalva, Mascagni, Pacchioni, Santorini, and Morgagni (who was practically the founder of Pathology) flourishing at this period; while in Britain, Cowper, William Hunter, John Hunter, Henson, Cruikshank, Monro *primus*, and Monro *secundus*; in France, Winslow, Vicq d'Azyr, and Bichât; in Holland, Bœrhaave, Albinus, Bonn, and Camper; in Germany, Haller, Meckel, and Sömmering—all developed the knowledge of A., and in the closing years of the XVIII. cent. and the beginning of the XIX. the science had attained to a high standard of exactness.

In Britain at the beginning of the XIX. cent. the most important work pub. on the subject was by Sir Charles Bell, who discovered the difference between sensory and motor nerves, while Fyfe, Monro *tertius*, John Bell, and others wrote valuable systematic works. In 1828 Quain published the first edition of his monumental text-book, which in successive editions and altered by successive authors has occupied a prominent place in the study of A. up to the present time. The first edition of Gray's systematic text-book appeared in 1858, and the work is still, in new editions, widely studied; and in 1902 the exhaustive work edit. by Cunningham was first published. Of the numerous important works on A. pub. in Germany in the XIX. cent. the most valuable are that of Henle, and the very complete work of Bardeleben, while in France Testut and Poirier have issued works of note.

In 1832 and 1871 ANATOMY ACTS were passed in Britain regulating the study of A. and the supply of human bodies, principally owing to the deeds of the Resurrectionists in the early part of the cent., who dug up bodies from newly made graves and sold them to anatomists, to whom no other source of supply was open, the crimes of Burke and Hare in 1828 in Edinburgh bringing the matter prominently before the public. By these Acts four A. inspectors were appointed, for London, England, Scotland, and Ireland, who supervise the supply to medical schools of unclaimed bodies from poorhouses, etc. Body snatching is thought to have persisted in some States of America until the end of XIX. cent., and the laws against it vary in different States.

Various sections of Anatomy are dealt with under: ABDOMEN; ARM; ARTERIES; BLOOD; BONE; BRAIN; CIRCULATORY SYSTEM; CONNECTIVE TISSUES; DIAPHRAGM; DIGESTION; EAR; EYE; FOOT; HAIR; JOINT; KIDNEY; LARYNX; LEG; LIVER; LYMPHATIC SYSTEM; MAMMARY GLAND; MUSCLE; NERVOUS SYSTEM; PANCREAS; RESPIRATORY SYSTEM; REPRODUCTIVE SYSTEM; SKELETON; SKIN; SKULL; SPLEEN; TEETH; THYMUS GLAND; THYROID; URINARY SYSTEM; VEINS.

ANAXAGORAS of Clazomenæ (*c.* 500–428 B.C.), Gk. philosopher. He was the first philosopher to live in Athens, where he was a friend of Pericles; when Pericles became unpopular, A. was accused of impiety—according to one account, for calling the sun a red-hot mass—and had to leave the city. His physical speculations tended in the direction of atomism; he is also famous for having introduced the doctrine that Mind or Reason orders the world, but it is uncertain whether he had arrived at the distinction of material and immaterial, or regarded Mind as a kind of matter.

ANAXARCHUS (*c.* 340 B.C.), Gk. philosopher; friend and mentor of Alexander the Great.

ANAXIMANDER (611–547 B.C.), scientific philosopher of Miletus; pioneer of exact science; said to have introduced sundial into Greece.

ANAXIMENES OF LAMPSACUS (*c.* 380 B.C.), Gk. historian and rhetorician; friend of Alexander the Great; opposed to the school of Isocrates.

ANAXIMENES OF MILETUS (d. *c.* 500 B.C.), Gk. philosopher of Ionic school; held that air is the origin of all life and matter.

ANAZARBUS (37° 18′ N., 36° 5′ E.), ancient town, Cilicia; destroyed by crusaders.

ANBAR (*c.* 33° 22′ N., 43° 49′ E.), town, Mesopotamia; ruins remain.

ANCACHS (9° 50′ S., 77° 20′ W.), province, Peru. Pop. 317,000.

ANCÆUS (classical myth.), s. of Zeus or Poseidon; steersman of the *Argo*; laid down cup of wine to chase a boar, which killed him, thus fulfilling words of soothsayer, 'There's many a slip 'twixt cup and the lip.'

ANCASTER AND KESTEVEN, DUKEDOM OF, title originally held by Bertie family, but now in abeyance; 23rd Baron Willoughby de Eresby cr. Earl of A. (1898).

ANCELOT, JACQUES ARSÈNE FRANÇOIS POLYCARPE (1794–1854), Fr. poet and dramatist; wrote *Warwick*, *Louis IX.*, *Elisabeth d'Angleterre*, etc. His wife, MARGUERITE CHARDON (1792–1875), was also a writer of distinction.

ANCENIS (47° 22′ N., 1° 10′ W.), town, on Loire, France; grain, wine. Pop. 5000.

ANCESTOR-WORSHIP, held by Herbert Spencer to have been the foundation of all religions; springs from the conception of a soul animating a body during life, and, after death, continuing in the unseen the life begun here. Thus with the Romans the word *manes* stood for the friendly spirits of the household, and it was the duty of male descendants to offer food and sacrifices to them. On festival occasions small images, called *Lares*, crowned with garlands, were placed around the hearth-stone, of which they were considered to be the unseen, but not less powerful, guardians. Similarly the Amer. Indians, and other primitive races, look to the spirits of their dead ancestors to further their success in battle. It is the dominant religion in China at the present day, and the 'spirit-tablets' found in the living-rooms of Chin. houses, inscribed with the names of dead ancestors, are supposed to be tenanted by their spirits.

Tylor's *Primitive Culture*; Spencer's *Principles of Sociology*.

ANCHISES (classical myth.), Trojan hero; s. of Capys and Themis. Aphrodite became enamoured of his beauty, and bore him Æneas. Æneas carried him on his shoulders, fleeing from burning Troy.

ANCHITHERIUM, a fossil ungulate mammal. See under HORSE FAMILY.

ANCHOR, appliance attached to a vessel by a cable and fixed to the bottom of the sea, river, or lake, thus holding the vessel in a particular place. Originally, and now in various localities, heavy weights such as stones were used. But since the use of iron became universal the popular form of a., with two branching arms ending in flukes for hooking fast, has persisted. They usually have a transverse stock to prevent the a. from becoming useless through dragging without fouling. Heavy patent stockless a's of steel, in which the arms are pivoted and the flukes are side by side, are now much used on large

vessels, *e.g.* men-of-war. Other kinds are the grapne for small boats, the screw a. and mushroom a. fo permanent moorings.

ANCHOR ICE is that formed in a river-bed whil the upper water continues to flow.

ANCHORITE, see HERMIT.

ANCHORITE ISLAND, one of chief islands o Bismarck Archipelago.

ANCHOVY (*Engraulidæ*), family of herring-like fishes attaining a maximum length of 8 in., caught ir the Mediterranean, off the Dutch coast, and in N America, and pickled for consumption.

ANCIEN RÉGIME (ancient rule), Fr. government before Revolution, 1789.

ANCIENT DEMESNE, land retained by crown in its own hands at time of Domesday Book; when subsequently alienated, grantee enjoyed special rights.

ANCIENT HISTORY, period commencing with earliest knowledge of existence of man, and ending, by hist. convention, with temporary fall of civilisation when Western Rom. empire came to an end, 476 A.D. The preceding period is PREHISTORIC, a term which has altered in meaning of late years; the ages before beginning of definite records used to be considered the field of archæology as opposed to pure history; now, however, that history has been established as a science, archæological evidence is essentially history. Ethnologists divide history into eolithic, palæolithic, neolithic, bronze, and iron ages, that is, into Stone and Metal Ages, discovery of metals forming great epoch in civilisation. Australian aborigines, Amer. Indians, etc., are still in Stone Ages, but central stream of human events has left them behind as period of history. The date of appearance of Eolithic ('earliest stone-work') man has been questioned; he possibly existed in geological Tertiary Period, but the 'eolithic' remains discovered in Kent and at Baalbek may belong to Quaternary Period, and it is still doubtful whether those supposed implements are not merely natural products.

Palæolithic Period falls in Second Ice Age, when mammoth, rhinoceros, reindeer, etc., roamed in northern and central Europe, human race definitely appeared and cave drawings, evidence of rudimentary art, were made. The Neolithic Age, marked by similar climate, fauna, and flora to that of later times, closed, 4000–2000 B.C. (the first bronze objects known date from *c.* 3000).

In the ordinary curriculum A. H. comprises the history of Egypt, Assyria, Babylonia, Persia, China, Greece, Macedonia, and Rome.

ANCIENT LIGHTS, legal phrase referring to the right to unobstructed light. It is determined, in general way, under Prescription Act (1832), that a building having had use of a glass-light for full period of 20 years, the right thereto shall be deemed absolute.

ANCILIA, twelve sacred shields borne in procession by the Romans; one was said to have been sent from heaven.

ANCILLON, CHARLES (1659–1715), Fr. lawyer and historian; left France after vainly endeavouring to secure repeal of Edict of Nantes and became trusted minister of elector of Brandenburg, who app. him historiographer, 1699.

ANCILLON, JOHANN PETER FRIEDRICH (1766–1837), Prussian statesman and writer; grandson of Charles A. (*q.v.*); tutored and exercised great influence on Frederick William IV.; wrote on political philosophy.

ANCON, in anat. the elbow; in arch. projecting brackets to support a cornice.

ANCÓN (11° 30′ S., 77° 5′ W.), bathing resort, Peru. Pop. 3000.

ANCONA (43° 37′ N., 13° 30′ E.), Adriatic seaport, capital of province of ANCONA, Italy; Rom. Arch of Triumph and mole; Romanesque cathedral, fine Gothic churches; good harbour; exports calcium carbide, silk, eggs; iron, soap, and sugar works. Pop. (1911) 63,000; province, 319,000.

ANCRE, BARON DE LUSSIGNY, MARSHAL D' (d. 1617), Ital. adventurer; went to France and rose to be marshal and minister of state; notorious for his profligacy; assassinated at instance of Louis XIII.

ANCREN RIWLE, work in Middle English, written probably about 1150–1200, containing spiritual and practical directions for monastic life.

ANCRUM (55° 31′ N., 2° 35′ W.), village, Roxburghshire; English defeated by Scots at A. Moor, 1545.

ANCUS MARCIUS (*c.* 640–616 B.C.), 4th king of Rome, grandson of Numa; extended the city, and founded Ostia.

ANCYLOPODA, sub-order of extinct (Miocene and Pliocene) ungulate mammals with limbs resembling those of edentates. *Chalicotherium* is a typical species.

ANCYRA (39° 55′ N., 33° E.), old city, Galatia, Asia Minor; occupied by Romans, 189 B.C.; marble temple, Augusteum, engraved with famous inscription recording life of Augustus, known as *Monumentum Ancyranum*; modern ANGORA (*q.v.*).

ANDAGOYA, PASCUAL DE (1495–1548), Span. geographer and administrator; gov. of New Castile; founded Buenaventura; travels trans. and pub. by Hakluyt Soc.

ANDALUSIA (37° 30′ N., 4° 30′ W.), old province, Spain; watered by Guadalquivir; mountainous in N. and S.; highest peaks, Mulkacen and Peleta; sherry, silk, fruit, copper, lead; chief towns, Seville, Malaga, Granada, Cadiz; successively invaded by Carthaginians, Romans, Vandals, Goths, Moors. Pop. 3,563,606.

ANDALUSIAN SCHOOL, Span. school of painting established at Seville during XVI. cent., with which Murillo was subsequently identified.

ANDALUSITE (Al_2SiO_5), hard, transparent, or greyish mineral crystallising in square prisms and occurring in altered clay or crystalline schists. A variation, *chiastolite* or cross-stone, is used as an amulet, a transverse section showing a black cross on a greyish ground.

ANDAMAN ISLANDS (12° 26′ N., 92° 22′ E.), two groups, Great A. and little A., Bay of Bengal; number some 200; largest: North, Middle, and South A.; area, 2508 sq. miles. Surface is hilly; highest peak, Saddle Peak, North A. (2400 ft.); no rivers; many bays have beautiful coral beds; coasts indented; principal harbours, Port Blair, Elphinstone Harbour, Stewart Sound, Port Cornwallis, Port Anson, Port Campbell. Islands form part of submerged mountain system; oldest rocks are tertiary and cretaceous. Climate is tropical; products, tea, coffee, timber, sugar, nuts, aloes, etc.; fauna includes turtles, bats, wild-cats, pigs. Natives (*c.* 2000) are Negroid savages of small stature; there are twelve tribes, each divided into septs. Bengal government established penal colony on islands, 1789–96. Ind. government has had convict settlement at Port Blair since 1858; convict pop. (1911) 12,000. A. is mentioned in Arab documents of IX. cent.; various early travellers, from Marco Polo onwards, describe the islanders' cannibalistic propensities.

Portman, *Records of Andamanese* (1893–98).

ANDANTE, musical term for a moderately slow movement, somewhat quicker than *larghetto*, somewhat slower than *andantino*.

ANDELYS, LES (49° 14′ N., 1° 24′ E.), town, Eure, France; composed of Great and Little A., former noted for interesting XIII.-cent. church, latter for vicinity to old Château Gaillard on Seine, built by Richard I. of England and important in mediæval warfare. Pop. 3925.

ANDENNE (50° 28′ N., 5° 7′ E.), town, Namur, Belgium; porcelain. Pop. 8000.

ANDERIDA (50° 47′ N., 0° 20′ E.), old Rom. fort, Pevensey, England.

ANDERLECHT (50° 50′ N., 4° 18′ E.), suburb, Brussels, Belgium; mills. Pop. (1910) 65,000.

ANDERMATT (46° 38′ N., 8° 34′ E.), small village, Switzerland; tourist resort.

ANDERNACH (50° 27′ N., 7° 23′ E.), town, Prussia. Pop. 7889.

ANDERSEN, HANS CHRISTIAN (1805–75), Dan. poet and writer of fairy tales; b. Odense; s. of a poor shoemaker. At the age of fourteen he went to seek his fortune in Copenhagen. He was ugly in appearance, clumsy in manners, and, with little education, he naturally failed in his search for employment, first in the theatres, and later as an operatic singer. After severe struggles he eventually made friends who were able to help him, amongst others being King Frederick VI. Throughout his life he was ambitious to make a reputation as a novelist and dramatist, which hope he never realised. The first series of the famous *Fairy Tales* appeared in 1835, and though he despised their success, he continued to publish instalments of them during the remainder of his life. The subjects of his tales were chiefly suggested by his own experiences, and the *Ugly Duckling* story is said to have been largely autobiographical. A. also wrote travel books and an interesting Autobiography.

ANDERSON (40° 5′ N., 85° 40′ W.), town, Indiana, U.S.A. Pop. (1910) 22,476.

ANDERSON, ADAM (1692–1765), Scot. economist; clerk in South Sea House; pub. *Historical and Chronological Deduction of the Origin of Commerce* (1762).

ANDERSON, ALEXANDER, 'Surfaceman' (1845–1909), Scot minor poet; railway surfaceman; librarian, Edinburgh Univ., 1905–9.

ANDERSON, SIR EDMUND (1530-1605), Eng. jurist; Lord Chief Justice of the Common Pleas; noted for severity to Catholics and Nonconformists; took part in trials of Edmund Campion, Sir W. Raleigh, and Mary Queen of Scots.

ANDERSON, MRS. ELIZABETH GARRETT (1836–), Eng. physician; pioneer of the movement for the admission of women to the medical profession; developed the New Hospital for Women (London) and its medical school; elected Mayoress of Aldeburgh (1908)—the first woman to hold such office in England.

ANDERSON, SIR GEORGE WILLIAM (1791–1857), Eng. colonial administrator; gov. of Mauritius (1849) and subsequently of Ceylon; noted for administrative reforms.

ANDERSON, JAMES (1739–1808), Scot. agriculturist; invented the 'Scot. plough'; pub. *Inquiry into the Nature of the Corn Laws* (1777).

ANDERSON, JAMES (1662–1728), Scot. author; Postmaster-General for Scotland (1715); wrote several books on Scot. history.

ANDERSON, JOHN (1726–96), Scot. natural philosopher; prof. of Oriental Languages (1756), of Natural Philosophy (1760) at Glasgow Univ.; he furthered the application of science to industry, and bequeathed his property for the foundation of Anderson's College, which developed into the Glasgow and West of Scotland Technical College.

ANDERSON, JOHN (1805–55), Scot. missionary, Madras, India.

ANDERSON, JOSEPH, LL.D. (1832–), Scot. antiquary; keeper of Nat. Museum of Antiq., Edinburgh; has edit. *Orkneyinga Saga*, Drummond's *Ancient Scottish Weapons*, etc.

ANDERSON, LAURENT (1480-1552), Swed. chancellor and reformer; noted for religious reform.

ANDERSON, MARY (1859–), Amer. actress of great beauty and fine voice; won great popularity in England and America in Shakespearean parts; retired, 1889; m. Antonio de Navarro.

ANDERSON, RICHARD HENRY (1821–79), Amer. general; when Civil War broke out joined Confederate forces, serving under Lee and Longstreet.

ANDERSON, ROBERT (1750–1830), Scot. author and editor; M.D. of St. Andrews; edit. *Works of the British Poets*, with biographical and critical notices (14 vols., 1792–1807), also works of Smollett, Blair, and other writers, and was the author of a *Life of Samuel Johnson*; LL.D., 1815.

ANDERSON, SIR ROBERT, K.C.B. (1841–), Eng. lawyer and author; was instrumental in bringing about the Parnell Commission; head of Criminal Investigation Dept. (1888-1901); has pub. *Criminals and Crime, Sidelights on the Home Rule Movement*, and numerous religious works.

ANDERSON, WILLIAM (1842–1900), Eng. surgeon and art collector; prof. of Surgery at Tokyo; pub. *The Pictorial Arts of Japan* and *Japanese Wood Engraving*.

ANDERSSEN, ADOLF (1818–79), Ger. chess-player; was prize-winner in several international tournaments; author of handbooks on chess.

ANDERSSON, KARL JOHAN (1827-67), Swed. traveller; explored the Kunene River and other parts of Africa; pub. *The Okavango River* and other travel books.

ANDES, LOS.—(1) (32° 58′ S., 70° 30′ W.) town of Chile, prov. of Aconcagua, S. America. Pop. 4500. (2) (*c.* 25° S., 67° 30′ W.) province of Argentina assigned to her on division of Puna de Atacama, 1899; area, 21,989 sq. m. Pop. *c.* 2317. (3) (*c.* 7° 40′ N., 72° W.) State of Venezuela; silver mines.

ANDES MOUNTAINS, range extending along Pacific coast, through Peru and Chile, S. America; over 4500 miles in length, between 40 and 400 in breadth; average height, 11,000 ft.; highest peak, Aconcagua (22,860 ft.), ascended by R. Rankin in 1902; gold, silver, precious stones, etc.; home of potato; district of dangerous volcanoes; range crossed by railway completed 1910 by line from Los Andes to top of Cordillera, which meets line from Mendoza.

Fitzgerald, *Highest Andes* (1899).

ANDESINE, mineral, a triclinic plagioclase felspar intermediate between albite and anorthite, occurring in igneous rocks of S. America.

ANDESITE, group of volcanic rocks, first investigated in the Andes, of porphyritic structure, usually lark brownish grey or green in colour; of varying constitution, they essentially consist of plagioclase felspars, biotite, augite, and hornblende. They occur not only in America, but in Japan, Philippines, East Indies, New Zealand, and Brit. Isles (Ochils, Cheviots, and part of Lake District).

ANDIJAN, ANDIZHAN (41° 35′ N., 71° 55′ E.), town, Russ. Turkestan. Pop. 75,000.

ANDKHUI (36° 58′ N., 65° 28′ E.), town, Afghanistan. Pop. *c.* 15,000.

ANDOCIDES (b. 440 B.C.), Attic orator; spoke in defence of Eleusinian mysteries, etc.; several speeches still extant.

ANDORRA (42° 32′ N., 1° 30′ E.), republic, Franco-Span. border; under suzerainty of France, and Span. Bp. of Urgel; Council of 24; area, *c.* 175 sq. miles; A. obtained autonomy, IX. cent.; suzerainty belonged successively to counts of Urgel, Castello, Foin; subsequently to Bourbon family. A. produces cereals, fruit, vegetables; hot springs; capital, ANDORRA. Pop. 6000.

ANDOVER (51° 12′ N., 1° 28′ W.), town, Hampshire; agricultural centre; Rom. remains. Pop. (1911) 7596.

ANDOVER (42° 39′ N., 71° 9′ W.), township, Massachusetts; educational centre. Pop. 6632.

ANDRADA, DIEGO DE PAIVA DE (1528–75), Portug. theologian.

ANDRADA E SYLVA, BONIFACIO JOZÉ D' (1765–1838), Brazilian politician; prof. of Geol. at Coimbra (1800); later Minister of Interior and Foreign Affairs.

ANDRAL, GABRIEL (1797–1876), distinguished Fr. pathologist; prof. at Paris Univ.

ANDRÁSSY, JULIUS, COUNT (1823–90), Hungarian politician; persecuted in early life for his patriotism, he spent some years in Paris and London; returned from exile (1858); made premier (1867);

and thenceforward became dominant figure in Magyar politics.

ANDRÉ, JOHN (1751–80), Eng. soldier; served with distinction in American War of Independence; arrested at West Point and hanged as a spy by American colonists.

ANDRÉ, LOUIS JOSEPH NICOLAS (1838–), Fr. soldier and politician; served with distinction in Franco-Ger. War; Minister of War (1902).

ANDREA DEL SARTO, see SARTO.

ANDREA, JOHANN VALENTIN (1586–1654) Ger. author; in his prose and poetry he lashed the foibles of the day; also wrote hymns and allegorical poems.

ANDREA PISANO (1270–1345), Ital. sculptor and architect; noted for his breaking away from Byzantine influence and traditions.

ANDREÆ, LAURENTIUS (1480–1552), Swed reformer; chancellor of Gustavus I.

ANDREANI, ANDREA (d. 1623), Ital. wood engraver. Works scarce and much sought after.

ANDREE, KARL (1808–75), and s., RICHARD A (1835–), Ger. geographers.

ANDRÉE, SALOMON AUGUST (1854–97 ?), Swed. engineer; started with two companions in a balloon from Spitsbergen, July 1897, in an ill-fated attempt to reach the North Pole.

ANDREINI, FRANCESCO (later XVI. cent.), Ital. actor of great celebrity; wife and s. also famous players.

ANDREINI, GIOVANNI BATTISTA (1578 1650), Ital poet; his *Adamo* (1613) is believed to have influenced Milton's *Paradise Lost.*

ANDREOSSY, ANTOINE-FRANÇOIS, COUNT (1761–1828), Fr. general; served under Napoleon later raised to dignity of count and made inspector general of artillery.

ANDREW, APOSTLE, bro. of Peter; first of Christ's disciples; crucified, according to tradition, at Patræ in Achæa on X-shaped cross (St. A.'s cross); patron saint of Scotland and first evangeliser of Russia; St. A.'s 'day,' Nov. 30

ANDREW I. (fl. 1046–58), king of Hungary; dethroned and murdered for his efforts to introduce Christianity.

ANDREW II. (1175–1235), king of Hungary; pious but reckless, and spendthrift; f. of St. Elizabeth of Hungary.

ANDREW III. (1290–1301), king of Hungary, conducted successful campaigns against the pope and Charles Martel.

ANDREW, JOHN ALBION (1818–67), Amer. politician; gov. of Massachusetts during Civil War, and took prominent part in politics of period.

ANDREW OF LONGJUMEAU (*c.* 1248), French Dominican explorer; sent by Louis IX. on mission to Mongols; travelled in Syria and Persia; his report to Louis tells of the Mongols' conflicts with Prester John (*q.v.*).

ANDREWES, LANCELOT (1555–1626), Eng. theologian. Master of Pembroke Hall, Cambridge, 1589; dean of Westminster, 1601; bp. of Chichester, 1605, of Ely, 1609; a scholarly man and fine preacher; wrote *Manual of Private Devotions*; of ascetic habits and deep piety; regarded by many as typical Anglican theologian.

ANDREWS, JAMES PETTIT (1737–97), Eng. historian; wrote *Savages of Europe* (1764); also *History of G. Britain* (*Henry VIII. to Jas. VI. of S.*), and other works.

ANDREWS, THOMAS (1813–85), Irish chemist, vice-pres. and prof. of Chem., Queen's College, Belfast, 1845–79; known for his researches on the development of heat in chemical actions, and on the liquefaction of gases.

ANDRIA (41° 11′ N., 16° 17′ E.), town, Italy. Pop. (1911) 49,967.

ANDRIEUX, FRANÇOIS (1759–1833), Fr. poet and fable and story writer; wrote *Meunier Sans Souci.*

ANDRISCUS (149–148 B.C.), obscure pretender who seized throne of Macedonia.

ANDROCLUS, Rom. slave, in age of Tiberius, who removed a thorn from a lion's foot and was afterwards spared by the same beast in the arena.

ANDROGYNOUS (Gk. *androgynos,* from *andros,* man, *gyne,* woman), having character of both sexes; applied to hermaphrodites of both animals and plants.

ANDROMACHE (classical myth.), wife of Hector of Troy, and mother of Astyanax. Her parting with Hector, who was going into the battle in which he perished, is regarded as the most pathetic passage in Homer's *Iliad.* In the sack of Troy her son was slain before her eyes, and she herself became the spoil of Neoptolemus.

ANDROMEDA (classical myth.), dau. of Cepheus, king of Ethiopia, and his wife Cassiopeia. The latter, having boasted that her beauty surpassed that of the Nereids, Poseidon sent a sea-monster which devastated the country. It was demanded that A. should be sacrificed to appease the deity. She was exposed naked upon a rock by the seashore, but was saved from her horrible fate by Perseus, whose wife she became; after her death turned into a star. Her story has formed the subject of plays by Sophocles, Euripides, and Corneille.

ANDROMEDE, one of a system of meteors which seem to radiate from a point in constellation Andromeda, and are possibly fragments of Biela's comet.

ANDRONICUS I., COMNENUS (*c.* 1110–85), Byzantine emperor; app. to command in Cilicia (1152); imprisoned for participation in conspiracy against Emperor Manuel (1153); escaped, 1165; subsequently became sole emperor (1183); assassinated. A. was a remarkably talented, but licentious man, a great general, and able politician.

ANDRONICUS II., PALÆOLOGUS (1260–1332), Byzantine emperor; in his time empire was devastated by Turks.

ANDRONICUS III., PALÆOLOGUS (1328–41), Byzantine emperor; dethroned preceding and fought unsuccessfully against Turks.

ANDRONICUS IV. (d. 1385), Byzantine emperor; dethroned his f. and ruled (1377–79), but the latter subsequently recovered his kingdom.

ANDRONICUS, LIVIUS, see LIVIUS ANDRONICUS.

ANDRONICUS OF CYRRHUS (fl. *c.* 100 B.C.), Gk. astronomer; built at Athens an octagonal 'tower of the winds' surmounted by an ornamental vane, the prototype of modern weathercocks.

ANDRONICUS OF RHODES (*c.* 58 B.C.), peripatetic philosopher who lived at Rome. All his own writings have perished, but he is noteworthy for having made known the works of Aristotle to the Romans.

ANDROPHAGI, Scythian cannibals referred to by Herodotus.

ANDROPOGON, family of coarse perennial grass.

ANDROS (37° 55′ N., 24° 54′ E.), Gk. island, Cyclades (*q.v.*). Pop. 18,000.

ANDROS ISLAND (24° 40′ N., 78° W.), Bahamas, West Indies. Pop. (1911) 7545.

ANDROS, SIR EDMUND (1637–1714), Eng. colonial official; gov. of New England, Virginia, Guernsey.

ANDROSCOGGIN (44° 28′ N., 70° 30′ W.), river, Maine, U.S.A.

ANDROTION, Gk. orator, contemporary of Demosthenes.

ANDROUET DU CERCEAU (1515–84), Fr. architect; designed the Pont Neuf, Paris.

ANDÚJAR (38° 4′ N., 4° 3′ W.), town, on Guadalquivir, Spain. Pop. 16,302.

ANEGADA ISLAND (18° 46′ N., 64° 20′ W.), one of Virgin Is., West Indies (Leeward group).

ANEL, DOMINIQUE (1679–1730), Fr. surgeon; celebrated for treatment of *fistula lacrymalis.*

ANEMOMETER, wind gauge, instrument for measuring the velocity and pressure of the wind. Robinson's is the best known, though not the most

reliable, a., and consists of four hemispherical cups placed on the end of the arms of a right-angled cross, revolving on a vertical axis connected with recording apparatus. In Lind's or tube a. the wind enters a tube in connection with a vane and the pressure is made to support a column of water. Wind pressure is also measured by letting it act on a square or circular plate with a spring behind. A's are used in mines, gas-wells, etc., as well as in meteorology.

ANEMOPHILY, see POLLINATION.

ANERIO, FELICE (XVI. cent.), Ital. composer; succ. Palestrina as papal composer in 1594. His bro., **Giovanni Francesco A.,** also achieved some fame as a composer.

ANEROID, see BAROMETER.

ANET (48° 50′ N., 1° 25′ E.), town, France; fine XVI.-cent. château.

ANEURIN (VII. cent.), Welsh bard; author of an epic, *Gododin*; Eng. trans. in Skene's *Four Ancient Books of Wales* (1866).

ANEURISM, a cavity communicating with the interior of an artery, containing blood, usually formed by the dilated or pouched wall of the artery.

ANFRACTUOSITIES, tortuous channels formed by erosion (geol.); the sulci of the brain (anat.).

ANGAMOS POINT (23° S., 70° 30′ W.), W. coast, Chile.

ANGARA (56° N., 112° E.), river (1200 miles), Siberia.

ANGAREP, African bedstead, consisting of hide stretched across wooden frame.

ANGARIA, name given to a state courier amongst the ancients; in modern law, the seizure of a vessel for public service; the destruction of neutral property by belligerents.

ANGEL (Gk. *angelos*, messenger), term generally used for spiritual beings intermediate between God and man. In Old Testament religion before monotheism became definite, Hebrew 'Elohim' (God) is used of beings inferior to Jahweh. The '*Malakh Jahweh*,' 'messenger of the Lord,' is spoken of, but no other mention of a's. Possibly earlier references have been modified by later monotheism. After the Exile Jewish religion was influenced by Zoroastrianism, particularly in angelology and demonology; hence we find a's in *Ezekiel*. A's appear in New Testament. In St. Paul's view a's were created through Christ (*Colossians* 1^{16}). Later Christian thought as regards a's has been much influenced by Pseudo-Dionysius.

ANGEL, Eng. gold coin bearing figure of archangel Michael slaying dragon on the obverse. It was in circulation c. 1465–1634, and was valued at different periods at from 6s. 8d. to 10s.

ANGEL FISH, MONK-FISH, MONGREL SKATE, SHARK-RAY (*Rhina squatina*), a Selachian (*q.v.*) intermediate between the sharks and rays, with flat body and pectoral fins which project in front, suggesting the top of an angel's wings; length, c. 5 ft.; found in tropical and temperate seas.

ANGELA OF FOLIGNO (1248–1309), an Italian mystic; beatified.

ANGELES, LOS, see LOS ANGELES.

ANGELET, Eng. gold coin worth half an angel.

ANGELICA, genus of Umbelliferous plants; *A. sylvestris* and *A. archangelica*, Brit.; sometimes used in confectionery; formerly considered medicinal. The a. tree of N. America is *Aralia spinosa*.

ANGELICO, FRA (1387–1455), Ital. religious artist; his real Christian name was Guido, Giovanni his religious and assumed name; became a Dominican, 1408; said to have refused archbishopric of Florence; painted in Florence, especially at convent of S. Marco, frescoes which still survive, and in the Vatican at Rome, and elsewhere; a man of very saintly life. His paintings are spiritual and beautiful, but not robust enough for some tastes.

Mason, *Fra Angelico*.

ANGELL, GEORGE THORNDIKE (1823–1909), Amer. philanthropist.

ANGELN (54° 35′ N., 9° 45′ E.), district, Schleswig-Holstein; original seat of the English (Angles).

ANGELO, MICHAEL, see MICHELANGELO.

ANGELUS, SILESIUS (1624–77), Ger. hymnologist.

ANGELUS, THE, R.C. devotion; at 6 a.m., noon, and 6 p.m. church bells are rung (3 strokes three times, and once 9 strokes), during which antiphons and prayers commemorative of the birth of Christ are said.

ANGERMANLAND (64° N., 17° 30′ E.), part of W. Norrland, Sweden; formerly a province.

ANGERMÜNDE (53° 2′ N., 14° 1′ E.), town, Prussia. Pop. 7600.

ANGERONA (classical myth.), the female patron deity of Rome; her festival (Angeronalia) was celebrated Dec. 21.

ANGERS (47° 27′ N., 0° 34′ W.), town, France, on Maine; ancient capital of Anjou; fine cathedral; old castle; Catholic Univ.; Episcopal see; birthplace of sculptor David; wine, woollens, cottons, corn, slate. Pop. (1911) 83,800.

ANGERSTEIN, JOHN (1735–1822), celebrated art patron, whose collection of pictures, secured by Brit. Government, served as the nucleus of the National Gallery.

ANGEVIN LINE, Eng. kings from Henry II. to Richard III., of the families of York, Lancaster, and Plantagenet. The name is derived from Henry II., who was s. of Geoffrey, Count of Anjou.

ANGHIARA (43° 30′ N., 12° 5′ E.), small town, Tuscany, Italy.

ANGHIERA, PIETRO D' (1455–1526), Ital. historian and statesman.

ANGILBERT (d. 814), Frankish poet; Charlemagne's valued servant and constant companion; wrote a number of Latin poems dealing with contemporary events.

ANGINA PECTORIS, sudden paroxysms of pain in the region of the heart, due to disease of the heart, aorta, or coronary arteries; amyl nitrite almost invariably gives relief.

ANGIOLIERI, CECCO (*c.* 1260–1315), Ital. lyric poet; wrote bacchanalian and amorous poems, remarkable for their humour.

ANGIOSPERMS, the most highly specialised plants, having the seed in a closed ovary in contradistinction to gymnosperms (*q.v.*). The class includes the majority of flowering plants, and is divided into Monocotyledons (*q.v.*), and Dicotyledons (*q.v.*). See PLANTS.

J. Coulter and C. J. Chamberlain, *Morphology of Angiosperms* (Chicago, 1903).

ANGKOR (13° 27′ N., 103° 50′ E.), ruins, Cambodia, Siam, including remarkable temple.

ANGLE, commonly the space between two intersecting straight lines. *Right* a. (90°), when lines form four equal angles; *acute* a., smaller; *obtuse* a., larger than right a. (plane geom.); space contained between planes intersecting in one point (solid geom.); *curvilinear* a., between two curves; and *mixed* a., between curve and straight line, are determined by a. between tangents at point of intersection. See TRIGONOMETRY.

ANGLER (*Lophius piscatorius*), flattened Teleostean fish of European coasts, preying on small fish and fry. Protective colouring and fringed appendages conceal it effectively among sand and seaweed; a long filament with plate at tip, a modified spine of anterior dorsal fin, lures prey within reach of its large jaws.

ANGLES, see TEUTONIC PEOPLES.

ANGLESEY, ANGLESEA (53° 17′ N., 4° 20′ W.), county, N.W. Wales; separated from mainland by Menai Strait; surface comparatively flat; lead, copper, zinc; Holyhead, port for Irish service; possessed in turn by Druids, Romans, Irish, Danes, English; area, c. 276 sq. miles. Pop. (1911) 50,943.

ANGLESEY (37° 16′ S., 145° 40′ E.), county, Victoria, Australia.

ANGLESEY, ARTHUR ANNESLEY, 1ST EARL (1614–86), actively promoted the Restoration; cr. Baron Annesley and Earl of A. in peerage of Gt. Britain (1661); Lord Privy Seal (1673–82); a sane, courageous, and able statesman.

ANGLESEY, HENRY WILLIAM PAGET, 1ST MARQUESS (1768–1854), a s. of Earl of Uxbridge; he led the British cavalry at the battle of Waterloo, and contributed much to the victory; succ. his f. in 1812 as Earl of Uxbridge, and his new title was the reward of his services at Waterloo; Field-Marshal, 1846. As Lord-Lieutenant of Ireland (twice) he gained the affections of the Irish.

ANGLESITE ($PbSO_4$), mineral, multiform orthorhombic crystals, originated through oxidation of galena; first discovered in Anglesey.

ANGLEUR (50° 42′ N., 5° 35′ E.), town, on Ourthe canal, Belgium; zinc.

ANGLIA, EAST (Norfolk and Suffolk), territory, settled in 551 by Angles.

ANGLING, the art of catching fish by means of a line and baited hook, is a pursuit of great antiquity, being mentioned in the *Book of Isaiah* and in the *Odyssey* of Homer, while prehistoric fish-hooks of different materials have been found in many widely separated parts of the earth. Its popularity as a sport has increased enormously during the last cent., and legislation now assists the preservation of fish by enforcing close times, while many rivers and lakes are systematically stocked. A. may be considered under the heads of fresh-water a. and sea a. Anglers divide Brit. fresh-water sporting fish into two classes, *salmonidæ*, salmon, trout, grayling, char; and *coarse fish*, pike, perch, ruffe, carp, tench, bream, barbel, roach, dace, rudd, chub, gudgeon, bleak, minnow, eel. In Scotland the salmon and trout in the streams, and trout, pike, and perch in the lakes, are the only sporting fish that abound, the eel not being considered under that category; and it is in the streams of the Midlands and S. of England that most of the others mentioned above are found. A. is a popular sport also in the Brit. Colonies (in some of which the trout has been acclimatised, while the salmon of N. America are well known), the United States, France, Germany, Austria, and northern Europe generally, and India, where anglers much esteem the mahseer.

Fresh-water a. may be divided into fly-fishing, spinning, and live-baiting, and bottom-fishing. *Fly-fishing* is considered the highest branch of angling, and is the chief manner of a. for *salmonidæ*; the 'wet-fly,' 'dry-fly,' or 'natural-fly' methods are employed, the first named being the most important. Salmon are usually fished for by the wet-fly method, and the casting and working of the line and fly must be carefully studied. Salmon flies vary in length from half an inch to over 3 inches, and are often of complex structure and wonderful colours. There are many theories regarding what the salmon mistakes them for and why he seizes them, for they resemble neither flies nor any other insects. Certain combinations of colour are more effective than others, and these differ in different streams. Trout-fishing requires even more skill and science than salmon-fishing, and while the wet-fly is still frequently used for trout, the dry-fly method, first practised in the clear chalk-streams of the S. of England, is now much advocated and adopted. The fly is cast on the surface of the water, in imitation of the natural insect, over a rising fish. The natural fly, of which the other two are developments, is hardly used now, except in Ireland.

In *spinning*, a small dead fish or an imitation in metal or gutta-percha is made to revolve on a swivel by pulling it through the water; and in *live-baiting*, a small living fish or frog is put on the hook, both methods attracting fish, *e.g.* salmon, trout, pike, perch, which prey on the smaller species.

Bottom-fishing, a. for fish feeding on the beds of streams, does not require much skill, a weighted line suspended by a float being used, the hook baited with worms or one or other of a great diversity of materials.

Sea a. requires stronger tackle than fresh-water a., and is classed in the same divisions as the latter. The fish angled for include bass, pollack, mullet, mackerel, cod, whiting, bream, and occasionally salmon and trout at the mouths of rivers. In America tarpon and tunny, often of enormous size, are sought by sea anglers.

Walton, *Compleat Angler*; Bickerdyke, *The Book of the All-Round Angler* (1900); Sir Edward Grey, *Fly-Fishing* (1907); Hodgson, *How to Fish* (1907).

ANGLOGÆA, term for N. America as far as Mexico.

ANGLOMANIA, term used in France, Germany, and U.S.A. to denote admiration and imitation of things English. Such a tendency was very marked in Germany during XVIII. cent. in regard to Eng. literature, and in France, just before the Revolution, in regard to Eng. free institutions. The same attitude applies at the present day in regard to all forms of outdoor sports.

ANGLO-NORMAN, term used to describe literature, etc., of Normans in England. See ENGLAND: *Literature, Language.*

ANGLOPHILE, to favour Eng. manner or policy; also the person who does so.

ANGLOPHOBE, person inclined to 'Anglophobia,' or the dread and dislike of England, sometimes displayed by continental nations. This regrettable attitude was very manifest during the last Boer War in France, Holland, and Germany.

ANGLO-SAXON, term loosely applied to Teutonic tribes who conquered Britain (V.–VI. cent.); also to their language and lit. as opposed to those of their kinsmen on Continent. Philologists and literary historians prefer term **Old English**. See ENGLAND: *History, Literature.*

ANGLO-SAXON CHRONICLES, name given to a series of six manuscripts, written at various times and in different places, of the first importance as authorities for early Eng. history. They are believed to have been commenced during the IX. cent., were reduced to something like chronological form during the reign of Alfred, and end about 1154. Some of the MSS. contain poems, including the narrative of the famous battle of *Brunanburh* (937).

Thorpe's *Anglo-Saxon Chronicles*, in the 'Rolls Series,' contains the six chronicles and a translation.

ANGLO-SAXON LAWS.—First A.S. code originated in Kent under Ethelbert, and probably resulted from introduction of Christianity. Wessex code, framed by Ine, *c.* 693, throws light on land tenure, money, wergild, etc. Alfred's Dooms add new enactments to Ine's, and give details of moots, besides marking changes of social conditions, land tenure, etc., probably caused by Danish invasions.

ANGMAGSALIK (65° 30′ N., 39° E.), meteorological and missionary station, E. coast, Greenland.

ANGOLA (13° S., 14° 40′ E.), Portug. West Africa; bounded N. and N.E. by Belgian Congo, E. by Barotseland, S. by German S.W. Africa, W. by Atlantic; area, 484,800 sq. miles. Surface consists of low-lying coastal districts separated from plateau of interior by mountain ranges. Chief rivers, Kwanza, Kunene, Katumbela. Interior has considerable amount of forest land. A. produces coffee, rubber, wax, sugar, palm oil, ivory, oxen, fish; minerals include gold, malachite, copper, iron, salt, petroleum; bulk of trade with Portugal; exports coffee, rubber, wax, hides, ivory, copal, gold dust, palm oil; imports textiles, foodstuffs, coal, etc. Principal ports are Loanda (capital), Benguella, Ambriz, Mossamedes, Lobito; railways running inland from Loanda and Benguella, mileage 510; new line from Lobito, to link up with Central African Railways, under construction, over 200 miles already completed. Climate varies; heat modified by trade

winds. Natives are of negroid stock. A. is ruled by ·. gen.; divided into six districts—Congo, Loanda, ıguella, Mossamedes, Huilla, Lunda. There are about 50 government schools, and various missions have been established. Portug. influence was established here in XVI. cent. Pop. *c.* 5000.

ANGONILAND (14° 30′ S., 34° E.), stretch of highlands, E. Central Africa; minerals.

ANGORA (39° 56′ N., 32° 41′ E.), vilayet, Anatolia, Asiatic Turkey; area, 27,370 sq. miles; goats and mohair; archbishopric; near by Tamerlane defeated Bayazid I., 1402. Pop. 932,800. The capital, **Angora**, is on site of ancient Ancyra (*q.v.*). Pop. *c.* 30,000.

ANGORA (39° 40′ N., 33° 40′ E.), province. Pop. *c.* 932,800.

ANGOSTURA (40° 32′ S., 63° 49′ W.), town and prov. of Argentina, South America.

ANGOSTURA or BOLIVAR (8° 8′ N., 63° 57′ W.), city, Venezuela, S. America.

ANGOULÊME (45° 39′ N., 0° 9′ E.), cathedral town, Charente, France; has assize court, theatre, hospitals, museums; manufactures paper, cognac, machinery. Pop. (1911) 38,200.

ANGOULÊME, CHARLES DE VALOIS, DUC D' (1573–1650), illegitimate s. of Fr. King Charles IX.; grand prior of order of Malta (1589); served in Fr. army; received duchy of A. as a legacy (1619).

ANGOULÊME, DUCHESSE D' (1778–1851), Fr. princess; dau. of Louis XVI. and Marie Antoinette; exercised great influence at court of Louis XVIII. and Charles X.

ANGOULÊME, LOUIS ANTOINE DE BOURBON, DUC D' (1775–1844), s. of Charles X. of France; after 1830 abandoned claim to throne; lived in exile.

ANGOUMOIS (45° 30′ N., 0° 3′ E.), old province, France; capital, ANGOULÊME.

ANGOXA, ANGOZA (16° 40′ S., 40° 5′ E.), coast town, Portug. E. Africa; ground-nuts, rice.

ANGRA, ANGRA DO HEROISMO (38° 38′ N., 27° 13′ W.), capital of Azores, on Terceira Is.; harbour. Pop. 10,788.

ANGRA PEQUENA (26° 37′ S., 14° 50′ E.), bay, Ger. S.W. Africa.

ANGRI (40° 44′ N., 14° 35′ W.), town, Salerno, S. Italy; cotton.

ANGSTRÖM, ANDERS JONAS (1814–74), Swed. physicist; authority on optics, pioneer in spectroscopy; Rumford medallist, Royal Society.

ANGUIER, MICHEL (1612–86), Fr. sculptor; executed a group of the Nativity in the Church of Val de Grâce, and numerous public decorations; his bro., **François A.**, was also celebrated as a sculptor.

ANGUILLA, SNAKE Is. (18° 17′ N., 63° 5′ W.), one of the Leeward Islands, Brit. W. Indies. Area, 35 sq. miles. Pop. 4000.

ANGUILLIDÆ, see EELS.

ANGUISCIOLA, SOFONISBA (1535–1625), Ital. artist; celebrated as portrait-painter both in Italy and Spain; her work exercised marked influence on Van Dyck; examples at Florence, Genoa, Vienna, and Berlin.

ANGUL (20° 40′ N., 85° E.), district, Bihar and Orissa, India; minerals.

ANGUS, ancient name of Forfarshire (*q.v.*), Scotland; breed of cattle.

ANGUS, EARLDOM OF, Scot. title; Celtic line of earls ended with Matilda (XIII. cent.); Norman line (1381); Stewart line with widow of 13th Earl of Mar; her illegitimate s. (fl. 1400), by 1st Earl Douglas, became (1389) 1st Earl of A. in a new line; the 6th earl (*c.* 1490–1557) m. widow of James IV. of Scotland; their dau. was mother of Lord Darnley; the 8th earl received earldom of Morton (1586), and the 11th earl (1589–1660) was made 1st Marquis of Douglas, whose eldest s. m. Ann, Duchess of Hamilton in her own right, whence the title is now held by Dukes of Hamilton.

ANHALT (51° 47′ N., 12° E.), duchy, central Germany; area, 888 sq. miles; eastern part flat and fertile, watered by Elbe and Saale, produces wheat, flax, rape, hops, tobacco; western part, towards Harz Mountains, has great mineral wealth—lignite, silver, lead, copper, hematite; sugar manufacture, brewing, distilling. Capital, Dessau. Duchy was formed in 1863 by combining duchies of A.-Dessau-Köthen and A.-Bernburg; became Imperial State, 1871. Government is limited monarchy; executive in hands of duke; legislative body, diet of thirty-six members. Pop. (1910) 331,000.

ANHALT-DESSAU, PRINCE OF, see LEOPOLD I.

ANHARMONIC RATIO of four points ABCD on a straight line is the ratio $\frac{AC}{AD} : \frac{BC}{BD}$. Also called cross-ratio.

AN-HUI, see NGAN-HUI.

ANHYDRIDE, an oxide which will combine chemically with water; term generally applied to acidic oxides; *e.g.* sulphur trioxide is sulphuric anhydride, because it combines with water, forming sulphuric acid.

ANHYDRITE ($CaSO_4$), calcium sulphate without water of crystallisation, mineral, orthorhombic crystals with three cleavage planes; occurs with gypsum in salt deposits.

ANHYDROUS (=without water), term used to describe the state of a chemical substance freed from water.

ANI (*c.* 40° 25′ N., 42° 50′ E.), ancient town, Armenia; ruins remain.

ANICET-BOURGEOIS, AUGUSTE (1806–71), Fr. author; wrote dramas and popular fairy stories.

ANICHE (50° 35′ N., 3° 12′ E.), town, Nord, France; coal-mines.

ANIE, PIC D' (42° 57′ N., 0° 45′ W.), sacred peak (8215 ft.), W. Pyrenees.

ANIELLIDÆ, family of snake-like lizards.

ANIENE, ANIO (42° N., 13° E.), river, Rome province, Italy.

ANILINE (Amidobenzene, Phenylamine), $C_6H_5NH_2$, colourless, malodorous, oily, poisonous liquid; M.P. −8°, B.P. 183°. Resinifies in air, forms salts with mineral acids; its compounds and by-products are of immense commercial value, used in dyeing industry and therapeutics. See DYEING, NITRO-COMPOUNDS.

ANIMAL HEAT, see HEAT.

ANIMAL MAGNETISM, see MESMERISM.

ANIMALCULE, microscopic form of animal life, such as protozoa (*q.v.*).

ANIMALS.—Living Matter.—It is not possible to say precisely what life is; but it is known that life is dependent on chemical and physical changes associated with a highly complex substance called protoplasm (*q.v.*). Whether the latter is regarded as being a ferment acting on other less complex substances without being changed itself, or as a labile state of interacting proteids undergoing a constructive and disruptive process (metabolism, *q.v.*), it is acknowledged that living matter undergoes a ceaseless building up (anabolism) and breaking down (katabolism), and is able to grow by the assimilation of material different from itself. Living matter is organised, *i.e.* it has a unified behaviour, showing activities such as the power of movement, of sensation, of nutrition (including respiration), of growth, and of reproduction. Organisms consist of one or more unit masses of living matter (cells, *q.v.*) in which there is either a relative preponderance of anabolic processes manifesting themselves in passivity or of katabolic processes appearing as activity.

Plants and Animals.—The former case is characteristic of plants and the latter of a's. But, though it is obvious that an oak is a plant and a monkey is an a., it is by no means so apparent that a sponge is an a. and the spherical volvox which gracefully rotates in fresh-water pools is a plant. No hard-and-fast line can be drawn between the simplest a's and the simplest plants. All life is one, and it is

only in types which are differentiated owing to division of labour of the component parts that the divergence of plants and a's becomes obvious. Athough there are some notable exceptions, a's differ essentially from plants in being active; in having a more clearly marked division of labour; in feeding only on substances already made by plants or other a's; in not possessing chlorophyll, with which the energy of sunlight is able to reduce carbonic acid gas; and in not possessing cell-walls consisting of cellulose.

Movement.—Apart from the unceasing intracellular, and, in the many-celled a's (Metazoa, *q.v.*), intercellular movement resulting from the chemical processes of metabolism, the power of movement from place to place for the purposes of finding suitable environment and food is effected owing to the contractility of living matter. In many one-celled a's (Protozoa, *q.v.*), *e.g.* the amœba (*q.v.*), outflowing processes of protoplasm serve for locomotion and engulfing food. In others, although in all Protozoa the single cell performs *all* the activities of life, definite contractile elements can be distinguished. In some Radiolaria (*q.v.*), the most beautiful of marine Protozoa, these contractile elements are attached to a siliceous skeleton, and serve to increase or decrease the bulk of the a., which can rise or sink in the sea according to conditions of temperature, pressure, etc. Other Protozoa (Infusoria, *q.v.*) are provided with delicate hair-like processes, cilia and flagella (*q.v.*), by means of which locomotion is effected and food particles are wafted towards the a. In another type of Protozoa, the parasitic gregarina (*q.v.*), fibrillar elements striped somewhat like a muscle show contractility, but locomotion is aided by the secretion of a thread of hardening 'jelly' which shoves the a. along. In Metazoa the sex-cells (gametes) move in the same way as their protozoan ancestors, either by amœboid processes or by means of a flagellum, the latter method being characteristic of the male sex-cells (microgametes or spermatozoa) of most a's. Amœboid cells also occur as white blood corpuscles. The young stages (larvæ) of many Metazoa (*e.g.* sponges, echinoderms), swim about actively by means of cilia, while the Ctenophora have comb-like combinations of cilia in the adult state. Ciliated cells occur in most Metazoa (except in insects). The actual movement of many-celled a's is effected by groups of cells which are differentiated from the others as muscular tissue. The muscles of a jelly-fish, of an earth-worm, of an insect, of an octopus, of the limbs and body of a vertebrate, or of the rhythmically contracting heart are examples of contractility of definite cells specialised through division of labour in the a. body. Generally, muscles are attached, both in vertebrates and other a's, to a skeleton which maintains the rigidity of the body, and when external, as in the sea-urchin, also serves for protection.

Skeleton.—The often exceedingly complex 'skeleton' of Foraminifera (*q.v.*) and Radiolaria illustrates the secretion of protective hard substances (calcium carbonate and silica respectively) by Protozoa. Both lime and silica occur as spicules in sponges, and the geological effects of lime formed by a's are demonstrated by the corals. The exoskeletons of echinoderma and the shells of mollusca are also familiar. In Arthropoda (*q.v.*) the exoskeleton consists of a substance called chitin (*q.v.*), while in the sedentary Ascidia (*q.v.*), the thick cuticle or tunic contains cellulose, a unique occurrence among a's. Possibly Balanoglossus (*q.v.*) and apparently Amphioxus (*q.v.*) show a rudiment of the skeleton system of vertebrates in possessing a dorsal axis or notochord. The latter persists in the simplest vertebrates (Cyclostomata, *q.v.*), but in the others is replaced by the backbone during embryonic life. The skull and associated small bones (mandible and hyoid), the backbone or vertebral column and ribs, and the limbs with the pectoral and pelvic girdle form the vertebrate skeleton. It is important to note that the bones as well as the various organs of different vertebrates are similar or homologous, both as regards development and structure. Thus the foreleg of a lizard, the wing of a bird, the flipper of a whale, and the human arm are *homologous*, but the wing of a bird and of an insect are structurally and developmentally different, though exercising the same function, and are termed *analogous*.

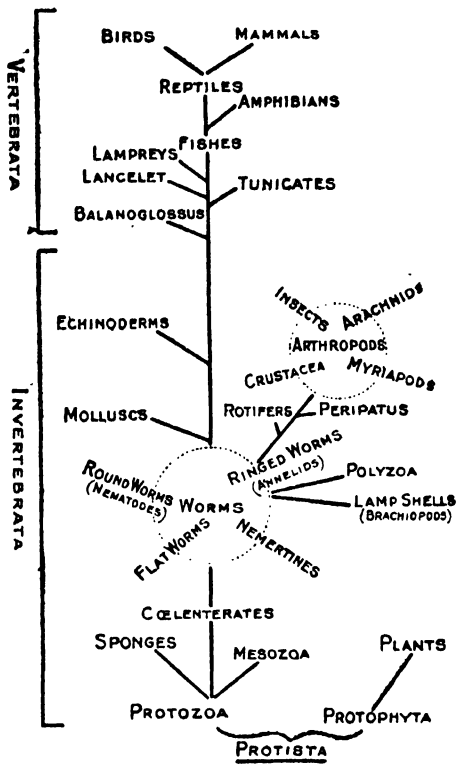
Sensation.—The Protozoa respond to stimuli, such as change of temperature, touch, chemical reagents, light, electricity—the amœba, for instance, shrinks from strong light and moves towards food. Sponges, though exceedingly passive, show antipathy to obnoxious substances. In jelly-fish there is a marked division of labour, special areas of cells (nervous epithelium) with 'ganglion' cells and associated with organs sensitive to change of equilibrium control the movements of the a. The sensitiveness of the tentacles of the sea anemone is a well-known phenomenon of the seashore. Except in degenerate parasitic forms, the power of sensation grows more complex according to the progress from simple to highly integrated animals. A nervous system is evolved associated with a definite motor centre or brain capable of receiving sensations of touch, light, sound, and chemical stimuli from the sense organs, of sending 'messages' to the muscular system, and of co-ordinating activities. The complexity of the brain of ants and bees baffles the microscopist, while the nervous system of the stickleback, which carefully constructs a nest to shelter its offspring, is equally wonderful. The courtship, parental activities, and the migration of birds are as yet not capable of interpretation in chemical and physical terms, and as the present knowledge of the anatomy and physiology of the human brain is scanty, there are many who find it necessary to postulate an energy apart from living matter to interpret the nervous activities of organisms, like Aristotle, Beethoven, or Darwin.

Nutrition.—The expenditure of energy in movement and growth is compensated by the ingestion of food. Some protozoa are able to utilise carbon dioxide, owing to the possession of chlorophyll, in the same manner as plants. The amœba engulfs and digests food such as algæ, and this power of intracellular digestion is shared by some of the cells in sponges and cœlentera. In an amœba and other protozoa the waste products are collected in one or more contractile vacuoles (*q.v.*), and ejected. In the majority of a's, however, the food is broken down into simpler compounds, and rendered soluble in an alimentary canal by the action of certain ferments before being absorbed by the body. Parasites, such as the tape-worm, have no alimentary system, as they absorb the digested food of their host through their body wall. From the tubular gut with digestive cells of a simple type of Cœlentera (*q.v.*), like Hydra, there is a growing complexity in the carrying out of the nutritive function according to the division of labour, and at the same time co-operation between the groups of cells concerned. Some kind of jaws for seizing and masticating or sucking food occur in all groups of the a. world, from the 'worms' onwards, and the alimentary canal from mouth to anus becomes more and more associated with various glands (salivary, gastric, pancreas, liver, etc.) and with a circulatory system conveying the products of digestion (*q.v.*) to their destination and the excretory system (nephridia, kidneys). In the vertebrates appears the most highly developed alimentary and circulatory system, which is closely associated with another function essential to a. metabolism, the absorption of oxygen or respiration. To begin again with the Protozoa, an a. like the amœba absorbs the oxygen dissolved in water, both of which are essential to a. life, on its entire surface. According to the medium in which they live, the breathing apparatus of the 'higher' a's consists of tracheæ (insects), gills (molluscs, crustacea, fishes, etc.), lungs (reptiles, birds, mammals), while amphibia (batrachia, *q.v.*), have both gills and lungs at different periods of their life-history.

Growth and Reproduction.—The metabolism of every a. permits of growth up to a certain limit, corresponding to a state of balance. As the bulk of an amœba, for instance, and its surface increase in the ratio of a cube to a square, the point will be reached when the surface becomes relatively too small to absorb sufficient food material. Division takes place, the two resulting cells closely resembling the original cell. Other Protozoa (*e.g. Pelomyxa*) form superficial buds which become liberated, while the Sporozoa (*q.v.*) divide repeatedly within a cyst, forming spores, often a complex process. It has been observed that after an Infusorian (*e.g. Stylonichia*) has undergone divisions resulting in more than two hundred generations, a marked debility sets in, and the power of nutrition and reproduction comes to a standstill. This 'senile decay,' however, does not occur when individuals of the same species but of a different stock are brought into contact. Two unrelated individuals conjugate, *i.e.* an interchange of vital material takes place between them, which has the effect of neutralising any variations disastrous to the preservation of the race. This illustrates the importance of sex even in one-celled a's. Many of the simpler Metazoa reproduce asexually by budding (Cœlentera) or fission (Turbellaria), but practically all classes develop two kinds of reproductive cells (gametes) either in the same individual (hermaphrodites) or in separate individuals, male and female, producing relatively inert macrogametes or ova and active microgametes or spermatozoa. A macrogamete and microgamete, in a process termed amphimixis, unite to form a cell (zygote), which is the beginning of a new individual. By successive divisions (segmentation) of the zygote an embryo is formed which develops into the adult, frequently in a circuitous manner, as in the 'holometabolic' insects (*e.g.* moths and butterflies). In some animals (*e.g.* crustacea and insects) the macrogamete may give rise to a new individual parthenogenetically, *i.e.* without fertilisation, the drones being a well-known example. Associated with the increasing complexity of structure in each a. group, there is a marked development of the mental functions associated with the care of the offspring (*e.g.* ants, bees, cephalopods, birds, mammals) and with the co-operation between individuals, finding its most complex expression in man and human society.

Classification.—To obtain a systematic survey of the a. world, it is necessary to group together a's of the same type structurally and developmentally. It would be obviously absurd to classify birds and insects together because they fly, or whales with fishes because they swim and there is some likeness between their tails. Some groups, like echinoderms, are well defined, while worms form a heterogeneous assembly with doubtful *homologies*. Another difficulty arises when the continuity of life is forgotten in the endeavour to provide each species with a suitable label. 'The imperfection of the geological record' makes it difficult to find 'missing links'; but there is sufficient evidence to show, for instance, that birds are descended from reptiles, that man and monkey sprang from some common stock, that Peripatus links the arthropods with the annelids, that the simplest Metazoa must have arisen from colonies of Protozoa. It is the aim of systematic zool. to discover a classification that will show the relationship between any species, living or fossil, and other species. The following outline of classification tentatively indicates the position of the more important groups, and it must be remembered that to devise a satisfactory model of the 'genealogical tree' it is necessary to make use of all three dimensions. For details of classification, see the articles on the respective classes, *e.g.* Crustacea, etc.

Distribution.—It is probable that the first fauna may have originated in the 'mud-line' along the coast, and that from there the a's spread and by natural selection became adapted to the sea and its abysses on one hand and on the other to fresh-water,



terrestrial, and aerial life. The geographical distribution depends on a multitude of factors, the most outstanding being the constitution of the a's and their adaptability to environment, migration, or dispersal from an original home and geological changes. Thus it is evident that the Australian fauna must have at one time traversed a land connection with the East Indies. The typical Arctic fauna is an example of adaptation to special environmental conditions. Most naturalists agree in dividing the surface of the earth into six zoological regions:—

Palæarctic: Europe (including Iceland and other N. Atlantic islands), Africa n. of the Atlas Mts., N. Asia, Japan; *Ethiopian*: Africa s. of the Atlas, Madagascar, and surrounding islands; *Oriental*: S. China, Philippines, India, and East Indies to Bali; *Australian*: Australasia, including New Guinea, Celebes, and Lombok; *Nearctic*: America n. of Mexico, Greenland; *Neotropical*: Mexico, Central and South America, and West Indies. See ZOOLOGY, CELL, PALÆOZOOLOGY, EVOLUTION, REPRODUCTION.

J. A. Thomson, *Outlines of Zoology*, 5th ed., 1911; *Cambridge Natural History*; R. Lyddeker, *Geographical Distribution of Mammals*; J. A. Thomson, *Heredity*.

Cult of Animals.—Animals have played an important part in many religions, though it is often very difficult to get at the ideas underlying their worship. Certain animals have been sacred in certain countries, *e.g.* cattle in Egypt and India, elephants in Siam. Many ancient deities seem originally to have been animal, *e.g.* Dagon, the fish-god among the Semites. One form of animal worship has been totemism (*q.v.*): the totem animal could only be killed on special occasions, and was then sometimes sacramentally eaten. Among primitive races gods, beasts, and men are not clearly distinguished, and this accounts for much that would otherwise be unintelligible.

Frazer, *The Golden Bough*; Tylor, *Primitive Culture*.

Cruelty to Animals.—Legislation on this subject has been largely due to the efforts of the Royal Society for the Prevention of Cruelty to Animals (1824), which resulted in the passing of a number of Acts for the protection of animals and birds, both domestic and wild, all offences rendering those concerned liable to prosecution and fines.

ANIMÉ, brown oleo-resin from *Hymenæa*, the locust tree of S. America, used in varnish-making and perfumery.

ANIMIN, chemical product of bone-oil distillation.

ANIMISM, the doctrine of souls and other spiritual beings. Through the medium of dreams, phantoms, and other agencies, primitive man is driven to believe in spiritual existence—that is, to refuse to identify life with matter in all cases. Thus attributing vaguely his own life to a spirit within himself, he proceeds by analogy to trace the changes and movements of the external world as being due to similar causes. He has not learned to differentiate conscious and unconscious existence, he cannot define personality, but he looks on all nature—rivers, mountains, winds, storms, rocks, stones, plants, and animals—as being the abode of spirits. The drama of nature around him, its successions of repose and strife, lead him to think of these spiritual beings as capable of assuming various forms—mineral, vegetable, animal; his instinct for a unity in nature makes such a continuity of life, a transmigration of soul, appear a likely process; and this stage of thought, in which soul or spirit is attributed to all natural objects, is called *Animism*.

E. B. Tylor, *Primitive Culture* (3rd ed., 1891).

ANIMUCCIA, GIOVANNI (1495-1571), Ital. musical composer; wrote *Laudi*, etc.

ANIO, see ANIENE.

ANION, see ELECTRICITY (ELECTROLYSIS).

ANISE (*Pimpinella Anisum*), umbelliferous plant of S. Europe and Levant; fruits (aniseed) used for preparation of oil of anise, used medicinally (as stomachic), and for confectionery and liqueurs.

ANJANGÃON (21° 10′ N., 77° 20′ E.), town, Ellichpur district, Berar, India.

ANJAR (23° 5′ N., 70° 1′ E.), town, Bombay, India. Pop. 18,000.

ANJEELA, Cingalese canoe-dwelling.

ANJER (6° 5′ S., 105° 40′ E.), town, W. coast, Java; fort.

ANJOU (47° 27′ N., 0° 25′ W.), former countship, France, now forms most of Maine-et-Loire and part of Mayenne, Sarthe, Indre-et-Loire; capital was Angers. In early times often ravaged by Normans; countship held by Fulk the Red in late IX. cent.; passed in 1060 to house of Gatinais, to which belonged Geoffrey IV. of A. (Plantagenet), who in 1128 m. Matilda, dau. of Henry I. of England; his s. became Henry II. of England, and A. remained an Eng. province until lost to France by King John, 1203; given in 1246 by Louis IX. to Charles, king of Naples and Sicily, coming by marriage to house of Valois; given by King John to s., Louis I. of Naples; belonged to kings of Naples till death of René, 1480; subsequently an appanage of Fr. crown.

ANKARSTRÖM, JOHN JACOB (1762-92), member of bodyguard of Swedish king, Gustavus III., whom he murdered, 1792.

ANKER (Dutch), liquid measure equal to ¼ aam, or approximately 10 wine gallons; used especially for spirits.

ANKERITE, $Ca(MgFeMn)(CO_3)_2$, yellowish reddish rhombohedral mineral, belonging to dolomite series, occurring in iron ore deposits of Styria and elsewhere.

ANKLAM (53° 52′ N., 13° 39′ E.), town, Prussia. Pop. 15,600.

ANKLE, the joint between the leg and the foot. See JOINTS.

ANKLESWAR (21° 30′ N., 73° E.), town, on Narbadá, Bombay, India; mills. Pop. 11,000.

ANKOBER, AKOBAR (9° 40′ N., 39° 40′ E.), town, S. Abyssinia.

ANKOLE (0° 10′ S., 31° E.), fertile district, Uganda, Brit. E. Africa; minerals.

ANKUS, Indian elephant-goad.

ANKYLOSIS, the diminution or total loss of the movements of a joint.

ANKYLOSTOMIASIS, a disease caused by a worm (*Ankylostoma duodenale*), ⅓-½ inch in length, which makes its habitat in the upper part of the human small intestine.

ANN, Scot. form; *Annat*, Eng. and Scot. form of *Annates*.

ANN ARBOR (42° 18′ N., 83° 47′ W.), town, Michigan, U.S.A.; seat of Michigan Univ. Pop. (1910) 14,817.

ANNA, Indian nickel coin, value 1d.

ANNA AMALIA (1739-1807), Duchess of Saxe-Weimar; patroness of Goethe and Schiller.

ANNA COMNENA (b. 1083), Gk. historian; dau. of Alexius I., Byzantine emperor, whose life she wrote.

ANNA IVANOVNA (1693-1740), Empress of Russia; niece and successor of Peter the Great (1730); allowed paramour, Biren, to tyrannise over empire.

ANNA LEOPOLDOVNA (1718-46), some time Regent of Russia, niece of Anna Ivanovna (*q.v.*).

ANNA PERENNA (classical myth.), a deity in whose honour the Romans instituted festivals. Being persecuted by Lavinia, wife of Æneas, she fled to the river Numicus, and bade the inhabitants of the country call her *Anna Perenna*, because she would remain for ever under the waters.

ANNABERG (50° 35′ N., 13° E.), town, Saxony. Pop. 16,800.

ANNABERGITE ($Ni_3(AsO_4)_2+8H_2O$), apple-green earthy mineral, sometimes crystallised, occurring as alteration product of nickel ores.

ANNABON (1° 30′ S., 5° 30′ E.), Span. island, Gulf of Guinea; area, 6¾ sq. miles. Pop. *c.* 3000.

ANNALS, chronological summary of events; term derived from *Annales Pontificum* or *Annales Maximi* of early Rome, compiled by Pontifex Maximus; annually recorded magistrates' names and noteworthy events; mediæval a's a development of 'Paschal' tables of early Western Church.

Compilers of a's on Roman history from Second Punic War to I. cent. B.C. were at times called ANNALISTS; among them were Fabius Pictor (II. cent. B.C.), Cincius Alimentus (both writing in Greek), and M. Porcius Cato (in Latin).

ANNAM, ANAM (11° to 21° N., 104° to 109° E.), Fr. protectorate, E. side of Indo-China, between Tonkin and Cochin-China; long narrow district; area, *c.* 52,100 sq. miles; surface mountainous except along coast, where are extensive rice-fields, giving employment to great majority of population, while sugar-cane is cultivated near Tourane. Besides rice and sugar-cane, principal products are maize and other cereals, cotton, tea, mulberries, rubber; minerals include coal, iron, gold, silver. Coast has several good harbours, notably Tourane Bay, Hon-Kohe, Nan-Khiet. Capital, Hué. Rainy season lasts from Sep. till Jan. Inhabitants are of Mongol race, professing Buddhist and Confucian religions. Pop. 5,600,000. Map, see SIAM.

ANNAN (54° 59′ N., 3° 15′ W.), burgh and port, Dumfriesshire. Pop. (1911) 4219.

ANNANDALE.—(1) (55° 10′ N., 3° 25′ W.) district of Dumfriesshire, Scotland. (2) W. suburb of Sydney, N.S.W.

ANNAPOLIS (38° 58′ N., 76° 29′ W.), capital, Maryland, named after Queen Anne; has Naval Academy, St. John's Coll., Observatory; principal industry, oyster-tinning. A. Convention met here, 1786, and summoned the Philadelphia Convention (*q.v.*) for the following year. Pop. (1910) 8609.

ANNAPOLIS (44° 45′ N., 65° 34′ W.), seaport, Nova Scotia.

ANNATES, or 'first-fruits'; first year's income of any benefice, formerly paid to Pope, in England and elsewhere, from XIII. cent.; in earlier times a tax paid to bp. who ordained; in England conferred on Crown 1534, in France abolished 1789.

ANNATTO, ARNOTTO, orange colouring matter prepared from the pulp surrounding the seeds of a tropical American tree (*Bixa orellana*), and used as a dye and for colouring cheese, butter, etc.

ANNE (1665–1714), Queen of Great Britain and Ireland; second dau. of James II. by Anne Hyde; m. Prince George of Denmark (1683); succ., 1702. Her accession marked a violent reflux of Tory feeling. A Tory ministry, headed by Godolphin, was established. Marlborough and his hectoring wife managed the Queen. Marlborough (now cr. Captain-General and Duke), a brilliant general, continued war begun by William III. Marlborough-Godolphin ministry lasted till 1710 (Sunderland, a violent Whig, was introduced 1706), and was distinguished by victories of Blenheim, Ramillies, Oudenarde, Malplaquet, capture of Gibraltar; expulsion of French from Flanders and Germany; and Union with Scotland. Between 1708–10 the Tory ministry became a Whig one. Its attitude to war and Church made it unpopular. Harley (dismissed 1708), kept Queen's confidence through backdoor influence of Abigail Masham, who supplanted the termagant Duchess of Marlborough in Anne's favour. Impeachment of Sacheverell (1710) was followed by fall of Whigs and formation of Harley Cabinet. The Duchess had to resign her key of office, and Marlborough was disgraced (1711). Harley (now Lord Treasurer and Earl of Oxford) concluded Peace of Utrecht (1713). Only one of A.'s many children survived infancy, and he d. at the age of eleven. The succession question divided the Tory party. Oxford was dismissed (July 1714) and Bolingbroke became Prime Minister. His plans for a Jacobite Restoration, however, were defeated by Anne's death and intervention of Whig lords; Elector of Hanover suc. as George I. (*q.v.*). Anne's reign witnessed a great spiritual revival and much political and intellectual activity. Dull, obstinate, but homely and good-natured, A. was deeply religious and 'entirely English' at heart.

Paul, *Queen Anne* (1907).

ANNE OF AUSTRIA (1610–66), dau. of Philip III. of Spain, wife of Louis XIII., and mother of Louis XIV.; regent on death of husband, with Cardinal Mazarin for minister; triumphed over Fronde (*q.v.*); retired to convent on death of Mazarin.

ANNE OF BOHEMIA (1366–94), dau. of Charles IV. of Germany; queen of Richard II. of England.

ANNE BOLEYN, see BOLEYN.

ANNE OF BRITTANY (1477–1514), wife of Charles VIII. of France, and afterwards of Louis XII.; added Brittany to France.

ANNE OF CLEVES (1515–57), fourth wife of Henry VIII.; unprepossessing appearance; marriage (Jan. 1540), arranged from political motives by the unfortunate Cromwell, was dissolved in six months. A. retired with a pension; d. at Chelsea.

ANNE OF DENMARK (1574–1619), wife of James VI. of Scotland (I. of England); m. at Opslo (1589); Prince Henry born (1594, d. 1612); crowned with James after Elizabeth's death (1603). A. was extravagant and pleasure-loving, but was nevertheless a faithful wife and devoted mother.

ANNE, ST., ANNA, wife of St. Joachim and mother of Virgin Mary; patron saint of carpentry; festival, July 26.

ANNEALING, process of making a substance, especially glass, iron, or steel, homogeneous and less brittle by slow cooling from a high temperature. If cooled rapidly, *e.g.* in water or oil, many metals are hardened, but require tempering (to prevent subsequent cracking) by being subjected to a certain heating up, the requisite temperature in the case of steel being judged from experience or by its colour. *Case-hardening* means giving the outer part of a wrought-iron or mild steel object a special hardness, as is necessary, *e.g.*, in eyes of levers, link motions of engines, etc.

ANNECY (45° 54′ N., 6° 9′ E.), chief town, Haute-Savoie, France; on beautiful Lac d'A. Pop. 13,620.

ANNELIDA, segmented worms—earth-worm, lob-worm, and leech are representatives.

ANNEN (51° 37′ N., 7° 25′ E.), town, Westphalia, Prussia; coal and iron. Pop. 12,200.

ANNEXATION, the act of seizing anything; in international law, the act of adding foreign territory to a state, either by forcible seizure or by the voluntary cession of one state, or power, to another in the interests of peace, or from some other cause.

ANNICERIS, Gk. philosopher, disciple of Aristippus, who founded a sect at Cyrene, and ransomed Plato from captivity.

ANNING, MARY (1799–1874), Eng. palæontologist; discovered Ichthyosaurus and Plesiosaurus.

ANNISTON (33° 40′ N., 85° 50′ W.), town, Alabama, U.S.A. Pop. (1910) 12,994.

ANNITE, black type of lepidomelane (*q.v.*).

ANNIVIERS, VAL D' (46° 9′ N., 6° 37′ E.), valley, Valais, Switzerland.

ANNO, ST. (d. 1075), abp. of Cologne; virtual ruler of Germany during minority of Henry IV.

ANNONA (Lat. *annus*, year), in Roman myth. the personification of the year's produce of the earth.

ANNONAY (45° 14′ N., 4° 40′ E.), town, Ardèche, France. Pop. 17,500.

ANNUAL REGISTER, Eng. list of public events published yearly: started, 1759, by bookseller Robert Dodsley; now pub. by Messrs. Longmans; early association with Edmund Burke; *New A. R.* ran 1781–1825, *Edinburgh A. R.* (to which Scott contributed) 1808–27; French *Annuaire historique* (1818) gave place (1849) to *Annuaire des deux mondes*.

ANNUALS, books of which new edition or further member of series is published annually. These include desk-books containing useful information and literary a's which preceded present Christmas number issue of most periodicals. Old literary a's, now rare, started with *Forget-me-not* (1822–44); among treasures of this kind are *The Literary Souvenir* (1824–34), to which important literary men contributed; *The Keepsake* (1827–56), for which Scott wrote; and *The Book of Beauty* (1833–56), edited by the famous Countess of Blessington. Among numerous modern a's are Whitaker's *Almanack*; *The Statesman's Year-Book*; Hazell's *Annual*; *Who's Who*; *Who's Who in America*; Crockford's *Clerical Directory*.

In botany, plants which germinate, flower, fruit, and die in a year.

ANNUITY, an amount of money, payable annually or at shorter intervals, either for a period of years or during the continuance of a person's life. Unless the contrary is stated, the word 'annuity' is understood to mean a life a. The Brit. Government grants a's in exchange for stock, the residue from the expired a's being devoted to the reduction of the National Debt. Government a's are also obtainable through the Post Office, of amounts from £1 up to £100; see *Insurance as a Means of Investment*, by W. A. Robertson.

ANNULAR, adjective applied to solid formed by closed curve rotating round axis outside it (math's); ligaments at wrist or ankle (anat.); duct strengthened by thickened layers forming rings (bot.).

ANNULARIA, family of fossilised plants, possibly kind of Calamitea.

ANNULET (heraldry), ring, to distinguish 5th s. or bro.

ANNULOSA, term for higher worms and arthropods.

ANNUNCIATION, THE, announcement of Christ's Incarnation to the Virgin Mary; feast (Lady Day), March 25.—**Annunciation, The Supreme Order of the**, knighthood order of house of Savoy.

ANNUNZIO, GABRIELE D', see D'ANNUNZIO.

ANNUS DELIBERANDI (year for deliberation), term in Scots law for year in which heir might decide as to acceptance of inheritance; shortened to six months, 1858–60; now obsolete through fact that heir is not responsible for debts of ancestor.

ANNUS MIRABILIS (marvellous year), name given to 1666; poem of Dryden called A. M. describes victory over Dutch and Great Fire of London of that year.

ANNWEILER (49° 12′ N., 7° 55′ E.), village, Bavaria; S.E. are the ruins of Trifels Castle; tanning, paper-making. Pop. 4000.

ANOA (*Bos depressicornis*), dwarf buffalo of Celebes.

ANODE, see ELECTRICITY (ELECTROLYSIS).

ANODONTA, Pond-mussel, see LAMELLIBRANCHIA.

ANODYNE, anything, commonly a drug, which relieves pain.

ANOMALURIDÆ, see FLYING SQUIRREL.

ANOMALY.—In a body revolving about a centre of attraction (like the earth round the sun) the nearest point to that centre is called the *pericentre* of the orbit. When the earth is at its pericentre it is said to be in *perihelion*, and in *aphelion* when farthest away. A. is the angular distance of a body from the pericentre of its orbit; and an *anomalistic year* is the time taken by a planet to pass from any given a. to the same again. It is convenient to reckon it for the earth from one to the next passage of the pericentre, and as this moves slightly the anomalistic year is 4 minutes 39·02 seconds greater than a sidereal year.

ANONYMITY, omission of name of author from his production (cf. *Pseudonymity*, use of false name). Many literary productions, like *Aucassin et Nicolette*, obstinately continue to conceal their authorship, but others yield to scholars' labours; progress of criticism in modern times has done much to discover secrets of styles and unmask a. Some treatments of this subject are Halkett and Laing, *Dictionary of the Anonymous and Pseudonymous Literature of Great Britain* (1881–88); Cushing, *Anonyms* (1890); Melzi, *Dizionario di opere anonime e pseudonime di scrittori italiani* (1848–59) with *Appendice* (1887); Quérard, *Supercheries littéraires dévoilées* (1869–71); Barbier, *Dictionnaire des ouvrages anonymes et pseudonymes* (1872–79); Brunet's *Supplement* (1889); *Deutsche Anonymenlexikon* (1902–3). Britain, America, and Germany largely employ a. in journalism, but France passed a law, 1850, by which all political and religious manifestations must be signed.

ANOR (49° 58′ N., 4° 5′ E.), town, France. Pop. (1901) 4610.

ANORTHITE ($CaAl_2Si_2O_8$), mineral occurring in basic igneous rocks, belonging to felspar group; anorthic crystals.

ANOSMIA, see SMELL.

ANQUETIL-DUPERRON, ABRAHAM HYACINTHE (1731–1805), Fr. Orientalist; app. interpreter of Oriental languages at Paris Royal Library (1762); associate of Academy of Inscriptions (1763); was discoverer and first translator of the *Zend-Avesta* (1771).

ANSA, loop-like structure of nerves (anat.); apparent 'handles' to heavenly body formed by ring projecting on two sides (*e.g.* of Saturn).

ANSARS (Sp., from Arab. *anṣār*, helpers), inhabitants of Medina, so called from fact that they gave aid to Mahomet.

ANSBACH, ANSPACH (49° 19′ N., 10° 34′ E.), town, Bavaria; machinery, weaving. Pop. 18,500.

ANSCHARIUS, ST., ANSCHAIRE, ANSGAR (801–65), 'Apostle of the North'; thought to have been born in Picardy; preached Christianity in Scandinavia, 801–64.

ANSDELL, RICHARD (1815–85), Eng. artist; b. Liverpool; famous for his pictures of animals; A.R.A. 1861; R.A. 1870.

ANSEGISUS (d. 833), abp. of Sens; made first collection of Carolingian Capitularies, 827.

ANSELM OF LAON (XI. cent.), Fr. theologian; a famous teacher of the Middle Ages.

ANSELM, ST. (c. 1033–1109), prelate and theologian; b. Aosta; became a monk, prior of Bec, 1063, and abbot, 1078; renowned for learning and practical wisdom; came to England, 1092; app. abp. of Canterbury by William II., 1093; had long quarrel with King over his investiture, which A. declared should be at hands of the Pope; a compromise effected, but dispute continued under Henry I. till 1100, when King made formal surrender. A. is famous as a scholastic theologian; his greatest work, *Cur Deus Homo*, profoundly influenced theology of the Atonement.

Church, *St. Anselm.*

ANSELME, FATHER (1625–94), Fr. genealogist; Augustinian friar; his works on heraldry, etc., are historically valuable.

ANSON, GEORGE ANSON, BARON (1697–1762), Brit. admiral; commanded voyage of circumnavigation (1740–44), and helped to reform navy; cr. Baron A. of Soberton (1747); story of his *Voyage round the World* (1748) highly popular.

ANSON, SIR WILLIAM REYNELL, Bart. (1843–), Eng. scholar and lawyer; Warden of All Souls' Coll., Oxford; Vice-Chancellor of University (1898–99); M.P. for University (L.U.); author of *Principles of the English Law of Contract*, etc.

ANSONIA (41° 21′ N., 73° 5′ W.), town, Connecticut, U.S.A.; machinery. Pop. (1910) 15,152.

ANSTED, DAVID THOMAS (1814–80), Eng. geologist, consulting mining engineer, popular writer on geological subjects; F.R.S.

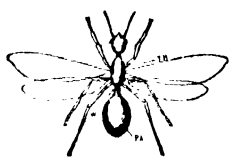
ANSTEY, CHRISTOPHER (1724–1805), Eng. poet; wealthy country gentleman; ed. Eton and Cambridge; famed for *New Bath Guide* (1766), a piece of humorous satire in verse, highly praised by Walpole and others (*Poetical Works*, 2 vols., 1808).

ANSTEY, F., pseudonym of THOMAS ANSTEY GUTHRIE (1856–), Eng. humorist; shows comic power of unusual kind in *Vice Versâ* (1882), *The Brass Bottle* (both dramatised with great success), and other novels; *The Man from Blankleys*, a play, and contributions to *Punch*.

ANSTRUTHER (56° 14′ N., 2° 42′ W.), port, Fifeshire; includes Kilrenny, Easter and Wester A.; fisheries. Pop. (1911) 4252.

ANT (*Formicidæ*), family of hymenopterous insects resembling bees and wasps both in structure and in having highly evolved social habits which have excited the interest of observers from ancient times. The so-called *white ants* or termites (*q.v.*) belong to the entirely different order of Neuroptera. A's occur in three different forms, the queens or fertile females, smaller usually sterile females or workers, and the short-lived males.

The whitish eggs laid by the queen develop into legless grubs (larvæ), which are fed by the workers and become chrysalids or pupæ, sometimes enveloped in silken cocoons. The workers continue to care for the helpless young for some time. After fertilising the queens during their nuptial flight, the males usually die, while the economy of the community is carried on by the workers and queens, special care being devoted to the building of nests for storing food and rearing the young. The complexity of their social life is illustrated by the division of labour in the workers, who may be differentiated into 'soldiers,' 'nurses,' and other castes. Different species also exhibit a great variety of functions. Some (e.g. *Formica sanguinea*) are predaceous, and invade the nests of other species, carrying home worker pupæ who are reared to become slaves. Others, like *Anergates*, have degenerated into being entirely dependent on their slaves.



MALE ANT. *TH*, anterior part of thorax; *W*, waist, formed from anterior segments of the abdomen; *PA*, posterior abdomen.

Many species have developed agricultural habits, cultivating certain fungi on specially prepared beds of finely-cut leaves, and harvesting the seeds of grasses which they store in 'granaries.' A's of pastoral habits tend other insects, known as ant-guests, in their nests, and in return receive nutrient secretions from them, *e.g.* the honey-dew of Aphides (*q.v.*). Other guests seem to be kept as pets, emotions of joy and playfulness having been observed to be developed in some a. species. Some small species (*Solenopsis*) are thieves who steal the larvæ of other a's. Other peculiarities characterise the honey a's, whose workers forcibly inject honey into other workers with enormously distended abdomens, used as living honey-pots for the young brood. *Pseudomyrma* lives in the thorns of certain Central and S. American acacias, defending the trees against the destructive leaf-cutting a's (*Atta*). See HYMENOPTERA.

D. Sharp, *Cambridge Natural History*, vol. vi., 1898; Sir J. Lubbock, *Ants, Bees, and Wasps*, 1882; E. Wasmann, *Die psychischen Fähigkeiten der Ameisen*, Stuttgart, 1899; C. Ll. Morgan, *Animal Behaviour*, 1900.

ANTÆUS (classical myth.), a Libyan giant, s. of Gea (the earth) and Poseidon (the sea). When his feet were planted on the earth he was invincible. Hercules, whom he challenged, divining the secret of his strength, lifted him in the air, and crushed him to death.

ANTALCIDAS, Spartan general, who made treaty with Persia, 387 B.C.

ANTANANARIVO (19° S., 47° 45′ E.), chief town, Madagascar; built on hill; palaces, mosque; two cathedrals; rebuilt since 1869. Pop. (1911) 94,800.

ANTAR (fl. VI. cent.), Arab poet whose works are included in *Divans of the Six Ancient Arabic Poets* (1870), by Wilhelm Ahlwardt (*q.v.*).

ANTARCTIC (66° 30′ S. to Pole), South Polar region. See POLAR REGIONS.

ANTARES, see SCORPIA.

ANT-EATER, name for mammals feeding on termites and ants. The great a. or ant-bear (*Myrmecophaga jubata*) lives in humid savannas of tropical America, destroys termite nests with strong claws, seizing prey with long sticky tongue. The tamandua and little a. are smaller, arboreal species. The aardvark of S. Africa and a few other mammals are also termed a's.

ANTE-CHAPEL, part of church on west side of chancel.

ANTEDILUVIAN, character of period before Flood; hence epithet for that which is extremely antiquated.

ANTELOPES, ruminants with non-deciduous, hollow horns, differing from goats by the lack of a beard and longitudinal ridges on the horns, and by living, on the whole, in the plains. About 150 species are included, but the group does not permit of a precise definition, the classification of the white goat of N. America and the chamois being doubtful. The size varies between the pigmy a. (*A. pygmæa*) of Africa (8 in. high) and the eland (*Taurotragus oryx*), which may stand up to 6 ft. in height and weigh about 1500 lb. Most a's are natives of Africa, *e.g.* the gazelles, the gnu, wildebeest, hartebeest, blesbok, oryx, and the bucks. The nilgai, the four-horned Indian chousingha, and the saiga are the best known Asiatic representatives.

P. L. Sclater and O. Thomas, *The Book of Antelopes* (4 vols., London, 1894–1900).

ANTENOR (classical myth.), Trojan prince, famed for his wisdom, who advised the Trojans to restore Helen to Menelaus. A. afterwards migrated to Italy and founded the town of Padua.

ANTEQUERA (37° 3′ N., 4° 29′ W.), town, Malaga, Spain; grain, fruit. Pop. 31,600.

ANTHELION, halo observed in alpine and polar regions round shadow of object cast by sun on cloud or fog-bank opposite.

ANTHEM (A.S. *antefen*, antiphon), hymn or arrangement of Scripture sung as part music. See ANTIPHON.

ANTHEMIUS (VI. cent.), Gk. architect and mathematician; designed the mosque Hagia Sophia in Constantinople; his bro's attained eminence in med. philology and jurisprudence.

ANTHER, see FLOWER.

ANTHERIDIUM, male sexual organ in Bryophyta and Pteridophyta; analogue of anther.

ANTHEROZOID, male sexual cell of antheridium.

ANTHESTERIA, annual Athenian festival in honour of Dionysus; lasted three days (11th–13th) in month Anthesterion (Feb.–March).

ANTHOLOGY, title derived from a Gk. word, meaning a garland, or collection of flowers, and applied generally to a choice collection of poetry. The most famous collection of the kind is the Gk. Anthology. The earliest version was that compiled by Meleager of Gadara (60 B.C.), which included poems by himself and some forty earlier poets. Additions were made by later editors, the most complete and best selected collection being that compiled by Constantinus Cephalas, a X.-cent. grammarian. The MS. of this collection was discovered in the Heidelberg Library (1606), and was first pub. in Brunck's *Analecta Veterum Poetarum Græcorum* (1772–76), the later and standard edition being F. Jacob's *Anthologia Græca* (13 vols. 1794–1803; new ed. 1813–17). This work contains specimens from 300 writers, and represents the most exquisite work of the Gk. poets from the earliest times. There are Eng. trans. of selections by Sterling, Merrivale, Macgregor, and Richard Garnett. Latin a's, in imitation of the Gk., were pub. by Scaliger (1573), Pitthöus (1590), Burmann (1759), and Riese (1869). Amongst Eng. a's the best-known are F. T. Palgrave's *Golden Treasury* (1st and 2nd Series); Sir A. T. Quiller-Couch's *Golden Pomp*, and *The Oxford Book of English Verse*; H. C. O'Neill's *Pure Gold*; Canon Beeching's *Lyra Sacra*, and *A Paradise of English Poetry*; Watson's *Lyric Lore*; Henley's *Lyra Heroica*; and Masefield's *A Sailor's Garland*.

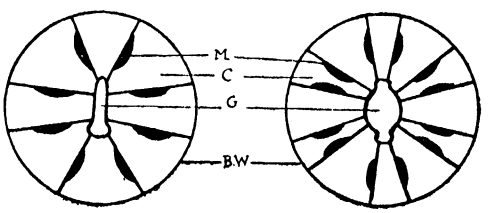
ANTHOMEDUSÆ, see under HYDROMEDUSÆ.

ANTHON, CHARLES (1797–1867), Amer. scholar; prof. of Gk. and Latin at Columbia.

ANTHONY, ST., ANTONY (251–356), founder of Monachism; b. Koma, Upper Egypt; said to have lived many years in lonely ruin of Thebaid, suffered strange temptations which have been favourite literary subject, and performed miracles related by Athanasius.

ANTHONY, SUSAN BROWNELL (1820–1906), Amer. reformer; Woman's Suffrage advocate.

ANTHOZOA, ACTINOZOA, class of Cœlentera, represented by sea-anemones and coral-forming polyps, with tentacles often provided with stinging cells round the mouth, a well-developed gullet, and vertical radially arranged ridges or mesenteries on the interior of the body walls. They reproduce



CROSS-SECTION OF 1, ALCYONARIAN; 2, ZOANTHARIAN. *M*, muscle bands on mesenteries; *C*, cœlenteron or gut-cavity of the body; *G*, gullet; *BW*, body-wall.

sexually, and chiefly by budding. Both individuals and colonies are some of the most beautiful denizens of the sea. The A. are divided into two subclasses. The *Zoantharia* have tentacles and mesenteries, some multiple of six, the limy skeleton, if any, grows from the base, and they are either simple or colonial,

and include the sea-anemones (Actiniaria), the reef-corals (Madreporaria), and the 'black' corals (Antipatharia). The *Alcyonaria* have eight feathered tentacles and eight mesenteries, and diversely shaped calcareous spicules forming corals, *e.g.* Dead-Men's-Fingers (Alcyonium), Sea-Pen (Pennatula), Red coral (Corallium), Organ-Pipe coral (Tubipora), etc. See COELENTERA, CORAL.

Challenger Reports, *Zoology*, vi. (1882), xvi. (1886), xxxi. (1889), xxxii. (1899).

ANTHRACENE ($C_6H_4(CH)_2C_6H_4$), white, fluorescent, crystalline solid; M.P. 213°, B.P. 351°; obtained from coal tar, used in preparation of alizarin and other dyes.

ANTHRACITE, hard kind of coal (stone-coal) in which vegetable constituents have been mineralised further than in ordinary coal; mined chiefly in N. America, China, Westphalia, and S. Wales; used as a smokeless, non-luminous fuel and for production of 'Dowson gas' for power purposes.

ANTHRACOTHERIUM, 'coal animal,' genus of extinct ungulate mammals, related to hippopotamus, found in lignite of Oligocene and Miocene of N. hemisphere, chiefly in Europe.

ANTHRAQUINONE ($C_{14}H_8O_2$), yellow crystallised organic substance, M.P. 277°; obtained from anthracene, used in manufacture of *Alizarin* (*q.v.*).

ANTHRAX, a virulent infectious disease, occurring more usually in cattle, sheep, horses, and other herbivora, but communicable by them to man. It affects animals in all parts of the world and particularly in marshy districts, usually through contaminated fodder or water, or by the infection of a surface wound. An attack is often very sudden, an animal falling down in convulsions, or there may be at first fever and bleeding at the mouth, etc. The public health authorities have very stringent regulations regarding the disposal of the bodies of infected animals.

The men usually infected are such people as wool-sorters, farm hands, and grooms, and the disease may be either external or internal. In the former a vesicle forms on the surface, which becomes pustular, and the danger is that the disease may become generalised. To prevent this, the affected area should be completely excised, and pure carbolic acid applied to the surface. In the internal form, in which infection usually causes virulent pneumonia, the anti-anthrax serum which has been introduced should be tried, and the person's strength kept up, but recovery is rather rare.

ANTHROPOID APES (*Simiidæ*), zoological family including the gibbon, gorilla, orang, and chimpanzee, resembling man in many ways.

ANTHROPOLOGY, the science of man, is, necessarily, of an extremely complex nature and difficult to define. It comprises the comparative anatomy of human races (physical a.), the study of their functions (ethnology), and their history, while anthropogeography treats of their distribution. The earliest history of man (archæology) merges into palæonology on one side and folk-lore and modern history on the other. The comparative study of the functions (physiology and psychology) of human races includes that of speech (philology), of craft (technology), of art (æsthetics), of conduct (ethics), and of religion (theology). The study of social customs (sociology) links folk-lore, economics, and politics. A. in the popular sense, *i.e.* physical a., has for its aim the elucidation of the relationship between the races of mankind and their forebears, and to define the term 'race' itself. Its methods are observational or statistical. The former deals with characters such as stature and pigmentation, and includes the study of the relative shapes of skulls (craniometry, *q.v.*). Concerning this branch of a. an interesting problem has been raised by the observation that there is a tendency of the skulls of immigrants to become in the course of a few generations like the native skull type, the example being the approximation of the skulls of Anglo-Saxon, Scandinavian, Italian, and other racial representatives to the Indian type in N. America. The statistical method of treating anthropological problems is included in biometrics and mainly consists of collecting an adequate number of measurements of certain individual characters, *e.g.* stature, cephalic index, fertility, to be able to arrive at a general formula for the occurrence of the character of a population. See ANTHROPOMETRY, ETHNOLOGY, SOCIOLOGY, RACES OF MANKIND.

A. C. Haddon, *The Study of Man* (1897); J. Deniker, *The Races of Man* (1900); E. Haeckel, *Evolution of Man* (1879); Keith, *Ancient Types of Man* (1911).

ANTHROPOMETRY, the system of measuring certain parts of the human body for comparison or identification; Bertillon method of a. used in France for identifying criminals.

ANTHROPOMORPHISM.—(1) The attribution to the deity of human characteristics, feelings, and conduct, arising from the need of symbolising the abstract. In Gk., Assyrian, Babylonian, Egyptian, and Judaic worship a. is met with, and persists in the Christian Churches and Muhammadanism. (2) Attribution of human characters to inanimate objects.

ANTHROPOPHAGI, cannibals. See CANNIBALISM.

ANTI, ferocious tribe of S. Amer. Indians (S. Peru).

ANTIAR, tree found in Java; upas tree.

ANTIBES (43° 34′ N., 7° 8′ E.), Mediterranean port, France. Pop. 10,500.

ANTI-BURGHERS, name given to former Scot. religious body, the General Association Synod, formed 1747 by those who rejected Presbyterian (*q.v.*) burgess oath.

ANTICHRIST.—The conception of 'Antichrist' is that of a great enemy of God who will rise to power at the end of time. For the origin of this idea we must go back to the mythology of ancient Babylonia and Iran. Iranian religion was dualistic, *i.e.* there was always a conflict between the power of good and the power of evil. This became involved with the Babylonian myth of the struggle of the Supreme God with a primeval water-dragon. These conceptions, like other myths, came to be applied to historic persons, so Antiochus Epiphanes in the Book of *Daniel* (II. cent. B.C.) becomes the type of an enemy of God, called in Christian theol., whence the term is taken over, 'Antichrist' (see in New Testament, *1 John*; cf. the 'man of sin,' *2 Thessalonians* 2³; and the reappearance of the dragon myth in *Revelation* 12). A. has been identified with Nero, Simon Magus, by Protestants with the Pope, and by Catholics with heresiarchs. It gave birth to a considerable Christian lit.

Bousset, *Antichrist* (1895).

ANTICLIMAX, term of rhetoric for weak culmination of literary crescendo (see CLIMAX). Well-known example, Pope's

> 'And thou Dalhousie, the great God of War,
> Lieutenant-Colonel to the Earl of Mar,'

shows literary effect of intentional use.

ANTICOSTI (49° 27′ N., 63° 5′ W.), island, Quebec, Canada. Pop. 250; now a game-preserve owned by M. Menier, the chocolate maker.

ANTICYCLONE, an atmospheric pressure system in which the pressure diminishes from the centre. In N. hemisphere air moves, in a. system, clockwise spirally outwards, in S. hemisphere counter-clockwise.

ANTICYRA.—(1) (38° 22′ N., 22° 38′ E.) Ancient town, Phocis, Greece; famous for its hellebore. (2) Others in Thessaly and Locris.

ANTIETAM (39° 40′ N., 77° 38′ W.), river, Maryland; joins Potomac near Sharpsburg, where Federalists under M'Clellan defeated Confederates under Lee, 1862.

ANTI-FEDERALISTS, opponents of the U.S. Federal Constitution (1787).

ANTIGO (45° 8′ N., 89° 7′ W.), town, Wisconsin, U.S.A.; lumber, furniture. Pop. (1910) 7196.

ANTIGONE (classical myth.), dau. of Œdipus and Jocasta; a devoted dau., she guided her blind f. in his wanderings; tragedy by Sophocles.

ANTIGONISH (45° 38′ N., 62° W.), town, Nova Scotia.

ANTIGONUS CYCLOPS (382–301 B.C.), Macedonian king; general of Alexander the Great defeated and slain at *Ipsus* (301) by coalition of fellow-satraps.

ANTIGONUS GONATAS (d. 239 B.C.), king of Macedon; patron of arts.

ANTIGONUS OF CARYSTUS (fl. III. cent. B.C.), Gk. historian; author of *Lives of the Philosophers*, and other works.

ANTIGUA (17° 12′ N., 61° 53′ W.), one of Leeward Islands, Brit. W. Indies, discovered by Columbus, 1493; chief product, sugar; capital, St. John. Area, 108 sq. miles. Pop. (1911) 32,265.

ANTI-JACOBIN, newspaper run, 1797–98, by George Canning (*q.v.*) to combat views of Fr. Revolutionary party called JACOBINS (*q.v.*).

ANTILEGOMENA, term used in Early Church for Scriptures of doubtful authenticity.

ANTILIA, mythical isle, Atlantic.

ANTILLES (14° N., 60° W.), W. Indies (*q.v.*); Northern Islands form Greater A., the Eastern (Leewards and Windwards) the Lesser A.

ANTILOCHUS (classical myth.), s. of Nestor, friend of Achilles; hero of Trojan War.

ANTIMACHUS (fl. 400 B.C.), Gk. poet and grammarian; held in estimation by Plato; founded a school of epic poetry; ranked by some critics next to Homer.

ANTIMONY (Sb = 120·2), bluish white, lustrous, brittle, crystalline, metallic element; M.P. *c.* 430°, B.P. *c.* 1300°. It occurs in the pure state in Borneo, Sweden, and Dauphiné, but chiefly in China, as stibnite (Sb_2S_3), from which it is smelted. A. having the property of expanding when solidifying and imparting this characteristic to its alloys, it is used extensively for sharp castings, especially type-metal, which consists of a., lead, and tin. An alloy of a., tin, and a small quantity of copper or zinc is called *Britannia metal*. A. acts as a severe poison similar to arsenic. Its compounds, especially tartar emetic (a. tartrate), are occasionally used medicinally to encourage perspiration and as a nervous depressant.

ANTINOMIANS (Gk. 'against law'), those who laid emphasis on faith, rather than on the moral law; especially so called by Luther.

ANTINOUS (d. 130 A.D.), Bithynian youth of great beauty, deified by Emperor Hadrian.

ANTIOCH (36° 10′ N., 36° 10′ E.), ancient town, on Orontes, Syria; named after Antiochus, whose s. Seleucus Nicator founded it in 300 B.C.; capital of Seleucid empire from *c.* 240 B.C.; citadel, fine public buildings; noted for wealth, luxury, and laxity of morals; reputation for art and lit.; great trading centre; taken by Romans, 64 B.C.; visited by Paul and Barnabas; was early centre of Gentile Christianity and missionary effort; suffered frequently from earthquakes; sacked by Chosroes of Persia, 538; rebuilt by Justinian; taken in turn by Saracens, Greeks, Turks, Crusaders, Egyptians; came into possession of Turks, 1516; modern town, Antakia. Pop. *c.* 26,000.

ANTIOCH IN PISIDIA (*c.* 38° 10′ N., 31° 5′ E.), ancient town, Asia Minor.

ANTIOCHIAN, relating to Antiochus of Ascalon, eclectic philosopher.

ANTIOCHUS III., 'THE GREAT' (223–187 B.C.), king of Syria; conquered Palestine and Cœle-Syria (198); later became involved in war with Romans, and was defeated by them at Thermopylæ (191) and at Magnesia (190); compelled to yield possessions and pay heavy tribute, he was by the people for his extortion.

ANTIOCHUS IV., 'EPIPHANES' (175–164 B.C.), king of Syria; s. of A. the Great; conquered large part of Egypt; twice took Jerusalem; notorious for his oppression of Jews; endeavoured to suppress their religion, and introduce worship of idols, which led to their successful rising under Mattathias and the Maccabees.

ANTIOPE (Gk. myth.).—(1) Dau. of Asopus or Nykteus; by Zeus became mother of twins, Amphion and Zethus; sent mad by Dionysus on account of vengeance she took on Lycus and Dirce; cured and wedded by Phocus. (2) Sister of Amazonian queen Hippolyta, and mother of Hippolytus.

ANTIOQUIA (6° 35′ N., 76° 5′ W.), department, Colombia; gold, silver, platinum. Area, 11,517 sq. miles. Pop. 740,937.

ANTIPAROS (37° 3′ N., 25° 2′ E.), Gk. island, Ægean. Pop. variously estimated at from 700 to 2000.

ANTIPATER (d. 319 B.C.), Macedonian leader, under Alexander the Great.

ANTIPHANES (fl. 390 B.C.), celebrated writer of Attic comedy; fragments of his numerous plays are to be found in Athenæus.

ANTIPHILUS (fl. IV. cent. B.C.), Gk. painter, contemporary of Apelles; portrayed Philip of Macedon, Alexander the Great, etc.

ANTIPHON, a composition for singing alternately, verse to be sung before or after the Psalms in liturgical services of R.C. Church.

ANTIPHON (b. 480 B.C.), celebrated Attic orator, who supported the oligarchical party at Athens, but, being accused of treason by the democrats, was condemned to death.

ANTIPODES (literally, with the feet opposite), those who live on the opposite side of the globe, and also the country of their habitation.

ANTIPODES ISLANDS (49° 30′ S., 178° 30′ E.), islands, New Zealand. Uninhabited.

ANTIPOPE, prelates who were not canonically elected popes, but, in spite of the fact that there existed a lawfully elected pope, claimed and to some extent received papal privileges. Hergenröther gives the names of twenty-nine a's, but he omits the names of Benedict XIII. and John XXIII. Corrected in this way, his list reads: Hippolytus, III. cent.; Novatian, 251; Felix II., 355–65; Ursicinus, 366–67; Eulalius, 418–19; Laurentius, 498–501; Constantine II., 767; Philip, VIII. cent.; Anastasius, 855; Leo VIII., 956–63; Boniface VII., 974; John XVI., X. cent.; Gregory, 1012; Sylvester III., 1044; Benedict X., 1058; Honorius II., 1061–72; Clement III., 1080–1100; Theodoric, 1100; Aleric, 1102; Maginulf, 1105; Gregory VIII., 1118; Anacletus II., 1130–38; Victor IV., 1159–64; Pascal III., 1164–68; Calixtus III., 1168–77; Innocent III., 1178–80; Nicholas V., 1328–30; Clement VII., 1378–94; Benedict XIII., 1394–1423; John, 1410–17; Felix V., 1439–49.

Some of these names are probably of only equal trustworthiness with those of Diocerus, 530; Sergius, 890; and Christopherus, 903; which are given by other authorities.

ANTIPYRINE, PHENAZONE ($C_{11}H_{12}N_2O$), a white, crystalline, bitter, inodorous substance used in medicine for lowering the temperature in fever, and for relieving pain, *e.g.* of headache; other drugs are now more commonly used, because of its depressant action on heart. See PYRAZOLE.

ANTIQUARY, a person devoted to the study of archæology and its kindred subjects. The Eng. Society of Antiquaries was formally constituted in 1717; the Scot. Society of Antiquaries in 1780; the Irish Society in 1890, though under other names it flourished much earlier; the Amer. Society (at Worcester, Mass.) in 1812.

ANTISANA (0° 40′ S., 77° 18′ W.), volcano, Ecuador, S. America.

ANTI-SEMITISM, the name given to a widespread political movement, which was directed against the Jews during the last twenty years of the XIX. cent.

and earlier years of the XX. cent. The hostile movement began in Germany and Austria, in both of which countries the Hebrew element was strong. The Jews, moreover, had succeeded in assimilating the Ger. national spirit in a very remarkable degree, and, besides having secured the control of a large share of the State's commerce, individual members of the Jewish body had achieved high positions in lit., music, and other arts (*e.g.* Heinrich Heine, Karl Marx, Ludwig Börne, and Ferdinand Lassalle; the composers Mendelssohn and Meyerbeer; and the politicians Edward Lasker and Ludwig Bamberger). So powerful had the Semitic influence become in political life that Prince Bismarck found it a serious menace to his schemes, and there gradually arose a strong anti-Semitic feeling, which is said to have been engineered by the Prince himself, and was fomented by a court preacher named Adolf Stöcker. The spark was lit in the year 1879, and was quickly fanned into flame. Quarrels were fixed upon members of the Jewish race; they were insulted and boycotted; attempts were made to exclude them from the schools and univ's; duels between anti-Semites and Jews were of frequent occurrence; and street riots were by no means uncommon. This abominable persecution, however, did not meet with general acceptance, and, amongst others, the Crown Prince Frederick publicly denounced the agitation as a standing disgrace to Germany.

Scarcely had the excitement aroused by this outbreak subsided, when a much more serious one took place in Russia. This was in 1881. As in Germany, an antagonistic feeling against the Jews was stirred by secret means, and the reign of persecution began. The Russ. Jews were cooped up in huge ghettos, chiefly in the Polish areas, and when the work of massacre and burning commenced, it quickly spread throughout Western Russia. It is estimated that nearly 200 towns and villages were concerned in the outbreak, including Warsaw, Odessa, and Kiev; immense numbers of men, women, and children met with violent deaths, and many thousands of unoffending people were ruined. Though in England public indignation was raised to the highest pitch, little notice was taken of any protest, and similar outbreaks (*pogroms*) occurred in 1890–91, and also within recent times. Almost concurrently with these earlier outbreaks in Germany and Russia, there arose violent persecutions in Rumania and Austria-Hungary, while Fr. anti-Semitic feeling reached its climax in the conspiracy by means of which a Fr. Jewish officer, Captain Alfred Dreyfus, was, in 1894, convicted of treason. Through the efforts of Émile Zola and others, this officer was in course of time set at liberty, and proved to have been the victim of an abominable plot, yet the never-ending efforts to prevent justice being done to this man, and the real culprits exposed, are sufficient proof of how deadly was the Fr. prejudice against the Jews.

Efforts to create anti-Semitic feeling have from time to time been made in England and America, but with little success. Yet with a Jewish population in the world of between eleven and twelve millions, of whom about nine millions are in Europe, it is scarcely to be supposed that the day of persecution is over, or that the Jewish question is finally settled. An effort was made by Baron Hirsch, in 1891, to ameliorate the condition of the Jews by the foundation of the Jewish Colonisation Association, with a view to establishing settlements in Argentina, Brazil, and other places, and to this purpose he contributed the greater part of his wealth.

Leroy-Beaulieu's *Israel among the Nations*, 1895; Reinach's *Histoire de l'affaire Dreyfus* (Paris, 1898, 6 vols.); F. C. Conybeare's *Dreyfus Case*, 1898.

ANTISEPTICS, substances which destroy or prevent or arrest the growth of bacteria, thus preventing putrefaction or fermentation; introduced in surgery by Lord Lister (*q.v.*); sepsis of wounds was prevented, and the high mortality due to this cause reduced. See SURGERY.

ANTISPAST, term used in prosody for foot consisting of iambus and trochee (∪ — — ∪).

ANTISTHENES (fl. 365 B.C.), Gk. philosopher; was a pupil of Socrates, and a zealous follower of his teaching; founded the Cynic school of philosophy.

ANTISTROPHE, portion of a Gk. ode sung by chorus in the nature of a reply, or complement, to the *Strophe*.

ANTITHESIS, term of rhetoric for contrast; example: 'He had a head which statuaries loved to copy, and a foot the deformity of which the beggars in the street mimicked' (Macaulay, *Essays*).

ANTITOXINS, see BACTERIOLOGY.

ANTITYPE, person in whom a prophetic type is fulfilled; thus Christ is said to be a. of Isaac, the Brazen Serpent, Paschal Lamb, etc.

ANTIUM (41° 27′ N., 12° 37′ E.), old Volscian town, Italy; Rom. remains; modern Porto d'Anzio.

ANTIVARI (42° 5′ N., 19° 9′ E.), port, Montenegro. Pop. *c.* 2500.

ANT-LION (*Myrmeleon*), neuropterous insect of Continental Europe. Larva traps ants and other insects in conical pit excavated 2 in. deep in loose sand.

ANTOFAGASTA.—(1) (23° 38′ S., 70° 24′ W.) capital of (2). Pop. 32,500. (2) province, Chile. Area, 46,597 sq. miles. Pop. (1910) 118,718.

ANTOINE, ANDRÉ (b. 1858), Fr. actor-manager; founded *Théâtre Libre*, Paris, opened 1887, closed 1894, and *Théâtre A.*, 1897, for production of higher drama; director of *Odéon*, 1906.

ANTOMARCHI, FRANCESCO (1780–1838), Ital. physician; entered service of Napoleon at St. Helena 1818, and after his death published famous, but untrustworthy, *Derniers Moments de Napoléon* (1823); genuineness of his representation of cast of Napoleon's head much questioned.

ANTONELLE, MARQUIS D' (1747–1817), Fr. politician of time of Revolution; took prominent part in proceedings against Marie Antoinette.

ANTONELLI, GIACOMO (1806–76), Ital. cardinal (cr. 1847); had considerable influence over Pius IX. on anti-liberal and anti-national side; thought by some unscrupulous in finance and diplomacy.

ANTONELLO DA MESSINA (d. 1479), Ital. artist; was impressed with the style of Jan Van Eyck and the Flemish school of painters, and studied in the Netherlands; his own work, consisting largely of studies of Madonnas and Saints, shows strong traces of this influence; the National Gallery contains three canvases by him.

ANTONGIL BAY (15° 45′ S., 49° 50′ E.), bay, E. coast of Madagascar.

ANTONINUS, ITINERARY OF, an official record of roads and stations under the Rom. Empire, which is regarded as of considerable hist. value. The part referring to Britain (*Iter Britanniarum*) was edit. by T. Reynolds (1799).

ANTONINUS LIBERALIS (fl. 150 A.D.), Gk. writer of mythological stories.

ANTONINUS PIUS (86–161 A.D.), Rom. emperor; b. near Lanuvium; adopted s. of Hadrian, whom he suc. (138); comparatively peaceful reign; simple and just ruler; adopted Marcus Aurelius (*q.v.*).—**Wall of Antoninus**, Roman wall, built by Emperor Antoninus Pius, and stretching from the Firth of Forth to the F. of Clyde, in Scotland, distance about 40 miles. It was erected in the year 140 A.D., as protection against invasion from north.

ANTONINUS, ST. (1389–1459), Dominican abp. of Florence; distinguished himself by self-sacrifice and devotion during a visitation of the plague, followed by earthquake; canonised, 1523; his festival is May 13.

ANTONIO (1531–95), unsuccessful claimant to Portug. throne; prior of Crato; illegitimate s. of Luis, Duke of Beja, s. of King Emanuel. He was defeated 1580 and 1582, and subsequently found refuge in France and England.

ANTONIO, NICOLÁS (1617–84), Span. bibliographer; author of *Bibliotheca Hispana Vetus*, and *Bibliotheca Hispana Nova*.

ANTONIUS, MARCUS (143–87 B.C.), a distinguished orator and prominent citizen; was one of the many eminent citizens of ancient Rome of the gens Antonia, named A.

ANTONIUS, MARCUS, MARK ANTONY (*c.* 83–30 B.C.), grandson of the above, was second only in influence and power during Cæsar's dictatorship, and triumvir after his death, taking eastern half of Empire. His infatuation for Cleopatra ultimately caused senate to deprive him of his powers (32). He was defeated at *Actium* (31) and committed suicide (30 B.C.).

ANTONOMASIA, description used in place of personal name as 'bard of Rydal Mount' for Wordsworth, or the 'Prior of Crato' for Antonio.

ANTONY, ST., of Egypt, see ANTHONY.

ANTONY, ST., of Padua (1195–1231); was Canon Regular of St. Augustine 1210–21, when he entered Franciscan Order; became great preacher, and is reputed a famous worker of miracles, whence he was canonised a year after his death.

Lepitre, *St. Antoine de Padone*, Eng. trans. by Guest (Lond. 1902).

ANTOZONE, hydrogen dioxide, H_2O_2; reduces ozone to oxygen.

ANTRAIGUES, EMMANUEL HENRI, COMTE D' (d. 1812), Fr. secret agent; murdered.

ANTRIM (54° 50′ N., 6° 10′ W.), county, N.E. Ireland; land area, 711,275 acres; capital, ANTRIM, largest town, Belfast; has Lough Neagh in S.; Giant's Causeway on N. Atlantic coast, remarkable basaltic cliffs; much of surface covered with volcanic rocks; bogs in S.W., hilly in N. and E. Chief rivers, Bann, Lagan. Produces flax, cereals; minerals include iron, rock salt, alum, clay. Industries include linen and cotton manufactures, fisheries, paper-making, distilling. Climate temperate. Pop. (1911) 478,603. Town, 1800.

ANTRIM, RANDAL MAC SORLEY MACDONNELL, 1ST EARL OF (*c.* 1580–1636), s. of Sorley Boy MacDonnell; implicated in O'Neill rebellion (1600).

ANTRIM, RANDAL MACDONNELL, 1ST MARQUESS OF (1609–83), Royalist; joined Ormonde; fought for king; cr. Marquess (1644); subsequently joined Ireton; excluded from Act of Oblivion at Restoration; his estates restored (1665).

ANTRUSTIONS, privileged guardian escorts of Merovingian sovereigns, almost always of Frankish descent; the institution disappeared about VIII. cent.

AN-TUNG (40° N., 124° 30′ E.), port, Manchuria, China. Pop. *c.* 143,000.

ANTWERP.—(1) (51° 14′ N., 4° 24′ E.) town, Belgium, on Scheldt, great port and commercial city; has excellent harbour and extensive quays; ten dry docks; chief industries, shipbuilding, sugar, textiles, lace, petroleum, tobacco, distilling, diamond-cutting; exports glass, coal, chemicals, iron, steel, cotton, ..s, etc.; birthplace of Rubens (*q.v.*); has fine Gothic cathedral (with Rubens' *Descent from the Cross*), museums, etc.; strongly fortified. After Treaty of Westphalia, 1648, closing of Scheldt ruined trade of A., but since its reopening in 1863 town has regained commercial importance; at different times besieged, plundered, and taken by various powers. Pop. (1910) 320,600. (2) (51° 13′ N., 4° 50′ E.) province, Belgium. Area, 1093 sq. miles. Pop. (1910) 989,300.

ANU ('Great One'), Babylonian deity, the father of the gods.

ANUBIS, Egyptian deity (with jackal's head), who conducts dead to nether world.

ANURADHAPURA (8° 18′ N., 80° 23′ E.), ruined city, Ceylon; capital of the island, V. cent. B.C. Pop. 3672.

ANVILLE, JEAN BAPTISTE BOURGIGNON D' (1697–1782), Fr. geographer; achieved much success with a map of Italy (1743), in which he corrected many errors of his predecessors; produced numerous geographical treatises, and upwards of 200 maps.

ANWARI, AUHAD UDDIN (fl. end of XII. cent.), Persian poet, whose shorter lyrics are highly estimated by Persian scholars.

ANYTUS, Athenian who with Meletas and Lycon accused Socrates of impiety, 399 B.C.

ANZENGRUBER, LUDWIG (1839–89), Austrian dramatist; wrote numerous plays chiefly dealing with peasant life, including *Der Weineidbauer*, *Hand und Herz*, *Das vierte Gebot*, etc.

ANZIN (50° 23′ N., 3° 27′ E.), town, Nord, France; coal-mining centre. Pop. 14,500.

AOKI, SHUZO, VISCOUNT (b. 1844), Jap. statesman; ambassador to Berlin, 1874 and 1892; minister, 1889–91, 1898–1900; took important part in revision of treaties with foreign countries.

AOMORI (40° 53′ N., 140° 46′ E.), town, Japan. Pop. (1908) 47,206.

AONIA, ancient district, Bœotia, Greece, sacred to the Muses; in its precincts was Mount Helicon, with the fountain of Aganippe, Milton's 'Aonian fount,' at its base.

AOSTA (45° 44′ N., 7° 20′ E.), town, Italy; Roman remains. Pop. 7600.

APACHES, North American tribe, definitely subdued, 1880; name also applied to bands of desperadoes who haunt streets of Paris at night.

APALACHEE, tribe of N. Amer. Indians; almost extinct.

APALACHICOLA (29° 44′ N., 85° W.), town, Florida. Pop. (1910) 3065.

APARRI (18° 28′ N., 121° 38′ E.), port, Luzon, Philippines; tobacco. Pop. 18,300.

APATIN (45° 41′ N., 18° 56′ E.), town, Hungary. Pop. 14,000.

APATITE ($(CaF)Ca_4P_3O_{12}$ fluor-a.; $(CaCl)Ca_4P_3O_{12}$ chlor-a.), mineral phosphate of varying composition occurring in crystalline rocks, often in hexagonal crystals in Canada and Norway; provides phosphates necessary for plant life.

APE, synonym for monkey (*q.v.*), especially of family Simiidæ.

APELDOORN (52° 13′ N., 5° 48′ E.), town, Holland. Pop. (1910) 36,500.

APELLA, Spartan general assembly at which State affairs were voted upon.

APELLES, court painter to Philip of Macedon and Alexander, and generally reputed to have been the greatest painter of ancient times; none of his works are now in existence.

APELLICON (fl. 85 B.C.), famous Athenian book-collector.

APENNINES (38° to 44° N., 8° to 16° E.), mountain chain beginning in Maritime Alps and extending southward through Italy, and into Sicily; average height about 4000 ft., sinking in the N. to 3500 ft., and rising in centre to about 7000 ft; highest point, Monte Corno, Gran Sasso d'Italia, (9578 ft.), in central portion of system; highest points in N. are Monte Bue, Monte Cimone; in S., Monte Miletto. Range is crossed by several railways at heights of from 1500 to 2000 ft. A. lie below snow-line. Rivers rising in A. are Po, Arno, Tiber, etc. Marble is found at Carrara, Seravezza, Siena.

APENRADE (55° 3′ N., 9° 23′ E.), town, Prussia. Pop. 7000.

APETALÆ, petal-less dicotyledons (*q.v.*). Some flowers have neither petals (*corolla*) nor sepals (*calx*), the outermost leaves. These are called *Achlamydeæ*.

APHANITE, a term for fine-grained crystalline rock; formerly applied to a dark diorite.

APHASIA, loss of the powers of expression and understanding of ideas in speech and writing, resulting from brain lesions. There are several varieties of a., depending on the situation of the lesion and the brain centre thus affected. These may be divided into two groups: 1. motor a., including (*a*) loss of the

power of speech (*aphemia*), (*b*) loss of the power of writing (*agraphia*); 2. sensory a., including (*a*) loss of the power of understanding spoken words (*auditory a.*), (*b*) loss of the power of reading (*visual a.*).

APHELION, point of planet's or comet's orbit most distant from sun. See ANOMALY.

APHEMIA, see APHASIA.

APHIDES, plant-lice, small homopterous insects of order Hemiptera, destructive to plants; complex life-history; some species are domesticated by ants on account of 'honey-dew' in excretions. American blight and the vine-destroying *Phylloxera vastatrix* are well-known pests.

APHORISM, short, pithy sentence; term first used by the celebrated Gk. physician Hippocrates (d. 361 B.C.), whose first *aphorism* runs: 'Life is short, art is long.'

APHRAATES (IV. cent. A.D.), Syrian convert from heathenism, who wrote upwards of twenty Christian homilies.

APHRODITE (classical myth.), Gk. goddess of love and beauty; dau. of Zeus and Dione; according to one legend A. sprang from the sea-foam (Gk. *aphros*, foam); as wife of Hephæstus (Vulcan) she proved as incontinent as she was beautiful; mother of Eros (Cupid) and the Trojan hero, Æneas; passionately devoted to Adonis, a beautiful youth, slain by a boar whilst hunting. The swan, dove, swallow, and sparrow were sacred to her; also the rose, myrtle, and apple. In Rom. mythology she bears the name of Venus, and she is also the counterpart of the Phœnician Ashtoreth (Astarté).

APHTHITALITE, white crystalline mineral composed of sodium and potassium sulphate.

APHYLLOUS, leafless, *e.g.* of plants.

API ISLAND (16° 45′ S., 168° 15′ E.), island, New Hebrides.

APIA (13° 50′ S., 171° 44′ W.), port, Upolu, Samoan Islands. Pop. *c.* 4000.

APIA, CHARLOTTE (1° 50′ N., 173° 5′ E.), island, Gilbert Islands, Oceania.

APIANUS, PETER, BIENEWITZ (1501–52), Ger. astronomer. His *Cosmographicus liber* (1524) introduced improvements in science of geography, and *Astronomicum Cæsareum* (1540) contained discoveries as to comets. His son PHILIP (1531–89) pub. maps of Bavaria.

APICIUS, GAVIUS, notorious Roman epicure, who lived during the reign of Tiberius, and wrote some works on cookery.

APICULTURE (Lat. *apis*, a bee), the business of tending an apiary; bee-keeping.

APION (I. cent. A.D.), Gk. rhetorician; settled in Rome (30 A.D.); most of his works are lost; they included a commentary on Homer, history of Egypt, etc.

APIS, the sacred bull worshipped by the ancient Egyptians, who was supposed to be the incarnation of Osiris, after Râ, the chief of the Egyptian gods. The black bull chosen had certain distinguishing marks; it was tended with great ceremony; at the end of twenty-five years it was killed and buried with solemn state in the city of Memphis; after which search was made for another bull bearing the identical marks.

APIUM GRAVEOLENS = Celery (*q.v.*).

APLITE, fine-grained whitish or pink rock, consisting chiefly of quartz and felspar, occurring as dykes in granitic bosses, having cooled at a later period than the latter.

APNŒA, temporary cessation of breathing, due to the blood containing more than its normal amount of oxygen.

APOCALYPSE (Gk. *apokalypsis*, revelation), a work disclosing the hidden; applied to various Jewish and Christian writings grouped as Apocalyptic Literature, and to Book of *Revelation* (*q.v.*). **Apocalyptic Literature** dates roughly from the II. cent. B.C. to the IV. A.D., though there are some stray examples of later date. The struggles through which the Jewish people had gone, and the unrealised Messianic hope produced a number of writings, many anonymous or pseudonymous, which, written sometimes in the name of the early patriarchs, were supposed to reveal the future. Various myths which were interpreted as prophecy were combined with them. A. is a later phase of Jewish religion than prophecy, for while the work of the prophets was mainly moral and reforming, that of a. was dualistic in tone (*i.e.* this present world is evil, and will soon come to an end). In the Old Testament, the chief a. passages are *Isaiah* 24–27, 33, 34–35, *Ezekiel* 38–39, *Daniel*, and *Zechariah* 12–14. These date roughly from 160 B.C. *Daniel* is the most important and the only wholly a. book. Outside the Old Testament the Book of *Enoch* (existing in Ethiopic) is by far the most important. In *Enoch* (*q.v.*) are fragments of a Book of *Noah*. Other writings are the *Testaments of the XII. Patriarchs*, originally in Hebrew, II. cent. A.D.; *Psalms of Solomon*, Pharisaic Gk. book, I. cent. B.C.; *Apocalypse of Baruch*, existing in Syriac and Gk. versions; *Ezra*, originally Hebrew, existing in several versions; *Book of the Secrets of Enoch* (Slavonic), I. cent. A.D.; various other apocalypses, many of which are lost. Some of these writings have influenced New Testament writers and are exceedingly important. In New Testament the a. passages are *Mark* 13 (= *Matthew* 24, *Luke* 21), a Jewish apocalypse worked in by the editor, *2 Thessalonians* 2 (representing earlier stage of St. Paul's thought), and *Revelation* (*q.v.*), only a. in New Testament. There are various uncanonical a. works, e.g. *Shepherd of Hermas* (*q.v.*), *Apocalypse of Peter*, etc. A. thought ceased in Judaism, and in Christianity was soon transcended.

Works and editions by R. H. Charles and M. R. James.

Apocalyptic Number, number 666, said in *Revelation* 13^{18} to be number of the beast. In both Gk. and Hebrew, numbers signify letters; hence several solutions of the cypher, among them 'Neron Kesar,' the Emperor Nero.

APOCARPOUS, see FLOWER.

APOCRISIARII, ecclesiastical representatives in early Church, of popes and patriarchs at Imperial Court, and of abp's at ecclesiastical superiors' courts.

APOCRYPHA.—This term is generally made to include a large body of lit. which falls into several groups.

(1) **The Apocrypha proper**, those books which are not recognised by Protestants or by the Church of England as of equal authority with the Old and New Testaments. These are (*a*) *I.* and *II. Esdras* (called sometimes 3 and 4 Ezra); *I. Esdras* is an edition of canonical *Ezra*, and *II. Esdras* a I. cent. Apocalypse with really nothing to do with the other books called by the same name. (*b*) *I.* and *II. Maccabees*; *I. Maccabees* contains history of Jews, 175–135 B.C., and was written in Hebrew about 100 B.C. and translated into Greek; *II. Maccabees*, an epitome of another work, deals with 176–161 B.C.: written before 70 A.D. (*c*) *Tobit*, a didactic narrative: date uncertain, not later than I. cent. A.D. (*d*) *Judith*, a romance, probably of I. cent. B.C. (*e*) The *Additions to Daniel* (*Song of the Three Holy Children*, *History of Susannah*, and *Bel and the Dragon*), probably about I. cent. B.C. (*f*) The *Additions to Esther*, late Greek, found in Gk. versions of that book. (*g*) *Wisdom of Solomon*, written in Greek, I. cent. B.C. (*h*) *Ecclesiasticus*, written in Hebrew (original partly preserved), II. cent. B.C., translated into Greek. (*i*) *Baruch*, composite, written in Greek, latter part I. cent. A.D., and appended thereto, *Epistle of Jeremy* and *Prayer of Manasses*. These are all in the Vulgate of St. Jerome. (*j*) The Septuagint also includes *III. Maccabees*, a pseudo-hist. work written about the time of Christ, and *IV. Maccabees*, written before destruction of Jerusalem. (A so-called 'V' Maccabees is only a compilation).

(2) There are, besides, a considerable number of Jewish works, many of them apocalypses, some only recently discovered, which are of great importance for Jewish history of immediately pre-Christian times,

such as the *Book of Enoch, Psalms of Solomon, Assumption of Moses, Ascension of Isaiah, Testaments of the XII. Patriarchs, Testament of Abraham, Apocalypse of Baruch, Sibylline Oracles*, etc.

(3) The New Testament Apocrypha, some works of which nearly attained canonicity:—*The Gospel according to the Hebrews* (only fragments preserved), written in Hebrew, trans. into Greek and Latin by Jerome; *Gospel according to the Egyptians*, c. 150 A.D., only fragments; *Protevangel of James*, written in Egypt c. 100 A.D.; *Gospel of Nicodemus*, date uncertain; *Gospel of Peter*, a part of which was discovered in 1885, and others which have entirely perished or exist only in very small fragments. Various apocryphal Acts, including *Acts of John* and *Acts of Paul*. Amongst apocryphal Epistles are the so-called *Letters of Christ and Abgarus* (King of Edessa) to each other, probably composed about 200. Other *Epistles of Paul* (certainly spurious), *Clement*, and *Ignatius*. Among Apocalypses, *The Shepherd of Hermas* (included in some manuscripts of the New Testament) and *The Apocalypse of Peter* are important.

See Swete, *Old Testament in Greek*, vol. iii. for (1)—the most convenient edition in English of the Apocrypha proper; for (2) and (3) various separate editions and articles, etc., by R. H. Charles and others: editions of the N.T. Apocrypha by Tischendorf, in Temple Bible in English, also for recently discovered sayings of Jesus, *The Logia*, edit. by Grenfell and Hunt: and *Two New Gospel Fragments*, Swete—interesting and important.

APODICTIC, incontrovertibly demonstrated (logic).

APOGEE, moon's position when farthest from earth; *perigee*, when nearest. See ANOMALY.

APOLDA (51° 2′ N., 11° 30′ E.), town, Saxony; woollen manufactures. Pop. (1910) 22,600.

APOLIMA (*c.* 13° 50′ S., 172° 10′ W.), island, Samoan Islands, Pacific.

APOLLINARIS (d. 390 A.D.), bp. of Laodicea (Syria); was strongly opposed to Arianism (but denied real humanity of Christ), and was associated with his f. in reproducing the Old Testament in verse and the New T. in the form of dialogue.—Those who followed him were called **Apollinarians**.

APOLLINARIS SIDONIUS, CAIUS SOLLIUS (d. 487 A.D.), bp. of Arverna (Clermont); author of *Panegyrico, Letters*, and *Poems*, which are of considerable hist. value for the light which they shed upon the events of the V. cent.

APOLLINARIS SPRING, well in Ahrtal, Rhineland, from which A. water, an alkaline drink, is obtained.

APOLLO (classical myth.), the god of pastures, of poetry and music, of oracles; the protector of youth. He was the son of Zeus and Leto, twin-brother of Artemis, and was born on Mount Cynthus, in the island of Delos, whither his mother had fled to escape the wrath of Hera. He is generally confounded with the sun-god, Helios, and thus becomes Phœbus-Apollo, the god of light, who illumines the world, warms the pastures, and brings forth the kindly fruits of the earth. He is also pre-eminently the god of prophecy, and the temple dedicated to his worship at Delphi, in Greece, was the most famous oracle of the ancient world. The most famous statue of the god is that known as the *Apollo Belvedere*, which originally stood on Mount Actium, and is now in the Vatican.

APOLLODORUS (fl. 140 B.C.), Gk. author, who wrote a valuable treatise on classical mythology.

APOLLODORUS (fl. 300–260 B.C.), a famous writer of Attic comedy, who is said to have produced upwards of forty plays.

APOLLONIUS MOLON (fl. 69 B.C.), Gk. rhetorician, from whom Cæsar and Cicero took lessons.

APOLLONIUS OF ALEXANDRIA, a famous grammarian who flourished in the II. cent. A.D., and who is credited with being the first to treat grammar scientifically.

APOLLONIUS OF PERGA (fl. 250–220 B.C.), Gk. geometer; is ranked with Euclid and Archimedes as one of the founders of mathematical science, and was known as 'The Great Geometer.' His famous treatise on *Conics* was in eight books, four of which survive in Greek, three in Arabic, while the eighth has perished.

APOLLONIUS OF RHODES (222–181 B.C.) Gk. epic poet and rhetorician; pupil of Callimachus; author of the *Argonautica*, a lengthy epic dealing with the story of the Argonauts; Eng. trans. by Way (1901).

APOLLONIUS OF TYANA, Gk. philosopher; b. about four years before the Christian era; he studied at Tarsus and Ægæ, and became a teacher of the Neo-Pythagorean school. He travelled extensively in Asia Minor, visited India and other places, and upon his return was credited with the powers of second sight and the working of miracles. His history was written after his death by Philostratus.

APOLLONIUS OF TYRE, hero of an early mediæval romance, derived from a Gk. original. The story found its way into most European languages, was incorporated by Gower in his *Confessio Amantis*, upon which version Shakespeare founded his *Pericles, Prince of Tyre*.

APOLLONIUS THE SOPHIST (I. cent. A.D.), grammarian of Alexandria, who compiled a Homeric lexicon.

APOLLOS, Alexandrine Jew, associated as preacher with St. Paul at Corinth and Ephesus; held by Luther and others to have been author of the *Epistle to the Hebrews*.

APOLLYON (Gk. 'the destroyer'), the fiend with whom Christian fights in the *Pilgrim's Progress*. Bunyan took the name from *Revelation* 9^{11}.

APOLOGETICS, the name given to the systematic defence by Christians of their own religion. Among famous apologetic works are those of Justin Martyr, Origen, and Augustine in the primitive Church, Anselm and St. Thomas Aquinas in mediæval times, and in the XVIII. cent. Paley and Bp. Butler. In the XIX. cent., however, the lines of defence and attack changed somewhat. The following are some of the arguments that have been used:—

THE ARGUMENT FROM NATURE.—The mystery of life which no one can completely explain suggests a Creator; further, the argument from design—what only mind can interpret only mind can create; again, an effect must have a cause; thus for various reasons it is possible to believe in God entirely apart from the idea of Revelation.

THE UNIVERSALITY OF THE BELIEF IN GOD.—Belief in a god or gods is found among all nations. The idea of God answers to our moral nature, and God is the highest possible object of thought and the ground of thought.

THE SPECIFICALLY CHRISTIAN ARGUMENTS.—Firstly, the evidence for and importance of the miraculous; then the change wrought by Christianity in its first disciples and in subsequent times (these two lines of defence often connected, *e.g.* the Resurrection, the difficulty of explaining it away and effect of it on the disciples). Again, the ministering of Christianity and the Church to the needs of those who believe in them and who cannot find satisfaction elsewhere.

In the XX. cent. other lines of apologetic are coming into greater prominence: (1) A tendency to emphasise the moral rather than the miraculous; (2) the importance of Evolution in religion—this argument turned back on opponents; (3) the study of comparative religions shows Christianity as the perfection of imperfect faiths, again an adverse argument turned round; (4) psychical research shows existence of other and deeper realities: on the whole easier for Christians than non-Christians.

APOLOGUE, short moral fable (*q.v.*) or allegory.

APOLYTIKON, dismissal hymn in liturgy of Gk. Church.

APONEUROSIS, a broad tendinous expansion of fibrous tissue, serving to attach a muscle.

APOPHYLLITE ($H_7KCa_4(SiO_3)_8+4\frac{1}{2}H_2O$), mineral of Zoolite group, occurring as colourless, reddish, greenish, or opaque white tetragonal crystals with peculiar optical properties; found in amygdaloidal cavities in igneous rocks.

APOPHYSIS (anat.), a bony prominence; (bot.) a swelling under the spore-case of certain mosses.

APOPLEXY, sudden unconsciousness, without any essential change in the pulse and respiration, resulting from cerebral hæmorrhage, embolism, or thrombosis. The unconsciousness must be distinguished from that due to epilepsy, syncope, uræmia, alcoholic or narcotic poisoning. The onset of the attack may sometimes be less sudden, and accompanied by headache, giddiness, confusion of the mind, or loss of power in a limb. The person may sink to coma and death, or he may recover after a short or a prolonged time, a certain degree of paralysis usually remaining, which most frequently affects one side of the body.

APOROSA, group of corals with non-perforated corallium.

APOSIOPESIS (Gk. 'becoming silent'), rhetorical trick by which a speaker leaves something unsaid, as 'He cried——, but no, I cannot repeat his words!'

A POSTERIORI, method of reasoning which proceeds from effects to causes; experimental, based on induction from observed facts. It is opposed to *a priori* reasoning which proceeds from assumptions to their necessary consequences, from causes to effects.

APOSTIL, marginal annotation.

APOSTLE, one sent upon a mission, particularly by Jesus Christ. The Twelve Apostles were Simon Peter, Andrew, John (s. of Zebedee), James (his bro.), Philip, Bartholomew, Thomas, Matthew, Thaddæus, Simon, James (s. of Alphæus), and Judas Iscariot. Matthias was chosen in the place of Judas, afterwards. 'The Apostle of the Ardennes' was St. Hubert, bp. of Liége (656–730); 'of the English,' St. Augustine (d. 607); 'of the French,' St. Denis (III. cent.); 'of the Gentiles,' St. Paul; 'of Germany,' St. Boniface (680–755); 'of the Highlanders,' St. Columba (521–97); 'of Hungary,' St. Anastasius (954–1044); 'of the Indies' (West), Bartolomé de Las Casas (1474–1500), and Rev. John Eliot (1603–90); 'of the Indies' (East), St. Francis Xavier (1506–52); 'of Ireland,' St. Patrick (d. 493); 'of the North,' Anscarius (801–64); 'of the Picts,' St. Ninian (IV.–V. cent's); 'of Scot. Reformation,' John Knox (1505–72); and 'of the Slavs,' St. Cyril (IX. cent.).

APOSTLE SPOONS, usually of silver, and bearing figures of the apostles for handles, were common baptismal gifts during the reigns of the Tudor and early Stuart sovereigns.

APOSTLES' CREED, see CREEDS.

APOSTOLIC FATHERS, the name given (first in XVII. cent.) to the Christian Fathers of the two generations after the Apostolic age, roughly, 70–130 A.D. These are (1) **St. Clement,** who writes from the Church of Rome to the Church of Corinth (second Epistle not genuine); (2) **St. Ignatius,** bp. of Antioch, martyred *c.* 110 A.D. Seven Epistles of his are genuine — most important as showing growth of episcopacy; (3) **Polycarp,** traditional disciple of St. John; P. wrote a letter to the Philippian Church; martyred 155.

The term Apostolic Fathers is used to include also these writings: (4) EPISTLE OF BARNABAS, probably not work of the companion of St. Paul; (5) SHEPHERD OF HERMAS, a document of the early Roman Church; (6) TEACHING OF THE TWELVE APOSTLES, a most important document, probably borrowed in part from a Jewish source, *The Two Ways*; the Teaching (Gk. 'Didache') was only recently discovered. (7) EXPOSITION OF THE LORD'S ORACLES, by Papias, bp. of Hierapolis, only preserved in fragments.

The theol. of the A. F's, though very devout and even passionate in loyalty, shows a marked falling off from St. Paul and St. John.

H. B. Swete, *Patristic Study*; editions of Ap. Fathers by Cotelier, Lightfoot, Harnack, etc.

APOSTOLIC LETTERS, papal documents; Epistles of the Apostles.

APOSTOLIC MAJESTY, title conferred on Hungarian kings; now borne by Emperor of Austria.

APOSTOLIC SEE, the see of an apostle, *e.g.* Antioch and Alexandria; now generally applied to Rome as See of St. Peter.

APOSTOLIC SUCCESSION, a distinctive doctrine of Catholic Christianity, that the bp's are successors of the Apostles, and that the episcopal order is conveyed by consecration and laying on of hands. According to the Protestant view the bp. is simply an official, and episcopacy not (as with Catholics) something necessary and divinely ordained.

APOSTOLICAL CONSTITUTIONS, THE, in eight books, purported to have been written by the Apostles, and have been accepted as genuine by many theologians in ancient and modern times. The growth of a critical spirit has shown the baselessness of their claim. They are, however, of great value for the history of the Church of the age from which they date. They are only one of a series of collections referring to Church order and discipline which came to be written. The *Constitutions* are based on the *Didascalia Apostolorum* (written in Greek but only existing entire in Syriac). The *Didache* (or 'Teaching of the Twelve Apostles') and other works seem also to have been made use of. The *Constitutions* were written in Greek, probably in Syria, and somewhere towards the close of the IV. cent.

Translation of Apost. Constit. in 'Ante-Nicene Christian Library,' book viii.

APOSTOLICI, term applied to certain Christian sects regarded as heretics—first thus called *c.* 200 A.D. (mentioned by Epiphanius); these lasted till IV. cent.; then to Ger. sect in XII. cent. who abstained from marriage and denied generally Catholic ritual and sacramentalism; again in Italy *c.* 1260–1300—led by Dolcino of Novara (executed 1307); only occasionally in XIV. cent.

APOSTOLIUS, MICHAEL (XV. cent.), Gk. theologian; zealous Platonist.

APOSTROPHE (Gk. turning away).—(1) Term in Gk. rhetoric for suspension of discourse, in order to address a person present, and ultimately applied to such address; hence Eng. application to passionate invocation of any kind. (2) Sign used to denote omission of letter, as in possessive case where original vowel of inflection has been omitted.

APOTACTICS, APOTACTITES, early Christian sect who adopted poverty.

APOTHECARY, one who prepares, sells, and prescribes drugs. An a. differs from a chemist and druggist in that he may prescribe drugs in addition to compounding and dispensing them. The Apothecaries' Society of London and Apothecaries' Hall in Dublin are empowered to grant licences to practise med. For Apothecaries' weights and measures, see WEIGHTS AND MEASURES.

APOTHEGM (also *apophthegm*), a terse remark or saying, under which heading many brief proverbs might be classed.

APOTHEOSIS, deification; due to ancestor worship; frequently found in ancient Greece, where dead heroes came to be regarded as gods or demigods. In Rome it really began with the Empire, and Emperors were called *divi*; this continued even after conversion of Empire to Christianity. According to Herbert Spencer and others, this is the origin of religion. A. is also used figuratively in the sense of glorification.

APOXYOMENOS, celebrated marble statue in Vatican, representing athlete scraping himself with a strigil; supposed to be copy of statue of Lysippus (*q.v.*) on same subject.

APPALACHIAN MOUNTAINS (39° N., 77° 30′ W.), extend over 1300 miles from N. to S. along

Atlantic coast of U.S.A.; divided by Hudson and Richelieu valley and Lake Champlain into two unequal groups—Green and White Mountains to N., Alleghanies and Blue Mountains to S. Highest point is Black Dome (6707 ft.) in Blue Mountains, N. Carolina. A. valley divides system lengthwise in S. Railways cross by Mohawk and Potomac valleys, Cumberland and Swannanoa Gaps. Iron ore abounds.

APPALACHICOLA (30° 24′ N., 85° W.), river, Florida, U.S.A.

APPANAGE, provision made by a king, noble, or other person for the younger members of his family, other than the direct heir; might take the form of a grant of lands, the bestowal of an office, or a gift in money; also anything of a dependent condition.

APPARITION, visualised subconscious ideation, often due to intense emotional experience, or appearance due to suprasensual agencies (ghost or wraith); distinct from an illusion.

APPAUMÉE, heraldic term for a hand open, erect, with palm showing.

APPEAL, COURT OF, consists of the Lord Chancellor, the Lord Chief Justice of England, and the Master of the Rolls as *ex-officio* judges, and five ordinary judges, whose title is that of Lord Justice of Appeal. An appeal from a decision of a judge, or a judge and jury, provided that decision be a final judgment, may be entered within three months from the time when the judgment or order was signed. All appeals are by notice of motion, and the appellant must, at least one week before the appeal is likely to come on, leave three copies of the notice of appeal, three copies of the judgment, and three copies of the pleadings. The respondent to the appeal may apply to the Court of Appeal for security for costs, and this is usually granted if the appellant is poor, or the appeal is of a frivolous nature. A party dissatisfied with a judgment or order may apply for a new trial within eight days after the trial, if it took place in London or Middlesex. If the trial took place elsewhere, notice of motion for a new trial must be served within seven days after the end of the Circuit in which the trial took place. An appeal may be based on the following grounds: misdirection of the jury, or rejection or wrong admission of evidence; discovery of fresh evidence; jury's verdict against weight of evidence; that there was no evidence to go to the jury; or that the defeated party was taken by surprise. In U.S.A. the 9 Circuit C's of A. are composed of 3 (or 2) judges chosen from: the Supreme Court justice for the circuit, and the circuit and district judges (no judge who tried original case to try appeal).

APPEAL, CRIMINAL, a person convicted on indictment, criminal information, or Coroner's inquisition, or as an incorrigible rogue, has a right of appeal to the Court of Criminal Appeal, on any ground which involves a question of law alone. If the ground of complaint involves a question of fact alone, or a question of mixed law and fact, or is directed against the severity of the sentence, the leave of the Court of Criminal Appeal, or a certificate from the judge who tried the prisoner that it is a fit case for appeal, is necessary before an appeal can be heard. Notice of appeal, or of an application for leave to appeal, must be given within ten days of conviction. The court has power to quash a conviction, or to vary a sentence. It has also power to impose a heavier sentence than that imposed by the judge at the trial.

APPELLANTS (*Lords Appellant*), name given to Lords Gloucester, Arundel, Derby, Nottingham, and Warwick, who in 1388 appealed (legal term for 'accused') favourites of Richard II. of treason.

APPENDICITIS, inflammation of the vermiform appendix of the large intestine, which is a slender, blind tube arising from the inner and back part of the cæcum about three-quarters of an inch below the ileo-cæcal junction, its average length being about three and a half inches. The disease occurs most frequently between the ages of ten and thirty, more often in males than females. It is due to bacterial infection, and may range from a simple catarrh to gangrene of the wall of the appendix. Concretions may, as a result of catarrhal inflammation, be formed in the tube from its fæcal contents, resembling date or cherry stones, for which they have been mistaken. Sudden pain, tenderness in the lower part of the right side of the abdomen, and often vomiting, are the first symptoms. The treatment, in slight cases, with the symptoms improving within twenty-four hours, is to relieve the pain with warm fomentations or an ice-bag on the abdomen, and give nothing by the mouth but sips of hot water; and in severe cases, which are not improving, prompt and early operation.

APPENDICULARIA, genus of free sea-swimming Tunicata (*q.v.*), resembling larval stages of other tunicate genera.

APPENDICULATA, term for group of cœlomate animals with hollow lateral appendages, comprising Chætopoda, Rotifera, and Arthropoda.

APPENZELL.—(1) (47° 20′ N., 9° 22′ E.) German-speaking canton, N.E. Switzerland, 1300 to 8000 ft. above sea-level; divided into Outer Rhodes (Prot.), with cotton and linen-weaving and dyeing, and Inner Rhodes (R.C.), with agriculture. Area, 162 sq. miles. Pop. (1910) 72,400. (2) (47° 20′ N., 9° 25′ E.) capital of Inner Rhodes. Pop. 4600.

APPERCEPTION, *conscious* process of perceiving (psychology).

APPERLEY, CHARLES JAMES (1777–1843), Eng. sporting author and journalist.

APPERT, BENJAMIN NICOLAS MARIE (1797–1847), Fr. philanthropist; devoted many years to improving the prison system, upon which subject he wrote several books; Legion of Honour (1835).

APPIAN OF ALEXANDRIA, Rom. historian who lived during reign of Trajan.

APPIAN WAY, VIA APPIA, ancient road, Rome to Tarentum.

APPIANI, ANDREA (1754–1817), Ital. fresco painter; achieved great success as a follower of Correggio; was patronised by Napoleon, whom he painted; much of his finest work is in the palace at Milan.

APPIN (56° 34′ N., 5° 22′ W.), district, E. of Loch Linnhe, Argyllshire, Scotland.

APPLE, fruit of *Pyrus malus,* tree belonging to order Rosaceæ; originally wild (crab-a.) in Asia and Europe, now cultivated in over 2000 species in temperate countries for eating, cooking, and manufacture of cider (*q.v.*). Many other fruits, *e.g.* custard apple, pine-apple, egg apple, have nothing but the name in common.

(1) The 'a. of Discord' was a golden apple thrown on the table at an Olympian banquet by Discord, and contended for by Hera, Athene, and Aphrodite. Paris, of Troy, when called upon to make the award, gave it to Aphrodite, and thereupon incurred the wrath of the two other deities. (2) When Hippomenes raced with Atalanta (*q.v.*) he cast three golden apples before her, and she, stopping to pick them up, lost the race. (3) The golden apples of the Hesperides (*q.v.*) were guarded by a dragon, and the gathering of these by Hercules constituted his twelfth labour. (4) 'A. of the eye,' literary epithet referring to something held in great regard. (5) 'A. of Sodom,' Dead Sea fruit, fair without, but full of ashes. (6) 'Adam's a.' (*q.v.*).

APPLEBY (54° 35′ N., 2° 29′ W.), town, Westmoreland, England.

APPLETON (44° 15′ N., 88° 25′ W.), town, Wisconsin, U.S.A.; univ.; paper-making. Pop. (1910) 16,773.

APPLETON, DANIEL (1785–1849), Amer. publisher, founder of firm D. A. & Co. One of important publications was *New American Cyclopædia.*

APPLETON, NATHAN (1779–1861), Amer. manufacturer and politician; introduced power-loom.

APPOGGIATURA, musical term for an accessary tone preceding an essential one; a kind of grace-note: it is of two kinds, 'short' and 'long.'

APPOINTMENT, POWER OF, in law, the power which is lodged in a person to realise property for the benefit of himself, or others.

APPOMATTOX COURT-HOUSE (37° 24′ N., 78° 49′ W.), village, Virginia. Here the Confederate army under Lee surrendered to Grant, 1865.

APPONYI, ALBERT, Count (1846–), Hungarian statesman.

APPORTIONMENT, legal term for the division of profits or liabilities in any undertaking; the proper distribution of rents from property in which there are general proprietors.

APPOSITION, grammatical term for placing as subject or object in sentence independent words or phrases explanative or extensive of each other, not connected by conjunction or relative pronoun. *E.g.* 'The third day comes *a frost, a killing frost*'; '*This royal throne of kings, this sceptred isle,*' etc.

APPREHENSION, term for arrest in Scots law; conception or consciousness of an object without applying criticism. See PSYCHOLOGY.

APPRENTICE, person who serves another in his profession, or trade, for a fixed period of years. The custom of apprenticeship dates back to about the latter half of the XII. cent., and during the ensuing period, down to comparatively modern times, the term of service was fixed at seven years, after which the a. became a member of the trade guild. The period of apprenticeship is now five years, or less. A master may administer corporal punishment to an apprentice who is under age. The agreement between the parties can only be cancelled by mutual consent, by the bankruptcy or death of the master, or the gross misconduct of the a.

APPROPRIATION, act of setting apart; to assume proprietorship in something; in ecclesiastical law, the annexation of a benefice.

APPROPRIATION ACTS, Eng. laws appropriating public funds for the use of the Government administration.

APRAKSIN, THEDOR MATRYEEVICH (1671–1728), Russ. general; prominent throughout reign of Peter the Great.

APRICOT (*Prunus armeniaca*), tree with ruddy golden single-stoned succulent fruit, originally cultivated in the East, now also in Europe and N. America. The kernels of some varieties, especially Musch-Musch, are edible.

APRIL, 2nd month in the ancient Roman calendar, and the 4th in the modern. It is suggested that the name is derived from Lat. *aperire*, meaning 'to open,' in allusion to the budding of plants and flowers.

A PRIORI, see A POSTERIORI.

APSARAS (Hindu myth.), female spirits who conduct the fallen warriors to paradise.

APSE, semicircular or polygonal covered recess at end of temple, basilica, or church, a feature in religious arch. from a little before the Christian era. In churches the a. most commonly forms the chancel at the E. end, but transepts often terminate in a's.

APSIS, point in the orbit nearest to or farthest from the centre of attraction, like aphelion or perihelion of a planet, or apogee and perigee of the moon.

APT (43° 52′ N., 5° 25′ E.), town, S.E. France. Pop. 6000.

APTERYGOTA, APTERA, widely distributed primitive wingless insects living in damp, dark places, consisting of two orders, bristle-tails (*Thysanura*) and spring-tails (*Collembola*); thorax and abdomen not well defined; they do not undergo metamorphosis, the young being miniature adults.

APTERYX, bird of same class as ostrich, of nocturnal habits, peculiar to New Zealand; rudimentary wings; feathers hair-like, loose, and pendent; eggs of extraordinary size.

APTIAN, marls, clays, and greensands constituting European subdivision of Lower Cretaceous rocks.

APULEIUS, LUCIUS (II. cent.), Latin philosopher and satirist; b. Madaura, in Africa; studied at Carthage and Athens; having m. a rich widow, he was accused by her family of having practised magic to gain her affections. His celebrated *Apologia*, which is still extant, was a successful vindication of his conduct. Apart from this work his fame rests chiefly upon the *Golden Ass*, a discursive romance containing the exquisite interlude concerning Cupid and Psyche, the work as a whole being a satire upon the vices of the age in general, and of the priesthood in particular. See trans. in Bohn's Classical Library.

APULIA (41° N., 16° E.), territorial division, S.E. Italy, including Foggia, Bari, Lecce; area, 7376 sq. miles; tableland in S., plain in N. Sheep, cattle, and horses are raised; fruits, grain, wine, olive oil produced. Chief ports are Brindisi, Bari, Taranto. Once inhabited by Apuli, Samnite tribe, A. belonged in turn to Romans, Ostrogoths, Lombards, Eastern Empire, Normans, Sicily, Italy. Pop. (1911) 2,128,600.

APURÉ (7° 15′ N., 70° W.), affluent of Orinoco, Venezuela.

APURIMAC (13° S., 73° W.), river, joining Ucayali, Peru.

APURIMAC (14° 10′ S., 72° 55′ W.), department, Peru. Area, 8187 sq. miles. Pop. 133,000.

APUS, a species of phyllopoda (see Entomostraca), now thought to be extinct.

APYREXIA, absence of fever in the course of a disease; also the interval between rises of temperature in intermittent fevers.

AQUA FORTIS (=strong water), commercial nitric acid.

AQUÆ (Lat. 'waters'), Roman name for the sites of mineral springs.

AQUÆ CUTILIÆ (42° 24′ N., 12° 58′ E.), mineral spring, Italy.

AQUAMARINE, gem-stone; transparent blue to greenish blue variety of beryl.

AQUARII, Christians who used water instead of wine in the Eucharist.

AQUARIUM, receptacle for keeping living fresh-water or marine animals and plants for amusement or study. The difficulties of preserving natural conditions, chiefly in maintaining the necessary percentage of oxygen, has been overcome by various contrivances used in aquaria connected with biological stations. The finest marine aquaria are kept at Naples, Trieste, Rovigno, Monaco, Villefranche, and Banyuls, for studying Mediterranean fauna and flora; Plymouth, Brighton, Port Erin, Millport, St. Andrews, for Brit. marine biology and fisheries; others, at Heligoland, Hamburg, Bergen, Helder, and Roscoff. Numerous marine and lacrustine biological laboratories and aquaria have been founded in America, Japan, and elsewhere, and have been of inestimable value not only to the progress of science but to the rational exploitation of an essential part of the world's food supply.

AQUARIUS, eleventh zodiacal constellation, between Capricornus and Pisces, symbolised by ♒.

AQUATIC, living in the sea or in fresh water.—**A. plants,** see Hydrophytes (article PLANTS).

A. animals occur in almost every group of the animal kingdom. They include the majority of invertebrates, and the young stages of many creatures which in adult life are terrestrial or aerial. Among their many diversities two features are very common—bodies or projections from the body with large superficial area to facilitate floating, or actively moving, more or less paddle-like (often numerous) appendages for swimming; and more or less gill-like structures which can utilise the oxygen contained in water for purifying the blood.

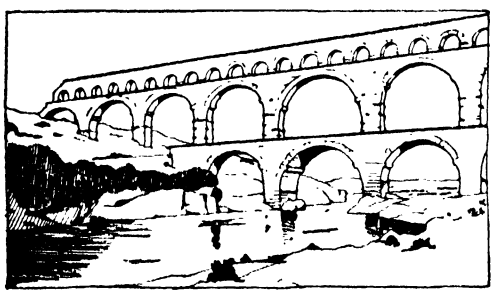
AQUATINT (Lat. *aqua*, water, and *tincta*, dyed), an etching, having somewhat the appearance of a wash-brush drawing, produced by the spaces being bitten in with acid.

AQUAVIVA, CLAUDIO (1542–1615), Ital. Jesuit;

5th general of Jesuit order (1579), which increased in influence under his able direction.

AQUEDUCT, artificial channel for conveying water flowing by gravitation, ordinarily, to supply the needs of a centre of population. In level districts traversed by rivers, like Egypt, Assyria, and Babylonia, and parts of the Levant, open canals with reservoirs were used in ancient times. The Phœnicians constructed waterworks of various kinds, for instance, subterranean channels in Cyprus and the towers for the artesian wells of Ras-el-Ain (Syria). Ancient Gk. a's were very efficient, and consisted of subterranean conduits, as well as basins and pipes of masonry, the best known examples being those of Samos, Athens, and Syracuse. The Romans, who devoted so much genius to the science and art of water supply, constructed long a's traversing valleys on a tier or tiers or arches. Rome was supplied with water by a dozen a's of a total length of over 300 miles. In the Provinces the magnificent existing testimonies to Roman enterprise are chiefly the beautiful Pont-du-Gard, part of the a. to Nimes, consisting of three tiers of arches, dry masonry except for the cemented channel on top; the a. bridges at Segovia (800 yds. long), Merida, and Tarragona; the a. near Metz and Mainz; and many waterworks in N. Africa, Asia Minor, Dacia, and Greece. The a. of Pyrgos and the a. of Justinian supplying Constantinople are notable instances of early mediæval engineering.

The material for the construction of a's necessarily varies with its availability and the nature of the country traversed. In western N. America wood has been used; the so-called 'flumes' cross valleys



PONT DU GARD, NÎMES.

and are carried along steep slopes on trestles; the Californian flume, used for timber transport, is over 50 miles in length; the High-Line Canal, Colorado, is in places 28 ft. wide and 7 ft. deep, and the San Diego flume (35 miles) is remarkable for its bold design, crossing several hundred trestle bridges. With the progress in iron and steel manufacture and the improvements in concrete, modern water supply is conveyed through cast-iron or steel pipes, their cheapness generally making large masonry works dispensable. Brickwork and concrete are, of course, necessary where tunnelling, so-called cut-and-cover work, and foundations for pipes have to be resorted to. Manchester is supplied with about 50,000,000 gallons of water daily by the Thirlmere a., 96 miles long, of which 14 miles are tunnels. Liverpool receives about 40,000,000 gallons from N. Wales by the Vyrnwy a.; the water supply of Glasgow—one of the best in Europe: up to 100,000,000 gallons, from Loch Katrine—is conducted through tunnels and pipes and over bridges of masonry, or through cast-iron troughs across smaller glens. Vienna has a famous a. from springs in the Styrian Alps, 60 miles distant. The Nadrai a. and Tansa a. in India are probably the largest in existence. New York can receive up to 425,000,000 U.S. gallons through the Old and New Croton a. and the Bronx River conduit. Among the best known canal a's in Great Britain are the Barton a., carrying the Bridgewater over Manchester Ship Canal, and the Ellesmere Canal a., across the Dee.

AQUEOUS ROCKS, those stratified rocks which have been formed by moving waters, such as rivers. See ROCKS.

'AQUIBA, BEN JOSEPH, Jewish Rabbi; head of a school at Jaffa; took part in the last revolt against Rome, and, being captured by Julius Severus, was flayed alive; was one of the first to reduce the Jewish traditions to a system.

AQUILA (the Eagle), constellation of N. hemisphere, S.E. of Lyra, known to the ancients.

AQUILA, CASPAR (1488–1560), Ger. reformer; friend of Luther, whom he aided in trans. of Old Testament.

AQUILA DEGLI ABRUZZI (42° 20′ N., 13° 25′ E.). (1) town, Italy; XVI. cent. citadel. Pop., commune (1911), 21,900. (2) province, Italy; area, 2484 sq. miles. Pop. (1910) 396,600.

AQUILA OF PONTUS (fl. 130 A.D.), convert to Jewish religion; made translation (utilised by Origen in his *Hexapla*) of Old Testament into Gk.

AQUILA ROMANUS (III. cent. A.D.), Lat. scholar, who wrote a work entitled *De Figuris Sententiarum et Elocutionis.*

AQUILEIA (45° 50′ N., 13° 5′ E.), town, Austria; Roman colony *c.* 180 B.C.; fortified 168 A.D.; almost totally destroyed by Attila, 452; St. Ambrose held council here, 381; seat of patriarchate till XVIII. cent.

AQUILON, the north wind.

AQUINAS, THOMAS—*i.e.* of Aquino—(*c.* 1227–74), theologian and saint; the *Angelic Doctor*; studied at Naples; became Dominican when seventeen; lectured at Rome and Bologna; canonised, 1323; greatest theologian of Western Church since St. Augustine, and greatest of the Schoolmen; best work, *Summa Theologiæ.* According to A., reason and revelation are the two sources of knowledge; revelation is based partly on Scripture, partly on the Church; reason and revelation cannot be contradictory, since they both rest on truth; religion and philosophy are complementary, not contradictory. Philosophically A. owes much to Aristotle and Pseudo-Dionysius.

Rickaby, *Scholasticism*; O'Neill, *New Things and Old in St. Thomas Aquinas.*

AQUINO (41° 30′ N., 13° 43′ E.), cathedral town, Italy; birthplace of St. Thomas Aquinas.

AQUITAINE, old province, in Garonne valley, France; held in turn by Romans, Visigoths, Franks; attained independence under successors of Charlemagne; came to Louis VII. of France through wife Eleanor, who subsequently m. Henry II. of England, uniting A. to Eng. crown, 1152; remained Eng. possession till *c.* 1451, when passed to France.

ARA (=censer or altar), a Southern constellation; only about twenty stars are visible to unaided eye.

ARABELLA STUART, see STUART, ARABELLA.

ARABESQUE, Moorish ornamental frieze or border, consisting of botanical figures—flowers, foliage, and tendrils—often interlaced in a most fantastic manner. Fine examples are to be seen in the Alhambra and other Moorish palaces of Spain, in some of the Span. cathedrals, and in many of the great Ital. cities.

ARABGIR (38° 58′ N., 38° 25′ E.), town, Asiatic Turkey. Estimated pop. 25,000.

ARABI PASHA (*c.* 1839–1912), Egyptian soldier, revolutionary leader, and war minister; b. Lower Egypt; started national Egyptian party; defeated by Wolseley at Tel-el-Kebir (1882); exiled to Ceylon; returned to Egypt (1901).

ARABIA (*c.* 12° 43′ to 34° 29′ N., 35° to 59° 30′ E.), most westerly peninsula, Asia, extending southwards from Persian Gulf and Gulf of Oman on E. and Red Sea on W.; united to Africa at Isthmus of Suez; length, *c.* 1500 miles; average breadth, *c.* 800 miles; area, *c.* 1,200,000 sq. miles. General surface is plateau with gradual decline from W. and S. to E. and N.; this plateau rises from elevation of 2500 ft. in N. to over 7000 ft. in S.W., and is

bounded by mountain ranges in S. and W.; between mountains and sea is strip of low fertile land which continues along practically whole of W. coast and about 400 miles along S. coast. Ptolemy subdivided country into *A. Petræa* in N.W., *A. Felix*, S. and W. coasts, and *A. Deserta*, remainder; but this division is obsolete. Northern part of A. is desert region, including Syrian Desert and Nafud or Red Desert; to N.W. is peninsula of Sinai. Central A. is mainly steppe region interspersed with fertile tracts; in W. is Hejaz, in E. El Hasa, and between them is Nejd. Southern A. includes great Dahna Desert in interior, Asir and Yemen on W. coast, Hadramut on S. coast, Oman on E. coast. Chief rivers are Wadi Hamd in Hejaz, Wadi Rumma in Nejd, Wadi Shahran, Wadi Bosha, Wadi Taraba in Asir. Principal mountains are Tehama range in Hejaz, Asir, and Yemen, all of which it divides lengthwise; among highest peaks are Jebel Sabur, Jebel Hadur; Shammar range in Nejd—highest peak, Jebel



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Fara; Akhdar Mountains in Oman; Mt. Sinai in N.W. There are volcanic hills in Yemen.

Climate generally is very dry and hot; in plains heat is excessive, in mountain regions of Yemen and Hadramut temperature is more moderate, and in Nejd great cold occurs in winter. Rainy season generally lasts from June till Sept. Simoon, a hot desert wind, blows from interior towards coast.

Geology.—Formation largely sandstone, with volcanic patches here and there; granite, limestone, and schists also occur.

History.—Thanks to many ancient inscriptions, recently discovered by Glaser and others, pre-Islamic history of A., formerly veiled in obscurity, is now traceable to period many cents. before Christian era, variously estimated at from IX. to XVI. cent. B.C. Among early kingdoms of which traces exist was that of Saba, which flourished from VIII. cent. B.C. onwards, and was ultimately superseded by Himyaritic kingdom late in II. cent. B.C. Himyarite stronghold was at Yemen, and they attained great power, the northern tribes also being under their sway for long. Mesopotamia, Persia, and Egypt all tried to subdue Arabs without success; Alexander of Macedon had arranged to invade country shortly before his death, and Romans made an unsuccessful invasion. For a long time struggle went on between Himyarites and Abyssinians, and latter held Yemen between 535 and 605, when former were restored by aid of Persia. Soon after this, however, arose Muhammad, who aimed at uniting whole of A. and establishing his religion; his followers overthrew Himyarites, and caliphate was established.

Reigns of first three caliphs were time of A.'s greatest prosperity, 632–656; Syria, Egypt, and Persia were conquered, and Muhammadan dominion spread over N. Africa and into Spain. Caliphs were of Ommayyad dynasty from 658 to 750, when 'Abbasids succeeded, to be followed in turn by Fatimites in early X. cent. With growth of Muhammadan power in W., and removal of seat of government from Damascus to Bagdad, A.'s importance gradually declined, and numerous independent principalities arose. Yemen was held by Egypt from about middle of XIII. cent., and with Hejaz came into hands of Turks in 1517. Latter has belonged to Turkey ever since, except for two short intervals, when it was held by Egypt; former regained virtual independence in 1633, and was ruled by native princes till 1871, when last native ruler was overthrown and state again passed to Turkey. Eastern state of Oman had meantime become of some importance, retaining independence for several cent's despite Persian attempts at conquest; from 1508 the chief town, Muscat, was held by Portuguese, who were finally banished in 1698, since when it has been ruled by native princes; included in Brit. sphere of influence, 1905. In central A. Wahhabi empire was established about 1760 by Abd-ul-Wahhab, a religious reformer; Wahhabi dominions at one time included El Hasa, Nejd, Mecca; but they lost much of their power by war with Egypt, which ended in their defeat, 1818. They still hold Nejd, but their other territories are now independent or subject to Turkey.

Divisions.—Hejaz, Yemen, and El Hasa belong to Turkey, Aden to Britain; remainder is ruled by independent emirs and sheikhs. Britain has established sphere of influence in Hadramut, Oman, and district surrounding Aden. Peninsula of Sinai belongs to Egypt.

Language and Literature.—Oldest pre-Islamic poems are collection called the *mu allaqât*, including poems by Imru'u'l-Qais, Tarafa, Zuhair, Labîd, 'Amr ibn Kulthûm, 'Antara, Al-Hârith ibn Hilliza (identity of last two doubtful). Of these Imru'u'l-Qais and Zuhair rank, with Nâbigha Dhubyânî, as three greatest Arab poets of this period, to which Samaual, a poet of Jewish descent, also belongs. Earliest prose work is the *Koran*,

consisting of speeches and teaching of Muhammad, said to be revealed to him by an angel; it is written in rhymed prose; its arrangement is artificial, according to length of chapters. Among poets of Omayyad times were 'Umar ibn Abí Rabí'a, many of whose poems were set to music and became popular songs; Al-Akhtal, who sang the valiant deeds of the caliphs; Ferazdaq, whose speciality was satire, and who was a confirmed plagiarist; and Jarír, rival of last-named satirist, and popular favourite. Chief poets of 'Abbasid period were Abu Nuwás, VIII. cent., Abu Tammám, and Buhturi, IX. cent.; Ibn Fárid was great mystic poet of XIII. cent., and Busiri (XIII. cent.) wrote poem on Muhammad. Among lexicographers and grammarians are Al-Khalil and Abu al-Walid al-Duali; historians, Muhammad ibn Ishaq, who wrote biography of Muhammad, and Tabori, author of universal history. There were many writers on philosophy, including Ibn Tufail and Ibn Roshd in XII. cent. *Book of 1001 Nights* ('Arabian Nights' Entertainments'), said to be translation from Persian. See also ARABS.

Resources and Productions.—A. has no forests, but there are long stretches of grass, which afford excellent pasture for horses, for which country has long been famed. Large numbers of camels, sheep, goats, and oxen are raised. Vegetable products are dates, coffee, cereals, fruits, spices, drugs, gums, resin, sugar, cotton. Minerals include silver, iron, lead, sulphur, precious stones. There are few manufactures; coarse linens and woollens made by Bedouin women, also hair bags. Trade is carried on chiefly by caravans, which bring quantities of merchandise both for internal use and to distribute among pilgrims; exports coffee, dates, figs, spices, drugs. Communications are chiefly by sea or caravan, but a railway is being built from Damascus to Mecca. Chief seaports, Maskat, on Gulf of Oman, Jedda and Hodeida, on Red Sea; good harbour at Aden, on S. coast.

Inhabitants are traditionally of Arab and Ishmaelitic stocks; former represented by agricultural population round coast, latter by Bedouins of desert and central A. In S. are many Jews. Principal religion is Muhammadanism; every year pilgrimage, or *haj*, is made to holy city, Mecca, by thousands of devotees. Pop. *c.* 5,000,000. See ARABS.

Travels of Niebuhr, Burckhardt, Burton, and Palgrave; Hogarth, *Penetration of Arabia* (1904); Zwemer, *Arabia, the Cradle of Islam* (1900); Sir W. M. Ramsay, *Historical Geography of Asia Minor* (1890); Huart, *Arabic Literature* (1903).

ARABIAN SEA (14° 40′ N., 68° 58′ E.), part of Ind. Ocean, between India and Arabia.

ARABIC FIGURES, see NUMERAL.

ARABICI (III. cent.), body of Christian materialists.

ARABIN, ARABIC ACID, $(C_6H_{10}O_5)_2+H_2O$, white, amorphous precipitate, obtained by adding hydrochloric acid and alcohol to an aqueous solution of gum-arabic.

ARABISTAN (31° 50′ N., 50° E.), province, Persia. Pop. *c.* 200,000.

ARABS, general name given to the people who at the present day inhabit, besides Arabia itself, parts of North Africa and Mesopotamia, and extensive districts on the coasts of the Red Sea and the Persian Gulf; and who conquered Spain and other parts of S. Europe in Middle Ages. The purest type is found in the neighbourhood of Hadramut and Yemen, and amongst the Bedouin nomads of the central Arabian desert. The A's of the coasts are often of very mixed descent. The pure-blooded A's are tall, lean, long-limbed, and muscular, brown-skinned, black-eyed, oval-faced, and with handsome features and beautiful teeth. They live simply and abstemiously, and are scrupulously clean in their habits. Their food consists of roughly ground wheaten cakes, rice, locusts, mutton and camel's flesh, tea coffee, butter, dates, etc. In character the Arabs are often proud, revengeful, and treacherous, but are capable of pity and gratitude, and are proverbially hospitable to strangers. Less to their credit is the A. association with the African slave-trade, their victims, over a very long period, having been obtained from the Sudan, Somaliland, and other places. The European powers have made strenuous efforts to suppress this iniquitous traffic, but it was not until the end of the XIX. cent. that the trade was arrested to any extent. In 1873 the Sultan of Zanzibar signed a treaty whereby he undertook to suppress the traffic.

Arabian Philosophy, not properly an Arabian system of thought, but a phase of Aristotelianism, finding expression in the A. tongue, and somewhat modified by Oriental influences; its abstract nature is entirely foreign to the lyrical and prophetical genius of the country, and its greatest exponents are not strictly Arabs, but Jews, Persians, and Spaniards. Its development is due to the expulsion of the Nestorian Christians from Syria in the V. cent.; these, finding refuge and patronage in Persia, introduced thither their Gk. science and philosophy. By the VIII. and IX. cents. there were numerous translations, first into Syriac and thence into Arabic, of Aristotle's writings, which henceforth received faithful interpretation but little further development. This learning was carried into Europe by the march of the victorious armies of Islamism; whence the rise of western schools, at Cordova, Granada, Toledo, Sevilla, Murcia, Valencia, and Almeria, as well as the eastern schools at Bagdad, Barsova, Bokhara, and Kufa. The most flourishing period extended from the IX. cent. to the XII., and while Christian Europe was in intellectual darkness, Andalusia, under Muhammadanism, was a centre for the diffusion of Eastern learning; books commanded high prices, there was keen search for manuscripts, and in the mosques, lectures on law, science, lit., and religion were delivered to crowded audiences.

The chief A. philosophers were Al-Kindi of Bagdad, IX. cent., translator of Aristotle and leader of the first philosophic revolt against Muhammadanism; Al-Farabi, X. cent.; Avicenna the Persian, XI. cent.; Al-Hazen; Avempace of Cordova, XII. cent.; Al-Gazel; Averroes, XII. cent., the last great Muslim thinker in the West. Their teachings profoundly influenced the later Scholastics. Thus the influence of Avicenna, who approached philosophy from a religious standpoint, and taught a doctrine of emanation, of active intellect common to all men, derived from God and returning to God, is evident in Dante and the Mystics; Averroes, whose philosophy is mainly Aristotelian, and who denies immortality and affirms a return to the 'Oversoul,' an emanation from God, influences Roger Bacon, Pomponazzi (*q.v.*), and Duns Scotus.

The A. philosophers were all of good family and held important positions in society. Much given to scientific studies, they did not separate med. and the physical sciences from philosophy. In astron., chem., and med. they observed facts, but reached no new laws; their math's was rendered useless by its adoption of Alexandrian metaphysics and Chaldean astrology.

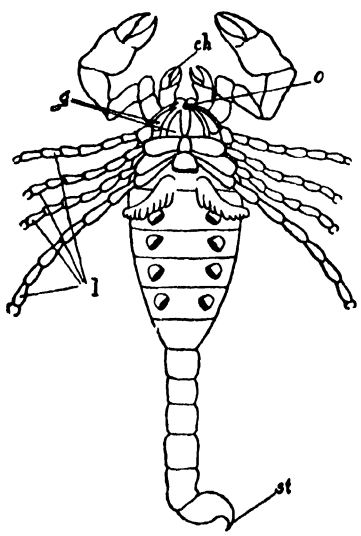
ARACAJÚ (11° 5′ S., 37° W.), port, Brazil. Pop. *c.* 22,000.

ARACATY (4° 30′ S., 37° 50′ W.), port, Brazil. Pop. 20,200.

ARACHNE (classical myth.), a Lydian weaver who challenged comparison with the work of Athena. The jealous goddess, unable to find any fault, destroyed the work, whereupon A. hanged herself, but was afterwards changed into a spider. The story is related by Ovid.

ARACHNIDA, a heterogeneous class of the phylum Arthropoda, including spiders, mites, scorpions, king-crabs, and trilobites. The anterior segments are usually fused to form a cephalothorax, with six pairs of appendages, of which the first two are modified for seizing food, and the others contain excretory (coxal) glands. Many forms are provided

with an internal plate-like skeleton, the endosternite. An elongated heart is found in the dorsal side of the abdomen. The sexes are separate, and the young generally resemble the adults. The following classification gives an outline of the characters of the different orders: (1) *Scorpionidæ*, animals with an elongated abdomen bearing a spine with a poison gland at the tip. The first appendages are shaped



A SCORPION AS AN EXAMPLE OF ARACHNIDA VIEWED FROM BELOW. *ch*, cheliceræ; *g*, chewing processes borne at the bases of *l*, the walking legs; *o*, mouth; *st*, sting, at tip of post-anal piece.

somewhat like the claws of a lobster, with which they seize their prey. The latter (small animals) are stung, and the blood and juices sucked out. The scorpions breathe by means of 'lung-books,' which have been regarded as being either modified tracheæ (respiratory tubes) or modified gills. They live in warm countries, hiding during daytime, but very active at night. The 'book-scorpions' and the long-legged 'harvestmen' (not to be confused with the harvest-bugs) eat minute insects and occur in northern countries, and are referred to orders distinct from the true scorpions. Scorpions have been found in Silurian and Carboniferous strata.

(2) *Araneidæ* or spiders are very widely distributed, and have very complex habits. Their body, consisting of a cephalothorax and abdomen connected by a narrow waist, is covered by a chitinous cuticle which is moulted during growth. The first appendages are modified as venomous fangs, while the second ones help in mastication, and, in the males, are used as copulatory organs. The senses are well developed, especially the touch, and vision by means of two or three rows of simple eyes. They breathe through complicated lung-books. Many spiders are provided with 'spinnerets,' organs secreting a kind of silk, which are under the control of the spinner. The threads are used for making traps to ensnare insects, for lining the often ingeniously constructed nests, for egg-cocoons, and for climbing purposes. Courtship is complicated, and the males are often brilliantly coloured to attract the females. The common garden spider, the house spider, the large tropical mygale (which can kill small birds), the jumping spiders, and the aquatic Agyroneta are well-known types. (3) *Acarina*, mites and ticks, are generally unsegmented, the abdomen being fused with the cephalothorax. They are frequently parasitic, *e.g.* the itch-mite, follicle-mite, harvest-mites, and ticks. The cheese-mites, water-mites, and the red spider are also well-known members of this order.

(4) *Xiphosura* are represented by the king-crab Limulus, with a horseshoe-shaped cephalothorax, and abdomen ending in a long spine, and live in shallow water off the Atlantic shores of N. America, the West Indies, and Eastern Asia. (5) *Eurypterina* are extinct marine animals found in Ordovician to Carboniferous formations, some attaining a length of over 5 feet. (6) The *Trilobita* are compact extinct forms, which flourished chiefly in Cambrian times. The last three orders may be united into a class, Palæostraca. The aberrant Pentastomida, the Tardigrada (sloth-animalcules or water-bears), and the Pycnogonida (sea-spiders), which climb about hydroids and seaweed, are also included in the class Arachnida.

R. I. Pocock, *Arachnida of British India* (London, 1900); Ellis, *Spiderland* (1912); C. Koch, *Die Arachniden*, 16 vols. (Nürnberg, 1831–48).

ARAD and NEW ARAD (46° 13′ N., 21° 17′ E.), town, Hungary. Pop. (1910) 63,166.

ARAF, AL (Arab.), region vaguely described in *Koran*, and variously interpreted by Muhammadans as Limbo or Purgatory.

ARAFAT, MOUNT, hill, near Mecca, visited by Muslim pilgrims.

ARAFURA SEA (10° 50′ N., 132° E.), sea between New Guinea and Australia.

ARAGO, DOMINIQUE FRANÇOIS JEAN (1786–1853), Fr. physicist; app. when nineteen, sec. at Paris Observatory; through Laplace's influence became Biot's assistant for meridional measurements. In the Balearic Islands he was imprisoned as a spy, escaped, and, after adventures in N. Africa, returned to France. App. prof. of Analytical Geometry and astronomer of the Paris Observatory at the age of twenty-three, he became famous for his astronomical lectures. With Gay-Lussac he founded the *Annales de chimie et de physique*; for his researches on rotary magnetism he received the Royal Society's Copley Medal, 1825; he further investigated polarisation of light, and made numerous other important discoveries in optics and magnetism. A. was a member of the Provisional Government, 1848; his political activity was of great value to Fr. science.

Arago's *Œuvres*, 17 vols. (1854–62); Rev. Baden Powell trans. of his *Autobiography* (London, 1858).

ARAGON (41° 50′ N., 0° 30′ W.), ancient kingdom, Spain, dating from XI. cent.; capital, Saragossa; united with Castile in 1479; now forms provinces of Huesca, Zaragoza, Teruel; area, 18,294 sq. miles; surface is hill-encircled plain, watered by Ebro. Pop. (1911) 950,633. See SPAIN.

ARAGONITE ($CaCO_3$), mineral, discovered in Spain; orthorhombic crystals usually twinned, calcite being its stable dimorph. Fibrous a. is termed satin spar.

ARAGUA (9° 25′ N., 64° 55′ W.), state, Venezuela. Pop. *c.* 95,000.

ARAGUAYA (8° S., 50° 30′ W.), river, Brazil; joins Tocantins.

ARAKAN (21° 6′ N., 92° 50′ E.), province, Lower Burma; Brit. since 1826; capital, Akyab; chief river, Koladaing; rice, timber, salt, coal, iron. Pop. 762,102.

ARAKCHEEV, ALEXSYEI ANDREEVICH, COUNT (1769–1834), Russ. general; entered army (1788); being a capable artillery officer, he won rapid promotion; cr. baron (1797); subsequently colonel of whole Preobrazhenski Guard; count (1799); inspector-general of artillery (1803); war-minister (1808); counsellor and senator (1810). A. reorganised the army, and was a stern disciplinarian and energetic conscientious administrator.

ARAL (45° N., 60° E.), second largest inland sea, W. Asia; water slightly saline; present area, *c.* 26,230 sq. miles, but is diminishing; receives waters of Amu-Darya and Sir-Darya; has innumerable islets

on E. side, larger ones farther N.; surrounded by desert lands; contains sturgeon, etc.

ARAM, EUGENE (1704–59), Eng. schoolmaster and murderer; b. Ramsgill (Yorks); was self-educated, but acquired considerable learning, and was a schoolmaster at Netherdale, Knaresborough, and Lynn (Norfolk); was the first scholar to draw attention to the affinity existing between the Celtic and other Indo-European languages. He was found guilty of the murder, thirteen years earlier, of Daniel Clark, whose body he hid in a cave at Knaresborough. He eventually confessed his guilt, asserting that Clark had been intimate with his wife, and was hanged at York, after having attempted to commit suicide; subject of novel by Bulwer Lytton, and poem by Thomas Hood.

ARAMAIC, Semitic language, or dialect, anciently spoken in Syria and Mesopotamia. It was employed, amongst others, by the Samaritans, and is believed to have been the language spoken in Palestine during the time of Christ.

ARAN ISLANDS (53° 6′ N., 9° 44′ W.), islands, W. Irish coast.

ARANDA, PEDRO PABLO ABARCA DE BOLEA, COUNT DE (1718–99), Span. general and statesman; built up Span. navy; procured expulsion of Jesuits; succ. in supreme power (1774) by Florida Blanca; was subsequently ambassador in Paris till 1787.

ARANEIDÆ, see ARACHNIDA.

ARANJUEZ (40° 2′ N., 3° 33′ W.), town, Spain; ancient royal palace. Pop. 12,670.

ARANY, JÁNOS (1817–82), Hungarian poet; in his early years he led an unsettled life, and was for some time an actor. He first made his mark as a poet with a satirical poem, *The Lost Constitution* (1845). He is perhaps best known as the author of an epic trilogy, *Toldi* (1847), *Toldi's Evening* (1854), *Toldi's Love* (1879). Other poems by him are: *The Conquest of Murany*, *The Death of Buda*, and *The Gypsies of Eida*. He also trans. several plays of Shakespeare, and the *Comedies of Aristophanes*. A. was one of the greatest of Hungarian poets, giving a character and nobility to its lit. which were previously wanting.

ARAPAHO, N. Amer. Indians now found in Oklahoma and Wyoming.

ARAPILES, LOS (40° 56′ N., 5° 37′ W.), small Span. town in province of Salamanca. Pop. 557; scene of victory of Wellington in Peninsular War, July 22, 1812.

ARARAT (39° 40′ N., 44° 15′ E.), mountain, Armenia, traditionally connected with Noah's Ark; consists of double volcanic peak, Great and Little A., respectively *c.* 17,000 and *c.* 13,000 ft. above sea-level; also called Mt. Massis; snow-line about 14,000 ft. above sea-level; first ascended in 1829.

ARARAT (37° 17′ S., 142° 54′ E.), town, Victoria. Pop. 3580.

ARAROBA POWDER, GOA POWDER, obtained from trunk of a tree (*Andira Araroba*) chiefly growing in province of Bahia, Brazil; powerful irritant and weak parasiticide.

ARAS (40° 5′ N., 43° E.), river, Asiatic Turkey and Russ. Armenia.

ARASSUAHY (16° 45′ S., 41° 40′ W.), town, Minas Geraes, Brazil. Pop. 44,000.

ARATUS (315–245 B.C.), Gk. poet and astronomer; contemporary of Theocritus, whose poems have been trans. by Cicero and others; A. is quoted in *Acts* xvii. 28.

ARATUS OF SICYON (271–213 B.C.), Gk. general and statesman; promoted Achæan League.

ARAUCANIA (38° 45′ S., 73° 5′ W.), territory, Chile, S. America. **Araucanians**, S. Amer. Indians living in Chile; of fine physique and considerable intelligence, nomadic habits, and warlike spirit, they offered fierce resistance to early Span. invaders.

ARAUCARIA, genus of evergreen Coniferæ, native of S. America and Australia—*A. imbricata*, 'monkey-puzzle,' grows in Britain.

ARAUCO (38° S., 73° 10′ W.), province, Chile. Pop. (1910) 62,260.

ARAUJO E AZEVEDO, ANTONIO DE (1754–1817), Count of Barca, Portug. statesman and diplomatist; on Fr. invasion (1808) assisted in royal flight to Brazil.

ARAUJO PORTO ALEGRE, MANOEL DE (1806–79), Brazilian poet who wrote on national themes, *Colombo*, *Brasilianas*, etc.

ARAVALLI HILLS (24° to 27° N., 72° to 75° E.), mountains from Gujarat through Rajputana and Ajmere Merwara, India; highest peak, Mt. Abu.

ARAWAK, S. Amer. Indians living in Guiana.

ARBACES.—(1) Mythical prince who defeated Sardanapalus (*q.v.*) and established Median empire. (2) General in army of Artaxerxes Memnon, 401 B.C. (3) Hero of Beaumont and Fletcher's *King and No King*.

ARBALIST, ARBALEST (from Late Lat. *arcuballista*), weapon of mediæval warfare which combined form and functions of cross-bow and gun.

ARBE (44° 48′ N., 14° 45′ E.), Austrian island, Adriatic. Pop. 4441.

ARBELA, ARBIL (36° 10′ N., 44° 20′ E.), town, Assyria; here Alexander the Great finally defeated Darius, 331 B.C. Pop. *c.* 4000.

ARBER, EDWARD (1836–1912), Eng. scholar; Fellow of King's Coll., London; D.Litt. (Oxon); F.S.A.; editor of *An English Garner* (1880–83), and numerous other reprints of rare books.

ARBITRAGE, term used for a traffic in stocks and shares by which a dealer buys in a relatively cheap market and sells in a dearer; also judgment by an arbitrator, but in this sense it is now practically obsolete.

ARBITRATION, a method of settling civil disputes without litigation; governed by the Eng. Arbitration Act (1889). By this Act disputants may arrange to submit matters of difference to the decision of one or two arbitrators, a custom which is increasing in popularity amongst trading concerns. The Arbitration (Scotland) Act (1894) differs in some of its details from the Eng. Act.

International A., the settlement of differences between independent countries by referring the matter in dispute to selected persons, who pronounce judgment after hearing the evidence tendered by both sides, it being understood that the award must be in accordance with international law. Many efforts have been made to establish permanent arbitration courts, and in 1873 a motion was carried in the House of Commons that the Powers should be urged to agree to such an arrangement. On the suggestion of the Tsar a peace conference was held at The Hague, in 1899, to which nineteen States sent delegates, and an international tribunal, known as 'The Hague Court,' was agreed to. Each State signing the convention had the power of nominating four persons of eminence in international law, who were willing to serve as arbitrators. In Oct. 1903 the Fr. Ambassador and Lord Lansdowne (Foreign Sec.) signed an agreement that questions of a judicial character, or relating to the interpretation of treaties, arising between Great Britain and France, should be referred to the Hague Court. That tribunal met on Nov. 13, 1903, to consider matters in dispute between Venezuela on the one hand and Britain and other European powers on the other. There is a growing tendency in favour of referring international disputes to arbitration, as is shown by the fact that, during the three years ending 1903, more than fifty cases were so referred. Later disputes thus settled have been between Great Britain, France, and Germany on the one hand, and Japan on the other, with regard to a certain tax levied by the latter power (1904–5); and at a little later date a delicate matter was settled with regard to the French flying their flags in the Red Sea and upon the littoral of S.E. Arabia. During the year 1911, arbitration treaties were drawn up between Britain and the U.S.A., and between the latter country and France. See PEACE MOVEMENT.

Industrial A., method of arriving at an amicable settlement between employers and employees, or other disputing parties. If the disputants seriously agree to settlement by a third party, the method is known as 'arbitration.' If, however, no such agreement is come to, the work of the mediator who endeavours to bring about an amicable settlement is described as 'conciliation.' By the Brit. Conciliation Act (1896) Conciliation Boards may be established, and registered with the Board of Trade, for the purpose of settling disputes between employers and workmen by conciliation or arbitration. Where differences exist, or are apprehended, the Board of Trade has power to inquire into the circumstances and to take steps for bringing together the representatives of either party with a view to an amicable settlement. Moreover, if either party desires it, the Board of Trade may appoint a Conciliation Board; and if both parties desire it, an arbitrator may be appointed. New Zealand Industrial Conciliation and A. Act (1894) makes the award of the Court of A. compulsory; New S. Wales and W. Australia have copied New Zealand legislation. Australian Commonwealth passed compulsory a. law, 1904, to deal with disputes of more than one state. Brit. Trade Unionists are in the main opposed to compulsion.

Russell, *On Arbitration and Award* (1906); Darby, *International Tribunals* (1904); Knoop, *Industrial Conciliation and Arbitration* (1905); Jeans, *Conciliation and Arbitration in Labour Disputes.*

ARBLAY, D', see D'ARBLAY.

ARBOGA (59° 24′ N., 15° 50′ E.), town, Sweden. Pop. 5254.

ARBOGAST (IV. cent.), Rom. barbarian general.

ARBOGAST, LOUIS FRANÇOIS ANTOINE (1759–1803), Fr. mathematician.

ARBOIS (46° 54′ N., 5° 46′ E.), town, Jura, France; wines. Pop. 4210.

ARBOIS DE JUBAINVILLE, MARIE HENRI D' (1827–1910), Fr. historian and philologist; was prof. of Celtic in the Collège de France; author of *Introduction à l'Étude de la littérature celtique* (1883), *L'Epopée celtique en Islande* (1892), *Études sur le droit celtique* (1895), etc.

ARBOR DAY, day app. for the public planting of trees for encouragement of forestry in U.S.A., and observed as a holiday. The date varies in different States.

ARBOR VITÆ, tree-like appearance of vertical section through cerebellum (anat.); tree of genus *Thuja* (bot.).

ARBORETUM, a place set apart for the scientific cultivation of trees and shrubs. See BOTANIC GARDENS.

ARBORICULTURE, the science and art of cultivating trees. See FORESTRY.

ARBROATH, ABERBROTHOCK (56° 33′ N., 2° 35′ W.), seaport, Forfarshire, Scotland; linen manufacture, sailcloth, leather, bleach-fields; tidal harbour; shipbuilding works; ruined abbey. Pop. (1911) 20,600.

ARBUES, PEDRO DE, ST. (1441?–85), Span. inquisitor; app. first inquisitor for Aragon, 1484; zeal led to his murder; canonised, 1661 and 1867.

ARBUTHNOT, ALEXANDER (1538–83), Scot. poet and ecclesiastic.

ARBUTHNOT, JOHN (1667–1735), Scot. physician and humorist; F.R.S.; friend of Swift, Pope, Gay, and others; physician to Queen Anne; author of *History of John Bull* and *Memoirs of Martinus Scriblerus*; also *An Argument for Divine Providence* (1710), *Effects of Air on Human Bodies* (1733), *Nature of Ailments, Table of Ancient Coins*, and other works.

ARBUTUS, genus of shrubs and trees of the order Ericaceæ, occurring in S. Europe, Asia, and America. *A. unedo*, the strawberry tree, grows near the Lakes of Killarney, cultivated in Britain as an ornamental evergreen. *A. Menziesii*, the Madroña, grows to 100 ft. high in California.

ARC, part of circumference of circle or other regular curve; part of apparent path of heavenly body; curved flame between two electrodes through which current is passed—*electric* a.

ARC, JEANNE D', see JOAN OF ARC.

ARCACHON (44° 40′ N., 1° 12′ W.), port and health resort, Gironde, France; famed for oysters. Pop. 9000.

ARCADE, a series of arches supported by columns or piers, such as may be seen in the Ducal Palace at Venice; where they appear as relief work against a wall they are termed 'blind arcades,' many examples of which are to be seen in the older Eng. cathedrals; the term is also used in modern times for a covered avenue between buildings, such as the Burlington Arcade, London.

ARCADELT, JACOB (1514–60), musical composer of Netherlands; famous singer and author of masses, madrigals, etc.

ARCADIA (37° 34′ N., 22° 13′ E.), department, Greece. Shut off by mountains, A. did not share in the civilisation of Greece. Inhabitants, a pastoral people mainly, were lovers of music and dancing: hence poetic ideal of A. Pop. 162,000.

ARCADIUS (378–408), Byzantine emperor; s. of Rom. emperor Theodosius, on whose death (395) the empire was divided between A. and his bro. Honorius. A. governed the eastern prefectures; his reign was marked by Alaric's invasion of Gk. peninsula (395–96), and exile of Chrysostom, Constantinopolitan patriarch (404); he was a weak, incompetent emperor.

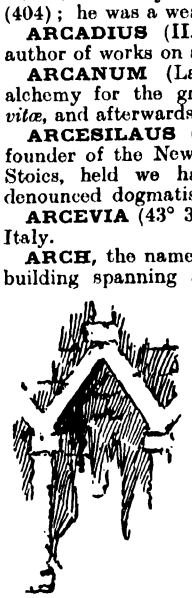
ARCADIUS (II. cent. A.D.), Gk. grammarian; author of works on syntax and orthography.

ARCANUM (Late Lat. secret place), term in alchemy for the great secret of nature, the *elixir vitæ*, and afterwards for secrets of quack doctors, etc.

ARCESILAUS (316–241 B.C.), Gk. philosopher, founder of the New Academy, who, in opposition to Stoics, held we have no criterion of truth, and denounced dogmatism.

ARCEVIA (43° 31′ N., 12° 56′ E.), town, Ancona, Italy.

ARCH, the name usually given to the section of a building spanning an opening, or passage, usually curved, and composed of wedge-shaped blocks of stone, or bricks. An a. may be round, pointed, trefoil, or varieties of these shapes. A's are distinguished in architecture by the distinct styles to which they belong; thus all Norman or Romanesque a's are round, the earlier ones plain, while a later development



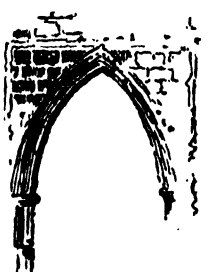
SAXON ARCH.



NORMAN ARCH.



EARLY ENGLISH (LANCET) ARCH.



DECORATED ARCH.

added the familiar zigzag decoration known as 'dog-tooth.' The Norman style was followed by the Gothic, which was pointed, and embraces Early English, Decorated, Perpendicular, and Tudor, covering the historic period from about the end of the XII.



PERPENDICULAR ARCH.



TUDOR ARCH.

cent. to the middle of the XVI. A's have also been built to stand by themselves as triumphal monuments, particularly by the ancients. Surviving examples of this kind are the Arch of Titus (80 A.D.); the Arch of Septimius Severus (203 A.D.); and the Arch of Constantine (312 A.D.), all at Rome. Others at Ancona, Orange, St. Rémy, and elsewhere in Italy and S. France. The Arc de Triomphe de l'Etoile, in Paris, completed in 1836, may be cited as a modern example.

ARCH, JOSEPH (1826–), Eng. politician; s. of an agricultural labourer in Warwickshire; self-educated; founded National Agricultural Union (1872).

ARCHÆOLOGY, the study of antiquities, which includes the art and architecture, and the customs, manners, and beliefs of early peoples, such as may reasonably be deduced from ancient monuments, and remains discovered in tombs, caves, river-drift, etc. A. was formerly taken as differing from history, which relies chiefly upon authenticated documents and recorded dates, while a. seeks to make out a connected story of man's development upon earth by a comparison of objects found in one country, under certain geological conditions, with similar objects found in another country. But the historian of to-day, in treating of the periods covered by a., makes use of its material and conclusions, whence a. has become, strictly, a department of history.

The science of a. is associated, to a certain extent, with the study of geology, philology, and anthropology. Though first applied only to the antiquities of Greece and Rome, the term is now generally understood to refer to the entire range of human development, from the prehistoric period down to the Middle Ages.

The study of a. may hardly be said to have been taken up systematically before the XIX. cent., and it was the Scandinavians who then attempted to reduce the study to an exact science by classifying the different periods of man's development, and attempting the fixing of their dates. Hereunder is given the classification arrived at by the Dan. archæologist Worsaae: (1) the Early Stone, or Palæolithic Age, dating back to about 3000 B.C.; (2) the Later Stone, or Neolithic Age (2000 to 1000 B.C.); (3) the Early Bronze Age (1000 to 500 B.C.); (4) the Later Bronze Age (500 B.C. to birth of Christ); (5) the Early Iron Age (1 to 450 A.D.); (6) Middle Iron Age (450 to 700 A.D.); (7) the Late Iron or Viking Age (VIII. to XI. cent.).

These can only be taken as extremely broad, and by many geologists (whose proper science is the study of the earth's ages) much-controverted conclusions. The assumption deduced from this system of study is that mankind has progressed from a state of savagery to various degrees of culture. This is shown by the domestic implements and weapons used at different periods. Thus it is supposed that wood, bone, or horn were the first substances employed by primitive man for domestic or warlike purposes; these, from their nature, have mostly perished; then came the use of flint, from which were fashioned rude axes, hammers, spear-heads, arrow-heads, knives, etc., which in later developments began to assume more artistic shapes, and were polished and otherwise decorated; then, in due course, followed the use of bronze and iron, as indicated in the foregoing table. It should be borne in mind, however, in using the above definitions that the term 'Age,' as applied to a., cannot be held to cover any definite period of time, inasmuch as the Early Bronze Age in one country may be contemporaneous with the Stone Age of another. It may be noted that in Scandinavia, and in Scotland, no evidence of man's occupation is yet forthcoming of an earlier period than the Neolithic Age. In dealing with so vast a subject as a. it is not possible here to do more than indicate the main lines of study to be followed, but many of its branches have been dealt with under their several heads. Since the establishment of the London Society of Antiquaries in 1751, and that of Scotland twenty-nine years later, the study of a. has spread rapidly, and flourishing societies of like kind are to be found in most provincial centres; while chairs and lectureships in a. exist at the leading Brit. universities.

Layard's *Nineveh* (1849); Wilkinson's *Ancient Egyptians* (1878); works by Prof. Flinders Petrie; Murray's *Greek Archæology* (1892); Smith's *Greek and Roman Antiquities* (1890); Lubbock's *Origin of Civilisation* (6th ed., 1902), and *Pre-Historic Times* (6th ed., 1900); Lyell's *Antiquity of Man* (4th ed., 1873); Tylor's *Primitive Culture* (4th ed., 1903); Dawkins's *Cave-Hunting* (1874), and *Early Man in Britain* (1880); Fergusson's *Rude Stone Monuments* (1872); Keller's *Lake Dwellings* (1878); Munro's *Lake Dwellings* (1890); Worsaae's *Pre-History of the North* (Eng. trans. 1887); Lowrie, *Christian Art and Archæology* (1901).

ARCHÆOPTERYX, extinct primitive bird, about the size of a crow, two specimens of which have been discovered in the Jurassic (Upper Oolitic) lithographic slates near Solenhofen (Bavaria). Although the possession of well-developed feathers, probably a keeled breast-bone, of wings, and a bird-like skull characterise a. as a distinct bird, the long tail, the structure of the hand skeleton, and the possession of teeth held in separate sockets, must link it with the reptiles.

ARCHAISM, the use of old or obsolete words or idioms; also an instance of such usage.

ARCHANGEL, ARKHANGELSK (64° 32′ N., 40° 33′ E.).—(1) Cathedral town and seaport on Dwina, Russia; trading centre. Pop. 35,000. (2) Government, Russia; area, 326,063 sq. miles; timber. Pop. (1910) 437,800.

ARCHANGELS, spiritual beings of the first order, referred to in Bible and Koran. According to the latter there are four: Gabriel, the recorder; Michael, Christ's champion; Azrael, the angel of death; and Azrafil, who will blow the trumpet at the resurrection.

ARCHBALD (41° 30′ N., 75° 35′ W.), borough, Pennsylvania, U.S.A. Pop. (1910) 7194.

ARCHBISHOP, a chief bp., or the bp. of a province, as well as of his own (arch) diocese; title usually implies metropolitan functions. First recorded use of the title (to denote respect) is by St. Athanasius in IV. cent. Certain Oriental Churches, some branches of Lutheran Church, R.C., and Anglican Churches still use the title, but the powers and functions associated with the title vary. The a's of Canterbury ('Primate of All England') and York ('Primate of England') share ecclesiastical government of Church of England; in some matters the former has jurisdiction in province of York; both a's by virtue of their office are ecclesiastical commissioners for England; their special symbol of office is the processional cross, borne immediately in front of them. R.C. a's wear the pallium.—**Archbishops' Court**, see ECCLESIASTICAL COURTS.

ARCHDEACON, official in Christian Church since IV. (possibly III.) cent. At first the a. was chief

of deacons, and assisted bp. in various ways, *e.g.* helping poor and in services of church. A.'s power increased till XIII. cent., when it declined; now in R.C. Church only nominal. In Anglican Church a's have important functions, holding visitations of clergy, etc.

ARCHDUKE, title borne by members of the imperial house of Austria; was first formally conferred by the Emperor Frederick III., in 1453, upon his s. Maximilian.

ARCHEAN SYSTEM, or PRE-CAMBRIAN, the oldest rocks known, of world-wide distribution and varied composition, but consisting chiefly of gneisses and metamorphic schists of enormous thickness. Owing to manifold mechanical deformations, subdivisions of the system are difficult to outline, and the occurrence of fossils is extremely rare, so that formerly the term *azoic* (without animal life) was applied to the rocks. These are frequently altered, owing to regional metamorphism, or mingled with sedimentary and volcanic beds, and penetrated by valuable mineral veins. The Lewisian igneous gneissose formation of N.W. Scotland, corresponding to Laurentian in Canada, and the Dalridian schistose series of Scotland and Scandinavia, corresponding to N. American Huronian, and the Torridonian (Scot.) and Sparagmite (Norway) beds or Keweenawan beds (N. American) are principal subdivisions.

ARCHEGONIATÆ, name given to Bryophyta (*q.v.*) and Pteridophyta (*q.v.*) because they possess Antheridium and—

ARCHEGONIUM, flask-like female organ, with walls of only one layer of cells; analogue of pistil.

ARCHELAUS, king of Judæa during rule of Augustus; notorious for cruelty.

ARCHELAUS (413–399 B.C.), king of Macedon; protected the exiled Euripides.

ARCHELAUS OF CAPPADOCIA, famous general under Mithradates the Great.

ARCHELAUS OF MILETUS (V. cent. B.C.), Gk. philosopher; pupil of Anaxagoras; devoted to the study of cosmology; originated the theory of the earth's spherical form.

ARCHENHOLZ, JOHANN WILHELM VON (1743–1812), Ger. historian; achieved considerable popularity with his *Geschichte des Sieben Jährigen Krieges* (1793); author also of *England und Italien*, and other works.

ARCHER, WILLIAM (1856–), Scot. dramatic critic and translator; dramatic critic of the *Figaro*, the *World*, the *Tribune*, and now of the *Nation*; trans. dramas of Ibsen; and has besides pub. *English Dramatists of To-day* (1882), *Poets of the Younger Generation* (1901), *Play-Making* (1912), etc.

ARCHERY, the art of shooting with the bow and arrow; has been practised since very ancient times, records and inscriptions proving its existence among the Egyptians, the Israelites, the Assyrians, and the Greeks, while savage tribes are found to-day still using the bow in hunting and in fighting. Perhaps the art was brought to greatest perfection in England in the time of Edward III., and the great victories of Crécy, Poitiers, and Agincourt were won mainly by the skill of Eng. bowmen. The introduction of fire-arms and artillery naturally led to the decline of a., but as late as the battle of Duns Law (1639), the Scot. Highlanders used the bow in warfare.

As a sport, a. continued to exist to a certain extent after it had ceased to be a serious method of attack in war, and at present quite a number of clubs and societies are flourishing. The oldest is the Scot. Royal Company of Archers, which is the King's Body-Guard for Scotland, and consists of Scot. noblemen and other Scotsmen of distinction. Its records date back to 1676, but it was in existence before that time, while many ancient prizes are still competed for by its members every year. In England the chief societies are the Royal Toxophilite Society, founded 1781; the Woodmen of Arden, founded 1785; and the Grand National Archery Society, founded 1861, which holds championship meetings and is the ruling body in England.

Shooting ordinarily is practised at targets 4 ft. in diameter at from 50 to 100 yds. apart, although the Royal Company of Archers shoots at targets 3 ft. in diameter, 180 yds. or more apart; the target has a gold spot in the centre, surrounded by circles of different colours. A bow is usually about 6 ft. long, its strength being calculated on the weight required to draw a full-sized arrow to its head—the ordinary drawing-power being 40 to 60 lb. An arrow is 27 to 30 in. long, the weight, calculated in new Eng. silver, being about equal to four-and-sixpence.

Roberts' *English Bowman*, 1801; Hansard's *Book of Archery*, 1840; Longman and Walrond's *Archery* (Badminton Library).

ARCHES, COURT OF, see ECCLESIASTICAL COURTS.

ARCHESTRATUS OF SYRACUSE (fl. 330 B.C.), Gk. poet; wrote a poem on gastronomy, some portion of which is preserved in Athenæus.

ARCHIAC, DESMIER DE SAINT SIMON, VICOMTE D' (1802–68), Fr. geologist and palæontologist; author of numerous research memoirs.

ARCHIAS (murdered 478 B.C.), tyrant of Thebes; warned of plot against him in letter, which he rejected with words, 'Business to-morrow.'

ARCHIAS, AULUS LICINIUS (b. 120 B.C.), Gk. poet, who was patronised by Lucullus; many of his epigrams find a place in the Gk. Anthology.

ARCHIDÆ, species of shell-fish with hinged equivalvular shell.

ARCHIDAMUS, name of five Spartan kings (Eurypontids), of whom the most famous was ARCHIDAMUS II. (476–427), who played a prominent part at beginning of Peloponnesian War.

ARCHIDONA.—(1) (37° 8′ N., 4° 23′ W.) town, Malaga, Spain. Pop. *c.* 8000. (2) (0° 45′ S., 76° 50′ W.) town, Ecuador.

ARCHIL, purple dye for woollens and silks, extracted from lichens, 'crottle' in Scotland.

ARCHILOCHUS (VII. cent. B.C.), Gk. poet; wrote elegies, hymns, and lampoons, and was the inventor of iambic verse. Horace is said to have been largely influenced by his metres.

ARCHIMANDRITE, title of Abbot-Extraordinary in Gk. Church.

ARCHIMEDES (*c.* 287–212 B.C.), Gk. mathematician; b. Syracuse; studied in Alexandria; returned to native city; accidentally killed after its capture by Romans under Marcellus. Besides being most eminent mathematician of antiquity, he founded the science of hydrostatics, invented engines of war, the water-screw, and numerous other mechanical contrivances.—The **Archimedean Principle** is that a body immersed in a liquid loses weight by an amount exactly equal to that of the liquid displaced. A. discovered this when taking a bath, and in his excitement rushed naked into the streets, crying '*Eureka! Eureka!* I have found it! I have found it!'—**The Screw of A.**, spiral screw revolving inside watertight cylinder for raising water to higher level.

Plutarch, *Life of Marcellus*; T. L. Heath, *The Works of Archimedes* (Cambridge, 1897).

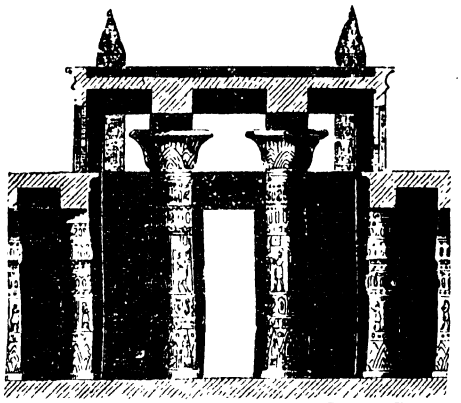
ARCHIPELAGO, any sea studded with islands; among best examples, Gk. A. and Malay A.

ARCHIPPUS (V. cent. B.C.), Gk. comic poet; wrote several comedies, the most famous of which was the *Fishes*.

ARCHITECTURE, the art of building; the planning of a structure and its harmonious arrangement and ornamentation according to definite principles, as a work of beauty or grandeur. The beginning of the art is found in the efforts of primitive man to provide shelter for himself, different modes of building being adopted according to the requirements and customs of the people and the climate of the country. The most elaborate buildings of different countries and

different periods may all be traced to the two important materials for building in early times, wood and stone, and on the methods naturally adopted for construction in those two materials all the principles of a. are founded. In building with wood, the main principle consists in having vertical pillars with beams laid across them, which is called the *trabeate* system; while in building with stone the underlying principle is the arch and its supports.

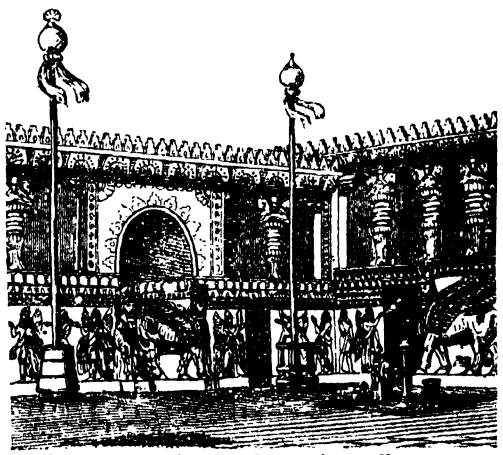
Egyptian Architecture.—It is in Egypt that the most ancient records of a. are found, well-known examples being the Pyramids at Ghizeh, near Cairo, dating from 3900 to 3700 B.C., of which the largest, commonly known as the Great Pyramid of Cheops, covers 13 acres. At Beni Hasan there are rock-cut tombs which have fluted columns supporting or appearing to support the overhanging rock, dating from about 2200 B.C. These are the earliest examples of a type of a. which influenced that of Greece and subsequently of all Europe. From 1700 to 1300 B.C.



SECTION OF CENTRAL PART OF HYPOSTYLE HALL AT KARNAK.

most of the noblest buildings in Egypt were built, among them the great temple at Karnak, the Hypostyle Hall of which (measuring 340 by 170 ft., and containing 134 columns in sixteen rows) is considered the most beautiful and imposing structure of its kind in the world. From this period also date the great temple at Luxor and the many great buildings of Memphis, Heliopolis, and Thebes. For 1000 years after this a. declined, reviving then for a time under the Ptolemies, the temple of Isis at Philæ being a beautiful example of this period.

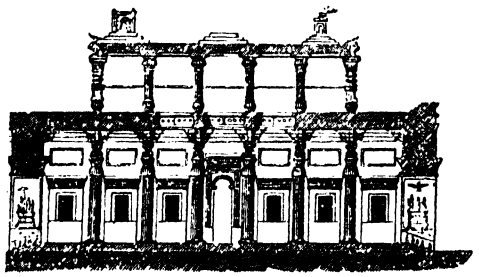
Assyrian Architecture.—About 800 B.C., 1200 years



RESTORATION OF ANGLE OF PALACE COURT, KHORSABAD.

after Nineveh was founded, the Assyrians commenced a period during which many magnificent buildings were erected. The use of the arch was known to them, but the column was not much employed. Some of the oldest buildings resemble the Pyramids of Egypt, but they were temples, not tombs; while excavations carried out at Nineveh, Nimrud, and elsewhere have revealed the sites of magnificent palaces, the great gateway of Khorsabad, with its massive human-headed winged bulls, parts of which are now in the Brit. Museum, being a well-known example of the style of this period.

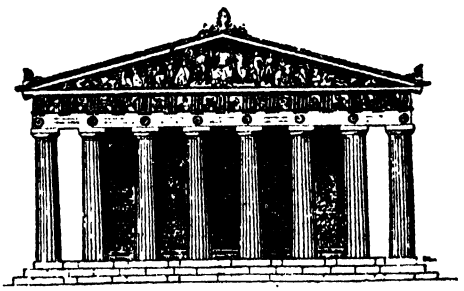
Persian Architecture.—Persian a. was derived to a great extent from that of the Assyrians. Under Darius and Xerxes (c. 500 B.C.) they surpassed even the Assyrians in the magnificence of their palaces, and, using marble where the Assyrians used wood and brick, these have been better preserved. The



RESTORED SECTION OF HALL OF XERXES.

palaces at Persepolis are the finest examples of their work, the Hall of Xerxes, extending to twice the area of the great Hypostyle Hall of Karnak, being one of the greatest buildings of ancient times. The Ionic and probably the Corinthian capital were developed by the Greeks from Persian decoration.

Greek Architecture.—Gk. a. was an original development, as recent discoveries at Crete have proved, although it was influenced in many ways by Egypt and Assyria. An advanced state of civilisation existed in Crete about 3000 B.C., when great palaces were built; but this older civilisation was swept away by invaders from the north about 1100 B.C., and the oldest Gk. temples, the remains of which have been discovered, date from shortly after this time. The culminating period of Gk. a. was at Athens from

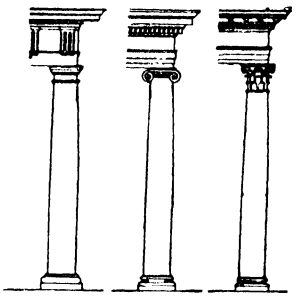


THE PARTHENON.

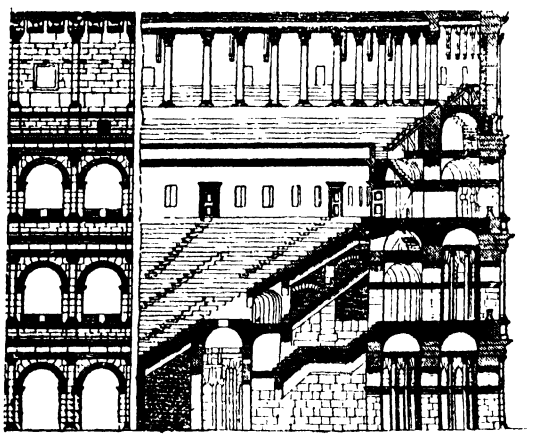
460 to 400 B.C. There are three styles of classic Gk. a., each of which is denoted by its particular form of column: the *Doric*, strong and simple; the *Ionic*, graceful and more ornate; and the *Corinthian*, with elaborate detail. The Greeks built their temples with the columns arranged outside with a view to external effect. The finest example of Gk. a. still extant is the Parthenon at Athens, built in the Doric style; but it was probably surpassed by the great Ionic temple of Diana at Ephesus, included by the ancients among the seven wonders of the world.

Etruscan and Roman Architecture.—The Etruscans, a race of Eastern origin, were in an advanced state of civilisation at the time of the foundation of Rome.

They made much use of the arch, one of the oldest examples in existence being the Cloaca Maxima, constructed about 600 B.C. for the purpose of draining the lower parts of Rome. About 200 B.C. Gk. a. began to influence Rome, and after the capture of Corinth by the Romans in 146 B.C. Gk. architects and sculptors were employed in constructing the buildings of the city. Roman a. was thus developed by the application of the arch of the Etruscans to the Gk. style of a., while vaulting was also employed. At first, buildings were erected in solid stone,



ROMAN DORIC. ROMAN IONIC ROMAN CORINTHIAN.

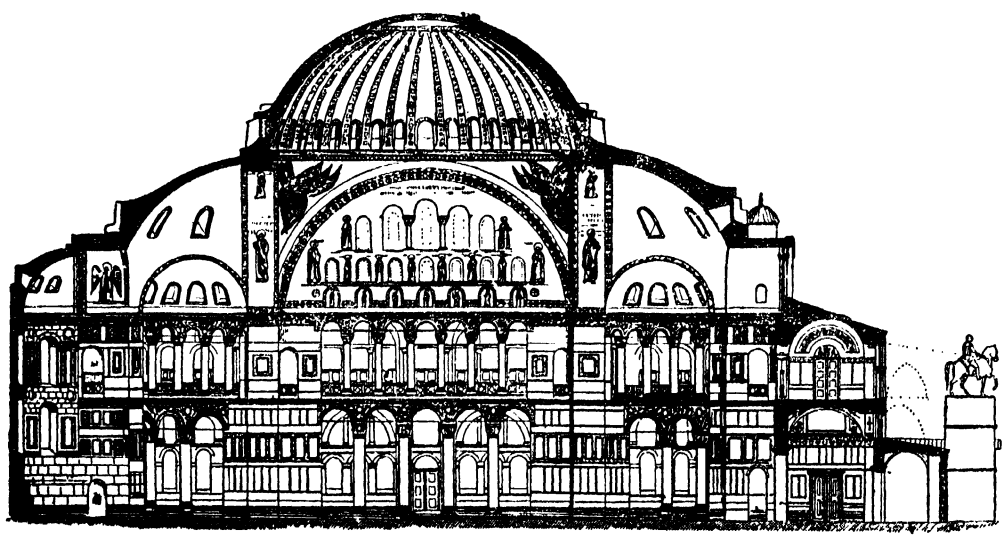


ELEVATION AND PART SECTION OF THE COLOSSEUM.

but in later times problems of a. were solved with concrete, walls and domes being formed of masses of this material, with false casings, arches, and arcades, of marble, stone, or brick concealing it. The Romans modified the Gk. columns and evolved two more orders, the *Tuscan*, a simple Etruscan form resembling the Gk. Doric, and the *Composite*, an attempt to combine the Ionic and Corinthian forms. The Colosseum, a great elliptical circus, built of concrete and stone, and ornamented outside by successive tiers of the different orders of columns, still survives at Rome. The excavations at Pompeii have revealed the Roman domestic a., and at other places in Italy, southern France, and elsewhere in Europe, Asia, and Africa there are interesting remains—Nîmes, in the south of France, for example, having the most perfect existing Roman temple.

Byzantine Architecture.—In the IV. cent. A.D. the Emperor Constantine transferred the seat of the empire to Byzantium or Constantinople, and under him great building enterprises were carried out. The style of a. was adopted from Rome, and the new capital was also much influenced by Oriental decoration. The dome was the characteristic feature of the Byzantine style, and because of this the plan gradually changed from a long rectangle to a square form of building. The Church of St. Sophia at Constantinople, built in 532 to 538 A.D., is the finest example of the Byzantine style, while the most perfect buildings of this character in Italy are St. Mark's, Venice, and St. Vitale at Ravenna. Russian a. is a somewhat debased version of the Byzantine style, which has been adopted in the buildings of the Gk. Church, the oldest examples being the XI. cent. cathedrals at Kiev and Novgorod.

Early Christian Architecture.—It was not until the Emperor Constantine recognised Christianity that the early Christians commenced to erect buildings for the purpose of worship, building them more or less on the plan of the Roman basilicas (halls used for commercial and other purposes), columns, ornaments, and marbles being taken from other buildings for the purpose, or, in some instances, simply making use of the older temples. The earliest Christian building existing now is the Church of St. Paul outside the Walls (Rome), erected in 386 A.D., and carefully restored at the beginning of the XIX. cent. It was built in the form of a square, with a pillared porch, and a semicircular apse opposite the entrance. Transepts were formed later in churches by widening the part of the building farthest from the entrance, in order to provide increased accommodation for the officiating clergy, a plan which subsequently developed into the typical plan of the mediæval cathedral.

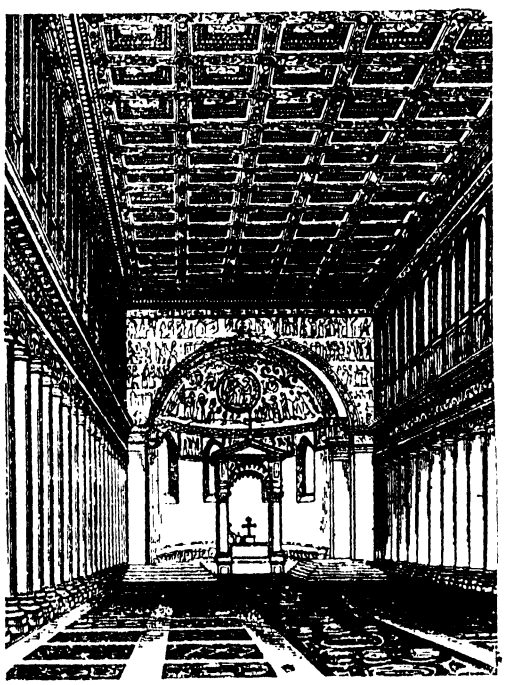


ELEVATION OF ST. SOPHIA, CONSTANTINOPLE.

The churches, tombs, and other buildings built by the early Christians in Syria from about 400 to 600 A.D., *e.g.* the churches at Kalat-Semen and Kalb-Lauzeh, resemble the basilica type rather than the domed Byzantine type of building, although in the details they show Byzantine influence. The earliest Coptic Christian churches in Egypt also show the basilica plan, but they were probably of independent origin.

Romanesque Architecture.—This term is applied in a general sense to the styles developed from Roman a. in Western Europe, through the spread of Christianity. Semicircular arches were substituted for the architraves joining the top of the pillars together, the general design being the same as that of the Roman basilicas.

In Italy different styles were in vogue in different parts of the country: in Rome the basilican design of the early Christians still flourished; in northern Italy there was a modification termed the *Lombard* style, the roofs of the churches were vaulted, and substantial piers took the place of the pillars—the churches of St. Ambrogio at Milan and St. Michele at Pavia being built in this manner; while in central Italy the *Tuscan* style, more slender and elegant than the Lombard, prevailed. In southern Italy and in Sicily a. was influenced by the Normans, owing to the Nor-



Sta Maria Maggiore.

man occupation of Sicily, and by the Muhammadans, who ruled the island for two cent's, an original feature being the pointed arch, which is of Arabic origin.

In France, in addition to the Roman inspiration, a Byzantine influence is noticeable in the south, owing to trade with Venice and the East. In the churches there was a long nave with vaulted roof and with aisles, and transepts generally of small size, an apse at the eastern end with small apses radiating from it, and perhaps a central tower. Buttresses counteracted the lateral thrust of the stone vaulting of the nave, a difficulty which the Romans avoided by building the vaulted roofs in solid concrete, which simply rested upon the walls like a lid. The style of northern France is important to us in the development of Eng. a., and it was influenced by Ger. designs as well as by those of southern France, the Church of St. Étienne at Caen being a fine example of the style.

In Germany Romanesque a. was closely modelled on the northern Ital. style, the cathedral built by Charlemagne at Aix-la-Chapelle about the beginning of the IX. cent. being, however, after the Byzantine design of St. Vitale at Ravenna; and along the Rhine the Romanesque manner reached a high standard of development, the cathedrals at Mainz, Worms, and Spires being good examples. Features of the Rhenish churches are the square or octagonal turrets, and arcaded galleries decorating the walls.

In England the *Anglo-Saxon* style was evolved by the builders copying the remains of the Roman buildings, and, as they were more accustomed to the use of wood, the earliest Anglo-Saxon buildings were either in wood or were imitations in stone of wooden structures. The nave of Greenstead Church is the only wooden building now existing which probably dates from the Anglo-Saxon period, but the churches at Earl's Barton, Monkwearmouth, and perhaps St. Regulus in St. Andrews are built in stone in this style. Even before the Conquest, Norman a. was making its influence felt in England, through builders, artists, and ecclesiastics coming from abroad. At first the style was almost as plain as the Anglo-Saxon, but we soon find it characterised by rich carving based on geometric forms, zigzags, stars, frets, etc., massive pillars and walls, cubical capitals, the decoration of the wall surfaces with arcades; and the plans show greater length in the choirs, transepts, and naves than was usual in Normandy. Several thousand churches built in the *Norman* style of a. were in existence in England within a cent. of the Conquest. Among the many examples still in existence are Durham Cathedral, Ely Cathedral, the crypt of Canterbury Cathedral; and in Scotland, Kirkwall Cathedral, Kelso and Jedburgh Abbeys.

Gothic Architecture.—Gothic a. was developed from Romanesque as a solution of the difficulty of vaulting, as the semicircular arch was found not to be successful for this purpose unless heavily loaded on the haunches, and owing to the lateral thrust it was necessary to reduce the span. The pointed arch was therefore adopted, first of all in southern France, where it was probably borrowed from the East, and in order to vault oblong spaces ribbed vaulting was carried out, in which a skeleton of ribs going transversely and diagonally across the nave made a framework which was filled in with lighter masonry, and the thrust was brought to bear on separate points, the wall being strengthened at those points by *buttresses*. The thrust being thus borne by the buttresses, the need for massive walls disappeared, so that the spaces between the buttresses began to be filled with great windows, and with the invention of painted glass these windows became one of the chief glories of the Gothic style, the spaces of the windows being divided up, in later times very elaborately, by window-tracery. When aisles were introduced at the sides of the naves the buttresses could not be carried straight down, and flying buttresses, which bridged over the space between the roof of the aisles and the nave, were constructed, and soon became a distinctive feature of the style. The Cathedral of St. Denis is the earliest existing example of Early Gothic a., while soon after its foundation Notre Dame at Paris was begun, together with the great cathedrals at Amiens (the finest example of pure Gothic), Chartres, Rheims, Beauvais, Bourges, and many other places. The principles of the style later developed into the *Flamboyant* style, with great elaboration of detail and profusion of ornament, fantastic and magnificent carvings. Examples of this decadent style are found in the Church of St. Maclou at Rouen and the façades of the cathedrals of Rouen, Rheims, and Troyes.

Gothic a. was adapted to all kinds of civil buildings, houses, and even shops, of which examples may be seen in many old Fr. towns. It was introduced into England at the time of the rebuilding of Canterbury Cathedral in the XII. cent., from France, but a dis-

tinctive Eng. style of a. was soon developed, called *Early English*, characterised by long and narrow pointed windows with little tracery, simple spires, high roofs, deep buttresses, slender columns with plain or foliage circular capitals, and deeply cut mouldings to the arches. In plan, also, there are differences from the Fr. style, the transepts being more prominent—Salisbury Cathedral, for instance, has two transepts. The nave and transepts of Westminster Abbey and Elgin Cathedral are built in this style.

Towards the end of the XIII. cent. there was a transition to a more elaborate manner of a., the *Middle Pointed* or *Decorated* style, in which the windows are wider and divided by mullions, with tracery, at first geometrical, but later wavy and variated, in the upper part, the buttresses are more decorated, and the ornamentation and capitals of columns are richly carved. This is generally considered the finest period of the Gothic style, and is exemplified in the nave of York Minster and in parts of Melrose Abbey.

A cent. or more later this developed into the *Late Pointed* or *Perpendicular* style, marked by vertical tracery in the windows, panelling of the walls, flattened four-centred (Tudor) arches, fan-tracery, and other elaborations of the vaulting; Henry VII.'s Chapel at Westminster and the east window of Melrose Abbey are in this style, as are many churches in the south-west of England.

In Italy the Gothic style of a. never became popular. The earliest examples of Gothic work were carried out by Dominican or Franciscan friars from Fr. and Ger. prototypes, the Church of St. Francis at Assisi (1228–53) being a remarkable piece of early Italian Gothic a., notable for its wall frescoes. The Gothic cathedrals in Italy are of very great size. The vast Cathedral of Milan, the Church of St. Petronio at Bologna, designed on an even larger scale, the cathedrals of Siena, Florence, and Ferrara are all instances of the grandeur and the defects of this period and this type of Ital. a. In Venice the Byzantine a. was blended with the Gothic, a famous example being the Doge's Palace.

In Germany the best examples are directly modelled upon the great Fr. cathedrals, Cologne being little more than an enlargement, with differences in the detail, of Amiens. Strasburg Cathedral also shows the Fr. influence strongly. There are many town halls and other public buildings in Germany dating from this period, built in Gothic style.

In Belgium the Church of Notre Dame, at Antwerp, built in this style about 1360, is remarkable in having three aisles on each side of the nave, making its breadth equal to half its entire length; St. Croix, St. Martin, and St. Jacques at Liége, St. Bavon at Ghent, and Notre Dame at Bruges are good examples of the period, a notable feature of the Belg. churches being the richly decorated rood screens. The town halls of Brussels and Mons, and trade halls at Ghent and elsewhere show the style magnificently adapted to secular purposes.

With the exception of the choir of the Cathedral of Utrecht and one or two minor churches, Holland has no ecclesiastical Gothic work of importance, and there are but few examples of the style in domestic or civic a.

Spain, however, has several magnificent Gothic cathedrals. The cathedrals of Toledo, Leon, and Burgos, built in the Early Pointed style, are imposing in plan and beautiful in detail, the first being surpassed in size only by the cathedrals of Milan and Seville, while its general design is finer than that of either. Seville Cathedral (of later date), which has a very elaborate interior, and is the largest of mediæval cathedrals, was built on a site formerly occupied by and practically on the same plan as a great Moorish mosque.

Renaissance Architecture.—With the revival of classical literature and art in Italy in the XV. cent. there came the revival of Classical a., a style which had never altogether died out. In 1420 Brunelleschi was entrusted with the task of completing the cathedral designed by Arnolfo del Cambio in Florence, and constructed a great dome over it, while he afterwards built several churches and other buildings modelled on classical forms. There sprang up a school of architects in Florence (Alberti, the author of several books on a., being the chief) who followed the lead of Brunelleschi, and constructed many great churches and palaces according to the classical ideas. These buildings are distinguished by a strong and massive appearance, the front of the stones on the lower parts of the walls being left rough, with deep channels at the joints. Milan adopted the classical ideas of Florence half a century later, and Venice was later still, developing a characteristic elegance of design with evidences still of Byzantine influence. St. Mark's Library and many of the palaces on the Grand Canal are built in this style. The classical movement did not begin to make headway in Rome till the beginning of the XVI. cent., when Bramante commenced the building of *St. Peter's* for Pope Julius II. in the classical style, but on his death, about six years later, the work was handed over to several successive architects, and little progress was made until it was confided to Michael Angelo. He died before the completion of the building, but it was finished according to his designs and models. St. Peter's is the largest church in the world, being almost 600 ft. in length, while the dome, 140 ft. in diameter, rises to a height of 430 ft. The interior, however, is lacking in imposing effect, as there is nothing to give it the proper scale.

Towards the end of the XV. cent. the a. of the Renaissance began to affect France, a style developing in which classical details were applied to general designs in the Gothic style; the Château of Blois (built about 1525), with its famous external staircase, is an example—the buttresses being replaced by pilasters and panels, the windows, chimneys, and similar parts of Gothic shape but with Renaissance detail. A later stage of the style is shown in the Louvre and the Tuileries in Paris; and, since the building of the Louvre progressed slowly through several cents., the changes in and gradual development of the style are excellently shown. The Luxembourg Palace, with rough stone façade like the Venetian palaces, the Hôtel des Invalides, with a fine central dome, and the Panthéon, formerly the Church of St. Geneviève, simply designed and with a dome modelled on that of St. Peter's at Rome, all three in Paris, are imposing examples of this Fr. style.

In England, as in France, the introduction of classical forms of a. was a very gradual process. Gothic a. had developed into a florid style usually termed *Tudor*, with flat, wide arches, elaborate and interlacing vaulted ceilings, and in domestic buildings, characteristic rectangular or polygonal low windows, octagonal towers at the entrances and elsewhere, highly ornamented doorways, while the long gallery usually on an upper floor was a distinctive feature. Classical details began to be added. Haddon Hall, for instance, built in the Tudor style, has classical detail of a modified type in its later parts, and at Hampton Court and elsewhere, as well as in many tombs, entrance gateways, and similar smaller pieces of a., classical details are incorporated. Hatfield House, Holland House, and Heriot's Hospital (Edinburgh) are well-known examples of the style of this period. In Wollaton Hall (built about 1590) the classical orders were freely used, along with other classical details, for the decoration. Inigo Jones (1572–1652), who had studied a. in Italy, built many noble edifices on classical models. His finest work was the designing of a great palace for Charles I. in Whitehall, the imposing Banqueting-Hall being, however, the only part actually built. Sir Christopher Wren (1632–1723) was more fortunate in his opportunities, for, soon after he had made a name as an architect, the Great Fire of London opened a wide field for him. He designed over fifty churches, the

Royal Exchange, Chelsea and Greenwich Hospitals, and numerous other great buildings, and rebuilt St. Paul's Cathedral on the lines of St. Peter's at Rome. The successors of Wren—Hawksmoor, Vanbrugh (the designer of Blenheim Palace), and others—built many works of note in the same classical spirit, and later in the XVIII. cent. Somerset House (built by Sir William Chambers), the Mansion House, and the Bank of England exemplify the imposing effects of the style.

In Spain the Classical style was grafted on to the Late Gothic a., and is distinguished by the plainness of the walls of buildings, decorative features being reserved for entrances and windows, while the upper storey is often adorned by an open arcade. The cathedral of Valladolid and the portal of the cathedral of Malaga are among the best examples of Span. Renaissance a. as applied to churches, those of this period being often notable for their magnificent iron grilles to the chapels. Civil buildings were greatly influenced by the Moorish style, one of the earliest being the palace adjoining the Alhambra at Granada, while the enormous palace of the Escorial at Madrid is of Renaissance design.

Muhammadan Architecture.—The first places of worship of the Muhammadans were not of definite design, any suitable building being employed for the purpose, but gradually a distinctive style was built up of Egyptian, Roman, and Byzantine elements, differing in detail in the different Muhammadan countries, mosques being constructed so that the worshippers faced towards Mecca, the birthplace of the Prophet, the general form being flat-roofed, arcaded cloisters enclosing a square courtyard. The earliest appearance of the pointed arch is in the Mosque of Tulun in Cairo (built in 879), and it is a characteristic of the style, except in the Barbary States and Spain, where the horseshoe arch is more popular. Slender minarets, generally octagonal and of various designs, for the purpose of calling the faithful to prayer, were at an early period added to the mosques. The *Alhambra* at Granada (begun in 1248), a great palace and citadel, is the finest building in this style, the Alcazar at Seville and the mosque at Cordova being in a more dilapidated or much altered condition. On the capture of Constantinople by the Turks the Church of St. Sophia was converted into a mosque, and it has since served as a model, with the addition of actual Muhammadan details, for Muhammadan mosques.

Indian Architecture.—Architectural history begins with introduction of stone in 250 B.C. in place of wood, in reign of Buddhist emperor, Asoka. Six styles—

I. BUDDHIST (India and Ceylon); principal objects—(*a*) *stambhas* or *lâts*, pillars bearing inscriptions on shafts; (*b*) *stûpas* or *topes*, relic-shrines, most important groups—Bhilsa and Amaravati Stûpas; (*c*) *rails* surrounding topes, etc.; most interesting at Bharaut; (*d*) *chaityas* or assembly halls, corresponding to Christian church in use, plan, position of altar, aisles, etc.; extant examples all rock-cut, chiefly in Bombay Presidency; (*e*) *vihâras* or monasteries, principal ones at Ellura, Ajanta, Nasik.

II. DRAVIDIAN (S. India); best period, XV. to XVIII. cent. A.D. Temples consist of four parts: (*a*) principal part, *vimâna*, square in plan, surmounted by pyramidal roof of one or more storeys, and containing cell in which image of god is placed; (*b*) porches, *mantapams*, covering and preceding door leading to cell; (*c*) gate-pyramids, *gopurams*, principal features in quadrangular enclosures surrounding more notable temples; (*d*) pillared halls or *châwadis*. Famous temples: Tanjore, Conjivaram, Rameswar, Madura.

III. CHALUKYAN (Deccan and Mysore); arose from Dravidian, but became distinct *c.* X. cent. A.D.; plan generally Dravidian, but corners more prominent and pillars markedly different; favourite arrangement was grouping of three shrines round central *mandap* or hall; best specimen at Ittagi (Haidarabad).

IV. JAINA architecture, like religion, closely resembles Buddhist; Orissa rock-cut caves date from II. cent. B.C.; characteristic structural feature of style is twelve-pillared dome; temples generally grouped together in 'cities' on summits of hills. Famous 'cities of temples' are Satrunjaya, Girnâr, Mt. Abu.

V. INDO-ARYAN (N. India), most interesting and complete Hindu style; chief features:—curvilinear outline of pyramid on polygonal base; no storeys; no pillars. Best examples: Orissa group of temples, particularly Bhuvaneswar and Jagannath.

VI. INDIAN SARACENIC, introduced by Muhammadans and possessing characteristic Saracenic features; about fifteen styles, divisible into two periods: (*a*) 1000 to 1500 A.D.; Pathan and other styles moulded by strong Hindu and Jain influences; (*b*) 1500 to 1750 A.D.; brilliant Mughal style which created Taj Mahal and Moti Masjid (Agra), Akbar's Tomb (Sikandra), Mosque and Palaces (Delhi).

Fergusson, *Indian Architecture*, 2 vols.

Modern Architecture.—During the XIX. cent. England has passed through several periods of revivals of different styles of a. At the beginning of the cent. there was a revival in classical a., the Church of St. Pancras and Univ. College in London, the old Parliament House in Dublin (now the Bank of Ireland), and the Art Galleries and Royal High School in Edinburgh being good examples of the period, modelled upon Gk. prototypes. St. George's Hall, Liverpool, was somewhat later in date, and marks the culmination of the revival. Gothic a. had also a number of eager advocates, more especially Sir Gilbert Scott and G. E. Street, and when Ruskin threw his influence on its side it became adopted as the general style for church a. as well as for some great secular buildings, notably the Houses of Parliament (designed by Sir Charles Barry) and the New Law Courts (by Street). In the latter part of the cent. the Renaissance style was generally adopted for civil and domestic a., particularly in the modified form known as the *Queen Anne* style (*e.g.* Chelsea Town Hall).

In France the Renaissance style is the most popular fashion of a., the new Sorbonne and the École de Médecine being imposing edifices designed according to its principles. In Germany, Italy, Belgium, and Austria the tendency has been to follow pure classical examples, the Law Courts at Brussels being a very remarkable example of modern genius applied to the classical style, while in Germany there is also a tendency towards Renaissance a. Mention must also be made of an important revival of Byzantine a. at the beginning of the XX. cent. in England, the R.C. Cathedral of Westminster being an imposing structure in this style. In America there has been a development of tower-like buildings, or 'sky-scrapers,' composed of a great number of storeys to which access is gained by lifts, due at first to the restricted space of the business quarter of New York, but now characteristic of all the great American cities, and latterly constructed of frameworks of steel, on which the building really depends, with an outer shell of masonry.

History of Architecture, Fergusson; *Gothic Architecture*, Pugin; *History of Architecture*, Sturgis; *Encyclopædia of Architecture*, Gwilt; *Byzantine and Romanesque Architecture*, Jackson (1913).

See also APSE, AQUEDUCT, ARCH, BASILICA, BATHS, BRIDGES, CRYPT, DOME, MOSQUE, PYRAMID, TEMPLE, and similar articles.

ARCHITRAVE, architectural term for part of entablature (in the five Orders) which rests on columns below the frieze.

ARCHIVES (Gr. *archeion*, state depository), place where MS. records are kept. Eng. national depository is known as Record Office (Chancery Lane, London); those of France, Germany, and other countries are called National or State A.; local Record Offices were set up in some Eng. counties in early XVIII. cent.; Ireland and Scotland have separate a.; Germany has no imperial a., but there are state a. in nearly every province, state, and town,

and central *Geheimes Staatsarchiv*, Berlin, Royal *Hausarchiv*, Charlottenburg. France, besides *A. Nationales* and *A. des Ministères*, has 87 departmental a. Italian depositories are the Vatican, and 18 state a. Spain's a. are at Madrid, Barcelona, and Simancas; those of Holland and Belgium at capitals of those countries.

ARCHON, the chief Athenian magistrate after the abolition of the monarchy following the death of King Codrus (*c.* 1068 B.C.). The latter's s., Medon, was the first a., and the office was at first for life. At a later period it was limited to ten years, and though first confined to the descendants of Codrus, it was afterwards open to the nobles, and finally to all citizens. In 683 B.C. the office was limited to a year only. During the VII. cent., besides the first, or king's a., there was a second who had control of the religious affairs, a third who was the commander-in-chief, besides six judges, or 'keepers of the law,' thus raising the number of a's to nine.

ARCHPRIEST, official in Christian Church now replaced by rural dean.

ARCHYTAS OF TARENTUM (fl. 347 B.C.), Gk. philosopher and mathematician; intimate friend of Plato; invented a primitive flying-machine; and was the first to apply geometrical ideas to mechanics.

ARCIS-SUR-AUBE (48° 32′ N., 4° 7′ E.), town, on Aube, France; birthplace of Danton; Napoleon was defeated here by the allied forces under Schwarzenberg, March 1814.

ARCOLA (45° 20′ N., 11° 17′ E.), village, Italy; Austrians defeated by Napoleon, 1796.

ARCOS DE LA FRONTERA (36° 46′ N., 5° 46′ W., town, Spain. Pop. 14,000.

ARCOT (12° 53′ N., 79° 20′ E.), town, India; taken by Clive, 1751; by French, 1758; British, 1760; Haidar Ali, 1781; ceded to Britain, 1801. Pop. *c.* 11,000.

ARCOT, NORTH (13° 26′ N., 79° 29′ E.), district, India; area, 7386 sq. miles. Pop. 2,200,000.—SOUTH A. (12° 3′ N., 79° 11′ E.), district, India. Pop. 2,350,000.

ARCTIC (66° 30′ N.), N. Polar regions.—**Arctic Circle and Arctic Ocean**, see POLAR REGIONS.

ARCTINUS OF MILETUS (fl. 744 B.C.), Gk. epic poet; continued the Trojan story from the close of the *Iliad*. (Lang's *Homer and the Epic*, 1893.)

ARCTURUS (*α Boôtes*), most brilliant star in N. hemisphere, almost in line with tail of Great Bear.

ARCUEIL (48° 45′ N., 2° 21′ E.), town, Seine, France. Pop. 8600.

ARCULF (VII. cent.), Gallican ecclesiastic who visited Britain (Bede's *History*).

ARDAHAN (41° 8′ N., 42° 47′ E.).—(1) Town, Armenia, Asiatic Turkey. (2) Fortress, Transcaucasia, Russia.

ARDALAN (35° 40′ N., 45° 40′ E.), province, Persia, forming E. part of Kurdistan.

ARDASHIR, the recognised transliteration of Artaxerxes (*q.v.*), a Persian royal name; Armenian form of name is Artaxias. Three kings of Achæmenian dynasty bore the name; also three kings of dynasty of Sassanides; ARDASHIR I. (d. 241 A.D.), founded Sassanian empire.

ARDEA (41° 36′ N., 12° 36′ E.), old Latian town, Italy; now a village surrounded by marshes; ancient remains.

ARDEBIL (38° 14′ N., 48° 21′ E)., town, Persia. Pop. *c.* 10,000.

ARDÈCHE (44° 37′ N., 4° 20′ E.), department, Central France, W. of Rhône; rugged and mountainous; occupied by Cevennes; watered by river A.; olives, vines, mulberries, silk; iron mines. Pop. (1911) 332,000.

ARDEE (53° 51′ N., 6° 32′ W.), town, County Louth, Ireland.

ARDEN, FOREST OF (*c.* 52° 15′ N., 1° 50′ W.), one of the largest of ancient British forests, said to have extended from Avon to Trent; now wooded district, N. Warwickshire.

ARDENITE, yellowish silicate of vanadium.

ARDENNES (50° 5′ N., 5° 30′ E.), hilly district, France and Belgium; formed one forest in Rom. times; large part still forested; horses raised.

ARDENNES (49° 33′ N., 4° 30′ E.), department, France; hilly, forest country; crossed by A. canal, connecting Meuse and Aisne; woollens, iron and copper works; cereals, fruit, potatoes; contains Sedan; area, 2027 sq. miles. Pop. (1911) 319,000.

ARDGLASS (54° 16′ N., 5° 37′ W.), town, County Down, Ireland.

ARDITI, LUIGI (1822–1903), Ital. composer; known for his vocal waltz, *Il Bacio*, and his operas, *La Spia* and *I Briganti*.

ARDMORE (34° 11′ N., 97° 8′ W.), town, Oklahoma, U.S.A. Pop. 9000.

ARDNAMURCHAN POINT (56° 44′ N., 6° 14′ W.), headland, coast of Argyll, Scotland; most westerly point of mainland; scene of many wrecks.

ARDOCH.—(1) (57° 24′ N., 5° 36′ W.) town, Ross-shire, Scotland. (2) (56° 3′ N., 4° 32′ W.) town, Dumbartonshire, Scotland. (3) (56° 17′ N., 3° 52′ W.) village and old Rom. camp, Perthshire, Scotland.

ARDRES (50° 50′ N., 1° 58′ E.), town, Pas de Calais, France; near A., in 1520, Henry VIII. and Francis I. met at the famous *Field of the Cloth of Gold*.

ARDROSSAN (55° 39′ N., 4° 49′ W.), port, Ayrshire; good harbour; service to Ireland; shipbuilding. Pop. (1911) 5760.

ARE, see WEIGHTS AND MEASURES.

ARECA, see BETEL NUT.

ARECIBO (18° 31′ N., 66° 47′ W.), port, Porto Rico. Pop. 8000.

AREMBERG, or ARENBERG, formerly *Berg*, a duchy situated between Juliers and Cologne, now included in Prussian administrative district of Coblenz.

ARENA (Lat. 'sand'), originally the central space in an amphitheatre, so named from its being strewn with sand; now used for any place of public contest.

ARENACEOUS, applied to rocks made up of sand particles, as *argillaceous* to those made up of clay.

ARENARIA, see CARYOPHYLLACEÆ.

ARENDAL (58° 30′ N., 8° 42′ E.), port, Norway. Pop. (1910) 10,300.

ARENDS, LEOPOLD (1817–82), Russ. author of poems and criticism, and of new system of shorthand, first set forth 1850.

ARENIG GROUP, lowest formation of Ordovician rocks in Britain, consists of dark slates (quarried in Wales), shales, grit, and limestones.

ARENSKIJ, ANTON STEPANOVICH (1861–1906), Russian composer, director of imperial choir, St. Petersburg; wrote operas and miscellaneous music.

AREOI, a secret society which flourished in the South Pacific Islands and was chiefly concerned with the worship of the reproductive powers of nature. Its ceremonies included obscene dances, and were attended with much debauchery.

AREOPAGUS (*c.* 37° 58′ N., 23° 44′ E.), hill, Athens; about 360 ft. high; often called Hill of Mars (mentioned in *Acts*); gave name to oldest Athenian court, which met in open air and was composed of former chief-magistrates of Athens. Its functions were modified by Solon's reforms in constitution, 594 B.C.; and its influence was decreased when Cleisthenes established his democratic constitution. In later times most of its functions were transferred to other bodies; existed in Roman times.

AREQUIPA (16° 22′ S., 72° 12′ W.), department, Peru. Area, 22,000 sq. miles. Pop. 172,000.

AREQUIPA (16° 20′ S., 71° 35′ W.), cathedral town, Peru; univ. Pop. 40,000.

ARES (classical myth.), the god of war, who revelled in slaughter, and was hated by all the deities of Olympus, save Aphrodite alone. He was wounded by Diomedes at the siege of Troy; known to the Romans under the name of Mars.

ARETÆUS (I.-II. cent. A.D.), Gk. physician, of Cappadocia; practised in Rome; author of admirable medical treatises in Ionic Greek.

ARETHAS (X. cent.), Byzantine theologian; wrote commentary on Apocalypse.

ARETHUSA (classical myth.), a nymph of Artemis, by whom she was changed into a fountain to enable her to escape the pursuit of the river-god Alpheus. The famous fountain bearing her name is in the island of Ortygia, near Syracuse.

ARETINIAN SYLLABLES, used in musical notation of Guido d'Arezzo (XI. cent.), who is supposed to have adopted them (*ut, re, mi, fa, sol, la*), from initial syllables of hemistichs of hymn to St. John Baptist.

ARETINO, PIETRO (1492–1556), Ital. author; writer of comedies, sonnets, and dialogues, many of which were satirical, and all licentious. He called himself the 'Scourge of Princes,' and succeeded in wringing money out of the nobility and other eminent people, who went in fear of his satire.

AREZZO (43° 28′ N., 11° 52′ E.).—(1) cathedral town, Italy; birthplace of Petrarch, Guido, Vasari; interesting buildings and artistic remains. Pop., commune (1911), 47,500. (2) province, Italy; area, 1273 sq. miles. Pop. (1911) 284,500.

ARGALI (*Ovis ammon*), large wild sheep of Siberian mountains.

ARGALL, SIR SAMUEL (*c.* 1580–1626), Eng. administrator of Virginia (1617–19); defeated Indians, 1612; French, in Nova Scotia, 1613; and assisted in attack on Cadiz, 1625–26.

ARGAND, AIMÉ (1755–1803), Swiss physician; invented lamp-burner, called after him by Quinquet, in which wick rises, forming hollow circle; effect, increase of light and heat.

ARGAO (9° 55′ N., 123° 35′ E.), town, Panay, Philippines; cacao. Pop. 35,500.

ARGAUM (21° 10′ N., 76° 57′ E.), village, Central Provinces, India. Here Wellesley defeated the Mahrattas, 1803.

ARGELANDER, FRIEDRICH WILHELM AUGUST (1799–1875), Ger. astronomer; pupil of Bessel; successively director of Abo, Helsingfors, and Bonn observatories; his great work is on observation of position of more than 300,000 stars.

ARGENS, JEAN BAPTISTE DE BOYER, MARQUIS D' (1704–71), Fr. man of letters; wrote *Lettres Juives*.

ARGENSOLA, LUPERCIO LEONARDO DE (1559–1613), Span. dramatist and poet; wrote three plays, which are mentioned in *Don Quixote*, but is chiefly remembered by his sonnets and other poems. His bro., **Bartolomé Leonardo** (1562–1631), was known as an historian and poet, and wrote *Conquista de las Islas Molucas*, and other works in prose and verse.

ARGENSON, D', name of a Fr. family, some members of which were intimately connected with national affairs from the time of Louis VIII. down to the latter half of the XIX. cent. (1) **René de Voyer, Seigneur d'A.** (1596–1651), enjoyed the favour of Cardinal Richelieu, to whom he owed various State appointments, and was made Ambassador to Venice by Mazarin. (2) **Marc René de Voyer, Marquis d'A.** (1652–1721), was Chief of Police in Paris (1697–1718), Pres. of the Council of Finance (1718–20), during which time he became implicated in the disastrous financial schemes of John Law, which brought about his downfall. (3) **René Louis Voyer, Marquis d'A.** (1694–1757), s. of the preceding, Sec. for Foreign Affairs (1744–47), author of *Considérations sur le Gouvernement de France* (1764), but is chiefly remembered by his *Mémoires*, which are full of valuable information regarding the period in which he lived. (4) **Marc Pierre de Voyer, Count d'A.** (1696–1764), bro. of last-named; War Minister (1742–57); was the friend of Diderot and Voltaire; incurred the dislike of Madame de Pompadour, through whom he was exiled, but was permitted to return to Paris after her death. (5) **Marc René de Voyer, Marquis d'A.** (1771–1842), who was some time aide-de-camp to Lafayette during the Revolution, but was later wrongfully denounced as a royalist conspirator.

ARGENTAN (48° 44′ N., 0° 1′ W.), town, on Orne, France; castle and church dating from XV. cent. Pop. 6290.

ARGENTATE, chemical compound with silver as metallic radical.

ARGENTEUIL (48° 56′ N., 2° 14′ E.), town, on Seine, France. Pop. 17,300.

ARGENTIÈRE, COL D' (44° 50′ N., 6° 31′ E.), mountain pass (6545 ft.) in Alps used from Roman times; Napoleon made carriage-road over it.

ARGENTINE (39° 5′ N., 94° 40′ W.), town, Kansas, U.S.A. Pop. 6000.

ARGENTINE REPUBLIC, REPUBLICA ARGENTINA (22° to 55° S., 54° to 73° W.), federal republic, S. America; length, *c.* 2300 miles; width, *c.* 800 miles; area, *c.* 1,100,000 sq. miles; bounded N. by Bolivia, N.E. by Paraguay, E. by Brazil, Uruguay, S. Atlantic, W. by Chile. **Surface** slopes gradually from foothills of Andes on W. towards E., and almost whole consists of great plains. Of flat ground, northern part is densely wooded, central pampas portion has great stretches of treeless pasture, and southern portion contains expanses of stony desert with patches of stunted thorn bush. Drainage of N. and centre is carried off by Paraná (with tributaries Pilcomayo, Vermejo, Salado) and Uruguay, which forms boundary with republic of Uruguay; farther S. are rivers Colorado, Negro, Chubut, Chico, and Santa Cruz; and in interior numerous streams end in marshes. Rainfall over great part of country is from 30 to 40 in., but diminishes in some places to 3 in.

History.—Aborigines belonged to Ando-Peruvian, Pampean, and Brasilio-Guaranian races. History begins with coming of Spaniards to River Plate in XVI. cent. First explorer, Juan Diaz de Solis, was killed and devoured by natives, 1516. Cabot's expedition in 1526–27, though more successful, had no permanent effect. Mendoza in 1535 founded first town at Buenos Aires, which was continually beleaguered by Indians and abandoned soon afterwards. Other explorers followed, but not until 1580 was permanent town built at Buenos Aires by Juan de Garay, who had already founded Santa Fé at junction of Paraná and Paraguay. In 1620 River Plate country was divided into two provinces, marking beginning of A., which then included Buenos Aires, Santa Fé, Entre Rios, Corrientes, Uruguay; whole remained under Viceroyalty of Peru. Gov. of A. at this time was Saavedra, founder of Argentine prosperity, and one of great heroes of Argentine history. In 1776 A. became a viceroyalty, and under Cevallos, first viceroy, trade was greatly expanded. During Fr. Revolutionary wars Great Britain, considering Spain's consent to a financial subsidy of France an act of hostility, sent two expeditions against Buenos Aires, both of which were repulsed by Argentines unaided by mother country. This led to formation of patriotic party. Spain's authority was set aside and independent government formed, May 25, 1810; struggle ensued; independence formally declared, 1816. After several victories gained by San Martin (great national hero) over Span. troops, congress met at Buenos Aires, 1822; independence recognised by U.S.A., 1823, Britain, 1825, Spain, 1842. New constitution was formed in 1853, which, with modifications introduced in 1866 and 1898, still exists. Since establishment of autonomy principal events have been war against Brazil, 1825–27; against Paraguay, 1865–70; various revolts and revolutions, after one of which, in 1890, there occurred a great financial crisis. There have also been boundary disputes with Brazil and Chile, settled respectively, 1895 and 1902.

Government.—Republic consists of fourteen provinces, ten territories, and one federal district (Buenos Aires city). Of former, four—Buenos Aires, Santa Fé,

Entre Rios, Corrientes—lie along River Plate; four—Rioja, Catamarca, San Juan, Mendoza—along Andes; three—Cordoba, San Luis, Santiago del Estero—in centre; three—Tucuman, Salta, Jujuy—in N. Territories are Formosa, Chaco, Misiones, Pampa, Rio Negro, Neuquen, Chubut, Santa Cruz, Tierra del Fuego. Constitution (1853) is based on U.S.A. Pres. is elected for six years by specially chosen representatives of provinces. National Congress comprises Senate (30 members) and House of Deputies (number of members varies according to population; in 1910, 120). Vice-Pres. acts as chairman of Senate. Ministry consists of eight Sec's of State. Each province has its own Legislature and local self-government; territories are under federal governors. Chief towns are Buenos Aires (capital), Rosario, La Plata, Tucuman. Buenos Aires and Ensenada are best harbours. Language is Spanish. Primary and secondary education are free; former obligatory for children from six to fourteen. Army is a National Militia; service compulsory. There is a small navy. Roman Catholicism is state religion.

COMMUNICATIONS.—There is coast-line of about 2700 miles; Paraná and Uruguay are navigable for many hundred miles. Railway mileage in 1911 was over 25,000 miles, and is being further developed. Trans-Andine railway (opened 1910) connects A. with Chile. Road communication is difficult owing to lack of road metal.

Resources and Production.—In N. are forests of hardwood, invaluable or railway sleepers, and quebracho, used in tanning; here are produced tobacco, jute, ramie, sugar, castor oil, fruits. In Andes regions are magnificent pine forests. In extreme S. seal-hunting and ice-collecting are carried on. There are many fibre-producing plants. Most economic minerals occur, but await development; coal is deficient. Agriculture and pasture are chief sources of wealth. Large numbers of sheep and cattle are raised; dairying important. A. is second wool-producing country in world. Horses, mules, asses, goats, and pigs also raised in large numbers. Chief crops are wheat, linseed, oats, barley, bird seed, rye, maize; sugar-cane and vines also cultivated. Imports include cottons, linens, coal, machinery, iron, beer, silk, cement, motor-cars, hardware, food-stuffs, agricultural implements, etc.; exports animals, wool, hides, frozen meat, butter, sugar, wheat, maize, etc. About one-third of import and one-sixth of export trade is with Great Britain. Pop. (1911) was estimated at 7,172,000; immigrants are chiefly Spaniards and Italians; also French, British, and other nationalities.

Handbook of Argentine Republic (Washington, 1903); *Argentine Year Book*; W. A. Hirst, *Argentina* (1910); W. H. Koebel, *Argentina, Past and Present* (1910).

ARGENTITE (silver glance), Ag_2S, grey lustrous silver ore occurring in mineral veins mined in Mexico, occasionally crystallised in cubes or octahedra.

ARGENTON (46° 35′ N., 1° 30′ E.), town, on Creuse, France. Pop. 6300.

ARGHOUL, Egyptian wind instrument, consisting of two reed pipes of unequal length, the smaller of which is pierced with six holes; it is of great antiquity, and is still used.

ARGILLACEOUS, see ARENACEOUS.

ARGO (classical myth.), see ARGONAUTS.

ARGO (*Argo Navis*), largest southern constellation; subdivided into four smaller groups: *Malus* (mast), *Vela* (sails), *Puppis* (stern), and *Carina* (keel); contains *Canopus*, brightest star in the sky except Sirius.

ARGOL, TARTAR, deposit which forms on fermentation of wine.

ARGOLIS (37° 35′ N., 23° 5′ E.), nomarchy, Greece.

ARGON (A = 39·9), colourless, odourless, chemically inactive, gaseous element, constituent (*c.* 0·8 %) of atmospheric air; B.P. −186°·1, M.P. −189°·6. Characteristic spectrum 'changing from red to a rich steel blue' (Crookes). The fact, already observed by Cavendish in 1785, that the density of nitrogen obtained from the atmosphere is about ½% greater than that of nitrogen prepared from its compounds, led to the discovery of a., in 1894, by Lord Rayleigh and Sir William Ramsay. It is isolated from the air by passing it over red-hot copper to remove the oxygen, and over magnesium to bind the nitrogen; it has also been prepared by electro-chemical methods. The elements *krypton*, *neon*, and *xenon* were afterwards discovered by Ramsay occurring in small proportions with a.

ARGONAUTA, a genus of Cephalopoda (*q.v.*).

ARGONAUTS (classical myth.), a band of heroes who sailed with Jason, in the ship *Argo*, to Colchis, to recover the *Golden Fleece*, which was guarded by a sleepless dragon. The venture proved successful, through the aid of the king's dau. Medea, who became the wife of Jason.

ARGONNE (49° 8′ N., 5° E.), hilly district, France, between Meuse and Aisne; forested.

ARGOS (37° 37′ N., 22° 48′ E.), town, E. Peloponnesus, Greece; acropolis, ancient theatre. A. in ancient times was predominant Hellenic state in Greece, power extending over most of Peloponnesus in VIII. cent. B.C. under ruler Phidon; a Doric city, famed for cult of Hera, whose temple, Heraion, stood on hill between A. and Mycenæ. In the long struggle between A. and Sparta, the latter ultimately attained ascendancy, *c.* 500 B.C. After various wars and alliances A. joined Achæan League, 229 B.C., to which it adhered until Roman conquest, 146 B.C.; prospered under Romans; held by Franks for time in XIII. cent.; burnt by Turks, 1825; modern town is straggling place, chiefly agricultural. Pop. *c.* 10,000.

ARGOSTOLI (38° 10′ N., 20° 30′ E.), port, Cephalonia, Greece. Pop. 9200.

ARGOSY, poetic name for a ship carrying a rich cargo, derived originally from vessels sailing from the Adriatic port of Ragusa (sometimes spelled Argosa).

ARGOT, see SLANG.

ARGUELLES, AUGUSTINO (1778–1844), Span. patriot and statesman; on account of his liberal views was imprisoned (1814–20); exiled (1823–32); subsequently Pres. of Chamber of Deputies.

ARGUIN (20° 15′ N., 17° 45′ W.), island, Fr. W. Africa.

ARGUS (classical myth.).—(1) S. of Inachus; had one hundred eyes; guardian of Io; slain by Hermes (Mercury). His eyes were afterwards transferred by Hera (Juno) to the tail of the peacock, a bird which was sacred to her. (2) The builder of the ship *Argo*. (3) A dog belonging to Odysseus, which knew its master after an absence of twenty years.

ARGYLL, EARLDOM AND DUKEDOM OF, honours borne by the Campbells of Loch Awe, Lord Colin C. being cr. 1st earl (1457); 2nd earl was killed at *Flodden*; 4th earl (d. 1558) was distinguished as being amongst the earliest of the Scot. peers to adopt principles of the Reformation; 5th earl (1530–73) was a Lord of the Congregation, notorious as being implicated in the Darnley murder, and became Chancellor under Regent Morton. Archibald C., 8th earl (1598–1661), was cr. marquis in 1641; noted for his seriousness of character and religious zeal, and though attached to Charles I. took the side of the Covenanters, raised an army, and was defeated by Montrose (*q.v.*) in 1644. He was opposed to the execution of Charles I., supported the cause of Charles II., but subsequently made his submission to Cromwell, for which he was called to account at the Restoration, condemned, and beheaded at the cross of Edinburgh. This marquis is dealt with in Scott's *Legend of Montrose*. The 9th earl (1629–85) was executed for participation in Monmouth rebellion; 10th earl (1651–1703), cr. duke (1701), actively promoted Revolution (1688), and was notorious for his association with massacre of Glencoe. John, 2nd duke (1678–1743), cr. Baron Chatham and Earl of Greenwich (1705) for distinguished services under Marlborough, led Royalist troops against Jacobites at Sheriffmuir (1715), and

was cr. Duke of Greenwich (1718); dealt with in Scott's *Heart of Midlothian*. George, 8th duke (1823–1900), was Lord Privy Seal (1852), Postmaster-General (1855), and Indian Sec. (1868); also noted as author of *Poems* (1894), *Primeval Man*, *The Unity of Nature*, etc. His s. John (1845–), 9th duke, m. (1871) Princess Louise; was Gov.-General of Canada (1878–83); author of *Canadian Pictures*, *Memories of Canada and Scotland*, *Life of Queen Victoria*, etc.

ARGYLLSHIRE (56° 20′ N., 5° 30′ W.), county, W. Scotland; besides irregularly shaped part of mainland, includes Mull, Islay, Jura, and many other islands; surface mountainous; highest peak, Ben Cruachan; coast-line deeply indented by arms of sea —Loch Long, Loch Fyne, Loch Linnhe, etc.; chief inland lake, Loch Awe; capital, Inveraray; largest towns, Campbeltown, Dunoon, Oban; Crinan Canal (opened 1801) connects Ardrishaig with Crinan; fine moors and deer forests; Highland cattle bred, sheep largely raised; quarrying, fishing, distilling. A. was held by independent princes till 1222, when became sheriffdom; after struggles between rival great families, Campbells became supreme and have held earldom (later dukedom) of Argyll since 1457; other important family, Macdonald of the Isles. Area, 3110 sq. miles. Pop. (1911) 70,900.

ARGYRODITE (Ag_8GeS_6), black purplish mineral crystallising in cubic system, found in Freiberg (Saxony) and Bolivian silver mines.

ARGYROKASTRO (40° 10′ N., 20° 8′ E.), town, Turkey. Pop. *c.* 11,000.

ARGYRONETA, see ARACHNIDA.

ARGYROPULOS, IOANNES (*c.* 1416–86), Gk. humanist; trans. Aristotle into Latin.

ARIA (*Ital.*), an ornate melody sung by a single voice in grand opera, oratorio, etc.

ARIADNE (classical myth.), dau. of Minos, king of Crete, who, when Theseus was confined in the labyrinth for the purpose of slaying the Minotaur, gave him a clue to its mazes. After his escape Theseus married Ariadne, but eventually abandoned her in the isle of Naxos.

ARIANO DI PUGLIA (41° 10′ N., 15° 7′ E.), town, Italy. Pop. 8400.

ARIAS MONTANO, BENITO (1527–98), Span. Orientalist.

ARICA (18° 28′ S., 70° 20′ W.), town, Tacna, Chile; port for Bolivia.

ARICIA (41° 44′ N., 12° 41′ E.), ancient town, Italy; modern, Ariccia. Pop. 3000.—**Aricini**, ancient people of Aricia.

ARIÈGE (42° 56′ N., 1° 25′ E.), frontier department, France, extending up northern slope of Pyrenees; forests; iron, lead, copper, manganese; cereals, fruit; area, 1892 sq. miles. Pop. (1911) 198,700.

ARIEL, satellite of Uranus.

ARIES (the Ram), constellation marking first sign of Zodaic (*q.v.*), symbolised by ♈. The point where the sun, passing through the intersection of the plane of the earth's equator and the *ecliptic* (the plane of its revolution round the sun), crosses from south to north of the equator formerly marked its entry into A., and was called the *First point of Aries*, or the *Spring Equinox*. It was used as the zero line of celestial measurements. The other point of intersection of these two planes, through which the sun crosses from north of the equator to south, is the *Autumnal Equinox*. See PRECESSION.

ARIKARA, N. Amer. Indians, now in N. Dakota.

ARIMASPI, ancient Scythian people; said to have been one-eyed; waged war on griffins.

ARIMATHÆA, town, Palestine, mentioned in Bible; site now unknown.

ARIMINUM (44° 5′ N., 12° 30′ E.), town, Italy; modern Rimini (*q.v.*).

ARINÆ, species of parrots with cuneiform tail.

ARIOBARZANES, king of Cappadocia; supported Pompey, and afterwards favoured by Julius Cæsar.

ARION (fl. 625 B.C.), celebrated lyric poet of Lesbos; went to Italy with Periander, tyrant of Corinth, where he acquired great riches. When he was returning to his own land, the sailors sought to murder him and possess themselves of his wealth. A. obtained permission to sing before his death, and the exquisite sound of his voice drew a number of dolphins around the ship. A. flung himself into the sea, and one of them bore him to safety.

ARIOSTO, LUDOVICO (1474–1533), Ital. poet; b. Reggio, in Lombardy; studied law (which he disliked) for five years, but subsequently devoted himself to literary composition. Some of his early work in the comic vein attracted the attention of Cardinal d'Este, who took the young poet into his service, but rewarded him only with a beggarly pittance. Later he transferred his services to the cardinal's bro., the Duke of Ferrara, and became governor of Garfagnana for three years; afterwards returned to Ferrara. A. is chiefly remembered for his immortal epic, *Orlando Furioso*, which he grafted on to an earlier attempt at epic-writing by Boiardo, entitled the *Orlando Innamorato*. This great work, which deals with the wars of Charlemagne with the Saracens, and more intimately with the loves of Ruggero and Bradamante, was begun in 1503, first pb. in 1516, but was continually being corrected and improved up to the time of the poet's death, which was due to consumption. The best Eng. trans. is that by W. S. Rose (1823). A. was also the author of a number of comedies, satires, and lyrical pieces.

ARIOVISTUS, Ger. chief, defeated by Julius Cæsar, 58 B.C., near Belfort.

ARISTA, bristle-like process on certain flies; awn.

ARISTÆUS (classical myth.), Gk. deity, s. of Apollo and Cyrene; m. Autonoë, dau. of Cadmus; was f. of Actæon; famed for benevolence; protector of the vine, olive, and bees, also of hunters and herdsmen.

ARISTAGORAS (d. 497 B.C.), tyrant of Miletus; revolted against Darius, 500; aided by Athenians.

ARISTANDER, soothsayer to Alexander the Great.

ARISTARCHUS OF SAMOS (*c.* 250 B.C.), Gk. astronomer; anticipated heliocentric theory of Copernicus.

ARISTARCHUS OF SAMOTHRACE (fl. 150 B.C.), Gk. grammarian; founder of the Aristarchean school of philologists which flourished at Alexandria and Rome; famous for his editions of Sophocles, Æschylus, and other Gk. poets; and more particularly for his exhaustive labours in idding text of Homer of interpolations.

ARISTEAS (*c.* 690 B.C.), Gk. poet; author of *Arimaspeia*. The accounts of his life are partly mythical, but he is mentioned by Herodotus.

ARISTIDES, THE JUST (*c.* 530–468 B.C.), Athenian statesman; strategus at *Marathon*; chief archon (489); ostracised for opposing Themistocles' naval policy (*c.* 484); distinguished himself at *Salamis* and *Platæa*; commander of fleet (477); as result of probity died poor.

ARISTIDES (fl. II. cent. B.C.), Gk. author, who wrote a number of *Milesian Tales*, and is said to have been the pioneer of Gk. prose romance.

ARISTIDES, writer of a valuable Christian apology which was read by its author to the Emperor Hadrian when he visited Athens. (Eng. trans. by W. S. Walford, 1909.)

ARISTIDES, ÆLIUS, THEODORUS (129–189), Gk. rhetorician. His rhetorical works were held in great regard by his contemporaries, and A. enjoyed the close friendship of the Emperor Marcus Aurelius.

ARISTIPPUS (fl. 356 B.C.), Gk. philosopher; founded Cyrenaic school; he regarded the pursuit of pleasure as one of the principal means of happiness, to which external luxury was a necessary adjunct.

ARISTO OF CHIOS (fl. 250 B.C.), Stoic philosopher; a follower of Zeno; devoted especially to study of ethics.

ARISTO OF PELLA (II. cent.), Jewish Christian writer; author of a famous *Dialogue*; referred to by Eusebius.

ARISTOBULUS (IV. cent. B.C.), Gk. historian, intimate companion of Alexander the Great; wrote a history of his campaigns.

ARISTOBULUS (II. cent. B.C.), Jewish Peripatetic philosopher; wrote commentaries on writings of Moses, quoted by Eusebius and others.

ARISTOCRACY, term used by Aristotle to mean 'the rule of the best'; hence, *right* government by a small privileged class. The term in modern English is used in reference to members of the peerage, a limited number of whom have hereditary seats in the House of Lords, and thus take part in the government of the country. The mediæval republics of Venice, Genoa, and other places in Italy may be cited as examples of government solely by the patrician class.

ARISTODEMUS (731–724 B.C.), king of Messenia, whose history is intermingled with legend.

ARISTOGEITON, Athenian who joined with friend Harmodius (*q.v.*) in tyrannicide, 514 B.C.

ARISTOLOCHIA, genus of shrubs, some species being tropical lianas. *A. clematitis* (birth-wort) occurs in England, *A. sipho* (Dutchman's pipe), native U.S.A., cultivated in gardens as climber.

ARISTOMENES OF ANDANIA (fl. 660 B.C.), half mythical hero of Second Messenian War; held Eira against Spartans eleven years; after its betrayal (*c.* 668 B.C.) A. went to Ialysus in Rhodes, where his son-in-law was king. One tradition says he died there; another represents him as slain in war by Spartans.

ARISTONICUS, Gk. grammarian, who lived at Rome during reigns of Augustus and his successor, and wrote a commentary on the text of Homer.

ARISTOPHANES (455–375 B.C.), the greatest comic poet of Greece; was an Athenian citizen; s. of [illegible]us, a landowner, in Ægina. Upwards of fifty comedies are ascribed to A., but of these only eleven are extant: *The Acharnians* (425), *The Knights* (424), *The Clouds* (423), *The Wasps* (422), *The Peace* (421), *The Birds* (414), *The Lysistrata* (411), *The Thesmophoriazusæ* (411), *The Frogs* (405), *The Ecclesiazusæ* (393), and *The Plutus* (388). In politics the poet held conservative views and was strongly antagonistic to the democratic school of thinkers represented by Socrates and Euripides. His plays were often made the medium of his opinions, and through them he gave expression to his brilliant powers of wit, humour, and invective. His plays are further distinguished by originality of plot, cleverly planned situations, and graceful and vigorous dialogue, while it is held by some distinguished critics that the poet achieved his highest success in the exquisite lyrics which are interspersed through them. A. is ranked with Shakespeare and Molière as one of the great comic dramatists of the world, whose humour can never become stale, and whose interpretation of human nature, and the virtues and follies of mankind, is not for their own age alone, but for all time.

Eng. trans. by W. J. Hickie, J. Hookham Frere, and B. B. Rogers; *Aristophanes*, by Collins.

ARISTOPHANES OF BYZANTIUM (*c.* 257–185 B.C.), Gk. critic and grammarian; became chief of Alexandrine Library; edit. Hesiod, Plato's *Dialogues*, and Aristotle's *Nature of Animals*.

ARISTOTLE (384–322 B.C.), one of the greatest thinkers of history; b. Stagira, Macedonia, whence known as the *Stagirite*. Losing both parents while still young, A. came to Athens, where he joined Plato's school; stayed in Athens twenty years; on death of Plato, migrated to Atarneus in Mysia, where he married Pytheas, the adopted dau. of Prince Hermias. In 342 A. became tutor to Alexander, afterwards the famous general. Returning, in 335 B.C., to Athens, he taught philosophy in the walks of the Lyceum (whence the name *Peripatetics* (q.v.) given to his followers); accused of impiety, he withdrew to Chalcis in Eubœa, where he died.

The writings of A., which are almost wholly the MSS. of lectures posthumously edit. by pupils, deal with almost all the branches of knowledge known to his age, and give a sketch of a complete system of the sciences. These are classed as theoretical (logic, metaphysics, and physics), practical (ethics, economics, politics), and productive (rhetoric and poetry).

Logic is regarded by A. as not properly a branch of philosophy, but as a study of method. His logical treatises were called the *Organon*, or *Instrument*, by the Peripatetics. He first deals with the ten categories—Substance, Quantity, Quality, Relation, Action, Passion, Where, When, Posture, Habit—a classification of the possible predicates of any subject; the highest classes in which all our ideas may be included. He then explains the combination of words into propositions, with definition and division. The 'analytic books' treat of the syllogism, deduction, and proof. The syllogism (*q.v.*) is the deduction of one judgment from two others, a connection being found in the middle term. Inference requires that these two premises should be already known, yet behind them lie the ultimate grounds of things, which cannot be proved by deduction, but are to be reached by 'induction.' This, taking an opposite course from deduction, starts from numerous sense experiences, and, apprehending the universal as a fact, leads to scientific knowledge. A lesser degree of certainty is reached in a 'dialectical' induction from expressed opinions.

The *metaphysics*, or 'first philosophy' of A. was so called by his followers from the position of these writings after 'the physics' (*μετὰ τὰ φυσικά*). Metaphysics deals with being, as being; with the ultimate conditions of existence. What is the Real, or true Substance? Plato's doctrine that the ideal alone is real is defective, as not explaining the unceasing change of nature, or how ideas, held to be the essences of things, can exist apart from them. Yet a materialistic theory is equally untenable; matter can have no existence apart from the form (*εἶδος*, the entire sum of its properties). Reality is then the concrete individual thing, containing elements which may be distinguished in thought, but have no separate existence. Hence the antithesis of matter (*ὕλη*) and form (*εἶδος*). Though these are the ultimate elements of being, yet all things, produced by art or nature, have four causes—Matter, Form, Efficient Cause, Final Cause. Matter is a mere capacity for existence (*δύναμις*); form, the essence of things, which with matter constitutes matter as we find it; the efficient cause is that which raises the mere capacity into actual existence, acting from within in plants and animals, or from without, as when an artist gives to his material the shape he has already in his mind; the final cause is the purpose which effects this passage from capacity to actuality (*ἐνέργεια*). These four are reduced to two, matter and form—*δύναμις* and *ἐνέργεια*, an antithesis really the same as the first of *ὕλη* and *εἶδος*, but dynamical and progressive instead of fixed and stationary.

The *theology* completes the metaphysics. God is the one perfect Being in which all possibility is at the same time actuality; the one self-existent essence, the cause of everything that exists, since nothing can exist without some precedent reality as moving cause.

Physics is called by Aristotle 'second philosophy,' and considers existence so far as in motion; actual, sensible reality. The universal conditions of all nature are space, time, motion (energy, entelechy, realisation of the potential). In nature is found a series of bodies extending from the inorganic up to man. Movement is produced by the soul, the principle of life. In plants, this is merely nutritive, in animals, also sentient, and in man rational; the human soul has all three functions, and the division expresses stages in its development. Sense perception is the apprehension of the forms of outward objects; not only passive, but active, distinguishing qualities by means

of one special sense, or several in combination (common sense). In this common sense, the five special senses have their unity, and lead to the development of imagination and memory. Reason belongs to man alone, and has a practical function in distinguishing things as agreeable or disagreeable. Unlike the nutritive and sentient parts of the soul, it is separable from the body, and immortal.

A.'s moral philosophy is included in the *Ethics* and *Politics*, which are to be taken as complementary works, dealing with the 'philosophy of human affairs' from different standpoints. In the *Ethics* is discussed the formation of individual character, taking the individual not in isolation, but as a social and political being. The knowledge thus acquired, however, is mere theory; it is through the State, operating through Law, that the best and happiest life is possible (*Politics*).

Ethics investigates the supreme good at which the individual aims in all his actions. This is Happiness, which consists, not in bodily pleasure, ambition, or speculative study, but in an active life in conformity with reason. Such a life is possible through the attaining of virtue, for which is necessary a thorough and systematic training. Virtue is thus not constituted by knowledge alone, as Socrates affirms; it cannot be taught, but requires an antecedent practical training. Hence the concern of politicians is to 'ethise' the citizens, to make them virtuous. A virtue is an excellence or perfection of any natural aptitude of the soul, attained through practice; a moral virtue is an excellence of that part of the rational soul which involves the regulation of capricious instincts and feelings within us. Taken together, the moral virtues constitute character. Moral virtues are mediocrities, acquired by repeating the same action many times; in excess, or in defect, they lead to vices. Thus courage is intermediate between cowardice and rashness, temperance between insensibility and intemperance, liberality between avarice and prodigality. This is the *Doctrine of the Mean*; virtue not opposite from vice (Plato), but a mean between extremes. Virtue and vice, also, are voluntary and in our power. What of pleasure? This is a concomitant of perfect activity; itself good, and a necessary part of the best life.

The production through the State of the virtuous life of the citizen, is discussed in the *Politics*. The best State is, generally speaking, of a moderate size, and well placed towards land and sea, excludes from government all engaged in trade and commerce, makes provision for religious worship and moral training, with law as the outward expression of the moral ideal. The best governments are, in order, Monarchy, Aristocracy, Constitutional Republic, Democracy, Oligarchy, Tyranny. The citizens are a small minority in the State; relieved from laborious money-getting employments, spending their whole time in the pursuit of virtue, subjected from infancy to a severe and systematic training, admitting neither of luxury or self-indulgence.

The productive sciences apply true reasoning from appropriate principles to the production of a desired practical result. All the arts are both rational and productive.

In his *Rhetoric* A. handles the art of persuasion with that touch of the master-mind which gives finality to the subject; while in his fragment of the *Poetics*, dealing with the subject of tragedy, his pronouncements (*e.g.* on the 'Unities') have largely influenced all later literary criticism.

Zeller, *A. and Earlier Peripatetics* (1897); Butcher, *A.'s Theory of Poetry and Fine Art* (1895); Taylor, *Aristotle* (1912).

ARISTOTLE'S LANTERN, see ECHINODERMATA.

ARISTOXENUS (IV. cent. B.C.), Gk. philosopher and writer on music; a pupil of Aristotle; author of several hundred works, of which only three books of his *Elements of Harmony* have been preserved.

ARITHMETIC, the science treating of numbers and calculations. *Numbers* are expressed by means of certain signs or symbols. These are, in the very great majority of cases, figures; occasionally the capital letters I, V, X, L, C, D, M are used. Calculations are always made with figures. The basis of all calculation is the *unit* 1, one. A number is a unit, such as *one penny*, or a collection of units of the same kind, as *seven horses*. A number, such as *four* or *five*, not attached to any particular things or units, is called an *abstract number*. A number of particular units, such as *four pigs* or *five geese*, is called a *concrete number*.

Figures, or *digits*, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, represent respectively *nought, one, two, three, four, five, six, seven, eight, nine* units. Each denotes one unit more than the preceding one.

The letters used to denote numbers are: M, a thousand; D, five hundred; C, one hundred; L, fifty; X, ten; V, five; and I, one. Since we have only the figures 0, 1, 2, etc., to represent all numbers, it is necessary to give a *place value* to the digits—that is, to make the value of a digit depend upon position as well as upon the symbol. The method was known in Europe to some extent about the XII. cent., and it is fairly certain that one of its avenues of approach was through the Moors.

A figure in the first place (*i.e.* the right-hand place) of a number denotes so many units. The same figure in the second place denotes 10 times as many. Hence, figures in the second place are often called *tens*. The same relation holds for all successive places, the *place value* of any one place being 10 times that of the one immediately to the right of it.

Each place has a place name, which corresponds with its place value; thus the digit 1 in the successive places from right to left denotes one unit, ten, one hundred, one thousand, ten thousand, one hundred thousand, one million, and so on up to one million million, which is called one billion, and to one million billion, called one trillion. In France and the United States a billion denotes a thousand million, a trillion a thousand billion, and so on.

The number 10, which is so important in our system of numeration, is called the *radix* or the *scale of notation*. Other systems with different *radices* have been employed, but no corresponding notation exists.

For further information on systems of notation, see NUMERAL.

(1) **Addition and Subtraction.**—*Addition* is the process of finding a single number equivalent to two or more numbers; *subtraction* is the operation of finding how much larger or smaller one quantity is than another. Addition is denoted by the sign + (plus), subtraction by − (minus), the left-hand one of two quantities being taken first and the next added to, or subtracted from, it. Thus 12 − 5 means we are to take 5 from 12.

Addition or subtraction usually involve rearrangement. Only quantities of the same kind can be added or subtracted. Thus, before we can perform the operation, 2 shillings − 6 pence, we have first to rearrange the 2 shillings as 1 shilling and 12 pence, when we can subtract the 6 from the 12, leaving 1 shilling and 6 pence.

Subtraction may be performed in one of two ways, based on (i) What must be added to a given number to make another? or (ii) By how much must a given number be diminished so as to equal another?

(2) **Multiplication** is a contracted form of addition, and is denoted by the sign ×. The result is known as the *product*. In multiplication it is better to deal with the left-hand digits first, as these are the most important. The development of physical science has emphasised the impossibility of ever obtaining absolute accuracy, so approximations are all we are ever justified in obtaining. It is just as easy to perform the ordinary process of long multiplication from left to right as from right to left, and the facility thus obtained is of considerable value when contracted methods of multiplication of decimals are reached. Multiplication is performed

with the aid of multiple tables giving successive multiples of a particular unit.

(3) **Division**, denoted by the sign ÷, is the operation of ascertaining how often one quantity is contained in another. A concrete quantity may be divided by another like quantity—as how often is 5s. contained in 15s. ? A concrete quantity may be divided by an abstract number—as find the fourth part of 12d.; or an abstract quantity may be divided by another. In any case the result is known as the *quotient*.

(4) **Factors.**—The factors of any number are such numbers as are integral parts of the number, no remainder being left on division. A number which has no factor other than itself and unity is called a *prime number*. The first few primes are 2, 3, 5, 7, 11. A knowledge of the prime factors of numbers is of much use in the processes of finding the *Least Common Multiple* and *Highest Common Factor* of several numbers; *e.g.* :—

$$\left.\begin{array}{l}24=2^3\times 3\\15=3\times 5\\36=3^2\times 2^2\end{array}\right\}\begin{array}{l}\therefore \text{ L.C.M. of } 24,\ 15,\ 36=2^3\times 3^2\times 5\\ \text{and H.C.F.}=3;\\ \text{where } 3^2 \text{ denotes } 3\times 3\times 3\\ \text{and generally } a^n=a\times a\times a\text{—to } n \text{ factors;}\end{array}$$

for the L.C.M. is the product of the highest powers of all the primes which occur, and the H.C.F. is the product of all factors common to the set of numbers.

(5) **Fractions and Decimals.**—A quantity being divided into any number of equal parts, one or more of such parts is a *fraction* of that quantity. Thus $\frac{3}{16}$ of 1 cwt. denotes that 1 cwt. is to be divided into 16 equal parts, and 3 of these taken. A fraction of a fraction is obtained from the principle that the value of a fraction is unchanged when both numerator and denominator are multiplied or divided by the same number. Thus to find $\frac{5}{4}\times\frac{7}{8}$ of X, we have $\frac{7}{8}$ of $X=\frac{4\times 7}{4\times 8}$ of X, and taking as a new unit $\frac{7}{4\times 8}$ of X, 4 times which is $\frac{7}{8}$ of X, we see that this must be taken 5 times instead of 4, giving the result $\frac{5\times 7}{4\times 8}$ of $X=\frac{35}{32}$ of X. Addition and subtraction of fractions is performed by reducing them all to a *common denominator*; it is usual to take for this the L.C.M. of the denominators.

In the *decimal notation* the system of place value is extended beyond the units figure. Thus 5·164 means 5 units, 1 tenth, 6 hundredths, 4 thousandths, or $5+\frac{164}{1000}$. The manipulation of decimals is thus exactly the same as for ordinary integral numbers, only the position of the decimal point giving difficulty. Multiplications and divisions are best performed by the contracted methods, the position of the decimal point being afterwards fixed by a rough approximation.

(6) **Approximation.**—*For most purposes the numbers used in arithmetic are expressed with sufficient accuracy by approximations, which may be correct to a certain number of significant figures (the significant figures of a number are those commencing with the first figure other than zero). For example, all numbers representing the results of physical determinations are necessarily limited by the inaccuracy of our measurements, so it is futile to extend calculations beyond a certain point depending on the accuracy with which the measurements have been made.*

(7) **Percentages** may be regarded as decimal fractions, the denominator in every case being 100. Thus $\frac{3}{4}$ is equivalent to $\frac{75}{100}$ or 75 %. In many cases only approximate values can be given, as $\frac{4}{7}=$·571428 . . . =approximately 57 %. But by using mixed fractions we may write $\frac{4}{7}=57\frac{1}{7}$ %$=$·57$\frac{1}{7}$.

(8) **Ratio** is concerned with the relative magnitude of quantities. **Proportion** deals with equality of ratios.

(9) **Special Applications.**—For information on Interest and Discount, etc., reference should be made to any text-book on commercial arithmetic.

Short History of Mathematics, W. W. R. Ball; *Teaching of Mathematics in Elementary and Secondary Schools*, J. W. A. Young; *Easy Mathematics, Chiefly Arithmetic*, Sir. O. Lodge. ELEMENTARY TEXT-BOOKS: *School Arithmetic*, Hall and Stevens; *New School Arithmetic*, C. Pendlebury.

ARIUS (d. 336), famous heresiarch; presbyter of Alexandria; from him Arian controversy took its name, though doctrines he promulgated were not entirely new, being similar to those of Lucian of Antioch and Paul of Samosata. According to A., the Son was a created being, hence not in orthodox sense 'perfect God'; the Logos was united with a human body, hence Christ's humanity was not real either. A. was excommunicated, 325, at Council of Nicæa; his heresy lived on till VII. cent.

ARIZONA (31° 20′ to 37° N., 109° 3′ to 114° 45′ W.), state, U.S.A.; bounded N. by Nevada and Utah, E. by New Mexico, S. by Mexico, W. by California and Nevada; area, 113,020 sq. miles. In N.E. is high plateau, in S.W. low-lying plains; has many short mountain ranges; highest points, Thomas Peak, Ord Peak. Chief rivers are Colorado (lower part navigable) and its tributary Gila; former crosses N.E. and turning S. forms part of W. boundary; latter drains S. Climate varies, hottest in S.; rainfall slight. Animals found are coyotes, prairie dogs, kangaroo rats, etc. Flora includes cacti, firs, juniper.

In 1848 northern A. as part of New Mexico became property of U.S.A. by treaty of Guadalupe-Hidalgo; southern part bought, 1854; separated from New Mexico, and organised as distinct territory, 1863; admitted as separate State to Union, Feb. 1912; capital, Phœnix. A. has Legislative Council of 12, and House of Representatives of 24, elected by popular vote for two years; sends two delegates to Congress.

Principal religious bodies: Roman Catholics, Latter-Day Saints, Presbyterians. Education is compulsory. Tucson has univ.

Cattle, sheep, horses, and pigs are raised; chief crops, alfalfa, wheat, barley; potatoes and apples grow in N., figs, grapes, etc., in S. Minerals include copper, lead, gold, silver, asbestos, quicksilver, zinc; granite, sandstone, limestone. Industries include copper-refining, car construction, timber-working, flour-milling.

Pop. (1910) 204,354, including about 26,000 Indians and 15,000 Mexicans. Map, see CALIFORNIA.

H. H. Bancroft, *History of Arizona and New Mexico* (San Francisco, 1887).

ARK (Lat. *arca*), in Old Testament the bulrush basket in which the child Moses was found; Noah's ark (300 cubits long, 50 broad, 30 high); also 'Ark of the Covenant,' the sacred chest (containing the tables of stone, etc.) carried by the Israelites into Palestine.

ARKANSAS (35° 15′ N., 93° 10′ W.), river, U.S.A., partly navigable; rises in Rocky Mountains, Colorado; waters Kansas, Oklahoma, Arkansas; joins Mississippi; drains about 185,600 sq. miles; chief tributary, Canadian R.; length about 2150 miles.

ARKANSAS (33° to 36° 30′ N., 89° 40′ to 94° 41′ W.), state, U.S.A.; bounded N. by Missouri, E. by Mississippi, S. by Louisiana, W. by Texas and Oklahoma; area, 53,850 sq. miles. Chief mts. are Boston range in N., Ouachita in S. Through centre flows A. River, other important streams being Ouachita, White, Bartholomew, and Red Rivers. Climate is healthy except in E., where swamps cause malaria.

Original inhabitants were Indian tribes; first European settlers French. A. formed part of Louisiana till 1812; of Missouri, 1812–19; organised as separate territory, 1819; became State, 1836.

Legislative powers are vested in Senate of 36 and House of Representatives of 100 members—former elected for four, latter for two years; sends two senators and seven representatives to Congress. Gov. holds office for two years. There is supreme court of judicature of five members, and several circuit courts. Baptist and Methodist churches predominate. State

system of education; separate schools for white and black.

A. is an agricultural State; chief crops, wheat, maize, oats, potatoes, hay, forage; crops in N., cotton, tobacco in S. In N.W. many fruits are grown, including apples, peaches, strawberries. Horses, mules, cattle, sheep, and pigs are raised. Forests cover nearly 2,000,000 acres, trees including cotton-wood, hickory, red cedar; timber-working is important industry. Coal is largely produced; other minerals include manganese, bauxite, lead, whetstones, granite, limestone. Industries include cotton-ginning, flour-milling. Capital, Little Rock; port for foreign trade, New Orleans. Pop. (1910) 1,574,449, over 25 % being negroes.

ARKANSAS CITY (37° 5′ N., 97° 20′ W.), town, Kansas, U.S.A. Pop. (1910) 7508.

ARKHANGELSK, see ARCHANGEL.

ARKLOW (52° 48′ N., 6° 10′ W.), port, Wicklow, Ireland. Pop. 5000.

ARKWRIGHT, SIR RICHARD (1732–92), Eng. inventor; b. Preston; apprenticed to barber, but took great interest in machinery used in the manufacture of cotton cloth; invented the spinning-frame, and made other improvements in processes of carding and spinning. With help of two wealthy partners he established mills at Nottingham, and at Cromford (Derbyshire), and amassed large fortune; knighted by George III. in 1786.

ARLBERG PASS (47° 8′ N., 10° 10′ E.), pass in Austrian Alps.

ARLES (43° 40′ N., 4° 38′ E.), river port, on Rhône, France; has ruined Rom. amphitheatre, and theatre where *Vénus d'Arles* was discovered; fine cathedral; various synods held here from 314 A.D. onwards. Pop. 16,200. **Arles, Kingdom of**, dated from 933 till about 1378, when its independent history ended; included Lyonnais, Franche Comté, and district between Rhône and Alps.

ARLINGTON (42° 24′ N., 71° 9′ W.), town, Massachusetts, U.S.A. Pop. (1910) 11,187.

ARLINGTON, HENRY BENNET, EARL OF (1618–85), Eng. statesman; sec. to Lord Digby (1643); member of Cabal (*q.v.*); fought for king during Civil War; knighted (1657); Charles' agent in Madrid till after Restoration. He became Sec. of State (1662); Baron A. (1663); Postmaster-General (1667); intimately connected with Dover Secret Treaty (1670); earl (1672); Lord Chamberlain (1674); Lord Lieutenant of Suffolk (1681). Agreeable but egotistical, A. was a typical Restoration statesman.

ARLON (49° 42′ N., 5° 49′ E.), town, Luxembourg, Belgium. Pop. (1900) 10,044.

ARMADA, THE (1588), fleet sent against England by Philip II. The commander (Duke of Medina Sidonia), was inexperienced; ships unwieldy and undermanned; gunnery inferior; and the provisions scanty. Eng. fleet, planned with view to naval battle, under Admiral Howard (Drake, Frobisher, Hawkins—subordinate admirals), finally routed the Spaniards; destruction completed by storms. Failure of A. represented Philip II.'s failure to make Roman Catholicism and Hapsburg dynasty supreme.

ARMADILLO, family of Central and S. American edentate, omnivorous, chiefly nocturnal mammals, provided with armour of bony plates and strong claws for burrowing; length up to 4 ft.; fossil species, some of immense size, found in caves. See EDENTATA.

ARMAGEDDON (or Harmagedon), the battle-field of the Apocalypse, where the final struggle between good and evil is to be determined on the Day of Judgment.

ARMAGH (54° 16′ N., 6° 35′ W.), county, Ulster, Ireland; area, 312,658 acres; rises to height of about 1900 ft. in S. (Slieve Gullion), but is elsewhere flat with good deal of bog; has good railway communications; linen and cotton-weaving; chief rivers, Bann, Blackwater, Newry, Callan. Pop. (1911) 119,600.

ARMAGH (54° 20′ N., 6° 40′ W.), cathedral town and ecclesiastical metropolis, Ireland; seat of Anglican and R.C. abp's. Pop. 7600.

ARMAGNAC (43° 30′ N., 0° 30′ E.), old province, France; soil fertile; wine, brandy. Counts of A. were rivals of dukes of Burgundy, with whom joined forces against England, 1415; family extinct, 1497; countship united to Fr. crown, 1607.

ARMAMENT, general preparations, offensive and defensive, for war; term thus includes not only arms and armour, but broadly armies and navies, naval bases and strategical arrangements.

Arms include any sort of offensive and (strictly, in the case of persons only) defensive weapon. Offensive weapons include arms to discharge missiles, *e.g.* catapults, firearms; missiles, *e.g.* spears; arms wielded by hand at close quarters for cleaving, thrusting, crushing, cutting, *e.g.* axes, daggers, clubs, sabres. Arms for purpose of defence comprise chain mail and metal plates to protect the body, head, and limbs, in addition to shields. Early races used stone weapons; those employed in the earliest (Palæolithic) times were chipped flints and celts, while in later (Neolithic) times more elaborate weapons were used, such as flint knives attached to handles. Various kinds of stone, horn, and bone were used for making weapons, spear-heads and arrow-points (leaf-shaped, lozenge-shaped, tanged, and triangular) were chipped in flint, and vegetable-fibre and bitumen fastened heads to shafts. Flint daggers (usually 12 in. long), were various in form and size. Short, leaf-shaped daggers and curved knives, with both edges sharpened, were highest type. Sling-stones and stone-balls (probably used like S. American *bolas*) were also used. Wristlets or braces of slate seem to have been only form of defensive armour in Stone age.

Metal was only gradually adopted for weapons; bronze dagger apparently earliest metal weapon. A sword with a long tapering blade and a long handle was a favourite weapon of the Bronze age. Swords of transition period between Bronze and Iron ages—generally iron copies of leaf-shaped sword, sometimes having flat bronze handle-plate. The problem of pre-Homeric and Homeric armour is largely a matter of inference; no single type of weapon predominates. According to Homeric poems, fully armed Homeric warrior wore shield, greaves, band, belt, tunic, helmet, breastplate, sword. Hoplites of later Greece wore helmet, breast- and back-plates, greaves of pliant bronze, round or oval shields, and fought with pikes and short double-edged sword. The heavy-armed cavalry carried lances. Between heavy- and light-armed were the peltasts (*pelta*—small light shield).

Equipment of Roman soldier underwent many changes. Early Roman sword was of bronze, straight blade, double-edged, obtusely-pointed. About Polybius' time (160 B.C.), the cavalry, originally protected by light ox-hide shield and fragile spear, adopted Gk. equipment of buckler, breast-plate, and strong spear. Later the *pilum* (a form of javelin) became characteristic weapon of the heavy-armed. Auxiliaries used the *hasta* and *spatha*. Under the Empire, the heavy-armed apparently had helmet, cuirass, long-sword and dagger, pilum and scutum. Cavalry had broadsword, buckler, long thrusting-pole, and javelins.

The fully armed Eng. knight (XI. cent.) had helmet, hauberk, shield, sword, lance (or sometimes axe, mace, and bow). The long-bow and the arbalest, or cross-bow, were two of the most formidable weapons of the Middle Ages. The Eng. victories at Crécy, Poitiers, and Agincourt were chiefly due to the use of the former weapon, while the French favoured the latter, and it continued in use in their army until about 1530. Créoy was the first Eng. battle in which cannon were used. Plate armour appeared in XIV. cent. In XV. cent. surcoat and horseman's shield tended to disappear. The *arquebus* was invented in Spain in XVI. cent.; and was succeeded by the *musket*, a clumsy weapon, fired from a rest. These in turn

gave place to the wheel-lock gun, the percussion gun (first made in England, 1820), and subsequently the carbine and magazine rifle.—In naval arms the tendency has been to equip larger and larger ships with heavier and heavier guns. To-day 13·5 in. guns are being installed in the newest vessels.

Armour, Naval, generic term for the protective features of a modern warship, of which the most important part is the broadside a., since upon this depends the safety of her engines, boilers, magazines, etc. Amongst the earliest Brit. iron warships was the *Warrior* (1860); but for some time afterwards it was the practice to armour wooden ships with iron plates, 4½ in. in thickness. This iron sheathing was subsequently increased to 6 in., 9 in., 12 in., and even 24 in. The use of steel plates was introduced by Schneider (1876), and this led to the adoption of 'compound a.,' *i.e.* steel surface on wrought-iron foundation plate, the combination being designed to render a projectile ineffective and yet preserve the plating intact. Compound a. was largely used from 1880–90, when further improvements were introduced (Harvey and Tresidder processes); and the use of nickel in steel plates was introduced by Schneider, 1889. Krupp's armour, first employed in 1897, now furnishes the chief protective element in warships. The steel used in this process has a high tensile strength, and contains nickel, chromium, and manganese. The *Dreadnought* type of warships are protected by Krupp plates, varying from 11 in. amidships to 6 in. and 4 in. at bow and stern, the heaviest plating being below the water-line, since if hulled by a projectile the vessel becomes more quickly disabled. See ARMY, SEA POWER, ARTILLERY, and GUN.

Brett's *Ancient Arms and Armour*; Hewitt's *Ancient Armour and Weapons in Europe*; Boutell's *Arms and Armour*. Brassey's *Naval Annual*; Herbert Russell's *ABC of the Royal Navy*, etc.

ARMATOLES (Klephtes), Greeks of northern mountains (Armatolia) who contributed heroic fighting force to War of Independence, 1821.

ARMATURE, revolving part of electro-motor or dynamo (*q.v.*).

ARMENIA (37° 30′ to 40° 30′ N., 37° to 45° 30′ E.), district, W. Asia, divided between Turk. vilayets Erzerum and Diarbekir, Russ. government of Erivan, parts of Kars and Tiflis, and part of Persian province of Azerbaijan. Surface is series of pastoral plateaus from 3000 to 7000 ft. above sea-level; highest point, Mt. Ararat (17,212 ft.); drained by Euphrates, Kur, Aras, Tigris. Climate is severe; cold N. winds; valleys have vineyards and orchards, produce cotton, tobacco, maize, rice, hemp, flax. Minerals include copper, silver, lead, iron, arsenic, alum, rock salt.

History.—A. was in early times successively subject to Assyria, Media, Persia; conquered by Lucullus, 69 B.C.; divided between Rome and Persia, 387 A.D. In 632 country was united to Byzantine empire; subsequently came under caliphs, under whom was established Bagratid dynasty; seized by Seljukian Turks in XI. cent. After various vicissitudes A. was divided between Turkey and Persia in XVI. cent., Russia acquiring share in 1828. Later in XIX. cent. revolutionary societies were formed; result of movement was massacre of Armenians by Turks in 1894, and subsequently at various dates. These massacres, known as *Armenian Atrocities*, have from time to time formed subject of negotiations between Britain, Russia, and Turkey. Map, see ASIA MINOR. Number of Armenians, *c.* 3,000,000.

Gregor, *History of Armenia* (1897); Lynch, *Armenia* (1901).

Armenian Language and Literature. — The old Armenian language, which is the medium of the country's lit., belongs to the Indo-Germanic group, and somewhat resembles ancient Greek. This may perhaps be explained by the fact that after the conversion of the Armenians to Christianity (300 A.D.) Gk. language and lit. became objects of special study, and at a somewhat later date use of the Gk. alphabet became general in western Armenia. The translation of the Bible was undertaken in V. cent. by St. Mesrob and Sahak the Great, and about same time translations were made of the Chronicle of Eusebius, St. Chrysostom's homilies, the Discourses of Philo, and other notable works. This literary language, however, is no longer a living tongue, and modern Armenian is divided into several dialects, and is marked by a considerable admixture of Turkish and Persian words.

Armenian Church. — Christianity penetrated Armenia from Syria, probably in early part of III. cent., but details are unknown. All is obscure till Gregory the Illuminator, the real founder of Armenian Christianity, began his work about 261, and baptized King Tiridates. The A. C. has always been national, and has several peculiarities. As regards doctrine, like the other Eastern Churches it rejects the *filioque*, asserting the Procession of the Holy Spirit from the Father only, not from the Father and the Son, and like the Coptic and Abyssinian Churches Armenians refuse to accept Chalcedonian definition of the person of Our Lord, saying they are Monophysite, admitting only one nature. In ritual they have still maintained pagan sacrifice of animals, which they practise on the great festivals. The A. C. as a whole did not admit the supremacy of the Roman See, but since the XIV. cent. there have been definitely organised Armenian Catholics, recognising the Pope.

The Key of Truth, and articles, etc., on the Armenian Church by F. C. Conybeare.

ARMENTIÈRES (50° 40′ N., 2° 50′ E.), town, Nord, France. Pop. 29,400.

ARMET, a helmet much in use in the XVI. cent. with protection for the neck. A defensive ridge ran across the top from front to back; and it might be worn with or without the beaver.

ARMFELT, GUSTAF MAURITZ, COUNT (1757–1814), Swed. diplomatist, ambassador, and general; b. Finland; supported the Gustavians; exiled (1811) after deposition of Gustavus IV.; first Gov.-Gen. of Finland.

ARMIDA, heroine of Tasso's *Jerusalem Delivered*; exercised magical fascination over heroes of Crusades.

ARMIDALE (30° 26′ S., 151° 40′ E.), town, New South Wales. Pop. 4200.

ARMILLARY SPHERE, astronomical instrument, consisting of rings, representing horizon, meridian, ecliptic, equator, and other imaginary circles; formerly used to demonstrate position of celestial bodies.

ARMINIUS, HERMANN (17 B.C.–21 A.D.), Ger. national hero, who led the tribes and won victory over Roman gov. Quintilius Varus, in Teutoburger Wald, and later over Germanicus Cæsar; eventually murdered by his relations, who became jealous of his power.

ARMINIUS, JACOBUS (1560–1609), Dutch religious leader; studied at Leiden Univ., 1576–82, where he met various able theologians; then at Geneva, Basel, and in Italy. Broad-minded and tolerant, he was too friendly with 'heretics' to satisfy the stern Calvinists of his day; was ordained, 1588; theological prof. at Leiden, 1603–9. His name has passed to the type of theol. which is anti-Calvinistic; Calvin maintained predestination, A. man's freedom—every man could be regenerated and saved if he would. *Life*, by Brandt.

ARMITAGE, EDWARD (1817–96), Eng. historical painter; ed. chiefly abroad, and commenced career in Paris; much success in competitions for cartoons and frescoes for new Houses of Parliament, 1843 and later. 'Samson' and various Crimean scenes are good examples of his art.

ARMOIRE (Fr.), name given to large decorated cupboards, or wardrobes, for containing church vestments, eucharistic vessels, etc. Many fine examples are to be seen in old Fr. cathedrals.

ARMORIAL BEARINGS, originally, devices

placed on armour, especially shield, or coat worn over armour (from which arose term 'coats of arms'); later, shield which shows devices, and crest, coronet, motto, etc. Hereditary *insignia gentilitia* existed X. cent., but were not in common use till XIII. cent.; by royal proclamation, 1419, nobody whose ancestors did not bear arms at Agincourt may assume them without royal licence; all male descendants may bear them, female only in lozenge or under curtain.

ARMORICA, Roman name for Brittany.

ARMOUR, PHILIP DANFORTH (1832–1901), Amer. merchant and philanthropist; head of firm of Armour & Co., pork-packers, in which business he acquired a vast fortune; founded, in Chicago, Armour Institute of Technology, and Armour Flats to provide workmen with good dwellings at low rentals.

ARMS, see ARMORIAL BEARINGS.

ARMSTEAD, HENRY HUGH (1828–1905), Eng. sculptor; executed much of the external decoration of the Colonial Office, Whitehall; the fountain at King's Coll., Cambridge; and numerous statues; A.R.A., 1875; R.A., 1880.

ARMSTRONG, ARCHIE (d. 1672), Eng. jester; after obtaining notoriety as an Eskdale sheepstealer, he entered service of King James I., and rose to be Court fool, continuing in that office during some part of the reign of Charles I. Asked to say grace at Whitehall when Laud was present, he uttered the famous words: 'Let great praise be given to God, and little *laud* to the devil.' He was subsequently dismissed the Court, set up as a moneylender in London, and, having acquired a comfortable fortune, retired to his Cumberland estate. (Scott's *Fortunes of Nigel.*)

ARMSTRONG, JOHN (1709–79), Scot. author and physician; settled in London and was intimate with John Wilkes; author of a didactic poem, *The Art of Preserving Health,* and numerous other writings in prose and verse.

ARMSTRONG, SAMUEL CHAPMAN (1839–93), Amer. soldier and educationist; did much to promote negro education.

ARMSTRONG, WILLIAM GEORGE ARMSTRONG, BARON (1810–1900), Eng. ordnance inventor; founder of Elswick manufacturing works; b. Newcastle; invented improved rotary water-motor (1839), hydraulic crane (1846), and 'accumulator' (1850); app. Engineer of Rifled Ordnance, and knighted (1859); made a peer (1887).

ARMY.—The term army in its widest sense signifies the force available to conduct operations against an enemy on land, and therefore includes men, horses, weapons, and other material of war—*e.g.* the French army. In a more restricted sense an army is any military force acting independently—*e.g.* Wellington's army. The word is also used for legal and administrative purposes in various senses—*e.g.* the Indian Army, Regular Army.

On looking backwards we find that an army has been always a reflection of the state of society or the stage of civilisation which called it into being. An army has no inherent vitality, no germ of development. It flowers only to decay. In the earliest ages tribes of shepherds took up arms and laid them aside again, becoming a nation at peace or a nation at war under the leadership of their chiefs. In countries where the population was agricultural, some division of labour became necessary, since each tribe on taking the field was compelled to leave behind some men to sow and reap. Later still, when artificers had settled in towns, the trade of a soldier became specialised, and yet the army remained practically a militia inasmuch as the character of the civilian predominated over that of the soldier, and troops could not be carried into distant countries for long periods without danger of mutiny.

The first armies of which we have any definite knowledge are those which fought at *Marathon* (490 B.C.), where Greek and Persian met. The Persian army of bowmen had reached some degree of perfection under Cyrus and his successor, Darius, but the Athenian spearmen under Miltiades won the victory; yet the Persians had overcome bowmen like the Medes, the Lydian lancers, and armoured hosts like the Babylonians, Egyptians, and Greeks, and we must therefore attribute the Athenian victory at Marathon to superior leadership. The seeming phenomenon that an army will grow and diminish, prove irresistible, and decline again, within a century, is accounted for by considering an army as the creation of a general with a genius for war, or as the instrument of a feeble ruler. Three Roman legions were exterminated by a German militia raised by Arminius; the armies of Sparta and other Greek republics could not withstand a force trained by Philip of Macedon and his son, Alexander the Great. The armies of Persia, of Carthage, of Macedon, and of Greece dwindled one by one as their leaders perished; the Roman army expired in its effort to check the Huns under Attila, who in the year 451 threatened to sweep away all trace of civilisation and Christianity in Western Europe. Since the time of Abderrahman, whom Charles Martel defeated at Tours in 732, we have seen no Oriental army capable of invading France.

In England, King Alfred (871 A.D.) raised a national army of militia to expel the Danes, but it proved unequal two centuries later under Harold to withstand the army of knights brought over by William of Normandy. Then came the feudal period when powerful nobles exacted military service from their dependents, and hired these forces out to support any cause they adopted—at one time aiding their king, at another time opposing the king's forces, or even, as in the Wars of the Roses (1455), destroying one another. But not until the XVI. cent. do we learn of an army fit to be compared with those of Greece and Rome. It was Philip II. of Spain who then incontestably bore the palm in respect of army and navy, but in the next cent. Gustavus Adolphus assumed the position which the death of Philip had left vacant, and became the military head of Europe, perfecting his army during the Thirty Years War. The Civil War in this country produced the formidable militia of the Commonwealth, which subsequently was replaced by the royal standing army. Meanwhile Gustavus Adolphus had yielded place in the military world to Louis XIV., whose army procured him all that Napoleon coveted at a later period, but the rise of the Duke of Marlborough proved fatal to the French army at the beginning of the XVIII. cent.

Modern Armies.—In the middle of the XVIII. cent. we find the modern army in embryo. Frederick the Great possessed about 50,000 Prussian infantry, cavalry, and artillery, an army which in the course of twenty years he developed to the highest pitch of excellence. He overcame the armies of France, Austria, and Russia in turn, and established a system of drill, discipline, and manœuvre which ensured success in battle. But 'the soul of an army is the mind of a great commander,' and on Frederick's demise the Prussian army declined. Meanwhile with the French Revolution many of the characteristics of primitive warfare were reproduced in the French levies which fought at *Valmy* and *Jemappes.* The male population of France found occupation in the army when civil disturbance had virtually put an end to the pursuits of peace. Untrained and undisciplined, but filled with an energy and spirit of adventure hard to realise to-day, they overthrew the royal standing armies of Europe and carried the tricolour beyond the Alps. This weapon the Republican government placed in the hands of the world's greatest soldier. Napoleon, at *Austerlitz* and *Jena,* showed what was possible to an absolute ruler at the head of a large well-trained and well-equipped army; but his foes were not long in learning the lesson he had to teach them, and then the tide turned. After *Waterloo* the French army, as Europe had known it for twenty years, ceased to exist.

Compulsory Service.—Scharnhorst and other army leaders in Prussia now showed the advantages to be gained by a nation which, in regard to its army, was

independent of local and ephemeral opinion, by enacting laws under which the entire male population were subject to military service; and what is more, to rigid and continuous military training. Prussian commanders in the field were never again to fail for want of numbers of trained soldiers. Moreover the universal obligation to serve put a premium on military rank so that the profession of arms became one to which the élite of society naturally turned. A war school was established at Berlin out of which grew a great General Staff, which in turn produced men of the type of Moltke and Von Roon. Royal personages were bred to arms, and when in 1866 Prussia invaded Austria she had at the head of her armies the king and his two sons. Their easy victory over the Austrians at *Sadowa*, and four years later over the French at *Gravelotte* and *Sedan*, convinced the world that her methods were perfect; and from that time it has been the aim of every first-class continental power to model its national forces upon the Prussian army.

The basis of a modern army is the male population of military age (from seventeen to forty-five), the whole of which is in theory available for the purposes of war; but since the resources of no state would enable it to maintain in barracks even 50 per cent. of the male population, the system of enrolment provides that every year all young men of a certain age should submit themselves to the military authorities; but the financial and economic conditions of the country finally govern the numbers selected for service with the colours for a period of two or three years. Thus every year a large number of men complete their period of continuous training and return to civil life for recruits to fill their places, with the result that a very large proportion of the population are in fact ex-soldiers. The numbers actually serving with the colours in time of peace in any given year constitute the army's *peace strength*, and by adding to this number the numbers required to fill the cadres the *war strength* (part of each peace unit, not appearing in the firing line, is not reckoned in fighting strength) is obtained; and to keep the units at their mobilised strength as casualties occur a reservoir of trained reserves is necessary. Ultimately the question of population will dominate the theory of compulsory service in Germany, for one million men annually present themselves for training of whom only one-fourth can be taken for service with the colours.

Strength of Modern Armies.—*Infantry* (*Peace*) *in thousands*: Russia 580; Germany, 404; France, 379; Austria, 194; Italy, 167; Britain (Regulars only), 151; Japan, 149; United States (Regulars only), 27.

Cavalry (*Peace*) *in thousands*: Russia, 115; France, 75; Germany, 73; Austria, 47; Italy, 24; Britain, 20; United States, 13; Japan, 4.

Peace Strength totals in thousands: Russia, 1200; France, 634; Germany, 634; Austria, 327; Italy, 288; Britain, 255; Japan, 230; United States, 81.

FIGHTING STRENGTH ON MOBILISATION.

Rifles in thousands: Russia, 973; Germany, 633; France, 618; Austria, 420; Italy, 300; Japan, 228; Britain, 135; United States, 39.

Sabres in thousands: Russia, 111; Germany, 76; France, 66; Austria, 37; Italy, 20; Britain, 15; United States, 15; Japan, 14.

Guns: Russia, 4432; Germany, 3866; France, 2936; Austria, 1854; Italy, 1470; Britain, 1170; Japan, 954 (besides about 228 heavy guns); United States, 144.

Fully trained Reserves in thousands: Germany, 4000; Russia, 3800; France, 2300; Austria, 1600; Italy, 1250; Japan, 1000; Britain, 215.

Army Units.—The units of an army are termed battalions, regiments, batteries, companies, etc. The group of units under a general officer and his staff is called a formation, such as the brigade, the division, the army corps; the units are maintained at a peace establishment (*cadre*) corresponding to the sum available for maintenance, which varies in different armies. The war establishment of units provides for the influx of reservists on mobilisation. The formation common to all armies is the *division*, which comprises all arms and branches of the service—viz. infantry, cavalry, artillery, engineers, signallers, besides what are called the services and departments for the supply of food, ammunition, and medical attendance. Britain and Japan have no higher organisation.

The United States has no 'formation' whatever; the a. is voluntary and recruits serve for three years. Each State has its own militia, subject at need to Federal authority, and in it every able-bodied man may be called to serve. The establishment has ever been small, and even in the war with Spain the a. did not reach a quarter of a million men, but they were conspicuous for initiative and resource. Officers are generally trained at West Point Military Academy.

The British Army is the most noticeable exception to the rule of universal service. The army system is a patchwork, exhibiting almost every known method of raising troops. In the Channel Islands, as in Jamaica and British Guiana, compulsory service is fully recognised, and every male inhabitant becomes liable for service in the militia. In the Isle of Man a local law permits the maintenance of volunteers, but rejects enlistment under the Territorial Forces Act. In Ireland men may be enlisted for the regular forces or for any form of militia service, but not as volunteers. In India volunteers are recruited from the European and Eurasian element, but not from the natives. The natives, however, may be enlisted as regular soldiers. On the frontiers a border militia has been established under feudal conditions.

In Bermuda volunteers are maintained, but in Malta the local forces are either regulars or militia. In West Africa the natives are enlisted as regular soldiers. The West Indies maintain a regiment of native regulars. In Great Britain every species of soldier exists except the conscript. There are regulars, militia (called the SPECIAL RESERVE), and volunteers (called the TERRITORIAL FORCES), besides certain hybrid organisations like the Honourable Artillery Company, the OFFICERS' TRAINING CORPS, and the NATIONAL RESERVE. Parliamentary prejudice against compulsory service is shared by the wealthy, who grant money and property for the support of the voluntary system, and so the cost of the military forces is colossal in comparison with the small numbers of trained men available. The argument is often used that owing to her insular position the navy is sufficient and no invasion need be feared.

It is further pointed out that Brit. oversea possessions demand garrisons of regular troops in peace time, and these troops could not be procured by any system of compulsion. On the other hand, it is urged that the navy cannot ensure the absolute inviolability of Brit. shores, and that an invasion could only be met by highly trained troops. Perhaps there would be less ground for self-reproach in the event of disaster if a conscript militia army were maintained for home defence, and the voluntary system relied on for a standing army for foreign service. With a conscript militia that degree of training could be ensured which military advisers prescribe, but no thoroughgoing system of universal service could well be applied to Britain's immense population, especially in view of the small accommodation available in barracks. It certainly ought not to be beyond the wit of man to devise a system based on the cadet system now established in Australia, by which every lad pays for his State education to the extent at least of fitting himself to bear arms in a modern army for home defence.

Jerram, *Armies of the World*; Fortescue, *History of Brit. Army*.

ARNALDUS DE VILLANUEVA (c. 1235–1313), Span. astrologer and alchemist; author of chemical and medical works.

ARNAUD, HENRI (1641–1721), Vaudois general

and pastor; untiring in efforts to secure restoration of his countrymen to their native valleys.

ARNAULD, ANTOINE (1560–1619), Fr. advocate; famed for diatribe against Jesuits (1594); f. of twenty children; six of his dau's became nuns at Port-Royal, while several of his sons were Jansenist theologians. His dau., **Angélique A.** (1624–84), was abbess of Port-Royal and wrote *Mémoires* of that place; his son, **Antoine A.** (1612–94), distinguished Jansenist theologian, was part-author of *Logique de Port-Royal*.

ARNAULT, ANTOINE VINCENT (1766–1834), Fr. dramatist and poet; his plays include *Germanicus* (1817) and *Blanche et Montcassin, ou les Vénitiens* (1798), but he is chiefly known for his short poems, *Fables et Poésies*, 1812.

ARNAUT (Arnaout), Turk. name for Albanians.

ARNDT, ERNST MORITZ (1769–1860), Ger. poet and patriot; prof. of History at Greifswald, and later at Bonn; famed for his *Was ist des Deutschen Vaterland?* and other patriotic songs.

ARNDT, JOHANN (1555–1621), Ger. Lutheran; wrote devotional works, *Wahres Christentum*, *Paradiesgärtlein*, etc.; specially admired by Ger. 'Pietists.'

ARNE, THOMAS AUGUSTINE (1710–78), Eng. composer; writer of numerous operas, oratorios, glees, and airs; musical director at Drury Lane, Covent Garden, and Vauxhall; Mus.Doc. Oxford (1759). Dr. A. is chiefly remembered for his settings of *Rule Britannia* and a number of Shakespeare's songs.

ARNETH, ALFRED, KNIGHT VON (1819–97), Austrian historian; was a prolific writer, his works including volumes on Prince Eugene of Savoy, Maria Theresa, Marie Antoinette, etc.

ARNHEM, Arnheim (51° 59′ N., 5° 55′ E.), town, Holland; formerly fortified; manufactures woollens, cottons, tobacco, soap, paper; in Groote Kerk is monument to Charles, Duke of Gelderland; fine public buildings; surroundings beautiful; twice stormed by French, who were driven from it by Prussians, 1813. Pop. (1910) 64,200.

ARNICA, European and N. Amer. genus of composite plants; tincture, used medicinally for sprains and bruises, prepared from *A. montana*.

ARNIM, ELISABETH VON (1785–1859), Ger. authoress; wife of Ludwig von Arnim; cherished hopeless passion for Goethe; pub. volumes of correspondence with him and other poets which were not wholly authentic.

ARNIM, HARRY KARL KURT EDUARD, COUNT VON (1824–81), Ger. diplomatist; Prussian envoy at papal court, 1864; Ger. envoy at Paris, 1871; sentenced to nine months' (afterwards five years') imprisonment for suspected treason with regard to State papers, 1874; escaped and d. abroad.

ARNIM, LUDWIG VON (1781–1831), Ger. novelist and poet; pub. collection of legends and ballads under title of *Des Knaben Wunderhorn* (1806–8); numerous hist. and other novels.

ARNIM-BOYTZENBURG, HANS GEORG VON (1581–1641), Ger. soldier and diplomatist; served with distinction in Polish, Swed., and Saxon armies.

ARNO (d. 821), abp. of Salzburg (Austria); promoted learning and Church reform.

ARNO (43° 50′ N., 11° 40′ E.), river, Italy; on it stand Florence and Pisa; enters Gulf of Genoa.

ARNOBIUS, Christian apologist and rhetorician in Diocletian's reign.

ARNOBIUS, THE YOUNGER (fl. V. cent.), Gallic Christian preacher; wrote commentary on Psalms.

ARNOLD, BENEDICT (1741–1801), Amer. soldier, b. Norwich, Connecticut; originally a shop-proprietor and trader, he co-operated in Montgomery's unsuccessful attack on Quebec, 1775; was commissioned brigadier-general, 1776; major-general, 1777. He distinguished himself in both battles of *Saratoga*, and received command of Philadelphia, 1778; reprimanded for alleged misconduct, 1780; plotted to betray West Point. On plot being discovered, A. escaped to Brit. lines, and became a brigadier-general in Brit. army.

ARNOLD OF BRESCIA (d. 1155), Ital. theologian; accused of heresy by St. Bernard; went to Rome, 1145; attacked clergy for having temporal possessions; compelled to flee to Campania; condemned and executed, 1155; religious rather than political enthusiast.

ARNOLD, SIR EDWIN (1832–1904), Eng. poet and journalist; won Newdigate Prize (1852) on subject of *Belshazzar's Feast*; was schoolmaster at Birmingham, principal of Sanskrit College, Poona, and, taking to journalism, eventually became editor of *Daily Telegraph*. His best known poem, *The Light of Asia* (1879), dealing with the life and teaching of Buddha, won wide popularity. Other volumes of poems are: *Indian Song of Songs* (1875); *Pearls of the Faith* (1883); *The Song Celestial* (1885); *With Sádi in the Garden* (1888); *Potiphar's Wife* (1892); and *Adzuma* (1893).

ARNOLD, GOTTFRIED (1666–1714), Ger. author; wrote numerous Prot. theological works.

ARNOLD, MATTHEW (1822–88), Eng. poet and critic; s. of Dr. Arnold of Rugby; ed. Rugby, Winchester, and Oxford; won Newdigate Prize (*Cromwell*), 1843; Fellow of Oriel, 1845; prof. of Poetry, Oxford, 1857–67; inspector of schools, 1851–86. His poetical works are: *The Strayed Reveller* (1849), and *Empedocles on Etna* (1852), both pub. under the initial 'A.'; and under his full name, *Poems* (1853); *Poems*, 2nd Series (1855); *Merope* (1858); *New Poems* (1867). Among his prose works are: *On Translating Homer* (1861–62); *Essays in Criticism* (2nd Series, 1865); *Study of Celtic Literature* (1867); *Essays in Celtic Literature* (1868); 2nd Series (1888); *Culture and Anarchy* (1869); *Friendship's Garland* (1871); *Literature and Dogma* (1873); *God and the Bible* (1875); *Last Essays on Church and Religion* (1877); *Mixed Essays* (1879); *Irish Essays* (1882); *Discourses in America* (1885). A. occupies a high place amongst the poets of the Victorian age, but his work is more remarkable for its finished workmanship than for inspiration. At the same time, his poetry is distinguished by a haunting and exquisite harmony, great clarity of thought and expression, and a sense of restfulness. A disciple of Wordsworth, he possessed a sense of proportion and a gift of humour (though it is not evident in his poetry) which saved him from the blunders of the Lake poet. As critic, A. is scarcely less eminent than as a poet, and his opinions, expressed in lucid and excellent prose, undoubtedly exercised a most stimulating influence on his time.

Monographs by Professor Saintsbury, 1899, and H. W. Paul, 1902; *Letters*, edit. by G. W. E. Russell, 1895.

ARNOLD, SAMUEL (1740–1802), Eng. composer; was organist of the Chapel Royal, and later of Westminster Abbey; composed numerous operas (including *The Maid of the Mill* and *Rosamond*), oratorios, and other musical pieces, and compiled a collection of Church music.

ARNOLD, THOMAS, D.D. (1795–1842), Eng. schoolmaster; head of Rugby School, 1828; prof. of Modern History at Oxford, 1841. His remarkable personality exercised a lasting influence over his pupils.

ARNOLD OF WINCKELRIED, Swiss patriot to whom victory of Sempach over Austrians, 1386, was due.

ARNOTT, NEIL (1788–1874), Scot. physician and physicist; b. Aberdeen; author of works on natural sciences, and inventor of the water-bed, Arnott stove, Arnott ventilator, and other appliances.

ARNOTTO, American tree from which annatto (*q.v.*) is produced.

ARNOULD-PLESSY, JEANNE SYLVANIE (1819–97), Fr. actress; made her début at the Comédie Française in 1834, and quickly achieved a popularity second only to that of Mlle Mars; m. the dramatist, J. F. Arnould.

ARNSBERG (51° 24′ N., 8° 4′ E.), town, Prussia. Pop. 9200.

ARNSTADT (50° 50′ N., 10° 54′ E.), town, Schwarzburg-Sondershausen, Germany. Pop. 16,300.

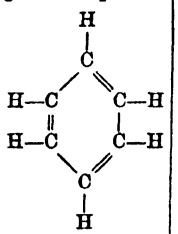
ARNSWALDE (53° 8′ N., 15° 24′ E.), town, Prussia. Pop. 9000.

ARNULF (d. 899), Rom. emperor; famous soldier and churchman.

AROIDEÆ, order of monocotyledon plants with about 1000 species, the best known British representative being the lords-and-ladies or cuckoo-pint (*Arum maculatum*). Other species, herbaceous, shrub-like, or climbing, are inhabitants of the tropics, and can be cultivated in hothouses.

AROLSEN (51° 24′ N., 9° 1′ E.), town, Waldeck, Germany. Pop. (1905) 2800.

AROMATIC, name applied to organic compounds derived from the benzene nucleus or ring:—



AROMATICS, derivatives of anise, cloves, cinnamon, camphor, rosemary, and similar plants, of musk deer and civet cat; have fragrant smell and are almost all strongly antiseptic.

ARONA (45° 45′ N., 8° 36′ E.), town, Italy. Pop. 4700.

AROUET, family name of Voltaire (*q.v.*).

ARPAD (d. 907), founder of Hungarian dynasty of A., whose members ruled till 1301, assuming title king, 1001.

ARPI (41° 29′ N., 15° 30′ E.), ancient town, Italy; near Foggia.

ARPINO (41° 39′ N., 13° 38′ E.), town, Campania, Italy; birthplace of Cicero and Marius. Pop. 10,600.

ARQUÀ (45° 15′ N., 11° 43′ E.), village, Padua, Italy. Here Petrarch lived the last four years of his life, and d. in 1374. His house is still shown, and his tomb.

ARQUEBUS, a firearm of the XV. and XVI. cent's, being an improvement upon the *gonne*, or *handcannon*, of the Middle Ages. It was in use as far back as the reign of Richard III., but, towards the end of the XVI. cent., was displaced by the musket.

ARQUERITE, compound of silver and mercury ($Ag_{12}Hg$).

ARQUES-LA-BATAILLE (49° 55′ N., 1° 9′ E.), village, Seine Inférieure, France; old castle; Henry IV. defeated Duc de Mayenne, 1589.

ARRACK (Rak), see Spirits.

ARRAH (25° 33′ N., 84° 38′ E.), town, Bihar and Orissa, India. During the Mutiny a dozen British soldiers with fifty Sikhs held A. against 3000 Sepoys. Pop. 40,200.

ARRAIGNMENT, a 'true bill' having been found against a prisoner, he is brought into open court and 'arraigned,' *i.e.* the indictment is read over to him, and he is asked whether he pleads 'guilty' or 'not guilty.'

ARRAN (55° 35′ N., 5° 15′ W.), island, Firth of Clyde, Scotland; area, 165 sq. miles; chief villages, Brodick, Lamlash, Corrie, summer resorts; excellent fishing and game; surface mountainous, highest peak, Goatfell; rainfall heavy; cairns and stone circles occur; ruined castles are Loch Ranza and Kildonan; Brodick Castle belongs to dukes of Hamilton; produces oats, potatoes; exports cattle, fish, sheep, oats. Pop. (1911) 4628.

ARRAN, EARLDOM OF (1475–1529).—(1) James Hamilton, s. of James Lord Hamilton, and Mary, dau. of James II. of Scotland, was created Earl of Arran, 1503; commanded Scot. fleet against England, 1513; one of Lords of Regency, 1517; d. 1527, succ. by his eldest s., (2) James Hamilton, 2nd earl (1515–75); he vacillated in the religious quarrels of his time, accompanied James V. to France in 1536, was chosen Regent of Scotland, 1542, and in 1549 cr. Duc de Chatellerault in France; he latterly supported Mary's cause. (3) James (1537–1609), s. of preceding, became a strong Prot.; resigned earldom in favour of James Stewart.

ARRAS (50° 17′ N., 2° 45′ E.), cathedral town, Pas de Calais, France; has trade in corn and oil; manufactures agricultural implements, lace, hosiery; seat of bp.; fine public buildings; formerly famous for tapestries. Pop. 25,813.

ARRENOTOKOUS, biological term for females producing males parthenogenetically.

ARREST, an arrest is not usually made without the authority of a 'warrant,' which is a written order instructing an officer to bring the suspected person before a Court. Warrants are issued by the Privy Council, Judges of the High Court, Justices of the Peace, and Coroners, and generally by a judicial executive to an officer, the law in U.S.A. being similar to that of Gt. Britain. A constable can arrest without a warrant any one whom he suspects of having committed a felony, any one committing, or having committed, or being about to commit a breach of the peace, or any one doing wilful damage to property. A private person may arrest without warrant any one suspected of having committed a felony, provided a felony has been committed, any one whose freedom will lead to a breach of the peace, any one committing or about to commit treason, any one committing offences under the Vagrancy Act, and any one for whom he has become bail when he wishes to be relieved of liability.

ARRESTMENT, in Scots law, a process, or 'diligence' by which A, who is in debt to B, is prohibited from settling his account until the latter has satisfied a claim which C has against him.

ARRETIUM (43° 38′ N., 11° 55′ E.), ancient town, Italy; modern Arezzo; has Rom. remains.

ARRHENIUS, SVANTE AUGUST (1859–), Swed. chemist and physicist; director of Physico-Chemical Department, Nobel Institute, near Stockholm; pub. researches on electrolysis and books on cosmic energy; Nobel Prize, 1903.

ARRIA, wife of Roman Cæcina Pætus, condemned to death, 42 A.D., as conspirator against Emperor Claudius; set her husband example of suicide.

ARRIAN, FLAVIUS (96–180 A.D.), Gk. historian and philosopher; b. Nicomedia, Bithynia; lived under Emperors Hadrian, Antoninus Pius, and Marcus Aurelius; pupil of Epictetus; wrote the standard history of Alexander the Great (*Anabasis of Alexander*), histories of Bithynia and Trajan's Wars, a work on India, and a treatise on the chase.

ARROL, SIR WILLIAM (1839–1913), head of engineering co. of William Arrol & Co.; builder of Tay and Forth Bridges.

ARRONDISSEMENT (Fr., from *arrondir*, to make round), division of Fr. department for purposes of administration; name given in 1800 to newly formed district of 1790.

ARROWROOT, edible starch obtained from root-tubers of a plant (*Maranta Arundinacea*) growing in W. Indies and the tropics generally; a valuable food for invalids.

ARROWSMITH, AARON (1750–1823), Eng. geographer and publisher; produced a large chart of the world on Mercator's projection (1790). The business was continued by his sons, Aaron and Samuel, and his nephew, John, the latter of whom was one of the founders of the Royal Geographical Society. Other publications of the firm were the *Eton Comparative Atlas*, and (1834) the *London Atlas*.

ARSACES, family of Scythian chiefs whose empire was overthrown about 226 A.D.

ARS-AN-DER-MOSEL (49° 4′ N., 6° 2′ E.), town, Alsace-Lorraine, Germany. Pop. 3800.

ARSENAL, word of Arabic origin which occurs in many languages; used of a large store containing war equipment and ammunition.

ARSENIC (As=74·96), metalloid in nitrogen group; name, however, popularly applied to 'white arsenic,' arsenious oxide. Element occurs native, combined with metals, as sulphides, also in small

quantities in pyrites, coal, etc.; and is obtained as a sublimate by heating arsenical pyrites. A. is a steel-grey, metallic-looking, good conductor of heat and electricity; has S.G. 5·73; sublimes at 450°, vapour smells of garlic, molecule As_4; condenses to (i.) yellow and (ii.) mirror allotropes; burns to oxide As_4O_6; used for hardening lead shot. Hydride AsH_3, gas, formed in Marsh's test, easily dissociates.

OXIDES AND DERIVATIVES.—As_4O_6, octahedral, prismatic, and vitreous forms; slightly soluble in water, producing arsenious acid, H_3AsO_3, a reducing agent. Arsenites: Na_3AsO_3, Ag_3AsO_3 (yellow precipitate), $CuHAsO_3$ (Scheele's green); $AsCl_3$, liquid, B.P. 130° C.; As_2O_5 deliquesces, forming arsenic acid, H_3AsO_4.—Arsenates: $Na_2HAsO_4+12H_2O$ and Ag_3AsO_4 (brown) [ortho]; $Na_4As_2O_7$ [pyro]; $NaAsO_3$ [meta]. As_2S_2 (realgar), As_2S_3 (orpiment), and As_2S_5, yellow precipitates.

ARSENIUS (d. 450), a Roman anchorite who was sometime tutor to the children of Theodosius the Great; spent his last forty years as a recluse in Egypt, where he won general admiration for sanctity of life.

ARSENIUS ANTORIANUS, patriarch of Constantinople during latter part of XIII. cent.; wrote *Synopsis Canonum*.

ARSENOLITE, arsenious oxide, generally white (As_2O_3).

ARSINOË, name of several Egyptian queens. Best known A. (d. 271 B.C.), dau. of Ptolemy I., sister and w. of Ptolemy II. (who killed his first wife, another A., at his marriage); accorded divine honours in her lifetime; she and her husband both called Philadelphus through their consanguinity. Another A. was sister of Cleopatra.

ARSINOTHERIUM, extinct giant mammal discovered in Middle Eocene of Egypt, with pair of large horns above the muzzle, in front of another small pair.

ARSON, the act of wilfully setting fire to a house, barn, stack, or any public or private building. The punishment, according to the nature of the crime, is two years' imprisonment, or penal servitude for from three years to a life sentence. In Scotland the crime is known as 'fire-raising.'

ARSUF (32° 11′ N., 34° 51′ E.), town, Palestine; site of ancient Apollonia; here Crusaders under Richard Cœur de Lion defeated Saracens under Saladin, Sept. 7, 1191.

ART, many attempts to define 'art' have been made, but no very satisfactory results have been achieved. Dr. Johnson's definition runs: 'The power of doing something which is not taught by Nature or by instinct'; Pope says: 'True art is Nature to advantage dressed'; while Sir Thomas Browne tells us: 'Nature is the art of God.' If it be conceded, however, that Art includes everything which we distinguish from Nature, it will readily be seen that Johnson's definition is very wide of the mark. It is the business of art to develop nature, and no art can exist either in form, colour, sound, speech, or movement, which is not in the first place inspired by nature. 'Living Art,' says Mr. Frank Brangwyn, 'is only to be found in the interpretation of Life.' The earliest attempts at pictorial art which have been discovered amongst the remains of primitive peoples invariably take the form of rude drawings of birds and beasts. It may therefore be supposed that early man had been impressed by the physical beauty of these animate objects, and had, from an instinctive love of the beautiful, attempted to perpetuate them. It has been said that 'A man's the noblest work of God,' and thus it came about that those early masters of sculpture (*q.v.*), Phidias and Praxiteles, casting about for objects upon which to exercise their genius, found their ideal in reproducing the perfect beauty of the human form. So with painting (*q.v.*), with poetry (*q.v.*), and with music (*q.v.*), Nature is ever the first means of inspiration. The glory of the sunrise, the terror of the storm, the song of the lark, the beauty of the summer landscape, each in its own way arouses to noblest effort the painter, the musician, and the poet; and so Nature, working through man, produces what we term Art.

Art Galleries.—National, municipal, or private buildings for the exhibition of paintings, sculptures, and other works of art, for the purpose of fostering and educating a taste for æsthetics. Amongst buildings of the kind the National Gallery, London (founded 1824), holds a deservedly high place. It is maintained by a government grant, and has been enriched by numerous private bequests. With the exception of the French, the Gallery is well represented by practically every school, some outstanding pictures being Raphael's *Madonna* (bought for £70,000), Vandyck's *Charles I.* (bought for £17,500), and Velazquez's *Venus*. The National Portrait Gallery (founded 1856), the Tate Gallery, and the Wallace Collection should also be mentioned, while other galleries in London and provincial towns are too numerous even to be named. Amongst great continental galleries the place of honour should undoubtedly be given to the Louvre, in Paris, while other institutions of world-wide fame are the Imperial Gallery at Vienna, those at Berlin, Dresden, and Munich, and the Hermitage Gallery at St. Petersburg. Among the famous galleries in U.S.A. are the Museum of Art, New York, and Museum of Fine Arts, Boston, which represent all schools; the Academy, Philadelphia, the Chicago Collection and Lennox Library, New York, rich in Flemish and French pictures; and there are the splendid collections of the late J. Pierpont Morgan, and Mrs. Gardner. In Italy the Pitti and Uffizi Galleries, at Florence, are of the first importance, the former being especially rich in examples of Raphael, Giorgione, Perugino, and Andrea del Sarto, the latter in works by Michael-angelo, Botticelli, and Leonardo da Vinci. Other celebrated galleries are at Rome (Corsini and Borghese Galleries), Venice, Genoa, Milan, Pisa, Verona, Perugia, and Padua; at The Hague, Haarlem, Rotterdam, and Leiden; at Antwerp, Bruges, and Cologne; and at Seville and other cities of Spain.

The Art Galleries of Europe (series); Gower, *Handbook to Art Galleries of Belgium and Holland*; Hare, *The National Gallery*; Brockwell and Konody, *The Louvre*; Konody, *The Uffizi Gallery*.

Art Societies.—Since the establishment of the Royal Academy (*q.v.*) it has been the custom in Great Britain for professional artists to attach themselves to some existing society, and in course of time offshoots from these have taken root, and have attracted followers according to the particular branch of art for which they have stood. Amongst the oldest of the kind may be named the Royal Society of Painters in Water Colours (founded 1804), and the Royal Society of British Artists (1823). Societies of later date include the New English Art Club, the Society of Portrait Painters, Royal Society of Painter-Etchers and Engravers, Society of Women Artists, and the Pastel Society; and in the provinces: the Royal Birmingham Society of Artists (founded 1825), the Manchester Academy of Fine Arts, and the Yorkshire Union of Artists (Leeds). In Scotland the societies include the Royal Scottish Academy, Royal Society of Painters in Water Colours, and the Society of Scottish Artists.

Art Teaching.—Towards the end of the first half of the XIX. cent. public interest began to be aroused in England in the industrial arts, and, with a view to putting the study upon a more systematic basis than had hitherto been known, a government grant was made for the purpose in 1836, and in the following year the first school of design was established at Somerset House. This was followed by the foundation, in 1852, of 'the Department of Practical Art,' at Marlborough House, which eventually found quarters at South Kensington. Very soon other schools of like kind came into existence, amongst which may be mentioned the Slade School of Drawing, Painting, and Sculpture, the Royal Female School of Art, the School of Art Wood-Carving, the Royal School of Art

Needlework, and provincial schools for art training, those at Birmingham and Manchester being especially notable, the latter having the advantage of Mr. Walter Crane as director for several years. In U.S.A., among the foremost of many flourishing schools are those at the National Academy of Design (1802) and at the Boston Museum of Fine Arts, the School of Applied Design for Women and Cooper Institute, N.Y., and the Art Institute, Chicago.

ART AND PART, in Scots law, the aiding in, or abetting, a crime.

ARTA (39° 8′ N., 20° 58′ E.), town, Greece. Pop. 9000. **Arta, Gulf of** (38° 57′ N., 21° E.), arm of Ionian Sea.

ARTABANUS.—(1) Persian captain who murdered Xerxes, 465 B.C., and was slain by Artaxerxes, s. of Xerxes. (2) Name of four Parthian kings of III. cent. B.C.; with death of A. IV. in war with Rome, 226, Arsacid kingdom came to an end.

ARTAGNAN, CHARLES DE BAATZ D' (*c.* 1612–73), original of character d'A. in *Three Musketeers* and other tales of Dumas.

ARTAXERXES I. (465–425 B.C.), king of Persia, younger s. of Xerxes; he made peace with Athens in 448, but did not take sides in the Peloponnesian War; is famous in Jewish history.—**Artaxerxes II.**, king of Persia (404–359), s. of Darius II.; many rebellions took place in his reign, and for long the empire was weak under him.—**Artaxerxes III.**, king (359–338); name adopted by Ochus, s. of preceding; he ruled sternly, compelled Athens to make peace, and tried to conquer Egypt.—**Artaxerxes IV.**, or Ardashir I. (*q.v.*).

ARTEDI, PETER (1705–35), Swed. zoologist, authority on fishes; friend of Linnæus.

ARTEGA, mixed race of African Arabs.

ARTEMIDORUS.—(1) (fl. 100 B.C.) Ephesian geographer who compiled a cartographical work (now lost) drawn upon by Strabo. (2) Roman soothsayer who flourished during the rule of Hadrian.

ARTEMIS (classical myth.), dau. of Zeus and Leto, and twin-sister of Apollo. She is sometimes called Ortygia and Cynthia, from places associated with her birth. To the Romans she was known as Diana, the goddess of hunting. A. was worshipped by the Greeks under various names, to each of which belonged special characteristics. Thus she is known as the Arcadian, Ephesian, and Brauronian A. Under the first-named aspect she is the goddess of hunting and chastity, who led a life of strict celibacy, and took terrible vengeance upon those who incurred her anger. Thus she changed the hunter, Actæon, into a stag, and caused him to be devoured by his dogs, because he had watched her bathing. The Ephesian A., known as 'Diana of the Ephesians' (*Acts* 19), was a very ancient Asiatic deity of Persian origin, whose worship the Gk. colonists found already established when they settled in Asia Minor, and whom they chose to identify with their own A. This goddess represented rather the omnipotence of love and the fruitfulness of nature. Her temple at Ephesus ranked among the seven wonders of the world. The Brauronian A. was a deity worshipped by Gk. settlers in the Taurica Chersonnesus (Crimea), to whom all strangers landing there were sacrificed. The priestess, Iphigenia, is stated to have brought the image of the goddess from Tauris to Brauron, in Attica, which gave rise to the name by which she is known. The most famous statue of A. is that known as the 'Diana of Versailles,' found in Hadrian's Villa, and now preserved in the Louvre.

ARTEMISIA, see WORMWOOD.

ARTEMISIA.—(1) (fl. 480 B.C.) Queen of Halicarnassus; famed for Amazonian qualities. (2) (fl. 353–350 B.C.) Queen who built the Mausoleum in Halicarnassus, one of seven wonders of the world.

ARTEMUS WARD, pseudonym of CHARLES FARRAR BROWNE (1834–67), Amer. humorist whose lectures in America and Europe and writings had great success.

ARTENA (41° 42′ N., 12° 53′ E.), town, central Italy Pop. 5016.

ARTERIES, the vessels which carry the blood from the heart to the different parts of the body. The walls of a's consist of three coats: the external, or *tunica adventitia*, of fibrous tissue; the middle, or *tunica media*, of muscular and yellow elastic tissue, muscular fibres predominating in the larger and elastic fibres in the smaller a's; and the internal, or *tunica intima*, of endothelial cells. The two chief a's of the body are the pulmonary a. and the aorta: the pulmonary a. conveys the impure, or venous blood, from the right side of the heart to be purified in the lungs, while the aorta conveys the purified blood from the left side of the heart, to which the blood comes from the lungs, to the tissues of the body by means of its branches. Small a's join, or anastomose, with one another freely; so that, if a large a. is blocked, the circulation can be carried on by the anastomosing branches, except in the case of the 'end-arteries,' found, *e.g.*, in the brain and the spleen, which do not anastomose with others; and consequently when one of the 'end-arteries' is blocked, the part which it supplies with blood dies.

ARTERN (51° 22′ N., 11° 16′ E.), town, Saxony. Pop. 5800.

ARTESIAN WELLS, name derived from a system of boring for water, which was first employed in Europe in the province of Artois, France. The fountains in Trafalgar Square are thus supplied; also several of the London breweries. The borings are made by means of spiral rods, and are carried through various strata until a water-carrying bed is reached. The water rises to the surface in virtue of hydrostatic pressure, its source being higher than the mouth of the boring.

ARTEVELDE, JACOB VAN (*c.* 1290–1345), Flemish leader and brewer; rose to prominence in his native city of Ghent in 1337; he ruled like a king, and Ghent prospered, but A. was killed in a popular rising, 1345.

ARTEVELDE, PHILIP VAN (d. 1383), Flemish military leader; killed at *Roosebeke*.

ARTHRITIS, inflammation of joints, usually associated with gout or rheumatism.

ARTHROPODA, phylum of bilaterally symmetrical, segmented animals, having variously modified jointed appendages and a cuticle of chitin. Numerous affinities exist between them and Annelids, notably in the division of the body into segments, the organisation of blood-vascular and nervous system. A. are usually very active, and represent more than half the known species of animals. The chief classes are *Crustacea* (*q.v.*); *Prototracheata*, including the primitive Peripatus (*q.v.*); *Myriopoda* (*q.v.*), the centipedes and millipedes; *Hexapoda* (*q.v.*), insects; *Arachnoidea* (*q.v.*), spiders, scorpions, and mites; *Palæostraca* (*q.v.*), the king-crab; and the extinct eurypterids and trilobites (*q.v.*). The *Pantopoda* (*q.v.*) or Pycnogonida (sea-spiders) have not been satisfactorily classified.

ARTHUR, KING (VI. cent.), Brit. king, the actual facts of whose life are almost lost in legend. He is said to have been the s. of Uther Pendragon, by Igerna, wife of Gorlois, king of Cornwall. He was probably half-Roman, and chosen by the Christian Britons as general (about 520 A.D.) against the Saxons, whom he defeated; afterwards he fought the heathen Britons, and was betrayed and slain.

Arthurian Legend.—After his death A. became a hero of Celtic legend in Cornwall, Wales, and Cumberland. About 850 Nennius mentions him and his battles against the Saxons, and the treachery of his nephew Mordred. In Welsh poetry of the XI. and XII. cent. he is spoken of as half-man, half-wizard, and the names of his allies, Kay, Bedivere, and Geraint, are given. The Welsh legends were carried to Brittany and France, whence the Romans brought them to England. About 1120 Geoffrey of Monmouth introduced Arthur into his *History of the British Kings*, dwelling on his miraculous birth and death, his conquests, and the chivalrous side of the legend. This book was put into verse by Wace, a Norman, and Layamon, an Englishman (about 1150), each adding legendary

touches, such as that of Excalibur, Arthur's sword. In France the legend became mixed with other legends, such as those of the Holy Grail, Percival, Lancelot and Tristram, and the idea of the 'Round Table' arose. The chief Fr. poets of Arthurian legend are Chrétien de Troyes and Marie de France. In Germany the legend was further amplified by Wolfram von Eschenbach. In the prose romances of the XIII. and XIV. cent. (notably those of Walter Map) the story of Lancelot and Guinevere (A.'s wife) was evolved. Later on, most of the Arthurian cycle was collected by Sir Thomas Malory in his *Morte d'Arthur* (1470). In late Eng. literature the legend has been dealt with by Spenser in his *Faery Queen*, Tennyson in his *Idylls of the King*, and Swinburne in *Tristram of Lyonesse*.

ARTHUR I. (1187–1203), Duke of Brittany; supposed to have been murdered by John, king of England.

ARTHUR III. (1393–1458), Earl of Richmond, Constable of France; fought against England at Agincourt, and under Joan of Arc; captured Paris from the English, 1436; succ. his nephew, Peter II., as Duke of Brittany, 1457.

ARTHUR, CHESTER ALAN (1830–86), Pres. (Republican) of the U.S.A. on death of Pres. Garfield, 1881; his term of office was noted for tariff legislation, the prohibition of polygamy in the territories, and railway enterprise.

ARTHUR'S SEAT, hill (822 ft.) of volcanic origin east of Edinburgh; shape, recumbent lion; name first occurs at end of XV. cent.

ARTICHOKE, two plants of order Compositæ; *Helianthus tuberosus* or Jerusalem a., now cultivated as vegetable for its edible tubers, and *Cynara scolymus*, the globe a., for succulent leaf scales and axis of flower heads.

ARTICLE (Fr., from Lat. *articulus*, dim. of *artus*, joint), division, and, by transference, portion between divisions; hence applied to clauses of agreements (in same sense as *capitulum*), items in magazines, etc.; again by transference, any separate object. Various Christian codes are known as a's of faith. *Ten A's*, 1536, promulgated by Henry VIII. as modifications of Roman Catholic doctrines; *Six A's* ('Whip with Six Strings'), 1539, restored Catholic usages as to private Masses, auricular confession, marriage of priests, etc.; *Thirty-Nine A's*, 1563, formed from forty-two set forth by Cranmer's commission, 1553; confirmed 1571 and 1604; contained in Book of Common Prayer; accepted by Irish Church, 1635; Scottish Episcopalian at end of XVIII. cent. Other religious A's are *A's of Perth*, 1618, agreed upon by Scottish General Assembly; Twenty-Five Methodist A's, 1784; Thirty-Five A's of Reformed Episcopal Church, 1875. *A's of Association*, legal term for written agreement as to mode of carrying on business of a limited company. *A's of the Navy* are rules by which navy is governed under Naval Discipline Acts, 1866 and 1884. *A's of War* are rules by which both army and navy are governed. Military A's of War used to be passed granting special criminal powers to commander in time of war; series of Mutiny Acts commenced 1689; Army Act, 1881 (passed annually), supersedes earlier legislation; by it power of admiralty to provide for naval discipline is confirmed.

ARTICULAR, belonging to or associated with the joints; whence **a. sensations** are sensations dependent upon sense-organs in or about the joints.

ARTICULATA, obsolete zoological term for animals, like insects, with jointed appendages.

ARTICULATION, juncture of bones in skeleton (anat.); distinct production of sound in speech.

ARTILLERY was the name given to any kind of military engine for the throwing or firing of projectiles, including bows and arrows, slings, and such weapons as were known to the ancients by the name of the *catapulta* and the *balista*. The term is now applied to any kind of cannon or ordnance, and in general to all the officers, men, horses, waggons, etc., engaged in the working or transport of the guns. Cannon were first employed by the English in field operations at Crécy (1346), but it is believed they were used by the Germans in Italy some years before. The early guns, however, were used chiefly for siege purposes, and it was not until the first half of the XV. cent. that field artillery came into general use. During the period of the Wars of the Roses the bowmen were regarded as the chief strength of both armies, but field guns were in frequent use, and *Loose Coat Field* (1470) is said to have been won by Edward IV.'s ordnance. Cannon, however, continued for a long time afterwards to be used chiefly for battering purposes, a notable example being the siege of Constantinople by the Turks in 1453, when they employed some very heavy artillery. Gustavus Adolphus (d. 1632) during the Thirty Years' War was the first general to make really effective use of field guns, his heavier weapons firing 12-pounder shot, and his demi-culverin 9-pounders. During the Eng. Civil War the Royalists were often very badly served by their a., which frequently arrived late, or not at all. Cromwell, on the other hand, made little use of a., except for sieges.

The earliest cannon consisted of bars of wrought-iron welded together with iron hoops, and were fixed on blocks. These eventually gave place to guns of cast-iron and brass, wheeled carriages were introduced, and iron balls to some extent superseded those of stone. The XVI. cent. brought us the culverin, demi-culverin, saker, and falcon. The old Eng. culverin was a very clumsy piece of ordnance, which required a considerable number of horses to drag it into position, and as cartridges had not then been introduced, its effectiveness in the field must have been largely discounted by the slowness with which it was loaded, the powder being put in with a ladle.

The Honourable Artillery Company, which is the oldest existing Volunteer force in England, was established in 1537. The Royal Regiment of Artillery was created in 1716.

From the XVI. to the XIX. cent. little progress was made in the manufacture of a., but during the last quarter of a cent. rapid strides have been made, with the result that the ordnance of the civilised world has now been brought to a high state of effectiveness. The British a. of the present day is classed as Horse, Field, and Garrison A. Horse A., mounting its men either on horses or the limbers of the guns, is required to manœuvre with cavalry, in which it differs from the Field A. A battery consists of 179 men and 16 carriages, and its guns are 15-pounders. A Field A. battery is composed of 171 men, and 6 guns of somewhat heavier calibre than those used by the Horse A., each gun being drawn by 6 horses. The Garrison A., as the name suggests, is a force organised chiefly for fortress and siege purposes, and the working and transport of the heaviest class of guns. See also AMMUNITION, ORDNANCE, and TACTICS.

Lloyd and Hadcock's *Artillery, its Progress and Present Position* (1893); and Raike's *History of the Hon. Artillery Company* (1878–80).

ARTIODACTYLA, sub-order of Mammalian order Ungulata, in which the third and fourth digits of the foot are equally developed, as contrasted with the *Perissodactyla*, or odd-toed animals, such as the horse and rhinoceros. The stomach is complex in many A. (camels, ruminants); the premolars are single-lobed, while molars have two lobes; and there are often bony outgrowths on frontal bones. They may be divided into four groups: (1) *Suina*, including pigs, hippopotami, and peccaries; (2) *Tylopoda*, the camels of the Old World and llamas of S. America; (3) *Tragulina*, or chevrotains of the East Indies and W. African coast; (4) *Pecora*, or true Ruminants, such as deer, giraffes, gazelles, antelopes, goats, sheep, and cattle.

ARTOIS (50° 30′ N., 2° 30′ E.), former province, N. France; after belonging in turn to Flanders,

France, Burgundy, Austria, and Spain, finally reverted to France in 1659.

ARTS AND CRAFTS, term which first came into general use with the establishment of the Arts and Crafts Society in 1888. The society was the outcome of a feeling of discontent amongst many artistic workers, who considered that the decorative arts, apart from painting, were not sufficiently recognised. The cultivation of artistic craftsmanship owed much to the example and inspiration of William Morris and his associates, and arts and crafts exhibitions are now frequent throughout Great Britain.

ARTS, MASTER OF, graduate of university who has passed examinations in literary subjects, or literary and scientific mixed. In some universities the M.A. degree is granted without further examination to those B.A.'s (*Bachelors of Arts*) who pay certain fees (Oxford and Cambridge), in others to all honours graduates, some fixed time after taking the B.A. degree.

ARU ISLANDS, Arru (5° 20′ to 7° S., 134° to 135° E.), islands, Dutch East Indies. Pop. *c.* 21,000.

ARUBA ISLAND, part of Dutch colony of Curaçao, West Indies.

ARUNDEL (50° 51′ N., 0° 33′ W.), town, Sussex, England; castle, dating from before Conquest, was damaged in Civil War; restored in XVIII. cent.

ARUNDEL, EARLDOM OF.—It may fairly be said that there were Norman Earls of Arundel, for they resided at the Castle, though they generally seem to have taken their title from the county of Sussex. William d'Aubigny, who m. Adeliz of Louvain, widow of King Henry I., was created Earl of A. After the death of the last earl in the male line in 1243, the title passed to the FitzAlans, John FitzAlan, feudal lord of Clun, marrying Isabel FitzAlan. Richard, 4th earl of A. and Surrey, a member of the Council of Richard II., was executed 1397. Henry, 12th earl, was prominent under Edward VI., Mary, and Elizabeth. He was a R.C., and fell into disfavour for a time. He was High Steward and Chancellor of Oxford Univ.; on the Commission for trial of Mary, Queen of Scots; again imprisoned for plotting; finally released, 1572; d. 1580. His s. predeceased him, and his dau. Mary married Thomas Howard, Duke of Norfolk, with which title the A. earldom is now held by Act of Parliament, 1627—not, as sometimes stated, by feudal tenure. Of later earls most important are Philip, 13th earl; became R.C.; d. in Tower, 1595; and Thomas, 14th earl, Royalist and art collector; purchased Arundelian or Oxford Marbles; d. abroad, 1646.

ARUNDEL, THOMAS (1353–1414), abp. of Canterbury, supported claims of Henry IV., whom he crowned; made vigorous efforts to suppress Lollardy.

ARUNDELL OF WARDOUR, THOMAS ARUNDELL, 1ST BARON (*c.* 1562–1639); went abroad and served against the Turks under the Emperor Rudolph II., who in 1595 cr. him Count for his bravery at the battle of *Gran*; on his return cr. Baron A. of W., 1605.

ARUSIANUS MESSUS (IV. cent. A.D.), Latin scholar; author of *Exempla Elocutionum*, containing examples from classic writers.

ARUWIMI, administrative district, Belgian Congo, Africa. River A. (1800 miles long) joins Congo, 2° N., 23° E.

ARVAL, light spiced cake, formerly used at funeral feasts (arval-dinners); the name is derived from a Norse word meaning 'heir-ale.'

ARVAL BRETHREN (*Fratres Arvales*), a priesthood, in ancient Rome, consisting of twelve members, who for three days during May conducted the annual sacrifice (*ambarvalia*) for the purpose of propitiating Ceres, the goddess of fertility. The reigning emperor was usually a member of the brotherhood.

ARVE (46° 5′ N., 6° 25′ E.), river, Savoy and Switzerland; receives in valley of Chamouni the Arveyron, which descends from glacier through cave known as 'Ice-Gates of Arveyron.'

ARVERNI, Gallic tribe subdued by Cæsar, 52 B.C.; gave name to Auvergne, France.

ARVERS, ALEXIS FÉLIX (1806–50), Fr. poet and dramatist; sonnets famous.

ARYA SAMAJ, sect of Hindu religious reformers founded (*c.* 1806) by a Brahman, Dayanand Saraswati, who studied the Vedas in the light of modern scientific culture.

ARYAN is a name given to the Indo-European family of languages, to which English belongs. It is a word of Sanskrit origin meaning *noble*, and was the name whereby the Old Hindus distinguished themselves from the less civilised peoples of India. The early A's were probably a community of tribes living in inland Russia. They evolved a primitive vocabulary which is the foundation of most of the literary languages of Europe, Persia, and India. The names of the *sun*, *moon*, *stars*, of the simple parts of the body (e.g. *head*, *eye*), of the most intimate relationships (e.g. *father*, *mother*), and of the numbers up to ten, being found in various forms in most of the Indo-European languages, probably date from this early vocabulary. In course of time the A. community split up, some going east into Persia and India, others west into Europe, and in their new homes the various Indo-European languages developed. The following are the main groups of Indo-European or A. languages: Indian (including Sanskrit, Pali, Hindustani, Bengali, and the Gipsy dialect), Iranian (including Persian), Keltic (Irish, Gaelic, Manx, Welsh, and Breton), Hellenic (Ancient and Modern Greek), Italic (Latin, French, Italian, Spanish, Portuguese, Provençal), Slavonic (Russian, Polish, Bohemian), Lettic (Old Prussian, Lithuanian), and Teutonic (Old Gothic, German, English, Dutch, Danish, Norse, and Swedish).

ARYL, any aromatic radical, such as phenyl (C_6H_5) to lyl ($C_6H_4CH_3$), etc., with a free valence belonging to the nucleus.

ARZAMAS (55° 30′ N., 43° 45′ E.), town, Russia. Pop. 10,591.

AS, Rom. measure; weighed 1 lb. of 12 oz. or 327·45 grs.; also name of coin of which lower parts were semis, triens, quadrans, sextans, uncia; originally lb. weight, but depreciated in Punic Wars and lowered by *lex Papiria*, 89 B.C., to ½ oz.; name of early Italian coin.

ASA, famous king of Judah.

ASAFETIDA, a gum-resin obtained from root of a plant (*Ferula fetida*) chiefly growing in eastern Persia and Afghanistan; has an unpleasant and characteristic odour; is used as a nervous stimulant, *e.g.*, in hysteria, also as stimulant to the respiratory and alimentary tracts.

ASAKY, GEORGE (1788–1871), Rumanian author; founded Rumanian literature, journalism, theatre, etc.

ASAPH, psalmist and prophet mentioned in *Bible* (*Chronicles* and *Psalms*); Asaphites afterwards assisted in service of Temple at Jerusalem.

ASAPH, BISHOPRIC OF ST., N. Wales; traditional founder, Kentigern, bp. of Glasgow; also said to have established St. A. as bp. *c.* 560.

ASARONE, sour chemical distilled from asarabacca.

ASBESTOS (unconsumable), amphibole mineral of fibrous texture or variety of serpentine occurring in N. America, S. Africa, Australia, and Europe, formerly sometimes woven into fabrics, now generally used as a fireproof and heat-retaining material for building, packing steam-pipes, etc., fabrics, filters for corrosives, electric insulating, and other purposes.

ASBJÖRNSEN, PETER CHRISTEN (1812–85), Norwegian writer who with Jörgen Engebretsen Moe (1813–82) collected and edit. a series of *Norwegian Popular Stories*, many trans. into English by Sir George Dasent. His folk-tales rank as classics.

ASBURY, FRANCIS (1745–1816), Eng. Methodist preacher; app. by Wesley to undertake missionary

work in America; known as 'the Father of Amer. Methodism.'

ASBURY PARK (40° 14′ N., 74° W.), town, New Jersey, U.S.A. Pop. (1910) 10,150.

ASCALON, ASKALAN (31° 38′ N., 34° 37′ E.), ancient city, Philistia, Palestine; ruined; birthplace of Herod the Great; scene of great battle between Crusaders and Saracens.

ASCANIUS (classical myth.), s. of Æneas by Creusa, was saved from flames of Troy by his f., whom he accompanied to Italy; succeeded Æneas in kingdom of Latium; built Alba, to which he transferred the seat of his empire from Lavinium; also known as Iulus, and the Julian family of Rome claimed him as their ancestor.

ASCENSION (8° S., 14° 20′ W.), lonely island of volcanic origin, south Atlantic; discovered by Portuguese on Ascension Day, 1501; Brit. since 1815; area, 34 sq. miles; fortified; has sanatorium on Green Mountain; abounds in turtles. Pop. (1910) c. 400.

ASCENSION, FEAST OF THE, Christian festival dating at least from IV. cent., forty days after Easter, in celebration of A. of Christ; always on Thursday.

ASCENSION, RIGHT, of a star is measured by arc of celestial equator between its declination circle and the first point of Aries (Vernal equinox). **Declination** is its distance from equator measured along arc of great circle (declination circle) passing through star and pole.

ASCETICISM, the practice of self-denial, often very severe, has been frequent in Christianity and other religions. It has taken many forms, abstinence from wine, flesh, and marriage, fasting, and infliction of self-tortures. It is related of St. James, traditional first bp. of Jerusalem and 'brother' of Christ, that he never anointed himself and never had a bath, and that he spent so long kneeling on the stone floor of the Temple that his knees became hard like a camel's. Abstinence from various meats (*e.g.* swine's flesh among Jews and beef among Hindus) rests often on primitive ideas of *taboo*—*i.e.* a certain animal was holy and akin to God and His people, and its flesh only eaten sacramentally, if at all. A. in Christianity was 'organised' in monasticism, but outside it has often been practised, especially in the early and mediæval Church, and still in Catholicism, where the Church has had sometimes to repress extreme developments. Thus by some even marriage was thought unclean. In Buddhism and other Oriental faiths, where the body and its passions must be subjugated, terrible austerities are practised.

Robertson Smith, *Religion of the Semites*; Frazer, *Golden Bough.*

ASCHAFFENBURG (49° 49′ N., 9° 11′ E.), cathedral town, Bavaria; castle (Johannisburg) was once residence of prince bp's of Mainz; manufactures paper, liqueurs, tobacco. Pop. (1910) 29,900.

ASCHAM, ROGER (1515–68), Eng. author; b. Kirkby Wiske (Yorks.); s. of steward to Lord Scrope of Bolton; ed. in household of Sir Anthony Wingfield, and later at St. John's Coll., Cambridge. Here he devoted himself especially to study of Greek, received a fellowship, and became lecturer in Greek; was also proficient in archery, and his first work, *Toxophilus* (1545), dealt with that subject, and was dedicated to Henry VIII. He became univ. orator, and tutor to the Princess Elizabeth, and Latin sec. to Edward VI., Mary, and Elizabeth. His principal work, *The Scholemaster* (1570), was a treatise on the teaching of Latin.

ASCHERSLEBEN (51° 46′ N., 11° 26′ E.), town, Saxony. Pop. 27,900.

ASCIANO (43° 15′ N., 11° 34′ E.), town, Siena, Italy.

ASCILIUS SULCATUS, predatory fresh-water beetle. See COLEOPTERA.

ASCITANS, early Christians who at their gatherings danced around a wine-skin.

ASCITES, an effusion of watery fluid into the abdominal cavity; non-inflammatory, and usually due to obstruction of the liver blood supply.

ASCLEPIADES (end of II. and beginning of I. cent. B.C.), Gk. physician; b. Prusa, Bithynia; flourished in Rome, where he had numerous pupils.

ASCLEPIADES (fl. 270 B.C.), Gk. lyric poet of Samos, who established forms of verse called *Asclepiadean.*

ASCOLI, GRAZIADIO ISAIA (1829–1907), Ital. philologist, and the principal modern authority on the Ital. language.

ASCOLI PICENO.—(1) (42° 51′ N., 13° 33′ E.) Cathedral town, Italy; ancient *Asculum Picenum,* burnt by Romans, 89 B.C.; Rom. gate, parts of walls, etc., remain; castle, baptistery; manufactures glass, paper. Pop. (1911) 30,600. (2) Province, central Italy; area, 796 sq. miles. Pop. (1911) 252,000.

ASCOT (51° 24′ N., 0° 40′ W.), village, Berkshire, England. A. Races take place in June, on a circular course nearly 2 miles in length.

ASCULUM, ancient Ital. town probably on site of present Ascoli Satriano; scene of Pyrrhus's victory, 279 B.C.; destroyed by Robert Guiscard, XI. cent.

ASCUS, membranous spore-sacs (sporangia) of Ascomycetes (bot.).

ASELLUS AQUATICUS, the water-slater, an Isopod crustacean. See MALACOSTRACA.

ASGARD, heaven of Norse mythology; opposed to *utgarth,* abode of monsters, *midgarth,* abode of men; inhabited by the Æsir, of whom Odin is ancestor and chief; in A. Odin dwells at *Gladsheim,* where is *Valhalla,* home of heroes slain in battle; Thor has *Thruthvang*; Balder, *Breidablik*; Freya, *Folkvang*; Ull, *Ydalir*; Vali, *Valaskjalf*; Saga, *Sokkvabekk*; Skadi, *Thrymheim*; Heimdal, *Himinbjorg*; Forseti, *Glitnir*; Njord, *Noatun*; Vidar, *Landvidi.*

ASGILL, JOHN (1659–1738), Eng. lawyer and pamphleteer; sat in English and Irish Parliaments; and spent last thirty years of his life as a debtor in the Fleet Prison.

ASH (*Fraxinus excelsior*), tree belonging to order Oleaceæ, grown for timber in Great Britain; other species occur in Europe, Asia, and N. America. The mountain a., or rowan, belongs to the pear and apple tribe of the order Rosaceæ.

ASH WEDNESDAY, first day of Lent; the custom of sprinkling ashes on heads of penitents that day still survives in the R.C. Church.

ASHANTI (7° N., 1° 40′ W.), Brit. territory, Gold Coast Colony, W. Africa; area, c. 20,000 sq. miles. Surface covered with wood; land cultivated in neighbourhood of towns produces large crops of grain, tobacco, sugar, cocoa, and pine-apples; gums, dye-woods, and timber are also important. Chief town, Kumasi (*q.v.*). Chief rivers, Volta, Black Volta, Tana, Bia. Climate is none too healthy. Flora includes mimosa, ferns, many trees; fauna includes elephants, monkeys, snakes, crocodiles, hippopotami.

History.—Early history is obscure; nation traditionally formed by tribes forced to emigrate southward by spread of Muhammadan empire. First hist. record occurs early XVIII. cent., when Osai Tutu conquered neighbouring tribes, and made Kumasi centre of his dominions. Later ruler, Osai Tutu Quamina, became involved in war with Britain as result of his depredations in Fantiland, 1807–26. War again occurred, 1873–74, when Wolseley defeated Ashantis at Amoaful and took Kumasi; and in 1895–96, when King Prempeh (*q.v.*) was deposed and exiled. Province was annexed by Britain, 1901; governed by gov. of Gold Coast or his representative.

Chief exports are gold dust and palm oil. Rubber is produced. Natives manufacture cotton goods, gold and silver work, earthenware; they are of negroid race. Principal religion, spirit worship; polygamy is still practised, and human sacrifices were formerly customary. Pop. variously estimated at from 500,000 to 3,000,000.

ASH'ARI, X.-cent. Arab. theologian.

ASHBOURNE (53° 1′ N., 1° 44′ W.), town, Derbyshire, England. Pop. (1911) 4050.

ASHBURNHAM, JOHN (1603–71), Eng. Royalist, became treasurer and paymaster of the king's army; with him in prison, 1647; suspected unjustly of disloyalty, but restored to favour after the Restoration; M.P. for Sussex, 1661–67.

ASHBURTON.—(1) (50° 31′ N., 3° 44′ W.) town, Devonshire, England; Stannary town since 1328. (2) (23° 15′ S., 116° 15′ E.) river, W. Australia; enters Exmouth Gulf. (3) (44° 3′ S., 171° 48′ E.) river, New Zealand; also called Hakatere.

ASHBURTON, ALEXANDER BARING, BARON (1774–1848), Eng. politician and banker; M.P. (1806–35); cr. peer (1835); was commissioned to negotiate the arrangement at Washington (1842) of the '**Ashburton Treaty**,' dealing with the suppression of slave trade, and defining the boundary line between Canada and Maine, etc.

ASHBURTON, JOHN DUNNING, 1ST BARON (1731–83), Eng. lawyer; famous for his defence of John Wilkes; was sometime Solicitor-General; member for Calne (Wilts); and Chancellor of the Duchy of Lancaster.

ASHBY, TURNER (1824–62), Amer. Confederate general.

ASHBY-DE-LA-ZOUCH (52° 44′ N., 1° 26′ W.), town, Leicestershire, England. Pop. (1911) 5000.

ASHDOWN (51° 33′ N., 1° 36′ W.), 3¼ miles N.W. of Lambourn, Berks; possibly scene of battle of Assandune, 871, between Alfred the Great and Danes.

ASHEHO (45° 25′ N., 127° 5′ E.), town, Manchuria. Pop. *c.* 50,000.

ASHER, Israelitish tribe called after the s. of Jacob and Zilpah (*Genesis* 30^{13}).

ASHES, the inorganic residue from the combustion of organic material.

ASHEVILLE (35° 37′ N., 82° 33′ W.), town, N. Carolina, U.S.A.; tanning, brick and tile making, cotton mills; health resort. Pop. (1910) 18,762.

ASHFIELD (33° 50′ S., 151° E.), town, New South Wales, Australia, 5 miles S. of Sydney. Pop. 14,331.

ASHFORD (51° 8′ N., 0° 52′ E.), town, Kent, England. Pop. (1911) 13,700.

'ASHI (352–427), Babylonian scholar; first editor of the *Talmud*, which was completed, after his death, by Rabina.

ASHINGTON (55° 10′ N., 1° 34′ W.), town, Northumberland, England. Pop. (1911) 24,600.

ASHLAND.—(1) (38° 32′ N., 82° 40′ W.) town, Kentucky, U.S.A.; iron and steel manufactures. Pop. (1910) 8688. (2) (40° 47′ N., 76° 22′ W.) borough, Pennsylvania, U.S.A.; anthracite coal mining. Pop. (1910) 6855. (3) (46° 35′ N., 90° 53′ W.) town, Wisconsin, U.S.A.; fine harbour; lumber and iron trade; foundries, sawmills. Pop. (1910) 11,594.

ASHLEY, WILLIAM JAMES (1860–), Eng. economist; professor at Toronto and Harvard Univ's; prof. of Commerce in Birmingham Univ. since 1901; has pub. *History of English Woollen Industry* (1887), *English Economic History and Theory* (1888–93), *Adjustment of Wages* (1903), etc.

ASHMOLE, ELIAS (1617–92), Eng. antiquary; b. Lichfield; ed. Oxford; founder of the Ashmolean Museum, Oxford; devoted much time to the study of astrology, and pub. *Theatrum Chymicum Britannicum, The Way to Bliss* (dealing with the 'philosopher's stone'), and a *History of the Order of the Garter.*

ASHMUN, JEHUDI (1794–1828), organised negro State of Liberia under auspices of Amer. Colonisation Soc. (1822–28).

ASHRAF, African Arabs claiming descent from Muhammad.

ASHREF (36° 40′ N., 53° 30′ E.), town, Persia. Pop. *c.* 6000.

ASHTABULA (41° 53′ N., 80° 45′ W.), town, Ohio, U.S.A. Pop. (1910) 18,226.

ASHTON-IN-MAKERFIELD (53° 29′ N., 2° 38′ W.), town, Lancashire, England. Pop. (1911) 21,540.

ASHTON-UNDER-LYNE (53° 29′ N., 2° 5′ W.), town, Lancashire, England; cotton-weaving, bleaching, dyeing, print works, machinery. Pop. (1911) 45,179.

ASHTORETH, see ASTARTE.

ASIA, largest continent; bounded N. by Arctic Ocean, E. by Pacific, S. by Ind. Ocean, S.W. by Africa, W. by Europe; greatest length, *c.* 5150 miles; breadth, *c.* 6000 miles; area, *c.* 16,819,000 sq. miles. Shape may be described as quadrangular central core, with peninsulas projecting to S., and chain of islands running down E. coast; coast-line irregular; E. coast fringed by Sea of Okhotsk, with Kamchatka peninsula and Kurile Isles outside; Sea of Japan, with Jap. islands outside; Yellow and E. China Seas, with Luchu Isles outside; S. China Sea, with Philippines and Borneo outside. In S., Bay of Bengal and Arabian Sea are respectively E. and W. of India. Eastern Archipelago Islands extend S.E. from mainland.

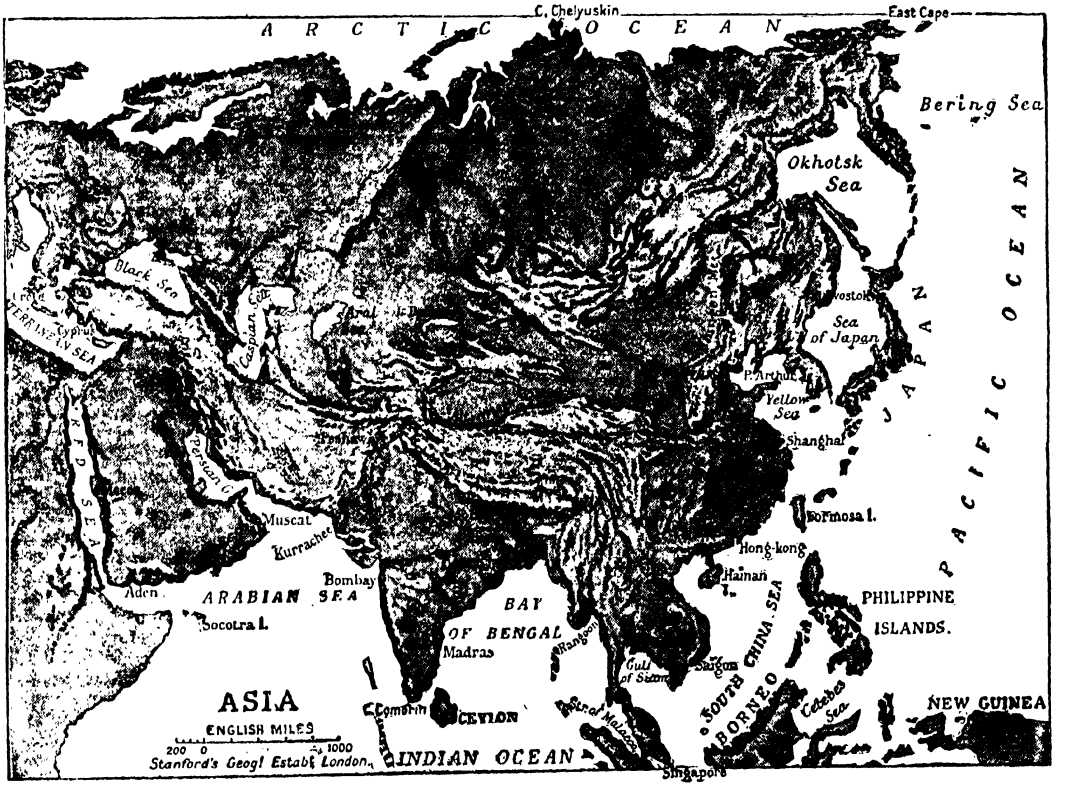
Relief.—In S.W. of continent is plateau called Pamir, where India, Afghanistan, Russ. Turkestan, and China meet, and whence great mountain-chains run in all directions. Principal mountain system is Himalayas—highest point, Mt. Everest (29,002 ft.); chief range extends S.E. from Pamir to borders of China, there breaking into numerous ridges which stretch across China proper, Tibet, Burma, Malay Peninsula; while Kuen-Tun in N. Tibet is northern flank of system. Tian-Shan Mountains extend N.E. from Pamir to Mongolia; further N., Altai and other ranges extend eastwards across N. Mongolia and E. Siberia towards Sea of Okhotsk, forming northern boundary of Desert of Gobi, eastern boundary of which is formed by Great Khingan Mountains. Mountain ranges also extend from Pamir S.W. through India and Afghanistan and W. towards Caspian. Tableland of Tibet, elevation 10,000 to 17,000 ft., lies N. of principal range of Himalayas, to S. of which is Ind. peninsula with tableland of Deccan (1500 to 3000 ft.). In S.W. is tableland of Arabia (2500 to 7000 ft.). Other plateaus are those of Iran, Armenia, and Asia Minor. Principal rivers are Hoang-Ho and Yang-tse-Kiang in S.E.; Irrawadi, Cambodia, Salwen, Brahmaputra, Ganges, Indus in S.; Euphrates and Tigris in S.W.; Sir Daria and Oxus (Ann Daria) in W. Largest lake is Caspian Sea, partly in Europe; farther E. is Sea of Aral, still farther E., Lake Balkash. Lake Baikal is a large lake in S. Siberia, and Lob Nor a lake in centre of continent which receives rivers of E. Turkestan. Chief lakes in Tibet, Dangra-Yum Nor and Tengri Nor. There are lowland plains along western Caspian-Obi district; in China, Manchuria, Siam, Lower Burma; in curve formed by valleys of Ganges and Indus in N. India; and in valleys of Euphrates and Tigris.

Climate varies greatly. About Verkhoyansk, in N. of E. Siberia, is coldest part of eastern hemisphere, with mean annual temperature of 2° Fahr. From this warmth gradually increases southward, isotherm of 10° passing roughly E. and W. from Bering Sea to mouth of Obi, of 20° from Sea of Okhotsk to S. end of Nova Zembla, of 30° from N. end of Saghalien to White Sea, of 40° from S. end of Saghalien to St. Petersburg, of 50° from middle of Japan to Sea of Azov, of 60° from S. end of Japan to Cape Baba, of 70° from Hong-Kong to Syria, of 80° (an irregular line) from middle of Philippines to Calcutta, thence round Himalayas, back by Gulf of Cambay, across the entrance of Persian Gulf, and thence westward across middle of Arabia. Winter lines are everywhere curved in centre to S.; summer lines even more curved to N.E., following course of monsoons, which blow from N.E. from Oct. to April, and from S.W. from April to Oct. Rainfall is great in lines where high ground intercepts wet winds, coastal regions and eastern Himalayas having over 90 in. and Indo-China peninsula 75; but there are rainless stretches in Tibet, Mongolia, Desert of Gobi, Baluchistan, and plateau from Persia westwards.

Fauna includes camels, lions, elephants, tigers, bears, wolves, Arctic foxes, ermines, deer, marmots, monkeys, some marsupials (in Malaya), crocodiles, pythons, rhinoceri, cheetahs; pheasants, ptarmigan, guillemot.

Flora.—Vegetation varies according to climate and lat. Chief trees are pine, larch, birch in Siberia, coniferous trees on Himalayas, oak, teak, deodar, sandalwood, palm, in India and Malaya; dwarf willows and birches occur in *tundra* districts, N. of Arctic Circle, where also mosses and lichens are found. Tropical flowers occur on lower Himalayan slopes, rhododendrons higher up. In Syria and Asia Minor flora is Mediterranean in character. Central A. produces vines, olive, fig, apple, and other European fruit trees; Jap. and Chin. vegetation occurs east of Himalayas. In S.E. occur many varieties of indigenous plants, sugar-cane, cotton, pepper, areca, sago, banana, and

History.—Earliest centres of civilisation in A. were Assyria and Babylonia, while China also has a civilisation dating back many cent's before Christian era. In VII. cent. B.C. Persia conquered Assyria and Babylonia, and henceforth held chief power till conquered by Alexander of Macedon, the division of whose kingdom caused wars between Egypt and Syria, these being both ultimately absorbed by Rome. In III. cent. A.D. the Persians struggled against the Romans for supremacy in A., and afterwards continued to struggle against the Byzantine Empire; ultimately destroyed by Muhammadan conquests in VII. cent. Caliphate, established by followers of Muhammad, for some time was chief power in A.; in X. cent. Mahmud of Ghaznai established his independence and founded Mogul dynasty in India. Other independent empires were established by Seljuk in A. Minor, and by Othman, founder of Ottoman empire; and caliphate was finally



cocoa-nut palms growing wild here, as well as many fruit trees and drug- and rubber-producing plants. Bamboos are abundant in India. Cultivated plants include tea, in China, Japan, Assam; coffee, in Arabia, S. India, China; cereals, in India and Arabia; rice and maize, in Eastern Archipelago islands; cotton, in China and Arabia; sugar, in China. Date palms and acacias abound in Arabia.

Geology.—A. is considered to be of comparatively recent origin. Chief mountain systems consist mainly of granites; schists occur in Himalayas and Altai mountains, gneiss in Himalayas, volcanic rocks in India and Siberia; much of continent said to have been covered till comparatively recent date by sea, of which Caspian and Aral Seas are traces; Himalayas apparently formed by upheavals occurring after Cretaceous period. Minerals include gold, precious stones, coal, iron; petroleum found in Caucasus, Burma, Sumatra.

overthrown by successors of Jenghiz Khan, conqueror of Central A. and Northern China. Byzantine Empire was overthrown by Turkey, 1453. Since XVI. cent. various European powers have established their influence in A.; Russia conquered Siberia in 1580–84. India, after struggle between France and Britain, was secured by latter in 1765.

Peoples.—Inhabitants of A. form over half population of world; belong to five different groups, Mongolian, Caucasian, Malayan, Dravidian, Negroid; Mongolians, numerically greatest, forming about $\frac{1}{5}$th of entire population, inhabit China, Japan, Tibet, N. Asia; Caucasians predominate in W. from Afghanistan to Asia Minor, and in India; Malayans in eastern peninsula and Eastern Archipelago; Dravidians in S. India and Ceylon; Negroid peoples in S.E. Asia and Philippine Islands. Other inhabitants are Russians, British, Jews, Arabs. Principal religion is Buddhism, but Hinduism prevails in India, Islam in

Central and Western A. A. was cradle of all great world-religions—Christianity, Muhammadanism, Buddhism, Jewish, and other faiths. Total pop. *c.* 900,000,000.

Keane, *Asia* (1896); Sievers, *Asien* (1894).

ASIA (Gk. myth.), dau. of Oceanus and Thetis, and bride of Prometheus; gave name to continent.

ASIA MINOR, ANATOLIA (36° to 42° N., 26° to 42° E.), western peninsula, Asia, forming part of Turk. Empire; bounded N. by Black Sea, E. by Russia and Persia, S. by Mediterranean and Syria, W. by Bosporus, Sea of Marmora, Dardanelles, and Ægean; coast-line broken. Central tableland, bounded by mountain ranges N. and S.; has salt lakes. Elsewhere are fertile river valleys and waste strips; in S. is Plain of Adana. Roads are practically unknown; traffic dependent on horses, camels, mules. Railway mileage is *c.* 1500 including section of Bagdad or Anatolian Railway, which, running from Scutari, has reached Konia and Bulgurli. Hill slopes are covered with trees—walnut, box, oak, beech, plane, ash. There are many sheep, goats, horses.

Ruling power in A. M. was held by Lydian kings in VII. cent. B.C.; came under control of Persia a cent. later, and was afterwards subdued in 334 B.C. by Alexander the Great, after whose death it was subdivided, greater part coming eventually to Seleucids, and kings of Pergamum; Rhodes became republic, and Bithynian kingdom was established; flourished under Romans from I. cent. B.C.; less prosperous under Byzantine empire; gradual annexation by Turks began XI. cent.; whole has belonged to Turkey since 1481.



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Manufactures include silks, cottons, carpets, mohair, wine, soap, liquorice paste, copper utensils. Among imports are textiles, iron, coal, petroleum, sugar; among exports, wheat, woods, salt fish, barley, millet, sesame, olive oil, cattle, hides, mohair, tobacco, meerschaum, soap, various ores, etc. Area, 197,711 sq. miles. Pop. (recent estimate) 10,500,000, including Turks, Circassians, Jews, Arabs, and other races.

Sir C. W. Wilson's *Handbook for Travellers in Asia Minor*; Ramsay's *Historical Geography of Asia Minor.*

ASIATIC QUESTION.—In many parts of the New World a serious Asiatic question has arisen owing to a rapid influx of Indians, Chinese, or Japanese, who, for one reason or another, have come to be regarded as undesirable immigrants. The main cause of anti-Asiatic feeling is generally to be found in the inability of the white man to compete in the labour and other markets on equal terms with the brown or yellow man; and antipathy is sometimes heightened by disgust at certain forms of disease or crime to which Asiatics are prone.

In older countries where population is large and scope for immigration therefore limited, the problem seldom presents itself, although even in Liverpool anti-Chinese riots are not unknown. In lands like South Africa, Australia, Canada, and U.S.A., however, the case is entirely different; there is not only room but need for immigrants; and there is danger of the white population being swamped by a wholesale invasion of Asiatics. Australia, for instance, has no wish to become the dumping-ground of Japan's surplus population. South Africa has made use of imported indentured coolie labour (Indian and Chinese) owing to its cheapness and suitability to the climate, but has no desire to allow a large body of Asiatics to gain a permanent footing in the country, because the Indian trader can easily undersell his white rival, owing to his business methods and the extreme frugality of his living; besides, the Indian usually sends his savings to India, instead of spending or investing the money where it was made. Hence the adoption in America, Australia, and S. Africa of Immigration Laws, which restrict or exclude Asiatics.

Serious rioting and strained international relations have resulted from anti-Asiatic movements in various countries; in 1906–7, for instance, outbreaks of the kind occurred in San Francisco and Vancouver, and feeling ran high in Japan in consequence. An agitation on humanitarian grounds against the importation (1904 onwards) of Chinese coolies (who lived in 'Compounds') for the Transvaal mines led to their repatriation (last batch returned, 1910). About the same time the Natal Government's attitude towards Indians led to the Indian Government's refusal to allow coolies for Natal plantations to be indentured in India; while the Transvaal Government's demand that all Indians in the country should have their finger-print taken as means of identification led to a Passive Resistance Movement, Indians considering this an imputation of crime.

Neame, *Asiatic Danger in the Colonies* (1895).

ASIATIC RUSSIA, see RUSSIA.

ASIATIC TURKEY, see TURKEY.

ASIENTO, ASSIENTO (Span.), a contract by which the taxes were farmed out. By the '*Asiento' Treaty* of 1713, between Spain and Britain, Brit. subjects were allowed to introduce 144,000 slaves into Span. colonies.

ASIO, a genus of Owls (*q.v.*).

ASIR (19° N., 43° E.), central mountainous district, W. Arabia; divides coastal strip from inner plateau; produces dates, cereals. Pop. *c.* 160,000.

ASKE, ROBERT, Eng. rebel, became leader of the 'Pilgrimage of Grace,' 1536; at first successful, but rebel force disbanded with promise of royal pardon; A. was executed, 1537.

ASKEW, ANNE (d. 1546), Eng. Prot. martyr; repudiated doctrine of transubstantiation; refused to recant, was racked, and burnt.

ASKHABAD (37° 55′ N., 58° 15′ E.), town, Russian Central Asia. Pop. 41,700.

ASKLEPIOS, see ÆSCULAPIUS.

ASKWITH, SIR GEORGE RANKEN (1861–), Eng. chief industrial commissioner (1911); held positions under Board of Trade, and settled many trade disputes, including cotton strike (1901) and railway and transport strike (1911); K.C.B. (1911).

ASMAR, town of Afghanistan below the Kunar valley; part of disputed territory annexed, 1893.

ASMARA (15° 10′ N., 38° 54′ E.), town, Eritrea, Africa; seat of government. Pop. *c.* 9000.

ASMODEUS, Jew. name (of Persian origin) for a demon referred to in Book of *Tobit* as loving Sara, and the destroyer of her successive husbands; hence he is famous as the spirit which destroys conjugal happiness. He is often referred to by old writers, and figures in Le Sage's *Le Diable Boiteux*.

ASNIÈRES (48° 55′ N., 2° 20′ E.), town, on Seine, France. Pop. (1911) 42,600.

ASOKA (fl. 264–228 B.C.), Ind. emperor; adopting Buddhism, he spread its doctrines by missionaries and teachers and by edicts carved on stone pillars and rock; reign marks beginning of stone architecture and sculpture in India.

ASOLO (45° 48′ N., 11° 57′ E.), town, Venetia, Italy. Pop. 5800.

ASP (*Vipera aspis*), poisonous snake of Mediterranean countries and Alps.

ASPARAGINE ($C_4H_8N_2O_3$), organic compound occurring in Asparagus and Leguminosæ.

ASPARAGUS, plant genus belonging to order Liliaceæ. *A. officinalis* cultivated for its edible stems; about a hundred other species occur in temperate parts of the Old World.

ASPASIA (fl. V. cent. B.C.), Greek woman who came to Athens from Miletus, entertained chief men of Athens in her house, won much fame for charm and intellectual gifts, and became mistress of Pericles, who was greatly attached to her; their s. was legitimised. A. was centre of free-thinking circle and vehemently attacked in literature of time, besides undergoing public prosecution.

ASPASIUS (I. cent. A.D.), Gk. Peripatetic philosopher; wrote commentaries on Aristotle and Plato.

ASPECTS, configuration of planets at any time with reference to their supposed effects for good or evil.

ASPEN (*Populus tremula*), European and Siberian tree with slender leaf-stalks causing 'trembling' of the foliage. *P. trepida* grows in N. America. Bark, containing salicin, is used medicinally. See POPLAR.

ASPENDUS (36° 54′ N., 31° 13′ E.), ancient town, Pamphylia, Asia Minor; remarkable Rom. remains, including fine theatre; site of modern Balkis Kalé.

ASPERGES, term for R.C. ceremony of sprinkling congregation with holy water before High Mass.

ASPERGILLUM, see under LAMELLIBRANCHIATA.

ASPERN, or **ESSLING**, battle fought between French under Napoleon and Austrians under Archduke Charles, May 1809; after fierce fighting, the French were beaten. A. and E. are villages near Vienna.

ASPHALT, MINERAL PITCH, blackish bituminous deposits formed by drying up of crude petroleum. Trinidad, Dead Sea, and Cuban deposits are exploited for manufacture of roofing felt, coating for floors, and black varnish. A. limestone from Val de Travers (Switzerland) is used as ingredient of concrete for pavements, etc.

ASPHODEL (*Asphodelus*), Mediterranean genus of lilies. Bog A. (*Narthecium ossifragum*) grows on Brit. peat bogs.

ASPHYXIA, cessation of respiration, through obstruction of the entrance of air to the lungs.

ASPIC, Egyptian venomous snake; spikenard plant (*Lavandula spica*); savoury jelly.

ASPIDISTRA, genus of lilies from Far East.

ASPINWALL, WILLIAM H. (1807–75), Amer. engineer; built Panama railroad, E. terminus of which bears his name. See COLON.

ASPIRATE (Lat. *aspirare*, to breathe towards).—(1) Letter *h*, as in *home*, to pronounce which special expulsion of breath is necessary; distinguished from *h* mute, as in *honour*. (2) In Gk., mark of aspiration (') denotes 'rough breathing.'

ASPIROTRICHA, a group of ciliated Infusorians (see CILIATA) among the Protozoa, equivalent to family *Paramæcinæ*.

ASPIROZ, MANUEL DE (1836–1905), Mexican diplomatist and author.

ASPLANCHNACEÆ, a genus of ROTIFERA (*q.v.*).

ASPROMONTE (38° 5′ N., 15° 55′ E.), mountain, Italy, 6420 ft.; Garibaldi wounded and captured here, 1862.

ASQUITH, HERBERT HENRY (1852–), Brit. statesman; b. Morley, Yorkshire; ed. City of London School and Balliol College, Oxford, where he took a first class in Classics, and was elected a Fellow of his College; proceeded to the Bar, becoming a Q.C. (1890); m. (2nd wife) Margot, dau. of Sir Charles Tennant (1894); entered Parliament as a Gladstonian Liberal for East Fife (1886); Home Sec. (1892–95). After Liberal defeat (1895) helped to found the Liberal League, and identified himself with the imperialistic views of Lord Rosebery. In ministry of Sir H. Campbell-Bannerman was appointed Chancellor of the Exchequer (1905), becoming Prime Minister in 1908 on the resignation of his chief. His administration has been notable for the inauguration of Old Age Pensions, the Parliament Act reducing the powers of the House of Lords, National Insurance, the payment of salaries to members of Parliament, and the introduction of bills for Irish Home Rule, Welsh Disestablishment, and Abolition of Plural Voting (1912); *Life*, by Elias (1909).

ASS (*Asinus*), sub-genus of horse tribe. See HORSE FAMILY.

ASSAB (12° 48′ N., 42° 40′ E.), port and bay, Eritrea, Africa.

ASSAM (26° N., 92° E.), Chief Commissionership in extreme N.E. of India; area, *c.* 56,500 sq. miles. Northern part lies along Brahmaputra valley, southern along Surma valley; between these two rivers lies hill district; chief mountains, Himalayas in N., Assam hills in S.; large amount of forest ground and fertile land. A. seems to have been independent State in VII. cent., called Kamarupa; conquered by Shans or Ahoms from E. in XIII. cent.; held by them until conquered by Burmese in late XVIII. cent. War between Burmese and British broke out, 1823–24; resulted in cession of A. to British, 1826; incorporated with Eastern Bengal, because of unrest in Bengal, culminating in Swadeshi movement, 1905; separated again, 1912.

A. produces about three-fourths of tea grown in India, plantations covering over 6,000,000 acres; large deposits of coal; petroleum, iron, and limestone also worked; forests contain rubber trees, sal and other hardwoods; produces gold, ivory, amber, lead, mustard, rice, jute, cotton; exports tea, rice, timber, coal; imports woollen and cotton goods, salt, glass, earthenware, tobacco, opium, betel. Animals found include rhinoceros, elephant, tiger, monkeys, porcupines, innumerable kinds of birds, crocodiles, snakes. Inhabitants are dark-skinned and black-haired; majority are Hindus (54 %); a large number of Muhammadans (27 %) and Animists, small number of Christians and Buddhists. Principal dialects are Assamese and Bengali. Chief town, Shillong. Pop. *c.* 5,000,000.

ASSAMAR, bitter yellow chemical produced by roasting sugar or starch.

ASSAROTTI, OTTAVIO GIOVANNI BATTISTA (1753–1829), Ital. educationist; founder in Italy, under the patronage of Napoleon, of the first school for the training of deaf-mutes.

ASSASSIN, a murderer, hired or otherwise; particularly the murderer of a public person. The name is derived from a secret society of murderers founded in Persia, in 1090, by Hassan ben Sabbah, who seized the fortress of Alamut, where he established the order, making the Sheikh el-Jebel ('old man of

the mountain') the ruler-in-chief. The *fedais*, who were those appointed to carry out the murders, were first intoxicated with a narcotic preparation made from hemp (*hashish*). From Persia branches of the Order of Assassins spread into Syria and Asia Minor, and for two cent's continued their operations. The Crusaders became acquainted with its terrors, and amongst its distinguished victims were Conrad of Montferrat and Count Raymond of Tripoli.

Assassinations.—Xerxes I., Artaxerxes III., and Darius III. of Persia were murdered; as were Julius Cæsar, the emperors Caligula and Domitian, Edward II. and Edward V. of England, James I. and James III. of Scotland, Henry III. and Henry IV. of France; notable a's in XIX. and XX. cent's are those of Tsars of Russia, 1801 and 1881; U.S. presidents Lincoln, 1865; Garfield, 1881; McKinley, 1901; Fr. president Carnot, 1894; King Humbert of Italy, 1900; Alexander I. of Servia, 1903; King and Crown Prince of Portugal, 1908; King of Greece, 1913; President Madero, 1913.

ASSAULT, an unlawful attempt to apply force to the person of another, either directly or indirectly. It is also the act of using a gesture towards another, so as to give him reasonable grounds for believing that the person using such gesture meant to use actual force upon him. It includes also the act of depriving another person of his liberty. Common a's are punishable by fine or imprisonment; those which occasion serious bodily harm are punishable by long terms of penal servitude. Any person resisting or obstructing a police officer in the execution of his duty is liable, upon conviction, to two years' imprisonment with hard labour.

ASSAYE (20° 17′ N., 75° 50′ E.), village, Hyderabad, India; scene of Wellesley's defeat of the Mahrattas, 1803.

ASSAYING, the quantitative determination of metals in ores and alloys, chiefly of iron, lead, copper, tin, mercury, antimony, silver, and gold.

Rhead and Sexton, *Assaying and Metallurgical Analysis* (1902).

ASSEGAI, a light wooden spear, pointed with iron, used by the Zulus and Kaffirs.

ASSEMANI, JOSEPH SIMON (b. 1687), Syrian Orientalist; famous for having edit. and pub. some of most valuable MSS. in Vatican Library, of which he was librarian. He was assisted in this work by his bro., Joseph Aloysius A., and his nephew, Stephen Exodius A. His grandson, Simon A., is remembered for his exposure of the Vella hist. imposture.

ASSEMBLIES (Fr. *assemblée*, assembly, from Lat. *assimulare*, to bring together), fashionable periodical gatherings, still held in provinces; meeting of clerical synods, such as Westminster A. of Divines, General A. of Scottish Church; in Fr. history council summoned by king as A. of Notables; important A. of Notables, 1787–88, advised summoning of States General.

ASSEN (53° N., 6° 34′ E.), town, Holland. Pop. 11,300.

ASSENT, ROYAL, to Bills (which then became Acts) of Parliament; given by sovereign in person or by commission; form in public acts, *le roy le veult*; in money acts, *le roy remercie ses bons sujets, accepte leur benevolence et ainsi le veult*; in private bills, *soit fait comme il est desiré*. Veto, not exercised since 1708, took form *le roy s'avisera*. R. A. is sometimes withheld from Colonial Acts of Parliament.

ASSER, JOHN (d. 910), Eng. ecclesiastic; friend and biographer of Alfred the Great; became bp. of Sherborne.

ASSESSMENT, official valuation of property or income for national or local government taxation purposes; also the amount of damages awarded in a court of law. **Assessor** (Late Lat. *assessor*, or regulator of taxation, by transference of meaning from *assessor*, assistant, from Lat. *assidere*, to sit beside).—(1) Official who assesses taxation. (2) Specialist called in to assist magistrate.

ASSETS, Eng. legal term for the entire property of a debtor or bankrupt, and the source from which his creditors must receive the whole or partial payment of their claims.

ASSIGN (Lat. *assignare*, to appropriate to), legal term for person to whom property is made over; conveyances in fee simple always made to guarantee his 'heirs, executors, administrators, and assigns.'

ASSIGNATION, *to writs and evidents and assignation to rents*, clauses in Scot. conveyances assigning title-deeds and rents to grantee.

ASSIGNATS, a system of paper money used in France during the years 1790–96, when the National Assembly confiscated the Church lands, for which, when resold, bonds were accepted bearing the above name.

ASSINIBOIA (50° 20′ N., 107° W.), former name of territory now included in Saskatchewan (*q.v.*) province, Canada; a district in Rupert's Land prior to 1870.

ASSINIBOIN, N. Amer. Indians, now in Canada and Montana.

ASSINIBOINE RIVER (50° 12′ N., 100° 30′ W.), tributary of Red R., Canada; waters the district known till 1905 as Assiniboia.

ASSINIE (5° 5′ N., 2° 57′ W.), one of chief ports of Fr. Ivory Coast, West Africa.

ASSISE, two adjacent strata of rock containing same fossils.

ASSISI (43° 4′ N., 12° 36′ E.), cathedral town, Italy; birthplace of St. Francis, 1182; has Franciscan monastery and double church. Pop. 5300.

ASSIUT, SIUT (27° 9′ N., 31° 12′ E.).—(1) town, Egypt; site of Nile barrage and lock; carved ivory, pottery, leather goods; hospital, mosques. Pop. 39,400. (2) province, Upper Egypt; area, 772 sq. miles. Pop. 907,435.

ASSIZE COURTS, courts of justice held several times each year in every county. The King's Commission to hold the a. is issued to His Majesty's Judges, one of whom usually presides, but it may be directed also to some King's Counsel, or other barrister, who then, if need be, takes the place of the judge. The Commission is in several parts, the united effect of which is to empower the judge to try treasons and felonies, to clear the jails of all prisoners, and to try all civil causes. For the purpose of holding the a's the country is divided into eight circuits, viz.: the Western, Northern, Midland, Oxford, North-Eastern, South-Eastern, North Wales, and South Wales. London and Middlesex are not included in the circuit system. Civil cases are tried in the High Court of Justice, and criminal cases at the Central Criminal Court ('Old Bailey').

ASSMANNSHAUSEN (50° N., 7° 53′ E.), village, Prussia; noted wine.

ASSOCIATES, clerks of the Supreme Court who prepare cause lists, record judgments, enter verdicts, etc. They are required to be properly qualified barristers or solicitors. It is also the title given to an artist connected with the Royal Academy, below the rank of a Fellow; and in other artistic and learned societies.

ASSOCIATION, see FOOTBALL.

ASSOCIATION OF IDEAS, a term first used by John Locke, and employed, in psychology, to describe the combination of states of mind with one another by what are known as the laws of a. Prominent among these laws are a. by similarity, and by contiguity. This method of logical speculation gave rise to what is known as the *Associationist school*, some of its principal later members being James Mill, J. S. Mill, and Prof. Bain. Associationists held that, given a sensation now, a previous sensation, by the law of similarity, is revived, and this by law of contiguity evokes the ideas that go to make up the object of perception. See PSYCHOLOGY.

Bradley's *Principles of Logic*; Stout's *Analytic Psychology*; James Mill's *Analysis of the Human Mind*; J. S. Mill's *System of Logic*.

ASSOILZIE, in Scots law, 'to acquit' (assoil).

ASSOLLANT, ALFRED (1827–86), Fr. author; wrote witty ironical essays and stories: *Aventures du capitaine Corcoran, Histoire fantastique du célèbre Pierrot*, are well known.

ASSONANCE, in Eng. prosody, a correspondence in sound in the termination of verses, less complete than that of rhyme—*i.e.* the vowels may be the same, but the consonants different. It was a common practice with old Eng. writers, who would rhyme 'stand' with 'man.' In the famous ballad of Sir Patrick Spens, 'deep' is made to rhyme with 'feet.' A. is believed to be a characteristic of Hebrew poetry.

ASSUAN, ASWAN (24° 7′ N., 32° 53′ E.), town, Egypt; site of dam constructed to form a great reservoir for irrigation in the times of 'low Nile.' The dam measures 1¼ mile in length, is nearly 100 ft. thick at its base, with a maximum height from its foundation of about 130 ft.; the greatest difference of level of water above and below the dam is about 67 ft. It is built of local granite, set in Portland cement; the total weight of masonry is over one million tons. The dam has 180 sluice openings, through which could pass 15,000 tons of water per second. These sluices are left open when the river is in flood, but when the discharge has fallen to 2000 tons per second, the sluice-gates begin to be closed, and the reservoir—that is, the river above the dam—begins to fill up. When full, the reservoir contains 1000 million tons of water, affecting the depth of the river for 140 miles above the dam. The dam was opened in 1902. Navigation is provided for by a ladder of five locks, each 260 feet long and 32 feet wide. Pop. 12,618. Province, Upper Egypt, area, 169 sq. miles. Pop. 234,600.

ASSUMPTION, FEAST OF, festival (Aug. 15) commemorative of tradition almost universally held (but not of faith) in R.C. Church, that the Virgin Mary's body was assumed after her death into heaven.

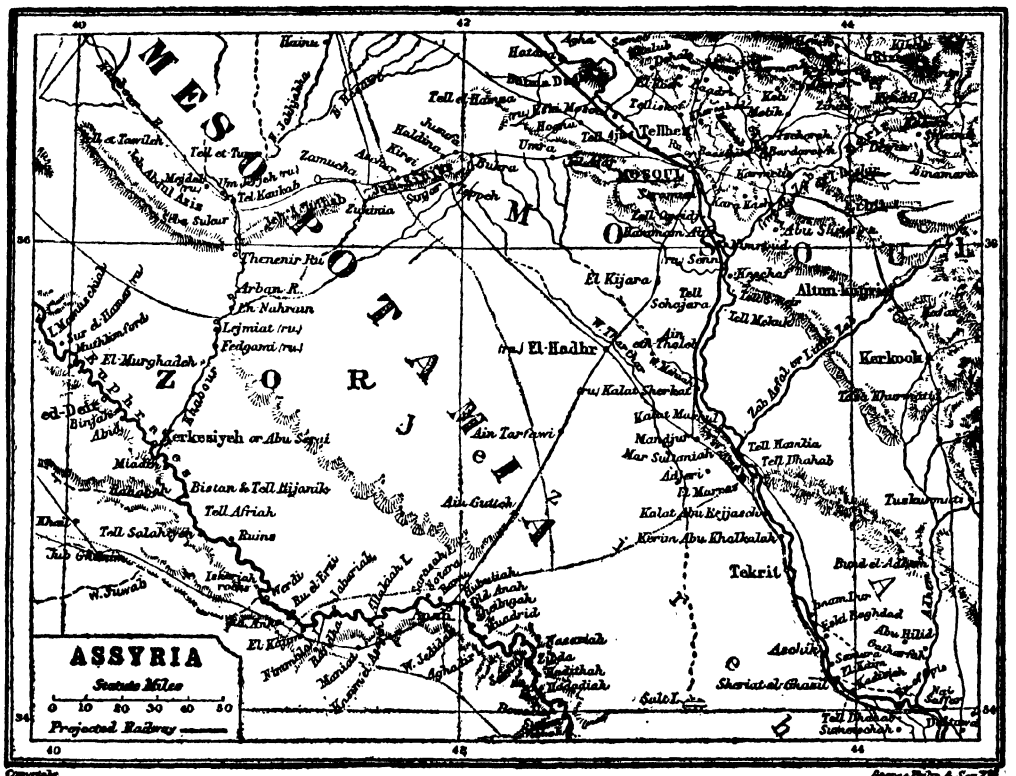
ASSUMPTION ISLAND (9° 44′ S., 46° 30′ E.), dependent island of Seychelles, Africa.

ASSUR (35° 32′ N., 43° 15′ E.), original capital, Assyria; site marked by Kaleh Sherghat, on Tigris; also name of god whose temple was there.

ASSUR-BANI-PAL, Assyrian king; after his f.'s death (668 B.C.) he subdued revolted provinces, but lost Egypt (660). His bro. (Babylonian king) declared war, but Babylon was starved into surrender (648 B.C.). When Assur-Bani-Pal d. (*c.* 626) his empire was already decaying.

ASSUS (39° 28′ N., 26° 13′ E.), old Gk. town, Asiatic Turkey; belonged successively to Lydia, Persia, Pergamum, Rome, Turkey; modern, Behram.

ASSYRIA (35° N., 44° E.), ancient country lying N. of Babylonia (*q.v.*) and forming part of Mesopotamia; named from Assur; became one of most extensive empires of ancient world, comprising Babylonia, West Media, Armenia, Syria, Palestine, and Egypt. Surface of country is high plain crossed by mountains and drained by Tigris and tributaries.



History.—Greek account of founding of state and its later capital Nineveh by Ninos (eponymous character), husband of Semiramis, was derived from Persian legends; Bible account of A. as colony of Babylonia is borne out by inscriptions; subject to Babylonia, 2250–1500 (?); succeeding period one of constant strife with Babylonia; *c.* 1270 B.C. Shalmaneser I., who changed capital from Assur to Calah, greatly increased prestige of A. Tiglathpileser I. gained control of great part of Babylonia, and again made Assur the capital. His successors lost control of Babylonia, which remained independent for several centuries. Ashur-Natsir-Pal III. (883–*c.* 860) carried out successful campaigns in all directions, subduing Aramæans and establishing Assyrian pre-eminence in the East. Nineveh, now capital, increased in splendour with each succeeding ruler. Shalmaneser II., who succeeded Ashur-Natsir-Pal, also carried out successful campaigns, and in following cent.

Tiglathpileser III. became king also of Babylonia. With his successor, Sargon II., Assyrian empire reached its apotheosis; he again subjugated Babylonia, defeated Hittites, and made Judæa a vassal state. Sennacherib, next king, destroyed Babylon and carried on various wars; his s. Esarhaddon, 680–669, warred against Egypt and was succeeded by his s. Assur-Bani-Pal (king, 668–626), a great soldier who carried on various wars, burning the palace of his rebellious brother in Babylon. After his death Babylonia broke away and A. began to decline; empire ended with destruction of Nineveh by Medes, Babylonians, and Scythians in 607 B.C., after which Babylonia again became centre of empire.

A fine set of Assyrian reliefs and inscriptions are in the Brit. Museum; among them famous relief of Assyrian Tree of Life, with winged figures kneeling on either side, and fighting scenes of bold, graceful, conventional treatment; strong decorative sense; colossal man-headed winged lions from palace at Nineveh are also in Brit. Museum.

H. Winckler, *History of Babylonia and Assyria* (Eng. ed., 1907); L. W. King, *History of Sumer and Akkad* (1910); W. St. C. Boscawen, *First of Empires* (1906).

ASSYRIAN RELIGION, see BABYLONIA (Religion).

AST, GEORG ANTON FRIEDRICH (1778–1841), Ger. philosopher and philologist; famous for his critical editions of Plato.

ASTARA (38° 30′ N., 48° 30′ E.), port on the Caspian, Transcaucasia, Russia.

ASTARABAD.—(1) (36° 50′ N., 54° 26′ E.) walled town, Persia. Pop. *c.* 11,000. (2) (36° 40′ N., 54° 40′ E.) province. Pop. *c.* 90,000.

ASTARAC (43° 30′ N., 0° 25′ E.), district of France.

ASTARTE, ASHTAROTH, or **ISHTAR,** Phœnician goddess, symbolised by the moon; represented the conceptive powers of nature, as Baal the generative. The rites connected with her worship at Tyre and Sidon were of a lascivious nature. A. is often confounded with Venus and other classical deities.

ASTER, genus of composite, generally herbaceous perennial plants, occurring in America, Europe, and Asia, many species being cultivated in gardens, *e.g.* Michaelmas daisies.

ASTERIA, precious stone, generally sapphire, which, when cut, gives the reflex of a star.

ASTERIŒLLA FORMOSA, a member of the Diatomaceæ (*q.v.*), which lives in colonies, the individuals joining like wheel-spokes.

ASTEROIDEA, star-fish. See ECHINODERMATA.

ASTHMA, disease characterised by sudden paroxysmal attacks of painful and distressful breathing, recurring at intervals. It is due to narrowing of the bronchial tubes, and previous lung disease, polypi, etc., and a neurotic history predispose to it. Certain atmospheric conditions, dusty particles, and reflex irritation, *e.g.* from alimentary system, excite attacks. Various inhalations, and lobelia, belladonna, and hyoscyamus are valuable in its treatment, while hypnotism has also been employed with benefit.

ASTI (44° 55′ N., 8° 15′ E.), town, Italy; birthplace of Alfieri; famous wine. Pop. 19,800.

ASTIGMATISM, see EYE.

ASTLEY, JACOB ASTLEY, BARON (1579–1652), Eng. Royalist leader; commanded the infantry at *Naseby*.

ASTLEY, PHILIP (1742–1814), noted trainer of horses, who held shows at Lambeth, etc.

ASTON MANOR (52° 31′ N., 1° 52′ W.), town, Warwickshire, England. Pop. (1911) 75,000.

ASTOR, JOHN JACOB (1763–1848), Amer. merchant; of Ger. birth; emigrated to America (1783), engaged in the fur trade, and became founder of the American Fur Company; from the profits of this and other undertakings he amassed a large fortune, amounting, it is estimated, to about $30,000,000. He founded Astor House and the Astor Library, both in New York City, and more numerous benefactions. William Waldorf A. (1848–) is his grandson.

ASTOR, WILLIAM WALDORF (1848–), owner of *Observer* and other papers; liberal patron of education.

ASTORGA (42° 28′ N., 6° 6′ W.), town, Spain. Pop. 5600.

ASTORGA, EMANUELE D' (1681–1736), Ital. composer; known chiefly for his *Stabat Mater*, and a number of chamber cantatas.

ASTORIA (46° 12′ N., 123° 48′ W.), town, Oregon, U.S.A.; founded by John Jacob Astor, 1811. Pop. (1910) 9599.

ASTOVE ISLAND, dependent island of the Seychelles (*q.v.*).

ASTRÆA (classical myth.), the goddess of justice; dau. of Zeus and Themis. In the Zodiac she is the constellation *Virgo*, represented as bearing the scales of justice.

ASTRAKHAN (47° N., 46° 40′ E.), government, Russia; area, 91,000 sq. miles. Pop. (1910) 1,246,000.

ASTRAKHAN (46° 22′ N., 48° 5′ E.), river port, on Volga, Russia; trading centre; exports caviare, fish, etc.; gives its name to A. fur (skin of still-born or young lambs); cathedral. Pop. (1909) 149,600.

ASTRAL PLANE, term in theosophy for region in which A. spirits, the spiritual or subconscious members of individualities, have conscious life; terminology borrowed from mediæval astrology.

ASTROID, star of over five points.

ASTROLABE, astronomical instrument for determining altitudes of heavenly bodies, developed from armillæ, and superseded by the quadrant and sextant (*q.v.*).

ASTROLOGY, study of the motions of heavenly bodies and their supposed influence on terrestrial events and human affairs. The science and art were first practised by the Chaldæans in Babylonia and Assyria, who spread their knowledge to Egypt. The ancient Greeks, and even more the Romans, were convinced of the possibility of divining the future by consulting the constellations. Arabian astrologers flourished in spite of much opposition by the orthodox Christian Church, and a. continued to exercise great influence on European scientists and statesmen until Copernicus (*q.v.*), by proving definitely that the earth is not the centre of the universe, gave the impetus which severed the science of the stars, astronomy (*q.v.*), from the still persistent art of astrology. Though more and more discredited, the latter has its votaries even at the present time, who, for a consideration, draw horoscopes and cast nativities.

G. Wilde, *Chaldæan Astrology up to date* (1901).

ASTRONOMY, the science that treats of the heavenly bodies, and especially of their movements, real or apparent. Their daily movement in the direction east to west, the most obvious and the first observed, is an apparent motion caused by the rotation of the earth upon its axis. The next movements observed were those of the sun and moon among the stars; the former being an actual movement, but the latter apparent only, due to the revolution of the earth round the sun in the course of a year. The first practical use made of these movements was the measurement of *Time*—the rotation of the earth giving the *day*; the phases of the moon the *month*; and the apparent revolution of the sun the *year*. Five *planets* or 'wandering stars' were also noted amongst the host of *fixed stars*, and from about 600 B.C. up to the time of HIPPARCHUS (190–120 B.C.), Gk. astronomers made great efforts to reduce their seemingly irregular motions to some orderly system, it being first assumed that sun, moon, and planets must all move round the earth in circles at uniform speed. As this theory did not agree with observation, it was supposed that it was not the planet itself that moved in a circle round the earth, but the centre of another circle, and that the planet travelled in this latter *epicycle*, as it was termed. But this did not account for all these irregularities, and

the first epicycle had to carry a second, and that a third. This system was named the 'Ptolemaic,' from CLAUDIUS PTOLEMY, who gave it its final development (137 A.D.).

COPERNICUS (1473–1543) showed that a great simplification could be secured by supposing the sun fixed and the earth and all the planets to revolve round it. KEPLER (1571–1630) found that the planets moved in *ellipses*, not circles, round the sun, which occupied one of the *foci*, and that the straight line joining the planet to the sun, the *radius vector*, passed over equal areas of space in equal periods of time. Further, that the cube of the distance of any planet bore in every case the same proportion to the square of the time of its revolution. These are known as Kepler's Three Laws, and SIR ISAAC NEWTON (1642–1727) proved that they are a consequence of a single universal law of *Gravitation*—that every particle of matter attracts every other particle with a force varying inversely as the square of the distance between them, and directly as the product of the two masses. He further proved that a body travelling under the influence of this law must revolve in one of four closely allied curves, known as *conic sections*, of which the circle and ellipse are two.

The most brilliant triumph of gravitational astronomy was achieved in 1846, when the seventh great planet, *Neptune*, was discovered from the computations of ADAMS and of LEVERRIER, who had independently predicted its position from the irregularities in the motion of *Uranus*, the sixth planet. This last had been discovered at the telescope by SIR WILLIAM HERSCHEL in 1781. Other members of the solar system are *Asteroids*, very small planets of which several hundreds are now known; and *Comets*, the most famous of which is called after HALLEY, since he first proved that it was moving in a regular orbit round the sun, in a period of about seventy-six years. Many other comets are now known to belong to the system, and closely connected with them are *Meteors*, or 'shooting stars,' so called because, when they encounter the earth, they become luminous as they rush through our atmosphere.

Before the telescope was invented at the beginning of the XVII. cent. only five planets were known: *Mercury*, *Venus*, *Mars*, *Jupiter*, and *Saturn*. GALILEO (1564–1642) added to these four *satellites* revolving round *Jupiter*, and two strange appendages to *Saturn* which Huygens showed to be a *Ring*. *Mars* is now known to have two satellites, *Jupiter* eight, *Saturn* ten, *Uranus* four, and *Neptune* one. The telescope has also enabled the surfaces of the sun, moon, and planets to be studied, creating a new department of astronomy, that dealing with their physical condition. Of these the sun is most important; its *photosphere* or luminous surface is diversified by dark *spots* and bright *faculæ*, subject to a cycle of change about eleven years in length. A total eclipse shows the sun to be surrounded by the *chromosphere*, a coloured shell of bright gases, from which rise the red flames or *prominences*; and the whole is surrounded by the *corona*.

Stellar astronomy began about 2700 B.C., when the ancients, to distinguish the stars one from another, associated them with certain imaginary forms, grouping them into *Constellations*. Hipparchus made the first catalogue, giving the celestial longitudes and latitudes of 1080 stars. Much more accurate positions were obtained after the invention of the telescope, the chief purpose then in view being the advancement of the practical art of *Navigation*. Star catalogues are now continually in the course of preparation at the chief National Observatories, and an International Photographic Chart is in course of preparation which will exhibit about 30 million star images.

Stellar astronomy has developed in several directions: viz., the study of *Variable Stars*, *i.e.* those that change their *magnitude*—that is, their brightness; of *Double Stars*, where two or more are evidently associated together, including *binaries* or double stars, where one is seen to be revolving round the other; of *Star Clusters*; and of *New* or *Temporary Stars*, that appear suddenly and rapidly fade away. The telescope has also shown *Nebulæ*, masses of faint filmy light, some *irregular* and extended, some small with defined outlines and known as *planetary nebulæ*, and an immense number of *spiral nebulæ*. Stellar distribution offers another subject of inquiry, for stars are not equally distributed, but are congregated most in the belt of the *Milky Way*. The *proper motions* of stars have shown that the sun, with all its planets, is moving rapidly in the direction towards the neighbourhood of the bright star Vega, and companies of stars have been found to show a common *Drift*.

The measurement of astronomical distances is effected through the principle of *parallax*, *i.e.* the apparent displacement of a body due to a real change in the position of the observer. Thus, by observing the moon from the observatories of Greenwich and of the Cape, her distance has been found to be 239,000 miles. The distances of several asteroids have been determined in like manner, and from these the distance of the sun—about 93 millions of miles—has been inferred. The distances of the stars are inferred from their *annual parallax*, that is, by observing them from opposite ends of the earth's orbit, and the parallaxes of about 50 are approximately known. The nearest star, *Alpha Centauri*, is distant about 280,000 times as far as the sun.

Science of the Stars, Maunder (1912); *Practical Astronomy*, Macpherson (1912); *History of Astronomy* (1907), Bryant.

ASTROPALIA (36° 35′ N., 26° 25′ E.), island, Ægean Sea; produces sponges.

ASTROPHYSICS, science of the physical and chemical constitution of heavenly bodies; grew into a distinct branch of astron. (*q.v.*), owing to the introduction of spectroscopy and the advance in photometry and photography.

ASTRUC, JEAN (1684–1766), Fr. physician and theologian; editor of a work on venereal diseases, *De Morbis Venereis* (1736); and (anonymously) a volume of *Conjectures* (1753), relating to sources of information used by Moses in compiling *Book of Genesis*.

ASTUR, Goshawk; see HAWK FAMILY.

ASTURA (41° 25′ N., 12° 46′ E.), peninsula, Italy; formerly island.

ASTURIAS (43° 15′ N., 5° 55′ W.), old province, Spain, which in early times maintained independence against Moors; area, 4200 sq. miles; surface mountainous, rising to height of *c.* 9000 ft. in S.; chief town, Oviedo; cereals, fruits, horses; well-wooded. Pop. (1910) 686,000. The heir to the Span. throne takes the title Prince of A.

ASTYAGES (d. 550 B.C.), last Median king.

ASTYANAX (Gk. myth.), s. of Hector and Andromache; prophecy that he would avenge destruction of Troy led Greeks to throw him over ramparts.

ASUNCION (25° 16′ S., 57° 42′ W.), capital, Paraguay; trades in leather, tobacco, sugar. Pop. (1910) 84,000.

ASUR, ASHUR, ASHIR, see ASSUR.

ASYLUM, a sanctuary, or place of refuge, from which persons could not be dislodged except by committing an act of sacrilege. The word is now generally applied to homes for the insane. See INSANITY.

Asylum, Right of, the privilege of a country, or state, to give protection to fugitives from another country, or state, which of late years has been protected from abuse, to a great extent, by extradition treaties.

ASYMPTOTE (Gk. 'not meeting'), straight or curved line which approaches curved line without meeting it in finite distance; purely mathematical conception.

ASYNDETON (Lat., from Gk. 'unconnected'), term of rhetoric for sentence or phrase in which conjunction is absent; redundance of conjunctions is *polysyndeton*.

ASYNJUR (sing. Asynja), goddesses of Norse celestial region, Asgard (*q.v.*).

ATACAMA (27° S., 70° W.), province, Chile; area, 30,720 sq. miles. Pop. (1910) 65,600. **Atacama, Desert of** (24° S., 70° W.), mountainous region rich in minerals.

ATACAMITE ($Cu_2Cl(OH)_3$), green soft mineral, crystallising orthorhombically, decomposition product of copper ores, found in Chile, S. Australia, and W. Africa.

ATAHUALPA, became Inca of Peru (1532) by dispossessing his bro. Huascar, who had succ. his f. Huayna Capac (1527), when A. had received Quito; during Span. conquest he was treacherously captured, and subsequently strangled (1533) by Pizarro's orders.

ATALANTA (classical myth.), Gk. maiden famed for her beauty and her fleetness of foot. Not being desirous to marry, she challenged her suitors to a race, death being the penalty of defeat. Hippomenes (Milanion in Arcadian version), one of these, won the race by dropping at intervals three golden apples given him by Aphrodite. A. stopped to pick them up, and so was outstripped by her lover.

ATARGATIS, a Syrian divinity, generally represented as a siren. In Kingsley's *Andromeda* she is spoken of as 'queen of the fishes.'

ATAULPHUS (d. 415), king of the Goths.

ATAVISM, unsatisfactory term, now abandoned, for reappearance in an individual of a character typical of a remote ancestor. See HEREDITY.

ATBARA (16° 50′ N., 35° 20′ E.), river, Africa; joins Nile; on the north bank Lord Kitchener defeated the Mahdists, April 8, 1898.

ATCHIN, see ACHIN.

ATCHISON (39° 33′ N., 95° 8′ W.), town, Kansas, U.S.A. Pop. (1910) 16,429.

ATÉ (classical myth.), the goddess of discord and all evil; dau. of **Zeus**, by whom she was flung out of Olympus by the hair, and left to dwell upon earth, where she incited mankind to all manner of wickedness.

ATELIERS NATIONAUX, Fr. provisional government, 1848, in order to relieve economic distress, established national workshops (*ateliers nationaux*) by which every man was to be provided with work; experiment failed disastrously; the workshops were abolished within the year, and system of outdoor relief for destitute established in its place.

ATELLA (40° 52′ N., 15° 38′ E.), ancient town, Campania, Italy.

ATELLANÆ FABULÆ, name of a form of satirical comedy popular among the early Romans, in which personal foibles, and the follies of the day, were pilloried under thin disguises.

ATESSA (42° 4′ N., 14° 28′ E.), town, Abruzzi, Italy.

ATESTE (45° 12′ N., 11° 40′ E.), ancient city, Italy; modern Este.

ATH, AATH (50° 38′ N., 3° 46′ E.), town, Belgium. Pop. 11,200.

ATHABASCA, ELK (59° 20′ N., 109° W.), lake, Canada, and (57° 20′ N., 111° 38′ W.) river, Canada.

ATHABASCA, TERRITORY OF, former division of Canada (area, 240,000 sq. miles); divided, 1905, between Alberta and Saskatchewan (*qq.v.*).

ATHALARIC (516–534), king of Ostrogoths.

ATHALIA, Old Testament character, queen of Juda; dau. of Ahab and Jezebel; m. Jehoram, whose children she killed in order to obtain throne; of traditional cruelty; subject of Racine's great play *Athalie*.

ATHAMAS (classical myth.), king of Thebes; m. Nephele, the cloud-goddess, whom he repudiated, and afterwards m. Ino, dau. of Cadmus, for which he was inflicted with madness by Hera.

ATHANARIC (d. 381), Visigothic general.

ATHANASIUS, ST. (293–373), bp. of Alexandria (326); sided actively against Arius in Arian controversy; his refusal to readmit Arius to communion ultimately caused his banishment (335); returned (337), but was deposed on religious and political grounds (339). Although pronounced guiltless by the Great Council of Synod at Rome (340), he was not restored till 346. On three further occasions he suffered exile, but from 366 he continued his episcopal labours uninterruptedly. He left several writings. A zealous defender of the Nicene faith, of heroic if imperious character and great intellectual powers, his title, 'Father of Orthodoxy,' is deservedly owned.

Bush, *Athanasius*.

ATHANOR, automatic furnace used in experiments on digestion; maintains constant temperature.

ATHAPASCAN, scattered stock of N. Amer. Indian tribes.

ATHARVA VEDA, 4th Vedic book.

ATHEISM, term applied to disbelief in God, though often used vaguely and as term of abuse flung at those whose belief is different from the conventional; an agnostic, strictly a pure sceptic, should be distinguished from an atheist who definitely denies.

ATHELNEY (51° 3′ N., 2° 56′ W.), district, Somersetshire, England; formerly island; Alfred found safety here, 879.

ATHENA, PALLAS-ATHENE (classical myth.), one of the chief Olympian deities, called by Romans Minerva. No satisfactory explanation of name Athena, or Athene, is known, and Pallas is variously derived from name of a giant slain by A., from shield which she carried and used to swing about her (*pallo*, I swing) to ward off antagonistic influences, or from Attic district of Pallene, which was one seat of her worship. She is said to have sprung fully armed from head of Zeus, who had swallowed her mother, Metis, then pregnant. She was protector of heroes in war, patron of arts of peace, and guardian deity of city of Athens, which was probably named after her. The Parthenon, at Athens, was her chief temple, and contained world-renowned statue by Pheidias. The owl, the cock, and the serpent were sacred to her, as also was the olive tree.

ATHENÆUM, name given originally to buildings dedicated to the worship of Athena; later, a place where poets and scholars used to meet for reading purposes, and to instruct their pupils, such an institution having been built at Rome by the Emperor Hadrian. In modern times it is a name given to many clubs and literary institutions, and forms the title of a well-known literary journal.

ATHENÆUS, Gk. rhetorician, who lived about time of Commodus (II. cent.), and wrote *Diepnosophistæ*, a dialogue containing a vast amount of information upon a great variety of subjects connected with social life. (Eng. trans. by Yonge in Bohn's Class. Library.)

ATHENAGORAS, writer of *Embassy concerning the Christians* (*c.* 177 A.D.), defending Christians against charges made against them, and attacking paganism.

ATHENODORUS CANANITES (74 B.C.–7 A.D.), Stoic philosopher; friend of Strabo; tutor to the Emperor Augustus, over whom he retained a lasting influence.

ATHENRY (53° 18′ N., 8° 44′ W.), town, Galway, Ireland.

ATHENS (37° 58′ N., 23° 44′ E.), capital, Greece, situated on small stretch of flat ground N.W. of Gulf of Ægina, between rivers Ilissus and Cephissus; 4½ miles by rail from its harbour at Piræus. Of recent years its industries—spinning of coarse cotton yarns, manufacture of coarse cotton cloths, making of silk and morocco leather—have been increasing in importance. Principal modern buildings are royal palace, Gk. cathedral, academy, museum, observatory, univ., theatre, library. There are Eng., Fr., Ger., and Amer. Institutes of Archæology, founded respectively in 1883, 1846, 1874, and 1882. Modern town lies to N. of Acropolis. Pop. 167,479.

Ancient Athens was built on several low hills rising from Attic plain. Interest of old town lies chiefly in *Acropolis*, which was hill in centre of city. Summit was occupied by many of finest

buildings of world, some of which are wonderfully preserved. Near centre is *Parthenon*, chief temple of Athene, and finest example of Doric arch., built in V. cent. B.C. Architects were Ictinus and Callicrates; whole was under supervision of Pheidias, sculptor of chryselephantine statue of Athene, which formerly stood in the cella. Pediment groups are now among Elgin Marbles in Brit. Museum. Much of it was destroyed by shell explosion, 1687. *Erechtheum*, to N. of Parthenon, is finest example of Ionic architecture, and has beautiful Caryatids. The *Propylæa*, or great entrance hall, stood at western end, and was faced by colossal bronze statue of Athene, by Pheidias. Other buildings were temple of *Athene Niké* (often called Wingless Victory), which has been reconstructed; and an old temple to Athene near Erechtheum, of which traces remain. Round base of Acropolis were many temples and other buildings, among which may be mentioned the Temple of Æsculapius, the Theatre of Dionysos, and the Odeum of Herod Atticus. In the city were also the Theseion and the Hephæstum, respectively east and west of *Agora*, or market-place, which in early and classical times was centre of municipal life; the Temple of Olympian Zeus, S.E. of Acropolis, and the Monument of Lysicrates. Traces of prehistoric civilisation have been revealed by excavations, such as rock tombs and dwellings, early fortifications on Acropolis, and parts of wall built round citadel and called Pelasgicum.

History.—The state of A. was traditionally founded by Theseus, c. XIII. cent. B.C., and ruled by kings until *c.* 1100 B.C., afterwards by archons. In IV. cent. B.C. Archon Solon remodelled the constitution, laying foundations of future prosperity. Solon's constitution was practically set aside by Peisistratus, who ruled with great splendour and success as tyrant, 560–527. His sons Hippias and Hipparchus also ruled as despots; latter murdered, former expelled in 510, after which Cleisthenes framed a democratic constitution, 508–7. Then various wars occurred, of which most important were those against Persia. Athenians defeated Persians at *Marathon*, 490, at *Salamis*, 480. In latter year city was destroyed by Xerxes, but was presently rebuilt, surrounding walls being raised by Themistocles. About this time A. became leader of Hellenist league against Persia, and became imperial state. Time of greatest glory was in second half of V. cent. B.C., when, under leadership of Pericles, chief power in Greece was acquired, and maritime supremacy established; this period was also marked by highest development of culture; plays of Euripides, Aristophanes, Sophocles produced; Parthenon built; sculpture found its highest expression in works of Pheidias. Peloponnesian War broke out, 431; ultimate result was conquest of Athens by Lacedemonians; city taken by Lysander, 405; ruled for short time by oligarchy of thirty, who were overthrown by Thrasybulus, and democracy restored, 403; again flourished for time; formed alliance with Thebes against Sparta, 378, and again became most powerful state in Greece; opposed Philip of Macedon in Phocian War, after which war between A. and Macedon broke out; defeated at *Chæronea*, 338 B.C., and lost independence; politically unimportant till Rom. conquest, 146 B.C.; city, which had retained independence, ultimately taken by Sulla, 86 B.C.; prospered under Hadrian; twice invaded by Goths, 267 and 395 A.D.; unimportant under Byzantines; became Latin lordship, 1204; duchy, 1258; given to Frederick of Aragon, king of Sicily, 1312; taken by Nerio Acciajuoli of Corinth, 1385; by Turks, 1458; remained under Turks till 1833, when became capital of independent kingdom of Greece.

Gardner, *Ancient Athens* (1902); Wordsworth, *Athens and Attica* (1869).

ATHENS (33° 53′ N., 83° 22′ W.), town, Georgia, U.S.A.; educational centre. Pop. (1910) 14,903.

ATHEROMA, type of arterial fatty degeneration; also a wen.

ATHERSTONE (52° 34′ N., 1° 31′ W.), town, Warwickshire, England. Pop. 5300.

ATHERSTONE, WILLIAM GUYBON (1813–98), S. African geologist; medical practitioner in Grahamstown; his discovery of diamond-bearing formations near Vaal River and Kimberley encouraged establishment of diamond industry.

ATHERTON, CHOWBENT (53° 31′ N., 2° 30′ W.), town, Lancashire, England. Pop. (1911) 19,000.

ATHETOSIS, slow, rhythmical, and involuntary movements of the hands and feet, and of their fingers and toes, which are widely separated and hyperextended; due to a brain lesion, frequently caused by injury to the head at birth.

ATHLETICS.—Athletic sports were practised in various forms by the ancient Egyptians, and were brought to a high standard of development by the ancient Greeks. In Great Britain they have been cultivated since Celtic times, different varieties of sports being in favour at different periods. Athletic sports in the modern sense were instituted by the Royal Military College at Sandhurst in 1812; in 1866 the Amateur Athletic Club held the first of a series of championship meetings, continued from 1880 by the Amateur Athletic Association, which is the chief authority in athletic sports. The recognised sports to-day include the 100 yards, 440 yards, 880 yards, 1 mile, 3 mile, 4 mile, 10 mile runs; 120 yards hurdle-race; high and long jumps, and pole-vault; throwing the hammer; and putting the weight.

One of the most important developments in athletic sports has been the revival of the *Olympic Games*, which were first instituted in Greece about the VIII. cent. B.C., and abandoned about the IV. cent. A.D. They were reinstituted as international athletic sports in the reconstructed ancient stadium at Athens in 1896, and have since been held every four years, at Paris (1900), St. Louis, U.S.A. (1904), London (1908), Stockholm (1912), and are arranged to be held in Berlin in 1916. Except at London in 1908 British athletes have never taken any great share in these games, and at Stockholm, in 1912, they took a particularly inglorious position in the prize-list. It has been evident for some years, however, that the British athlete—and the British public—is not so much interested in athletic sports of this type as in team games, such as football and cricket (*q.v.*), in which the individual strives not for himself but for his team. In U.S.A., A. are governed by the Amateur Athletic Union (1888), founded, 1880, as National Association of Athletics of America. Track and field sports have been adopted so enthusiastically that at Stockholm the U.S. team scored more than double the points of any other country, took 16 firsts, 12 seconds, and 13 thirds in the Stadium games, and made 8 of the 13 new records.

ATHLONE (53° 26′ N., 7° 56′ W.), town on Shannon, Westmeath, Ireland; fisheries, sawmills, woollen mill; agricultural centre; thrice besieged; burnt by Cromwell. Pop. 6600.

ATHOL (42° 35′ N., 72° 14′ W.), township, Massachusetts, U.S.A. Pop. 7200.

ATHOLL, ATHOLE (56° 47′ N., 3° 55′ W.), district, Perthshire, Scotland.

ATHOLL, EARLDOM AND DUKEDOM OF, Scot. titles; Sir John Stewart of Balveny (d. 1512) was cr. Earl of A. (c. 1457); the Stewart line of earls ended 1595, and a new line (the Murray line) began 1629. The 2nd earl in this line, John Murray (1631–1703), became Marquess of A. (1676); m. dau. of 7th Earl of Derby (hence later dukes of A. obtained sovereignty of Isle of Man). John Murray, 2nd marquess (1660–1724), became Duke of A. (1703).

ATHOS (40° 20′ N., 24° 10′ E.), peninsula, Turkey in Europe; extends into Ægean, connected with mainland by narrow strip of land; canal was made here by Xerxes, c. 480 B.C.; ends in conical peak,

Mt. A. (6778 ft.); remarkable for religious establishments; monastic republic since 1060; now has 21 monasteries and about 6000 monks; plundered after fall of Constantinople, 1204; revived under Palæologi; pays tribute to Turkey; MSS., frescoes, mosaics.

ATHY (53° N., 6° 59′ W.), town, Kildare, Ireland. Pop. 3600.

ATITLÁN (14° 40′ N., 91° 14′ W.), town, Guatemala, Pop. c. 9000.

ATIU (WATEEO) (20° S., 158° 10′ W.), one of Cook Islands, New Zealand. Pop. 811.

ATJEH, see ACHIN.

ATKINSON, SIR HARRY ALBERT (1831-92), Brit. farmer, financier, and statesman; b. Chester; became Prime Minister of New Zealand.

ATLANTA (33° 45′ N., 84° 21′ W.), capital (since 1868) of Georgia, U.S.A.; besieged and burnt in Civil War; educational centre—medical school, Georgia School of Technology, Coll. of Physicians, etc.; Clark and A. Univ's for negroes; public buildings include State Capitol, court-house, library, opera-house, etc.; railway centre; chief trading and manufacturing town in State; produces cottons, lumber, machinery, cigars, chemicals, woollens, bricks, flour, fertilisers; exports horses, mules, cotton, grain, etc. Pop. (1910) 154,839.

ATLANTES (Gk. pl. of *Atlas*, q.v.), architectural term for sculpture of human beings put to columnar uses; more generally known as caryatids.

ATLANTIC (41° 24′ N., 95° 2′ W.), town, Iowa, U.S.A. Pop. (1910) 4560.

ATLANTIC CITY (39° 22′ N., 74° 25′ W.), town, New Jersey, U.S.A.; popular seaside resort. Pop. (1910) 46,150.

ATLANTIC OCEAN, ocean separating Old from New World, Europe and Africa lying to E., N. and S. America to W.; opens northward into Arctic Ocean; spreads out southward into great Southern Ocean, with extreme length of c. 7000 miles along part enclosed by land; greatest breadth, c. 5000 miles; narrowest part, between Brazil and African coast, 1600 miles. Area has been variously computed at from 24,000,000 to 30,000,000 sq. miles. Deepest point, just North of Virgin Islands, which lie E. from Porto Rico, has depth of 4561 fathoms. Bed crossed by number of telegraphic cables, connecting Ireland with Newfoundland and Nova Scotia; France with Newfoundland and Boston; London with Lisbon, Madeira, Cape Verde Islands, and Pernambuco; Senegal with Brazil; Africa with Teneriffe and Europe; S. America with W. Indies and United States. See OCEAN, GULF STREAM.

ATLANTIS, mythical island kingdom, which according to tradition was situated in Atlantic, W. of Pillars of Hercules; rich and extensive; finally engulfed by sea.

ATLAS (classical myth.).—(1) One of the Titans, bro. of Prometheus and Epimetheus, led the war against the gods, for which he was condemned by Zeus to bear the heavens upon his shoulders; f. of the Hesperides, Pleiades, and Hyades. Another legend makes A. a king who refused shelter to Perseus; the latter turned him into a mountain by exposing to his view the head of Medusa. (2) Name given by Mercator to a collection of maps.

ATLAS MOUNTAINS (32° N., 6° W.), irregular series of mountain groups running along N. of Africa from Cape Nun in Morocco to Cape Bon in Tunis, distance of about 1400 miles. Greatest height, between 14,000 and 15,000 ft., is near W. end, S. of city of Morocco; from this point eastward elevation steadily falls to little over 7500 ft. in Algeria, c. 4500 ft. in Tunis, and c. 2300 ft. in Tripoli. Hills are covered with pine, oak, poplar, and olive forests in N., W., and S.

ATMAN (Skr.),. Hindu term for soul; used by pantheists to mean universal soul.

ATMOLYSIS, separation of mingled gases of different densities by means of their different rates of diffusion (*q.v.*) through a porous medium.

ATMOMETER, instrument for measuring rate of evaporation from a wet surface.

ATMOSPHERE, gaseous envelope surrounding a heavenly body, in the earth possibly to height of 200 miles; air pressure at sea-level, or at 760 mm. of mercurial barometer, 14·7 lb. per sq. inch. Air is a mixture, not a compound, averaging 77·12 % nitrogen, 20·66 % oxygen, c. 1·4 % aqueous vapour, c. 0·79 % argon, 0·03 % carbon dioxide, and traces of hydrogen, krypton, neon, xenon, and helium, besides dust. See METEOROLOGY.

ATOLL, coral island enclosing a central lagoon, very common in the Pacific Ocean. The shape is something like that of a horseshoe, the opening to the lagoon being on the leeward side.

ATOMS, the ultimate particles or elements of matter, which have been held to be indivisible. It would be theoretically possible to divide by mechanical means limestone, for instance, into fine particles, which could not physically be divided any further, but chemically these particles are shown to be of a composite nature, and may be divided into the three constituents—calcium, carbon, and oxygen, which at present cannot be converted into other forms of matter. Moreover, when these constituents or a's combine to form compounds, they always do so in definite proportions by weight that are characteristic of the compound. If two or more elements combine to form more than one compound, they combine in simple multiples of these definite weights (Dalton's laws). Modern physico-chemical researches, especially in radioactivity, have intensely modified the current views on the integrity of the a., and tend to prove the ultimate unity of matter. A's would have to be regarded as centres of electrical force, and it seems that it will ere long be possible to prove definitely the possibility of converting elements of high atomic weight into others of lower weight, at least in the same group of the periodic system (Sir W. Ramsay). See CHEMISTRY, ELEMENTS, RADIOACTIVITY, STOICHEMISTRY.

ATON, god of sun's face. See EGYPT.

ATONEMENT, involves the idea that man is somehow alienated from God and needs to be reconciled. Jewish '*Day of Atonement*' one of most important annual observances. In Christian theol., doctrine of a. has taken various forms. Some said Christ paid 'ransom' to Satan; according to others 'ransom' was paid to God, or sacrifice was within Divine nature itself; Christ being infinite was able to satisfy for human sin, which, on account of the Being sinned against, was also infinite.

ATOSSA (fl. VI.–V. cent. B.C.) Persian queen, dau. of Cyrus, and successively wife of Cambyses, Smerdis, and Darius Hystaspis; Sapphic reputation.

ATRATO (7° 30′ N., 77° 5′ W.), river, W. Colombia, S. America.

ATREK (37° 55′ N., 56° E.), river, Persia; enters Caspian.

ATREUS (Gk. myth.), king of Mycenæ, whose descendants were known as *Atrides*; s. of Pelops and Hippodamia, and f. of Agamemnon and Menelaus; slew children of bro. Thyestes, to whom he served them up as food, and drew down curse on his race; slain by Ægisthus, s. of Thyestes.

ATRI (42° 34′ N., 13° 59′ E.), town, N. Italy. Pop. 13,500.

ATRIUM, name given by the Romans to the great central hall in their dwellings, which was the reception and living-room, and contained the household gods, etc. A space in the centre of the roof was open to the sky, and in the floor beneath was a marble basin into which the rain water drained.

ATROPHY, wasting of a part or the whole of the body, essentially due to impairment of nutrition; may be practically physiological, *e.g.* thymus gland after birth, and uterus after parturition; more usually due to disease, malnutrition, or obstruction of blood supply.

ATROPIA or **ATROPINE**, DATURINE, $C_{17}H_{23}NO_3$,

alkaloid in berry of deadly nightshade and thorn apple (*Datura stramonium*); crystals, M.P. 115·5° C., mydriatic (*i.e.* dilates pupil of eye), very poisonous; is the tropine ester of tropic acid. See TROPINE.

ATROPOS (classical myth.), one of the three Parcæ, or 'Fates.' Clotho wound the flax on the distaff, Lachesis spun the threads, which, in turn, were cut by the 'abhorred shears' of Atropos.

ATTACAPAN, N. Amer. Indian linguistic family; dialect spoken by the almost extinct Atakapa.

ATTACHMENT (legal term), any person who has obtained a judgment or order for the recovery or payment of money may apply to a Court or a judge for an order that all debts owing to or accruing to the judgment debtor shall be attached to answer the judgment or order. If the Court makes such an order, then the person who owes the judgment debtor any sum is called the 'garnishee.' The latter is summoned to appear before the Court to show cause why he should not pay the money owing to the judgment creditor for the purpose of satisfying the judgment debt. The garnishee may either admit or dispute the debt, but even if he admits it he should not pay the money to the judgment creditor until he has received the order of the Court.

ATTAINDER, BILL OF, a means of reaching offenders whom the ordinary process of law, or an impeachment, would probably fail to touch, for want of legal proof or some other technicality. A bill is brought in and has to pass through both Houses of Parliament, declaring that the accused has been guilty of treason in certain acts. The accused is then allowed to defend himself before both Houses. If the bill passes, and receives the sovereign's assent, the ordinary consequences of a conviction for treason follow. The last instance of the passing of a bill of a. in England was that against Lord Edward Fitzgerald, a principal in the Irish rebellion of 1798.

ATTAINT, WRIT OF, instrument issued against members of a jury who were believed to have given a false verdict, but the usage is now practically obsolete.

ATTALUS, name of three kings of Pergamum. A. I., SOTER (king, 241–197 B.C.), assisted Romans against Philip of Macedon. His s., A. II., PHILADELPHOS (159–138), received Roman aid against Prusias of Bithynia. A. III., PHILOMETOR (138–132), made Rome his heir.

ATTAR, or **OTTO OF ROSES**, perfume of essential oil of roses, prepared in Bulgaria, Persia, and India.

ATTENTION, making ready to apprehend any object (of perception, thought, etc.). See PSYCHOLOGY.

ATTERBOM, PER DANIEL AMADEUS (1790–1855), Swed. poet; author of a romantic drama, *The Fortunate Island*, but chiefly famous for his lyrical work, which reached a high standard of excellence.

ATTERBURY, FRANCIS (1662–1732), Eng. politician, writer, and bp. of Rochester; b. at Milton, Bucks; royal chaplain, 1691; supported High Church party in controversies of 1700; dean of Carlisle, 1704; prominent in trial of Sacheverell, whose defence is attributed to him, 1710; dean of Christ Church, Oxford, 1711; administered affairs badly; bp. of Rochester, 1713. After accession of George I. plotted in favour of Pretender; he was arrested, imprisoned, stripped of dignities, and finally exiled; d. in Paris, and was buried, privately, in Westminster Abbey.

ATTESTATION, act of testifying, or bearing witness to anything.

ATTIC, something pertaining to Attica, in Greece; hence, 'A. muse,' Xenophon, famed for his simple and elegant style; 'A. salt,' the quality of delicate wit; 'A. taste,' used by Milton in reference to the elegance of Gk. poetry; 'Atticism,' term used to describe an elegant composition in any language, but more particularly in ancient Gk. The word is also used by moderns to describe the top storey of a dwelling.

ATTIC BASE, term used in arch. for the moulded base of a column, consisting of an upper and lower torus, separated by a scotia and two narrow fillets.

ATTICA (38° 15′ N., 23° 25′ E.), eastern division, ancient Greece, in form of triangle, one side of which is separated from Bœotia by mountains, while other two are washed by Ægean Sea; chief rivers, Ilissus, Cephissus; capital, Athens (*q.v.*); chief mountains, Cithæron and Parnes ranges. Surface consists of series of plains separated from each other by mountain ridges; plains are the Athenian, which stretches from sea to Parnes range and has Hymettus in E., famed for blue marble, and in N.E., Pentelicus, which has white marble quarries; and the plains of Eleusis in S.W., Megara in W., and Marathon in N.E. A. produces olives, grapes, figs. Laurium, famed in ancient times for silver mines, now produces lead, manganese. Climate is almost perfect. A. formed monarchy with Bœotia till 1899, since when it has been separate department, including Megaris, Ægina, Salamis, Makronisi. Area, 2474 sq. miles. Pop. 341,200.

ATTICUS HERODES, TIBERIUS CLAUDIUS (101–77 A.D.), Gk. rhetorician; app. by Antoninus Pius tutor to Marcus Aurelius; was possessed of great private wealth, which he devoted to the erection of public buildings, of which the Odeum, a theatre, at Athens, still exists.

ATTICUS, TITUS POMPONIUS (109–32 B.C.), Rom. patron of learning; was the intimate friend of Cicero, who addressed many letters to him.

ATTIGNY, town, Ardennes, France; residence of Fr. kings from time of Clovis; scene of Wittekind's baptism (786), and penance of Louis le Débonnaire (822).

ATTILA (*c.* 406–53), king of the Huns, known as the 'Scourge of God'; s. of Mundzuk; reigned jointly with his bro. Bleda after succeeding their uncle Rhuas (434); put Bleda to death (444), and afterwards reigned alone. His original kingdom (modern Hungary and Transylvania) he greatly extended; he overran Greece, Thrace, and Macedon, and made himself virtually supreme in central Europe; invaded Gaul (451), but was defeated with great slaughter near site of Châlons-sur-Marne by Romans under Aëtius, and the Visigoths under Theodoric. In the following year he devastated northern Italy, threatened Rome, which was only saved from destruction by the appeal of Pope Leo I., and died on the night of his marriage with the Princess Hilda of Burgundy.

Gibbon's *Decline and Fall*; Thierry's *Attila*.

ATTLEBOROUGH (52° 31′ N., 1° 1′ E.), town, Norfolk, England. Pop. (1911) 8881.

ATTOCK (33° 54′ N., 72° 10′ E.).—(1) town, Punjab, India. (2) district; area, 4022 sq. miles. Pop. 464,400.

ATTORN, to make over something to another; to agree to new ownership.

ATTORNEY-AT-LAW, Amer. name for solicitor; obsolete in England since 1873. Attorney-in-fact (one having 'power of a.') is a proxy, or agent, deputed to transact the business affairs of another absent person.

ATTORNEY-GENERAL, in England and Ireland the head legal official who is charged with the management of affairs in which the Crown is interested—formerly known as 'King's Attorney'; a member of House of Commons, selected by party in power; receives a salary of £7000 per annum, besides fees; since 1895 prohibited from accepting private practice. A similar official in Scotland is known as the Lord Advocate. In U.S.A. the A.-G. is a member of the Cabinet, and administers Department of Justice.

ATTORNMENT, the act of agreement by a tenant that he holds his property of a new landlord.

ATTRACTION.—Newton pointed out (in 1687) that all bodies exert an attractive force upon one another, which varies according to the mass and distance.

ATTRITION, sorrow for sin through fear of the involved penalties.

ATTWOOD, THOMAS (1765–1838), Eng. composer, organist of St. Paul's Cathedral (1796), and

composer to the Chapel Royal; his services, anthems and glees achieved considerable popularity.

ATTWOOD, THOMAS (1783–1856), Eng. politician; advocated franchise and currency reform.

ATWOOD, GEORGE (1746–1807), Eng. mathematician; invented machine for measuring uniform acceleration of motion; F.R.S., Copley medallist.

ATYS, ATTIS (classical myth.), a beautiful youth beloved by Rhea, the mother of Zeus and other Olympian gods. Having incurred the anger of the goddess, he fled from her presence and slew himself. Rhea (also known as Cybele) and A. were afterwards worshipped together in Phrygia and Rome.

AUBADE, name given to a song in welcome of the dawn by the Fr. troubadours; called by the Ger. minnesingers *Tagelied*

AUBAGNE (43° 18′ N., 5° 34′ E.), town, S. France. Pop. 6000.

AUBAINE, DROIT D', Fr. feudal term; right of overlord to escheated estates of aliens.

AUBANEL, THÉODORE (1829–86), Provençal playwright and poet; member of Provençal literary association, Félibrige.

AUBE (48° 19′ N., 4° 10′ E.), department, France cereals, vegetables, wines; cattle raised; watered by Seine and A.; area, 2326 sq. miles. Pop. (1911) 240,700.

AUBENUS (44° 36′ N., 4° 24′ E.), town, S. France; silk industry. Pop. 3976.

AUBER, DANIEL FRANÇOIS ESPRIT (1782–1871), Fr. composer; his operas achieved world-wide popularity, and include: *Masaniello* (1828), *La Fiancée* (1829), *Fra Diavolo* (1830), *Le Domino Noir* (1837), *Les Diamants de la couronne* (1841), and about forty others.

AUBERGINE, BRINJAL (*Solanum melongena*), annual plant cultivated in Italy and France for its purple or white (egg-plant) edible fruit.

AUBERVILLIERS (48° 55′ N., 2° 20′ E.), town, on Seine, France. Pop. 33,300.

AUBIGNAC, FRANÇOIS HÉDELIN, ABBÉ D (1604–76), Fr. dramatist and author; was some time tutor to the Duc de Fronsac, a relative of Cardinal Richelieu; was author of four dramas: *La Cyminde* (1642), *La Pucelle d'Orléans* (1842), *Zénobie* (1647), and *Le Martyre de Sainte Catherine*; and a treatise, *Pratique du Théâtre* (1657), laying down the 'Unities.'

AUBIGNÉ, AGRIPPA D' (1552–1630), Fr. poet and historian; famous for his *Mémoires*, his great epic, *Les Tragiques*, and his *Histoire universelle*. Inured to arms as a boy, he became one of the most conspicuous figures of his time, and took part in most of the military operations of that period. Blunt in manner and bitter in his speech, he frequently defied Catherine de' Medici and Henry III., was the trusted friend and counsellor of Henry of Navarre, and himself remained firm in the Huguenot religion up to the time of his death.

Macdowall's *Henry of Guise and other Portraits* (1898).

AUBIGNÉ, CONSTANT D' (d. 1647), s. of Théodore Agrippa d'A. (*q.v.*); f. of Mme de Maintenon; was an unscrupulous adventurer.

AUBIGNÉ, JEAN HENRI MERLE D' (1794–1872), Swiss divine, of Huguenot family; lived in Switzerland, Germany, and England; wrote *Histoire de la Réformation*, etc.

AUBREY, JOHN (1626–97), Eng. antiquary; s. of a Wiltshire country gentleman; dissipated his estates; supplied Anthony à Wood with much quaint information for the latter's *Athenæ Oxonienses*. His only completed work was the *Miscellanies*, pub. 1696, dealing with the subject of ghosts and dreams.

AUBRIOT, HUGUES (d. 1382), Frenchman who caused erection of Bastille.

AUBURN.—(1) (44° 7′ N., 70° 14′ W.) town, Maine, U.S.A.; manufactures boots. Pop. (1910) 15,064. (2) (42° 55′ N., 76° 35′ W.) town, New York; textiles, rope. Pop. (1910) 34,668.

AUBUSSON (45° 57′ N., 2° 10′ E.), town on Creuse, France; notable for artistic carpet-weaving. Pop. 6475.

AUBUSSON, PIERRE D' (1423–1503), Fr. soldier and cardinal; grand master of Order of St. John of Jerusalem; forcibly extirpated Judaism in Rhodes.

AUCASSIN ET NICOLETTE, famous old Fr. romance in prose and verse by unknown author; date early XIII. cent.; pub. in Eng. by A. Lang, Laurence Housman, and Bourdillon.

AUCH (43° 38′ N., 0° 33′ E.), cathedral town, on Gers, France; manufactures leather, tools; trades in cottons, woollens, wine, brandy; archiepiscopal palace, museum. Pop. 9300.

AUCHINLECK (55° 29′ N., 4° 22′ W.), Scot. village, 1 mile N. of Old Cumnock, Ayrshire. Near are A. House, seat of Boswells, and Aird's Moss, important in history of Covenanters.

AUCHMUTY, SIR SAMUEL (1756–1822), Brit. general; served in India and Egypt.

AUCHTERARDER (56° 18′ N., 3° 42′ W.), town, Perthshire, Scotland; manufactures tartans.

AUCHTERMUCHTY (56° 18′ N., 3° 14′ W.), royal burgh, Fifeshire, Scotland; linen-weaving, scales.

AUCKLAND (36° 52′ S., 174° 46′ E.).—(1) Seaport, N. Island, New Zealand; splendid harbour; fine public buildings, parks; shipbuilding, sugar works. Pop. (1911) 40,500; with suburbs, 102,700. (2) Provincial district, N.Z. Area, 25,746 sq. miles. Pop. (excluding Maories) (1911) 264,500.

AUCKLAND ISLANDS (50° 25′ S., 166° 7′ E.), volcanic islands, Pacific; uninhabited.

AUCKLAND, GEORGE EDEN, EARL OF (1784–1849), Gov.-Gen. of India (1835–41).

AUCKLAND, WILLIAM EDEN, 1ST BARON (1745–1814), Brit. lawyer and politician; Under-Sec. of State (1772); Chief Sec. for Ireland (1780); Vice-Treasurer of Ireland (1783); friend of Pitt.

AUCTION is the method of disposing of property or goods to the highest bidder. The projected sale having been duly advertised, the **Auctioneer,** on the day appointed, 'puts up' the various lots, or articles, and they are duly 'knocked down' to the person offering the highest price. Frequently the vendor places a reserve price upon his property or goods, and if this amount is not reached by those bidding, the property is withdrawn. In what is termed a *Dutch auction*, goods are offered at a particular figure, and subsequently reduced until a buyer is found. The Scot. term for auction is 'roup,' and the conditions of the sale are known as 'articles of roup.' By an Act of 1845 an auctioneer is required to provide himself with an annual licence, costing £10, and the penalty for trading without such a licence is £100.

AUCUBA JAPONICA, Jap. laurel with red berries; male and female flowers on separate plants.

AUDE (43° 12′ N., 3° 13′ E.), river, France; enters Gulf of Lyons.

AUDE (43° 3′ N., 2° 30′ E.), department, France; cereals, wine, fruit; distilling, quarrying, paper-making; drained by A.; area, 2448 sq. miles. Pop. (1911) 300,500.

AUDEBERT, JEAN BAPTISTE (1759–1800), Fr. miniature-painter and naturalist, who pub. *Histoire des Colibris*, etc., and several other works on birds.

AUDHUMLA (Norse myth.), cow formed from frost; suckled Ymir.

AUDINCOURT (47° 30′ N., 6° 50′ E.), town, Doubs, France.

AUDIT, an examination of the accounts of any concern to see if they truly represent its position.—**Auditor,** a person who examines the accounts of a business so as to ascertain its exact financial position. The law now requires that the accounts of local governing bodies be audited, as must also accounts of all bodies entrusted with public funds. The mere fact that an a. certifies accounts to be correct, and that books have been properly kept, is no guarantee

that business has been prudently managed, or that its funds have been judiciously expended or invested. It is only in the case of local authorities that a.'s certificate is a guarantee that the funds have not been improperly expended.

AUDLEY, SIR JAMES (d. 1386), Eng. military leader under Black Prince; one of founders of Order of the Garter.

AUDLEY, THOMAS AUDLEY, BARON (c. 1488–1544), Eng. Lord Chancellor; chancellor of duchy of Lancaster and speaker of House of Commons (1529).

AUDOUIN, JEAN VICTOR (1797–1841), Fr. entomologist; investigated parasites of vine and mulberry.

AUDRAN, EDMOND (1842–1901), Fr. composer; his light comic operas are as well known in London as in Paris, and include *The Great Mogul*, *The Mascotte*, *La Cigale*, and *La Poupée*.

AUDRAN, GÉRARD (1640–1703), Fr. engraver; celebrated for his engravings of Le Brun's 'Battles of Alexander,' 'Stoning of Stephen,' and 'Constantine's Battle with Maxentius.' He stands in the front rank of Fr. engravers, and was a member of a family which for several generations was distinguished in the same line.

AUDREY, ST., see ÆTHELDREDA.

AUDUBON, JOHN JAMES (1780–1851), Amer. naturalist; pub. large work on *Birds of America*.

AUE (50° 35′ N., 12° 44′ E.), town, Saxony; machinery. Pop. 17,100.

AUENBRUGGER VON AUENBRUGG, LEOPOLD (1722–1809), Austrian doctor who discovered method of detecting lung complaints by percussion of chest.

AUER, ALOYS (1813–69), Austrian state printer and author of books on printing; ennobled as Ritter von Welsbach.

AUERBACH, BERTHOLD (1812–82), Ger. novelist; achieved success in 1837 with a novel founded on the life of Spinoza; later became widely known for his stories dealing with the peasantry of the Black Forest.

AUERSPERG, distinguished Austrian family originally from A. near Laibach in Swabia; prominent from XV. cent. when Engelhard was made hereditary imperial marshal and chamberlain.

AUERSPERG, ANTON ALEXANDER, COUNT VON (1806–76), Austrian poet (pseudonym, *Anastasius Grün*) and ardent Liberal.

AUERSTÄDT (51° 6′ N., 11° 34′ E.), town of Weimar, S.W. Germany.

AUFIDENA (41° 42′ N., 14° 3′ E.), old Samnite city, Italy, where tombs and buildings have been excavated; situated on two hills; near modern Alfedena.

AUFKLÄRUNG (Ger. enlightenment), watchword of philosophic movement of XVIII. cent. See DEISM, RATIONALISM, etc.

AUFRECHT, THEODOR (1822–1907), Ger. philologist; prof. at Edinburgh, 1862–75, Bonn, 1875–89; authority on Sanskrit and tongues of Umbria; pioneer of comparative philology.

AUGEAN STABLES (classical myth.), stables of Augeas, king of Elis, Greece; contained 3000 oxen and remained uncleaned for thirty years; one of 12 labours of Hercules to cleanse them in a day was performed by turning rivers Alpheus and Peneus through them.

AUGEREAU, PIERRE FRANÇOIS CHARLES, DUKE OF CASTIGLIONE (1757–1816), Fr. general; b. Paris; served in Russian, Prussian, Neapolitan, and Fr. armies; distinguished himself under Bonaparte; became marshal (1804). He was deprived by Louis XVIII. of military title and pension.

AUGHRIM, AGHRIM (53° 18′ N., 8° 18′ W.), village, Galway, Ireland. At A. in 1691 the forces of James II. were defeated by those of William III.

AUGIER, ÉMILE (1820–89), Fr. playwright; from appearance of *La Ciguë* (1844) successful writer of comedies, some of which (e.g. *Le Gendre de M. Poirier*) are still acted; polished, ironical depicter of society.

AUGITE ($CaMgSiO_4$, with aluminium and iron silicates), a mineral of the pyroxene order similar to hornblende and composed of such igneous rocks as basalt, greenstone, and porphyry; found in rhombic crystals; composed of silica and magnesia, and generally of a dark green colour; varieties: diopside, sahlite, malacolite, and coccolite.

AUGMENTATION as technical term: (1) (XVI. cent.) addition to revenues of crown from dissolved monasteries; this led to A. Office and Court of A. (established 1536 to settle disputes as to title). (2) (Heraldry) Additional charge to coat of arms to assume which crown grants licence. (3) (Music) Extension of original theme in composition. (4) Process of A. in Scot. Court of Teinds is action brought by minister to obtain increase of stipend.

AUGSBURG (48° 22′ N., 10° 54′ E.), cathedral town, Bavaria; built by Augustus, 15 B.C.; interesting old buildings—churches, Fugger Haus; textiles, paper, chemicals; associated with Reformation. Pop. (1910) 102,500. **Augsburg, Confession of**, Prot. manifesto drawn up by Luther, Melanchthon, and others, 1530, and presented to Charles V. at A.; met by Papal *confutatio* to which Melanchthon replied; its acceptance basis of Schmalkaldic league; one of sources of Eng. Thirty-nine Articles. **Augsburg, war of the League of**, European war (1688–97), between the Emperor, Spain, Sweden, and other states combined against Louis XIV.; ended with Peace of Ryswick.

AUGURS, members of a college of Roman soothsayers. The order is said to have been founded by Romulus, and lasted until the IV. cent. A.D. In early times it consisted of three members, but this number was gradually increased, until in the time of Julius Cæsar there were sixteen a's, and this number continued under the later emperors. The duty of the a. was the interpretation of signs and portents—thunder and lightning, the movements of comets and shooting stars, the flight of birds, etc. His observations were made within a rectangular space (*templum*), after prayer, and in the presence of a magistrate. The a's insignia consisted of a peculiarly knotted staff, and a toga bordered with purple and bearing scarlet stripes.

AUGUST, month of, named after Roman emperor Augustus; previously called 6th month (*Sextilis*). Roman year commencing (as did English till 1752) in March; 31st day added by Augustus.

AUGUSTA (33° 27′ N., 81° 52′ W.), town, Georgia, U.S.A.; trading centre; cottons, lumber, fruits, cotton-seed oil, flour, vegetables; has fine parks, hospitals, Federal building, medical school; popular health resort; founded 1736 by Oglethorpe; twice taken by British during war of independence. Pop. (1910) 41,040.

AUGUSTA (44° 20′ N., 69° 45′ W.), capital, Maine, U.S.A.; manufactures paper, etc. Pop. (1910) 13,211.

AUGUSTA (37° 13′ N., 15° 13′ E.), port, Sicily. Pop. 15,000. Near A. Admiral De Ruyter, commanding the combined Span. and Dutch fleets, defeated the French under Duquesne.

AUGUSTALES.—(1) Officials in Roman empire who performed rites of deified emperors. (2) Gold coins struck by Emperor Frederick II. in the Two Sicilies (1197–1230).

AUGUSTINE, ST. (d. 612–14), Apostle of England, sent by Pope Gregory I.; landed at Thanet, 597; converted Æthelbert of Kent; made abp. of Canterbury, 601.

AUGUSTINE, ST., OF HIPPO (354–430), one of the greatest Christian saints; s. of a Christian mother, Monica, but himself a pagan till 387. His conversion to Christianity was the result of a gradual process. Always searching for truth, he could not be contented with Manichæism. He passed through

not only intellectual and spiritual but moral conflicts, and had great struggles before he could give up a sensual life. His experiences influenced his passionate temperament, and have left their mark through his writings on subsequent Christian theol. His works are very voluminous, but some stand out—his *Confessions*, wherein he recounts his own experience; the *De Civitate Dei*, in which he repels the attacks on Christianity made by paganism; his *De Trinitate* and commentary on St. John. He was the great opponent of Pelagianism. His work has probably had a larger influence on the Church than that of any other single saint or theologian; *Regula B. A.*, a rule of life drawn up by A., formed the basis of the constitutions of many mediæval religious orders.

Migne, *Patrologia*; Swete, *Patristic Study*; Harnack, *Monasticism and Confessions of St. Augustine.*

AUGUSTINIAN or **AUSTIN FRIARS**, strict order of mendicant friars; till 1250 in isolated congregations, then united into Order; once very numerous on Continent, few in England.

AUGUSTOVO (53° 50′ N., 22° 58′ E.), town, Russ. Poland. Pop. 12,700.

AUGUSTULUS, ROMULUS, last Rom. emperor of the W.; diminutive A. sign of contempt; deposed 476 by Odoacer.

AUGUSTUS, title, meaning 'the revered,' first bestowed by Roman senate (27 B.C.) on Gaius Julius Cæsar Octavianus, 1st Roman emperor, and afterwards adopted by all succeeding Roman emperors, whence the title *Augustan History*, given to a chronological series of imperial biographies, from Hadrian to Carinus, the work of 6 authors (not collaborators), written professedly during reigns of Diocletian and Constantine. Original documents, both genuine and spurious, are cited in the work. In the age of Theodosius the lives were seriously interpolated.

AUGUSTUS CÆSAR (63 B.C.–14 A.D.), reputed 1st Roman emperor (though Cæsar, towards the end of his life, assumed and wielded imperial power). Gaius Julius Cæsar Octavianus was s. of Gaius Octavius and Atia, niece of Julius Cæsar; his f. died whilst the boy was still young; adopted by his great-uncle (Cæsar) as his son, and subsequently declared his heir; sent to Apollonia by him to be educated under Apollodorus, where he was when news reached him of Cæsar's murder (44 B.C.); went to Rome and professed republican principles; took up arms against Antony, whom he defeated at Mutina; subsequently threw in his lot with Antony and Lepidus, and formed the triumvirate (43 B.C.). In conjunction with Antony, A. defeated Brutus and Cassius at Philippi (42 B.C.). Differences subsequently arising between the triumvirs, the Empire was divided, A. taking the W., Antony the E., and Lepidus receiving Africa. A. destroyed the power of Sextus Pompeius (36 B.C.), deposed Lepidus, and making war on Antony, who had repudiated his wife, Octavia (sister of Augustus), defeated him at *Actium* (31 B.C.). He now became supreme ruler of the entire Roman Empire, but restored the form of the republic, and achieved marked popularity by his reform of abuses, and in particular by his reform of the administration of the provinces. His later years were marked by brilliant victories in Asia, Spain, Gaul, and other places, but his army suffered a crushing defeat under Varus, in Germany (9 A.D.). Besides being one of the greatest statesmen the world has seen, A. did much to improve and beautify Rome. It was said that he found the city built of brick and left it built of marble. He was deified after death. His period is known as the '*Augustan Age*,' and amongst the great authors who adorned it were Vergil, Horace, Ovid, Tibullus, Livy, and others. (The title has also later been given to the age of Queen Anne in England; and that of Louis XIV. in France.)

Firth's *Augustus Cæsar*, 'Heroes of the Nations' Series; Shuckburgh's *Life of Augustus.*

AUGUSTUS I. (1526–86), elector of Saxony; belonged to Albertine branch of Wettin family; m. dau. of king of Denmark (1548); succ. his bro. Maurice as elector (1553). Desire to cultivate friendship of Hapsburgs and maintain peace between contending religious parties actuated his policy. Hostility between Albertines and Ernestines troubled him till his defeat of John Frederick (1567). He enlarged his territories, and was a politic, enlightened, economical ruler.

AUGUSTUS II., KING OF POLAND (1670–1733); became elector of Saxony (as Frederick Augustus I.), 1694; secured election to Polish throne (1697); deposed after defeat by Charles XII. of Sweden (1702); recovered Poland after *Poltava* (1709). His aim was to make Poland hereditary monarchy, and weaken power of Saxon nobles.

AUGUSTUS III. (1696–1763), king of Poland; known also as Elector Frederick Augustus II. of Saxony.

AUGUSTUSBAD (*c.* 51° 12′ N., 13° 35′ E.), spa, Saxony.

AUKS (*Alcidæ*), family of diving sea-fowl with short wings; the *great a.* or garefowl recently extinct; a.'s eggs about same size as a swan's, yellowish white with black markings, are highly prized by collectors, and have realised as much as 300 guineas each.

AULA REGIS (Lat. 'hall of the king'), assembly of tenants-in-chief; also called *curia regis* (q.v.).

AULD LICHTS (Old Lights), stricter members of Scot. Presbyterian Church.

AULIC COUNCIL, a standing court erected by Maximilian I. (1497–98), entirely under his control, to act as a supreme administrative and judicial body; at first matters pertaining to hereditary principalities were referred to it, but this practice was discontinued (*c.* 1558).

AULIE-ATA (43° 3′ N., 71° 30′ E.), town, Russ. Turkestan. Pop. 12,000.

AULIS (38° 26′ N., 23° 35′ E.), port of Bœotia in ancient Greece; excavations.

AULNOY, MARIE CATHERINE (1650–1705), Fr. writer of fairy tales, travel books, and popular history. Lady Ritchie published a version of *The Fairy Tales of Madame d'Aulnoy* in 1892.

AULOS, ancient Gk. musical instrument somewhat after the style of the modern clarinet; the name was sometimes given to the pan-pipes.

AULUS GELLIUS, see GELLIUS, AULUS.

AUMALE (49° 46′ N., 1° 42′ E.), town, Seine-Inférieure, France; glass, steel.

AUMALE, HENRI EUGÈNE PHILIPPE LOUIS D'ORLÉANS, DUC D' (1822–97), Fr. administrator; fourth s. of King Louis Philippe; served with distinction in Algeria, becoming governor (1847); inspector-general of army (1879).

AUMONT, ancient Fr. family prominent in history during several centuries.

AUNDH.—(1) (17° 35′ N., 74° 23′ E.) Native state, Bombay, India; area, 447 sq. miles. Pop. 64,000 (2) Town. Pop. *c.* 3500.

AUNE (Fr. from O. Fr. *alne*), Fr. measure corresponding to Eng. ell; still survives despite metric system.

AUNGERVILLE, RICHARD (1287–1345), Eng. scholar; called RICHARD DE BURY; tutor to Prince Edward (afterwards Edward III.); ambassador at Avignon, 1330–33; dean of Wells, 1333; lord treasurer, 1334; lord chancellor, 1335; famous as collector of books and MSS.; wrote *Philobiblon*, 1345; *Liber Epistolaris Ricardi de Bury* may be his.

AURA, peculiar feeling, taking different forms, such as shivering or nausea, which persons subject to epileptic fits experience immediately before an attack; electrical discharge causing air current.

AURANGABAD, AURUNGABAD (19° 54′ N., 75° 15′ E.).—(1) town, Hyderabad, India. Pop. 36,800. (2) district; area, 6172 sq. miles. Pop. 721,400. (3) division comprising four districts: A., Parbhani, Nander, and Bhir.

AURANGZEB, AURUNGZEBE (1618–1707), great Mogul emperor of Hindustan; seized throne by craft

(1658), imprisoning his f., and procuring assassination of two bro's. His empire was wealthy and extensive, but internally decaying and threatened by growing Mahratta power. After his death, during an expedition which he had undertaken against the Mahrattas, the great empire rapidly disintegrated.

AURAY (47° 40′ N., 2° 59′ W.), town, France; leading centre of sardine and other fisheries; scene of famous battle (1364); church of St. Anne is place of pilgrimage. Pop. 5200.

AURELIAN, L. DOMITIUS AURELIANUS (*c.* 214–275), Rom. emperor; general of Emperor Claudius II.; succ. him as emperor, 270; ended Gothic war, resigning Dacia to Goths; secured Rhine and Danube frontiers; destroyed Zenobia's monarchy; assassinated. A. was warlike monarch; he restored unity of empire, and began the rebuilding and enlargement of the walls of Rome, a task completed after his death. **Aurelian Way,** VIA AURELIA, old high road, Italy; starting from Rome, it ran northwards along the coast through modern Palo and Orbetello.

AURELIUS, MARCUS, see MARCUS AURELIUS.

AUREOLE, in sacred art, the luminous cloud surrounding the person of Christ, the Virgin Mary, and saints and martyrs. A circle of light around the head only is properly termed a 'nimbus,' and a combination of the two is known as a 'glory.'

AURICH (53° 29′ N., 7° 29′ E.), town, Hanover. Pop. 6000.

AURICLE, the external ear; also, from a resemblance in shape, the upper and posterior chambers of the heart.

AURICULA (*Primula auricula*), hardy perennial, originally Alpine herb; well-known spring garden flower with numerous varieties.

AURICULAR CONFESSION, see CONFESSION.

AURIFABER, JOANNES, GOLDSCHMIDT (1519–75), Ger. reformer; studied at Wittenberg, became secretary of Luther, and was present at his death; he edit. Luther's *Letters* (1556–65) and *Table Talk* (1566).

AURIGA (charioteer), constellation of N. hemisphere, between *Taurus* and *Perseus*.

AURILLAC (44° 56′ N., 2° 25′ E.), town, Cantal, France. Pop. 14,000.

AURISPA, GIOVANNI (1370–1459), Sicilian scholar; spent most of his life in Italy, where he did much to promote the study of Greek, for which he is chiefly remembered; produced some translations of Hierocles and Dio Cassius.

AUROCHS (*Bos taurus primigenius*), recently extinct European wild ox (*Urus* of Cæsar), from which many modern cattle breeds are descended. The bison preserved in Lithuanian and Caucasian forests is closely allied.

AURORA (classical myth.), Roman name of the dawn-goddess (Greek, Eos), dau. of Hyperion and Thea; usually spoken of by the ancient poets as 'rosy-fingered.'

AURORA.—(1) (41° 47′ N., 88° 25′ W.) town, Illinois, U.S.A. Pop. (1910) 29,807. (2) (36° 58′ N., 93° 35′ W.) town, Missouri, U.S.A. Pop. 6200.

AURORA BOREALIS AND AUSTRALIS, POLAR LIGHTS, meteorological phenomenon occurring in high latitudes, chiefly observed in the direction of the magnetic meridian in the northern hemisphere (*Aurora Borealis*), as there is little inhabited land in high latitudes in the southern hemisphere, where it is termed *Aurora Australis*. It takes the form of arcs, bands, rays, wavy curtains, patches, or a 'corona' varying in colour from silvery white to yellow, green, violet, or red, which move about coruscating or resembling illuminated clouds. Curves connecting points of equal annual frequency are termed *isochasms*, the maximum being an oval belt round the N. coast of Siberia, N. America, Labrador, and through the Faroe Islands and N. Norway. Both annual variations in the occurrence have been observed, with a maximum in midwinter and a minimum in midsummer, and diurnal variations with a maximum in the evening. Numerous explanations of the phenomenon have been brought forward, most investigators agreeing that it represents some form of electrical discharge. There is an intimate relation between aurora and magnetic disturbances, another remarkable connection existing between the frequency of auroral displays and sun-spots. A swishing sound is alleged to accompany a. when low above the ground. The phenomenon can be artificially produced by discharging electricity of high potential from a number of metallic points. See ELECTRICITY, MAGNETISM.

See reports of polar expeditions, and Cleveland Abbe, *Terrestrial Magnetism*, vol. iii., 1898.

AUSCULTATION, listening to the sounds perceptible in the human body, in order to judge the condition of certain organs, especially the heart and lungs. The *stethoscope*, invented by the French physician Laënnec (1781–1826), is the instrument used for this purpose.

AUSGLEICH (Ger. 'adjustment'), especially applied to treaties arranging dual government of Austria and Hungary.

AUSONIA, Vergilian name for Italy, after Auson, s. of Ulysses.

AUSONIUS, DECIMUS MAGNUS (310–395), Rom. poet, rhetorician; his extant works include *Gratiarum Actio*, an address to Gratian; *Periochæ*, being summaries of the *Iliad* and *Odyssey*; trans. from the *Greek Anthology*, and other works of a scholarly kind.

AUSPICES (Lat. from *avis*, bird; *specere*, to behold), omens which Romans saw in flights of birds.

AUSSIG (50° 42′ N., 13° 54′ E.), town, Austria; chemicals, glass. Pop. (1910) 39,300.

AUSTEN, JANE (1775–1817), Eng. novelist; dau. of Rev. George A.; b. at Steventon Rectory (Hants). Her life was uneventful, and was passed entirely in the county of her birth, at Bath, Southampton, and Winchester, where she died. Of her six novels, *Sense and Sensibility* (1811), *Pride and Prejudice* (1813), *Mansfield Park* (1814), and *Emma* (1816) were all published anonymously, while *Northanger Abbey* and *Persuasion* were published in the year following her death. She experienced great difficulty in finding publishers for her earlier books, and it was not until comparatively recent years that her genius has been fully appreciated, though Macaulay, Scott, Coleridge, Tennyson, and many other people of eminence were her enthusiastic admirers. Her characters are of quite ordinary type, and, apart from her remarkable gifts of humour and satire, her strength chiefly lies in her admirable delineation of female character, in which domain she is unsurpassed. With Scott she purified and ennobled the novel as a form of literature.

Mitton, *Jane Austen and her Times* (1907); monographs by Austen Leigh, Hill, Goldwin Smith.

AUSTER, Roman name for S. wind; hence used in Austria, Australia, etc., to mean south.

AUSTERLITZ (49° 10′ N., 16° 52′ E.), town, Austria, near which, on Dec. 2, 1805, Napoleon, with a much smaller force, defeated the Austrians and Russians; casualties of allies about 30,000, while Fr. losses only about 7000. Town has palace, church. Pop. 3000 to 4000.

AUSTIN.—(1) (30° 19′ N., 97° 43′ W.) capital, Texas, U.S.A.; trading centre; lime, cotton-seed oil, fruits, lumber, leather articles; exports grain, cattle, wool. State Capitol, granite, built 1881–88; university. Pop. (1910) 29,860. (2) (43° 39′ N., 92° 58′ W.) town, Minnesota, U.S.A. Pop. (1910) 6960.

AUSTIN, ALFRED (1835–1913), Eng. Poet-Laureate (1896); b. Headingley (Yorks); ed. for the Bar, but devoted himself to journalism, and became leader-writer for the *Standard*; made his first appearance as a poet with *The Season: a Satire* (1861), and since that date has issued many volumes of drama, narrative, and lyric verse. His most enduring work is to be

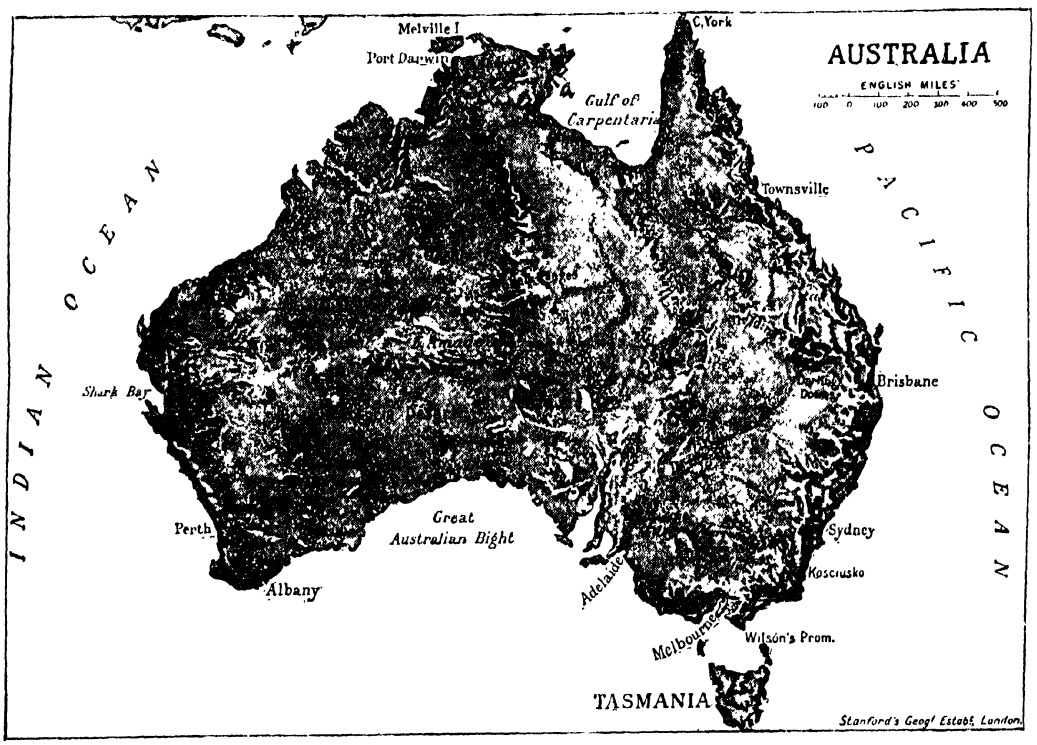
found in such volumes of fanciful prose as *The Garden that I Love* (1894), *In Veronica's Garden* (1895), and *Lamia's Winter Quarters*.

AUSTIN, JOHN (1790–1859), Eng. jurist; s. of an Ipswich miller; m. Sarah Austin (*q.v.*); spent some time in the army, in Sicily and Malta, but subsequently retired, studied law, and was called to the Bar (1818). He was prof. of Jurisprudence in London Univ. (1826–32), where J. S. Mill was one of his pupils. His publications include *The Province of Jurisprudence determined* (1832), and *Lectures on Jurisprudence*.

AUSTIN, SARAH (1793–1867), Eng. author; wife of John A. (*q.v.*); trans. into Eng. Ranke's *History of the Popes* (1840), and other hist. works; edit. *Memoirs of Sydney Smith*, Lady Duff-Gordon's *Letters from Egypt*, and her husband's *Lectures on Jurisprudence*.

AUSTIN, STEPHEN FULLER (1793–1836), Texan pioneer; Sec. of State to republic of Texas.

AUSTRALASIA, part of Oceania, comprising Australia, New Zealand, and adjacent isles; according to some, also includes New Guinea.



AUSTRALIA (10° 39′ to 39° 11′ S., 113° 5′ to 153° 16′ E.), continent, southern hemisphere; bounded N. by Torres Strait, E. by South Pacific, S.W. and N.W. by Indian Ocean; separated from Tasmania by Bass Strait. Coast-line little indented; surface divided into narrow coastal strip, broken circle of hills, and central plateau; tableland low; mountains most marked in E., where they extend from Cape York to Melbourne in Great Dividing Range, known in different places as Gregory, Craig, New England, and Liverpool Ranges, Blue Mountains, Australian Alps, and Grampians; highest peak, Mt. Townshend, Australian Alps; across centre of continent are Coast, Macdonnell, and Flinders Ranges; in S.W. is Darling Range. There are no active volcanoes; there are tablelands on either side of Great Dividing Range, that on W. sloping to great central Upland Plains, which pass into Great Sandy and Victoria Deserts further W. Lakes are Eyre, Torrens, Gairdner, Amadeus, Frome, all salt lakes, in S. Australia and Northern Territory; Austin, Barlee, Cow-cowing, in Western Australia. Principal rivers are Victoria and Roper, in Northern Territory; Flinders, Burdekin, Fitzroy, and Brisbane in Queensland; Hunter, in New South Wales; Murchison and Swan, in Western Australia; S.E. drained by Murray-Murrumbidgee system, which, with tributaries Darling and Lachlan, drains Great Lowland Plain, entering sea on S. coast.

Climate generally is warm and dry; mean temperature of coldest month, July, varies from 64° to 80° Fahr. in inter-tropical districts, 40° to 64° in parts outside tropics. Rain in some parts torrential; often there are long droughts, disastrous to stock. For climate and production, Dividing Range is important, as it lies directly in path of S.E. trades, and therefore drains moisture from rain-bearing clouds carried against land, with result that E. coast strip receives too much rain, central and W. districts too little. Rainfall is heaviest in N.

A. has unique **fauna**, having great number of marsupial animals, among which kangaroos, wombats, and opossums may be mentioned as typical Australian mammals. Many parrots occur, and emus, lyre-birds, and black swans are found.

Geology.—Chiefly composed of Archæan rocks; granite forms basis of tableland; volcanic rocks occur in eastern mountainous districts.

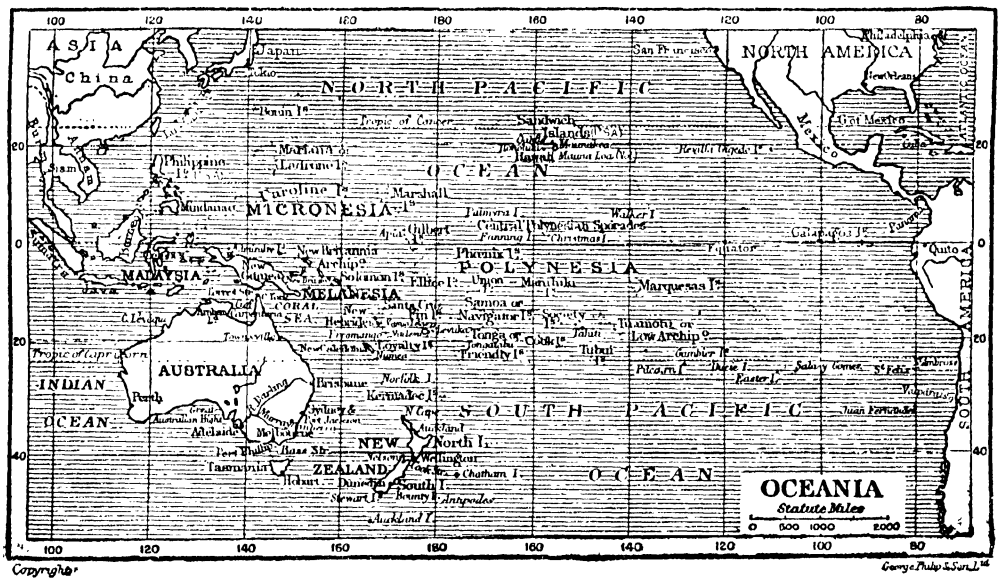
Resources.—Vegetable productions may be divided into (1) tropical and sub-tropical forest and crops, in N. and part of E. Queensland coast; (2) forests and crops of temperate zone, in E. coast and in S.E. corner; (3) mountain forests of temperate zone, along Dividing Range; (4) evergreen bushes, in S.W. corner of Western Australia and both sides of Spencer Gulf; (5) pasture and scrub, on rest of country

except deserts. There are many valuable trees—eucalyptus, blue gum, red gum, iron bark, stringy bark, acacia, cabbage palm, karri, jarrah, kangaroo grass, and saltbush. Pasture is great source of wealth; sheep and cattle largely raised. A. is greatest wool-producing country in world, annual output over 800,000,000 lb.; Australian merino wool is longer in staple and heavier than any other; 65 % goes to United Kingdom, 14 % to France, and 9 % each to Germany and Belgium. Cattle-rearing has greatly developed recently, through spread of frozen meat trade; there are about 2,000,000 horses in country and 1,500,000 pigs. Rabbits (introduced from Britain) have become a pest. Chief crops are wheat, hay, potatoes, maize, oats, barley. Grapes, bananas, and other fruits, sugar-cane, cotton, and tobacco are grown; wine industry is rapidly growing. Minerals include gold, silver, copper, tin, coal, iron, manganese, antimony, cinnabar, rubies, sapphires. A. is third gold- and silver-producing country. Coal is little developed.

Trade.—Country's natural resources have brought its commerce to largest figure, in proportion to population, in world; 60 % of trade carried on with United Kingdom, 12 % with other Brit. colonies, and 28 % with other countries. Principal exports are wool, wheat, butter, beef and mutton, skins and hides, copper and gold; chief imports, metal manufactures, cotton and linen goods, iron and steel, apparel, machinery. A. has a protective tariff.

A. has regular communication with all countries. There are cables connecting it with Java, and so with London, and with New Zealand, Norfolk Island, Fiji, Fanning Island, and Vancouver. Railway mileage is over 17,000; lines run from Adelaide to Brisbane, and towards Port Darwin; from Brisbane, Rockhampton, and Townsville into interior; and from Perth to Geraldton and Albany. Trans-continental railway is being constructed from Port Augusta (S. Australia) to link up at Kalgoorlie with West Australian line. Trans-Australian railway from N. to S. is also under consideration. Railways belong to States; postal communications are controlled by Commonwealth; wireless stations round coast.

History.—Date of first discovery of A. is doubtful. A Span. explorer, Torres, sailed through strait now called after him in 1606; later in same cent. Tasman discovered and gave name to Tasmania; Dutch navigators explored part of western coast and islands; and Dampier explored part of W. and N.W. coasts. Captain Cook explored E. coast in 1770; expedition remained several days in Botany Bay to allow collection of botanical specimens to be made by Sir Joseph Banks and Dr. Solander, who gave name to bay. Flinders, after whom river and mountains of that name are called, surveyed in 1801 part of E. and N. coasts. Grant and Murray explored coast of Victoria about same time, and in 1837–43 the *Beagle*, with Charles Darwin on board, completed coast exploration. Exploration of interior began in XIX. cent. with crossing of Blue Mountains by Blaxland, Lawson, and Wentworth, in 1813; three or four years later Oxley explored Lachlan River, afterwards discovering the Macquarie. Captain King carried out explorations in Western A. in 1821. Darling River explored by Sturt, 1828, who also explored Murrumbidgee in 1831. Sir Thomas Mitchell also explored Darling district, 1833, and surveyed richest part of Victoria. Interior was explored by Eyre, 1840–41, and Sturt, 1845. Part of Queensland was explored by Leichhardt, 1843–46, who crossed thither from Arnheim Land, 1844. One of most successful explorers was Stuart, who made passage across whole continent from S. to N. in 1862, after two unsuccessful efforts on his part and disastrous expedition undertaken by Wills and Burke in 1861. Other crossings have been made by Warburton, Giles, Forrest, and others.



A. consists of five mainland States, New South Wales, Victoria, Queensland, South A., Western A.; Northern Territory (federal possession); and State and island of Tasmania. Of these, New South Wales is oldest, a Brit. colony and penal settlement having been established here in 1788. Tasmania became separate government in 1825. Population increased between 1850 and 1861 from about 400,000 to nearly three times that number, owing to discovery of gold in New South Wales and Victoria. In 1851 Victoria was constituted a separate State; New South Wales and Victoria obtained right of responsible government in 1855, South A. and Tasmania in 1856. Queensland was detached from New South Wales in 1859, when it was established as a separate colony. Western A. did not receive right of responsible government till 1890, when its population had greatly increased owing to discovery of gold.

The Commonwealth.—In 1901 the States were all united in a federation called the Commonwealth of Australia; Northern Territory and Papua in New Guinea (*q.v.*) are under the Federal Government.

Gov.-Gen. represents king, first Governor being Lord Hopetoun, subsequently cr. Lord Linlithgow. Legislature consists of Senate and House of Representatives. Senate has 36 members (6 for each original State); House of Representatives has over 72 members, who are elected every three years by universal suffrage, States being represented in proportion to population. Commonwealth Government controls trade, finance, defence, and other national concerns; purely State affairs, including education, controlled by State Parliaments. A site for the Federal capital has been chosen at Yass Canberra (*q.v.*). Flag is dark blue ground with Union Jack crosses in upper corner, underneath that a six-pointed star, and on outer part five stars arranged like Southern Cross. There is no State religion in A. Education is compulsory in all States; besides State schools there are grammar and high schools, and technical colleges. There are univ's at Sydney, Melbourne, Adelaide, Hobart, Brisbane, and Perth. See UNIVERSITIES.

Defence.—A. is building up a Royal Australian Navy to form a unit of the Royal Navy. It consists (1913) of one armoured cruiser, three unarmoured cruisers, six destroyers, three submarines, and a training-ship. It will be under Australian control in peace, but Imperial control in war. Since 1911 military training is compulsory for males between the ages of 12–26; cadets, 12–18; recruits, 18–20; citizen soldiers, 20–26. Total number under arms (1912), over 89,000.

People are mainly British. Aborigines, numbering *c.* 170,000, constitute distinct race, and are sometimes regarded as lowest human family. Natives of Tasmania were Papuans, and possibly original inhabitants of A. were also of this race, and were overwhelmed by Dravidian emigrations. Height of typical Australian aborigine is little less than that of average European; he has thick skull, long, narrow head, and receding forehead; colour varies from light to very dark brown; hair black, long, and wavy. Tattooing is common; clothes often absent, sometimes skins are worn. Natives live on grubs, roots, berries, and products of chase. Weapons are primitive but effective, boomerang being a typical weapon. Women are the property of their husbands, and polygamy is practised. Wives are supposed to supply their husbands with vegetables, roots, etc., and are beaten and bruised when enough is not forthcoming. Religion is little more than fear of demons, and there are certain rites practised at different times in a man's life. Language is circumscribed but expressive; sibilants seldom occur, gutturals commoner; there are many inflexions; genders are not distinguished, and they recognise three numbers—singular, dual, plural. Government of tribes is that of family, older men forming council to arrange general affairs. Only domestic animal is dog. Pop. (1911) 4,805,000.

Rusden, *History of Australia* (1897); Thomas, *Native Tribes of Australia* (1907); Barton, *Australian Physiography* (Brisbane, 1895).

AUSTRASIA (Kingdom of East), name of part of old Frankish dominions, subsequently merged in Germany.

AUSTRIA (42° to 51° N., 10° to 26° E.), country, Europe, western part of Austro-Hungarian empire; divided into provinces of Lower A., Upper A., Salzburg, Styria, Carinthia, Carniola, Trieste, Görz-Gradisca, Istria, Tirol, Vorarlberg, Bohemia, Moravia, Silesia, Galicia, Bukovina, Dalmatia; bounded N. by Germany and Russia, E. by Russia and Hungary, S. by Hungary, Adriatic, Italy; W. by Switzerland, Germany; area, 115,903 sq. miles. Surface is mountainous; S.W. occupied by Carnic, Julian, and Dinaric Alps (highest point, Ortler Spitz, 12,814 ft.); N.E. by Carpathians; in N.W. are Riesengebirge, Erzgebirge, Böhmerwald, and Moravian Mountains; flat parts are Lower A., round Vienna, and N.E. Galicia; drained by Danube and Dneister, flowing to Black Sea; Vistula, to Baltic; Elbe, to North Sea; Adige, to Adriatic. There are small lakes in S.W.; mineral springs in N.W. Great variety of climate, from perpetual snow of mountains to mild winters in S.; eastern portion has warm summers and cold winters; mean temperature varies from 44° Fahr. in N.E. to 58° in S.W.; mean annual temperature at Vienna, 49°; rainfall varies from 18 in. at Prague to over 60 in. on Adriatic coast. Animals found include wild boar, chamois, bear, wolf, jackal, deer; golden eagles, and herons.

Resources.—Much of surface is covered with forests; in Bohemia and Moravia, pine, beech, larch; in Galicia, oak, beech, elm. A. produces wheat, oats, rye, beet, hemp, rape, flax, hops, tobacco; horses, cattle, pigs, and sheep are raised; silkworms and bees are kept. Minerals include coal, lignite, graphite, salt, zinc, silver, iron, lead, quicksilver, copper. Industries include sugar-making, manufacture of woollen, linen, silk, and cotton textiles, iron and steel, glass, beer. More than half population is engaged in agricultural pursuits; dairy-farming important in Alpine districts; exports timber, coal, sugar, horses, cereals, dairy produce, glass, etc.; imports wool, cotton, silk, cattle, leather, rice, etc. Country is well supplied with railways, Vienna being one of greatest railway centres in Europe. Most important waterways are Danube and tributaries.

Inhabitants include Germans, Czechs, and Poles, Magyars, Italians, Slovenes, Jews, and other races. Pop. (1910) 28,570,000. State religion is Roman Catholicism. Education is controlled by State For Literature, see GERMANY: *Literature*. Government is limited monarchy, with imperial title. Parliament, or *Reichsrath*, consists of two houses. See AUSTRIA-HUNGARY.

AUSTRIA, LOWER (48° N., 15° E.), crownland, Austria, forming E. portion of archduchy of A.; hilly; crossed by Danube; sends 64 representatives to Reichsrath; area, 7654 sq. miles. Pop. (1910) 3,532,000.

AUSTRIA, UPPER (48° 45′ N., 16° E.), crownland, Austria, forming W. portion of archduchy; crossed by Danube; sends 22 members to Reichsrath; area, 4631 sq. miles. Pop. (1910) 853,000.

AUSTRIA-HUNGARY (42° to 51° N., 9° to 27° E.), empire, Central Europe; territories include *Cisleithan* dominions, viz. Empire of Austria (*q.v.*), *Transleithan* dominions, viz. Kingdom of Hungary (*q.v.*), and Provinces of Bosnia (*q.v.*) and Herzegovina. A.-H. is bounded N. by Germany and Russia, E. by Russia and Rumania, S. by Rumania, Servia, Montenegro; W. by Germany, Switzerland, Italy; area, *c.* 260,000 sq. miles; second largest empire in Europe. Pop. (1910) *c.* 51,340,000.

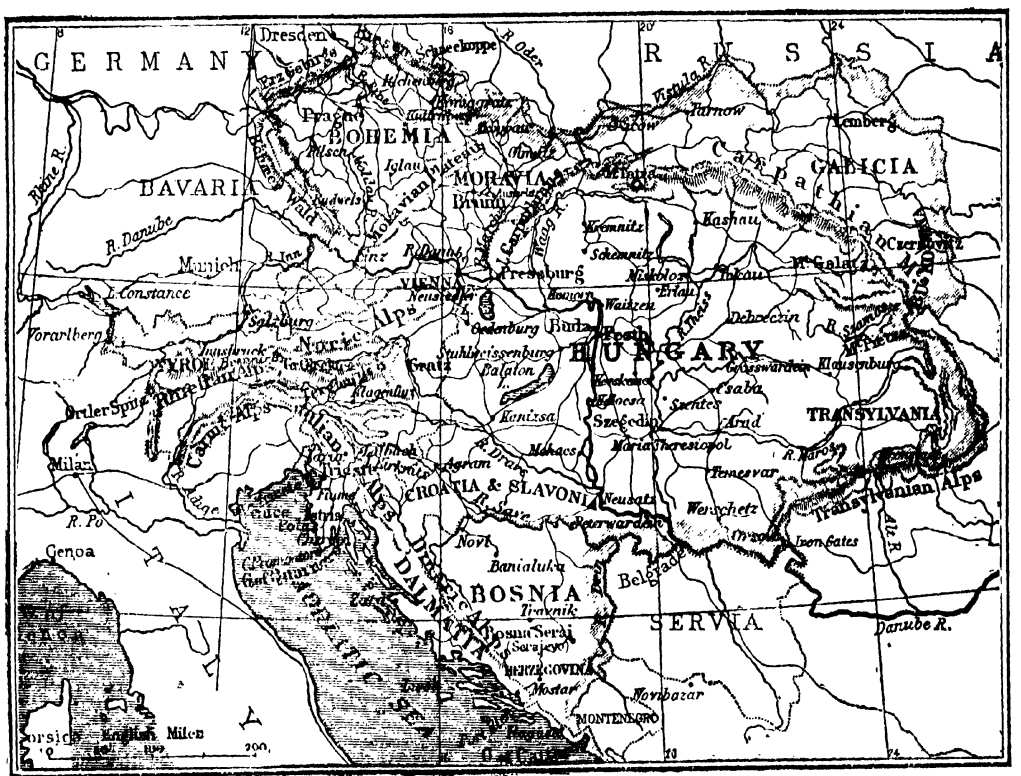
History.—Country was apparently occupied in prehistoric times by Celtic tribes, of whom Taurisci have been identified with later Norici who came into conflict with Rome in I. cent. B.C. Other inhabitants were Germanic tribes, who had migrated hither from farther N.; among these, Cimbri and Teutons were defeated by Marius in 101 B.C. Subsequent Rom. campaigns were those of Julius Cæsar against Marcomanni, of Octavianus in Pannonia and Dalmatia, and of Drusus and Tiberius in Tirol and Eastern Alps.

During decay of Rom. empire, country was successively occupied by various barbarian tribes; Goths and Franks appeared in III. cent., Huns in IV.; Avars established themselves here in VI. cent., holding their own for about 250 years, till close of VIII. cent., when they were subdued by Franks under Charlemagne, who founded Margravate of A. and sent Frankish colonists there. A century later, Hungary was invaded by Magyars, who put an end to influence of Franks; and were in turn defeated by Ger. king Otto I., who re-established Margravate, which late in X. cent. was granted by Otto II. to Leopold, count of Babenberg. Babenberg family governed A. till 1246, when became extinct with death of Duke Frederick, slain in battle with Magyars. Emperors meanwhile belonged to Saxon, Franconian, and Hohenstaufen families. On Duke Frederick's death, disputes arose as to succes-

sion to his dominions A. and Styria, which were finally sequestered by Emperor Frederick II. and transferred to Otto of Werdenberg; subsequently taken by Otto of Bavaria, and then by Ottokar of Bohemia, who also acquired Carinthia and Carniola (*c.* 1268), but later lost all his dominions to RUDOLPH OF HAPSBURG, who was elected Ger. king in 1273.

Rudolph had them made hereditary in Hapsburg family, and they were conferred on his sons, Albrecht and Rudolph, at Diet of Augsburg, 1282. A. and Styria were then governed by Albrecht and his descendants; Carinthia, which was granted to Meinhard of Tirol in 1286, reverted to Hapsburgs in 1335, while Tirol, Istria, and other territories were also added to Hapsburg dominions at various dates.

XIV. century.—After death of RUDOLPH IV. in 1365, his bro., ALBRECHT III., took over A. and Carniola. LEOPOLD III., another bro., took Styria and other territories,



but in war against Swiss was slain at *Sempach*, 1386, whereupon Albrecht III. temporarily administered his dominions, presently transferring them to his nephews, Leopold's sons; family continuing to hold Styria, while elder branch had A. ALBRECHT V. of A. added Bohemia and Hungary to his dominions by marriage with Elizabeth, dau. of Emperor Sigismund, king of these countries, 1437; became Ger. king, 1438; imperial crown henceforward held by Hapsburgs till 1740. At death of Albrecht's (posthumous) s., Ladislaus, in 1457, A. passed to surviving Hapsburg princes, and ultimately to Emperor FREDERICK III.; but Bohemia and Hungary elected as their kings George Podebrand and MATTHIAS CORVINUS respectively; latter invaded A., 1477, and took Vienna, which Maximilian, s. of Frederick III., afterwards recovered. Austrian territories were restored to Frederick III. by Treaty of Pressburg, 1491, when also succession to Bohemia and H. was entailed on Hapsburgs, on extinction of male descendants of Ladislaus, s. of Podebrand, who had been elected king of H. on death of Matthias Corvinus. MAXIMILIAN succeeded his f. in 1493; he had already acquired Netherlands by marriage with Mary of Burgundy, and been elected Rom. king in Frederick's lifetime; reign marked by reforms in empire and advance of Hapsburgs (*q.v.*).

Reformation (*q.v.*) began in this reign and continued in that of Maximilian's grandson, CHARLES V., who succeeded him in 1519 as archduke of A. and as emperor. He aimed at establishing Roman Catholicism; and was the most powerful ruler in Europe, holding also Spain and Netherlands. The Austrian territories he handed to his bro., FERDINAND I., while Spain and Netherlands passed to his s., Philip II. of Spain. Ferdinand I. was m. to Anne, dau. of Ladislaus of Bohemia and H., in whose right he had succeeded to Bohemian throne in 1526; but his claim to H. was disputed, and he obtained only royal title and part of W. Hungary, N.E. being held by JOHN ZAPOLYA, S.E. by Turks. He adopted policy of toleration towards Reformation, which was also pursued by his s., MAXIMILIAN II., who succeeded him in A., Bohemia, and H. in 1564.

A.-H. in XVI. century.—Maximilian II. was succeeded by his s., RUDOLPH II., in 1576, who tried to put down Protestantism, which led to open revolts in various parts of his dominions; in his reign Turks under Sultans Amurath and Muhammad invaded H., supporting rebels there and practically establishing independence; Rudolph, who concerned himself less with political affairs than with study of alchemy and astrology, was in 1608 compelled to cede A., H., and Moravia to his bro. MATTHIAS, to whom crown of Bohemia was also transferred in 1611. Matthias made concessions to his Prot. subjects, and re-established authority in A., 1609.

At Rudolph's death in 1612, Matthias obtained imperial crown. Being childless, he succeeded in entail-

ing his dominions on his cousin, Ferdinand of Styria, who became emperor (FERDINAND II.) at Matthias's death, 1619. Protestants in Bohemia and H., however, rejected him, Bohemia choosing Frederick, Elector Palatine, as king, whereupon THIRTY YEARS WAR (*q.v.*) broke out; after battle of *White Mountain*, 1620, elector fled and Ferdinand was reinstated in Bohemia. War later assumed European character, cause of Protestants being aided by France and Denmark; Ferdinand, for whom Wallenstein raised large army, was predominant in his dominions by 1629; extirpated Protestantism, issued Edict of Restitution, restoring Catholics to Church offices. He was now opposed by Gustavus Adolphus (*q.v.*) of Sweden, who was subsequently joined by John George of Saxony; combined army defeated imperial troops at *Breitenfeld*, 1631, and at *Lützen*, 1632. In 1634 Emperor's s. Ferdinand defeated Swedes at *Nordlingen*; he succeeded his f. as FERDINAND III. in 1637. War continued for many years, becoming struggle of France and Sweden against A. and Spain; ended by Peace of Westphalia, 1648, whereby Calvinism was recognised and advantages secured to Protestants.

Ferdinand III. was. succeeded in 1657 by his s., LEOPOLD I., who warred against Turks, from whom he gained Transylvania, most of H., part of Slavonia, and Croatia by Treaty of Carlowitz, 1699; persecuted Hungarian Protestants.

The XVIII. century.—Leopold died in 1705, before close of WAR OF SPANISH SUCCESSION (*q.v.*); his son and successor, JOSEPH I., made treaty of neutrality for Italy with Louis XIV.; his principal work was pacification of H.; d. 1711, succ. by bro., CHARLES VI., whose chance of succession in Spain ended with Peace of Utrecht, 1713. He joined Quadruple Alliance; exchanged Sardinia for Sicily; became involved in war with Turks on behalf of Venice, which resulted in addition of part of Bosnia and Servia to Austrian dominions; issued Pragmatic Sanction (*q.v.*), 1720, with object of securing succession of his dau., Maria Theresa; warred against France, 1733–35, on question of Polish succession; towards end of reign, again involved in war with Turkey, to whom he lost Servia; d. 1740.

On death of Charles, 1740, Spain, Saxony, and Sardinia sought to dismember Empire, while Charles, Elector of Bavaria, claimed (*inter alios*) to be heir to whole, and the WAR OF AUSTRIAN SUCCESSION began. MARIA THERESA, though gifted and patriotic, was young and inexperienced. Prussia, which had guaranteed Pragmatic Sanction, led attack by occupying Silesia; Austrian general, Neipperg, was defeated at *Mollwitz*, 1741. France, also guarantor of Pragmatic Sanction, now made treaty with Prussia for partition of empire and appointment of Elector of Bavaria as emperor with diminished realm; Linz was captured and Elector became Charles VII.; Maria, however, made touching appeal to loyalty of her Hungarian subjects, and bought off Frederick the Great by secret cession of Silesia, Oct. 1741; he repudiated the treaty, but ceased to prosecute war with vigour. On death of Charles VII., 1745, Maria Theresa's husband was elected emperor as FRANCIS I.; war ended with Peace of Aix-la-Chapelle, whereby Maria Theresa was recognised as queen of A., but had to confirm Frederick of Prussia's acquisition of Silesia, and cede her Ital. duchies to Philip of Spain, Savoy and Nice to Sardinia. Her subsequent attempt to recover Silesia resulted in SEVEN YEARS WAR (*q.v.*), 1756–63, which, ending with Peace of Hubertsberg, left position unchanged. She henceforth devoted herself to internal affairs, reforming government, education, Church, and improving commercial and industrial conditions.

Francis I. d. in 1765, and their s. became emperor as JOSEPH II., and joint-ruler of A. with his mother. Maria Theresa acquired Galicia and Lodomeria by partition of Poland, 1772; she d. in 1780. Joseph tried to unify his dominions by doing away with distinctions of language, etc.; he did much to ameliorate condition of lower classes; declared Roman Catholicism to be State religion, but tolerated other religions; his reforms induced revolts in Tirol and Netherlands; he was unsuccessful in war against Turks; d. 1790. His bro. and successor, LEOPOLD II., put down revolt in Netherlands, and made peace with Turks and Prussia, who had allied themselves against A. On outbreak of Fr. Revolution he formed alliance with Frederick William of Prussia, 1792, but died soon afterwards. His s., FRANCIS II., succeeded him; he warred against France, and was party to second division of Poland, 1793; defeated by Napoleon Bonaparte, 1796; acquired Venice, but lost Austrian Netherlands by Treaty of Campo-Formio, 1797; subsequently lost much to France; proclaimed hereditary emperor of A. as FRANCIS I., 1804; two years later resigned crown and government of Holy Rom. Empire.

The XIX. century.—By Treaty of Pressburg, 1805–6, he lost Venice to Italy, Vorarlberg, Tirol, etc., to Bavaria; by Peace of Schönnbrunn lost further territories (Galicia, Salzburg, part of Bohemia, Croatia, etc.) to France, Russia, Saxony, and Rhine Confederation, 1809. Metternich now became chief minister; formally declared war against France, 1813, whereupon alliance formed between A., Prussia, Russia, and United Kingdom, with ultimate result of Napoleon's defeat and abdication in 1814. By Congress of Vienna, A. then regained her possessions in N. Italy, acquired Lombardy and precedence in new federal diet of Germany.

Francis I. died 1835; reign of s., FERDINAND I. (1835–48), marked by risings; national movement commenced in H. (inspired by Szechenyi, Kossuth, Deák), and in Croatia and Bohemia; revolution in Cracovia led to its annexation, 1846; Fr. Revolution, 1848, caused fall of Metternich from power, and forced emperor to grant power to diet to establish constitutional government, freedom of speech, press, etc. Czechs were fully enfranchised. Meanwhile, Lombard insurrection commenced at Milan, and every Austrian State armed itself to win independence; emperor fled and abdicated, Dec. 1848, in favour of nephew, present emperor, Francis Joseph; revolutions quelled, 1849; emperor hastened to forestall action of diet, by himself promulgating constitution, suppressed 1852; retrogressive and repressive policy; War of Italian Independence broke out, 1859; Lombardy lost, and Austrian rulers of Modena, Parma, and Tuscany expelled, 1859; constitution again granted, 1860–61, but bitterly opposed by non-German provinces. Decisive defeat by Prussia at *Königgrätz* led to Treaty of Prague, 1866, by which Austria lost Venice and her status in Germany; continued revolts in H. led emperor to grant it autonomy, 1867, by celebrated compromise; dualist system of Austro-Hungarian monarchy led to great discontent, particularly of Slavs, and A. has still to consider advisability, or even necessity, of turning her empire into federation.

Reichsrath was made independent of provincial diets by Liberal centralist ministry, 1873, which strengthened Ger. minority and introduced religious and legal reforms, but was involved in financial scandals of 1873. A. strengthened her position by alliance with Germany, 1879; invited by Berlin Congress, she occupied Bosnia (*q.v.*) and Herzegovina, 1879, and, supported by Germany and disregarding the expostulation of the Powers, annexed them, 1908. The ministry of Taaffe (1879–83) favoured federalism and, at same time, autocracy. Czechs, conciliated, sent deputies to *Reichsrath*; their language was made official speech in Bohemia and Czech Univ. founded at Prague, despite opposition of Germans; alliance with Italy, 1882, freed A. from fear of aggressive party of *Italia irredenta*, which sought the union of Italian-speaking districts with Italy; foreign ambitions of A. since *Sedan* directed to east, but energies absorbed in keeping together heterogeneous empire. Elements of opposition in interior combined to win electoral reform, 1896, which merely enraged socialists and nationalists by its insufficiency. H. meanwhile had been faced with similar problems; she granted to Croatia

rts own language as official tongue and fair representation in Hungarian Parliament, 1868, and strove to keep balance even between ruling Magyar and subject-peoples of H. till retirement of Deák (d. 1876). His successor Tisza sought to make H. balance A., and to establish Magyar supremacy in H., thus winning hatred of Croats and his own fall, 1890; after his fall reforms went forward; religious toleration secured. Tisza had made H. chief member of dualist system and established party which has since worked for replacement of dualist system by merely personal tie, but nationalism now seems stronger influence; Germanising ended in A. with introduction of universal suffrage, 1907, as Magyarising is expected to do when promised measure is passed in H.

Government.—The empire of A. and kingdom of H. were united, 1868, under emperor-king as the Austro-Hungarian monarchy; hereditary dual monarchy, descending in tail male with remainders to female issue according to Pragmatic Sanction, 1713; dual foreign policy, army, navy, treasury, railway services, etc.; separate governments with common executive. Austrian Parliament, *Reichsrath*, is composed of upper chamber of nobles, bp's, and nominees of emperor, and lower chamber of elected representatives of seventeen provinces of A.; Hungarian Parliament has House of Magnates (*Magnatentafel*) and House of Representatives (*Repræsentantentafel*); Central Board, *Delegation*, elected by the two Parliaments, meets in Vienna and Buda-Pesth alternately; provincial diets (except in Transylvania, which is administered from Hungary) and communal councils regulate local affairs.

Defence.—The common army is recruited by compulsory service of males between ages of 19–42. In addition, there are the separate Austrian and Hungarian Landwehr and Landsturm forces and the Ersatz reserve. Peace establishment is 312,540, including 22,540 officers and officials. Reorganisation, now in progress, is to be completed 1915.

Navy consists of 13 battleships, 3 armoured cruisers, 8 small cruisers, 6 torpedo vessels, 12 destroyers, 55 torpedo boats, 6 submarines; but additions are rapidly being made in execution of the new naval programme of 1911. Personnel is 1500 officers and 13,500 men.

Coxe, *House of Austria* (continued by Kelly, 1873); Whitman, *Austria* (Story of the Nations, 1899); Colquhoun, *The Whirlpool of Europe* (1907); Hampel, *Ungarische Alterthümer* (1905); Hugessen, *Political Evolution of the Hungarian Nation* (1908); Drage, *Austria-Hungary* (1909).

AUSTROMANCY, divination and prophecy from observation of winds.

AUTEUIL (48° 50′ N., 2° 20′ E.), division of Paris.

AUTHORISED VERSION, see BIBLE.

AUTO, Span. and Portug. mystery play; Lope de Vega Carpio, Calderon, and others wrote a's; still played in Portugal, but prohibited in Spain, 1765.

AUTOBIOGRAPHY, a man's life written by himself. From beginning of literature men have in some form written a., which fulfils two human needs, gossip and confession; instinct of a. extended to public events produces memoirs, chronicles, and history. A. includes diary kept for private purposes and set account destined to be presented to world, and may be of nature of annals (narrative of events), or account of thoughts and feelings. Early example of latter kind of a. is Hebrew *Psalms*; modern example is *Journal* of Marie Bashkirtseff (*q.v.*), in which strong thread of passion connects few events of monotonous life; this *Journal* is rare instance of deliberate bequest to the world of private matter for its value as 'a human document'; illustrates special interest in self which has intimate connection with artistic production; late masterpiece in this kind Edmund Gosse's *Father and Son*.

Other books which take form of a. may be mixture of fiction and confession, as in Sterne's *Sentimental Journey*, or purely fictitious like *Don Quixote* or *Gil Blas*, where device gives attraction of verisimilitude. Early a's usually simple annals which are invaluable historically; they became common in England in XVII. cent., when, besides famous diaries of Evelyn and Pepys, a's were frequently written by unimportant people like Mrs. Alice Thornton (*Memoirs* [Surtees Soc.]), and throw light on manners and customs. Among XVI. cent. a's chief is that of Benvenuto Cellini (1500–72); important a's of XVII., XVIII. and XIX. cent's are Bunyan, *Grace Abounding*; Wesley, *Journal*; Gibbon, *Memoirs*; Walpole, *Short Notes of my Life*; Rousseau, *Confessions*; Silvio Pellico, *Le mie Prigioni*; Goethe, *Aus meinem Leben*; Coleridge, *Biographia Literaria*; *Autobiography of John Stuart Mill*; Ruskin, *Præterita*; Mark Pattison, *Memoirs*.

AUTOCHTHONES, natives of the soil, as distinct from settlers; name used by the Greeks.

AUTOCLAVE (*Digester*), apparatus, with safety valve, for heating liquids under pressure.

AUTOCRACY, despotic power vested in a single individual, like that of Russia; government by aristocracy, being government by the privileged few; while democracy stands for government by the many.

AUTO-DA-FÉ ('act of faith'), grim ceremony of the Span. Inquisition in putting to death heretics. The first a. took place in 1481, the last in 1826.

AUTOGAMY, self-fertilisation (bot.).

AUTOGENY, hypothetical inorganic phase in evolution of living matter.

AUTOGRAPH, document written or signed by a particular individual or a separate signature. A. signatures to documents were common from the earliest times, as may be seen from the papyrus seals and waxen tablets recovered from the ancient Egyptian tombs, and from the ruins of Pompeii and Herculaneum. The employment of a monogram, or sign manual, in place of the full a., became common about the reign of Charlemagne, and continued in use for some considerable time, but eventually gave place to the custom of using seals. Later it became usual to append the signature in addition to the seal. Collections began in XIV. cent. See Nichols, *Autographs of Royal, Noble, Learned, and Remarkable Personages* (Eng.); Hardy, *Handwriting of the Kings and Queens of England, Facsimiles of A's in the Brit. Museum*; Scott and Davey's *Guide*.

AUTOGRAVURE or photogravure, photographic process by which engraved negative is obtained from which prints can be made; discovery patented by J. R. Sawyer, London, 1884.

AUTOHARP, musical instrument of unequal chords like harp; when certain chords are pressed down rest form chord.

AUTOLYCUS (classical myth.), s. of Hermes; noted as a thief and swindler; hence the derivation of A. in Shakespeare's *Winter's Tale*, who claimed to be 'a picker-up of unconsidered trifles.'

AUTOLYCUS OF PITANE (c. IV. cent. B.C.), Gk. mathematician and astronomer.

AUTOMATISM, involuntary action; the theory that consciousness does not control one's actions. —**Automatic Writing** is performed without their volition by persons in an hypnotic or hystero-epileptical 'trance.' This phenomenon of subconscious mentality forms a debatable argument for spiritualism.

AUTOMEDON (Gk. myth.), charioteer of Achilles and Neoptolemus.

AUTOMOBILES, see MOTOR-CAR.

AUTOMORPHISM, the practice of automorphic characterisation (*i.e.*) to form a conception of another's mind on the pattern of one's own.

AUTONOMY (Gk. self-rule), right of bodies politic to control their own affairs. Cherished privilege of Ionian cities and colonies of Greece and of states of mediæval Germany and Italy; term now chiefly employed in describing rights of self-government enjoyed by certain subject states.

AUTOPSY, term originally and correctly applied to a personal examination; now generally to the

examination and dissection of a dead body to ascertain the cause of death.

AUTOTYPE, photographic printing process largely used for reproduction of works of art.

AUTRAN, JOSEPH (1813–77), Fr. poet; wrote *La Mer* (1835); *Vie Rurale* (1856); *Laboureurs et Soldats* (1854); also *La Fille d'Eschyle*, traged (1848).

AUTUMNAL EQUINOX, see ARIES.

AUTUN (46° 58′ N., 4° 20′ E.), town, Saône-et-Loire, France; bp.'s seat; XII.-cent. cathedral Rom. antiquities; cloth.

AUTUNITE, CALCO-URANITE, $Ca(VO_2)_2(PO_4)_2+8$ (or 12) H_2O, mineral found near Autun, in Saxony, and in Cornwall.

AUVERGNE (45° 20′ N., 2° 40′ E.), ancient province, France; now forming departments Puy-de-Dôme, Cantal, and part of Haute-Loire; united to France, 1610; mountains, volcanic structure; fertile minerals.

AUWERS, ARTHUR (1838–), Ger. astronomer; director of Potsdam new observatory, 1881; author of works on fixed stars and solar parallax, and of Catalogue of the stars.

AUXANOMETER, apparatus for measuring growth in plants.

AUXENTIUS (fl. *c.* 370), Arian theologian; bp. of Milan, 355–74.

AUXERRE (47° 55′ N., 3° 35′ E.), town, Yonne, France; formerly bp.'s seat; fine cathedral and churches; ancient walls surrounding city form site for boulevards; wine, ochre.

AUXIMUM (43° 29′ N., 13° 30′ E.), ancient town, Picenum; Rom. fortress; cathedral.

AUXONNE (47° 10′ N., 5° 52′ E.), town, Côte d'Or, France; fortified by Vauban.

AVA (21° 54′ N., 96° 4′ E.), former capital, Burma; now ruined.

AVADĀNA, Buddhist romances, *Century of Legends*, *The Heavenly Legend*, etc.

AVAHI (*Avahis laniger*), lemur living in the forests of Madagascar.

AVALANCHE, collection of snow or ice which descends from higher latitude. Different kinds are: (1) Drift or Dust A., which acquires tremendous velocity, causes compression of air, and becomes dangerous force; (2) Glacial A., which descends from glaciers in summer months.

AVALLON (47° 28′ N., 3° 54′ E.), town, Yonne, France; wine. Pop. 5900.

AVALON, in the Arthurian legends the place to which King Arthur was borne after his last battle; identified with neighbourhood of Glastonbury and other places.

AVARS (VI. cent.), Tartar tribe; conquered Pannonia and Dalmatia, but were subdued by Charlemagne.

AVATAR, the descent and incarnation of a Hindu deity upon earth; thus regarding the ten a's of Vishnu it is held that he has already visited the earth nine times, and that when he finally appears, as the horse Kalki, the earth will be destroyed.

AVATCHA BAY (53° N., 158° 30′ E.), bay, Kamchatka, Asia.

AVE MARIA (Lat. 'Hail, Mary!'), first words of prayer used by Roman Catholics, a composite of the words used by angel Gabriel to the Virgin Mary (*Luke* 1^{28}), those used by Elizabeth to her (*Luke* 1^{42}), and an invocation of the Virgin's help.

AVEBURY, ABURY (51° 25′ N., 1° 51′ W.), village, Wiltshire, England; near megalithic antiquities consisting of stone circles, and immense barrow known as Silbury Hill. See STANDING STONES.

AVEBURY, JOHN LUBBOCK, 1ST BARON (1834–1913), English banker, politician, and author; s. of Sir J. W. Lubbock, Bart.; sat in parliament for Maidstone and for London University; Vice-Chancellor of latter; author *Ants, Bees, and Wasps* (1882), *Pleasures of Life* (1887), and many other works.

AVEIA (42° 16′ N., 13° 15′ E.), ancient town, Via Claudia Nova, Italy.

AVEIRO (40° 38′ N., 8° 39′ W.), seaport and province, Portugal; bp.'s seat; fisheries.

AVELLANEDA, GERTRUDIS GOMEZ DE (1816–73), Span. poetess and novelist, etc. (pseudonym, *Peregrina*).

AVELLINO.—(1) (40° 55′ N., 14° 47′ E.) town, Italy; seat of bishopric. Pop. (1911) *c.* 23,873. (2) (41° N., 15° E.) province, Italy. Pop. (1911) 397,048.

AVEMPACE (d. 1138), Arab. philosopher; lived in Spain; wrote *Conduct of the Solitary*, set of moral maxims for the proper ordering of life. See ARABS.

AVENTINE HILL (*Mons Aventinus*), one of seven hills of Rome, included in growing city by Ancus Martius; plebeian quarter in later times.

AVENTURINE, variety of quartz, occurring chiefly in Ural Mts.; also kind of glass with gold-red spangles.

AVENZOAR (XII. cent.), Arab. physician; b. Seville; held in great repute in his day; wrote *The Method of Preparing Medicines and Diet*; trans. into Latin by Paravicius (Venice, 1490).

AVERAGE, term used to define a service due from a feudal tenant to his superior, which was usually carriage of goods; in modern shipping it refers to loss caused by accidents in navigation, and consequent loss or depreciation of cargo, and is either *general* or *particular*; in general use, a mean proportion or quantity, made out of unequal quantities, obtained by adding the sum of the quantities, and dividing by the number of quantities—thus, A gains £20, B £25, and C £30; the average gain is £25. The term is also used in reference to persons of a general standard, as the 'average man,' the 'average student,' etc.

Average, Adjustment of, term used in Marine and also Fire Insurance to determine the amount the policy-holder is entitled to receive, and the distribution of loss to be borne by the underwriters.

Lowndes, *General Average*, 4th ed., 1888; Hopkins, *Handbook of Average*.

AVERNUS, AVERNO (40° 54′ W., 14° 4′ E.), small lake, near Naples; crater of extinct volcano. Birds flying over it were said to fall dead, and through it Virgil's Æneas descended to Hades; Vergil wrote of *'facilis descensus Averno'*; close by is cave of sibyl of Cumæ.

AVERROES (1126–98), Arab. scholar; lived in Spain and Morocco; studied math's, philosophy, theol., and med.; a profound admirer of Aristotle, A. held that both active and passive intellect are one in all men, that religion is but the philosophy of the illiterate, that matter, an emanation from God, is eternal, and that life exists on each of the heavenly bodies. See ARABS.

AVERSA (40° 59′ N., 14° 11′ E.), town, Caserta, Italy; founded by Normans, 1027.

AVES, see BIRD.

AVESNES (50° 9′ N., 3° 58′ E.), town, former fortress, Nord, France; wool-spinning. Pop. 6220.

AVESTA (ZEND-AVESTA), sacred books of Parsees; four divisions; sacrificial liturgy, law, forms of worship and prayers; nearly all lost but liturgy.

AVEYRON (44° 18′ N., 2° 40′ E.), mountainous department, S. France; formed old district Rouergue; chief rivers, the Lot, Aveyron, and Tarn; good pastures, sheep and cattle; celebrated Roquefort cheese; coal, iron. Pop. (1911) 369,448.

AVEZZANO (42° 2′ N., 13° 28′ E.), town, Aquila, Italy; castle (1490).

AVIANUS, Lat. fabulist; Eng. version was printed by Caxton (1483); later edit. by R. Ellis (1887).

AVIARY, an enclosure for keeping birds in captivity either as a pastime, or for culinary purposes, or in order to study their habits.

AVIATION, see FLIGHT.

AVICEBRON, SALOMON BEN JEHUDA BEN GABIROL (*c.* 1020–70), Span.-Jewish poet and philosopher,

sometimes called an Arab; wrote in Arabic important scholastic works.

AVICENNA (980–1037), Arab. scholar; ed. Bokhara, then a centre of Muhammadan culture; studied math's and philosophy, specially Aristotle's *Metaphysics*; became vizier; his pleasure-loving life hastened his death. A's philosophy is a Neoplatonic Aristotelianism; he holds that the active intellect is one and universal and that knowledge comes from its contact with the individual passive intellect, that being may be divided into the (1) necessary of itself–God, (2) the necessary by God's decree though but possible of itself, and (3) the merely possible. See ARABS.

AVIENUS, RUFUS FESTUS, Roman geographer and poet of IV. cent. A.D. Translated Greek geographical works into hexameters and compiled other geographical works.

AVIGLIANA (45° 4′ N., 7° 20′ E.), town, Turin, Italy; dynamite.

AVIGNON—*Avenio*, 'Windy City'—(43° 58′ N., 4° 49′ E.), town, on Rhône, France; founded by Phocæans, 539 B.C.; ancient cathedral and palace; residence of popes (1309–76), to whom city belonged till annexation to France, 1791; mediæval bridge and XIV.-cent. walls; here Petrarch first saw Laura; Villeneuve-les-A. (*q.v.*) is suburb across Rhône; abp.'s seat; formerly univ.; silk, madder. Pop. (1911) 49,304.

AVILA.—(1) (40° 40′ N., 5° W.) province, Spain, S. part Old Castile; area, 3042 sq. miles; mountainous, centre and south; merino wool, timber; lower fertile tracts towards N.; grain. Pop. (1910) 209,000. (2) (40° 38′ N., 4° 46′ W.) town; St. Teresa's birthplace. Pop. 12,000.

AVILA, GIL GONZALES DE (1577–1658), Span. historiographer; wrote lives of some of the Castilian kings; also descriptions of cathedrals and biographies of prelates.

AVILA, JUAN DE (1500–69), Span. priest and mystical writer; associated with monastic reforms of St. Teresa (*q.v.*).

AVILA Y ZUNIGA, LUIS DE (*c.* 1548), Span. historian; much favoured by Charles V.

AVILES (43° 31′ N., 5° 56′ W.), seaport, Oviedo, Spain; glass. Pop. *c.* 13,000.

AVILONA, see AVLONA.

AVISON, CHARLES (*c.* 1710–70), Eng. musical composer; wrote *Essay on Musical Expression*, edited Marcello's *Paraphrases of the Psalms*.

AVITUS, MARCUS MÆCILIUS (d. 456), Rom. emperor of West; prefect of Gaul when chosen emperor on death of Maximus, 455; deposed by Ricimer, 456.

AVIZ, ORDER OF, Portug. religious military order, founded XII. cent., named from its seat, A., with which it was endowed by Alfonso II., 1211–23; reorganised and remains as military order purely.

AVIZANDUM (Lat. *avizare*), Scot. legal term, meaning to consider, in reference to a judgment.

AVLONA, AVILONA, VALONA (40° 29′ N., 19° 26′ E.), port, European Turkey; seat of Greek abp.; damaged by earthquake, 1831. Pop. *c.* 6000.

AVOCA, OVOCA (52° 48′ N., 6° 9′ W.), river and valley, Co. Wicklow, Ireland; celebrated in Moore's poem, *The Meeting of the Waters*.

AVOCADO PEAR (*Persea gratissima*), a luscious W. Indian fruit.

AVOGADRO, AMADEO, CONTE DI QUAREGNA (1776–1856), Ital. physicist; discovered that (*Avogadro's law*) equal volumes of different gases, at same pressure and temperature, contain same number of molecules.

AVOIRDUPOIS, system of weights used in Britain and N. America.

AVOLA (36° 55′ N., 15° 6′ E.), town, Sicily. Pop. 16,300.

AVON (Celtic, 'river').—(1) East (50° 48′ N., 1° 47′ W.), rises Wiltshire, enters Eng. Channel, at Christchurch. (2) Lower (51° 25′ N., 2° 43′ W.), rises Cotswold Hills, Gloucestershire; flows Bristol Channel. (3) Upper (52° 3′ N., 2° 8′ W.), rises Naseby, North-

) tributary (

Banffshire. (6) (56° 2′ N., 3° 41′ W.) tributary of Forth, Scotland.

AVONIAN, Lower Carboniferous formation in Avon gorge, Bristol; corresponds to Dinantien of Fr. geologists; sub-stages are Kidwellian and Clevedonian.

AVONMOUTH (51° 30′ N., 2° 41′ W.), town, Gloucestershire, England; docks.

AVRANCHES (48° 40′ N., 1° 22′ W.), town, Manche, France; cider, lace, salt, leather-dressing. Pop. 7500.

AVRE (49° 45′ N., 1° 24′ E.), river, Somme, France.

AVRICOURT (48° 37′ N., 6° 46′ E.), town, Franco-German frontier; customs.

AWAJI (34° 34′ N., 134° 44′ E.), island, Japan, between Hondu and Shikoku; pottery.

AWE, LOCH (56° 20′ N., 5° 10′ W.), fresh-water loch, Argyllshire, Scotland; ruin, Kilchurn Castle.

AXE, weapon found with earliest human remains in Stone and Bronze Ages; now made of iron, with steel edge and wooden haft.

AXEL, abp. See ABSALON.

AXENSTRASSE, road hewn out of rock beside Lake Lucerne, between Tell's Chapel and Fluelen.

AXHOLME (53° 32′ N., 0° 50′ W.), island, N.W. Lincolnshire, formed by rivers Trent, Idle, and Don. Pop. (1911) 6816.

AXILE, AXIAL, related to the axis; embryo maintaining axis of seed (bot.).

AXIM (4° 47′ N., 2° 5′ W.), town, Gold Coast, Africa.

AXINITE ($HCa_2BAl_2(SiO_4)_4$), clove or violet mineral, wedge-shaped anorthic crystals, found in basic eruptive rocks; occasionally used as gems.

AXINOMANCY, Gk. method of discovering crime by ordeal of axe.

AXIOM, an adage, or proverb; an accepted principle in an art or science.

AXIS, an imaginary line round which an object rotates, or around which a body is symmetrical; the second cervical vertebra (anat.).

AX-LES-THERMES (42° 43′ N., 1° 48′ E.), watering-place, Ariège, France; sulphur springs.

AXMINSTER (50° 46′ N., 2° 59′ W.), town, river Axe, Devonshire, England; famous carpets; brushes. Pop. (1911) 6800.

AXOLOTL (*Amblystoma*), larvæ salamanders, indigenous to lakes in Mexico and the E. and W. of the U.S.A.; they closely resemble the Brit. newt larvæ, but attain a length of 11 in., and are used as article of food. On account of their being able to reproduce before completing metamorphosis by losing external gills, they were for some time classified as Perennibranchiates; the Mexican name has now been extended to branchiate newts generally. Under suitable conditions, however, the a. can undergo normal metamorphosis; see H. Gadow, *Nature*, lxvii. (1903).

AXSTONE, AXESTONE, variety of jade used by natives of New Zealand, South Sea Islands, etc., for making axes.

AXUM (14° 7′ N., 38° 44′ E.), ancient town, Tigre, Abyssinia; formerly capital; religious centre; interesting ruins.

AYACUCHO (12° 40′ S., 74° 6′ W.), town and department, formerly called *Guamanga*, Peru; here Peruvians finally defeated Spaniards, 1824.

AYAH (Span. *aya*), term employed by English for native Indian nurse.

AYALA, DON PEDRO LOPEZ DE (1332–1407), Span. soldier, historian, and poet; wrote chronicle of the four Castilian kings under whom he lived, and also some satirical and didactic poetry. He was taken prisoner by the Black Prince at *Najera* (1367).

AYALA Y HERRERA, ADELARDO LOPEZ DE (1828–79), Span. politician and dramatist; his political sympathies constantly varied; he took part in the revolution of 1868, but later, reverting to Conservative

principles, he became a member of Alfonso XII.'s Cabinet; wrote many plays, and some lyrical poetry. *Complete Dramatic Works*, 7 vols., Madrid, 1881–85.

AYE-AYE, subfamily (*Chiromyinæ*) of Malagasy Lemuridæ.

AYESHA (d. 677), childless wife and constant companion of Muhammad; on his death she secured succession as caliph to her f., Abu-Bekr, 632, but they were finally defeated by Ali Ben Abu Talib (*q.v.*) in 656.

AYLESBURY (51° 49′ N., 0° 49′ W.), market town, Buckinghamshire, England; straw manufactures; ducks. Pop. (1911) 11,045.

AYLESFORD (51° 18′ N., 0° 29′ E.), town, Kent, England; scene of battle, 455 A.D., between Britons and Saxons; Kit's Coty House is near. See STANDING STONES.

AYLESFORD, HENEAGE FINCH, 1ST EARL OF (1649–1719), Eng. lawyer; s. of 1st earl of Nottingham; became Solicitor-General; engaged in trial of Algernon Sidney, and was counsel for King James in trial of Titus Oates for libel; held to be one of the finest orators of his period.

AYMARA, Indian tribe who were found in subjection to Incas at time of Span. conquest. They now live chiefly in Bolivia and some parts of Southern Peru.

AYMESTRY LIMESTONE, between Upper and Lower Ludlow shales of Silurian. *Pentamerus knightii* is the leading fossil.

AYMON, romance of XIII.-cent. 'Fr. cycle,' about A., Count of Dordogne, and his four sons, Alard, Richard, Guichard, and Renaut; ascribed to Villeneuve.

AYR (55° 28′ N., 4° 36′ W.), royal burgh, chief town of Ayrshire, mouth of river A.; charter granted by William the Lion, 1200; famous old bridge; associated with poet Burns; town hall, academy; chief Scot. horse-racing centre; shipbuilding, shoemaking, carpets, etc. Pop. (1911) 32,985.

AYRER, JAKOB (d. 1605), Ger. dramatist; lived chiefly at Nuremberg, where there was pub. a collection of his tragedies, comedies, and Shrovetide plays under the title of *Opus Theatricum* (1618).

AYRES, JOHN (c. 1680–1700), writer on calligraphy; made Ital. script fashionable in England.

AYRSHIRE (55° 32′ N., 4° 20′ W.), county, S.W. Scotland; area, 724,523 acres; famous for early potatoes, dairy-farming, cheese; coal-fields, ironworks; fireclay, limestone, and honestone deposits; carpets, tweeds, cottons, chemicals, leather, tools, fisheries; chief seaports, Ayr (chief town), Ardrossan, Girvan, Troon, Largs; watered by Ayr, Stinchar, Doon, Irvine, Girvan, etc.; hilly districts in N. and S.; chief lake, Loch Doon; represented by two M.P.'s; some Roman remains and monastic ruins; scene of Alexander's defeat of Norwegians in 1263, and of several victories gained by Wallace and Bruce over Edward I.; took an active part in the Covenanting movement; known as 'the land of Burns,' after its most distinguished native. Pop. (1911) 268,300.

AYRTON, WILLIAM EDWARD (1847–1908), Eng. physicist; invented electrical measuring apparatus; Royal medallist, 1906. His wife (d. 1908) was also a scientist; author of *Electric Arc* (1902); discoverer of causes of sand-ripples on seashore, etc.

AYSCOUGH, SAMUEL (1745–1804), Eng. librarian; called 'The Prince of Indexers'; s. of a Nottingham printer, he migrated to London in early life and secured a position at the Brit. Museum; had a large share in the 1787 Catalogue; indexed ancient rolls and charters, and prepared Shakespeare Concordance.

AYSCUE, SIR GEORGE (d. 1671), Eng. admiral; employed with Blake in the reduction of Scilly (1651); later in W. Indies; served under Monk in the Four Days' Battle (June 11–14, 1666), but his flagship was captured by the Dutch and he remained for some time prisoner in Holland.

AYTOUN, SIR ROBERT (1570–1638), Scot. poet; held Court offices under James I. and Charles I.; knighted, 1612; wrote poems in Latin and English, his best known being *Diophantus and Charidora*. He is sometimes credited with an early version of *Auld Lang Syne*.

AYTOUN, WILLIAM EDMONSTOUNE (1813–65), Scot. poet; wrote *Lays of the Scottish Cavaliers* (1848); part author of *Bon Gaultier Ballads* (1855), with Sir Theodore Martin, who also assisted him in the translation of *Poems and Ballads of Goethe* (1858); prof. of Rhetoric at Edinburgh Univ. (1845).

AYUNTAMIENTO, Span. municipal council, administrative district, or town hall.

AYUTHIA (14° 28′ N., 100° 36′ E.), city, Siam; formerly capital; ruined palaces, temples.

AZAÏS, PIERRE HYACINTHE (1766–1845), Fr. philosopher; his chief work was *Des Compensations dans les Destinées Humaines* (1809), which won the approbation of Napoleon.

AZALE, extract of madder-flower used as dye.

AZALEA, genus of plants belonging to order *Ericaceæ*, resembling the rhododendron; native of N. America and S. Europe; has delicately tinted flowers, white to dark red.

AZAMGARH (26° 3′ N., 83° 13′ E.), city and district, Gorakhpur division, United Provinces, India; city, on Tous, founded 1665, by Azam Khan.

AZĀN, public call to prayer in Muhammadan countries. This is announced from the mosque, twice daily, by the Muezzin, who stands with his face towards Mecca.

AZARD, DON JOSÉ NICHOLAS DE (1731–1804), Span. diplomatist; ambassador to Rome and Paris; he was the unwilling instrument in negotiations which led to subjection of Spain to Napoleon, which embittered his after-life.

AZAY-LE-RIDEAU (47° 17′ N., 0° 30′ E.), town, Indre-et-Loire, France; Renaissance château.

AZAZEL (Hebr.).—(1) Name given to scapegoat chosen to bear sins of people into wilderness, from allusion in *Leviticus* 16. (2) Evil spirit ranking next to Satan; Satan's standard-bearer in *Paradise Lost*.

AZEGLIO, MASSIMO TAPARELLI, MARQUIS D' (1798–1866), Ital. statesman and author; in early life maintained himself as an artist; m. dau. of novelist, Alessandro Manzoni, and himself pub. two hist. novels in style of his father-in-law; later entered political arena, and became premier under Charles Albert, king of Sardinia, and his successor, Victor Emmanuel II.

AZERBAIJAN (37° 50′ N., 46° E.), mountainous province, N.W. Persia; area, c. 40,000 sq. miles; grain, cotton, hemp, tobacco, saffron; lead, copper, tin; chief town, Tabriz. Pop. c. 2,000,000.

AZIMUTH is the angle, measured along the horizon, between where a vertical plane passing through a given star cuts it, and the meridian of the observer.

AZINCOURT, see AGINCOURT.

AZO-COMPOUNDS, organic compounds containing —N=N— combined with aromatic radicals; many are of value as yellow, red, or brown colouring agents. See DYEING.

AZOIMIDE (*Hydrazoic Acid*) (N_3H), colourless, malodorous, highly explosive liquid; B.P. 30° C.; first isolated by T. Curtius. All the salts are explosive.

AZORES (37° to 40° N., 25° to 31° W.), three groups of hilly islands in Atlantic belonging to Portugal, of which they are treated as an integral part; extend over length of c. 400 miles; of volcanic origin, hilly. Climate is temperate. A. have frequently suffered from earthquakes. Hot mineral springs occur. Largest island is São Miguel (41 by 9½ miles); smallest, Corvo (4½ by 3 miles); area, c. 900 sq. miles. Eastern group comprises Santa Maria, São Miguel, Formigas Rocks; central, Terceira, Graciosa, São Jorge, Pico, Fayal; western, Flores, Corvo. A. were known to Carthaginians, Normans, and Arabs; discovered by Portuguese, 1440; Spanish possession, 1580–1640; Flores in the A. scene of heroic exploit of Sir Richard

Grenville against Spain in *Revenge*, 1591; scene of disturbances caused by Dom Miguel of Portugal, 1828–33. A. produce wine, pine-apples, oranges, bananas, grain, pulse, tobacco, sweet potatoes; industries include butter and cheese making, distilling; export above productions, also pork, beef. Best harbour is at Horta, Fayal Island. Capital, Angra in Terceira. Pop. 260,000, mostly Portuguese.

AZOTE, Lavoisier's name for nitrogen (*q.v.*).

AZOTH, panacea of Paracelsus; alchemistic for mercury.

AZOTUS, ASHDOD (31° 44′ N., 34° 43′ E.), village, Palestine; one of the five Philistine cities.

AZOV (47° 2′ N., 39° 28′ E.), town, Don Cossacks, Russia; fisheries. Pop. 26,000. **Azov, Sea of** (46° N., 36° 30′ E.), arm of Black Sea, S. of Russia; very shallow; gradually silting up; valuable fisheries; caviare and isinglass.

AZPEITIA (43° 11′ N., 2° 10′ W.), town, Guipuzcoa, Spain; birthplace of Loyola. Pop. 6500.

AZRAEL, RAPHAEL, one of four archangels of Muhammadan celestial hierarchy; sent by Allah to separate soul from body.

AZTECS, Nahuatlan Ind. tribe which founded the Mexican empire, subsequently conquered by Cortes. Their otherwise high state of civilisation was stained by wholesale human sacrifices. See MEXICO.

AZUAGA (38° 17′ N., 5° 29′ W.), town, Badajoz, Spain; woollen goods. Pop. 12,000.

AZUAY (3° 20′ S., 78° 51′ W.), southern province, Ecuador; capital, Cuenca; minerals, grain. Pop. *c.* 150,000.

AZUL.—(1) (13° 1′ S., 76° 25′ W.) town, Peru. (2) (36° 40′ S., 59° 50′ W.) town, Argentina. Pop. *c.* 8000.

AZUNI, DOMENICO ALBERTO (1749–1827), Ital. jurist; wrote number of works on maritime law; also hist. and geographical account of Sardinia.

AZURARA, GOMES EANNES DE (*c.* 1470), Portug. chronicler; wrote *Chronicle of the Discovery and Conquest of Guinea*, which is a principal authority for the life and voyages of Prince Henry the Navigator.

AZURE, blue colour, supposed to be derived from name of the stone lapis lazuli; in heraldry is represented by horizontal lines.

AZURINE, blue roach. See CARPS.

AZURITE (*Chessylite*), $2CuCO_3.Cu(OH)_2$, mineral occurring with malachite in copper-ore deposits. See MALACHITE.

AZYME, unleavened loaf used by Jews in Passover ceremony.

AZYMITES, term applied by the Eastern to the Western church because of its use of unleavened bread (*azyme* = unleavened).

B, second letter of Eng. alphabet, a like symbol occupying the same position in Hebrew, Gk., and various other alphabets; called by the Phœnicians and Hebrews *beth*, whence is derived the Gk. *beta*.

BAADER, FRANZ XAVER VON (1765–1841), Ger. philosopher and theologian; Prof. of Philosophy at Munich (1826); pub. *Fermenta Cognitionis* (1822–25), in which he opposes the trend of modern philosophy. He was a disciple of Jacob Boehme, and believed that an attempt to realise the divine life should be man's ultimate ambition.

BAAL, a Semitic word meaning 'lord' or 'husband,' and sometimes used in that sense in Hebrew; used more specifically of the God of the Canaanites, corresponding to the Babylonian Bel. He was often worshipped on mountain-tops, and his cult was accompanied by immoral rites. In *II. Kings* 1 Ahaziah wishes to seek information of Baal-zebub (Lord of flies), the god of Ekron. Raisin-cakes were eaten at his sacrificial feasts (*Hosea* 3).

BAALBEK (34° N., 36° 10′ E.), ancient city, Syria, on lower slope of Anti-Libanus; formerly magnificent; has remains of three temples, of which greatest was built by Antoninus Pius; sacked by Saracens in 748, and by Timur in 1400; present village is to E. of ruins; has Brit. mission school.

BAARN (52° 12′ N., 5° 17′ E.), village, Utrecht, Holland; summer resort.

BAAS, Kafir form of address borrowed from Dutch word signifying captain; cf. Boss.

BABA (Arab., Persian, Turk. 'father'), title of respect similar to R.C. 'Father' when addressing priests.

BABADAG (44° 54′ N., 28° 52′ E.), town, Tulcea, Rumania.

BABANANGO, district, Natal, S. Africa.

BABBAGE, CHARLES (1792–1871), Eng. mathematician and mechanician; designed but did not finish calculating machines; author of mathematical works.

BABEL, name given to city of Babylon, somewhere in the neighbourhood of which place the descendants of Noah (*Genesis* 11), after the deluge, attempted to build a tower which should reach up to heaven, but God punished the builders with a confusion of tongues; derived from Hebrew, *balbel*, 'to confound.'

BAB-EL-MANDEB (13° N., 43° 10′ E.), strait (15 miles wide) between Arabia and Africa, forming entrance to Red Sea; means 'Gate of Tears' owing to record of shipwrecks; there is now a lighthouse on Perim in middle of strait.

BABENBERG, Franconian family, dating back to IX. cent., who held the Austrian duchy before the Hapsburgs. The male line became extinct in 1246.

BABER, 'the tiger,' surname of ZAHIR UD-DIN MUHAMMAD (1483–1530), founder of the Mogul dynasty; s. of Omar Sheik, ruler of Ferghana (Russ. Turkestan), and descended from Timur; was a great soldier, and conquered all northern India.

Caldecott, *Life of B.*, 1844; Lane-Poole, *Baber*, 1899.

BABEUF, FRANÇOIS NOEL (1762–97), Fr. agitator and journalist; originally a land surveyor, he became an adherent of the extreme party at the outbreak of the Revolution (1789); was commended by Marat, but opposed the aims of Robespierre during the Terror. He launched a paper called the *Tribune of the People* in which, over the signature of 'Gracchus Babeuf,' he advocated a system of communism by which all property should be distributed with the most strict equality. To further his views, B. associated himself with a plot to overthrow the Directory, which, being discovered, B. was guillotined.

BÁBÍISM, religion of a Muhammadan sect, founded 1844, by Mírzá 'Alí Muhammad, which acknowledges Muhammad as a prophet, and the *Koran* as an inspired book, but refuses to accept the finality of either, and denies the doctrine of bodily resurrection.

BABINGTON, ANTHONY (1561–86), Eng. R.C. gentleman (of Derbyshire), who had been page to Mary Queen of Scots at Sheffield, and later became head of a plot to assassinate Elizabeth and place Mary on the throne. The conspiracy was discovered, and B. and the rest of the plotters were hanged at Tyburn. Its discovery also led to Mary's execution.

BABINGTON, CHURCHILL (1821–89), Eng. classical scholar; made his reputation as a translator of the writings of Hypereides from the papyri discovered at Thebes (1847–56).

BABIRUSA, BABIROUSSA (*Babirusa alfurus*), the 'pig-deer' of Buru and Celebes. It differs from the genus *Sus* in having ever-growing canines. Those of the upper jaw grow upwards through the skin of the face and curl backwards, giving the animal an appearance of a pig with four horns.

BABLE, Sp. dialect spoken in Asturias.

BABOON, African monkey of genus *Papio* or *Cynocephalus*, with fore and hind limbs nearly equal, being thus adapted for a terrestrial rather than an arboreal existence. The *Mandrill* (*q.v.*) and *Chacma* (*q.v.*) are examples.

BABRIUS, Gk. fabulist, of whose life nothing is known. A MS. containing 123 of his fables was discovered in 1842, at St. Laura's Convent, Mount Athos, and is now in Brit. Museum.

BABU, BABOO, term for 'Mr.' or 'Esquire,' applied to Hindu gentlemen; also a Hindu clerk; applied sometimes disparagingly to an Indian who has been educated in England.

BABUL TREE, Indian acacia, gives hard timber and a medicinal and edible gum.

BABUYANES (19° 20′ N., 121° 10′ E.), volcanic islands, Philippines; produce fruits, cereals. Pop. *c.* 10,000.

BABY.—At birth a normal baby weighs about 7½ lb. This weight is doubled at six months (15 lb.) and trebled at twelve months (22½ lb.), but babies fed artificially increase in weight less regularly than breast-fed babies. An infant is normally put to the breast during the first two or three days of life for five or ten minutes at a time, at intervals of six hours, thus obtaining colostrum, which has a beneficial effect on the digestive system, and stimulating the secretion of milk. During the first month the baby is put to the breast at intervals of two hours during the day and twice during the night, for fifteen minutes at a time; during the second and third months, at intervals of two and a half hours during the day and once during the night; during the fourth and fifth months at intervals of three hours during the day and once during the night, towards the end of the fifth month feeding at night being unnecessary.

Weaning is generally a gradual process, at the commencement of the ninth month one of the nursing periods in the morning being omitted and artificial feeding substituted, while in another week an afternoon nursing period is omitted in place of artificial feeding, and so on. The best bottles are boat-shaped, with a rubber teat at one end and a screw stopper or rubber valve at the other. During lactation the baby is sometimes accustomed to artificial feeding by giving it a bottle once a day containing a little warm water which has been boiled. Cow's milk, scalded and modified by dilution with water and the addition of cream and sugar, and, in special cases, bicarbonate of soda, etc., is the best artificial food for the baby; at the second month, when artificial feeding is necessary so early, 2 parts of water to 1 of milk, at the fourth month equal parts, at the sixth month 1 part of water to 2 of milk, and at the eighth pure milk—cream and sugar begun in small quantities and increased, the maximum amount of cream to be 1 tablespoonful, and of sugar 1 dessertspoonful. During the last three or four months of the first year, some farinaceous food can be added to the milk diet.

Baby-Farming, the taking of children to nurse for payment. As they were mostly illegitimate, it was to interest of parents that such infants should not live,

and the mortality, previous to 1871, was enormous. But by Acts passed in 1872, 1897, 1907, and 1908 nurses receiving such children are placed under strict supervision, and severe penalties are imposed for evasion of laws relating to them.

Chavasse, *Advice to a Mother*; *The Baby* (Jack, 1912).

BABYLON—Heb. *Babel* (*q.v.*), gate of the god—(32° 35′ N., 44° 40′ E.), ancient town, Mesopotamia, on E. bank of Euphrates, capital of Babylonian empire; most important between XIX. and VI. cent's B.C.; was ruined by Sennacherib of Assyria, *c.* 690 B.C., but regained prosperity under Nabopolassar and Nebuchadrezzar; conquered by Cyrus, 539; by Alexander the Great, 331; began to decline under Seleucidæ (*q.v.*), of whose kingdom Seleucia (near by) became capital. The remains of the Great B. show it to have been smaller than painted; traces of three walls still to be seen; German excavations, 1899 onwards, have revealed sites of palaces, etc. Adjoining that of Nebuchadrezzar II. traces of irrigation works probably mark site of *Hanging Gardens* of Semiramis, who represents fabulous luxury of B.; built in terrace form and supported on arches resting upon other arches, they were one of seven wonders of the world. The traditional worldliness, luxury, and vice of B. furnished Puritans of XVI. and (still more) XVII. cent's with an epithet to describe Rome, symbolism of *Revelation* being transferred to current events; the 'Great B.' is a common figure of speech applied to large cities.


BABYLONIA
Statute Miles
0 10 20 30 40 50
Projected Railway
B A G H D A D
I R A K
A R A B I S T A N
Kerbela or Meshed Hussein
Hillah
Kufa
Diwaniyah
Samawah
Lemloom
Nasiriah
Amara
Kornah
Nazrieh
Shatra
Sinjara
Souk el-Sinjara
Tell Khowaiha
Tell Lakes
Tell Kotchek
Tell Mokdam
Tell Mogeyer
Tell Mediena
Tell Mardina
Tell Kte
Tell Ibrahim
Tell Sechera
Tell Lowaija
Tell Maghallat
Tell Afrim
Tell Kasr
Tell Kesra
Tell Kaseiba
Tell Kesrwan
Tell Mahawil
Tell Hamam
Tell Zubeidia
Tell Zemeia
Tell Tobul
Tell Ibrahim
Tell Hamdan
Tell Mahomed
Tell Mahawil
Tell Mahomed
Tell Mahawil
Tell Mahomed
Tell Mahawil

Nebuchadrezzar, but declined after his death in 561. Last king of B., Nabuna'id, was subdued by Cyrus of Persia in 538; B. henceforth held by Persia, till latter conquered by Alexander the Great, after whose death country became of no importance.

Babylonian Law is known to us from a fairly large number of ancient records and archæological evidence from the very remote past down to about the time of Christ. Even when Babylon had ceased to exist as a state its law survived, and some of it was taken over by Muhammadan codes (*q.v.*). But the discovery of the Code of Hammurabi (king of Babylon about 2250 B.C.) gave a much more detailed knowledge of it than was possible before. It shows a highly developed political and social system then in existence. The community was divided into three classes—first, a ruling class, including those of noble and professional rank, n intermediate class whose exact scope and function it is difficult to determine, and the slaves. Commerce was regulated, and a regular financial and banking system had come into being. An elaborate system of waterworks kept the country irrigated. The criminal law inflicted many penalties—death by hanging or burning, mutilation on the principle 'Let the punishment fit the crime,' and financial penalties. Before he could be punished a man had to be *proved* guilty. Trade was carried on by caravans which often journeyed far outside Babylonia. Marriage had to be accompanied by payment to the bride's f., but the money was generally returned to the bride. The wife was still considered to belong to her own family, and her husband could divorce her if he chose, though he had to relinquish the children. Immorality was punished with death or other penalties. See Harper, *Code of Hammurabi*; Cook, *Laws of Moses and Code of Hammurabi*.

Religion.—During the period of the development of the Babylonian and Assyrian religion changes took place, but the primitive belief was that every object in nature housed a spirit which collectively governed the actions of mankind. Thus arose a fetish-worship, with its medicine-men, who professed to combat the malevolent spirits who were the cause of disease and sickness. In course of time these multitudinous spirits were gathered into a great hierarchy, whence arose the gods of the heavens, the earth, and the underworld. Of these deities Ea was lord of the sea; Dav-kina, his consort, the earth-goddess; their children being Tammuz and Istar, both of whom were held in great veneration throughout Babylonia and the whole of Western Asia; there were also Samas, the sun-god; Mul-lil, lord of the nether world; his consort, Ninkigat, and their son Namtar, who spread disease and death. The powers of all these gods, however, eventually became absorbed in the paramount Baal (*q.v.*), the f. and creator of the universe.—See A. H. Sayce, *Religion of the Ancient Babylonians* (1887); L. W. King, *Babylonian Religion and Mythology* (1899).

Babylonian Captivity, name given to the deportation of the Jews from Judæa to Babylon by Nebuchadrezzar; they were allowed to return to their own country when Cyrus conquered Babylonia (537 B.C.); name also applied to residence of Popes at Avignon, 1309–77.

BACAU, Bakau (46° 36′ N., 26° 50′ E.), town, Moldavia, Rumania; chief commercial centre.

BACCARAT, gambling game, with cards, of complicated and varying rules, played by from three to eleven persons. It is forbidden in many clubs. The origin of the name is unknown. It has been popular in France for a long period. Several b. clubs raided in London, 1912–13.

BACCARAT (48° 28′ N., 6° 43′ E.), town, France; manufactures glass. Pop. c. 7000.

BACCHANALIA (Lat.), riotous orgies held at Rome and other towns in honour of the god Dionysus (Bacchus). At these festivals the grossest debauchories were committed, which led to their partial suppression throughout Italy (186 B.C.).

BACCHIUS, metrical foot (∪ — —).

BACCHUS, see Dionysus.

BACCHYLIDES (fl. 467 B.C.), Gk. lyric poet; nephew of Simonides; wrote odes, elegies, and drinking songs.

BACCIO D'AGNOLO (1460–1543), Ital. wood-carver, architect, and sculptor; did much carving for Church of Santa Maria Novella and Palazzo Vecchio, Florence; was also architect of the Bartolini Palace, the Villa Borghese, and the campanile of Santo Spirito.

BACCIOCHI, FELICE PASQUALE (1762–1841), Corsican who served in Italy under Napoleon, whose eldest sister, Elisa, he m., 1797; cr. Prince of Lucca and Piombino (1805). Their dau., Napoleone Elise (1806–69), m. Count Camerata.

BACH, JOHANN SEBASTIAN (1685–1750), Ger. composer; b. Eisenach, where his f. was court and town musician; member of a family which had produced musicians for several generations; lost his f. at age of ten, and was taken under the care of an elder bro., Johann Christoph, organist at Ohrdruf. Apparently the boy's progress was too rapid for his guardian, who forbade him the use of certain compositions of the earlier masters. The lad, however, managed to obtain secret possession of the volume at nights, spent six months in laborious copying by moonlight only to have the work confiscated by Christoph when it was discovered, while the strain put upon Sebastian's eyesight undoubtedly did much to hasten the blindness which overtook him. At the age of fifteen he was thrown upon his own resources by the death of his brother. He went to Lüneburg, and having a fine soprano voice became a member of the choir at St. Michael's School, remaining after his voice had broken as violinist and player upon the harpsichord. When nineteen he became organist at Arnstadt, later moved for a year to Mülhausen, and secured a long engagement as Kapellmeister to the Köthen court. Here he devoted himself to composition, producing some of his greatest works. Eventually he went to Leipzig, where the remainder of his life was spent.

All forms of composition were developed by B. to such an extent that his life marks an epoch in the history of music, and he is unrivalled in ease of intricate composition. His orchestral works had much influence on those of succeeding composers, his violin and violoncello compositions are held in the highest esteem, and he was the greatest organist of his time. He had an inventive faculty, and introduced a new method of fingering and a new system of tuning, both of which are universally employed to-day.

Several of B.'s sons achieved distinction as musicians: **Bach, Wilhelm Friedeman** (1710–84), eldest son; organist and skilful composer; died in poverty. **Bach, Karl Philipp Emanuel** (1714–88), third s.; composed oratorios, cantatas, sonatas, etc.; his work was held in great esteem by Mozart, Beethoven, and other composers. **Bach, Johann Christian** (1735–82), eleventh and youngest son; the 'Eng. B.'; became music master to Queen Charlotte, 1762.

Lane Poole, *Bach* (Great Musicians Series); Parry, *Studies of Great Composers*.

BACHARACH (53° 3′ N., 7° 47′ E.), town, on Rhine, Germany; wine.

BACHAUMONT, FRANÇOIS (1624–1702), Fr. author; wrote *Voyage de Chapelle et B.* in collaboration with Chapelle; gave name to Fronde.

BACHE, ALEXANDER DALLAS (1806–67), Amer. physicist; superintendent U.S.A. coast survey.

BACHE, FRANCIS EDWARD (1833–58), and **WALTER BACHE** (1842–88), Eng. musicians; were bro's; former, composer of operettas and pianoforte pieces; latter, Prof. of Pianoforte at Royal Academy of Music; see C. Bache, *Brother Musicians*, 1901.

BACHELLER, IRVING (1859–), Amer. author; editorial staff of *New York World* (1898–1900); achieved success as novelist with *Eben Holden* (1900); later works include *D'ri and I* (1901), *Silas Strong* (1906), and *Keeping up with Lizzie* (1911).

BACHELOR (supposed to be derived from Low

Lat. *baccalaris, baccalarius*, tenant of a small farm), term applied to an unmarried person, or person holding an inferior degree or standing—thus knight-b. was an inferior of a knight-banneret; an inferior grade of ecclesiastic; the lowest degree of a univ.

BACHIAN (0° 30′ S., 127° 30′ E.), fertile island, Molucca Sea, Dutch East Indies.

BACILLUS, see BACTERIOLOGY.

BACK, SIR GEORGE (1796–1878), Arctic explorer; started 1833 in search of Capt. Ross; discovered Artillery Lake, 1834, and traced Great Fish or B.'s River to mouth in Frozen Ocean; among other honours, made admiral, 1857.

BACKARGANJ (22° 30′ N., 90° 20′ E.), district, Dacca, Brit. India: part of Ganges and Brahmaputra delta, and in S. forest tracts, Sunderbunds; fertile, healthy country, intersected by rivers and canals; great rice crops; area, 4542 sq. miles. Pop. 2,291,752.

BACK-BOND, Scot. legal term for a document qualifying an earlier deed.

BACK-BONE, spinal column. See SKELETON.

BACKGAMMON, game of skill, played on a folding board, or table, each half of which is marked off into twelve *flèches*, or points, six at each end. It is played by two persons, each player having fifteen draught-like pieces, the movements of which are governed by the casting of dice.

BACKHUYSEN, LUDOLF (1631–1708), Dutch artist, famous for his realistic seascapes and nautical studies.

BACKNANG (5° 10′ N., 105° W.), river, 560 miles, Canada; enters inlet of Arctic Ocean.

BACKSCRATCHER, long slender rod, made of various materials, with a carved human hand affixed, or bird's claw, and used for the purpose suggested by its name; common in XVIII. and early part of XIX. cent's, and now much sought after by collectors.

BACKSWORD, sword with one edge; singlestick.

BACKWELL, EDWARD (d. 1683), Eng. goldsmith, who introduced modern system of banking into Eng.

BACKWOODS, uncivilised parts of Canada and U.S.A.

BACON, DELIA (1811–59), Amer. authoress; dau. of David B., missionary among the Indians and founder of town of Tallmadge, Ohio. She is remembered only by her *Philosophy of the Plays of Shakespeare Unfolded* (1857), in which she sought to prove that Shakespeare's plays were written by Francis Bacon, Spenser, and Raleigh. In the preparation of this work she spent some years in England, during which time she became insane.

BACON, FRANCIS, LORD VERULAM AND VISCOUNT ST. ALBANS (1561–1626), Eng. philosopher, essayist, and statesman; youngest s. of Sir Nicholas B. (*q.v.*), and nephew of William Cecil, 'the Great Lord Burghley'; b. London, Jan. 22; ed. privately, and later at Trinity Coll., Cambridge; subsequently entered Gray's Inn (1576), was called to the Bar (1582), and became a bencher of his Inn (1586). While a student at Cambridge he attracted the favourable notice of Queen Elizabeth, who dubbed him 'the Young Lord-Keeper.' He accompanied Sir Amyas Paulet on a mission to France (1577); applied to his powerful uncle for a Court appointment, but was unsuccessful. His success at the Bar, however, was considerable, and he entered the political arena as member for Melcombe Regis (1584), sitting subsequently for Taunton, Liverpool, Middlesex, and Southampton. He obtained from Burghley (1589) the reversion of the clerkship of the Star Chamber (worth £4600 per year), but this did not fall vacant until 1608. In the meantime he attached himself to the Earl of Essex, Burghley's rival at Court, who bestowed many favours upon him. B. commenced his public life with an inordinate belief in himself, and was throughout his life servile to those placed above him, and treacherous to his friends.

With the downfall of Essex, B. had no compunction in endeavouring to secure the Earl's conviction for treason, while at the same time he sought to exonerate himself. With the accession of James I. B. lost no time in bringing his old arts of flattery and obsequiousness to bear upon the new monarch, with the result that he was knighted (1603); became Solicitor-General (1607); Attorney-General (1613); Lord-Keeper (1618); Lord-Chancellor, and Baron Verulam (1619), and was cr. Viscount St. Albans (1621). These latter titles were derived from *Verulamium*, the Latin name of St. Albans, near which his estate lay. B.'s rise to greatness was followed by his immediate downfall, for on March 17, 1621, charges of corruption were laid against him by the Commons. He attempted no defence, merely asking his judges 'to be merciful to a broken reed.' Having been found guilty, B. was fined £40,000 (which fine was remitted), was committed to the Tower during the king's pleasure, and was declared incapable of again holding a public office.

B. was now able, for the remainder of his life, to devote his energies entirely to the literary and philosophical writings in which he really achieved greatness, and which constitute his enduring title to fame. Dissatisfied with the Aristotelian system of deductive logic he evolved a theory based on inductive methods which did not rest solely upon enumeration of phenomena, but upon their proper selection and arrangement. In brief, the substance of his philosophy is that man is merely the interpreter of Nature, and that all knowledge is the result of experience. As the pioneer of scientific induction, he is in some sense the parent of the school of Eng. philosophy developed later by Hobbes, Locke, and Hume, and of modern science. B.'s *Advancement of Learning* was pub. 1605; *Wisdom of the Ancients* (1609); *Novum Organum* (1620); *Henry VII.* and other works (1622); *Essays* (complete) and *Apophthegms* (1625). In a purely literary sense B. is seen at his best in his *Essays*, which combine a high sense of style with much practical wisdom and keen observation of life; and in his *Henry VII.*, which displays much scholarly research, he characterises Henry with remarkable skill, and gives an attractive and animated account of that momentous reign. The attempts by some writers to father upon B. the plays of Shakespeare need not be seriously considered.

Francis Bacon, Skemp (Jack, 1912).

BACON, JOHN (1740–99), Eng. sculptor; patronised by George III.; examples of his work are to be found in St. Paul's Cathedral, Christ Church and Pembroke Colleges, Oxford, Bath Abbey, and Bristol Cathedral.

BACON, LEONARD (1802–81), Amer. congregationalist; bro. of Delia B.; pastor at Newhaven, Connecticut (1825–81); exercised considerable influence upon Amer. theol., and was regarded as the leading Congregationalist of his time. He was opposed to slavery, wrote a number of hymns, and pub. *Slavery Discussed* (1846), *Thirteen Historical Discourses, Genesis of the New England Churches*, etc.

BACON, SIR NICHOLAS (1509–79), Lord-Keeper of the Great Seal of England; was the f., by his second wife, of Francis Bacon, Viscount St. Albans; he seems to have possessed moral principles which were wanting in his more famous son; he lived respected and died regretted; founded a free grammar school at Redgrave.

BACON, ROGER (1214–94), Eng. philosopher and scientist; b. Ilchester; ed. at Oxford; said to have taken orders (1233), and later continued his studies at Univ. of Paris, where he acquired some renown, took the degree of D.D., and was familiarly known as *Doctor Mirabilis*. He joined the Franciscans and was imprisoned on a charge of practising magic. B.'s chief works were *Opus Majus* (a treatise on maths., logic, grammar, physics, etc.), *Opus Secundum*, and *Opus Tertium*. He was a firm believer in astrology and the use of the philosopher's stone; was the inventor

of the magnifying glass; several of his scientific generalisations were far in advance of his time. He suggested several inventions, such as the telescope, air-pump, diving-bell, camera obscura, and is said to have invented gunpowder.

See Brewer's preface to *Opera Inedita* (Rolls Series).

BACONTHORPE, JOHN (d. 1346), Eng. Carmelite monk; known as 'the Resolute Doctor'; defended Averroism.

BACSANYI, JANOS (1763–1845), Hungarian poet and patriot; pub. *The Valour of the Magyars* (1785), edit. *Magyar Museum*, and wrote for the *Magyar Minerva*.

BACTERIOLOGY, the study of bacteria, a general term including the minute vegetable micro-organisms of the class *schizomycetes* (splitting fungi), occurring in the air, water, and the soil, as well as in the tissues of living plants and animals and their products. Bacteria may be divided into two classes, those of a simpler and lower type, and those which are somewhat more highly developed. The former are unicellular masses of protoplasm, without definite nuclei and without chlorophyll, which multiply by fission, some having little prolongations of their outer covering (certain authorities consider them rather protrusions of the protoplasmic cell contents) in the form of cilia or flagella, which serve as means of propulsion. This class comprises the *coccus* form, a minute globule, the *bacillus*, a straight rod, and the *vibrio*, *spirillus*, and *spirochæte*, which are curved or spiral rods, some of which must be included among the higher types, as they really consist of several cells united end to end. In the process of reproduction the cell becomes more elongated, a septum forms longitudinally up the middle, and the cell splits along the septum, forming two cells which become exactly like the parent cell. This process may go on indefinitely, so that enormous numbers of bacteria may develop in a short time, and when developed in a liquid they may become glued together by their swollen cell-walls, and form a film on the surface or a clump floating in the liquid, called a *zooglœa*.

The second class comprises filaments composed of cells which remain united end to end after division, the structure of each element being the same as in the lower types, and also filaments in which some of the cells form *spores* for the purpose of the reproduction of the species. A spore commences by the appearance of a granule round which the protoplasm in the cell gathers, a fine membrane forming and enveloping the mass. This is very resistant and can withstand great extremes of temperature, and under suitable conditions it swells and develops into a cell like that from which it was originally formed.

The **growth** of bacteria depends on (*a*) the supply of nourishment, (*b*) the presence of moisture, (*c*) the presence of certain gases, (*d*) the temperature, and (*e*) light.

Most bacteria require organic matter as food, some requiring protein or carbohydrates, and all requiring nitrogen in some form or other, but a certain number can exist on inorganic food; while inorganic salts (phosphates, chlorides, etc.) are necessary for the life of all.

Moisture is necessary for the existence of all bacteria, although a number of species, particularly in the spore form, are able to live without it for some time.

Oxygen is a very important factor in the life of bacteria, which may be divided into those which require oxygen for existence (*aerobes*), those which cannot exist in the presence of oxygen (*anaerobes*), and those which can live either in the presence or absence of oxygen (*facultative anaerobes*). Carbon dioxide also prevents the growth of anaerobes to a certain extent.

There is a particular temperature, called the optimum temperature, at which each species of bacteria grows best, that for the bacteria commonly existing in the tissues of animals being between 36° and 38° C.; while the lowest temperature at which growth is ordinarily possible is 10° to 12° C., and the highest 43° to 45° C. Certain bacteria, called *thermophilic* bacteria, have been found, *e.g.*, in putrefying animal excretions, which grow at a temperature as high as 70° C.

Sunlight is found to kill even extremely resistant bacteria after a very short time, the time required depending on the density of the medium in which the bacteria are; and it has been found by experiment that the green, violet, and ultra-violet rays of the spectrum are the most bactericidal.

Benefits of bacteria.—It is erroneous to imagine that all bacteria are harmful; the greater number of them are harmless and a large number are actually advantageous to man, in agriculture, certain fermentation processes, and other spheres of industry. There are species of bacteria in all cultivated soils which are able to form organic matter from inorganic sources by, for instance, obtaining carbon from carbon dioxide and nitrogen from ammonia, others combining nitrogen with other elements so as to compose substances which plants can absorb. On the roots of leguminous plants (beans, peas, etc.) there are little nodules containing great numbers of bacteria which bring the nitrogen of the air into combination with the soil, and such plants are not only able to live in poor, unmanured soils, but they actually enrich the soil they grow in. For this reason such plants are or should be included in all rotations of crops. The bacterial nodules are nominally only found on the roots of leguminous plants, but Prof. Bottomley, of King's Coll., London, has recently succeeded in producing them in other plants by a special method of infection.

Milk usually contains numbers of bacteria (e.g. *tubercle bacillus*) which are harmful to man, for which reason the milk should be sterilised before it is used as a food; but, in addition, it often contains bacteria which are not only harmless but impart desirable flavours to milk products, *e.g.* butter and cheese—a fact which is now being made use of by makers of dairy produce, who cultivate pure cultures of such bacteria and treat butter and cheese with them.

The preparation of tobacco and indigo and the process of tanning are other instances of the value of bacteria to man, for in the fermentations in these and similar processes bacteria play an important part.

Bacteria and disease.—It is, however, to the effects produced by pathogenic bacteria in man, and to the means of resisting and overcoming these effects, that most attention has been paid. As early as the XVII. cent. van Leeuwenhoek was able to describe bacteria with the aid of the primitive microscope. Müller divided them into two classes in 1773, while in 1838 Ehrenberg proposed quite an elaborate classification. Cohn, however, laid the foundations of the modern science by his researches and discoveries in 1853–75, which were developed by Pasteur, who first showed that disease could be caused by bacteria, and by Koch, by whom most of the modern methods of bacteriological study were instituted. Koch obtained a pure culture of the anthrax bacillus in 1876, and from that time to the present day the knowledge of the bacteria causing different specific diseases, of the effects of the bacteria on the tissues, and of the best methods of resisting and neutralising these effects, has gradually become more exact and complete. Before a bacterium can be universally regarded as the cause of a particular disease, it must be found in the affected tissues (by the use of the microscope), it must be obtained in a pure culture (*i.e.* quite separate from other organisms), and the disease must be reproduced in an animal by inoculation of it with a pure culture of the bacteria. For microscopic examination lenses of very high power must be employed, and the bacteria are detected by straining them in fine sections of the tissues by special and sometimes complicated methods, usually with solutions of aniline dyes. In growing particular bacteria outside the tissues separate from other species meat extracts

with gelatine or agar (a gelatinous substance obtained from certain seaweeds) and peptones (products of protein) are commonly used as nutritive culture media, while coagulated blood serum, milk, slices of potato, glucose, and other sugars with gelatin and other substances, are all frequently employed. To ascertain the effect of bacteria on animal tissues inoculations are made usually on rabbits, guinea-pigs, or mice. The effects produced in animal tissues by bacteria are due to the poisons or toxins formed by them, but little is yet known regarding the precise manner of the formation and the chemical composition of these toxins. The tissue changes are partly due to disturbances in the living cells caused by the toxins, and partly due to the reaction of the tissues against the invasion. The cells may degenerate or die, there may be acute inflammation or suppuration, hæmorrhages, emigration of white corpuscles, exudation of fluid, increased growth of connective tissue, and fatty, hyaline, or waxy degenerations of cells. See PATHOLOGY.

Natural immunity.—The actual results of the invasion of the body by bacteria vary under different circumstances, depending on the virulence of the organisms, on the local resistance of the part infected, and on the general susceptibility of the individual. Animals may be naturally immune to diseases caused by different bacteria, or they may acquire immunity by successfully undergoing an attack of a particular disease, or through one or other of the methods of inoculation. Natural immunity is due to the power of the animal to destroy the bacteria which invade its tissues, either by the agency of the white blood corpuscles which are strong enough to overcome the bacteria and engulf them, or through certain substances in the blood serum which are able to kill the bacteria. The power of the white corpuscles to overcome the bacteria is greatly assisted by substances in the blood serum called *opsonins*, which become attached to the bacteria and cause them to be more easily taken within the white corpuscles; and the *opsonic index* is the ratio between the number of bacteria taken up by the white corpuscles in the normal blood of an animal and the number contained within the white corpuscles in the blood of an infected animal of the same species.

Artificial immunity may be considered under two heads, *active* and *passive*. Active immunity is produced by injecting into an animal non-lethal doses of the living organisms, with their virulence attenuated by various abnormal methods of growing them, or simply in small, non-lethal quantities, or by injecting non-lethal doses of the dead bacteria or of the filtered toxins produced by them in cultures. This gradually produces a resistance to the effects of the bacteria in the animal subjected to the treatment, by the production of more and more resistant substances in the blood. Passive immunity is produced by injecting into an animal the blood serum of another animal which has been rendered immune by the methods described in regard to active immunity, thus carrying to the second animal the resistant substances formed in the blood of the first. The antitoxins, or substances which counteract the bacterial toxins, are believed to be substances which are normally present in the blood, but under the stimulation of the toxins they are produced in increased quantity, and they act directly by combining with the toxins and neutralising them.

Principles of Bacteriology, Abbott; *Structure and Functions of Bacteria*, Fischer; *Manual of Bacteriology*, Muir and Ritchie; *Studies in Immunity*, Ehrlich; *Handbuch der Pathogenen Mikroorganismen*, Kolle and Wassermann.

BACTRIA, ancient district, Central Asia, now forming part of Afghanistan and Asiatic Russia; situated between Amu Daria R. and Hindu-Kush Mts.; said to have been powerful kingdom dating to XI. cent. B.C.; subdued by Persians, subsequently by Alexander the Great; part of Seleucid empire; independent kingdom under Diodotus I. (III. cent. B.C.).

BACUP (53° 42′ N., 2° 12′ W.), market town, on Irwell, Lancashire, England; cotton spinning. Pop. (1911) 22,300.

BAD LANDS, waste tracts of deeply eroded plateaus, forming valleys, columns, and peaks, found in Black Hills region of Missouri basin, which early French visitors called *mauvaises terres*.

BADAJOZ.—(1) (38° 59′ N., 6° 56′ W.) frontier province, western Spain; undulating surface; metals, pork; area, 8451 sq. miles. Pop. (1910) 561,900. (2) (38° 53′ N., 6° 48′ W.) town, on Guadiana, Spain; strong fortress; old cathedral; ruined Moorish castle; surrendered to Soult, 1811; retaken by Wellington, 1812; hats, pottery. Pop. (1910) 33,200.

BADAKSHAN (37° N., 70° 30′ E.), territory, part of Afghan Turkestan between Hindu-Kush and Oxus; watered by B. River; capital, Faizabad; produces gold, silver, iron, copper, lead, rubies, emeralds, lapis lazuli, etc.; conquered in turn by Chinese, Sultans of India, Afghans, Uzbegs; whole conquered by Afghans, 1859. WAKHAN is dependency, S. of Panj R. People are of Aryan race. Area, 8500 sq. miles. Pop. c. 150,000.

BADALONA (41° 25′ N., 2° 12′ E.), port, Spain; manufactures sugar, glass. Pop. 19,240.

BADBY, JOHN (d. 1410), Eng. Lollard martyr; burned at Smithfield for repudiating the doctrine of transubstantiation.

BADDELEY, ROBERT (d. 1794), Eng. actor; played chiefly at Drury Lane and Haymarket theatres, where he made a great reputation in low comedy, and was the original Moses in the *School for Scandal*. He bequeathed £3 annually to provide a cake and wine at Drury Lane on Twelfth Night, which custom is still observed. His wife, Sophia B. (1745–86), an actress and singer, was noted for her beauty and loose conduct.

BADEN, grand-duchy, S.W. Germany, between Württemberg and the Rhine. Of surface about five-sixths along the E. is hilly. Odenwald is in N., Schwarzwald or Black Forest in S., and remainder in W. is part of Rhine valley; extreme S.E. drained by Danube; rest lies in Rhine basin, tributaries being Main, Neckar, Murg, Kinzig. Temperature and rainfall vary considerably; mean temperature for Heidelberg and Mannheim, 51° Fahr., rainfall ranges from about 40 in. in N. to nearly 80 in Schwarzwald.

History.—The grand-duchy dates only from time of Napoleon I. In XII. cent. member of house of Zähringen (from Z. in the Breisgau), Hermann I., margrave of Verona, inherited B., and from 1112 his successors called themselves margraves of B., sometimes united under one tenant, but early divided into the over-margravate of B.-B. and lower of B.-Durlach, separate, 1527–1771. B.-B. remained Catholic at Reformation while B.-D. became Protestant; united, 1771, under Karl Friedrich of B.-D. In 1803 margravate was raised to electorate, and in 1806 Karl Friedrich by joining Confederation of Rhine became sovereign prince and assumed title grand-duke; his grandson Karl married Stéphanie de Beauharnais; in 1815 B. entered German Confederation and received liberal constitution, 1818; reforming grand-duke Leopold (1830–52), the *Volksfreund*, introduced Prussian *Zollverein*, 1832; forced to fly by armed risings of 1848–49; reinstated, 1849, by Prussian aid. Religious differences, still unsettled, broke out under his son; Concordat made (1859) with Rome roused strong opposition. B. supported Austria against Prussia, 1850–66, but then left German Confederation and joined Prussia, whom she supported against France, 1870–71.

Government is monarchy; executive in hands of grand-duke, who shares legislative power with *Landtag*, assembly of two houses, of which lower has 73 members elected by people. Upper House has some hereditary members, some who are chosen by grand-duke and some who sit in virtue of their office.

Resources.—Rhine district produces grain, tobacco, hemp, rape, chicory, hops; vines on hills, forests of pine.

oak, beech, birch, ash in Schwarzwald; several districts noted for wine. Minerals include limestone, gypsum, salt, soda; many mineral springs. Manufactures cottons, ribbons, paper, tobacco, beer, clocks, musical instruments, hats, chemicals, etc., all exported. Capital, Karlsruhe. Area, 5823 sq. miles. Pop. (1910) 2,142,833.

BADEN (47° 28′ N., 8° 18′ E.), town, Switzerland; noted for thermal mineral springs since Roman times; seat of Swiss federal council for three cent's. Pop. 6050.

BADEN-BADEN, or BADEN (48° 46′ N., 8° 15′ E.), beautifully situated watering-place in Baden; famous for mineral springs and baths; known to Romans; visitors annually about four times pop., *c.* 17,000.

BADEN-BEI-WIEN (48° 1′ N., 16° 14′ E.), town, Lower Austria; well-known spa, has thermal mineral springs. Pop. 12,447.

BADENI, CASIMIR FELIX, COUNT (1846–1909). Austrian premier (1895–97); roused great opposition from German element in Reichsrath through support of Bohemians and Moravians.

BADENOCH (56° 55′ N., 4° 10′ W.), mountainous district, S.E. Inverness-shire, Scotland; deer forests.

BADEN-POWELL, LIEUT.-GEN. SIR ROBERT STEPHENSON (1857–), Brit. general; held Mafeking until its relief, 1900, and assisted in capture of Pretoria; estab. Boy Scouts brigades, 1908. The **Boy Scouts** movement (including 'Sea Scouts') has spread all over the Brit. Empire and U.S.A.; it aims at giving knowledge of art of war and at development of hardihood and manliness in future citizens. A similar association of GIRL GUIDES has been formed.

BADENWEILER (47° 49′ N., 7° 24′ E.), village, Baden, Germany; mineral springs.

BADGE (M.E. *Bage*), emblem adopted by different families; originated at same time as armorial bearings, to which it does not belong; early example, Fr. *fleur-de-lys* (XII. cent.) of royal family.

BADGER (*Meles*), Musteline Carnivora of N. hemisphere, of nocturnal, solitary habits, living in burrows; badger-drawing was an old Brit. sport, hence *badgering*, term for worrying or teasing. See also WEASEL FAMILY.

BADGHIS (35° 10′ N., 62° E.), district, N.W. Afghanistan.

BADHAM, CHARLES (1813–84), Eng. scholar; b. Ludlow; ed. Oxford; subsequently schoolmaster at Louth and Birmingham; from 1866 until his death was prof. of Logic and Classics in Sydney Univ.; was noted for his ripe scholarship, and editions of Euripides, Plato, and other classic authors.

BADIGEON, compound used for filling holes in marble-work.

BADINGUEUX (Fr.), nickname of supporters of Napoleon III., who was styled *Badinguet* after his flight from Ham in clothes of mason of that name.

BADMINTON, a game, named after the seat of the Duke of Beaufort in Gloucestershire, somewhat resembling tennis, played with racquets and a shuttlecock by two players, one on each side, or four players, two on each side, on a court 44 ft. long and 20 ft. broad, with a net stretched transversely across the middle, 30 in. deep, the top of the net being 5 ft. from the ground at the centre. In England the game is usually played in a covered court, which must not be less than 18 ft. in height. The game is for 15 or 21 aces (in ladies' singles 11 aces), and a rubber is the best of three games. (*Laws of Badminton and the Rules of the Badminton Association*, pub. annually.)

BADMINTON (51° 35′ N., 2° 17′ W.), village and parish, Gloucestershire, England.

BADNUR (21° 52′ N., 77° 57′ E.), town, Betul, Central Provinces, India.

BADRINATH (30° 44′ N., 79° 32′ E.), sacred town, United Provinces, India; temple.

BADULLA (7° N., 81° 5′ E.), town, Uva, S.E. of Kandy, Ceylon.

BAEDEKER, KARL (1801–59), Ger. guide-book publisher; b. Essen; s. of a printer and bookseller; acquired a world-wide reputation for his series of travel hand-books, which now number upwards of seventy volumes. Though the name 'Baedeker' has now come to be used as a common noun, it should not be forgotten that the inception of guide-books was due to John Murray, who, in 1836, published the first of its kind, the *Handbook for Holland and North Germany*. B. followed with a similar vol. in 1839, in which he expresses his indebtedness to the Eng. publisher; and for several years following Karl B. assisted in the editing of Murray's guides. The modern editions of B.'s guides are works of wonderful completeness.

BAEL FRUIT (*Aegle marmelos*), or BENGAL QUINCE, tree, with aromatic fruit, of W. Africa and tropical Asia; cultivated in India.

BAENA (37° 38′ N., 4° 19′ W.), town, Cordova, Spain. Pop. 14,539.

BAER, KARL ERNST VON (1792–1876), Ger. biologist; founded the science of comparative embryology; discovered the human ovum and the chorda dorsalis, and investigated the development of vertebrates; also became an authority on Arctic fauna and flora; his discoveries had far-reaching and permanent influence on modern biological science; chief of the Zoological Museum at Königsberg (1817), and librarian of the Academy of Sciences, St. Petersburg, 1834.

BAER, WILLIAM JACOB (1860–), Amer. artist; revised miniature-painting in America, and was first Pres. of the Society of M. P., New York.

BAEYER, JOHANN FRIEDRICH WILHELM ADOLF VON (1835–), Ger. chemist, Prof. of Chem. in Munich, noted for researches in organic chem., especially on indigo.

BAEZA (37° 57′ N., 3° 27′ W.), town, Jaen, Spain; important Moorish city; leather. Pop. 14,379.

BAFFIN BAY (72° 30′ N., 66° W.), large gulf, W. of Greenland; first explored by Baffin, 1616; whales, seals.

BAFFIN LAND (70° N., 70° W.), extensive island, W. of B. Bay; no trees.

BAFFIN, WILLIAM (1584–1622), Eng. navigator; b. London, of lowly parentage; served as pilot in a Greenland voyage, 1612; spent two years in Spitzbergen whale-fishing, 1613–14; went as pilot of the *Discovery* in search of the N.W. Passage for the Muscovy Company, 1615, when he made a survey of Hudson's Strait. In the following year he discovered the bay which has since borne his name. He was killed at the siege of Ormuz, Jan. 23, 1622, when the English were allied with the Persians against the Portuguese.

Voyages, edit. by Sir C. R. Markham, 1880.

BAGAMOYO (6° 31′ S., 38° 50′ E.), seaport town, Ger. E. Africa; commercial centre. Pop. 11,000.

BAGASSE (Fr.), remains after pressing sugar-cane; forms fuel.

BAGATELLE, originally meaning (Fr.) a trifle; a game resembling billiards, played on a table about 7 ft. by 1½ ft. or slightly larger, with slate floor covered with cloth, and cushioned at the sides. Nine small ivory balls are used, the object being to put them into nine numbered holes at one end of the table by the aid of a cue.

BAGDAD, BAGHDAD.—(1) (33° 17′ N., 44° 28′ E.), vilayet, Asiatic Turkey, in valleys of Euphrates and Tigris; area, 42,500 sq. miles. Pop. 600,000. (2) (33° 22′ N., 44° 28′ E.) town, Asiatic Turkey; capital, vilayet of B., on Tigris; great commercial centre, has large transit trade with Aleppo and Damascus; Bagdad or Euphrates Valley Railway, which is to extend Anatolian line from Konia to Persian Gulf, was completed as far as Bulgurli, 1904; financed internationally.

B. manufactures leather, silks, cottons; exports wools, carpets, galls, gums, dates, mohair, skins, hides, ore, almonds, pulse, seeds. Town is surrounded by brick and mud wall, and is situated on both sides of river, with bridge of boats connecting the two parts; there is

a citadel commanding river. Little trace remains of former glory except a few ruined mosques, and some ancient tombs. Modern town is very irregular, with narrow unpaved streets, quaint houses, and few important public buildings. There is modern palace; many mosques, both old and modern. People are chiefly Muslims, with admixture of Jews, and there are a few Christians. Administration rests with pasha and council.

From various remains there seems to have been a town on site of B. at very early date. Caliph Al-Mansur founded Arab city here about 763 A.D.; this quickly developed, becoming chief town of caliphate and reaching its greatest glory in times of celebrated Haroun al Raschid in IX. cent., when it was most magnificent city in world. Under later caliphate B. began to decline; taken and sacked by Hulaku in 1258, by Timur the Tartar 150 years later; afterwards saw constant struggle between Shahs and Sultans until its greatness was completely gone; has belonged to Turkey since 1638. Pop. c. 150,000.

BAGÉ (31° 30′ S., 54° 15′ W.), town, Rio Grande do Sul, Brazil.

BAGEHOT, WALTER (1826–77), Eng. economist; s. of a banker; b. Langport, Somerset; ed. Univ. Coll., London; called to Bar (1852); joined his f. in the banking business of Stuckey & Co.; editor of *The Economist* from 1860 until his death. His notable writings include: *The English Constitution* (1867), *Physics and Politics* (1869), *Lombard Street* (1873), *Literary Studies* (1879), *Economic Studies* (1880), the two latter being pub. after his death. B. undoubtedly exercised considerable influence upon the thought of his time, and several of his works were trans. into a number of foreign languages.

BAGELKHAND, Baghelkand (24° N., 82° E.), tract of country, Central India, comprising several Rajput states; area, 11,324 sq. miles. Pop. 1,737,100.

BAGGESEN, JENS IMMANUEL (1764–1826), Dan. poet; b. Korsör, of very poor parents; was self-educated until he managed to gain entrance to Copenhagen Univ. in 1782. His *Comic Tales* (in verse), pub. when he was 21, met with immediate success. He wrote with equal fluency in both Danish and German; his other works include *Alpenlied*, *The Labyrinth*, and *Parthenais*. His later years were clouded with poverty and madness.

BAGHAL (31° 13′ N., 77° 1′ E.), small hill state, Punjab, India.

BAGHERIA (38° 4′ N., 13° 31′ E.), town, Palermo, Sicily. Pop. 18,500.

BAGILLT (53° 15′ N., 3° 9′ W.), town, Flintshire, Wales; coal mines.

BAGIMOND'S ROLL, roll of assessment, drawn up by B. (Boiamund) de Vitia, of tax imposed by Council of Lyons (1274).

BAGIRMI (11° N., 17° E.), state, Central Africa, in valley of river Shari; capital, Chekna; subject to Wadai; contains fertile level plateau; pop. principally negroes; rice, cotton; pastoral Fula and Arabs rear cattle.

BAGLIVI, GEORGES (1669–1706), Ital. physician.

BAGNÈRES-DE-BIGORRE (43° 6′ N., 0° 7′ E.), watering-place, Hautes Pyrénées, France; sulphur springs, marble.

BAGNÈRES-DE-LUCHON (42° 46′ N., 0° 35′ E.), watering-place, Garonne, Pyrenees, France; sulphurous thermal springs. Pop. 7000.

BAGNES (Fr. plur., from Ital. *bagno*, first applied to bath in palace at Constantinople, afterwards to prison probably adjoining), Fr. prisons which in 1748 replaced the galleys; abolished 1852 by Napoleon III.

BAGNI (43° 48′ N., 10° 24′ E.), town, Tuscany, Italy.

BAGNI DI LUCCA (44° 2′ N., 10° 35′ E.), town, Lucca, Italy; mineral springs. Pop. 13,685.

BAGNO (43° 32′ N., 10° 37′ E.), town, Pisa, Italy; hot mineral springs. Pop. 20,899.

BAGNO A RIPOLI (43° 46′ N., 11° 18′ E.), town, Florence, Italy. Pop. 15,936.

BAGNO IN ROMAGNA (43° 50′ N., 11° 57′ E.), town, Florence, Italy; thermal springs. Pop. 9601.

BAGPIPE, wind instrument, which has been known from a very early period throughout Europe and Asia; was common in Germany and England as early as the XV. cent.; is referred to by Chaucer, Spenser, and Shakespeare; and is still used in Italy, in Southern France, and in Great Britain (Ireland, Scotland, and Northumberland). The Highland b., which is now the most familiar, consists of an air-tight leathern bag, a wind-tube for blowing, three wooden pipes called *drones*, and the *chanter*, a pipe with notes, which produces the melody, the compass consisting of nine notes only. In playing, the *drones* point over the left shoulder, the bag is held under the left arm, the blow-pipe is taken between the lips, and the fingers manipulate the notes of the *chanter*. Occasional 'flourishing' or ornamental notes introduced by a player are known as *warblers*. The Irish b., with a much more elaborate *chanter*, is a very sweet-sounding instrument, but is now rarely met with.

BAGRATIDES, Armenian dynasty who ruled Armenia from 885 till overthrow by Turks, XI. cent., and continued in Lesser Armenia till 1375 and in Imeritia, Georgia, till 1810.

BAGRATION, PETER, PRINCE (1765–1812), brilliant Russ. general.

BAGSHOT BEDS, Upper Eocene series of sands and clays containing fossil plants (e.g. *Eucalyptus*, *Platanus*), exposed in Surrey, Hants, Alum Bay (I.O.W.).

BAHADUR SHAH II., last Mogul emperor of Hindustan (1837–57).

BAHÁIS, influential Muhammadan sect in Persia; disciples of Bahá'ullah (d. 1892), who broke away from Babiism (*q.v.*). The Bible, Koran, and their own books they regard as equally inspired. Buddha, Zoroaster, Christ, Muhammad, and Bahá'ullah were all messengers and manifestations of God. Propagandist work is being actively carried on in Britain and America. The present head of the B. is 'Abbas Efendi, a son of Bahá'ullah.

BAHAMAS, Lucayos, chain of coral islands, W. Indies, extending about 600 miles from E. coast of Florida to N. coast of Hayti; belong to Britain; include 29 islands and 660 islets, about 20 being inhabited; area, c. 4400 sq. miles. Rock is porous, retaining moisture, hence soil fertile. B. produce maize, cotton, pine-apples, oranges, lemons, olives, tamarinds, cinnamon, etc.; sponges found in surrounding seas; import textiles, earthenware, glass, foods, etc.; principal exports, sponges, fruits, fibre; administered by gov., executive, and legislative councils and representative assembly; government system of education. Islands were first land seen by Columbus on his voyage of discovery; have belonged without interruption to Britain since 1718. Largest are Andros, Gt. Abaco, Gt. Bahama, and Gt. Inagua islands. Capital is Nassau, New Providence. Pop. (1911) c. 56,000.

BAHAWALPUR, Bhawalpur (29° 24′ N., 71° 47′ E.), capital, native state, in Punjab, India, near the Sutlej; level and partly desert; silks, chintzes; area of state, 15,000 sq. miles. Pop. (1911) 780,641.

BAHIA (12° 56′ S., 38° 27′ W.), state of Brazil, bordering Atlantic; traversed N. and S., by mountain range; principal river, São Francisco; productive soil; diamonds, gold; area, 216,000 sq. miles. Pop. 2,300,000.

BAHIA, or São Salvador (12° 56′ S., 38° 27′ W.), seaport, capital B. state; one of the best harbours east S. America; oldest Brazilian city, founded 1510; seat of R.C. abp. Pop. 250,000.

BAHIA BLANCA (39° 25′ S., 61° 25′ W.), city and port, Buenos Aires, Argentine Republic; good harbour. Pop. 50,138.

BAHOUR, district, Fr. India. Pop. 16,850.

BAHR, Arabic geographical term signifying lake or river, *e.g.* Bahr-el-Yemen, Red Sea.

BÄHR, JOHANN CHRISTIAN FELIX (1798–1872), Ger. classical scholar; chief work, *Geschichte*

der romischen Literatur, continued in works on early Christian and Carolingian writers.

BAHRAICH, BHARAICH (27° 35′ N., 81° 38′ E.), town and district, United Provinces, India; tomb of Masaud, warrior and Mussulman saint, visited by pilgrims. Pop. 24,300.

BAHRÂM, name of five Persian kings of Sassanid dynasty. Bahrâm V. (420–39), the 'Wild Ass,' is celebrated in Persian lit. as warrior and hunter.

BAHRDT, KARL FRIEDRICH (1741–93), Ger. theologian; extreme rationalist; forced to abandon Univ. of Giessen; finally retired to Prussia, established secret society, and was imprisoned; author of *True Christian in Solitude* and *Commentary on Malachi*.

BAHREIN ISLANDS (26° N., 50° 30′ E.), group of islands, Persian Gulf, near Arabian coast, governed by Sheikh, under Brit. protection; principal island, B.; capital, Manameh; pearl fishing centre; dates. Pop. *c.* 100,000.

BAHR-EL-GHAZAL (9° N., 28° E.), river, Sudan; rises in Belg. Congo and, flowing to N.E. through marshy district, unites with White Nile near Sobat; has several feeders, including Bahr-el-Homr, Lol, Jur, Tonj; sometimes obstructed by sudd. Another river of same name flows from Lake Chad to Bodele region, where it ends in swampy country.

BAIÆ (40° 48′ N., 14° 4′ E.), town, Campania, Italy, W. of Naples; favourite watering-place of ancient Romans; famous for its warm mineral springs; remains of villas and baths; in B. Triumvirate was formed by Cæsar, Pompey, and Crassus, 60 B.C.

BAIBURT (40° 14′ N., 40° 4′ E.), town, on Churuk, Asiatic Turkey; carpets. Pop. *c.* 10,000.

BAÏF, JEAN ANTOINE DE (1532–89), Fr. poet; intimate friend of Ronsard; was patronised by Charles IX. and Henry III.; wrote much original verse, paraphrased some of the principal Gk. and Latin lyric poets, and introduced changes into Fr. versification; member of Pléiade (*q.v.*).

BAIKAL (54° N., 108° 30′ E.), lake, E. Siberia, surrounded by mountains rising to height of 4500 to 5500 ft. above sea-level; length, 370 miles, breadth, 50; surface, about 1380 ft. above sea-level; average depth, *c.* 900 ft.; frozen, Dec. to May; crossed by steamers in connection with Siberian railway; salmon, sturgeon, and seal fisheries in N. end; fresh water; receives many streams.

BAIKIE, WILLIAM BALFOUR (1824–64), Brit. traveller, scientist, and author; surgeon and naturalist to Niger expedition, 1854; opened up Niger for England and pub. books on native languages.

BAIL, the setting free of an arrested person who procures surety, or b., on the part of one or more persons who are responsible for his or her reappearance to answer a charge at a fixed time and place. The power of admitting to b. is, in ordinary cases, at the direction of the magistrate.

BAILÉN (38° 5′ N., 3° 45′ W.), town, Spain; French surrendered to Spaniards, 1808. Pop. 7500.

BAILEY, GAMALIEL (1807–59), Amer. journalist; was a strong abolitionist; became editor of the *National Era* (Washington, D.C.), in which Mrs. Stowe's *Uncle Tom's Cabin* first appeared (1851–52).

BAILEY, NATHAN (d. 1742), Eng. lexicographer; was a Stepney schoolmaster and Seventh-day Baptist; pub. *Dictionarium Britannicum*, or *Universal Etymological English Dictionary* (1721), which had a wide sale and was frequently enlarged and improved. It served as the foundation of Dr. Johnson's later work, and was used by Chatterton in his composition of the 'Rowley Poems.'

BAILEY, OLD, the Central Criminal Court, London.

BAILEY, PHILIP JAMES (1816–1902), Eng. poet; b. Nottingham, where his f. was a newspaper proprietor; his fame depends entirely upon his long poem, *Festus*, pub. anonymously (1839), which had a very extensive sale both in England and America; member of Spasmodic School (*q.v.*).

BAILEY, SAMUEL (1791–1870), Eng. philosophical writer; pub. *Essays on the Formation and Publication of Opinions* (1821), *Essays on the Pursuit of Truth* (1829), *Money and its Vicissitudes*, *Theory of Reasoning*, etc.

BAILIE, Scot. municipal officer who sits as police-court magistrate, approximating to the Eng. alderman, but whose office is elective and lasts only for a term of three years.

BAILIFF.—(1) Officer app. by a peer or other landed proprietor to manage his estates, collect rents, etc. (2) A sheriff's officer app. to summon Juries, collect fines, etc. (3) County Court b., vulgarly called 'bum-bailiff,' serving under the high-bailiff, who is responsible for the serving and execution of distress warrants.

BAILLET, ADRIEN (1649–1706), Fr. scholar; pub. *Vie de Descartes* (1691), *Histoire de Hollande* (1693), *Les Vies des Saints* (1701), and numerous other hist. and antiquarian works.

BAILLEUL.—(1) (50° 47′ N., 2° 43′ E.) town, Nord, France. Pop. 13,530. (2) (52° 14′ N., 3° 18′ E.) town, Belgium.

BAILLIE, LADY GRIZEL (1665–1746), Scot. poetess; dau. of Sir Patrick Home (afterwards Earl of Marchmont); m. George Baillie, s. of the Scot. patriot, Robert B. of Jerviswood; she left numerous songs in MS., besides those pub. during her lifetime, her best-known lyric being *Werena my heart licht I wad dee*.

BAILLIE, JOANNA (1762–1851), Scot. dramatist and poet; dau. of the minister of Bothwell, in Lanarkshire; began to pub. verse at an early age, but is chiefly remembered for her *Plays on the Passions* (1798), which was followed by several other vol's of a like character. Her dramas were little suited for stage representation.

BAILLIE, ROBERT (1599–62), Scot. theologian; member of Glasgow Assembly (1638); chaplain in Leslie's Scot. army; prof. of Divinity, Glasgow (1642); one of the commissioners sent to Holland (1649) to invite Charles II. to Scotland. His *Letters and Journals* are of considerable hist. value.

BAILLIE, ROBERT, OF JERVISWOOD (d. 1684), Eng. conspirator, hanged for implication in Rye House Plot.

BAILLOT, PIERRE MARIE FRANÇOIS DE SALES (1771–1842), famous Fr. violinist.

BAILLY, JEAN SYLVAIN (1736–93), Fr. astronomer; observed Halley's comet, 1759; took part in Revolution; guillotined in Paris.

BAILY, EDWARD HODGES (1788–1867), Eng. sculptor; b. Bristol; s. of a naval wood-carver; entered R.A. Schools (1809); gold medal (1811); R.A. (1821); carved some of the bas-reliefs on the Marble Arch, and was responsible for the Nelson Statue in Trafalgar Square.

BAILY, FRANCIS (1774–1844), Eng. astronomer, pioneer of modern solar eclipse expeditions; superintended preparation of star catalogues; one of leading founders of R. Astronomical Soc.; observed and described the discontinuous beadlike effect occurring in the visible crescent of the sun at times of eclipse, called **Baily's Beads**.

BAILY, WILLIAM HELLIER (1819–88), Eng. palæontologist; assisted in Eng. and Irish Geological Survey; author of works on palæontology; nephew of E. H. Baily.

BAIN, ALEXANDER (1818–1903), Scot. philosopher; b. Aberdeen; was a weaver in early life, later entered Marischal Coll.; prof. at Aberdeen and Glasgow; subsequently moved to London, and pub. *The Senses and the Intellect* (1855), *The Emotions and the Will* (1859); prof. of Logic and English in the Univ. of Aberdeen from 1860–80. His later publications include *Higher English Grammar* (1863), *Manual of Rhetoric* (1866), *Manual of Mental and Moral Science* (1868). His psychology was based wholly upon mental physiology, and was strongly associationist in tendency. He lived on intimate terms with J. S. Mill and Grote, and founded *Mind*, a philosophical journal.

BAIN, ANDREW GEDDES (1797–1864), Scot. geologist; emigrated to S. Africa; started geological map of Cape Colony; discovered *Dicynodon* and other fossil reptiles in Karroo Beds.

BAINBRIDGE, JOHN (1582–1643), Eng. astronomer; Savilian prof. of Astron., Oxford.

BAINBRIDGE, WILLIAM (1774–1833), Amer. commodore; fought against England, then Barbary Pirates; improved organisation of navy.

BAINDIR (38° 3′ N., 27° 40′ W.), town, Asiatic Turkey; figs.

BAINES, EDWARD (1774–1848), Eng. newspaper editor and proprietor and politician; bought *Leeds Mercury*; compiled directories for Yorks and Lancs. M.P. for Leeds, 1834–41.

BAIRAKTAR, MUSTAFA, BAIRAK-DAR (1755–1808), Turk. grand vizier; avenged murder of Selim III. on janissaries, 1808, and assisted Mahmud II. to obtain sovereignty; besieged by janissaries and slew their candidate and himself.

BAIRAM, name of two Muhammadan festivals; first, at beginning of X. month (3 days long), followed after 70 days by second, which commemorates Abraham's offering up of Isaac.

BAIRD, SIR DAVID (1757–1829), Brit. soldier; commanded at capture of Cape Colony, 1806; second in command under Moore at Corunna, where he lost an arm.

BAIRD, SPENCER FULLERTON (1823–87), Amer. naturalist; studied chem., physiology, math's, and especially ornithology and zool.

BAIREUTH, see BAYREUTH.

BAIT-BUG (*Hippa talpoidea*), small Amer. crustacean of burrowing habits.

BAIZE, stout fabric, generally green; used extensively as cover for card- and billiard-tables.

BAJAUR (35° N., 71° 30′ E.), small protected district, borders of Brit. India and Afghanistan; fertile plain, encircled by forest-covered mountains; iron ore; area, *c.* 370,000 sq. miles. Pop. *c.* 120,000. Capital, B. Pop. *c.* 5000.

BAJAZET I., BAYAZID (1347–1403), great Ottoman sovereign and warrior, who obtained title of Sultan from the Caliph.

BAJAZET II., BAYAZID (1447–1512), Sultan of Turkey; succ. his f., Muhammad II., in 1481. The power of Turkey greatly diminished under his rule.

BAJZA, JOSEPH (1804–58), Hungarian author, editor, etc.; wrote notable verse and developed national literature.

BAKCHISERAI (44° 44′ N., 33° 53′ E.), town, Crimea, Russia; was capital of Tartar Khans; morocco. Pop. 15,000.

BAKE, JAN (1787–1864), Dutch critic and philologist; prof. of Greek and Latin at Leiden Univ.; pub. *Critica Nova* (1825–31), *Scholica Hypomnemata* (1837–62), also edit. some of the works of Cicero and Longinus.

BAKEL.—(1) (51° 31′ N., 5° 45′ E.) town, Brabant, Holland. (2) (14° 57′ N., 12° 19′ E.) town, Sudan. (3) (15° 5′ N., 12° 40′ W.) fortified town, Senegal, W. Africa.

BAKER CITY (45° N., 117° 30′ W.), town, Oregon, U.S.A.; gold and silver mines. Pop. 6742.

BAKER ISLANDS, islands on equator, Pacific Ocean; under Brit. protection.

BAKER, MOUNT (48° 45′ N., 121° 42′ W.), mountain, Washington, U.S.A.; 10,827 ft.

BAKER, SIR BENJAMIN (1840–1907), Eng. engineer; associated with Sir John Fowler; designed metropolitan and other London underground railways; designed the special vessel for conveying Cleopatra's Needle to London; his best-known work is the Forth Bridge; consulting engineer for Assuan dam; author of many engineering papers.

BAKER, HENRY (1698–1774), Eng. naturalist; m. dau. of Daniel Defoe; Copley gold medallist for microscopical researches on crystallisation, and founder of Bakerian Lecture of Royal Soc.

BAKER, SIR RICHARD (d. 1645), Eng. scholar; was an Oxfordshire squire and high sheriff of the county; knighted by James I.; ruined by aiding his wife's relations, and spent his last ten years in Fleet Prison, where he wrote *Chronicle of the Kings of England* and other hist. and theological works.

BAKER, SIR SAMUEL WHITE (1821–93), Brit. explorer, sportsman, and writer of books of travel; founded Brit. colony at Newera Eliya, Ceylon, 1848; built Black Sea Railway, 1859–60; explored sources of Nile, discovering Lake Albert Nyanza, 1861–64.

BAKER, THOMAS (1656–1740), Eng. clergyman and antiquary; Fellow of St. John's Coll., Cambridge, and rector of Long-Newton; collected upwards of 40 valuable MSS. relating to Cambridge Univ.

BAKER, VALENTINE, 'BAKER PASHA' (1827–87), Brit. soldier; brilliant cavalry officer, bro. of Sir Samuel B. (*q.v.*); distinguished himself in Crimean War and afterwards in service of Turks.

BAKEWELL (53° 14′ N., 1° 42′ W.), town, on Derwent, Derbyshire, England; mineral springs.

BAKEWELL, ROBERT (1725–95), Eng. agriculturist and breeder; best known for improving the Leicestershire breed of sheep and Dishley cattle.

BAKEWELL, ROBERT (1768–1843), Eng. geologist; one of the earliest teachers and writers on geology.

BAKHMUT (48° 30′ N., 37° 35′ E.), town, Ekaterinoslav, Russia; salt. Pop. 20,000.

BAKHTEGAN (29° 40′ N., 54° E.), saline lake, Persia.

BAKING, see COOKERY, BREAD.

BAKÓCZ, TAMAS (1442–1521), Hungarian cardinal and statesman; established Austro-Hungarian alliance.

BAKONY WALD (47° 25′ N., 18° 5′ E.), forested district, Hungary, between Danube and Lake Balaton.

BAKSHISH (Pers.), term used in Egypt and parts of East for 'tip' or gratuity.

BAKU.—(1) (40° 21′ N., 49° 51′ E.) government, Transcaucasia, Russia, W. of Caspian Sea; area, 15,061 sq. miles. Pop. (1910) 1,013,900. (2) (40° 35′ N., 49° 55′ E.) fortified seaport town, capital of B. government; Russ. naval station; great petroleum district; ancient temples of fire-worshippers. Pop. 177,777.

BAKUNIN, MIKHAIL (1814–76), Russ. revolutionary and political writer; organised anarchical movements and democratic associations all over Europe; frequently extradited.

BALA (52° 53′ N., 3° 35′ W.), market town, Merionethshire, Wales; flannel. **Bala Series,** or CARADOC GROUP, consists of sandstones, shales, and fossiliferous (Brachiopods, trilobites, and graptolites) limestones, forming upper Ordovician; well developed near Bala.

BALAAM, a Gentile prophet whom Balak, king of Moab, sent for to curse Israelites; God, in a dream, forbade him to do so (*Numbers* 22–24).

BALADHURT (d. 892), important historian of Persia; so known from poison by which he died.

BALÆNA, see WHALE.

BALAFRÉ (Fr.), person who has scar of wound (*balafre*) on face.

BALAGHAT (21° 20′ N., 80° 15′ E.), plateau, Nagpur, Central Provinces, India; between E. and W. Ghats; area of dist., 3132 sq. miles. Pop. 325,371.

BALAGUER, VICTOR (1824–1901), Span. author and politician; his first play (*Pepin el Jorobado*) was produced at Barcelona when he was 14, and his second, *Don Enrique el Dadivoso*, when 19; he was Liberal leader (1843–68), editor, and proprietor of the newspaper, *El Consellor*; was subsequently minister of finance, vice-pres. of Congress, and senator.

BALAKIREV, MILI ALEXEIVICH (1836–), Russ. composer; well known as a conductor in his native country; composer of symphonies, overtures, songs, etc., some of which have been given at Eng. musical festivals.

BALAKLAVA (44° 33′ N., 33° 38′ E.), fishing

village, Crimea, Russia; port of Laestrigonians at which Ulysses is said to have touched; Brit. headquarters during Crimean war; indecisive battle (Oct. 25, 1854), in which Light Brigade, Heavy Brigade, and Highland Brigade all distinguished themselves.

BALALAÏKA, a Slav stringed instrument, very popular as an accompaniment to dances and folk-songs amongst the Russ. peasantry; has triangular sound-board, fitted with a long wooden neck, strung with from two to four strings, which are plucked with the fingers.

BALANCE, appliance for comparing weights and forces. See WEIGHING MACHINES.

BALANCE, THE, see LIBRA.

BALANCE OF POWER, political term signifying international interest in keeping one state from preponderating. It became axiom of foreign politics in XVII. cent.

BALANOGLOSSUS, a primitive chordate animal (see HEMICHORDATA), worm-like in habits and appearance, and found burrowing in sand or mud in shallow sea water. The body is in three divisions: proboscis, containing the notochord; ring-like collar, in front of which the mouth lies; and long trunk, with segmentation only in the respiratory and genital organs. Within it are many gill-slits which open to the exterior by gill-pores. The free pelagic larva is known as a Tornaria.

BALAPUR (20° 40′ N., 76° 48′ E.), town, Berar, India. Pop. 10,486.

BALARD, ANTOINE JÉRÔME (1802–76), Fr. chemist; discovered Bromine; numerous researches in pure and applied chem.

BALASINOR (22° 59′ N., 73° 16′ E.), dependency of Guzerat, India. Pop. 32,618. Capital, B. Pop. 8530.

BALASORE (21° 30′ N., 87° E.), district and seaport, Orissa division, Bihar and Orissa, India; early Brit. settlement (1642); produces rice; area, 2085 sq. miles. Pop. 1,071,197.

BALASSA, BÁLINT (1551–94), Magyar lyric poet; was author of hymns, battle-songs, and love lyrics, all marked by striking originality; killed at the siege of Esztergom, during the Turkish War.

BALATA GUM, juice obtained from b., sapotaceous tree of tropical America; it is used in place of india-rubber and also makes chicle gum.

BALATON (46° 45′ N., 17° 45′ E.), largest lake, Hungary; c. 50 by 10 miles.

BALAYAN (13° 51′ N., 120° 42′ E.), seaport and bay, Luzon, Philippine Islands. Pop. 8500.

BALBI, ADRIANO (1782–1848), Ital. geographer, whose writings were noted for accuracy. S., EUGENIO B. (1812–84), was prof. and geog. writer.

BALBI, GASPARO (fl. XVI. cent.), Ital. traveller; made explorations in India and wrote *Viaggio nelle Indie Orientali* (1590).

BALBO, CESARE, COUNT (1789–1853), Ital. author and statesman; b. Turin; served in various capacities under Napoleon, after whose fall he devoted his energies entirely to his native country. He had no expectation of a truly united Italy, but speculated upon a confederation of states under the papal supremacy; pub. *Vita di Dante* (1839), and several works advocating Ital. independence.

BALBOA, VASCO NUÑEZ DE (1475–1517), Span. explorer; of noble birth; began life as an adventurer, and developed into an able general and administrator; founded a colony on the Darien Isthmus; discovered the Pacific (1513) and received from King Ferdinand title of 'Admiral of the South Sea.' His brilliant successes, however, aroused the jealousy of Don Pedro Arias de Avila, the new gov. of the Darien colony, who put forward a false charge against him and secured his execution.

BALBRIGGAN (53° 37′ N., 6° 12′ W.), seaport and market town, County Dublin, Ireland; hosiery.

BALBUS (meaning 'Stammerer') was the surname of several Roman families. The best-known B. was **Lucius Cornelius Balbus,** friend, adviser, and sometime secretary to Cæsar. He was a native of Gades (Cadiz); became a Roman citizen, and after Cæsar's death rose to be (40 B.C.)—the first alien—consul.

BALCARRES, EARLDOM OF.—David Lindsay, grandson of David, 9th Earl of Crawford (*q.v.*) and 2nd s. of John Lord Menmuir, was cr. Lord Lindsay of B. (1633); his s. Alexander was in 1651 cr. Earl of B. by Charles II. and left a s., Colin, a prominent Jacobite, but finally pardoned. The 6th earl, Alexander, succ. in 1808, under the patent of 1642, to the earldom of Crawford, the earldom of Lindsay (*q.v.*) being then separated from it. See CRAWFORD.

BALCONY (Ital. *balcone,* from O.H.G. *balcho,* beam), platform projecting from wall of a building inside or outside, and enclosed by parapet; the outside b., great feature of Renaissance architecture, is attached to the window; the inside runs round almost entire wall as in theatre or concert-hall; usually supported by consoles, but may have invisible iron supports.

BALDACHIN(O) (Ital. *baldacchino*), canopy used in R.C. Church to carry over priest in procession, or stationed over altar or pulpit; made later of architectural materials.

BALDER, BALDR, BALDUR, Teutonic god of light and justice; in the Edda, son of Odin and Freya; everything in creation but mistletoe took oath not to injure him; slain by mistletoe-shaft through cunning of Loki; in the Ragnoravk (*Götterdämmerung*) returned to Asgard; different version preserved by Saxo Grammaticus.

BALDNESS, loss of hair, is due to follicles losing productive power. **Causes** may be: wearing of a 'bowler' hat, which by pressure lessens flow of blood to head; excessive perspiring about head (cf. liability of Europeans to b. in tropics); excess of dandruff. **Treatment** is mostly preventive; dandruff is removed by washes, *e.g.* spirit of soap, bay-rum, perchloride of mercury; in the country no hat should be worn; hard brushes irritate the scalp and produce dandruff. *Alopecia areata,* patchy b., occurs in animals.

BALDUNG, HANS, HANS GRÜN (1476–1545), Ger. artist; a friend of Dürer; his 'Crucifixion,' a masterpiece, is in Freiburg Cathedral.

BALDWIN I. (d. 1118), king of Jerusalem; 2nd s. of Eustace II. of Boulogne; went on First Crusade, 1096; established Christian principality of Edessa, 1098 (which lasted 47 years); succ. his bro. Godfrey de Bouillon as king of Jerusalem, 1100.

BALDWIN II. (d. 1131), king of Jerusalem; c. s. of Hugh, Count of Rethel; succ. his cousin, B. I., as Count of Edessa, 1100, and as king of Jerusalem, 1118; relieved Antioch (1119), besieged by Saracens; taken prisoner (1123). He was ransomed (1124) and extended his kingdom by continual wars. At his death it included all Syria but the territories of Aleppo, Damascus, Emesa, and Hamaah. The religious Orders of the Knights of the Temple and Hospital of St. John of Jerusalem date from his reign, he granting them their places of abode and obtaining papal confirmation. His character was pious and ascetic.

BALDWIN IV., king of Jerusalem (1174–83). The weakness of his rule prepared way for Saladin's conquests.

BALDWIN I. (d. 1205), emperor of Rumania (1204); as Count of Flanders and Hainault was leader in Fourth Crusade by which Constantinople was captured and Latin Empire of Rumania formed.

BALDWIN II. (1217–73), last Frankish emperor of Rumania; s. of Pierre de Courtenay; succ. elder bro. Robert as emperor, 1228. Michael Palæologus drove B. from Constantinople, 1261.

BALDWIN (d. 1191), abp. of Canterbury; d. during siege of Acre in Third Crusade.

BALDWIN, JAMES MARK (1861–), Amer. philosopher; held professorships at Toronto, Princeton, and Johns Hopkins Univ's; founded *Psychological Review*; pub. *Handbook of Psychology* (1890), *Elements of Psychology* (1893), *Story of the Mind* (1898), etc.

BALDWIN, ROBERT (1804–58), Canadian states-

man; advocated home rule; became solicitor-general, 1840, premier and attorney-general of Upper Canada, 1842.

BÂLE, see BASEL.

BALE, JOHN (1495–1563), Eng. author and bp. of Ossory; b. Cove, near Dunwich, Suffolk; wrote plays and pamphlets against R.C. party, 1538 onwards. He fled to Germany on the fall of Thomas Cromwell; returned under Edward VI., and was made bp., 1552; exiled, 1553–58. His history of Eng. lit. contains valuable information; and his play, *Kynge Johan*, has been printed by Camden Society.

BALEARIC ISLANDS (39° 30′ N., 3° E.), islands, off Span. coast, Mediterranean; belonged in turn to Carthaginians, Romans, Vandals, Moors, Aragonese; independent kingdom, 1232–1349, and subsequently united to Spain; famed for slingers in antiquity; include Majorca, Minorca, Iviza, Formentera, and eleven small islands; area, *c.* 1930 sq. miles; largest towns, Palma, Manacor, Port Mahon; fine climate; produce fruit, wine, oil, grain; export fish. Pop. (1910) 325,703.

BALES, PETER (1547–1610), Eng. calligraphist; pub. *The Writing Schoolemaster* (1590), which included what he termed the *Arte of Brachygraphie*, the earliest Eng. attempt at a system of shorthand.

BALFE, MICHAEL WILLIAM (1808–70), Irish composer and vocalist; s. of dancing master; b. Dublin; for many years operatic singer in Italy and England; composed many operas in English, French, and Italian with remarkable success, of which the best known in Britain is his *Bohemian Girl*; retired (1864) to take up farming.

BALFOUR, ARTHUR JAMES (1848–), Brit. statesman and author; eldest s. of James Maitland Balfour, of Whittingehame, Haddingtonshire, and Lady Blanche Cecil, dau. of 2nd Marquis of Salisbury; Conservative member for Hertford (1874), and became private sec. (1878) to Lord Salisbury, then foreign minister; a member of the 'Fourth Party'; Pres. of Local Government Board (1885–86); Sec. for Scotland, with seat in Cabinet (1886–87); Chief Sec. for Ireland (1887–91); carried *Crimes Act* through Parliament and set up Congested District Boards; app. First Lord of Treasury and leader of House of Commons, 1891–1902. On retirement of Lord Salisbury (1902) he became Prime Minister; passed *Education Act, Irish Land Purchase Act, Licensing Act, Scottish Churches Act, Unemployed Act*, and *Aliens Act*; instituted the Army Council and Imperial Defence Committee; cemented the *Entente Cordiale* with France. His undecided attitude towards Mr. Chamberlain's tariff proposals contributed to the Unionist crisis, and ultimate overwhelming defeat in 1906, after his resignation of office in Dec. 1905; but soon regained his prestige as most brilliant parliamentarian of his time. He resigned Opposition leadership in Nov. 1911, being succeeded by Mr. Bonar Law. He is a metaphysician of note, and has written *A Defence of Philosophic Doubt* (1879) and *The Foundations of Belief* (1895). In other circles he is known as an accomplished musician and as a keen golfer; see Alderson's *A. J. B.: the Man and his Work* (1903), and Short's *A. J. B. as Philosopher and Thinker* (1912).

BALFOUR, FRANCIS MAITLAND (1851–82), Scot. biologist, younger bro. of A. J. Balfour; brilliant morphologist at Cambridge Univ.; author of widely recognised treatise on *Comparative Embryology*.

BALFOUR, SIR JAMES, Bart. (1600–57), Scot. antiquary; contributed to Dugdale's *Monasticon*; was knighted and made baronet by Charles I., and also Lyon King-at-Arms, from which office he was dismissed by Cromwell. His *Annales of Scotland* (from MSS. in Advocates' library, Edinburgh) were pub. 1824–25.

BALFOUR, SIR JAMES (d. 1583), Scot. Lord Pres. of the Court of Session; was deeply implicated in the murder of Darnley, is said to have drawn up the marriage-contract between Mary and Bothwell, and afterwards betrayed the Queen to her enemies. He was held to be the greatest lawyer of his day, and was perhaps one of the most infamous characters in Scot. history.

BALFOUR, JOHN HUTTON (1808–84), Royal botanist for Scotland; prof. of Botany at Glasgow and Edinburgh successively.

BALFOUR OF BURLEIGH, BARONY OF.—Sir Michael B., ancestor of present Lord B., created Lord B., 1607, was descendant of Sir John B., kt. of Balgarvie, who received Burleigh, 1445–46; his dau. and heir, Margaret, m., 1606, Robert Arnot, who took name B. Their descendant, Robert, 5th lord, was sentenced to death for murder, 1709, but escaped in his sister's dress, aided Pretender, was attainted, 1715, and d. unmarried, 1757. His nephew, Robert Bruce, Lord Kennet, was great-grandfather of Lord B. of B. (1849–), Brit. (Conservative Free Trader) statesman.

BALFRUSH, see BARFURUSH.

BALI, LITTLE JAVA (8° 30′ S., 115° E.), island, Lesser Sunda group, E. of Java; mountainous and volcanic in centre; loftiest peak Gunung Agung, 10,500 ft.; forms, with Lomok (separated by Lomok Strait), Dutch residency; capital, Buleleng; fertile, well cultivated; rice, cotton, coffee. Area, 2300 miles. Pop. 750,000.

BALIKESRI (39° 35′ N., 27° 50′ E.), town, Turk. Asia Minor; great annual market in August. Pop. *c.* 15,000.

BALIOL, Scot. family named from their fee of Bailleul, Normandy; Guy came to England with Conqueror; Bernard (Barnard) built Barnard Castle, Durham, early in XII. cent., and fought at Battle of the Standard, 1138; his descendant, John, m. Devorgilla (who founded B. College, Oxford), descendant of David I. of Scotland, and was f. of King **John B.** (1292–96), f. of **Edward B.**, king 1332–38, who lost favour in Scotland through subservience to Eng. kings; entire family seems to have died out XIV. cent.

BALISTIDÆ, see TRIGGER-FISHES.

BALIUAG (14° 55′ N., 120° 50′ E.), town, Luzon, Philippine Islands; silk. Pop. 14,000.

BALKAN PENINSULA (36° to 48° N., 16° to 29° 40′ E.), easterly peninsula, S. Europe; bounded N. by Hungary, Russia, Moldavia; S. by Mediterranean, E. by Black Sea, Sea of Marmora, and Ægean Sea; W. by Ionian and Adriatic Seas; comprises Rumania, Servia, Montenegro, Bulgaria, with E. Rumelia, Turkey, Greece, Dalmatia, and Bosnia—Herzegovina; surface mountainous; area, *c.* 180,000 sq. miles. Principal rivers are Danube and Maritza, entering Black Sea and Ægean Sea respectively; chief lakes, Scutari and Ochrida. Whole peninsula was under sway of Turks from XV. to XIX. cent., when it began to break up; Greece obtained her independence in 1836; in 1878, by Berlin Treaty, Servia and Rumania also obtained complete independence, the administration of Bosnia and Herzegovina was handed over to Austria-Hungary, and the principalities of Montenegro and Bulgaria were established; in 1886 E. Rumelia was annexed by Bulgaria, and in 1908 Bulgaria was proclaimed an independent kingdom. Pop. is very mixed; consequent hostility of creeds led to incessant unrest, and was prime cause of the international problem known as the Eastern Question, which culminated, 1912, in the Turko-Balkan War (*q.v.*). Pop. *c.* 18,000,000.

The Balkan Question, edit. L. Villari (London, 1905); 'Odysseus,' *Turkey in Europe* (London, 1900).

BALKANS, THE, term applied to whole mountain range of Balkan Peninsula, but specifically to range which is an immediate continuation of Carpathians, beginning S. of the Iron Gates of the Danube and running E. to Black Sea; other ranges are the Pindus, in Turkey and Greece; the Central Balkans, which form a long and almost uniform ridge running east (highest peak, Yumrukchal, 7790 ft.); the Anti-Balkans (with Mt. Vitosha, 7515 ft.); in the Thraco-Macedonian region is the mountainous district of the Rhodope (highest peaks, Rilodagh and Muss-Alla, *c.* 10,000 ft.); the Dinaric Alps occupy west of the

peninsula, and run parallel to coast from Dalmatia to Greece (highest peak, Mt. Dinara, 6000 ft.).

BALKASH, BALKHASH (46° 30′ N., 75° 30′ E.), salt-water lake, Asiatic Turkey; about 300 miles long and 50 miles wide.

BALKH (36° 45′ N., 66° 48′ E.), city, on river B., Afghanistan; in ancient times, as BACTRA, a flourishing trade centre; now extensive ruins, modern town occupying only small portion of original city; associated with Zoroaster; destroyed by Jenghiz Khan, 1220.

BALL, a spherical or ovoid body of various substances, usually smooth, used in different games or as a missile. B. games have been played from very early times, and were very popular among the ancient Greeks and Romans. See BASE-BALL, CRICKET, GOLF, FOOTBALL, TENNIS, etc., for games in which balls are employed.

BALL, SIR ALEXANDER JOHN, Bart. (1759–1809), Eng. rear-admiral; served under Rodney and Nelson; commanded the *Alexander* at *Battle of the Nile*; blockaded Malta for two years, and eventually became gov. there; frequently mentioned in Nelson's dispatches.

BALL, JOHN (d. 1381), Eng. religious agitator; described by Froissart as the 'mad priest of Kent'; his Socialist opinions brought him into conflict with the religious authorities, by whom he was cast into prison at Maidstone, but was released by the Kentish rebels, only to be captured again at Coventry, where he was executed. He may be regarded as the earliest Eng. Socialist, and has been made the subject of a study by William Morris.

BALL, JOHN (1585–1640), Eng. Puritan preacher; ed. St. Mary's Hall, Oxford; was for some time a tutor in Cheshire, afterwards holding a curacy at Whitmore (Staff.), of which he was deprived because of his opinions. He pub. *Treatise of Faith* (1632), *A Short Catechisme* (many editions), and other works of the kind.

BALL, JOHN (1818–89), Irish politician and naturalist; Liberal M.P. for County Carlow; Colonial Under-Sec., 1885–1887; 1st pres. Alpine Club.

BALL, SIR ROBERT STAWELL (1840–), Eng. astronomer; Lowndean prof. of Astronomy and Geometry, Cambridge, and author of popular astronomical works.

BALL, THOMAS (1819–1911), Amer. sculptor; executed statues of Washington at Boston, Daniel Webster at New York, Edwin Forrest as 'Coriolanus' at Philadelphia, and many others which have brought him considerable fame.

BALLACHULISH (56° 42′ N., 5° 11′ W.), village, Argyll, Scotland; slate quarries.

BALLAD, originally a song accompanying a dance (from O. Fr. *baller*, to dance), now used in reference to a narrative poem in simple rhymed metre, most commonly in eight- and six-syllable measure, as thus:—

'John Gilpin was a citizen
Of famous London town.'

B's and folk-songs form part of the lit. of all European countries, and often the same story will be found in various languages. Some of the most beautiful of Eng. and Scot. traditional ballads are of very early date, and have undergone a process of alteration at the hands of many generations of minstrels. Bp. Percy and Sir Walter Scott did much to preserve old ballad lit. Percy's *Reliques* appeared in 1765, and the first vol. of Scott's *Border Minstrelsy* in 1802.

BALLADE, Old Fr. form of verse consisting of three stanzas and an envoi, and containing not more than three or four rhymes. It came into vogue during reign of Charles V., and was very successfully employed at different periods by Alain Chartier, Henry Baude, François Villon, Clément Marot, and Théodore de Banville. The *ballade* form has been used in England by Chaucer, Gower, Lydgate, and amongst later writers by Swinburne, Austin Dobson, and Andrew Lang.

BALLANCE, JOHN (1839–93), New Zealand statesman; b. Ulster; worked in ironmongery business at Belfast and Birmingham, afterwards emigrating to New Zealand, where he became a newspaper proprietor, entered Parliament, and became Premier (1891). He instituted the system of small farm-holdings, with Government aid, which has worked very successfully.

BALLANCHE, PIERRE SIMON (1776–1847), Fr. philosopher; b. Lyons; attempted to reconcile theocratic and rationalist schools.

BALLANTINE, JAMES (1808–77), Scot. artist and author; did much for modern art of staining glass; carried out staining of windows of House of Lords.

BALLANTINE, WILLIAM (1812–87), Eng. serjeant-at-law; famous for prosecution of Franz Müller (1864), and his defence of the Tichborne claimant (1871). Was a conspicuous figure in the literary and theatrical circles of his day.

BALLANTRAE (55° 6′ N., 5° W.), fishing village, Ayrshire, Scotland.

BALLANTYNE, JAMES (1772–1833), Scot. publisher; produced Scott's *Border Minstrelsy*, 1802; removed to Edinburgh, and with his bro. JOHN (1774–1821), established firm of B. & Co., in which Scott had half the shares; final bankruptcy, 1826.

BALLANTYNE, ROBERT MICHAEL (1825–94), Scot. novelist; b. Edinburgh; six years in service of Hudson Bay Company; on his return pub. *Hudson's Bay, or Life in the Wilds of North America*; entered Constable's publishing firm, but in 1856 adopted lit. as profession, and produced about 80 books for boys.

BALLARAT, and BALLARAT EAST (37° 34′ S., 143° 53′ E.), city, Victoria, Australia, next in importance to Melbourne; intersected by Yarrowee Creek; lies in centre of one of the richest gold-fields in the world; largest nugget ever found (the 'Welcome') was found at B.; district suitable for sheep-breeding; industries, gold-mining, iron-founding, brewing; railway centre. Pop. (1910) 44,000.

BALLAST, heavy material placed in hold of ship for stability; sand carried in balloon, and thrown out to ensure rising; gravel on slag bed for railway track.

BALLATER (57° 3′ N., 3° 3′ W.), village, Aberdeenshire, Scotland; mineral springs of Pannanich.

BALLENSTEDT (51° 43′ N., 11° 13′ E.), town, duchy Anhalt, Germany; iron ore. Pop. 5696.

BALLET (Fr. *ballet*, Ital. *balletto*, to dance), theatrical entertainment consisting of artistic dancing, posturing, and pantomimic action. Such performances were popular with the Greeks and Romans, and from early times the b. flourished throughout Italy—a notable performance of the kind being that given at Tortona to celebrate the marriage of the Duke of Milan in 1489. The b. was introduced into France by Catherine de' Medici, who wished to divert the attention of her s. (Henry III.) from State affairs. Henry IV., Louis XIII. and XIV., and Cardinal Richelieu all spent lavish sums on these entertainments, the three kings being themselves frequent performers in them. Women did not appear in b's until 1681, when four lady dancers took part in *Le Triomphe de l'Amour*. The earliest b. performed in London was *The Tavern Bilkers*, at Drury Lane, 1702. The word 'balette' was first used in English by Dryden in 1667.

BALL-FLOWER, architectural decoration (like ball enclosed in flower) largely used during XIV. cent.; good examples may be seen in Gloucester Cathedral.

BALLIA (25° 44′ N., 84° 11′ E.), district and town, Benares, United Provinces, India; rice, sugar-cane; area of dist., 1245 sq. miles. Pop. 987,768.

BALLINA (54° 6′ N., 9° 12′ W.), market town and seaport, County Mayo, Ireland; salmon fishery. Pop. 4500.

BALLINASLOE (53° 19′ N., 8° 14′ W.), market town, County Galway, Ireland; corn mills. Pop. 5000.

BALLINROBE (53° 38′ N., 9° 13′ W.), town, Mayo, Ireland.

BALLISTA, BALISTA, Rom. engine of warfare, which utilised principle of cross-bow to hurl missiles. See ARBALIST.

BALLISTICS, science treating of projectiles (*q.v.*). See also CHRONOGRAPH.

BALLOON, bag made of light and strong material, *e.g.* silk, and filled with a gas so as to rise and float in the air, which it does when the weight of the whole is less than the weight of an equal volume of air. In mediæval times various suggestions were made by philosophers and others to enable metal spheres and other vessels to float in the air, but the first b. was invented in 1782 by the bro's Joseph and Jacques MONTGOLFIER, paper-makers at Annonay, near Lyons, who inflated a paper bag over a fire with smoke so that it ascended into the air. They reproduced this experiment on a larger scale, and were imitated in Paris by CHARLES and the bro's ROBERT in 1783, who, however, substituted hydrogen gas an an inflating agent. In that year the Montgolfiers carried out their famous experiment before the king and queen at Versailles, sending up a large decorated b. inflated with smoke and heated air (it was later ascertained that not the smoke, as the Montgolfiers supposed, but the lighter heated air was the agent that enabled their b's to rise), to which was attached a cage carrying a cock, a duck, and a sheep, which were found to be uninjured when the b. descended.

In 1783, also, the first human being, DE ROZIER, ascended in a captive and later in a free fire-b., while only a few days later Charles, who invented the valve, netting, and other accessories, ascended in a b. inflated with hydrogen. The first person in Britain to rise in a b. was TYTLER, who ascended at Comely Gardens, Edinburgh, in 1784, in a fire-b. constructed by himself, some days before the first ascent by the well-known LUNARDI, at London. In 1785 the Eng. Channel was first crossed in a b. by BLANCHARD and JEFFERIES, and in 1836 another famous b. voyage was made by HOLLAND, MASON, and GREEN, from London to Weilburg, in Nassau, about 500 miles, in 18 hours. In 1912 BIENAIMÉ made a voyage in a b. from Stuttgart, Germany, to near Moscow, Russia, a distance of nearly 1362 miles.

As early as 1784 the b. was employed for making scientific observations, and between 1862 and 1866 numerous ascents were made by GLAISHER for the purpose of making barometrical and thermometrical observations, collecting air at different altitudes for analysis, etc., on behalf of the Brit. Association, ascending on one occasion to a height of 37,000 feet. B's and kites are much used for meteorological experiments (see METEOROLOGY), either carrying passengers to make observations or merely with instruments attached.

B's have also been employed for making reconnaissances in war, being used in the Fr. revolutionary wars at the beginning of the XIX. cent., in the Ital. campaign (1859), in the Amer. Civil War (1861), and in practically all modern wars and army manœuvres, while in the Franco-Prussian War (1870–71) communication was kept up between besieged Paris and the provinces by means of b's.

Dirigible Balloons.—The problem of controlling the direction of b's was the cause of experiments from the very beginning of ballooning, the bro's Robert, who were among the first balloonists, employing oars worked by hand for this purpose, with little if any success. In 1852 GIFFARD attached a steam-engine to a b.-car, and was able to deviate slightly from the direction of the wind; the bro's TISSANDIER (1884) employed an electric motor with a spindle-shaped b., and were successful to some extent in their object, and the French War Department subsequently experimented on the lines they had taken.

In 1900 Count VON ZEPPELIN finished the construction of a spindle-shaped rigid air-ship, consisting of numerous gas-bags enclosed in an aluminium framework with powerful motors attached, which, on experiment, travelled at the rate of 18 miles per hour, and since that time he has built a number of air-ships on the same design, with improved details, one of which has attained a speed of 37 miles per hour, but his air-ships have been very unfortunate in regard to accidents. In 1901 SANTOS DUMONT won the *Deutsch* prize for encircling the Eiffel Tower in Paris with a cigar-shaped balloon, his motive-power being a small petrol engine, and since then, in Germany, France, and Britain more particularly, but also in Italy, Belgium, and other countries, quite a large number of air-ships of the cigar-shaped balloon and petrol-engine type have been constructed, many of them under the auspices of the different armies and navies, in several of which aeronautical corps have been established.

Considerable journeys have been made by dirigible b's, especially by the rigid air-ships of von Zeppelin, one of which in 1909 accomplished a voyage of 870 miles in 37 hours, while attempts, which have proved vain, have been made to reach the North Pole from Spitzbergen (see ANDRÉE) and to cross the Atlantic. See also FLIGHT.

BALLOT (Ital. *ballotta*, a small ball) signifies a device for secret voting, the name originating in Gk. practice of voting by ball, the white or unpierced ball dropped into voters' box showing approbation, the black ball denoting disapproval—what we still call 'black-balling.' The Romans adopted a similar system, II. cent. B.C., but voted on pieces of wood. The idea has been adopted for elections by modern democracies; used in New England States from 1775; agitation for its use commenced in England with general agitation for Parliamentary reform at beginning of XIX. cent.; definitely adopted as part of Liberal programme, 1831. France (1852), Italy (1861), and Brit. Colonies (Australia, 1856) set the example; English Ballot Act, 1872, drawn up by W. E. Forster on Australian model, enforces voting by ballot of parliamentary and municipal elections. Names of candidates are printed in alphabetical order on a white, stamped paper; voter puts an X against name he approves, folds paper, and hands it to official, who drops it into locked, sealed box.

The Second B. is employed—or advocated—where the candidate at top of poll in a three or more cornered election has not been returned by more than half the total votes; in the second election the two top candidates of first b. alone present themselves.

BALLOU, HOSEA (1771–1852), Amer. preacher; s. of a Baptist minister; convert to Universalism (1789); founded *The Universalist Magazine* (1819), *The Universalist Expositor*, *The Universalist Quarterly Review*, etc.

BALLSTON SPA (43° 2′ N., 73° 55′ W.), summer resort, Saratoga County, New York, U.S.A.; mineral springs. Pop. (1910) 4138.

BALLYCASTLE (55°12′ N., 6° 15′ W.), market town, County Antrim, Ireland; summer resort.

BALLYMENA (54° 52′ N., 6° 17′ W.), town, County Antrim, Ireland; brown linen. Pop. 11,000.

BALLYMONEY (55° 3′ N., 6° 31′ W.), market town, County Antrim, Ireland; breweries, tanneries.

BALLYMOTE (54° 5′ N., 8° 31′ W.), market town, County Sligo, Ireland; carriage-building works.

BALLYSHANNON (54° 29′ N., 8° 12′ W.), seaport town, County Donegal, Ireland; salmon fisheries.

BALM (*Melissa officinalis*), fragrant Labiate herb, growing in S. Europe, also S. England. See BALSAM.

BALMACEDA, JOSÉ MANUEL (1838–91), Pres. of Chile Republic.

BALMAIN (34° S., 151° E.), town, Cumberland, New South Wales, Australia; sawmills; iron foundries, Pop. 31,000.

BALMAT, JACQUES (1762–1834), Alpine guide; first to reach highest summit of Mont Blanc (1786).

BALME, COL DE, famous pass of Rhône Valley between Chamonix and Martigny; height over 7000 ft.; magnificent views.

BALMERINO (56° 25′ N., 3° 2′ W.), village, Fife, Scotland, from which the Elphinstones took their title. JAMES ELPHINSTONE (*c.* 1553–1612), 1st Lord B., Scot. politician, was sentenced to death as traitor, 1609, for friendly correspondence with Pope, but spared,

as James I. might have been inculpated. Last baron was beheaded, 1764, for part in the '45.

BALMORAL CASTLE, royal residence, Deeside, Aberdeenshire, Scotland; estate was purchased by Queen Victoria in 1851, and present castle was erected from designs of Prince Consort, 1855.

BALNAVES, HENRY (1512–79), Scot. reformer; an active member of James V.'s privy council; favoured an alliance with England; taken by the French at surrender of St. Andrews Castle (1547), and was for several years kept a prisoner at Rouen; one of Bothwell's judges in Darnley murder case.

BALNEOTHERAPEUTICS, see BATHS.

BALQUHIDDER (56° 20′ N., 4° 20′ W.), village and parish, Perthshire, Scotland; Rob Roy's burial place.

BALRAMPUR (27° 25′ N., 82° 15′ E.), town, United Provinces, India; cotton. Pop. 16,800.

BALSAM, substance which is a mixture of an oleo-resin with benzoic acid or cinnamic acid, or with both; those used in med. are: b. of Peru, b. of Tolu, prepared **storax** (*Styrax preparatus*) and benzoin — the two former used chiefly in perfumery, and the two latter in ointments for some skin diseases, and together in a tincture as an expectorant; *balm of Gilead* (much prized in the East) and Canada b. (used in microscopic preparations) contain neither benzoic nor cinnamic acid, and should not therefore be included among b's.

BALTA (48° 3′ N., 29° 33′ E.), town, Podolia, Russia. Pop. 23,393.

BALTCHIK, BALTJIK (43° 25′ N., 28° 13′ E.), port, Bulgaria. Pop. 6000.

BALTHAZAR, see BELSHAZZAR.

BALTIC, OSTSEE (57° N., 19° E.), inland sea, N. Europe, surrounded by Sweden, Russia, Germany, and Denmark, connected with North Sea by Sound, Great Belt, Little Belt, Cattegat, Skager Rack, Kaiser Wilhelm Canal; in N. is Gulf of Bothnia, in E. Gulf of Finland; principal islands are: Aland Islands, belonging to Russia; the Dan. islands of Zealand, Fünen, Laaland, and Bornholm; Gottland and Oland, belonging to Sweden; length, c. 950 miles; greatest width, c. 350; area, c. 170,000 miles; length of coast line, 5000 miles; average depth, 20 fathoms, deeper in N. end; little tide, except at entrance; navigation dangerous; great part frozen in winter. B. Sea at Kiel and North Sea at mouth of Elbe were connected by Canal, 1895.

BALTIMORE (39° 17′ N., 76° 37′ W.), town, Maryland, U.S.A., on left bank of Patapsco, an inlet of Chesapeake Bay. Founded in 1729, B. became city in 1796; as shipping trade developed, merchant ships called 'Baltimore clippers' became known throughout world; repulsed British in 1814, when they attacked city; suffered from fire, 1904. Built on undulating ground, B. has fine public buildings, including white marble court-house and city hall; R.C. cathedral, library, etc.; seat of Johns Hopkins Univ., law and medical faculties of Maryland Univ., college for negroes, medical coll., etc.; Johns Hopkins Hospital ranks with finest in Europe; many other hospitals and asylums; finest park is Druid Hill Park. B. is only port of great importance in Maryland; railway, commercial, and manufacturing centre; fine spacious harbour, and enormous elevators for coal and grain; exports cereals, flour, cotton, tobacco, copper, meat, tallow, lumber, sheep, etc.; industries include fruit-, vegetable-, beef-, and oyster-canning, shipbuilding, manufacture of bricks, clothing, fertilisers, furniture, cotton duck, iron, steel. Pop. (1910) 558,485.

BALTIMORE, GEORGE CALVERT, 1ST BARON (d. 1632), Eng. statesman; b. Kipling (Yorks); ed. Trinity Coll., Oxford; frequently employed in State affairs by James I.; knighted, 1617; Sec. of State, 1619; cr. Baron B., 1625; was the founder of the Avalon colony in Newfoundland, 1621. His s. Cecilius, 2nd Baron B., was the founder of Maryland.

BALTISTAN, LITTLE TIBET (35° 24′ N., 75° 25′ E.), district, Kashmir, India; crossed by Karakorum Mountains, which culminate in Mt. Godwin Austin, over 28,000 ft. high; drained by Indus.

BALUCHISTAN, BELUCHISTAN, country, S.W. Asia, between Afghanistan and Arabian Sea; area, c. 134,000 sq. miles. Coast-line extends about 500 miles, but there are no good harbours. Considerable portion is under Brit. control, called **British B.,** in N.W.; whole is within Brit. sphere of influence. Surface generally consists of dry tablelands, but there are low-lying plains in E. Principal mountains are Suliman system in N., Kirthar range in E., Pab Hills in S., Sarawan and Jalawan ridges in Kalat plateau in S.W.; chief rivers, Nari, Bolan, Badra, in E.; chief town, Kalat. Climate has extremes of cold and heat; rainfall slight.

Early history of B. is veiled in obscurity; ruled by Hindu rajas till XVII. cent., when last raja applied for aid to Kambar, chief of mountain tribe, who eventually deposed him and established Muhammadan religion. In following cent. Nadir Shah established Persian influence in country, and appointed as ruler Nasir Khan in 1739. In 1839 Kalat was attacked and captured by British, who, however, evacuated it in 1841, having concluded treaty of friendship. Other treaties were concluded on two subsequent occasions, and British B. was established in 1887.

Fruits, cereals, and potatoes are grown; camels, horses, oxen, and cows kept. Minerals include coal, iron, lead, asbestos, chromite, salt, but are little worked. There are few manufactures; needlework, felts, pottery, etc., made; exports dates, dried fish, etc.

British B. and the political agencies of Quetta-Pishin, Zhob, Loralai, Bolan Pass, Sibi, and Chagai are directly governed by chief commissioner, who also, as gov.-gen.'s agent, supervises administration of remainder of country, comprising native States of Kalat and Las Bela, and tribal areas.

Inhabitants are chiefly of Pathan, Brahin, and Baluch races; Pathans found in directly administered districts, Brahins in middle, Baluchs in S.; there are also Lasis, Saiads, Chuttas, and other races, including Persians. Islam is principal religion, but there are some Hindus and a few Christians and Sikhs. Pop. (1911) 829,712. Map, see PERSIA.

Floyer, *Unexplored Baluchistan* (London, 1882); Holdich, *Indian Borderland* (London, 1901); Hughes, *The Country of Baluchistan* (London, 1877).

BALUE, JEAN LA (1421–91), Fr. cardinal; almoner to Louis XI., who obtained cardinalate for him (1468); as crafty and treacherous as his master, after whose humiliation by Charles the Bold he entered into an intrigue with the Burgundian; was discovered, and suffered eleven years' im[illegible]. After release, he lived in high favour at Rome.

BALUZE, ÉTIENNE (1630–1718), Fr. scholar; pub. *Capitularia Regum Francorum* (1674); *Nova Collectio Conciliorum* (1677); *Letters of Pope Innocent III.* (1682); *Vitæ Paparum Avenionensium, 1305–94* (1693).

BALZAC, HONORÉ DE (1799–1850), Fr. novelist; b. Tours; ed. Collège de Vendôme and Sorbonne; intended by his f. for the law, Honoré had other intentions, and went to Paris (1819) to seek his fortune as an author. Here for ten years he struggled, achieving no success. It was not until he was thirty that he made a reputation with his *Les Derniers Chouans,* followed by *La Peau de Chagrin,* and other novels. Then he conceived the idea of presenting, under the general title of the *Comédie Humaine,* a large series of novels which should give a complete panorama of modern life, including men and women of every rank and occupation. With this purpose in view, B. produced in rapid succession *La Recherche de l'Absolu, Le Père Goriot, Les Illusions Perdues,* etc. He wrote some eighty novels in twenty years, working sometimes eighteen hours daily, yet he was involved in debt to the end of his days. Criticism has raged round B.'s writings, and, despite his unique position, he is far from receiving unmixed eulogy from important critics. Many of his books are devoted to the emotions of trivial people, and the excitements

and ideals of the drawing-room, and the wit which makes such things acceptable is lacking; though that B. had a genuine, if not subtle, sense of humour is shown by the *Contes drolatiques*. He is at his lightest and happiest in sketching tragedies of common people like *Le Père Goriot*; he sought force rather than felicity of wording.

Lawton, *Life* (1910); Saintsbury has written critical prefaces to his Eng. edit. (1895–98); monograph by Brunetière (1906); Helm, *Aspects of B.*

BALZAC, JEAN LOUIS GUEZ DE (1594–1654), Fr. author; b. Angoulême; elegant writer, much patronised by Cardinal Richelieu; exercised much influence on Fr. language; chiefly known for his *Lettres*, and *Lettres Inédites*.

BAM (29° 10′ N., 58° 18′ E.), town, Kerman, Persia; famous citadel.

BAMAKO (12° 10′ N., 8° W.), capital, Upper Senegal-Niger, Fr. W. Africa. Pop. 6500.

BAMBARRA (12° N., 7° 12′ W.), district, Fr. W. Africa; inhabited by mixed race of same name; chief towns, Bamako (*q.v.*), Sego. Pop. *c.* 2,000,000.

BAMBERG (49° 54′ N., 10° 58′ E.), manufacturing town, Bavaria; former independent bishopric, secularised, 1801; annexed by Bavaria, 1803; magnificent Romanesque cathedral (1004), containing tomb of founder, Henry II.; important trade, cotton, silk, tobacco. Pop. 45,460.

BAMBERGER, LUDWIG (1823–99), Ger. politician and economist; prominent authority on finance and economics; promoted the gold currency, developed the Ger. Imperial Bank, and was a strong opponent of bimetallism.

BAMBINO, name for representations of the infant Christ in swaddling clothes; especially figure preserved in Rome, believed to work miracles.

BAMBOO (*Bambuseæ*), tribe of grasses, often tree-like (120 ft. high), growing in tropics, but spreading to subtropical and temperate zones; cultivation possible even to snow-line of Himalayas and Andes. The 23 genera are put to multifarious uses; succulent shoots and fruits for food; stems for buildings, masts, cooking vessels, writing-reeds, weapons; strips of outer cuticle are excellent material for basket-making and other wicker-work; in China, internal portions pulped for paper-manufacture.

BAMBUK (13° N., 11° W.), mountainous district, Fr. W. Africa; produces gold, iron, timber, fruit, cereals; live stock raised. Pop. *c.* 800,000.

BAMBURGH, Bamborough (55° 37′ N., 1° 43′ W.), village, Berwick-upon-Tweed, Northumberland, England; castle founded by Ida, about 547, stands on rock projecting into North Sea; fortress in mediæval wars; monument to Grace Darling (*q.v.*); sea-coal, lead mines.

BAMBUTE, African nomad race of pygmies found on western borders of Uganda Protectorate; they wear absolutely no clothes, do not decorate their persons; are fond of music; shoot game with poisoned arrows; average height about 4 ft. 6 in.

BAMFORD, SAMUEL (1788–1872), Eng. labour politician; a weaver by trade; wrote *Passages in the Life of a Radical* (1840–44) and poems in the Lancashire dialect.

BAMIAN (34° 49′ N., 67° 28′ E.), mountainous valley (8500 ft.), Afghanistan; ruins of ancient city; seat of Buddhist worship, enormous idols (one 173 ft. in height) carved in rocks, which form N. side of valley; caves, wild and deep passes.

BAMPTON.—(1) (50° 59′ N., 3° 29′ W.) town, Devonshire, England. Pop. (1911) 1572. (2) (54° 34′ N., 2° 45′ W.) town, Westmoreland, England.

BAMPTON-IN-THE-BUSH (51° 44′ N., 1° 33′ W.), town, Oxford, England Pop. (1911) 4666.

BAMPTON, JOHN (1690–1751), Eng. theologian; founder of B. Lectures for defence of Christianity.

BAMPUR (27° 12′ N., 60° 18′ E.), town, Persia.

BAMRA (21° 30′ N., 84° 23′ E.), native state, Bengal, India; timber; area, 1988 sq. miles. Pop. 123,000.

BAN, Persian title, meaning 'lord or master,' brought into Europe by the Avars; later it meant 'to proclaim,' 'to announce'; in Fr. it is the name of the section of the population first liable for military service, while *arrière-ban* means the reserve; by Shakespeare, Milton, and other Eng. writers it is used in the sense of 'to forbid'; it retains its earlier meaning of 'to proclaim' in 'banns of marriage.'

BANANA (*Musa*), tropical, perennial herbaceous plant; about 40 species, cultivated for food; *M. corniculata* produces a single fruit requiring cooking; leaves are used for packing, plaiting mats, etc. Manila hemp is prepared from *M. textilis*; b. is native of tropics of Old World, but is now distributed throughout the hot regions of America; large quantities exported from West Indies and Canaries; b. closely allied to the plantain (*q.v.*); latter more farinaceous than b., and is generally cooked.

BANANA.—(1) (8° 8′ N., 13° 6′ W.) volcanic island, Sierra Leone, Africa. (2) (6° S., 12° 17′ E.) seaport, Belgian Congo, Africa; exports rubber, palm oil, ivory.

BANAT, Bánság (45° 35′ N., 21° 30′ E.), district, S.E. Hungary, comprising counties Torontal, Temes, and Krasso Szöreny; fertile; wheat, vineyards, minerals, silk.

BANBRIDGE (54° 22′ N., 6° 17′ W.), market town, County Down, Ireland; linen. Pop. 5000.

BANBURY (52° 4′ N., 1° 19′ W.), market town, Oxfordshire, England; incorporated by Queen Mary (1553); ancient cross, noted in nursery rhyme, destroyed by Puritans, 1610; famous cakes; rope, leather. Pop. (1911) 13,463.

BANC, med. Lat. expression, *in banco*, applied to justices sitting on bench (*bancus*), gave rise to expression 'in b.' for sittings of courts.

BANCA, see Banka.

BANCROFT, GEORGE (1800–91), Amer. historian; b. Worcester (Mass.); ed. at Harvard and several Ger. univ's; for a time Sec. of the Navy, and Sec. of War, and minister to Great Britain (1846–49); associated with Goethe, Humboldt, Macaulay, and Hallam. He was the author of a monumental *History of the United States*, which began to appear in 1834.

BANCROFT, HUBERT HOWE (1832–), Amer. historian; originally a San Francisco bookseller; pub. *Native Races of the Pacific States* (1874–76); *History of the Pacific States of North America* (1882–90).

BANCROFT, RICHARD (1544–1610), Eng. theologian; bp. of London, 1597, abp. of Canterbury, 1604; staunch anti-Puritan controversialist, particularly at Hampton Court Conference, 1604.

BANCROFT, SIR SQUIRE (1841–), Eng. actor and theatre manager; first appearance, 1861; m. Miss Effie Wilton, with whom he was afterwards associated in management of the Prince of Wales theatre. He retired, 1885, and was knighted, 1897.

BAND.—A brass b. uses only brass wind instruments, like trumpet, a string b., string instruments, such as violin; a regimental or military b. has various brass and wooden wind instruments, drum, and triangle, and is prominent feature of regiment. An annual brass b. contest is held at Crystal Palace.

BAND FISHES (*Cepolidæ*), 10 species of crimson, small-scaled, 'bony' fishes, inferior as food; the red b. f. (*Cepola rubricens*) is a rare Brit. fish. The rest are widely scattered.

BANDA (25° 26′ N., 80° 25′ E.), capital and district, Allahabad, India; area, 3061 sq. miles; barren; trade in cotton; produces millet, rice. Pop. 631,058.

BANDA ISLANDS (40° 30′ S., 130° E.), group of Molucca islands, Dutch East Indies; chief town, Nassau, in Banda Neira; frequent earthquakes, volcanoes; nutmegs, sago. Pop. 9000.

BANDA ORIENTAL, old name for Uruguay (*q.v.*).

BANDANA, Ind. name for a silk handkerchief, dyed in a particular way, and usually bearing a pattern of lozenges, or spots; now generally applied

to a class of cotton handkerchiefs manufactured in Lancashire.

BANDEL, ERNST VON (1800–76), Ger. sculptor erected gigantic statue of Arminius at Detmold.

BANDELIER, ADOLPH FRANCIS ALPHONSE (1840–), Swiss-Amer. archæologist; emigrated to U.S.A. as a youth, and made a special study of Inca civilisation.

BANDELLO, MATTEO (1480–1562), Ital. novelist wrote a collection of *Novelle* (1554–73) in the manner of Boccaccio's *Decameron*, which served as a quarry for the Eng. Elizabethan dramatists. Shakespeare derived several of his plots from B.

BANDER ABBASI, BENDER ABBAS (27° 13′ N., 56° 23′ E.), seaport town, Persian Gulf, Kerman province, Persia; formerly called GOMBRUN; renamed after Shah Abbas I., who with aid of English drove Portuguese out of Ormuz, 1622, and transferred portion of trade to B. A.; extensive trade with India and Europe; cotton, raisins, indigo. Pop. *c.* 6000.

BANDER LINGAH (26° 35′ N., 54° 40′ E.), seaport town, Persian Gulf, Persia; pearl fisheries.

BANDICOOT, small marsupials of genus *Perameles*, native of Australia, Tasmania, New Guinea, and some adjacent islands.

BANDICOOT-RAT (*Nesocia bandicota*), Asiatic, especially Ind. and Cingalese rodent, an aberrant form of b. with long hind feet.

BANDIERA, ATTILIO and **EMILIO** (d. 1844), Ital. patriots; sons of an Austrian admiral; were associated with Giuseppe Mazzini and others in the cause of Ital. liberation. They were betrayed by one of their party, and executed.

BANDINELLI, BARTOLOMMEO, BACCIO (1493–1560), Ital. sculptor; vainly vied with Michael Angelo; some of his best work is to be found in the Cathedral of Florence.

BANDIT, see under **THEFT**.

BANDOLINE, preparation from Irish moss, quince seeds, or gum tragacanth used for hair.

BANDON, BANDONBRIDGE (51° 44′ N., 8° 43′ W.), market town, County Cork, Ireland; distilleries.

BANDS, two linen strips at front of neck, worn by R.C. priests, Lutheran, Presbyterian, and other 'Reformed' ministers, and as legal and academic badge.

BANDY, name given to hookey when played on ice.

BANEBERRY, HERB CHRISTOPHER (*Actæa spicata*), poisonous ranunculaceous herb of N. temperate zone.

BANER, JOHAN (1596–1641), Swed. general; principal military leader under Gustavus Adolphus; invaded Bohemia, and won a complete victory over the Saxons at *Chemnitz*.

BANFF.—(1) (57° 40′ N., 2° 32′ W.) royal and parliamentary burgh, seaport, and county town, mouth of Deveron, Banffshire, Scotland; of great antiquity; fishing, agriculture; woollens. Pop. (1911) 3821. (2) (51° 15′ N., 115° 38′ W.) town, Alberta, Canada; thermal sulphurous springs.

BANFFSHIRE (57° 28′ N., 3° 4′ W.), county, N.E. Scotland; between Elgin, Inverness, and Aberdeen; area, *c.* 631 sq. miles; agriculture important; oats, barley, wheat grown, cattle raised; industries include distilling, fisheries; granite, slate, etc., quarried; surface hilly in S., low-lying in N.; well wooded; drained by Spey, Deveron, Avon, Livet; chief mountains, Ben Macdhui, Cairngorm; capital, Banff. Pop. (1911) 61,402.

BANFFY, DESIDERIUS (1843–), Hungarian premier (1895–99); forced to resign through violence of opposition; leader of New Party, 1905.

BANG, HERMANN JOACHIM (1858–), Dan. novelist; pub. *Faedra* (1883), *Tine* (1889), and other novels, also poems and miscellaneous works.

BANGALA, town and administrative district, Belgian Congo, Africa.

BANGALORE (12° 57′ N., 77° 35′ E.), chief town, native state of Mysore, India; military station; salubrious, over 3000 ft. above sea; fertile, permanent water supply; fort captured by Lord Cornwallis, 1791; cottons, carpets. Pop. (1911) 189,485. District of B. has area, 3092 sq. miles. Pop. 879,263.

BANGANAPALLE (15° 15′ N., 78° 15′ E.), native state, Karnul district, Madras, India; capital, B.; area, 255 sq. miles. Pop. (1911) 39,300.

BANGASH, Pathan tribe, living near Kohat; noted for fine physique and military ardour.

BANGKOK (13° 45′ N., 100° 28′ E.), capital, Siam, on delta of river Menam. The city has been greatly improved in cleanliness and health by the persistent clearing away of the small wooden houses. There are electric trams. The Royal palace, the Government offices, and the finest temples are within the walled town. Chinese control most of the trade. The most important export is rice, amounting to nearly £7,000,000 in 1910–11; teak, £583,000. Pop. 628,700, about 1000 of them being European.

BANGOR.—(1) (54° 39′ N., 5° 40′ W.) small seaport and watering-place, County Down, Ireland. Pop. 6000. (2) (53° 13′ N., 4° 7′ W.) seaport, city, and market town, Carnarvonshire, Wales; holiday resort, Univ. Coll. of N. Wales and Normal Training Coll.; Cathedral (founded, *c.* 525); slate quarries. Pop. (1911) 11,237. (3) (44° 47′ N., 68° 46′ W.) city and seaport, seat of Penobscot County, Maine, U.S.A.; on W. bank Penobscot, at head of navigation; seat of Congregational theological seminary; extensive manufactures, boots and shoes, machinery. Pop. (1910) 24,803.

BANGORIAN CONTROVERSY, see **HOADLY, BENJAMIN**.

BANGWEULU, BANGWEOLO (12° S., 30° E.), lake, Brit. Central Africa; discovered by Livingstone, 1868; area variable; in dry season, 1670 miles; forms headwaters of Congo.

BANIAN (Sanscrit *vanij*, merchant), member of Hindu trading caste; to be found in all large towns of Asia and many commercial centres of Africa.

BANIM, JOHN (1798–1842), Irish novelist; wrote *Tales of the O'Hara Family* (1825), 2nd series (1826); assisted by his bro. **MICHAEL** (1796–1874).

BANISHMENT, legal penalty which consists in segregation of the offender from the community. It was frequently inflicted in Greece and Rome, in preference to the death sentence, and it was probably as a classical punishment that Sir Thomas More advocated its use in his *Utopia*. In England b. was not recognised as a punishment until 1597, when it was adopted as expedient for ridding the country of the sturdy rogues who had baffled economists throughout the century; but death might be escaped by taking sanctuary, renouncing allegiance, and abjuring the land. That the old Borders between England and Scotland continued to be lawless is shown by statute of 1667, permitting **Transportation** of criminals of those regions; imprisonment for life was often commuted to transportation until this was abolished by Acts of 1853 and 1857. By an unrepealed statute b. is still penalty in Scotland for celebrating clandestine marriages.

B. (or **Exile**) as punishment for political offences was practised by Gks. as *ostracism* (q.v.), and by Romans as *proscription*. By clause of Magna Carta b. might not be inflicted on Eng. freeman except after lawful trial; Richard II.'s illegal b. of Bolingbroke was immediate cause of his own deposition. Under the Catholic Emancipation Act of 1829, however, unregistered Roman Catholics may be banished. B. is still inflicted for political offences in Russia, etc.

BANJALUKA (44° 47′ N., 17° 11′ E.), town, Bosnia; tobacco. Pop. 14,812.

BANJERMASIN (3° 25′ S., 114° 37′ E.), town, capital of Dutch Borneo, East Indies; spices, gold. Sultanate of B. ended 1857. Pop. 50,000.

BANJO, musical instrument, popular in U.S.A., consisting of a long wooden neck, bearing a metal or wooden hoop for body, over which is stretched a sheet of vellum, and having from five to nine strings. Apparently of African origin, for similar instruments, with grass strings, are still used on the Guinea coast.

introduced into U.S.A. probably in XVII. cent., and about 1846 into England by Amer. negro minstrels.

BANKA, Banca (2° 30′ S., 106° E.), island, Dutch East Indies; length, 157 miles; narrow, hilly; chief town, Muntok; tin, bananas; area, 4460 sq. miles. Pop. 115,189.

BANKET, term for auriferous conglomerate in S. African goldfields. See Gold.

BANKIPUR (20° 33′ N., 88° 25′ E.), ancient village, on Hugli, Bengal, India.

BANKRUPTCY.—The law of b. in Britain affords relief to insolvent debtors, who, by surrendering their property for the benefit of their creditors, are relieved from liability in regard to their debts. One creditor is prevented from obtaining undue advantage over his fellow-creditors, either by making a secret arrangement with the debtor, or by his own fraud. The debtor is prevented from taking improper advantage of his creditors, and is punished if he is guilty of fraud. The administration of the bankrupt's estate, until a trustee is app., is carried out under the supervision of an *Official Receiver* app. by the Board of Trade. There is a difference between a person who is *insolvent* and a *bankrupt*. An insolvent trader is one who, if pressed for payment, would not be able to meet all his liabilities; but by means of loans, or part payment of debts, he may contrive to avoid b. altogether.

Proceedings in b. are commenced by a creditor or creditors with aggregate claims of £50, on proof of their claim and the commission by debtor of an 'act' of b.: 1, failure to satisfy creditor on a bankruptcy notice; 2, the making of an assignment for the creditors generally; 3, his absconding or keeping house; 4, giving notice of suspending payments; 5, filing a declaration of inability to pay; 6, if his goods are seized. (In U.S.A., 2, 3, and 5 are acts of b., and giving any creditor a preference *is* also an act. Intent is needed in Brit. law to make last-named an act. In U.S.A. a petitioning creditor must be owing $500 out of $1000 or over.) The Court, on being satisfied as to the matters alleged in the petition, issues a 'receiving order.' The official receiver thereby becomes the receiver or protector of the property until a trustee is app. by the creditors. Within seven days of the receiving order being made, the debtor must furnish to the official receiver his statement of affairs, after which he will be required to attend for public examination on oath. The official receiver makes a report on the debtor's statement of his affairs, and to a great extent the debtor's discharge depends on the nature of this report. Within fourteen days after the receiving order, a general meeting of the creditors is held, and this meeting decides whether the debtor shall be adjudged bankrupt, or whether a composition or an arrangement shall accepted from him. If the debtor is adjudged bankrupt, the creditors then appoint a trustee to wind up the bankrupt's estate, or, failing them, the Board of Trade appoints a trustee, and it is his duty to realise the property and to divide the proceeds amongst the creditors. At any time after he has been adjudged bankrupt, but not until his public examination has been concluded, the bankrupt may apply for his discharge. The Court may grant, refuse, or suspend the discharge, or may grant it conditionally. The Court will, as a rule, grant the discharge, provided that a good dividend has been paid, that the bankrupt shows that his accounts have been properly kept, that he has not been recklessly extravagant, or indulged in rash or hazardous speculation, or been guilty of misdemeanour in his business. The Court, however, must suspend the discharge for two years at least in such circumstances as the following: when a dividend of 10s. in the £ has not been paid; when the bankrupt has not kept proper books for three years preceding his b.; when he has contracted debts with no reasonable prospect of being able to pay them; or when he has been previously adjudged bankrupt. In U.S.A. discharge may be refused if bankrupt gained credit by false written statement, within four months of filing petition removed or destroyed property to delay or defraud creditors, or refused to obey order or answer question of Court.

If an undischarged bankrupt obtains credit of £20 or upwards, without disclosing that he is undischarged, he is liable to two years' imprisonment; all property accruing to him until he receives his discharge will go to his creditors; and he cannot sit or vote in either House of Parliament, or act as a J.P., or fill the office of county or borough councillor, or sit on various other local boards.

Where the estate of the debtor is not likely to exceed £300, the court may order it to be summarily administered with the object of saving time and expense. In London, b. business is administered by the High Court; in the provinces by the local County Courts.

Williams, *Law and Practice of Bankruptcy* (7th ed., 1898); Robson, *On the Law of Bankruptcy* (6th ed., 1887); Goudy's *Law of Bankruptcy in Scotland* (1895).

BANKS, a crude system of banking appears to have existed amongst the ancients several cent's before Christ, while among the later Greeks and Romans the regulation of b's was established upon a fairly well-defined basis. These early b's received money, sometimes, but not always, at interest, and repaid it at their customer's written order, or at a stipulated time, charging a commission like all modern b's. But banking, as it is now understood, first came into existence in 1157, when the *B. of Venice* was established. Other early banking establishments were the *B. of Barcelona* (1401), the *B. of Genoa* (1407), the *B. of Amsterdam* (1609), the *B. of Hamburg* (1619), and the *B. of Stockholm* (1668), said to have been the first European b. to issue *b.-notes*. The Amsterdam b., during the cent. following its foundation, became the world's central depository.

The foundation of the *B. of England* (1694) was due to a Scotsman, William Paterson, notorious also as promoter of the Darien Scheme. For a long period the London goldsmiths had changed foreign money and lent at interest. James I., Charles I., and Charles II. borrowed from the goldsmiths, and the account of James the First's relations with George Heriot, in Scott's *Fortunes of Nigel*, is familiar. The *B. of Scotland* was established, 1695; the *British Linen Co.* was launched as a trading concern in Scotland, 1746, but after 1762 confined itself to banking, and still flourishes; and the *B. of Ireland* was established, 1783. *Cheques* were first issued in England in 1781.

The U.S. National Banking System arose out of the large credit issues of the Civil War. National b's are controlled by Treasury. Cities of over 6000 inhabitants may have no National b. with less than $100,000 capital, and this varies to $25,000 in cities of less than 3000; half capital must be paid in before business can commence, and 25 % must be transferred in Government bonds to Treasury, which authorises issue of notes to full par (not exceeding market) value of bonds. County banks must maintain reserve of 15 % of outstanding notes and deposits, three-fifths of which can be redeposited in seventeen large (*reserve*) city banks. Reserve b's must keep 25 % reserve, but half can be in National b's in New York, Chicago, and St. Louis.

Bank-Note, promissory note, issued by a bank, and payable on demand; in England the lowest note is of £5 value; in Scotland and Ireland notes of £1 are issued. In U.S.A. the lowest note issued by National b's is for $5, but Government issues them for $2 and $1. B. of England notes are printed in black upon water-marked paper. After once being returned to the b. they are not again put into circulation.

Bank-Rate, rate of discount charged by the chief, or State, banks, as opposed to the market rate. In England it is fixed by the Bank of England, and constantly fluctuates according to the scarcity or abundance of money in circulation.

Modern B's.—According to their functions b's are

either *b's of deposit*, or *b's of issue*. A b. of deposit has power to receive money from depositors, but not to issue notes. A b. of issue has the right to receive deposits and issue b.-notes. In England and Wales the right to issue notes is confined chiefly to the B. of England. The B. of England is not a State B., but it is the b. in which State revenue is deposited, and is the agent for the Government in raising loans. On account of its peculiar business, other b's have found it convenient to deposit a certain amount of their cash with it, and every b. which is a member of the Clearing-House must keep an account at the B. of England. Apart from these circumstances, the B. of England is in the same position as all other b's, and conducts its business like other b's. The original capital of the B. of England was £1,200,000; in 1816 it amounted to £14,553,000, at which figure it has since remained.

Private B's and Joint-Stock B's.—The number of *private b's* is diminishing year by year. They cannot consist of more than ten partners, whose liability is unlimited. With regard to *Joint-Stock B's*, the legislation of 1826 prohibited the issue of notes for less than £5 in England and Wales; but it expressly permitted, outside a radius of 65 miles from London, the establishment of Joint-Stock B's with the right to issue notes; and withheld this right from all b's within the radius, excepting the B. of England. An Act was passed, 1833, permitting Joint-Stock B's to carry on a deposit business in London. Since the passing of Acts of 1826 and 1833, the business of Deposit B's in England and Wales has gradually increased and has reached gigantic proportions, largely owing, no doubt, to Companies Acts of 1858 and 1862, which allowed limitation of liability of shareholders. National b's are only b's of issue in U.S.A., but there are numerous deposit b's, and loan and trust companies which pay interest on deposits.

The Clearing-House.—A number of the London private bankers arranged, in 1775, a scheme (the Clearing-House) by which the representatives of each b. met daily and exchanged the cheques which each held on the other. The accounts so exchanged were added up, and the differences in the amounts only were handed over in cash. For many years the private b's had a monopoly of the Clearing-House, but in 1854 the Joint-Stock B's in London were allowed to join. There are still, however, only seventeen b's entitled to send representatives to the Clearing-House. All other b's must do their clearing business through the agency of a b. which is a member of the Clearing-House. By the system of *Country Clearing*, cheques held by country b's on other b's are sent to the Clearing-House, and thence are passed on to the London agents of the b's on which the cheques are drawn. The London agent sends these cheques nightly to his principals in the provinces. In this way each country b. ascertains what amount may be due by it to all other b's, and what it may be entitled to receive. The difference, if any, is then sent on to its London agent. Thus each b. has but one remittance to deal with each day, instead of having to make remittances to or to receive remittances from b's in all parts of the kingdom.

Banker and Customer.—The relation of banker and customer is that of debtor and creditor. The customer lends money to or deposits money with the banker, who thereby becomes its owner, but undertakes to repay it either by honouring the customer's cheques or by repaying the whole or part on due notice. That the banker becomes the owner of customer's money is shown by the fact that he trades with it and keeps profit. Again, were the bank to stop payment, the customer could not demand his money back, but merely rank as an ordinary creditor of the banker. Should a banker refuse to honour the cheque of a customer who has sufficient funds to his credit in the b., such customer is entitled to damages, and can bring an action for breach of contract. When a customer deposits securities with his banker as a guarantee for the repayment of a loan made by the banker, the latter has a lien on the securities—that is, a right to retain them until the loan has been repaid. Indeed, in some cases the banker, when the lien has once arisen, has a right to sell such securities and pay himself out of the proceeds. When a customer has deposited securities as a guarantee for a particular loan, the banker must return them when the loan is repaid, and has no further lien on them, even though the banker may have made other advances to him which have not been repaid. Of course, where the securities have been deposited to cover advances made by the banker generally, the banker has a lien on them until the whole amount has been repaid.

Savings B's.—1. Post Office; 2. Trustee. Former were established by Post Office Savings B. Act, 1861, to grant facilities, with State guarantee, for deposit of small savings at low interest; latter may only be formed with approval of National Debt Commissioners, not be run for profit, and are under State inspection.

Co-operative Credit B's originated in Germany where they are conducted either on Raiffeisen or Schulze-Delitzch principles; Raiffeisen (*q.v.*) started in Rhenish Prussia, in 1849, loan banks which have gradually spread all over Germany and become a federation; Schulze started Schulze-Delitzch banks, by which advances are made at low interest, 1850, as profitable investment rather than philanthropic effort. The 237 Irish **Agricultural Credit B's** established since 1889 are, in imitation of former class, for benefit of borrower; movement less popular in England and Scotland, but since 1901 (when Eng. Agricultural Organisation Society was formed) 45 credit b's (with Central Agricultural B.) have been established in Great Britain.

Bank Holidays.—By the *Bank Holidays Act* of 1871 the following days are kept as holidays: in England and Ireland, Easter Monday, Whit-Monday, 1st Monday in August, and Dec. 26; in Scotland, Christmas Day, New Year's Day, Good Friday, and 1st Mondays in May and Aug. By a *Bank Holiday (Ireland) Act*, 1903, March 17 was added as a Bank Holiday for that country. In U.S.A. 4th July and Christmas Day are the only universal B. H's, but some thirty others are recognised by various States.

Kerr, *History of Banking in Scotland*; Herbert, *The Law of B's and Banking*; Warren, *The Story of the B. of England*; Clayton, *Co-operation*.

BANKS ISLANDS (14° S., 168° 30′ E.), New Hebrides, Oceania.

BANKS LAND (73° N., 121° W.), island, Arctic Ocean, Brit. N. America; named after Sir Joseph Banks (*q.v.*).

BANKS, SIR JOSEPH, Bart. (1743–1820), Eng. naturalist; undertook expedition to Newfoundland and Labrador, 1766; fitted out *Endeavour* expedition and accompanied Captain Cook to Pacific Ocean; Pres. of Royal Soc. (1778–1820).

BANKS, NATHANIEL PRENTISS (1816–94), Amer. politician and soldier; entered Congress and became Speaker; Gov. of Massachusetts, 1857–59; served on the side of the North in Civil War, holding command on the *Potomac*, in Shenandoah Valley, and elsewhere; captured Port Hudson, 1863.

BANKS, THOMAS (1735–1805), Eng. sculptor; studied in Rome; employed by Empress Catherine for two years at St. Petersburg; elected A.R.A. (1784), R.A. (1785); chief works are statue of Achilles in entrance hall of Burlington House, Shakespeare groups in garden of New Place, Stratford, monuments in Westminster Abbey and St. Paul's Cathedral.

BANKSIA, Australian shrub or tree (sometimes 50 ft. high) of the order *Proteaceæ*, with yellow, red, or white umbellate flowers.

BANKURA (23° 14′ N., 87° 7′ E.), town, Burdwan, Bengal, India; indigo, silk. Pop. 21,000. District area, 2621 sq. miles. Pop. 1,116,411.

BANN (54° 23′ N., 6° 28′ W.), river, Ireland; flows through Loch Neagh; salmon.

BANNATYNE, GEORGE (1545–1608), Scot. merchant, famed for his collection of old Scot. poetry. The 'Bannatyne Manuscript' is preserved in the Advocates' Library, Edinburgh, and was pub. by the Glasgow Hunterian Club, 1873. The Bannatyne Club was founded at Edinburgh by Sir Walter Scott in 1823.

BANNERET (Fr.), high grade of knighthood, dating back to reign of Edward I., conferred upon the field of battle for distinguished service. The last recorded instance of its being conferred was by Charles I., in the case of John Smith, at *Edgehill*, 1642.

BANNER-STONES, axe-shaped stones found in U.S.A., probably ornamental.

BANNISTER, CHARLES (1738–1804), Eng. actor and vocalist, acted with Garrick at Drury Lane, and was a popular favourite.—**Bannister, John** (1760–1836), s. of the above; also acted with Garrick, and was regarded as the finest low comedian of his day.

BANNOCK ('Girdle-cake'), Scot. and N. English name for a flat unleavened cake of oat- or barley-meal, baked upon a girdle.

BANNOCKBURN (56° 6′ N., 3° 55′ W.), village, Stirlingshire, Scotland; scene of Robert the Bruce's great victory over Edward II. of England, June 24, 1314, by which Scot. independence was secured; site marked by Bore Stone in which Bruce planted his standard; carpet, tweed, and woollen factories.

BANNS OF MARRIAGE, public notice in church, thrice repeated, of an impending marriage, which was made a law in the Eng. Church by a Westminster Canon of 1200; the Lateran Council of 1215 made the publication of banns compulsory throughout Christendom. In America such a preliminary to marriage is not required. In England the ceremony may be avoided by means of a 'licence,' or 'special licence.'

BANNU (33° N., 70° 40′ E.), town (Edwardesabad) and district, N.W. Frontier Prov., India; founded 1648 by Sir Herbert Edwardes; salt, alum. District area, 1680 sq. miles. Pop. 231,485.

BANQUETTE, ledge inside parapet of rampart, on which defenders can mount to shoot down at foe.

BANSDA (20° 45′ N., 73° 28′ E.), native state, Bombay, India; governed by rajput; area, 214 sq. miles. Pop. 40,382.

BANSHEE (Irish, *bean sidhe*; Gaelic, *ban sith*), a female goblin common to Celtic myth., but more particularly to the folk-lore of Ireland and the W. of Scotland. Heard at night, 'the Banshee's lonely croon' is believed to herald the death of some member of the family.

BANSWARA (23° 27′ N., 74° 27′ E.), state, Rajputana, India; capital, B.; fortress, temples; area, 1946 sq. miles. Pop. (1911) 165,496.

BANTAM.—(1) (6° 7′ S., 106° 10′ E.) residency forming western extremity, island of Java; majority of inhabitants Sudanese; rice, coffee. (2) town and seaport, founded by Dutch, 1595; formerly head of residency; unhealthy; gave name to B. fowls.

BANTIN, Banting (*Bos sondaicus*), wild ox of Java, Bali, and Borneo.

BANTRY (51° 41′ N., 9° 27′ W.), seaport town, County Cork, Ireland; fisheries, tweeds; scene of Fr. and Jacobean attempt to land, May 1, 1689 (battle of Bantry Bay). Pop. 3109.

BANTU ('men'), generic name for the language, with its many dialects, spoken by the native tribes occupying a large part of Africa south of the equator; also applied to tribes themselves.

Dr. Bleek's *Comparative Grammar of South African Languages* (1869); Father Torrend's *Comparative Grammar of the Bantu Languages* (1894); Stow, *Native Races of S. Africa.*

BANVILLE, THÉODORE DE (1823–91), Fr. poet and miscellaneous writer; s. of naval captain; devoted himself from his early years to lit. and journalism; pub. many vol's of verse of high quality, and had several plays produced at the *Théâtre Français*; a leader of Parnassian school.

BANYAN (*Ficus bengalensis*), Indian tree of fig genus. '*B. Days*' in Brit. navy meant days when no flesh was received with rations; derived either from b. or from Banian (*q.v.*), whom sailors might consider types of asceticism.

BANYULS-SUR-MER (42° 40′ N., 3° 6′ E.), summer resort, France. Pop. 3111.

BANYUMAS, Banjoemas (7° 32′ S., 109° 20′ E.), town and residency, Java. Pop. of town, 5302; of residency, 1,251,963.

BANYUWANGI (8° 19′ S., 114° 20′ E.), port, Java. Pop. 16,198.

BANZAI (=a thousand years), Jap. greeting.

BAOBAB, Monkey Bread, African tree; one of the largest known; its trunk sometimes measures upwards of 30 ft. in diameter; it produces a fruit, and the wood is very soft.

BAPAUME (50° 6′ N., 2° 51′ E.), town, France; site of battle, 1871. Pop. 3113.

BAPHOMET, idol which Templars (*q.v.*) were accused of worshipping before dissolution of their order.

BAPTISM, the rite of immersion or sprinkling with water which constitutes admission into the Christian Church. It has parallels in various ancient religions, and was observed in later Judaism in the time of Christ. John the Baptist baptized those who came to him in the Jordan, and from the earliest times b. was essential in the Christian Church, for Jesus Himself was baptized by John. The command to baptize all nations is in *Matthew* 28^{19}. The authenticity of the Trinitarian formula has been questioned, as there is some reason for thinking that b. simply into the name of Christ was the primitive custom.

The earliest account of Christian b. is in the *Didache* (Teaching of the Twelve Apostles). The custom of infant b. came in only by degrees; with many there was rather a tendency to delay it as much as possible, as all sin was forgiven at b. Those who sinned after b. found it difficult to get re-admission into the Church. Constantine was only baptized on his death-bed. Those who were undergoing instruction for b. were called *Catechumens*, and the same term is used in the mission field to-day. Total immersion was the primitive custom (it is now only observed by Baptists), but sprinkling of water on the forehead is now usual. According to Catholic doctrine b. to be valid must be with water and in the threefold name, but can be performed by any one, though of course should be normally by a priest (thus still valid performed by a woman, 'heretic,' or even pagan). There has been much controversy whether infants dying unbaptized are damned. B. is observed by all Christians except the Quakers, and infant b. is the rule. Baptismal regeneration is a Catholic as opposed to a Prot. doctrine, *i.e.* it not only symbolises the removal of sin but sacramentally effectuates it, and this seems to be the New Testament view. The sacrament of b., too, is done once for all, and can never be repeated. Amongst Nonconformists b. is somewhat falling into disuse.

Darwell Stone, *Baptism*; liturgies, etc.

Baptistery (Lat. *baptisterium*), the chapel or building annexed to a church and specially designed for baptism; when baptism was by immersion and only took place three times a year, large b's were necessary; famous examples at Florence, Pisa, Asti, etc.

BAPTIST CHURCH, see under Free Churches.

BAPTISTE, JEAN, name applied to Fr. Canadians.

BAPTISTE, NICOLAS ANSELME (1761–1835), Fr. actor; member of a family all the members of which achieved success on the stage.

BAR (49° N., 27° 55′ E.), fortified town, Podolia, Russia. Pop. 10,614.

BAR, name in heraldry for horizontal stripe not more than fifth of field in breadth crossing field not in chief or fesse; *Bar sinister*, see Baton.

BAR, CONFEDERATION OF, formed by Polish nobles at Bar (1768) to oppose Russ. aggression in the person of her representative, Prince Repnin.

BAR, THE.—(1) Division in a court of law: in the higher courts K.C's are admitted within the b., other legal members sit outside. (2) The dock wherein the prisoner stands in criminal cases, hence the form of address, 'prisoner at the bar.' (3) A railed space in the Houses of Parliament, known as the 'bar of the House.' To be 'called to the Bar' in England is when one of the Inns of Court summons a student in law, and he thus becomes a barrister.

BAR HARBOR (44° 20′ N., 68° 15′ W.), summer resort, Hancock County, Maine, U.S.A.

BARA, warlike people of southern Madagascar.

BARA BANKI (26° 56′ N., 81° 13′ E.), town and district, United Provinces, India; wheat; area, 1758 sq. miles. Pop. 1,179,323.

BARABA STEPPE (c. 54° 30′ N., 78° E.), steppe region, Tomsk, Russia in Asia.

BARABBAS, Biblical character; imprisoned for murder, but chosen by Jews to be saved when Pilate offered them choice between B. and Jesus; illustrates popular injustice.

BARABOO (43° 28′ N., 89° 45′ W.), city, Wisconsin, U.S.A.; woollen factories. Pop. (1910) 6324.

BARABRA, name given to the Nubian dwellers in the Egyptian Sudan.

BARACALDO (43° 17′ N., 2° 56′ W.), port, on Nervion, Biscay, Spain; iron, dynamite. Pop 15,000.

BARACOA (20° 23′ N., 74° 21′ W.), seaport, Cuba; oldest Span. settlement in Cuba (1512). Pop. 5600.

BARAGUAY D'HILLIERS.—(1) Louis (1764–1812), Fr. general, distinguished under Napoleon. (2) Achille, his s. (1795–1878), Fr. marshal, was distinguished in Crimean, Italian, and Franco-Prussian Wars.

BARAHONA DE SOTO, LUIS (1535–95), Span. poet; author of the *Primera parte de la Angélica* (1586). His work was highly praised by Cervantes.

BARANTE, AMABLE GUILLAUME PROSPER BRUGIÈRE, BARON DE (1782–1866), Fr. statesman and author; held various public offices under Napoleon and Louis Philippe; pub. *Histoire des ducs de Bourgogne de la Maison de Valois* (1824–28); trans. works of Schiller, and Shakespeare's *Hamlet.*

BARASAT (22° 43′ N., 88° 32′ E.), town, Twenty-four Parganas, Bengal, India. Pop. 8600.

BARATIER, JOHANN PHILIPP (1721–40), Ger. scholar; famous for precocious ability; proficient in Fr., Dutch, Lat., Gk., and Hebrew languages; Master of Arts (Halle) at age of fourteen.

BARATIERI, ORESTE (1841–1901), Ital. general; fought under Garibaldi; distinguished until 1896, when after defeat by Abyssinians, he was tried by military court and resigned.

BARATYNSKI, JEVGENI ABRAMOVICH (1800–44), Russ. poet; early life of adventure; wrote much-read *Eda* and *The Gipsy.*

BARB, backward arrow points; Moorish breed of horses; breed of pigeons; linen band about neck and chin worn by nuns; mucous membrane under tongue of horses and cattle; fleshy appendages on mouth of barbel; a leaf of heraldic rose.

BARBACENA (21° 11′ S., 43° 44′ W.), town, Brazil; health resort; cheese, cattle. Pop. c. 10,000.

BARBADOS, Barbadoes (13° 5′ N., 59° 36′ W.), most easterly of Brit. W. Indian Islands; length, 21 miles; width, 14 miles; area, 166 sq. miles; exports sugar, molasses, rum, hides, tamarinds, aloes, chemicals, whale oil; imports coal, machinery, timber, rice, flour, etc.; administered by Gov., Executive and Legislative Councils, and Representative Assembly; chief town, Bridgetown; government system of education; nine-tenths of inhabitants negroes; climate hot; has belonged to Britain since 1605. Pop. (1911) 171,982.

BARBARA, ST. (fl. III. cent.), Christian martyr; legendary connection with thunder-storms made her patron of artillery; feast, Dec. 4.

BARBARIANS, term used by Greeks to describe all non-Greeks, probably from 'bar-bar,' the sounds their language seemed; later Romans applied it to those beyond pale of their civilisation.

BARBAROSSA, see Frederick I.

BARBAROSSA, HORUK and KHAIR ED-DIN, Turkish corsairs; Horuk was captured and beheaded by the Spaniards, at Oran (1518). The younger bro. captured Algiers (1519), Tunis (1533), and became admiral of Turk. fleet under Solyman II. (1536). From that year until his death (1546) he was known as 'the scourge of the Mediterranean,' and the inveterate foe of all Christians. B. means red-beard.

BARBAROUX, CHARLES JEAN MARIE (1767–94), Fr. revolutionist; of the Girondist faction; boldly opposed Marat and Robespierre, and was by them denounced as an enemy of the republic; guillotined at Bordeaux.

BARBARY, former name for region of Northern Africa, inhabited by Berbers, and including Morocco, Algeria, Tunisia, and Tripoli.

BARBARY APE (*Macacus inuus*), is tailless, gregarious; inhabits Algeria, Morocco, and Gibraltar Rock.

BARBARY PIRATES, see under Theft.

BARBASTELLE, bat found in England and elsewhere, with thick beard and hairs tipped with yellow.

BARBASTRO (41° 56′ N., 0° 9′ E.), town of Aragon, Spain; formerly seat of Cortes of Aragon. Pop. 7033.

BARBAULD, ANNA LETITIA (1743–1825), Eng. poetess; dau. of Dr. John Aikin (*q.v.*); m. Rochemont B.; wrote *Hymns in Prose for Children*; edit. letters of Samuel Richardson, etc.

BARBAZAN, capital, Fr. canton, Haute-Garonne arr. of Saint-Gaudens; mineral springs.

BARBAZAN, ARNAULD GUILLAUME DE (1360–1431), Fr. general; called *Chevalier sans reproche.*

BARBECUE (also *bucan*), Span. buccaneer term for a wooden framework, placed over a fire, on which meat was preserved by smoking; open-air feast at which animals were roasted whole.

BARBED WIRE, strands of wire twisted together and armed with short projecting spikes; invented in America, about 1867, where there was a great need of inexpensive cattle-fencing. The barbs were found very effective in preventing the cattle rubbing against the wire, and so damaging it. It is also used as modern method of fortification in war and as private police measure; by B. W. Act, 1893, placer of b. w. is responsible for damage done to persons not trespassing.

BARBEL (*Barbus vulgaris*), fish of Cyprinid family.

BARBÉ-MARBOIS, FRANÇOIS, MARQUIS DE (1745–1837), Fr. politician; eulogised Napoleon, whom he indifferently served, and was made a peer by Louis XVIII.; pub. *Réflexions sur la colonie de Saint-Domingue* (1794); *La Guyane* (1822); and other works.

BARBER (Lat. *barba*, beard), trimmer of beards; Eng. b's were incorporated in 1461 by Edward IV.; they were joined to the Surgeons' Company by Henry VIII., but their operations, apart from beard-trimming, were confined to blood-letting and extraction of teeth; in 1745 George II. gave the b's a separate corporation, but barber's sign, the pole, may still sometimes be seen accompanied by the surgeon's basin. B.'s shop, a place of gossip in Horace's time, remained so until days of daily postman and newspaper; *B. of Seville,* comic opera, masterpiece of Rossini.

BARBERINI, powerful Ital. family settled in Florence since XI. cent. Maffeo B. became Pope Urban VIII. (1623), and several of his relatives were made cardinals; magnificent B. palace and library (Rome) were founded by them.

BARBERRY (*Berberis vulgaris*), shrub of order Berberidaceæ, with edible berries.

BARBERTON (25° 55′ S., 31° 10′ E.), town, Transvaal, S. Africa; goldfields.

BARBÈS, ARMAND (1810–70), Fr. politician and revolutionary; called *le Bayard de la démocratie.*

BARBETTE (Fr.), protected platform for artillery, either in a fortification or battleship.

BARBEY D'AUREVILLY, JULES AMÉDÉE (1808–89), Fr. novelist; noted for his handling of criminology; pub. *Une Vieille Maîtresse* (1851); *L'Ensorcelée* (1854); *Chevalier Destouches* (1864); *Les Diaboliques* (1874).

BARBEZIEUX (45° 28′ N., 0° 9′ W.), town, Charente, France.

BARBICAN, an outwork, or gateway-tower, to protect a drawbridge. The places bearing this name in London, Plymouth, and other towns mark the sites of such defensive buildings.

BARBIER, ANTOINE ALEXANDRE (1765–1825), Fr. librarian; discovered the Fénelon MSS.; was librarian under the Directoire, Conseil d'Etat, and Napoleon, and had a large share in the foundation of the great libraries at the Louvre, Fontainebleau, and elsewhere.

BARBIER, HENRI AUGUSTE (1805–82), Fr. satirical poet; pub. metrical trans. of Shakespeare's *Julius Cæsar* (1848), and collaborated with de Wailly in the libretto of Berlioz's *Benvenuto Cellini*; best known for his satires, *Iambes* (1831).

BARBITON, ancient stringed musical instrument, familiar by name to readers of classics, and believed to be of Persian origin; it was shaped something like a lute.

BARBIZON (48° 25′ N., 2° 35′ E.), village, borders of forest of Fontainebleau, France; home of Millet; gave name to **Barbizon School** of landscape painters, founded by Rousseau, Millet, Corot, Dupré, Daubigny, and others.

BARBOU, Fr. family of famous printers. JOHN B. established press at Lyons in early XVI. cent.; they ultimately removed to Paris, and sold business (1808) to firm of Delalain.

BARBOUR, JOHN (1316–95), Scot. poet; regarded as father of Scot. poetry; archdeacon of Aberdeen; wrote a narrative poem, *The Brus*, in twenty books, and upwards of 13,000 lines, for which he received from King Robert II., in 1377, a gift of £10, and in following year a perpetual annuity of twenty shillings. *The Brus* was first printed at Edinburgh in 1571.

BARBUDA (17° 40′ N., 61° 50′ W.), island, Leeward group, Brit. W. Indies; cattle.

BARBUS, see CARPS.

BARBY (51° 59′ N., 11° 53′ E.), town, Saxony, Prussia; sugar factories. Pop. 5200.

BARCA, Carthaginian family. See HAMILCAR, HASDRUBAL, HANNIBAL.

BARCA, ancient city, Cyrenaica, N. Africa; modern Merj.

BARCAROLLE, a class of song peculiar to Venetian gondoliers, with a simple, swinging measure; hence it has become name for similar sort of musical composition, used by Mendelssohn, Chopin, and others.

BARCELLONA (38° 7′ N., 15° 10′ E.), town, Sicily. Pop. (commune) 23,493.

BARCELONA.—(1) (41° 22′ N., 2° 11′ E.) seaport, N.E. Spain, on the Mediterranean; most important industrial centre in Spain and second seaport; good harbour; univ.; the *Rambla* is one of the finest promenades in Europe; fine cathedral; most important industry is cotton-spinning and weaving; also soap and glycerine factories, tanneries, etc.; chief exports, almonds, saffron, olive oil, wines. Pop. (1910) c. 560,000. (2) (41° 23′ N., 2° 9′ E.) province, Catalonia, Spain; mountainous, well-wooded; cotton manufactures; area, 2968 sq. miles. Pop. (1910) 1,133,900. (3) (10° 4′ N., 64° 48′ W.) capital, Bermudez, Venezuela; declining trade. Pop. 13,000.

BARCELONETTE (44° 25′ N., 6° 35′ E.), town, Basses-Alpes, France; marble.

BARCLAY, ALEXANDER (1475–1552), Scot. poet; held preferments at Ottery St. Mary, All Hallows, Lombard Street, and at Croydon. He wrote eclogues, but is chiefly known for his free trans. of Sebastian Brant's *Ship of Fools*, written in Chaucerian stanzas, in which he lashes the sins and follies of his time.

BARCLAY, JOHN (1582–1621), Scot. satirist; lived chiefly in London and France; pub. *Sylvæ*, collection of Latin poems (London, 1606); other works were *Satyricon*, a satire on the Jesuits, and *Argenis*, a fanciful romance in the style of Sidney's *Arcadia*.

BARCLAY, JOHN (1734–98), Scot. Presbyterian minister; founded Berean or Barclayite sect.

BARCLAY, JOHN (1758–1826), Scot. surgeon and author; anatomical collection nucleus of Barcleian Museum, Edinburgh.

BARCLAY, ROBERT (1648–90), Scot. Quaker; gov. of East New Jersey; his chief work was *An Apology for the True Christian Divinity*, pub. in Latin (Amsterdam, 1676), trans. into Eng., 1678.

BARCLAY DE TOLLY, MICHAEL (1760–1818), Russ. field-marshal; Minister of War, 1810, commander-in-chief of western army, 1812, and of whole Russ. army at Dresden, Kulm, Leipzig, and Paris, 1813–14; Count (1815).

BARCLAY-ALLARDYCE, ROBERT (1779–1854), noted pedestrian; walked 1000 miles in 1000 consecutive hours, 1809.

BARCOCHEBAS, or BAR-COCHBA, led Jewish rebellion against Rome, 132–135 A.D.

BARD, name for Celtic poet, who enjoyed special social rank; later applied to verse-writers in general. As national minstrels they flourished in Early Gaul and Britain, and their primitive office has been revived in Wales. The Welsh b's were exempt from taxes and military service, and up to the time of Elizabeth, bardic gatherings (*Eisteddfodau*) were summoned by royal authority. The modern revival began c. 1822.

BARDAISÂN, BARDESANES (154–222 A.D.), early Christian teacher; b. Edessa, Mesopotamia; author of numerous religious writings, all of which are lost, with the exception of the *Hymn of the Soul* contained in the apocryphal *Acts of Thomas.*

BARDILI, CHRISTOPH GOTTFRIED (1761–1808), Ger. philosopher; pub. *Grundriss der ersten Logik* (1800), *Briefe über den Ursprung der Metaphysik*, etc.

BARDOWIEK (53° 16′ N., 10° 20′ E.), town, Hanover, Prussia.

BARDSEY (52° 45′ N., 4° 48′ W.), 'bard's island,' N. point Cardigan Bay, Wales; legendary last retreat of Welsh bards; farming and fishing; lighthouse.

BARDWAN, see BURDWAN.

BAREBONE, PRAISE-GOD, BARBON (d. 1680), Eng. tradesman; Baptist preacher, and later Fifth Monarchy man (*q.v.*); sat as representative of the City of London in Cromwell's Parliament of nominees (1653), which was derisively called after him 'Barebone's Parliament'; was an active opponent of the Restoration.

BAREFOOTED RELIGIOUS ORDERS, DISCALCED ORDERS, include those who went literally barefoot, such as the Alcantarine branch (before 1897) of the Franciscan Order, and those who wear sandals, such as Franciscans generally, with the Colettines and Capuchin sisters, the Camaldolese, Discalced Carmelites, Passionists, and branches of the Cistercians, Augustinians, and Servites.

BARÈGES (42° 54′ N., 0° 6′ E.), village, Hautes-Pyrénées, France; sulphurous springs.

BAREILLY, BARELI (28° 26′ N., 79° 33′ E.), city and capital, B. district, United Provinces, Brit. India; Mutiny of 1857 first broke out here; Government Coll., mosques, citadel; manufactures furniture. Pop. (1911) 129,462. District area, 1580 sq. miles. Pop. 1,090,117.

BARENTIN (49° 35′ N., 0° 55′ E.), town, Seine-Inférieure, France; cotton. Pop. 5500.

BARENTS SEA (76° 10′ N., 40° E.), part of Arctic Ocean, between Novaya Zemlya, Spitzbergen, and mainland.

BARENTS, WILLEM (d. 1597), Dutch navigator; conducted three unsuccessful expeditions from Holland

in search of a N.E. passage to Asia (1594–97). On the third voyage he discovered Spitzbergen, rounded Novaya Zemlya, where he was compelled to winter, and there died. In 1871 his camp and relics were discovered, and in 1875 a portion of his Journal was found; Barents' *Voyages*, trans. and pub. by Hakluyt Socy., 1876.

BARÈRE DE VIEUZAC, BERTRAND (1755–1841), Fr. revolutionist; s. of a Gascon lawyer; became deputy to National Assembly (1789), delegate from Hautes-Pyrénées to National Convention (1792), and a member of Committee of Public Safety. Voting first with the Girondists, he bitterly attacked Robespierre, but later joined his party and soothed his resentment by flattery. He voted for death of the king, proposing that 'terror should be the order of the day.' Later he was imprisoned and disgraced.

BARETTI, GIUSEPPE MARC' ANTONIO (1719–89), Ital. critic; settled in London, and was associated with Dr. Johnson and the Thrales (Boswell's *Life*); wrote on Shakespeare and other authors, and compiled a *Dictionary and Grammar of the Italian Language*.

BARFLEUR (49° 41′ N., 1° 16′ W.), ancient seaport, Manche, France; highest Fr. lighthouse at Cape B.; *White Ship* wrecked outside harbour, 1120.

BARFURUSH, Balfrush (36° 32′ N., 52° 43′ E.), town, Mazandarin, Persia; important commercial centre; colleges, bazaars; rice, cotton. Pop. 60,000.

BARGA PASS, much-used pass over Himalayas, Bashahr State, Punjab.

BARGAIN AND SALE, legal term for a contract by which real or personal property is transferred from one individual to another.

BARGE (44° 42′ N., 7° 18′ E.), town, Italy; slate quarries. Pop. 9319.

BARGE, flat-bottomed boat used on canals, and towed by a horse; on tidal waters they are sometimes fitted with sails; a 'lighter,' boat used for loading or unloading vessels; stationary house-boat like the Oxford College b's on the Iris; in earlier times a highly-decorated craft used by kings and nobles.

BARGEBOARD, a piece of board, often ornamented, covering the roof timbers of a gable.

BARGHEST, Barguest, spectre hound in N. Eng. folk-lore.

BARHAM, RICHARD HARRIS, 'Thomas Ingoldsby' (1788–1845), Eng. humorist; ed. St. Paul's School and Brasenose Coll., Oxford; clergyman and minor canon of St. Paul's; acquired (1837 onwards) lasting fame by his *Ingoldsby Legends*, combining humour with deep scholarship.

BAR-HEBRÆUS, see Abul-Faraj.

BARI (41° 7′ N., 16° 49′ E.), seaport, capital of B. province, Apulia, Italy; abp.'s seat; pilgrim church, St. Nicola, founded 1027; nautical school; olive oil, soap. Pop. (1911) 103,522. Province area, 2065 sq. miles. Pop. (1911) 892,417.

BARILI (10° 10′ N., 123° 30′ E.), town, Cebu, Philippine Islands; Ind. corn.

BARILLA, an impure carbonate of soda obtained by burning plants grown in salt marshes or on seacoast; formerly widely used method, but abandoned now that the carbonate is obtained from salt.

BARING, family of Eng. financiers and bankers; firm of Baring Bros. (1770–1890), 1st banking-house in Europe; members of the family have been prominent statesmen, and obtained respectively baronies of Ashburton, Northbrook (afterwards made an earldom), Revelstoke, and earldom of Cromer (*q.v.*).

BARING-GOULD, REV. SABINE (1834–), Eng. author and clergyman; writer of numerous novels, hymns, religious and antiquarian works.

BARINGO (0° 40′ N., 36° 10′ E.), lake, Central Africa; no outlet; discovered, 1883.

BARISAL (22° 50′ N., 90° 20′ E.), town, Dacca, Bengal, India. Pop. 19,000.

BARITONE, male voice of light bass character; an intermediate range between tenor and bass.

BARIUM (Ba = 137·37), metallic element belonging to alkaline earths; difficult to isolate; of silver lustre, oxidises readily, reacts with water and alcohol; occurs chiefly as barytes, witherite, baryto-calcite, baryto-celestine, and in complex silicates; spectrum shows two characteristic green lines.

BARKER, EDMUND HENRY (1788–1839), Eng. scholar; edited classics.

BARKER, HARLEY GRANVILLE (1877–), Eng. actor-manager and playwright; fosters the 'new' drama plays; wrote *Voysey Inheritance* (1905), *Waste* (1910), etc.

BARKER, ROBERT (1739–1806), Irish artist associated with Edinburgh.

BARKER'S MILL, engine, named after inventor, worked by pressure of water instead of that of steam.

BARKING (51° 33′ N., 0° 5′ E.), market town, Essex, England; ruined abbey; factories. Pop. (1911) 31,302.

BARKLY EAST (30° 58′ S., 27° 39′ E.), town, Cape Province, S. Africa; sheep farming.

BARKLY WEST (28° 30′ S., 24° 35′ E.), town, Cape Province, S. Africa; diamonds.

BARKLY, SIR HENRY (1815–98), Brit. governor of Brit. Guiana, Jamaica, Victoria, Mauritius, and Cape, successively (1848–77).

BARLAAM AND JOSAPHAT, Christianised mediæval romance of Buddhist origin.

BAR-LE-DUC (48° 47′ N., 5° 10′ E.), town, on Ornain, Meuse, France; was capital of mediæval county, afterwards Duchy, of Bar; birthplace of great Duke of Guise and Marshal Oudinot. Pop. 17,700.

BARLETTA (41° 19′ N., 16° 15′ E.), seaport town, Bari, Italy; tartaric acid. Pop. (1911) 42,964.

BARLEY (*Hordeum sativum*), important hardy cereal including numerous sub-species, cultivated from ancient times in temperate regions for domestic cookery, malting, and brewing. Under fair conditions one peck may yield about 4½ bushels (each 56 lb.). B. is liable to same parasitic diseases as wheat. Of the three varieties (*H. distichum*, *H. hexastichum*, i.e. two-rowed and six-rowed, and *H. vulgare*, or common, which is four-rowed), first is best for brewing, while second is thought scarcely worth while cultivating. Decorative character recognised by ancients; Romans used it as adornment on coins of corn-goddess Ceres. **Barley-corn,** formerly barley-grains, a measure of length; malt liquor, personified in Burns' song, 'John B.'—**Barley sugar,** sweetmeat made of sugar and b. water.

BARLEY-BREAK, old Eng. country game, played by three persons of each sex in couples, placed in three positions close to one another, the middle couple trying to catch the others, who, when caught, were put in the middle position, or *hell*.

BARLOW, JOEL (1754–1812), Amer. poet and politician; wrote for Girondists in France, 1789–91, for Whigs in England, and in 1807, *The Columbiad*, epic poem.

BARLOW, PETER (1776–1862), Eng. mathematician; prof. of Mathematics, Royal Military Academy, Woolwich; improved mariner's compass, the telescope, and encouraged steam locomotion.

BARLOW, SIR THOMAS (1845–), Bart. (cr. 1901), physician-extraordinary to Queen Victoria and Edward VII.; pres. of Roy. Coll. of Physicians, 1910.

BARM, yeast (*q.v.*); scum on fermenting malt liquor.

BARMECIDES, Persian family founded by Barmak; appear in *Arabian Nights*, where is account of B. Feast, banquet of imaginary dishes served to a beggar whose sense of humour allowed him to pretend to eat them, become uproarious on visionary wine, and win his entertainer's goodwill by giving him a box on the ear.

BARMEN (51° 17′ N., 7° 11′ E.), town, Dusseldorf district, Germany; ribbons. Pop. (1911) 169,201.

BARMOUTH (52° 44′ N., 4° 3′ W.), summer resort, Cardigan Bay, Merionethshire, N. Wales.

BARNABAS (=Son of Consolation, so called by the Apostles), the Apostle, was a Levite of Cyprus

named Joses, who sold his land and gave the money to the Apostles. He was the uncle of Mark. B. championed Paul, after the latter's conversion; was sent to Antioch; accompanied Paul on his first missionary journey; returned to Antioch and sailed with Mark to Cyprus, where he is said to have d. as a martyr. The apocryphal *Epistle of B.* is found in the *Codex Sinaiticus*, and Clement of Alexandria (200) frequently quotes it and attributes it to B. It deals with the attitude of the Church towards the Jewish Law, in an anti-Judaistic spirit. Harnack gives its date as about 130.

BARNABITES, religious order of 'Regular Clerks of St. Paul,' founded in Milan, 1530; named from place of assembly, church of St. Barnabas.

BARNACLE, see THYROSTRACA.

BARNARD CASTLE (54° 33′ N., 1° 55′ W.), market town, on Tees, Durham County, England; ruins of Castle Barnard; birthplace of John Baliol; scene of Scott's *Rokeby*; flax thread. Pop. (1911) 4757.

BARNARD, LADY ANNE (1750–1825), Scot. poetess; dau. of 5th Earl of Balcarres; m. Andrew B., who was app. colonial sec. at Cape of Good Hope. She is chiefly remembered for her ballad, *Auld Robin Gray*, written 1772 (pub. anonymously, 1783; authorship admitted to Sir W. Scott, 1823), and her *Letters* from the Cape.

BARNARD, FREDERICK AUGUSTUS PORTER (1809–89), Amer. educationist and scientist; associated with development of Columbia Univ., and with admission of women to univ's.

BARNARD, GEORGE GREY (1863–), Amer. sculptor; has executed many subject studies, including *Two Natures* (Metropolitan Museum, New York).

BARNARD, HENRY (1811–1900), Amer. educationist; first U.S.A. education commissioner; instituted Bureau of Education.

BARNARDO, THOMAS JOHN (1845–1905), Irish philanthropist; opened 'Dr. B.'s Home,' at Stepney, 1867, to shelter and train homeless children; and afterwards established 111 similar refuges, besides village at Barkingside for girls.

BARNATO, BARNETT ISAACS (1852–97), S. African diamond merchant.

BARNAUL (53° 20′ N., 83° 48′ E), town, Tomsk, Asiatic Russia; smelting furnaces. Pop. 29,408.

BARNAVE, ANTOINE PIERRE JOSEPH MARIE (1761–93), orator of Fr. Revolution, most distinguished after Mirabeau; among first to oppose monarchy; escorted king back from Varennes; but opposed touching king's person; executed for having advised Louis XVI. to veto bills.

BARNBURNERS, Amer. democratic party, so named (*c.* 1844) from drastic measures advocated.

BARNBY, SIR JOSEPH (1838–96), Eng. composer and conductor; head of Guildhall School of Music (1892); his works include *Rebekah*, an oratorio, anthems, part-songs, about 250 hymn-tunes.

BARNES, ALBERT (1798–1870), Amer. Presbyterian theologian; eloquent preacher and popular expositor of Scriptures.

BARNES, BARNABE (1569–1609), Eng. poet; pub. two plays, *The Devil's Charter* and *The Battle of Evesham*; also *Parthenophil* (odes, elegies, etc.) and *A Divine Century of Spirituall Sonnets*.

BARNES, SIR EDWARD (1776–1838), Eng. general and gov. of Ceylon.

BARNES, THOMAS (1785–1841), Eng. journalist; followed Dr. Stoddart as editor of *The Times* (1817); intimate with Lamb, Hazlitt, and others.

BARNES, WILLIAM (1801–86), Eng. poet and philologist; s. of farmer; was successively lawyer's clerk, schoolmaster, and clergyman; pub. *Poems in the Dorset Dialect* (1844); *Ilwomely Rhymes* (1858); *Collected Poems* (1879); *Philological Grammar* (1854); *Glossary of Dorset Dialect* (1863), etc. B. seems to have been a man of singular sweetness of character, and his poems of Dorset life have secured a firm place in modern Eng. lit.

BARNET (51° 37′ N., 0° 12′ W.), district, Herts, England; on Great North Road; great fair still held; scene of battle (1471) in Wars of Roses, where 'Kingmaker' fell; obelisk erected, 1740. Pop. 10,440.

BARNETT, JOHN (1802–90), Eng. composer; b. Bedford; s. of Prussian jeweller who assumed Eng. name; sang on stage as boy, and received musical training; father of modern Eng. opera; *Mountain Sylph* (1834) well received at Lyceum; followed by *Fair Rosamond* (1837) and *Farinelli* (1839).

BARNETT, SAMUEL AUGUSTUS (1844–1913), Eng. clergyman and social reformer; Steward of Westminster; noted for Church work among Whitechapel poor; promoted Univ. Extension; first warden of Toynbee Hall; pub. *Practicable Socialism* (1888).

BARNEVELDT, JAN VAN OLDEN (1547–1619), Dutch patriot and statesman; b. Utrecht; advocate-general, 1515; opposed warlike policy of Maurice of Nassau; proposed religious toleration, but as Remonstrant (follower of Jacobus Arminius, *q.v.*) was beheaded for treason. *Life*, by Motley.

BARNFIELD, RICHARD (1574–1627), Eng. poet; ed. Brazenose Coll., Oxford; pub. *The Affectionate Shepherd* (1594); *Cynthia, with certain Sonnets* (1595); *Lady Pecunia* (1598); and *The Passionate Pilgrim* (1599). The latter work bore Shakespeare's name on title-page, but later researches have proved it to be largely the production of B.

BARNIM (52° N., 13° 20′ E.), district, Brandenburg, Prussia, embracing Berlin.

BARNSLEY, BLEAK B. (53° 34′ N., 1° 28′ W.), market town, parliamentary and municipal borough, on Dearne, Yorkshire; coal-fields; iron and steel; linen. Pop. (1911) 50,623.

BARNSTABLE (41° 44′ N., 70° 14′ W.), seaport town, Massachusetts, U.S.A. Pop. (1910) 4676.

BARNSTAPLE (51° 1′ N., 4° 5′ W.), seaport, Devonshire, England; municipal, parliamentary, and ancient royal borough; XII.-cent. bridge over river Taw; mediæval church and grammar school; shipbuilding, lace, pottery. Pop. (1911) 14,488.

BARNUM, PHINEAS TAYLOR (1810–91), Amer. showman; successfully toured with the dwarf, 'General Tom Thumb,' in U.S.A. and England (1842–44), and introduced Jenny Lind to the Amer. public. In 1871 he launched enterprise known as 'The Greatest Show on Earth,' with which he toured world.

BAROCCHIO, GIACOMO (1507–73), Ital. architect; under the patronage of Pope Julius III. he succeeded Michael Angelo as the architect of St. Peter's (1564), and designed numerous other buildings in Rome; pub. *Five Orders of Architecture* (1563), and *Practical Perspective* (1583).

BARODA (23° N., 72° E.), native state, Gujerat, Bombay, India; ruled by Gaekwar under Brit. supervision; capital, B.; temples, colleges, cotton mills; area, 8099 sq. miles. Pop. (1911) 2,032,798.

BAROMETER, instrument for measuring atmospheric pressure. Galileo's observation that water ordinarily rises in a pump to a height of about 34 ft. induced Torricelli to prove experimentally that the atmosphere has weight. He demonstrated that mercury, filling a tube 3 ft. long sealed at one end, when inverted in a basin containing the same fluid, sank to a level of about 30 in. above that of the mercury, in the basin, a vacuum being left at the top of the tube. Subsequently, Pascal showed that the level of the mercury varied in different altitudes or in different weather, thus making Torricelli's appliance provided with a scale known as a *weather glass* and an instrument for determining altitudes. In the so-called *cistern b.* the mercury level in the basin naturally varies with the level in the tube, rendering the exact observation of different pressures difficult owing to this 'error of capacity.' This is obviated in the *Fortin b.* by a screw by means of which the mercury in the cistern can be adjusted to a standard level indicated by an ivory point. The obvious disadvantages of the mercury b. are avoided in the *aneroid b.*, which consists of a thin metal box

from which the air has been evacuated, its shape changing with different pressures. Alterations are magnified by a system of levers, and indicated on a dial by a hand. *Barographs* are self-registering barometers.

Barometric Light, electric glow caused by friction between mercury and air in shaken barometer tube.

Marvin, *Barometers and the Measurement of Atmospheric Pressure* (1901).

BARON, in early times in England the word was used to distinguish a person who held lands of the sovereign, but was not in any sense a title. It was first employed as a title by Richard II., who in 1387 created John de Beauchamp b. of Kidderminster. Henry VI. was the first king to create a number of b's. Charles II. gave b's a coronet. The title, which is hereditary to the heirs-male, is the lowest in the peerage. The children of a b. are addressed as 'The Honourable.'

BARON AND FEMME, FEME, Norman words, meaning man and wife, used in Eng. law and heraldry.

BARON, MICHEL (1653–1729), Fr. actor; leading actor of his period; played in Molière's company, and created many principal rôles in Racine's tragedies.

BARONET, hereditary Brit. title instituted by James I., the first person thus cr. being Sir Nicholas Bacon, knight (f. of Francis Bacon), who received the honour in 1611. A b. takes precedence of a knight, but not of the younger sons of barons. His wife is styled 'Dame,' but usually is called 'Lady.'

BARONIUS, CÆSAR (1538–1607), Ital. cardinal and historian; chiefly remembered as author of *Annales Ecclesiastici*.

BARONS, WAR OF THE, see ENGLAND (p. 549 D).

BARONY, division of a county in Ireland, equivalent to an Eng. 'hundred' (*q.v.*).

BAROSS, GABOR (1848–92), Hungarian statesman and economic reformer.

BAROTAC NUEVO, town, Iloilo, Panay, Philippine Islands. Pop. 12,000.

BAROTSELAND (*c.* 15° 25′ S., 25° E.), district, N.W. Rhodesia; inhabited by Bantu race.

BARQUE, see SHIP.

BARQUISIMETO (10° N., 69° W.), city, state of Lara, Venezuela; bp.'s seat; coffee. Pop. 31,000.

BARR (48° 24′ N., 7° 22′ E.), town, Alsace-Lorraine, Germany; wine, timber. Pop. 5000.

BARRA, BARRAY (57° N., 7° 32′ W.), island, Outer Hebrides, Inverness-shire, Scotland; fisheries.

BARRA MANZA, town on Parahiba, Brazil. Pop. 12,000.

BARRACKPUR (22° 45′ N., 88° 20′ E.), town, on Hugli, Bengal, India; mills. Pop. 32,000.

BARRACKS.—A standing army must be lodged apart from the civil population and the permanent buildings provided for them are called barracks: they are of various types and dimensions; many date from the XVIII. cent., others have been built of late years with more regard to modern ideas of comfort. The buildings are generally planned to form a quadrangle which is used as a drill ground. In the case of infantry each company appropriates a room, a floor, or a block, which is furnished by a branch of the Army Service Corps with tables, forms, beds, and boxes, a coal bin, and cleaning implements. The regimental kitchen is situated in a position convenient for all— each company employing its own cook.

N.C.O's above the rank of corporal take their meals in common in a building called the sergeants' mess, which is also a recreation room. The officers occupy a separate block, which contains a reading-room, dining-room, billiard-room, kitchen, and bedrooms; this is known as the officers' quarters. Another building is appropriated to the married people, from private to sergeant-major; unmarried sergeants sleep in an anteroom used as the company office, and known as the 'bunk.' A building is also appropriated to the regimental staff, where the adjutant and the quartermaster, assisted by their clerks, prepare the correspondence, etc., for the lieutenant-colonel, who attends daily for the discharge of routine business.

There is a guard-house near the barrack gate, where refractory soldiers are confined. There is stable accommodation for chargers; also latrines and bath-houses. The troops obtain beer and other refreshments at a regimental shop familiarly known as the *canteen*. There is another building where coffee, soup, etc., may be obtained, and where indoor games may be played. There is also a gymnasium and sometimes a skittle-alley or miniature rifle range. In short, the barracks is a walled town in miniature, of which the inhabitants are soldiers and their families. In India the troops are accommodated in cantonments (from *canton*, a district) apart from the native inhabitants.

BARRACOUTA, BARRACUDA, fish of tropical and subtropical regions which attacks man.

BARRAFRANCA (37° 21′ N., 14° 13′ E.), town among mountains of Sicily. Pop. 11,068.

BARRANDE, JOACHIM (1799–1883), Austrian geologist; issued numerous papers on lower Palæozoic fossils, and a great work on Bohemian Silurian system.

BARRANQUILLA (11° N., 74° 55′ W.), city and port, Magdalene river, Colombia. Pop. 48,907.

BARRANTES, VICENTE (1829–98), Span. author and politician, wrote poems, satires, history, etc.

BARRAS, PAUL FRANÇOIS NICOLAS, COMTE DE (1755–1829), Fr. statesman; member of Directory, 1795–99; corrupt and immoral; left notes for memoirs.

BARRATRY.—(1) Act of stirring up quarrels or breaches of the peace. (2) Fraudulent act by a master-mariner against the owner of his ship, or cargo, such as scuttling the ship, embezzlement, etc. (3) In Scots law, the crime of a judge who accepts bribery.

BARRE (44° 15′ N., 72° 30′ W.), city, Washington County, Vermont, U.S.A.; granite. Pop. (1910) 10,734.

BARRÉ, ISAAC (1726–1802), Brit. soldier of Fr. extraction; treasurer to navy, 1782.

BARREL-ORGAN, portable mechanical organ, played by turning a handle. This handle turns a wooden cylinder set with pins which raise the keys, thus admitting air from the wind-chest. Originally known as 'the Dutch organ,' the barrel-organ was first made in the Netherlands during the XV. cent. After its introduction into England it was frequently used in churches.

BARREN ISLAND (12° 6′ N., 93° 45′ E.), volcanic island, Bay of Bengal.

BARRÈS, MAURICE (b. 1862), Fr. author, politician, and academician; chief novel, *Les Déracinés*, sets forth political creed, as *Le Jardin de Bérénice* sets forth his Nietzschean philosophy.

BARRETT, ELIZABETH, see BROWNING.

BARRETT, LAWRENCE (1838–91), Amer. actor; noted for his performance of Shakespearean characters, and, after Edwin Booth, the leading 'legitimate' actor of his day in America; served with distinction during Civil War; wrote lives of Edwin Booth and Edwin Forrest.

BARRETT, LUCAS (1837–62), Eng. naturalist; director of Jamaica Geological Survey.

BARRETT, WILSON (1846–1904), Eng. actor and dramatist; excelled in melodrama; wrote *The Sign of the Cross* (1895) and other plays.

BARRHEAD (55° 48′ N., 4° 23′ W.), burgh and town, on Leven, Renfrewshire, Scotland; weaving, engineering. Pop. (1911) 11,387.

BARRIAS, FÉLIX JOSEPH (1822–1907), Fr. historical painter; his bro., LOUIS ERNEST (1841–1905), sculptor, has executed several public works at Paris.

BARRIAS, LOUIS ERNEST (1841–1905), Fr. sculptor; besides public monuments, has done groups on classical subjects, noted for strength and simplicity of handling.

BARRICADE (BARRICADO), improvised fortification to check hostile advance. **Barricades, Days of the** (*Journées des*); raising b's is favourite Parisian way of commencing insurrection; chief—May 12, 1588, raised by League with view of deposing Henry III. in favour

of Duke of Guise; Aug. 27, 1648, first important manifesto of Fronde; during revolutions 1830, 1848, and 1871.

BARRIE (44° 23′ N., 79° 43′ W.), town, capital of Simcoe County, Ontario, Canada; summer resort; breweries. Pop. 6000.

BARRIE, SIR JAMES MATTHEW, Bart. (1860–), Scot. novelist and dramatist; b. Kirriemuir; made his reputation with sketches and novels of Scot. life, *A Window in Thrums* (1889), *The Little Minister* (1891), etc., and plays of a delicate fancy and whimsical satire, the most esteemed being *The Admirable Crichton* (1903), *Peter Pan* (1904), *What Every Woman Knows* (1908), *The Twelve-Pound Look* (1910).

BARRIER ACT, 1697, act of General Assembly of Scot. Church by which ecclesiastical bills must receive assent of presbyteries and General Assembly; named from forming b. to hasty legislation.

BARRIER REEF (c. 10° to 25° S., 144° to 152° 30′ E.), chain of coral reefs outlining most of E. Queensland coast.

BARRIER TREATY (1709), treaty between England and United Netherlands, by which former guaranteed latter against Fr. aggression in return for guarantee against attack on Prot. succession in England.

BARRIÈRE, THÉODORE (1823–77), Fr. dramatist; produced *La Vie de Bohème* (1849), *Manon Lescaut* (1851), *Les Faux Bonshommes*, *Le Gascon*, etc.

BARRILI, ANTONIO GIULIO (1836–1908), one of most popular Ital. novelists.

BARRING-OUT, act of rebellion amongst schoolboys, which consisted of excluding the master from the school premises. A notable instance took place at Edinburgh High School (1595), when Bailie Macmorran was shot dead by one of the boys.

BARRINGTON, DAINES (1727–1800), Eng. lawyer and author; s. of 1st Viscount B.; pub. *Tracts on the Probability of Reaching the North Pole* (1775) and *Miscellanies on Various Subjects* (1781), including studies on the language of birds.

BARRINGTON, GEORGE, Irish actor; real name Waldron; having served several long terms of imprisonment for pocket-picking, etc., was transported to Botany Bay, and became High Constable of Paramatta; pub. *Voyage to Botany Bay* (1801) and *History of New South Wales* (1802).

BARRINGTON, JOHN SHUTE, 1st Viscount (1678–1734), Eng. lawyer, politician, and theologian.

BARRINGTON, SAMUEL (1729–1800), Brit. admiral; s. of 1st Viscount B.; distinguished in Seven Years War.

BARRINGTON, WILLIAM WILDMAN SHUTE, 2nd Viscount (1717–93), Eng. statesman; Chancellor of Exchequer, 1761.

BARRISTER, a legal practitioner qualified to plead in the higher law courts of England, who must be a member of one of the Inns of Court. It is necessary, in order to become a b., to pass a general examination, pay certain fees, and to keep twelve terms at one of the Inns, when, after further examination, it rests with the benchers of the Inn to call him to the Bar. When a barrister is made a King's Counsel (not less than 10 years after being called) he is said to 'take silk,' and is then debarred by etiquette from undertaking certain minor forms of legal work. In Scotland a b. is known by the title of advocate (*q.v.*), and must be a member of the Faculty of Advocates, to which he is admitted on examination and on payment of certain fees.

BARROS, JOÃO DE (1496–1570), Portug. historian; wrote a romance of chivalric age, the *Chronicle of the Emperor Clarimundo* (1516), but is chiefly renowned for his *Decades*, setting forth the history of the Portuguese in Asia; was a noted literary stylist.

BARROSA (36° 20′ N., 6° 10′ W.), town, Spain. British defeated French, 1811.

BARROT, CAMILLE HYACINTHE ODILON (1791–1873), Fr. politician; famous as an advocate; joined National Guard and took part in Revolution of 1830, also in that of 1848; became head of Louis Napoleon's first ministry; retired after the *coup d'état*, but returned to office again in 1872.

BARROW (52° 30′ N., 6° 58′ W.), river, Leinster, Ireland; joins Suir, Waterford harbour.

BARROW, ISAAC (1630–77), Eng. mathematician and divine; prof. of Greek in Cambridge; Gresham prof. of geometry; master of Trinity and vice-chancellor; author of numerous scientific works, his *Method of Tangents* influencing Newton's work.

BARROW, SIR JOHN (1764–1848), Eng. traveller and author; b. Ulverstone (Lancs); spent much time in China as sec. to Lord Macartney; held post of 2nd sec. to Admiralty for 40 years; pub. *Travels in S. Africa* (1801–83), *Travels in China* (1804), *Voyage to Cochin-China* (1806), and history of modern Arctic expeditions, 1818, 1846.

BARROWE, HENRY (d. 1593), Eng. Puritan; was intimately associated with John Greenwood, leader of the Separatists, whose views he adopted, and was, in 1586, cast into the Fleet Prison at the instance of Abp. Whitgift. Here he remained until he was condemned and hanged, the charge being that of circulating seditious books. He wrote *A Brief Discovery of the False Church* (1591) and other books promulgating Separatist opinions.

BARROW-IN-FURNESS (54° 7′ N., 3° 14′ W.), county borough and seaport town, on Morecambe Bay, Lancs, England; of modern and rapid development; in vicinity are extensive iron-ore mines; large manufactures iron and steel; magnificent docks; engineering; wagon works. Pop. (1911) 63,775.

BARROWS (A.S. *beorgh*, 'a little hill'), sepulchral mounds which are found throughout Europe and in many other parts of the world. In the Brit. Isles they are either round or oval in shape, and are formed of a stone-built inner chamber covered with earth, or sometimes of earth alone. In other instances they consist entirely of stone, several uprights, supporting a huge capstone; these in England are known as *cromlechs*, and in Brittany as *dolmens*. Sometimes the human remains were burned, and the ashes deposited in urns, but often actual bodies were buried, together with arms, drinking-vessels, and domestic animals belonging to the deceased. The b's of the Viking age were frequently very large, and it seems to have been a common custom to bury a warrior aboard his ship. The Gokstad ship, discovered in a burial mound in 1880, and now in the Christiania museum, is 78 ft. long, while the b. also contained the remains of a dozen horses, besides numerous other animals, weapons, etc.

Greenwell, *British Barrows* (1877).

BARROW-UPON-SOAR (52° 46′ N., 1° 9′ W.), village, Leicestershire, England; industries, stone and cement works, stocking manufacture.

BARRY (Fr. *barré*, barred), term in heraldry for field traversed by horizontal bars of different colours.

BARRY (51° 24′ N., 3° 16′ W.), seaport, Glamorganshire, S. Wales, opposite island of B., Bristol Channel; docks accommodate largest vessels afloat; enormous quantities of coal shipped. Pop. (1911) 33,767.

BARRY (56° 31′ N., 2° 45′ W.), village, Forfarshire, Scotland; annual military and territorial camp.

BARRY CORNWALL, see PROCTER, BRYAN WALLER.

BARRY, SIR CHARLES (1795–1860), Eng. architect; designed Houses of Parliament, Bridgewater House, and many churches and private mansions; also Royal Institution (1824) and Athenæum (1836) at Manchester; was knighted (1852); buried in Westminster Abbey.

BARRY, ELIZABETH (1658–1713), Eng. actress; won high praise from Dryden and Cibber, and was particularly famous for her performances in Otway's plays.

BARRY, JAMES, R.A. (1741–1806), Irish artist; b. Cork, where he received early art training; came to London, was patronised by Edmund Burke and others. He painted many large pictures, chiefly on hist. and

allegorical subjects, many of which were done for the great hall of the Soc. of Arts in the Adelphi.

BARRY, JEANNE BÉCU, COMTESSE DU (1741–93), mistress of Louis XV.; fled to England at outbreak of Revolution, but returned and was guillotined during Terror.

BARRY, SIR JOHN WOLFE WOLFE- (1836–), Eng. engineer; s. of Sir Charles B. (*q.v.*); assumed addition 'Wolfe' by licence, 1898; constructor of Tower Bridge, Blackfriars ry. bridge, and many other important works.

BARRY, SIR REDMOND (1813–80), Australian judge; did much to promote higher education in the colonies; founder and first Chancellor of Melbourne Univ. (1853).

BARRY, SPRANGER (1719–77), Irish actor; b. Dublin; in leading Shakespearean rôles became a rival of Garrick, over whom he possessed the advantage of a tall and handsome person. His second wife, **Ann Street Barry** (d. 1801), an actress, was considered the superior of Mrs. Siddons in some characters.

BARSI (18° 12′ N., 75° 43′ E.), town, Sholapur, Bombay Presidency, India. Pop. 24,000.

BAR-SUR-AUBE (48° 17′ N., 4° 38′ E.), district and town, Aube, France; flour. Pop. 4600.

BAR-SUR-SEINE (48° 6′ N., 4° 19′ E.), town, Aube, France; glass, brandy; French defeated Austrians, 1814. Pop. 3300.

BART, JEAN (1651–1702), Fr. naval officer; s. of a fisherman; b. Dunkirk; first served in Dutch navy under De Ruyter, later entered Fr. service; by sheer force of character and bravery rose to highest rank. He was no respecter of persons, and many stories of his blunt humour are recorded.

BARTAS, GUILLAUME DE SALLUSTE, SIEUR DU (1544–90), Fr. Huguenot; author of great religious epic poem, *La Semaine, ou Création du Monde.*

BARTÁN, BARTIN (41° 39′ N., 32° 19′ E.), town and port; Kastamuni vilayet, Asiatic Turkey.

BARTELS, HANS VON (1856–), Ger. artist; chiefly known for his vigorous water-colours depicting storm scenes and incidents in the lives of fisher-folk.

BARTENSTEIN (54° 15′ N., 20° 49′ E.), town, on Alle, Prussia; carriage-building. Pop. 7071.

BARTET, assumed surname of JEANNE JULIA REGNAULT (1854–), prominent Fr. actress.

BARTH (54° 20′ N., 12° 40′ E.), seaport town, Pomerania, Prussia; shipbuilding. Pop. 7600.

BARTH, HEINRICH (1821–65), distinguished Ger. explorer and writer of books of travel; made observations on North and Central Africa for Brit. government, 1850–55.

BARTH, KASPAR VON (1587–1658), Ger. philologist; travelled extensively, and was a voluminous writer of great learning; his *Adversaria* (1624) is a mine of miscellaneous information.

BARTHÉLEMY, ANATOLE JEAN-BAPTISTE (1821–1904), Fr. numismatist; pub. *Nouveau manuel complet de numismatique ancienne* (1851) and a similar work on modern coinage (1853).

BARTHÉLEMY, AUGUSTE MARSEILLE (1796–1867), Fr. satirical poet; collaborated with J. P. A. Méry; trans. *Æneid* into verse; pub. *Les Sidiennes* (1825), *La Villéliade* (1827), *La Corbiéréide,* and other works.

BARTHÉLEMY, FRANÇOIS, MARQUIS DE (c. 1747–1830), Fr. diplomatist and politician under monarchy, empire, and restored monarchy.

BARTHÉLEMY SAINT-HILAIRE, JULES (1805–95), Fr. philosophical writer and republican statesman.

BARTHEZ, PAUL JOSEPH (1734–1806), Fr. physician; prof. of Med. and chancellor of univ. of Montpellier; author of *Science de l'homme,* trans. into many different languages.

BARTHOLDI, FRÉDÉRIC AUGUSTE (1834–1904), Fr. sculptor; Statue of *Liberty* (New York Harbour) and *Lion of Belfort* are among his works.

BARTHOLINUS, GASPARD, CASPAR BERTHELSON (1585–1629), Swed. physician; prof. of Med., Copenhagen; later prof. of Divinity; his descendants distinguished themselves in science.

BARTHOLOMÉ, PAUL ALBERT (1848–), Fr. sculptor and painter; among works is *Monument aux morts* in Père-Lachaise, Paris.

BARTHOLOMEW FAIR, fair held in Smithfield, London, on St. B.'s Day, from 1133 to 1855. It was a vast national market, opened by the Lord Mayor, and lasted for a fortnight.

BARTHOLOMEW, JOHN (1831–93), Scot. cartographer; b. Edinburgh; founded the Edinburgh Geographical Institute, an organisation of world-wide fame in cartographical work.

BARTHOLOMEW, ST., one of twelve Apostles; said to have been flayed alive, and then crucified head downwards; festival observed on Aug. 24.—**Massacre of St. B.** See FRANCE (p. 627 D).

BARTIZAN, a small, overhanging, battlemented turret, near a gateway, usually furnished with arrow-slits.

BARTLETT, JOHN (1820–1905), Amer. publisher and compiler; member of Boston bookselling and publishing firm; memorable as the compiler of *Familiar Quotations,* first pub. 1855; also pub. an exhaustive *Shakespeare Concordance* (1894).

BARTLETT, JOHN RUSSELL (1805–86), Amer. author and statesman; b. Providence, Rhode Is., became Sec. of State for Rhode Is.; edit. Records of the Colony (1636–1790); is chiefly remembered for his *Dictionary of Americanisms* (1848).

BARTLETT, PAUL WAYLAND (1865–), Amer. sculptor; b. New Haven (Conn.); has executed statues of Columbus and Michael Angelo for Washington, D.C., M'Clellan for Philadelphia, etc.

BARTOLI, DANIELLO (1608–85), Ital. Jesuit; wrote history of Society of Jesus in 6 vols. (Rome, 1650–73).

BARTOLI, TADDEO DI (*c.* 1363–1422), Sienese painter; chief work: series of frescoes in chapel of municipality, Siena.

BARTOLINI, LORENZO (1777–1850), Ital. sculptor; produced, among other works, *Charity, Hercules and Lichas, Faith in God,* and bust of his patron Napoleon.

BARTOLOMMEI, MARQUIS FERDINANDO (1821–69), Ital. patriot; associate of Cavour and Mazzini; organised Tuscan contingent for war of Italy against Austria, and secured expulsion of Grand Duke from Florence.

BARTOLOMMEO DI PAGHOLA, FRA (1475–1517), Ital. artist; famous for his magnificent altar-pieces; also for his friendship with Savonarola and Raphael.

BARTOLOZZI, FRANCESCO (1725–1815), Ital. engraver; b. Florence; studied at Rome and Venice; came to London (1764), where he spent a considerable portion of his life, but d. in Portugal. He contributed to Boydell's *Shakespeare Gallery.*

BARTON, ANDREW (d. 1511), Scot. merchant; regarded in England as bold pirate; slain by English in naval engagement; subject of ballad.

BARTON, BENJAMIN SMITH (1766–1815), Amer. naturalist; prof. at Philadelphia; pres. of Amer. Philosophical Soc.

BARTON, BERNARD (1784–1849), Eng. Quaker poet; b. Carlisle; bank-clerk at Woodbridge, Suffolk (1809); pub. *Metrical Effusions* (1812) and *Household Verses* (1845); was friend of Lamb, Southey, and Hogg, and was the father-in-law of Edward Fitzgerald.

BARTON, CLARA (1830–1912), Amer. philanthropist; app. head of hospital department in Amer. army, 1864; aided Red Cross Society in Franco-German war, and has since done much personal field work; became pres. of newly established Amer. Red Cross Society, 1881.

BARTON, SIR EDMUND (1849–1912), Australian

statesman; promoter of Australian Commonwealth and its first Prime Minister (1901–3).

BARTON, ELIZABETH (*c.* 1506–34), the 'Nun' or 'Maid' of Kent; forbade divorce of Henry VIII., prophesying his dethronement; executed at Tyburn.

BARTON BEDS, Upper Eocene grey and brown fossiliferous clays, with sandy layers; sands used in glass-making.

BARTON-UPON-HUMBER (53° 41′ N., 0° 27′ W.), town, Lincolnshire, England; tanning; pottery. Pop. (1911) 6676.

BARTON-UPON-IRWELL (53° 28′ N., 2° 22′ W.), town, Lancashire, England. Pop. (1911) 9270.

BARU, fibrous material obtained from leaves of E. Indian sago-palm and used in place of wool for cushions, etc.

BARUCH, THE APOCALYPSE OF, consists of a VI.-cent. Syriac MS. discovered by Ceriani in the Milan library in 1866, of which he produced a Latin trans. B. is said to have been companion and sec. of Jeremiah, and his work includes the prayer of the captives in Babylon, a dissertation on wisdom, and songs celebrating the return from captivity; see Charles, *Apocalypse of B.* (1896).

BARUGO (11° 15′ N., 124° 50′ E.), coast town, island Leyte, Philippine Islands; hemp. Pop. 12,000.

BARYATINSKY, ALEXANDER IVANOVITCH, PRINCE (1814–79), Russ. general and gov. and conqueror of the Caucasus.

BARYE, ANTOINE LOUIS (1796–1875), Fr. sculptor; in reproductions of animal life was the greatest modern Fr. master; exhibited *Theseus and the Minotaur* (1847), *Lapitha and the Centaur* (1848), besides executing many figures for the Tuileries, gardens, and public buildings.

BARYTES, Heavy Spar ($BaSO_4$), orthorhombic mineral occurring in metalliferous veins; known as *cawk* in Derbyshire lead-mines; sp. gr. 4·5; used as 'permanent white' pigment.

BARYTOCALCITE, $BaCaCO_3$, monoclinic white transparent crystals, found only at Alston Moor, Cumberland, England.

BASALT, igneous (volcanic) rocks with dark cleavage surfaces, weathering to turbid shades; composition varied, chiefly felspars, olivine, augite, black hornblende, biotite, and nepheline, together with grains of magnetite; many are characterised by columnar picturesque conformations, of which Staffa and Giant's Causeway are well-known examples.

BASCINET, Basinet, Basnet, light peaked helmet, worn with or without a movable front, in common use during reigns of Edward I., II., III., and Richard II.

BASE (Chemistry), a compound which will unite with acids to form salts. All metallic oxides are b's, and are hence called **Basic Oxides** to distinguish them from non-metallic oxides, which, being acid-forming oxides, are called **Acid Oxides.**

BASE-BALL, national game of U.S.A., played with bat and ball upon a diamond-shaped smooth pitch, the points of the figure being named home-base, and 1st, 2nd, and 3rd bases. It is played by two sides of nine players each; if score is not equal nine innings completes a game, an innings being ended when three batsmen are out on each side.

Murnane, *How to Play Base-Ball* (New York).

BASEDOW, JOHANN BERNHARD (1723–90), Ger. educationist, disciple of Rousseau; wrote books embodying Rousseau's theory of education, and established institute at Dessau.

BASEL, Bâle.—(1) (47° 23′ N., 7° 35′ E.) town, Switzerland; founded in Rom. times; includes Great and Little B., separated by Rhine; has XIV.-cent. cathedral, XV.-cent. univ., XVI.-cent. town hall. Pop. (1910) 131,914. (2) (47° 25′ N., 7° 45′ E.) canton, Switzerland; area, 177 sq. miles; comprises the half-cantons, B.-Stadt, B.-Land. Pop. (1910) 211,987.

Basel, Confession of, statement of faith, promulgated by Oswald Myconius, of Basel (1534); read in churches of that town annually on Wednesday in Passion Week up to 1826; later annulled.

Basel, Council of, summoned by Martin V. in 1424 at Pavia and in 1431 at Basel. Eugenius IV., succeeding in the latter year, found the council sitting with the aim of reforming the Church and putting down the Hussites. Eugenius, wishing to effect a union with the Gk. Church, dissolved the council in 1437, and convoked a council at Ferrara in 1438, where, the next year, a temporary union was effected. Meanwhile, the council of B., though deserted by most of its members, maintained its sittings, pronounced the deposition of Eugenius in 1439, and elected Felix V. Eugenius died in 1447, the anti-Pope abdicated in 1449, and Nicholas V., the successor of Eugenius, was acknowledged. The struggle between council and Pope at B. had ended in favour of the latter.

BASHAHR, see Bussahir.

BASHAN (32° 45′ N., 36° 15′ E.), extensive district, Palestine, E. of Upper Jordan; inhabited by Amorites; their king, Og, was conquered by Israelites; territory allotted to half-tribe of Manasseh; volcanic in origin; proverbially fertile; men, also cattle, remarkable for large stature.

BASHI-BAZOUK.—(1) Turk. cavalry force consisting of irregulars. (2) Turk. mounted police.

BASHKALA (38° 12′ N., 44° 21′ E.), town, vilayet, Van, Asiatic Turkey.

BASHKIRES, Bashkirs, people of Urals, Russia, of Tartar speech, Muhammadan religion.

BASHKIRTSEFF, MARIE (1860–84), Russ. author and artist of precocious talents; spoke four languages, read Gk. and Lat. authors in original, skilled musician, and achieved considerable eminence as a painter in Paris; chiefly remembered by remarkable *Journal* (begun in childhood and continued throughout her life), pub. 1887 (Eng. trans., 1890).

BASIL I. (d. 886), Byzantine emperor, called 'the Macedonian,' from birthplace; became sole emperor, 867; revived Byzantine power; extended his territory and codified the laws.

BASIL II. (*c.* 958–1025), Byzantine emperor, called 'Slayer of the Bulgarians'; great-great-grandson of Basil I. He and his bro. Constantine succ. their f., 963, as joint-emperors; B. made himself real master of army, and annexed Armenia and Bulgaria.

BASIL THE GREAT, St. Basil (329–79), bp. of Cæsarea, in Cappadocia, one of most eminent Gk. Fathers; involved in most of religious controversies of time, and resolute opponent of Arianism. B. founded a monastic order, since known as *Basilian Monks,* which brought about a great change in the ideal of the religious life. He was dissatisfied with the eremitical life, and so established the cenobitical, believing that work and usefulness could be carried on in conjunction with saintliness and austerity. Consequently the *Rules of St. Basil* provided for common daily prayers, common meals, and hard field-work, while the austerities of this life were scarcely less than those practised by the Eremites. The Rules of St. Basil have been the inspiration of monasticism in the Gk. Church, and there can be no doubt that St. Benedict's Rule owes much to them.

BASILICA.—(1) Gk. digest, in 60 books, of Justinian's laws of the Byzantine empire, pub. in the early part of X. cent. (2) Roman building in which public meetings and legal tribunals were held. It consisted usually of an oblong nave, with side aisles, divided by colonnades, latter supporting a gallery. At one end of the building was a semicircular apse, with a dais, or raised seats, for the judges, or for other persons officiating in the business of the meeting. The first such building was the B. Porcia, erected at Rome, 184 B.C., by Cato 'the Censor.' B's continued to be built, in Rome and other Ital. towns, down to the end of the III. cent. A.D. The name was afterwards given to buildings built upon a similar plan for Christian worship, which were known as 'basilican churches.' See Architecture.

BASILICATA (40° 25′ N., 16° 10′ E.), division o S. Italy, forming province Potenza.

BASILIDES (fl. 117 A.D.), Gnostic philosopher wh lived at Alexandria during the rule of the Emperor Trajan and Hadrian.

BASILISK, imaginary malignant monster of th ancients (*cockatrice*); genus of lizards.

BASIM (20° 5′ N., 77° 5′ E.), town, Akola district Berar, India. Pop. 12,500.

BASIN, BASON, a bowl; land drained by rive and tributaries; rock beds with a centro-clinal dip depressions, often occupied by lakes, created glacially by solution of underlying strata, or by movements o the earth's crust.

BASIN, THOMAS (1412–91), Fr. bp. and his torian; app. bp. of Lisieux, 1447, which position he later renounced; cr. abp. of Cæsarea by Sixtus IV. conspicuous public figure during troubled period wrote valuable history of Charles VII. and Louis XI.

BASINGSTOKE (51° 16′ N., 1° 5′ W.), town, Hamp shire, England; connected with river Wey by canal; has Roman remains and ruined castle. Pop. (1911 11,540.

BASKERVILLE, JOHN (1706–75), Eng. printer greatly developed art of typography; became printer to Cambridge Univ. (1758), and was noted for his editions of the Bible, Prayer Book, and Latin classics.

BASKET, plaited receptacle for carrying smal articles; also protection for hand when fighting o fencing. B. work was primitive art; material—willow wands, reeds, bamboo, Span. cane, split wood. These are soaked for some time, dried out of doors, used whole or split with a special b.-maker's instrument ('the splitter'). In plaiting, the bottom is first woven, and into it the sharpened ends of other pieces are plaited and turned up at the edges to form the sides; into these upright pieces are woven horizontal pieces over which they are at last turned down. Sharpened stakes, pushed down centres of the sides and fastened there, are woven together to form handle.

Plaited cane is largely used for common chairs, and was formerly much employed for sofas. B. work is to be seen in Chippendale furniture. Bamboo furniture was introduced into West from India and Japan, where it is an important manufacture.

BASKET-BALL, an Amer. game invented by James Naismith, in 1891. It is played by two sides of five players each, with an inflated leather-covered ball of about 10 in. diameter. The object is to throw the ball into the 'basket' (a *net* suspended 10 ft. above the ground), which the opposing team endeavour to prevent, as in *football*.

Hepbron, *How to Play Basket-Ball.*

BASKET-FISH, many-armed starfish, found off Amer. coast.

BASNAGE, JACQUES (1653–1725), Fr. Huguenot divine and theological writer.

BASOCHE, association of clerks of Paris, in existence XIV. cent. till Revolution; elected a king, etc.; among privileges was that of producing morality plays, *soties*, etc.; scurrilous *soties* (satirical farces) led to loss of their theatre, 1582.

BASQUES, a race of people inhabiting region at W. end of Pyrenees, including part of department of Basses-Pyrénées in France, and provinces of Biscaya, Guipuzcoa, and Alava, and part of Navarre in Spain. They retained practical independence in Spain until 1876, in France until time of Revolution. They are of good height and excellent physique, fair-skinned, and dark- or fair-haired; are brave, intelligent, hard-working, extremely religious, and characterised by great pride of birth; have long been famous as seamen and whalers. Many ethnologists hold they are descended from Iberians, the earliest-known inhabitants of the peninsula; while their language, *Escuara* or Euscara, is polysynthetic and is related to no other tongue known to philologists, whose researches have so far yielded no definite results. Grammars have been compiled by Van Eys, Prince Lucien Bonaparte, and others, and the language is said to have eight dialects. Lit. is modern and comparatively unimportant, consisting chiefly of historical and religious plays, proverbs, and songs.

Basque Provinces (43° N., 2° 30′ W.), district, N.E. Spain, on Bay of Biscay, comprising three provinces, Viscaya, Guipuzcoa, Alava; traversed by Pyrenees; fertile soil; iron-mining centre; area, 2739 sq. miles. Pop. (1910) 671,488.

BAS-RELIEF, BASSO-RELIEVO, term used in sculpture for designs in low relief.

BASS, male voice of lowest register; low-pitched musical instruments; low notes in harmony; kind of bag made of plaited straw or fibre.

BASS CLARINET, larger musical instrument than ordinary clarinet, and an octave lower in pitch; invented by Grenser, a Dresden maker, in 1793.

BASS ROCK, THE (56° 4′ N., 2° 38′ W.), islet, entrance of Firth of Forth, Scotland; 350 ft. high; circumference, one mile; served as prison for Covenanters; held by Jacobites against William III., 1691–94; frequented by solan geese; lighthouse.

BASS STRAIT (39° 20′ S., 146° E.), channel between Australia and Tasmania, 80 to 150 miles wide.

BASS TUBA, see SAXHORN.

BASS, WILLIAM (b. 1720), Eng. brewer; founder of Messrs. Bass, Ratcliff, & Gretton Ld., a Burton-on-Trent firm of world-wide reputation.

BASSA (7° 40 N., 7° 30′ E.), province, Brit. Protectorate, Northern Nigeria, W. Africa, bordering Benue river on N., Niger on W.; fertile, extensive forests. Pop. *c.* 500,000.

BASSANO (45° 46′ N., 11° 43′ E.), cathedral city, Vicenza, Italy; majolica. Pop. 6500.

BASSANO, JACOPO DA PONTE (1510–92), Ital. artist; his altarpiece of *The Nativity* at Bassano, his birthplace, was highly praised by Lanzi.

BASSARAB, BASSARABA, name of Rumanian dynasty ruling over Wallachia till 1658; XVI. and XVII.-cent. princes famous as builders and scholars.

BASSARIDÆ, species of carnivores whose dentition generally resembles canine; raccoon-like in appearance.

BASSE TERRE (16° 3′ N., 61° 42′ W.), town, Guadeloupe, W. Indies. Pop. 8656.

BASSEIN (16° 46′ N., 94° 48′ E.).—(1) mountainous district, Lower Burma; fertile; important centre of rice trade; area, 4127 sq. miles. Pop. 391,427. (2) town, in B. district. Pop. 31,400.

BASSELIN, OLIVIER (1400–50), Fr poet; fuller by trade; b. Val-de-Vire, Normandy; famous for drinking-songs, called *Vaux-de-Vire*. He forms subject of poem by Longfellow.

BASSES, SEA-PERCHES (*Serranidæ*), perch-like bony fishes, marine, and found in all seas, although a few ascend rivers. The commonest Brit. form is the Basse (*Morone labrax*), which may weigh 20 lb., but the related Jew Fishes of tropical seas may be 6 ft. or more in height, weighing almost 600 lb. The Murray 'Cod' (*Oligorus macquariensis*) is the most important food-fish in the rivers of S.E. Australia.

BASSES-ALPES (44° 10′ N., 6° E.), department, S.E. France; very mountainous; wool; area, 2698 sq. miles. Pop. (1911) 107,231.

BASSES-PYRÉNÉES (43° 15′ N., 1° W.), department, S.W. France, consisting of former province of Bearn and part of Basque region; Pyrenees occupy southern portion, elevation increasing W. to E.; extensive forests covering slopes furnish most valuable product; N. and E. territory consists of pastures and fertile valleys; mineral springs; sheep, cattle; area, 2977 sq. miles. Pop. (1911) 433,318.

BASSET, Venetian card game, introduced into France during the latter part of the XVII. cent., where it became very popular. It was played by five persons with a full pack of cards.

BASSET, see DOG.

BASSET HORN, single-reed tenor clarinet; much

favoured in compositions of Mozart, Beethoven, and Mendelssohn; invented by a maker named Horn, about 1770.

BASSETERRE (17° 20′ N., 62° 44′ W.), town, St. Kitts, W. Indies. Pop. 9962.

BASSI, UGO (1600–49), Ital. revolutionist; became monk; joined national forces, 1848, as chaplain, in which capacity he played important part in Garibaldi movement.

BASSIGNY, district of ancient France, divided (1790) into departments of Meuse, Aube, and Upper Marne.

BASSOMPIERRE, FRANÇOIS DE (1579–1646), Fr. soldier and diplomatist; put down Huguenot rising of 1621–22, and became Maréchal de France. His *Mémoires* are important as a hist. source.

BASSOON, large dual-tubed wind instrument, of double-reed kind, serving as bass to oboe and clarinet; evolved from earlier and clumsier instrument, called 'bass-pommer,' which dates back to the XV. cent.; much favoured by Bach, Beethoven, Weber, Mozart, and other masters.

BASSORA, BASRA, BUSRA (32° N., 47° 34′ E.), vilayet, Asiatic Turkey; capital and river port, BASRA, on Shat-el-Arab, near Persian Gulf; marshy, unhealthy; famous date groves; silk, cotton; area, 53,580 sq. miles. Pop. *c.* 600,000.

BASSUS, AUFIDIUS, Rom. historian and orator under Augustus and Tiberius.

BASSVILLE, NICOLAS JEAN HUGON DE (d. 1793), Fr. Revolutionary journalist and diplomatist; murdered in Rome by populace.

BASTAR (19° N., 81° 30′ E.), native state, Brit. India; high flat plateau; some mountains; dense forests; jungles inhabited by aboriginal tribe; chief town, Jagdalpur; unhealthy; rice, oil-seeds; area, 13,002 sq. miles. Pop. (1911) 433,310.

BASTARD (O. Fr.), meaning 'pack-saddle child,' a child born out of wedlock. Such children are not legally entitled to bear the name of either parent, they cannot inherit real property, and, as they are in nearly every legal aspect *filius nullius* ('nobody's child'), the parents can have no control over their marriage. In Eng. law an Act of Parliament is required to legitimise such a child; in Scots law the subsequent marriage of the parents confers this privilege.

BASTI (26° 45′ N., 82° 45′ E.), town in district of B., United Provinces, India. Pop. 14,761.

BASTIA (42° 40′ N., 9° 27′ E.), seaport town, N.E. Corsica; former capital; oil. Pop. 23,659.

BASTIAN, ADOLF (1826–1905), distinguished Ger. ethnologist and traveller.

BASTIAN, HENRY CHARLTON (b. 1837), Eng. physician, author of important treatises on nerves and on the origin of life.

BASTIAT, FRÉDÉRIC (1801–50), Fr. political economist; started Fr. agitation against Protection (1844); organised Free Trade Association (1846); wrote against Socialism, setting forth virtues of competition (1848–50).

BASTIDE (O. Fr.), name of towns built XII.–XIV. cent's in southern France to guard surrounding regions.

BASTIDE, JULES (1800–79), Fr. soldier, editor, and (1848) Minister of Foreign Affairs.

BASTIEN-LEPAGE, JULES (1848–84), Fr. artist; painted portraits, landscapes, and hist. pictures: *Sarah Bernhardt, Joan of Arc listening to the Voices, Gambetta on his Death-bed, The Thames at London.*

BASTILLE (O. Fr. *bastir*, to build), name of Fr. castle; especially given to towers guarding city gates of Paris, and now only applied to that of St. Antoine, which in XVII. and XVIII. cent's was used to detain political prisoners. Associated with despotism, it was stormed by the populace, July 14, 1789, and destroyed with every accompaniment of violence and bloodshed; date since observed as *Fête Nationale*; its deep underground dungeons have given rise to many stories of wretched captivities.

BASTINADO (Span. *baston*, a stick), European name for an Eastern form of punishment, consisting of light blows with a stick on the soles of the feet, or other parts of person; if long continued may cause death.

BASTION (Fr.), projection from fortification (*q.v.*).

BASTWICK, JOHN (1593–1654), Eng. Puritan; polemical writer.

BASUTOLAND (29° S., 28° E.), Brit. crown colony, S. Africa; area, 10,293 sq. miles; bounded by Orange Free State on N. and W., Cape Province on S., Griqualand and Natal on E. and N.E.; surface is part of great plateau, *c.* 5000 ft. above sea-level, and has mountains crossing it, including Maluti ranges and Drakenberg; principal rivers, Tugela, Caledon; capital, Maseru. Administration is carried out by resident commissioner, subject to authority of High Commissioner for S. Africa. Capital is Maseru. B. was annexed by Britain, 1868; became part of Cape Colony, 1871; war which occurred, 1880–81, in consequence of attempt to disarm natives, resulted in establishment of autonomy; again taken directly under authority of Imperial Government, 1884, since when trade and agriculture have greatly developed; took no part in Boer War, or native risings of 1906. Inhabitants are of negroid stock, majority Basutos proper, with admixture of other tribes. B. is a native reserve. Productions include great quantities of cereals; cattle, ponies, and sheep raised for export; coal is found. Pop. (1911) 405,600 (including 1400 whites).

Lagden, *The Basutos* (1909).

BAT, flying, insectivorous animal. See CHIROPTERA.

BATAC (16° 55′ N., 120° 25′ E.), town, Luzon, Philippine Islands; sugar. Pop. 23,500.

BATALA (31° 49′ N., 75° 14′ E.), town, Punjab, India; cotton, silk. Pop. 27,400.

BATALHA (39° 40′ N., 8° 50′ W.), town, district Leiria, Portugal; Dominican monastery, commemorates victory of King John I. of Portugal over king of Castile, 1385. Pop. 3900.

BATANGAS (13° 32′ N., 121° 12′ E.), seaport, Luzon, Philippine Islands; coffee. Pop. (1910) 33,100.

BATARNAY, IMBERT DE (1438–1523), Fr. soldier, statesman, and courtier.

BATAVIA, see NETHERLANDS.

BATAVIA.—(1) residency, Java; includes some adjacent islands; area, 24 sq. miles. Pop. 1,500,000. (2) (6° 15′ S., 106° 50′ E.) seaport, N. coast, Java; capital and chief commercial city, Dutch East Indies; bay, shallow towards coast, served as port before Tanjong Priok harbour, 6 miles N.E., was made; mixed population; unhealthy climate; founded beginning of XVII. cent.; held by British, 1811–14; coffee, rice, sugar, and other products. Pop. *c.* 138,551.

BATES, HARRY (1850–99), Eng. soulptor; Rodin; executed many busts and statues on subjects; A.R.A. (1892); some of his works, purchased by the Chantrey Trustees, are now in the Tate Gallery.

BATES, HENRY WALTER (1825–92), Eng. naturalist; explored the Amazon with A. R. Wallace; author of *The Naturalist on the Amazons* (1863); assist. sec. of the Roy. Geog. Soc., and eminent entomologist.

BATES, WILLIAM (1625–99), Eng. Nonconformist preacher and author; chaplain to Charles II.; pub. *The Existence of God and the Immortality of the Soul* (1676), *Spiritual Perfection* (1699), etc.

BATH.—(1) (51° 23′ N., 2° 22′ W.) watering-place and largest town, Somerset, England; on Avon; the Roman *Aquæ Solis*; its hot saline and chalybeate springs were known to Romans from I. cent.; contains Rom. baths and other antiquities; Abbey Church, begun in Henry VII.'s reign, completed 1609; Bath and Wells have formed one bishopric since 1135; very fashionable in XVIII. cent. Pop. (1911) 50,729. (2) (43° 55′ N., 69° 52′ W.) city, county seat of Sagadahoc County, Maine, U.S.A.; shipbuilding. Pop. (1910) 9396.

BATH, ORDER OF THE, order of chivalry of

U.K., founded 1399, refounded 1725 and 1815, and frequently extended since; originally a purely military order, it received in 1815 a civil element; the civil and military badges, which are slightly different, alike bear motto, *Tria juncta in uno*, about rose, shamrock, and thistle.

BATH, THOMAS THYNNE, 1ST MARQUESS OF (1734–96), Eng. politician; e. s. of Viscount Weymouth; libelled by Wilkes, who was therefore expelled from Parliament.

BATH, WILLIAM PULTENEY, 1ST EARL OF (1684–1764), Brit. statesman; took prominent part against Dr. Sacheverell; led opposition to Walpole and on his fall, 1741, became Prime Minister; lost influence on accepting peerage (1742); gift of attack, but not administration; good scholar and orator.

BATHBRICK, piece of Bathstone (*q.v.*) made into bricks for domestic purposes at Bridgwater.

BATHGATE (55° 53′ N., 3° 40′ W.), town, Linlithgowshire, Scotland; minerals, paraffin. Pop. 8226.

BATHILDA, ST. (d. 680), Eng. princess; m Clovis II. of France; regent during minority of Clothair III., Childeric II., and Thierry III.

BATHOLITE, igneous (granitic) rock intruded in stratified rocks, and forming bosses.

BATHONIAN SERIES, oolitic limestone strata, first studied near Bath; corresponds to Upper Dogger (Middle Jurassic) of Germany.

BÁTHORI, ELIZABETH (d. 1614), Polish princess, said to have been a werwolf; imprisoned 1610 on charge of numberless horrible murders.

BÁTHORY, SIGISMUND (1572–1613), Prince of Transylvania; disastrous anti-Turkish policy.

BATHOS, a descent from the elevated to the ridiculous (or commonplace); cf. ANTICLIMAX.

BATHS.—The habit of bathing, both for cleanliness and for pleasure, has been practised by almost every people from the earliest times. Before the inception of public and private b's it was customary to bathe in running water of rivers, but hot b's were employed by the early Egyptians, Greeks, and Persians, and are referred to in Homer as restorative after violent exertions. The buildings themselves must in primitive times have had considerable pretensions to luxury, for the b. of the Persian king, Darius, excited wonder and admiration of Alexander the Great. It was, however, under Rom. Empire that public b's reached most advanced stage of luxury. The earliest Roman b's were called *piscinæ*, and were cold swimming-baths, but later developed into vast establishments called *thermæ*, which included cold swimming-b's for both sexes, hot b's, vapour b's, dressing-rooms, a gymnasium, and sometimes also a library and theatre. Such *thermæ* were erected by the Emperors Agrippa, Nero, Titus, Domitian, and several later rulers. The b's appear to have reached their highest state of luxury under Diocletian. Marble seats were provided for thousands of bathers; water flowed from mouths of silver lions into basins of the same precious metal, and while young men played at ball in the spacious gymnasium, philosophers and elder folk discussed the news of the day in the marble galleries adorned with mosaics and enriched with sculptures. Soap being then unknown, the Romans had their bodies anointed by the b. attendants with oils and pomades, after which the skin was scraped with a curved metal instrument, called the *strigillus*; usual bathing hour was before dinner, but it was not uncommon to take several b's during course of day. In addition to hot-water and hot-air b's, sun b's were commonly indulged in by the Greeks and Romans, and the habit of burying the body in sand dates back to even earlier times. There are various modern specialised forms of bathing—Turkish, Russian, electric, mineral, etc.

Cold bathing in England has been commonly practised from the beginning of the XVIII. cent., and the value of *sea-bathing* was recognised somewhat later. Smollett, in *Humphry Clinker*, describes Scarborough bathing-machines as a novelty. The excessive use of hot b's has an enervating effect; the cold bath, while undoubtedly beneficial to those of robust constitution, is often harmful to more delicate individuals.

The treatment of disease by baths is called BALNEOTHERAPEUTICS, but the term is generally now restricted to mineral waters, mud baths, and other treatments in vogue at spas. The waters employed have usually the salts of sodium, calcium, magnesium, lithium, or iron, or sometimes other minerals dissolved in them; but the benefit is as much due to the change of air and scene, the regular bathing, dieting, and drinking of prescribed quantities of water, and the regular exercise, as to any therapeutic qualities of the waters themselves. Harrogate, Aix, Carlsbad, Marienbad, Homburg, Nauheim, Kissingen, Baden-Baden, etc., are all spas of repute for different diseases. See HYDROPATHY.

BATHSEBA, BATHSHEBA.—(1) Bible character; wife of Uriah the Hittite, slain for her sake by David, who then took her to wife. (2) Duchess of Portsmouth in Dryden's *Absalom and Achitophel*.

BATHSTONE, mixed limestone and sandstone (Lower Oolite stratum) obtained from neighbourhood of Bath; used for scouring and for covering hearths, etc.

BATHURST.—(1) (33° 27′ S., 149° 35′ E.) town, New South Wales. Pop. (1910) 10,000. (2) (43° 19′ S., 146° E.) town, Tasmania. (3) (13° 24′ N., 16° 36′ W.) town, Gambia, W. Africa. Pop. 6000 to 8000.

BATHURST, EARLDOM OF (1772 onwards).—ALLEN BATHURST (1684–1775), 1st earl, belonged to old Sussex family and distinguished himself as Tory politician; cr. Baron B., 1712; earl, 1772; 2nd earl was Lord Chancellor, and was cr. Baron Apsley, 1771; 3rd earl became Secretary for War and Colonies, 1812; and Pres. of the Council, 1828–30.

BATHYBIUS, slimy precipitate of gypsum by alcohol in sea-water, at one time supposed to be a simple organism living in the deep sea.

BATISTE, fine, closely woven linen, said to be named from inventor, Baptiste of Cambrai, XIII. cent.

BATLEY (53° 43′ N., 1° 38′ W.), town, Yorkshire, England. Pop. (1911) 36,395.

BATNA (35° 33′ N., 6° 8′ E.), town, Algeria. Pop. 6914.

BATOIDEA, see RAYS.

BATON (Fr. *bâton*), staff carried by a field-marshal; a policeman's truncheon; light stick used by orchestra conductor; sign of illegitimacy in heraldry ('baton sinister'), often erroneously called 'the bar sinister.'

BATON ROUGE (30° 30′ N., 91° 15′ W.), city, Louisiana, U.S.A., on Mississippi; state capital, 1849–62, and again, 1880; captured from British by Spaniards, 1779; taken by Federalists, May 1862; held against attack by Confederates, Aug 1862; sugar and cotton plantations; state univ. Pop. (1910) 14,897.

BATRACHIA, class of vertebrates of interest as illustrating the transition from aquatic to terrestrial life; frequently considered conterminous with AMPHIBIA, or as a sub-class of the latter. Through the Dipnoi they are to a certain extent linked with fishes,



NEWT.



CÆCILIAN (ICHTHYOPHIS) COILED ROUND ITS EGGS.

and through Microsauria (Stegocephalia) with reptiles. The main anatomical differences separating Batrachians from reptiles, although no satisfactory line of demarcation can be drawn, are the skull bones. Excepting a few viviparous forms, they mostly undergo a gill-breathing stage in their metamorphosis. The follow-

ing classification is convenient: (1) *Stegocephalia*, extinct lizard- or serpent-like b.: Upper Devonian to Triassic. (2) *Apoda*, limbless, worm-like, tropical b. belonging to 33 species; no fossil forms known. (3) *Caudata*, tailed b.; about 150 species; few fossil; salamanders well-known representatives. Three blind species inhabit N. Amer. and Europ. caves. A number of skin-breathing forms, without gills or lungs, have been discovered. (4) *Ecaudata*, containing about 1300 (including about 40 fossil) species of frogs and toads. See METAMORPHOSIS.



FROG.

Cambridge Natural History, viii. (1901).

BATRACHOMYOMACHIA (Gk. 'battle of the frogs and mice'), mock-epic, in hexameter verse, of unknown authorship, sometimes ascribed to Homer.

BATTA, Anglo-Indian designation of rations served to soldiery in war.

BATTAGLIA (45° 15′ N., 11° 50′ E.), town, Venetia, Italy; warm saline springs.

BATTALION, military division consisting of four or more companies. The full war strength of an infantry b. in Brit. army consists of about 1000 men and staff.

BATTAMBANG (13° 6′ N., 103° 6′ E.), town, Cambodia, Siam; ceded to French, 1907.

BATTAS, cannibal race living in the hills of Sumatra. They read and write, and have a curious religion and lit., latter committed to bamboo staves.

BATTEN, joiner's name for a fir-board used in strengthening wooden framework; also marine term for strip of wood used aboard ship to prevent sea-water entering the hatchways.

BATTEN, SIR WILLIAM (d. 1667), Eng. naval commander; surveyor to the navy, and Vice-Admiral; frequently mentioned by Pepys.

BATTENBERG, revived Ger. title conferred upon Countess von Haucke, morganatic wife of Prince Alexander of Hesse; made Countess of B. (1851), raised to rank of Princess, 1858; e. s., Louis, became admiral in Eng. navy; 3rd s., Henry Maurice, m. Princess Beatrice, Queen Victoria's dau. (1885), and d. 1896; the dau. of the latter, Victoria Eugénie, m. (1906) Alphonso XIII. of Spain. B. lies in Hesse-Nassau, Prussia.

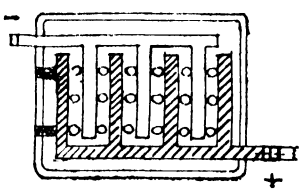
BATTERING-RAM, primitive military weapon, dating back to times of Josephus, or earlier, used for beating down the walls of a fortress; it was a heavy beam, about 120 ft. long, shod at the fore end with a piece of metal, shaped like a ram's head, and generally slung in a wooden protected framework.

BATTERSEA, metropolitan borough, S.W. London; Surrey side, Thames, opposite Chelsea, and communicating by bridges; fine park; factories and foundries.

BATTERY, a number of ordnance with their equipment; the men and horses attending a battery; battlemented platform upon which guns are mounted; in law, assault by beating.

Primary Electric B., VOLTAIC, GALVANIC, CHEMICAL B., an arrangement of cells, elements, or couples which produces a current by chemical action. The original VOLTAIC cell was a zinc and a copper plate resting in a weak acid solution and joined by a wire. The hydrogen liberated made a coating on the copper (or negative) plate, stimulated a reverse action, and weakened the current (*polarisation*). This was obviated in the DANIEL cell by placing the copper in a solution of copper sulphate in a porous pot, the hydrogen then replacing the copper which was deposited on the copper plate. In the LECLANCHÉ cell the zinc rests in sal-ammoniac solution, and a plate of carbon (replacing copper) is placed in a porous pot packed with manganese dioxide and bits of carbon. This is the cell generally used for electric batteries. It has an electromotive force of nearly 1½ volt.

Secondary B., ACCUMULATOR or REVERSIBLE B., contrivance for the storage of electrical energy; an electric battery which can be charged by a current passing in the reverse direction of the current of discharge. The most effective accumulator is the lead-peroxide-sulphuric-acid cell, which essentially consists of plates or grids of lead coated with lead peroxide (PbO_2) connected with the positive, alternating with plates of pure lead connected with the negative electrode. They are immersed in sulphuric acid (H_2SO_4) and held apart by strips of glass or ebonite. In discharging the cell, hydrogen is conveyed to the positive plates and reduces the lead peroxide, the resulting lower oxide combining with the sulphuric acid to form lead sulphate. The lead of the negative plates becomes oxidised and also covered by a layer of the sulphate, the progress of the discharge being indicated by the weakening of the acid and decreased voltage. When the current is reversed by connecting the cell or battery with a dynamo, hydrogen is carried to the negative plates, reducing the lead sulphate to lead, and the oxygen converting the sulphate on the positive plates into peroxide of lead, and the sulphuric acid being formed in the process. It becomes apparent that the term *storage battery*, frequently used for accumulators, does not exactly mean a storage of electricity, but of the electro-chemical transformation products, the cell being reformed by charging after having been altered by the discharge. Many types of a. have been invented, the Planté, Faure, and Tudor cells being the best-known types. They are not only used for supplying motive power and light for vehicles and boats, and for experimental purposes, etc., but are indispensable in an electric-power station, where they serve to balance the ratio between demand and supply of electricity. A nickel-peroxide-iron-caustic-potash accumulator has been designed by Edison, but it can hardly be said that it has left the experimental stage.



PLAN OF ACCUMULATOR.

F. Dolezalek, *The Theory of the Lead Accumulator* (1906); Sir D. Salomons, *Management of Accumulators* (1906).

BATTEUX, CHARLES (1713–80), Fr. philosopher; pub. *La Morale d'Épicure tirée de ses propres écrits* (1758), *Histoire des causes premières* (1769), *Cours de belles-lettres, Principes de la littérature*, etc.

BATTHYANI, family of Hungarian nobles who claim descent from Örs, companion of Arpad; chief members, **Prince Karl Joseph** (1697–1772), Austrian field-marshal, distinguished in War of Austrian Succession; **Count Casimir** (1807–54), follower of Kossuth and Hungarian foreign minister; **Count Louis** (1806–49), premier of first responsible ministry, 1848, but resigned; executed by order of court-martial.

BATTLE (50° 55′ N., 0° 30′ E.), town, Sussex, England; received its present name (in place of *Senlac*) from the battle in which William I. defeated Harold, 1066. The conqueror founded there a Benedictine abbey in which was deposited **Battle Abbey Roll**, supposed list of barons who fought with William; authenticity of the copies is disputed.

Duchess of Cleveland, *Battle Abbey Roll*, 3 vols. (1889).

BATTLE CREEK (42° 20′ N., 85° 10′ W.), city, Michigan, U.S.A.; factories. Pop. (1910) 25,267.

BATTLEDORE (derivation unknown).—(1) Plaything like small tennis-racket used in game of b. and shuttlecock; (2) (Obs.) hornbook; (3) implement used to beat clothes in washing; (4) applied to certain tools, etc.

BATTLEFORD (52° 40′ N., 108° 20′ W.), town, Saskatchewan, Canada.

BATTLEMENT, parapet surmounting walls of a fortified building, consisting of solid blocks of masonry

alternating with open spaces for the discharge of missiles, the solid parts being designated *merlons* and the apertures *crenels*. At first designed purely for defensive purposes, b's have, in modern times, come to be used merely for decorative effect.

BATTLESHIP, see NAVY, SHIPS.

BATTUE, the system of killing game by means of beating the bushes and driving the quarry towards a given point where the guns wait.

BATU, ROCK ISLANDS (0° 10′ S., 98° E.), group of small islands, Dutch East Indies; cocoanuts.

BATUM, BATOUM (41° 38′ N., 41° 40′ E.), fortified seaport, Russ. Transcaucasia; exports oil. Pop. 30,008.

BATWA, nomad tribe of African pygmies, discovered in 1880 by Pogge and Wissmann, near Wissmann Falls (Bel. Congo); 4 ft. high; lightish skins; hunt game with bows and poisoned arrows.

BATYPHONE, musical instrument of the clarinet type, invented 1839; proved ineffective, and gave place to the bass tuba.

BAUAN (13° 50′ N., 121° E.), town, Luzon, Philippine Islands; palm-fibre goods. Pop. 39,094.

BAUCHI (10° N., 9° 30′ E.), province, Brit. Protectorate, N. Nigeria; larger portion, N.W. to S.E., occupied by belt of highlands; plateaus forming S.W. of province fertile and grow grain, cotton, indigo; inhabitants mainly pagan tribes; in consequence of persistent slave-raiding by Fula, a Brit. expedition was sent out, 1902; emir overthrown and country brought under Brit. rule. Pop. *c.* 40,000.

BAUCIS, wife, according to Ovid, *Metamorphoses*, of Philemon; the couple extended hospitality to Zeus in Phrygia, and in reward their house was changed into a temple while others were destroyed by floods; changed into trees in answer to their request that they might not be separated; types of conjugal constancy.

BAUDELAIRE, CHARLES PIERRE (1821-67), Fr. poet; after taking degree, 1839, led life of extravagant debauchery; acquired habits of opium and haschisch; paralysis was followed by miserable death; first important literary work, translation of tales of horror of Edgar Allan Poe, in whom B. found kindred spirit, though his own poems far surpass those of Poe in depth and *technique*; bond between the two was their love of thrills and their morbidity; B. analyses himself in *Lunatiques*, an essay on those who are under influence of the moon and 'love all that it loves.' First collection of poems appeared 1857 as *Fleurs du mal*, some of which were excised by censors after prosecution of author; further translations from Poe and much critical work followed.

BAUDIER, MICHEL (1589-1645), Fr. historian; historiographer to Louis XIII.

BAUDRILLART, HENRI JOSEPH LÉON (1821-92), Fr. economist; author of *Jean Bodin et son temps* (1853), *Manuel d'économie politique* (1857), *Des rapportés de la morale et de l'économie politique* (1860).

BAUDRY OF BOURGUEIL (d. 1130), Fr. poet and historian; became abbot of Bourgueil abbey (1079); abp. of Dol (1107); most important work, history of first crusade (1095-99) entitled *Historiæ Hierosolymitanæ*.

BAUDRY, PAUL JACQUES AIMÉ (1828-86), Fr. artist; excelled in portraits and classical subjects, and became famous for his mural decorations in foyer of Paris opera-house, and other public buildings.

BAUER, BRUNO (1809-82), Ger. theologian; free-lance Biblical critic of sceptical character; wrote numerous hist. treatises on the Gospels, Epistles, etc.

BAUER, CAROLINE (1807-78), Ger. actress of much celebrity; left memoirs, *Aus meinem Bühnenleben*, etc.

BAUHIN, GASPARD (1560-1624), anatomist and botanist; b. Switzerland, of Fr. descent.

BAUMBACH, RUDOLF (1840-1905), Ger. poet; b. Thüringia; made considerable reputation as writer of narrative and legendary verse and vagabond lyrics; pub. *Zlatorog* (1877), *Lieder eines fahrenden Gesellen* (1878), *Frau Holde* (1881), *Von der Landstrasse* (1882), etc.

BAUMÉ, ANTOINE (1728-1804), Fr. chemist; inventor of an hydrometer.

BAUME-LES-DAMES (47° 22′ N., 6° 21′ E.), town, Doubs, France; ancient abbey.

BAUMGARTEN, ALEXANDER GOTTLIEB (1714-62), Ger. philosopher; inventor of word *æsthetics*; pub. *Disputationes de nonnullis ad poema pertinentibus* (1735), *Æsthetica* (1739), *Ethica sophica* (1751), etc.

BAUMGARTEN, MICHAEL (1812-89), Ger. Prot. theologian; one of the founders of the Ger. Prot. League; writings include, *A Prophet-Voice from the Present, The Authentic Sayings of Christ, History of Jesus*, etc.

BAUMGARTEN-CRUSIUS, LUDWIG FRIEDRICH OTTO (1788-1842), Ger. Prot. preacher and author; from 1812, prof. of Theol. at Jena; pub. *Text-Book of Church Morals* (1826), *Sources of Bible Theology* (1828), *Compendium of Dogma* (1840), etc.

BAUR, FERDINAND CHRISTIAN (1792-1860), Ger. theologian; prof. of Theol. at Tübingen; wrote numerous works on Church history, Biblical criticism, and the philosophy of religion.

BAUTAIN, LOUIS EUGÈNE MARIE (1796-1867), Fr. philosopher; pub. *Philosophie du Christianisme* (1835), *Psychologie Expérimentale* (1839), *Philosophie morale* (1840), and other works of a like character.

BAUTZEN (51° 12′ N., 8° 25′ E.), capital of district of same name, Saxony; surrounded by old walls with towers; possesses Castle of Ortenburg and Early Gothic *Domkirche*; many industries: textile, machinery, ironworks, etc.; besieged by Hussites, 1431; captured by Saxons, 1620; Wallenstein, 1633; Saxons again, 1634; Napoleon defeated Russians here with great slaughter, 1813. Pop. (1910) 32,754.

BAUXITE, $Al_2O(OH)_4$, clay-like aluminium ore, similar to laterite, used in S. France and elsewhere for manufacture of aluminium. See ALUMINIUM.

BAVARIA, BAYERN (49° N., 12° E.), kingdom, E. side of S. Germany; area, 29,282 sq. miles. B. has detached portion called Palatinate or Rhenish B., W. of Rhine, N. of Alsace. Surface along boundaries is generally hilly; chief ranges, those of Alps in S. (highest peak, Zugspitze, 9700 ft.), Frankenwald, Fichtelgebirge and Rhongebirge in N.; Böhmerwald in N.E.; Haardt mountains in Palatinate; Palatinate is drained by Rhine and tributaries, S. of B. proper Danube with tributaries Isar and Inn, N. by Main Danube and Main connected by Ludwig's Canal; principal lakes, Ammer See, Starnberger See, Walchen See. Climate varies; lower parts have mean temperature of 50° Fahr., higher, 39°; rainfall is from 40 to 50 in.

History.—B. was apparently inhabited from about 600 B.C. by Celtic people, who were conquered by Rome late in I. cent. B.C. After fall of Western Empire country was occupied by tribes called Boiarii, who ultimately became tributary to Franks; ruled for over two cent's by dukes; formed part of Charlemagne's dominions, and after his death was governed first by margraves and after 920 by dukes; duchy held by Guelph family, 1070-1137; granted by emperor to Otto, Count of Wittelsbach, 1180, ancestor of present dynasty. During several cent's various partitions of duchy occurred, but in 1506 country was united under Albert the Wise, who established system of primogeniture; on extinction of younger or Bavarian line of Wittelsbach family with death of Maximilian Joseph in 1777, succession passed to representative of older branch, Charles Theodore, Elector Palatine, whose family had held Palatinate since 1329, when it was separated from B. proper. B. was after this involved in wars, first against Austria and afterwards against France, to whom she lost Palatinate in 1801. She then formed alliance with France, by whose aid she became a kingdom in 1805; subsequently joined alliance against Napoleon, 1813; regained Palatinate W. of

Rhine, 1814–15; new constitution granted by Maximilian, 1818; became integral part of Ger. Empire, 1871. Last king, Ludwig II. (*q.v.*), committed suicide in 1886; succ. by bro., Otto I., on account of whose insanity country is governed by regent.

Over half area is cultivated; chief wealth, produce of fertile soil; plains N. of Munich called 'granary of Germany'; chief crops are rye, oats, barley, wheat; hops, tobacco, vines grown in Franconia, flax in Upper B. and Swabia, vines in Palatinate; one-sixth of surface under grass, cattle and sheep largely raised, dairy-farming carried on; one-third of area under timber—oak, beech, pine; chief forest districts are along Alps, in S., in Franconia and Palatinate. Chief minerals are salt, coal, lignite, iron, graphite, lithographic stone; mineral springs abound. Most important manufacture is beer; other industries are pencil-making, Christmas card producing, distilling, manufacture of linens, woollens, glass, porcelain, sugar, toys, chemicals, jewellery, mathematical instruments. Capital is Munich. Pop. (1910) 6,887,291.

Buchner, *Geschichte von Baiern* (1853); Reizler, *Geschiche Bayerns* (1898); Baedeker, *Southern Germany* (1904).

BAVAY (50° 14′ N., 3° 55′ E.), town, Nord, France; marble quarries.

BAVENO (45° 55′ N., 8° 15′ E.), town, on Lake Maggiore, Italy; summer resort; granite quarries; cotton.

BAX, ERNEST BELFORT (1854–), Eng. Socialist and author; assisted Morris in founding Socialist League, 1885; writings chiefly on historical aspects of Socialism.

BAXTER, ANDREW (1686–1750), Scot. metaphysician; principal work, *Enquiry into the Nature of the Human Soul* (1733), an examination of the properties of matter.

BAXTER, RICHARD (1615–91), Eng. Puritan preacher; b. Rowton, Salop. During the Civil War he acted as chaplain in the Parliamentary army; strongly opposed to execution of Charles I., and was influential in bringing about the Restoration; became Charles II.'s chaplain. B. subsequently underwent much persecution at the hands of Judge Jeffreys, being imprisoned for eighteen months. He was noted for the saintliness of his private life, and, though he suffered continually from ill-health, his industry was remarkable. He is credited with the authorship of nearly 170 works, of which the best known is his *Saints' Everlasting Rest* (1650), others being *Call to the Unconverted* (1657), *The Life of Faith* (1670), and *Christian Directory* (1675); see *Life*, by Davies (1887).

BAY, indentation in a coast-line; chestnut colour (see BAYARD); peculiar bark of a dog (hence Scott's 'deep-mouthed bloodhound's heavy bay'); the laurel tree (hence to be 'crowned with bays' is to be crowned with laurel leaves); bay-window, window in bay (division of room architecturally severed from rest).

BAY CITY (43° 38′ N., 83° 14′ W.), city, Michigan, U.S.A.; seat, Bay County; fish, salt. Pop. 45,166.

BAY ISLANDS (16° 30′ N., 86° 30′ W.), group in Caribbean Sea, N. of Honduras, to which they belong; fruit. Pop. 6020.

BAY RUM, rum distilled with bayberry leaves; used extensively by hairdressers.

BAYADERES, dancing women of India of the two ranks—*devadasi*, who perform religious dances in services of the *devas*, and *nautchis*, wonderfully trained secular dancers.

BAYAMO (20° 27′ N., 76° 57′ W.), town, on river B., E. Cuba; sugar-cane. Pop. 4100.

BAYARD (O. Fr. 'bay'), orig. bay horse; especially applied to celebrated bay steed of Rinaldo (*q.v.*).

BAYARD, PIERRE TERRAIL, CHEVALIER DE (1473–1524), Fr. miliary commander; b. Dauphiné; perfect example of chivalrous knight of mediæval type; was renowned for looks, bravery, kindliness, piety, and military genius—the *Chevalier sans Peur et sans Reproche*. After serving as page to the Duke of Saxony, he entered the service of Charles VIII. of France, whom he accompanied into Italy; distinguished himself at battle of *Fornova* (1495), when he was knighted; held the bridge of the Garigliano single-handed against 200 Spaniards; took part in the sieges of Genoa, Padua, and Brescia; displayed remarkable bravery at the battle of *Ravenna* (1512); fell a prisoner to Henry VIII. at the *Battle of Spurs* (1513), but was immediately set at liberty; conferred knighthood on Francis I., at latter's request, after the victory of *Marignano*; killed in defending passage of the Sesia against the Milanese.

BAYARD, THOMAS FRANCIS (1828–98), Amer. democratic statesman and diplomatist; ambassador to Great Britain in Bering Sea controversy.

BAYASID, BAJAZET (39° 27′ N., 44° 9′ E.), fortified town, Armenia, Asiatic Turkey; military station.

BAYBAY (10° 42′ N., 124° 55′ E.), town, W. coast of Leyte, Philippine Islands; hemp, rice. Pop. 17,000.

BAYBERRY (*Pimenta acris*), tropical Amer. plant of myrtle order; leaves used for bay rum.

BAYEUX (49° 13′ N., 0° 43′ W.), town, capital of Calvados, France; early Gothic cathedral; museum contains celebrated B. tapestry; lace. Pop. 7800. —**Bayeux Tapestry**, represents 72 scenes in Conquest of England, 1066; agreed to be contemporary work; exhibited by B. municipality.

BAYLE, PIERRE (1647–1706), Fr. author and philosopher; pub. *Pensées diverses sur la Comète de 1680* (1682), *Dictionnaire historique et critique*, *Nouvelles de la République des Lettres*; for some years prof. of Philosophy and History at Rotterdam; attitude towards established beliefs and attempt to modernise knowledge anticipate work of *philosophes* and encyclopædists of succeeding cent., who drew much from him.

BAYLY, THOMAS HAYNES (1797–1839), Eng. dramatist and song-writer, e.g. *She wore a Wreath of Roses*; *I'd be a Butterfly*.

BAYNES, THOMAS SPENCER (1823–87), Eng. philosopher and man of letters; ed. Bath and Edinburgh Univ.; edited *Edinburgh Guardian* (1850–52); assistant-editor of *Daily News* (1858); prof. of Logic at St. Andrews (1864); app. editor of *Encyclopædia Britannica*, 9th edition (1873), with which he was associated until his death.

BAYONET, short sword fixed to muzzle of rifle; introduced into Fr. army by Louvois under Louis XIV.; takes name from Bayonne (*q.v.*).

BAYONNE.—(1) (43° 27′ N., 1° 33′ W.) fortified town, Basses-Pyrénées, France, on Adour; in possession of English, 1152–1451; XII.-cent. cathedral; gave name to *bayonet*; chocolate, leather; large trade. Pop. 27,600. (2) (40° 40′ N., 74° 6′ W.) city, Hudson County, New Jersey, U.S.A.; factories. Pop. 55,545.

BAYOU, American-French for lake formed at bend in river by flood joining the arms of the bend.

BAYREUTH, BAIREUTH (49° 55′ N., 11° 32′ E.), town, Upper Franconia, Bavaria; former residence of margraves; noted musical festivals; national theatre erected by Ludwig II. for performance of Wagner's operas; houses of Wagner and Richter; Liszt's burial-place; woollen, linen, and cotton goods. Pop. (1910) 34,547.

BAZA (37° 33′ N., 2° 43′ W.), ancient town, Granada, Spain.

BAZAAR, Persian word for market, a line of stalls or booths; in England it has been adopted as general name for sale-of-work for charitable or other purposes, and for retail establishments in which objects of varied character are sold at same price.

BAZAINE, FRANÇOIS ACHILLE (1811–88), Fr. soldier; rose from ranks; made general in Crimean War; commander of Legion of Honour (1855); marshal and senator of France (1864); chief commander in Franco-German War; charged with treason for Fr. defeat, and sentenced to 20 years' detention for capitulating at Metz before necessity demanded.

BAZALGETTE, SIR JOSEPH WILLIAM (1819–91), Eng. engineer; chief engineer, London Metro-

politan Board of Works; carried out sewage system, Thames Embankment, Putney and Battersea bridges.

BAZARD, AMAND (1791–1832), Fr. Socialist; wrote *Exposition de la doctrine de Saint-Simon* and founded the *Charbonnerie française*, branch of Carbonari (*q.v.*).

BAZAS (44° 27′ N., 0° 12′ W.), town, Gironde, S.W. France; tanneries. Pop. *c.* 5000.

BAZIGARS, nomadic people of India; Muhammadans.

BAZIN, FRANÇOIS (1816–78), Fr. musical composer; among his comic operas is *Le Maître Pathelin*.

BAZIN, RENÉ (1853–), Fr. novelist; member of the *Académie française*; pub. *Une Tache d'encre*, (1888), *Donatienne* (1903), *Le Blé qui lève* (1907), *Les Oberlé*, and numerous other novels and books of travel, many of which are trans. into English.

BDELLIUM, certain myrrh-like gum-resins.

BEACHES, RAISED, ancient sea margins presenting horizontal terraces at varying heights above present sea-level, caused by gradual elevation of land.

BEACHY HEAD (50° 44′ N., 0° 15′ E.), headland, S. coast of Sussex, England; perpendicular chalk cliff, projecting into Eng. Channel, 570 ft. high; French gained naval victory over combined Eng. and Dutch fleets, 1690; Belle lighthouse erected, 1831.

BEACONSFIELD.—(1) (51° 35′ N., 0° 42′ W.) market town and parish, Buckinghamshire, England; burial-place of Edmund Burke. (2) (28° 55′ S., 24° 45′ E.) town, adjoining Kimberley, S. Africa; diamonds. Pop. (1911) 14,295. (3) (41° 10′ S., 146° 46′ E.) town, Tasmania, centre of goldfields. Pop. *c.* 3000.

BEACONSFIELD, BENJAMIN DISRAELI, EARL OF (1804–81), Eng. statesman and novelist; b. London; s. of Isaac Disraeli (author of *Curiosities of Literature*, etc.). The f. with all his family abandoned Judaism, and Benjamin was baptized in the Eng. Church (1817). He received little schooling, but had the run of his f.'s extensive library; in solicitor's office, Old Jewry, 1821–23; entered at Lincoln's Inn (1824), but, having made acquaintance of John Murray, turned attention to literature; achieved considerable success with his novel *Vivian Grey* (1826); became society dandy; health breaking down, he travelled abroad for some years, reappearing as Radical candidate for High Wycombe (1832); attacked Liberals in *Letters of Runnymede* (1836); returned as Conservative member for Maidstone (1837); delivered maiden speech in House, a disastrous failure, but memorable for his prediction, 'The time will come when you will hear me'; at first a follower of Peel, but went over to the Protectionists; became Chancellor of the Exchequer under Lord Derby (1852), again (1858–59 and 1866); Prime Minister for a short time (1868), and again took office (1874–80). During this period were passed a *Factory Act*, *Artisans' Dwellings Act*, and the *Agricultural Holdings Act*; cr. Earl of Beaconsfield in 1876. D. was undoubtedly one of the greatest statesmen of modern times; a master of epigram and brilliant debater; his many novels remain as valuable pictures of the times in which he lived. The best of these are: *Lothair*, *Sybil*, *Coningsby*, *Tancred*, and *Henrietta Temple*, most of which were pub. during the earlier years of the writer's political career.

Authoritative *Life*, by Monypenny (2 vols., 1910, 1912). There are also Memoirs by J. A. Froude, T. E. Kebbel, Harold Gorst, and F. Hitchman.

BEADLE, parish officer, app. by the vestry, who received wages out of the church rate. Until the transference of poor-law business to the Guardians, in 1834, he was an officer of some importance. The word survives in the 'bedels' of Oxford and the 'Esquire-bedels' of Cambridge, who are honorary attendants upon the Vice-Chancellor.

BEADS, glass b's are made from rough glass tubing, which is cut into small sections and heated in moving drums with charcoal, etc. They have been used as ornaments from earliest times, specimens being found in Assyrian temples, on Egyptian mummies, and in the graves of Romans, Greeks, and Britons.

B's have also been used from very early times to count any given number of prayers, and they are so used by Buddhists and Muhammadans to-day. Sometimes the b's are berries, and a definite number is marked by metal discs or threads of silk. Their use has its origin in the systematisation of the instinct to repeat given petitions or praises, and in Christianity this has been found as in paganism. The early hermits used to count their petitions by numbers of stones, but the string of b's has resulted in the *Rosary* (q.v.), an obviously more convenient form.

BEAGLING, old Eng. sport. The *beagle* resembles a foxhound, but is much smaller (smallness being one of its points), with very short legs and not anything like the speed of the foxhound; the pack is therefore followed on foot, often with the addition of hunting poles for clearing obstacles, and used only for chasing hares and rabbits. Beagles have deep bell-like bay to which they probably owe their name, and are extremely intelligent and faithful; now to great extent superseded by harriers.

BEAK, bill of a bird or anything of similar shape, as jaws of Cuttlefish, aviolarium of Polyzoa, umbo of Lamellibranch shells, snout of Weevils, and prow of a ship.

BEALE, DOROTHEA (1831–1906), Eng. educationist; b. London; ed. Queen's Coll.; principal of Cheltenham Ladies' College, 1858, till death; raised college to foremost rank and exercised a remarkable influence over her pupils.

BEAM, one of stout transverse timber props which support ship's deck; whence b. of ship means its breadth, and term 'b. ends' means turned on side.

BEAN, seed of certain leguminous plants, as *Vicia*, *Dolichos*, *Phaseolus*, *Glycine*, universally cultivated for food; the broad b. (*Faba vulgaris*) was, with bacon, a favourite Roman dish.

BEAN-FEAST, colloquial term for any kind of jovial feast; probably derived from the old custom of cutting the Twelfth-Night cake, in which a bean was hidden, the receiver of which was declared the king.

BEAR (*Ursidæ*), family of Arctoid carnivora; widely distributed except in Australia and Africa S. of Atlas Mts. Arrangement of teeth (molars) facilitates feeding on vegetable diet; plantigrade, entire sole of feet used for walking. Soles of polar bear are covered with hair to prevent slipping on ice. Chief varieties are: common brown b. (*Ursus arctos*), of Europe and Asia; polar b. (*Ursus maritimus*); grizzly b. (*Ursus horribilis*), and black b. (*Ursus americanus*), of N. America; spectacled b. (*Ursus ornatus*), of the Andes; sloth b. (*Ursus labiatus*), of S. Asia and Ceylon.

BEAR, term applied on Stock Exchange to (1) person who, having sold stock not yet in his possession, with idea of buying and delivering it when prices have gone down, seeks to lower prices; (2) stock so sold.

BEAR, GREAT AND LITTLE, see URSA MAJOR AND MINOR.

BEAR LAKE (45° 37′ N., 67° 5′ W.), lake, New Brunswick, Canada.

BEAR LAKE, GREAT (66° N., 120° W.), lake, N.W. Canada.

BEAR-BAITING and BULL-BAITING, brutal form of Eng. sport in vogue from the times of Henry II. until its prohibition in 1835; conducted in amphitheatres called 'bear-gardens,' in which the bear was chained to a stake and worried by bull-dogs. The bull was also frequently tethered, and his nose well peppered to render him more ferocious. Queen Elizabeth used to witness these exhibitions, and the 'Paris Garden' on the Bankside was a noted resort at that period. The sport dates back to the Romans, and was popular throughout Europe.

BEARD, see HAIR.

BEARD, WILLIAM HOLBROOK (1825–1900), Amer. artist; member of Nat. Academy of Design; noted for his humorous pictures of animals.

BEARDSLEY, AUBREY VINCENT (1872–98), Eng. black-and-white artist; b. Brighton; appeared first as an infant musical prodigy; from 1893 until his

death from consumption, ranked as the foremost artist in the decadent and grotesque of his day; work marked by extreme beauty of line; some of most distinctive work was done for the *Yellow Book* and the *Savoy* magazine, also for the *Morte d'Arthur* (Dent), Wilde's *Salome*, and *The Rape of the Lock*.

BEARDSTOWN (39° 57′ N., 90° 11′ W.), city, Illinois, U.S.A.; factories, fishing. Pop. (1910) 6107.

BEARER COMPANY, commissariat and ambulance department of brigade in Brit. army.

BEARING, direction of ship with respect to points of compass, or b. of any mark relative to fore-and-aft line of ship (naut.); part of building resting on support, as beam upon wall, or span between supports (arch.); support which permits moving part of machine to revolve or slide (mech.). The simplest b. consists of block and cap containing two semicylindrical 'brasses' between which the shaft journal rests, and lubrication contrivance to interpose film of oil between journal and brasses. In *thrust block* b., the journal is provided with collars fitting into circumferential grooves in the brasses, to prevent longitudinal shifting of shaft, *e.g.* of propeller shaft. *Footstep* or *pivot* b. supports the entire weight of vertical shaft and must, therefore, be provided with special lubricating apparatus. Friction is considerably reduced by fitting roller or ball b., which are extensively used in cycles and motor-cars.

BÉARN (42° 30′ N., 0° 10′ W.), ancient province; S. France; united with France by Henry of Navarre; now forms part of department Basses-Pyrénées; capital, Pau.

BEAS, Bias (31° 50′ N., 75° 45′ E.), river, Punjab, India; rises in Kulu Mts.; joins Sutlej.

BEATIFICATION, in the R.C. Church an initial stage in the process of canonisation.

BEATON, DAVID (1494–1546), Scot. cardinal; s. of John B. of Balfour (Fife); ed. St. Andrews, Glasgow, and Paris; Abbot of Arbroath (1525); Lord Privy Seal (1528); cr. Cardinal by Paul III. (1538); succ. his uncle, James B., as abp. of St. Andrews (1539); became Chancellor of Scotland, and made himself hated by his persecutions of the Protestants; died at the hands of assassins in the castle of St. Andrews, May 29, 1546.

BEATRICE.—(1) Florentine lady (1266–90), wife of Simone de' Bardi; beloved by Dante, whose writings she inspired. (2) Principal character in Shakespeare's *Much Ado About Nothing*. (3) **Princess B.** (1857–), youngest dau. of Queen Victoria, wife of Prince Henry of Battenberg (d. 1896) and mother of Victoria Eugénie, who m. Alphonso XIII. of Spain (1906).

BEATRICE (40° 17′ N., 96° 45′ W.), city, Nebraska, U.S.A.; dairy products. Pop. (1910) 9356.

BEATTIE, JAMES (1735–1803), Scot. poet; ed. Marischal Coll., Aberdeen, where he afterwards held chair of Moral Philosophy; chiefly remembered as author of *The Minstrel* (1771–74), a long poem in the Spenserian stanza, and very popular in his day; lived on intimate terms with Dr. Johnson and other literary men of the period who highly valued his character.

BEAU, the leader of male fashion in the XVIII. and early XIX. cent's, the period of wig, patch, powder, enamelled snuff-box, satin knee-breeches, etc., which may be studied in Austin Dobson's *Ballad of B. Brocade*. Bath, Tunbridge Wells, Harrogate, Scarborough, and other resorts to which the rank and fashion flocked to take the waters, offered highly organised social enjoyments culminating in the Assembly and presided over by the b.; the b. owed his position largely to his wit, but chiefly to his elegance.

One of earliest was **Richard Nash** (fl. 1700), who held sway over Bath as master of the ceremonies, 1704–20; **George Bryan Brummell** (1778–1840), who was raised from lowly rank by the Prince of Wales and flourished until 1816, was accepted by royalties as their superior; the last of the b's was the Frenchman, **Alfred, Count d'Orsay** (1798–1852), who lived a good deal in England, where he initiated modern dress, and was *arbiter elegantiarum* in France under the Second Empire. See Costume.

BEAUCAIRE (43° 47′ N., 4° 39′ E.), town, on Rhône, France; formerly centre of trade; noted fair; stone quarries. Pop. 9150.

BEAUCE (48° 20′ N., 1° 50′ E.), district, Eure-et-Loir and Loir-et-Cher, France; wheat.

BEAUCHAMP, ALPHONSE DE (1767–1832), Fr. author and historian; useful writings on contemporary events.

BEAUCLERK (= good scholar), surname of Henry I. of England.

BEAUFORT, Eng. family prominent in XIV. and XV. cent's, descended from John of Gaunt, Duke of Lancaster, who named his four illegitimate children after his Norman castle of B. The B's were declared legitimate in 1397, but excluded from succession to throne, 1407. The male line became extinct in Wars of Roses.

BEAUFORT SCALE, numbers from 0 to 12 to indicate wind force from calm to hurricane, established by Admiral Beaufort, 1805.

BEAUFORT WEST (32° 17′ S., 22° 20′ E.), town and district, Cape Province, S. Africa; sheep-farming. Pop. of district *c.* 10,000, of town *c.* 3000.

BEAUFORT, FRANÇOIS DE VENDÔME, DUC DE (1616–69), Fr. soldier and courtier; popular nickname, *roi des halles*.

BEAUFORT, HENRY (*c.* 1377–1447), bp. of Winchester and Cardinal, 2nd illegitimate s. of John of Gaunt, Duke of Lancaster; bp. of Lincoln, 1398, of Winchester, 1404; took part of Prince Henry against Henry IV. and was important statesman when former succ. to throne; assisted Pope's party at Council of Constance, 1417, and against Hussites, and was made Cardinal, 1426; retained position under Henry VI., whose misfortunes date from B.'s death.

BEAUFORT, LOUIS DE (d. 1795), Fr. historian; criticised traditions of early history of Rome.

BEAUGENCY (47° 46′ N., 1° 40′ E.), town, Loiret, France; captured by Joan of Arc from English, 1428. Pop. 3800.

BEAUHARNAIS, Fr. noble family, still represented. **Alexandre** (1760–94), **Vicomte de B.,** m. Josephine (*q.v.*) Tascher de la Pagerie, afterwards first wife of Napoleon; elegant manners of old *noblesse*; served Revolution as general of army of Rhine, 1792, but executed; dau., **Hortense,** m. Louis Bonaparte, and was mother of Napoleon III.; son, **Eugène de B.** (1781–1824), Fr. soldier; stepson and favourite of Napoleon I; served in Napoleon's wars, and became Prince of the Empire and Viceroy of Italy; brave and skilful general.

BEAUJEU (46° 10′ N., 4° 30′ E.), town, Rhône, France; capital of former province of Beaujolais; wine. Pop. 3400.

BEAUJOLAIS (46° 1′ N., 4° 10′ E.), district of France in north part of old province of Lyonnais. The fief came to the crown in XVI. cent., but was afterwards settled on Duke of Orleans; B. wines are famous.

BEAULIEU (43° 40′ N., 7° 30′ E.), village, Alpes-Maritimes, France; winter resort.

BEAULY (57° 29′ N., 4° 27′ W.), town, on river B., Inverness-shire, Scotland; ruined Priory.

BEAUMANOIR, Fr. lordship which gave name to family distinguished in history. Jean de B. was one of heroes of the *Combat des trente* (1351); his successor, Jean (1551–1614), was marshal of France.

BEAUMARCHAIS, PIERRE AUGUSTIN CARON DE (1732–99), Fr. dramatist; b. Paris; s. of a watchmaker named Caron, and apprenticed to the same trade. Possessed of handsome person and agreeable manners, he secured appointment at court, changed his name, and rose to be the sec. to the king. His first attempt at dramatic writing was drama *Eugénie* (1767), but it was the production of *Le Barbier de Seville* (1775) and *Le Mariage de Figaro* (1784) which established his fame as a comic dramatist. These plays, his best, show Molièresque skilful construction, wit, and irony; still enjoyed in France, but

best known to foreigners through the operas of Mozart and Rossini respectively; inimitable *Mémoires*.

BEAUMARIS (53° 17′ N., 4° 6′ W.), town, Anglesea, Wales. Pop. (1911) 2233.

BEAUMONT (30° 7′ N., 94° 5′ W.), city, on Neches River, Texas, U.S.A.; lumber centre; oil-fields. Pop. (1910) 20,640.

BEAUMONT (Belmont, Bellemont), name of Eng. family, taken from Beaumont-le-Roger in Normandy; held lands in England, 1086; summoned to Parliament as barons by writ from 1309.

BEAUMONT, CHRISTOPHE DE (1703-81), abp. of Paris; noted for opposition to the Jansenists; pub. a formal condemnation of Rousseau's *Émile*, to which R. replied in his famous *Lettre à M. de Beaumont* (1762).

BEAUMONT, FRANCIS (1584-1616), and **FLETCHER, JOHN** (1579-1625), Eng. dramatists; described by Swinburne as 'the Dioscuri of Eng. poetry.' B. was the s. of Sir Francis B., Judge of the Common Pleas, and was b. at Grace Dieu, Leicestershire; ed. Broadgates Hall (now Pembroke Coll.), Oxford; left without taking a degree (1600), and entered the Inner Temple to read for the law. In London he made the acquaintance of Ben Jonson and other 'Mermaid' poets, wrote a translation of Ovid and some miscellaneous verses, and formed a friendship with F. The two poets lived together until B.'s marriage in 1613 with Ursula Isley, an heiress. B. was buried in Westminster Abbey. Fletcher was the s. of Richard F., afterwards bp. of London; b. Rye; ed. Bene't (now Corpus Christi) Coll., Cambridge; like many univ. men of the period in search of fortune, drifted into the service of the theatre. He died of the plague.

Of the fifty plays attributed to the two dramatists, *The Maid's Tragedy, Philaster, The Knight of the Burning Pestle*, and *The Faithful Shepherdess* (by F. alone) are considered the finest examples, and rank only below the masterpieces of Shakespeare. The general opinion seems to be that B. had the loftier genius, while F. had more constructive ability and excelled in wit and fancy. It is also known that the two were sometimes associated with other dramatists in the writing of plays—notably with Shakespeare, Massinger, Jonson, and Shirley. *The Two Noble Kinsmen*, sometimes attributed to Shakespeare, was largely the work of F.; while he was associated with Massinger in the authorship of part at least of Shakespeare's *Henry VIII.*

Selection of their best plays in the series of *Mermaid Dramatists*; vol. vi. of *Cambridge History of Eng. Lit.*

BEAUMONT, SIR JOHN (1583-1627), Eng. poet; elder bro. of Francis B., the dramatist; best known for his poem on *Bosworth Field*, pub. after his death (1629). He also wrote a long poem, *The Crown of Thorns*, which was greatly admired in MS. (lost).

BEAUNE (47° 1′ N., 4° 51′ E.), town, Côte d'Or, France; ancient ramparts; XV.-cent. hospital of St. Esprit; XIII.-cent. church; famous wines. Pop. *c.* 14,000.

BEAUREGARD, PIERRE GUSTAVE TOUTANT (1818-93), Amer. general in army of South, and military writer.

BEAUREPAIRE, NICOLAS JOSEPH (1740-92), Fr. commander who slew himself when Verdun was about to fall before Prussians.

BEAUSÉANT, device and standard of knights of Temple (*q.v.*).

BEAUSOBRE, ISAAC DE (1659-1738), Fr. Huguenot, scholar, and theologian; wrote valuable *Manichéisme*.

BEAUVAIS (49° 26′ N., 2° 5′ E.), town, capital of Oise, France; besieged by English, 1433; defended against Charles the Bold of Burgundy by female inhabitants under Jeanne Hachette, 1472; fine Gothic cathedral; Gobelin tapestry. Pop. *c.* 20,000.

BEAUVAU, Fr. noble family of Anjou; among prominent members was CHARLES JUSTE DE B. (1720-93), marshal of France.

BEAUVILLIER, name of Fr. noble family prominent XV. to XVIII. cent's.

BEAUVOIR, ROGER DE (1806-66), *nom de plume* of EUGÈNE AUGUSTE ROGER DE BULLY, Fr. novelist of independent means and extravagant habits, who amused himself by writing romantic novels, of which *L'Écolier de Cluny ou le Sophisme* (1832) is considered a good example.

BEAUX, CECILIA (1863-), celebrated Amer. portrait-painter; amongst her sitters has been Mrs. Roosevelt.

BEAVER (*Castor fiber*), largest European aquatic rodent, closely related to Amer. b. (*C. canadensis*), valued for fur and as food. Fossil remains found in superficial deposits; *Trogontherium cuvieri* a giant Pleistocene genus. See RODENTIA.

BEAVER DAM (43° 28′ N., 88° 57′ W.), city, Wisconsin, U.S.A.; woollen and cotton goods. Pop. *c.* 6758.

BEAVER FALLS (40° 46′ N., 80° 36′ W.), borough, Pennsylvania; iron and steel industries. Pop. (1910) 12,191.

BEAWAR, BEAWR (26° 9′ N., 74° 23′ E.), town, Rajputana, India; cotton. Pop. 22,000.

BEBEL, FERDINAND AUGUST (1840-), Ger. Socialist, of school of Karl Marx; sat in *Reichstag* for over 30 years; now most important member of Social Democrat party.

BEC ABBEY, founded 1034 at Rouen, Normandy, by Benedictine monks; centre of civilisation; from it came Lanfranc and Anselm, abp's of Canterbury.

BECCAFICO (fam. *Sylviidæ*), small bird living on figs and grapes.

BECCAFUMI, DOMENICO DI PACE (1486-1551), Ital. artist; s. of a peasant; displayed remarkable talent for art from earliest years, and, having been well trained, executed great number of religious pictures for churches; famous for share in designing magnificent pavement in cathedral at Siena.

BECCARIA, CESARE DE (1738-94), Ital. philosopher who wrote on amendment of criminal law.

BECCLES (52° 37′ N., 1° 34′ E.), market town, Suffolk, England; printing works. Pop. (1911) 7100.

BÊCHE-DE-MER, TREPANG, see ECHINODERMATA.

BECHER, JOHANN JOACHIM (1635-82), Ger. chemist and physician; wrote on such varied subjects as metallurgy, physics, a universal language, and commerce. His ideas on combustion induced G. E. Stahl to formulate the Phlogiston Hypothesis. See STAHL.

BECHUANALAND (26° S., 23° E.), great district, Brit. S. Africa, between Zambesi and Orange Rivers, and between German S.W. Africa on W. and Transvaal on E. Southern part, as far N. as river Molopo, was incorporated with Cape Colony in 1895; rest of district, extending to Victoria Falls on Zambesi, is a protectorate. Surface is part of great central plateau, with elevation of 4000 to 5000 ft.; rainfall varies from 25 in. in E. to 10 in W. B. produces maize, millet; great herds of cattle. There seems to be plenty of underground water, and wells and irrigation might render soil very fertile. Gold occurs in places. Chief town is Mafeking; area of Cape part, 51,254 sq. miles. Pop. (1911) 99,538 (including 15,009 whites). Area of Protectorate, *c.* 270,000 sq. miles.

Administration of **Protectorate** is carried out by Resident Commissioner under direction of High Commissioner. Inhabitants belong to Bamangwato, Bangwaketsi, Bakwena, and other tribes, each of which is ruled by native chief, under supervision of Commissioner. Various missions have been established since beginning of XIX. cent., and David Livingstone lived for time at Kolobeng and carried on explorations. B. was included in Brit. sphere of influence, 1885. Pop. 125,350. See also SOUTH AFRICA.

BECK, CHRISTIAN DANIEL (1757-1832), Ger. scholar; prof. at Leipzig Univ.; edit. works of Euripides, Plato, Cicero, and many other classical authors.

BECK, JAKOB SIGISMUND (1761-1840), Ger. philosopher; follower of Kant.

BECKENHAM (51° 24′ N., 0° 2′ W.), town, Kent, England, 8 miles S.E. of London. Pop. (1911) 31,700.

BECKER, HEINRICH (1770–1822), Ger. actor; for long the idol of the Weimar stage, and was held in great estimation by Goethe.

BECKER, KARL FERDINAND (1804–77), Ger. musical critic and collector; wrote several works on music.

BECKER, WILHELM ADOLF (1796–1846), Ger. classical scholar; b. Dresden; prof. of Archæology at Leipzig, chiefly known for his *Gallus* (1838) and *Charicles* (1840), clever studies of daily lives of ancient Greeks and Romans.

BECKET, THOMAS (1118–70), abp. of Canterbury, and Chancellor under Henry II.; s. of a London portreeve; member of the household of Abp. Theobald, whom he accompanied to Rome (1143); was made Archdeacon of Canterbury (1154); Chancellor of England (1155). He now became Henry's chief adviser, lived in great magnificence, and encouraged the king in all his warlike enterprises, himself taking a chief part in leading the Eng. army in France. In 1162, upon Theobald's death, Henry appointed him to the See of Canterbury, and from this time he gave himself thoroughly to ascetic practices, and became the Church's enthusiastic champion. Refusing his assent to the Constitutions of Clarendon, he was exiled, but returned in 1170. Some hasty words which Henry let fall were acted upon by certain of Becket's enemies, and the Abp. was murdered in his own cathedral. He was canonised (1172), and his shrine became a noted place of pilgrimage, as related in the *Canterbury Tales* of Chaucer.

Lives of Becket by Robertson (1859), Morris (1885), Hutton (1910).

BECKFORD, WILLIAM (1760–1844), Eng. author; s. of William B., who was twice Lord Mayor of London; inherited an income of £100,000 a year, most of which he squandered in extravagant building schemes; famous as the author of *Vathek* (1782), a mysterious Oriental romance, characteristic product of Romantic movement in England. B. was also noted for his eccentricities. He m. Lady Margaret Gordon, and one of his two dau's became Duchess of Hamilton.

BECKINGTON, THOMAS (1390–1465), Eng. prelate and statesman; sec. to Henry VI.; was sent on an embassy to Calais, 1439, and wrote an account of it in Latin; on his return made Lord Privy Seal, and Bp. of Bath and Wells.

BECKMANN, JOHANN (1739–1811), Ger. scientific author; founder of the science of technology.

BECQUE, HENRY FRANÇOIS (1837–99), Fr. dramatist; produced *Michel Pauper* (1870), *Les Corbeaux* (1882), *La Parisienne* (1885), and other plays.

BECQUEREL, distinguished Fr. family. ANTOINE CÉSAR B. (1788–1878), prof. of Physics in Paris; Copley medal of Royal Society of London, 1837, for memoirs on electricity.—ALEXANDRE EDMOND B. (1820–91), s., authority on optics, inventor of phosphoroscope.—ANTOINE HENRI B. (1852–1908), s. of preceding; discovered radioactivity (*q.v.*); Nobel prize, 1903.

BED, article of furniture for sleeping upon. Ancient Egyptian beds were high, and were ascended by steps; early Gk. beds consisted of a wooden frame, with head-board, and across the frame bands of hide were stretched; at a later period the frames were richly inlaid, and the b. coverings were handsomely embroidered. In Europe the b. developed from the simple pallet to the hearse-like structure which is familiar to all visitors to show-places where royal beds are among the curiosities. These unhealthy erections, with little modification, lasted well on into the Victorian era, when they were replaced by metal frames. There is now a widespread tendency to revert to the use of wooden frames, of a plain and light character.

BED (*stratum*), deposit of sedimentary rocks in layers; thin layers are termed *laminæ*.

BED OF JUSTICE (Fr. *lit de justice*), use of prerogative of Fr. monarch to enforce, as supreme power in state, registration of his edicts by recalcitrant *parlements*; supposed to be named after cushioned throne on which king sat on those occasions.

BEDARIEUX (43° 37′ N., 3° 12′ E.), town, S. France; cloth-weaving, dyeing, tanning, Pop. 5600.

BED-BUG, see under BUG.

BEDCHAMBER, OFFICIALS OF THE, the chief is titular functionary, the *Groom of the Stole* in case of male ruler, *Mistress of the Robes* in case of female ruler; next in rank are *Lords* or *Ladies of the B.* (to king or queen regnant respectively), and beneath them grooms or b. women; lucrative and much-coveted posts. THE B. QUESTION, 1839, when the queen refused to allow Peel as prime minister to dispose of these posts, resulted in his refusing to form a Cabinet.

BEDDOES, THOMAS (1760–1808), Eng. physician and scientist; reader in chem. at Oxford (1788); forced to resign because of revolutionary sympathies (1792); established a 'Pneumatic Institution' at Clifton (1798) for treatment of disease by inhalation of different gases, Humphry Davy being the actual superintendent.

BEDDOES, THOMAS LOVELL (1803–49), Eng. dramatic poet; s. of Thomas B. (*q.v.*); nephew of Maria Edgeworth; ed. Charterhouse and Pembroke Coll., Oxford; author of *The Improvisatore* (1820), *The Bride's Tragedy* (1822), and a posthumous play, the solemn and beautiful *Death's Jest-Book* (1850). His plays are inspired by the Elizabethans, and some of his lyrics, which are of considerable beauty, betray the influence of Shelley.

BEDE, BÆDA (672–735), Eng. historian; usually called 'the Venerable'; author of the *Ecclesiastical History of the English Nation*, written 731, in the preface to which he gives the history of his own life. In early youth he was placed under care of Benedict Biscop, Abbot of Wearmouth, later under that of Ceolfrith, Abbot of Jarrow, where he spent remainder of his life; there he was buried, but his bones were removed to Durham during the XI. cent. He has been called 'the father of Eng. history,' and was undoubtedly the most learned Englishman of his time and chief source of O.E. history. Amongst other works he wrote a *History of the Abbots*, and a scientific treatise, *De Natura Rerum*; see *Venerable Bede*, by Browne.

BEDE, CUTHBERT (1827–89), pseudonym of EDWARD BRADLEY, Eng. humorist; b. Kidderminster; ed. Durham and Oxford; took holy orders and held various livings; chiefly remembered for *Adventures of Mr. Verdant Green, an Oxford Freshman* (1853).

BEDEGUAR GALL, see GALL-FLIES.

BEDELL, WILLIAM (1571–1642), Anglican Bp. of Kilmore and Ardagh; trans. *Book of Common Prayer* into Ital., and directed trans. of Bible into Erse.

BEDESMAN, a pensioner whose duty it was to pray for the souls of others. In Scotland the king's bedesmen, who wore blue gowns and metal badges, were permitted to beg throughout the kingdom. No bedesmen were app. after 1833.

BEDFORD.—(1) (52° 8′ N., 0° 28′ W.) county town, Bedfordshire; on Ouse; important for its educational institutions, which originated in the gift of Sir William Harpur, 1561; statue and relics of John Bunyan; agricultural implements, lace, straw-plaiting. Pop. (1911) 39,200. (2) (38° 53′ N., 86° 32′ W.) city, Indiana, U.S.A.; stone quarries. Pop. 8716. (3) (40° 2′ N., 78° 28′ W.) town, Pennsylvania, U.S.A., near B. Mineral Springs, a summer resort. Pop. 2235.

BEDFORD, EARLDOM AND DUKEDOM OF.—JOHN PLANTAGENET, Duke of B. (1389–1435), 3rd s. of Henry IV., was cr. Duke of B. by his bro., Henry V., in 1414. On Henry's death (1422) he became Regent of England, and continued Henry's work of conquest in France, forming an alliance with the Duke of Burgundy, whose sister he m. Stemming the tide of disasters which followed the siege of Orleans, he crowned Henry VI. king at Paris (1431), but the English con-

tinued to lose ground, and after an abortive attempt to arrange terms of peace, B. died at Rouen, without legitimate issue.—GEORGE NEVILL (1457–83), s. of Earl of Northumberland, was cr. Duke of B. (1470), but was degraded from the rank after his f.'s attainder and death.—JASPER TUDOR (1430–95), uncle of Henry VII., was cr. Duke of B. (1485), but d. without legitimate issue.—JOHN RUSSELL, Earl of B. (1486–1555), was a favourite of Henry VIII., acted as diplomatic envoy on the Continent, and held high offices of state under Henry VIII., Edward VI., and Mary.—FRANCIS RUSSELL, 2nd Earl of B. (1527–85), was a prominent statesman under Elizabeth. He was succeeded by his grandson EDWARD (1572–1627), who d. without issue.—FRANCIS RUSSELL, 4th Earl of B. (1593–1641), cousin of 3rd earl, was a leader of the Parliamentarians, dying in the middle of the struggle, and had a great part in the drainage of the Fens, called the *Bedford Level*.—His s. WILLIAM (1613–1700) fought latterly on the side of the king in the Civil War, and was cr. Duke of B. (1694). The title descended to his grandson WRIOTHESLEY (1680–1711), who was succ. by his son WRIOTHESLEY (1708–32), succ. by his bro. JOHN RUSSELL (1710–71), 4th Duke of B., a prominent politician, a Cabinet minister under Pelham, Bute, and Grenville, Viceroy of Ireland (1756–61), and holder of many other public offices.—FRANCIS RUSSELL, 5th Duke of B. (1765–1802), grandson of 4th duke, was a friend of George IV., a leading politician, and much interested in agriculture. His bro. JOHN (1766–1839) succ., and from him the title descended to his s. FRANCIS (1788–1861), and grandson WILLIAM (1809–72). The latter was succ. by his cousin FRANCIS CHARLES HASTINGS (1819–91), the title after his death going to the grandson of the 6th duke, both of whose sons, GEORGE WILLIAM FRANCIS SACKVILLE RUSSELL (1852–93), and HERBRAND ARTHUR RUSSELL (1858–), succ. in turn to the title, the latter being interested in natural history, and pres. of Zoological Society.

BEDFORDSHIRE (52° 4′ N., 0° 24′ W.), county, England, bordering on Huntingdon, Northampton, Buckingham, Hertford, Cambridge; about 36 miles long, 21 broad; area, *c.* 466 sq. miles; mainly consists of fertile clayey plain, undulating and well wooded, watered by Ouse and tributaries, and bounded on S. by Dunstable and Luton Downs, continuations of Chiltern Hills. County is partly devoted to sheep-grazing, partly to market-gardening, partly to corn-growing; manufactures: straw-plaiting, pillow-lace, rush-matting; produces phosphate of lime and fuller's earth; county town, Bedford (*q.v.*), parliamentary borough; ten market towns; Watling Street passes through county, and there are other traces of Roman occupation; many old churches, affording fine examples of Saxon, Norman, and later architecture. Pop. (1911) 197,660.

BEDIVERE, SIR, knight of Round Table; attended Arthur on his death-bed and threw Excalibur into the mere.

BEDLAM, generic name for lunatic asylums, derived from the name Bethlehem Hospital, Bishopsgate St., London, founded as a priory by Sheriff Simon Fitz Mary in 1247, and used as the first lunatic asylum in England about a hundred years later; it was transferred to Moorfields in 1675, and finally to St. George's Fields, Lambeth.

BEDLINGTON (55° 7′ N., 1° 38′ W.), town, on Blyth, Durham, England; coal, iron. Pop. (1911) 25,597.

BEDMAR, ALFONSO DE LA CUEVA, MARQUIS DE (1572–1655), bp. of Oviedo, cardinal and governor of Netherlands; his plot against Venice, 1618, subject of Otway's *Venice Preserved*.

BEDOUINS (Arab. 'people of the desert'), name given to Arab tribes who inhabit the desert; of noble, regular physique; wild and warlike, and of primitive hospitality.

BED-SORE, form of ulceration or gangrene caused, in persons confined to bed, by prolonged pressure usually over a bony prominence, especially if the rt be moist with perspiration, urine, or discharge om wound; interference with nerve supply of the skin and general debility predispose strongly to b's. It can be prevented by regularly changing the position of the person, by cleanliness and keeping the skin on prominent parts dry, *e.g.* by sponging with water and then rubbing with methylated spirits, which is then allowed to dry on the skin, or dusting with boracic powder.

BEDWORTH (52° 29′ N., 1° 29′ W.), town, Warwickshire, England; coal, iron. Pop. 7200.

BEE (*Anthophila*), family of hymenopterous insects with feather-like hairs on head and body; mouth parts modified for sucking nectar from flowers; first legs possess mechanism for cleaning antennæ, third legs broadened, and (in workers) modified for gathering pollen; like other Hymenoptera (*q.v.*) they undergo complete metamorphosis. From primitive 'solitary' species, of curious nesting habits, have evolved the social bees with two kinds of females, reproductive *queens* and, ordinarily, sterile *workers*, the Brit. hive bee (*Apis mellifica*), domesticated from ancient times, being the common and most highly specialised representative. The differentiation of labour in the wonderful organisation of the hive-bee society is less marked in the *humble-bees* (*Bombus*), where the queen in addition to her egg-laying functions also assists the workers.

The hive bee *swarms* in early summer. The workers, after a great commotion, having stuffed themselves with honey and loaded their legs with a resinous substance called *propolis*, fly with a fertilised queen to form a new colony. The workers settle on the proposed site, usually in a hive, and wait for a day till the temperature has risen sufficiently to enable them to exude small plates of wax from eight pockets on the lower side of abdomen. After the wax has been kneaded by the jaws of the workers it is fixed at the top of the hive, and the construction of the hexagonal cells proceeds till the *comb* is completed. Egg-laying now begins, most cells receiving fertilised (worker) eggs, others, built larger for the purpose, parthenogenetic (*drone*) eggs, the queen probably instinctively regulating fertilisation. While the eggs in the drone cells develop into *drones*, stingless males, whose sole function is that of sex, the fertilised eggs give rise to workers or queens according to the food given to the grubs. While the worker grubs are fed with pollen and honey, those destined by the community to develop into queens are in specially built cells, 'royal cradles,' fed with a more nutritious preparation called 'royal jelly.' Should there be no queen, a new one is developed by the workers by feeding a worker grub on 'royal jelly.' The entire development of a queen, from egg through grub-pupa stage to adult, requires 16 days, that of a worker 21 days, of a drone 24 days. The older workers gather the honey while the younger ones are engaged in various duties inside the hive, feeding the grubs, ventilating the hive, keeping it clean, repairing cells with *propolis*, fighting alien bees, and destroying the surplus drones, if the hive has a breeding queen. The virgin queen kills her rivals on returning to the hive after having engaged on her nuptial flight, fertilisation occurring in mid-air by the strongest and best-flying drone. If a new colony is to be founded, the nuptial flight takes place, and the first queen escapes with a band of workers. Honey is stored in large quantities for winter consumption.

Bee-Keeping.—Bees are most important domesticated animals, not only being providers of honey, but also indispensable for fertilising flowering plants which are themselves adapted to the insects in the same measure as the latter are modified for collecting nectar. From the earliest times, when a hollowed tree served as a hive, to the straw *skep*, and, finally, to the modern scientific bee farm (*apiary*) of N. America, with its annual harvest of more than 100,000 lb. of honey, many improvements in bee-

keeping have led to the latter result. These improvements have been the wooden frame, the artificial comb foundation, and other appliances to direct and aid the bees in completing the comb, the centrifugal honey extractor, which enables the bee-keeper to use the same comb again, and, above all, a greater knowledge of the bees and their diseases. Many of these can be prevented, the most destructive being *foul brood*, dysentery, and *Isle of Wight disease*.

F. R. Cheshire, *Bees and Bee-Keeping* (London, 1885–88); M. Maeterlinck, *The Life of the Bee* (London, 1901); *The British Bee Journal*, weekly since 1873; *Bee-Keeper's Record*, monthly since 1882.

BEECH (*Fagus*), genus of trees of temperate regions, containing about 10 species, e.g. *F. sylvatica* (Europe), *F. americana* (Eastern N. America), *F. antarctica*, and the evergreen *F. betuloides* (Tierra del Fuego). The fruit (mast) is edible. Ancient Runic tablets were made of b.-wood slabs; the word has same root as Sanskrit *bokor*, letter.

BEECHAM, THOMAS (1879–), Eng. musical composer and conductor.

BEECHER, CHARLES EMERSON (1856–1904), Amer. palæontologist; authority on brachiopoda and crustacea.

BEECHER, LYMAN (1775–1863), Amer. preacher; sometime pres. of Lane Theological Seminary, Cincinnati; enjoyed great popularity as preacher; *Collected Works*, 3 vols. (1852), *Autobiography*, 2 vols. (1863–64). He was the f. of Henry Ward B., Mrs. H. B. Stowe, Edward B., Charles B., Thomas Kinnicutt B., Catherine Esther B., all of whom obtained considerable distinction either as writers or preachers. **Beecher, Henry Ward** (1813–87), as pastor of Plymouth Congregational Church, Brooklyn, N.Y., established a reputation as a preacher which made him famous throughout English-speaking world; pub. *Seven Lectures to Young Men* (1844), *Life Thoughts* (1858), *Life of Christ* (1871), and numerous other works. **Beecher Stowe, Harriet Elizabeth** (1811–96); m. Rev. Calvin Stowe, 1832; her *Uncle Tom's Cabin* (pub. in *The National Era*, 1850; in book form, 1852) was read all over the world, and excited popular feeling against system of slave-owning.

BEECHEY ISLAND (74° 40′ N., 92° W.), island, Brit. N. America.

BEECHEY LAKE (65° 33′ N., 105° 50′ W.), lake, Brit. N. America.

BEECHEY, FREDERICK WILLIAM (1796–1856), Eng. explorer; after serving in navy and later in explorations under Franklin and Admiral Smyth, spent three years exploring under his own flag, and pub. (1831) *Voyage to the Pacific and Bering's Strait to Co-operate with the Polar Expeditions, 1825–28*; rear-admiral, 1854.

BEECHEY, SIR WILLIAM (1753–1839), Eng. artist; portrait-painter to Queen Charlotte and other members of the royal family; A.R.A. (1793); R.A. and knighthood (1798).

BEECHING, HENRY CHARLES (1859–), Eng. clergyman and poet; Canon of Westminster (1902); Dean of Norwich (1911); has pub. *In a Garden and other Poems* (1895); *Seven Sermons to Schoolboys* (1894); has edit. *A Paradise of English Poetry* (1892), *Lyra Sacra* (1894), besides editions of Milton, Crashaw, Herrick, and Henry Vaughan.

BEECHWORTH (36° 22′ S., 146° 41′ E.), town, Victoria, Australia; gold-mining. Pop. 7400.

BEE-EATERS, small family of bright-coloured birds (*Meropidæ*) which catch their insect food on the wing; they inhabit the Old World; *Merops apiaster* is a rare British visitor.

BEEF, old pl. **Beeves**, flesh of ox, bull, or cow, and, formally, those animals themselves; joints cut by Eng. butchers are sirloin, rump, aitchbone, buttock, mouse buttock, veiny parts, thick flank, thin flank, shin, fore ribs, middle ribs, chuck ribs, leg-of-mutton piece, brisket, clod, neck, cheek.

BEEF-EATER.—(1) Hypothetical original O.E retainer. (2) Yeoman of the Guard, a body first formed by Henry VII.; Tudor costume still worn. (3) Warder of Tower.

BEEFSTEAK CLUB, otherwise 'The Sublime Society of Steaks,' founded by John Rich at Covent Garden Theatre, which, besides royalties, numbered amongst its members Hogarth, Garrick, and Wilkes. The club met later at the Bedford Coffee-House and the Lyceum Theatre.

BEELZEBUB, a name of uncertain derivation. In *2 Kings* 1 we find mention of Baal-zebub, the god of Ekron; while in *Mark* $3^{22\text{-}27}$ B. is identified with the devil, and of Christ it is said by the scribes, 'He hath Beelzebub, and by the prince of the devils casteth he out devils.' In Milton's *Paradise Lost* (Bk. ii.) B. ranks as second to Satan.

BEER, see Brewing.

BEER ACTS, see Licensing Laws.

BEER MONEY, payment made in Brit. army, 1800–73, to non-commissioned officers and privates in lieu of allowance of ale.

BEERBOHM, MAX (1872–), Eng. paradoxical and impressionist writer, and caricaturist of such fame that misrepresentation by his pen is stamp of celebrity.

BEERSHEBA (31° 17′ N., 34° 54′ E.), most southerly village in Canaan; mentioned in Old Testament from times of Abraham; 'from Dan even unto B.' meant the whole of Palestine; site marked by ruins and two circular wells.

BEESLY, EDWARD SPENCER (1831–), Eng. historian and positivist; sometime editor of the *Positivist Review*.

BEESTINGS, milk taken from cow after calving; much richer than ordinary milk.

BEESWAX, secretion of worker bees when forming honeycomb, of which it composes cells.

BEET (*Beta vulgaris*), edible biennial, forming succulent tap-root first season, flowering stem following year; numerous varieties, *e.g.* field b., garden b., mangold-wurzel. From certain varieties sugar is obtained. See Sugar.

BEETHOVEN, LUDWIG VAN (1770–1827), Ger. composer; b. Bonn; s. of a tenor singer at the Elector of Cologne's court, a man of violent temper and drunken habits, with the natural result that the family suffered dire poverty during Ludwig's early years. The f., discerning the precocity of his s., was eager to turn his musical gifts to profit at the earliest possible date, and commenced the child's training at the age of five. By the time he was nine, however, the elder B. could teach him no more, and he passed successively into the hands of another singer, Pfeiffer, Ries, Van den Eeden (the court organist), and his successor, Neefe. As early as 1781 B. had acted as deputy to the latter; in 1783 he was made cymbalist at the Bonn theatre, and, in the following year, was given a court appointment under Neefe. In 1787 he visited Vienna, where he played before Mozart, and received a few lessons from him. But the illness of his mother, to whom he was greatly attached, and her subsequent death put an end to these advantageous studies, and he returned to his work at Bonn and the charge of his f.'s household, of which he was the chief support. In his native town he had won the friendship of Count Waldstein, through whose instrumentality the Elector was induced to send B. again to Vienna (1792), where he quickly made a reputation for himself by his playing and extemporisation.

Vienna was destined to be his home for the remainder of his life, and immediately after settling there he placed himself under the tuition of Haydn. B., however, did not get on comfortably with his tutor, and was dissatisfied with his progress. He therefore took lessons from Schenk, and studied counterpoint later with Albrechtsberger, and the violin with Schuppanzigh. It was in Vienna, consequently, that all his chief works were composed, and in this great musical centre he formed many lasting friendships. Yet there was much in B. that was calculated to destroy friendly relations, for, though a man of the

most generous and noble character, he frequently treated his best and most intimate friends with inconsiderate rudeness and incivility. Perhaps some portion of this defect of character may have resulted from the deafness with which he had been afflicted since before he was thirty years of age, and which increased to such an extent that, from 1822 until his death, he could only be communicated with in writing. Yet it may be mentioned incidentally that some of his greatest compositions belong to this period.

To B.'s first period belong: first two symphonies, first 10 sonatas (including *Pathétique*, 1799, and *Moonlight*), string trios, first 6 string quartets, *Mount of Olives* (oratorio), and most of the sets of variations for pianoforte. Second period includes most of his greatest works, *e.g. Kreutzer* Sonata (violin and piano), 1803; 3rd (*Eroica*) Symphony, 1804; *Fidelio* (Opera), 1805, *Appasionata* Sonata, 4th Symphony, and 32 Variations in C minor for Pianoforte, 1806; C minor (5th), and *Pastoral* (6th) Symphony, 1807; and G minor Pianoforte Concerto, 1807; Violin Concerto and *Lebewohl* Sonata, 1809; music to *Egmont* and trio in B♭, 1810; Symphonies 7 and 8, 1812. To the last period belong 9th (*Choral*) Symphony (1823 onwards); last 4 pianoforte sonatas, last 4 string quartets, *Missa Solemnis*, 2 overtures, and other minor works. The greatest musical composer of all time, B.'s earlier works were akin to Mozart and Haydn; his later works marked entirely new departures, characterised by amazing individuality of style and classical beauty and perfection of form.

Corder, *Beethoven* (1912); Grove, *Beethoven and his Nine Symphonies* (1896); Thayer, *Life of Beethoven*; Diehl, *Life* (1908).

BEETLE, coleopterous insect. Black b's are cockroaches (*q.v.*), not true b's. See COLEOPTERA.

BEETS, NICOLAAS (1814–1903), Dutch writer and divine who has won distinction for stories and criticism.

BEFANA (Ital.), fairy benefactor who on Twelfth Night (Epiphany) attends to the wants of children. It used to be customary to parade her effigy in the streets on eve of Epiphany.

BEGAS, KARL (1794–1854), Ger. artist; painted Biblical and hist. pictures, and portraits of public men; was court painter to the king of Prussia.

BEGAS, REINHOLD (1831–), Ger. soulptor; s. of Karl B.; has executed statues of Schiller, von Humboldt, and Bismarck, for Berlin; the sarcophagi of the Emp. Frederick III. and the Empress Frederick; and the national monument to the Emp. William at Berlin.

BEGG, JAMES (1808–83), Scot. Presbyterian divine; led secession, 1843, and rigorously maintained independence of Free Church.

BEGGAR, one who exists on charitable contributions. The word is of uncertain origin, but its use in England dates back to the XIII. cent. See MENDICANCY.

BEGGAR-MY-NEIGHBOUR, card game, played by two players.

BEGHARDS, lay male confraternity which flourished in Europe XIII. and XIV. cent's; modelled on Béguines (*q.v.*).

BEGONIA, genus of succulent herbs, comprising about 350 species; native of moist tropics.

BÉGUINES, lay sisterhoods founded at Liège about 1170 by a priest named Lambert le Bègue, who devoted his fortune to establishment of church and hospital there; the B. were not required to take vows, but expected to devote their whole time to good works; movement very popular, and spread rapidly. A Béguinage at Ghent, at the present time, numbers some hundreds of sisters.

BEGUM, Indian title of honour bestowed on mother, sister, and wife of ruler.

BEHAIM, MARTIN (*c.* 1436–1507), Ger. navigator and geographer; made globe of world, 1492, kept at Nuremberg.

BEHAR, see BIHAR, BIHAR AND ORISSA.

BEHADING, see CAPITAL PUNISHMENT.

BEHEMOTH, Biblical (*Job* 40[15]) animal, probably hippopotamus.

BEHISTUN (34° 8′ N., 47° 20′ E.), village, Persia; on the face of a steep rock is the remarkable cuneiform inscription in three languages, recording deeds of Darius I.; king of Persia, copied and trans. by Sir Henry Rawlinson (*q.v.*), 1835–37.

BEHM, DR. ERNST (1830–84), Ger. geographer and statistician; editor of *Mitteilungen*, etc.

BEHN, APHRA (1640–89), Eng. novelist and dramatist; wrote a novel about an African prince named Oroonoko; plays include *The Forced Marriage*, *The Amorous Prince*, *The Town Fop*, etc., distinguished by wit, vivacity, and indecency; employed by Charles II. as a spy in the Netherlands; said to have been the first Eng. professional authoress.

BEHR, WILLIAM JOSEPH (1775–1851), Ger. publicist; was accused of disloyalty to Maximilian I. of Bavaria; author of several works of a socialistic tendency.

BEHRING, see BERING.

BEILAN (36° 30′ N., 36° 13′ E.), town, N. Syria. Pop. *c.* 5000. B. Pass connects Syria with Cilicia.

BEILLANY (22° 13′ N., 31° 48′ E.), town, Lower Nubia, Africa.

BEIRA.—(1) (40° 30′ N., 7° 50′ W.) province, Portugal; area, 9208 sq. miles. Pop. 1,515,834. (2) (19° 50′ S., 34° 55′ E.) seaport town, Portug. E. Africa; built on tongue of sand at mouth Pungwe River; nearest port to Mashonaland; B. railway links up with Cape to Cairo line at Bulawayo. Pop. 7200.

BEIRUT, BEYROUT (33° 54′ N., 35° 29′ E.), vilayet, Syria, stretching along Mediterranean coast; capital and chief town, BEIRUT; centre of transit trade of southern Syria; connected by railway with Damascus; ancient Phœnician town; silk, gold, and silver threads. Pop. *c.* 119,000.

BEIT, ALFRED (1853–1906), S. African financier; b. Hamburg; associated with Cecil Rhodes in De Beers; partner in firm Wernher, Beit, & Co., and director of the Rhodesia and other railways; founded chair of Colonial History at Oxford (1902), and left large bequests for educational purposes to London Univ., Hamburg, Capetown, and Johannesburg.

BEITH (55° 46′ N., 4° 37′ W.), town, Ayrshire, Scotland. Pop. (1911) 6699.

BEJA (38° 3′ N., 7° 49′ W.), town, Alemtejo, Portugal; cathedral; grain, fruit. Pop. 8895.

BEJA, collective name for numerous Hamitic tribes of nomads who, in ancient times, ranged over entire stretch of country between Nile and Red Sea; all Muhammadans, of polygamous habits; noted for physical beauty.

BEJANT, BAJAN (Fr. *bec jaune*), old name for 'freshman,' still used in St. Andrews and Aberdeen Univ's.

BEJAR (40° 20′ N., 5° 39′ W.), town, Spain. Pop. 9488.

BEJAR, SIERRA DE (40° 17′ N., 5° 35′ W.), mountain range, Spain.

BÉJART, ARMANDE CLAIRE ELIZABETH (1645–1700), Fr. actress; wife of Molière, who wrote many leading parts for her; outlived Molière and afterwards m.an actor named Guérin. Her sister, MADELEINE B. (1618–72), was also a prominent member of Molière's company.

BEK, THOMAS (d. 1293), Lord Treasurer of England under Edward I.; bp. of St. David's (1280).

BEKE, CHARLES TILSTONE (1800–74), Eng. traveller and author; travelled extensively in Abyssinia, Syria, Palestine, and Egypt; pub. *The Nile and its Tributaries* (1847), *The Sources of the Nile* (1860), *The British Captives in Abyssinia* (1865).

BÉKÉS (46° 47′ N., 21° 8′ E.), town, Hungary.

BÉKÉSCABA (46° 41′ N., 21° 7′ E.), market town, Hungary, near White Körös; cereals. Pop. 37,547.

BEKKER, BALTHASAR (1634–98), Dutch theologian; follower of Descartes.

BEKKER, ELIZABETH (1738–1804), Dutch novelist; wrote, in conjunction with Agatha Deken, several novels which achieved popular success.

BEKKER, IMMANUEL (1785–1871), Ger. philologist; pioneer of diplomatic criticism in his editions of Gk. and Lat. classics.

BEL, signifying 'lord' or 'master'; principal Babylonian deity, whose temple was in the sacred city of Nippur; cf. Baal.

BEL AND THE DRAGON, usually considered apocryphal book of Bible, though accepted by Council of Trent (1546) as chapter xiv. of Daniel.

BELA (25° 55′ N., 82° 2′ E.), town, United Provinces, India; agricultural produce. Pop. 7000.

BELA III. (d. 1196), king of Hungary, s. of Geiza II., grandson of Bela II.; adopted by Manuel, emperor of Constantinople, who afterwards, however, had a son. He succ. as king of Hungary, 1173, on death of his bro. Stephen; distinguished by his Byzantine tendencies.

BELA IV. (1206–70), king of Hungary, s. of Andrew II., grandson of Bela III.; succ. in 1235; one of most energetic kings of Hungary; previously headed revolts against oppression of Andrew II., and forced him to sign the Golden Bull, 1222; as king suppressed aristocratic misrule; driven from Hungary by Mongols, 1241, and forced to colonise country on his return.

BELBEIS (30° 24′ N., 31° 35′ E.), town, Egypt. Pop. 11,267.

BELBEIS, see BILBEIS.

BELCHER, SIR EDWARD (1799–1877), Eng. admiral, Arctic explorer, and writer.

BELCHITÉ (41° 20′ N., 0° 50′ W.), town, Spain. Pop. 4000.

BELEM.—(1) (38° 41′ N., 9° 14′ W.) town, Portugal. (2) (7° 8′ N., 61° 35′ W.) town, Venezuela. (3) (23° 33′ S., 57° 8′ W.) town, Paraguay. (4) (25° 9′ S., 51° 34′ W.) town, Brazil. (5) (1° 28′ S., 48° 24′ W.) town, Brazil. Pop. 100,000.

BELEMNITE, an extinct genus of Cephalopoda (*q.v.*).

BELFAST.—(1) (54° 36′ N., 5′ 55° W.) largest town, Ireland; port and great commercial centre of Ulster, on Belfast Lough, 12 miles from Irish Sea; headquarters of linen trade in U.K.; has also great shipbuilding yards, which have produced some of the largest steamships, including *Oceanic* and the ill-fated *Titanic*. Industries include distilling, brewing, iron-founding, flour-milling, making of rope, blacking, sail-cloth, aerated waters; harbour very large and safe; there are four graving docks. There is a R.C. Cathedral; Prot. Cathedral begun in 1899; Univ. (*Queen's Univ.* (1909), founded as Univ. Coll. in 1849), R.C., and two dissenting colleges. Public buildings include magnificent city hall, free library, museum. B. is centre of Prot. anti-Home Rule sentiment in Ireland. Pop. (1911) 385,492. (2) (44° 23′ N., 69° 1′ W.) seaport, Maine, U.S.A. Pop. (1910) 4618.

BELFORT.—(1) (47° 38′ N., 6° 53′ E.) territory, E. France, bordering on Alsace; remnant of department Haut-Rhin after cession to Germany, 1871; cereals, iron, machinery, cloth; area, 235 sq. miles. Pop. (1911) 101,000. S. of Vosges lies the pass, TROUÉE DE B. (2) (47° 38′ N., 6° 53′ E.) town, E. France; important strategical position near Ger. and Swiss frontiers; high citadel; belonged for time to Austria, but acquired by France, 1648; fortified by Vauban, 1688; often besieged in wars of XVII. and XIX. cent's; surrendered to Germans after 3 months' siege, Feb. 1871; 'Lion of B.,' by sculptor Bartholdi, commemorates siege; fortifications since rebuilt; fine church and town hall; industries include cotton spinning, tanning, brewing, machinery; considerable export and import trade. Pop. (1911) 39,371.

BELFRY (from Ger. *bergfriede*, place of refuge), crenellated portion of church; meaning lost later in sense of bell-tower.

BELGÆ, inhabitants of *Gallia Belgica*, the district of Gaul between the Marne, Rhine, Seine, and North Sea; described by Cæsar as most warlike Germanic people.

BELGARD (54° N., 16° E.), town, Prussia; horse, cattle markets. Pop. 8600.

BELGAUM (15° 50′ N., 74° 31′ E.), town (and district), Bombay; military cantonment; fort captured by British, 1818; cotton mills. Pop. 36,900. Area of district, 4649 sq. miles. Pop. 994,000.

BELGIAN CONGO, see CONGO, BELGIAN.

BELGIOJOSO (45° 9′ N., 9° 19′ E.), town, Lombardy, Italy, which gives name to family of B. Cristina, PRINCESS OF B. (1808–71), was prominent patriot and author. Pop. 3830.

BELGIUM (49° 30′ to 51° 30′ N., 2° 30′ to 6° 7′ E.), kingdom, Europe; bounded N. by Netherlands, E. by Netherlands, Prussia, Luxembourg, S. and S.W. by France, N.W. by North Sea; length, *c.* 170 miles; width, *c.* 108 miles; area, 11,373 sq. miles. Surface is flat and low lying except in S.E., where Ardennes rise to 2000 ft.; coast districts in some places below sea-level, protected by sand-dunes and dykes; along Dutch border is marshy tract called Campine, with woodland and good agricultural ground; drained by Scheldt and Maas, with tributaries—of former, Lys, Dender, Durme, Rupel; of latter, Sambre and Ourthe. Climate resembles that of S. of England; rainfall varies from 28 to 40 inches.

History.—Originally B. was inhabited by people of Celtic race, who were expelled by Germans; latter were in turn conquered by Romans, who remained here for several cent's, but were ultimately expelled by Franks; B. formed part of Charlemagne's empire; by Treaty of Verdun in 843 eastern provinces became duchy of Alsace-Lorraine, and western (see FLANDERS) fell to France; subsequently various principalities arose, and history was one of factions and rivalries between different families, towns, and provinces. Most of states were ultimately united under dukes of Burgundy, and in 1477 they passed to Hapsburgs by marriage of Mary, dau. of Charles of Burgundy, to Maximilian, who later became emperor. Their son, Philip, governed Netherlands for time, and was succ. by his sister, Margaret of Austria, who was regent from 1507–30; under her nephew, Charles V., emperor and king of Spain, those adopting Reformed religion were persecuted, and country was formally united to Spain; he abdicated in 1555, whereupon his son, Philip II. of Spain, succeeded; he continued persecution of heretics, and during regency of his half-sister, Margaret of Parma, various outbreaks occurred against Span. rule; Alva, sent to reduce rebels, accomplished his task with such cruelty that result was revolt of all Netherlands (*q.v.*) in 1568; this ended in establishment of northern provinces as kingdom of Holland (*q.v.*), while southern region (Flanders) remained under Span. control. B. was given to Clara Isabella Eugenia in 1598, by her father, Philip II., on her marriage with Archduke Albert of Austria, at whose death in 1621 it returned to Spain. In later XVII. cent. some provinces were lost to France, but by Treaty of Rastadt in 1714 they passed to Austria. Under Archduchess Marie Elizabeth (1725–41), Charles of Lorraine (1741–80), and Archduchess Marie Christina (1781–92) country enjoyed considerable prosperity; though in 1789 there was revolt, which was suppressed. During Fr. Revolutionary wars Austria suffered many defeats, and in 1814 B. was ceded to France. On fall of Napoleon it was, by treaty of London and Congress of Vienna, united with Holland as kingdom of Netherlands under William of Orange. Result was not satisfactory, and in 1830 an insurrection broke out at Brussels and spread over whole of B., resulting in revolution and separation of B. from Holland once again. Ultimately Leopold of Saxe-Coburg-Gotha was chosen as king of B., and assumed crown in 1831. For some time after this Holland refused to recognise B. as separate kingdom, and sent army to occupy Antwerp; but, owing to Fr. intervention, they had to withdraw in 1832. Leopold I. died in 1865, and was succ. by his son, Leopold II., in whose reign Congo Free State was annexed to B. (see CONGO, BELGIAN). He died in 1909, and was succ. by his nephew, the present king, Albert I. The

neutrality of B. is guaranteed by Austria, Russia, Britain, and Prussia by the Treaty of London, 1831.

B. is limited monarchy; Parliament consists of Senate of 110 members and House of Representatives of 166 members (1912).

Resources and Productions.—B. has over 3000 miles of railways; chief railway centres are Malines, Brussels. Scheldt and Maas are navigable; many canals. Forests cover about ⅛ of surface, and about ¾ are cultivated; chief crops, wheat, rye, oats, barley, potatoes, beet, hemp, flax, tobacco, hops, chicory, madder. Horses are bred; honey produced, silkworms reared. Minerals include coal, iron, lead, zinc, copper, manganese, calamine, E. and S.E. districts being rich in ores. B. is pre-eminently a manufacturing country, and has many important industrial towns, while Antwerp is one of greatest shipping and manufacturing centres in N. Europe. The country's commercial prosperity is largely due to Leopold I. and Leopold II., the former having had great struggle with commercial conservatism of country. Metal manufactures are valuable and numerous, including machinery, fire-arms, cannon, wire, gold, silver, tin, brass, and copper goods. Other industries are linens, lace, woollens, carpets, cottons, silk, velvet, hosiery, glass, paper, leather, gloves, sugar, brewing, distilling, fisheries. Chief manufacturing towns besides Antwerp are Liège, Brussels, Ghent. Exports include sugar, glass, cottons, linens, woollens, fruit, flour, oils, coal, coke, grain, chemicals, iron, steel, machinery, diamonds, caoutchouc; imports raw materials for textile trade, hides, rubber, dyes, wine, soap, hops, meat, grain, wheat, coffee, etc.



Population.—In agricultural N. are *Flemings* (Teutonic); in industrial S. are *Walloons* (Latin). Besides Belgians themselves, population consists of Dutch, French, Luxembourgeois, British, and other European nationalities. B. is one of most densely populated countries of the world (652·9 per sq. mile), hence importance of BELGIAN CONGO. Chief religion is Roman Catholicism; there are a few Protestants and Jews. Primary education is free; Brussels and Louvain have free univ's, Ghent and Liège state univ's. French and Flemish are equally spoken. Pop. (1910) 7,423,784.

Boulger, *History of B.* (1900); Williams, *Historians' History of World*, vol. xiii. (1907); Charriant, *La Belgique Moderne* (1910); Clive Holland, *Belgians at Home* (1911).

BELGRADE (44° 47′ N., 20° 26′ E.).—(1) capital of Servia, at confluence of Danube and Sava; centre for Servian export trade; unimportant industries; Royal palace, scene of murder of King Alexander and Queen Draga, 1903; B. belonged at various times to Roman and Byzantine empires, Greeks, Bulgarians; taken by Turks, 1521; finally transferred to Servians, 1867. Pop. (1911) 90,900. (2) department, Servia; area, 782 sq. miles. Pop. (1910) 155,800.

BELGRAVIA, district round B. Sq., London; aristocratic quarter.

BELHAVEN AND STENTON, JOHN HAMILTON, 2ND BARON (1656-1708), Scot. politician and orator.

BELIAL, epithet of Satan in Bible; hence Satan or an evil person.

BELIEF, theological term for assent to a creed. Amount of assurance in b. differs in each individual case, from that of Tennyson, who wrote, 'We have but faith, we cannot know,' to that of the mystic who feels that b. is knowledge, or enjoys conviction as great as that with which he accepts natural phenomena.

BELISARIUS (*c.* 505–65), general of Byzantine empire; put down *Nika* revolt at Constantinople, 532; won famous victories against Vandals and Ostrogoths of Africa and Italy; d. in disgrace.

BELIZE, BALIZE (17° 29′ N., 88° 11′ W.), town, Brit. Honduras. Pop. 10,000.

BELL, hollow metal vessel, provided with clapper, by which it is sounded. B's are composed of a mixture of copper and tin (4 to 1), and are cast in the following manner: First an inner core of brickwork is formed, the outside of which is liberally smeared with grease, and upon this structure is moulded a clay model of the intended b. Upon the outside of this clay b. the inscriptions (if any) are moulded in wax, these in their turn being smeared with grease, and then two separate layers of clay are carefully moulded around the inner structure. The entire mass is then baked to the required degree of hardness, during which time the wax and other grease escapes through holes left for that purpose. After this the clay b. is knocked away, and into the space thus left between the outer *cope* and the original *core* the necessary amount of molten metal is poured, and the b., when cooled, is complete.

Small b's have apparently been in use from the earliest hist. times, as they have been discovered in ancient Egyptian tombs and in the ruins of Nineveh; the bathing-hour was announced in Imperial Rome by the ringing of a b. In the Brit. Isles b's were in use as early as the VI. cent., the most primitive type consisting of quadrangular plates of hammered iron, riveted together. Benedict Biscop brought a b. from Italy for his abbey at Wearmouth, and a b. called the monk Cædmon to prayers at Whitby Abbey. The Saxons became industrious b.-makers, so much so that England became known as the 'ringing island.' The use of b's in religious buildings is believed to have created the need for steeples, or b.-towers, and so led to the development of one of the most distinctive features in ecclesiastical arch. Before the use of large b's in churches the towers were generally squat and insignificant. As regards the various uses of b's it may be noted that the great b. of a cathedral in mediæval times usually belonged to the burghers, and not to the ecclesiastical authorities.

It used to be the custom to ring the *Passing B.* for the dying, but, by later usage, a muffled b. is rung immediately before funerals. The use of the *Curfew B.* is well known; and the *Sanctus B.*, which was formerly hung in a turret outside the church so that all who heard might prostrate themselves when it was rung during the celebration of Mass.

On board ship b's are rung every half-hour to mark the progress of each watch; thus *two b's* show that an hour of the watch is over. Sets of b's tuned to harmonise form *chimes*. Fact of vibrations of b's has been utilised for signalling at sea in fogs, etc., the b's being fixed below deck. The largest b. known is the great b. of Moscow, cast in 1733, but never hung, having been cracked in the making. It weighs 198 tons, is 19 ft. in height, and is now used as a chapel. Another Moscow b., in present use, weighs, 128 tons. There are also enormous b's to be seen in Burma, Pekin, Cologne, Vienna, and Paris. In England the largest b's are St. Paul's, 16 tons; 'Big Ben,' Westminster, 13½ tons; 'Great Peter,' York, 12 tons; 'Great Tom,' Oxford, 8 tons.

North's *English Bells and Bell Lore* (1888); Raven's *Bells of England* (1906).

BELL, BOOK, AND CANDLE, objects which figure in papal excommunication; sentence closes with words, 'shut the book, extinguish the candle, ring the bell.'

BELL (OR INCHCAPE) ROCK (56° 26′ N., 2° 23′ W.), reef surmounted by a lighthouse in German Ocean, off coast of Forfarshire, 11¾ miles S.E. of Arbroath. The name refers to an old tradition made popular in Southey's ballad, *The Inchcape Rock*.

BELL, ACTON, CURRER, AND ELLIS, see **BRONTË**.

BELL, ALEXANDER MELVILLE (1819–1905), Amer. educationist; b. Edinburgh, Scotland; lectured on Elocution at univ's of Edinburgh and London; became lecturer on philology at Kingston (Ontario) and Washington, D.C., successively. His son, **Alexander Graham Bell** (1847–), Amer. physicist and physiologist; b. and ed. Edinburgh, Scotland; inventor of telephone (*q.v.*), photophone, and a phonogra

BELL, ANDREW (1753–1832), Scot. c and educationist; b. St. Andrews; went to Madras as army-chaplain (1787), and two years later was app. head of the Male Orphan Asylum there, where he introduced the system of education by pupil teachers. Upon his return to England the 'Madras system' was adopted by others, and soon became popular; given prebend of Westminster; buried in the Abbey.

Southey, *Life of Dr. Bell*.

BELL, SIR CHARLES (1774–1842), Scot. anatomist and surgeon; bro. of **JOHN B.**, anatomist, and **GEORGE B.**, jurist; practised in London; prof. of Surgery in Edinburgh; gained international fame owing to his discovery of existence of distinct sensory and motor nerves; author of several works on anat. and surgery.

BELL, GEORGE JOSEPH (1770–1843), Scot. jurist; author of *Law of Bankruptcy* (1804), *Commentaries on the Law of Scotland* (1826), and other legal works.

BELL, HENRY (1767–1830), Scot. engineer; built first Brit. steamboat, the *Comet* (1812).

BELL, HENRY GLASSFORD (1803–74), Scot. advocate and author; editor of *Edinburgh Literary Journal* (1828).

BELL, JACOB (1810–59), Eng. pharmacist, founder of the Pharmaceutical Society of Great Britain (incorporated 1843) and of the *Pharmaceutical Journal*.

BELL, JOHN (1796–1869), Amer. politician; foremost opponent of secession of southern states, 1860; gave his name to southern constitutional party.

BELL, JOHN (1691–1780), Scot. physician and traveller; travelled extensively in Russia, Turkey, and Asia with Russ. embassies; physician to Peter the Great on expedition to Caspian Gates.

BELL, JOHN (1763–1820), Scot. surgeon and anatomist; was lecturer on anat. in Surgeon's Hall, Edinburgh (1790), and practised as surgeon.

BELL, JOSEPH (1837–1912), Scot. surgeon; editor (1873–96) *Edinburgh Medical Journal*; surgeon and teacher of surgery, Royal Infirmary, Edinburgh; the original of 'Sherlock Holmes,' whose methods were based on B.'s methods of diagnosis.

BELL, ROBERT (1800–67), Irish author; pub. annotated edition of the *English Poets*, with memoirs (24 vols., 1854–57), completed Southey's *Lives of the British Admirals*, and was associated with various other works.

BELLADONNA, DEADLY NIGHTSHADE, plant, *Atropa belladonna*, of natural order *Solanaceæ*, the leaves and roots of which are used as a drug in med. because of the alkaloids contained, *atropine* being the most important. B. is used externally for relieving pain, *e.g.* in neuralgia or osteo-arthritis, or for preventing the secretion of milk in the breasts of women unable to nurse their children, or, usually as a solution of atropine sulphate, for dilating the pupil in ophthalmic practice. Internally B. is used in asthma, whooping-cough, etc., for relieving the spasm and decreasing the excessive secretion; and also for relieving nocturnal incontinence of urine. In cases of B. poisoning stimulants, *e.g.* strychnine, etc., hot strong coffee, or caffeine in large doses should be given, and artificial respiration should be resorted to, as the poisoning depends on the action of B. in stopping the action of the heart and lungs.

BELLAGGIO (45° 58′ N., 9° 16′ E.), town, Italy. Pop. 3536.

BELLAIRE (40° 2′ N., 80° 47′ W.), town, Ohio, U.S.A. Pop. (1910) 12,946.

BELLAMY, EDWARD (1850–98), Amer. author; ed. for Bar, but became a journalist; famous as the author of *Looking Backward, 2000–1887* (1888), a Socialistic tract in form of a romance.

BELLAMY, GEORGE ANNE (1727–88), Eng. actress; natural dau. of Lord Tyrawley, ambassador at Lisbon; adopted the stage, and was associated with many of Garrick's triumphs at Drury Lane; pub. an *Apology* in 6 vols. (1785) for her irregular life.

BELLAMY, JACOBUS (1757–86), distinguished Dutch poet.

BELLAMY, JOSEPH (1719–90), Amer. theologian; Congregational pastor at Bethlehem, Connecticut; popular preacher with powerful influence on religious thought of time.

BELLARMINE, ROBERT FRANCIS ROMULUS (1542–1621), Ital. cardinal; b. Monte Pulciano; entered Society of Jesus (1560); made cardinal (1599); apb. of Capua (1601), but resigned, 1605; became later abp. of his native town; led life of strict asceticism; famous controversialist and theologian; a prolific writer upon many religious subjects.

BELLARY, Ballari (15° 8′ N., 76° 50′ E.), town, Madras, India; upper fort, on high rock, used as prison; lower fort has barracks; trades in cotton. Pop. 58,247. District produces cotton, cereals. Pop. 947,214.

BELLAY, GUILLAUME DU, Sieur de Langey (1491–1543), Fr. diplomatist; served Francis I. of France; also historian of merit; sympathised with the Reformers; friend of Rabelais. **Bellay, Jean du** (c. 1493–1560), younger bro. of Guillaume, diplomatist; cr. cardinal, 1535; bp. of Ostia; dean of Sacred Coll., 1555; of liberal views; wrote Latin verse.

BELLAY, JOACHIM DU (1522–60), Fr. poet and critic; formed a close friendship with Ronsard, and through him became associated with other poets in founding the Pléiade (see Ronsard). His critical writings are of high quality (e.g. *Défense et Illustration de la Langue française*), and in poetry he ranks next to Ronsard. Hilaire Belloc, *Avril.*

BELL-BIRD, popular name of various kinds of birds which have bell-like note, such as Australian *Manorhina,* New Zealand Honey-Sucker, *Anthornis,* S. Amer. Chatterer—*Chasmorhynchus.*

BELLE ISLE, STRAIT OF (51° 30′ N., 57° W.), channel, separating Labrador from Newfoundland; midway lies island of B. I.

BELLE-ALLIANCE, LA, farm on field of *Waterloo* (q.v.).

BELLEAU, REMI (d. 1577), Fr. poet; friend of Ronsard; one of *Pléiade* (q.v.), famous for his exquisite lyrics; wrote *La Bergerie,* a pastoral romance, in verse and prose.

BELLEFONTAINE (40° 21′ N., 83° 47′ W.), town, Ohio, U.S.A. Pop. (1910) 8238.

BELLEGARDE, HEINRICH JOSEPH JOHANNES, COUNT VON (1756–1845), Austrian diplomatist and general; won great successes in Italy.

BELLE-ÎLE-EN-MER (47° 20′ N., 3° 10′ W.), island, west Fr. coast. Pop. 9703.

BELLE-ISLE, CHARLES LOUIS AUGUSTE FOUQUET, DUC DE (1684–1761), Fr. general and diplomatist; distinguished himself in wars of Span. and Polish successions; made marshal of France, 1741; cr. duke and peer of France, 1748.

BELLENDEN, JOHN (d. 1587), Scot. historian; in service of James V., at whose desire he trans. Boece's *Historia Scotorum,* pub. 1536 as *The History and Chronicles of Scotland,* a fine example of Scot. prose.

BELLENDEN, WILLIAM (b. 1555), Scot. classical scholar; patronised by King James; noted authority on life and writings of Cicero.

BELLEROPHON (classical myth.), s. of Poseidon; famous for slaying monster, Chimæra, which he attacked upon his winged horse, Pegasus (*q.v.*).

BELLES-LETTRES (Fr.), the literature of art as opposed to the literature of science; used generally of literary writing; term first employed in England during first decade of XVIII. cent.

BELLEVILLE.—(1) (44° 11′ N., 77° 27′ W.) port of entry, Ontario, Canada; cheese. Pop. 9117. (2) (38° 27′ N., 89° 57′ W.) city, Illinois, U.S.A.; factories. Pop. (1910) 21,122.

BELLEY (45° 46′ N., 5° 40′ E.), town, Ain, France; ancient cathedral; lithographic stones. Pop. 6500.

BELL-FLOWER, see Campanula.

BELLIGERENCY, state of carrying on war (*q.v.*) under conditions of international law.

BELLINGHAM (48° 45′ N., 122° 42′ W.), city and port, Washington, U.S.A.; railway terminus; sawmills. Pop. (1910) 24,298.

BELLINGHAM, SIR EDWARD (d. 1549), Deputy-Gov. of Ireland who strengthened Eng. rule there.

BELLINI, GIOVANNI (1430–1516), Ital. artist; s. of **Jacopo B.** (c. 1400–70), and younger bro. of **Gentile B.** (c. 1430–1507), all distinguished artists, and founders of the great XV.-cent. Venetian school. The f., who was s. of a pewterer, became pupil of Pisanello and Fabriano, and one of the most successful portraitists of his age. Gentile, who, together with Giovanni, had assisted the elder B. in some of larger works for public buildings, early established wide reputation for his individual work. He spent some considerable time in Constantinople at the invitation of Muhammad II., whose portrait he painted. Examples of his work are to be seen in the Louvre and the National Gallery, London; much of his work done for Venetian buildings was unfortunately destroyed by fire in 1577. Giovanni, however, was the most distinguished member of the family, and after serving as his f.'s assistant at Venice and Padua till nearly thirty years of age, became the greatest Ital. artist of the XV. cent. Much of his work, also, has been destroyed by fire, but several fine examples, including *Loredano, Doge of Venice,* are in the National Gallery, London. His success was such that for many years before his death B. was compelled to decline a great number of commissions; Dürer, who met him in 1506, when he was at the height of his fame, speaks of his generosity and kindliness to all members of his craft; amongst his pupils were Titian and Giorgione. See Painting.

R. Fry, *Giovanni Bellini* (1899); Hay, *Bellini* (masterpieces in colour).

BELLINI, VINCENZO (1801–35), Sicilian composer; b. Catania; studied at Naples; first operas, *Adelson e Savina* (1825) and *Bianca e Fernando* (1826), were both produced at Naples; *Il Pirata* (1827), produced at Milan, was his first distinct success, and was followed by his masterpieces, *I Montecchi e Capuleti* (1830), *La Sonnambula* (1831), *Norma* (1831), and *I Puritani* (1835), now seldom performed, though distinguished by delicacy and melodiousness.

BELLINZONA (46° 11′ N., 9° 1′ E.), town, Ticino, Switzerland, on St. Gotthard railway; formerly fortified; three castles. Pop. c. 5000.

BELLMAN, KARL MIKAEL (1740–95), Swed. poet; famous for songs and odes; pub. *Fredmans Epistlar* (1790), *Fredmans Sanger* (1791), *Bacchi Tempel, Zion's Högtid,* etc.

BELLO, ANDRES (1781–1865), Venezuelan poet and scholar.

BELLOC, HILAIRE (1870–), Eng. (Liberal) politician and author of poems, satirical novels, books of travel, etc.; polished style.

BELLO-HORIZONTE (20° 1′ S., 44° 17′ W.), city, Brazil. Pop. c. 30,000.

BELLONA (classical myth.), goddess of war; war personified.

BELLOT, JOSEPH RENÉ (1826–53), Fr. sailor; joined Franklin search expeditions (1851–52), and discovered 'Bellot' Strait (72° N., 94° 40′ W.), in Brit. N. America.

BELLOWS, see BLOWING MACHINES.

BELLOWS, HENRY WHITNEY (1814–82), Amer. Unitarian divine; popular preacher and writer; minister in New York, 1839–82.

BELLOY, PIERRE LAURENT BUIRETTE DE (1727–75), Fr. dramatist; author of *Zelmire* (1762), *Le Siège de Calais* (1765), *Pierre le Cruel, Gabrielle de Vergy*, and other pieces.

BELL-THE-CAT, see DOUGLAS, ARCHIBALD.

BELLUNO (46° 8′ N., 12° 14′ E.), town and province, N. Italy; cathedral; silk. Pop. 6900.

BELMEZ (38° 16′ N., 5° 17′ W.), town, Spain. Pop. 8978.

BELOIT (42° 30′ N., 89° 3′ W.), city, Wisconsin, U.S.A.; college; factories. Pop. (1910) 15,125.

BELOMANCY, ancient form of divination with arrows (*Ezekiel* 21^{21}).

BELON, PIERRE (1517–64), Fr. naturalist and traveller; pioneer in science of comparative anatomy.

BELPASSO (37° 33′ N., 14° 58′ E.), town, Sicily. Pop. 9460.

BELPER (53° 2′ N., 1° 29′ W.), market town on Derwent, Derbyshire, England; cotton. Pop. (1911) 11,900.

BELSHAM, THOMAS (1750–1829), Eng. divine; became Unitarian, 1789; able thinker and writer; minister in London from 1805.

BELSHAZZAR (VI. cent. B.C.), Babylonian general, identified by modern scholars as s. of King Nabonidos, not of King Nebuchadrezzar, as stated in *Book of Daniel*; made last resistance of Babylonia to Cyrus; Biblo story of B.'s feast is thought apocryphal.

BELT, GREAT (55° 30′ N., 10° 50′ E.), strait, Denmark, between Zealand and Fünen.

BELT, LITTLE (55°12′ N., 9° 53′ E.), strait, Denmark, between Fünen and Jutland.

BELT, THOMAS (1837–78), Eng. geologist, investigated gold-bearing rocks in Australia, Nova Scotia, and Nicaragua; pub. papers on Glacial period.

BELTANE, Celtic festival associated with May-Day, supposed to be derived from the Druidical worship of the sun-god. Mention is made of it as early as the beginning of X. cent. by Cormac, abp. of Cashel. It was the custom to light 'beltane fires,' at which 'beltane cakes' were baked, and certain usages were observed in the distribution of these cakes amongst the company.

BELTRAMI, GIULIO CESARE (1779–1855), Ital patriot, explorer, and author; discovered sources of Mississippi.

BELUCHISTAN, see BALUCHISTAN.

BELUGA, WHITE WHALE (*Delphinapterus leucas*), Arctic Delphinid cetacean. See DOLPHIN FAMILY.

BELVEDERE ('beautiful view'), Ital. building with fine view; the b. formerly part of Vatican, Rome, gave name to *Apollo B.*

BELVIDERE (42° 16′ N., 88° 47′ W.), city, Illinois, U.S.A.; factories. Pop. (1910) 7253.

BELZONI, GIOVANNI BATTISTA (1778–1823), Ital. traveller, engineer, antiquarian; went to Egypt, 1815, to construct a hydraulic machine for Mehemet Ali; later studied Egyptian antiquities, opened second pyramid of Gizeh, and searched for the ruins of the temple of Jupiter Ammon. Many of the antiquities found by him are in the British Museum; pub. *Excavations in Egypt and Nubia* (1821); d. during a journey to Timbuktu.

BEM, JOSEPH (1795–1850), Polish soldier; as leader of the Hungarian insurgents won many victories over Austrians; later entered Turk. service, embraced Islamism, and performed brilliant services in suppressing Arab insurrections.

BEMBERG, HERMAN (1861–), Fr. composer; opera *Elaine* produced at Covent Garden, 1892.

BEMBO, PIETRO (1470–1547), Ital. cardinal; b. Venice; app. historiographer at Venice (1529), and afterwards librarian of St. Mark's; secured a cardinal's hat from Paul III. (1539). He was famous for his learning, and became one of the most elegant writers of the Tuscan school.

BEMBRIDGE BEDS, Oligocene fluvio-marine deposits with Osborne beds below and Hampstead beds above, Isle of Wight and Hampshire.

BEMIS, EDWARD WEBSTER (1860–), Amer. economist; pub. *History of Co-operation in the United States* (1888), *Municipal Monopolies* (1899), etc.

BEN.—(1) In Scot. two-roomed cottage ('a but and a ben') the kitchen, or outer room, is known as the *but*, the inner chamber, opening from the kitchen, the *ben*. (2) Gaelic for mountain, *e.g.* Ben Nevis. (3) Arab. and Hebr. for s. of, *e.g.* Rabbi ben Ezra, Benjamin.

BEN LEDI (56° 16′ N., 4° 21′ W.), mountain (2875 ft.), beside Loch Lubnaig, S.W. Perthshire, Scotland.

BEN LOMOND (56° 11′ N., 4° 37′ W.), mountain (3192 ft.), E. side of Loch Lomond, N.W. Stirlingshire, Scotland.

BEN MACDHUI (57° 4′ N., 3° 43′ W.), mountain (4296 ft.), Cairngorm range, S.W. Aberdeenshire, Scotland.

BEN NEVIS (56° 48′ N., 5° W.), mountain, S.W. Inverness-shire, overlooking Fort William; highest peak (4406 ft.) in Brit. Isles, observatory on top now closed.

BEN VENUE (56° 13′ N., 4° 26′ W.), mountain (2393 ft.), in Trossachs, S.W. Perthshire, Scotland; overlooking Loch Katrine.

BENARES (25° 19′ N., 82° 56′ E.).—(1) city, United Provinces, India, on Ganges; labyrinth of narrow streets; many temples, mosques, shrines, palaces; notable buildings are Mosque of Aurungzeb and Golden Temple and old Observatory. From remotest ages B. has been Hindu Holy City, and centre of Brahminical learning; annually visited by innumerable pilgrims who come to bathe in sacred river; commercial centre; manufactures brocade, gold filigree, silver and brass work. Pop. (1911) 203,804. Pop. of district, 882,084; of division, 5,069,020. (2) native state; cr. 1911; area, 887 sq. miles. Pop. 362,000.

BENAVENTE (42° N., 5° 40′ W.), town, Spain. Pop. 4959.

BENAVENTE (38° 56′ N., 8° 46′ W.), town, Portugal. Pop. 3559.

BENBECULA (57° 26′ N., 7° 18′ W.), island and strait, Hebrides, Scotland.

BENBOW, JOHN (1653–1702), Eng. vice-admiral; s. of a Shrewsbury tanner; rose in Navy to highest rank. William III. had immense faith in 'honest B.,' and sent him in 1701 as commander-in-chief to the West Indies. On Aug. 19, 1702, when cruising off Santa Marta, he gave chase in flagship *Breda* to Fr. squadron under Du Casse. His captains were mutinous; without their aid he maintained a running fight for four days; right leg shattered by a chain-shot, but he continued to direct from a basket on the poop; eventually d. of his wounds.

BENCH, word used to signify legal or political body, as King's B. (or Queen's B. when queen is reigning), Treasury B., etc.; 'board' has received similar transference of meaning.

BENCOOLEN, BENKULEN (3° 50′ S., 102° 25′ E.), district, Sumatra. Pop. *c.* 204,269.

BEND, curvature in a road or river; nautical term, meaning to attach, such as 'bending' a cable on to an anchor; in heraldry, a band crossing the shield diagonally from right to left; when drawn in the opposite direction it is termed a 'bend sinister.' A diminution of this latter mark constitutes a 'baton sinister,' the sign of illegitimacy.

BENDA, GEORG (d. 1795), Ger. composer; famous for musical melodramas *Ariadne auf Naxos, Medea, and Zaïde.*

BENDEMANN, EDUARD (1811–89), Ger. historical painter employed in royal palace at Dresden, etc.

BENDER, BENDERY (46° 47′ N., 29° 32′ E.), town, Bessarabia, Russia; Charles XII. besieged B. after *Pultowa* (q.v.); brick-kilns. Pop. 33,700.

BENDER ABBAS, see BANDER ABBASI.

BENDER-I-GEZ (36° 50′ N., 54° 10′ W.), port, Persia.

BENDIGO (36° 45′ S., 144° 18′ E.), town, Victoria, Australia. Pop. (1910) 42,000.

BENDIN (50° 19′ N., 19° 14′ E.), town, Poland, Russia. Pop. 45,716.

BENDL, KAREL (1838–97), Bohemian composer.

BENEDEK, LUDWIG VON (1804–81), Austrian general; won distinction in suppressing the revolt in Galicia (1846), afterwards performing brilliant service in various battles in Italy and Hungary (1849–59); gov. of Hungary (1860); commander-in-chief at Venice (1861); suffered a crushing defeat by the Prussians at *Sadowa*, 1866.

BENEDETTI, VINCENT, COUNT (1817–1900), Fr. diplomatist; ambassador at Berlin during last years of Second Empire, and was concerned in the declaration of war against Prussia (1870); pub. *Ma Mission en Prusse* (1871), *Essais Diplomatiques* (1895–97), both of which bear upon Bismarck's diplomacy.

BENEDICITE, first word of Lat. version of the *Canticle of the Three Children* (Apocrypha), and of the Lat. Grace used in R.C. institutions, which it is accordingly used to describe.

BENEDICT, name of fourteen popes. Of the first nine popes and one anti-pope (**B. X.**, 1058) little of importance is known, save that one (**B. II.**, 684) was noted for holiness of life, and is reputed a saint, and one for dissoluteness of life (**B. IX.**, 1032). He was driven out of Rome, and resigned the Papacy several times, and at length retired to a monastery. **B. XI.** (1303–4), Nicholas Boccasini, a Dominican; wrote scriptural commentaries; is beatified. **B. XII.** (1334–42), Jacques Fournier, a Cistercian; an able theologian; wished to restore Papacy to Rome, and tried to unite the Gk. and Lat. Churches. **B. XIII.** (1724–30), Pietro Orsini, became a Dominican in spite of family opposition; made cardinal at 23; made pope against his will; ruled with piety and vigour. **B. XIV.** (1740–58), Prospero Lambertini, an able theologian and canonist, left a work on canonisation, which is still authoritative.

The anti-pope Pedro di Luna (*q.v.*) was known as **B. XIII.**

BENEDICT BISCOP (d. 690), Eng. abbot; founded monastery at Jarrow; teacher of Bede.

BENEDICT, SIR JULIUS (1804–85), musical composer; b. Stuttgart; settled in London, 1835: associated with grand opera at Drury Lane and other theatres. His own operas include *The Lily of Killarney*, *The Crusaders*, *The Bride of Venice*, etc.; and he composed besides numerous oratorios, cantatas, and operettas; knighted, 1871.

BENEDICT OF NURSIA, ST. (*c.* 480–*c.* 545), author of monastic Rule of St. B., mild, according to the ideas of the time. See **BENEDICTINES.**

BENEDICTINE, liqueur prepared at Fécamp, France.

BENEDICTINES ('BLACK MONKS'), so called after St. Benedict of Nursia, who established monasteries at Subiaco, Monte Cassino (famous in annals of monasticism), and, before his death, twelve other places. When Monte Cassino was taken by the Lombards (*c.* 590) the monks migrated to Rome. To this Order belonged St. Augustine, who evangelised England; offshoots were planted in Gaul and Germany; and by the VIII. cent. St. Benedict's was the chief monastic rule in Europe. B's, besides Christianising England and the Slavonic and Scandinavian peoples, did much educational work; they had many schools in the Middle Ages, as they have to-day. In the IX. cent. their great monastery of Cluny (France) became of enormous importance in Europe, and lesser houses were subordinated to it. New orders, among them the Cistercians, adopted the B. rule. The Lateran council of 1215 decreed that B. houses should be federated in provincial chapters. During the later Middle Ages the B. houses degenerated, particularly the convents for women, but reform came with the Council of Trent and the Counter Reformation. There are now in England several large abbeys, a priory, and a nunnery. In France an important congregation, called the Maurists, was established in 1621, at St. Maur, and other B. monasteries associated with it. They are specially known for their hist. work, being initiators of hist. research in France. Before their dispersion at the Revolution they had issued several hundred volumes, many of them works of the Fathers, besides Biblical, hist., and monastic collections.

Montalembert, *Monks of the West*; Gasquet, *English Monastic Life*; Echenstein, *Women under Monasticism.*

BENEDICTION (Lat. *benedictio*, blessing), ecclesiastical term for the blessing either of persons or of things. Among Protestants it is generally limited to the b. of the congregation by the minister at the close of the service, but among Catholics it is much more widely used. All sorts of things, water or oil used in worship, and places or buildings for purely secular use, receive b. Catholic b. is sacramental and believed to guard specially against evil spirits.

BENEDICTUS (d. 1194), abbot of Peterborough (1177–94); caused *Gesta Henrici Regis Secundi* to be copied; wrote two works on Becket.

BENEDICTUS, Lat. name for hymn of Zacharias in *Luke* 1[68].

BENEDIX, JULIUS RODERICH (1811–73), Ger. dramatist; author of *Das bemooste Haupt*, *Dr. Wespe*, *Der Vetter*, *Das Lügen*, *Die Dienstboten*, and many other plays.

BENEFICE (Lat. *beneficium*, benefit).—(1) estate granted for life under Roman Empire and in early Middle Ages. (2) estate granted to clergy, settled on themselves and successors. The patron of the b., *i.e.* the donor of the estate or purchaser of the advowson, presents a clerk to the bp., who institutes him to his office; or if the bp. is patron he collates a clerk of his own choice to the b.

BENEFIT OF CLERGY, exemption claimed by priesthood from the jurisdiction of the secular courts in charges of felony. In XV. cent. exemption was extended to laymen also who were 'clerks'; privilege abolished, 1827.

BENEKE, FRIEDRICH EDUARD (1798–1854), Ger. philosopher; his views were strongly opposed to those of Hegel and Kant; he held that empirical psychology forms the basis of all philosophy, and that mental phenomena are to be treated by generic methods. He was prof. of Philosophy at Berlin for 1832; pub. *Erkenntnisslehre* (1820), *Lehrbuch der Psychologie als Naturwissenschaft* (1833).

BENETT, ETHELDRED (1776–1845), one of first Eng. woman geologists; authority and writer on Wiltshire fossils.

BENEVENTO (41° 7′ N., 14° 45′ E.), town (and province), Italy; abp.'s see; part of papal domain, 1053; conquered by French, 1798; restored to Pope, 1815; united with Italy, 1860; magnificent triumphal arch of Trajan, built 114, is a gate of city. Pop. 17,200.

BENEVOLENCE, name given to forced loan levied by Eng. crown without consent of Parliament; against provision of Magna Carta, and declared illegal by Petition of Right, 1629, and Bill of Right, 1689.

BÉNÉZET, ANTOINE (1713–84), American who agitated for Negro Emancipation.

BENFEY, THEODOR (1809–81), Ger. philologist; pub. *Sanskrit-English Dictionary* (1866), *Manual of Sanskrit*, and other works.

BENGAL (23° N., 89° E.), Presidency of 'Fort William in Bengal'; created a Governorship, 1912; includes deltas of Ganges and Brahmaputra and alluvial plains along their courses; area, 70,000 sq. miles; bounded N. by Sikkim, Bhutan, E. by Assam, Upper Burma, W. by Bihar and Orissa, S. by Bay of Bengal; divided into Presidency, Burdwan, Darjeeling, Chittagong, Dacca, and Rajshahi divisions. B. came into hands of E. India Co., 1765; transferred to Brit. crown, 1858; divided into two provinces—(1) B. and (2) Eastern B. and Assam—1905; owing to political

unrest reconstituted, 1912. Thanks to heavy rainfall and moist, warm atmosphere, production is enormous; mainly rice, but also pulse, indigo, opium, sugar-cane, oil-seed, cotton, ginger, pepper, tea, cinchona, spices, tussore silk, timber, etc.; great mineral wealth—coal, iron, saltpetre; manufactures, cottons, jute fabrics, gunny bags, silk, canvas, muslin, pack-thread; good communications by rail and river. Capital is Calcutta; secondary capital, Dacca.

Administration is carried out by gov. assisted by executive council of three members and legislative council of 50 members.

Inhabitants are of many races; majority of Hindu religion, Muhammadanism next in numerical importance. Pop. c. 42,000,000.

BENGAL, BAY OF (16° N., 88° E.), triangular portion, Indian Ocean, between India and Burma.

BENGALI is the Eng. name of *Banga-Bhāsā*, one of the four principal languages of India, spoken by about 45,000,000 people, mainly in the extensive district of the Lower Ganges. One of the earliest writers in this language was the poet Candī Dās (end of XIV. cent.), who established a school of poets devoted to the honour of Krishna.

BENGAZI (32° 6′ N., 20° 20′ E.), seaport, N. Africa; good roadstead but harbour shallow; starting-point for caravans trading with interior; exports oxen, sheep, and sponges. Pop. 35,000.

BENGEL, JOHANN ALBRECHT (1687–1752), Ger. Lutheran theologian; studied at Tübingen; preceptor of a theological coll. at Denkendorf, 1713–41; pub. edition of New Testament, the outcome of his critical studies on the text, 1734, and his *Gnomon Novi Testamenti* (still very valuable), 1742.

BENGUELLA (12° 42′ S., 13° 8′ E.), seaport, Angola, W. Africa; exposed roadstead about a mile from shore; exports amber, rubber, ivory; connected by rail with Lobito Bay, whence railway to interior is being built.

BENI (11° S., 66° 10′ W.).—(1) department, N.E. Bolivia, S. America; fertile country; cocoa, hides; area, 102,100 sq. miles; pop. (1910) 37,300. (2) river, Bolivia; rises La Paz; joins the Mamoré.

BENI CARLO (40° 26′ N., 0° 25′ E.), town, Spain; wines. Pop. 7251.

BENICIA (38° 7′ N., 122° 4′ W.), town, California; arsenal of U.S.A. Pop. (1910) 2360.

BENI-HASSAN, Speos Artemidos (27° 53′ N., 30° 56′ E.), village, Upper Egypt; numerous tombs with paintings of very early period.

BENI-ISRAEL (sons of Israel), Jewish people settled for cent's on Malabar coast.

BENIN (6° 30′ N., 5° 40′ E.), part of Southern Nigeria; lies to W. of Niger R.; produces rice and other economic plants; exports great quantities of palm oil. In E. is capital, Benin (6° 20′ N., 5° 30′ E.), where is Brit. residency. Chief river, Benin (5° 50′ N., 5° 20′ E.), flows to Atlantic. B. first discovered by Portuguese, XV. cent.; French and Dutch afterwards made settlements here; for time centre of slave trade; under Brit. protection since 1897.

BENI-SUEF (29° 9′ N., 31° 13′ E.), town, Egypt. Pop. 23,357.

BENITOITE ($BaTiSi_3O_9$), colourless or bluish gem stone, hexagonal crystals, discovered in California.

BENJAMIN, in Old Testament the youngest s. of Jacob; specially beloved by his f.; his mother Rachel d. in giving him birth; traditional founder of tribe of B., within territories of which lay Jerusalem and other famous towns; among its members were King Saul, Jeremiah, and St. Paul.

BENJAMIN, JUDAH PHILIP (1811–84), Anglo-Amer. lawyer and politician; compiled digest of cases of New Orleans and Louisiana; Confederate Sec. of State (1862–65); Q.C. (1872).

BENJAMIN OF TUDELA (fl. XII. cent.), Jewish rabbi and traveller in East; his account of his journeys is valuable.

BENJAMIN, PARK (1849–), Amer. lawyer and author; joint editor of *The Scientific American* (1872–8); author of *History of Electricity*, etc.

BENLOWES, EDWARD (d. 1676), Eng. minor Caroline poet.

BENNETT, CHARLES EDWIN (1858–), Amer. classical scholar; Latin prof., Cornell Univ.

BENNETT, ENOCH ARNOLD (1867–), Eng. novelist and playwright; stories realistic studies of social life in Potteries; plays include *What the Public Wants* (1909); *Milestones* (with Edward Knoblauch, 1912).

BENNETT, JAMES GORDON (1794–1872), Scoto-Amer. journalist; founder and editor of *New York Herald* (1835). His son, **James Gordon Bennett** (1841–), succ. his f. in the control of his newspaper; further known for association with foundation of the Commercial Cable Co., Stanley's search for Livingstone, the Jeannette polar expedition, and as the donor of cups for automobile and balloon races.

BENNETT, JOHN HUGHES (1812–75), Eng. physician and physiologist; prof. of Physiology at Edinburgh (1843); made valuable original observations in physiology and med.; author of many medical works.

BENNETT, SIR WILLIAM STERNDALE (1816–75), Eng. composer; prof. of Music at Cambridge (1856); principal of Royal Academy of Music (1866); composed two cantatas, *The May Queen* and *The Woman of Samaria*, besides numerous symphonies, overtures, concertos, etc.

BENNIGSEN, LEVIN AUGUST, COUNT VON (1745–1826), distinguished Russ. general; led most successful charges, culminating at Leipzig, against Napoleon.

BENNIGSEN, RUDOLF VON (1824–1902), Ger. politician; founded National Association to secure constitutional freedom of Hanover, and afterwards National Liberal Association in Prussia.

BENNINGTON (42° 40′ N., 73° 18′ W.), town, Vermont, U.S.A.; Americans defeated British near here, 1777. Pop. (1910) 8698.

BENNO (1010–1106), bp. of Meissen and Church reformer; canonised 1523.

BENOÎT DE SAINTE-MAURE, XII.-cent. Fr. *trouvère*, who wrote a verse chronicle of the Dukes of Normandy, from Rollo onwards, in some 40,000 lines.

BENOIT, PETER LEONARD LEOPOLD (1834–1901), Flemish composer; attempted unsuccessfully to found a distinctly Flemish school of music; composed operas, oratorios, cantatas, etc.; his oratorio *Lucifer* was produced in London (1888).

BENSARADE, ISAAC DE (1613–91), Fr. poet; author of *Cléopâtre* (1635), a tragedy, *Métamorphoses d'Ovide* (1676), rendered in form of rondeaux. B. enjoyed the patronage of Richelieu and Anne of Austria; chief employment writing words for court ballets.

BENSON, EDWARD WHITE (1829–96), abp. of Canterbury; b. Birmingham; s. of E. W. Benson, manufacturing chemist; ed. King Edward VI.'s School, Birmingham, and Trinity Coll., Cambridge; first headmaster of Wellington Coll.; prebendary of Lincoln (1868); bp. of Truro (1877); abp. of Canterbury (1883); B., besides being a good scholar, was a man of very devout life, and in his Primacy showed great activity. His eldest s., Arthur Christopher Benson (1862–), is distinguished as an essayist, critic, and poet; his 3rd s., Edward Frederick Benson (1867–), is a successful author of satirical novels of fashionable life; his 4th s., Robert Hugh Benson (1871–), a R.C. priest, is also an author of note, best known for novels of a strongly mystical type.

A. C. Benson, *Life of Archbishop Benson* (1899).

BENSON, FRANCIS ROBERT (1858–), Eng. actor; gained distinction at Oxford as athlete and amateur actor; took over Walter Bentley's Shakespeare repertory company, 1883, and has since toured under his own name; has managed the Stratford-on-Avon festivals since 1888; has done more to popularise Shakespeare and the legitimate drama than any Eng. actor of modern times.

BENSON, GEORGE (1699–1762), Eng. dissenting minister; held Socinian views.

BENT GRASS (*Agrostis*), genus of grass, with numerous species, distinguished by open panicle and small spikelets with only one flower each.

BENT, JAMES THEODORE (1852–97), Eng. author and traveller; with his wife made extensive journeys in Italy, South Africa, Asia Minor.

BENTHAM, GEORGE (1800–84), Eng. botanist, nephew of Jeremy B.; ed. in France; called to Bar; author of important work on logic, numerous botanical papers, and, in collaboration with Sir Joseph Hooker, of *Genera Plantarum*, a masterpiece of systematic bot.

BENTHAM, JEREMY (1748–1832), Eng. writer on law and political economy; son of attorney; b. Houndsditch; called to Bar but refused to plead; gave himself up to philosophical writing, publishing *Fragment on Government, or A Comment on the Commentaries* (1776), against Blackstone's conception of perfection of Eng. constitution; *Principles of Morals and Legislation* came out 1789, *Defence of Usury*, 1816; established *Westminster Review*, 1823. B. belonged to rationalist-utilitarian school of philosophy (himself inventing phrase *utilitarian*), and adopted as motto, 'the greatest happiness of the greatest number.' His *Principles of Penal Law* foreshadowed modern principles of punishment; see Sir Leslie Stephen's *Jeremy Bentham*.

BENTHAMIA, in botany, species of Cornaceæ; the *B. fragifera* of Nepaul bears stone fruit.

BENTHOS, marine plants and animals which live on the sea-floor, attached there, or capable of only limited wanderings.

BENTINCK, family name of earls and dukes of Portland (*q.v.*).

BENTINCK, WILLIAM CAVENDISH (1774–1839), 2nd s. of 3rd Duke of Portland, introduced reforms into Indian administration, and became first Governor-General of India (1833–35).

BENTINCK, WILLIAM GEORGE FREDERICK CAVENDISH (1802–48), commonly called LORD GEORGE BENTINCK, younger s. of 4th Duke of Portland; prominent Whig politician; promoted enfranchisement of Irish and Jews, but opposed Free Trade, and was formidable opponent of Peel; cut great figure in sporting world.

BENTIVOGLIO, GIOVANNI (1443–1508), tyrant of Bologna deposed by French.

BENTIVOGLIO, GUIDO (1579–1644), Ital. cardinal, diplomatist, and author.

BENTLEY, RICHARD (1662–1742), Eng. scholar; b. Oulton (Yorks); ed. Wakefield and Cambridge; master of Spalding Grammar School (1682), but soon resigned to become tutor to the son of Dr. Stillingfleet, Dean of St. Paul's. He remained with this family for six years, and upon the dean being app. bp. of Worcester, accompanied his pupil to Oxford, where he became noted for his learning, and delivered the Boyle lectures on the *Evidences of Natural and Revealed Religion*; having taken his degree at both univ's, he took holy orders, with a view to ecclesiastical preferment. His letter to Dr. Mill, editor of the Gk. chronicler John Malalas, in 1691, and his famous *Dissertation on the Epistles of Phalaris*, established his reputation as the greatest scholar of his age. In 1700 he was app. Master of Trinity Coll., Cambridge; in 1717 Regius Prof. of Divinity. At Cambridge he was constantly engaged in litigation or dispute either with the authorities or some individual. His various scholastic controversies gave rise to Swift's *Battle of the Books*, and, having incurred the enmity of Pope, he was satirised in *The Dunciad*. Besides writings already referred to, B. pub. various annotated editions of the classics, including Terence and Horace, and of Milton's *Paradise Lost*.

Monk, *Life* (1833); Sir R. Jebb, *Life* (1882); vol. ix. of *Cambridge History of Lit.*

BENTLEY, RICHARD (1794–1871), Eng. publisher; originally a printer; began business as publisher in conjunction with Henry Colburn, 1829; *B.'s Miscellany*, which first appeared 1837, was edit. for three years by Charles Dickens.

BENTON HARBOR (42° 5′ N., 86° 30′ W.), city, Michigan, U.S.A.; mineral springs. Pop. 9185.

BENTON, THOMAS HART (1782–1858), Amer. statesman; senator for Missouri, 1821–51, and leader of Democratic party. B's great interest was expansion of U.S.A. westward, advocating annexation of Oregon and Texas; disapproved of slavery, and lost his seat in Senate for refusing to forward grievances of Southerners.

BENUE (7° 50′ N., 6° 40′ E.), river, W. Africa; principal tributary of Niger.

BENYOWSKY, MAURICE AUGUSTUS, COUNT DE (1741–86), Hungarian who occupied Madagascar for France.

BENZALDEHYDE, OIL OF BITTER ALMONDS (C_6H_5CHO), most simple aromatic aldehyde, colourless liquid smelling of bitter almonds, B.P. 179·1°. Theoretically and practically important because of derivatives used in production of artificial indigo.

BENZENE, BENZOL (C_6H_6), colourless, mobile, highly refracting, volatile liquid having inflammable vapour; M.P. 5·4°, B.P. 80·4°; Sp. G. 0·899 at 0°; solvent for fats, resins, etc.; important in dyeing industry for preparation of its derivatives; of great theoretical interest, its molecule being formed by a ring of six carbon atoms, to each of which one hydrogen atom is attached; the derivatives are termed aromatic or benzenoid compounds. See CHEMISTRY.

BENZIDINE, *Di - para - diamino - diphenyl* ($NH_2.C_6H_4.C_6H_4.NH_2$), di-acid base crystallising in scales; M.P. 122°, B.P. 360°; of technical importance in preparation of cotton dyes.

BENZOIC ACID (C_6H_5COOH), aromatic acid, volatile, crystalline solid; M.P. 121·4°; B.P. 249·2°; prepared from coal-tar toluene. *B. a.* and its compounds are used medicinally as antiseptics, and as stimulating expectorant in bronchitis and phthisis.

yellowish

from *Styrax benzoin*, used in preparation of antiseptic ointments and the antiseptic tincture (friar's balsam), and as incense.

BENZOLINE = Benzene (*q.v.*).

BENZOPHENONE (*Diphenyl Ketone*) ($C_6H_5.CO.C_6H_5$), a dimorphous aromatic ketone; B.P. 306°. Its derivative, *Tetramethyl - diamido - benzophenone*, $CO[C_6H_4N.(CH_3)_2]_2$, is important technically in dyestuff manufacture.

BENZYL ALCOHOL, PHENYL CARBINOL ($C_6H_5CH_2OH$), colourless aromatic liquid; B.P. 206°.

BEÖTHY, ÖDÖN (1796–1854), Hungarian soldier and distinguished Liberal politician.

BEOWULF, earliest Eng. epic, in which are incorporated many Teutonic traditional stories; considered the parent of modern literatures; it probably first took shape in V. or early VI. cent., but date and, still more, place of action are matters of discussion; it is in West Saxon dialect, but possibly translation from Northumbrian; theory that Boulby, Yorks, was 'B's by' has been heatedly advocated and rejected; the single MS. containing the story is in the Cottonian Collection (Vitellius, A 15), Brit. Museum, and was probably copied out *c.* 1000 A.D. The following is a brief outline of the epic. Beowulf, nephew of the Swedish king, Hygelac, hears of the ravages committed by Grendel, a monster in human form, at the court of King Hrothgar. He therefore sets sail for 'Seeland' (wherever that may have been) with fourteen companions, is kindly received by Hrothgar, and, lying in wait by night for the monster, succeeds, after a fierce struggle, in tearing off its arm. By means of bloodstains Grendel is traced to his lair, which lies beneath a distant mere. The night following the king's hall is visited by Grendel's mother, who carries off a noble; B. follows, plunges into the mere, fights with, and kills, the female monster, cuts off the head of the dead Grendel, and returns in triumph.

Handsomely rewarded by Hrothgar, B. returns to his own land, succeeding eventually to his uncle's kingdom, and reigned happily for some fifty years. At the end of that time a fiery dragon begins to lay waste his country; B., now an old man, goes forth against the monster, which he succeeds in slaying, but also receives his own death-wound. See EPIC, THE.

Eng. prose, trans. by J. R. C. Hall, 1911; verse by Morris.

BÉRANGER, PIERRE JEAN DE (1780–1857), Fr. song-writer; b. Paris. When on the brink of starvation (1802) he besought the patronage of Lucien Bonaparte, who made him a small allowance; later he procured a clerkship in the univ. Between 1808–12 were written and handed about, *Les Gueux*, *Le Bœuf Gras*, and the *Petit Homme Gris*; while his *Roi d'Yvetot* (1813) made his name familiar throughout France. In 1815 his songs were collected into a vol., and in 1821 a second vol. appeared, for which B. was imprisoned for three months. In 1825 *Chansons Nouvelles* appeared, and in 1828 *Chansons Inédites*, for the publication of the latter of which, containing his democratic and anti-papal views, he was fined 10,000 francs and imprisoned for nine months. *Dernières Chansons*, his last vol., was pub. in 1857. His songs were witty, full of high feeling and pathos, and by them B. acquired a great political influence and an unrivalled hold on the hearts of the Fr. people.

BERAR, or HYDERABAD ASSIGNED DISTRICTS (21° N., 77° E.), one of Central Provinces of India, E. of Bombay; the dominion of the Nizam; formed part of dominions of Mahratta Rajah of Nagpur; assigned by Nizam to Brit. government, by treaties of 1853 and 1861; since 1903 under administration of commissioner-general for Central Provinces; fertile plateau; grain, cotton; area, 17,711 sq. miles. Pop. 2,752,418.

BÉRARD, JOSEPH FRÉDÉRIC (1789–1828), Fr. physician and philosopher; pub. *Doctrine médicale de l'école de Montpellier* (1819) and *Doctrines des rapports du physique et du moral* (1823).

BERAT (40° 44′ N., 19° 59′ E.), fortified town, vilayet Jannina, Albania; wine. Pop. 10,000.

BERAUN (49° 47′ N., 14° 3′ E.), manufacturing town, Bohemia, Austria. Pop. 9693.

BERBER (17° 56′ N., 34° E.), town (and province), Anglo-Egyptian Sudan; on E. bank Nile; commercial centre. Pop. 10,000.

BERBERA (10° 30′ N., 45° E.), chief seaport town, Somaliland, N.E. Africa; annual fair of inland tribes, Oct. till April, attended by 20,000 persons. Pop. *c.* 3500.

BERBERINE ($C_{20}H_{17}NO_4$), yellow, crystalline, solid alkaloid occurring in *Berberis* and other plants.

BERBICE (6° 10′ N., 57° 30′ W.), district, Brit. Guiana, S. America. Pop. 40,000.

BERCHEM, NICOLAAS, BERGHEM (1620–83), Dutch artist; b. Haarlem; much esteemed for his landscapes, some of which have been engraved by John Visscher; works in Amsterdam Museum, and at St. Petersburg.

BERCHTA, BERTA, figure of S. Ger. mythology; mentioned XIV. cent.; name still used to frighten children who misbehave.

BERCHTESGADEN (47° 38′ N., 13° E.), town, Bavaria; salt; wood-carving; summer resort.

BERCK (50° 24′ N., 1° 34′ E.), watering-place, Pas-de-Calais, France; fisheries. Pop. *c.* 8000.

BERDICHEV (49° 53′ N., 28° 35′ E.), town, Kiev, Russia; silk, iron. Pop. *c.* 54,000.

BERDYANSK (46° 40′ N., 36° 52′ E.), port, Sea of Azof, Russia; grain. Pop. *c.* 27,000.

BEREA (37° 35′ N., 84° 20′ W.), town, Kentucky, U.S.A.; college; also suburb of Durban. Pop. 1520.

BEREANS, XVIII.-cent. Scot. sect which resisted everything save Biblical authority.

BERENGAR I., king of Italy (887–924); crowned emperor, 915; murdered after life of warfare; his grandson, **B. II.** (d. 966), was crowned 950; died prisoner of Emperor Otto I.

BERENGARIA OF NAVARRE, m., 1191, Richard I. of England.

BERENGARIUS, see BÉRENGER DE TOURS.

BÉRENGER DE TOURS, BERENGARIUS (998–1088), Fr. theologian who denied transubstantiation and founded sect condemned by several councils.

BERENICE (23° 53′ N., 35° 34′ E.), ancient seaport, W. of Red Sea, Egypt.

BERENICE, name of several Egyptian and Jewish princesses, one of whom was mother of Ptolemy Philadelphus, another his dau.; another was dau. of Ptolemy Auletes and elder sister of the notorious Cleopatra; still another B. was dau. of Salome, wife of Aristobulus and sister of King Herod I.

BERESFORD, LORD CHARLES WILLIAM DE LA POER (1846–), Eng. admiral and politician; 2nd s. of 4th Marquess of Waterford; b. Ireland; famous for gallantry at bombardment of Alexandria (1882); commanded Channel Squadron (1903–5); admiral (1906); Commander of Mediterranean Fleet (1905–7); Commander of Channel Fleet (1907–9); M.P. (Unionist) for Portsmouth since 1910; keen naval critic and leader of the 'big navy' party.

BERESFORD, WILLIAM CARR BERESFORD, VISCOUNT (1768–1854), Eng. general; illegitimate s. of George de la Poer Beresford, 1st Marquess of Waterford; distinguished in Peninsular War; cr. Baron of Albuera and Dungarvan, 1814; viscount, 1823; general, 1825.

BEREZINA (52° 50′ N., 29° 30′ E.), river, Minsk, Russia, tributary of Dnieper; noted for disastrous passage of Napoleon's army in retreat from Moscow, 1812.

BEREZNA.—(1) (51° 33′ N., 31° 44′ E.) town, Tchernigov, Russia. Pop. 9921. (2) (51° N., 26° 43′ E.) town, Polhynia, Russia.

BEREZOV (63° 42′ N., 65° 38′ E.), town, Tobolsk, Russia; furs.

BEREZOVSK (56° 53′ N., 60° 44′ E.), small town, Perm, Russia; centre of goldfields.

BERG (48° 55′ N., 8° 4′ E.), former duchy of Germany; right bank of Rhine; ceded to Prussia, 1815.

BERGA (42° 4′ N., 1° 47′ E.), town, Spain. Pop. 5465.

BERGAMA (39° 7′ N., 27° 14′ E.), town, Anatolia, Asiatic Turkey. Pop. 20,000.

BERGAMO (45° 42′ N., 9° 41′ E.), city and province, Italy; formerly belonged to Venice; cathedral; silks. Pop. (1911) *c.* 56,000; province, *c.* 510,000.

BERGAMOT, OIL OF, a limpid, greenish-yellow fragrant fluid, used in perfumery and microscopical preparations.

BERGEDORF (53° 28′ N., 10° 12′ E.), town, Hamburg territory, Germany; market gardens. Pop. 10,000.

BERGEN (60° 26′ N., 5° 22′ E.), seaport and fortified town at head of Byfjord, Norway; founded 1070; formerly principal Nor. port; second largest town; cathedral, museum, and churches; tourist centre; birthplace of Ole Bull and Edvard Grieg; fish and fish products. Pop. (1911) *c.* 77,000.

BERGEN-OP-ZOOM (51° 30′ N., 4° 18′ E.), town, N. Brabant, Holland; pottery; former fortress; attacked by British, 1814. Pop. 14,230.

BERGERAC (44° 52′ N., 0° 29′ E.), town, Dordogne, France; ancient Huguenot stronghold; wines. Pop. *c.* 16,000.

BERGERAC, see CYRANO.

BERGHAUS, HEINRICH (1797–1884), Ger. geographer; compiler of the *Physikalischer Atlas* (1838–48) and numerous other cartographical works.

BERGK, THEODOR (1812–81), Ger. philologist; pub. *Poeta Lyrici Græci* (1843), *Griechische Litteraturgeschichte* (1872–87), and editions of Anacreon and other classical authors.

BERGMAN, TORBERN OLOF (1735–84), Swed. naturalist and chemist.

BERGSCHRUND, cleft between upper part of glacier or snowfield and steep mountain-side.

BERGSON, HENRI (1859–), Fr. philosopher, prof. at the Collège de France, and exponent of the *Philosophy of Change*, according to which previous systems of thought attach too much importance to knowledge. Life is first to be explained, and gives a key to the nature of knowledge. Knowledge has a value in serving life. The intellect and instinct are two modes of the mind's activity, developed along different lines of evolution, to serve the needs of the organism. But in 'intuition' we have a power of apprehending reality directly, a sympathetic attitude by which we seem to enter into it. B. is first to recognise intuition as a philosophical instrument.

Henri Bergson, by H. Wildon Carr (1912).

BERGUES (50° 59′ N., 2° 25′ E.), town, Nord, France. Pop. *c.* 5000.

BERHAMPUR (24° 5′ N., 88° 10′ E.), town, Murshidabad dist., Bengal, India. Pop. *c.* 25,000.

BERHAMPUR (19° 18′ N., 84° 48′ E.), town, Madras presidency, Brit. India; silk weaving. Pop. *c.* 25,000.

BERI-BERI, disease occurring in Japan, Korea, southern China, Malay Peninsula, Burma, Ceylon, East Africa, and the West Indies, and carried by ships to different parts of the world; not contagious, but breaks out from time to time in the same localities, and is supposed to be due to a fungus infecting rice. There are two types of the disease, which is sometimes of prolonged duration, one *paralytic*, the symptoms beginning in legs, which are tender on pressure, and extending to other parts of body, and the other *œdematous*, in which tissues, especially of legs, are swollen and infiltrated with fluid, and there is difficulty in breathing; treatment consists in isolation, general hygiene, and treating the symptoms, heart weakness, etc., as they appear.

BERING, VITUS, Behring (1680–1741), Dan. discoverer after whom are named **Bering Sea** (55° N., 180° E.), part of Pacific Ocean between Aleutian Islands and B. Strait; **Bering Strait** (65° N., 169° W.), channel connecting Arctic and Pacific Oceans, and separating Alaska and Siberia; and **Bering Island** (55° 17′ N., 165° 26′ E.), island, S.W. part, B. Sea, where B. died.—**Bering Sea Arbitration** ended fishery dispute between Great Britain and U.S.A.; Brit. ships on seal-catching expeditions captured (1886–87) by American revenue officials on ground (1) of trespassing on Alaska territory; (2) America's sole right of seal-fishing in Bering Sea as purchaser of this territory from Russia which had previously had this right; and (3) necessity of protecting seals; arbitrators app., 1892; award given in favour of Great Britain, 1893.

BERJA (36° 48′ N., 2° 56′ W.), town, Almeria, Spain; lead-mines. Pop. 13,224.

BERKA (50° 55′ N., 11° 20′ E.), watering-place, Saxe-Weimar, Germany; sulphur baths.

BERKELEY.—(1) (37° 28′ N., 122° W.) city, California, U.S.A.; seat of California univ. Pop. 40,434. (2) (51° 42′ N., 2° 28′ W.) market town, B. Vale, near Severn, Gloucestershire, England; castle built, 1100–54; cheese.

BERKELEY FAMILY.—One Roger, who held lands in England in 1086, then held Berkeley, County Gloucester, at farm from the Crown, and afterwards took his name from the place. The B's were summoned to Parliament as barons by writ from 1295. William, Lord de B. was cr. viscount, 1481; Earl of Nottingham, 1483; Marquis of B., Jan. 1488–89—dignities which ceased at his death without issue. George, Lord de B. was cr. Viscount Dursley and Earl of B., 1679—dignities which became dormant on death of the 5th earl, 1810.

BERKELEY, GEORGE (1684–1753), Irish philosopher; b. Kilkenny; ed. Trinity College, Dublin; resolving to establish centre of Christian civilisation in Bermuda, he went to Rhode Island (1728), but, as ed grant was not paid, he returned (1731); bp. of , 1734, he worked zealously for people's welfare; d bishopric, 1752, and died at Oxford. B. wrote on economics, *Querist*, anticipating Adam Smith, on therapeutics, *Siris*, with a metaphysical turn, but is chiefly noted for *Essay towards a New Theory of Vision*, *a Treatise on the Principles of Human Knowledge*, in which he advanced the theory that the actuality of the seen world depends on its being perceived, and that this involves the assumption of creative Eternal Reason. See Idealism.

BERKELEY, MILES JOSEPH (1803–89), Eng. botanist; founder of Brit. mycology (scientific Fungus study).

BERKELEY, SIR WILLIAM (*c.* 1608–77), Brit. gov. of Virginia.

BERKHAMPSTEAD, Great Berkhamstead (51° 46′ N., 0° 34′ W.), market town, Hertfordshire, England. Pop. (1911) 7302.

BERKSHIRE (51° 28′ N., 1° 15′ W.), county, England, lying S. of Thames, which separates it from Buckinghamshire and Oxfordshire; borders also on Hampshire, Surrey, Wiltshire; eastern part contains Bagshot Heath and Windsor Park, and is well wooded with oak, beech, ash, elder, hazel; crossed by rivers Ock, Kennet, Loddon, and by two canals. Vale of Ock is called Vale of White Horse, from gigantic figure of horse made (according to tradition, to commemorate battle of Ashdown, 871) by removing turf from chalk of downs; in this district are the famous Wayland's Smithy, and Cumnor (*q.v.*). County is excellent agricultural district, dairy-farming and grazing successfully carried on; produces Gloucester cheese. Kennet is famous for trout and eels; county town, Reading, famous for biscuits. There are three parliamentary divisions, each returning one member, and seven municipal boroughs, of which Windsor and Reading each return one member; area, 721 sq. miles. Pop. (1911) 303,428. See Victoria County History—*Berkshire*.

BERKSHIRE HILLS, hill district, watered by four rivers, in W. Massachusetts, U.S.A.; famous summer resort.

BERKSHIRE, THOMAS HOWARD, 1ST EARL OF (1587–1669), Eng. soldier; fought on king's side in Civil War.

BĔRLAD (46° 14′ N., 27° 43′ E.), town, Rumania. Pop. 24,484.

BERLICHINGEN, GOETZ (or **GOTTFRIED**) **VON** (1480–1562), Ger. knight called *Iron-Hand*, cousin of Conrad von Berlichingen; lost hand in war and wore iron hand, still preserved; regarded as last knight of chivalry.

BERLIN (52° 32′ N., 13° 25′ E.), city, capital of Prussia and of Ger. Empire, on Spree. B. has been residence of Hohenzollern family since middle of XV. cent.; sacked several times during Thirty Years War; suffered in Seven Years War and Fr. Revolutionary wars. Its importance dates from time of Great Elector, Frederick William, by whom modern town was laid out. His s., Frederick I., caused construction of Friedrichstadt, 1688; enormous building activity since 1870, due partly to stimulus of successful war, partly to ideas gleaned in Paris during the occupation.

Height is *c.* 100 ft. above sea; site of B. is level; well laid out, with many fine streets; third town in size, and perhaps cleanest in Europe. The river Spree divides city into two parts; on its right bank are oldest parts, Old B., with the *Rathaus*, and, finally united to it XV. cent., Old Kölln, with royal palace, on an island. Seventy-five per cent. of buildings are modern, a large proportion being very good modern Renaissance work showing Fr. influence; principal old buildings are Kloster Kirch and three other churches. Principal street is famous Unter den Linden, over a mile long, formed by three avenues of lime trees; it contains numerous public buildings, government offices, statues, etc., and claims to be finest street in Europe; it is entered at W. end by Brandenburger Thor, celebrated gateway, copied from Propylæa, Athens, leading to the chief park, the Tier-Garten; at E. end are the Opern Platz, filled with monuments, and Lust-Garten, near which is royal palace, an enormous

rectangular building, and well-known example of Renaissance architecture. The *Schlossbrücke* is adorned with eight groups of marble statuary. Opposite the palace is the new Renaissance cathedral. Other important streets run parallel, and at right angles, to Unter den Linden, the ground having been systematically laid out; Leipziger Strasse is busy thoroughfare through which traffic flows over Leipziger Platz, Potsdamer Strasse, and Potsdamer Platz, to the west; Friedrichstrasse, with its famous shops, stretching for over 3 miles, starts from Belle-Alliance-platz, and crosses Unter den Linden and Leipziger Strasse on its way N. to its continuation, the Chaussee-strasse. Wilhelmstrasse, street of palaces, starts like Friedrichstrasse at Belle-Alliance-platz, and runs to the Linden; from same centre Königstrasse radiates to Leipziger Platz; in it are War Office, General Post Office, etc., and most fashionable shops. There are many modern churches, including new cathedral. Univ., founded 1810, N. of Opern Platz, is foremost in Germany; near it is the Royal Library, and on other side of Opern Platz is the Opera-House. The National Gallery and several museums are all situated near the Lust-Garten; theatres are numerous. There are many bridges over river, and everywhere are statues and monuments. W. end is favourite residential quarter; in E. are many works and factories, in N. foundries, and in N.W. hospitals, law courts, etc.

B.'s geographical situation in centre of N. Prussia and of waterways covering district between Elbe and Oder, and at crossing of lines of communication between Brandenburg, Silesia, Saxony, and Hanover, Mecklenburg, Pomerania, is commercially advantageous; great manufacturing city; produces woollens, cottons, porcelains, earthenware, machinery, metal goods, beer, paper, gold, silver, and bronze work, hardware, etc. Pop. (1910) 2,070,695.

Baedeker, *Berlin* (1912).

Congress of Berlin took place in B. in 1878 to reconsider terms of Treaty of San Stefano between Turkey and Russia, which had caused dissatisfaction to other powers, in particular Britain and Austria. Representatives of Britain, France, Austria, Germany, Russia, and Turkey met on June 13, and on July 13 Treaty of B. was concluded, which considerably modified that of San Stefano; by it Bulgaria was divided into Bulgaria proper and eastern Rumelia (*q.v.*); Bosnia and Herzegovina were to be occupied by Austria; Rumania, Servia, and Montenegro made independent; Ardahan, etc., ceded to Russia.

Berlin Decrees.—Decrees issued by Napoleon when at Berlin, 1806, establishing continental blockade with idea of destroying Eng. commerce; also known as CONTINENTAL SYSTEM.

BERLIN.—(1) (44° 28′ N., 71° 12′ W.) city, New Hampshire, U.S.A.; sawmills. Pop. 11,786. (2) (43° 26′ N., 80° 37′ W.) port, Ontario, Canada. Pop. 9700.

BERLINHAFEN (2° 30′ S., 142° 45′ E.), port, in New Guinea, Ger. Pacific.

BERLIOZ, HECTOR (1803–69), Fr. musical composer; b. Côte-Saint-André; s. of physician; pioneer of the Romantic movement (*q.v.*) in music; influenced, as all the Fr. *Romantiques* were, by England, and m. Miss Smithson, an Irish actress of Shakespearean characters whose acting kindled in him a passionate admiration of the Eng. poet's works which remained throughout life, and inspired some of his best works; his compositions include an opera, *Benvenuto Cellini*, *Damnation de Faust*, *Roméo et Juliette*, *Béatrice et Bénédict*, which are the glories of Fr. music; *Autobiography* (trans., 1905).

BERMONDSEY, S.E. metropolitan borough of London; parliamentary borough of Southwark; tanneries. Pop. (1911) 126,000.

BERMUDAS, SOMERS ISLANDS (33° N., 65° W.), islands, mid-Atlantic, belonging to Britain; area, 20 sq. miles; administered by resident gov., assisted by executive and legislative councils, and House of Assembly. Soil is poor; frost unknown; produce potatoes, tomatoes, and other vegetables, arrowroot, bulbs, all of which are exported; import provisions, general goods. Pop. (1911) 19,000.

BERMUDEZ (9° N., 64° W.), state, N.E. Venezuela, between Orinoco River and Caribbean Sea; area, 32,243 sq. miles. Pop. 364,000.

BERN, BERNE.—(1) (46° 57′ N., 7° 26′ E.) capital Switzerland and of canton B.; situated on rocky peninsula, almost surrounded by river Aar (several bridges); commands magnificent Alpine views, 'Bernese Oberland'; principal buildings, Gothic Münster, Federal Council Hall, univ., museum; bear-pit (*bern* signifies a bear); made free imperial city, 1218; federal capital, 1848. Pop. (1910) 85,300. (2) (47° N., 7° 30′ E.) canton, Switzerland; most populous and second largest in area; traversed by Jura and Alps; contains Bernese Oberland in S.; drained by Aar and tributaries; mountain pine forests; fertile valleys; majority of inhabitants German-speaking Protestants; grain, cattle; area, 2657 sq. miles. Pop. (1910) 642,700.

BERNADOTTE, see CHARLES XIV. of Sweden.

BERNARD, CHARLES DE (1804–50), Fr. novelist; author of *Le Nœud Gordien* (1838), *Gerfaut* (1840), *La Peau du lion* (1841), and other stories.

BERNARD OF CHARTRES (*c.* 1167), Fr. philosopher; leader of the Chartres school of Platonic philosophers; referred to by John of Salisbury.

BERNARD, CLAUDE (1813–78), Fr. physiologist, noted for researches on poisons, functions of pancreas, and glycogenic function of liver.

BERNARD, JACQUES (1658–1718), Fr. theologian; sometime minister of the Walloon church at Leyden, and prof. of Philosophy and Math's in the univ.

BERNARD, MOUNTAGUE (1820–82), Eng. lawyer and legal writer; served on many international commissions.

BERNARD, ST. (1090–1153), Fr. monastic reformer; b. Burgundy; s. of Tescelin, a knight of noble birth; entered monastery of Citeaux, 1112; chosen as one of party to found daughter monastery of Clairvaux, where life was rigidly ascetic. B. became famous, 1130, for support of election of Innocent II. to Papacy; rebuilt Clairvaux, 1135; preached Second Crusade, 1145, and when it failed tried to reorganise it. B.'s influence in Europe as abbot of Clairvaux was enormous; he was a man of strong and passionate character, a theologian and a mystic; great opponent of Abelard, and strongly conservative; believed heresy should be met by argument, but advocated persecution rather than allow it to spread; devotional works continue to be read.

Morison, *Life of St. Bernard*; Vacandard, *Vie de St. Bernard*.

BERNARD, ST., OF MENTHON (923–1008), founder of monasteries and hospices at passes of Alps (Gt. and Little St. B.); feast, June 15.—**Great St. Bernard,** pass, from the Valais in Switzerland to Aosta, Italy; known to Romans, who erected temple at highest point; named after St. B., who established hospice here; Augustinian convent since XII. cent.; St. B. dogs assist in rescue of travellers from snow.—**Little St. Bernard,** pass, also honoured by Romans with temple, and by St. Bernard with a hospice; joins valleys of Isère and Aosta.

BERNARD, SIR THOMAS, BART. (1750–1818), gov. of Massachusetts at revolt of colonies.

BERNARDINE OF SIENA, ST. (1380–1444), Vicar-General of Observant Order (Franciscan), and popular preacher of wide fame.

BERNAUER, AGNES (d. 1435), a baker's dau. who secretly m. Albert, s. of the Duke of Bavaria-Münich. When the marriage was discovered by the duke she was arrested, condemned for witchcraft, and drowned in the Danube; subject of several plays.

BERNAY (49° 5′ N., 0° 35′ E.), town, Eure, France; cotton and woollen goods. Pop. 8200.

BERNAYS, JAKOB (1824–81), Ger. philologist and author of a number of works on Gk. philosophers. His

bro., **Michael Bernays** (1834–97), pub. critical works on Shakespeare, Goethe, and other writers.

BERNBURG (51° 47′ N., 11° 43′ E.), manufacturing town, Anhalt, Germany. Pop. (1910) 33,700.

BERNERS, JOHN BOURCHIER, 2ND BARON (1467–1533), Eng. author and diplomatist; trans. *Froissart* (1523–25), *The Golden Book of Marcus Aurelius, The Book of Duke Huon of Bordeaux, Arthur of Little Britain*, etc.; style places him with Malory at head of last romance writers of Middle Ages.

BERNERS, JULIANA (b. *c.* 1388), author of the famous *Boke of St. Albans* (1486), a treatise on hawking, hunting, and heraldry; said to have been prioress of Sopwell Nunnery, near St. Albans.

BERNESE OBERLAND (46° 30′ N., 7° 30′ E.), highland district of Bern, Switzerland; occupied by Bernese Alps, which culminate in Finsteraarhorn, Jungfrau, and Aletschhorn; among chief passes are Jungfraujoch, Gemmi, Gt. Scheidegg. Region includes summer resorts of Grindelwald, Interlaken, Meiningen, and great glaciers of Ober- and Unter-Grindelwald.

BERNHARD, DUKE OF WEIMAR (1604–39), Ger. general in Thirty Years War; youngest s. of Duke Johann III.; assisted Gustavus Adolphus to win battle of *Lützen* for the Swedes; then won many battles for French against the Emperor.

BERNHARDT, SARAH (1845–), Fr. actress; b. Paris, of Fr. and Dutch parentage, and Jewish descent; entered the *Conservatoire* at thirteen; début at the *Comédie Française* (1862); since 1880 her golden voice and dramatic power universally recognised.

BERNI, FRANCESCO (1497–1535), Ital. poet; held clerical position in the Vatican, and later received canonry in cathedral at Florence; stands easily at head of Ital. comic poets; chiefly known for rewriting of Boiardo's *Orlando Innamorato*, a crude poem which he turned into a classic of its kind. Of *Bernesque poetry* Byron was afterwards a master; in it, small but important element of eloquence is enclosed in mass of satire and sparkling epigram.

BERNICIA, northern kingdom of the Angles; extended from Forth to Tyne; said to have been founded by Ida in VI. cent.; B. and Deira constituted Northumbria.

BERNICIAN SERIES, Lower Carboniferous rocks in Northumberland; corresponds to 'Dinartien' of Fr. geologists.

BERNIER, ETIENNE (1762–1806), Fr. divine who promoted Concordat and became bp. of Orleans.

BERNIER, FRANÇOIS (1625–88), Fr. traveller who became physician to Aurungzebe in India and wrote admirable *Voyages*.

BERNINI, GIOVANNI LORENZO (1598–1680), Ital. artist; b. Naples; chiefly celebrated as architect and sculptor; designed Barberini Palace at Rome, and colonnade of St. Peter's; employed by Charles I of England and Louis XIV. of France.

BERNIS, FRANÇOIS JOACHIM DE PIERRE DE (1715–94), Fr. cardinal (1758), author and statesman; sec. of state for foreign affairs during Seven Years War.

BERNKASTEL (49° 53′ N., 7° 2′ E.), town, on Mosel, Prussia; wine. Pop. 4500.

BERNOULLI, BERNOUILLI, eminent family of Basel, Switzerland; refugees from Antwerp, remarkable for their hereditary scientific ability, especially in math's. (1) JACQUES B. (1654–1705) extended the use of the calculus and determined various curves; prof. and rector, Basel Univ. (2) JEAN B. (1667–1748), his bro., discovered exponential calculus and curve of swiftest descent; prof. in Groningen, afterwards succ. (1) in Basel. (3) NICOLAS B. (1695–1726), e. s. of (2), Math's prof. in St. Petersburg. (4) DANIEL B. (1700–82), s. of (2), gained international recognition, sharing prize of *Académie des Sciences*, Paris, with Maclaurin and Euler; prof. of Math's, St. Petersburg; prof. of Experimental Physics in Basel. (5) JEAN B. (1710–90), youngest s. of (2), succ. his f. in Basel. (6) NICOLAS B. (1687–1759), s. of (3); met Halley and Newton in England; Math's prof. in Padua; afterwards prof. of Logic in Basel. (7) JEAN B. (1744–1807), grandson of (2) and s. of (5), astronomer in Berlin, afterwards mathematical director of the Akademie. (8) JACQUES B. (1759–89), bro. of (7); travelled; succ. (4) in chair of Experimental Physics in Basel; afterwards prof. of Math's, academy of St. Petersburg.

BERNSTEIN, EDUARD (1850–), Ger. social-democrat, politician, and author of democratic lit.

BERNSTEIN, HENRI (1876–), Fr. playwright who has attained great success, especially with *La Rafale* (1905) and *La Griffe* (1906).

BERNSTORFF, ANDREAS PETER, COUNT VON (1735–97), Dan. statesman; cr. count, 1767; became minister after Struensee's fall; renewed friendship between England and Denmark, proposed new system of finance and abolition of serfdom, and allowed liberty to the press; started the development of Dan. manufactures, ship-building, and commerce.

BERNSTORFF, CHRISTIAN GÜNTHER, COUNT VON (1769–1835), Dan. and Prussian statesman; Dan. ambassador successively to Sweden, Austria, and Germany; made Prussian Minister of Foreign Affairs, 1818.

BERNSTORFF, JOHANN HARTWIG ERNST, COUNT VON (1712–72), Dan. statesman; called by Frederick the Great 'The Oracle of Denmark.' He emancipated the serfs; under him trade flourished, hospitals were built, and Copenhagen became literary centre.

BEROSUS, priest of Bel at Babylon; fragments of his history of Babylon have been handed down.

BERRI (45° 40′ N., 1° 40′ E.), ancient province, Central France, corresponding roughly to departments of Indre and Cher; country and people described in George Sand's later novels.

BERRY, CHARLES ALBERT (1852–99), Eng. congregationalist minister; pres. of Free Church Council and of Congregational Union.

BERRY, CHARLES FERDINAND, DUC DE (1778–1820), 2nd s. of Charles X. of France; assassinated by republican; memoirs written by Chateaubriand; his wife, CAROLINE FERDINANDE LOUISE, DUCHESSE DE B. (1798–1870), suffered imprisonment, 1832, for stirring up revolt against Louis Philippe in Vendée.

BERRYER, ANTOINE PIERRE (1790–1868), Fr. lawyer and politician; famous as orator in political prosecutions; strong legitimist.

BERSAGLIERI, company of marksmen in Ital. army, raised 1836; noted for speed and endurance.

BERSERKER (of disputed etymology).—(1) name of twelve sons of Scandinavian hero, Berserk; (2) any reckless Scandinavian warrior of Viking times.

BERT, PAUL (1833–86), Fr. physiologist and anti-clericalist politician; wrote standard work on physiological effects of barometric pressure.

BERTANI, AGOSTINO (1812–86), Ital. patriot under Garibaldi.

BERTAUT, JEAN (1552–1611), Fr. poet; writer of light verse, which found much favour at the gay court of Henri IV.

BERTHA.—(1) **St. B.** (d. early VII. cent.), wife of Ethelbert of Kent; persuaded him to accept Christianity. (2) **'B. au grand pied'** (d. 783), wife of Pippin the Short and mother of Charles the Great; subject of early literature. (3) Sister of Charles the Great and mother of Roland in Arthurian romances. (4) Wife of Rudolf II. of Burgundy; subject of many anecdotes; d. *c.* 1000.

BERTHELOT, MARCELLIN PIERRE EUGÈNE (1827–1907), Fr. chemist and politician; author of numerous research papers and books on chem.; well known for investigations in synthetic organic chem.; Minister of Public Instruction (1886); Minister for Foreign Affairs (1895).

BERTHIER, LOUIS ALEXANDRE (1753–1815), Prince of Neuchâtel; marshal of France; Napoleon's

chief staff-officer, 1796–1814; made marshal at establishment of the Empire; Prince of Wagram, 1809.

BERTHOLLET, CLAUDE LOUIS (1748–1822), Fr. chemist; accompanied Napoleon to Egypt (1798); pioneer in theory of chemical affinity.

BERTHON, EDWARD LYON (1813–99), Eng. naval inventor; clerk in Holy Orders.

BERTHOUD, Fr. name for Prussian town, Burgdorf.

BERTHOUD, FERDINAND (1727–1807), Swiss inventor of sea clocks and watches.

BERTILLON, LOUIS ADOLPHE (1821–83), Fr. statistician.—**ALPHONSE** B. (1853–), s., eminent criminologist, applied anthropometrical methods to detection of criminals.

BERTIN, LOUIS FRANÇOIS (*l'aîné*) (1766–1841), Fr. journalist; founded, 1789, *Journal des Débats*, which he edited with his bro., **Bertin de Vaux** (1771–1842); his sons succ. as editors.

BERTINORO (44° 8′ N., 12° 9′ E.), town, bp.'s see, Italy; mineral springs. Pop. 3700.

BERTOLD (1442–1504), elector and abp. of Mainz (1484); strove for German unity.

BERTOLD OF REGENSBURG (1220–72), Ger. preacher; vigorous sermons still preserved.

BERTRAM, CHARLES (1723–65), Eng. literary forger; professed to have discovered at Copenhagen the MS. of an Eng. chronicle written by a monk named 'Richard of Westminster' (Abbey).

BERTRAND, HENRI GRATIEN, COMTE (1773–1844), Fr. soldier; devoted general and aide-de-camp of Napoleon.

BÉRULLE, PIERRE DE (1575–1629), Fr. cardinal, diplomatist, and statesman.

BERVIC, CHARLES CLÉMENT (1756–1822), famous Fr. engraver.

BERVIE, INCHBERVIE (56° 51′ N., 2° 17′ W.), royal burgh, Kincardineshire, Scotland; first machine in Scotland for spinning linen yarn set up here, 1788; woollens.

BERWICK, JAMES FITZ-JAMES, DUKE OF (1670–1734), natural s. of James II. B. established his fame as a Fr. soldier by winning, among many other victories, battle of *Almanza*, 1707.

BERWICK, NORTH, see **NORTH BERWICK.**

BERWICKSHIRE (55° 46′ N., 2° 25′ W.), county, S.E. Scotland; county town, Duns; fertile productive district, many varieties of soil; agriculture principal industry; sheep and cattle largely raised; important fisheries; manufactures include paper, woollens, linens, brewing, distilling, tanning. Tweed is most important river, outlining S. border; also watered by Leader, Whiteadder, and other affluents of Tweed. Antiquities include remains of Roman and Pictish camps, stone circles, etc., and there are some monastic ruins. County returns one member. B. was frequently overrun in wars between England and Scotland; area, 457 sq. miles. Pop. (1911) 29,643.

BERWICK-UPON-TWEED (55° 47′ N., 2° W.), walled town on N. side of mouth of Tweed; during Border wars frequently changed hands; in 1482 finally taken by English; for many years treated as independent county separate from England and Scotland, but since 1885 included in Northumberland; remains of castle and fortifications; salmon and sea fisheries. Pop. (1911) 13,075.

BERYL ($Be_3Al_2Si_6O_{18}$), gem-stone, related to emerald and aquamarine; hexagonal, pleochroic, variously coloured crystals occurring in granitic rocks; often weathers into kaolin and mica.

BERYLLIUM, GLUCINUM (Be = 9·1), metallic element, isolated by L. N. Vauquelin (1798); S.G. 1·64; S.H. 0·4079. Its position in periodic system of elements has been much discussed.

BERYLLONITE ($NaBePO_4$), complexly crystallised mineral discovered by E. S. Dana in granitic vein at Stoneham, Maine, U.S.A.

BERZELIUS, JÖNS JAKOB (1779–1848), Swed. chemist; prof. at Stockholm; sec. of Academy of Sciences; famous for analytical work and determination of atomic and molecular weights; chief founder of radical theory in organic chem.; introduced present system of chemical formulæ, and discovered various new elements.

BESANÇON (47° 15′ N., 6° 2′ E.), town, France, on Doubs; cathedral, dating from IV. cent., and XVI.-cent. town hall; considerable Rom. remains; seat of abp.; univ. and many schools; fortifications; principal industry, watchmaking; metallurgical works, boots, paper, leather, hosiery, etc.; distilling; birthplace of Victor Hugo. Pop. (1911) 58,000.

BESANT, MRS. ANNIE, *née* Wood (1847–), Eng. theosophist, lecturer, and author.

BESANT, SIR WALTER (1836–1901), Eng. novelist, biographer, and antiquary; held professorship at Royal Coll., Mauritius (1861–67); sec. to Palestine Exploration Fund (1868–85); wrote many widely circulated novels, biographies of Coligny, Whittington, Captain Cook, and Richard Jefferies, and several valuable topographical works on London and Westminster.

BESCOW, BERNARD VON, BARON (1796–1868), Swed. poet and historian; held court appointments and was sec. of Swed. Academy; works include *Thorkel Knutsson*, *Erik XIV.*, and other poems in dramatic form, volumes of lyrical poems, memoir of Gustavus III., and miscellaneous works.

BESICLOMETER, optician's instrument for measuring forehead and eyes for dimensions of spectacles.

BESSARABIA (47° 20′ N., 28° 20′ E.), province, S.W. European Russia, lying along Rumanian frontier; N. occupied by spurs of Carpathians, but W. flat and fertile; higher ground covered with wood, in low ground attention is paid to cattle breeding, tobacco, and vines; manufactures leather, soap, and candles; exports cattle, wool, tallow, and salt; cap. Kishinev; ceded to Russia, 1812; area, 17,143 sq. miles. Pop. (1910) 2,441,000.

BESSARION, JOHANNES, or **BASILIUS** (*c.* 1395–1472), titular patriarch of Constantinople; one of scholars who introduced Gk. learning into Italy.

BESSBOROUGH, EARLS OF, family name Ponsonby; furnished Eng. statesmen XVII.–XIX. cent's.

BESSÈGES (44° 17′ N., 4° 9′ E.), town, Gard, France; coal, iron, glass. Pop. 9000.

BESSEL, FRIEDRICH WILHELM (1784–1846), Ger. astronomer, introduced the heliometer and correction for personal equation (1823); invented **BESSEL'S FUNCTIONS,** a mathematical relation between two variables, of importance in mathematical physics.

A. Gray and G. B. Matthews, *Treatise on Bessel's Functions* (1895).

BESSEMER (33° 24′ N., 86° 57′ W.), town, Alabama, U.S.A.; iron, coal. Pop. (1910) 10,864.

BESSEMER, SIR HENRY (1813–98), Eng. engineer and inventor; famous for his steel-manufacturing process. An hydraulic appliance to counteract effects of a rolling ship was unsuccessful. See **IRON AND STEEL.**

BESSIÈRES, JEAN BAPTISTE (1768–1813), Duke of Istria (1809), marshal of France (1804); one of most distinguished cavalry officers in Napoleonic wars; said to have secured day at *Marengo*; colonel-general of the Consular Guard (1805–7), receiving Grand Eagle of Legion of Honour; won battle of *Medina del Rio Seco* (1808); commanded Imperial Guard cavalry in retreat from Moscow.

BEST, WILLIAM THOMAS (1826–97), Eng. organist; associated with Liverpool, where his performances at St. George's Hall made him famous throughout England; pub. *Organ Pieces for Church Use.*

BESTIA, surname of Rom. *gens* Calpurnia. One, Lucius Calpurnius B., was disgraced in war against Jugurtha; another was Catiline conspirator.

BESTIARY, favourite class of mediæval book treating characteristics of animals as Christian symbols.

BESTUSHEV-RYUMIN, ALEXEI PETROVITCH, COUNT (1693–1768), grand chancellor of Russia; on accession of Elizabeth became supreme

in foreign affairs, and organised general alliance against France and Prussia; made chancellor (1744); his fall commenced with peace Congress at Aix-la-Chapelle, when Britain deserted the alliance; he was banished through intrigue (1759).

BETAÏNE, *Oxyneurine, Lycine* ($C_5H_{13}NO_2$), methyl hydroxide of dimethyl glycocoll, occurring in sugar beet, vetch, cotton seed, and wheat.

BETANZOS (43° 15′ N., 8° 10′ W.), town, Spain. Pop. 8948.

BETEL NUT, seed of betel palm, *Areca catechu*, is extensively used by the inhabitants of tropical Asia for chewing. The b. leaf is produced from b. vine (*Chavica betel*).

BETHANY (31° 46′ N., 35° 17′ E.), village, foot of Mount Olivet, Palestine; mentioned in New Testament as home of Martha, Mary, and Lazarus.

BETHEL (31° 55′ N., 35° 20′ E.), ancient city, Palestine; resting-place of Ark.

BÉTHENCOURT, JEAN DE (c. 1360–1422), Fr. adventurer; wrote *Le Canarien* (account of conquest he claimed to have made of Canary Islands).

BETHESDA.—(1) sacred spring in Jerusalem where remarkable cures were said to be performed (*St. John* 5[2]). (2) (53° 12′ N., 4° 3′ W.) town, Carnarvonshire, Wales; slate quarries. Pop. (1911) 4716.

BETH-HORON, two neighbouring villages, Palestine; 12 miles N.W. of Jerusalem.

BETHLEHEM (31° 33′ N., 35° 13′ E.), town, Palestine; birthplace of David and (according to Matthew, Luke, and John) of Jesus Christ; convent containing Grotto of the Nativity; cave where St. Jerome translated the Bible.

BETHLEHEM (40° 38′ N., 78° 23′ W.), borough, on Lehigh, Pennsylvania, U.S.A.; founded by Moravians, 1741; iron and steel manufactures. Pop. 12,837.

BETHLEHEMITES, Orders in R.C. Church. (1) Knights to fight Turks, founded 1459. (2) B. of Guatemela, existed 1650–1850.

BETHLEN, GABRIEL (1580–1629), Prince of Transylvania by election, 1613; elected king of Hungary, 1620, but refused crown; compelled the Emperor Ferdinand II. to grant religious toleration in Hungary by Peace of Nickolsburg, 1621.

BETHNAL GREEN, eastern metropolitan and parliamentary borough, London; museum. Pop. 128,282.

BÉTHUNE (50° 30′ N., 2° 35′ E.), town, Pas-de-Calais, France; coal. Pop. 12,400.

BÉTHUNE, Fr. family from which sprang distinguished nobles till Fr. Revolution.

BETONY, mint-like herb (*Stachys Betonica*); purple flowers; perennial.

BETROTHAL, marriage-pledge made between two persons; with the early Jews the b. was as binding as the marriage ceremony; and in France and Germany at the present day it is still of considerable importance. In England the laws regarding b's have never been very clearly defined, and have sometimes led to the parties concerned, particularly in country districts, regarding b. as a licence for cohabitation; damages through breach of promise may be recovered at common law.

BETTERMENT, legal term for appreciation of value of real property; when it accrues without effort or expense of owner, known as 'unearned increment,' to obtain taxation of which many attempts have been made.

BETTERTON, THOMAS (1635–1710), Eng. actor; made first appearance at the Cockpit, Drury Lane (1660); considered greatest actor of his time. He introduced movable scenes in place of tapestry hangings. B. was noted for his generosity and warm friendship, and purity of life in a dissolute age.

BETTIA (26° 46′ N., 84° 30′ E.), town, Bihar and Orissa, India; indigo. Pop. 24,696.

BETTING, the staking of money on horse races or other forms of sport. B. is legally permitted, under certain conditions, on racecourses; but, by the Street Betting Act of 1906, 'any person frequenting or loitering in streets or public places, on behalf either of himself or of any other person, for the purpose of book-making, or wagering, or agreeing to bet or [illegible], or paying, or receiving, or settling bets,' shall be liable to a maximum fine of £10; for a second offence, £20; for a third or subsequent offence, £50 or six months' imprisonment, or, on summary conviction, to a fine of £30 or three months' imprisonment. The penalties incurred by a third offence are also incurred by a bookmaker having any betting transaction in a public place with a person under 16 years of age. Further, by the Licensing Act of 1872 any licensed person permitting b. transactions on his premises is liable to a fine of £10 for a first offence, and £20 for any subsequent offence.

An Act of 1853 makes it a specific offence to publish advertisements, handbills, placards, etc., showing that any house is kept or opened for the purpose of betting. Under a penalty of £30 and costs, or two months' imprisonment, the sending or publishing is prohibited of any letter, telegram, or advertisement, offering information or advice as to any bet or wager relating to a horse-race, or any other sport. By the Betting and Loans (Infants) Act (1892), the sending of any such letter or advertisement to an 'infant' (under 21 years) is made a misdemeanour, to which imprisonment and heavy fines are attached. See GAMING.

BETTWS-Y-COED (53° 6′ N., 3° 48′ W.), town, Carnarvonshire, Wales; artist and tourist resort.

BETTY, WILLIAM HENRY WEST (1791–1874), Eng. actor; known as 'the Young Roscius'; b. Shrewsbury; first appearance, at age of twelve, at Belfast; he quickly won immense popularity. He retired from stage (1808), having amassed a large fortune, spent four years at Christ Coll., Cambridge, after which he returned to the theatre, but without success.

BETUL (21° 35′ N., 78° E.), town and district, Central Provinces, India; plateau surrounded by belt, hilly, forest country; Tāpti flows through S. portion; inhabitants are Gonds; cotton, teak; area, 3826 sq. miles. Pop. 285,400; pop. of town, 4700.

BETWA (24° 30′ N., 78° 20′ E.), river, Bhopal, Brit. India, tributary of Jumna.

BEUDANT, FRANÇOIS SULPICE (1787–1850), Fr. mineralogist and geologist.

BEUGNOT, JACQUES CLAUDE, COUNT OF (1761–1835), Fr. politician; made count of the empire by Napoleon, 1808; author of valuable autobiography.

BEULÉ, CHARLES ERNEST (1826–74), Fr. prof., archæologist, politician, and author.

BEURNONVILLE, PIERRE DE RUEL, MARQUIS DE (1752–1821), marshal of France and diplomatist.

BEUST, FRIEDRICH FERDINAND, COUNT VON (1809–86), Austrian statesman; represented Ger. diet in London conference on Schleswig-Holstein question, 1864; Minister of Foreign Affairs at Vienna, (1866); pres. of the council and chancellor of the empire (1867); concessions made to Hungary were due to him; he opposed the papal party and abolished the Concordat; after Franco-Prussian war established friendship between Austria and Prussia, opposing demands of Bohemia.

BEUTHEN, NIEDERBEUTHEN (51° 45′ N., 15° 47′ E.), town, on Oder, Prussian Silesia; straw-plaiting. Pop. 3033.

BEUTHEN, OBERBEUTHEN (50° 21′ N., 18° 55′ E.), town, Prussian Silesia; coal. Pop. 60,078.

BEVEL, sloped or canted edging to solid body, as glass, wood, etc.; rule with two jointed arms adjustable to an angle.

BEVELAND, NORTH (51° 33′ N., 3° 47′ E.), island, Holland.

BEVELAND, SOUTH (51° 27′ N., 3° 52′ E.), island, Holland.

BEVEREN (50° 56′ N., 2° 36′ E.), town, Belgium. Pop. 9921.

BEVERIDGE, WILLIAM (1637–1708), bp. of St. Asaph; Anglican author much read in his time.

BEVERLAND, ADRIAN (1654–1712), Dutch theological writer much persecuted for his writings; good scholar.

BEVERLEY (53° 51′ N., 0° 26′ W.), market town, near river Hull, E. Riding, Yorks; St. John's Church (the Minster), favourite destination of mediæval pilgrims, is a magnificent building showing arch. of different periods and contains the Percy shrine; connection of St. John of B. with B. not known; St. Mary's Church, in Decorated and Perpendicular styles; seat of suffragan bp.; leather, agricultural implements. Pop. (1911) 13,700.

BEVERLY (42° 33′ N., 70° 57′ W.), city, N. coast, Massachusetts Bay, U.S.A.; boots and shoes. Pop. (1910) 18,650.

BEVIS OF HAMPTON, Eng. XIII.-cent. metrical romance showing strong Fr. influence. B. was s. of Guy, Count of Hampton, who was murdered at his wife's instigation, the s. being eventually sold into slavery. In the East he became enamoured of a princess, named Josiane, whom he eventually married. The romance is chiefly occupied with the account of his wonderful exploits. It has been pub. by the Abbotsford Club (1838) and Early English Text Society (1885).

BEWCASTLE (55° 4′ N., 2° 38′ W.), village, Cumberland, England; runic cross.

BEWDLEY (52° 23′ N., 2° 18′ W.), market town, Worcestershire, England; horn goods. Pop. (1911) 2745.

BEWICK, THOMAS (1753–1828), Eng. wood-engraver; b. near Newcastle-on-Tyne; apprenticed to a local engraver, Beilby, whom he afterwards joined in partnership; celebrated for his engravings for *British Birds* (1797–1804), *Quadrupeds*, Goldsmith's *Traveller* and *Deserted Village*.

BEX (46° 14′ N., 7° 1′ E.), town, Switzerland. Pop. 4561.

BEXHILL (50° 51′ N., 0° 28′ E.), watering-place, Sussex, England. Pop. (1911) 15,331.

BEXLEY (51° 27′ N., 0° 8′ E.), town, on Cray, Kent, England. Pop. (1911) 15,900.

BEXLEY, NICHOLAS VANSITTART, BARON (1766–1851), Eng. politician; Chancellor of Exchequer (1812–23); cr. baron (1823); Chancellor of Duchy of Lancs. and Cabinet minister (1823–28).

BEY (Turkish *Bèy* or *Beg*, a prince).—(1) hereditary ruler of Tunis. (2) Turk. grandee.

BEYBAZAR (40° 5′ N., 31° 20′ E.), town, Angora vilayet, Asiatic Turkey; rice.

BEYLE, MARIE HENRI (1783–1842), Fr. author of beginning of Romantic movement; *nom de plume*, STENDHAL; saw military service under Napoleon, but after the emperor's fall retired to Milan, where he made the acquaintance of Manzoni, Silvio Pellico, Lord Byron, and other men of letters; chiefly remembered by his two novels, *Le Rouge et le noir* and *La Chartreuse de Parme*; and by his critical work, *Racine et Shakespeare*.

BEYPUR (11° 10′ N., 75° 48′ E.), town, Madras, India. Pop. 6700.

BEYRICH, HEINRICH ERNST VON (1815–96), Ger. geologist; prof. at Berlin Univ.; co-director of Prussian Geological Survey; introduced the term *Oligocene*.

BEYROUT, see BEIRUT.

BEZANT, originally a Byzantine gold coin, of the value of 9s., widely circulated throughout Europe down to middle of XIII. cent. Silver b's were used in England during XIII. and XIV. cent's. Also a heraldic figure, represented by a gold circle, introduced during the Crusading period.

BEZBORODKO, ALEXANDER ANDREEVITCH, PRINCE (1747–99), grand chancellor of Russia; became adviser of Catherine II., and guided Russ. affairs. The advantageous terms of peace made with Gustavus III. (1790), and the Turks (1792) were due to him, as was also third partition of Poland. B. retained entire control after death of Catherine, becoming chancellor.

BEZDAN (45° 52′ N., 18° 53′ E.), town, Hungary. Pop. 7985.

BÈZE, THEODORE DE, THEODORUS BEZA (1519–1605), Fr. theologian; prof. of Greek at Lausanne, later prof. of Theol. at Geneva; on Calvin's death became leader of the Protestants there; wrote the greater part of the Huguenot Psalter, and edited the *Vulgate*, besides other theological works.

BÈZIERS (43° 20′ N., 3° 12′ E.), town, on Orb, Hérault, France; ancient ramparts; remains of Rom. amphitheatre; fine Gothic church; scene of massacre, Albigensian War, 1209; distilleries. Pop. (1911) 52,268.

BEZIQUE, card game, played with a double pack.

BEZOAR (from Persian *padzahr*, an antidote to poison), a ball found in stomachs and intestines of ruminants, formed by concretion of salts, etc., round particle of foreign matter; supposed to have medicinal uses.

BEZWADA (16° 31′ N., 80° 39′ E.), town, on Kistna, Madras, India; commercial centre. Pop. 24,000.

BHAGALPUR (26° N., 86° 45′ E.).—(1) division, Bengal, India; includes districts of B., Monghyr, Purnea, Sonthal Parganas; area, 18,6 2 sq. miles. Pop. 7,850,000. (2) district, situated in central part of division; level, well watered and cultivated in N., hilly in S.; grain, indigo; area, 4226 sq. miles. Pop. 2,088,500. (3) town, on Ganges; silk. Pop. (1911) 74,300.

BHAGAVAD GITA (=The Song of the Holy One), one of sacred books of Hinduism; it centres round Krishna.

BHAGIRATHI (30° 48′ N., 78° 22′ E.), river, India.

BHAMO (24° 15′ N., 97° E.), town on Irawadi, B. district, Burma, 40 miles W. of Chinese frontier; military station; important trading centre; woollen, cotton, and silk goods. Pop. 7000.

BHANDARA (21° 7′ N., 97° 37′ E.), district, Central Provinces, Brit. India; contains number of little native tributary states; minerals; produces rice, grain, cotton; capital, Bandara, on Wainganga; area, 3965 sq. miles. Pop. 663,062.

BHANG, Indian term for hemp plant (*Cannabis sativa*); desiccated and otherwise prepared leaves used as narcotic and intoxicant.

BHANPURA (24° 31′ N., 75° 37′ E.), town, Central India. Pop. 20,000.

BHARAHAT, BARHUT (24° 15′ N., 80° 45′ E.), village, state of Nagod, India; ruined city; interesting remains of a *stupa*, Buddhist period, III. cent. B.C.

BHARATPUR, BHURTPORE (27° 13′ N., 77° 32′ E.).—(1) native Jat state, Rajputana, India; level, fertile; only river, Banganga; cotton, sugar; area, 1982 sq. miles. Pop. (1911) 558,800. (2) capital, B. state; fort besieged by Lord Lake, 1805; taken by Lord Combermere, 1826. Pop. 43,600.

BHARTRIHARI, Ind. poet (? VII. cent. A.D.) whose famous sayings have been translated into Western languages.

BHATGÁON (27° 39′ N., 85° 22′ E.), town, Nepal, India. Pop. *c.* 30,000, mostly Brahmans.

BHATTIANA, tract of country, part of Hissar and Sirsa districts, Punjab, India.

BHAU DAJI (1822–74), Hindu physician and antiquarian; practised med. with great success in Bombay, where he also took a prominent part in the promotion of education; author of many papers on Sanskrit and Indian antiquities.

BHAUNAGAR, BHAVNAGAR (21° 45′ N., 72° 12′ E.).—(1) native state, Kathiawar, India; area, 2868 sq. miles. Pop. 412,700. (2) port, B. state; cotton. Pop. 56,400.

BHAVABHÛTI (*c.* 700 A.D.), Ind. dramatist whose works are among greatest Sanskrit productions.

BHERA (32° 28′ N., 72° 50′ E.), town, Punjab, India; cotton goods, carving. Pop. 18,700.

BHILS, BHEELS, a Dravidian tribe of India who lead

nomad life; to civilise them Bhil corps has been formed in Brit. army.

BHILSA (23° 30′ N., 77° 46′ E.), town and district, Gwalior, Central India; Buddhist remains.

BHIWANDI (19° 17′ N., 73° 4′ E.), town, Bombay, India. Pop. 10,354.

BHIWANI (28° 46′ N., 76° 18′ E.), town, Punjab, India; commercial centre. Pop. 35,900.

BHOPAL (23° 15′ N., 77° 26′ E.), native state, Central India, founded by Afghan adventurer in XVIII. cent.; female succession since 1844; ruler styled Nawab Begum; supported British in Maratha wars and in Mutiny; people mostly Hindu, but ruling family Muhammadan; area, 6902 sq. miles. Pop. (1911) 1,050,700.

BHOPAWAR (22° 35′ N., 75° 1′ E.), native state, Central India; area, 1413 sq. miles. Pop. (1911) 698,500.

BHOR (18° 9′ N., 73° 53′ E.).—(1) capital, B. state. Pop. 4200. (2) native state, Bombay, India; area, 925 sq. miles. Pop. 137,300.

BHUJ (23° 18′ N., 69° 43′ E.), capital of native state of Cutch, Bombay, India. Pop. 26,400.

BHUTAN (26° 40′ to 28° 7′ N., 88° 54′ to 91° 54′ E.), independent state, E. Himalayas; bounded N. by Tibet, E. by Towang country, S. by Brit. India, W. by Darjeeling, Sikkim, and Chumbi Valley. Area, *c.* 20,000 sq. miles. Surface is mountainous, occupied by Himalayan ridges and spurs; watered by various tributaries of Brahmaputra. Climate varies according to elevation. B. produces rice, corn, millet; manufactures textiles. Inhabitants are chiefly Bhutias, racially allied to Tibetans. Religion is Buddhism. Chief towns, Punakha (capital) and Tasichozong. B. is administered by two supreme authorities, Dharma Raja and Deb Raja, respectively spiritual and secular rulers. Part called the Dwars was annexed to Britain, 1865. Pop. *c.* 250,000.

BIAFRA (4° 18′ N., 10° 40′ E.), town, B. district, Kamerun, Africa. **Biafra, Bight of** (2° 30′ N., 8° E.), bay, Kamerun.

BIALYSTOK.—(1) (53° 6′ N., 23° 18′ E.) town, S.W. Russia. Pop. 63,927. (2) (53° N., 23° 30′ E.) province, Russia.

BIANCAVILLA (37° 30′ N., 15° E.), town, Sicily. Pop. 13,358.

BIANCHINI, FRANCESCO (1662–1729), Ital. astronomer and antiquary.

BIARD, FRANÇOIS (1798–1882), well-known Fr. *genre* painter.

BIARRITZ (43° 29′ N., 1° 33′ W.), fashionable watering-place, Basses-Pyrénées, S.W. France. Pop. 13,600.

BIAS (fl. VI. cent. B.C.), one of 'Seven Sages' of Greece; lived at Priene, Ionia; famous for wisdom of his councils and for philosophical fortitude; said to have remarked when the armies of Cyrus lay before Priene, 'Nobody can rob me of my treasures.'

BIBACULUS, MARCUS FURIUS (b. 103 B.C.), Roman poet; wrote satirical poems remarkable for their bitterness.

BIBERACH (48° 6′ N., 9° 48′ E.), town, Württemberg; hardware, fruit, cattle. Pop. 9100.

BIBIRINE, BEBEERINE ($C_{19}H_{21}NO_3$), alkaloid produced from *Nectandra rodiæi*, a S. Amer. tree; occasionally used against fever.

BIBLE, THE (Gk. *Ta Biblia*, the books), name given to collection of writings accepted by Christians as directly inspired by God. There has been considerable dispute as to inclusion of some of books of *Apocrypha* in the canon. The B. consists of two great parts, the Old and New Covenants, or, as the translators of the old Latin version preferred to call them, Testaments (Lat. *testamentum*). The Old Testament consists of (1) The Pentateuch, or five books of the Law, attributed to Moses; (2) The Prophets; and (3) The Hagiographa (writings concerning holy men), viz. *Psalms, Proverbs, Job, The Song of Songs, Ruth, Lamentations*, and other books not included under the Law or the Prophets. The New Testament, written in Gk., consists of the *Four Gospels*, the *Acts of the Apostles*, and the *Epistles*. The Old T., written in Hebrew, was translated into Gk. at Alexandria about 270 B.C. by 70 translators; their version is known as the Septuagint. Both Old and New Testaments were trans. into Lat. by St. Jerome, 385–404, and the entire vol. is known as the Vulgate. No MS. of the Old T., in the original Hebrew, dates from before the IX. cent.; and none of the New T., in the Gk., is earlier than the IV. cent., but commentators are generally agreed that the I. cent. text has come down to us practically intact. A printed text of the Old T. Psalter was issued by Jews in Italy in 1475; the first complete Lat. Bible was printed at Soncino (1488).

The English Bible.—The earliest attempt to write any portion of the Scriptures in the Eng. vernacular of which we have any record, is attributed to Cædmon (d. 680), who was a monk of Whitby Abbey, and paraphrased certain portions of the B. He was followed by the 'Venerable' Bede (d. 735) of Jarrow, author of the *Ecclesiastical History of England*, who translated a portion of the Gospel of *St. John*, while Ælfric, Abbot of Eynsham (955–1022), translated the *Pentateuch, Joshua, Judges, Kings, Job, Esther, Judith*, and the *Maccabees*. The first complete trans. of the Vulgate into Eng. was made by Wycliffe, about 1382, and this version was revised by John Purvey in 1388. Wycliffe was not acquainted with Heb. or Gk.; and consequently, with the introduction of printing in England (1477), and the wider diffusion of knowledge of the ancient languages, it became possible to work upon a broader textual basis than his; Renaissance scholars went back to the Gk. New Testament instead of relying on mediæval Lat. versions. This is especially notable in the New Testament of William Tyndale (pub. at Worms, 1525), and in the Pentateuch and other portions of the Scriptures translated by him. The first complete Eng. B. was that by Miles Coverdale, afterwards bp. of Exeter, in 1535, which was founded on Tyndale's and other existing Eng. and continental versions, and was much less scholarly than that of Tyndale; it is noteworthy that Coverdale was the first editor to take the non-canonical books from the body of the Old Testament and place them at the end under the title of *Apocrypha*. In 1537 appeared a version known as 'Matthew's Bible,' which bore on the title-page the name of John Matthew, though the text is taken wholly from Tyndale and Coverdale. In 1539 was published 'the Great Bible,' a version of Matthew's Bible, undertaken at the instance of Cromwell, Earl of Essex. Several other versions followed, which differed only in minor particulars, and in 1604 James I. resolved to have a new translation prepared; it was completed in 1611, and has continued to be the Authorised Version of the Eng. Bible down to recent times. The modern Revised Version, undertaken at the suggestion of the convocation of the clergy, was commenced in 1870; the New T. appeared in 1881, the Old T. in 1885, and the Apocrypha in 1895.

J. Eadie, *The English Bible* (2 vols., 1876); A. Edgar, *The Bibles of England* (1889); F. G. Kenyon, *Our Bible and the Ancient Manuscripts* (1895).

Bible Societies.—Various Societies have been founded to circulate the Bible. The earliest in point of date is the Soc. for the Propagation of Christian Knowledge (S.P.C.K.), founded 1698, which has pub. versions of the Scriptures in 38 different languages; others are the Canstein Bible Institute, founded by Baron von Canstein, at Halle (1710); the Bible Soc. (1780), later known as the Naval and Military Bible Soc.; the Fr. Bible Soc. (1792); the Religious Tract Soc. (1799), which pub. *The Boys' Own Paper* and *The Girls' Own Paper*, and carries on important home and foreign missionary work; the Brit. and For. Bible Soc. (1804); the National Bible Soc. of Scotland; and the Hibernian Bible Soc. First Amer. Society at Philadelphia (1808); most societies now affiliated to Amer. Bible Soc. (1816), which has pub. Bible in 100 tongues, including Arabic, Chinese dialects, and Amer. Indian.

BIBLE CHRISTIANS, religious sect, founded by William O'Bryan (1815); sometimes called 'Bryanites.' O'Bryan was a Wesleyan Methodist local preacher of Luxillian, Cornwall, and his efforts were devoted to reclaiming the wreckers and smugglers of that coast. A flourishing congregation exists in Salford, near Manchester; two of the principal articles of their doctrine are teetotalism and vegetarianism.

BIBLIOGRAPHY (older form, 'bibliology'), formerly meant the writing or transcription of books; but for nearly a cent. now the word has come to mean expert writing on books and MSS. with regard to points of variation between different editions, questions of authorship, binding, type, etc.; also a catalogue of books relating to some special subject or author.

BIBLIOMANCY, method of divination performed by a haphazard opening of the Bible and fixing the issue upon the first passage which strikes the eye.

BIBLIOTHÈQUE NATIONALE, Paris, Fr. national depository of books, art treasures, etc.

BIBRACTE, ancient Gaulish town, capital of the Aedui; 8 miles W. of Autun, France; modern Mont Beuvray.

BIBULUS, surname of Rom. *gens* Calpurnia. Marcus Calpurnius B. important in last days of republic.

BICARBONATE—acid carbonate. See CARBONATES.

BICE, term for certain dark green or blue pigments.

BICEPS, see ARM.

BICESTER (51° 52′ N., 1° 9′ W.), market town, Oxfordshire, England; brewery. Pop. (1911) 3400.

BICÊTRE (48° 49′ N., 2° 21′ E.), suburb, Paris; has famous hospital.

BICHAT, MARIE FRANÇOIS XAVIER (1771–1802), Fr. physician, anatomist, and physiologist; conducted valuable researches in med., anat., and physiology.

BICHIR, see POLYPTERUS.

BICHROMATES, see CHROMIC ACID.

BICKERSTAFFE, ISAAC (1735–1812?), Eng. dramatist; b. Ireland; author of many popular plays; name used as pseudonym by both Swift and Steele.

BICKERSTETH, EDWARD (1786–1850), Eng. clergyman; pub. *A Scripture Help* (1816), *Christian Psalmody* (1833), and other works.

BICKERTON, SIR RICHARD HUSSEY (1759–1832), Brit. admiral, distinguished under Nelson, etc., against French.

BICYCLE, vehicle composed of two wheels placed one behind the other and connected by a frame, propelled by pedalled cranks, the rider sitting on a saddle. The inventor is unknown, but various machines, the 'hobby-horse,' 'draisine,' and 'boneshaker,' were the forerunners of the modern safety b. Dunlop's invention of the pneumatic tyre, the equalisation of the front and rear wheel, improvements in steel manufacture and gearing, as well as modern manufacturing methods in general, have made the b. not merely a luxury for amusement, but a necessary article of daily life even for those of humble means.

BIDA (9° 5′ N., 6° 2′ E.), town, N. Nigeria; brass and copper work; inhabitants Hausa.

BIDAR—(1) (18° 33′ N., 77° E.) district, Hyderabad, India; area, 4168 sq. miles. Pop. 766,129. (2) (17° 53′ N., 77° 30′ E.) town, India. Pop. 11,000.

BIDASSOA (43° 21′ N., 1° 45′ W.), river, France and Spain.

BIDDEFORD (43° 30′ N., 70° 34′ W.), city, Maine, U.S.A.; Saco river supplies water-power; cotton. Pop. (1910) 17,079, largely French Canadians.

BIDDER, GEORGE PARKER (1806–78), Eng. engineer; assisted George Stephenson in construction of London to Birmingham railway; designed Victoria Docks (London). GEORGE PARKER B., JUN. (1836–96), s., authority on secret writing codes.

BIDDING-PRAYER, in Anglican Church, special form of prayer said before sermon in cathedrals, Inns of Court, and before the Univ. sermon at Oxford and Cambridge; in R.C. Church, prayer before sermon for souls of departed benefactors.

BIDDLE, JOHN (1615–62), 'Father of English Unitarianism'; established Unitarian conventicles; imprisoned for opinions (1645–52, 1654–58, 1662).

BIDDLE, NICHOLAS (1786–1844), Amer. financier, government director, 1819, and afterwards pres. of U.S. Bank; drew up *Commercial Digest*, long authority for international trade regulations.

BIDEFORD (51° 1′ N., 4° 12′ W.), seaport town, on Torridge, N. Devon, England; XIV.-cent. bridge of 24 arches; earthenware. Pop. (1911) 9074.

BIDENS, coarse herb; perennial; sometimes called Spanish needles.

BIDPAI, FABLES OF, or PILPAY, collection of ancient Hindu stories, which have been trans. into most European languages.

BIDRI, BIDDERY, alloy of zinc, tin, lead, and copper used in India for metal-work.

BIEBRICH (50° 2′ N., 8° 14′ E.), town, on Rhine, Prussia; castle of Dukes of Nassau, 1744–1840; cement, iron foundries. Pop. 19,000.

BIEDERMANN, FRIEDRICH KARL (1812–1901), Ger. prof., editor, historian, and politician.

BIEL, BIENNE (47° 9′ N., 7° 15′ E.), town, Swiss canton Bern; N.E. Lake of B.; watch-making, machinery. Pop. 24,000.

BIEL, LAKE OF (47° 5′ N., 7° 10′ E.), Switzerland; contains island of St. Pierre, Rousseau's residence, 1765.

BIELA, WILHELM, BARON VON (1782–1856), Austrian astronomer; discovered three comets, among them the B. COMET (1826).

BIELEFELD (52° 1′ N., 8° 31′ E.), town, on Lutter, Westphalia; centre of Westphalian linen, damask, and bleaching works; machinery. Pop. (1910) 78,380.

BIELITZ (49° 50′ N., 19° 3′ E.), town, on Biala, Austrian Silesia; woollens. Pop. 16,900.

BIELLA (45° 34′ N., 8° 3′ E.), town, Piedmont, Italy; cathedral; cloth manufactures. Pop. 3500.

BIENNE, see BIEL.

BIERSTADT, ALBERT (1830–1902), Amer. artist, of Ger. birth; celebrated for his landscapes of Amer. mountain scenery.

BIESBOSCH (51° 45′ N., 4° 45′ E.), expanse of water, Holland.

BIG HORN.—(1) (44° 30′ N., 107° 40′ W.) mountains, Nebraska. (2) (45° 30′ N., 107° 2′ W.) river, Nebraska.

BIG RAPIDS (43° 44′ N., 85° 29′ W.), city, Michigan, U.S.A.; furniture. Pop. (1910) 4519.

BIG SANDY RIVER (38° 20′ N., 82° 22′ W.), river dividing W. Virginia from Kentucky; joins Ohio.

BIGAMY, the act of a person marrying again during the lifetime of the first wife or husband. In canon law a second marriage, or marriage with one who has been married before, is bigamy. According to the ecclesiastical law of England a bigamous marriage is void, and the maximum punishment in the civil courts is seven years' penal servitude. To support a charge of b. a valid marriage must in the first instance be proved, and if it can be shown that the person charged really believed, and had reasonable grounds for believing, that his or her wife or husband was dead at the time of the later marriage, the charge fails; also if the person charged has neither seen nor heard of, or from, the first husband or wife for seven years immediately preceding the later marriage, the charge likewise fails. Until the reign of William III. b. was punishable by death; afterwards by life imprisonment and branding of the right hand; the present penalty was instituted by an act of George I.

BIGELOW, JOHN (1817–1911), Amer. journalist and diplomatist; edit. of Amer. papers till 1861; minister to France till 1867; Sec. of State for New York, 1867–68.

BIGGAR (55° 36′ N., 3° 32′ W.), town, Lanarkshire, Scotland.

BIGGLESWADE (52° 7′ N., 0° 16′ W.), market town, Bedfordshire, England; market gardening. Pop. (1911) 5400.

BIGHORN (*Ovis montana*), sheep found on Rocky Mountains; reddish-grey in colour.

BIGHT, large open bay (geography); loop of rope (nautical).

BIGNON, JÉRÔME (1589–1656), Fr. legal writer; advocate-general to grand council and *parlement* of Paris.

BIGNON, LOUIS PIERRE ÉDOUARD (1771–1841), Fr. Liberal politician and contemporary historian; helped to form Confederation of the Rhine and a constitution for Poland.

BIGOD, HUGH (d. 1177), 1st Earl of Norfolk (1141); 2nd s. ultimately heir of Roger Bigod; made earl for supporting Stephen against Empress Matilda.

BIGSBY, JOHN JEREMIAH (1792–1881), Eng. geologist and physician; served on Canadian Boundary Commission; made researches on geol. of Canada, and on Palæozoic rocks.

BIHAC (44° 48′ N., 15° 54′ E.), town, Bosnia. Pop. 4330.

BIHAR, BEHAR (25° 11′ N., 85° 31′ E.), town, Bihar and Orissa, India; traditional capital of ancient kingdom of Magadha; has great inn for Muhammadan pilgrims. Pop. 45,000.

Bihar and Orissa (24° N., 86° E.), Indian province (Lieutenant-Governorship), formed 1912 (from parts of Bengal as constituted, 1905); contains Bhagalpur, Patna, Tirhut, Chota Nagpur, and Orissa divisions. The Ganges traverses the N.; in the centre is hilly country (Parasnath, 4500 ft.); in S. fertile delta and valley of Mahanadi; irrigation by Son and Orissa canals. People are mostly Dravidian and Aryo-Dravidian. B. produces sugar, maize, rice, wheat, barley, tobacco, opium, cotton, tea; manufactures muslins, carpets, silk, glass, pottery; saltpetre and mica are obtained. Capital is Patna; there is a Legislative Council; area, 113,000 sq. miles. Pop. *c.* 35,000,000.

BIHARI, one of the four principal Indian languages, the others being Bengali, Assamese, and Oriya. It is spoken by about 35,000,000 people.

BIHARI-LAL (*c.* 1662 A.D.), Indian poet, author of *Sat-sai*, a collection of poetical distichs which are held in great estimation.

BIJAPUR (16° 49′ N., 75° 46′ E.).—(1) ancient city, Bombay, India; formerly capital of B. kingdom; from Hindus passed through the hands of Muhammadans and Mahrattas, becoming British, 1848; has ruined temples, mosques, palaces; principal building, tomb of Muhammad Adil Shah. Pop. 23,800. (2) district; plain, bordering Nizam's dominions; millet, cotton, silk; area, 5669 sq. miles. Pop. 735,435.

BIJAWAR (24° 38′ N., 79° 32′ E.).—(1) native state, Central India; forests; area, 973 sq. miles. Pop. 110,500. (2) chief town, B. state. Pop. 5200.

BIJNOR, BIJNAUR (29° 22′ N., 78° 10′ E.).—(1) district, United Provinces, India; sugar, cotton cloth; area, 1791 sq. miles. Pop. 779,900. (2) chief town, B. district. Pop. 17,600.

BIKANER (28° 1′ N., 73° 18′ E.).—(1) native state, Rajputana, India; mostly sandy and waterless; inhabitants poor; Bikaner Camel Corps saw service in China, 1901, when the Maharajah commanded, and in Somaliland, 1904; camels, horses, cattle; area, 23,311. Pop. (1911) 701,035. (2) walled town, capital B. state; Jain temples; pottery, carving. Pop. (1911) 53,075.

BIKRAMPUR (23° 37′ N., 88° 20′ E.), town, Dacca, Bengal, India.

BILASPUR (22° 5′ N., 82° 12′ E.).—(1) district, Central Provinces, India; occupies portion of Chhat-[illegible]rh plateau; large tract of hilly country to north; [illegible]ipal river, Mahanadi; S. well watered, undulating, [illegible]ly populated and cultivated; rice, wheat, timber; area, 7602 sq. miles. Pop. 917,240. (2) capital, B. district, on river Apra. Pop. 18,900.

BILBAO (43° 15′ N., 2° 54′ W.), chief town of Biscay province, Spain, on river Nervión, 8 miles S.E. of mouth; leading seaport of Spain; exports over four million tons of iron ore annually, mostly to U.K.; imports coal; unsuccessfully besieged by Carlists, 1835 and 1874. Pop. (1910) 92,514.

BILBEIS, BELBEIS (30° 25′ N., 31° 30′ E.), town, lower Egypt, E. arm of Nile.

BILBERRY, BLAEBERRY, WHORTLEBERRY (*Vaccinium myrtillus*), small shrub with ovate leaves and purple edible berries, growing in N. temperate and arctic zones.

BILBILIS (41° 25′ N., 1° 39′ W.), ancient town, Spain.

BILDERDIJK, WILLEM (1756–1831), Dutch poet; pub. collections of love songs in 1781 and 1785; an epic, *Elias* (1786); a didactic poem, *The Disease of the Learned* (1807); a tragedy, *Floris V.*, etc.; described by Ten Brink as 'the cleverest verse-maker of the XVIII. cent.'

BILEJIK (40° 7′ N., 30° 3′ E.), town, vilayet Brusa, Asia Minor; silk. Pop. 10,000.

BILFINGER, GEORG BERNHARD (1693–1750), Ger. divine, statesman, mathematician, and philosopher of school of Wolff and Leibnitz.

BILGE, lowest internal part of ship's hull. *Bilge-water* collects there.

BILHARZIOSIS, disease, occurring in Africa, caused by the presence of the ova and embryos of a parasite, *Bilharzia hæmatobia* (*Schistosoma hæmatobium*), in the blood-vessels of the mucous membrane of the bladder and urinary passages; the parasites are supposed to enter the body either by the rectum or urethra when bathing in infected water, or by swallowing infected food or drink. The treatment is mainly surgical, but *filix mas*, or *benzoic acid* in large quantities of water, along with *methylene blue* at stated intervals, have proved of benefit. See TREMATODES.

BILIN (50° 35′ N., 13° 48′ E.), town, Bohemia, Austria; mineral springs. Pop. 6931.

BILL (Med. Lat. *billa*, from Lat. *bulla*, any circular or cyclindrical object like seal or roll).—(1) **B. of Parliament**, see ACT. (2) **B. of Attainder** (*q.v.*). (3) Beak of a bird and other animals. (4) Pruning instrument of husbandman, with blade curved like bird's b. (5) Military weapon of similar shape used from O.E. times to XVIII. cent. (6) Letter, as in B. of Costs (solicitor's account), B. of Credit, B. of Exchange (below), B. of Health (certificate furnished to shipmaster by authorities of port from which he sails).

Bill of Exchange, an order in writing addressed by one person to another for the payment of a certain sum of money at a certain time, without condition or restriction; may be made payable either at home or abroad. The following is an example of an inland bill:—

CAMBRIDGE, *July* 1, 1912.

£300.

Two months after date pay to Mr. H. Black, or order, the sum of three hundred pounds, value received.

MURPHY & Co.

Messrs. Jones & Robinson,
Edinburgh.

Here Murphy & Co. are the 'drawers,' Jones & Robinson the 'drawees,' and H. Black the 'payee.' As soon as the drawees write their signature across the face of the bill, with or without the word 'accepted,' they are called the 'acceptors.' By so doing they signify that they have agreed to the order of the drawees; they are not liable on the bill until they have done so, and have delivered the bill to the person who is entitled to it. As the bill is payable to order, the payee must write his signature on the back of the bill before he can obtain payment of it or transfer it to a third party. A b. of e. is good payment for a debt unless and until it has been dishonoured, when the debt revives, and the creditor is not bound to accept payment by another bill, or by cheque, but can demand payment in cash. No person can be made liable on a bill unless he has affixed his signature and has a legal capacity to contract, *e.g.* an infant cannot be made liable on a b. of e. A bill is said to be dishonoured when the drawee refuses to accept it when presented, or refuses to pay it when due.

Bill of Rights, which became Act of Parliament, 1689, enforcing, among other enactments, the Prot. religion on Eng. sovereigns, declaring William III. and Mary II. King and Queen of England, and setting forth chief liberties or 'rights' of subjects.

Bill of Sale, a deed by which the ownership of personal chattels, but not the possession thereof, is transferred from one person called the grantor to another person called the grantee. The grant may be absolute, *i.e.* the goods and chattels may be sold outright to the grantee, or the grant may be conditional, in which case it is usually made as a mortgage (security for the repayment of money lent by the grantee to the grantor). If the money is repaid the grant ceases to have effect, *i.e.* the grantee has no longer any claim upon the chattels; but if the money is not repaid, the grantee may, under certain conditions, take possession of the goods; this is known as foreclosure. A b. of s. can only be given in regard to personal chattels (which term includes goods, furniture, trade effects, fixtures, etc.). Statutes regulating b. of s. were passed, 1854, 1866, 1878, 1882, 1890, and 1891.

BILLAUD-VARENNE, JACQUES NICOLAS (1756–1819), Fr. Jacobin; most bloodthirsty member of Committee of Public Safety; insisted on execution of Marie Antoinette; deported for cruelty, 1795.

BILLET, architectural ornament shaped like small cylinder, placed at regular intervals along cornice.

BILLETING, quartering of soldiers in private houses; illegal by Petition of Right, 1628; but authorised under certain contingencies by Mutiny Act, 1689, Army Discipline Act, 1879, and Army Acts, 1881 onwards.

BILLIARDS, a table game, the origin of which is lost in obscurity; mentioned in will of a II.-cent. Irish king; referred to in Shakespeare's *Antony and Cleopatra*, mentioned by Spenser, and was the fashionable game in France during the reign of Louis XIV. Eng. b. is now played upon oblong tables, 12 ft. long by 6 ft. broad, resting upon six legs. The framework is usually of mahogany, the bed of the table consisting of slabs of slate, very accurately fitted and levelled, the side-cushions being of vulcanised india-rubber. The bed of the table and the cushions are covered with a fine green cloth, and six pockets are placed around the table—one at each corner and one in the centre of each side. In the ordinary game three balls are used, two white and one red. The best of these are of ivory, 2⅛ in. in diameter; the cue used for striking is an ash staff, 4 ft. 9 in. in length, tipped with leather. Longer cues are used with a 'rest' to support them when the balls are too far distant for a player to strike them with the ordinary cue supported on his hand as a rest. The ordinary game is to make 100 points (or any fixed number) by scoring cannons (2) (striking the other white and the red ball), or by striking the red ball with the player's ball, and so driving either ball into a pocket (3). Each time [illegible] *Pyramids* and *Pool* are other games of b. Amer. and Fr. b. are cannon (Amer. *carom*) games, the tables being smaller and without pockets.

J. Roberts, *The Game of Billiards* (1898).

BILLINGS, ROBERT WILLIAM (1813–74), Eng. antiquary, architect, and author of valuable books on architecture and antiquities.

BILLINGSGATE, London fish-market, held by Thames in B. a little above Tower; licensed, 1699; variety of Cockney spoken here is noted for freedom and expressiveness.

BILLINGTON, ELIZABETH (d. 1818), Eng. prima donna; wife of James B., a double-bass player; achieved great success in Ital. opera at Covent Garden and Drury Lane, and at Florence, Venice, and Milan.

BILLITON (2° 55′ S., 108° E.), island, Dutch East Indies, between Sumatra and Borneo; surrounded by rocks and islets; tin; area, 1863 sq. miles. Pop. 36,858.

BILLOM (45° 44′ N., 3° 20′ E.), town, Puy-de-Dôme, France. Pop. 4300.

BILLON (Fr. debased coin), heavily alloyed metal used for medals and coins.

BILLROTH, ALBERT CHRISTIAN THEODOR (1829–94), Ger. surgeon; prof. of Surgery at Zürich (1860) and Vienna (1867); was made a member of the Austrian House of Peers (1887); one of the greatest surgeons of his time, introduced many new methods of operation.

BILMA (18° 37′ N., 13° 22′ E.), district, Kawar valley, Sahara Desert; salt.

BILNEY, THOMAS (c. 1495–1531), Eng. Protestant martyr; led early meetings at Cambridge; burned.

BILOXI (30° 21′ N., 88° 51′ W.), city, B. Bay, Mississippi, U.S.A.; early Fr. settlement; oyster canning. Pop. 5000.

BILSTON (52° 24′ N., 2° 5′ W.), market town, Staffordshire, England; coal, iron. Pop. (1911) 25,700.

BILTONG, sun-dried strips of meat (S. Africa).

BIMANA, term once used to distinguish man from Quadrumana (monkeys).

BIMETALLISM, employment of mixed currency, gold and silver, as legal tender of a country; in Britain monometallic system is in force, gold being recognised legal tender; it is contended that ratio (about 16 to 1) should be fixed between two metals and that less fluctuation in prices of metals would result; open to objection that scheme was tried in France with little success; free coinage of silver suspended by Paris mint, 1873. In U.S.A. gold has been standard since (nominally) 1873. BLAND SILVER BILL (1878), a compromise, provided for monthly silver coinage of from $2,000,000 to $4,000,000; Sherman law (1890) provided for monthly purchase by Treasury of 4,500,000 oz. of silver and issue of Treasury notes for it—notes and silver were full legal tender; purchase abandoned, 1893. Presidential b. candidate was defeated (1896), and with Currency Law (1900), cessation of silver coinage by India, and general introduction of gold standard, b. died as popular cause. See Darwin's *Bimetallism*, 1897; *Report of Gold and Silver Commission* and of *International Monetary Conference of Brussels*, 1892.

BIMLIPATAM (17° 50′ N., 83° 30′ E.), seaport, Madras, India; oil-seeds. Pop. 10,200.

BINAN (14° 25′ N., 121° E.), town, Luzon, Philippine Islands; rice. Pop. 9600.

BINARY NOMENCLATURE, application of a generic together with a specific name for plants and animals, e.g. *Caltha palustris* (marigold).

BINARY SYSTEM, double stars revolving around each other.

BINCHE (50° 24′ N., 4° 9′ E.), town, Belgium. Pop. 11,999.

BINGEN (49° 57′ N., 7° 54′ E.), manufacturing and trading town, on Rhine, Hesse, Germany; wine; in the middle of the river stands the famous Mouse Tower, where, according to legend, Abp. Hatto was destroyed by mice. Pop. 10,000.

BINGER, LOUIS GUSTAV (1856–), Fr. explorer, administrator, and author, who opened up country from Niger to Gulf of Guinea, Africa.

BINGERBRÜCK, town, Prussian Rhine prov. (below Bingen); wines. Pop. 3000.

BINGHAM, JOSEPH (1668–1723), Eng. clergyman; Fellow of Univ. Coll., Oxford, of which position he was deprived on a charge of heresy; pub. a valuable antiquarian work, *Origines Ecclesiasticæ* (1708–22).

BINGHAMTON (42° 6′ N., 75° 54′ W.), city, New York, U.S.A., at confluence of Susquehanna and Chenango Rivers; important manufacturing centre, tobacco, milling. Pop. (1910) 48,443.

BINGLEY (53° 51′ N., 1° 50′ W.), market town, W. Riding, Yorkshire; woollen goods. Pop. (1911) 18,800.

BINION, Breton wind instrument, with drone and chanter, somewhat like bagpipe.

BINMALEY (16° 5′ N., 120° 18′ E.), town, Luzon, Philippine Islands; rice, salt. Pop. 16,400.

BINNACLE, covered stand for compass on ship.

BINNEY, EDWARD WILLIAM (1812–81), Eng. geologist; authority on Lancashire coal measures.

BINNEY, HORACE (1780–1875), leading Amer. lawyer and politician.

BINNEY, THOMAS (1798–1874), Eng. Congregationalist preacher.

BINOCULAR, see STEREOSCOPE.

BINOMIAL, algebraical expression composed of sum or difference of two quantities. By **b. theorem,** invented by Newton, any power of a binomial can be expanded into a series, *e.g.* $(x+a)^n = (\frac{n}{1})ax^{n-1}+(\frac{n}{2})a^2x^{n-2}+\ldots\ldots+(\frac{n}{n-1})a^{n-1}x+a^n$

BINTANG (1° 10′ N., 104° 30′ E.), island, Malay Peninsula.

BINTURONG (*Arctitis binturong*), nocturnal civet-like carnivorous animals of E. Ind. forests.

BINYON, LAURENCE (1869–), Eng. poet, won Newdigate prize (1890); assistant keeper, Brit. Museum; his volumes of verse include *London Visions, The Praise of Life, Odes, Porphyrion and Other Poems, The Death of Adam,* all showing strong classical feeling; his play, *Attila,* performed at *His Majesty's,* lacks variety of emotion, as, also, does *Paris and Œnone,* but the strength and finish of some of his non-dramatic work, especially *Malham Cove,* cannot be too highly praised; author of excellent books on Oriental art.

BIO-BIO.—(1) (37° 30′ S., 72° W.) province, Chile, capital, Los Angeles; timber; agriculture; area, 5245 sq. miles. Pop. (1910) 100,200. (2) (36° 49′ S. 73° 2′ W.) largest river, Chile; rises in Andes, enters Pacific at Concepcion; length, 220 miles; navigable about half-way.

BIOGENESIS, term introduced by Huxley for theory 'that living matter always arises by the agency of pre-existing living matter.' See BIOLOGY.

BIOGRAPHY (Gk. *biographia,* from *bios,* life, *graphein,* to write), history of a person's life. One of the earliest forms of literature, the epic poem takes the shape of b.; long after close of Homeric age, authors like Æschylus, Sophocles, and Euripides treated their characters as subjects of b. not legend, and as such they were considered by the audience. pure b. was developed both in Greece and Rome. The Gk. historian Plutarch (*c.* 45–*c.* 125 A.D.) set model of b. in his *Lives of Illustrious Greeks and Romans,* which was trans. into Fr. by Amyot (1513–93), turned into classical English (1579) by North, and became the groundwork of Shakespeare's classical plays.

In the Middle Ages Mystery and Miracle plays were intended to be biographical, as were also the various rhyming histories of the saints. The b., as we know it, began to be written in the XVI. cent. when Cavendish wrote famous *Life of Wolsey* and William Roper penned a life of his f.-in-law, Sir Thomas More. Notable Eng. b's are: in the XVII. cent. Fuller's *Worthies of England,* Izaak Walton's lives of Donne, Wotton, Hooker, Herbert, and Sanderson, the *Athenæ Oxonienses* of Anthony à Wood; in the XVIII. cent. Dr. Johnson's *Lives of the Poets* (1779–81), which had important influence on the history of criticism, Godwin's *Life of Chaucer* and *Lives of the Necromancers,* and (1791) Boswell's *Life of Dr. Johnson.*

Nearly everybody of importance has received a b. since beginning of XIX. cent.; among outstanding b's in Eng. are Lockhart's *Scott,* Southey's *Nelson,* Coleridge's *Biographia Literaria,* Thomas Moore's *Life of Byron,* Carlyle's studies of Burns, and other small masterpieces in the *Essays,* greater than his *Frederick* and other larger b's, Froude's *Bunyan, Eng. Seamen,* etc., Scaliger's *Milton* (1879), Sellar's *Roman Poets* (these have their counterparts in France in books of Boissier), the various b's of Lord Morley, Winston Churchill's *Life of Lord Randolph Churchill,* W. Ward's *Cardinal Newman,* Cabot's *Emerson,* Lounsbury's *James Fenimore Cooper,* Paine's *Mark Twain.* National b's, e.g. *Dictionary of National B., Cyclopædia of Amer. B.,* and *Allgemeine Deutsche Biographie,* have been compiled in many modern countries.

BIOLOGY, life-lore; the description of all the phenomena of what is called life falls within its scope. For practical purposes, however, it is convenient to delimit this branch of science by excluding the study of human beings, except in so far as comparison and relation with other living organisms is concerned. B. is, therefore, the comparative description of the structure, functions, distribution, and evolution of animals and plants, the more particular study of each being the function of the sciences of Zoology and Botany, respectively. See ANIMALS, EVOLUTION.

BION (*c.* 100 B.C.), Gk. bucolic poet, whose best-known poem is the *Lament for Adonis.*

BIOT, JEAN BAPTISTE (1774–1862), Fr. physicist, prof. of Math's at Beauvais, afterwards prof. of Physics at Collège de France, and of Physical Astron. at Faculté des Sciences; invented polarimeter; pub. researches on polarised light, astron., physics, and other subjects. **Edouard Constant B.,** his s. (1803–1850), authority and writer on Chinese affairs.

BIOTITE ($(H,K)_2(Mg,Fe)_3Al_2(SiO_4)_3$ to $(H,K)_2(Mg,Fe)_4(Al,Fe)_2(SiO_4)_4$), important rock-forming mineral in igneous and crystalline rocks, a monoclinic, pleochroic (showing different colours as light falls on it in different directions) mica.

BIPARTITE, of two leaves separated at base (bot.); of curve with two branches (math's); b. factor, quantity which, when squared, exactly divides another quantity.

BIPLANE, see FLIGHT.

BIQUADRATIC, fourth power of a quantity; equation in which highest power of unknown is b.

BIQUINTILE, two-fifths of circle (144°).

BIR, BIREJIK (36° 59′ N., 38° 3′ E.), town, on Euphrates, Asiatic Turkey. Pop. 10,600.

BIRBHUM (24° 5′ N., 87° E.), district, Bengal, India; capital, Suri; silk; area, 1752 sq. miles. Pop. 902,300.

BIRCH (*Betula*), genus of hardy trees and shrubs of N. temperate zone to 70° N., *B. alba* being the common species, forming large forests in Russia; has a silvery cuticle, easily peeled, small irregularly serrated leaves, and the fruit has membranous wings to assist its dispersal. The bark (from which an oil is obtained), wood, and sap are applied to various uses. Twigs of b. are used to form rods for schools and prisons.

BIRCH, CHARLES BELL (1832–93), Eng. sculptor who executed many public works, including griffin at Temple Bar.

BIRCH, SAMUEL (1813–85), Eng. antiquarian; head of Egyptian and Assyrian dept., Brit. Museum.

BIRCH, THOMAS (1705–66), Eng. divine, historian, and biographer; occupied various livings; D.D., 1753; books highly esteemed then, and still used.

BIRCH-PFEIFFER, CHARLOTTE (1800–68), Ger. actress, novelist, and dramatist; played leading rôles at the Berlin (royal) theatre up to time of her death; pub. *Gesammelte Novellen und Erzählungen* (novels and tales), plays and adaptations.

BIRD, EDWARD (1772–1819), Eng. *genre* painter.

BIRD, WILLIAM (BYRD) (1563–1623), Eng. musical composer; wrote first Eng. madrigals (1588).

BIRD-CATCHING SPIDERS, see TARANTULAS.

BIRD-LICE (*Mallophaga*), neuropterous, biting insects, parasitic on skin, hair, and feathers; different from true lice (*Rhyncrota*).

BIRDS (*Aves*), class of highly specialised vertebrate bipeds of world-wide distribution, characterised by their intense metabolism, indicated by high body temperature, by numerous anatomical adaptations for the function of flight, by the possession of feathers, and by the hatching of their young from eggs with calcareous shells.

The most ancient known bird (*Archæopteryx*) has been found in the Jurassic lithographic slates of Solenhofen, Bavaria, and forms a distinct link between reptiles and birds, possessing teeth held in sockets, no sternum, and clawed fingers. This extinct bird forms the sub-class *Archæornithes* or *Saururæ.* All other birds are included in the sub-class *Neornithes.*

The first division of the latter, *Ratitæ,* running

birds without power of flight, persisting since the Miocene, with keelless breastbone, are represented by the ostrich (*Struthio*) of Africa and Arabia, the S. Amer. ostrich (*Rhea*), the Austral. emu (*Dromœus*) and Austral.-Malayan cassowaries (*Casuarius*), the little wingless and four-toed kiwi (*Apteryx*) of New Zealand and its extinct giant relative, the moa (*Dinornis*), the recently extinct order *Æpyornis* of Madagascar, and various Eocene and Pleistocene species.

The second division, *Odontolcæ*, consists of extinct swimming birds with keelless breastbone and teeth situated in grooves, and a few affinities to living flying types. *Hesperornis* of N. America and *Enaliornis* of Eng. cretaceous strata are the typical representatives.

The flying birds with keeled breastbone are comprised in the third division, *Carinatæ*. Their principal adaptations for flight are the general shape of the body, offering comparatively little resistance to the air; the construction of the wings; the keeled breastbone for the attachment of the powerful pectoral muscles; the air-spaces in the body cavity and in the long bones in connection with the non-expansible lungs, and the air in spongy spaces in the skull-bones connected with the Eustachian and nasal tubes, facilitating breathing during flight. Many birds undertake long and hazardous migratory flights to ensure a supply of food when the climatic conditions make a sojourn in the breeding area prohibitive. The remarkable development of the brain, manifesting itself in the complex emotions of courtship, and all the functions associated with the care of offspring (*e.g.* nest-building), and in migration and other habits, makes some orders of the *Carinatæ* rank with the mammals as the highest evolutionary phases of the animal kingdom.

A segregation of *Carinatæ*, over 11,000 species into 14 orders, introduced by Dr. Gadow, seems most advantageous. The extinct (cretaceous) *Ichtyornithes* have biconcave vertebræ and teeth in sockets, and were able to fly well. The aquatic *Colymbiformes* with straight bill include the grebes and divers. In the penguins, or *Sphenisciformes*, the wings are transformed into flippers for swimming. Flying seabirds like albatrosses and petrels belong to the order *Brocellariiformes*; the gannets, cormorants, frigate-birds, and pelicans, however, as well as wading birds like storks, ibises, and flamingos, are grouped as *Ciconiiformes*. Screamers, ducks, geese, and swans are included in *Anseriformes*. The *Falconiformes* are diurnal birds of prey and excellent fliers, and include falcons, hawks, eagles, vultures, condors, and others. Of the small Central and S. Amer. order *Tinamiformes*, the tinamou, a partridge-like game-bird, is the best known representative. Fowls, pheasants, quails, and similar birds constitute the order *Galliformes*, with the curious hoatzin of Northern S. America, whose unhatched chick has clawed fore-limbs, showing reptilian affinities. Wading birds, like cranes, rails, bustards, and bitterns, are *Gruiformes*. The large order *Charadriiformes* includes such different types as plovers, pigeons, auks, and gulls, and the extinct dodo of Mauritius. Parrots and cuckoo-like birds belong to the *Cuculiformes*. A large order with most varied representatives is the *Coraciiformes*, comprising ravens, owls, hummingbirds, toucans, woodpeckers, kingfishers, and others. The most heterogeneous order of all is the *Passeriformes*, in some of which the emotional life finds its most highly developed and beautiful expression; it includes the birds of paradise, bower-, weaver-, and tailor-birds, and all the singing birds like finches, thrushes, nightingale, etc. See ANIMALS, ORNITHOLOGY, EVOLUTION, MIGRATION.

Kirkman, *The British Bird Book*; A. Newton, *A Dictionary of Birds* (London, 1896); J. E. Harting, *Handbook of British Birds* (new edit., 1901); Hartert and others, *A Hand List of Brit. Birds* (1912); Headley, *The Flight of Birds* (1912); Pycraft, *A History of Birds* (1910).

BIRD'S-EYE, flower with bright centre, as germander speedwell and mealy primrose—there is popular superstition against picking it; cut tobacco, including ribs of leaves; nodules in planed timber.

BIRD'S-NEST, name applied to plants of different kinds which live as concealed parasites of others.

BIRDS OF PARADISE (*Paradiseidæ*), closely allied to crows, inhabiting New Guinea and Malay Archipelago; magnificent plumage of adult males evolved by sexual selection; females have plain plumage for protection.

BIRDWOOD, SIR GEORGE CHRISTOPHER MOLESWORTH (1832–), Brit. writer on Indian art and other Indian subjects.

BIREN, ERNST JOHANN VON (1687–1772), favourite of Anne, Empress of Russia; s. of peasant called Bühren; took name and arms of Duc de Biren; made Duke of Courland, 1737.

BIRETTA (Ital. *berretta*, a cap), square cap of different colours according to rank (white for the pope, red for cardinals, purple for bp's, black for lower clergy), worn on certain occasions by R.C. ecclesiastics. The name first appears in XIII. cent., but shape and significance fixed in XVI. and XVII. cent's; considered sign of Erastianism when worn by Anglican clergy in XVII. cent. The use has been revived in modern (ritualistic) Anglican Church, but was declared illegal, 1871.

BIRGEND (32° 53′ N., 59° 10′ E.), town, Khorassan, Persia. Pop. *c.* 20,000.

BIRGER, JARL OF BJÄLBO (d. 1266), Swed. statesman and legist.

BIRKBECK, GEORGE (1776–1841), Eng. physician; prof. of Natural Philosophy at Andersonian Institution, Glasgow (1799); founded Mechanics' Institute, London (1823), afterwards called *B. Institution*, of which he was director: it has day and evening classes in science, lit., and arts.

BIRKDALE (53° 37′ N., 3° W.), town, Lancashire, England. Pop. (1911) 18,001.

BIRKENFELD (49° 38′ N., 7° 10′ E.).—(1) town, capital of B. principality, Germany; breweries. (2) principality dependent on grand-duchy of Oldenburg (*q.v.*); hilly, well-wooded; agriculture; area, 312 sq. miles. Pop. (1910) 50,496.

BIRKENHEAD (53° 24′ N., 3° 1′ W.), seaport, Cheshire; has ferry, and tunnel under Mersey connecting it with Liverpool; became borough in 1877; large shipbuilding works, iron foundries; splendid docks, first of which was opened 1847; exports coal, etc.; three public parks; fine public buildings, including town hall, library. Pop. (1911) 130,832.

BIRMINGHAM (52° 28′ N., 1° 52′ W.), town, Warwickshire, England, with suburbs extending into Staffordshire and Worcestershire; one of great Midland manufacturing towns, 97½ miles S.E. of Liverpool, 112 miles by rail N.W. of London.

Town is irregularly laid out; some fine streets and public buildings near centre, including town hall, of Gk. arch. with Corinthian pillars, where triennial musical festivals are held, art gallery, council house, etc. Univ. was established in 1900, and there are various other educational institutions, including technical school, school of art, and grammar school founded and endowed by Edward VI. B. is b'pric of Anglican, and an archbishopric of R.C. Church; cathedral built in 1839–41. There are several large hospitals and charitable institutions; numerous statues. B. is parliamentary, municipal, and county borough. Municipal administration carried out by city council, with lord mayor at head.

Town was in existence before Norman Conquest, and is mentioned in *Domesday Book*; it later gave its name to resident family, who held manor here for about three cent's; supported Roundheads in Civil War; suffered attack by Prince Rupert, who captured and sacked it; in reign of Charles II. was ravaged by plague. Serious riots have thrice occurred, against Unitarians in 1791, in favour of Chartists in 1839, and against Irish in 1866; enfranchised in 1832; became city in 1889; is the stronghold of the Tariff Reform move-

ment, dominated by the personality of Mr. Joseph Chamberlain, who has had the chief share in the development of modern B. Manufactures include all kinds of metal work, founding, rolling, stamping, plating, drawing; making of machinery, iron roofs, girders, gasometers; steam, gas, and hydraulic engines; railway plant, electric apparatus, tools, guns, rifles, bells, electroplate, watches, clocks, glass, chemicals, ammunition, swords, jewellery, coins, buttons, buckles, lamps, toys, pins, steel pens, nails, screws, locks. At the gun proof-house about 600,000 gun barrels are tested annually. Railways run in all directions; canals to Severn, Thames, Mersey, and by Potteries to Trent. Pop. (1911) 525,960.

BIRMINGHAM (33° 28′ N., 86° 40′ W.), city, Alabama, U.S.A.; important iron and steel manufactures; centre of agricultural trade; cotton. Pop. 132,685.

BIRNAM (56° 42′ N., 3° 35′ W.), hill and village, Perthshire, Scotland.

BIRNEY, JAMES GILLESPIE (1792–1857), Amer. reformer and political writer; procured enactment by Alabama government of statute forbidding importation of slaves, 1827; settled in Kentucky for anti-slavery crusade, 1833; made New York his centre, 1837.

BIRON, ARMAND DE GONTAUT, BARON DE (1524–92), Fr. soldier and favourite of Henry III.; grand master of Artillery (1569); marshal of France (1576); joined Henry of Navarre (1589); killed at siege of Épernay (July 26, 1592).

BIRON, CHARLES DE GONTAUT, DUKE OF (1562–1602), Fr. admiral and marshal, known as *Fulmen Galliæ*; finally beheaded for treason.

BIRR, PARSONSTOWN (53° 7′ N., 7° 54′ W.), market town, King's County, Ireland; castle granted by James I. to Lawrence Parsons, ancestor of Earl of Rosse, present proprietor.

BIRRELL, AUGUSTINE (1850–), Eng. essayist and Liberal politician; b. near Liverpool; Quain prof. of Law, Univ. Coll., London (1896–99); entered Parliament, 1889; app. Pres. of Board of Education (1905), brought in Education Bill, which was abandoned; Chief Sec. for Ireland (1907); under his régime *Irish Univ. Act*, *Irish Land Act*, and *Home Rule Bill* were introduced; a witty speaker, famous for his 'birrellisms'; an essayist of delightful style, author of *Obiter Dicta* (first and second series), *Men, Women, and Books*, etc.

BIRTH, the act of being born, or bringing forth a child. In Britain the father or mother of every child born alive, or in default of them, the occupier of the house, or any person present at the b. or having charge of the child, is compelled to give particulars regarding the b. to the registrar within forty-two days, and to sign the register in presence of the registrar. In addition, under the *Notification of Birth Act* (1907), which may be adopted and enforced by local authorities, the father and any person in attendance on the mother (medical practitioner or midwife) must notify the Medical Officer of Health of the district of the b. within thirty-six hours, in order that he may take steps for the prevention of infant mortality. *Concealment of b.*, in Scotland, and concealment of b. by secret disposal of the dead body of the child, in England, is in both cases a misdemeanour punishable by not more than two years' imprisonment. A mature child at b. is, on an average, 18 in. in length, and 6 to 7 lb. in weight, but quite normal infants may differ widely from these figures. See BABY, REPRODUCTION, GENERATIVE SYSTEM, VITAL STATISTICS.

BIRŪNI (973–1048), Arab. scholar; two of his works, *Chronology of Ancient Nations* (1879) and *History of India* (1888), have been trans. into Eng.

BISACQUINO (37° 42′ N., 13° 14′ E.), town, Sicily; produces jasper, agates. Pop. 9076.

BISAHIR, see BUSSAHIR.

BISCAY, VISCAYA (43° 20′ N., 3° 15′ W.), one of three Basque provinces, N.E. Spain; mountainous, thickly wooded; rich in minerals; inhabited by Basques (*q.v.*); capital and chief port, Bilbao (*q.v.*); area, 836 sq. miles. Pop. (1910) 349,700.—**Biscay, Bay of** (45° N., 4° W.), bay of the Atlantic, formed by coasts of France and Spain; named from Span. province of B.; subject to severe storms, owing to its exposure to the prevailing S.W. winds and the opposition of its currents to the tides.

BISCEGLIE (41° 15′ N., 16° 29′ E.), seaport, on Adriatic, Italy; cathedral. Pop. 28,600.

BISCHOFF, THEODOR LUDWIG WILHELM (1807–82), Ger. biologist, and pioneer in embryology.

BISCHOFSWERDA (51° 14′ N., 14° 11′ E.), town, Saxony; cloth manufactures. Pop. 7500.

BISCHWEILAR (48° 46′ N., 7° 51′ E.), town, on Moder, Alsace, Germany; woollen cloth. Pop. 8300.

BISCUITS, crisp thin cakes, manufactured chiefly from flour, with salt, sugar, butter, etc. Dough passes from kneaders to rollers, whence sheets of requisite thickness proceed over endless conveyor-bands to punching-machine, then through long baking-ovens to packers.

BISECTRIX, BISECTOR, line dividing angle, or point dividing line into two equal parts.

BISHOP, an official of the Christian Church in all those branches that have maintained the Catholic tradition and some others. In the Catholic theory b's, priests, deacons, and subdeacons are the major orders. The early history of EPISCOPACY (*q.v.*) is involved in controversy. The b. has certain peculiar functions in the Roman, Eastern, and Anglican Churches. He alone can confirm, ordain priests and deacons (and subdeacons), anoint monarchs, and consecrate buildings. A b. is consecrated by an archbishop and other b's, who lay their hands upon him. R.C. b's are elected by chapters or provincial synods or app. by secular authorities, subject to papal confirmation. In the Anglican Church, though the Chapter nominally elects, the appointments are really made by the Crown. The last half-cent. has seen an increase of sees in England, and *suffragan* (*i.e.* assistant; *coadjutor* and *auxiliary* are the terms used in R.C. Church) b's have been revived. **Bishops, Trial of the Seven.**—The protest of Abp. of Canterbury and six other bp's against Declaration of Indulgence (April 1688) was followed by their arrest at instigation of James II., trial, and acquittal (June 30) amidst rejoicings of nation.

BISHOP AUCKLAND (54° 39′ N., 0° 41′ W.), market town, Durham, England; coal, iron, and cotton. Pop. (1911) 13,839.

BISHOP, SIR HENRY ROWLEY (1786–1855), Eng. composer; was successively musical director at Covent Garden, Drury Lane, and Vauxhall; subsequently prof. of Music at Edinburgh and Oxford; knighted 1842, being the first musician to receive that honour; chiefly remembered by settings of Shakespeare's songs, and popular ballads like *My Pretty Jane* and *Home, Sweet Home*, introduced into his opera, *Clari* (1822).

BISHOP, ISABELLA, *née* BIRD (1832–1904), Eng. travel-writer; wife of Dr. John B., an Edinburgh physician; author of books on East.

BISHOP'S CASTLE (52° 30′ N., 3° 1′ W.), market town, Shropshire, England; remains of castle of the bp's of Hereford.

BISHOP'S STORTFORD (51° 52′ N., 0° 10′ E.), market town, Hertfordshire, England; brewing and malting. Pop. (1911) 8723.

BISHOP'S WALTHAM (50° 57′ N., 1° 13′ W.), town, Hampshire, England. Pop. (1911) 4570.

BISKRA (34° 55′ N., 5° 36′ E.), town and oasis, Algeria, comprising number of small villages, separated by olive groves and date palms; genial winter climate; popular resort; captured by French, 1844; military post. Pop. 7500.

BISLEY (51° 19′ N., 0° 38′ W.), village, Surrey, England; meeting-place of the National Rifle Association, whose competitions, extending over a fortnight

in July, attract shots from all parts of British Empire. The King's Prize (£250 and gold medal) is the chief event, and is open only to past and present Volunteers or Territorials.

BISMARCK (46° 46′ N., 100° 40′ W.), town, capital of North Dakota, U.S.A.; grain, furs. Pop. 5443.

BISMARCK ARCHIPELAGO (4° S., 150° E.), island group, S. Pacific; Ger. protectorate.

BISMARCK, OTTO EDUARD LEOPOLD, PRINCE VON, DUKE OF LAUENBURG (1815–98), Ger. statesman; b. Schönhausen, Brandenburg; admitted to public service (1835); undertook management of family estates in Pomerania (1839); app. Deichhauptmann (1846); represented lower nobility of his district in Estates-general (1847); helped to found the *Kreuzzeitung* (organ of Prussian monarchical party); sat for Brandenburg (1849); Prussian representative in Federal Diet (1851–59); discovered its subservience to Austria, and became convinced that only by 'blood and iron' could Germany be welded into a national state. Ambassador at St. Petersburg (1858), at Paris (1862), B. was appointed Prime Minister (Sept. 1862), and ruled four years without a budget, depending solely for his position on the king's confidence. B. aided Russia during Polish rebellion (hence regarded as enemy of liberty); opposed popular Augustenburg claims to Schleswig and Holstein (1863); acting with Austria, he went to war with Denmark.

After Treaty of Vienna (1864) he prepared for war with Austria as only way of securing Prussian ascendancy in Germany. War of 1866 left Prussia supreme in Germany; thus B. finished the work of Frederick the Great; the settlement of 1866 was his work. He became sole responsible minister in confederation of North German States, and pursued a Nationalist policy. After 1870 B. absolutely controlled foreign policy and played foremost rôle in events leading up to Franco-German War (*q.v.*). He fostered in Germany the ideal of the strong, effective man, encouraging historians, like Mommsen, who preached Cæsarism, and new school of philosophers (of whom Nietzsche was leader), whose standard is merely the amount of energy a man possesses; thus exercised enormous influence on Ger. thought; estranged from ultramontanist Conservatives (1866), his opposition to claims of R.C. hierarchy (1873–66) causing much criticism. He carried through important commercial reforms. A practical, far-sighted statesman, and shrewd, trusty minister, B. was dismissed from office (1890) by William II. See GERMANY: *History*.

Paul Schulze and Otto Koller's *Bismarck-Literatur* (Leipzig, 1896), and works of Heyck, Kreutzer, Lenz, Busch, Klein-Hattingen; *Life*, by Jacks (1899); *B. and the Foundation of the Ger. Empire*, by Headlam (1899).

BISMUTH (Bi=208·5), brittle metal of crystalline texture, white or yellowish tinged with faint red; S.G. 9·8; M.P. 268° C.; expands on solidification; found native in Cornwall, France, Germany (especially Saxony), Liberia, etc. B. exists combined with oxygen, carbonic acid, lead, and tellurium; is simple to separate, and readily forms alloys. 'Fusible metal' is formed of 1 part lead, 1 part tin, and 2 parts bismuth. This metal melts at 93·75° C. B. is used externally and internally in medicine.

BISON, see OX GROUP.

BISSAGOS ISLANDS (11° 30′ N., 16° 30′ W.), islands, off Senegambia, W. Africa; belong to Portugal.

BISSAU (11° 48′ N., 15° 47′ W.), port, Portuguese Guinea.

BISSELL, GEORGE EDWIN (1839–), Amer. sculptor; has executed statues of Pres. Lincoln for Edinburgh, and 'Burns and Highland Mary' for Ayr.

BISSEN, WILHELM (1798–1868), Dan. sculptor of classical and poetical school of Thorwaldsen.

BISSON, ALEXANDRE (1848–), Fr. dramatist whose comedies, *Les Surprises du divorce*, *Château historique*, etc., have had great success.

BISTRITZ (47° 8′ N., 24° 28′ E.), town, Transylvania, Hungary. Pop. 10,873.

BITHUR (26° 36′ N., 80° 19′ E.), town, on Ganges, United Provinces, India; captured by Havelock, 1857. Pop. 7200.

BITHYNIA (*c.* 41° N., 32° E.), old division, N.W. Asia Minor, bordering on Sea of Marmora and Black Sea. Capitals were Nicomedia, Nicæa; subdued by Lydia, VI. cent. B.C.; afterwards part of Persian empire; independent in III. cent. B.C.; became Roman province, 74 B.C.

BITING ANGLE, in gunnery, the smallest angle at which a projectile will penetrate armour, being the angle between the axis of the projectile and the armour.

BITLIS (38° 26′ N., 42° 3′ E.), town, Asiatic Turkey; numerous mosques and churches; red cotton cloth. Pop. 40,000.

BITONTO (41° 7′ N., 16° 41′ E.), walled town, Italy; castle; bp's see. For victory over Austrians at B., 1734, Span. general Montemar received title of Duke of B. Pop. 26,800.

BITSCH (49° 4′ N., 7° 28′ E.), fortified town, Alsace-Lorraine, Germany. Pop. 4758.

BITTER LAKE (37° 20′ S., 66° W.), lake, La Plata, S. America.

BITTER LAKES (*c.* 31° N., 33° E.), two lakes, Suez, Egypt.

BITTER ROOT MOUNTAINS (46° 40′ N., 115° W.), mountains separating Idaho from Montana, U.S.A.

BITTER SPAR, see DOLOMITE.

BITTERFELD (51° 37′ N., 12° 15′ E.), town, Saxony; founded by Flemings, XII. cent.; machinery. Pop. 13,300.

BITTERN (*Botaurus stellaris*), marsh-loving bird, related to Heron and Stork; feeds on fish; found throughout the Old World, but no longer breeds in Great Britain.

BITUMEN, term for mineral compounds of carbon and hydrogen, including naphtha, petroleum, and especially asphalt and its forms.

BITURIGES, a Celtic race, who during the Roman Empire occupied vast tracts of land in Gaul.

BITZIUS, ALBRECHT (1797–1854), Swiss novelist; better known as JEREMIAS GOTTHELF; wrote novels dealing with Bernese peasant life.

BIVALVES, see LAMELLIBRANCHIATA.

BIVOUAC (Fr.), a night-watch; the term is now applied to troops lying out in the open, without tents.

BIWA (35° 15′ N., 136° E.), lake, Hondo; largest in Japan (36 miles long).

BIXIO, NINO (1821–73), Ital. soldier; performed brilliant services under Garibaldi; took part in attack on Rome (Sep. 1870), and captured Cività Vecchia.

BIZERTA (37° 16′ N., 9° 48′ E.), fortified seaport, Tunis, N. Africa; excellent harbour; held by French since 1881; naval station. Pop. 25,000.

BIZET, GEORGES, pseudonym of ALEXANDRE CÉSAR LEOPOLD (1838–75), Fr. composer; gained the *Grand Prix de Rome* (1857); experienced many struggles and privations during his musical career; produced several comic operas, *Les Pêcheurs de perles* (1863), *La Jolie Fille de Perth* (1807), and *Djamileh* (1872), which achieved little success, and the charming incidental music to Daudet's *L'Arlésienne*. His masterpiece, *Carmen*, produced in 1875, was received with acclamation, exercised considerable influence on lyric opera, and has retained its popularity.

BJÖRNEBORG (61° 29′ N., 21° 46′ E.), town, on Gulf of Bothnia, Finland; shipbuilding. Pop. 11,700.

BJÖRNSON, BJÖRNSTJERNE (1832–1910), Nor. poet, novelist, and dramatist; s. of a Lutheran pastor; ed. Christiania; commenced his career as a journalist. Later he began to write novels, many of which have enjoyed a European reputation. His first work was *Synnöve Solbakken* (1857), followed by *Arne* (1858), *A Happy Boy* (1860), *The Fisher Maiden* (1868), and numerous others. His plays include *Between the Battles*, *Lame Hulda*, *Sigurd the Bastard*, *Sigurd the Crusader*, *Mary Stuart*, *The Newly Married*, *Beyond our Powers*, ranging from poetic tragedy to

comedy and social drama. In 1870 he issued his *Poems and Songs* and *Arnljot Gelline*, including his famous ode *Bergliot*. He was awarded the Nobel prize for lit. in 1903. His later work was used as the medium for the propagation of his radical, social, and religious views; but much of his work entitles him to share with his fellow-countryman, Ibsen, a foremost place in European literature.

Brandes, *Ibsen and Björnson*; *Works*, with preface by Gosse (1895).

BJÖRNSTJERNA, MAGNUS FREDRIK, COUNT (1779–1847), Swed. soldier, statesman, and author; fought in 1813 campaign against Napoleon; promoted alliance with Norway, 1814.

BLACK COUNTRY, Eng. mining and manufacturing district in South Staffs, stretching from Birmingham to Wolverhampton in one direction, and Walsall to Dudley in another.

BLACK DEATH, see PLAGUE.

BLACK EARTH, fertile soil deposit resembling loess (*q.v.*), covering large areas in S. Russia.

BLACK FLUX, composed of carbon and potassium carbonate; like all fluxes a substance used in extraction of pure metal from ores, the flux forming a slag with impurities.

BLACK FOREST, SCHWARZWALD (48° 20′ N., 9° E.), mountainous district, Baden and Württemberg, Germany, near Rhine valley; highest peak, Fieldenberg, 4900 ft.; extensive forests; minerals; picturesque scenery, tourist resort; cattle, clocks; area, 1800 sq. miles. Pop. (1910) 571,000.

BLACK FRIARS, see DOMINICANS.

BLACK FRIDAY, May 11, 1866 (England), Sept. 11, 1869, and Sept. 19, 1873 (U.S.A.), days of financial panic; first due to failure of Overend & Gurney, second to attempt by Fisk & Gould to corner gold market.

BLACK GROUSE, see GROUSE.

BLACK HAND (Span. *mano negro*), name of Span. and Ital. secret societies; the latter have within recent years committed outrages in U.S.A.

BLACK HILLS (44° 30′ N., 103° 35′ W.), mts., S.W. Dakota and N.E. Wyoming, U.S.A.; loftiest peak, Harney, 7216 ft.; extensive forests; fertile; gold, silver.

BLACK ISLE (57° 37′ N., 4° 12′ W.), peninsula between Beauly and Moray Firths and Cromarty Firth, Scotland.

BLACK LETTER, see PRINTING.

BLACK LIST, under Licensing Act, 1902, registers ('Lloyd George's B.L.') of habitual drunkards are kept.

BLACK MOUNTAIN (*c.* 34° 30′ N., 73° 10′ E.), mountain range and district, N.W. Frontier Province, India.

BLACK PRINCE, THE, EDWARD, PRINCE OF WALES (1330–76), e. s. of Edward III.; distinguished himself in Fr. wars, specially at *Crecy*, 1346; returned to England, 1373, and became head of political faction opposed to his bro., John of Gaunt. The Black Prince's death left his s. Richard, afterwards Richard II., heir to throne.

BLACK ROD, an officer (since XIV. cent.) of the House of Lords and also of the Order of the Garter; app. by the Crown. The black rod from which he derives his title is a black staff surmounted with a golden lion, which he carries as a symbol of office. One of his principal duties is that of carrying communications between the Lords and Commons. Thus, when the King opens Parliament, B. R. is sent to summon the Commons to attend at the bar of the House of Lords to hear the King's speech.

BLACK SEA, EUXINE (43° N., 33° E.), inland sea, between Europe and Asia; area, 180,000 sq. miles; communicates with Mediterranean by Strait of Bosphorus, Sea of Marmora, and Dardanelles; shores high; good harbours except N.; numerous affluents; water fresher than ocean; freezes readily; one island, Adassi, at mouth of Danube.

It was named by the ancients PONTUS EUXINUS, being called *Euxeinos* (hospitable) by the Gks. on same principle which made them call the Furies Eumenides; considered by them in early times as inaccessible and under supernatural control; over it Jason sailed to find the Golden Fleece, and its shores are the scenes of numerous Gk. legends. Later, Gk. colonies were planted, and it was opened up to commerce by Rome and continued to offer free access to Western nations, particularly after the establishment of Constantinople at the old Byzantium, until Constantinople fell into possession of the Turks (1453), when it was closed to all foreign traders. In 1774 Russia obtained right to trade here; shortly afterwards this right was extended to Austria, Britain, and France, and in 1856 (by Treaty of Paris) to all nations. The sea was declared neutral by the Treaty of Paris, but ceased to be so by decree of the Powers, 1871; Turkey declared blockade, 1877; Russian B. S. Fleet reorganised, 1886; B. S. territory declared Russian province, 1896.

BLACK WATCH, Highland regiment, wearing dark tartan; established, 1688, to repress Jacobitism; comprises old 42nd and 73rd Regiments.

BLACK, ADAM (1784–1874), Scot. publisher; s. of a builder; b. Edinburgh; was first a bookseller, but afterwards took up publishing; became proprietor of the *Encyclopædia Britannica*, the Waverley novels, and other valuable copyrights; founder of the firm of A. & C. Black; was twice Lord-Provost of Edinburgh, and sat as member for the city for ten years (1856–65).

BLACK, JEREMIAH SULLIVAN (1810–83), Amer. lawyer and statesman; Sec. of State (1860–61); reporter to Supreme Court of U.S.A. (1861).

BLACK, JOSEPH (1728–99), Scot. chemist and physician; b. Bordeaux; lecturer on chem., Glasgow (1756); prof., Edinburgh (1766); discovered carbon dioxide, then called 'Fixed air' (1754), and propounded theories of 'Specific heat' and of 'Latent heat.'

BLACK, WILLIAM (1841–98), Eng. novelist; abandoned journalism for novel-writing, scored a great success with *A Daughter of Heth* (1871), and for nearly thirty years maintained his popularity as a writer of fiction. Not the least of his attractions was his power of describing Scot. scenery.

BLACKBERRY, BRAMBLE (*Rubus fruticosus*), common Brit. plant of family Rosaceæ (*q.v.*).

BLACKBIRD, a thrush, of the ousel family. See under THRUSH FAMILY.

BLACKBURN (53° 45′ N., 2° 30′ W.), town, Lancashire, England; cotton-weaving; birthplace of Hargreaves, who invented spinning-jenny, 1764. Pop. (1911) 133,000.

BLACKBURN, COLIN BLACKBURN, BARON (1813–96), Eng. judge; made a lord of appeal (1876), and noted as a high authority on common law; author of the *Law of Sales*.

BLACKBURN, JOSEPH HENRY (1842–), English chess-master.

BLACKBURNE, FRANCIS (1782–1867), Lord Chancellor of Ireland (1852 and 1866).

BLACKFEET, small tribe of N. Amer. Indians of Algonquian family, living in Montana and Canada.

BLACKHEATH, open common, S.E. London; here golf was first played in England, 1608; scene of insurrection of Wat Tyler and Jack Cade; frequented by highwaymen end of XVIII. cent.

BLACKIE, JOHN STUART (1809–95), Scot. scholar and poet; for thirty years prof. of Greek in Edinburgh Univ.; pub. *Homer and the Iliad* (1866), *The Language and Literature of the Scottish Highlands* (1876), *Lay Sermons* (1881), and poems.

BLACKING, for producing a polish on boot leather; contains powdered ivory or bone black, oil, vinegar, sugar, gum-arabic, and sulphuric acid.

BLACKLEAD, see CARBON.

BLACKLOCK, THOMAS (1721–91), Scot. poet; s. of bricklayer; blind from childhood; entered ministry; friend of Burns; *Poems* (1746); collected edit., 1793.

BLACKMAIL, legal term, meaning to extort money under threat of public exposure. The crime is punishable by a severe penalty, even though the statements alleged against a person be true. It was

formerly the name given to money paid to Border raiders to purchase immunity from their devastations.

BLACKMORE, SIR RICHARD (d. 1729), Eng. physician and poet; physician in ordinary to William III. and Anne, by the former of whom he was knighted; author of a dull, philosophical poem, *The Creation*, tedious epics, and some medical works.

BLACKMORE, RICHARD DODDRIDGE (1825–1900), Eng. novelist and scholar; achieved remarkable success with *Lorna Doone* (1869), a romance of Exmoor, which has done much to popularise the West Country.

BLACKPOOL (53° 49′ N., 3° 3′ W.), favourite watering-place, Lancashire, England; fine promenade; piers; great wheel, etc. Pop. (1911) 58,500.

BLACKSTONE, SIR WILLIAM (1723–80), Eng. advocate and standard legal commentator; b. London; ed. Charterhouse and Pembroke Coll., Oxford; entered at Middle Temple (1741); fellow of All Souls Coll. (1744); called to Bar (1746); D.C.L. (1750); elected to Vinerian professorship (1758); pub. *Commentaries on the Laws of England* (1765–69); subsequently resumed practice in London and sat in the court of Common Pleas.

BLACKWALL, district, London, England; fine docks; terminus of B. railway, opened 1840.

BLACKWATER.—(1) (52° N., 7° 52′ W.) river, Munster, Ireland; enters Youghal Bay. (2) (54° 31′ N., 6° 35′ W.) river, Ulster, Ireland; enters Lough Neagh. At Battle of B. (1598) the Irish chieftain, Hugh O'Neill, defeated Sir Henry Bagnall. (3) (51° 47′ N., 0° 59′ E.) river, Essex; enters North Sea.

BLACKWATER FEVER, a form of malaria, endemic in parts of S. Europe, parts of Asia, and of subtropical and tropical America and Africa, probably due to a specific protozoal parasite.

BLACKWELL, ALEXANDER (d. 1747), Scot who became royal physician in Sweden; executed for treason.

BLACKWELL, THOMAS (1701–57), Scot. classical scholar; b. Aberdeen, and ed. at Marischal Coll., where he became later prof. of Greek, and finally principal; pub. several works on the life and writings of Homer, *Letters Concerning Mythology*, and *Memoirs of the Court of Augustus*.

BLACKWOOD, family name of barons and marquesses of Dufferin (*q.v.*).

BLACKWOOD, SIR HENRY, Bart. (1770–1832), Brit. vice-admiral; distinguished at *Trafalgar*.

BLACKWOOD, WILLIAM (1776–1834), Scot. publisher; founder of the firm of William Blackwood & Sons; b. Edinburgh, of poor parents; apprenticed to a local bookseller at age of 14; later moved to Glasgow and London, but eventually settled in Edinburgh as a bookseller, finally exchanging this trade for publishing; pub. first number of *Blackwood's Magazine* (1817).

BLADDER (urinary), sac of muscular and membranous structure, serving as a receptacle for urine, which it receives from the kidneys by the ureters and expels from the body through the urethra; when empty it lies entirely within the human pelvis, when distended it rises up into the abdomen. The b. is attached to the pelvis by ligaments at its neck, which is where the urethra commences, at the lowest part of the organ, otherwise it is freely movable, being supported by the neighbouring structures, and above, behind, and at the sides, by the peritoneum. Its normal capacity is about one pint, but this is often enormously exceeded under abnormal conditions.

Cystitis, or inflammation of the b., is due to bacterial infection, usually by way of the urethra, and is manifested by painful and frequent micturition. It is treated by fomentations, urinary antiseptics, and sedatives, and, if necessary, irrigation of the b.

Under certain conditions *calculi* or stones are formed in the b., and these are removed by operation. The usual operation is that of *lithotomy*, in which the stone is crushed by an instrument passed by the urethra and the fragments removed by a catheter. The old operation of *lithotomy*, or 'cutting for stone,' is not now generally advised, but is still necessary under certain extreme conditions.

Enlargement of the prostate, which may be considered here because of its involvement of the b., is usually first shown by inability of the patient to empty the b. completely, and is generally treated by the operation of opening into the b. by a supra-pubic incision and scooping out the enlargement with the finger.

BLADENSBURG (38° 44′ N., 77° W.), village, Maryland, U.S.A.; British defeated Americans, 1814. Pop. c. 500.

BLADES, WILLIAM (1824–90), Eng. printer and bibliographer.

BLADUD, legendary Brit. king, f. of Lear.

BLAENAVON (51° 46′ N., 3° 6′ W.), town, Monmouthshire, England; ironworks. Pop. (1911) 12,000.

BLAEU, Blaeuw, Dutch family distinguished in XVII. cent. for map-making and geographical works.

BLAGOVYESHCHENSK (50° 20′ N., 127° 40′ E.), town, Asiatic Russia; commercial centre. Pop. 32,600.

BLAIKIE, WILLIAM GARDEN (1820–99), Scot. theologian; b. Aberdeen; prof. of Apologetics and Pastoral Theology, New College, Edinburgh (1868–97); chairman of general assembly (1892).

BLAINE, JAMES GILLESPIE (1830–93), Amer. politician, journalist, and author; elected to Congress (1862); Speaker (1869); entered senate (1876); Sec. of State (1880–81) and again under Pres. Harrison; nominated for Pres. (1884), but not elected; played important part in Pan-American Congress; wrote *Twenty Years of Congress* (1884–86).

BLAINVILLE, HENRI MARIE DUCROTAY DE (1777–1850), Fr. zoologist and anatomist; prof. at Paris Univ. (1812), and at Collège de France (1832), succeeding Cuvier; author of various scientific works.

BLAIR ATHOLL (56° 46′ N., 3° 52′ W.), village and parish, Perthshire; Blair Castle, Duke of Atholl's seat.

BLAIR, FRANCIS PRESTON (1821-75), Amer. lawyer and general; served in Mexican and Civil Wars; senator, 1870-73; candidate for Vice-President, 1868.

BLAIR, HUGH (1718–1800), Scot. preacher; filled various pulpits in Edinburgh, and was sometime prof. of Rhetoric and Belles Lettres in the Univ. His *Sermons* (4 vols.) achieved remarkable popularity, and secured him a pension of £200 from George III.

BLAIR, JAMES (1656–1743), Amer. ecclesiastic and educationist; bp. of Virginia, pres. of its Council, and founder of its College.

BLAIR, ROBERT (1699–1746), Scot. poet and preacher; b. Edinburgh, and was a 'son of the manse'; author of a long and somewhat dull poem, *The Grave*, which, however, contained some impressive passages, and had the advantage of being illustrated by William Blake.

BLAIRGOWRIE (56° 36′ N., 3° 21′ W.), town, on Ericht, Perthshire, Scotland; linen, fruit. Pop. (1911) 4319.

BLAKE, HON. EDWARD (1833–1912), Canadian-Irish politician; Prime Minister, Ontario (1870–72); M.P. South Longford (Ireland), 1892–1907.

BLAKE, ROBERT (1599–1657), Eng. admiral and naval hero; b. Bridgwater, Somersetshire; sat in Short Parliament (1640); adherent of parliamentary cause; distinguished himself for resolute defence of Bristol (1643), Lyme (1644), and Taunton; app. with two colonels to command of fleet (Feb. 1649); destroyed bulk of Royalist squadron near *Cartagena* (Nov. 1650); fought successfully against Dutch, who were led by famous commanders, Ruyter, Tromp, and Witt (1652–53), and by his victories founded Eng. naval supremacy; defeated the Spaniards (1655–56), inflicting crushing, final blow at Santa Cruz (1657); died at sea (Aug. 17); renowned for skill, daring, and lofty character; innovator in tactics.

BLAKE, WILLIAM (1757–1827), Eng. poet, mystic,

and engraver; s. of a small London hosier; apprenticed at the age of 14 to an engraver; engraving remained his chief occupation for life. At the age of 25 he married Catherine Boucher, the good genius of his life, an educated woman, whom he taught to print and colour his engravings. At the age of 14, B. wrote the exquisite lyric beginning, 'How sweet I roamed from field to field.' His *Songs of Innocence* appeared in 1789; and *Songs of Experience* in 1794—the poems and decorations being engraved by B. himself. His mystical works include *The Book of Thel* (1789), *The Marriage of Heaven and Hell* (1790), *The Gates of Paradise* (1794), and *The Song of Los* (1795). Besides B.'s incomparable lyrics, many of his engravings (especially the marvellous illustrations for the *Book of Job*) were destined to live in fame; his art work, nearly all symbolistic, has unsurpassed dignity and poetry of line; *Life*, by Symons (1907).

BLAKENEY, WILLIAM BLAKENEY, BARON (1672–1761), Eng. soldier; lieut.-gov. of Minorca (1747); hero of gallant defence of Port St. Philip (April 18 to June 28, 1756).

BLAMIRE, SUSANNA (1747–94), Eng. poetess; known as 'the Muse of Cumberland'; author of 'What ails this heart of mine?' 'Ye shall walk in silk attire' (*Collected Poems*, 1842).

BLANC, MONT (45° 51′ N., 6° 53′ E.), highest peak (15,782 ft.) of Alps, and loftiest mountain in Europe; first ascended, 1786.

BLANC, LOUIS (1811–82), Fr. politician; founded socialistic organ, *Revue du progrès* (1839); pres. of government labour commission which established *Ateliers nationaux* (*q.v.*) (1848); member of National Assembly (1871); wrote several important works on political and social questions; and pub. *Histoire de la Révolution Française* (1847–62).

BLANCH (BLENCH) HOLDING, old Scot. tenure system, annual duty being only nominal (*e.g.* a penny Scots or a rose).

BLANCHARD, EDWARD LAMAN (1820–89), Eng. journalist; was on staff of the *Daily Telegraph*, and enjoyed great popularity as a writer of Christmas extravaganzas; *Life*, by Clement Scott, 1891.

BLANCHARD, FRANÇOIS (1738–1809), Frenchman who invented parachute.

BLANCHARD, SAMUEL LAMAN (1804–45), Eng. author and journalist; editor of *True Sun* and *The Courier*; his *Sketches from Life* were pub. 1846, and his *Poetical Works* in 1876.

BLANCHE OF CASTILE (1188–1252), dau. of Castilian king, Alphonso VIII. and John's sister, Eleanor; m. Louis VIII. of France; regent for Louis IX. (1226–35; 1248–52).

BLANCO.—(1) (20° 37′ N., 17° 4′ W.) cape, Sahara, W. Africa. (2) (33° 7′ N., 8° 37′ W.) cape, Morocco, Africa. (3) (43° 37′ N., 6° 49′ W.) cape, Spain. (4) (4° 15′ S., 81° 11′ W.) cape, Peru.

BLAND SILVER BILL, see BIMETALLISM.

BLANDFORD (50° 51′ N., 2° 9′ W.), market town, Dorset., England; ancient earthworks. Pop. (1911) 3500.

BLANDRATA, GIORGIO, BIANDRATA (c. 1515–90), Ital. physician and theologian; founder of Unitarianism in Poland and Transylvania.

BLANE, SIR GILBERT, Bart. (1749–1834), Scot. physician; head of Naval Medical Board; introduced lime-juice into navy as anti-scorbutic (1795).

BLANK VERSE, unrhymed iambic pentameter verse is so called, because of the absence of rhyme:

'So all day long the noise of battle roll'd
Among the mountains by the winter sea.'

The same verse in rhymed couplets is called 'heroic verse,' and is used, for instance, in Pope's *Homer*. If the rhymes are alternate, as in Gray's *Elegy*, the form is known as 'elegiac verse.' 'Blank verse' was employed as far back as the K. cent., but, in Eng. lit., it was reserved for Marlowe to throw off the shackles of rhyme, and in Shakespeare, his immediate follower, it was brought to a high state of perfection, and has since been regarded as the most suitable medium for the noblest kinds of poetry.

BLANKENBERGHE (51° 18′ N., 3° 6′ E.), watering-place, Flanders, Belgium; fishing. Pop. 5900.

BLANKENBURG.—(1) (51° 47′ N., 10° 57′ E.) town, in Harz Mts., Germany; health-resort. Pop. 11,200. (2) (50° 42′ N., 11° 16′ E.) town, Schwarzburg-Rudolstadt, Thuringia; here Froebel established first kindergarten. Pop. 3000.

BLANKETEERS, name given to a large body of Manchester operatives who met in St. Peter's Fields (March 10, 1817), provided with blankets for camping purposes, in order to march to London to lay their grievances before the Prince Regent. The leaders were imprisoned, but some reforms followed.

BLANQUI, JÉRÔME ADOLPHE (1798–1854), Fr. economist; travelled extensively in Europe and the East, and pub. numerous valuable works upon economic subjects.

BLANQUI, LOUIS AUGUSTE (1805–81), Fr. author; founded *Société républicaine centrale*; uncompromising agitator of communism; pub. several works on economic and social questions.

BLANTYRE (55° 47′ N., 4° 7′ W.), town, Lanarkshire, Scotland, comprising High B. and Low B.; coal mining. Dr. Livingstone b. at Low B.

BLANTYRE (16° S., 36° E.), mission station, Nyasaland, Brit. Central Africa; named after Livingstone's birthplace.

BLAPS, see under HETEROMERA.

BLARNEY (51° 56′ N., 8° 35′ W.), town, Cork, Ireland; in outer wall of B. Castle is the B. stone, out of reach of ground; to kiss it gives eloquence, hence any one with unusual powers of persuasion is said in Ireland to have kissed the B. stone.

BLASEWITZ (51° 3′ N., 13° 49′ E.), town, Saxony, Germany. Pop. 7719.

BLASIUS, ST. (d. 316), martyr bp. of Sebaste, Armenia; feast, Feb. 3; emblem, a comb; protects from affections of the throat.

BLASPHEMY, illegal act of uttering or publishing matter relating to God, Jesus Christ, the Bible, or Book of Common Prayer, intended to wound the feelings of mankind, to excite contempt and hatred against the Church by law established, or to promote immorality. The extreme penalty is fine and imprisonment for three years, but it is rarely inflicted.

BLASS, FRIEDRICH (1843–1907), Ger. classical scholar; his principal work was *Die attische Beredsamkeit* (1868), and he produced numerous critical editions of Gk. authors.

BLASTING, method of shattering large masses of solid matter, such as rock, by explosive compounds; used chiefly in quarrying, mining, engineering, and road and railroad cutting, and for removing obstructions to navigation, such as reefs. Before the invention of gunpowder the only way rock could be quarried or removed was by chisel or wedge and hammer, or sometimes by 'fire-setting,' which consisted of building a fire on the rock and then pouring on water, which caused the rock to crack and splinter. When large, regular blocks of stone are required, the wedge is still used, as the action of explosives generally shatters the rock into irregular pieces.

Up to 1864 gunpowder was the explosive compound generally used, but in that year nitro-glycerine was applied to b. by Alfred Nobel, who in 1867 invented dynamite. This name is now generally applied to any compound of a highly explosive character. Other explosives are nitro-cotton and gun-cotton, porous substances which have absorbed a quantity of dynamite. Dynamite is seldom used in its free state, owing to its great tendency to explode accidentally. Litho-fracteur is a form of gun-cotton, whilst a combination of nitrate of barium and gun-cotton forms tonite. Gelatine or b. jelly is a solution of gun-cotton in nitro-glycerine in a jelly-like form, and

is of violent explosive force. Many other explosives have been invented, but the use of the majority is forbidden under the Explosives Act.

There are three kinds of b. with modern explosives: (*a*) the small-shot system, (*b*) the mine system, and (*c*) surface blasts. *The small-shot system*, perhaps the most common, is carried out by boring holes (varying from 1 to 3 inches in diameter and from a few inches to 16 or 20 ft. in depth) with hand or machine drills. The charge, generally in the form of a waterproof dynamite cartridge, is then introduced to the extreme end of the hole, which is afterwards closed with clay or sand. The charge may be exploded by (*a*) a slow time-fuse, which, burning at 2 or 3 ft. per minute, is set sufficiently long to give the workmen ample time to get out of the danger zone; or (*b*) by the more common modern method of electricity. By this method the charge may be fired at any time by the operator simply making a connection which allows a current of electricity to pass along insulated wires to the charge, where a spark is produced followed by the explosion. This method does away with the great danger of mis-firing, or hanging fire, which have been responsible for the greater number of accidents in connection with b.

The mine system is more often used when a large mass of rock has to be removed with one blast, and for this system shafts are sunk in the rock, or galleries driven in its face. The charge varies according to the nature of the rock and the power of the explosive compound used. Anything from 200 to perhaps 15,000 lb. of powder might be employed, and approximately four or five tons of rock are dislodged for every 1 lb. of powder used.

Surface blasts were not possible until detonating explosives were invented, for gunpowder burns comparatively slowly and would expend its force in the air. Gun-cotton or nitro-glycerine give such a sudden and violent explosion, however, that it is possible to use them with effect by placing them on or near the substance to be blasted, and firing them by means of detonators. Surface blasts were used for removing reefs and other obstacles to navigation in the East River Channel, New York—a channel which has probably seen more blasts than any other locality on the earth.

Famous Blasts.—Among some of the world's famous blasts is that which blew up the Round Down Cliff on the South-Eastern Railway, near Dover. This occurred in 1843, and nearly 19,000 lb. of powder was used, and fired in three separate charges.

At Crarae Quarry in Argyllshire a great blast took place in 1886, when over 60,000 tons of granite were dislodged by a blast of 14,000 lb. of powder.

Perhaps the greatest blast on record is that which removed Flood Island (or Hell Gate, as it was sometimes called, owing to its danger to navigation) from the East River, New York. The island covered 9 acres, and was first tunnelled to the extent of 24 galleries in one direction and 46 at right angles. Nearly 13,000 holes were drilled in these galleries, each being 9 ft. deep and 3 in. in diameter. Each hole was then charged with a cartridge of Sprengel's patent explosive, called 'rackarock,' and a cartridge of dynamite. Altogether 240,500 lb. of rackarock and 42,330 lb. of dynamite were used. This was exploded on Oct. 10, 1885, with a result that over 270,000 cubic yds. of rock were shattered.

In the spring of 1912 a large blast was made at Ochr-y-voel Quarries, Dyserth, when 500 lb. powder were used and 2000 tons of rock were displaced without any damage to surrounding property.

BLASTODERM, embryological term, a thin membrane formed of cells or blastomeres resulting from the segmentation of the ovum, which gradually surrounds the yolk.

BLATCHFORD, ROBERT (1851–), Eng. socialist (pseudonym, *Nunquam*); helped to start *Clarion*; author of *Merrie England*.

BLAUBEUREN (48° 26′ N., 9° 46′ E.), town, Württemberg, Germany. Pop. 3114.

BLAVATSKY, HELENA PETROVNA (1831–91), Russ. theosophist; claimed to have been initiated into esoteric Buddhism, and to have the power of communicating with the unseen world. With Col. Olcott and other converts she founded, in America, the Theosophic Society (1875). Mme B. was the author of *Isis Unveiled* (1877) and *The Key to Theosophy* (1889).

BLAYDES, FREDERICK HENRY MARVELL (1818–1908), Eng. classical scholar; was a Northamptonshire clergyman, but devoted his leisure to a study of the Gk. dramatists, and pub. trans. of the principal works of Aristophanes, Sophocles, and Æschylus.

BLAYE-ET-STE-LUCE (45° 8′ N., 0° 40′ W.), town, Gironde, France. Pop. 3423.

BLAZON, the heraldic description of a coat-of-arms n the proper terms of Armory.

BLEACHING is the decolourising of materials by chemical treatment. The materials may be cotton, linen, wool, silk, straw, etc., and the b. may be by oxidation or reduction.

Oxidising b. agents are: b. powder (calcium chlorohypochlorite $Ca.Cl.OCl$, prepared by saturating slaked lime with chlorine gas); *eau de Javelle* (potassium hypochlorite, $KOCl$); sodium hypochlorite, $NaOCl$ (obtained by passing chlorine into sodium hydroxide solution: $2NaOH + Cl_2 = NaCl + NaOCl + H_2O$, or by electrolysis of sodium chloride solution: $2NaCl = 2Na + Cl_2$, $2Na + 2H_2O = 2NaOH + H_2$, $2NaOH + Cl_2 = NaCl + NaOCl + H_2O$); air and ozone; sodium peroxide, Na_2O_2; hydrogen peroxide, H_2O_2; potassium permanganate, $KMnO_4$, and dichromate, $K_2Cr_2O_7$. The most important of these agents is b. powder, from which chlorine is liberated by dilute acid, thus: $CaOCl_2 + 2HCl = CaCl_2 + H_2O + Cl_2$. Dry chlorine will not bleach, and the action of moist chlorine is attributed to the liberation of nascent oxygen from water, thus: $Cl_2 + H_2O = 2HCl + O$. So bleaching is due to oxidation.

Reducing b. agents are: sulphur dioxide, SO_2; sulphurous acid, H_2SO_3, and sulphites, *e.g.* sodium 'metabisulphite,' $Na_2S_2O_5$; hydrosulphites (or true hyposulphites), *e.g.* sodium hydrosulphite, $Na_2S_2O_4 + 2H_2O$. B. by reduction is probably due to the addition of hydrogen to the colouring matter, thus: $SO_2 + 2H_2O = H_2SO_4 + 2H$, and is not so permanent as b. by oxidation, because reoxidation by the air gradually takes place.

Vegetable fibres, *e.g.* cotton and linen, are scoured before they are bleached with b. powder by being boiled with caustic lye ($NaOH$) or soda ash (Na_2CO_3), or sometimes milk of lime, in a *kier*. This process saponifies the fats present in the fabric or yarn, which are then removed by washing with water or dilute mineral acid.

The material is next *chemicked* with b. powder solution, and then *soured* in a bath of dilute mineral acid. This liberates chlorine from the b. powder, and completes the b. Finally, the material is thoroughly washed with water. Woollen goods are washed with soap solution, since caustic lye would damage the fibres, and bleached with sulphurous acid, or, better, hydrogen peroxide. B. powder turns wool yellow. Silk is washed with soap solution to remove the 'silk-glue,' and bleached with sulphur dioxide, hydrogen peroxide, or permanganate and sulphurous acid. Straw is bleached by reduction with sulphur dioxide; hence it turns yellow again by atmospheric oxidation. Hair, furs, feathers, and sponges are bleached by hydrogen peroxide.

Bottler, *Bleaching Agents*.

BLEAK, see CARPS.

BLEEDING, see HÆMORRHAGE.

BLEEK, FRIEDRICH (1793–1859), Ger. theological writer; f. of WILHELM HEINRICH IMMANUEL (1827–75), S. African ethnologist.

BLEEK, WILHELM HEINRICH IMMANUEL

(1827–75), Ger. philologist; spent much time in South Africa, and pub. *Vocabulary of the Mozambique Language* (1856), *Comparative Grammar of the South African Languages*, and other philological works.

BLEIBERG (46° 37′ N., 13° 41′ E.), town, Carinthia, Austria. Pop. *c.* 5000.

BLENDE or **SPHALERITE**, zinc sulphide (ZnS); found in cubic and tetrahedral commonly twin-crystals, very brittle, semi-transparent to opaque. Brown, black, red, yellow, or green, it usually contains admixtures of iron, sometimes cadmium sulphides soluble in strong nitric acid, leaving sulphur; abundant Cornwall, Derbyshire, Cumberland; used for preparation of zinc vitriol and sulphur.

BLENDING, mingling varieties of tea, tobacco, wines, whiskies, etc. Woollen b. is mixing of different wools for cloth.

BLÉNEAU (47° 44′ N., 2° 56′ E.), town, France; French defeated Spanish, 1652.

BLENHEIM (48° 38′ N., 10° 37′ E.), village, Bavaria, near Danube; at HOCHSTÄDT (*q.v.*), in neighbourhood, English and Austrians under Marlborough and Prince Eugene defeated French and Bavarians under Tallard and Marsin and Elector of Bavaria, Aug. 13, 1704; allies casualties amounted to 12,000; Tallard's army destroyed.

BLENHEIM (41° 34′ S., 174° E.), town, New Zealand; fruits.

BLENHEIM PARK, at Woodstock, England; granted to Marlborough, 1704; fine house designed by Vanbrugh (*q.v.*).

BLENNERHASSETT, HARMAN (1765–1831), Amer. lawyer, of Irish birth and education; after his marriage settled in America, and became intimate with Aaron Burr (*q.v.*), in whose conspiracy he became implicated. He afterwards became a cotton planter, and finally a lawyer. His wife achieved some popularity as a poetess.

BLENNIES (*Blenniidæ*) includes *c.* 350 species of long-bodied fishes, with long dorsal and anal fins; mostly small, active fishes common about shore rocks in all regions, although a few occur in fresh waters. Several species, the shanny, the gunnel or butter-fish, and the wolf-fish or cat-fish (*q.v.*) inhabit Brit. seas, but only the last, which may be 5 or 6 ft. long, is of value as food.

BLÉRIOT, LOUIS (1871–), Fr. aviator; first to 'fly' Eng. Channel (1909).

BLESSINGTON, MARGUERITE, COUNTESS OF (1789–1849), Irish writer and woman of fashion; dau. of Edmund Power, a small landowner; m. Captain Farmer, a drunken rake, after whose death she m. the Earl of Blessington. The earl d. 1827, and Lady B. afterwards lived under the protection of Count D'Orsay who had previously m. her step-daughter. She travelled much on the Continent, made the acquaintance of Lord Byron, and her London house attracted most of the notabilities of the period. She edit. *The Book of Beauty* and *The Keepsake*, pub. a few novels and other books, including her *Conversations with Lord Byron*.

BLETCHLEY (51° 59′ N., 0° 46′ W.), town, Bucks, England; now included in Fenny Stratford.

BLICHER, STEEN STEENSEN (1782–1848), Dan. poet and novelist; skilfully describes rural types of Jutland.

BLIDA (36° 30′ N., 2° 50′ E.), town, Algeria; orange and flour trade. Pop. 16,866.

BLIGH, WILLIAM (1754–1817), Eng. admiral; served under Cook and Howe; was sent to the Pacific (1787) in charge of H.M.S. *Bounty* for the purpose of introducing the bread-fruit tree into the West Indies. His crew mutinied (1789), and B. and some others were cast adrift. He eventually reached England; fulfilled his mission in the W. Indies; and afterward took part in the battles of *Camperdown* and *Copenhagen*, and was made Gov. of New South Wales.

BLIND SPOT in eye, see VISION.

BLIND, KARL (1826–1907), Ger. revolutionary (1848 onwards).

BLIND, MATHILDE (1841–96), Eng. poetess; step-dau. of Karl B.; author of *The Prophecy of St. Oran* (1881), *The Heather on Fire* (1886), and *The Ascent of Man* (1888). She also trans. the *Memoirs of Marie Bashkirtseff*, and wrote biographies of George Eliot and Madame Roland.

BLIND WORMS, see under LIZARDS.

BLINDNESS may be due to obstruction between the rays of light and the optic nerve, to disease of the optic nerve, or to disease of the brain itself. Through better comprehension of the causes and through modern development of hygienic ideas and of medical science, b. is now on the decrease. The most important cause is purulent inflammation of the eyes of newly born infants, which can in nearly every case be very simply prevented, and, in its early stages, always cured. Moreover, it has been calculated that half the b. existing is preventable in one way or another (see EYE DISEASES). There are now about 27,000 blind persons in England and Wales, 3200 in Scotland, and 4000 in Ireland, the proportion per thousand of the population being greatest in Ireland and least in Scotland. In the chief British colonies the numbers approximately are: Australia, 2800; New Zealand, 300; Cape Province, 2800; Canada, 4000; while in the U.S.A. there are estimated to be about 65,000.

The first record of an institution for the blind being established is the foundation of an hospital by St. Louis in Paris in 1260 A.D., for the accommodation of 300 blind persons, who, the story goes, were soldiers stricken in the Crusades, though for this there is no hist. authority. The education of the blind, however, was first commenced by Valentin Haüy, who founded the National Institution for Teaching the Blind in Paris in 1785. Since that time schools and institutions have been established in all civilised countries, the first in Britain being the School for the Indigent Blind in Liverpool (1791), closely followed by the Royal Blind Asylum in Edinburgh (1793), while in the United States the first similar institution was the Perkins Institution and Massachusetts School for the Blind (1829).

Following the first, which Haüy invented, numerous systems of raised characters to enable the blind to read had been promulgated, and the Bible and other books had been printed, when the British and Foreign Blind Association, founded by Dr. Armitage in 1868, made an exhaustive inquiry into the different systems, and adopted the BRAILLE TYPE, used both for words and for music, invented by Louis Braille, a French teacher of the blind, which has since remained the standard system. It consists of variations on six dots in an oblong ⁚⁚, 63 different combinations being possible. The National Lending Library has nearly 6000 works in Braille and other type, which are distributed throughout the country, while nearly a score of periodicals are pub. in raised characters, including a special edition of the *Daily Mail*. There is also an excellent system, invented by the Rev. W. Taylor, for working arithmetical or algebraical problems, in variations in the positions of embossed pins in a board; while raised geometrical figures, maps in relief, and numerous other similar appliances are to-day employed in educating the blind. In 1893 an Act of Parliament was passed in Britain making the elementary education of blind children compulsory.

Music is the profession which is the most suitable for and, where possible, the most often followed by the blind, either playing or teaching music or pianoforte-tuning. School-teaching also provides occupation for a certain number, and, for such as are unable to prepare themselves for the above, various handicrafts, *e.g.* basket-making, chair-caning, mat-making, bedding manufacture, provide a means of livelihood. The Royal Normal College for the Blind, founded in 1872, gives both a general and a musical education to young blind persons in order to qualify them for various posts, especially as piano-tuners, organists, school-teachers and music-teachers, and it is now recognised by the Education Department as a training college

for blind teachers. In America the education of the blind is in an even more advanced condition than in Britain. History is by no means wanting in examples of famous and distinguished blind persons, including Homer; John, the blind king of Bohemia, killed at Crécy; John Milton; Thomas Blacklock, the Scottish poet; Hüber, the Swiss naturalist; Holman, the traveller; W. H. Prescott, the historian; Louis Braille, the inventor of Braille type; Dr. Milburn, chaplain to the U.S.A. House of Representatives; Henry Fawcett, professor of Political Economy at Cambridge Univ. and Postmaster-General. See also EYE and DEAF AND DUMB.

Armitage, *Education and Employment of the Blind* (1871); *Report of the Royal Commission on the Blind, Deaf, and Mutes* (1889); Mell, *Encyklopädisches Handbuch des Blindenwesens* (1900); Helen Keller, *The Story of My Life* (1903); and the *Annual Reports* of the various institutions for the blind.

BLINDSTORY, architectural term sometimes applied to triforium of Gothic church; distinguished from *clerestory*, which has windows.

BLISTER BEETLES, see under HETEROMERA.

BLIZZARD, name given in U.S.A. to bitter, snowladen wind; most severe b's occur in Central and W. States.

BLOCH, JEAN DE (1836–1902), Polish financier, statistician, and author (*inter alios*) of much-discussed book, *Is War now Impossible?*

BLOCH, MARK ELIEZER (*c.* 1730–99), Ger. naturalist; wrote classic memoir on fishes.

BLOCK, system of pulleys protected with wooden or metal framework.

BLOCK ISLAND (41° 10′ N., 71° 34′ W.), island, off Rhode Island, N. America.

BLOCK, MAURICE (1816–1901), Fr. statistician; gained an extensive reputation by his statistical studies; numerous books.

BLOCKADE, a siege conducted by so surrounding a place as to prevent the besieged having any communication with the outside; term now generally used of maritime sieges; a belligerent right to which by international law neutrals are compelled to submit. B's must be effective and must be duly proclaimed. 'Paper b's,' instead of *de facto* investments (*e.g.*, Napoleon's Continental B., 1806–12), were discontinued after 1826–27, when Great Britain and U.S.A. definitely asserted that b's to be binding must be effective. B. rules were laid down during conference of maritime powers called together by Brit. government (Dec. 1908–Feb. 1909).

BLOCKHOUSE, name, which dates back to the XVI. cent., for a small temporary fort composed of logs, corrugated iron, or other material, roofed in, and loopholed for rifle fire. It is sometimes surrounded by a trench, and entirely covered with earth to render it bomb and fire proof.

BLOEMFONTEIN (29° S., 26° 40′ E.), formerly republican capital, now provincial capital, Orange Free State (*q.v.*), S. Africa; situated on a plain; elevation, 4518 ft.; well-built, large gardens; healthy climate; Grey Univ. Coll.; seat of Supreme Court of S. Africa; Military Coll.; occupied by Lord Roberts, March 1900, and annexed May 28. Pop. (1911) 58,300 (white, 26,200).

BLOET, ROBERT (d. 1123), Eng. bp.; held the See of Lincoln; was chancellor to William I. and II., and justiciar to Henry I.; patron of Henry of Huntingdon.

BLOIS (47° 35′ N., 1° 20′ E.), town, Loir-et-Cher, France, on Loire; castle of great hist. interest (XIII.–XVI. cent's); favourite residence of Fr. kings; Gothic cathedral; wine, shoes. Pop. 21,500.

BLOIS, COUNTSHIP OF, held in fee by Robert the Strong, Margrave of Neustria, and his successors (865–*c.* 940); then passed to Capetian family; subsequently united with crown by accession of Louis XII., grandson of Louis I., Duke of Orleans, who had purchased it from Guy II.

BLOIS, LOUIS DE (1506–66), Flemish mystic; became Abbot of Liessies (Hainaut), 1530; many of his works, which were written in Latin, have been trans. into English: *Book of Spiritual Instruction* (1900); *Comfort for the Fainthearted* (1903); *Sanctuary of the Faithful Soul* (1905).

BLOMEFIELD, FRANCIS (1705–52), Eng. topographer; rector of Fersfield (Norfolk); author of a valuable *History of Norfolk*, two vol's only being pub. during his lifetime, the work being completed in eleven vol's at a later date.

BLOMFIELD, CHARLES JAMES (1786–1857), bp. of London; originator of diocesan reforms; classical editor.

BLOMMAERT, PHILIP (1809–71), Flemish writer who developed idea of Belg. nationality.

BLONDEL (fl. XII. cent.), Fr. trouvère; according to legend, discovered Richard Cœur de Lion, imprisoned at Dürrenstein, by singing one of Richard's songs.

BLONDIN, CHARLES (1824–97), stage-name of JEAN FRANÇOIS GRAVELET, Fr. tight-rope walker; crossed Niagara Falls (1859) on a tight-rope, during the course of which performance he carried a man on his back, cooked an omelette, and wheeled a barrow. He appeared at the Crystal Palace, London, or elsewhere in England during 1861–62; afterwards retired, but reappeared (1880); last appearance (1896).

BLOOD, red fluid which circulates in the arteries and veins of animals, in order to nourish the body, to carry away waste products to the excretory organs, and to protect the body against invading organisms. Human b. has S.G. 1·055, a salt taste, and an alkaline reaction. It is composed of the fluid element, or *blood plasma*, which carries food substances and waste products in solution, and the cellular elements, or *red* and *white corpuscles* and *blood platelets*. In a cubic millimetre of human b. there are about 5,000,000 red corpuscles, 8000 white corpuscles, and 500,000 blood platelets. In shape a red corpuscle is a disc, concave on each side, and slightly thicker at the edge. It is composed chiefly of nitrogenous material with which is in loose chemical combination an important protein named *hæmoglobin*, which combines with oxygen and yields it up on its concentration decreasing. This power of oxygen-carrying, which the red corpuscles have in the hæmoglobin, is their most important quality. White corpuscles, or *leucocytes*, are derived from lymph glands and the spleen, and are of various kinds and shapes, being classified mainly according to the staining qualities they exhibit under the microscope. The great value of the white corpuscles is in the power they have of destroying inflammation products, bacteria, etc., and thus protecting the body. Blood platelets are small circular bodies, about half the size of red corpuscles, and are believed to have an important function in the *clotting* of b. In the process of clotting *fibrin* is precipitated from the plasma in the form of fine threads, which interlace in every direction, and entangle the corpuscles in their meshes; during the process *fibrin* is also believed to be derived from the clumps which form blood platelets. Resistance to disease caused by bacteria is due to the white corpuscles and the formation of certain anti-bodies in the b., which either destroy the bacteria or assist the white corpuscles to do so. This resistance can be produced or stimulated artificially by the injection of the products of bacteria or their toxins in regulated non-lethal doses.

In ANÆMIA (*q.v.*), either primary or secondary, the amount of hæmoglobin in the blood is lessened, either in the individual red corpuscles, or through diminution in the number of red blood corpuscles.

In LEUCOCYTHÆMIA, or Leukæmia, the white corpuscles are enormously increased, being deposited in the liver, kidney, and other organs; and there is anæmia.

Wooldridge, *Chemistry of the Blood*; Howell, *Text-book of Physiology*; Halliburton, *Textbook of Physiology*.

BLOODHOUND, see DOG FAMILY.

BLOOD-LETTING, formerly practised in almost all diseases, is still performed under certain conditions of, *e.g.*, chronic valvular disease of heart, pericarditis

toxæmia, either by venesection, cupping, or by means of leeches.

BLOOD-POISONING, see SEPSIS.

BLOOD-RAIN, rain which occurs in Mediterranean regions, having absorbed reddish sands blown from African deserts.

BLOODSTONE, HELIOTROPE, a variety of chalcedony with bright red spots and streaks.

BLOOD-WORMS, the aquatic larvæ of midges belonging to family *Chironomidæ*.

BLOODY ASSIZES, see JEFFREYS.

BLOOMER, AMELIA JENKS (1818–94), Amer. dress reformer, after whom 'bloomers' are named; was a pioneer of the women's dress reform movement (short skirt and loose trousers); was also a worker in the cause of temperance and woman's suffrage.

BLOOMFIELD (41° 15′ N., 74° 15′ W.), town, New Jersey, U.S.A.; silk. Pop. (1910) 15,070.

BLOOMFIELD, MAURICE (1855–), Amer. scholar; prof. of Sanskrit at Johns Hopkins Univ.; specialised on Vedic lit.; trans. Max Müller's *Sacred Books of the East*.

BLOOMFIELD, ROBERT (1766–1823), Eng. poet; pub. several vol's of verse dealing with rural life; his best-known poem, *The Farmer's Boy*, had a large sale, and was illustrated by Bewick; *Remains* (1824).

BLOOMINGTON (40° 36′ N., 88° 58′ W.), city, Illinois, U.S.A.; important railway centre; seat of Illinois Wesleyan univ.; iron foundries; near coal-mines. Pop. (1910) 25,768.

BLOOMINGTON (39° 9′ N., 86° 31′ W.), city, Indiana, U.S.A.; furniture. Pop. (1910) 8838.

BLOOMSBURG (41° N., 76° 28′ W.), town, Pennsylvania, U.S.A.; railway cars. Pop. (1910) 7413.

BLOOMSBURY, district, London, mostly in parish of St. Giles-in-the-Fields.

BLOUET, PAUL, see O'RELL, MAX.

BLOUNT, CHARLES (1654–93), Eng. deist; author of *Anima Mundi* (1679), in which he expresses his views on immortality; *Great is Diana of the Ephesians* (1680), an attack upon priestcraft; and a trans. of the first two books of *Apollonius Tyaneus*.

BLOUNT, EDWARD (fl. 1588–1632), Eng. printer; was the joint-printer with Jaggard of the 'first folio' of Shakespeare's plays (1623), which he is supposed to have helped Heming and Condell to edit. He also pub. some works of Marlowe and Lyly, and himself trans. from the Spanish and Italian.

BLOUNT, THOMAS (1618–79), Eng. antiquary; author of *Nomolexicon* (1670), a legal dictionary, and similar antiquarian works; but is chiefly remembered as the author of the *Boscobel* tract (1651) describing the adventures of Charles II. after *Worcester*.

BLOUNT, SIR THOMAS POPE, Bart. (1649–97), Eng. author; bro. of Charles B. (*q.v.*); author of *Essays on Several Occasions* (1692), in which he deals with educational and other topics.

BLOUNT, WILLIAM (1749–1800), Amer. conspirator; chiefly remembered for his share in conspiracy to seize Florida and Louisiana for Great Britain; impeached and expelled from U.S. senate.

BLOW, JOHN (1648–1708), Eng. composer and organist; b. North Collingham (Notts); became chorister of the chapel royal; organist of Westminster Abbey (1669–80); composer to the chapel royal (1699). He wrote an immense number of anthems and services, besides odes and other forms of music.

BLOWING MACHINES, contrivances for producing currents of air are used chiefly for supplying blast for furnaces and for ventilation. They have developed from simple *bellows* with intermittent puffs, the latter disadvantage being obviated by the double bellows providing a continuous blast used by smiths. For furnaces and the Bessemer steel-manufacturing process *blowing engines* of various types have been constructed, the simplest consisting of a cylinder with reciprocating piston moved by steam- or gas-engine. The air is sucked into the cylinder with a valve, while at the next stroke the air is expelled through another valve. The Lackenby, Dowlais or Richardsons, Westgarth & Co., and Davy blowing engines are commonly used for blast furnaces. American *rotary blowers*, especially Baker's and Root's, are used for delivering air at very high pressure. *Centrifugal fans* can be used in mines, factories, and elsewhere for ventilation by exhausting air or for creating compressed air for boiler draught or iron-melting furnaces. Günther's and Davidson's are the best-known types.

BLOWITZ, HENRI GEORGES STEPHAN DE (1825–1903), Anglo-Fr. journalist; became chief Paris correspondent of *The Times* in 1873, for which paper he had acted for some time as assistant-correspondent. He soon became a force not only in journalistic but diplomatic circles, and on more than one occasion influenced international affairs.

BLOW-PIPE, instrument, consisting in its simplest form of a tube with mouthpiece and fine nozzle, for blowing air or gas through a flame so as to direct and concentrate it upon a substance; used in glass-blowing, soldering, and chemical analysis.

BLOW-PIPE, BLOW-GUN, reed pipe used for blowing poisoned arrows by the S.A. Indians, Borneo Dyaks, and other savage tribes, and formerly by some of the N.A. Indians. The pipes vary from 3 to 11 ft. in length, and the arrows from a few inches to 18 in. The weapon is called by the Indians *pucuna*; by the Dyaks *sumpitau*.

BLUBBER, oil lying beneath skins of whales and other sea mammals; used for machine oil; Eng. whale fishery (XVIII.–XIX. cent's) chiefly to obtain b., by mariners of Hull and Yorks ports, flourished.

BLÜCHER, GEBHARD LEBERECHT VON (1742–1819), Prince of Wahlstatt, Prussian general; one of leaders of Prussian war-party (1805–6); became commander-in-chief of Silesian army during War of Liberation; became a general field-marshal (1813); won action of *Laon* (March 1814); defeated by Napoleon at *Ligny* (June 1815); made decisive charge at *Waterloo*; possessed virtues of dashing cavalry soldier, but was without tactical skill of great commander; said to have been uncultivated, but naturally shrewd, vigorous, upright character.

BLUE, a primary colour, of which the sapphire stone represents a type. Artists divided the shades into cobalt, indigo, Prussian, and ultramarine. There are many colloquial uses. From XVII. cent. until 1864 there were Red, White, and B. Squadrons in the Navy; the Royal Horse Guards (XVII. cent.) were known as 'the B's'; the 'b. Peter' (contraction of *b. repeater*) is a ship's flag hoisted as signal of approaching departure; a univ. B. is a member of Oxford (dark) or Cambridge (light) Univ. who plays in matches, or takes part in the boat-race, between these univ's.

BLUE BOOK, publication containing parliamentary reports, usually contained in a blue paper cover.

BLUE GROUND, matrix of S. African diamonds.

BLUE MOUNTAINS.—(1) (30° 46′ S., 151° 50′ E.) mountains, New S. Wales, Australia; (2) (29° 30′ S., 27° 55′ E.) Basutoland, S. Africa; (3) (44° 54′ N., 64° 6′ W.) Nova Scotia; (4) (40° 10′ N., 77° 37′ W.) Pennsylvania; (5) (18° 5′ N., 76° 50′ W.) Jamaica.

BLUE RIBBON.—(1) part of insignia of the Garter; (2) any token of supreme honour; (3) badge adopted, 1883, by total abstainers of B. R. ARMY, founded 1878.

BLUE RIDGE (36° to 38° N., 79° to 82° W.), mts., Virginia and N. Carolina, U.S.A.

BLUEBEARD, nickname of monster in a fairy tale by Charles Perrault (1697), who murdered his wives and hid their bodies in a secret chamber.

BLUEBELL, see HAREBELL.

BLUE-BIRDS, name applied to genus *Sialia* of N. America and Bermuda, which nests in holes in tree trunks; also to *Irena puella*, native of India, Ceylon, and Burma.

BLUE-BOTTLE FLIES, see under HOUSE FLY.

BLUECOAT SCHOOL, see CHRIST'S HOSPITAL.

BLUEFIELDS, BLEWFIELDS.—(1) (12° 3 N.,' 83° 53° W.) town, Mosquito Coast, Nicaragua. Pop. 4706.

(2) (18° 12′ N., 78° W.) town, Jamaica. (3) (12° 20′ N., 84° 30′ W.) river, Mosquito Coast, Nicaragua.

BLUEFISH (*Cheilodipterus saltatrix*), relative of horse-mackerels, but with larger scales, highly esteemed as food; an exceedingly voracious and destructive feeder, common in most warmer parts of Atlantic.

BLUE-GOWNS, see BEDESMAN.

BLUESTOCKING, a pedantic woman. The term was first applied, during the Johnsonian period, to men and women who met to discuss literary subjects; one of them, Benjamin Stillingfleet, usually wore blue stockings. The name was later given only to women of literary pretensions.

BLUFF HARBOUR (46° 37′ S., 168° 20′ E.), port, New Zealand; large shipping trade.

BLUM, ROBERT FREDERICK (1857–1903), Amer. artist; noted for his black-and-white drawings in the *Century*, *St. Nicholas*, and *Scribner's Magazines*, particularly of Japanese subjects. He was also well known as a colourist, and executed some fine Venetian pictures.

BLUMENAU (48° 10′ N., 17° 6′ E.), village, near Pressburg, Hungary; scene of last fight between Austria and Prussia before armistice of Nikolsburg, 1866.

BLUMENBACH, JOHANN FRIEDRICH (1752–1840), Ger. anthropologist, biologist, and physiologist; prof. of Med. (1778), Göttingen; founder of the science of anthropology (*q.v.*); had great influence on almost all natural sciences.

BLUMENTHAL, JACQUES (1829–), Ger. pianist who instructed Queen Victoria.

BLUMENTHAL, LEONHARD, COUNT VON (1810–1900), Prussian soldier; won distinction in wars of 1866 and 1870; general of infantry (1873); general field-marshal (1888).

BLUNDERBUSS, obsolete Dutch hand-gun, with bell-shaped muzzle, used for firing at short range; introduced into England during reign of Charles II.

BLUNT, WILFRED SCAWEN (1840–), Eng. poet; formerly in the diplomatic service; breeder of Arab horses; has travelled extensively; his *Love Sonnets of Proteus* (1880) and other vol's of verse are highly esteemed; his wife, Lady Anne B., is author of *Bedouins of the Euphrates* (1879) and *A Pilgrimage to Nejd* (1881).

BLUNTSCHLI, JOHANN KASPAR (1808–81), Swiss doctor of law and conservative politician; b. Zürich; member of Great Council (1837); prof. of Constitutional Law at Munich (1848) and Heidelberg (1861); helped to found Ghent Institute of International Law (1873).

BLYTH (55° 8′ N., 1° 29′ W.), seaport on river B., Northumberland; shipbuilding. Pop. (1911) 28,500.

B'NAI B'RITH, ORDER OF, a Jewish organisation, founded at New York (1843), for helping distressed Jews and generally promoting the cause of charity.

BOA, see under SNAKES.

BOA VISTA (16° N., 21° 46′ W.), island, Cape Verde Islands, Africa. Pop. *c.* 5000. Also name of seven towns in Brazil.

BOABDIL, ABU ABDALLAH (1482–92), king of Granada; was the last of the Moorish kings; surrendered the city to Ferdinand and Isabella (1492).

BOACO (*c.* 12° 50′ N., 85° W.), town, central Nicaragua. Pop. 10,000.

BOADICEA (d. 61 A.D.), Brit. queen; her husband Prasutagus ruled the Iceni tribe, inhabiting portions of Norfolk and Suffolk, and upon his death his dominions were seized by the Romans. Roused by the indignities she and her people had suffered, B. raised an army, attacked several Roman settlements, and destroyed London. She was eventually defeated by the Roman governor, Suetonius, and committed suicide by taking poison rather than fall into his hands.

BOANERGES, SONS OF THUNDER, name given to James and John by Christ (*Mark* 3[17]); term applied to orators.

BOAR, see under PIG FAMILY.

BOARD, a piece of timber; subsequently the name given to a table; hence 'Board of Green Cloth,' 'Board of Trade,' etc., meaning a company of persons sitting in council around a table. In regard to ships, the term 'board' is used in innumerable ways, but it may be noted that 'starboard' (right-hand side of the ship looking forward) dates back to the times before the invention of the rudder, when a large oar was suspended over the right side of the stern, and was known as the 'steer-board.'

BOARD OF TRADE UNIT, unit of commercial electrical supply equivalent to 1000 watt-hours.

BOARDING-HOUSE, a private house for the reception of paying guests. The keeper of such a house is not legally bound to receive any lodger who offers himself, unless he chooses to do so, nor is he, like the innkeeper, responsible for his guests' property. He is expected to take reasonable care of such, but there his responsibility ends. Notices that valuables should be deposited with the proprietor, for safety, are usually exhibited in most large boarding-houses.

BOARDING-OUT, a system under the Eng. poor law of providing for the maintenance of orphan or deserted children with foster-parents, which is under the administration of the Local Government Board, the sum payable ranging up to 4s. weekly.

BOAT, as distinct from 'ship,' any small water-craft which is usually propelled by oars; boat may sometimes make use of sails, and, strictly speaking, the word 'ship' is only applied to a large, three-masted, square-rigged vessel. Primitive man possibly attempted to cross water-spaces by means of rafts, and, in course of time, superimposed a platform; then he would attempt to protect the sides of his craft by raising a plank-shelter; later he would see the need of making his bow pointed, and rounding his stern. Between primitive rafts and built boats came the 'dug-out,' *i.e.* a large tree-trunk hollowed out by rude implements or fire. B's are innumerable in form, and modern boat-building is a highly specialised art. All b's are either *carvel*-built (*i.e.* when the planks lie edge to edge, presenting a smooth exterior) or *clinker*-built (when the planks overlap).

BOAT-BILL, BOAT-BILLED HERON (*Cancroma cochlearia*), broad-billed Night-Heron, found in the forests along Brazilian rivers.

BOBBILI (18° 30′ N., 83° 5′ E.), ancient town, Madras, India. Pop. 17,000.

BOBBIO (44° 47′ N., 9° 22′ E.), town, Lombardy, Italy; cathedral; VII.-cent. abbey. Pop. 5000.

BOBER (51° 50′ N., 15° 16′ E.), river, Germany; joins Oder at Krossen.

BOBOLINK, Amer. bird (*Dolichonyx oryzivorus*), noted for its song and strength of wing.

BOBRUISK (53° 8′ N., 29° 12′ E.), town, on Beresina, Russia; ironworks. Pop. (1910) 40,600.

BOCAGE, MANOEL MARIA BARBOSA DU (1765–1805), Portug. poet; served in the navy until 1790, afterwards devoting himself to lit. He wrote in many forms of verse, but excelled in the sonnet, and is second only to Camoens in the appreciation of his countrymen.

BOCCA TIGRIS (22° 48′ N., 113° 43′ E.), forts at mouth of Canton R., S.E. China.

BOCCACCIO, GIOVANNI (1313–75), Ital. author; was the natural son of a merchant, and was b., according to his own statement, at Certaldo, near Florence, though much doubt exists upon this point. Disliking commerce, he was trained for the law, but eventually went to Naples, commenced to write poetry, became a hanger-on of the court, and fell deeply in love with Maria, the illegitimate dau. of King Robert of Naples and Sicily, whom he afterwards celebrated in his writings under the name of 'Fiammetta.' His love for this lady undoubtedly inspired his best work, and it was at her desire that some of his earlier works were written — *Fiocolo*, the *Ameto*, and *Fiammetta*. B. disliked Florence, and spent most of the years of his early manhood about the Neapolitan court, during which period he produced many works in prose and

verse. In 1350, however, he returned to Florence, and largely devoted the next fifteen years of his life to the public service, formed a close friendship with Petrarch, and acted as Florentine ambassador to Rome, Avignon, Ravenna, and Brandenburg.

In 1358 he completed his great prose masterpiece, the *Decameron*, upon which he had been engaged for ten years. This work—which in its style combines both the classic and the mediæval—sets forth how, during the plague of 1348, seven court ladies and three gentlemen seek refuge in a country villa, where, to while away the time, they relate tales. These tales number one hundred, and though many of them are very indelicate in subject, the masterly Italian in which they are written serves to give the *Decameron* a place amongst the greatest books the world has seen. It is worth remembering, too, that there is scarcely an English poet of any note, from Chaucer downwards to Keats, Tennyson, and Swinburne, who has not drawn on the rich stores of Boccaccio.

J. A. Symonds, *Boccaccio as Man and Author* (1894); Hutton, *Life* (1910).

BOCCAGE, MARIE ANNE FIQUET DU (1710–1802), Fr. poetess; prominent in the *salons* and esteemed by Voltaire.

BOCCALINI, TRAJANO (1556–1613), Ital. satirist; his chief work was *Ragguagli di Parnaso*, an amusing satire upon his contemporaries.

BOCCANEGRA, Boccanera, illustrious Venetian family from which sprang statesmen, doges, admirals.

BOCCHERINI, LUIGI (1743–1805), Ital. composer; chiefly known as a voluminous writer for the violoncello.

BOCCHUS (*c.* 106 B.C.), king of Mauretania (Morocco); of a vacillating and treacherous nature, he sought favour with the Romans by giving his father-in-law, Jugurtha, a prisoner into their hands.

BOCHART, SAMUEL (1599–1667), Fr. scholar; was a noted authority on Oriental languages, and wrote, amongst other works, *Hierozoicon*, a treatise on scriptural animals.

BOCHNIA (50° N., 20° 30′ E.), town, Galicia, Austria. Pop. *c.* 10,000.

BOCHOLT (51° 51′ N., 6° 36′ E.), town, Westphalia, Prussia; machinery. Pop. 24,000.

BOCHUM (51° 29′ N., 7° 13′ E.), town, Westphalia, Prussia; steel and iron works. Pop. (1910) 137,000.

BÖCKH, PHILIPP AUGUST (1785–1867), Ger. scholar; famous for his exhaustive critical edition of Pindar, which placed him in the front rank of modern scholarship; his other works on the classics were numerous, and he also wrote on philosophy and philology.

BÖCKLIN, ARNOLD (1827–1901), Swiss artist; famous for his realistic treatment of the weird and of mythological subjects, including *Battle of the Centaurs*, *Prometheus*, *Ulysses and Calypso*, etc. Examples of his work are to be seen in the Basel and Lucerne galleries.

BOCLAND, Bookland, part of folk-land granted by Anglo-Saxon monarch with consent of Witan by 'book' (the charter of later times); last mentioned in Domesday Book.

BOCSKAY, STEPHEN (1557–1606), prince of Transylvania; supposed to have been poisoned by his chancellor.

BODE, JOHANN ELERT (1747–1826), Ger. astronomer; pub. astronomical almanacs and maps.

BODEL, JEHAN (*c.* 1210), Fr. *trouvère*; wrote a miracle play, *Le Jeu de Saint Nicolas*, and is believed to have been the author of certain *fabliaux* dealing with the wars of Charlemagne.

BODENBACH (50° 46′ N., 14° 12′ E.), town, Bohemia. Pop. (1900) 10,782.

BODENSEE, see Constance, Lake of.

BODENSTEDT, FRIEDRICH MARTIN VON (1819–92), Ger. poet and translator; his *Die Lieder des Mirza Schaffy* (1851) was a volume of original verse with a Persian atmosphere, which met with great success. He wrote on the Elizabethan dramatists, trans. Shakespeare's sonnets, and (with others) a complete edition of the plays.

BODICHON, BARBARA LEIGH SMITH (1827–91), Eng. educationist; friend of George Eliot.

BODIN, JEAN (1530–96), Fr. author, lawyer, and political philosopher; b. Angers; king's attorney at Laon (1576); sec. to Duc d'Alençon (1581); pub. several works, of which the most important is the *Six Livres de la République* (Paris, 1576), a work on political science.

BODINAYA KANUR (10° N., 77° 20′ E.), town, Madras, India. Pop. 22,209.

BODLE, former Scot. copper coin, of smaller value than Eng. farthing.

BODLEIAN, famous library at Oxford, to which copy of every book is sent; founded by Thomas Bodley (*q.v.*), 1598.

BODLEY, GEORGE FREDERICK (1827–1907), Eng. architect; served his articles under Sir Gilbert Scott; A.R.A. (1881); R.A. (1902); designed cathedrals at Washington (D.C.) and San Francisco, college buildings at Oxford and Cambridge, and numerous churches and domestic buildings throughout the country.

BODLEY, SIR THOMAS (1545–1613), b. Exeter; ed. Oxford; a diplomatist and scholar, but chiefly remembered as founder of Bodleian Library, Oxford.

BODMER, JOHANN JAKOB (1698–1783), Ger. author; prof. of History at Zürich; wrote plays and epics of no great merit, but his editions of the Minnesingers are held in great estimation.

BODMIN (50° 28′ N., 4° 42′ W.), town, Cornwall; old church, Decorated chapel, Tudor tower, remains of Franciscan friary; agricultural trade. Pop. (1911) 5734.

BODÖ (67° 17′ N., 14° 28′ E.), port, Norway. Pop. 4827.

BODONI, GIAMBATTISTA (1740–1813), Ital. printer; famous for the elegance of his typographical work, including Gk., Latin, and Ital. classics. His *Homer* is especially valued.

BÖDTCHER, LUDVIG (1793–1874), Dan. poet, whose lyrics are best productions of modern Scandinavia.

BODY, see bibliography and cross references under Anatomy.

BODY'S ISLAND, island, off N. Carolina, U.S.A.; lighthouse.

BODY-SNATCHING, the disinterring of bodies by so-called 'resurrection-men' was a fairly common crime previous to the passing of the Anatomy Act (1832). The perpetrators were liable to fine or imprisonment.

BOECE, HECTOR (*c.* 1465–*c.* 1536), Scot. historian; b. Dundee; prof. of Philosophy in Montaigu Coll., Paris; first principal of Aberdeen Univ.; chiefly remembered for his *History of Scotland* (1527).

BOECKH, PHILIPP AUGUST (1785–1867), Ger. classical scholar; chief work, *Corpus Inscriptionum Græcarum*.

BOEHM, SIR JOSEPH EDGAR, Bart. (1834–90), Eng. sculptor; A.R.A. (1878); R.A. (1882); executed statues of Queen Victoria (Windsor), Carlyle (Chelsea), Dean Stanley (Westminster), Wellington (Hyde Park Corner), and many others.

BOEHM VON BAWERK, EUGEN (1851–), Austrian statesman and writer on economics.

BOEHME, JAKOB (1575–1624), Ger. philosopher and mystic; s. of a peasant. Received little education, herded cattle while a boy, and eventually became a shoemaker. From his earliest years he was of a contemplative disposition. His first work, *Aurora*, was pub. 1612, and similar works followed. The purpose of his studies is to explain the origin of all things, and his writings, which have been trans. into English and numerous other languages, have exercised considerable influence on European thought.

BŒOTIA (38° N., 23° 30′ E.), district, ancient Greece; bounded by Phocis, Gulf of Corinth, Attica, and the Euripus; chief city was Thebes; chief river, Cephissus; chief lake, Copais; plains bounded by

mountains; Mt. Helicon in S.W. Thebes (*q.v.*) was chief power in Greece in IV. cent. B.C.; lost importance after Macedonian conquest; B. is now a nomarchy of Greece. Pop. *c.* 66,000.

BOER (Dutch, 'farmer'), name given to South Africans of Dutch descent; *c.* 50 % of white population.

BOER WARS, see SOUTH AFRICA and TRANSVAAL.

BOERHAAVE, HERMANN (1668–1738), Dutch physician and scientist; lecturer (1701), prof. of Bot. and Med. (1709), rector and prof. of Practical Med. (1714), and prof. of Chem. (1718), Univ. of Leyden. The most famous physician of XVIII. cent.

BOETHIUS, ANICIUS MANLIUS SEVERINUS (*c.* 480–524 A.D.), Rom. statesman, author, and philosopher; brought up in Rome; subsequently he won favour of Theodoric the Ostrogoth; became consul in 510. At once a great official and author, he was noted as a philosopher, mechanist, astronomer, and theologian; accused of treason by Cyprian, the *magister officiorum*, towards end of Theodoric's reign, he was put on his trial before the Senate, and condemned; was imprisoned for a year, and while in prison he wrote his famous *De Consolatione Philosophiæ*, which for cent's was one of the great text-books of moral wisdom. His goods were confiscated, and he himself tortured and put to death in 524; he was regarded as a martyr some cent's after his death. Several theological works have been ascribed to his authorship; he also wrote several commentaries, a text-book on music, and trans. into Latin some of Aristotle's works.

Works of Boethius (Peiper, Leipzig, 1871); also T. Hodgkin, *Italy and her Invaders*, iii. (1896).

BOÉTIE, ÉTIENNE DE LA (1530–63), Fr. writer; enjoyed classic friendship with Montaigne; wrote celebrated *Servitude volontaire*.

BOGARDUS, JAMES (1800–74), Amer. mechanician; invented instruments for deep-sea soundings, making postage stamps, etc.

BOGHAZ KEUI (40° N., 34° 30′ E.), village, Angora, Asia Minor; ruined temple.

BOGNOR (50° 46′ N., 0° 41′ W.), town, Sussex, England. Pop. (1911) 8142.

BOGO (11° N., 124° E.), town, Philippines. Pop. 14,915.

BOGODUKHOV (49° 58′ N., 36° 9′ E.), town, Russia. Pop. 11,928.

BOGOMILI, sect of Gk. Church, XII. to XVI. cent's; founder, Basil, burned, 1118; may have developed from early Eastern heresies which survived into the Middle Ages. The B. held Christ was the Son of God by grace and adoption—not by inherent divinity; rejected the sacerdotal system and thought images idolatrous. They resembled the Paulicians (*q.v.*).

BOGORODSK (55° 50′ N., 38° 27′ E.), town, Russia. Pop. 11,210.

BOGOTÁ, SANTA FÉ DE BOGOTÁ (4° 35′ N., 74° 10′ W.), capital, Colombia; cathedral, capitol, observatory, library, univ., and museum; seat of abp.; subject to earthquakes; founded by Quesada, 1538. Pop. *c.* 121,000.

BOGRA, BAGURA (24° 53′ N., 89° 14′ E.), town, Bengal, India. Pop. 7094. District (24° 55′ N., 89° E.); pop. 854,533.

BOGS are common in land formerly covered by forests; often covered with peat; known as 'moss' in N. of England (see CHAT MOSS, SOLWAY MOSS). B. BUTTER is yellow, oleaginous, mineral substance found in peat b. B. IRONSTONE is a porous limonite variety.

BOGUE, DAVID (1750–1825), Scot. Congregational minister; one of founders of London Foreign Missionary, the Foreign Bible and the Religious Tract Societies.

BOGUSLAV (49° 32′ N., 30° 54′ E.), town, Kiev, Russia. Pop. *c.* 9000.

BOGUTSCHÜTZ (50° 16′ N., 19° 4′ E.), mining village, Pruss. Silesia. Pop. *c.* 15,000.

BOHAIN (49° 57′ N., 3° 28′ E.), town, Aisne, France. Pop. *c.* 7000.

BOHEMIA, BÖHMEN (49° 50′ N., 14° 40′ E.), northern province, Austria (*q.v.*), bordering on Bavaria, Saxony, Prussian Silesia; area, 20,060 sq. miles. Surface is undulating plateau with slight northern slope, surrounded by mountain ranges, N.E. by Riesengebirge, N.W. by Erzgebirge, S.W. by Bohemian Forest, S.E. by Bohemian and Moravian Mountains; drained by Elbe and tributaries, chief being Moldau, Iser, Eger.

History.—Early inhabitants of B. were Celtic tribe called Boii, conquered by Marcomanni, Teutonic tribe, I. cent. B.C. Other Teutonic tribes followed; ultimately Czechs, Slavonic tribe, subdued country *c.* 450 A.D. Early history obscure; seems to have been divided into number of small states or principedoms, united for short time under Samo in VII. cent.; came into collision with Charlemagne in VIII. cent., becoming tributary to him. Introduction of Christianity occurred in IX. cent. in reign of Borswog, prince of Premyslid dynasty, which ruled B. for 600 years. Kingly title first bestowed on Wratislaws, 1088. In XIII. cent. Premysl Ottokar II. extended his dominions; joined Teutonic knights in crusade against Prussia; defeated Hungarians; acquired Carinthia, Istria, part of Italy; ultimately came into conflict with emperor, Rudolph of Hapsburg, by whom he was defeated and slain near Marchfield, 1278. With his grandson, Wenceslas III., Premyslid dynasty came to an end, 1306. From 1310 till 1437 B. was ruled by kings of Luxembourg dynasty; John of Luxembourg, elected in 1310, went on crusade against heathen in Lithuania, when he lost his eyesight; killed at *Creçy*, 1346. His s. Charles (1346–78) founded Prague Univ.; became emperor, 1349; issued Golden Bull, 1356, regulating election of Ger. king.

His s., Wenceslas IV., was involved in struggles with nobles; caused St. John Nepomuk to be drowned, and John Huss, reformer, to be burned; reign marked by religious wars, which continued in reign of Sigismund, 1419–37, who persecuted Hussites; became emperor; d. 1437; succ. by Albert of Austria after death of whose posthumous s., George of Podebrand, was chosen king, 1458. George warred against Matthias Corvinus of Hungary; his successor in 1471 was Wladislaws of Poland, in whose reign religious disputes were ended by Peace of Kuttenberg, 1485; B. and Hungary united by his election to Hungarian throne in 1490. Reign of Wladislaws' s. Louis marked by wars against Turks, who invaded Hungary under Solyman, defeating and killing king at *Mohacs*, 1526. His bro.-in-law, Archduke Ferdinand of Austria, elected, 1526; subsequently had himself declared hereditary king; crushed revolt in Prague, 1547; became emperor; introduced Jesuits in Bohemia; d. 1564. His s. Maximilian, emperor and king of B., tolerated Reformation; and Maximilian's s. Rudolph granted Letter of Majesty in 1609, ensuring religious liberty; he was deposed and succ. by his bro. Matthias, 1612, whose reign was marked by religious disputes. Matthias d. without issue, and his cousin, Ferdinand (Emperor Ferdinand II.), was elected king, but was presently deposed in favour of Frederick Elector Palatine, whereupon Thirty Years War broke out; Ferdinand, aided by Bavaria, Spain, Poland, Italy, Saxony, defeated Bohemians at *Weissenberg*, 1620; Elector fled; Ferdinand reinstated; extirpated Protestantism, re-established Roman Catholicism, suppressed national privileges, promulgated new constitution, established Hapsburgs as hereditary dynasty in B., history of which henceforth follows that of Austria. (See AUSTRIA-HUNGARY.) On death of Charles VI., 1740, struggle took place between his dau., Maria Theresa, and Charles of Bavaria, former ultimately successful. Her s., Joseph II., passed Edict of Toleration and established many reforms. In 1848 occurred a quickly suppressed rising in favour of Bohemian independence, since when there

have been constant struggles for supremacy between Czechs and Germans, former aiming at autonomy.

Language and Literature.—Czech language belongs to Slavonic subdivision of Aryan group; alphabet has forty-two letters, 'ch' being only guttural sound; there are many inflexions and prefixes, and few articles and auxiliaries. Earliest period of lit. down to time of Huss, is represented by various hymns, legends, didactic and satirical poems, translation of Bible, and Chronicle of Dalimil. Various religious works were written by Huss and his followers, many of which are lost. Greatest age of Bohemian lit. was XVI. cent.; historian Hajek may be mentioned among writers of that time. Lit. greatly influenced by 'Bohemian Brethren,' among whom Comenius (1592–1670) wrote excellent works on education. Modern writers include Vrchlicky, Tomek, Heyduk. Greatest historian is Palacky (d. 1876).

Climate is genial in valleys, cold in upper districts. About one-third of surface forested; over half cultivated; chief crops, wheat, rye, barley, oats; flax, hops, fruit, beet produced; hops important for beer manufacture, beet for sugar, of which greatest quantity goes to Britain. Chief mineral is lignite; black coal, iron ore, silver, gold, antimony, zinc, tin, graphite, lead, sulphur also produced; manufactures include woollens, carpets, cottons, linen, silk, paper, gloves, glass, buttons, bottles, porcelain. There are mineral springs at Carlsbad, Marienbad, Franzensbad, Teplitz, Johannisbad, Bilin. B. imports agricultural machinery and road-rollers from U.K., tools from Germany. Capital is Prague (*q.v.*). Inhabitants are two-thirds Czechs, rest Germans. Pop. (1910) 6,769,548.

Bachmann, *Geschichte Böhmens* (1890, 1905); Maurice, *Bohemia* (1896); Lutzow, *History of Bohemian Lit.* (1899); Morfill, *Bohemian Grammar* (1899).

BOHEMIAN BRETHREN, Moravian B. (*q.v.*).

BOHEMUND, name borne by six princes of Antioch. Bohemund I. (c. 1058–1111), s. of Robert Guiscard, prince of Antioch, efficiently filled his f.'s place; was one of leaders of first crusade. His s., Bohemund II. (1108–31), ally of Baldwin II. of Jerusalem, was slain by Muhammadans. Bohemund III., grandson of B. II., succ. as prince of Antioch (1163), and his s., Bohemund IV., became count of Tripoli (1187). Bohemund V. succ. 1233, and like his f. had to face hostility of Armenia. Bohemund VI. (1237–75) lost Antioch to the Sultan Bibars (1268), and within two years of death of Bohemund VII. Tripoli was captured.

BÖHMER, JOHANN FRIEDRICH (1795–1863), Ger. historian; author of numerous works dealing with Ger. history during the Middle Ages.

BOHN, HENRY GEORGE (1796–1884), Eng. publisher; originally a book-dealer on an extensive scale; commenced, in 1846, to pub. the famous 'Bohn Libraries' of standard works in many departments of lit., which extended to nearly 800 vol's. He disposed of his copyrights, in 1864, to Messrs. G. Bell & Sons.

BOHOL (9° 30′ N., 123° 30′ E.), island, Philippines; area, 1615 sq. miles. Pop. 243,148.

BÖHTLINGK, OTTO VON (1815–1904), Ger. scholar; famous for his Sanskrit studies, his most important work being *Sanskrit-Wörterbuch* (7 vol's, 1853–75).

BOHUN, historical Eng. family whose lands lay chiefly on Welsh marches and finally included earldoms of Hereford, Essex, and Northampton; male line extinguished (1373), when lands were divided between two co-heiresses.

BOIARDO, MATTEO MARIA, COUNT (1434–94), Ital. poet; author of the celebrated poem, *Orlando Inamorato*, which served as the inspiration of Ariosto's *Orlando Furioso*.

BOIELDIEU, FRANÇOIS ADRIEN (1775–1834), Fr. composer; produced numerous operas and musical pieces which achieved considerable popularity, including *Le Calife de Bagdad*, *Jean de Paris*, *Le Chapeau rouge*, and *La Dame Blanche* (the White Lady of Scott's *Monastery*), which alone survives and unites simple Scottish airs with light and graceful Fr. harmonies.

BOIGNE, BENOIT DE, COUNT (1751–1830), Fr. military adventurer; after serving in the Irish Brigade and the Russian service he went to India, where he acquired a high position as a military leader on the side of the Mahrattas, and amassed a great fortune.

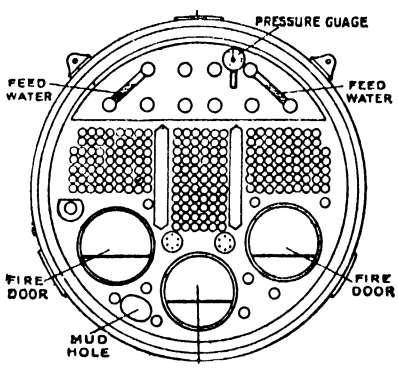
BOII, a Celtic tribe, who migrated from Gallia Transalpina and subsequently settled in three main groups in the district of the Po, in part of modern Bohemia, and round Bordeaux.

BOIL, painful inflammation of subcutaneous tissue leading to formation of mass of tissue and pus.

BOILEAU-DESPRÉAUX, NICOLAS (1636–1711), Fr. poet and critic; studied for the Church and for the Bar, but eventually devoted himself to lit. and became arbiter of literary taste in Europe. He continued the work of Malherbe in laying down laws of style which had deterrent effect on original genius, but abundant recognition for their disciplinary uses when not too slavishly followed. He became, in 1677, joint historiographer-royal with Racine. His poems, including the mock-epic *Lutrin*, are distinguished by their correctness of form. His most important work was his *Art Poétique* (1674) (both precept and example), in which he discussed in a most exhaustive manner the canons of verse; vigorously defended the usages of the ancient classic writers against the 'moderns' in the famous *Querelle* (see France: *Lit.*). Both his poetry and his criticism exercised considerable influence on the work of Pope and other Eng. authors; the characteristic excellences of Pope, ease, neatness, and point, are to be found in B.

Complete Works (Eng. trans.), 1712; *Boileau*, by Lanson (Grands Ecrivains).

BOILER, vessel in which a liquid is heated to the boiling point, and especially that part of a steam-engine used for generating steam from water. When the b. is open, the temperature of the steam remains at or near 212° Fahr., and the pressure is that of the atmosphere, about 14·7 pounds to the square inch. In a closed b. the temperature and pressure may be varied greatly, being limited only by the strength of the b. The main considerations determining the form of a b. are ability to resist internal pressure and



efficiency in producing steam. The spherical form was the earliest used, and is the strongest; but it presents to the fire a minimum of surface in proportion to its contents, and therefore its steam-producing efficiency is low. The cylindrical form is the one now in general use, as it combines high efficiency in raising steam with strength to resist the great working pressures now employed.

B's may be divided into two great classes: *tank* b's, containing large quantities of water, and *water-tube* b's, in which the water is mostly contained in a number of small tubes. The two forms are often

combined. In a b. the level of the water must be kept above that of the heating surfaces. The feed supply may be regulated by hand, or by automatic float mechanism, the level of the water being ascertained by a water gauge. The feeding is done by a pump driven by the main engine or by an independent engine, or by injection, the water being admitted by a check-valve which is kept on its seating by the b. pressure when the feed-pump is not working. There also must be a steam gauge to show the steam pressure, and one or more safety valves. Openings giving access for cleaning or repairs are usually made oval, the doors being on the inside and kept shut by the pressure.

Impurities in the feed water become concentrated by evaporation and encrust the b. surfaces, making regular cleaning necessary. When the water is very impure, b's of the 'Lancashire' or other similar type are most suitable, as they are easy of access for cleaning. If water-tube b's are used the water must be softened and filtered. The steam from engines may be condensed and used as feed water, but the oil with it is difficult to get rid of. The majority of b's are hand fired, as mechanical stokers are not yet altogether satisfactory. The draught for combustion is either natural, by chimney, or forced. A forced draught may be obtained by driving in air by fans and permitting it to escape only through the fires, or, as in locomotives, by the blast of the exhaust steam.

BOILING, see COOKERY.

BOILING TO DEATH, barbarous punishment for poisoning, coining, and other crimes, commonly employed in England during the XVI. cent. Numerous instances are cited during the reign of Henry VIII.

BOISE (43° 30′ N., 116° 20′ W.), capital, Idaho, U.S.A.; gold and silver mines. Pop. (1910) 17,358.

BOISGUILLEBERT, PIERRE LE PESANT, SIEUR DE (1676–1714), author and economist; magistrate at Rouen (1690); published *Détail de la France* (1695); *Factum de la France* (1705 or 1706).

BOIS-LE-DUC, Fr. form of 'S HERTOGENBOSCH (*q.v.*).

BOISROBERT, FRANÇOIS LE METEL DE (1592–1662), Fr. poet; entered the priesthood and became Canon of Rouen; he was greatly favoured by Richelieu, and after his death attached himself to Mazarin. He wrote *La Belle Plaideuse*, and other comedies, and much verse which enjoyed considerable popularity.

BOISSARD, JEAN JACQUES (1528–1602), Fr. antiquary and poet; he travelled extensively in Greece, and spent many years in Italy in the study of antiquities; his works include *Poemata*, *Romanæ Urbis Topographia*, *Theatrum Vitæ Humanæ*, etc.

BOISSERÉE, SULPICE (1783–1854), Ger. archæologist celebrated for collection of Early Ger. pictures now in Pinakothek, Munich.

BOISSIER, MARIE LOUIS ANTOINE GASTON (1823–1908), Fr. scholar; sec. of Fr. Academy; devoted himself to the study of Roman antiquities; pub. *Cicéron et ses Amis* (Eng. trans., 1897), *La Religion romaine d'Auguste aux Antonins*.

BOISSONADE, JEAN FRANÇOIS (1774–1857), Fr. classical scholar and author of books on recondite classical subjects.

BOISSY D'ANGLAS, FRANÇOIS ANTOINE, COMTE (1756–1826), Fr. statesman; pres. of Convention (1795); member of Committee of Public Safety and subsequently of Council of Five Hundred; proscribed Sept. 1797; lived in England until the Consulate; member of Tribunate (1801); senator (1805).

BOITO, ARRIGO (1842–), Ital. composer and poet; his opera, *Mefistofele*, was produced at Milan, in 1868, but that and his other musical compositions, all slight though with marked individuality, achieved little success at the time, but, praised by the critics, have been steadily winning a position. As a writer of libretti he has won distinction; author of the books of Verdi's *Otello* and *Falstaff*, Ponchielli's *La Gioconda*, and numerous others; Mus.Doc., Cambridge, 1893.

BOIVIN, FRANÇOIS DE, Baron de Villars (d. 1618), Fr. chronicler of Henry II.'s wars.

BOJADOR CAPE (26° 12′ N., 14° 27′ W.), cape, W. Africa. **B. C., FALSE** (26° 30′ N., 14° 6′ W.), cape, W. Africa.

BOJANO (41° 28′ N., 14° 29′ E.), town, Italy. Pop. c. 6000.

BOKENAM, OSBERN (*c.* 1446), Eng. poet; wrote metrical lives and legends of female saints, his verse showing the influence of Chaucer and other early poets; a copy of his work is contained in the Arundel *MS.* (Brit. Museum).

BOKHARA (39° 45′ N., 65° E.), khanate, Central Asia, with Afghanistan on S., elsewhere surrounded by provinces of Russia; conquered by Russia, 1868; under Russ. suzerainty; Amir, Sayid Abdul Ahad, succ., 1885. Rivers are Oxus, Zarafshan, Surkhab; soil barren, except where irrigated from rivers. W. is hot and dry, with flat surface, fertile through irrigation; produces pasture for stock-rearing, cottons, vines; middle is plateau, produces pistachios, fruits; E. is mountainous, valleys producing cereals, mulberries; sheep, goats, camels, horses, asses raised; silkworms reared. Minerals include salt, sulphur, alum, sal ammoniac; rice, cotton, wheat, barley, tobacco, fruits, etc., produced; area, *c.* 90,000 sq. miles. Pop. *c.* 1,500,000.

BOKHARA (39° 50′ N., 65° E.), town, B., Asia; has 360 mosques, Mir-Arab being most remarkable; centre of religion and learning. Pop. *c.* 100,000.

BOLAN PASS (29° 45′ N., 67° 15′ E.), pass, Afghanistan.

BOLAS, weapon of S. Amer. Indians; stone balls attached to a hide or hempen rope.

BOLBEC (49° 34′ N., 0° 28′ E.), town, France. Pop. 10,959.

BOLE, earthy clay-like mineral, consisting of silica, alumina, red iron, oxide, and water; occurs in veins, in basalt, and other rocks.

BOLESLAW I. (d. 1025), became king of Poland, 992; made Poland a great power, and established a native church.

BOLESLAW II. (1039–81), Polish king; exiled, 1079.

BOLESLAW III. (1086–1139), king of Poland; succ. 1102; devoted his life mainly to subjugation of maritime provinces of Pomerania.

BOLEYN, ANNE, BULLEN (*c.* 1507–36), second wife of Henry VIII. of England, and niece of Duke of Norfolk. Her f. was Sir Thomas B., cr. Earl of Wiltshire and Ormonde (1529). Henry m. her secretly about Jan. 25, 1533; subsequently their marriage was declared valid, and Anne was crowned (June). Birth of a dau. (Sept. 1533), instead of desired s., disappointed Henry, who soon tired of his arrogant, flighty, voluptuous wife. Anne was imprisoned in the Tower (May 2, 1536) on charges of flagrant immorality, condemned and sentenced (May 15), and beheaded on May 19.

BOLGARY (55° N., 58° 45′ E.), ancient town, Kazan, Russia.

BOLGRAD (45° 38′ N., 28° 39′ E.), town, Bessarabia, Russia. Pop. c. 9000.

BOLI (40° 45′ N., 31° 30′ E.), town, Turkey-in-Asia. Pop. c. 11,000.

BOLINGBROKE, HENRY ST. JOHN, VISCOUNT (1678–1751), Eng. statesman and writer. Entering Parliament (1701), he attached himself to Harley, becoming War. Sec. (1704), and Sec. of State (1710). Cr. Viscount B. (July 1712), he proceeded to France to conduct peace negotiations, and had a responsible share in underhand negotiations which resulted in Peace of Utrecht (March 31, 1713). Gradually superseding Oxford in the leadership, B. was supreme after Oxford's retirement (July 1714), but his plans for a Jacobite Restoration were upset by Queen Anne's sudden death (Aug. 1) and intervention of Whig lords. Dismissed from office on accession of George I., B. joined the Pretender, but, having received

pardon (1723), he returned to London; was received coldly by Walpole, and organised opposition in conjunction with Pulteney. Success seemed imminent when king died (1727). B. subsequently joined opposition round Frederick, Prince of Wales, but returned to France (1739); finally he settled in Battersea. A famous man of fashion and letters, a plausible and eloquent debater, his diplomacy was subordinated to party necessities. His writings include the *Patriot King*, which inspired the political ideas of Bute and George III.; *Life*, by Hassall (1889).

BOLIVAR (8° 30′ N., 76° W.), department, Colombia; area, 22,320. Pop. *c.* 425,975.

BOLIVAR (7° N. to 65° W.), state, Venezuela; capital, Ciudad Bolivar; area, 91,870. Pop. 55,744.

BOLIVAR, SIMON (1783–1830), S. Amer. soldier and administrator; b. Caracas, Venezuela; associated himself with cause of independence of Span. colonies in S. America; aided rebellion at Caracas (April 1810), and was commissioned colonel by the revolutionary convention. Venezuela declared its independence (1811); war began, 1812. After varying success, B. defeated Spaniards at *Barcelona* (Feb. 1817), won victory of *Boyaca* (Aug. 1819), and finally routed Spaniards at *Carabobo* (1821). Venezuela and New Granada were united to form 'Republic of Colombia,' under B.'s presidency (1821). B. also liberated Ecuador and Peru; Upper Peru became a separate state, called *Bolivia*, in honour of B., who was proclaimed perpetual protector. Bolivian Code was adopted as constitution of Peru, and B. declared pres. for life (Dec. 1826); subsequently B. exercised supreme power in Colombia (1828–30); *Life*, by Petre (1910).

BOLIVIA (10° to 23° S., 57° 30′ to 70° W.), republic, near centre of W. side of S. America, but separated from coast since 1882, when Chile annexed districts W. of Andes; bounded N.N.E. and E. by Brazil, S.E. and S. by Paraguay and Argentine, W. by Chile and Peru. S.W. consists of plateaus lying between Andes and Cordillera Real to E.; of these Oruro plateau (with Lakes Titiaca and Aullagas) is 13,000 ft. above sea-level; southern part lower, a sandy or salt-covered desert; along N.E., hills sink rapidly, and on E. by series of terraces to northern and eastern plains; former drained by Beni and Mamore to Madeira, latter by Paraguay; other rivers are Guapore, Purus, etc. Chief mountains are Bolivian Andes; there are many active volcanoes. Climate varies with altitude and exposure; higher plateaus have hot days, cold nights; lower plateaus and eastern terraces temperate; upper valleys sub-tropical; northern and eastern plains tropical; first two regions have wet and dry seasons; elsewhere rain falls all year round. Fauna resembles that of Peru; great variety of birds and insects. Condors and humming-birds occur; wild animals include tapir, jaguar. Chief town, La Paz (*q.v.*); nominal capital, Sucre (Chuquisaca); railway communications poor (*c.* 2500 miles); Beni and Mamore are navigable; roads few and bad.

History.—B. seems to have been united with Peru from earliest times, and so remained after Span. conquest of that country; became province of Buenos Aires, 1776. Natives were cruelly oppressed under Span. rule, and several risings occurred. In XIX. cent. occurred great stuggle for independence, in which natives were aided by people of Peru and La Plata, 1809–25. Rebels, under Bolivar (*q.v.*), ultimately seized La Paz, 1825, and a month later Spaniards were defeated at Potosi, their last remaining province. Constitution was framed by Bolivar, from whom country was named, in 1826; and Sucre (*q.v.*), who had defeated Spaniards at Ayacucho in 1824, became first pres. of new republic, accepting office for two years only. Since then frequent insurrections and revolutions have occurred, sometimes followed by changes in constitution. In 1879 war broke out with Chile, during progress of which a revolution occurred in B.; war ended in 1883, when treaty was concluded, whereby B. lost her coast province, Atacama, to Chile. Most important recent events have been settlement of boundary dispute with Brazil, 1903, when B. obtained district on Matto Grosso frontier and Madeira River, together with £2,000,000, in exchange for Upper Acré and other districts; and confirmation of coast provinces to Chile in 1905, for which she received money compensation.

Constitution, dating from 1880, is republican. Executive vested in pres., elected by popular vote for term of four years; legislative, in two chambers, Senate and Chamber of Deputies, members of both elected by people. There are two vice-presidents, and ministry of six departments. Republic is divided into 8 departments, 55 provinces, 437 cantons, and 248 vice-cantons. State religion is R.C., though other faiths are tolerated. Head of church is abp., who lives at Sucre. Elementary education is compulsory. Military service is compulsory for all men between 20th and 50th years.

Resources and Productions.—Upper plateaus produce potatoes, barley; lower plateaus, wheat, maize; upper valleys, fruits; great plains have luxuriant tropical vegetation. There are grassy savannahs in S., valuable timber in N.; rubber, copal, coffee, cocoa, coca, rice, cotton, cinchona, pine-apples, bananas produced; cattle and sheep largely bred; vicunya, alpaca, llama, guanaco, chinchilla are valued for their skins and wool. Minerals include silver, copper, tin, lead, mercury, zinc, antimony, bismuth, gold, borax, coal; many of these await development. Silver is great source of wealth, tin coming next in importance. Salt and mineral oil also occur. Chief imports are provisions, wines, spirits, cottons, woollens, silks, linens, clothing, hardware; exports, silver, rubber, tin, wool, hides, cattle, coffee, cocoa.

Inhabitants include Indians, half-breeds, whites, negroes; white inhabitants are chiefly of Span. descent; area, 567,500 sq. miles. Pop. (1911) *c.* 2,260,000.

Child, *South American Republics* (N.Y., 1891); Wright, *Bolivia* (1906); Conway, *Bolivian Andes*.

BOLKHOV (53° 23′ N., 35° 58′ E.), town, Russia; manufactures leather, gloves, soap. Pop. 20,700.

BOLL, BOLE, measure used in Scotland and N. of England; held 6 imperial bushels; the 'new b.' held 2.

BOLLANDISTS, succession of Jesuit writers, so called after the first, JOHN VAN BOLLAND, who (1643) compile *Acta Sanctorum* (q.v.).

BOLOGNA (44° 29′ N., 11° 21′ E.), city, Italy; capital of B. province; Cathedral of San Pietro dates from 910, Church of San Petronio from 1390; other interesting old churches, two leaning towers, Torre Asinelli and Torre Garisenda, and many fine palaces; univ. dates from XI. cent. (perhaps first ever founded); important museum and picture gallery; railway centre; manufactures liqueurs, sausages, soap, glass, tobacco. Pop. (1911) 172,639. Province; area, 1448 sq. miles. Pop. (1911) 577,969.

BOLOGNA STONE, a variety of heavy spar or sulphate of barytes.

BOLOGNA, GIOVANNI DA (1524–1608), Fr. sculptor; lived chiefly in Italy, and assumed this Ital. name; was employed by Francesco and Cosimo de' Medici; fine examples of his work (e.g. *The Rape of the Sabines*) in Florence.

BOLOMETER, see under ELECTRICITY.

BOLSENA (42° 39′ N., 12° E.), town, on Lake of B., Italy. Pop. 3286.

BOLSOVER (53° 14′ N., 1° 18′ W.), town, Derbyshire, England; coal mines. Pop. (1911) 11,225.

BOLSWARD (53° 5′ N., 5° 32′ E.), town, Holland. Pop. 6517.

BOLTON, BOLTON-LE-MOORS (53° 35′ N., 2° 26′ W.), town, Lancashire, England; centre of cotton industry; manufactures muslins, paper, chemicals; has iron foundries, sawmills; coal mines in neighbourhood; created parliamentary borough, 1832; returns two members; grammar school, founded 1641; stormed by Royalists in Civil War. Pop. (1911) 180,885.

BOLTON, DUKEDOM OF, the family of Paulet

(Powlett) held the title from 1689 to 1794, when the dukedom became extinct.

BOLTON, EDMUND (b. 1575), Eng. author; wrote *Hypercritica*.

BOLZANO, BERNHARD (1781–1848), Austrian philosopher; was ordained to the priesthood, and became prof. of Philosophy at Prague, but his opinions led to his being deprived of the exercise of both offices; author of *Lehrbuch der Religionswissenschaft*, and other philosophical works.

BOMA (5° 40′ S., 13° 15′ E.), capital, Belg. Congo; important seaport; exports rubber, ivory. Pop. *c.* 3500.

BOMARSUND (60° 15′ N., 20° 11′ E.), town, Finland; formerly fortified; captured by French and English, 1854.

BOMB, shell of metal filled with explosives; used by Nihilists. Explosion by clockwork or detonation.

BOMBARDIER BEETLE, beetle which when attacked ejects from anus evil-smelling fluid.

BOMBARDON, Bass Tuba, one of the saxhorns, a deep-toned musical instrument used in orchestras and military bands; for the latter use it is made in a circular form, and worn round the body.

BOMBAY PRESIDENCY (13° 52′ to 28° 40′ N., 66° 40′ to 76° 29′ E.), governorship, Brit. India; area, 123,064 sq. miles; bounded N. and N.W. by Baluchistan, N.E. by Punjab, Rajputana, Malwa, E. by Berar, Hyderabad, Madras, W. by Arabian Sea; coast-line towards N. broken by Gulfs of Cutch and Cambay; Nerbudda River, flowing to latter, divides province into two parts, of which northern consists of Guzerat and great plain of Sind, southern of coastal strip along Arabian Sea and part of Deccan tableland; chief mountains are W. Ghats, Satpura Range, and outliers of Aravalli Hills; rivers, Indus, Nerbudda, Tapti.

History.—Between late XV. and early XVII. cent. settlements were made in B. by Portuguese, Dutch, and English, of whom Portuguese first appeared. B. island passed to England when Charles II. married Catharine of Braganza in 1661, and was subsequently granted to East India Company in 1668; other districts were added at various dates, and by about 1853 presidency attained its present form; frequently suffered from plague, cholera, and famine.

Climate varies; high temperature in Sind plains; rainfall slight in N., moderate on tableland; heavy on coastal strip; wettest months, June to October; chief crops are wheat, cotton, millet, rice; other products are pulse, oil seed, sugar-cane, indigo, tobacco; principal industries, cotton manufacture, silk-weaving, carpets, leather goods, pottery, brass-work, wood-carving, cutlery, jewellery; minerals include gold, iron. Railway mileage, *c.* 26,500. Administration carried out by governor, who is assisted by executive council of three members and legislative council of 48 members; population includes Europeans, Mahrattas, and other races; majority are of Hindu religion, Muhammadanism coming next in numerical importance. Pop. (1911) 19,672,640.

Bombay (18° 55′ N., 72° 49′ E.), chief town and seat of government of B. Presidency, India, situated in S. of island of same name, lying off coast of province and connected with mainland by bridges and causeways. In N. is native town; in S., European garrison; natives are of many different races; chief religions, Hinduism, Muhammadanism. B. has univ., several colleges and schools, hospitals; most important manufacturing town in India; favourably situated for foreign trade; has magnificent natural harbour, wet docks, and many dry docks; railway communication with all parts of India; centre of cotton trade; other industries are dyeing, tanning, metal work; imports and exports are practically those of province (*q.v.*). *Bombay furniture* is a distinct type of blackwood furniture which is chiefly manufactured in the neighbourhood of Bombay. It takes a fine polish, is much used for ornamental tables and stands, and is frequently inlaid. Pop. (1911) 979,445.

Edwardes, *The Rise of Bombay* (1902).

BOMBELLES, MARC MARIE, MARQUIS DE (1744–1822), Fr. diplomatist; later, bp. of Amiens.

BOMMEL (51° 48′ N., 5° 15′ E.), town, Gelderland, Holland. Pop. 4000.

BONA, Bône (36° 55′ N., 7° 42′ E.), port, Algeria; quasi-Byzantine cathedral, Grand Mosque, and citadel; fine harbour; exports phosphates, sheep, barley, iron, etc.; imports manufactured articles; occupied by French, 1830, 1832. Pop. (1911) 42,000.

BONA DEA (classical myth.), Rom. goddess of fruitfulness.

BONA FIDES (Lat. 'good faith').—The b. f. of defendant is an equitable consideration which entered largely into Rom. law and modern codes founded thereon. To obtain alcoholic liquors on Sunday in Scotland, or in certain hours in Eng., persons must be *b. fide* travellers (*i.e.* have travelled from three miles distant that day).

BONA, GIOVANNI (1609–74), Ital. cardinal and author; wrote numerous devotional and liturgical books; his *Manuductio ad Cœlum* (Guide to Heaven) was trans. into English by L'Estrange, 1680 (new ed., 1898).

BONAIRE ISLAND (12° N., 68° 50′ W.), island, Dutch W. Indies. Pop. (1909) 6353.

BONALD, LOUIS GABRIEL AMBROISE, VICOMTE DE (1754–1840), Fr. politician, philosopher, and writer of the traditionalist school; Minister of State, 1822.

BONANZA (Span. 'prosperity'), colloquial expression in Amer. mining districts for anything profitable.

BONAPARTES, Buonapartes (Ital. form).—The Bonaparte family consisted of: **Charles Bonaparte** (1746–85), f. of Napoleon I., descendant of Ital. family settled in Corsica; occupied position at court of Ajaccio; m. (1764) Letizia Ramolino, a good *bourgeoise* to whom Napoleon was devotedly attached; as 'Madame Mère' in the Tuileries, she obstinately made economies against the evil days which she knew would come; she followed Napoleon to Elba, and d. 1836. **Napoleon I.** (*q.v.*) was the second son (b. 1769); he had 4 bro's and 3 sisters, whom he treated with culpably magnificent generosity. He once said bitterly: '*On dirait que j'aurais mangé l'héritage de notre père.*'—**Joseph** (1768–1844), eldest bro. of Napoleon I., b. Corte, Corsica; became councillor of Ajaccio municipality; fled to France on victory of Paolist party; app. minister to court of Parma (1797); subsequently one of members for Corsica in Council of Five Hundred; king of Naples (1806–8); king of Spain (1808–13). In Spain he endeavoured to thwart Napoleon, but was little more than nominal king, and retired from Madrid after his defeat at *Vittoria* (1813); he was lieut.-general of France (1814); subsequently settled in U.S.A. as Comte de Survilliers; d. at Florence.—**Lucien** (1775–1840), Prince of Canino; Napoleon's ablest bro.; espoused democratic movement (1789); subsequently pres. of Council of Five Hundred and Minister of Interior (1799); ambassador to Madrid (1800); estranged from Napoleon (1803); lived for some years in Italy; offered Napoleon his help during the Hundred Days; d. at Rome. His eldest s., Charles Lucien Jules Laurent, went to America, and is famous for his *Amer. Ornithology*; his younger s., Louis Lucien (1813–91), was authority on Celtic speeches.—**Louis** (1778–1846), Napoleon's favourite bro., educated by Napoleon, at the cost of much privation, from his lieutenant's pay; accompanied Napoleon during Ital. campaign (1796–97); became general (1804); gov. of Paris (1805); king of Holland (1806–10); showing himself vain and ostentatious, Napoleon declared Holland an integral part of Empire (1810); Louis fled to Bohemia. His s. afterwards became Napoleon III. (*q.v.*), f. of Eugène Louis Jean Joseph (b. 1856–79), 'Prince Imperial,' slain by Zulus.—**Jerome** (1784–1860), king of Westphalia (1807–13); m. Catherine of Württemberg; commanded a division of Fr. army at *Waterloo*; subsequently a marshal of France and pres. of Senate.—The *affaires galantes* of Napoleon's sisters were matters of European scandal.

Elisa (1777-1820), m. Felix Baciocchi, a well-connected Corsican (1797); made Grand Duchess of Tuscany and Princess of Lucca and Piombino by Napoleon.—**Pauline** (1780-1825), Princess Borghese (1803), Napoleon's second and most beautiful sister; Duchess of Guastalla (1808-13).—**Caroline** (1782-1839), m. Joachim Murat, king of Naples (1808-13), and devoted herself to furthering his interests.

All the above had issue, many of whom achieved distinction. The Bonapartes of Baltimore are descended from Jerome Bonaparte by his marriage with Elizabeth Patterson (1803).

By his second w., Marie Louise, Napoleon had a s., the little king of Rome, afterwards recognised as NAPOLEON II. (*q.v.*). Napoleon's stepdaughter, Hortense de Beauharnais, m. his brother Louis, father of Napoleon III.

Levy, *Napoléon Intime*; Masson, *Napoléon et sa famille* (Paris, 1897-1900); Morse Stephens, *Revolutionary Europe* (Rivingtons, 1907).

BONAR, HORATIUS (1808-89), Scot. Presbyterian theologian, author of well-known hymns.

BONASA GROUSE (*Bonasa umbellus*), N. Amer. grouse, recognised by absence of feathers from toes and lower leg, and by black neck-ruffs.

BONAVENTURA, ST. (1221-74), Ital. Franciscan theologian; studied at Paris; general of Franciscan order, 1256; called 'The Seraphic Doctor'; canonised, 1482. A mystical theologian, he opposed the Aristotelianism of Roger Bacon and St. Thomas Aquinas and showed platonising tendencies; a profound philosopher and theologian.

BONAVISTA (48° 40′ N., 53° 10′ W.), town, Newfoundland. Pop. 4000.

BONCHAMP, CHARLES MELCHIOR ARTUS, MARQUIS DE (d. 1793), Vendéan leader; served in Fr. army, but retired on outbreak of Revolution; became leader of Vendéan insurgents (1793), and was killed at battle of *Cholet*.

BOND, a written instrument, signed and sealed by a person who is called the obligor, by which he acknowledges that he owes a certain sum of money to another, or that he is bound to do some act for the benefit of that other, who is called the obligee. Money due under a b. can be recovered within twenty years after it has become due, whereas in the case of simple contract debts, the right to recover is barred at the end of six years from the last acknowledgment in writing of the debt, or the last payment of any portion of the principal or interest.

BOND, SIR EDWARD AUGUSTUS (1815-98), Eng. librarian; entered Brit. Museum (1838); app. chief librarian (1878); one of the founders of the Palæographical Soc.; edit. a series of Anglo-Saxon charters.

BOND, SIR ROBERT (1857-), Premier, Newfoundland, 1900-9; prominent in Fisheries disputes.

BOND, WILLIAM CRANCH (1789-1859), Amer. astronomer; introduced astronomical photography, discovered 8th satellite of Saturn (1848), invented astronomical chronograph.

BONDE, GUSTAF, COUNT (1620-67), Swed. statesman; became Lord High Treasurer (1659), and member of council of regency during minority of Charles XI.; favoured pacific and economic policy in national affairs, but overborne by colleagues.

BONDED WAREHOUSE, a government store or custom-house store where imported goods are lodged, pending re-exportation or until the duties chargeable thereon are paid on removal. The system of bonded warehouses (proposed in Walpole's Excise Scheme, 1733) was not adopted till 1803.

BONDI, CLEMENTE (1742-1821), Ital. poet, priest, prof.; chief work, the poem, *La giornata villereccia*, resembles Lamartine's style.

BONDU (14° N., 13° W.), native kingdom, Fr. Senegal, W. Africa; well cultivated; people chiefly Fula; cotton, tobacco. Pop. *c.* 30,000.

BONE is the hard substance of which the skeletons of animals is built up, serving as a framework for the body and for the protection of vital parts, and is a connective tissue in which earthy salts have been deposited in order to strengthen the structure. B's are classed as *long*, e.g. in thigh, *flat*, e.g. in skull, and *cutical* or *irregular*, e.g. in wrist. The animal or organic matter amounts in b. to about one-third of the whole, and the earthy or organic matter, in the form of salts, to about two-thirds. According as it is dense and hard in structure, or light and spongy, b. is called *compact* or *cancellous*. On microscopic examination b. is found to be formed by innumerable little canals, running longitudinally in a long b., each containing blood vessels, and their walls formed by a series of rings of bony substance. Filling the spaces in b. is marrow, composed of fat cells, and of the same corpuscular elements as are found in the blood (*q.v.*), but in a less advanced stage of development; there are two kinds of *marrow*, yellow and red, the former being found in the interior of long bones, *e.g.* the thigh bone, and the latter in smaller long bones, *e.g.* the ribs, and in short bones, *e.g.* vertebræ. Yellow marrow has a much greater number of fat cells, hence its colour, while red marrow is almost entirely composed of the other cellular elements, from which the blood corpuscles are formed. B. is formed from cartilage or from membrane, usually the former, little points of bony cells developing and the area then spreading.

Inflammation may affect the covering of the b. or *periosteum*, the b. itself, or the substance in the canal within, or *medulla*. It may be acute or chronic, the acute form usually being due to injury followed by bacterial infection, and the chronic to the continued suppuration of acute form, to syphilis, and to tuberculosis. The former is usually treated by rest and fomentations, operation being sometimes necessary, and the latter by general treatment of the disease affecting the individual.

Fractures are treated by rest in splints, and massage, begun early.

Rickets (q.v.) is a general disease of children, with special manifestations in the bones.

BÔNE, see BONA.

BONE ASH, formed from calcined bones; used for fertilising and in manufacture of cupels.

BONE MANURES consist mainly of phosphate of lime and ammonia.

BONE, HENRY (1755-1834), Eng. enamel-painter; private and hist. portraits and classical subjects.

BONER, ULRICH (XIV. cent.), Swiss fabulist; author of a collection of fables, *Der Edelstein*, written in Middle High German; edit. by G. F. Benecke (1816).

BO'NESS, BORROWSTOUNNESS (56° 1′ N., 3° 36′ W.), seaport, Firth of Forth, Scotland; extensive harbour; large shipping trade; coal, iron; salt, soap. Pop. (1911) 10,866.

BONFIRE, a corruption of 'bone-fire,' a fire for burning bones, which spelling was employed in England as late as the latter part of the XVIII. cent., though the alternate spelling had been some time in use. B's were formerly lit in England as beacons, or warnings; the approach of the Armada was so notified to the people. At the present day they are lighted on occasions of national rejoicings.

BONGARS, JACQUES (1554-1612), Fr. diplomatist; edit. works on Fr. and Rom. history.

BONGHI, RUGGERO (1828-95), Ital. politician and educationist; as Minister for Public Instruction (1873) introduced useful reforms; celebrated for his vivacious but acrimonious wit.

BONGO, negro tribe of Sudan, of medium height, black-haired, with a reddish-brown complexion; peaceable and industrious agriculturists.

BONHAM (33° 39′ N., 96° 14′ W.), town, Texas, U.S.A.; cotton mills. Pop. (1910) 4844.

BONHEUR, ROSA (1822-99), Fr. artist; was of Jewish parentage; originally a dressmaker; famous for her masterly painting of animals. Her work was highly appreciated in England, and a replica of *The Horse Fair* is in the National Gallery.

BONI (4° 40′ S., 120° E.), native state, Celebes, Dutch East Indies; inhabitants of Bugis race; rice, tobacco; capital, BONI. Pop. c. 70,000.

BONI, GIACOMO (1859–), famous excavator of Rom. remains, especially in Forum at Rome; author of works on Rom. antiquities.

BONIFACE V., pope, 619–25; said to have made Canterbury chief Eng. see.

BONIFACE VIII., BENEDICT CAJETAN, pope (1294–1303), upheld temporal power; quarrelled with several kings; issued bull, *Clericis Laicos*, 1296, forbidding taxation of clergy; captured by Fr. king at Anagni; imprisoned, and died on release.

BONIFACE, ST. (680–754), 'Apostle of Germany'; of Eng. birth; began missionary labours in Frisia, 716; founded abbey of Fulda and churches in Bavaria and Franconia; became abp. of all Germany; martyred. To him the conversion of Germany was really due.

BONIFACE OF SAVOY (d. 1270), abp. of Canterbury, 1243; uncle of Eleanor of Provence, Henry III.'s wife.

BONIFACIO (41° 23′ N., 9° 8′ E.), seaport, Corsica, on peninsula, Strait of B.; olive oil. Pop. 3000.

BONIFACIUS (d. 432), Rom. gov., defended Hippo against Vandals.

BONIN ISLANDS (27° 45′ N., 142° E.), volcanic islands, N. Pacific, belonging to Japan; capital, Port Lloyd, on Peel Island, the largest of the chain; discovered by Japanese, 1593.

BONINGTON, RICHARD PARKES (1801–28), Eng. landscape painter; one of pioneers of Eng. Romantic school.

BONITO, see MACKEREL.

BONITZ, HERMANN (1814–88), Ger. scholar; famed for his commentaries on Aristotle and Plato; *Disputationes Platonicæ Duæ* (1837), *Observationes Criticæ in Aristotelis Libros Metaphysicos* (1842).

BONIVARD, FRANÇOIS (1493–1570), Cluniac prior of Geneva, hero of Byron's *Prisoner of Chillon*; being imprisoned there for six years by order of Charles III. of Savoy; released when Chillon fell into hands of Bernese, 1536; took refuge at Geneva, accepted the Reformation, and wrote *Chroniques de Genève*, an unscholarly production.

BONN (50° 44′ N., 7° 4′ E.), town, Prussia, on Rhine; Minster is Romanesque church, dating from XI. cent.; famous univ., established 1808; building was formerly electoral palace; has five faculties, antiquarian museum, and library; fine bridge across Rhine; behind town is Kreuzberg, with monastic church; Beethoven's birthplace. Pop. (1910) 87,978.

BONNAT, LÉON JOSEPH FLORENTIN (1833–), Fr. historical painter and portraitist.

BONNER, EDMUND (*c.* 1500–69); Eng. bp.; Wolsey's chaplain, 1529; subsequently transferred to king's service; archdeacon of Leicester, 1535; bp. of London, 1539; imprisoned in Marshalsea, Sep. 1549, for failure to promote cause of Reformation; restored on Mary's accession, he vigorously supported Roman Catholicism and persecuted Protestants; again imprisoned, April 1560, for refusal to take Oath of Supremacy; d. in Marshalsea.

BONNET, CHARLES (1720–93), Swiss naturalist and author; made special study of insect life; advanced theory that plants possess sense of discernment; also formulated a system of philosophy.

BONNEVAL, CLAUDE ALEXANDRE, COMTE DE (1675–1747), Fr. soldier; served under Prince Eugene; later in Turk. service.

BONNEVILLE (46° 4′ N., 6° 24′ E.), town, Haute-Savoie, France.

BONNEVILLE, BENJAMIN (1795–1878), Amer. soldier and explorer; explored the Rocky Mountains (1831–36); an account of his adventures was edit. by Washington Irving. He subsequently served in the Mexican and Civil Wars.

BONNEY, REV. THOMAS GEORGE (1833– Eng. geologist, author, and Camb. prof.; pres., British Association, 1910–11.

BONNIVET, GUILLAUME GOUFFIER, SEIGNEUR DE (1488–1525), Fr. soldier; ed. with Francis I., with whom he remained a favourite; admiral, 1515; commanded the army of Navarre, 1521; served in Italy, 1523–25, and was killed at *Pavia*. He was the implacable foe of the Constable de Bourbon; famed for his wit, his handsome person, and licentious life.

BONNY.—(1) (4° 30′ N., 7° 23′ E.) port, Nigeria. Pop. *c.* 20,000. (2) (5° 16′ N., 7° E.) river, Nigeria.

BONOMI, GIUSEPPI (1739–1808), Eng. architect; b. Rome; settled in England; was elected A.R.A.; did much to revive classical arch. in U.K. His s., GIUSEPPI (JOSEPH) B. (1796–1878), the sculptor and writer on antiquities, had great knowledge of architecture, hieroglyphics, etc., and was curator of Soane Museum.

BONONIA, the modern Bologna (*q.v.*).

BONPLAND, AIMÉ (1773–1858), Fr. botanist; travelled in Central and S. America.

BONSTETTEN, KARL VICTOR VON (1745–1832), Swiss author; held advanced liberal opinions which sometimes involved him in difficulties with the authorities, but won for him the regard of many distinguished people, including the Eng. poet, Gray, and Mme de Staël. His best-known work is *L'Homme du midi et l'homme du Nord* (1824).

BONY FISHES, TELEOSTEI, by far the greater number of existing fishes, are grouped together in this order, containing about 10,000 species, including such diverse forms as salmon, herrings, eels, pike, cod, sea-horses, and globe-fishes (*qq.v.*). The most apparent character which unites the infinite variety of Teleosts is the presence of a skeleton of true bone, as the scientific name indicates. There are many other less evident but as distinctive characters; the tail is altogether formed of what is, in more primitive fishes, only the ventral lobe, which here assumes a false appearance of symmetry (homocercal). The heart has a non-contractile arterial bulb, the optic nerves cross, but do not interlace (decussate), there is no spiral valve in the intestine, and the air-bladder, except in very rare cases, has ceased to be used in respiration. For the most part bony fishes are protected by thin, overlapping scales, but in some there are bony plates, and in some the skin is naked. Teleosts are amongst the most modern of fishes, but herring-like examples have been found in rocks of Jurassic Age.

BOOK (A.S. *bōc*; Ger. *buch*), the name formerly applied to any written tablet or document; now used to describe a printed literary work, stitched and bound; also the division of such a work, as 'Book II.' of *Paradise Lost*. A modern printed b. is described according to the size of its pages, which size is governed by the number of times a single sheet of printing-paper (*folio*) is folded. Thus a folio b. consists of sheets folded once, forming two leaves, or four pages; in a *quarto* the sheet is folded twice (four leaves, eight pages); in *octavo* it is folded three times (eight leaves, sixteen pages), and so on down to smaller sizes. The most common size to-day is *crown octavo* (Cr. 8vo), which is the size of the usual six-shilling novel, and many other b's; while a favourite smaller size is that known as *foolscap octavo* (Fcp. 8vo), which is often used for b's of verse, and with uncut leaves of *deckle-edged* (untrimmed) paper.

The first page of a printed b. is called the *recto*, and usually contains the bare title, or, if it is a long and elaborate one, a portion only, and is known as the *half-title page*. The back of it is usually left blank, and is called the *verso*. Then follows the *title-page* proper, bearing the year of publication, though there is a growing tendency at present to print the date on the back of the title-page, as thus: 'First printed in 1912.' The title-page is followed in proper order by the dedication, preface, and contents pages. In early

printed b's the name of the printer and the date and place of publication were inscribed at the end of the b.; this appendix (containing sometimes a note as to the nature of the b.) was called the *colophon*. In early printed b's the leaves were not numbered, the pioneer in leaf numeration being a Cologne printer who first made use of it in about the year 1470, while pagination was a product of the XVI. cent. See Duff's *Early Printed Books* (1893); Jacobi's *Some Notes on Books and Printing* (1902).

Bookbinding, the art of making up a book by fastening together the sheets and providing them with an outer cover to protect them. Before the invention of printing, manuscript books were both written and bound by monks, but when printing presses became established towards end of XV. cent., bookbinding became a separate art in which Italy took the lead. In XVII. cent. Fr. binding became prominent, and during early XIX. cent. Eng. binding reached a high position, which it still maintains. Books are bound in either leather or cloth, the latter being less strong, but cheaper. The binder folds the sheets which come from the printer into two, four, or eight leaves according as the book is folio, quarto, or octavo, and arranges these in the proper order as indicated by letters, called signatures, printed at the bottom of the first page of each sheet. The sheets are then pressed and saw-cuts made across the back to take the cords with which they are stitched. The back is then hammered and pressed to round it and to form side projections, called joints, to hold the case. In cloth binding the case, consisting of two pieces of millboard joined by a strip of paper to form the back, is then attached.

Book Clubs.—(1) Early form of circulating library. (2) Learned Scot. soc's like Bannatyne, Maitland, and Roxburghe Clubs founded to print literary and hist. texts. *The Times* B. C. was formed, 1905.

Book-Collecting.—The habit of collecting rare books came into fashion in England after the time of Henry VIII. There were a few notable collectors during the reign of Elizabeth. A bookseller named George Thomason, who d. in the early years of Charles II.'s reign, made a collection of Civil War pamphlets, which have proved invaluable to historians. By this time collecting had become pretty general throughout Europe, and public sales of rare books became common in England during the last quarter of the XVII. cent. Most of these early collectors bequeathed their treasures to univ. or public libraries. Sir Thomas Bodley founded the famous Oxford library which is named after him; the Brit. Museum was founded in 1753 to house the collection formed by Sir Hans Sloane and other valuable literary treasures, which was further enriched by George II., who transferred to its keeping the valuable collection of books made by preceding sovereigns. George III. brought together an immense independent collection of books and MSS., and these in turn eventually passed to the British Museum.

The gifts of books to the univ's of Oxford and Cambridge during the past three cent's are too numerous to mention. A very famous collection of modern times was that made by the Earls Spencer, known as the Althorp Library, which collection having been purchased by Mrs. Rylands, formed the nucleus of the magnificent 'John Rylands Library' in Manchester. It is not, however, only the wealthy that find pleasure in book-collecting. The book-lover of limited means may take an exquisite pleasure in the pursuit of literary treasures, and, since rare books usually increase in value, the collector may console himself with the reflection that his money is well invested. Buyers may derive much useful information from *Book-Prices Current*, which is pub. annually.

Bookplates, name given to labels placed inside cover of books to denote ownership; used since XV. cent.; before their introduction covers of books were stamped with owner's personal device. They are also known as *ex libris*. The earliest known are of Ger. origin, but an Old Eng. b. appears in an ancient folio of Henry VIII.'s library, bearing an elaborate emblemary drawing. Many different designs have been utilised, but the majority are armorial. Many of the best-known artists have designed b's, including Dürer, Hogarth, Marshall, and Bewick. B's are now little used, but are in demand by collectors.

Bookselling.—The issue of a book to the public at the present day is usually the work of four separate producers—the publisher, the printer, the binder, and the bookseller. Publishing as a distinct trade is of comparatively modern growth. During the XVII. and XVIII. cent's in England, the word publisher was unknown. If a literary work was to be issued, it was printed by the bookseller on his own premises, and retailed to the public by himself and his assistants. Thus we read of Dr. Johnson, Dryden, Goldsmith, and other famous authors 'writing for the booksellers,' and usually making very bad bargains. Some of the more famous of these early booksellers may be mentioned. Thomas Guy (1644–1724), the founder of Guy's Hospital; Jacob Tonson (1656–1736), who pub. Dryden's works, and with whom the poet was constantly quarrelling; Lincott (1675–1736), who pub. Pope's *Homer*; Samuel Richardson (1689–1761), who was the king's printer, and wrote *Clarissa Harlowe* and other novels; and Joseph Cottle (1770–1853), of Bristol, who was associated with the early work of Wordsworth, Coleridge, and Southey. See PUBLISHING.

BOOK-KEEPING is the art of recording business transactions in a systematic manner, so that a trader can see at a glance in what position a debtor stands to him financially, or in what position he himself stands to his creditors. The system now in use was derived from the Venetian traders of the XV. cent., though doubtless many small improvements have been made during the course of five cent's. The system is either by single or double entry, and in large trading concerns many different kinds of books are employed.

DOUBLE ENTRY is the name given to the standard method; single entry is incomplete and unsystematic. The essential book is the *Ledger*, in which all transactions are classified. For convenience the Ledger is usually split up into separate books—*Private Ledger*, *Sales Ledger*, *Town Ledger*, etc.; and to relieve it of details subsidiary books are employed in which transactions are entered chronologically, e.g. *Sales Day Book*, *Purchases Day Book*, *Cash Book*. In modern practice the use of the *Journal* is restricted to such entries as cannot conveniently be made elsewhere. The principles of b.-k. are uniform, but the form may be varied infinitely to meet the exigencies of any particular business, *e.g.* the *Tabular Method* in hotel b.-k.; while in certain cases, such as *Joint-Stock Companies* and *Life Assurance Companies*, specific forms of account are compulsory by Act of Parliament. Generally, certain statistical books are required, of which *Stock Books* and a Company's *Register of Members* are examples; these are auxiliary to the Books of Account. However differing in detail, the essential of all b.-k. is that an exact and full knowledge of the financial position should be readily available at any time. A personal Ledger account is made out in this form—

HENRY JOHNSON

Dr.					*Cr.*				
1911.		£	*s.*	*d.*	1911.				
June 9.	To goods.	21	0	0	Sep. 1.	£	*s.*	*d.*	
Aug. 20.	,, .	10	5	0	By cheque	29	13	9	£ *s. d.*
Sep. 1.	,, .	5	9	0	,, discount	1	11	3	31 5 0
					,, balance owing .		5	9	0
		£36	14	0					£36 14 0
Balance brought forward . .		£5	9	0					

By this statement it will be seen that the two earlier items have been paid, less 5 % discount, leaving the final item still unpaid.

The *Balance Sheet* is a complete statement of the financial position at a given date, and is usually prepared annually somewhat after the following style:—

BALANCE SHEET OF JONES & Co., *December* 31, 1912.

LIABILITIES.	£	s.	d.	ASSETS.	£	s.	d.
Amount due to Creditors . .	1550	0	0	Accounts due	1000	0	0
Bills payable .	450	0	0	Stock in hand	500	0	0
Capital . . .	1000	0	0	Cash	200	0	0
				,, in bank	1200	0	0
				Machinery .	80	0	0
				Furniture .	20	0	0
	£3000	0	0		£3000	0	0

Fieldhouse, *The Student's Complete Commerical Book-Keeping*; Cropper, *Book-Keeping and Accounts*; Thornton's *Manual of Bookkeeping*; Heaps' *Antiquity of Bookkeeping*, etc.

BOOK-LICE, or DUST-LICE, DEATH-WATCHES (*Psocidæ*), a separate order of insects (till recently included in Neuroptera); with small soft bodies, and with or without wings. Two genera, *Clothilla* and *Atropos*, to be seen running actively in quiet apartments, eat the starch paste in bookbindings and are said to cause the nocturnal ticking which is alleged to portend death. A beetle, *Anobium*, produces a somewhat similar noise.

BOOK-SCORPIONS (*Pseudoscorpionidæ*, an order of Arachnids), minute, scorpion-like creatures found in warm regions lurking within books or in dark confined places. They feed upon the juices of insects.

BOOK-WORM, see under POLYMORPHA.

BOOLE, GEORGE (1815–64), Eng. logician and mathematician; b. Lincoln; started life as a teacher; afterwards proprietor of a school; prof. of Math's, Queen's Coll., Cork (1849); pub. treatise on *Differential Equations* (1859), and on *Calculus of Finite Differences* (1860); received medal of Royal Society for paper on *General Method of Analysis*. His principal work as a logician was the *Laws of Thought* (1854).

BOOM (51° 5′ N., 4° 22′ E.), town, Belgium. Pop. 13,500.

BOOM, see RIGGING.

BOOMERANG, curved or angular hardwood weapon used by savage tribes in Australia and Africa, also by the Dravidians of India. It is used in warfare or to kill animals; one form is so constructed that it returns to the sender.

BOONE (42° 4′ N., 93° 54′ W.), town, Iowa, U.S.A. Pop. (1910) 10,347.

BOONE, DANIEL (1734–1820), Amer. backwoodsman; won fame as a fearless Indian fighter; a great hunter and trapper; explored Kentucky region.

BOONVILLE.—(1) (38° 45′ N., 92° 31′ W.) town, Missouri, U.S.A. Pop. (1910) 4252. (2) village, New York, U.S.A. Pop. 4118.

BOORDE, ANDREW, BORDE (c. 1490–1549), Eng. physician, traveller, and author; wrote, among other works, *The Fyrst Boke of the Introduction of Knowledge*, an account of his European travels with geographical descriptions.

BOOS, MARTIN (1762–1825), Ger. Catholic divine who started emotional religious movement, regarded as heretical, in Prussia.

BOOT, Scot. instrument of judicial ordeal; one or both legs were encased in wooden (perhaps sometimes iron) b., and wedges successively driven down between case and leg; made illegal, 1709.

BOOT, covering for the foot. The ancient Greeks wore sandals, as did the Roman plebeians, but the Roman patricians wore leather b's. The Early Britons probably wore sandals, and, in later times, b's made of skins. The b. first became prominent in England when a fashion was introduced, during the reign of Edward IV., of wearing b's with such ridiculously long points that they had to be supported by light chains depending from below the knee. In Early Tudor times an ugly broad-toed b. was worn by men, as may be seen in pictures of the period. During the reigns of Charles I. and II. b's with bag-like, open tops were the fashion. After these came the *Jack-b.*, the *Hessian*, and the *Wellington b.* Buckled ankle shoes were also commonly worn from the time of the Early Stuarts. In Georgian days they were worn with high, red heels. One of the chief centres of the modern b. industry is Northampton.

BOOTAN, see BHUTAN.

BOOTH, BARTON (1681–1733), Eng. actor; ed. Trinity Coll., Cambridge; played at the Haymarket and Drury Lane theatres; buried in Westminster Abbey. He achieved his greatest successes as Cato, Hotspur, Brutus, King Lear, Othello, 'the gay Lothario,' and ghost in *Hamlet*.

BOOTH, CHARLES (1840–), Eng. sociologist; chairman of the Booth Line of steamships; has devoted much time and money to social questions; author of *Life and Labour of the People in London* (1891–1903); P.C. (1904); F.R.S., etc.

BOOTH, EDWIN THOMAS (1833–93), Amer. actor s. of Junius Brutus B., one of the most famous actors of his time. He made his first appearance at Boston (1849), but in spite of his grace and handsome person little was expected of his future. After years of struggle, however, by means of his striking personality, and the charm of his elocution, he became generally recognised as the greatest Shakespearean actor the Amer. stage has produced. In his later years he alternated the chief parts in *Othello* with Sir Henry Irving, at the Lyceum. Apart from the high quality of his acting, he was remarkable for his artistic taste and his lavish generosity. His bro., JOHN WILKES B. (1839–65), also an actor, was the assassin of Pres. Lincoln.

BOOTH, WILLIAM, GENERAL BOOTH (1829–1912), Eng. home missionary; resigned ministry in Methodist New Connexion, 1861, and in 1865 established the Christian Mission, out of which developed the **Salvation Army**, in the East End of London. B., elected 'General,' was granted almost absolute power, and became one of most prominent individualities of Eng. life, as his Army has become feature of almost every Brit. town and village, besides spreading abroad; costume is navy blue serge uniform, blue cap for men, and blue straw for the familiar Salvation Army 'lasses.' The teaching is emotional Christianity, doctrinally broad; they earnestly fight 'the drink,' and are noted for their patience with apparently hopeless drunkards and gaol-birds. B. organised Rescue, Maternity, Prisongate, and Children's Homes, Slum Posts, Shelters for Homeless, Food Depôts, Labour Bureaux, and Farms. B.'s *In Darkest England and the Way Out* (1890) is an experienced philanthropist's work.

Nicol, *General Booth and the Salvation Army* (1911).

BOOTHIA, FELIX (70° N., 96° W.), peninsula, N. America; discovered by Sir John Ross (1829–33); contains Magnetic Pole.

BOOTLE (53° 27′ N., 3° W.), town, Lancashire, England; practically part of Liverpool. Pop. (1911) 69,881.

BOPP, FRANZ (1791–1867), Ger. philologist; prof. of Sanskrit at Berlin (1821); famous *Comparative Grammar*, in six parts (1833–52).

BOPPARD (50° 14′ N., 7° 35′ E.), town, Rhineland, Prussia. Pop. 6000.

BORA, KATHARINA VON, BOHREN (1499–1552), wife of Luther (1525); led secession from her convent (1523) after reading Luther's works.

BORACIC ACID, BORIC ACID (H_3BO_3), obtained from hot springs and jets of steam and gases in volcanic districts in Tuscany, Lipari Islands, and Western America, or prepared pure from borax; a weak but very generally useful antiseptic.

BORACITE ($2Mg_3B_8O_{15}+MgCl_2$), mineral salt of magnesium, bordle, and magnesium chloride; occurring in isometric tetrahedral crystals, transparent, vitreous, or adamantine, colourless, white, or yellowish green; having pyro-electrical properties and being doubly refractive.

BORAGINACEÆ, herbaceous plants, leaves alternate, hairy; flowers, salver wheel or funnel-shaped, blue or purplish; mucilaginous, containing alkalies, roots often yield dyes. Borage (*Borago officinalis*), favourite ingredient in claret cup; *Anchusa* (Alkanet) yields dye; *Symphytum* (Comfrey); *Myosotis* (Forget-me-not).

BORÅS (57° 44′ N., 12° 57′ E.), town, Sweden. Pop. (1911) 21,997.

BORAX ($N_2B_4O_7$), white crystalline substance, dirty yellow in native state, occurring in *tincal*; biborate of sodium; antiseptic properties; used in soldering, glazing pottery, glass manufacture, and as a preservative.

BORCHGREVINK, CARSTEN EGEBERG (1864–), Norweg. Antarctic explorer; made first landing on S. Polar continent (1895).

BORDA, JEAN CHARLES DE (1733–99), Fr. scientist and marine specialist; forwarded scientific navigation.

BORDEAUX (44° 50′ N., 0° 35′ W.), town, Gironde, S.W. France; in midst of great wine, fruit, grain, and timber-producing country; trading centre; connected with Narbonne by canal; exports wine, brandy, hides, wool, fish, fruits, sugar, coffee, oil, resins, cottons, machinery, etc. Archiepiscopal see; cathedral, fine churches; town hall, museums, theatre, library, hospital; courts of appeal and commerce; univ., various educational institutions; taken by Romans, afterwards held by Goths; passed to France and then to England with Eleanor of Aquitaine; French since 1453. Pop. (1911) 261,687.

BORDEN, HON. SIR FREDERICK WILLIAM, K.C.M.G., P.C. (1847–), Minister of Militia Defence, Canada, 1896–1911.

BORDEN, ROBERT LAIRD (1854–), Prime Minister of Canada since 1911; leader of Conservative party since 1901; distinguished K.C.; defeated Laurier policy of Reciprocity with U.S.A.; proposed gift of £7,000,000 to mother country for addition of three super-dreadnoughts to Brit. navy, 1912.

BORDENTOWN (40° 9′ N., 74° 43′ W.), town, New Jersey, U.S.A.; Military Institute. Pop. (1910) 4250.

BORDERS, THE (*c.* 55° to 55° 45′ N., 1° 30′ to 3° 30′ W.), district on both sides of Cheviot Hills, Scotland and England; surface generally moors and hills; long inhabited by Cymric race, who were displaced by Saxons and Norsemen; was part of Northumbrian kingdom, annexed to England, X. cent.; scene of many feuds and incessant warfare for many cent's.

BORDIGHERA (43° 48′ N., 7° 41′ E.), town, Riviera, Italy. Pop. 4700.

BORDONE, PARIS (1495–1570), Ital. artist of Venetian school; painted portraits and scriptural and mythological subjects; his work has much in common with that of Titian, whose style he followed very closely; examples in the Louvre, National Gallery, Venice Academy, and many other continental galleries.

BORDURE, heraldic term for border, either blank or charged, of shield.

BORE.—(1) wall of water formed at mouths of certain tidal rivers by narrowing of the banks; 2 or 3 ft. high in Severn, Trent, Solway, Dee, 12 ft. in Brahmaputra (see TIDES). (2) hollow in barrel of gun, or diameter of barrel.

BOREAS (classical myth.), the north wind; s. of Astræus and Eos; generally represented as a vigorous, winged youth in the act of flying through the air.

BORELLI, GIOVANNI ALFONSO (1608–79), Ital. physician and physicist; prof. of Math's (1649), Messina and (1656) Pisa; prof. of Med. (1657), Pisa. The first to apply math's to animal physiology.

BORERS, see under POLYMORPHA.

BORGA (60° 20′ N., 25° 45′ E.), port, Finland. Pop. 5500.

BORGERHOUT (51° 13′ N., 4° 26′ E.), town, Belgium; suburb of Antwerp. Pop. (1910) 49,333.

BORGHESE, Sienese family afterwards settled at Rome and distinguished as patrons of art. Camillo B., who became cardinal, 1596, and pope as PAUL V., 1605, bought the B. Palace and built the B. Villa at Rome early in XVII. cent. Camillo Filippo Ludovico B. (1775–1832) m. Napoleon's beautiful sister Pauline, was created prince of Guastalla (1805), and sold to Napoleon the art treasures, most of which are now in the Louvre, of the B. Villa; he separated from Pauline after Napoleon's fall. His nephew, Camillo, was War Minister, 1848; Paolo was compelled to sell the remaining possessions of the family in 1892, and while Pope Leo VIII. added its muniments to the Vatican MSS., the Ital. government acquired the Palace and valuable collection of paintings.

BORGIA, CESARE (1476–1507), s. of Rodrigo Borgia, Pope Alexander VI. (*q.v.*); cr. cardinal (1493); released from ecclesiastical vows (1498); invested by Louis XII. with counties of Valentinois and Dioïs and title of duke; m. Charlotte d'Albret (1499); subsequently became Duke of Romagna, but his dominions and power greatly lessened on his f.'s death (1503), and election of Pope Julius II. (Julian della Rovere), enemy of Borgias. Cesare was killed while besieging castle of Viana (March 12, 1507); was a clever, unscrupulous adventurer.

BORGIA, LUCREZIA (1480–1519), sister of Cesare; puppet of the schemes of her f. and bro.; her 3rd husband was Alphonso d'Este, Duke of Ferrara; in high repute at death as patroness of culture, but her name afterwards became synonymous, probably unjustly, with civilised cruelty and vice.

BORGIA, ST. FRANCIS, succ. his father as Duke of Candia, 1543; joined newly founded Soc. of Jesus, becoming general, 1565; had he wished might have been cardinal; canonised, 1671.

BORGO MANERO (45° 43′ N., 8° 27′ E.), town, Italy. Pop. 10,000.

BORGO SAN DONNINO (44° 52′ N., 10° 3′ E.), walled town, Parma, Italy; old cathedral. Pop. 6300.

BORGOGNONE, AMBROGIO (*c.* 1450–1523), Ital. artist; famous for his church decorations, examples of his best work are to be seen in the Certosa, at Pavia, and the church of San Satiro, Milan; two small examples in the London National Gallery.

BORGU (18° 15′ N., 18° 30′ E.), district, basin of Niger, W. Africa; western part included in Fr. Dahomey; eastern part forms province of Brit. Nigeria; chief town, Kiama; rice, grain.

BORING, process of penetrating substances such as rocks, in mechanical and engineering operations. For b. soft wood awls are used, but for hard wood gimlets, augurs, or brace and bit are employed. Hand drills of steel and bit are used by jewellers, whilst machine drills are used for b. metals.

B. is also used in connection with prospecting for minerals; in sinking petroleum or artesian wells; in determining the depth of rock below the surface preparatory to mining, and in geological investigations. The first practical b. machine was used at Mont Cenis tunnel, and was invented by Sommeiller. In modern tunnel (*q.v.*) construction a shield fitted with diamonds as cutting agents is used. The shield is made to rotate, and is at the same time pressed against the face of the rock. The diamonds are not even scratched owing to their extreme hardness.

BORIS, FEDOROVICH GODUNOV (*c.* 1551–1605), Russ. Tsar; served at Russ. court; his sister, Irene, m. Theodore, s. and successor of Ivan the Terrible. Boris became omnipotent as guardian of Theodore, and succ. him as Tsar of Russia (Feb. 1598); a pacific, prudent ruler.

BORISOGLYEBSK (51° 23′ N., 42° 13′ E.), town, Russia; iron foundries. Pop. 22,500.

BORISOV (54° 12′ N., 28° 28′ E.), town, Minsk, Russia. Pop. 16,600.

BORISOVKA.—(1) (56° 2′ N., 44° E.) town, Nijni Novgorod, Russia. (2) (53° N., 44° 47′ E.) town, Kazan, Russia. (3) (52° 52′ N., 40° E.) town, Tambov, Russia. (4) (56° 36′ N., 31° 28′ E.) town, Pskov,

Russia. (5) (50° 34′ N., 36° 2′ E.) town, Kursk, Russia. Pop. 25,080.

BÖRJESSON, JOHAN (1790–1866), Swed. lyrical poet and dramatist; masterpiece—play in verse, *Erik XIV.*

BORKU (18° N., 20° E.), region in Sahara; hilly; partly fertile; dates, barley. Pop. *c.* 10,000.

BORKUM (53° 36′ N., 6° 45′ E.), Eastern Frisian island, North Sea, mouth of Ems, Prussia.

BORLASE, WILLIAM (1695–1772), Eng. antiquary; Cornish county historian.

BORMIO (46° 28′ N., 10° 22′ E.), town, Lombardy, Italy; warm sulphur baths.

BORNA (51° 7′ N., 12° 30′ E.), manufacturing town, Saxony; organs. Pop. 8900.

BÖRNE, KARL LUDWIG (1786–1837); real name, LÖB BARUCH; b. Frankfort-on-Main; studied law and med.; police actuary at Frankfort (1811–14); subsequently took up journalistic work; edit. *Die Wage* (1818–21); and pub. (Paris, 1834) his *Briefe aus Paris* (1830–33); author of several other works; was a brilliant, satirical, political writer.

BORNEO (7° N. to 4° S., 109° to 119° 15′ E.), large island, Eastern Archipelago, between Australia and French Indo-China, immediately N. of Java; extreme length, over 800 miles; breadth, over 600; bounded E. by Mindoro and Celebes Seas, Macassar Strait; S. by Java Sea; W. and N.W. by China Sea. Labuan (*q.v.*), an island off N.W. coast of B., was incorporated with Singapore, 1907. About two-thirds of island in S.E. and S. are claimed by Dutch, while N. and N.W. (states of N. Borneo, Brunei, and Sarawak) belong to Britain. Mountain ridge runs from N.E. to S.W., height ranging from 8000 ft. in N.E. to 3500 in S.W.; in extreme N., Kinabalu range reaches height of 13,700 ft.; interior mountainous with rich river valleys, marshy plains; principal rivers, Barito, Kapuas; coast is low and swampy. Best bays are in Brunei and Brit. North B. Mean annual temperature, *c.* 80° Fahr.; rainfall is heavy, averaging 120 in.

History.—B. was discovered by Portuguese early in XVI. cent.; during XVII. cent. unsuccessful attempts were made by Spaniards, Portuguese, Dutch, and English to establish trading stations. First permanent settlement was that made by Dutch at Banjermasin in 1733; Dutch proceeded to make further settlements, and have mastered most of island. In 1838–41 the Malay pirates were suppressed by Rajah Brooke, who founded independent state of Sarawak, which became Brit. protectorate in 1888. In this year Brunei also came under Brit. protection.

Forests produce ironwood, teak, sandalwood, ebony, india-rubber, damar, camphor, pepper, cloves, nutmegs, cinnamon, ginger, betel-nuts, sago, cocoa-nuts, gambier, bamboo, canes, etc. Rice, sugar-cane, sago, tapioca, coffee, earth-nuts, indigo, maize, hemp, cotton, tobacco, are cultivated; in Brit. part chief products are pepper, gambier, sago, rice. Minerals include coal, iron, gold, antimony, quicksilver, platinum, diamonds. Edible birds' nests, trepang, pearls, and tortoise-shell are obtained. Exports are pepper, spices, gold dust, diamonds, drugs, timber, canes, gutta-percha, india-rubber, and many of above productions; imports general goods, clothing, machinery, hardware, opium, rice, oils. Chief town of Sarawak is Kuching; of Brunei, Brunei; of Brit. North B., Sandakan; of Dutch B., Banjermasin. Excepting Australia and Papua, B. is the largest island in the world; area, *c.* 289,000 sq. miles. Pop. *c.* 2,000,000, including Dyaks, Malays, Arabs, etc.

British North B. is under administration of Brit. North B. Company, which obtained royal charter, 1881; Gov., app. subject to approval of Sec. of State, administers affairs in B., and there is Court of Directors in London. Its area is about 31,106 sq. miles Pop. *c.* 200,000. Brunei and Sarawak are under Brit. protection.

Dutch Borneo comprises two administrative districts; of these, West B. occupies about 55,825 sq. miles, and has pop. estimated at 500,000; while East and South B. have area of 156,912 sq. miles, and pop. estimated at 783,000.

Handbook of Brit. N. Borneo; Ireland, *The Far Eastern Tropics* (1905); Furness, *Home Life of Borneo Head-Hunters* (1902).

BORNHOLM (55° 6′ N., 15° E.), Dan. island, Baltic; lighthouse; exports freestone; capital, Rönne. Pop. 41,000.

BORNIER, HENRI, VISCOMTE DE (1825–1901), Fr. poet; author of two poetic plays produced at the Comédie Française—*Le Mariage de Luther* and *La Fille de Roland*—the latter of which achieved a popular success; *Poésies complètes* (1894).

BORNU (*c.* 12° 20′ N., 12° 20′ E.), state, Central Africa, W. and S. of Lake Chad; area estimated at 57,000 sq. miles; surface flat, with branches of Komadugu R. flowing to Lake Chad; climate very hot and unhealthy; produces indigo, maize, millet, cotton, ground-nuts; imports calico, sugar, salt; administered by Brit. resident with several assistants; native chief still recognised; people are negroes and half-breeds; chief religion, Islamism.

B. was independent state in Middle Ages; considerable prosperity in XV. cent.; struggle began in early XIX. cent., against the Fula, who were ultimately defeated and expelled by fakir Muhammad el Anim; subject to Brit. control since 1902. Chief towns, Kuka and Maidugari. Pop. *c.* 4,000,000.

BORO-BUDUR, remains of ancient Buddhist temple, Java.

BORODIN, ALEXANDER PORFYRIEVICH (1834–87), Russian composer; ed. for the medical profession, which he abandoned for music; became a brilliant executant on several instruments. His compositions were distinctly Russian in character, and consist of symphonies, string quartets, songs, and an opera, *Prince Igor.*

BORODINO (55° 45′ N., 35° 33′ E.), village, Russia, on Kolotscha; here Napoleon defeated Russians under Kutusov, Sept. 7, 1812, making them cede Moscow; heavy losses both sides.

BORON (B=11), non-metallic element; occurs as borax (sodium tetra-borate) in some Amer. lakes; as boric acid (H_3BO_3) in volcanic steam-jets (*fumarolles*), Tuscany. There are two forms: AMORPHOUS, a greenish grey powder, prepared by fusing boron trioxide (B_2O_3) with sodium; CRYSTALLINE, by fusing amorphous boron with aluminium. Crystals are colourless, octahedral, hard; S.G., 2·68; generally contain carbon or aluminium; boron combines readily with nitrogen, chlorine, and sulphur.

BORORÓS, THE, people of S.W. Brazil, probably akin to Patagonians; average stature over 6 ft. 4 in.

BOROUGH (A.S. *burh*, a fortified stronghold or camp), the name of a town possessing certain governmental rights. In many places an Anglo-Saxon 'burh' grew up on or near the site of a Roman colony, but the case is not proven for the former developing out of the latter. The 'burh' was the stronghold of a king or a tribe, with a 'wall' or 'hedge' around it. It often became a political, military, and commercial centre. In the X. cent. the b. court or 'moot' first appears, with a definite area of jurisdiction, but the feudal castle of the Norman conquerors sometimes overshadowed it. 'Royal boroughs' were created by the king; the burgesses paid certain annual rents to him. Various privileges were granted by successive kings to London.

Eng. b's developed much from the XII. cent. onwards, when various gilds began to be formed, and charters were granted with taxation and privileges more defined. In Tudor and Stuart times the b. machinery was utilised for political purposes by the monarch, by creating b's and nominating members of the governing body. The Corporation Act of 1661 decreed that all members of town councils must be communicants. By the beginning of the XIX. cent. many b's had become very corrupt, the burgesses often being only a very small proportion of the total amount of townsmen.

Frequently the town corporation gave no account of the revenues they received, and divided the profits among themselves (Professor Maitland, in his remarkable work, *Township and Borough*, speaks of the mediæval lack of distinction between 'corporateness' and 'commonness'). On the political side, the change came with the Reform Bill of 1832, on the municipal side, by the Municipal Corporations Act of 1835, the franchise was

In Ireland b. life began in the reign of Henry II., and at the plantation of Ulster by James I. many close b's were created.

Scot. b's have certain peculiarities, but many of their ancient privileges are now lost.

Borough English, name of old Eng. custom (still existing in certain parts of the country) by which lands are made the inheritance of the youngest son.

See various works by C. Gross, M. Bateson, and F. W. Maitland, specially the latter's *Township and Borough*.

BOROUGH, STEVEN (1525–84), Eng. navigator; b. Northam, Devon; accompanied Sir Hugh Willoughby (1553) in his search for a northern passage to Cathay; discovered Kara Strait (1556). His bro., WILLIAM BOROUGH (1536–99), commanded the *Lion* in Drake's Cadiz expedition (1587); wrote *A Discourse of the Variation of the Compass* (1581).

BOROUGHBRIDGE (54° 5′ N., 1° 24′ W.), town, Yorkshire, England.

BOROVICHI (58° 23′ N., 34° 2′ E.), town, Novgorod, Russia. Pop. 11,000.

BOROVSK (55° 12′ N., 36° 32′ E.), town, Kaluga, Russia. Pop. 10,000.

BORROMEAN ISLANDS (45° 54′ N., 8° 35′ E.), four islands, Lake Maggiore, Italy.

BORROMEO, CARLO (1538–84), saint and cardinal; studied at Pavia; cr. cardinal and abp. of Milan by his uncle, Pope Pius IV., 1560; took part at Council of Trent; did much for moral reform of Church and foundation of educational establishments; canonised, 1610.

BORRON, ROBERT DE, and Elie de B. (fl. XII. cent.), Fr. trouvères who gave final form to the Arthurian story.

BORROW, GEORGE HENRY (1803–81), Eng. author and philologist; b. Norfolk; s. of a soldier; apprenticed to a solicitor; in 1824 went to London and found work as a publisher's hack. In 1833 he entered the employment of the Bible Society, and was sent to St. Petersburg, and afterwards to Spain. In the latter country he associated with the Zincali, in whose language he found a close affinity with that of the Norfolk gipsies he had known in his youth. He returned to England in 1839, and in 1841 pub. *The Zincala*, an exhaustive work on the gipsy languages. It was followed by *The Bible in Spain* (1843), *Lavengro* (1851), *The Romany Rye* (1857), *Wild Wales* (1862), and his most important philological work, *Romano Lavo Lil* (1874). Having spent a wandering life, B. acquired a wide knowledge of humanity, and, being practically self-educated, his method of expression is distinctly individual; *Life*, by Jenkins (1912).

BORROWDALE (54° 32′ N., 3° 11′ W.), district, Cumberland, England; plumbago.

BORROWSTOUNNESS, see BO'NESS.

BORTHWICK CASTLE (55° 49′ N., 3° 2′ W.), castle, Midlothian, Scotland; visited by Mary Queen of Scots and Bothwell, 1567.

BORY DE SAINT-VINCENT, JEAN BAPTISTE GEORGES-MARIE (1780–1846); Fr. traveller and naturalist.

BORYSTHENES (46° 32′ N., 32° E.), old Gk. colony at mouth of B., now called the Dnieper, S.W. Russia; founded by Milesians (VI. cent. B.C.).

BORZHOM (41° 50′ N., 43° 25′ E.), watering-place, Transcaucasia, Russia. Pop. 5800.

BORZOI, Russ. wolfhound; has long powerful jaws, narrow but deep chest, white coat; height, 26–33 in.

BOSA (40° 18′ N., 8° 30′ E.), port, Sardinia. Pop. 6900.

BOSBOOM-TOUSSAINT, ANNA LOUISA (1812–86), Dutch novelist; famous as a writer of hist. stories, including *The Earl of Devonshire*, *Leicester in the Netherlands*, *The House of Lauernesse*, and *Gideon Florensz*.

BOSCÁN-ALMOGAVER, JUAN (d. 1542), Span. poet; author of *Hero of Leander* and other poems, pub. in 1543. He was the first to popularise Ital. verse measures in Spain.

BOSCAWEN, EDWARD (1711–61), Eng. admiral; s. of Viscount Falmouth; performed brilliant service at siege of Cartagena (1741); at Cape Finisterre (1747); besieged Pondicherry (1748); took Louisburg (1758); crushed Fr. naval power in Lagos Bay (1759).

BOSCH, see ÆKEN.

BOSCH, JAN VAN DEN, COUNT (1780–1844), Dutch statesman; gov. of East Indies, 1828–33; Sec. for Colonies, 1833–39.

BOSCHVARK (*Potamochœrus africanus*), African river-hog.

BOSCOBEL (52° 42′ N., 2° 22′ W.), parish, Shropshire, England; contains house where Charles II. hid after *Worcester* (1651).

BOSCOVICH, ROGER JOSEPH (1711–87), Ital. mathematician and nat. philosopher; b. Ragusa; joined Jesuit order, and app. prof. of Math's at Roman Coll. (1740), at Pavia, and Milan (1770–74); on suppression of Jesuits in Italy settled in France; app. Director of Optics to Navy (1774–83); wrote *Elementa Universæ Matheseos* (1757).

BOSHOF (28° 50′ S., 25° 18′ E.), town, Orange Free State, S. Africa; British defeated Boers, 1900.

BOSIO, FRANÇOIS JOSEPH, BARON (1769–1845), Fr. sculptor; patronised by Bonapartes and Bourbons.

BOSNA SERAI, SARAJEVO (43° 54′ N., 18° 30′ E.), fortified town, capital of Bosnia. Pop. (1910) 51,919.

BOSNIA-HERZEGOVINA (44° N., 18° E.), provinces, extreme S. of Austria-Hungary, between Servia and Dalmatia, and with Montenegro and Novibazaar to S.E.; area, 19,768 sq. miles. Dinaric Alps run from N.W. to S.E., surface sloping thence N.E. to Save basin, S.W. to Adriatic. Herzegovina, in S., is bare and rocky; Bosnia, to N., has mountain forests and fertile valleys; chief rivers, Save and its affluents; large part of surface wooded—lime, beech, pine, larch.

History.—The Slavs settled in B. in VI. and VII. cent's, and for time maintained their independence; subject to Hungary, XI.–XIII. cent's; to Servia in XIV. cent., attaining independence under Twartko in 1370. After latter's death kingdom began to decline and became involved in war with Turks, who ultimately subdued B. in 1463, Herzegovina in 1483. Under Turk. rule natives were cruelly oppressed; Christians constantly persecuted; murder was considered no crime, robbery and brigandage were recognised professions. Revolts occurred in 1849 and 1875. In 1878 by Treaty of Berlin provinces were handed over to Austria-Hungary for administration and military occupation; and in 1908 they were definitely annexed to that empire.

By constitution of 1910, finance, taxes, and other public questions are dealt with by Diet, subject to Austrian or Hungarian veto; diet chosen by universal suffrage; pres. and vice-pres. nominated by emperor. There are six district and fifty-four county authorities for purposes of administration.

Great majority of population are engaged in agriculture; chief crops—tobacco, grain, fruits, beet, flax, hemp; cattle, sheep, swine, horses, mules, are largely raised, pains being taken by government to improve breeds; silk culture is being introduced, and wine is made. Exports include above crops and animals, besides timber, skins, sugar, wool, eggs, bark, gall-nuts, salt, alkalis; imports include oils, coffee, beer, wine, spirits, wool, cottons, silk, grain, flour,

rice, paper, leather, glass, china, hardware, machinery, soap. Capital of Bosnia, Sarajevo; of Herzegovina, Mostar. There are railway communications with Brod on Danube and Gravosa on Adriatic; mileage over 1200.

Inhabitants are Croato-Servians; Span. Jews, gipsies, and colonists of other nationalities also represented. Principal religions are Oriental Orthodox, Muhammadan, R.C., and there are some Jews, Evangelicals, and other Christians. Education is free, but not obligatory. Military service is compulsory for men over 21. Pop. (1910) 1,931,802.

Laveleye, *Balkan Peninsula* (1887); Asboth, *Official Tour through Bosnia and Herzegovina* (1890); Holbach, *Bosnia and Herzegovina* (1910).

BOSPORUS, Bosphorus (41° 10′ N., 29° 5′ E.), strait between Black Sea and Sea of Marmora; under Turkish control (see Black Sea), and Powers have guaranteed, by treaties, 1841 and 1878, that no ships of war shall enter without leave of the Porte.

BOSPORUS CIMMERIUS (45° 15′ N., 36° 30′ E.), old name for strait between Azov and Black Seas; length, c. 23 miles, width, 2 to 22 miles; district traditionally inhabited by Cimmerii; formed independent kingdom, V. cent. B.C.; conquered by Mithridates of Pontus, 115 B.C.; belonged in turn to Sarmatians, Chersonesians, Tartars; modern Kerch or Yenikale.

BOSQUET, PIERRE FRANÇOIS JOSEPH (1810–61), Fr. marshal; performed brilliant service in Crimean War at *Alma, Sevastopol,* and *Inkerman.*

BOSS, the raised outside centre of a shield, or buckler; a protuberant ornament; in arch., a projecting ornament; colloquial (of Amer. origin), an employer, a master-workman.

BOSSI, GIUSEPPE (1777–1816), Ital. artist and writer; his own brushwork was not remarkable, but his critical writings are valuable, and include *Del Cenacolo di Leonardo da Vinci, Delle opinioni di Leonardo,* etc.; he was sec. of the Milan Academy, and an intimate friend of Canova.

BOSSUET, JACQUES BÉNIGNE (1627–1704), Fr. theologian and orator, ordained 1652; came to Paris, 1659, and became famous as a preacher, especially for his *Oraisons funèbres* (funeral sermons); tutor to the dauphin, s. of Louis XIV., 1670. B. was a man of keen intellect, but entirely opposed to disorder and anarchy, and therefore a firm believer in absolutism in Church and State, which he defended in his *Discours sur l'histoire universelle.* He applauded, therefore, the Revocation of the Edict of Nantes. But he defended the liberties of the Fr. Church against the Papacy in the *Defensio Cleri Gallicani.* He became involved in a bitter controversy with Fénelon. B. is one of the greatest figures of the monarchy of Louis XIV.

See Rebellion, *Bossuet.*

BOSSUT, CHARLES (1730–1814), Fr. mathematician and author of *L'Histoire générale des mathématiques.*

BOSTON (53° 4′ N., 0° 1′ W.), seaport, Lincolnshire, England; fine parish church with decorated chapel; tower called Boston Stump; important fisheries; exports coal. Pop. (1911) 16,679.

BOSTON (42° 22′ N., 71° 5′ W.), capital, Massachusetts, U.S.A., on B. Harbour, at mouth of Charles and Mystic Rivers. B. is a great railway centre; number of lines of steamers ply regularly to foreign ports; has large harbour with depth of 30 ft. along quays and 27 ft. at mean low water in channel, and three graving-docks. Imports include wool and woollens, chemicals, iron and steel manufactures, wood, leather, fruit, fish, paper stock; exports provisions, live cattle, bread-stuffs, cottons, leather goods, wood, iron and steel manufactures, spirits.

Older part of town noted for narrow, irregular streets; newer part regularly laid out; main thoroughfare, Washington Street. Most famous buildings are public library, second largest in America, old State House, and Faneuil Hall, where resistance against Britain was first declaimed by revolutionary orators. In northern suburb of Charlestown is Bunker Hill Monument, commemorating famous battle in War of Independence. There are beautiful parks, including Franklin Park, and many churches, including R.C. cathedral. Educational institutes include Boston Univ., R.C. College, medical school of Harvard Univ., fine art school, and music conservatory; and there are many schools, including over 300 primary schools. B. was for long the centre of culture in America, and many great literary men, such as Longfellow, Lowell, Emerson, Whittier, have been associated with it; birthplace of Benjamin Franklin and Poe.

History.—B. has developed from a settlement made in 1630 by members of the Massachusetts Bay Company, led by John Winthrop. Most of early settlers were Puritans and came from Lincolnshire. First called Trimountaine, name was afterwards changed to B. It was chosen as capital in 1632, and soon became principal seaport in America. In 1765 the Stamp Act was bitterly opposed here, and the *B. Tea Party,* 1773, when 350 chests of tea were thrown into B. Harbour, was a prelude of the American revolution; B. played an important part in War of Independence and Abolition of Slavery. Pop. (1910) 670,585.

Lodge, *Boston*; Hale, *Historic Boston.*

BOSTON, Fr. card game, popular in America during the latter part of the XVIII. cent. It is said to have been first played at Boston, Mass., and had certain similarities to both whist and quadrille.

BOSTON, THOMAS (1676–1732), Scot. theologian; wrote famous *Human Nature in its Fourfold State* (1720).

BOSTRÖM, CHRISTOFFER JACOB (1797–1866), Swed. philosopher; formulated a rational system of idealism, which is somewhat akin to the philosophy of Spinoza.

BOSWELL, SIR ALEXANDER (1775–1822), Scot. poet and archæologist; founded Auchinleck Press (1815).

BOSWELL, JAMES (1740–95), Scot. author; s. of Alexander B. of Auchinleck, who subsequently became judge of the Supreme Court, and assumed the title of Lord Auchinleck; ed. at the High School and Univ. of Edinburgh; called to the Eng. and Scot. Bar, and practised with little success as an advocate. He m. his cousin, Margaret Montgomery, and, after succeeding to his f.'s estate, was enabled to live in independence. In character he was weak, foolish, vain, incontinent, and addicted to drunkenness. Yet for all his folly he possessed a distinct genius for hunting down celebrities, and had, as Goldsmith said, 'the faculty of sticking.' As the biographer of Samuel Johnson, he produced a work which is unique in its kind, and is indisputably one of the masterpieces of Eng. lit. His first meeting with Dr. Johnson took place in 1763, at Davies's bookshop in London, when the great lexicographer was fifty-four, and B. twenty-three. Thereafter they met frequently; 'Bozzy' was elected a member of the Literary Club; and travelled with Johnson in Scotland, the result being the *Journal of a Tour in the Hebrides* (pub. 1786). His *magnum opus, The Life of Samuel Johnson, LL.D.,* was first pub. in 1791, and met with instantaneous success. During his earlier continental travels he became acquainted with Pascal di Paoli, the Corsican chief, and pub. his *Account of Corsica* in 1768.

W. K. Leask's *Life of Boswell* (1896).

BOSWORTH FIELD (52° 37′ N., 1° 25′ W.), in Leicestershire, England; where Henry Tudor defeated Richard III., 1485.

BOSWORTH, JOSEPH (1789–1876), Scot. divine and author of Anglo-Saxon *Dictionary* (1838), still in use in Toller's edit.

BOT FLIES (*Œstridæ*), large, strong flies, the larvæ of which bore in the flesh chiefly of domesticated animals. *Gastrophilus* larvæ attach themselves to the stomach of horses; *Hypoderma* larvæ bore beneath the skin of cattle, forming 'warbles'; and *Œstrus* larvæ are laid alive by the adults in the nostrils of sheep, where they commence to bore.

BOTANY, the branch of Biology which deals with plants. It is divided into the following sections: (1) MORPHOLOGY, treating of the external form of plants and their internal construction—the last-named study being also called HISTOLOGY or MICROSCOPIC ANATOMY; (2) PHYSIOLOGY, dealing with the life processes of the plant as a whole, the functions of its various organs, and the method of its growth and development; (3) SYSTEMATIC BOTANY or CLASSIFICATION, the principles upon which plants are classified. Two systems of classifications are distinguished: (*a*) *The Artificial* or *Linnæan* (1735; now obsolete) based on character and arrangement of *one set* of organs (stamens and pistil); (*b*) *Natural System*, De Jussieu (1789), De Candolle (1813), Lindley (1845), based on natural relationship and grouping together species, genera, and orders most resembling each other in the sum-total of characters. The most generally adopted modern system groups plants as follows:—

Division I. *Cryptogams*—Flowerless plants; class 1, *Thallophytes* (Bacteria, Algæ, Fungi), class 2, *Bryophytes* (Mosses, Liverworts), class 3, *Pterydophytes* (Ferns, Horsetails).

Division II. *Phanerogams*—Flowering plants; class 1, *Gymnosperms* (Cicads, Conifers), class 2, *Angiosperms* (Grasses, Herbs, Shrubs, Trees); subclass *a*, *Monocotyledons* (seed with 1 root-leaf—Palms), *b*, *Dicotyledons* (seed with 2 root-leaves). (4) GEOGRAPHICAL BOTANY, investigating the natural distribution of plants and the causes influencing it. (5) PALÆONTOLOGICAL BOTANY, the study of the forms of plants found as fossils in the various geological strata.

M. C. Stopes, *Botany* (Jack, 1912); S. H. Vines, *Students' Text-Book of Botany* (London); *Text-Book of Botany*, E. Strassburger, Noll, and others (London, 1898).

Botanic Gardens.—Purely scientific gardens are first found in XVI. cent., when univ's and private scholars began to study bot. for its own sake and various Ital. cities set up b. g's. The royal garden established in Paris, 1597, developed into *Jardin des Plantes*. B. g's were instituted at Oxford (1632), Chelsea (1677), Edinburgh (1670); Kew B. G. (1760) is unsurpassed in the world; Berlin, St. Petersburg, Vienna B. G's are also famous.

BOTANY BAY (34° S., 151° 13′ E.), inlet, New South Wales, Australia; discovered by Cook, 1770. England's first penal settlement in the East was established here in 1787, but moved to Port Jackson the following year. The name, however, continued to be applied popularly to the Australian convict settlements generally. Though remarkable for its variety of plants (to this it owes its name), the soil is sandy and unsuitable for cultivation. See AUSTRALIA: *History*.

BOTH, JAN (1610–52), Dutch classical painter; influenced by Claude Lorraine.

BOTHA, LOUIS (1863–), first Prime Minister of the Union of South Africa (1910); b. Natal; succ. Gen. Joubert as commander of the Transvaal Boers, during South African War (1899–1902), performing many brilliant services; Premier of Transvaal, 1907–10; enthusiastic agriculturist; Hon. Gen. of Brit. Army (1912).

BOTHNIA, GULF OF (62° N., 20° E.), northern arm of Baltic Sea.

BOTHWELL (55° 49′ N., 4° 4′ W.), town, on Clyde, Lanarkshire; ruins of B. castle; Covenanters defeated at B. Brig, 1679. Pop. of parish (1911), 54,891.

BOTHWELL, JAMES HEPBURN, 4TH EARL OF (*c.* 1536–78), Lord High Admiral of Scotland (1556); P.C. (1561); became one of chief advisers of Mary Queen of Scots, and obtained complete ascendancy over her. After Darnley's murder (Feb. 9, 1567) B. became more powerful than ever; cr. Duke of Orkney and Shetland, and m. Mary, according to Prot. usage (May 1567). The lords revolted; B. was driven into exile and Mary forced to abdicate. B. was divorced from Mary (Sept. 1570), and after her downfall, imprisoned in Zealand (June 16, 1573) till his death.

BOTOCUDOS (Portug. 'plug'), name given by Brazilian settlers to degraded native race whose salient characteristic is b. let into lower lip.

BOTORI, game played in Jap. boys' schools; fifty to one hundred players aside; two high poles are fixed firmly in the ground about 200 yards apart, and each side endeavours to capture the other's pole.

BOTOSANI, BOTOSHANI (47° 45′ N., 26° 41′ E.), town, Rumania; flour-mills. Pop. (1911) 34,219.

BOTTA, CARLO GIUSEPPE GUGLIELMO (1766–1837), Piedmontese hist. writer; became naturalised Fr. citizen; rector of Rouen Univ. (1817); pub. (1824) *History of Italy*, from 1789–1814.

BOTTA, PAUL EMILE (1802–70), s. of Ital. historian, **Carlo Giuseppe Guglielmo B.** (1766–1837); archæologist and diplomatist in Fr. service.

BOTTESINI, GIOVANNI (1823–89), Ital. composer and conductor; was a celebrated double-bass player; enjoyed European reputation as a conductor; composed numerous operas, including *Christoforo Colombo* (1847), *L'Assedio di Firenze* (1856), *Marion Delorme* (1862), etc.

BOTTICELLI, SANDRO (1444–1510), Ital. artist of the Florentine school; his real name was Alessandro di Mariano di Vanni dei Filipepi; b. Florence; s. of a tanner; received his nickname, 'Botticelli' (Little Cask), from the small barrel which hung outside his bro. Giovanni's door as a sign of his trade. Apprenticed at fifteen to a goldsmith, he early developed artistic ambitions and entered the studio of Fra Filippo Lippi (1460), under whom he spent several years, afterwards working with the brothers Pollaiuolo, during which time he won considerable fame amongst the art-lovers of Florence. His famous picture, *The Adoration*, now in the National Gallery, was painted whilst the young artist was still with Fra Lippo Lippi. B. found favour in the eyes of the Medici family, and his future progress, both artistically and financially, was continuous for many years. One of the greatest artists of the Earlier Renaissance period, he has been called 'the reanimate Greek,' and his subjects, drawn almost entirely from classic and scriptural sources, are marked by an atmosphere of Neoplatonism. He, however, created a new type of beauty of which Athens knew nothing, even as he essayed to grasp the significance of Hellenism and brought it into the flower-carpeted Italian meadows. Amongst his most famous pictures are *The Adoration*, already named, *Spring*, *The Birth of Venus*, *Mars and Venus*, *Pallas and the Centaur*, *The Nativity*, and numerous Madonnas.

Henry B. Binns, *Botticelli*; *Lives*, by Julia Cartwright and Herbert P. Horne.

BOTTLE, a vessel, now usually of glass or earthenware, for the storing of liquid. The ancients commonly used b's made of the skins of goats or other animals; the 'leather bottel' was a common object of daily use down to the end of the XVII. cent., and skin bottles are still extensively used in parts of Asia.

The use of glass bottles has led to the invention of numerous machines for *bottling*, the simplest being contrived on the siphon principle, and the bottles are corked and labelled by machinery.

BOTTLE-FISH (*Saccopharynx ampullaceus*), has sac-like distensible body; preys on other fish.

BOTTLE GOURD (*Lagenaria*, from Lat. *lagena*, bottle), Indian annual flowering plant; fruit of enormous size; has hard rind which, when dried, holds liquids and is often named CALABASH (*q.v.*).

BOTTOMRY, in maritime law, is money payable to the owner of a ship, or his agent, for the use of the said ship, which depends upon its safe arrival at port. If the ship is cast away the lender loses his money, but if she reaches her port of destination safely he receives back his loan, together with interest. B. contracts must always be in writing, setting forth full particulars regarding the rate of interest and

other details of the transaction, and, unlike mortgages, their priority ranks in inverse order to their dates—*i.e.* if there are several such bonds running, the latest executed has the first claim to satisfaction.

BOTZARIS, MARCO (d. 1823), Gk. leader in War of Independence.

BOTZEN, Bozen, Bolzano (46° 30′ N., 11° 20′ E.), trading town, Austrian Tirol; silk. Pop. 14,500.

BOUCH, SIR THOMAS (1822–80), Eng. engineer; constructed first Tay Bridge (1870–77).

BOUCHARDON, EDME (1698–1762), Fr. sculptor; was regarded as most perfect worker in plastic art of his day; one of his great works was the equestrian statue of Louis XV. for Paris, which was destroyed during the Revolution; another famous work being his 'Cupid fashioning a Bow out of the Club of Hercules.'

BOUCHER DE CRÈVECOUR DE PERTHES, JACQUES (1788–1868), Fr. geologist and antiquary; b. Rethel (Ardennes); customs officer, Abbeville; wrote on Stone Age and Prehistoric Man.

BOUCHER, FRANÇOIS (1703–70), celebrated Fr. artist of Louis Quinze period; popularised Pompadour fashions.

BOUCHES-DU-RHÔNE (43° 35′ N., 5° E.), department, S.E. France, in Rhône delta, formerly part of Provence (*q.v.*); contains three arrondissements—Marseilles, Aix, Arles; hilly in E.; large tracts stony country (Crau), swamp (Étang de Berre), and prairie (Camargue); olives, mulberries, vines, and fruits; horse- and cattle-rearing. Area, 2025 sq. miles. Pop. (1911) 805,532.

BOUCICAULT, DION (1822–90), Irish dramatist and actor; played with Macready and Webster, and was regarded as best stage Irishman of his time. His plays, which met with immense popular success, and are still played, include *London Assurance*, *The Colleen Bawn*, *Arrah-na-Pogue*, and *The Shaughraun*.

BOUCICAUT, JEAN (d. 1421), Fr. marshal; captured at *Agincourt*; d. England.

BOUDIN, EUGÈNE (1824–98), Fr. artist; served as cabin-boy in his youth; developed a taste for art, which he cultivated in Paris, and became famous as a painter of marine pictures.

BOUDINOT, ELIAS (1740–1821), Amer. politician, soldier, and author.

BOUFARIK (36° 36′ N., 2° 44′ E.), town, Algeria. Pop. 9284.

BOUFFLERS, LOUIS FRANÇOIS, DUC DE (1644–1711), Fr. marshal; brilliant service at *Malplaquet*.

BOUFFLERS, STANISLAS JEAN, CHEVALIER DE (1737–1815), Fr. statesman, wit, and poet; m. Madame de Sabran.

BOUGAINVILLE, LOUIS ANTOINE DE (1729–1811), Fr. navigator; entered army (1753), becoming a colonel (1756); accomplished first Fr. circumnavigation of world (1766–69); made *chef d'escadre* (1779); field-marshal in army (1780); vice-admiral (1791); and subsequently became a senator and Count of the Empire.

BOUGH, SAMUEL (1822–78), Eng. landscape painter, noted for original, delicate colouring.

BOUGIE (36° 44′ N., 5° 4′ E.), fortified seaport, on bay of B., Algeria; at one time greatest commercial centre N. African coast, and capital of Berber kingdom, Beni-Hammad; captured by French, 1833; oils, wax. Pop. 10,500.

BOUGUER, PIERRE (1698–1758), Fr. scientist; chief works, *Figure de la Terre* and *Optique*, important in history of physics.

BOUGUEREAU, ADOLPHE WILLIAM (1825–1905), Fr. artist; was a versatile painter in many styles, but chiefly known for somewhat heavy treatment of classical subjects and the nude.

BOUHOURS, DOMINIQUE (1628–1702), Fr. author and Jesuit; wrote *Vie de Saint Ignace de Loyola* (1679), *Vie de Saint François Xavier* (1682), trans. New Testament into French, and produced several other devotional and secular books.

BOUILHET, LOUIS HYACINTHE (1822–69), Fr. dramatist; his plays achieved considerable success, and include *Madame de Montarcy*, *Hélène Peyron*, and the *Conjuraton d'Amboise*.

BOUILLÉ, FRANÇOIS CLAUDE AMOUR, MARQUIS DE (1739–1800), Fr. general; attempted to rescue Louis XVI., 1791; wrote *Mémoires*.

BOUILLON (49° 48′ N., 5° 5′ E.), town, Belgium; remains of Godfrey of B.'s castle; was seat of dukedom from X. cent. Pop. 2721.

BOUILLY, JEAN NICOLAS (1763–1842), Fr. dramatist, author of words of comic operas of Cherubini, etc.

BOULAINVILLIERS, HENRI, COUNT DE (1658–1722), Fr. writer on early Muhammadanism and Arab history.

BOULANGER, GEORGE ERNEST JEAN MARIE (1837–91), Fr. general and statesman; director of infantry at War Office (1882); became War Minister (1886–87), and created the 'Boulangist' democratic agitation which threw France into confusion; he himself fought a duel with Floquet, the premier, in 1888; general (1887); returned for Paris (1889), but, accused of monarchical intrigues soon after, he lost courage and fled; committed suicide at Brussels (Sep. 30).

BOULAY DE LA MEURTHE, ANTOINE JACQUES CLAUDE JOSEPH, COMTE (1761–1840), Fr. author and politician. His elder son, Comte Henri Georges Boulay de la Meurthe 1797–1858), a Bonapartist, vice-pres. of republic 1849); advocate of popular education.

BOULDER (40° N., 105° 12′ W.), town, Colorado, U.S.A.; seat of Colorado Univ. Pop. (1910) 9539.

BOULDER CLAY occurs in Brit. Isles, Norway, Sweden, Denmark, Central and N. Russia; shows traces of glacial action; belongs to Post-Tertiary or Quaternary period.

BOULÉ (compare Spartan *Gerusia* or *Gerousia*), advisory council of ancient Greece; such a council, probably composed of leading nobles, existed in Homeric state. The original Athenian b. (later the 'Areopagus') was superseded by Solonian b. of 400 members, 100 from each Ionic tribe; this in turn gave place to Cleisthenes' council of 500, fifty from each of ten artificially created tribes. The members were app. by the demes, and proportional representation was aimed at; they were paid one drachma per day (later 5 obols). The b. was an administrative and judicial body, a part of the legislative machinery, and had to prepare all business to be brought before the Ecclesia. After establishment of Gk. independence in XIX. cent. a b. of 235 senators was appointed under a system of manhood suffrage for four years; there is no Lower House.

BOULEVARDS (Fr. b., from Ger. *bollwerk*, bulwark), promenades in Fr. towns on sites of old fortifications; hence any avenues in a town.

BOULGER, DEMETRIUS CHARLES (1853–), Eng. author, established *Asiatic Quarterly Review*, 1885, jointly with Sir Lepel Griffin; authority on Asiatic and Belgian problems.

BOULLE, ANDRÉ CHARLES (1642–1732), Fr. cabinet-maker; patronised by Louis XIV. and the nobility, and had lodgings in the Louvre. He was one of the greatest artists in his craft that France has produced. Authenticated examples of his work are much sought after, and fetch high prices. The Wallace Collection, London, contains several specimens.

BOULOGNE-SUR-MER (50° 43′ N., 1° 34′ E.), seaport, France; fortified; divided into Haute Ville and Basse Ville; former, surrounded by ramparts, has château, belfry tower, law court, town hall; modern town has churches, museum, library, casino. B. was the *Bononia* of the Romans; it was conquered by Edward III. and held 1544–50 by Henry VIII.; place where Napoleon assembled army and fleet with which he intended to invade England, 1802; Sainte-Beuve's birthplace; fine harbour; cross-Channel

service to Folkestone; imports textiles, wood, coal, iron; exports wine, fruit, vegetables, motor-cars, etc. Pop. (1911) 53,128.

BOULOGNE-SUR-SEINE (48° 50′ N., 2° 14′ E.), suburb of Paris, with famous pleasure-ground, 'Bois de B.' Pop. (1911) 57,027.

BOULTON, MATTHEW (1728–1809), Eng. mechanician; James Watt's partner.

BOUNCE, see under SHARKS and DOG-FISHES.

BOUNDARY, that which marks the limit, or extent, of any area, or territory; in matters relating to land, a boundary is generally marked by a road, ditch, stream, wall, or hedge.

BOUNDS, BEATING THE, old Eng. custom of formally visiting the parish boundaries on Ascension Day, which is still observed in some places.

BOUNTY ISLANDS (47° 40′ S., 179° E.), rocky islands, E. of New Zealand; uninhabited.

BOUNTY, KING'S.—(1) impressment becoming illegal (1660), K. B. was for long paid for voluntary enlistment in army in time of war; (2) given to seamen for extraordinary services, *e.g.* capturing pirate ships; (3) formerly granted as encouragement to certain branches of commerce; (4) bestowed on subjects who produce three or more children at a birth.

'BOUNTY,' MUTINY OF H.M.S., at Tahiti, April 28, 1789; overbearing commander, William Bligh, set adrift with loyal men, reached Batavia in safety; ringleaders established at Tahiti were hanged, but some mutineers escaped to Pitcairn Island (*q.v.*).

BOUNTY, QUEEN ANNE'S.—After Reformation tenths and first-fruits were paid by Church to State, until formed into clergy fund by Anne (1704).

BOURBAKI, CHARLES DENIS SAUTER (1816–97), Fr. soldier; joined the army, becoming a zouave (1836); lieut. of the Foreign Legion (1838), and aide-de-camp to Louis Philippe; distinguished himself in Crimean, Ital., and Franco-Ger. wars, and subsequently app. military gov. at Lyons.

BOURBON, Fr. family, figuring in history from IX. cent. In 1272, a younger s. of Louis IX. of France obtained the lordship of B. in Berry by marriage with the heiress; his s. Louis was cr. Duke of B. in 1327; the Constable of B. (b. 1490) obtained fame in imperial service and was slain during sack of Rome (1527). In the person of Henry IV. the B's ascended the throne of France (1589), and the War of the Span. Succession (*q.v.*) resulted in establishment of B's on throne of Spain; for long Span. and Fr. 'Family Compacts' threatened balance of power.

The B's fell in France, 1791, and were expelled from their various Span. and Ital. possessions by Napoleon; restored 1815; younger Orleanist branch replaced elder in France, 1830–48, when they were expelled; driven from Naples (1860), Spain (1868–74). The elder branch d. out with the Comte de Chambord, 1883, and the Orleanists again became sole hope of the Fr. monarchists; present representative, Louis Philippe, Duke of Orleans. Prince Charles of Bourbon represents younger branch of family.

BOURBON, ISLE OF, see RÉUNION.

BOURBON-LANCY (46° 37′ N., 3° 46′ E.), town, Saône-et-Loire, France.

BOURBON L'ARCHAMBAULT (46° 35′ N., 3° 4′ E.), town, Allier, France; hot springs.

BOURBONNAIS (45° 30′ N., 1° E.), old province, France; chiefly included in Allier.

BOURBONNE-LES-BAINS (47° 57′ N., 5° 43′ E.), town, Haute-Marne, France; hot springs. Pop. 3738.

BOURBOULE, LA (45° 35′ N., 2° 30′ E.), town, France; thermal spring.

BOURCHIER, ARTHUR (1864–), Eng. actor-manager, adapter, and translator of plays; m. Violet Vanbrugh, 1894.

BOURCHIER, THOMAS (d. 1486), Eng. ecclesiastic; abp. of Canterbury (1454), Lord Chancellor (1455), cardinal (1467). He crowned Edward IV. Richard III., and Henry VII.

BOURDALOUE, LOUIS (1632–1704), Fr. Jesuit; famous as preacher at court of Louis XIV.; man of beautiful character and great oratorical power; much revered by all classes.

BOURDON, FRANÇOIS LOUIS, BOURDON DE L'OISE (d. 1797), Fr. revolutionist; as member of Convention voted for death of Louis XVI.; later became notorious for antagonism towards Robespierre.

BOURGAS, see BURGAS.

BOURGELAT, CLAUDE (1712–79), Fr. veterinary surgeon; originator of schools of veterinary med.

BOURG-EN-BRESSE (46° 12′ N., 5° 13′ E.), town, Ain (in old province of Bresse), France; famous church, Notre Dame de Brou, founded by Margaret of Austria, XVI. cent. Pop. 20,000.

BOURGEOIS, LÉON VICTOR AUGUSTE (1851–); Fr. statesman and lawyer; formed Radical Cabinet, 1895; nominated a member of permanent court of arbitration (1903); Pres. of Chamber of Deputies (1902–3); Minister of Foreign Affairs (1906), of Labour (1912).

BOURGEOISIE (*i.e.* burgess class), Fr. middle class, divided into *petite* and *haute* b.; forms the Philistia of Bohemians.

BOURGES (47° 4′ N., 2° 24′ E.), city, on Canal du Berry, Cher, France; ancient *Avaricum*, capital of Aquitania; seat of abp.; cathedral of St.-Étienne, one of greatest in France; large arsenal; gunpowder, ammunition; Council here asserted freedom of Gallican Church, 1438, by Pragmatic Sanction; Charles VII.'s capital. Pop. (1911) 45,735.

BOURGET, LE (45° 39′ N., 5° 49′ E.), town, Savoie, France; Prussians defeated French, 1870.

BOURGET, PAUL CHARLES JOSEPH (1852–), Fr. novelist and critic; has produced a considerable number of novels in various styles, many of which are masterly psychological studies, and all are distinguished by an exquisite sense of form and expression. He also occupies a high position as a critic, *e.g.* *Études et portraits* (1888); while his descriptive powers are shown in *Sensations d'Italie* (1891).

BOURIGNON, ANTOINETTE (1616–80), Flem. visionary; had following in Holland, France, England, and Scotland.

BOURKE (30° 12′ S., 145° 40′ E.), town, New South Wales, Australia; copper-ore.

BOURMONT, LOUIS AUGUSTE VICTOR, COMTE DE GHAISNE DE (1773–1846), Fr. general; served with army of *émigrés* (1792–93); subsequently became a general in imperial army; went over to enemy at beginning of Waterloo campaign; war minister (1829); commanded Algiers expedition (1830); and retired to Portugal on Revolution of 1830.

BOURN(E) (50° 47′ N., 0° 24′ W.), market town, Lincolnshire, England. Pop. (1911) 4300.

BOURNE, FRANCIS (1861–), R.C. abp. of Westminster since 1903; cardinal, 1911.

BOURNE, HUGH (1772–1852), founder of Eng. religious sect of Primitive Methodists (1811) from Wesleyan Methodist Connexion.

BOURNE, VINCENT (1695–1747), Eng. Latin poet; was a master at Westminster school; famous for the exquisite grace of his Latin poems, which have received high praise from Cowper, Lamb, and others.

BOURNEMOUTH (50° 43′ N., 1° 53′ W.), watering-place, on Eng. Channel, Hampshire, England. Pop. (1911) 78,677.

BOURNONITE (CuPbSbS), mineral, sulphide of antimony, lead, and copper, steel-grey metallic lustre, found in Cornwall, Harz Mountains, Mexico; used as lead ore.

BOURNVILLE (52° 26′ N., 1° 55′ W.), garden city, near Birmingham, England; site of Cadbury's chocolate factories.

BOURRIENNE, LOUIS ANTOINE FAUVELET DE (1769–1834), Fr. diplomatist; ed. military school of Brienne with Napoleon; subsequently studied law and diplomacy at Vienna and Leipzig; private sec. to Napoleon (1798); Fr. envoy to Hamburg (1805–10);

joined the Royalists (1814). B. is chiefly remembered for his *Mémoires.*

BOURRIT, MARC THÉODORE (1739–1819), Swiss author and mountaineer; was the first climber to essay the ascent of Mont Blanc, in which he failed, but made other famous ascents. He pub. several descriptive works on Swiss mountain-climbing.

BOURSAULT, EDME (1638–1701), Fr. dramatist; his plays are now forgotten, but he obtained considerable notoriety by reason of his bickerings with Molière and Boileau, both of whom had ridiculed him.

BOURSE, continental Stock Exchange (*q.v.*).

BOURSSE, ESAIAS (1630–73), Dutch artist; was famous as a painter of interiors, and his works are scarce; a fine example is in the Wallace Collection, London.

BOUSSA, see BUSSA.

BOUSSINGAULT, JEAN BAPTISTE JOSEPH DIEUDONNÉ (1802–87), Fr. chemist and agronomist; chief work, *Économie rurale.*

BOUSSU (50° 26′ N., 3° 47′ E.), town, Belgium; coal, iron, copper. Pop. 11,315.

BOUTERWEK, FRIEDRICH (1766–1828), Ger. philosopher; prof. of Philosophy at Göttingen; at first was a follower of Kant, but later favoured the views of F. H. Jacobi; besides his philosophical writings he pub. some novels and poetry.

BOUTHILLIER, CLAUDE, SIEUR DE FOUILLETOURLE (1518–1652), Fr. diplomatist and statesman; sec. of State (1628); superintendent of finances (1632–43).

BOUTS-RIMÉS (Fr. 'rhymed ends'), verses made from selected rhyme-endings, a form of metrical exercise begun in France during the XVII. cent. D. G. Rossetti, amongst Eng. writers, sometimes amused himself by writing sonnets to rhymes supplied by another.

BOUTWELL, GEORGE SEWALL (1818–1905), Amer. statesman; a democratic representative in Congress (1863–69); sec. of treasury (1869–73); U.S. senator from Massachusetts (1873–77).

BOUVET, FRANÇOIS JOSEPH (1753–1832), Fr. admiral; served in Fr. navy, becoming captain and rear-admiral (1793); dismissed for failure to land General Hoche in Ireland (Dec. 1796); restored to service by Napoleon.

BOUVIER, JOHN (1787–1851), Amer. judge and legal writer.

BOUVINES (50° 34′ N., 3° 12′ W.), village, Nord, France; Philip Augustus of France defeated Otto IV. of Germany, 1214.

BOVIANUM.—(1) (41° 29′ N., 14° 25′ E.) ancient city of Samnium, Italy; modern Bojano. (2) (41° 43′ N., 14° 22′ E.) ancient city, 5 miles S. of Agnone, Italy.

BOVIDÆ, family of hollow-horned ruminants now distributed throughout the world, but formerly not occurring in Central and S. America and Australia. It includes sheep, goats, cattle, antelopes, gazelles, etc.

BOVILL, SIR WILLIAM (1814–73), Eng. solicitor-general and judge.

BOVILLÆ, ancient town of Latium, Via Appia, Italy.

BOVINO (41° 13′ N., 15° 22′ E.), cathedral town, Italy; seat of bishopric. Pop. 7773.

BOW, anything curved or bowed; formerly it was used for arch, whence is derived Bow Church; weapon used to shoot arrows (see ARCHERY). Violins and similar instruments are played with b's, consisting of a stick of Pernambuco wood, about 29 in. in length, strung with white horsehair. The best kind of b. in use at the present time, with its various parts and accessaries, was the invention of François Tourte (1747–1835). A primitive kind of b. was in use from very early times.

BOWDICH, THOMAS EDWARD (1790–1824), Eng. author; spent some years on the Gold Coast, during which time he went on a mission to the king of Ashanti; pub. an account of his adventures under the title of *Mission from Cape Coast Castle to Ashantee* (1819).

BOWDITCH, NATHANIEL (1773–1838), Amer. sailor and scientist; wrote valuable book on navigation.

BOWDLER, THOMAS (1754–1825), Eng. editor and philanthropist; was an M.D. of private fortune, who became notorious as the editor of *The Family Shakespeare* (1818), in ten vol's, in which all words and expressions were omitted which might offend the prudish sense. From his name is derived the phrase, to *bowdlerise,* and though he has been execrated by many, his work has been praised by Swinburne.

BOWDOIN, JAMES (1726–90), Amer. separatist in War of Independence. His s., **James Bowdoin** (1752–1811), was politician and diplomatist.

BOWELL, SIR MACKENZIE (1823–), Canadian statesman; head of Orange Association.

BOWELS, see DIGESTION.

BOWEN, CHARLES SYNGE CHRISTOPHER BOWEN (1835–94), Baron for life (1893); Eng. judge, distinguished in Tichborne case, etc.; made lord of appeal in ordinary (1893); translated *Eclogues* and part of *Æneid* of Vergil; wrote legal studies.

BOWEN, FRANCIS (1811–90), Amer. educationist; b. Charlestown, Mass.; ed. Harvard; edit. *North American Review* (1843–54); besides biographies of public men, he wrote *A Treatise on Logic* (1864), *American Political Economy* (1870), and numerous other works.

BOWEN, SIR GEORGE FERGUSON (1821–99), first Gov. of Queensland, later of New Zealand, Victoria, Mauritius, and Hong-Kong.

BOWER, WALTER, BOWMAKER (1385–1449), Scot. chronicler; was abbot of Inchcolm; completed his history, *Scotichronicon,* in 1447; afterwards prepared an abridgment, which is known as the *Book of Cupar.*

BOWFINS (*Amiidæ*), only living representative, the bowfin or grindle, *Amia calva,* a mottled green ganoid fish approaching the Herring family in characters, found in the fresh waters of the eastern U.S.A.; an excellent sporting fish, but seldom used as food. Fossil species occur from the Eocene onwards.

BOWIE-KNIFE, hunting weapon named from its inventor, COL. JAMES BOWIE (c. 1790–1836); double blade about 12 in. long, curved.

BOWLES, CAROLINE, see SOUTHEY.

BOWLES, SAMUEL (1826–78), Amer. journalist; was editor of the *Springfield Republican* (founded by his f., Samuel B., in 1824), which under his control became one of the most influential dailies in America; was also author of a travel-book, *Our New West,* 1869.

BOWLES, THOMAS GIBSON (1842–), Eng. politician and author; founded *Vanity Fair* (1868); authority on finance and maritime law.

BOWLES, WILLIAM LISLE (1762–1850), Eng. poet and antiquary; canon, Salisbury Cathedral; pub. *Fourteen Sonnets on Picturesque Spots* (1789), which greatly influenced Coleridge and Wordsworth, and prepared the way for the revolt against the pseudo-classical school of poetry of the XVIII. cent. He wrote much other verse of no great merit; an antiquarian work, *Hermes Britannicus* (1828); and involved himself in a literary controversy with Byron, Campbell, and *The Quarterly Review.*

BOWLING GREEN.—(1) (36° 57′ N., 86° 24′ W.) city, Kentucky, U.S.A.; commercial centre. Pop. (1910) 9173. (2) (41° 22′ N., 83° 40′ W.) city, county seat, Wood County, Ohio, U.S.A.; district rich in oils and natural gas. Pop. (1910) 5222.

BOWLS, with the exception of archery, the oldest surviving Eng. game. It was played as early as the XIII. cent.; the first mention of the game by the name of 'bowls' occurs in acts of Henry VIII.'s time; and during the Elizabethan age 'bowling alleys' were to be found throughout the country. Henry VIII. enjoyed a game; Sir Francis Drake was playing at bowls when news reached him of the coming of the Armada; the Stewart kings were followers of the game, Charles I. especially, who is said to have beguiled

with it his captivity at Holmby and Carisbrooke. The Puritans regarded the pastime with no friendly eye, but, with the Restoration, it again came into favour, since which time it has continued to flourish, and was never more popular than it is at the present day.

The game is either played upon a flat sunk green (40 or more yards square), or a 'crown' green, *i.e.* one which is formed with a gentle rise towards the centre. As a rule there are two players on each of two sides, using lignum vitæ bowls, which receive a bias from the wood-turner, in place of loading, which used to be the method. It will thus be seen that in playing upon a 'crown' green, with biassed bowls, considerable skill is required in placing the 'woods' to advantage. The game is played by the 'leader' of one side throwing the 'jack,' after which the players deliver their bowls in turn, and attempt to place them as near to the jack as possible. The bowls are thrown with the foot placed on a 'footer,' or india-rubber mat, used for the purpose of preserving the green. The 'leader,' already mentioned, having played his bowl, gives place to the 'second,' who is also the scorer of the game; then to the third, who is also the 'measurer,' *i.e.* the person who measures, if necessary, the distances between the bowls and the jack; finally to the fourth player, who is also called the 'skip' and 'captain,' necessarily a player of resource, for often upon him depends the success of the game. When all the bowls have been played a point is reckoned for each bowl of one side which lies nearer the jack than the corresponding bowl of the other side.

Alwin's *The Gentle Art of Bowling* (1904); Manson's *The Bowlers' Handbook* (1906).

BOWNESS-ON-WINDERMERE (54° 22′ N., 2° 25′ W.), town, Westmoreland, England; tourist centre.

BOWRING, SIR JOHN (1792–1872), Eng. linguist (100 languages); first edit. of *Westminster Review*, and gov. of Hong-Kong; ordered much criticised bombardment of Canton (1856).

BOWYER, WILLIAM (1699–1777), Eng. printer—the 'Learned Printer'; author of books on printing, texts, etc.

BOX (*Buxus sempervirens*), the common box tree, belongs to the order *Euphorbiaceæ*, is a native of S. Europe, and is found in parts of Asia and Africa. In warm countries it reaches a considerable height. The wood is hard, close, and heavy, of a pale yellow colour, and much used in the manufacture of flutes and similar musical instruments. A dwarf variety is used for garden borders.

BOXALL, SIR WILLIAM (1800–79), Eng. hist. and portrait painter; director of National Gallery, London (1865–74).

BOX-DAYS, days during recesses of Scot. law terms when pleadings, etc., may be lodged; named from receptacles introduced, 1690, to obviate contact between client and judge.

BOXERS, members of Chin. militant religious soc.; led antichristian movement, 1899–1902. See CHINA (History).

BOXING, the art of fighting with the fists, now generally with the hands protected by padded gloves. Although the ancient Greeks and Romans had b. contests with strict rules regarding them, the development of modern b., which has been almost entirely confined to England, the Brit. colonies, and U.S.A., dates from the beginning of the XVIII. cent., becoming a popular and fashionable sport about 1735–50, when Jack Broughton, the inventor of boxing-gloves, flourished. The Augustan Age of b. was during the first two decades of the XIX. cent., the times of Mendoza, Belcher, 'Gentleman' Jackson, Gully, Tom Cribb, Dutch Sam, and Tom Spring.

A revival took place about 1850–60, when Heenan, King, Tom Sayers, and Jem Mace were in the ring. The public outcry after the great fight between Heenan and Sayers caused prize fighting to be declared illegal in England. In 1866 the Amateur Athletic Club was founded, and the rules on which the modern sport is based were drawn up mainly by the 8th Marquess of Queensberry. Among amateurs the popularity of b. has declined somewhat to-day, although since about 1890 considerable public interest has been taken in professional contests, Peter Jackson the negro, Sharkey, Pedlar Palmer, John L. Sullivan, Kid M'Coy, Dick Burge, Bob Fitzsimmons, Jem Corbett, James J. Jefferies, Tommy Burns, and Jack Johnson the negro, all being well-known names.

French b. permits the use of the feet as well as the fists, and is a development of the old *savate*, in which the feet alone were used. Charles Lecour is said to have founded the sport in 1852, after studying b. in England.

Egan, *Boxiana* (4 vol's, 1818); Miles, *Pugilistica* (2 vol's, 1880); Mitchell, *Boxing* (Badminton Library, 1889); Allanson-Winn, *Boxing* (Isthmian Library, 1897).

BOXING DAY, day (not Sunday) after Christmas, when 'box,' or present, is given to servants, etc.

BOXTEL (51° 35′ N., 5° 19′ E.), town, N. Brabant, Holland. Pop. *c.* 7000.

BOY BISHOPS were elected in Middle Ages by cathedral chorister boys on St. Nicholas's Day (Dec. 6); held office till Dec. 28.

BOY SCOUTS, see BADEN-POWELL.

BOYACA, BOJACA (5° 25′ N., 73° 40′ W.), town and department of Colombia, S. America; has richest emerald mine in world; capital, Tunja; area, 16,460 sq. miles. Pop. (department) 586,499.

BOYAR (Russ. *boydrin*, lord), name of members of privileged rank of old Russ. aristocracy next in dignity to princes; abolished by Peter the Great.

BOYCE, WILLIAM (1710–79), Eng. composer; s. of a cabinet-maker; became master of the king's band, and organist of the Chapel Royal; celebrated for his church services and anthems, e.g. *By the Waters of Babylon*; pub. a valuable work on *Cathedral Music* (3 vol's).

BOYCOTTING, system adopted under the 'Land League' in Ireland to prevent any person from taking or working a farm or building from which a tenant had been evicted for the non-payment of rent. Labourers were forbidden to work for the 'land-grabber,' tradesmen refused to deal with him, and in many cases cattle were maimed, crops destroyed, and personal assaults committed. The first victim was CAPTAIN BOYCOTT (1832–97), agent for Lord Erne, with whom the Connemara inhabitants refused to have any dealings, because of the evictions for which he was responsible. His life was threatened, his property damaged, and he experienced many other troubles.

BOYD, ANDREW KENNEDY HUTCHISON (1825–99), Scot. clergyman, famous as 'A.K.H.B.'; author of *Recreations of a Country Parson*.

BOYD, ROBERT BOYD, LORD (d. *c.* 1470), Scot. statesman; regent during minority of James III.; secured Orkney Islands for Scotland.

BOYD, ZACHARY (1585–1653), Scot. Puritan divine; wrote metrical version of Scriptures, *B.'s Bible*.

BOYER, ALEXIS (1757–1833), Fr. surgeon; surgeon to Napoleon I., whom he accompanied on his campaigns, and to the succeeding sovereigns of France; prof. of Operative and later of Clinical Surgery, École de Santé; surgeon-in-chief (1825), Hôpital de la Charité.

BOYER, JEAN PIERRE (1776–1850), native Pres. of republic of Haiti, 1818–43.

BOYLE (53° 58′ N., 8° 18′ W.), market town, County Roscommon, Ireland, on river Boyle.

BOYLE, THE HON. ROBERT (1627–91), Eng. natural philosopher; 7th s. of Richard B., Earl of Cork; ed. Eton, and afterwards travelled extensively abroad; studied natural sciences, particularly physics, and made important inventions and researches in pneumatics (*Boyle's law*); also studied theology. B. was a founder of Royal Soc., an East India Co. director, and instituted 'Boyle Lectures' for defence of Christian religion. Works include *Seraphic Love*,

Hydrostatical Paradoxes, Experiments touching Colour. Of feeble constitution, gracious and kindly nature.

BOYNE (53° 43′ N., 6° 16′ W.), river, Ireland; rises in Bog of Allen, enters Irish Sea; scene of battle, July 1, 1690, in which William III. defeated James II.

BOYS' BRIGADE, disciplinary association formed by W. A. Smith of Glasgow in 1883.

BOZRAH.—(1) (32° 31′ N., 36° 33′ E.) ancient city, Bashan, Syria; ruins of cathedral, mosque, Rom. triumphal arch, and theatre. (2) town, Edom, S.E. Dead Sea.

BOZZARIS, MARCOS (1788–1823), Gk. hero of War of Independence; fell in sortie from Missolonghi.

BRA (44° 42′ N., 7° 52′ E.), town, N. Italy. Pop. *c.* 15,800.

BRABANÇONNE, LA, Belg. song of freedom; composed, 1830.

BRABANT, mediæval duchy of Low Countries, corresponding to modern province North or Dutch B. (*q.v.*) and the Belg. provinces of South B. (*q.v.*)—inhabitants mostly Walloons—and Antwerp (inhabitants chiefly Flemings); separated from Lorraine, XI. cent.; Limburg attached, 1288; united to Burgundy, 1430; became part of Span. monarchy, 1516; afterwards formed part of kingdom of Holland; since 1830, three provinces as above.

BRABANT, NORTH (51° 32′ N., 5° E.), province, southern Holland; area, 1980 sq. miles; surface flat; heathy and marshy tracts; agriculture and cattle-rearing; inhabitants mostly R.C.; chief town, Hertogenbosch. Pop. 640,000.

BRABANT, SOUTH (50° 45′ N., 4° 30′ E.), province of Belgium, between Meuse and Scheldt; area, 1267 sq. miles; industrial and agricultural; thickly populated; capital, Brussels (*q.v.*). Pop. 1,469,677.

BRACCIANO (42° 7′ N., 12° 11′ E.), town, Italy, on Lake B.; numerous small craters in neighbourhood. Pop. 4000.

BRACCIO, FORTEBRACCIO, see MONTONE, ANDREA DA.

BRACCIOLINI, FRANCESCO (1566–1645), Ital. poet; wrote poetry in various forms, but is chiefly noted for his mock-epic, *Lo Scherno degli Dei*, and his narrative poem, *La Croce Racquistata*.

BRACE, CHARLES LORING (1826–90), Amer. religious and social worker and writer.

BRACEGIRDLE, ANNE (d. 1748), Eng. actress; acted with Betterton; chiefly remembered in connection with Congreve's comedies; superseded in public favour by Mrs. Oldfield, and retired; noted for her purity of life and charity, and buried in Westminster cloisters.

BRACELET, article of adornment, worn on the arms (in earlier times by men as well as women), and dating back to prehistoric times. The earliest kinds were either spirals, in the form of snakes, or artistically finished hoops, with highly decorated terminals. In later times bracelets with chased and jewelled panels came into favour.

BRACHINUS, see under CARABOIDEA.

BRACHIOPODA, class of invertebrate marine animals with bivalve shells, ranging in size between a quarter of an inch to 4 inches, while certain species (e.g. *Productus giganteus*) attain a length and breadth of almost 1 foot. They are of great interest and importance, partly owing to the great number of species (over 4000), most of which are fossil and form valuable indications of the age of the strata to which they belong, and partly due to the uncertainty of their systematic position in the animal world. It has been variously held that the B. show affinities with the Mollusca, Annelida, and Tunicata, but they may be regarded as allied to the Polyzoa, offshoots from the heterogeneous group called 'worms.'

One of the characteristic features of the class is the beautifully shaped and tinted shell, which resembles lamellibranchiate bivalves only to a limited extent, and consists of a 'dorsal' and 'ventral' valve, the latter generally being the larger of the two. The valves are lined and secreted by the 'mantle,' and are opened and closed by a frequently extremely complex set of muscles, the interlocking being strengthened by teeth and sockets on the valves. The B. possess a pair of brachial organs which are fleshy, generally spirally coiled, appendages, prolongations of the margin of the mouth. These labial appendages are, in one of the two groups into which the class may be divided, supported by a calcareous skeleton, serve in respiration, and are always fringed with long cirri, for wafting minute food particles to the mouth. *Singula, Terebratula, Spirifer,* and *Productus* are typical and important genera.

The B. flourished from the Cambrian to the Carboniferous era, then decreased in numbers during the Permian and Triassic periods, and again became comparatively abundant in the Jurassic and Cretaceous seas. There are about 100 species existing at the present time.

BRACKLESHAM BEDS, a series of clays and marls in Middle Eocene strata.

BRACKLEY (52° 2′ N., 1° 8′ W.), market town, on Ouse, Northamptonshire, England; breweries.

BRACKLEY, THOMAS EGERTON, VISCOUNT (*c.* 1540–1617), judge and Chancellor of England; Solicitor-General (1581); took part in trial of Mary, Queen of Scots; Attorney-General (1592); knighted (1593); Master of the Rolls (1594); a P.C. and Keeper of the Great Seal (1596). He became a trusted adviser and diplomatic agent of Elizabeth, and a staunch friend of Essex; reappointed Lord Keeper and cr. Baron Ellesmere and Lord Chancellor (1603); cr. Viscount B. (1616), he retired (1617), after an active public career. Several writings have been ascribed to him.

BRACTON, HENRY DE (d. 1268), Eng. judge and priest; archdeacon of Barnstaple and chancellor of Exeter Cathedral (1264); wrote treatise on laws and customs of England.

BRADDOCK (40° 24′ N., 79° 53′ W.), borough, Pennsylvania, U.S.A.; steel manufactures. Pop. (1910) 19,357.

BRADDOCK, EDWARD (d. 1755), Brit. general; commanded the forces operating against the French on the Ohio; taken in an ambuscade during attempt, with Washington, to capture Fort Duquesne. Nearly half his troops fell, and B. received mortal wound.

BRADDON, MARY ELIZABETH (1837–), Eng. novelist; dau. of a Cornish solicitor; her first novel was *The Trail of the Serpent* (1861); her first popular success, *Lady Audley's Secret* (1862); since which time she has pub. many novels, which have appealed to a very wide public. She m. the publisher, John Maxwell, and her s., W. B. MAXWELL, is well known as a writer of fiction.

BRADFORD (53° 48′ N., 1° 45′ W.), city, municipal county and part of W. Riding, Yorkshire, England; principal seat of woollens and worsteds manufacture; important wool market; silks, velvets also made; first mill built, 1798; now over 300; St. Peter's Church dates 1485; handsome public buildings; fine parks and statues; good railway communication; connected with Humber and Liverpool by canal; near coal, iron mines, stone quarries; engineering. Pop. (1911) 288,505.

BRADFORD (41° 59′ N., 78° 44′ W.), city, Pennsylvania, U.S.A.; oil-wells, machinery. Pop. (1910) 14,554.

BRADFORD CLAY, a blue clay occurring at Bradford, near Bath, England; contains many fossils, including crinoids.

BRADFORD, JOHN (d. 1555), Eng. Prot. martyr; b. Manchester; studied law, but subsequently turned to divinity, and became a fellow of Pembroke Hall, Cambridge, was made chaplain to Edward VI. and the bp. of London (Ridley), and became popular preacher. During Mary's reign B. was committed to the Tower, tried for heresy, and burnt at Smithfield.

BRADFORD, WILLIAM (1590–1657), Amer.

colonial gov.; b. Husterfield, Yorkshire; joined th Separatists; sailed in *Mayflower* (1620); elected go of Plymouth colony (1621).

BRADFORD-ON-AVON (51° 21′ N., 2° 16′ W. market town, Wiltshire, England; church of Hol Trinity contains curious tombs, ancient brasses Saxon church, St. Lawrence, built by St. Aldhelm (*q.v.*), VIII. cent., only perfect example of its kind i England; formerly important manufactures of broad cloth; quarrying and iron-founding. Pop. (1911) 4501

BRADING (50° 31′ N., 1° 9′ W.), town, Isle o Wight, England; Rom. remains. Pop. (1911, regis tration district) 14,179.

BRADLAUGH, CHARLES (1833-91), Eng. poli tician (advanced Radical); b. Hoxton, London, in humble circumstances; gradually won reputation a a free-thought lecturer; conducted *National Reforme* for many years; allied himself with Mrs. Annie Besant.

BRADLEY, HENRY (1845–), Eng. philologist; joint-editor of *Oxford Eng. Dict.*; editor of early texts.

BRADLEY, JAMES (1693–1762), Eng. astronomer, discoverer of 'Aberration of Light' (*q.v.*); Savilian prof. of Astron., Oxford (1721); lecturer on experi mental philosophy (1729); Astronomer-Royal (1742).

BRADSHAW, GEORGE (1801-53), Eng. printe and publisher; b. Pendleton, Manchester; pub. well known *Bradshaw's Railway Time-Tables*, 1839 onwards.

BRADSHAW, HENRY (d. 1513), Eng. poet; was a monk of St. Werbergh's Abbey, Chester, and wrote a legendary epic dealing with the patron saint of his abbey, which has been edit. for the Chetham Society (1848) and the Early Eng. Text Society (1887).

BRADSHAW, HENRY (1831-86), Eng. scholar and librarian; fellow of King's Coll., Cambridge; dean (1857-65); Univ. librarian (1867); made a special study of Celtic and other MSS. in the library.

Prothero's *Memoirs of Henry Bradshaw* (1888).

BRADSHAW, JOHN (1602-59), Eng. judge; called to Bar (1627), becoming a bencher (1647); presided over 'High Court of Justice' which tried Charles I.; pres. of Council of State (1649); Commissioner of Great Seal (1659). B. was a zealous republican; his body was disinterred at Restoration and gibbeted.

BRADWARDINE, THOMAS (1290-1348), abp. of Canterbury; chaplain to Edward III.; present at *Crécy* and taking of Calais; called 'Doctor Profundus' from his anti-Pelagian work, *De Causa Dei*.

BRADY, NICHOLAS (1659-1726), Irish divine; wrote, with Tate, metrical version of *Psalms*.

BRADYPUS, see SLOTH.

BRAEMAR (57° N., 3° 25′ W.), district, S.W. Aberdeenshire, Scotland; deer forests; tourist resort; royal seat, Balmoral.

BRAG, old card game, in which five or more players take part, an ordinary pack being used; the players 'brag' or stake their hands against one another.

BRAGA (41° 35′ N., 8° 21′ W.), city, N. Portugal; abp.'s seat; Gothic cathedral; Rom. ruins; firearms. Pop. 24,200.

BRAGANÇA, BRAGANZA (41° 50′ N., 6° 46′ W.), town, Portugal; capital of Traz-os-Montes province; partly surrounded by walls; cathedral; silk; gave name to house of B.; 8th Duke of B. ascended throne, 1640, on liberation of Portugal (*q.v.*). Pop. 5000.

BRAGANÇA.—(1) (0° 55′ S., 46° 55′ W.) town, Brazil, S. America. Pop. *c.* 18,000. (2) (22° 48′ S., 46° 32′ W.) town, Brazil. Pop. *c.* 10,000.

BRAGG, BRAXTON (1817-76), Amer. Confederate general and engineer; his bro., THOMAS BRAGG (1810-72), was gov. of N. Carolina (1855-59), U.S.A. senator (1859-61), and attorney-general in Confederate Cabinet (Nov. 1861-March 1862).

BRAGI, god of poetry in northern mythology; possibly deified form of B. BODDASON, Norweg. (VIII. or IX. cent.) minstrel.

BRAHAM, JOHN (1774-1856), Eng. vocalist; b. London, of Jewish parents; real name, Abraham; sang at Covent Garden as a youth; afterwards supported himself by pianoforte teaching. When he recovered his voice (a tenor of remarkable richness and purity), he at once leapt into public favour, and, for upwards of forty years, was in the front rank of operatic and concert singers. B. built the St. James's Theatre (1836), and was a composer of some ability, his *Death of Nelson* being still popular.

BRAHE, PER, COUNT (1602-80), Swed. chancellor; served with distinction in army; gov.-gen. of Finland (1637-40, 1648-54); founded Abo Univ. (1640).

BRAHE, TYCHO (1546-1601), astron.; b. Kulstrup, Sweden; discovered star *Cassiopeia* whilst resident in Germany (1572); director of Observatory of Uraniborg (1576-97); from 1599 worked at Prague in conjunction with Kepler; chief work, *Astronomiæ instauratæ Mechanica*.

BRAHMA SOMAJ, large religious soc., founded in India in 1830; principle of creed is mystical theism.

BRAHMANISM, name given to the pre-Buddhist religion of India. A body of sacred writings called *Veda* is preserved. There are four collections of these writings, and *Brahmanas*, a kind of commentary on them (dating from VII. cent. B.C.). The type of religion shown in them is that of the great forces of nature, which seem to be personified. By degrees a pantheistic stage was reached. But Indian religion must always be viewed in relation to Indian history, and it must never be forgotten that an invasion of India by white-skinned Aryan race took place in early times, and the darker and more primitive peoples were subdued. In the Vedic hymns (which represent the primitive Aryan society) there is a military and noble and also a priestly class, both superior to the common people. In the fully developed B. we see a rigid caste system of four classes: the *Brahmana*, or priestly class; the *Vishatriya*, or warriors; the *Vaisya*, or tradesfolk; and the *Sudra*, or serfs.

The first three of these represent the Aryan, the ast the older inhabitants. The first three classes, hough rigidly marked off the one from the other, were he 'twice-born.' The Sudras were purely servile. There could be a certain amount of intermarriage. A man could marry beneath him if he had already a wife of his own rank. A devout Brahman was supposed to pass through four stages of religious life: he was to be first a student, then a householder, then a recluse, then a beggar. The third stage was only to be entered on late in life, when he retired into the woods alone, living on wild herbs and accepting charity only when obliged. Gradually theistic besides pantheistic tendencies developed, and a conception of 'brahma' as a personal god appeared. Older forms of devotion were grafted in; thus **Brahma**, Vishnu, and Siva came to represent the creative, preservative, and destructive aspects of the world. Siva took the place of another Vedic god as the representative of reproduction. Each of the three had a female partner. A reformation was carried out by GOTAMA (VI. cent. B.C.), the Buddha, who, while he maintained caste, abolished the sacrificial and sacerdotal system.

Monier Williams, *B. and Hinduism* (1887), and *ndian Wisdom* (1893); Lyall, *Asiatic Studies* (1899).

BRAHMAPUTRA (24° N., 89° 45′ E.), river, Asia, rising probably in Lake Manasowar, on tableland N. of Himalayas in W. Tibet, close to head-waters of Sutlej and Indus; has course eastward of *c.* 1000 miles, then turns S.E., crosses Himalayas, and passes through Assam to join Ganges; supposed great falls not yet discovered (1913). Length, *c.* 1800 miles navigable about 800 miles). B. means 'Son of Brahma.'

BRAHMIN OX, see ZEBU.

BRAHMS, JOHANNES (1833-97), Ger. composer; b. Hamburg; an austere classicist, it has only been since his death that B. has taken a foremost place among composers. He wrote symphonies, concertos, Hungarian dances, songs, and practically every musical form but the dramatic, all marked by skilful technique and greatness of rhythm, but he attains

highest point in his *Lieder* and choral works, among which are well-known *Schicksalslied, Rinaldo, Triumphlied*; see *Life*, by Erb (1905), and *Brahms*, by Stanford (1912).

BRAHUI, people inhabiting the Brahui mountains, (Baluchistan), believed to be either of Scythian or Tartar origin.

BRAID, JAMES (*c.* 1795–1860), Scot. physician; specialist in neurology and hypnotism.

BRAIDWOOD, THOMAS (1715–1806), Scot. educationist; opened at Edinburgh (1760) the first school in Great Britain for the education of the deaf and dumb; removed to London, 1783, and his system was adopted in all similar institutions throughout the kingdom.

BRAILA (45° 17′ N., 27° 55′ E.), river port, on Danube, Rumania; ruined fortress; extensive docks; belonged to Turks XVI. to XVIII. cent.; taken by Russians, 1770 and 1828; free port till 1883; grain. Pop. (1911) 60,901.

BRAILLE, LOUIS, see BLIND.

BRAIN, that part of the central nervous system contained in the skull: consists of the *cerebrum*, divided into two hemispheres, the great mass of the b. which dominates the working of the other parts; the *mid-brain*, a short stalk connecting the cerebrum with the *hind-brain*, which comprises the *pons Varolii*, bridging over the lower part of the stalk; the *cerebellum*, a large bi-lobular mass below and behind the cerebrum; and the *medulla oblongata*, the bulbous continuation of the spinal cord in the skull, below the cerebellum. The b. is enveloped by three membranes—the *dura mater*, the *arachnoid mater*, and the *pia mater*. The dura mater is the most external, closely applied to the interior of the cranial bones, and strong extensions of it dip down into the b., the *falx cerebri*, a deep sickle-shaped partition, dividing the two hemispheres of the cerebrum, the *tentorium cerebelli* forming a floor between the cerebrum and cerebellum, and the *falx cerebelli* separating the halves of the cerebellum behind. The dura mater also forms channels, *venous blood sinuses*, for conveying the venous blood away from the b. The arachnoid mater is a delicate membrane loosely covering the b. and separated from it by the pia mater, which closely covers the outer surface, dipping down into the furrows between the convolutions on the surface of the b.

The **Cerebrum** is divided by a deep cleft, the *great longitudinal fissure*, into two equal hemispheres, joined together at the foot of the fissure by a broad transverse band of fibres termed the *corpus callosum*. The substance of the cerebrum is composed of *grey matter*, consisting of groups of nerve cells which form centres for sensation, thought, etc., and *white matter*, consisting of nerve fibres held together by a special connective tissue termed the neuroglia. There is a layer of grey matter covering the surface of the cerebrum, and this layer, under the microscope, is found to be made up of four layers of different types of branching nerve cells, from which numerous fine nerve fibres are given off. The surface of the cerebrum is thrown into folds called *convolutions*, or *gyri*, with furrows between termed *sulci*, or, in the case of the deeper ones, *fissures*. Because of these convolutions and sulci the surface area, and therefore the grey matter, of the b. is greatly increased. The depth of the furrows and the prominence of the convolutions is in direct proportion to the intelligence; intellectual persons have them very well marked, while persons of low intelligence and, still more, idiots have them but slightly marked.

The furrows and convolutions have practically the same position in different b's; the two most important fissures are the *fissure of Sylvius*, which begins at the front of the inner margin of the lower surface of the hemisphere and extends outwards and upwards to about the centre of its external surface, and the *fissure of Rolando*, which extends obliquely downwards and forwards on the external surface from the middle of the superior margin of the hemisphere almost to the fissure of Sylvius. The hemispheres are divided into lobes by the fissures: the *frontal lobe* is the front part of the cerebral hemisphere, bounded behind by the fissure of Rolando, and below by the fissure of Sylvius; the *parietal lobe* is the upper part and the side of the hemisphere, bounded in front by the fissure of Rolando, and below by the fissure of Sylvius, and an imaginary line drawn backwards in continuation of it; the *occipital lobe* is the back pyramidal part of the hemisphere, divided from the adjacent lobes by arbitrary boundaries, except on its inner aspect, where a deep fissure divides it off; the *temporal lobe* is the lower part of the front and side of the hemisphere, below the Sylvian fissure and an imaginary line drawn backwards from it. The *falciform* or *limbic lobe* is that part of the hemisphere on its inner surface, towards the longitudinal fissure, above, behind, and below the corpus callosum, while the *island of Reil*, or *central lobe*, is situated at the bottom of the fissure of Sylvius, and can only be observed when the lips of the fissure are pulled widely asunder.

If the corpus callosum be cut through so as to separate the hemispheres completely, the *ventricles*, or internal cavities of the b., normally containing a clear fluid, can be observed. The *lateral ventricles*, one in each hemisphere, are cavities with an anterior, a posterior, and a descending horn, and each communicates with the third ventricle by a small opening, the *foramen of Monro*; the *third ventricle* is a narrow cleft between the hemispheres, below the corpus callosum, and from it a channel, the *aqueduct of Sylvius*, leads backwards to the *fourth ventricle*, which is a shallow quadrilateral cavity, tapering to a point at its upper and lower extremities, above and behind the pons Varolii. The so-called *fifth ventricle* has no connection with the other ventricles, and is a little cleft in the partition between the lateral ventricles in front.

On each side of the third ventricle, composing that part of each hemisphere which forms its lateral wall, is an ovoid mass of grey matter, termed the *optic thalamus*, its superior surface forming part of the floor of the lateral ventricle. Extending in an arch from the anterior horn to the descending horn of each lateral ventricle, and bulging into it, is another mass of grey matter in the interior of each hemisphere, termed the *caudate nucleus*. On the outer side of the optic thalamus and the caudate nucleus, embedded in the white substance of the cerebrum between them and the surface, is another mass of grey matter, the *lenticular nucleus*; that part of the cerebrum between the optic thalamus and the lenticular nucleus is an important structure, composed of the nerve fibres which go to and from the nerve cells of the cerebral cortex, and is termed the *internal capsule*.

The **Mid-Brain**, which connects the cerebrum with the hind-brain, consists in its under part of two thick bands of nerve fibres, the *crura cerebri*, each of which emerges from the inner and under surface of the cerebral hemisphere to connect it with the spinal cord; the superior part of the mid-brain consists of two pairs of rounded projections, the *superior* and *inferior quadrigeminal bodies*, while projecting over these from the back of the third ventricle is the *pineal body*, shaped like the stone of a cherry and considered to be a rudimentary third eye. The aqueduct of Sylvius, connecting the third and fourth ventricle, runs in the centre of the mid-brain.

The **Hind-Brain** comprises the pons Varolii, the cerebellum, and the medulla oblongata.

The *pons Varolii* forms a large rounded prominence on the under surface of the b., bridging over that part between the medulla oblongata and the crura cerebri. It lies in front of the cerebellum, to which a broad band of fibres passes back from it at each side, and its posterior surface forms the floor of the fourth ventricle. It is mainly composed of nerve fibres linking up the different parts of the b. and going to and from the

spinal cord, forming the white matter, and also of small masses of nerve cells, forming the grey matter, irregularly scattered through the white matter.

The CEREBELLUM lies below and behind the cerebrum and behind the pons Varolii and medulla oblongata, and consists of a median portion, the *vermis*, at the sides of which lie two large rounded lateral parts, the *lateral hemispheres*. Both in front and behind, the *cerebellum* has a marked notch in the middle, the hemispheres forming the sides of the notch and the vermis the bottom, and the posterior notch, which is the narrower, is occupied by a sickle-shaped fold of dura mater, the *falx cerebelli*. The surface is divided by curved parallel fissures, closely set together, into characteristic folds or *lamellæ*, and if a section is made through the body of the cerebellum it is observed that the arrangement of the branching fissures and lamellæ gives it a peculiar tree-like appearance, called the *arbor vitæ*. Like the cerebrum the surface is covered with a layer of grey matter, which, examined microscopically, shows two layers of nerve cells, with a layer of large pear-shaped nerve cells, peculiar to the cerebellum, at their junction; the interior of the cerebellum is composed of white matter. Some of the fissures which divide up the surface of the cerebellum are deeper and more evident than the others, and these divide the surface into recognised lobes; the most important is the *great horizontal fissure*, which begins at one side of the organ in front, its edges enclosing the cerebellar peduncles, and passes horizontally right round it, across the one hemisphere, the vermis, and the other hemisphere, to enclose the peduncles at the other side in front; this fissure is the division between the upper and lower surfaces of the cerebellum.

The cerebellum is attached to the other parts of the b. by three pairs of thick bands of fibres, the largest of which, the *middle peduncles*, pass forwards on each side to the pons Varolii, the *superior peduncles* passing upwards at each side to the inferior quadrigeminal bodies of the mid-brain, and the *inferior peduncles* passing downwards at each side to the medulla oblongata.

The MEDULLA OBLONGATA is the transition stage between the spinal cord and the b., its diameter increasing as it ascends upwards. The anterior and posterior median fissures of the spinal cord are continued up the middle of the front and back of the medulla respectively, and longitudinal furrows divide the anterior surface of the medulla into three distinct areas on each side of the median fissure, from within outwards—the *pyramid*, the *olive*, a bulging eminence, and the *restiform body*. Similarly, the posterior surface is divided, from within outwards, into the *funiculus gracilis* expanding into the *clava*, the *funiculus cuneatus* expanding into the *cuneate tubercle*, and the narrow *funiculus of Rolando* expanding into the prominent *Rolandic tubercle*. The central canal of the spinal cord is continued up the lower part of the medulla, and opens into fourth ventricle of the b. upon the back of the upper part of the medulla, which constitutes the lowest part of the floor of the ventricle. The medulla is composed of nerve fibres connecting the b. and the spinal cord, forming the white matter, and also irregular small masses of nerve cells, forming the grey matter scattered irregularly through the white matter.

Weight of the Brain.—The average weight (which has no bearing upon the intelligence) of the human male b. is between 48 and 49 oz., the female b. being lighter, but only in proportion to the lighter weight of the female body.

Physiology of the Brain.—The functions of the *cerebrum* are connected with the higher faculties, the will, the intelligence, the senses, the control of movements of the body, while the cerebrum has also a controlling influence on the functions of the other parts of the b. and of the nervous system generally. It has been shown by experiment that different parts of the cerebrum have different functions, but the precise functions of the greater portion of the b. have yet to be discovered. The frontal lobes are the seat of the intellectual faculties, the occipital lobes are the centres of the sense of sight, the temporal lobes, immediately below the fissure of Sylvius, of the sense of hearing, and, on their internal surface, of the senses of taste and smell. The centre controlling speech is on the left inferior frontal convolution, *Broca's convolution*, while the postcentral convolution, immediately behind the fissure of Rolando, is associated with muscular sense. The area of the cerebral cortex controlling the movements of the different parts of the body has been mapped out with singular exactness, and occupies the præcentral convolution immediately in front of the fissure of Rolando, the area on the one side of the brain controlling the opposite side of the body. The area controlling movements of the leg is at the upper end of the præcentral convolution, then comes the trunk area, the arm area lower, but still above the middle of the convolution, then the neck area, the face area lower still, and the tongue area lowest. Farther in front of the middle of the convolution is the area controlling the eyes and head.

The functions of the *cerebellum* are associated with the co-ordination of movements, while it gives force and tone to the general nervous system, qualities which have been found to disappear when it is removed. In the *pons Varolii* and *medulla oblongata* are centres governing the respirations, the beating of the heart, swallowing, vomiting, and other important physiological processes.

Pathology of Brain.—*Meningitis* (q.v.), or inflammation of the membranes, may be due to infection from a wound, or to a specific organism (cerebro spinal m., tuberculosis, syphilis).—*Brain Fever*, popular term applied either to nervous prostration after severe mental effort or strain (treated by rest, change of air, and tonics), or to meningitis (*q.v.*).—*Concussion* and *Compression* of b. The former is a condition due to shock to the b. through injury, without any actual effect on the b. tissue. The individual is collapsed, with feeble pulse. There is often vomiting on consciousness beginning to return. The treatment is absolute rest, without any stimulant. In compression the symptoms are due to increase in intra-cranial pressure due to hæmorrhage, inflammatory products, or tumours, etc. Irritation and restlessness are the first signs, then paralytic symptoms and unconsciousness gradually come on. Operative treatment is desirable.

Abscess of b. is always due to bacterial infection, usually from disease of the internal ear. The symptoms are pain, fever, and usually unconsciousness; and the treatment is to open the abscess as soon as possible, let out the inflammatory material, and drain.—In *Anæmia of b.*, due to exhausting diseases, or to loss of blood from wounds, etc., the head should be kept low, and the individual treated for anæmia (*q.v.*) as in other cases.—*Tumours* vary greatly in structure, and their symptoms vary also, depending on the situation of the tumour. Some, *e.g.* syphilitic gummata, may be treated medically, others by operation, but in the majority the outlook for the patient is bad.

See, in regard to anatomy and physiology, EAR, EYE, HYPNOTISM, MUSCLE, NERVOUS SYSTEM, SLEEP, SMELL, SPINAL CORD, TASTE, TOUCH, VISION; and, in regard to pathology, APHASIA, APOPLEXY, EPILEPSY, HYDROCEPHALUS, INSANITY.

BRAIN CORAL, massive coral with convolutions resembling brains; chiefly in West Ind. Ocean.

BRAINE-LE-COMTE (50° 37′ N., 4° 7′ E.), town, Belgium. Pop. 8913.

BRAINERD (46° 26′ N., 94° 8′ W.), city, Minnesota, U.S.A.; sawmills. Pop. (1910) 8526.

BRAINERD, DAVID (1718–47), Amer. missionary to N. Amer. Indians; *Journal* much read.

BRAINTREE (42° 14′ N., 71° W.), town, Massachusetts, U.S.A.; shoe factories. Pop. (1910) 8066.

BRAINTREE (51° 53′ N., 0° 33′ E.), market town, Essex, England; silk, crape. Pop. (1911) 6168.

BRAISING, see COOKERY.

BRAKE (53° 22′ N., 8° 25′ E.), town, on Weser, grand-duchy of Oldenburg, Germany; shipbuilding. Pop. 5200.

BRAKE, instrument to check the velocity of moving body, or to bring it to rest, by increasing the resistance to its motion. Two of the simplest forms of b. action are the pressing of a metal shoe against the rim of a moving wheel, and the tightening of a strap on a revolving drum. On slow-moving road-vehicles the wheels may be prevented from rotating by fixing skids beneath them, or by passing through the spokes a chain fastened to the vehicle. The resistance of fluids is sometimes used for braking purposes, as when revolving blades are checked by the resistance of the air or of some liquid in which they are arranged to work.

B's may be applied by muscular force acting through a lever or screw, as in the case of most road vehicles; but the power thus obtained is insufficient for many purposes, and the power-b. becomes necessary. Amongst the many different types of power-brakes may be mentioned *mechanical* b's, worked by springs or chains wound on drums; *hydraulic* b's, in which the power obtained by forcing water through pipes is transmitted by suitable mechanism to the brake-shoes; *electric* b's; *compressed air* and *vacuum* b's; and b's worked by steam or water from an engine boiler, operating through cylinders.

BRAKELOND, JOCELYN DE, Eng. monk; wrote chronicle of monastery of Bury St. Edmunds, 1173–1202.

BRAMAH, JOSEPH (1749–1814), Eng. mechanician; invented hydrostatic press, safety locks, etc.

BRAMANTE, DONATO (1444–1514), Ital. architect; was patronised by Popes Alexander VI. and Julius II.; joined the Belvedere Palace to the Vatican, and was commissioned to rebuild St. Peter's, which, begun in 1506, was completed after his death by Michelangelo and others.

BRAMBANAN, PARAMBANAN (7° 28′ S., 110° 51′ E.), locality of Surakarta, Java; remains of many ancient temples.

BRAMBLE, see BLACKBERRY.

BRAMBLING, see FINCH FAMILY.

BRAMHALL, JOHN (1594–1663), abp. of Armagh (1660); as bp. of Derry carried Laud's Arminianism into Ulster; impeached with Strafford; called 'the Athanasius of Ireland.'

BRAMPTON (54° 56′ N., 2° 48′ W.), market town, Cumberland, England; cotton, tweeds.

BRAMPTON, HENRY HAWKINS, BARON (1819–1907), Eng. judge; b. Hitchin; called to Bar (1843); raised to Bench (1876); retired, 1898.

BRAMWELL, BYROM (1847–), celebrated physician; pres., Royal College of Physicians, Edin.; author of numerous medical works.

BRAMWELL OF HEVER, BARON, GEORGE WILLIAM WILSHERE BRAMWELL (1808–92), Eng. judge; joint author of Common Law Procedure Act, 1852, abolishing special pleading, and Companies Act, 1862.

BRAN.—(1) mythical Celtic hero; (2) dog of Ossian's Fingal.

BRANCO, PARIMA (1° 20′ S., 62° W.), river, N. Brazil, joins Rio Negro.

BRAND, see BRANDING.

BRAND, SIR JOHN HENRY (1823–88), pres. of Orange Free State, 1863 and 1869–84.

BRANDAN, ST., BRENDAN (d. 578), Irish Benedictine abbot of the monastery of Clonfert (Galway). The real B. became confused with a legendary hero who sailed to an island paradise in the neighbourhood of the Canaries or the West Indies. The existence of 'St. Brandan's Isle' was long believed in by geographers, and numerous expeditions were undertaken in search of it.

BRANDE, WILLIAM THOMAS (1788–1866), Eng. scientist; wrote on chem. and med.

BRANDENBURG, Ger. margraviate and electorate, nucleus of later kingdom of Prussia. Brennibor (later Brandenburg) was captured by Henry I. of Germany (923); mark of East Saxony divided, northern portion becoming later margraviate of Brandenburg (965); Albert the Bear was made margrave of north mark (1134), and on death of Duke of B. (1140) took title of Margrave of B.; a coloniser and civiliser; territory extended under the three Ottos (1130–67); ruled by imperial house of Wittelsbach directly or indirectly, 1323 onwards; Louis IV. granted margraviate to his s. Louis (1323), who after a reign of anarchy enfeoffed his step-brothers, of whom Louis was recognised as one of seven electors by Golden Bull, 1356. They bequeathed the remainder of the margraviate to Wenceslaus, s. of Charles IV., who (1373–78) ruled in his name, restoring law and order, and causing Doomsday survey to be made; Wenceslaus (1410) granted electoral vote to Frederick VI. of HOHENZOLLERN, who was made gov. (1411), and in 1415 purchased the electorate, margraviate, and office of chamberlain, ever since held by his house. The later history of his house is that of the rise of Prussia.

Frederick I. (1415–40) put down nobles; Frederick II. (1440–71), called 'Iron,' reduced rebellious towns and purchased new mark of B.; Albert Achilles (1471–86) extended territory, and entailed (1473) margraviate and electorate; Joachim I. (1499–1535) restored law and order and encouraged trade; Joachim II. (1535–71) suppressed monasteries, established national Church, obtained (1569) half duchy of Prussia and remainder of other half; John George (1571–98), careful administrator, Lutheran; John Sigismund (1608–19) started claim to Cleves, Jülich, and Berg, and became (1618) Duke of Prussia; George William (1619–40) brought disaster on B. through slothful policy in Thirty Years War; Frederick William, the 'Great Elector,' put down nobles, built wonderful army, started navy, expelled Swedes, extended territory, and became leader of Reformation; Frederick III. continued his f.'s policy, and in 1701 was crowned King of Prussia. See PRUSSIA.

BRANDENBURG (50° 20′ N., 13° 30′ E.), central province of Prussia; contains government districts Potsdam and Frankfort-on-Oder; area, 15,380 sq. miles. Pop. (1910) 4,092,616.

BRANDENBURG (52° 26′ N., 12° 32′ E.), town, Prussia; capital of B. province, on Havel; formerly bp.'s seat; castle; cathedral; woollens, silks. Pop. (1910) 53,595.

BRANDES, GEORG MORRIS COHEN (1842–), Dan. literary critic; established a European reputation by brilliant critical writings, including studies of Shakespeare, Ibsen, Anatole France, and other authors. An earlier work of high merit is *Main Streams in the Literature of the Nineteenth Century* (1872–75).

BRANDING (O. Teut. *brinnan*, to burn), legal punishment used in England chiefly for vagrants; abolished, except for deserting soldiers (1829), and in 1879 entirely. Method of scorching signs into animal's flesh for purposes of identification.

BRANDIS, CHRISTIAN AUGUST (1790–1867), Ger. philologist; prof. of Philosophy at Bonn (1821); author of several authoritative philological and philosophical works.

BRANDL, ALOIS LEONHARD (1855–), Austrian English scholar; prof. at Berlin.

BRANDON (49° 50′ N., 99° 58′ W.), city, port of entry, Manitoba, Canada; agriculture; grist-mills, sawmills. Pop. (1911) 13,839.

BRANDON (52° 27′ N., 0° 37′ E.), market town, on Little Ouse, Suffolk, England; flint.

BRANDY (Old Eng. *brandywine*; Ger. *Branntwein*, *i.e.* burnt wine), a spirituous liquor; average percentage of alcohol, 54; S.G. ·93; prepared by distillation of wine; the best at *Cognac*; exported also from California, Spain, and Canada. Pure b. is colourless; pale b. deriving its colour from cask, brown b. from

caramel; flavour and aroma due to various ethers: furfurol, œnanthic, butyric, and acetic; often made by adding these to alcohol and water; recently legally defined as genuine only if distilled from grape wines by pot still.

BRANDYWINE (39° 43′ N., 75° 37′ W.), stream, Pennsylvania and Delaware, U.S.A.; Lord Howe defeated Washington, Sep. 11, 1777.

BRANFORD (41° 17′ N., 72° 50′ W.), watering-place, Connecticut, U.S.A.; on Long Island Sound, mouth of B. River; locks, iron. Pop. (1910) 6047.

BRANGWYN, FRANK (1867–), Eng. artist; b. Bruges; worked in the studio of William Morris; went to sea as a youth, and afterwards travelled in the East; noted for his breadth of style and sumptuous sense of colour; A.R.A., 1904.

BRANKS, punishment for scolds—from a head-piece which rested on the shoulders, an iron bar projected and held down the tongue.

BRANT (*Branta bernicea*), species of wild duck found in Europe and America; breeds in Arctic regions.

BRANT, JOSEPH (1742–1807), Mohawk chief, friendly to England.

BRANT, SEBASTIAN (1457–1521), Ger. satirist; famed as the author of *Das Narrenschiff* (1494), in which he lashed vices of his time. Barclay's *Ship of Fools* (1509) is one of several imitations of the poem.

BRANTFORD (43° 12′ N., 80° 17′ W.), city, port of entry, Ontario, Canada; machinery. Pop. (1911) 23,132.

BRANTINGHAM, THOMAS DE (d. 1394), lord treasurer of England, 1369–71, 1377–81, 1389; bp. of Exeter, 1370.

BRANTÔME (45° 25′ N., 0° 37′ E.), town, Dordogne, France; ruined abbey.

BRANTÔME, PIERRE DE BOURDEILLE, SEIGNEUR AND ABBÉ DE (*c.* 1540–1614), Fr. historian, soldier, and courtier. His *Mémoires* give a valuable picture of profligacy of contemporary society.

BRANXTON, Brankston (55° 38′ N., 2° 10′ W.), village, Northumberland, England; near *Flodden*.

BRAS D'OR (45° 50′ N., 6° 50′ W.), tideless gulf, Cape Breton Island; communicating with Atlantic by ship canal.

BRASH, disease due to disordered stomach and bowels, accompanied by acidity of mouth; frequently infantile.

BRASIDAS, Spartan soldier and orator; came to forefront during Peloponnesian War; relieved Methone (431 B.C.); prevented Athenian attack on Megara; won over Acanthus, Stagirus, and other Athenian allies; routed Athenians before Amphipolis, but was himself killed in the battle (422).

BRASS (4° 28′ N., 6° 38′ E.), town, district, and river, Southern Nigeria, Brit. W. Africa; trading centre.

BRASS, alloy of copper and zinc (3 parts copper to 1 or 2 zinc), prepared by fusing the metals in clay crucibles; yellow, very tenacious, ductile, malleable, rendered harder by slight (2 to 4%) admixture of iron.

BRASSES, MONUMENTAL, in England, date from the beginning of the XIII. cent., though the earliest now extant is one in the church at Stoke Dabernon, Surrey, dated 1277. They consist of plates of brass inlaid in slabs of polished stone, and usually contain a representation of the person they are intended to commemorate, either in the form of the plate itself, or incised in the plate, together with the coat of arms and an inscription. They are valuable for the light they throw upon the people of the period, their dress, and armour, etc. The finest specimens are found amongst those engraved before the XV. cent. The art, of late years, has been successfully revived.

Bontell's *Monumental Brasses of England* (1849); Macklin's *The Brasses of England* (1907).

BRASSEUR DE BOURBOURG, CHARLES ÉTIENNE (1814–74), Belg. ethnographer; authority on Mexican antiquities.

BRASSEY, THOMAS (1805–70), Eng. surveyor and railway contractor; constructed part of Grand Junction Railway (1835), and with a partner, railway from Paris to Rouen (1840); also constructed Canadian Grand Trunk Railway and railways in Italy, Spain, Holland, Prussia; employed enormous number of workers, and was a genius in his calling.

BRASSEY, THOMAS, LORD (1836–), Eng. naval expert; gov. of Victoria (1895–1900); cr. baron, 1886.

BRASSO, see Kronstadt.

BRATHWAITE, RICHARD (1588–1673), Eng. poet; author of *Barnabee's Journall* (1638), a humorous itinerary valuable for its topographical information; other works include *The Poet's Willow* (1614), *The Prodigal's Tears*.

BRATIANU, ION (1821–91), Rumanian statesman; leader in Rumanian revolt, 1848; secured deposition of Cuza, 1866; minister, 1866–70, 1876–88.

BRATTLEBORO (42° 48′ N., 72° 34′ W.), town, Vermont, U.S.A.; organs. Pop. (1910) 7541.

BRAUN, AUGUST EMIL (1809–56), Ger. antiquary; wrote on Gk. and Rom. mythology.

BRAUNAU (50° 35′ N., 16° 15′ E.), town, Bohemia, Austria; Benedictine abbey; cloth. Pop. 3800.

BRAUNSBERG (54° 23′ N., 19° 50′ E.), town, on Passarge, Prussia. Pop. 13,000.

BRAWLING.—By the Brawling Act (1860) it is provided that proceedings may be taken against any person committing violent or indecent behaviour in any place of worship or burial-ground. The penalty is £5 or two months' imprisonment. Such person may be arrested either by a constable or churchwarden. A clergyman is guilty of b. if he uses violent language in the pulpit, or if he preaches against individual members of his congregation, and is liable to punishment in the ecclesiastical, but not the civil, courts.

BRAY (53° 12′ N., 6° 5′ W.), seaport, Wicklow, Ireland; the 'Irish Brighton.' Pop. 7400.

BRAY (51° 31′ N., 0° 42′ W.), village, Berkshire, England; Simon Aleyn, Vicar of B. (1540–88), retained living during reigns Henry VIII., Edward VI., Mary, and Elizabeth by changing principles; famous song assigns him to reigns Charles II. to George I.

BRAY, SIR REGINALD (d. 1503), Eng. soldier, statesman, and architect of the chapels of St. George, Windsor, and of Henry VII. in Westminster Abbey.

BRAY, THOMAS (1656–1730), Eng. clergyman who helped to found S.P.C.K. (1698) and S.P.G. (1701).

BRAZIL (4° 30′ N. to 34° S., 35° to 73° W.), republic, occupying nearly half the South American continent; extreme length, *c.* 2600 miles; breadth, *c.* 2700 miles; area, *c.* 3,220,000 sq. miles. B. is bounded N. by Colombia, Venezuela, Brit., Dutch, and Fr. Guiana; N.E. by N. Atlantic, S.E. by S. Atlantic; S.W. by Uruguay, Argentina, Paraguay, Bolivia; W. by Peru, Ecuador, Colombia; N.W. occupied by basin of Amazon and tributaries; S.W. is in Paraguay basin; both these areas have large amount of unhealthy, low-lying, and swampy land; E. and S.E. occupied by great plateau, average elevation over 1500 ft., and by higher tableland cut up by deep valleys having appearance of series of mountain ranges, some reaching height of over 7000 ft.; these, running parallel with Atlantic, render communication with interior very difficult; large part of country still unexplored. Chief tributaries of Amazon are Japura, Rio Negro from N., Jurua, Purus, Madeira, Tapajos, Xingu from S., Tocantyns. Araguaya flows northward, entering sea near mouths of Amazon, and San Francisco R. cuts across eastern ranges, entering sea between Maceio and Aracaju; Paraguay, Taquary, and Parana drain S.; Madeira and rivers east of it, and Parana and tributaries flow through tableland and hills, and have many falls and rapids. Chief mountains are Mar, Orgãos, Espinhaço, Mantiquiera, Geral, Vertentis, Pyreneos, Santa Martha, and Piauhy ranges in eastern coastal and central districts. Chief towns are Rio Janeiro (temporary capital), Bahia, Pernambuco. Permanent Federal capital is still to be built in Central

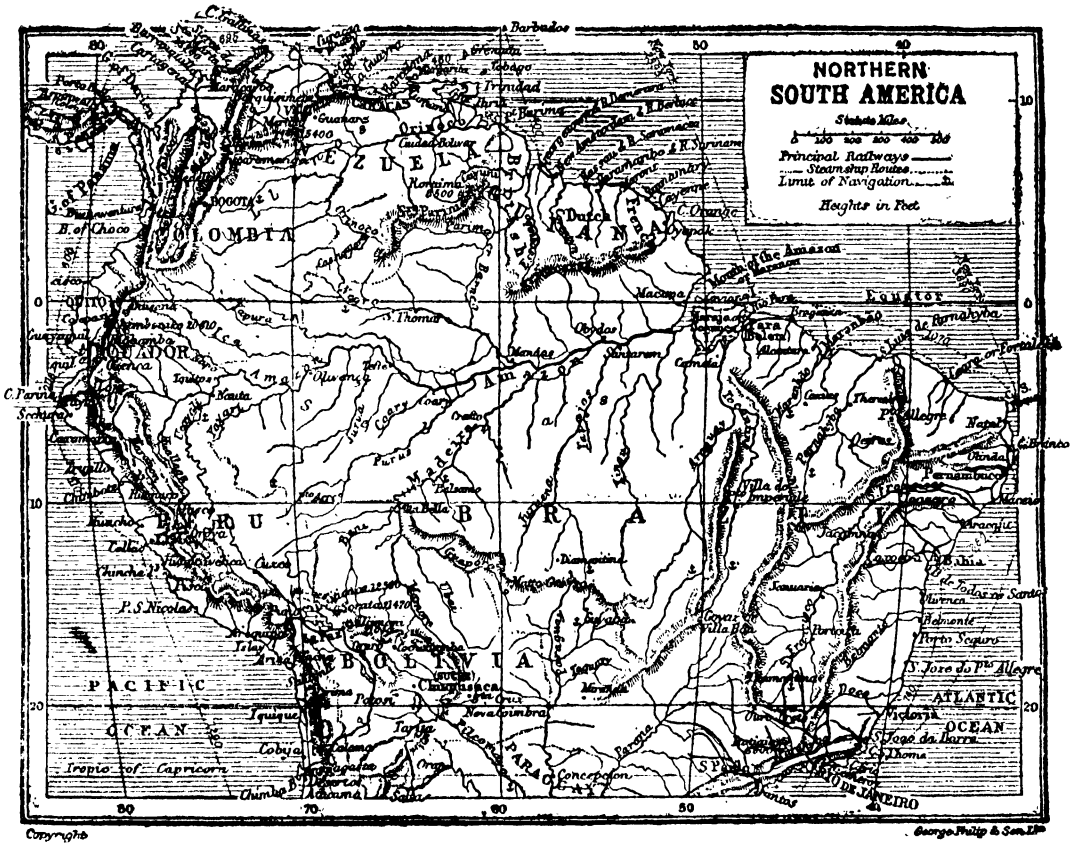
Brazil. Climate varies greatly; mean temperature ranges between 63° and 79° Fahr.; rainfall between 50 and 90 inches.

Flora includes palms, mimosa, bombax, lianas, grasses, ferns, cypresses, acacias, myrtles, coffee, tobacco, and many valuable trees and plants. Fauna includes many kinds of birds and snakes, monkeys, deer, bats, opossums, jaguars, rodents, etc.

History.—B. has oldest civilisation in W. hemisphere; first sighted by Span. comrade of Columbus, named Pinzon, who explored mouths of Amazon in 1500; later in same year Portug. navigator Cabral reached coast of B. and took formal possession of country in name of king of Portugal. Portuguese established fort at Pernambuco, c. 1526, which soon afterwards was sacked both by French and by an Eng. adventurer, Hawkins. In 1530 first systematic attempt at settlement was made, João III. of Portugal sending Affonso de Sousa to divide country into 'capitaneas' or portions of land which were granted to such Portug. subjects as undertook to develop them and subdue aborigines. Affonso was aided by Caramuru, whom he found already settled here, in founding town of Bahia. The result of capitanea system was that number of abuses crept in, Portug. colonists ill-treating natives and thus causing revolts and race-hatreds; Portug. government therefore sent Thomé de Sousa in 1549 to act as gov.-gen.; he was accompanied by 4000 settlers and six Jesuits; latter had great share in developing civilisation in B.; former intermarried with Ind. women, thus creating Brazilian nation, which in about fifty years was practically a European race.

In 1578 gov. had to swear allegiance to Philip II. of Spain, who had annexed Portugal in that year; from this time various attacks and invasions were made by French, Dutch, and English. Santos was twice sacked, 1583, 1591; Pernambuco taken by French and English, 1595; Dutch repulsed from Bahia, 1599, 1604; Bahia taken by Dutch, 1621; compelled to withdraw, 1625; but in 1629 they reduced great part of coast of B., and established their government, of which Maurice of Nassau became pres. in 1637. With restoration of Portug. independence in 1640, connection of B. with Spain ended. Dutch were compelled to leave country by Portuguese after many years of war, and in 1713 treaty was made with French, who also retired, English, French, and Dutch henceforth holding the Guianas, and leaving B. to Portuguese. Principal event of later XVIII. cent. was expulsion of Jesuits in 1760; their influence, at first beneficial, had declined, and many of them suffered ill-treatment when expelled. In 1763 Rio became seat of government. Following cent. saw great changes in history of B. In 1807 Napoleon's invasion of Portugal resulted in flight of royal family to B.; the regent, Don João, was welcomed with enthusiasm, and great advances took place in civilisation. In 1813 country was declared a kingdom, and in 1816 Don João succeeded his mother, Queen Maria, as João VI. of 'Portugal, Brazil, and Algarves.' He, however, returned to Portugal in 1821, leaving administration of B. to his son, Don Pedro. This was followed by formal separation of B. from Portugal.

Don Pedro, ordered to return to Portugal, refused to do so, and in 1822 he became first emperor of B. and granted constitution; independence recognised by Portugal in 1825; northern provinces, having rebelled, were subdued with assistance of Lord Cochrane; and soon afterwards war broke out with Uruguay, ending in 1828 in establishment of that state as independent republic. Pedro I.'s administration was marked by political agitations which culminated in 1831 in revolt; he then abdicated and left for Europe, country being under regents during his son Pedro II.'s minority, which ended in 1840. Pedro II.'s reign



was marked by civil war and wars against Argentina, Uruguay, Paraguay; his dau. Isabel thrice acted as regent, one of her principal acts being the abolition of slavery, 1888. Next year it was rumoured that Pedro II. meant to abdicate in her favour, whereupon a bloodless revolution was effected, and a republic proclaimed; the imperial family left for Lisbon, and Marshal Fonseca became first dictator and afterwards pres. of new republic. B. was now a federation of twenty states; administration of first two presidents marked by violence and disorder, various controversies and revolts occurring; second pres., Marshal Peixoto, retired in 1894, succ. by Moraes, the first civilian pres.; he introduced financial reforms and suppressed several insurrections, and on retiring was succeeded by Campos Salles, who, like his successor, Dr. Alves, played considerable part in financial development of B. Sixth pres., Affonso Penna, introduced extensive system of irrigation and established Caisse de Conversion; his successor in 1909 was Dr. Peçanha; but when election took place Hermes da Fonseca, war minister, was chosen as pres.

Government.—Republic of B. consists of federal district and 20 federated states; pres., who with vice-pres. and ministers of state forms executive, is elected by direct vote, holds office four years; legislative power lies with Congress, composed of Chamber of Deputies and Senate; former has 212 members elected for three years, and latter 63 members elected for nine years. The states are Amazonas, Para, Maranhão, Piauhý, Ceará, Rio Grande do Norte, Parahyba, Pernambuco, Alagôs, Sergipe, Bahia, Espirito Santo, Rio de Janeiro, Sao Paolo, Paraná, Santa Catharina, Rio Grande do Sul, Matto Grasso, Goyaz, Minas Geraes. Each state has its own local government, which must be republican in form, keeps up its own administration and uses most of its own revenues for its own benefit; while the federal government keeps up the army and navy, superintends the general administration of the states, and is charged with the direction of the home and foreign policy of the republic. There is no state religion; education is not obligatory. Military service is nominally compulsory.

Resources.—Timber and other vegetation of great tropical forests along Amazon and elsewhere are most valuable, including caoutchouc, fibre-plants, nuts, furniture woods, dye woods, drug plants. Cultivated products include coffee, sugar-cane, tobacco, cotton, maté, rubber, cassava, cinchona, cocoa, vines. In S. inland provinces are raised great herds of cattle. Minerals are abundant but undeveloped, except gold; in S. are beds of coal, lignite, bituminous schist, peat; silver, lead, iron, copper, manganese, quicksilver also occur; diamonds are found in Minas Geraes, Bahia, São Paulo, Matto Grasso; other deposits are saltpetre, rock-salt, mineral oil, china clay.

B. is largely agricultural, with only small proportion cultivated at present, but there are some industries, including cotton spinning and weaving, woollen manufactures, silk weaving, flour mills, fruit preserving, distilling, brewing; imports food-stuffs, coal, coke, cottons, machinery, woollens, chemical products, metals, furniture, leather goods, books, etc.; exports coffee, rubber, tobacco, sugar, cocoa, maté, gold, hides, cotton. Railway mileage (in 1913 c. 14,000) is in process of extension; telegraphic communications are controlled by state, and wireless stations are being established.

Inhabitants of B. include Italians, Portuguese, Spanish, Germans, English, Indians, Africans, half-breeds. Pop. (1910) estimated at between 21 and 22 millions.

P. Denis, *Brazil* (1911); C. W. Domville-Fife, *United States of Brazil* (1910); *Brazilian Yearbook*.

BRAZIL (39° 32′ N., 87° 8′ W.), town, Indiana, U.S.A.; block-coal mines. Pop. (1910) 9340.

BRAZING AND SOLDERING, processes for uniting metallic surfaces by fusing between them other metallic substances called solders. In Brazing (or *hard* soldering), *spelter*, a kind of brass, is employed, the surfaces being cleaned and heated, and fusion assisted by borax. In *soft* soldering (*e.g.* tin ware), fusion is effected by a heated copper wedge.

BRAZOS (30° 50′ N., 96° 34′ W.), river, Texas; enters Gulf of Mexico.

BRAZZA (43° 19′ N., 16° 40′ E.), largest of Dalmatian islands; olives, figs; area, 152 sq. miles. Pop. 25,000.

BRAZZA, PIERRE PAUL FRANCOIS CAMILLE SAVORGNAN, COUNT DE (1852–1905), Fr. explorer and colonial commissioner; persuaded France to take part in Congo enterprise; put at head of Fr. Congo expedition, 1880–82; commissioner-general of Fr. Congo, 1886.

BRAZZAVILLE (4° 30′ S., 15° 20′ E.), town, Fr. Equatorial Africa. Pop. *c.* 5000.

BREACH *of trust* is failure to fulfil moral and sometimes legal obligation; *b. of promise* to marry is actionable as b. of contract; *b. of the peace* (*i.e.* the public peace) is actionable; *b. of arrest*, offence of military officer under arrest in going beyond bounds assigned him.

BREACHING TOWER, movable structure which gave protection to besiegers in Rom. and mediæval warfare; on wheels; several storeys.

BREAD is baked dough, which is essentially a mixture of flour and water, with a little salt, generally 'aerated' and so 'raised' by means of carbon dioxide gas. *Unleavened* b. and biscuits are made without aeration. The aeration and raising of dough may be carried out with or without fermentation by yeast.

Fermentation processes of bread-making are very old. Leaven is dough remaining from a previous batch. Yeast for bread-making may be brewers' or compressed (German) yeast, from distilleries, or it may be cultivated by the baker; it should contain only the organism *Saccharomyces cerevisiæ*. Dough must be thoroughly kneaded—often by special machinery—to distribute the yeast [illegible] and then kept at about 80° F. for some hours, while glucose, derived from the starch of the flour, is fermented to carbon dioxide and alcohol (see under Brewing). The carbon dioxide aerates the dough, making it rise, and most of the alcohol is dissipated in the subsequent baking. B. is baked at about 390° F., and loses 15 to 20 % in weight. The production of crust is due to conversion of starch into caramel and dextrin, which are more soluble and digestible than starch. Hence dry toast is more digestible than crumb b. The interior of the loaf is not heated much above 212° F.; nevertheless the digestibility of the starch is increased. The size and stability of a loaf is connected with the quality of the gluten of the flour.

Non-fermentation processes. — *Muffins* are aerated by beating flour and water vigorously to entrap air; and *sponge-cakes* owe their lightness to eggs beaten to a froth. In other processes aeration depends on carbon dioxide introduced or generated in the following ways: (1) Flour, salt, and water are mixed in an iron vessel, and impregnated with carbon dioxide under pressure. The baked product is 'aerated bread.' (2) Carbon dioxide is liberated from sodium bicarbonate mixed with the dough by the lactic acid of sour milk. (3) Baking powders are employed, which contain sodium bicarbonate mixed with dry cream of tartar, tartaric acid, etc., and rice flour, so that carbon dioxide is liberated on adding water. (4) Ammonium carbonate is mixed with the dough, and is completely volatilised in the oven, yielding ammonia, carbon dioxide, and water vapour. White b. is made from wheat flour only; whole-meal b. from the entire wheat berry, from which, however, some of the outside husk or bran may have been removed before [illegible]. The superior dietetic value of the latter is doubtful, for although bran is rich in nitrogenous substances and phosphates, its cellulose is not digestible, and may be irritable.

The following is the approximate composition of white b.: water, 38·5 %; carbo-hydrates (chiefly starch),

52·4 %; cellulose, 0·3 %; proteins (nitrogenous), 7·2 %; fats, 0·6 %; salts, 0·8 %; acidity, 0·2 %.

Vienna Bread is made of very white flour leavened with compressed yeast, mixed with certain quantity of milk, and having glazed crust. For **Standard B.**, see FLOUR.

BREADALBANE (56° 30′ N., 4° 15′ W.), district, N.W. Perthshire, Scotland; mountains and lochs.

BREADALBANE, JOHN CAMPBELL, 1ST EARL OF (c. 1636–1717), Scot. statesman; obtained oath of allegiance to William III. and Mary from Highlanders, and caused 'Massacre of Glencoe'; considered astute and unprincipled.

BREADALBANE, JOHN CAMPBELL, 2ND EARL OF (1662–1752), of social notoriety; known as 'Old Rag.'

BREADALBANE, JOHN, 3RD EARL OF (c. 1696–1782), diplomatist.

BREAD-FRUIT, fruit of *Artocarpus incisa*, tree growing in East Indies and Pacific islands; in size and shape like melon, contains white nutritious juice; cut in slices and roasted for food. Another species, *A. integrifolia*, furnishes the Jack-fruit, eaten, also its roasted seeds, in Ceylon and S. India.

BREAKSPEAR, NICHOLAS (d. 1159), probable name of ADRIAN IV., only Eng. pope; b. St. Albans; became abbot of house of St. Rufus, near Valence; as strict disciplinarian, made cardinal of Albano, 1146; after embassy to Norway, acclaimed as 'Apostle of the North'; became pope, 1146; a wonderful orator, gentle, but of inflexible purpose; won notable victories over Ghibellines; quarrelled with Emperor Frederick Barbarossa. Adrian's grant of Ireland to Henry II. has been matter of heated debate, and the bull *Laudabiliter* is now considered spurious.

Round, *The Pope and the Conquest of Ireland.*

BREAKWATER, a barrier built to shelter a harbour or roadstead from the violence of the waves, thus providing safe anchorage for ships. B's may be in the form of piers having one end connected with the land, or they may be placed across the entrance to a bay and completely isolated. They must be of the strongest possible construction in order to withstand the pressure of the waves, which has been known to attain a force equivalent to 3½ tons per sq. foot, as registered by the dynamometer. Huge blocks of masonry have been literally quarried out of the faces of breakwaters, and masses of concrete weighing 2000 tons have been moved from their foundations. The foundation of a b. usually consists of a mound of rough stones, or rubble. The superstructure may consist of a masonry wall built of comparatively small blocks and faced with granite, or it may be formed of huge concrete blocks weighing 50 or more tons.

One great drawback to a wall of small blocks is that during its construction the unfinished end is very liable to be shattered by storms. The concrete now in general use consists of a mixture of Portland cement and broken stone and sand. The blocks are made by pouring the mixture into boxes with movable sides, the sides being removed when the concrete sets. The blocks are laid in position by steam cranes, the largest of which are capable of laying 50-ton blocks anywhere within a radius of 100 feet. The blocks are brought to the required position in barges, and as they are lowered by the crane are accurately adjusted by divers. In the Detached Mole at Gibraltar a steel caisson was sunk on the rubble foundation and filled with about 9000 tons of concrete, the breakwater being completed with concrete blocks. The foundation of a b. may also be formed of large bags of liquid concrete, which rapidly hardens under water. Blocks are sometimes formed on the spot where they are to remain by depositing the concrete liquid in cases. Additional blocks may be deposited round the foot of a b., forming what is called the 'apron.'

BRÉAL, MICHEL JULES ALFRED (1832–), Fr. philologist; an authority upon educational subjects; pub. *Hercule et Cacus* (1863), *Dictionnaire étymologique latin* (1885), *Grammaire latine* (1890).

BREAM, see under CARPS.

BREATHING, see RESPIRATORY SYSTEM.

BREAUTÉ, FALKES DE (d. 1226), foreign mercenary enriched in England by King John.

BRECCIA, rock composed of angular fragments united by matrix or cement. Cliff débris is sometimes consolidated into b.; also the angular fragments shot out from volcanoes.

BRECHIN (56° 44′ N., 2° 39′ W.), town, Forfarshire, Scotland; seat of bp.; part of XII. cent. cathedral now used as parish church; town and castle burned by Montrose, 1645; manufactures linen, sailcloth, paper. Pop. (1911) 8439.

BRECKINRIDGE, JOHN CABELL (1821–75), Amer. pro-slavery statesman; commander in Confederate service in Civil War; finally Sec. of War for Confederate States.

BRECON, BRECKNOCK (51° 57′ N., 3° 23′ W.), county town, B.-shire, Wales; manufactures flannels, coarse woollens, hats; connected with Bristol Channel by B. and Abergavenny Canal, *via* Monmouthshire Canal; chief public buildings, Shire Hall, Guildhall; several interesting old churches; was site of Brit. and Rom. camps; formerly fortified. Pop. (1911) 5908.

BRECONSHIRE, BRECKNOCKSHIRE (52° N., 3° 30′ W.), inland county, S. Wales; bounded by Radnor, Hereford, Monmouth, Glamorgan, Carmarthen, Cardigan; county town, Brecknock; surface mountainous; highest peak, Pen-y-Fan; chief rivers, Wye, Usk; traversed by Brecon and Abergavenny Canal; has several lakes and mineral springs. B. was occupied by Romans, after whose departure it belonged to Welsh princes till late XI. cent.; traces of Roman camps and roads remain. B. produces wheat, oats, barley; dairy produce; cattle and sheep raised; manufactures include woollens, leather, iron goods; minerals include coal, iron, limestone; area, 742 sq. miles. Pop. (1911) 59,298.

BREDA (51° 36′ N., 4° 46′ W.), fortress town, North Brabant, Holland. Charles II. made B. his home during part of his exile, and here issued Declaration of B. before Restoration. The second Dutch War terminated with Treaty of B., 1667; frequently stormed; linen, carpets. Pop. (1911) 27,259.

BREDERODE, HENRY, COUNT OF (1531–68), Dutch opponent of Spain before Spain lost Netherlands.

BREDOW (53° 28′ N., 14° 37′ E.), northern suburb of Stettin, Germany; shipbuilding.

BREDOW, GOTTFRIED GABRIEL (1773–1814), Ger. prof. and historian.

BREED, a group of individuals, within a species, closely related by birth, belonging to the same stock; offspring. **Breeding**, the art of continuing a race by selecting parents of the same stock (in-breeding), or of creating new races or cross-breeds by selecting parents of different stocks (cross-breeding or crossing); the act of procreating; nurture; deportment.

BREEZE FLIES, see GAD FLIES.

BREGENZ (47° 28′ N., 9° 45′ E.), town, on Lake of Constance, Austria; ancient *Brigantium*. Pop. 7600.

BREHM, CHRISTIAN LUDWIG (1787–1864), Ger. ornithologist; f. of noted naturalist, **Alfred Edmund B.** (1829–84).

BREHON LAWS, the Eng. name given to the *Feineachas*, or ancient laws of Ireland. The various MSS. from which these are derived are all more or less imperfect, and their publication in six vol's, under the title of *The Ancient Laws of Ireland* (1865–1901), was the work of a royal commission including many distinguished scholars.

Ginnell's *Brehon Laws* (1894); Joyce's *Social History of Ancient Ireland* (1903).

BREISACH, ALTBREISACH (48° 3′ N., 7° 36′ E.), town, on Rhine, Baden, Germany; formerly important frontier stronghold; XIII.-cent. cathedral; trade in wines. Pop. 3600.

BREISGAU (48° N., 7° 40′ E.), district, Germany; ht bank of Rhine, including Freiburg and southern ack Forest.

BREITENFELD (51° 26′ N., 12° 22′ E.), village, Saxony; Swedish victories, 1631 and 1642.

BREITKOPF, noted family of Ger. printers and publishers; Leipzig firm founded, 1723.

BREMEN (53° 5′ N., 8° 49′ E.).—(1) free state, Germany, on Weser; includes city of B., Vegesack, and Bremerhaven; Republican government; sends representative to Bundesrat (Federal Council) and one to Reichstag; area, 99 sq. miles. Pop. (1910) 299,526. (2) city, second largest port of Ger. Empire; free port; imports (1911), £106,237,000; has fine docks; manufactures woollens, cottons, cigars, paper; breweries, distilleries, sugar refineries, jute- and oil-mills; trades largely with U.S.A.; imports tobacco, rice, cotton, indigo, wool, petroleum. Notable buildings are cathedral, town hall, church of St. Ansgarius, museum, observatory; famous wine-cellar below town hall. B. was an important member of Hanseatic League (*q.v.*); captured by French in 1810, but regained independence three years later. Pop. (1910) 247,437.

BREMER, FREDRIKA (1805–65), Swed. novelist; her earlier stories were of a simple, idyllic character, and were trans. into English by Mary Howitt; later she devoted her attention to the emancipation of women and to philanthropic work, and her subsequent novels were written with a view to the dissemination of her ideas.

BREMERHAVEN (53° 32′ N., 8° 34′ E.), seaport town, mouth of Weser, Germany; large docks; free port; shipbuilding; part of free state of Bremen (*q.v.*). Pop. (1910) 24,165.

BRENDAN, ST., see BRANDAN.

BRENHAM (30° 14′ N., 96° 20′ W.), city, Texas, U.S.A.; cotton mills. Pop. (1910) 4718.

BRENNAN, LOUIS (1852–), Irish engineer; invented remarkable torpedo and gyroscopic monorail transport system.

BRENNER PASS (47° 3′ N., 11° 37′ E.), Tirol; lowest pass (*c.* 4500 ft.) crossing main chain of Alps, connecting Germany and Italy; railway opened, 1867.

BRENNUS, name of two Celtic chieftains of Gaul, the first of whom burned Rome, 390 B.C.; the second invaded Greece, 280 B.C.

BRENT GOOSE, see DUCK FAMILY.

BRENTA (56° 26′ N., 12° 10′ E.), river, Italy; enters Adriatic.

BRENTANO, KLEMENS (1778–1842), Ger. poet and novelist; bro. of Goethe's friend, Bettina von Arnim; author of *Godwi*, a romance, *Ponce de Leon*, a drama, and numerous other novels and dramas; also of some charming short stories, which have been trans. into English.

BRENTANO, LUJO (1844–), Ger. political economist.

BRENTFORD (51° 29′ N., 0° 18′ W.), market town, Middlesex, England; scene of Dan. defeat, 1016; Royalist victory, 1642. Pop. (1911) 16,584.

BRENTON, SIR JAHLEEL (1770–1844), Brit. admiral and military and naval historian; present at battle of *St. Vincent*, etc.

BRENTWOOD (51° 37′ N., 0° 18′ E.), market town, Essex, England; breweries. Pop. (1911) 6923.

BRENZ, JOHANN (1499–1570), one of authors of Württemberg Confession and of widely used catechism.

BRÉQUIGNY, LOUIS GEORGES OUDARD FEUDRIX DE (1714–95), Fr. scholar; made a special study of Fr. history in Eng. archives.

BRESCIA.—(1) (45° 35′ N., 10° 15′ E.) province, N. Italy; area, 1800 sq. miles. Pop. (1911) 595,547. (2) (45° 33′ N., 10° 13′ E.) city, Lombardy, at foot of Alps; under Venice, XVI.–XVIII. cent's; captured by Austrians, 1849; joined Italy, 1859; ancient cathedral; iron goods; silks. Pop. (1911) 83,323.

BRESLAU (51° 6′ N., 17° 1′ E.), chief town of Pruss. Silesia, Germany, on Oder; centre of extensive manufacturing district; has important railway and water communication. Industries include manufacture of beet sugar, linens, woollens, cottons, silk, machinery, earthenware, distilling; large trade in cereals, wool, linen, coal, metals, timber, lumber, hemp, flax. B. has univ., R.C. cathedral, Jewish synagogue, some fine churches; town hall (XIV. cent.). Pop. (1910) 514,765.

BRESSAY (60° 8′ N., 1° 5′ W.), island, Shetland.

BRESSE (46° 24′ N., 5° 12′ E.), ancient district, Eastern France; annexed, 1601.

BRESSUIRE (46° 51′ N., 0° 30′ W.), town, Deux-Sèvres, France; agricultural centre. Pop. 5000.

BREST (48° 23′ N., 4° 27′ W.), fortified seaport, Finistère, France; leading naval station; large roadstead; fine military and commercial harbours; fortifications begun by Richelieu; Fr. fleet defeated by Lord Howe, June 1, 1794. Pop. (1911) 91,540.

BREST-LITOVSK (52° 15′ N., 23° 42′ E.), fortified town, on Bug, Russia; extensive cloth trade. Pop. (1910) 54,030.

BRETAGNE, see BRITTANY.

BRETEUIL, LOUIS CHARLES AUGUSTE LE TONNELIER, BARON DE (1730–1807), Fr. diplomatist; successor of Necker.

BRETIGNY (48° 22′ N., 1° 32′ E.), village, Eure-et-Loire, France; by TREATY OF B., 1360, John II. was freed from captivity by ceding S.W. France and paying three million crowns to Edward III. of England.

BRETON, CAPE (45° 56′ N., 59° 46′ W.), cape, E. coast, Cape Breton Island, Nova Scotia.

BRETON, JULES (1827–1906), Fr. artist; commenced as a painter of hist. subjects, which he eventually abandoned, and secured a high reputation by his landscapes and rustic scenes.

BRETON LANGUAGE, see Celts.

BRETON, NICHOLAS (1545–1626), Eng. poet and novelist; in verse, *A Flourish upon Fancie*, *The Passionate Shepherd*, etc.; in prose, *A Mad World, my Masters*, and *Grimello's Fortunes*. He wrote some charming lyrics, and his stories are full of quaint beauty.

BRETÓN DE LOS HERREROS, MANUEL (1796–1873), Span. dramatist; wrote upwards of 300 plays, amongst the best known of which are *Muérete; y verás!* and *La Escuela del Matrimonio*.

BRETTEN (49° 2′ N., 8° 43′ E.), town, Baden, Germany. Pop. 5000.

BRETTS AND SCOTS, LAWS OF THE, Celtic Code in Scotland repealed by Edward I. (1305) because not sufficiently severe. B. is supposed to have meant Brehon.

BRETWALDA, name meaning 'lord of Britain,' given to the chief of the petty kings of the Saxon Heptarchy, mention of which is found in the *Anglo-Saxon Chronicle*.

BREUGHEL, PIETER, BRUEGHEL (1525–69), noted Dutch *genre* painter. His s., **Pieter B., the Younger** (1564–1638), was less talented in same line; younger s., **Jan B.** (1568–1625), was famous landscape painter and engraver, and f. of **Jan B., the Younger** (1601–78), painter of same school.

BREVE, musical measurement; in mediæval notations, half or third of long note; now written 𝅜 =4 minims; *semi-breve*=2 minims; mediæval Lat. term for writ.

BREVET, form of allowance from person in authority, as in warrant or certificate; in army, grant of honorary rank.

BREVIARY, the 'prayer book' of the R.C. Church, from which much of the Anglican Prayer Book has been compiled. It contains psalms, hymns, portions of Scripture, and commentaries from the Fathers for every day. All priests (deacons and subdeacons) and monks are obliged to say aloud in public or private the daily portion. It is separate from the Missal (see MISSAL and MASS), which contains everything that pertains to the Eucharist. In the primitive Church the Bible, especially the psalms, formed the chief service book, and the B. as we have it only came

into being in the XI. cent. The Roman B. is now used universally in the R.C. Church, except in Toledo, where the Mozarabic is used, and Milan, which retains the Ambrosian, and in certain religious orders (*e.g.* Dominican). The B. is pub. in four vol's, one for each season, and also in one vol. and two.

BREVOORTIA, see under HERRING FAMILY.

BREWER, EBENEZER COBHAM (1810–97), author of widely used *Dictionary of Phrase and Fable*, etc.

BREWER, JOHN SHERREN (1810–79), Eng. historian of Henry VIII.'s period.

BREWING, the process of beer-making, may be divided into the preliminary process of malting, which prepares the material for brew and brewing proper.

Malting.—Malt consists of barley grains which have been induced to germinate so as to produce diastase, and then dried to arrest their growth. A barley grain contains within its husk and skin the germ or embryo, and the endosperm or food material consisting of starch-containing and aleurone (nitrogenous) cells. Malting consists of four processes—

(1) SCREENING, by which dust and dirt and small or damaged corns are removed.

(2) STEEPING: thoroughly soaking in water at 50–55° F. for about fifty hours to arouse the dormant vitality of the grain. The barley is added in a thin stream to the water, which is changed several times to avoid putrefaction of dissolved matter. A little bisulphite of lime is sometimes added for the same purpose. The steeped grain should be thoroughly wetted and softened throughout, and should leave the husk by gentle pressure; its bulk and weight are increased, but cane sugar, gum, diastase, colouring and mineral matter, and about half the soluble nitrogenous matter have been removed.

(3) GERMINATION: The starch stored in the endosperm of a barley grain is insoluble, and not immediately available to feed the growing plant. The first activity of the seed is the production of the enzyme or unorganised ferment, diastase, whose function is essentially to disintegrate the starch grains and convert them into maltose, a soluble food. The aim of the maltster is to promote the maximum growth of diastase, and then to kill the germ before further developments take place. (*a*) The steeped grain is *couched*, i.e. piled on the cement floor of the malt house to a depth of 12–14 in., and left there for 24 hours, being turned every 5 or 6 hours. Growth commences, accompanied by respiration; hence ventilation is necessary; the temperature rises to 60–63° F., and rootlets appear (*chitting*). (*b*) The grain is spread out, and turned day by day on the floor (*flooring*), so that the whole is aerated, the depth being regulated by the temperature. Growth and production of diastase continue for 8 or 9 days; the diastase permeates the endosperm, and dissolves the cellulose walls of the starch grains. (*c*) About the fifth day the grain will be getting too dry, and water is sprayed over it (*sprinkling*). (*d*) At about the ninth day, when sufficient growth has taken place, the malt remains for 24 hours unturned. Thus the heat accumulates, the grain dries, and growth is arrested (*withering*). These processes are carried out more efficiently by pneumatic malting, in revolving drums through which air at a suitable temperature, and saturated with moisture, is passed. The product of the whole germination process is 'green malt.'

(4) DRYING is carried out in kilns, containing two or more floors, and heated by a fire beneath. The malt is dried gradually, starting at 100° F., cured for 6 hours at 190–230° F., and stored in a dry place. For black beers malt is roasted to a chocolate colour.

Brewing consists in making beer from malt, with the addition of hops, etc. In a gravitation brewery the water and grist are elevated to the tower, whence they gravitate as required.

OPERATIONS: The *grinding of malt* should be done in a grist mill the day before use, fine enough to yield the maximum extract without clogging the mash-tun. *Mashing* consists in extracting the grist with water at about 145–155° F. in a cylindrical tun of wood, copper, or iron, with mechanical stirrer and false bottom. During mashing, diastase converts starch into maltose (shown by absence of blue colour with iodine): $2(C_6H_{10}O_5)n + nH_2O = nC_{12}H_{22}O_{11}$. The sweet wort produced runs off through the false bottom into the copper, and the residue is *sparged*, i.e. sprayed with hot water to avoid waste. What remains is brewers' grains, used for cattle food. *Boiling and hopping*: The wort is boiled in the copper to concentrate it, and destroy bacteria and diastase. Hops (catkins of humulus lupulus, containing tannin, hop oil, alkaloids, and resin) are added meanwhile to confer aroma (by the oil), to aid precipitation of albuminoids (by tannin), and act as preservative (antiseptic resin). After 6 hours the wort is separated from hops and sediment in the 'hop back.' *Cooling and refrigeration*: The wort is cooled to 60° F., and brought into the fermenting vat in contact with sterilised air.

FERMENTATION: *Yeast*, a unicellular micro-organism, should be carefully chosen and cultivated, and be not more than a week old. Perfectly pure yeast may be grown from a single cell. The enzyme maltase in yeast hydrolyses maltose thus: $C_{12}H_{22}O_{11} + H_2O = 2C_6H_{12}O_6$ (glucose), and zymase ferments glucose, the chief reaction being: $C_6H_{12}O_6 = 2C_2H_6O + 2CO_2$. All the yeast is mixed with a little of the wort at 65–75° F. (*pitching*) to induce rapid fermentation in the vat; then the rest is quickly introduced. The temperature, which must not rise above 70°, is regulated by cold water circulating through coils or *attemperators*. The liquor becomes covered first with a frothy head due to carbon dioxide, then with a yeasty head. The yeast is skimmed from the beer in the vat, after about 48 hours, or removed by settling. The liquor is conveyed through leather or india-rubber hose to the casks (*racking*), and yeast may afterwards be extruded from the bung holes by continued fermentation. Fresh hops are subsequently added to impart aroma, and isinglass dissolved in sulphurous acid for clarification (*fining*).

Beer is a fermented liquor brewed from malt or malt substitute, flavoured with hops or other bitter. *Ale* is light coloured, and rather strong in alcohol. *Porter* and *stout* are dark coloured on account of caramel derived from charred malt; they contain much sugar and extract, and stout much alcohol. *Lager beer* is low in alcohol, and rather high in extract.

COMPOSITION OF BEERS.

	Burton Pale Ale.	Dublin XXX Stout.	Munich Lager Beer.
Maltose	1·75	5·35	1·57
Dextrin	2·48	2·09	3·15
Proteins (nitrogenous)	0·21	0·43	0·40
Lactic and succinic acids	0·14	0·25	0·14
Ash, colouring matter, and hop extract	0·55	1·40	1·82
Total solid matter	5·13	9·52	7·08
Acetic acid	0·02	0·04	0·01
Alcohol	5·37	6·78	4·75
Water	89·48	83·66	88·16

Moritz and Morris, *Science of B.*; Green, *Soluble Ferments*; Baker, *The B. Industry*.

BREWSTER, SIR DAVID (1781–1868), Scot. scientist; principal of Edinburgh Univ.; made many discoveries in the science of optics; edit. the *Edinburgh Encyclopædia* (1808–30), contributed to *Encyclopædia Britannica*, and wrote *Life of Newton* (1831), *Martyrs of Science* (1841), *More Worlds than One* (1854); knighted, 1831.

BREWSTER, WILLIAM (d. 1644), one of the principal 'Pilgrim Fathers.'

BRÈZÉ, family of Anjou, whose lordship of B.

eventually came into hands of Princess of Condé, who sold it to Thomas Dreux; subsequently it was erected into a marquisate.

BRIALMONT, HENRI ALEXIS (1821–1903), Belg. fortification expert; b. Venlo, Limburg; ed. Brussels military school; became sub-lieut. of engineers in army (1843); lieut.-gen. (1877); supervised Belgian and Rumanian defence works; pub. military studies and originated *Le journal de l'Armée Belge* (1850).

BRIAN (926–1014), chief king of Ireland.

BRIANÇON (44° 56′ N., 6° 35′ E.), fortified town, Hautes-Alpes, France; elevation, 4334 ft. Pop. 7400.

BRIAND, ARISTIDE (1862–), Fr. statesman and socialist leader; premier, 1909–11, 1913; chief promoter of Separation Law.

BRIANSK (53° 14′ N., 34° 23′ E.), cathedral town, Orel, Russia; arsenal. Pop. 23,520.

BRIANZA (45° 40′ N., 9° 5′ E.), district, Lombardy, Italy; hilly, fertile; summer resort.

BRIARE (47° 39′ N., 2° 44′ E.), town, on Loire, France; pottery. Pop. 5600.

BRIAREUS, Ægæon, god of Gk. mythology; with 300 arms and 50 heads.

BRIBERY, the purchase of advantages from persons who have no right to profit by their disposal. The sale of places became illegal by the Sale of Offices Act (1809). Special Acts against b. of Customs officials were passed in 1827 and 1853. The Public Bodies Corrupt Practices Act (1889) made b. of a public servant a misdemeanour. Various Acts have been passed to prevent parliamentary and municipal electoral corruption. In U.S.A. laws against b. vary in different States, imposing fines or imprisonment or both on conviction, and in general are the same as in Britain.

BRICKS.—The word 'brick' is derived from the Fr. word *brique,* meaning a piece, or fragment, and is the Eng. name given to a piece of worked and moulded clay, slightly over 9 in. in length, by 4½ in. in width, and used for building purposes. Sun-baked b's were in use amongst the ancient Egyptians, Assyrians, and Babylonians, and some of these are still to be seen in a perfect state of preservation. Kiln-baked b's, however, mixed with chopped seeds or straw, were also employed in very early times by these peoples. They were also largely used by the Romans, and by them were introduced into England. After the withdrawal of the Romans b.-making fell into disuse in England until the craft was reintroduced by the Flemings in the XIII. cent. But it was not until the XV. cent. that b's came again into any general use. Hampton Court is a fine example of Early Eng. b.-building. Half-timbered houses, filled in with lath and plaster, still continued to be built, and it was not until well on in the reign of Charles II. that b. buildings became common.

The clay used in b.-making is abundantly found in many parts of the Brit. Isles, and the substance contains varying proportions of silica, alumina, iron, lime, and other salts. The clay is dug in autumn, left to weather until the spring, after which it is damped and worked with the spade, or ground in the pug-mill. The substance is then ready for moulding, which is done either by hand in a wooden, or metal-faced, mould, or by specially designed machinery. The b's are then removed to the drying-ground, or shed, where they are piled in open stacks which allow a free passage of air, and after about a week are ready for the baking process. This is done either in clamps or kilns. A clamp consists of a rectangular stack of dried b's, provided with flues and fire-holes, in the latter of which fires are lighted, and all apertures having been stopped up, the completed b. is thus produced. The kiln is a conical b. fire-chamber, in which the 'green' b's are placed. This is provided with a furnace, which is fully charged, and when well alight the mouth of the kiln is closed and the process of baking (generally about 48 hours) begins. Both clamps and kilns were used in very early times.

Bricklaying is the process of building with b's. It has already been stated that an Eng. b. is about 9 in. in length, therefore a 9-in. wall is a one b. wall; 14 in., one and a half b., 18 in., two b., etc. A b., the side of which is exposed, is called a 'stretcher'; where the end is outwards it is known as a 'header,' and from the distribution of these positions of the b's is derived the 'bond' or style of building. The two chief are 'English bond' and 'Flemish bond.' The former consists of alternate courses of 'stretchers' and 'headers'; the latter in which stretchers and headers are laid alternately in each course. The Eng. bond is considered the stronger, while the Flemish bond is more ornate. The mortar used in b.-setting is composed of a mixture of sand and lime, and before the b's are laid it is usual to dip them in water, or to dash water over the pile as they lie near at hand for use; by this means a more perfect adhesion between the b. and the mortar is gained.

Handbooks on *Building Construction,* by Henry Adams and by E. F. Mitchell.

BRIDE, a newly married woman. The origin of 'bride-cake' dates back to the days of ancient Rome when part of the marriage ceremony consisted of the bridal pair eating of a cake made of salt, flour, and water. Later it became customary to shower grains of wheat over the bride; subsequently small cakes were flung at the bride, and by such developments we have reached the pretentious sugared confections of the present day.

BRIDE, ST., see Bridget.

BRIDEWELL, district, S. of Fleet Street, London; celebrated prison demolished, 1864.

BRIDGE, card game, a development of whist, variously reputed to be of Dutch, Russ., or Turk. origin. Introduced into Britain first at the Portland Club in 1894, it has since increased enormously in popularity. Four persons take part in the game, two being partners against the other two, an ordinary pack of cards being used. The dealer decides trumps ('no trumps' is a possible declaration) after the players have examined the cards, or he may leave the declaration to his partner, who *must* then declare. This partner does not play his hand, which is exposed on the table as a 'dummy' hand, and played, in addition to his own, by the dealer. The strength of the cards in making tricks, and the general scheme of play, is the same as in whist.

The value of each trick won, over six, depends on the trumps declared, and is: in no trumps 12, hearts 8, diamonds 6, clubs 4, spades 2. After the declaration of trumps the opponents may double the value of the tricks, when the first pair may redouble, and so on. The partners who first score 30 points win a *game,* and those who first win two games win a *rubber,* a rubber counting 100. If one side wins all the tricks it scores 40 points, *grand slam*; if it wins 12 tricks, 20 points, *little slam.* Points are also given for 'honours,' which are ace, king, queen, knave, ten, in a suit declaration, and for *chicane,* the case when a player has no trump card in his hand; for honours the scoring is somewhat more complicated. The total score of each side includes the points for tricks, rubbers, honours, grand slam, etc., all added together.

Auction Bridge is a popular variety of the game.

'*Saturday*' *Bridge,* Dalton; *Advanced Bridge,* Elwell; *Bridge Tactics,* Foster; *Laws and Principles of Bridge,* 'Hellespont.'

BRIDGE OF ALLAN (56° 9′ N., 3° 56′ W.), town, Stirlingshire, Scotland; mineral wells. Pop. (1911) 3121.

BRIDGE OF SIGHS, see Venice.

BRIDGE, SIR JOHN FREDERICK (1844–), Eng. musician and composer; organist at Westminster Abbey.

BRIDGE-BUILDING BROTHERHOOD (*Fratres Pontifices*), Fr. religious order, recognised by Pope, c. 1189, for keeping bridges and fords in order.

BRIDGE-HEAD, fortification at end of bridge, guarding it on exposed side.

BRIDGEMAN, SIR FRANCIS (1848–),

commander of Home Fleet, 1907; First Sea Lord, 1911–12; K.C.B., 1908; K.C.V.O., 1911.

BRIDGEND (51° 31′ N., 3° 34′ W.), market town, Glamorganshire, Wales; ironworks. Pop. (1911) 8021.

BRIDGEPORT (41° 14′ N., 73° 22′ W.), city, port of entry, Connecticut, U.S.A.; excellent harbour; coasting trade; sewing-machines. Pop. (1910) 102,154.

BRIDGES.—Probably the earliest b's were made by felling a tree, and directing its fall across a stream. Later, a baulk of timber was used, and placed on rough pillars formed of heaped-up stones. In Japan a kind of cantilever bridge was built long ago, in which pieces of timber were embedded in each bank with their ends protruding over the stream, and a cross-piece placed thereon. An ancient cantilever bridge—with beams 100 ft. long, and each embedded 50 ft. in the bank—was built at Sutlej, India. No doubt the first masonry bridges were constructed by the Romans, to whom the adoption of the arch is generally attributed.

Stone Bridges.—(*a*) ARCHED.—A b. built by Trajan across the Danube (4500 ft. long, 60 ft. wide), had 20 arches, each spanning 170 ft. and 150 ft. high; Adrian destroyed it through jealousy. The largest b. in Europe in mediæval times was that of freestone over the Trent at Burton, built in XII. cent.; 1545 ft. long; 36 arches; used until 1864. A 3-arched bridge was built over river Taffat, Pontypridd, in 1746, but was swept away 2½ years later. A single span b. of 140 ft. was erected in its place, but fell in. In 1750 a third attempt was made to bridge the river, this time successfully. GROSVENOR BRIDGE, across the Dee at Chester, is a fine example of an arch b., being the second largest of its kind in existence; opened, 1832; 200 ft. span; 42 ft. rise; 33 ft. wide; took five years to build; cost £50,000.

(*b*) SEMI-ELLIPTICAL ARCHED.—WATERLOO and NEW LONDON BRIDGES are examples of 9 and 5 semi-elliptical arches respectively.

Timber Bridges are only found where timber is cheap and plentiful, as in America, where M'Callum's inflexible arched truss system is generally adopted.

Cast-Iron Bridges.—In XVIII. cent. cast-iron arches were introduced, and first used in the b. across the Severn, near Ironbridge; built, 1779; a single arch of 100 ft. span. SOUTHWARK BRIDGE (built by Rennie, 1824), has 3 cast-iron arches supported on stone piers; centre arch has span of 240 ft. and 24 ft. rise; two side arches have 210 ft. span and 18 ft. 10 in. rise; cast-iron in centre arch weighs 1605 tons, in each side arch, 1400 tons. The HIGH LEVEL BRIDGE, Newcastle-on-Tyne, has bow-string arches, and has two roadways, one above for railway traffic, one below for vehicular and pedestrian; over ½ mile long; 6 spans of 125 ft. each; arches rest on stone piers 16 ft. thick; bridge contains 4728 tons of cast-iron, 321 tons of wrought-iron; opened, 1849; cost £243,000.

Wrought-Iron Bridges.—Cast-iron being found unsuitable where long-span arches were required, wrought-iron tubes were employed. The first bridge of this kind was the BRITANNIA BRIDGE, over the Conway and Menai Straits, on Chester and Holyhead Railway. It consists of two independent and continuous wrought-iron tubular beams (1510 ft. long, weighing 4680 tons) held by four towers, one built on Britannia Rock in midstream; b. is 230 ft. above water; four spans, two over water being 460 ft. long, two over land, 230 ft.; weight of each long span is 1587 tons, each short span, 630 tons.

Lattice Girder Bridges have sides of iron lattice work; the first erected was on the Dublin and Drogheda Railway, 1843; span, 84 ft. CHARING CROSS BRIDGE, across the Thames, on the S.-Eastern Railway, is also of this type; contains 7000 tons of metal; cost £180,000.

Cantilever Bridges.—The greatest and most magnificent b. in the world—the FORTH BRIDGE—is of this type. It belongs to a combine of railway companies; opened by the Prince of Wales, March 1890; crosses Forth at Queensferry; two large spans of 1700 ft. (nearly ½ mile), two shore-end spans of 675 ft., and 15 smaller spans of 168 ft., total length being 1½ miles; a mile is covered by cantilevers; 152 ft. above water; over 20 acres of painted surface; cost £1,600,000.

Suspension Bridges are those in which the roadway is suspended by chains, links, or steel ropes, passing over piers or towers, fixed firmly in the ground. ROEBLING'S BRIDGE at Niagara (built 1855) has a span of 822 ft. The MENAI SUSPENSION BRIDGE, of iron, has two 12.-ft. roadways and a footpath; total length, 7710 ft.; 579 ft. between points of suspension; weight of metal, 2187 tons; took six years to construct; cost £120,000. A suspension b. crossing the Sarine at FRIBOURG, Switzerland (1834), has a span of 870 ft., is 167 ft. above the river, and is suspended by steel ropes. The CLIFTON SUSPENSION BRIDGE, Bristol, is hung by three chains on each side; span, 702 ft.; width, 31 ft. BROOKLYN SUSPENSION BRIDGE, crossing East River and connecting Brooklyn with New York (built 1883), is of steel; central span, 1595½ ft. long; two land spans of 930 ft. each; total length, 7580 ft.; weighs 7000 tons; has 5 roadways—two for vehicular traffic, one for pedestrians, and two for tramways. The neighbouring and more recent MANHATTAN BRIDGE (6855 ft.) and WILLIAMSBURG BRIDGE (7308 ft.) deserve to rank with Brooklyn Bridge.

Movable Bridges are generally used in connection with docks, canals, rivers, etc., where it is necessary to leave a clear way at times for shipping, etc, as—

(1) BASCULES, or DRAWBRIDGES, which consist of one or two pieces so hinged that one end may be lifted up, hinging on the other. Such b's were used in mediæval castles, and very few are to be found now. The TOWER BRIDGE, London, comes under the above heading, although a compound of bascules and suspension. A suspension leads from the land at each side to two solid towers of masonry. Two bascules join these towers together, with a span of 200 ft. The suspensions are 270 ft. long, giving total length of 800 ft.

(2) SWING BRIDGES are the most common of moving b's. Generally they are double-sided, swinging on a central pivot, as that over the Raritan, New Jersey, which crosses two passages 216 ft. wide. Kansas City Bridge crosses two passages 160 ft. wide; moving weight of 303 tons; opened by steam in 1½ minutes.

(3) TRAVERSING BRIDGES, or TELESCOPE BRIDGES, are rolled horizontally backward and are uncommon. One is found at Arun, on South Coast Railway; 144 ft. long; moves on wheels.

(4) LIFT BRIDGES are also uncommon, there being only two, one over Surrey Canal, one over Canal at Dublin.

(5) PONTOON OR FLOATING BRIDGES are constructed of boats fastened by anchors, and planks laid across to form roadway. One at Rouen, 900 ft. long, was paved with stone. The longest crosses the Hugli at Calcutta; 1530 ft. long; 14 pairs of pontoons, each anchored by 3-ton weight; roadway of Burmese teak wood, 48 ft. wide, with footpaths on each side; cost £182,000. Military b's are temporary constructions generally on the pontoon principle, using boats, casks, or rafts. See also TAY BRIDGE, VICTORIA FALLS.

J. C. Tidler, *Bridge Construction*; Dempsey, *Bridges, Tubular and other Iron Girder*.

BRIDGES, ROBERT (1844–), Eng. poet; formerly physician, and practised at various London hospitals; has pub. many vol's of plays in experimental metres, narrative poems, and lyrics; *Poetical Works* (1898–1905). His poetry has long been appreciated by a limited class of readers, but a certain aloofness of style will prevent its ever appealing to a wide public.

BRIDGET, ST. (1302–73), founded *Bridgettines* (Augustinian Order) in Sweden; lived in Rome from 1350. **St. Bridget, or St. Bride**, popular Irish saint of V. cent.

BRIDGETON (39° 25′ N., 75° 13′ W.), city, port of entry, New Jersey, U.S.A.; glass. Pop. (1910) 14,209.

BRIDGETOWN (13° 9′ N., 59° 35′ W.), port, Barbados; trading centre; seat of bishopric. Pop. (1911) 16,648.

BRIDGETTINES, see BRIDGET, ST.

BRIDGEWATER, FRANCIS EGERTON, 3RD DUKE OF (1736–1803), pioneer in inland navigation; with aid of Brindley, made canals from Worsley to Manchester and Manchester to Liverpool; these now belong to Manchester Ship Canal Co.

BRIDGEWATER, FRANCIS HENRY EGERTON, 8TH EARL OF (1758–1829), left bequest of £8000 for book on attributes of the Deity; this led to the B. TREATISES.

BRIDGMAN, LAURA DEWEY (1829–89), Amer. deaf-mute; was also blind. Carefully taught in blind asylum of Boston, her mind developed in spite of her affliction. Her own impressions and the observations made by her instructors, have proved of great service to the teachers of deaf-mutes and the blind.

BRIDGNORTH (52° 31′ N., 2° 26′ W.), market town, on Severn, Shropshire, England; XI.-cent. leaning tower; grammar school (founded 1503); carpets. Pop. (1911) 5768.

BRIDGWATER (51° 8′ N., 3° 7′ W.), town, on Parrot, Somersetshire, England; bath-bricks. Pop. (1911) 16,802.

BRIDLINGTON, BURLINGTON (54° 6′ N., 0° 12′ W.), watering-place, East Riding, Yorkshire, England; remains of XIII.-cent. priory; fine bay and harbour; chalybeate mineral spring. Pop. (1911) 14,334.

BRIDPORT (50° 44′ N., 2° 45′ W.), market town, on Brit, Dorsetshire, England; cord, ropes. Pop. (1911) 5919.

BRIDPORT, ALEXANDER HOOD, VISCOUNT (1727–1814), Brit. admiral; distinguished in Seven Years War and war with France after Revolution till 1800.

BRIE (48° 44′ N., 3° E.), small district, France; E. of Paris; corn, cheese.

BRIEF.—(1) A brief (in law) is an epitome or abridged statement of a client's case for the instruction of counsel, with a reference to the points of law supposed to be applicable to the case. (2) Papal briefs were sent by the Pope to individuals or religious communities, relating to matters of privilege or discipline. (3) Church briefs were letters sent out in the king's name, after the Reformation, to abp's, bp's, the clergy, and magistrates, licensing them to collect money for church building and similar objects. Since 1853 such briefs have been in abeyance.

BRIEG (50° 51′ N., 17° 29′ E.), town, on Oder, Prussian Silesia. Pop. 27,500.

BRIEG, BRIG (46° 19′ N., 8° E.), town, on Rhône, Switzerland.

BRIELLE, BRIEL (51° 55′ N., 4° 10′ E.), fortified seaport, S. Holland. Pop. 4000.

BRIENNE, JOHN OF (d. 1237), Fr. noble who became king of Jerusalem by marrying (1210) its queen, Marie de Montferrat; regent for their dau., Yolande or Isabel, 1212; elected Byzantine emperor, 1229.

BRIENNE-LE-CHÂTEAU (48° 22′ N., 4° 33′ E.), town, Aube, France; here Napoleon studied at military school, 1779–84; and defeated Allies, 1814.

BRIENZ (46° 45′ N., 8° E.), town and lake, in canton Bern, Switzerland; tourist resort.

BRIERLEY, BENJAMIN (1825–96), Eng. dialect writer; b. Failsworth, near Manchester; edit. *Ben Brierley's Journal*, in which many of his novels and poems in the Lancashire dialect appeared. Whereas Waugh wrote in the dialect of the moorlands, B.'s vernacular was that of the Lancashire towns.

BRIERLEY HILL (52° 30′ N., 2° 10′ W.), town, Staffordshire, England; coal, iron, fire-clay. Pop. (1911) 12,264.

BRIERLY, SIR OSWALD WALTERS (1817–94), Eng. artist; b. Chester; after studying art and naval arch., he spent much time in sea travel, and acquired that intimate knowledge of nautical life which gave realism to his marine pictures, the most famous of which are: *The Retreat of the Spanish Armada* (1871), *Drake and the 'Capitana'* (1872), and *The Loss of the 'Revenge'* (1877).

BRIEUX, EUGÈNE (1858–), Fr. dramatist; some of his later works include: *Petite Amie* (1902), *La Couvée* (1904), *Maternité* (1904), *L'Armature* (1905). Showing remarkable powers of character-drawing, his plays deal largely with social problems, and have occasionally been interdicted.

BRIGANDINE (O. Fr. *brigand*, a light-armed soldier), light coat of mail of attached plates of metal.

BRIGANTES, ancient Brit. tribe who inhabited northern Eng. counties.

BRIGG (53° 33′ N., 0° 29′ W.), market town, Lincolnshire, England; agricultural products. Pop. (1911) 3343.

BRIGGS, CHARLES AUGUSTUS (1841–), Amer. theologian and Old Testament scholar.

BRIGGS, HENRY (1561–1630), Eng. mathematician; prof. of Geom., Evesham Coll. (1596–1619); Savilian prof. of Astron., Oxford; authority on logarithms.

BRIGHOUSE (53° 43′ N., 1° 46′ W.), town, W. Riding, Yorkshire, England; woollen factories. Pop. (1911) 20,845.

BRIGHT, JOHN (1811–89), Brit. statesman and manufacturer; b. Rochdale; s. of a Quaker cotton manufacturer; ed. at a Friends' School at Ackworth, and afterwards at York and Newton. While in his f.'s cotton-mill he took great interest in public questions, and after a foreign tour (1835) became a prominent member of Anti-Corn-Law League, and joined Cobden in Free Trade agitation throughout the country. He entered Parliament (1843), already famous as an orator. In 1847 he was member for Manchester and advocated Free Trade, electoral reform, and religious freedom. He opposed the Crimean War (1854). In 1857 he was returned for Birmingham; his name is closely associated with Reform Bills of 1859–67; President of Board of Trade (1868), supported disestablishment of Irish Church (1869), and Irish Land Act (1870), and became Chancellor of Duchy of Lancaster (1873). Unable to support Government's Egyptian policy, he retired (1882), and strenuously opposed Gladstonian Home Rule Bill (1886). He was Lord Rector of Glasgow Univ. (1880), and given an honorary degree of Oxford Univ. (1886).

Life and Speeches of Right Honourable John Bright, M.P., by George Barnett Smith (1881), and Vince (1898).

BRIGHT, RICHARD, see BRIGHT'S DISEASE.

BRIGHTLINGSEA (51° 49′ N., 1° 2′ E.), seaport, Essex, England; oyster fishing. Pop. (1911) 4404.

BRIGHTON (50° 49′ N., 0° 8′ W.), town, on Eng. Channel, Sussex; fishing village, XVIII. cent., now fashionable holiday resort; mild climate; magnificent promenade extending over 3 miles; splendid buildings; educational centre; 'Pavilion' originally built as residence of George IV.; aquarium. Pop. (1911) 131,250.

BRIGHTON (37° 57′ S., 145° 1′ E.), watering-place, Victoria, Australia. Pop. 10,500.

BRIGHT'S DISEASE, inflammation of kidneys, named after the first describer, Richard Bright (1789–1858). It is characterised especially by changes in the urine, and by dropsy, first noticeable in the face, and a pasty colour of the skin. The onset is usually sudden, the first symptoms being chilliness, pains in the back, vomiting, and slight rise of temperature; an attack usually lasts four or five weeks, and may go on to the chronic form. The urine is scanty, of high specific gravity, turbid, and contains blood corpuscles, hyaline, epithelial, and blood casts, and much *albumen*. The attack usually follows an acute specific fever (especially scarlet fever) or a chill. The treatment is to diminish the proteids in nourishment in order to rest the kidneys, give water and other diluents, and increase the action of the skin and bowels; tonics are given during convalescence.

BRIGNOLES (43° 25′ N., 6° 8′ E.), town, Var, France; large trade in prunes and wines. Pop. 4800.

BRIHUEGA (40° 44′ N., 2° 48′ W.), town, Spain. Pop. *c.* 4000.

BRIL, PAUL (1554–1626), Flemish painter; painted frescoes of Vatican, Lateran, etc., assisted by bro., MATTYS B. (1550–84).

BRILLAT-SAVARIN, ANTHELME (1755–1826), Fr. gastronomist; member of Court of Cassation (1797); his *Physiologie du goût*, a work on the art of dining, has gone through numerous translations; pub. in English as *Handbook of Gastronomy* (1884).

BRILON (51° 25′ N., 8° 33′ E.), town, Westphalia, Germany. Pop. 4950.

BRIMSTONE, see SULPHUR.

BRIN, BENEDETTO (1833–98), Ital. naval designer and organiser; Minister of Marine for nearly 20 years.

BRINDABAN (27° 33′ N., 77° 44′ E.), town, Muttra district, United Provinces, India; holy city of Hindus, and place of pilgrimage. Pop. 23,000.

BRINDISI (40° 40′ N., 18° 1′ E.), seaport town, S. Italy, on Adriatic; archiepiscopal see; important station for passengers and mails to and from the East; ancient *Brundusium*; besieged by Cæsar, 49 B.C.; wine and oil exported. Pop. 28,000.

BRINDLEY, JAMES (1716–72), Eng. engineer; invented pump for mines; constructed several canals.

BRINE SHRIMPS, see under ENTOMOSTRACA.

BRINK, JAN TEN (1834–1901), prominent Dutch novelist and critic.

BRINVILLIERS, MARIE MADELEINE MARGUERITE D'AUBRAY, MARQUISE DE (*c.* 1630–76), infamous Fr. poisoner; beheaded and her body burned (Paris, July 16, 1676).

BRIONIAN ISLANDS (44° 55′ N., 13° 45′ E.), group of small islands (Austrian) in Adriatic, W. coast of Istria; quarries.

BRIOUDE (45° 17′ N., 3° 24′ E.), town, Haute-Loire, France; chief trade, grain, wine. Pop. 4900.

BRIQUEMAULT, FRANÇOIS DE BEAUVAIS, SEIGNEUR DE (d. 1572), Fr. Huguenot leader in several battles; executed.

BRISBANE (27° 28′ S., 153° 2′ E.), town, Australia; capital of Queensland, on river B., 25 miles from sea; extensive wharf accommodation, dry docks; chief trading centre of colony; port of call, seat of Catholic abp. and Anglican bp.; North and South B. connected by bridge; founded as convict station, 1825; made free settlement, 1842; exports wool, gold, hides. Pop. (1911) 143,514.

BRISBANE, SIR THOMAS MACDOUGALL (1773–1860), Scot. general and scientist; gov. of New S. Wales; gave name to Brisbane, Queensland; made list of stars.

BRISSON, EUGÈNE HENRI (1835–1912), Fr. statesman; exposed Panama scandals.

BRISSOT, JACQUES PIERRE (1754–93), Fr. revolutionary; edit. *Patriote français* (1789–93); orator of Jacobin Club, etc.; Girondists were also called *Brissotins*.

BRISTLE-WORMS, see CHÆTOPODA.

BRISTOL (51° 28′ N., 2° 35′ W.), city, England; in Gloucestershire and Somersetshire, at junction of Frome and Avon; important port, has good dock accommodation; large trade with U.S.A., Canada, Indies, and other parts of empire; exports coal, salt, tin-plates, machinery, cottons, chemical products, etc.; imports provisions, timber, grain, oils, marbles, ores, etc. B. is an episcopal see, has cathedral, incorporating remains of Augustinian monastery, and many beautiful old churches, including that of St. Mary Redcliffe, one of finest in England; fine public buildings, hospital, museum, etc.; seat of univ. (1909). In district are traces of Rom. and Brit. camps; while under Dan. rule, noted as slave market; surrendered to William the Conqueror, after which it was fortified; scene of rising against Edward II. in 1313; supported Parliament in Civil War; suffered three sieges; scene of riots at various dates in XVIII. cent. and during Reform Agitation, 1831. Pop. (1911) 357,059.

BRISTOL (41° 41′ N., 72° 56′ W.), town, Connecticut, U.S.A.; industries, iron-founding, clock-making. Pop. (1910) 13,502.

BRISTOL (40° 6′ N., 74° 56′ W.), borough, Pennsylvania, U.S.A.; hosiery. Pop. (1910) 9256.

BRISTOL (41° 38′ N., 71° 18′ W.), port of entry, Rhode Island, U.S.A.; rubber goods. Pop. 8565.

BRISTOL (36° 35′ N., 82° 13′ W.), city, Sullivan County, bordering Tennessee and Virginia, U.S.A.; furniture. Pop. (1910) 7148.

BRISTOL CHANNEL (51° 20′ N., 4° 30′ W.), inlet of Atlantic between S. Wales and S.W. counties of England.

BRISTOL, EARLDOM AND MARQUESSATE OF.—John Digby, 1st Earl of B. (1580–1653), Eng. politician, s. of Sir George Digby of Coleshill, Warwickshire; several times ambassador to Spain; quarrelled with Buckingham; requested by Charles I. not to take his seat in Parliament, 1626; insisted, charged with treason, and sent to Tower, but liberated by demand of lords; opposed policy of Charles I., but fought on his side in Civil War, and d. in exile; conscientious patriot. — **George Digby, 2nd Earl of B.** (1612–77), Eng. statesman; wrote *Letters* to Sir Kenelm Digby against Roman Catholicism (1638–39); opposed king in Short and Long Parliaments, but disapproved of Strafford's attainder; urged Charles to arrest Five Members, and was impeached; commanded for Charles in Civil War; became R.C.; impeached Clarendon, 1663; returned to Protestantism, 1664. He was regarded as a typical instance of brilliant gifts and unstable character, and had fatal influence on policy of Charles I.; remarkably handsome, and considered by Clarendon his most accomplished contemporary.— **John Hervey** (1665–1751) supported the settlement of 1688, and was cr. Earl of B. in 1714.—Among the important chiefs of this family are **George William** (1721–75), follower of Pitt; **Augustus John** (1724–79), vice-admiral and Lord of Admiralty and defender of Keppel; **Frederick Augustus** (1730–1803), bp. of Derry (1768), dilettante and revolutionary; **Frederick William** (1769–1859), cr. Marquess of B. (1826), great-grandfather of present marquess.

BRISTOW, BENJAMIN HELM (1832–96), Amer. soldier, lawyer, and statesman; Solicitor-General (1870–72); Sec. of the Treasury (1874–76); ended scandals of 'Whisky Ring.'

BRITAIN (Lat. *Britannia*), Rom. name for island constituted by England and Scotland; now whole territory of Brit. Isles (*q.v.*).

BRITANNIA, Lat. form of Britain (*q.v.*) and its personification in female figure on coins, etc. *Rule B.*, written by Thomson (*q.v.*), is patriotic Brit. anthem.

BRITANNIA METAL, white alloy of zinc, antimony, copper, and bismuth; used for cheap teapots, forks, spoons.

BRITANNICUS (*c.* 41–55), son of Rom. Emperor Claudius; suffered death by poisoning.

BRITISH ASSOCIATION, imperial society, founded at York, 1831, by Sir D. Brewster for promoting scientific research; meets annually, occasionally in the colonies.

BRITISH CENTRAL AFRICA. — Until 1907 what is now officially known as *Nyasaland Protectorate* was called 'British Central Africa.' The latter term is now commonly used to denote all Brit. territory in Central Africa (as distinguished from Brit. East, Brit. West, and Brit. South Africa), viz. Nyasaland and that part of Rhodesia (*q.v.*) north of the Zambesi.

Nyasaland (9° 30′ to 17° S., 33° to 36° E.), Brit. Protectorate; bounded on N. by Ger. East Africa; E. by Lake Nyasa (*q.v.*), Portug. East Africa, and Lake Chilwa; S. by Portug. E. Africa; W. by Northern Rhodesia; area, *c.* 40,000 sq. miles. Surface is mostly lofty plateau over 3000 ft. above sea-level; numerous streams flow into Lake Nyasa, which drains by Shiré River into Zambesi. From Blantyre (chief town) in Shiré 'Highlands' railway runs to Port

Herald on Portug. border, whence there is steamer service to Chinde on coast by Shiré and Zambesi. Stevenson's Road connects Lakes Nyasa and Tanganyika.

First explored by Portuguese, N. was later and more thoroughly mapped by Livingstone (*q.v.*); British Central Africa Protectorate established, 1891; proclaimed Nyasaland Protectorate, 1907.

N. is administered by gov. under Colonial Office, assisted by Executive and a Legislative Council, and District Residents; seat of administration is Zomba. Pop. (largely concentrated in healthy Shiré Highlands) consists of *c.* 1,000,000 natives, 600 whites, and 500 Asiatics; missionary centre; sleeping-sickness in parts. Chief exports are coffee, rubber, cotton, tobacco, rice, oil-seeds, horns, etc.; imports include textiles, machinery, tools, food-stuffs, and hardware.

Nyasaland Handbook; Johnston, *Brit. Central Africa* (1897).

BRITISH COLUMBIA (49° to 60° N., 120° to 140° W.), largest province, Dominion of Canada; between Rocky Mountains and Pacific; greatest length, 1250 miles; breadth, *c.* 400; area, 400,000 sq. miles; includes Vancouver and Queen Charlotte Islands; surface very mountainous, Rockies reaching height of 16,000 ft., in Mounts Brown and Hooker; W. of Rockies are Selkirk and Gold Ranges, rising to 10,000 ft., Cascade or Coast Range rising to 7000 ft.; chief rivers, Columbia, Fraser, Thomson, Peace. Climate varies; mild near coast, dry and hot in S. interior, severe winters in N.; heavily wooded; important commercial trees are Douglas fir, maple, yellow cypress, red and yellow cedar, white spruce; much pastoral and agricultural land. Chief industries are lumbering, mining, fruit-growing, ranching, fishing, canning, fur sealing; very rich in minerals; gold is worked in the Yukon valley and at Carriboo and Kootenay; coal, silver, lead, copper, are also mined; the working of cinnabar, platinum, gypsum, asbestos, plumbago, has begun. Capital, Victoria, is situated on Vancouver Island; other towns, Vancouver and New Westminster, on mainland; univ. (1913); railways being greatly extended. Administration is carried out by lieut.-gov., assisted by five ministers and legislative assembly; represented in Federal Parliament by three senators and seven members of lower house. B. C. became British colony, 1858; united with Vancouver, 1866; admitted into Dominion of Canada, 1871; Alaska boundary dispute with U.S. settled, 1903. Pop. (1911) 392,480.

BRITISH EAST AFRICA Brit. territory in East Central Africa, comprising (1) East Africa Protectorate, (2) Uganda Protectorate, (3) Zanzibar Protectorate. Brit. Somaliland may also be included in the term.

East Africa Protectorate (1° N., 39° E.), bounded by Abyssinia (N.), Uganda Protectorate (W.), Ger. East Africa (S.), Ind. Ocean and Somaliland (E.); area about 200,000 sq. miles; seaboard about 400 miles; coastal strip from Ger. frontier to Kipini, Lamu Archipelago, and Kismayu, near Juba, are leased from Sultan of Zanzibar. Coast regions are flat and unhealthy; parts of interior healthier; traversed by volcanic mountain ranges; highest peaks, Mount Kenya (over 18,000 ft.), Sattima (13,200 ft.), Nandarua (*c.* 12,000 ft.), Longonot (8700 ft.), and Suswa (7800 ft.) in S.W., extinct volcanoes. In interior are valuable forests and fine pasture lands; southern and north-eastern districts fertile. Chief rivers are Juba, Tana, Sabaki; principal lakes, Stephanie, Sugota, Naivasha, Njemps, and part of Rudolf and Victoria Nyanza. Principal towns are Nairobi (capital), Mombasa (chief port), Lamu, Kismayu, Melinde (ports), Kisumu, Kenya. Coast is inhabited by Swahilis and Arabs; Somalis, Gallas, Bantu, etc., inland. Paganism predominates, but Muhammadanism is spreading rapidly, especially on coast.

Portuguese arrived in XV. cent. and built forts at Mombasa, Lamu, and Melinde; territory conquered by the Imâm of Muscat, 1698; Germans acquired a protectorate over Witu, 1884; Brit. East Africa Co. assumed control over Sultan of Zanzibar's mainland possessions, 1888; boundary agreements made between Germany and Britain, 1886, 1890, Britain and Italy, 1891, Britain and Congo Free State, 1894; Protectorate of Great Britain accepted by Sultan, 1890; administration taken over by Foreign Office, 1895, by Colonial Office, 1905; explored by Krapf, Burton, Speke, Grant, Baker, Stanley, etc. E. A. P. is divided into seven provinces: Ukamba, Seyidie, Tanaland, Jubaland, Kenya, Naivasha, Kisumu, and some unorganised territory in N.; administered by gov. and executive and legislative councils. Mombasa-Victoria (Uganda) State Railway (584 miles) was completed in 1902; steamers on Lake Victoria Nyanza; cable between Zanzibar and Mombasa. Principal products are maize, rice, cocoa-nuts, hemp, coffee, wheat, valuable timber, ostriches, sheep; exports ivory, rubber, hides, skins, cotton, copra, tobacco. Mineral resources as yet unimportant. Country gives promise of great developments. Pop. *c.* 4,000,000, including 2000 Europeans and Eurasians and 25,000 Asiatics.

Uganda (2° N., 33° E.), bounded N. by Anglo-Egyptian Sudan, E. by East Africa Protectorate, W. by Congo State, S. by Ger. E. Africa and Lake Victoria Nyanza. The Uganda Protectorate includes Uganda proper, Usoga, Unyoro, part of Kavirondo, Koki, and Ankoli. It is divided into five provinces: kingdom of Buganda with islands, the Eastern, Northern, Western, and Rudolf provinces, each divided into several districts; total area, *c.* 117,681 sq. miles. U. is traversed by high volcanic mountain ranges; Ruwenzori Range in W., with glaciers and snow-fields, highest peak, Mt. Stanley (16,816 ft.); Mt. Elgon (14,000 ft.) on border of Eastern province, Mt. Debasien in Eastern province, Mt. Agoro in Northern province, etc. Principal river is Victoria Nile. U. contains part of Lakes Rudolf, Albert Nyanza, Albert Edward Nyanza, Victoria Nyanza, and the whole of Lakes Choga, Kioga, Kwania. Soil is fertile except in Rudolf province, which is hot and very dry; luxuriant tropical vegetation; extensive forests; marshy tracts in Eastern province. Climate is healthy in parts; sleeping-sickness very prevalent in the Victoria Lake region, owing to tsetse fly. Fauna includes giraffe, elephant, okapi, chimpanzee, buffalo, zebra, rhinoceros, hippopotamus, and antelope. Chief towns are Entebbe (Brit. headquarters), Mengo (native capital of Uganda), Jinja. Native tribes include Baganda (civilised and intelligent), Banyora, Bari, Madi, Tesi, and pygmies known as Bambute or Bakwa. Missionaries established stations, 1877–99, which progressed favourably under the reign of King Mtesa. His son, Mwanga, who succeeded him in 1884, was a persecutor of the Christian faith, and caused the murder of Bp. Hannington, 1885. The authority of Brit. East Africa Co. was recognised, 1890, by agreement between Captain Lugard and Mwanga; U. became a Brit. Protectorate, 1894; explored by Speke and Grant, 1862, Baker, 1864, Stanley, 1875, and others. 'UGANDA RAILWAY,' through E. Africa Protectorate, does not enter U., but reaching Victoria Nyanza gives U. an outlet to the coast. A railway runs between Jinja and Kakindu on Nile, *c.* 53 miles. Steamers ply on Lakes Victoria and Albert Nyanza. U. is administered by a governor. There are several Prot. and R.C. schools, and many missionary societies. Chief products are cotton, rubber, ivory, timber, gum, hides, sugar, ground-nuts, chillies, coffee, cocoa, vanilla, cattle, sheep. Iron ore, copper, and gold are found. Native pop. *c.* 3,000,000, and 560 Europeans.

Hindlip (Lord), *Brit. E. Africa* (1905); Johnston (Sir Harry), *Uganda Protectorate* (2 vols., 1902); Eliot, *East Africa Protectorate* (1905).

BRITISH EMPIRE.—Title of whole territory under rule of British Crown; extent about 12,000,000 sq. miles; white population (1911), *c.* 60,000,000,

entire population, 420,000,000. Its Constitutions fall under the two main headings of Home Government and Colonial Governments. There are three classes of Colonial government: (1) the Crown colony, *e.g.* Ceylon, in which legislation is controlled by Home Government, to which all its officials are responsible; (2) and (3) colonies in which the Home Government has only veto on legislation; but while in (2) all officials are responsible to Eng. Crown, as in Barbados, in (3) governor only is responsible, as in Canada and Australia. In (1) laws are made by governor and a council, except in Gibraltar and St. Helena, where they are made by governor alone. The councillors are nominated by the Crown. In (2) there is either chamber of deputies in addition to council, or there is single chamber in which there is representative element. In (3) government is composed of governor, executive council and chamber of deputies; governor exercises Crown's prerogative of veto; Crown has no control of money bills, and is not responsible for debts of colony.

Growth of Empire dates from Elizabethan times, when attempts were made to colonise Virginia; first permanent settlement at Jamestown, 1607, followed by rapid American colonisation and acquisition of Barbados and Jamaica; claim to Newfoundland, Nova Scotia, and Hudson Bay Territory recognised, 1713. By 1763 Canada had been added and foundations of Indian Empire laid by Clive. In 1788 first settlers landed in Australia, and during Napoleonic wars many islands, especially in West Indies, were captured from the French and their allies; Cape of Good Hope was taken from the Dutch (1806), and after annexations of native territory the Transvaal and Orange Free State were added in 1902.

'Council of Trade and Plantations' (after 1695, 'Board of Trade and Plantations') was early medium between colonial governor and Crown; 1784, Board of Control for India appointed; 1840, responsible government granted to Canada; 1854, appointment of Sec. of State for Colonies; 1858, Sec. of State for India, and India Council. With abandonment of protection of trade came loss of interest in colonies; interest revived by Imperial Federation League, 1884, Colonial and Imperial Conferences from 1887; tariff reform aims partly at drawing bonds of Empire closer.

In early days of colonising, Home Government furnished funds for government and protection of colonies, and in return imposed severe trade restrictions. Navigation Act (1660) enacted that colonial goods should be exported and imported in Brit. bottoms; protective policy endured till 1849, when Navigation Acts were repealed under influence of Free Trade agitation; in 1897 Canada granted preference to British goods, an example followed by South African States, Australia, and New Zealand.

Home Government is responsible for naval defence, of which the 'two-power' is the accepted standard, while the Dominions, S. Africa and New Zealand by money, Canada by ships, Australia by local unit of Brit. Fleet, contribute towards maintenance of navy. General defence is undertaken by Britain, but local forces are rapidly developing throughout Empire. Canadian Militia Act, 1868, established Canadian army. S. Africa, New Zealand, and Australia have lately established systems of military service.

BRITISH DOMINIONS, CROWN COLONIES, PROTECTORATES, AND DEPENDENCIES.

Territory.	Area in sq. miles.	Population.
United Kingdom, including Isle of Man and Channel Islands	121,400	45,500,000
Europe—		
Gibraltar	2	25,000
Maltese Islands	120	220,000
Carry forward	121,522	45,745,000
Brought forward	121,522	45,745,000
Asia—		
Aden, Perim, and Socotra (Dep.)	10,400	60,000
Brunei	4,000	25,000
Ceylon	25,332	4,109,000
Cyprus	3,584	274,000
Federated Malay States	28,000	1,000,000
Feudatory Malay States	18,000	800,000
Hong-Kong	400	450,000
Indian Empire	1,800,000	315,000,000
N. Borneo	31,100	207,000
Sarawak	45,000	500,000
Straits Settlements	1,600	715,000
Wei-hai-wei	285	147,000
Africa—		
Ascension Island	34	400
Basutoland	10,300	400,000
Bechuanaland	275,000	125,000
East Africa Protectorate	202,000	2,295,000
Gambia	3,600	150,000
Gold Coast	80,000	1,500,000
Mauritius and deps.	825	375,000
N. Nigeria	256,000	8,500,000
Nyasaland	39,800	1,000,000
Rhodesia	445,000	1,760,000
St. Helena	47	3,500
Seychelles and deps.	150	20,000
Sierra Leone	33,000	1,500,000
Somaliland	68,000	300,000
S. Nigeria	77,300	7,000,000
Swaziland	6,500	90,000
Uganda	223,500	3,000,000
Union of S. Africa (D.)	470,000	5,500,000
Zanzibar	1,000	197,000
America—		
Bermuda	19	19,000
Brit. Honduras	8,600	40,000
Brit. Guiana	90,500	296,000
Canada (D.)	3,730,000	7,081,000
Falkland Islands	6,500	2,300
Newfoundland (D.) and Labrador	162,000	241,000
South Georgia, etc.	1,000	
W. Indies	12,000	1,700,000
Oceania—		
Australia	3,000,000	4,700,000
Fiji Islands	7,400	135,000
Pacific Islands	12,600	205,000
Papua	90,000	300,000
New Zealand	104,750	1,060,000
Total	11,506,648	418,527,200

BRITISH GUIANA, see GUIANA; **B. HONDURAS**, see HONDURAS; **B. NEW GUINEA**, see NEW GUINEA; **B. NORTH BORNEO**, see BORNEO; **B. WEST INDIES**, see WEST INDIES.

BRITISH ISLES, THE, collection of islands round Great Britain and under its direct administration; also applied to Great Britain, Ireland, and adjoining islands.

BRITISH MUSEUM, THE, national depository of books, MSS., and various antiquities and objects of art, Great Russell Street, London. In 1754 Montague House was purchased by the Government for lodgment of Cottonian and Harleian MSS., and the Sloane library and museum; it was opened, 1759, as the B. M., but pulled down, 1845, and the present building erected on its site. The great circular domed reading-room, with wide reading space for 300 readers, was added, 1857. The library contains about 2,000,000 books, and is entitled to a copy of every publication which appears in Gt. Britain. The Natural History exhibits were removed to S. Kensington Natural History Museum, 1880–81. Hints and directions as to use of B. M. will be found in *The British Museum Reading-Room* (R. A. Peddie).

BRITISH NORTH AMERICA ACT, see CANADA.

BRITISH SOUTH AFRICA CO., B.S.A. or CHARTERED Co., trading company established by Cecil Rhodes, and chartered, 1889. See RHODESIA.

BRITOMARTIS, Cretan goddess with attributes of Artemis.

BRITON.—(1) Native of Britain; (2) since Union, native of Great Britain or Brit. Empire.

BRITON FERRY (51° 37′ N., 3° 49′ W.), town, Glamorganshire, Wales; extensive steel and iron works. Pop. (1911) 8474.

BRITTANY (*c.* 48° N., 3° W.), Eng. name for old province of *Bretagne*, France, which forms peninsula, bounded N. by Eng. Channel, W. by Atlantic, S. by Bay of Biscay; coast much indented; surface mountainous. There are many quaint towns, ancient megalithic monuments, and beautiful ruins. People are Celtic; *Breton* language resembles Welsh; ancient *Armorica*, B. was a province under Romans; independent duchy in Middle Ages.

BRITTLE-STARS, see ECHINODERMATA.

BRITTON, JOHN (1771–1857), Eng. antiquary; wrote numerous popular topographical works, including *The Beauties of England and Wales*, *The Architectural Antiquities of Great Britain*, *Autobiography* (1850), etc.

BRIVE, BRIVE-LA-GAILLARDE (45° 9′ N., 1° 33′ E.), town, Corrèze, France; wine. Pop. 20,600.

BRIXEN (46° 44′ N., 11° 37′ E.), town, Tirol, Austria; bp.'s see; summer resort. Pop. 5800.

BRIXHAM (50° 23′ N., 3° 31′ W.), seaport and market town, on Torbay, Devonshire, England; principal industry sea-fishing, some coasting and foreign trade; William of Orange landed here, Nov. 1688; cavern, containing prehistoric remains, discovered, 1858. Pop. (1911) 7954.

BRIXTON, S. district, London, England; in metropolitan borough Lambeth. Pop. (1911) 76,000.

BRIZEUX, JULIEN AUGUSTE PÉLAGE (1803–58), Fr. poet; author of *Les Ternaires* (1841), *Les Bretons* (1845), and a trans. of Dante's *Divina Commedia* (1841).

BROACH, BHARUCH (21° 43′ N., 73° 2′ E.).—(1) ancient city, Bombay Presidency, India; formerly important seaport and famous for cloth manufacture. Pop. 42,900. (2) district, wooded, cultivated; cotton-mills. Area, 1467 sq. miles. Pop. 291,800.

BROAD BOTTOM ADMINISTRATION, name given to Pelham's ministry, which reunited Whigs, 1744–54.

BROAD CHURCH PARTY, name adopted by Anglican latitudinarians of XIX. cent. Charles Kingsley (*q.v.*) took important part in its evolution at a time when science and religion stood at the parting of the ways. He, Dr. Arnold of Rugby, Frederick Denison Maurice, and others opposed to High Church mysticism and what Kingsley considered Dissenting emotionalism, an earthly ideal of the *mens sana in corpore sano* united to due acceptance of the Church of England teaching; they were pioneers of social reform, Sunday games, popular education, etc.

BROADMOOR (51° 22′ N., 0° 41′ W.), state criminal asylum, Berkshire, England.

BROADS (*c.* 52° 35′ N., 1° 30′ E.), low-lying marshy region, Norfolk, England, continuing into Suffolk; contains series of wide shallow lakes; crossed by Yare and other streams.

BROADSTAIRS (51° 21′ N., 1° 26′ E.), watering-place, Kent, England. Pop. (1911) 8929.

BROCA, PAUL (1824–80), Fr. surgeon, pathologist, anthropologist, and medical author; prof. of Surgical Pathology in Paris Faculty of Med. (1867); founded Paris Anthropological Soc. (1859); made discoveries concerning aphasia.

BROCADE, silk fabric, sometimes woven with gold or silver thread, in which the decorative portions appear in low relief against the main substance. During the XIV. cent. heavy b's were chiefly manufactured in Italy; at a later date Lyons was a centre of the industry; while at the beginning of the XVIII. cent. Spitalfields began to produce b's.

BROCK, SIR ISAAC (1769–1812), Brit. commander; distinguished in Canada.

BROCK, SIR THOMAS (1847–), Eng. sculptor; besides groups and numerous busts of public persons, amongst his best-known works are the equestrian statue of the *Black Prince* (Leeds) and the *Queen Victoria Memorial* (Buckingham Palace); A.R.A. (1883); R.A. (1891); knighted (1911).

BROCKEN, BROCKSBERG (51° 50′ N., 10° 38′ E.), highest peak (3733 ft.), Harz Mts., Germany; famous for supposed Spectre, really beholder's shadow projected through and magnified by mists.

BROCKES, BARTHOLD HEINRICH (1680–1747), Ger. poet; trans. Thomson's *Seasons*, and portions of Pope; and, in his original work, was a pioneer of the study of natural phenomena.

BROCKHAUS, FRIEDRICH (1772–1823), Ger. publisher; completed the issue of the *Konversations-Lexikon* (1810–11), besides numerous other valuable bibliographical and hist. works.

BROCKLESBY, RICHARD (1722–97), Eng. physician, friend of Samuel Johnson and Edmund Burke.

BROCKTON (42° 2′ N., 71° 1′ W.), city, Massachusetts, U.S.A.; boots and shoes. Pop. (1910) 56,878.

BROCKVILLE (44° 37′ N., 75° 46′ W.), town, port of entry, Ontario, Canada; agricultural implements. Pop. 8800.

BROD (45° 8′ N., 18° E.), fortified town, on Save, Croatia-Slavonia, Hungary. Pop. 7300.

BRODHEAD, JOHN ROMEYN (1814–73), Amer. historian; started investigation of sources of Amer. colonial history.

BRODICK (55° 36′ N., 5° 9′ W.), town, Arran, W. Scotland; seaside resort.

BRODIE, SIR BENJAMIN COLLINS, 1st Bart. (1783–1862), Eng. surgeon and medical author; pres., Royal Soc. (1858); first pres., General Medical Council.

BRODIE, SIR BENJAMIN COLLINS, 2nd Bart. (1817–80), prof. of Chem. (1865), Oxford.

BRODIE, WILLIAM (d. 1788), Scot. criminal; was a master cabinetmaker in the Edinburgh Lawnmarket (known as 'Deacon Brodie'); committed numerous daring burglaries, for which he was tried and hanged; subject of a play by Stevenson and Henley.

BRODY (50° 7′ N., 25° 10′ E.), town, Galicia, Austria; commercial centre; leather. Pop. 17,400.

BROEK.—(1) (52° 42′ N., 4° 48′ E.) village, N. Holland, Netherlands; dairy produce. (2) (52° 59′ N., 5° 47′ E.) town, Friesland, Netherlands.

BROEKHUIZEN, JAN VAN (1649–1707), Dutch classical scholar; originally a soldier, but retired on a pension after the Peace of Ryswick (1697); famous for his editions of Propertius and Tibullus, and some original poems.

BROGLIE, Fr. noble family who emigrated from Piedmont, 1643, when they assumed title of *Comtes de Broglie*. Distinguished members are: (1) VICTOR MAURICE (1647–1727), marshal of France, 1724; (2) FRANÇOIS MARIE (1671–1745), marshal of France, 1734, duc de Broglie, 1742; (3) VICTOR FRANÇOIS (1718–1804), marshal of France, 1759, became an *émigré* at the Revolution; (4) CHARLES FRANÇOIS (1719–81), distinguished diplomatist; (5) VICTOR CLAUDE (1757–94), *maréchal de camp*, Revolutionist and Jacobin, but executed in the Terror; (6) ACHILLE CHARLES LÉONCE VICTOR (1785–1870), statesman, attempted to keep France both from reaction and violent democracy; strengthened country by friendship with Britain.

BROHAN, AUGUSTINE SUSANNE (1807–87), Fr. actress; appeared with great success both at the Odéon and the Comédie Française; retired, 1842.

BROILING, method of cooking meat; see COOKERY.

BROKE, ARTHUR (d. 1563), Eng. translator; issued the first Eng. trans. of the Fr. version of Bandello's Ital. story, *The Tragicall Historie of Romeus*

and Juliett. B.'s version, which was the one followed by Shakespeare in *Romeo and Juliet*, contains scenes which do not appear either in the Fr. or Ital. originals.

BROKE, SIR PHILIP BOWES VERE (1776–1841), Eng. rear-admiral; of Suffolk family of Broke Hall; heroic defeat of U.S.A. *Chesapeake*, 1813.

BROKEN HILL (30° 58′ S., 141° 21′ E.), town, N.S.W., Australia; silver mines. Pop. (1911) 31,386.

BROKEN HILL (14° S., 29° E.), gold mine, Rhodesia, S. Africa.

BROKER, an agent employed to make bargains in matters of trade or navigation for other people in return for a compensation called *brokerage*. He is, in short, a mercantile agent. A b. is not in possession of the goods which are the subject of the contract. He cannot as a rule buy or sell in his own name when acting for other people, and he is not liable to be sued on the contract which he enters into on behalf of others, unless he appears in the contract to be a principal. When a b. makes a contract for others, he enters the terms of the contract in his own book, and then sends a copy of the entry to both parties. These copies should be identical, otherwise there may be no contract at all, especially, as often happens, when the b. has not entered the terms in his book.

Insurance b's are employed to effect policies of insurance. The underwriter is paid the premium by the b., who in turn looks to the insured for the premium. He receives the policy of insurance from the underwriter, and it is his duty to see that the policy is drawn up. He must use all diligence in obtaining adjustment and recovering the loss for the insured. If the b. pays the full loss to the insured, not knowing one of the underwriters to be bankrupt, he is prevented by trade custom from recovering it. Ship b's are employed to effect the charter of a ship. They are usually paid a commission of 5 % on the freight by the shipowner. Stock b's are persons who negotiate for the purchase or sale of securities on the Stock Exchange. When any person wishes to buy or sell shares or stock he employs a b., who in turn sells the shares to, or buys the shares from, a stock-jobber. *The Daily Mail* in 1912 commenced a brokerage department at extremely small fees.

BROMBERG (53° 7′ N., 18° E.), town, Prussia; iron foundries. Pop. (1910) 57,696.

BROME, RICHARD (d. 1652), Eng. dramatist; servant, and afterwards friend, of Ben Jonson; wrote about fifteen comedies, including *The Northern Lass*, *The Court Beggar*, *The City Wit*, *A Jovial Crew*, etc. His *Dramatic Works* were pub. 1873.

BROMELIACEÆ, order of monocotyledonous plants, including pine-apple (*Ananassa sativa*) and other valuable fibre-yielding plants (*Bromelia*, *Tillandsia*); found in tropical America, West Africa, East Indies.

BROMINE (Br., At. Wt. 80), non-metallic element, chemically similar to chlorine, heavy, dark-red liquid giving off red, evil-smelling (Gk. *brōmos*, a stench), poisonous vapour; B.P. 59-60°; solidifies at −24°; sp. g. 3·19; soluble in water, solution having bleaching powers. B. occurs combined with potassium and sodium in sea and some mineral waters and salt beds. B. and its compounds are used in photography, medicine (those of potassium and sodium as valuable sedatives), and manufacture of coal-tar colours.

BROMLEY (51° 24′ N., 0° 1′ E.), market town, Kent, England. Pop. (1911) 33,649.

BROMLEY, SIR THOMAS (1530–87), Eng. Lord Chancellor.

BROMPTON, W. district, London, part of Kensington; in 1854 the B. Oratory was transferred from King William Street, Strand, where it had been instituted by Father Faber in 1853.

BRÖMSEBRO (56° 30′ N., 15° 40′ E.), village, Sweden, where treaties between Denmark and Sweden were concluded, 1541, 1645.

BROMSGROVE (52° 22′ N., 2° 4′ W.), market town, Worcestershire, England; nails, buttons. Pop (1911) 8928.

BRONCHI, see RESPIRATORY SYSTEM.

BRONCHIECTASIS, a cylindrical or saccular dilatation of the bronchial tubes, most often occurring with chronic bronchitis or chronic pneumonia.

BRONCHITIS, inflammation of the mucous membrane of the bronchial tubes, the most common disease of the lungs in the Brit. Isles, is usually due to a chill. It is a frequent accompaniment of many specific fevers, especially measles and typhoid, and of many other lung diseases, or it may result from the spreading of a laryngitis. Certain occupations which expose individuals to a constant dusty or otherwise irritating atmosphere, *e.g.* masons, cotton-millers, chemical manufacturers, predispose towards b. The symptoms are pain behind the sternum, frequent cough, shortness of breath, slight rise of temperature; and an attack usually lasts one to three weeks. The treatment is, in the first stage to promote the secretion; when it is free, stimulate the mucous membrane in order to get rid of it, and then improve the general condition with tonics, cod-liver oil, etc.

BRONCHOCELE, see GOITRE.

BRONCO, see under HORSE FAMILY.

BRONGNIART, ADOLPHE THÉODORE (1801–76), Fr. botanist; b. Paris; M.D. (1826); director of Museum of Nat. History (1833); wrote important work on Fossil Plants (1828–37); founded and was 1st pres. of Fr. Bot. Soc. (1854).

BRONI (45° 3′ N., 9° 15′ E.), town, Italy; French defeated by Prince Eugene, 1703. Pop. *c.* 7000.

BRONN, HEINRICH GEORG (1800–62), Ger. scientist; adopted Darwinian theory; wrote on zool. and geol.

BRONSART VON SCHELLENDORF, PAUL (1832-91), Pruss. general and military author.

BRONTE (37° 45′ N., 14° 49′ E.), town, Sicily; Nelson cr. Duke of B., 1799. Pop. 19,000.

BRONTË, CHARLOTTE (1816–55), **EMILY** (1818–48), and **ANNE** (1820–49), Eng. novelists; were three dau's of Rev. Patrick Brontë, incumbent of Haworth, a wild moorland parish in the West Riding of Yorkshire. The children were left motherless at an early age, and the f., a man of hard nature and eccentric habits, lavished what affection he had for his offspring upon his only s., Branwell, who turned out a sot and a wastrel, and came to an early grave. It became Charlotte's business to 'mother' the family, and in their lonely life the three girls found solace in literary composition. Their first venture was a volume of *Poems*, under the pseudonyms, CURRER, ELLIS, and ACTON BELL (1846), which cost them £50, and only one or two copies were sold.

Notwithstanding this failure the sisters next applied themselves to novel-writing. Charlotte wrote *The Professor*, which, however, proved too short for the publishers to whom it was offered, and it did not appear in print until after her death. In the meantime she wrote *Jane Eyre*, which was pub. in 1847, and at once achieved a popular success. It was followed by *Shirley* (1849) and *Villette* (1852). In 1854 she married her f.'s curate, Rev. A. Nicholls, but died in the following year. Emily was the author of *Wuthering Heights* (1848); and Anne pub. *The Tenant of Wildfell Hall* and *Agnes Grey* (1848). The novels of the Brontë sisters have held a secure place in Eng. fiction for the past sixty years and more, and there is little evidence that their popularity is likely to diminish.

Life of Charlotte Brontë, by Mrs. Gaskell; also later ones by Birrell, Shorter, and Madame Duclaux; *The Brontës*, Miss Flora Masson (1912).

BRONTOSAURUS, extinct reptile, see REPTILES.

BRONTOTHERIUM, gigantic extinct member of the UNGULATA (*q.v.*).

BRONX, THE, most northerly of the five boroughs, city of New York, U.S.A.; area, 39¼ sq. miles. Pop. (1910) 430,890.

BRONZE, alloy of copper (80 %) and tin (20 %), with frequently addition of zinc, sometimes also of

phosphorus, silicon, or manganese; used for coins, bells (on account of its resonance), and statues. Exposure to atmosphere produces green coating of copper carbonate. Aluminium b. or gold b. contains 5 % of aluminium and is used for cheap jewellery.

BRONZE AGE, see ANCIENT HISTORY.

BRONZE-WING (*Phaps chalcoptera*), pigeon found in Australia, with bronze-coloured plumage.

BRONZITE, silicate of magnesia and ferrous oxide, a rock-forming mineral belonging to pyroxene group.

BROOCH (Fr. *brocher*, to pierce), ornamental device for fastening two articles or ends together, the pin and hook being usually concealed behind an ornamental plate, but sometimes an integral part of the ornament, as in the Irish b. The Tara b. is formed from hollow circle cut across by great pin which attaches by piercing without a hook, and stones are set into border of circle among interlaced filigree work. The b. was a matter of high art with the Greeks, who often ended both sides of b. with pin; the harp shape is characteristic of Rom. *fibula*. The Celtic hollow circle, crossed by the pin and bordered by design of large stones, displaced in XIV. cent. Eng. embossed disc, but the latter was parent of modern b.; rage for cameo b's marked XVIII. cent.

BROOK FARM (*c.* 42° 18′ N., 71° 10′ W.), district, near West Roxbury, Massachusetts, where an attempt was made at founding a socialistic settlement in 1841 by George Ripley and others. Members had to do certain amount of work daily; dissolved, 1847.

BROOKE, FULKE GREVILLE, 1ST BARON (1554–1628), Eng. poet; s. of Sir Fulke Greville; treasurer of the navy (1598); Chancellor of the Exchequer (1614); cr. baron (1621); wrote his own epitaph describing himself as 'Servant to Queene Elizabeth, Conceller to King James, Frend to Sir Philip Sidney.' He is chiefly remembered for his *Life* of Sidney, but he also wrote a tragedy, *Mustapha*, and some poems of no great merit.

BROOKE, HENRY (d. 1783), Irish author; trans. two books of Tasso's *Jerusalem Delivered* (1738); wrote a tragedy, *Gustavus Vasa*; and is chiefly remembered by his novel, *The Fool of Quality* (1765–70).

BROOKE, SIR JAMES (1803–68), Rajah of Sarawak (1841); Brit. colonial gov.; aided Sultan's forces to reduce revolted tribes of Sarawak (1839–41); ruled as Rajah (1841–46); island of Labuan purchased for Brit. colony, and Brooke made gov. (1847); charged with maladministration and displaced (1851); driven from Sarawak by pirates (1867).

BROOKE, STOPFORD AUGUSTUS (1832–), Brit. Unitarian minister and author; sometime chaplain-in-ordinary to Queen Victoria; later of Bedford Unitarian Chapel; author of *Poems* (1888), *Primer of Eng. Literature* (1876), *History of Early Eng. Literature* (1892), and numerous other literary and critical works.

BROOKFIELD, CHARLES (1857–), joint examiner of plays since 1911; has written several plays.

BROOKITE, mineral, titanium dioxide (TiO_2), occurring in right prismatic transparent to opaque yellowish-red crystals in igneous rocks (Snowdon, Tremadoc).

BROOKLINE (42° 20′ N., 71° 7′ W.), town, Massachusetts, U.S.A. Pop. (1910) 27,792.

BROOKLYN (40° 40′ N., 74° W.), borough of New York, city, occupying western end of Long Island and connected with mainland by bridges; is favourite residential quarter; has some beautiful parks, of which Prospect Park is much the largest; many educational institutions, of which most remarkable is B. Institute of Arts and Sciences. There are over 130 grammar schools, some good private schools and colleges, and many excellent libraries. Public buildings include white marble city hall, State arsenal, museum; U.S.A. navy yard is here, and a marine hospital; important trading and manufacturing centre; flour mills, sugar refineries, brass-works, breweries; B. was founded by Walloon colonists in 1636; site of battle during War of Independence; incorporated with New York, 1898. Pop. (1910) 1,634,351.

BROOKLYN BRIDGE, see BRIDGES.

BROOKS, CHARLES WILLIAM SHIRLEY (1816–74), Eng. novelist; ed. for law, but adopted journalism, and was on the staff of *Morning Chronicle*, *Illustrated London News*, and *Punch*, becoming editor of the latter. His novels include *Aspen Court*, *The Gordian Knot*, *The Silver Cord*, and others. He was a brilliant letter-writer, and celebrated as a wit.

BROOKS, PHILLIPS (1835–93), Amer. bp., noted preacher and author.

BROOM, evergreen shrub, SAROTHAMNUS SCOPARIUS; common on sandy soil; large, yellow, papilionaceous flowers; twigs used for brooms and thatching roofs, juice of tops medicinally as diuretic and laxative; many foreign species form handsome garden and greenhouse plants.

BROOME (18° S., 122° E.), port, W. Australia; pearl fisheries. Pop. (1911) 3763.

BROOME, WILLIAM (1689–1745), Eng. man of letters; assisted Pope in translation of *Odyssey*, and quarrelled with him when his (B.'s) share was minimised.

BRORA BEDS, strata occurring at Brora, Sutherlandshire, Scotland; of same geological age as Yorkshire oolites; contain seam of coal.

BROSCH, MORITZ (1829–1907), Ger. journalist and historian.

BROSELEY (52° 36′ N., 2° 29′ W.), town, Shropshire, England.

BROSSES, CHARLES DE (1709–77), Fr. scholar and statesman; wrote on geography, etymology, ancient history, etc.

BROTHERS OF COMMON LIFE, religious community established by Gerhard Groot in Deventer, *c.* 1380; to it St. Thomas à Kempis belonged; members devoted themselves to good works, but lived their ordinary life in the world; extinct about 1750.

BROTHERS, RICHARD (1757–1824), Brit. prophet and religious writer; put in asylum.

BROUGH, ROBERT (1872–1905), Scot. artist; was a painter of great promise; died from injuries received in a railway accident. His *Fantaisie en Folie* is in the Tate Gallery; and the Venice public gallery contains two fine examples of his work.

BROUGHAM, JOHN (1814–80), Irish dramatist and actor; a prolific writer of plays, one of his best-known being *The Duke's Motto*; as an actor he was very successful in Irish parts.

BROUGHAM AND VAUX, HENRY PETER BROUGHAM, 1ST BARON (1778–1868), Eng. Lord Chancellor; b. Edinburgh; ed. Edinburgh High School and Univ.; admitted to Scot. Bar (1800). B. co-operated in founding *Edinburgh Review* (1802), and contributed 80 articles to first 20 numbers; entered at Lincoln's Inn (1803); settled in London (1805); and was called to Eng. Bar (1808). Entering Parliament (1810) he was soon regarded as a possible leader, and carried a Bill making slave-trading felony. He was without a parliamentary seat, 1812–16. Returned for Winchelsea (1816), he became a prominent Opposition member, defeated Income-Tax Bill, and zealously advocated popular education.

As Queen Caroline's Attorney-General (1820), his management of her case won his fame. He introduced a great scheme of Law Reform (1828), was returned for York (1830), and in Nov., although Whig leaders would have gladly omitted him from the Cabinet, he was made Lord Chancellor. Whig Government broke up (1834), and on its reconstruction (1835) B. was excluded. He died at Cannes. Versatile, egotistical, turbulent, B. is chiefly remembered as a law reformer and author.

Victorian Chancellors, J. B. Atlay (1906); *Brougham's Life and Times*, by Hy., Lord Brougham (1871);

collected edition of his works, 2 vols. (1855–61; 2nd ed., 1872–73).

BROUGHTON, JOHN CAM HOBHOUSE, BARON (1786–1869), politician; b. Bristol; M.P. for Westminster (1820); supported reform party in Parliament; Sec. for War (1832); confined himself mainly to literary work after 1852; was a friend of Byron, an able debater, and an author.

BROUGHTY-FERRY (56° 28′ N., 2° 52′ W.), town, Firth of Tay, Forfarshire, Scotland; favourite watering-place; fortified castle. Pop. (1911) 11,059.

BROUSSA (40° 10′ N., 29° 5′ E.), town (and vilayet), Asiatic Turkey; seat of Gk. and Armenian abp's; thermal springs; silk and cotton manufacture; exports tobacco, meerschaum clay, opium, etc. Pop. *c.* 100,000. Area of vilayet, 25,400 sq. miles. Pop. 1,626,800.

BROUSSAIS, FRANÇOIS JOSEPH VICTOR (1772–1838), Fr. surgeon and pathologist; prof. of General Pathology in Paris Academy of Med. (1830); promulgated a new theory of medicine.

BROUSSONET, PIERRE MARIE AUGUSTE (1761–1807), Fr. botanist and zoologist; introduced Merino sheep and Angora goat to France.

BROUWER, ADRIAN (1606–38), master of Dutch school of *genre* painting.

BROWN SPAR, 'pearl-stone,' name of certain crystalline varieties of dolomite (*q.v.*) or magnesian limestone tinged with peroxide of iron; lustre, pearly.

BROWN, CHARLES BROCKDEN (1771–1810), Amer. novelist; author of *Wieland, Arthur Mervyn, Ormond,* etc. The weird element enters largely into B.'s writings, which show the influence of Godwin and similar authors.

BROWN, FORD MADOX (1821–93), Eng. artist; s. of a navy purser; displayed a remarkable talent for realistic treatment of hist. episodes, some of his best-known pictures being *Christ washing Peter's Feet, Romeo and Juliet, Don Juan, Shakespeare, Chaucer at the Court of Edward III.,* etc. In some of his pictures he was influenced by the 'Pre-Raphaelite' movement, of which he was the pioneer, though not a member of the Brotherhood. Much of his best work is to be seen in the Manchester Art Gallery and Town Hall (which contains twelve historical frescoes).

His s., OLIVER MADOX B. (1855–74), showed astonishing precocious genius, exhibited pictures, and pub. a novel, *Gabriel Denver.* His g.-children are the distinguished writers FORD MADOX HUEFFER, who wrote an account of the circle in *Ancient Lights,* and OLIVER MADOX HUEFFER ('Jane Wardle').

BROWN, FRANCIS (1849–), Amer. Hebrew scholar; author of *Assyriology* (1885), *A Hebrew and English Lexicon of the Old Testament,* etc.

BROWN, SIR GEORGE (1790–1865), Eng. general; served in the Light Division in the Peninsular War, and was wounded at *Talavera*; performed brilliant service in the Crimea; Commander-in-Chief in Ireland (1860–65).

BROWN, GEORGE (1818–80), Canadian reforming statesman and politico-religious writer; helped to bring about federation of British America.

BROWN, GEORGE DOUGLAS, see DOUGLAS, GEORGE.

BROWN, GEORGE LORING (1814–89), Amer. landscape painter of classical school; imitated Fr. school of XVII. cent.

BROWN, HENRY KIRKE (1814–86), Amer. sculptor; executed statues of George Washington and Pres. Lincoln for New York, and numerous others of public men for Washington (D.C.) and elsewhere.

BROWN, JACOB (1775–1828), Amer. general in wars against Britain.

BROWN, JOHN (1722–87), Scot. divine, s. of weaver; wrote *Dictionary of the Bible,* and *Self-Interpreting Bible.*

BROWN, JOHN (1736–88), Scot. physician, founded the Brunonian theory of medicine.

BROWN, JOHN (1800–59), Amer. abolitionist; **'Ossawatomie Massacre'** (*i.e.* execution of five 'pro-slavery' settlers who had murdered five 'free-state' settlers) carried out by his orders, 1856, and pro-slavery force defeated; assisted escape of slaves; captured and hanged (1859). B. is the subject of song, *John Brown's Body,* etc.

BROWN, JOHN (1810–82), Scot. physician and essayist; author of *Horæ Subsecivæ* (1858–61), *Rab and His Friends* (1859), *Marjorie Fleming* (1863), *John Leech and Other Papers* (1882).

BROWN, ROBERT (1773–1858), Scot. botanist; b. Montrose; ed. Aberdeen and Edinburgh Univ's; naturalist on scientific expedition to New Holland (1801–5); pres. Linnean Soc. (1849–53); keeper botanical collection at Brit. Museum (1827–58).

BROWN, THOMAS (1663–1704), Eng. satirist; wrote numerous poems and lampoons which possess some hist. value as sidelights upon the times. Amongst others he attacked Dryden, and his writings generally are scurrilous.

BROWN, THOMAS (1778–1820), Scot. philosopher; succ. Dugald Stewart as prof. of Moral Philosophy at Edinburgh, where he achieved great popularity as a lecturer. His *Lectures on the Philosophy of the Human Mind* had an extensive sale. He also wrote a considerable amount of poetry.

BROWN, THOMAS EDWARD (1830–97), Manx poet and schoolmaster; assistant-master at Clifton Coll. (1863–92); author of *Fo'c'sle Yarns* (1881), *The Doctor and Other Poems* (1887), *The Manx Witch* (1889), *Old John and Other Poems* (1893); *Collected Poems* (1900). Many of his narrative poems are written in the Manx dialect.

BROWNE, CHARLES FARRER, see ARTEMUS WARD.

BROWNE, EDWARD HAROLD (1811–91), Anglican divine; bp. of Ely (1864), Winchester (1873); author of standard theological books.

BROWNE, HABLÔT KNIGHT (1815–82), Eng. artist; better known as PHIZ; b. London, of Huguenot descent; apprenticed to the engraver Finden; had ambition to make a reputation as an artist, but, meeting with Dickens in 1836, he was pressed into service as an illustrator of the *Pickwick Papers,* then appearing serially. He was also the illustrator of *David Copperfield, Dombey and Son, Martin Chuzzlewit,* and *Bleak House,* besides many of the novels of Ainsworth, Lever, and Smedley.

BROWNE, ISAAC HAWKINS (1705–60), Eng. poet and wit; author of *The Pipe of Tobacco,* a poem which satirised the chief poets of his time; and a Latin poem, *De Animi Immortalitate,* which was admired for its display of scholarship.

BROWNE, JAMES (1793–1841), Scot. author; wrote *History of the Highlands and Highland Clans* (1834–36), and other hist. works.

BROWNE, SIR JAMES (1839–96), Anglo-Indian army engineer and administrator.

BROWNE, MAXIMILIAN ULYSSES, COUNT VON (1705–57), Austrian general; field marshal, 1753; idolised by soldiery; name given (1888) to Austrian infantry regiment.

BROWNE, ROBERT (1550–1630), founder of extreme Puritan, anti-episcopalian sect especially obnoxious to Queen Elizabeth; the BROWNISTS were partly suppressed by Whitgift's Court of High Commission, but secretly formed first Dissenting body, that of the Independents.

BROWNE, SIR THOMAS (1605–82), Eng. author and physician; b. London; ed. Winchester and Oxford; travelled abroad, and then practised med. at Norwich (1637); author of *Religio Medici* (1643), *Pseudodoxia Epidemica* (1646), *Hydriotaphia or Urn-Burial* (1658). Amid the stirring affairs going on around him in England, he had a singularly detached and contemplative mind, which he exhibits in his works. They are written in an elaborate and rich style, which is one of the most admired in Eng. prose. *Life,* by Gosse (1905); *Sir Thomas B.: an Appreciation,* by Whyte (1898).

BROWNE, WILLIAM (1591–1643), Eng. poet; author of *Britannia's Pastorals* (1613–16), and *The Shepherd's Pipe*. His poems celebrate the charms of his native Devonshire, and were read by, and to some extent influenced, Milton, Herrick, and Keats.

BROWNE, WILLIAM GEORGE (1768–1813), Eng. traveller; travelled extensively in Africa, Asia Minor, and other parts; pub. *Travels in Africa, Egypt, and Syria* (1799).

BROWNHILLS (52° 40′ N., 1° 55′ W.), urban district, Staffordshire, England; mining centre. Pop. (1911) 16,856.

BROWNIE, see FAIRIES.

BROWNING, ELIZABETH BARRETT (1806–61), Eng. poetess; dau. of Edward Moulton-Barrett, who had inherited valuable plantations in Jamaica. She developed a remarkable aptitude for study at a very early age, taking especial delight in Gk. poetry and philosophy. At the age of ten she began to write verse, and her first vol. of poetry, *An Essay on Mind and Other Poems*, was pub. when she had reached the age of nineteen. It was followed by *Prometheus Bound* (1833), *The Seraphim and Other Poems* (1838), and two vols. of *Collected Poems* (1844), including *The Drama of Exile*, *The Vision of Poets*, and *Lady Geraldine's Courtship*. In the following year she first met her future husband, Robert Browning, whose poetry she had already admired. They were married privately in 1846, she being then thirty-seven and Browning thirty-four, after which they went to Pisa, and later settled at Florence. The reason for this secrecy was that Mrs. B.'s father objected to his dau. marrying at all during his lifetime, and he never forgave her disobedience to his wishes.

Mrs. B.'s health had always been delicate, but it greatly improved after her marriage, and she applied herself with renewed energy to her literary work. On March 9, 1849, her only child, Robert Barrett B., was born. *Sonnets from the Portuguese* appeared in 1850. *Casa Guidi Windows* (1851), and her great poem, *Aurora Leigh* (1856). In 1860 she published a collected edition of her poetical work, under the title of *Poems before Congress*. Shortly afterwards her health began rapidly to decline, and she died in the following year. Her work is often slipshod, and her rhyming far from perfect, but, setting aside these blemishes, Mrs. B. is undoubtedly the greatest of English female poets, while Dr. Furnivall claimed that she was 'the greatest poetess whom the world has yet seen.' Certain it is that *Aurora Leigh*, *Lady Geraldine's Courtship*, and many of her shorter lyrical pieces, have secured a lasting place in Eng. lit.

J. H. Ingram's *E. B. Browning* (Eminent Women Series, 1888); Lubbock's *Mrs. B. in her Letters* (1906).

BROWNING, ROBERT (1812–89), Eng. poet; b. London; s. of Robert B., an official in the Bank of England; ed. privately, and at University Coll.; pub. his first poem, *Pauline*, anonymously in 1833. Two years later he issued *Paracelsus*, a long dramatic poem, which met with little success, but found appreciative readers in Wordsworth, Carlyle, and other men of letters. In 1837 Macready produced his *Strafford*, and in 1840 *Sordello* was published. These were followed by *Bells and Pomegranates* (1841), *A Blot on the 'Scutcheon*, (1843), *Luria*, and *A Soul's Tragedy* (1846). In the latter year he married Elizabeth Barrett, and went to live in Italy, returning to England after his wife's death in 1861. *Men and Women* appeared (1855), *Dramatis Personæ* (1864), *The Ring and the Book* (1868–69), *Balaustion's Adventure* (1871), *Fifine at the Fair* (1872), *Red Cotton Night-Cap Country* (1873), *The Inn Album* (1875), *Pacchiarotto* (1876), *La Saisiaz* (1878), *Dramatic Idylls* (1879–80), and *Asolando* (1889) was pub. on his death-day.

The obscurity of his earlier poems, like *Sordello*, and the general ruggedness of diction of the greater part of his work, have undoubtedly militated very strongly against B.'s popularity, but it has long been recognised that he belongs to the hierarchy of Eng. poets. What he lacks in poetical form he makes good in thought and vigour of expression. Beside his greatest work the correct Victorian style of Tennyson appears somewhat effeminate, while the passionate music of Swinburne seems empty of meaning. If B. could have combined something of the finer qualities of both these writers, his fame would undoubtedly have ranked higher, but it is certain that his profound knowledge of the mind and heart of man, his fearless optimism, his manliness, his tenderness, and his humour will be increasingly appreciated as the years go by.

Mrs. Orr's *The Life and Letters of Browning* (1891); E. Gosse's *Robert Browning* (1890); Stopford Brooke's *The Poetry of Robert Browning* (1902); and G. K. Chesterton's *Browning* (Eng. Men of Letters, 1908).

BROWN-SÉQUARD, CHARLES EDWARD (1817–94), neurologist and physiologist; b. Mauritius; studied med. in Paris; physician to National Hospital for Paralysed and Epileptic, London (1859); prof. of Physiology and Neuro-Pathology, Harvard (1864); prof. in École de Médecine, Paris (1869); returned to practise in America (1873); prof. of Experimental Med. in Collège de France, Paris (1878); did valuable research on spinal cord, internal secretions, etc.

BROWNSON, ORESTES AUGUSTUS (1803–76), Amer. socialist and religious writer; pub. *Brownson's Quarterly Review*, 1844–64; praised as philosopher by Comte.

BROWNSVILLE (25° 53′ N., 97° 26′ W.), city, river port, Texas, U.S.A., near mouth of Rio Grande; commercial centre; important market for live stock, rice, sugar-cane, etc.; has custom-house, R.C. cathedral, and coll.; bombarded by Mexicans, May 1846. Pop. (1910) 10,517.

BROXBURN (55° 57′ N., 3° 28′ W.), town, Linlithgowshire, Scotland; coal, paraffin shale oil. Pop. 7900.

BRUAY (50° 25′ N., 2° 15′ E.), town, Pas-de-Calais, France; in rich coal-mining district. Pop. 14,800.

BRUCE, BRUS, Scot. dynasty; ancestor came over with Conqueror from Normandy; Robert de Bruis received land grant in Yorkshire; branch obtained lordship of Annandale, Scotland; from latter descended ROBERT DE BRUS, claimant of Scot. crown, and his sons, ROBERT I. (*q.v.*) and EDWARD BRUCE (d. 1318), who assisted in establishing Scot. independence, conquered Ulster, was crowned King of Ireland, 1316, and killed at *Dundalk*. Robert Bruce's son reigned as DAVID II. (*q.v.*); his grandson as ROBERT II. (*q.v.*), first of Stewart line.

BRUCE, COL. SIR DAVID (1855–), kt.; Brit. scientist; expert on sleeping sickness and pathology in general.

BRUCE, JAMES (1730–94), Scot. African explorer, author of *Travels*, etc., and archæologist; discovered source of Blue Nile (1768–70) and (1772) its confluence with White Nile (the true source).

BRUCE, MICHAEL (1746–67), Scot. poet; s. of a weaver; herded cattle as a boy, but received a fair education, and spent some time at Edinburgh Univ.; afterwards became a schoolmaster, and d. of consumption. His best poem, *Elegy written in Spring*, was composed shortly before his death. His well-known *Ode to the Cuckoo* was unjustly appropriated by the Rev. John Logan, who edit. his remains.

Poems on Several Occasions, by Michael Bruce (1770).

BRUCH, MAX (1838–), Ger. composer and musician; well known as a violinist and conductor; conductor of Liverpool Philharmonic (1880–82); composer of numerous orchestral and vocal pieces, and two operas, *Lorelei* and *Hermione*.

BRUCHSAL (49° 8′ N., 8° 35′ E.), town, grand-duchy Baden, Germany; burnt by French, XVII. cent. Pop. (1910) 15,391.

BRUCINE, alkaloid accompanying strychnia in *nux vomica* (q.v.).

BRUCK.—(1) (48° 3′ N., 16° 47′ E.) town, Lower Austria, Austria. Pop. 5150. (2) (47° 25′ N., 15° 16′ E.)

town, Styria, Austria. Pop. 6500. (3) (47° 28′ N., 9° 39′ E.) town, Vorarlberg, Austria. (4) (48° 12′ N., 11° 15′ E.) town, Bavaria. Pop. 4450.

BRÜCKENAU (50° 19′ N., 9° 47′ E.), watering-place, Bavaria, Germany; mineral springs.

BRUCKER, JOHANN JAKOB (1696–1770), Ger. author; wrote chiefly on philosophical subjects, his best-known work being *Historia Critica Philosophiæ*, 1742–44.

BRUCKNER, ANTON (1824–96), Austrian composer; achieved a considerable reputation by his symphonies, which are marked by a strong Wagnerian influence.

BRUGES, BRÜGGE (51° 13′ N., 3° 14′ E.), city, Belgium, capital of Flanders; intersected by canals; flourishing commercial centre in XIII. cent.; retains mediæval appearance; fine churches, including Notre Dame; Les Halles, famous belfry, 353 ft. high; commercial importance restored, new ship canal to Zeebrugge being opened in 1905. Chief industry, lace-making. Pop. (1910) 53,285.

BRUGG (47° 29′ N., 8° 12′ E.), town, Switzerland; in vicinity is ruined castle of Hapsburg.

BRUGSCH, HEINRICH KARL (1827–94), Ger. Egyptologist.

BRÜHL (50° 49′ N., 6° 56′ E.), town, Rhine province, Prussia; royal palace. Pop. 7500.

BRÜHL, HEINRICH, COUNT VON (1700–63), Ger. statesman; controlled Saxon policy under Elector Frederick Augustus II., being made prime minister, 1746; entirely incapable and corrupt, he brought about disgrace of Saxony.

BRUISES, see WOUNDS.

BRUMAIRE, 2nd month in the Fr. republican calendar (Oct. 22 to Nov. 20) promulgated in year 1793.

BRUMATH, BRUMPT (48° 44′ N., 7° 42′ E.), town, Alsace-Lorraine, Germany. Pop. 5650.

BRUMMELL, GEORGE BRYAN, see BEAU.

BRUNANBURH, unidentified place, probably in N. England, where Danes, Welsh, and Scots were defeated by Athelstan, 937.

BRUNCK, RICHARD FRANÇOIS PHILIPPE (1729–1803), Fr. classical scholar; famous for his edition of Sophocles (1786), with Latin trans.; also editions of Virgil, Plautus, Terence, Anacreon, and other authors.

BRUNDUSIUM, see BRINDISI.

BRUNE, GUILLAUME MARIE ANNE (1763–1815), Fr. marshal; served under Napoleon.

BRUNEAU, ALFRED (1857–), Fr. composer; has written two collections of songs, *Lieds de France* and *Chansons à danser*, besides overtures, choral symphonies, and operas.

BRUNEI (4° N., 115° E.), sultanate under Brit. protection, N.W. Borneo; area, c. 4000 sq. miles; watered by Limbang; produces coal; exports sago. Chief town, BRUNEI (4° 50′ N., 114° 45′ E.), with pop. 10,000. People are Malayans, Kadangans, Chinese, etc. B. was independent state till 1888, when it became Brit. protectorate; administered by Brit. resident since 1906. Pop. 30,000.

BRUNEL, ISAMBARD KINGDOM (1806–59), Eng. engineer; s. of Sir Marc Isambard B.; b. Portsmouth; designed (1831) Clifton Suspension Bridge (completed, 1864); engineer to Gt. Western Rly. (1833); constructed *Great Western*, first steamship to cross Atlantic (1838); and *Great Eastern* (launched, 1858); also constructed docks, Monkwearmouth (1831), Plymouth, Milford.

BRUNEL, SIR MARC ISAMBARD (1769–1849), inventor and engineer; b. Normandy; expelled on Fr. Revolution; settled in U.S.A.; established arsenal and canon foundry at New York; coming to England, 1799, was employed by government in construction of his machine for making pulley blocks; built Thames Tunnel, opened 1843.

BRUNELLESCHI, FILIPPO (1379–1446), Ital. architect; revived the classic style in Italy; most of his great work was executed in Florence, his birthplace, and includes the Pitti Palace, the great cupola of the cathedral of Santa Maria del Fiore, the Capella del Pazza, etc.

BRUNETIÈRE, FERDINAND (1849–1906), Fr. critic; editor of *Revue des Deux Mondes*; author of *Études Critiques* (1880–98), *Histoire et Littérature* (1884–86), *Questions de Critique* (1888).

BRUNHILD.—(1) In Norse myth. a Valkyrie, dau. of Odin, by whom she was thrown into a charmed sleep on Hindarfjell. (2) In the *Nibelungenlied*, queen of Iceland, who procured the murder of Siegfried, once her lover. (3) A Visigoth princess, wife of Sigbert, king of Austrasia (567).

BRUNI (43° 22′ S., 147° 20′ E.), island, Tasmania, Oceania; coal.

BRUNI, LEONARDO (1369–1444), Ital. scholar of Renaissance; papal sec., chancellor of Florence; author of *Historiarum Florentinarum Libri*.

BRÜNIG PASS (46° 47′ N., 8° 7′ E.), pass leading from Bernese Oberland to Unterwalden, Switzerland.

BRÜNN (49° 13′ N., 16° 36′ E.), town, Austria, capital of Moravia; formerly fortified; cathedral, several old churches; centre of cloth industry. Pop. (1910) 125,737.

BRUNNE, ROBERT OF, see MANNYNG, ROBERT.

BRUNNEN (46° 59′ N., 8° 36′ E.), village, Switzerland; summer resort.

BRÜNNOW, FRANZ FRIEDRICH ERNST (1821–91), Ger. astronomer; b. Berlin; assistant, Berlin Observatory (1851); director, Observatory of Ann Arbor, Michigan (1854); astronomer-royal for Ireland (1866).

BRUNO, THE GREAT (925–65), abp. of Cologne; s. of Henry the Fowler of Germany and bro. of Otto the Great.

BRUNO, ST., see CARTHUSIANS.

BRUNO, GIORDANO (c. 1550–1600), Ital. philosopher; b. Nola, near Naples; Dominican friar in youth, but fled to Geneva (1576) on account of religious opinions; proceeded to Toulouse (1579) and to Paris (1580), where he lectured on philosophy and attacked Aristotelians; visited England (1583), where he met Sir Philip Sidney; in 1586, prof. at Wittenberg; returned to Italy, 1592; imprisoned by Inquisition, and burnt as a heretic, in Rome (1600). His philosophy tends towards pantheism, and influenced the thought of Descartes, Spinoza, Schelling, etc.; chief works, *Della Causa Principio ed Uno* (1584), and *Del Infinito Universo e Mondi* (1584).

BRUNOW, LUDWIG (1843–), Ger. soulptor; important monuments in Berlin, etc.

BRUNSBÜTTEL (53° 54′ N., 9° 7′ E.), port, Schleswig-Holstein, Germany.

BRUNSWICK (31° 10′ N., 81° 30′ W.), town, Georgia, U.S.A. Pop. (1910) 10,182.

BRUNSWICK, BRAUNSCHWEIG (52° 20′ N., 10° 30′ E.), duchy, N.W. Germany, with Harz Mountains in S.; area, 1424 sq. miles; rivers, Ocker, Weser, navigable; beech, fir, pine, oak forests; coal, iron, agriculture, and cattle rearing important; sugar principal manufacture. Government is constitutional monarchy; one legislative assembly. In early times B. was incorporated in Saxony; became independent duchy, XIII. cent.; held by Guelphs till death of Wilhelm I., 1884, since when ruled by regent, as next heir, Duke of Cumberland, refused to forego claims to Hanoverian crown; regent is Duke John Albrecht of Mecklenburg. Pop. (1910) 494,339.

BRUNSWICK (52° 15′ N., 10° 30′ E.), capital, B. duchy, Germany; Romanesque cathedral, begun c. 1173, fine Gothic town hall, several old churches, and other interesting buildings; Ducal palace is modern; several museums; industries include printing, jute-spinning, manufacture of chemicals, machinery, beer. Pop. (1910) 143,552.

BRUNSWICK (43° 52′ N., 70° 1′ W.), village, Maine, U.S.A.; seat of Bowdoin Coll., with good art collection; paper, cotton. Pop. (1910) 5341.

BRUNSWICK, NEW, see NEW BRUNSWICK.

BRUNSWICK-BEVERN, AUGUST WILHELM, DUKE OF (1715–81), distinguished Prussian general.

BRUNSWICK-LÜNEBURG, CHARLES WILLIAM FERDINAND, DUKE OF (1735–1806), Prussian general; b. Wolfenbüttel; m. dau. of Frederick, Prince of Wales; succ. to duchy (1780); commanded Austrian and Ger. troops against French (1792); led Prussian troops against Napoleon; mortally wounded at Auerstadt (1806).

BRUSSELS, Bruxelles (50° 52′ N., 4° 21′ E.), capital of Belgium, in province of Brabant; centre of canal and railway system; industries, carpets, lace, embroidery, ribbons, linen, hats, damask, paper, porcelain, jewellery, soap, carriages. Modern town is well laid out, has fine lime-planted boulevards separating it from suburbs and avenues connecting it with park and *bois*; older town in centre. Important buildings are town hall, magnificent Palais de Justice, royal palace, houses of parliament, three fine old churches, art and natural history museums, univ. Various guilds were established in B. from XI. cent.; 1st charter granted in 1312; saw struggles between rival guilds, and execution of Egmont and Horn; thrice burnt; capital of Austrian Netherlands in XV. cent.; taken by French, 1794, who held it till 1814; capital of Belgium, 1830; centre of art and music. Pop. (1910) 720,347.

Gilliat-Smith, *Story of B.*

Brussels Conferences, international conferences: (1) on usages of war, 1874, abortive; (2) to consider exploration and civilisation of Africa, 1876; International Association formed; Congo Free State ultimately established.

BRUT, THE TROJAN, legendary Brit. hero. Immediate effect of 'Roman cycle' of romances was Eng. effort to connect England with Roman history; hence Geoffrey of Monmouth (*q.v.*) traces Brit. kings back to Brutus, whom he makes banished descendant of the Æneas of Homer and Virgil.

BRUTTII, Ital. tribe in classical times; inhabited district now known as Calabria; aided Pyrrhus against Rome, and supported Hannibal; as punishment their territory was annexed by Rome.

BRUTUS, surname of members of Rom. *gens* Junia. Distinguished representatives were **Lucius Junius,** who helped to overthrow the Tarquin monarchy and became one of first consuls (509 B.C.), and **Marcus Junius** (85–42 B.C.), the great patriot of Shakespeare's *Julius Cæsar,* taken from Plutarch's *Lives*; the latter was deeply loved by Cæsar, but joined in his assassination (44); after defeat by Augustus, slew himself at Philippi; considered in Middle Ages a traitor, later a republican martyr.

BRÜX (50° 31′ N., 13° 37′ E.), town, Bohemia, Austria. Pop. (1910) 25,692.

BRY, THEODORUS DE (1528–98), Ger. publisher and engraver; carried on business at Frankfort-on-Main; visited London and met Richard Hakluyt, who assisted him in the preparation of an illustrated collection of voyages and travels which appeared in parts (1590–1634), the work being carried on after his death by his s., Johannes de B.

BRYAN, WILLIAM JENNINGS (1860–), Amer. politician; leader of democratic party, bimetallist, anti-imperialist, and anti-protectionist; representative of First Congressional District of Nebraska in House of Representatives, 1891–95; Democratic candidate for presidency, 1896, 1900, 1908; Secretary of State, 1913.

BRYANSK, see Briansk.

BRYANT, JACOB (1715–1804), Eng. antiquary; sec. to Duke of Marlborough; author of numerous works on history and mythology; bequeathed his valuable library to King's Coll., Cambridge.

BRYANT, WILLIAM CULLEN (1794–1878), Amer. poet and journalist; b. Massachusetts; adopted legal profession, which he abandoned in 1829 to become editor of the *New York Evening Post,* with which he was associated for the remainder of his life. He may be regarded as the pioneer of Amer. poets, his first considerable poem, *Thanatopsis,* appearing in 1817. He also trans. Homer's *Iliad* and *Odyssey*; *Poetical Works* (New York, 1903).

BRYCE, JAMES (1838–), Brit. historian and statesman; b. Belfast; ed. Glasgow and Oxford; called to Bar (1867), and entered House of Commons (1880); prof. of Civil Law at Oxford (1870–93); Under-Sec. for Foreign Affairs (1886); chancellor of Duchy of Lancaster (1892) in Mr. Gladstone's administrations; pres. of Board of Trade in ministry of Lord Rosebery (1894), taking a prominent part in the Irish Home Rule campaigns. He was appointed Chief Sec. for Ireland (1905) in the ministry of Sir Henry Campbell-Bannerman, and (1907–13) ambassador to the U.S.A., where he laboured to bring about an Anglo-American arbitration treaty. Author of *The Holy Roman Empire* (1862), *The American Commonwealth* (1888), *Impressions of South Africa* (1897), *South America: Observations and Impressions* (1912), etc., which have secured him a place among the great historians.

BRYDGES, SIR SAMUEL EGERTON (1762–1837), Eng. poet and antiquary; prosecuted an unsuccessful claim to the Chandos barony; pub. *Censura Literaria, British Bibliographer, Restituta, Autobiography,* and was a voluminous writer of sonnets.

BRYENNIOS, PHILOTHEOS (1833–), Gk. abp. of Nicomedia; discovered and pub. letters of Clement I. (1875) and MS. *Teaching of the Apostles* (1883). See Didache.

BRYENNIUS, NICEPHORUS (1062–1137), Byzantine general, statesman, and chronicler.

BRYNMAWR (51° 48′ N., 3° 10′ W.), town, Brecknockshire, England. Pop. (1911) 7592.

BRYOLOGY, the science of mosses. See Bryophyta.

BRYOPHYTA, group of plants which includes two classes—the Liverworts or Hepaticæ, and the Mosses or Musci. As in the Pteridophyta (*q.v.*), the sexual organs consist of archegonia and antheridia, and consequently the two [illegible] goniatæ. The antheridia are generally stalked ovoid or globular structures producing a large number of biciliate sperms, whilst the archegonia do not differ essentially from those of the Pteridophyta. There is a distinct alternation of generations, the fertilised egg producing the sporophyte, which usually consists of an absorptive region, the foot, a stalk or seta, and a specialised capsule which produces the asexual spores. This is always to a large extent dependent on the gametophyte or moss 'plant,' the relative importance of the two generations thus being the reverse of that obtaining in the Pteridophyta.

The germinating spore in the liverworts usually produces a flat cell-plate from which the gametophyte originates directly, but in the mosses a branched filamentous growth, the protonema, at first arises, and from this the leafy shoots are developed. The mature gametophyte in the Hepaticæ may consist of a ribbon-like, repeatedly forked thallus, or, as in all the Musci, of a leaf-bearing shoot, attached to the substratum by a branching rhizoid system. They do not possess true roots, nor are their tissues differentiated into the specialised conducting elements of the higher forms. The leaves are also simple in type, except in a few such as Polytrichum. The sexual organs are borne on the upper surface of the thallus in the thalloid forms, or at the apex of the stem or branches in the leafy forms. The sporophyte produced from the fertilised egg varies considerably in structure, being on the whole much simpler in the Hepaticæ than in the Musci. In the majority of the former the capsule develops elongate cells termed elaters, which are primarily nutriment conductors, but which later develop spiral thickenings and assist in spore dispersal.

In the case of one group only, the Anthocerotales, is there a sterile central axis in the capsule, whilst in the Musci the presence of such an axis or columella is a general feature. The capsule in these also possesses a basal assimilatory portion in most forms, but is

devoid of elaters. Asexual reproduction by specialised gemmæ also occurs in many liverworts and a few mosses. Classification: (1) HEPATICÆ — (*a*) Marchantiales, thalloid forms, (*b*) Jungermanniales, mostly leafy forms, (*c*) Anthocerotales; (2) MUSCI — (*a*) Sphagnales, bog mosses, (*b*) Andreæales, (*c*) Phascales, (*d*) Bryales or true mosses.

BRYOZOA, see POLYZOA.

BRZEZANY (49° 28′ N., 24° 57′ E.), town, Galicia, Austria. Pop. 11,450.

BUBASTIS, Gk. form of the name of the Egyptian goddess Ubasti, to whom the domestic cat was sacred. The festivals of this goddess were marked by considerable riot.

BUBO, see OWLS.

BUBONIC, see PLAGUE.

BUCARAMANGA (7° 20′ N., 73° 10′ W.), town, Colombia. Pop. 19,750.

BUCCANEERS, see THEFT.

BUCCARI (45° 18′ N., 14° 32′ E.), town, Hungary.

BUCCINA, ancient Roman musical instrument consisting of a curved brass tube, roughly in the shape of the letter C.

BUCCINUM, see WHELK.

BUCCLEUCH, DUKEDOM OF, held since 1663 by descendants of Scot. house, Scott of B., in Selkirkshire.

BUCENTAUR (debased from Ital. *bucintoro*), barge in which Doge of Venice, on Ascension Day yearly, wedded the Adriatic; custom commenced about 1000 A.D.; discontinued, 1789.

BUCEPHALUS (Gk. *Boukephalos*, ox-head), name of horse of Alexander the Great; many legends have sprung up about it; Alexander built city of BUCEPHALIA (site of modern Dschalalpur) on the Hydaspes (Dschelam) to its memory (326 B.C.).

BUCER, MARTIN, BUTZER (1491–1551), learned Ger. reformer who aided Luther.

BUCH, CHRISTIAN LEOPOLD VON, BARON (1774–1853), Ger. geologist and geographer; b. Pommerania; travelled Italy, France, Scandinavia, Canaries, Hebrides, making special study of volcanic rocks.

BUCHAN (*c.* 57° 34′ N., 2° 10′ W.), region, Aberdeenshire and Banffshire, Scotland.

BUCHAN, EARLDOM OF, held by Scot. families of Comyn, Stewart, and Erskine successively.

BUCHAN, DAVID (1780–*c.* 1839), Brit. arctic explorer; perished in search for N.W. passage.

BUCHAN, PETER (1790–1854), Scot. printer and engraver who made important collections of Scot. ballads (Percy Soc.).

BUCHAN, WILLIAM (1729–1805), Scot. doctor; pub. *Domestic Medicine* (1769).

BUCHANAN, CLAUDIUS (1756–1815), Scot. divine; chaplain under East India Co.; wrote *Christian Researches in Asia.*

BUCHANAN, GEORGE (1506–82), Scot. humanist and reformer; had to fly from Scotland (1539), through writing against monastic orders; became prof. of Latin at Bordeaux (where Montaigne was his pupil), and wrote Latin plays, winning fame; imprisoned in Portugal by Inquisition (1551); tutor to Mary, Queen of Scots (1562); tutor to James VI. (1570); wrote democratic political treatise condemned by Parliament and burned by Univ. of Oxford (1579); pub. history of Scotland, valuable as material for his own times (1582). He was a scholar and writer of first rank. *Life,* by Hume Brown (1890), Macmillan (1906).

BUCHANAN, JAMES (1791–1868), 15th Pres., U.S.A.; ed. Dickinson College, Carlisle, Pennsylvania (1809); barrister (1812); in Lower House of state legislature (1814–16); Congress (1821–31); ambassador to St. Petersburg (1832–33); in Senate (1834–45) as democrat; Sec. of State (1845–49); Minister to Great Britain (1853); Pres. (1856–61); pub. a defence of his administration (1866).

BUCHANAN, ROBERT WILLIAMS (1841–1901), Eng. poet, novelist, and dramatist; his first vol. of verse, *Undertones* (1863), was followed by many others; *Complete Poetical Works* (1901). Of his numerous novels, *The Shadow of the Sword* and *God and the Man* are perhaps the best. He achieved his greatest success with his original plays and his adaptations of Fielding's novels.

Jay's *Robert Buchanan* (1903).

BUCHANITES, followers of Elspeth Simpson (1738–91), concubine of Robert Buchan and preacher of communistic Christianity in Scotland.

BUCHAREST (44° 25′ N., 26° 5′ E.), capital, Rumania; situated in Walachian plain, and traversed by Dumbovitza R.; has royal palace, government buildings, state univ., museum, many Gk. churches, and charitable institutions; trading centre, principally in agricultural produce, timber, and petroleum; strongly fortified with chain of eighteen forts round city. B. was held by Austria, 1789–91. Treaty settling boundary question concluded here by Turkey and Russia, 1812. Pop. *c.* 300,000.

BUCHER, LOTHAR (1817–92), Ger. publicist; Bismarck's sec. and confidant.

BUCHEZ, PHILIPPE JOSEPH BENJAMIN (1796–1865), Fr. writer; helped to form secret society against government (1821); grad. in medicine (1825); expounded a doctrine of 'Christian Socialism'; was pres. of Constituent Assembly (1848); and wrote several important works on history, philosophy, and social science.

BUCHHOLZ (52° 8′ N., 13° 45′ E.), town, Saxony, Germany. Pop. 9500.

BÜCHNER, FRIEDRICH KARL CHRISTIAN LUDWIG (1824–99), Ger. philosopher; author of *Kraft und Stoff* (1855), in which he advances theories upon the indestructibility of matter.

BUCHON, JEAN ALEXANDRE (1791–1849), Fr. scholar; travelled extensively in Europe and the East, collecting materials relative to Fr. settlements abroad, which have proved of considerable value to historians.

BUCK, see under DEER FAMILY.

BUCK, DUDLEY (1839–1909), Amer. composer; held appointments as organist at Chicago, Boston, and New York; operas include *Serapis* and *Deseret*; cantatas, *Columbus, Golden Legend, Light of Asia,* etc.

BUCKEBURG (52° 16′ N., 9° 2′ E.), town, Schaumburg-Lippe, Germany. Pop. 6000.

BUCKET SHOPS, offices of brokers who, not being Stock Exchange members, are not allowed to carry out sale or purchase of stocks or shares, and must employ Stock Exchange brokers.

BUCKHOLDT, JOHANN (1508–35), Dutch Anabaptist fanatic; executed.

BUCKIE (57° 41′ N., 2° 58′ W.), town, Banffshire, Scotland; fishing. Pop. (1911) 8897.

BUCKINGHAM (52° N., 0° 59′ W.), town, Buckinghamshire, England; grammar school founded by Edward VI.; agricultural and lace trade. Pop. (1911) 3282.

BUCKINGHAM PALACE, royal residence, London; built, 1825, in Georgian style, on site of B. House, Duke of B.'s residence in Anne's reign.

BUCKINGHAM, EARLDOM, MARQUESSATE, AND DUKEDOM OF.—Earldom of B. goes back to XI. cent. GEORGE NUGENT TEMPLE GRENVILLE (1753–1813), 2nd Earl Temple, was cr. Marquess of B. (Dec. 1784). His elder s., RICHARD GRENVILLE (1776–1839), was cr. Duke of B. and Chandos (1822). The dukedom became extinct in 1889.

BUCKINGHAM, GEORGE VILLIERS, 1ST DUKE OF (1592–1628), Eng. statesman; introduced to king (Aug. 1614); soon gained favour as successor to Earl of Somerset; app. Cupbearer (Nov. 1614); Gentleman of the Bedchamber, and knighted (April 1615); Master of the Horse (1616); Order of Garter (1616); cr. Viscount Villiers and Baron Waddon (1616), Earl of B. (1617), and Marquess of B. (1618); Lord High Admiral (1619); m. Lady Catherine Manners (1620); supported Span. party (1620–22), but after disastrous visit to Madrid (1623) headed popular

movement against Spain, and strove for a Fr. alliance. His schemes were interrupted by James's death (1625). B. and Charles were resolved to fight Spain, but their attempts failed disgracefully; Parliament (1625–28) demanded B.'s dismissal, but Charles stood by his minister; B. was assassinated by a discontented subaltern (Aug. 23, 1628) at Portsmouth, while preparing an expedition to relieve La Rochelle. Handsome, insinuating, self-confident, B. was an incompetent, harmful minister.

BUCKINGHAM, GEORGE VILLIERS, 2ND DUKE OF (1628–87); brought up with Charles I.'s children; fought for king in Civil War. Charles II. made him a P.C. (1650); app. general of Eastern Association in England (1650); present with Charles at battle of *Worcester* (1651). Subsequently he returned to England, and m. Lord Fairfax's dau. (1657); was imprisoned on suspicion of organising a Presbyterian plot against government (1657–59). Restored to favour at Restoration, he subsequently succ. Clarendon as chief minister; his tenure of office chiefly marked by scandals and intrigues; forced to retire into private life (1674); joined Opposition; constituted himself the champion of the dissenters, but separated from Whigs on Exclusion question; restored to king's favour, 1684, but took no part in public life after James's accession; volatile, insincere man, the 'Zimri' of Dryden's *Absalom and Achitophel*, and

> 'In the course of one revolving moon,
> Was chemist, fiddler, statesman, and buffoon.'

Wrote occasional verses and satires, and witty comedies, including *The Rehearsal* (1671), in which he parodied Dryden's manner—Dryden, the poet-laureate, appearing as 'Bayes.'

BUCKINGHAM, HENRY STAFFORD, 2ND DUKE OF (in the Stafford line) (1454–83); recognised as duke (1465); transferred his support from Richard of Gloucester to Henry Tudor, hence tried and executed (Nov. 2, 1483).

BUCKINGHAM, JAMES SILK (1786–1855), Eng. author and journalist; b. Falmouth; went to India and founded the *Calcutta Journal* (1818); returned to England and started *The Athenæum* (1828); M.P. for Sheffield (1832–37); travelled extensively and wrote numerous books of travel.

BUCKINGHAM AND NORMANBY, JOHN SHEFFIELD, 1ST DUKE OF (1648–1721), Eng. statesman; succ. 3rd Earl of Mulgrave (1658); served in army and navy; Lord Chamberlain on accession of James; made Marquess of Normanby (1694); Duke of B. and Normanby (1703); Lord Steward (1710); Lord Pres. of Council (1711); was patron of Pope and Dryden, and composed several poems.

BUCKINGHAMSHIRE (51° 26′ to 52° 11′ N., 0° 35′ to 1° 8′ W.), county, England; area, 748 sq. miles; bounded N. by Northampton, E. by Bedford, Hertford, Middlesex, S. by Berkshire, W. by Oxford; surface generally undulating; in S. are Chiltern Hills, which are well wooded, especially with beeches; in centre is Vale of Aylesbury, a district noted for dairy produce, ducks, and sheep; drained by Thames, which bounds county on S., and by Ouse, Colne, Thame; there are no large towns; capital, Aylesbury; manufactures unimportant, include straw-plait, wooden chairs, thread lace, paper. Famous school, Eton, is near southern boundary. B. is traversed by Watling Street and other ancient highways; was included in old kingdom of Mercia; saw struggles against Danes; scene of hostilities in Civil War of John's reign; supported Roundheads in Great Rebellion. Pop. (1911) 219,583.

BUCKINGHAMSHIRE, EARLDOM OF.—**John Hobart** (*c.* 1694–1756), lord-lieut. of Norfolk (1740), was cr. Earl of B. (1746). His s., **John** (1723–93), lord-lieut. of Ireland (1776–80), succ. as 2nd earl. After **Robert Hobart**, 4th earl (1760–1816), pres. of Board of Control (1812–16), the titles passed to his nephew, **George Robert Hobart** (1789–1849), lieut.-gov. of Grenada.

BUCKLAND, FRANCIS TREVELYAN (1826–80), Eng. zoologist; experimented in fish-culture.

BUCKLAND, WILLIAM (1784–1856), Eng. scientist and divine; lectured and wrote on geology; became dean of Westminster.

BUCKLE, GEORGE EARLE (1854–), Eng. journalist; b. near Bath; ed. Winchester and Oxford (M.A., 1st class, Lit., Hum., and Mod. Hist.); barrister (never practised); on staff of *The Times* (1880); editor (1884–1912).

BUCKLE, HENRY THOMAS (1821–62), Eng. historian and student; b. Lee, Kent; travelled on Continent, and in Egypt and Syria; a famous chess-player; d. at Damascus (May 1862). B. pub. his great work, *History of Civilisation in England* (1857–61).

BUCKNILL, SIR JOHN CHARLES (1817–97), Eng. physician; lord chancellor's visitor in lunacy (1862–76); author of several works on insanity and psychology.

BUCKSTONE, JOHN BALDWIN (1802–79), Eng. actor and dramatist; was an admirable low comedian, and a prolific writer of farces, but is chiefly remembered as manager of the London Haymarket theatre.

BUCOLICS, name given to the pastoral poetry of the ancient Gk. and Latin poets, and so applied in modern times to similar work.

BUCYRUS (40° 55′ N., 82° 58′ W.), town, Ohio, U.S.A. Pop. (1910) 8122.

BUCZACZ (49° 4′ N., 25° 23′ E.), town, Galicia, Austria. Pop. 11,800.

BUDA-PESTH (47° 32′ N., 19° 4′ E.), capital, Hungary; consists of two towns, Buda and Pesth, on opposite banks of Danube, which were united in 1873. Buda (or *Ofen*) is principal seat of govt.; royal palace and houses of parliament situated here; Pesth is commercial centre, but contains national Univ., observatory, museum, and art collections; there are many fine churches, notably the Matthias church in Buda, and the Leopoldstadt Basilica in Pesth; other churches include synagogue and mosque. B. contains many mineral springs, some of which were known in Rom. times, and some splendid baths.

Buda was site of both Celtic and Rom. settlements; of latter, called *Aquincum*, traces still exist, including remains of baths. Romans withdrew in late IV. cent. A.D., after which place was successively occupied by Huns, Goths, and other barbarian peoples; taken by Magyars in X. cent.; ruined by Mongols in 1241; restored by Bela IV.; fell to Turks, 1526; became Hungarian capital, 1867.

Industries include flour-milling, tanning, sugar-refining, distilling, manufacture of cutlery, gold and silver goods, tobacco, etc.; trade carried on in corn, wine, spirits, cattle, and famous Hungarian flour. Inhabitants are Germans, Magyars, and other nationalities. Pop. (1910) 880,371.

BUDAUN (28° 2′ N., 79° 11′ E.), town, United Provinces, India. Pop. 41,600. **Budaun** (27° 38′ to 28° 29′ N., 78° 21′ to 79° 35′ E.), district; area, *c.* 2000 sq. miles. Pop. 1,035,000.

BUDDHA, founder of Buddhism (*q.v.*), was really called *Siddhattha*, though usually described by his family name *Gotama*, or as *the Buddha*—'the enlightened one.' He was son of Suddhodana, a chief of the Sakiya clan, and was born probably about 568 B.C. Married at nineteen, he led a life of ease; when twenty-nine fled from home, and became beggar. After temptation by Mara, the tempter, he spent six years of most terrible austerities till, worn out, he ceased to inflict penances on himself, thereby forfeiting some of his followers' admiration. Still he could not satisfy himself, but at last he attained peace of mind meditating beneath a bo tree.

Determined to preach and bring to others the peace he had found himself, B. began by winning back his former disciples. Gotama continued his preaching and teaching for 45 years. At length, on a journey to Kusimara, north-east of Benares, he lay down to

die beneath two sala trees. He was a great and gracious character. An urn containing ashes, probably those of B. himself, was discovered only recently.

Oldenburg, *Buddha* (Eng. trans., 4th ed., 1904); Rockhill, *Life of B.*

BUDDHAGHOSA (IV. cent. A.D.), Buddhist author; wrote several works on Buddhist doctrine, some of which have been pub. by the Pāli Text Society.

BUDDHISM, religion founded by Buddha; widely spread in Asia, though it has never gone beyond. Its main principle is the Middle Path, between self-indulgence and asceticism. The 'Middle' Path is also the Eightfold Path, that is (in the translation of a modern scholar) Right Views, Right Aspirations, Right Speech, Right Conduct, Right Mode of Livelihood, Right Effort, Right Mindfulness, and Right Rapture. Besides this there are Four Truths, that unsatisfied desire is painful, that desire is the origin of suffering, that the removal of pain is the emancipation of desire, and that the way thereto is the Eightfold Path. B. involves belief neither in God, immortality, nor sacrifice. Great emphasis is laid on love. Besides the things to be desired there are Ten Bonds, Five Hindrances, and Four Intoxications which are to be avoided. When a man has conquered himself and guided his life aright in all these, he can attain the *Arahatship*. The three great sins are self-indulgence, ill-will, and stupidity, and the emancipation from these constitutes *Nirvana*.

B. lays enormous emphasis on emancipation in this life, not in the future; rejects the immortality of the soul, but keeps the doctrine of the transmigration. Though no soul really exists, yet the desires possessed in one creature pass on to another in the next life. This doctrine is called *Karma*.

Though writing was known in Buddha's time, his teaching was oral, and was delivered in *sutras* (formulæ). These were gathered together by his disciples, and are all in Pali, the everyday speech of his time (Sanskrit already being a dead language). A large number of works relating to B. were written at various times within six cent's after Buddha's death; many not yet printed.

B. spread in India, but there was a reaction towards Hinduism, and now B. is almost extinct except in Nepal. Ceylon is Buddhist. It is also the religion of Further India, and Lamaism, the religion of Tibet, is a corrupt form. B., one of the religions that have exerted most influence on the world, now numbers more adherents than any other faith except Christianity, but it does not seem likely to influence Europe much.

Rhys Davids, *Buddhist India* (Story of the Nations), *History of Buddhist India* (Hibbert Lect.), *Buddhism* (S.P.C.K.); Mrs. Rhys Davids, *Buddhism*.

BUDE (50° 50′ N., 4° 31′ W.), port, Cornwall, England.

BUDÉ, GUILLAUME, BUDÆUS (1467–1540), Fr. scholar; was a prolific writer both in Gk. and Latin, and was much esteemed by Francis I. and Erasmus; did much to promote the cause of learning, and was one of the founders of the Collège de France.

BUDGELL, EUSTACE (1686–1737), Eng. essayist; Addison's cousin; wrote for the *Tatler*, *Spectator*, and *Guardian*; lost a fortune in the 'South Sea Bubble'; was accused of forgery, and drowned himself.

BUDGET (O. French, *bougette*), the financial statement annually made in House of Commons by Chancellor of Exchequer. The 'Budget' obtains in Brit. colonies, Brit. India, and, in modified forms, in France, U.S.A., and elsewhere. The term also indicates a small coffer, and thus is used for a dispatch-box containing official papers.

BUDINI, ancient race, who inhabited district in S.E. of European Russia.

BUDRUM (37° 4′ N., 27° 26′ E.), port, Turkey-in-Asia; site of ancient Halicarnassus (*q.v.*). Pop. *c.* 6000.

BUDWEIS (48° 59′ N., 14° 28′ E.), cathedral town, Bohemia; commercial centre. Pop. (1910) 44,538.

BUELL, DON CARLOS (1818–98), Amer. Federalist general.

BUEN AYRE, BONAIRE (*c.* 12° 12′ N., 68° 25′ W.), one of Leeward Islands, Dutch W. Indies; area, 95 sq. miles. Pop. (1909) 6353.

BUENAVENTURA (3° 50′ N., 77° 15′ W.), port, Colombia.

BUENOS AIRES (34° 40′ S., 58° 20′ W.), capital of Argentine Republic, on right bank of La Plata R.; extensive docks; terminus of six railways; great manufacturing town and centre of inland trade; manufactures cloth, carpets, furniture, cigars, boots, shoes; city regularly laid out, has fine squares and parks; has large cathedral and archiepiscopal palace; other important buildings are government house, exchange, State library, univ., opera-house. City was finally established by de Garay in 1580, after two unsuccessful attempts at settlement by earlier Span. colonists; Brit. forces twice sent against town during Fr. Revolutionary wars, without success; has suffered from bad epidemics. Pop. (1912) 1,383,663.

BUENOS AIRES (37° S., 60° W.), province, S. America; area, 117,800 sq. miles; surface is plain, crossed by many streams and dotted with lakes; chief industry, sheep and cattle raising; produces cereals, tobacco, fruits; exports butter, wool, wheat, jerked beef; capital, La Plata. Pop. (1910) *c.* 1,796,320.

BUFFALO (42° 55′ N., 78° 50′ W.), town, New York, U.S.A., at eastern end of Lake Erie; terminus of Erie Canal, and a great trading and railway centre. Grain, flour, live stock, coal, and lumber are chief articles of commerce. Industries include meat-packing, oil-refining, brewing, distilling, car- and ship-building, manufacture of leather, tobacco, clothing, etc.; has fine harbour. B., second largest city in New York, is a fine town, regularly laid out with broad tree-lined streets and handsome public buildings, including granite city hall, State Arsenal, Government Building, etc. There are many charitable institutions and several beautiful parks. B. was founded in 1801 by Holland Land Company; incorporated as city, 1832; Pan-American Exposition, 1901. Pop. (1910) 423,715.

BUFFALO, *Bubalus*, genus of ruminants belonging to the same family (*Bovidæ*) as the ox; includes two principal species: the Indian B. (*B. buffelus*) is indispensable as a powerful beast of burden and for traction and domestic purposes. They have a preference for marshy ground, which they frequent. Domesticated herds have been introduced into Italy and Greece. The Cape B. (*B. caffer*) occurs in large herds in Central and S. Africa, and is very powerful and dangerous when wounded, and not to be domesticated. The base of the horns forms a thickening which is practically bullet-proof.

BUFFIER, CLAUDE (1661–1737), Fr. philosopher; attached to the Jesuit College at Rouen for the greater part of his life; evolved a system of philosophy which won Voltaire's commendation.

BUFFON, GEORGE LOUIS LECLERC, COMTE DE (1707–88), Fr. naturalist; b. Montbard (Burgundy); early abandoned law for natural sciences; app. member of Academy and Keeper of Jardin du roi (1739); enjoyed favour of Louis XV. and XVI.; produced with assistance of Daubenton his great work, *Histoire Naturelle*.

BUG.—(1) (*c.* 52° 45′ N., 22° E.) river, Austria and Russia. (2) (46° 58′ N., 32° E.) river, Russia.

BUG, a general name for any member of the insect order Hemiptera (*q.v.*); or particularly the bed-bug (*Cimex lectularius*), a flat, wingless semi-parasite found only in human dwellings, although related species occur on bats and birds.

BUGA (3° 59′ N., 76° 22′ W.), town, Colombia. Pop. *c.* 13,000. B. department has area, 3090 sq. miles. Pop. *c.* 98,000.

BUGASON (11° 10′ N., 122° 30′ E.), town, Philippines. Pop. *c.* 14,000.

BUGEAUD DE LA PICONNERIE, THOMAS ROBERT (1784–1849), Fr. soldier; served in

Napoleonic campaigns; became a field-marshal (1831); won distinction in Algeria, being gov.-gen. (1840–46); marshal of France (1843); became Duke of Isly (1844); commanded army of Alps (1848–49).

BUGENHAGEN, JOHANN (1485–1558), Ger. Reformer; convert and helper of Luther.

BUGGE, SOPHUS (1833–1907), Norweg. philologist; prof. of Philology at Christiania; edit. the Elder Edda, *Gamle Norske Folkeviser* (folk-songs), etc.

BUGGY, light four-wheeled conveyance used in America and Australia for travelling over rough ground.

BUGIS, a Malayan people of Muhammadan faith, inhabiting Celebes and other portions of the Malay Archipelago; governed by a native king, they are brave and fierce in disposition, practise agriculture, and drive flourishing trade in native products.

BUGLE.—(1) A wild plant, bearing a blue flower. (2) A longish black bead used in dress ornamentation.

BUGLE, treble brass or copper wind instrument with cup-shaped mouthpiece, used in military service. During the XVIII. cent. it superseded the drum in Eng. infantry regiments as a signal instrument, and eventually ousted the cavalry trumpet. There is also a keyed instrument known as the 'Royal Kent Bugle,' which, however, has now given place to the cornet. The b. is a very ancient musical instrument, and originally was made of a bull's horn—hence the term 'bugle-horn.'

BUGULMA (54° 27′ N., 52° 42′ E.), town, Samara, Russia. Pop. *c.* 12,000.

BUGURUSLAN (53° 43′ N., 53° 22′ E.), town, Samara, Russia; leather, live stock. Pop. *c.* 21,000.

BUHR STONE, variety of quartz; a siliceous or siliceo-calcareous stone much used as millstones.

BUHTURĪ (820–97), Arabian poet of the Tāi tribe, much of whose poetry is addressed to Alwa, an Aleppo maiden.

BUILDING, the name given to the art of erecting houses, public edifices, shops, etc., which, besides the architect who designs the structure, is the work of various craftsmen such as the mason, bricklayer, carpenter, joiner, plumber, painter, and glazier. Though the architect delegates the manual work to a builder, it is requisite that he should have a thorough knowledge of building construction, drainage, and other matters; that he should understand the kind of foundation required from an examination of the soil; be fully acquainted with the by-laws governing the erection of buildings with regard to height, spacing, materials used, and numerous other necessary details; and, in short, be fully competent to supervise the work of the builder. In choosing a site for the erection of a building 'made' ground, *i.e.* land which has at some time been artificially filled in, should be especially avoided, likewise marshy ground; a dry subsoil, with natural drainage, being the most suitable for building purposes. Even when a site with a dry soil has been chosen the builder frequently lays a foundation of concrete, which is not only calculated to give greater stability to the superstructure, but also serves to protect the building from the effects of damp.

BUILDING SOCIETIES, associations from whose funds advances are made to members upon security by mortgage of real property, the object being at first purely to enable people of small means to build, purchase, or obtain lease of a house, afterwards partly to provide bank for profitable investment of small sums.

There are two varieties of B. S., terminating and permanent. Many of former came into existence under Friendly Societies Act, 1834; funds are invested with intention of paying stipulated sum when sufficient has accumulated to each member, but payments are made in anticipation to those who pay discount and continue to pay 'redemption money' as well as subscription till other members have received payments. The 'advanced' member must give security on real property for future payments, and Building Societies Act, 1894, protects such mortgages from law against usury; discount paid very high, and great profit to society. When all members have received stipulated sum society winds up.

Members of permanent society, qualified to receive advance, submit to society property in view, receive advance, purchase the property and mortgage it to society, repaying advance with interest by easy monthly instalments.

All societies formed since 1856 and some of earlier ones are incorporated under Building Societies Acts, 1874 and 1894. The incorporated societies are governed according to provisions of those Acts. The Act of 1874 repealed Act of 1836 (earliest B. S. legislation) and enacted incorporation of all future B. S's, under its own provisions; that of 1894 made provision of 1874 as to keeping and auditing accounts binding on all.

BUILTH, BUILTH WELLS (52° 9′ N., 3° 23′ W.), town, Brecknockshire, Wales; summer resort; mineral springs; agricultural centre.

BUISSON, FERDINAND (1841–), Fr. educationist; Director of Primary Education at Paris (1879–96); afterwards prof. of Education at Sorbonne; member of Chamber of Deputies.

BUITENZORG (6° 30′ S., 106° 48′ E.), town, Java, Dutch East Indies; residence of gov.-gen.; has famous botanic garden. Pop. 25,000.

BUJALANCÉ (37° 53′ N., 4° 24′ W.), town, Spain; leather, woollens. Pop. 10,756.

BUJNURD (37° 29′ N., 57° 21′ E.), town, Persia.

BUKHĀRĪ (810–72), Arabic writer; spent many years in travel, collecting traditions concerning Muhammad, which he afterwards sifted; held in great veneration.

BUKKAR, BAKAR, BUKKUR (27° 45′ N., 68° 50′ E.), fort and island, Sind, India.

BUKOWINA (48° N., 25° 30′ E.), duchy and crown-land, Austria; great part occupied by Carpathian Mts.; fertile, extensive forests; chief trade, cattle, grain, wool, agricultural produce; mixed population, leading nationalities Ruthenian, Rumanian; ceded to Austria, 1777; incorporated with Galicia, 1786, but made separate crown-land, 1849; capital, Czernowitz. Pop. (1910) 800,098.

BULACAN (15° N., 120° 58′ E.), town, Luzon, Philippines; chief products, minerals, sugar, rice; destroyed by fire, 1898. Pop. 15,000.

BULANDSHAHR (28° 24′ N., 77° 54′ E.), town and district, India, in Meerut division of United Provinces; district intersected by Ganges; canal, which is navigable and also irrigates land; chief centre of trade, Khurja; exports indigo, cotton, wool, and cereals. Pop. *c.* 19,000.

BULAWAYO (20° 10′ S., 28° 40′ E.), town, capital of Matabeleland, S. Rhodesia, S. Africa; lies in fertile district, rich in minerals, gold principally. Pop. 4000.

BULBUL, name given on account of their call to several common Indian garden-birds of family Timeliidæ; and also to the Persian Nightingale, DAULIAS.

BULDANA (*c.* 20° 32′ N., 76° 14′ E.), town and district, S.W. Berar, Central Provinces, India; rich in agricultural produce; well watered; exports, cotton and grain; area (district), 2809 sq. miles. Pop. 430,000.

BULDUR, BURDUR (36° 50′ N., 30° 7′ E.), town, Konia vilayet, Asia Minor; chief industries, linen-weaving and leather-tanning.

BULELENG (8° 17′ S., 115° 4′ E.), harbour, Bali Island, Dutch E. Indies.

BULFINCH, CHARLES (1763–1844), Amer. architect; succ. Latrobe as architect of the Washington Capitol; exercised considerable influence on Amer. arch.

BULGARIA (43° N., 25° E.), kingdom, Balkan Peninsula, S.E. Europe; bounded N. by Danube, E. by Black Sea, S. by Balkans; includes Eastern Rumelia. B. is drained by Iskar, Maritza, and other affluents of Danube; crossed by Balkans and Rhodope Mountains. In N. between Tirnova and Rustchuk

are grass-covered plains, dotted with thousands of tumuli or burial mounds, which are also found on plains near Philippopolis.

History.—Early history is obscure; peopled by Thraco-Illyrian tribes, who were subdued by Philip and Alexander of Macedon; annexed by Vespasian, and became Rom. province in I. cent. A.D. Part between Balkans and Danube was called *Dacia Aureliani*, and was included by Constantine the Great in his empire. About this time, however (328 A.D.), emigrations of Eastern barbarians had already begun, and country was overrun successively by Goths, Huns, and other tribes, of whom most important were Slavs, who settled here between III. and VII. cent's. Later in VII. cent. the *Bulgari*, an Asiatic tribe, appeared. Under Asparich they subdued country, *c.* 680, gave it their name, and founded first Bulgarian empire. In IX. cent. Krum warred against Gk. emperor. One of his successors, Boris, became Christian, 864, and encouraged spread of Christianity in B. Boris abdicated, *c.* 888. Under his s., Simeon, first Bulgarian empire reached its apotheosis, but after his death it gradually declined. Gk. emperor, Nikephorus, tried to conquer B., *c.* 965, and was aided by Russians under Sviatoslav, who later (969) again invaded country with some success at first, but was ultimately expelled.

Soon after this Boris II. of B. was deposed by Greeks, who annexed country in 1018. B. remained subject to Byzantium till 1186, when Bulgarians rose in revolt, led by John and Peter Asen, who threw off Byzantine yoke and founded Asenide dynasty, which lasted for two cent's, attaining greatest power under Asen II., 1218–41. About a cent. later country was for time ruled by Servia, attaining great importance under Dushan, 1331–55. After this Turks began to encroach on B. They finally subdued whole country and established Ottoman rule, 1389, which lasted for about four cent's. Of this period history remains obscure through lack of records, which were destroyed by conquerors; but the Bulgarians seem to have been treated with great cruelty and injustice. From about middle of XVIII. cent. began a revival of lit. and education. Histories were written, giving accounts of former greatness of nation, thus rousing discontent and hostility to Turks.

Crimean War (*q.v.*), which brought about emancipation of Rumania from Turkey, had no such result in B., which was if possible worse treated than before; revolts which occurred were crushed without mercy. From 1875 to 1877 European powers engaged in various conferences with object of forcing Turkey to grant religious freedom to subject races. In 1876 occurred the 'Bulgarian Atrocities,' when over 15,000 Christians were massacred by Turk. troops with utmost cruelty. These were made known by Amer. consul at Constantinople and by Eng. press correspondents; and Mr. Gladstone emerged from retirement in order to speak in aid of oppressed Bulgarians and to demand autonomy for state. In 1877 Alexander II. of Russia declared war against Turkey, in which he was supported by Rumania; ultimate result was Treaty of Berlin, 1878, whereby B. was constituted as an autonomous and tributary principality, under Sultan's suzerainty; a prince was to be elected by the people. Eastern Rumelia was by this treaty also made largely autonomous, and was to be ruled by gov. named by Sultan. Alexander of Battenberg was chosen as first prince of B., 1879, while Prince Vogorides became first gov. of E. Rumelia.

He was succeeded by Gavril Pasha Krestovich, during whose governorship the two states were united. Alexander of Battenberg presently fell into disfavour in Russia, and Tsar Alexander III. withdrew all Russ. officers from Bulgarian army. About same time Servia declared war on B.; Servians were ultimately driven back and peace was concluded. Russia then formed plot against Alexander of Battenberg, which many of his officers were induced by bribery to join, and which resulted in his abdication, 1886. In 1887 Prince Ferdinand of Saxe-Coburg-Gotha was chosen as second prince of Bulgaria; independence of B. was recognised by Powers, 1909, when Prince Ferdinand became Tsar. War against Turkey declared, 1912 (see TURCO-BALKAN WAR).

Most important towns are Sofia (capital), Tirnova (old capital), Philippopolis (capital of E. Rumelia), Varna and Rustchuk (ports), Slivno (manufacturing city). Country is almost entirely agricultural, about five-sevenths of population engaged on land. Wheat is principal product, largely exported; wine, tobacco, silk also produced. Minerals include iron, gold, silver, lead, manganese, copper. Chief manufactures are attar of roses (at Kezanlik), woollens, cottons, cigarettes; there are breweries, distilleries, filigree works, sugar-refining works; fisheries in Danube and Black Sea; imports textiles, metal goods, machinery, petroleum, leather, etc.; articles imported from Britain are cottons, coal, colonial and metal goods; exports, cereals, attar of roses, rice, silk, wine, tobacco, eggs, skins. Inhabitants are mainly Bulgarians proper, with considerable number of Turks; principal religion, Gk. Church. Education is compulsory. Area, *c.* 37,000 sq. miles. Pop. (1910) 4,337,513.

BULGARIA, EASTERN, former kingdom; now included in Russia.

BULGARUS (d. 1166), Ital. lawyer; chief of the celebrated 'Four Doctors' of Bologna Univ.

BULK MODULUS, see ELASTICITY.

BULKHEADS, see SHIPS.

BULL.—(1) Edict of Pope with leaden seal (*bulla*) attached. (2) Irish bulls are seriously made statements containing contradictory terms, with ludicrous effect. (3) One who agrees to buy stock, hoping that, by settlement time the price having risen, he may sell at a profit.

BULL RUN (38° 50′ N., 77° 35′ W.), stream in N.E. Virginia; flows between Fairfax and Prince William counties; Federalists were twice defeated by Confederates, July 21, 1861, and Aug. 29–30, 1862.

BULL, GEORGE (1634–1709), Eng. bp.; wrote *Harmonia Apostolica* to reconcile teaching of SS. Paul and James on Justification, and *Defensio Fidei Nicenæ*.

BULL, JOHN (1563–1628), Eng. organist and composer; organist of Hereford Cathedral, Queen Elizabeth's chapel, and prof. of Music at Gresham Coll., London. In 1617 he became organist of Antwerp Cathedral, where he died. Amongst others, he has been claimed as the composer of the National Anthem.

BULL, JOHN, humorous impersonation of the collective English people, conceived of as well-fed, good-natured, justice-loving, and plain-spoken; designation derived from Arbuthnot's satire, *The History of John Bull*.

BULL, OLE BORNEMANN (1810–80), Norweg. violinist; first professional appearance in Paris (1832); afterwards toured Italy, England, and America with immense success.

BULLA, see under GASTEROPODA.

BULL-BAITING, see BEAR-BAITING.

BULLDOG, see DOG.

BULLER, CHARLES (1806–48), Eng. lawyer and radical politician.

BULLER, SIR REDVERS HENRY (1839–1908), Brit. general; member of old Cornish family; distinguished himself in Kaffir and Zulu wars and in Sudan; app. commander-in-chief of South African Field Force for Boer War (1898); repulsed at *Colenso*, and superseded by Lord Roberts, but as commander of Natal army finally relieved Ladysmith.

BULLET, see AMMUNITION.

BULL-FIGHTING, the Span. national sport since the XI. cent., in which some of the earlier kings used to take part. A modern bull-fight is divided into three parts. After the formal parade around the arena of all those about to take part in the spectacle, the bull is let loose into the ring, and having been already infuriated, he attacks the *picadores* (mounted upon blindfolded horses), who are armed with short-pointed lances. The bull almost invariably disembowels

the horses, which are afterwards dragged out, and the *picadores* endeavour to weaken the creature by repeated thrusts with their weapons. The next stage is that of planting darts in the bull's neck by the *banderilleros*; and the final act is the stabbing of the beast to the heart by the *matador*, armed with a short flat sword. It is estimated that from 5000 to 6000 horses and about 1300 bulls are slain annually in Spain in connection with these spectacles.

BULLFINCH, see FINCH.

BULLFINCH MINES, W. Australia; scene of 'gold-rush,' 1910–11; rich veins of quartz in places.

BULLHEADS (*Cottidæ*), small, large-headed, large-finned, tapering fishes found in shallow water and chiefly in Northern seas. A few inhabit fresh water. There are 4 Brit. b's (*Cottus*): the miller's thumb, a prickly little fish common beneath stones in streams (related forms with similar names occur in America); the sea scorpion; the fatherlasher; and the four-horned b.

BULLI (34° 20′ S., 150° 59′ E.), town, New South Wales.

BULLINGER, HEINRICH (1504–75), Swiss Reformer; friend and successor of Zwingli; assisted in drawing up Helvetic Confession; friend and correspondent of Lady Jane Grey.

BULL-ROARER, Eng. plaything, consisting of a flat strip of wood (8 in. by 4), bored at one end for a string to be passed through, which, when whirled round in circles, produces a roaring sound. A similar object is used by the Australian aborigines and other primitive races (called 'tundun') in their heathen ceremonies.

BULL-TROUT, see under SALMON FAMILY.

BÜLOW, BERNHARD HEINRICH KARL MARTIN, PRINCE VON (1849–), Ger. statesman; Foreign Sec., 1897–1900, carrying on colonial expansion of Germany; Chancellor of the empire and President of Prussian ministry (1900), and as such defended emperor's policy in China; made Prince (1905); libelled in case that made great stir (1907); resigned Chancellorship on virtual defeat of his budget in the year 1909.

BÜLOW, DIETRICH HEINRICH, COUNT VON (1757–1807), Ger. writer; bro. of the field-marshal; lost opportunities by attacks on existing institutions; pub. *Geist des neueren Kriegssystems* (1805), and followed it up with military works on same lines, from which Prussia learnt much.

BÜLOW, FRIEDRICH WILHELM, FREIHERR VON, COUNT OF DENNEWITZ (1755–1816), Russ. general; cr. count for great victory at *Dennewitz* (1813), repelling Napoleon; took part in invasion of France (1814); made celebrated charge at *Waterloo*.

BÜLOW, HANS GUIDO VON (1830–94), Ger. pianist and conductor; abandoned law for music, and studied under Hauptmann, Liszt, and Wagner. He was a pianist of the first rank, and obtained fame throughout Europe and America as a masterly conductor. He married the dau. of Liszt, but the union was afterwards dissolved, and the lady married Wagner.

BULSAR (20° 35′ N., 72° 56′ E.), port, Bombay, India; timber. Pop. 13,500.

BULSTRODE, SIR RICHARD (1610–1711), Eng. cavalier and author; joined Charles I. at outbreak of Civil War; was employed abroad by Charles II., and shared in the exile of James II. His *Memoirs* (not pub. till 1721) contain much valuable hist. matter.

BULWER, SIR HENRY—William Henry Lytton Earle Bulwer, Baron Dalling and Bulwer—(1801–72), Eng. diplomatist; s. of General William Earle B., and bro. of the novelist Edward (Lord Lytton); won distinction as *attaché* at The Hague during revolt of Belgium, and establishment of independence under Leopold I.; became *chargé d'affaires* at Brussels; helped new government and wrote brilliant account of its establishment in *Westminster Review*, Jan. 1831; author of able books on France and politics during succeeding years; as sec. to embassy at Constantinople obtained important commercial concessions from Turkey, 1838; app. ambassador to Spain, 1843; denounced dictatorship of Marshal Narvaez and was ordered to leave Spain; his act was approved at home and apology ultimately obtained; baron, 1871; one of the most skilled modern diplomatists.

BULWER-LYTTON, see LYTTON.

BUN, name given in England to a round light cake, about the size of a saucer, made of ordinary baker's dough mixed with currants, raisins, and candied peel. 'Scotch bun,' on the other hand, is much larger and thicker, and is a heavy, rich, spiced cake covered with a thin outer crust of ordinary dough.

BUNBURY (33° 15′ S., 115° 35′ E.), port, Western Australia.

BUNBURY, HENRY WILLIAM (1750–1811), Eng. caricaturist; s. of Sir W. Bunbury, Bart.; one of most celebrated comic artists of his day, and a popular social figure.

BUNCRANA (55° 8′ N., 7° 27′ W.), town, Donegal, Ireland.

BUNDABERG (24° 45′ S., 152° 25′ E.), town, Queensland. Pop. 5200.

BUNDELKHAND, BANDALKHAND (25° N., 80° E.), district, Central India States; area, *c.* 13,000 sq. miles; surface generally hilly; plain in N.E.; mountains are Bindhachal, Panna, and Bander ranges; rivers, Sind, Betwa, Ken, Jumna, etc. Diamonds are found. Fauna includes tigers, hyenas, leopards. British acquired all rights in B. from peshwa, 1817. Pop. 1,375,000.

BUNDESRATH, see GERMAN EMPIRE.

BUNDI, BOONDEE (25° 26′ N., 75° 37′ E.), state, Rajputana, India; chief town, BUNDI. Pop. 171,227.

BUNDORAN (54° 30′ N., 8° 15′ W.), village, Donegal, Ireland; watering-place.

BUNER (*c.* 25° 26′ N., 75° 37′ E.), district, N.W. Frontier Province, India. Pop. *c.* 7000.

BUNGAY (52° 27′ N., 1° 26′ E.), town, Suffolk, England. Pop. (1911) 3359.

BUNGENER, LOUIS FÉLIX (1814–74), Fr. divine; author of theological novels.

BUNION, swelling caused by chronic inflammation of synovial sac on metatarsal joint of great toe; due mainly to wearing of improperly made boots; treated by correcting the deformity of the great toe by proper boots, manipulation, etc., soothing applications to the swelling; in very pronounced cases operation is necessary.

BUNKER HILL (42° 24′ N., 71° 3′ W.), low hill, Charlestown, suburb of Boston; granite obelisk marks site of famous battle in American War of Independence (June 17, 1775), when Amer. forces were defeated.

BUNN, ALFRED (1796–1860), Eng. theatre manager and librettist; after being stage-manager at Drury Lane Theatre, he eventually undertook the sole management of that theatre and Covent Garden; produced the principal operas of Balfe, the libretti of which he trans.

BUNNER, HENRY CUYLER (1855–96), Amer. author; was editor of *Puck*, which he raised into a strong political organ; wrote several novels and plays, but was at his best as a writer of short stories and light verse.

BUNSEN, CHRISTIAN CHARLES JOSIAS, BARON VON (1791–1860), Ger. diplomatist; b. Korbach; ed. Korbach Grammar School and Marburg Univ.; became sec. and subsequently successor to Niebühr, Prussian envoy to papal court; aided Fred. William IV. to establish Prusso-Anglican bishopric at Jerusalem; was ambassador to court of St. James's for thirteen years; sat in Prussian Upper House as Baron von B. (1858), and henceforth engaged mainly in literary work.

BUNSEN, ROBERT WILHELM VON (1811–99), Ger. chemist; successively Chemistry prof. at Marburg, Breslau, and Heidelberg; famous as the founder, with Kirchhoff, of spectrum analysis; the inventor of the

burner (in which gas is sent through a tube which is pierced at the base as well as open at the top; air is thus drawn in, and an intensely hot non-luminous flame is produced; the principle is utilised in laboratories and in gas stoves) and cell bearing his name, and magnesium light; famous for numerous other researches. His successful methods of teaching attracted many students.

BUNTER (from Ger. *Bunt* = variegated), lowest section of Triassic rocks; consists of mottled red and green sandstones and conglomerates, with interposed pebble beds; contains few fossils. Attains thickness of 2000 feet in Cheshire and Staffordshire.

BUNTING, see EMBERIZIDÆ.

BUNTING, JABEZ (1779–1858), Eng. Methodist divine; pres. of Wesleyan Coll. at Hoxton, 1835.

BUNYAN, JOHN (1628–88), Eng. religious leader and writer; b. near Bedford, of humble parentage. He spent a gay boyhood, but it was gradually borne in upon him that he was extraordinarily wicked, although he never seems to have lived an immoral life, swearing being his only vice. He married in 1648, gradually gave up his amusements and dancing, and led a religious life, but could find no inward peace. At length he became happier, and preached the Gospel. But nonconformist preaching was not tolerated, and in 1660 he was imprisoned in Bedford gaol. In prison he wrote his *Grace Abounding to the Chief of Sinners*, describing his own religious conflicts. He was let out for a short time in 1662, and again imprisoned till 1678. In 1678 appeared his *Pilgrim's Progress*, one of the most famous religious books in English. Before his death it was read widely in England, New England, and among foreign Protestants. Written in the form of an allegory, it has appealed to successive generations of readers, though, as a modern authority points out, it was for long read almost only by the lower orders of society. His position among Baptists was such that he was called 'Bp. Bunyan,' and though he sometimes feared persecution he was never again imprisoned. He published *The Life and Death of Mr. Badman* in 1680, and in all more than fifty other works.

Brown, *John Bunyan*. Numerous editions of Bunyan's own works.

BUNZLAU (51° 16′ N., 15° 36′ E.), town, on Bober, Prussian Silesia, Germany; manufactures famous pottery, and woollens; large trade in grain and cattle. Pop. *c.* 15,000.

BUOL-SCHAUENSTEIN, KARL FERDINAND, COUNT (1797–1865), Austrian diplomatist; present at Dresden Conference, Congress of Paris, etc.

BUONAPARTE, see BONAPARTE.

BUONARROTI, see MICHELANGELO.

BUOYANCY, see ARCHIMEDES, HYDROMECHANICS.

BUPRESTIDÆ, see under POLYMORPHA.

BURANO (45° 30′ N., 12° 28′ E.), island and town, N.E. of Venice, Italy; chief industries, lace-making and fishing. Pop. 8200.

BURAUEN (10° 58′ N., 124° 55′ E.), town, Leyte, Philippine Islands; hemp. Pop. 18,200.

BURBAGE, JAMES (d. 1597), Eng. actor and manager; built the Shoreditch Theatre (1576), the earliest in London; afterwards built the Blackfriars Theatre (1596).

BURBAGE, RICHARD (d. 1619), s. of the above, was the most famous actor of his day, excelling especially in Richard III. and other tragic parts. He pulled down the Shoreditch Theatre and erected the Globe, in the proprietorship of which he was associated with Shakespeare and others. (Quiller-Couch, *Shakespeare's Christmas.*) He was also an artist, and the 'Felton' Shakespeare portrait is said to have come from his brush.

BURBANK, LUTHER (1859–), Californian naturalist who has 'created' many new varieties of fruits and flowers (*e.g.* stoneless plums, thornless cacti); conducts valuable horticultural experiments.

BURBOT, EEL-POUT, RABBIT-FISH (*Lota lota*), only Brit. freshwater member of cod family, found in East Eng. streams as well as in N. Europe and Siberia; dark olive fish, with coarse, tasteless flesh.

BURCKHARDT, JACOB (1818–97), Swiss author; his writings are on art subjects, and include *Der Cicerone: eine Anleitung zum Genuss der Kunstwerke Italiens* (1855), *Die Cultur der Renaissance in Italien* (1860), Eng. trans. of which have been published.

BURCKHARDT, JOHN LEWIS (1784–1817), Swiss explorer and student of Oriental life and language; b. Lausanne; explored interior of Africa; bequeathed his collection of Oriental MSS. to Cambridge Univ.

BURDEAU, AUGUSTE LAURENT (1851–94), Fr. statesman; pres. of Chamber of Deputies, 1894.

BURDEKIN (20° 36′ S., 147° 10′ E.), river, Queensland, Australia; enters Pacific.

BURDER, GEORGE (1752–1832), Eng. Congregationalist minister; noted preacher and sermon writer.

BURDETT, SIR FRANCIS (1770–1844), Eng. Radical politician; advocated parliamentary reform, removal of R.C. disabilities, ballot, universal male suffrage, etc.; twice imprisoned for political reasons.

BURDETT, SIR HENRY (1847–), Eng. authority on finance and on hospital administration; author of numerous works; founder of *The Hospital*; superintendent of Queen's Hospital, Birmingham, and of Seamen's Hospital, Greenwich; sec. Share and Loan Department, London Stock Exchange.

BURDETT-COUTTS, ANGELA GEORGINA (1814–1906), Baroness (1871); Eng. philanthropist; inherited £2,000,000 from her grandfather, and took additional name Coutts; m. William Lehman Ashmead Bartlett (1881); founder of many charitable institutions.

BURDON-SANDERSON, SIR JOHN SCOTT, Bart. (1828–1905), Eng. physiologist; Jodrell prof. of Physiology (1874), University College, London; Waynflete prof. of Physiology (1882), and regius prof. of Med. (1895), Oxford; great advocate of value of experiments on animals.

BURDUR, see BULDUR.

BURDWAN, BARDWAN (23° 14′ N., 87° 54′ E.), town, Bengal, Brit. India; composed of numbers of small villages; palace and gardens of Maharajah; group of 108 temples.

District is flat, well-watered plain; important coalfields; indigo, silk; area, 2689 sq. miles.

Division, bordering Bay of Bengal, comprises six districts; area, 13,949 sq. miles. Pop., town, 35,000; district, 1,532,500; division, 8,240,000.

BUREAUCRACY, system of government in which various departments are controlled by officials independent of the electorate. Tsar of Russia appoints his ministers to hold office during his pleasure; system obtains in Prussia also.

BURFORD (51° 48′ N., 1° 38′ W.), market town, on Windrush, Oxfordshire, England; fine church.

BURG (52° 16′ N., 11° 51′ E.), town, Prussian Saxony, Germany; cloth, leather. Pop. 23,500.

BURGAGE TENURE, tenure in ancient Eng. boroughs, whether royal or mesne, the *burgensis* owing a fixed ancient rent for his *burgagium*. In Scotland it only existed in royal boroughs and remained important until Conveyancing Act, 1874. *Burgagia* in some boroughs (perhaps always those of Saxon origin) descended according to Borough English (*q.v.*).

BURGAS (42° 30′ N., 27° 30′ E.), seaport, Eastern Rumelia, on inlet of Black Sea; grain, wool. Pop. (1910) 14,897.

BURGAS, LULE, see TURCO-BALKAN WAR.

BURGDORF, BERTHOUD (47° 3′ N., 7° 38′ E.), town, canton Bern, Switzerland; old castle; school established by Pestalozzi. Pop. 8400.

BÜRGER, GOTTFRIED AUGUST (1748–94), Ger. poet; famous as the author of the ballad *Lenore*, which first appeared in the Göttingen *Musenalmanach*, in 1773. This essay in the supernatural was very widely read, and was trans. into Eng. by Sir Walter Scott. None of B.'s other writings achieved

very great popularity, and his ill-regulated life ended in failure and pecuniary want.

BURGERS, THOMAS FRANÇOIS (1834–81), pres. of Transvaal republic (1872–77). His presidency showed up weakness of Transvaal, and terminated with its annexation to Britain.

BURGES, GEORGE (1786–1864), Eng. classical scholar; famous for his critical editions of Gk. authors; trans. Plato and Gk. Anthology for Bohn's Library.

BURGESS, JOHN BAGNOLD (1829–97), Eng. *genre* painter; excelled in Span. subjects.

BURGESS, THOMAS W. (1873–), Brit. swimmer who crossed Eng. Channel in 22 hours 35 min. in 1911.

BURGH, BURKE, Irish family prominent in history; founded, 1189, by William, bro. of Hubert de Burgh. His s. Richard conquered nearly all Ireland, and was cr. Earl of Ulster. This earldom came to crown by marriage of heiress to Lionel, s. of Edward III., but most of de Burgh lands were divided between two male kinsmen from whom descended earls and marquesses of Clanricarde and viscounts and earls of Mayo.

BURGH, HUBERT DE (d. 1243), Eng. chief justiciar (1215–31); held important offices under John, and received custody of Arthur of Brittany, whom he is said to have preserved from being blinded (1201); repulsed Fr. invasion, 1217; ruled kingdom in minority of Henry III., dismissing foreign mercenaries. B. was a great popular minister.

BURGHERS AND ANTI-BURGHERS, party which seceded from Church of Scotland, 1732, and differed among themselves as to the burgess oath, separating, 1747; joined to form United Associate Synod of the Secession Church, 1820; united with the Relief Church to form the United Presbyterian Church, 1847.

BURGHERSDORP (30° 48′ S., 26° 39′ E.), town, Cape Province, S. Africa. Pop. *c.* 3000.

BURGHLEY, WILLIAM CECIL, BARON, BURLEIGH (1520–98), Eng. statesman; M.P. for Stamford (1547); fought at *Pinkie Cleugh*; master of requests and sec. of Protector Somerset (1548); Chancellor of the Garter (1552); not prominent under Mary, but made Chief Sec. of State on accession of Elizabeth, who said to him: 'This judgment I have of you, that you will not be corrupted with any manner of gifts, and that you will be faithful to the state'—a speech regarded as outlining Cecil's character; from this time his policy was the Queen's; master of court of wards (1561); lord high treasurer (1572); claim to fame is that of successful administrator; his spy-system being the only blot on his administration; a scholar, pattern of domestic virtue, and a friend to poor. He was of medium height, small build, with a large nose, fine eyes, and beard.

BÜRGI, JOST, JUSTUS BYRGIUS (1552–1633), Swiss astronomer; made celestial globe.

BURGKMAIR, HANS (1473–1531), Ger. engraver whose dau. married Holbein; valuable woodcuts and paintings.

BURGLARY, see THEFT.

BÜRGLEN.—(1) (46° 52′ N., 8° 40′ E.) town, Uri, Switzerland; traditional birthplace of William Tell. (2) (47° 7′ N., 7° 16′ E.) town, Bern, Switzerland. (3) (46° 42′ N., 7° 26′ E.) mountain, Bern, Switzerland.

BURGOMASTER (Ger. *bürger-meister*, master of the borough), head of corporation of a Ger. or Dutch town.

BURGON, JOHN WILLIAM (1813–88), Anglican divine; attacked Revised Version of Bible and defended conservative theological positions; dean of Chichester, 1876.

BURGOS (42° 25′ N., 3° 40′ W.).—(1) province, Northern Spain, S. of Biscay and Alava; elevated surface, traversed N. and N.E. by series of mountain chains; unfertile soil; thinly populated; sheep-farming. Area, 5480 sq. miles. Pop. (1910) 346,694. (2) capital of B. province; fine Gothic cathedral; manufactures woollens, linens, hats; surrendered to British, 1813. Pop. (1910) 31,480.

BURGOYNE, ALAN, M.P. (1880–), authority on naval matters.

BURGOYNE, JOHN (1722–92), Brit. general, politician, and playwright; caused general outcry by surrendering to Amer. forces at *Saratoga*, 1777.

BURGOYNE, SIR JOHN FOX (1782–1871), Brit. general; illegitimate s. of above; distinguished in Peninsular and Crimean Wars.

BURGRAVE, Ger. title of hereditary ruler of fortified town and district attached.

BURGRED, king of Mercia (852–74); expelled by Danes.

BURGSTADT (50° 55′ N., 12° 49′ E.), town, Saxony; cottons, hosiery. Pop. 7253.

BURGUNDIANS, see FRANCE (HISTORY).

BURGUNDY, BOURGOGNE (*c.* 47° 20′ N., 5° E.), ancient province, France; named after Burgundii, who founded kingdom in S.E. Gaul in V. cent.; overcome by Franks, 534. On break-up of Charlemagne's empire, two kingdoms of B. were established; these were united as kingdom of Arles in 933; annexed to Ger. empire, 1032. Duchy was founded in 887; on death of Duke Philip in 1361 it was attached to Fr. crown. King John granted it to s., Philip, 1363; engaged in struggle for supremacy with France and England. On death of Charles the Bold (*q.v.*) it reverted to Fr. crown, 1477. Soil is fertile; famous wines and agricultural produces; chief town, Dijon.

BURGUNDY WINE, see WINE.

BURHANPUR (21° 17′ N., 76° 16′ E.), town, Central Provinces, India; once Muhammadan capital of Deccan; flowered silks; gold and silver wire manufactures. Pop. 33,300.

BURIAL.—Like modern nations of Europe, many primitive and Oriental peoples have practised *inhumation* (the b. of corpses in the earth), and with it many interesting customs are associated: the Australian aborigines take off the nails of the corpse and tie its hands so that it may not be able to work its way out again; with the Norse warrior were buried his horse and armour, ready for his ride to Valhalla; the Laplander places beside the corpse steel, flint, and tinder for the dark journey, and nearly every primitive people gives evidence of thoughtfulness for the needs of the next life; the classic instance is the coin placed by the Greeks on the tongue of the deceased to pay Charon for ferrying him over the Styx, and the honey-cake provided for Cerberus. The Parsees are almost alone in exposing the corpse.

Cremation (Lat. *crematio*, burning by fire), burning of dead human bodies to ashes was practised by the later Greeks, Romans, Danes, etc., evidence being found in barrows of all countries of Europe. Christian inhumation was universal, probably owing to doctrine of resurrection of body, but Cremation Societies were formed in XIX. cent., and c. is urged on sanitary grounds. Burial Acts (see below) have made reforms in system of inhumation, but c. remains preferable from health standpoint; sole object of c., as described by pioneer, Sir Henry Thompson, is to resolve dead body into its final constituents of carbonic acid, water, and ammonia 'rapidly, safely, and not unpleasantly.' Apparatus invented by Prof. Brunetti, was exhibited at Vienna Exhibition, 1873, for completely consuming body in 6 hours, with fuel costing 2s. 4d. The first Ger. crematorium was established at Gotha (1878). An Eng. Cremation Society was established, 1874, under presidency of Sir Henry Thompson; one acre of land at Woking purchased, 1878, and Prof. Gorini of Lodi invited to build furnace; Home Office forbade c. without special leave; government refused to undertake c., and in 1882–83 private c's took place; lawsuit terminated in judgment that c. might lawfully be performed if no nuisance was caused; c's commenced at Woking, 1885, and have since become frequent, nearly all large towns possessing *crematoria*. Christian objections are answered by instance of martyrs who

expect resurrection; obviously c. might be utilised for disposal of murdered persons, but examination of cause of death is one of great features of movement; regulated by Cremation Act, 1902. Enough fear of being buried alive exists to have given rise to an institution which guarantees thorough examination to its members, *post-mortem*.

Numerous Acts from 1852–1900 impose regulations as to burial, and are hence known as **Burial Acts**. By them Home Office (or Local Government Board) is empowered to close b. ground and make all sanitary provisions for interment or disinterment; its consent is necessary for opening b. ground; b. grounds in each parish were at first put under the control of b. board composed of ratepayers elected by vestry, but were transferred to control of urban district and parish councils. In disused churchyards only buildings for religious purposes may be raised, but in metropolis they may be converted into public recreation grounds. Corpses may be removed for sanitary or judicial reasons on authorisation by Ordinary, Home Sec., or coroner. B's (except in case of suicides) may take place in consecrated ground without religious service; Church of England clergymen are permitted in case of necessity to perform b. service in unconsecrated ground. 'Body-snatching' for sale to anatomists was carried on to great extent in early XIX. cent., and its profitableness led to murders by the 'Resurrection' men, notably by Burke and Hare; it was one of the social evils exposed by Dickens.

B. Societies are associations to provide for payment of b. expenses of members, children and wives and widows of members.

BURIATS, race of Mongolian Buddhists, dwelling in Eastern Siberia.

BURIDAN, JEAN (fl. 1358), Fr. rationalist philosopher; wrote a *Compendium logicæ*, and numerous similar works.

BURKE, EDMUND (1729–97), Brit. statesman, writer, and orator; b. (probably) Dublin. From a school at Ballitore, Kildare, B. proceeded to Trinity Coll., Dublin (1743–48), where he devoted himself to extensive but desultory reading. He entered Middle Temple, London (1750), but soon abandoned law for literary work. In 1756 he wrote *A Vindication of Natural Society*, a satire upon Bolingbroke, and also a *Philosophical Inquiry into the Origin of our Ideas on the Sublime and Beautiful*. From 1759–88 he contributed largely to the *Annual Register*.

B. was private sec. to Hamilton, sec. for Ireland (1761–63), and to the Marquis of Rockingham (1765). Entering Parliament for Wendover, he soon became prominent as the great Whig defender. After the failure of the Rockingham administration (1766), B. held no office till 1782, but his public activity never ceased. He drew up all the principal protests of his party between 1767 and 1782. In his *Thoughts on the Cause of the Present Discontents* (1770) he attacked the 'system of double government' and defended party government against both George and Chatham. He was the greatest orator and thinker of the Whigs, and his speeches were not merely weapons for the moment, but permanent treasures of political wisdom.

The accession of Charles James Fox, a brilliant seceder from North's ministry, to Whig party, was largely due to B.'s teaching and influence. Under Fox and B. the 'New Whigs' became purged of the old party leaven. B. was chosen a representative for Bristol (1774). During events which ended in emancipation of Amer. colonies, B. showed unrivalled knowledge and zeal on Amer. questions. His *Speech on Conciliation* appeared 1775. In the second Rockingham ministry (1782) B. became Paymaster of the Forces, and was entrusted with the great plan of economical reform. He had lost his Bristol seat (1780) as a result of his advocacy of Irish claims to similar indulgences as America. During rest of his parliamentary life he sat for Malton, a pocket borough. On Rockingham's death (July 1782), B. and Fox declined to serve under Shelburne, and joined North in coalition against him. The coalition forced on king a government nominally headed by Duke of Portland (1783). B. returned to his office of paymaster. Rejection of India Bill resulted in dismissal of ministers (Dec. 1783), and Pitt acce[illegible] ship. B. was soon engaged in his famous impeachment of Warren Hastings, whose trial began (Feb. 1788), but was more famous for oratory than for its results, and finally ended in Hastings' acquittal (1795).

B.'s attitude towards the Fr. Revolution ended some of his political friendships. He had already incurred some unpopularity owing to his vehemence in debates on the India Bill and on Hastings' impeachment. In debate on the Canada Bill (May 1791) B. inveighed against the Revolution in answer to Fox's praise of the new Fr. constitution. A public rupture between Fox and B. resulted.

B.'s *Reflections on the French Revolution* (Nov. 1790), followed by his *Appeal from the New to the Old Whigs*, greatly influenced English opinion. He viewed the Revolution with misgivings from the first. At close of 1794 B. left Parliament. He refused to accept anything from king but a pension. He wrote against Pitt's anxiety for peace in his *Letters on a Regicide Peace* (1796).

A self-confident statesman and political genius, champion of the old order of Europe, B. was a great man, despite some eccentricities and aberrations.

Select Works of Burke, Clarendon Press (1897); *Memoir of the Life and Character of Edmund Burke*, Prior (1824); John Morley, *Edmund Burke* (1879).

BURKE, SIR JOHN BERNARD (1814–92), Eng. genealogist; s. of John B., whose work he continued as the compiler of *Burke's Peerage*, pub. annually since 1847; Ulster king-at-arms (1853); knighted (1854); pub. numerous other genealogical and heraldic works.

BURKE, ROBERT O'HARA (1820–61), Australian traveller; b. Ireland; ed. Belgium; became a captain in Austrian army; member of Royal Irish Constabulary (1848); emigrated (1853), and became a police-inspector at Melbourne; led heroic, ill-fated expedition across Australian continent (1860–61); d. of starvation on return journey.

BURKE, WILLIAM (1792–1829), Irish murderer; was implicated (1827–29) with WILLIAM HARE in a series of murders in an Edinburgh lodging-house; the victims were suffocated ('burked') and the bodies sold for the purposes of anatomy; Hare turned king's evidence; B. was hanged.

BURLAMAQUI, JEAN JACQUES (1694–1748), Swiss writer on ethics.

BURLEIGH, see BURGHLEY.

BURLESQUE (Ital. *burlesco*), literary treatment of a serious theme in a comic way; favourite *genus* in every age, representing constant human dislike of tension of emotion. The Homeric epic was burlesqued in the *Batrachomachia* (Battle of the Frogs and Mice), and there was much mediæval b. in so-called *Passiones*. Mediæval Fr. *sotie*s were blend of satire and b.; great feature of the Renaissance, which produced the *Orlando Innamorato* of Berni, *Don Quixote*, and *The Knight of the Burning Pestle*. The b. is distinguished from the modern farce by its seriousness of treatment and different quality of the amusement raised. See PARODY, EPIC (Mock).

BURLINGAME, ANSON (1820–70), Amer. diplomatist; minister to China, and associated with 'Burlingame Treaty.'

BURLINGAME, EDWARD LIVERMORE (1848–), s. of above; editor *Scribner's Magazine*, 1886.

BURLINGTON (40° 44′ N., 91° 17′ W.), city, Iowa, U.S.A.; railway centre; machinery, flour. Pop. (1910) 24,324.

BURLINGTON (40° 3′ N., 74° 54′ W.), city, New Jersey, U.S.A., on Delaware; shoes. Pop. (1910) 8336.

BURLINGTON (44° 29′ N., 73° 13′ W.), port of entry, Vermont, U.S.A., on Lake Champlain; good

harbour; seat of Vermont Univ.; manufacturing centre; marble quarries, lumber. Pop. (1910) 20,468.

BURMA (10° to 28° 15′ N., 93° 2′ to 100° 40′ E.), large province in S.E. of Ind. Empire; 1100 miles in extreme length, 700 in breadth; area, 236,738 sq. miles; bounded N. by Tibet, E. by China, Fr. Indo-China, Siam, S. by Bay of Bengal, W. by Bengal, Manipur, Assam; includes Upper and Lower B. Latter comprises Arakan, Pegu, and Tenasserim, all belonging to Britain; former has belonged to Britain since 1885, previous to which it was the kingdom of B.

History.—Early history rests on tradition; Upper B. was powerful kingdom in XI.–XIII. cent's A.D.; and in XIV.–XV. cent's the two chief powers were those of Ava in N. and Pegu in S. Pegu was one of several old kingdoms in Lower B.; it held the supreme power in XVI. cent., when the Irawadi and Sittang valleys were included in its dominions. It came to an end in middle of XVIII. cent., when new Burmese empire was established by Alompra. FIRST B. WAR (against Britain), caused by Burmese encroachments on Brit. possessions; Brit. government formally declared war, 1824; ended by Treaty of Yandabo (1826), which granted Brit. terms. SECOND B. WAR (1852), provoked by bad treatment of Brit. merchants at Rangoon; resulted in annexation of Pegu. THIRD B. WAR (1885–86), caused by attempt on part of Burmese government to hinder trade between Bombay and Burma; Brit. army crossed frontier (Nov. 14, 1885), occupied Mandalay (Nov. 28), and sent Burmese king, Thibaw, to Rangoon. Upper Burma was formally annexed, Jan. 1, 1886.

Surface is mountainous, with vast forests of teak and bamboo; river plains or deltas at river mouths are only flat parts, and are flooded in wet season; principal mountains are the Patkoi Hills, in N.; the Kachin, Shan, and Karen Hills in E.; Pegu Yoma and Arakan Yoma; chief rivers, Irawadi, Sittang, Salwin; climate trying; huge rainfall up country; chief towns, Rangoon (capital), Mandalay (native capital).

Administration is carried out by lieut.-gov., assisted by a legislative council of 17 members; lieut.-gov. is nominated by Gov.-Gen.; province is subdivided into 8 divisions, each administered by a commissioner. Northern and Southern Shan States are administered through Sawbwas or hereditary chiefs.

Inhabitants include Burmese, who form great majority of population, Karens, Talaings, Chins, Shans, and other races. Burmese proper are of Mongoloid stock, are brown-skinned, black-haired, and robust in figure. About 90 % are Buddhists, other religions including Hinduism, Christianity, Islamism. Language is akin to Shan and Tibetan tongues. Ancient or Pali literature consists chiefly of Buddhist scriptural writings. Burmese modern literature includes plays, rhymed fables, historical and religious works.

Rice is largely cultivated in both Upper and Lower B., and is chief export. Teak, oil-tree, ironwood, and palms are among valuable trees, and many fruits are grown, including bananas, pineapples, guavas. Tobacco, sugar-cane, tea, cotton, are cultivated; many varieties of precious stones found; rich ruby mines in upper district beyond Mandalay; sapphires and other gems, jade, etc. Minerals include gold, silver, copper, tin, iron. All these are exported, also rice, teak, bamboo, cotton, hides, wax, ivory, gum, rubber, oil. People display skill in silver repoussé work, wood-carving, lacquer work, silk-weaving; imports, European manufactured goods. Rivers are chief means of communication; Irawadi navigable all year. Roads and railways have developed greatly under Brit. administration. Pop. (1911) 12,115,217. Map, see INDIA.

Ireland, *The Province of Burma* (1907); Mar, *The Romantic East—Burma, Assam, Kashmir* (1906); Phayre, *History of Burma* (1883); Scott, *Burma* (1911); Nisbet, *Burma under British Rule and Before* (1901).

BURMANN, PIETER (1668–1741), Dutch scholar; a prolific writer, famed for his editions of Horace, Ovid, Lucan, Suetonius, George Buchanan, and other authors.

BURMANN, PIETER (1714–78), Dutch philologist; nephew of above; prof. of History, Philology, and Poetry at Amsterdam, and author of many scholarly works.

BURN, RICHARD (1709–85), Eng. antiquary; noted for *History of Cumberland* and legal works.

BURNABY, FREDERICK GUSTAVUS (1842–85), Eng. soldier and traveller; entered Royal Horse Guards (1859); made an adventurous journey on horseback to Khiva (1875–76), an account of which he pub. in his *A Ride to Khiva*; was engaged in Suakin campaign (1884), and wounded at *El-Teb*; killed at *Abu Klea* (Nile Expedition).

BURNAND, SIR FRANCIS COWLEY (1836–), Eng. humorist; editor of *Punch* (1880–1906); knighted, 1902; author of *Happy Thoughts*, and, in his earlier years, of innumerable burlesques and farces.

BURNE-JONES, SIR EDWARD, Bart. (1833–98), Eng. artist; b. Birmingham; ed. Oxford, where he formed a friendship with William Morris, and became deeply impressed with paintings of D. G. Rossetti, under whom he afterwards studied. Being a fine classical scholar, and an enthusiastic student of Chaucer and the earlier Eng. writers, his mind was richly stored with mythological and mediæval lore, which he turned to useful account in his choice of subjects for pictures, decorative work, and stained-glass designs, of which latter he produced an immense number. He undoubtedly exercised a strong influence upon the art of his time, and though his output was large, he stands out conspicuously as one of the great artists of the XIX. cent.

Memorials of Edward Burne-Jones, by Lady Burne-Jones; also *Life* by Julia Cartwright (1894).

BURNELL, ARTHUR COKE (1840–82), Eng. Sanskrit scholar; employed in Indian Civil Service at Madras; pub. a *Handbook of South Indian Palæography*, and similar works.

BURNES, SIR ALEXANDER (1805–41), Scot. traveller; entered the service of the East India Company as a youth; later made extensive journeys through Afghanistan to Bokhara and Persia, accounts of which he pub. (1834); assassinated at Kabul during an insurrection.

BURNET, GILBERT (1643–1715), Anglican bp. and historian; b. Edinburgh; s. of a lawyer who became judge of the Court of Session; ed. Marischal Coll., Aberdeen; took orders in the Episcopal Church; prof. of Divinity at Glasgow (1669). Received preferments from Charles II., but, venturing to reprove the king upon one occasion, he lost Court favour; settled in Holland and became attached to interests of William of Orange, on whose accession he was made bp. of Salisbury, which office he filled with conspicuous ability; mainly responsible for establishment of Queen Anne's Bounty. He was the author of a *History of the Reformation of the Church of England* (1679–1714), but is chiefly remembered by his valuable *History of My Own Times* (1723), pub. by his own desire, after his death.

Clarke and Foxcroft's *Life of Gilbert Burnet* (1907).

BURNET, JOHN (1784–1868), Scot. artist and author of books on art; well-known engravings.

BURNET, THOMAS (1635–1715), Eng. schoolmaster and clergyman; master of the Charterhouse (1685); Clerk of the Closet to William III., which office he lost through the publication of *Archæologiæ Philosophicæ* (1692), in which he gave expression to certain heterodox opinions.

BURNETT (25° 10′ S., 152° 0′ E.), river, Queensland.

BURNETT, FRANCES HODGSON (1849–), Eng.-Amer. novelist; b. Manchester; twice married; author of many novels, the most successful of which have been *That Lass o' Lowrie's* (1877), *Little Lord Fauntleroy* (1886), *A Lady of Quality* (1896), *The Shuttle* (1907), and *The Secret Garden* (1911).

BURNEY, CHARLES (1726–1814), Eng. musician;

studied under Dr. Blow and Dr. Arne; won considerable fame as an organist. Besides operatic pieces, he wrote numerous sonatas, concertos, and anthems. He is chiefly remembered for his exhaustive *History of Music* (1776-89), and for the descriptions of his musical tours. His life was written by his dau., Fanny, Madame D'Arblay (*q.v.*).

BURNEY, FANNY, Madame D'Arblay (1752-1840), Eng. novelist; famous as author of *Evelina* (1778), *Cecilia* (1782); helped to develop Eng. novel as form of lit.; entered service of Queen Charlotte; her *Diary* was begun in 1768.

BURNHAM BEECHES (51° 30′ N., 0° 40′ W.), fragment of ancient forest, Bucks, England; preserved for public use by Corporation of London.

BURNHAM, EDWARD LEVY LAWSON, LORD (1833-), chief proprietor of *Daily Telegraph*.

BURNHAM-ON-CROUCH (51° 37′ N., 0° 49′ E.), watering-place, Essex, England; boat-building. Pop. (1911) 3190.

BURNING ALIVE was a common death penalty, for both sexes, from very early times. In England, at one time, it was frequently in use for heresy and alleged witchcraft. The punishment was abolished by statute in 1790.

BURNLEY (53° 48′ N., 2° 15′ W.), town, Lancashire, England; cotton-weaving; near collieries. Pop. (1911) 106,337.

BURNOUF, JEAN LOUIS (1775-1844), Fr. scholar; author of classical grammars. His s., **Eugène B.** (1801-52), prof. of Sanskrit at Collège de France, 1832-52, was a noted philologist.

BURNOUS, Burnoose, hooded cloak, generally of wool; worn by Arabs.

BURNS AND SCALDS, the former result from dry heat, the latter from moist heat; b. are considered under six degrees, according to severity. Danger depends mainly on the area of skin affected, and on the shock.

BURNS, SIR GEORGE, Bart. (1795-1890), Brit. shipowner; s. of Rev. John B., of Glasgow; became one of the founders of the 'Cunard' line of steamships; cr. baronet (1889); succ. by his s. John (1829-1901), who became head of the Cunard Co., and was cr. Baron Inverclyde, 1897.

BURNS, JOHN (1858-), Brit. politician, b. London; worked as an engineer; imprisoned (1887) for asserting right to hold mass meetings in Trafalgar Square; a leader of the great dock strike (1889); elected to London County Council (1889); M.P. for Battersea since 1892; Pres. of Local Government Board, with seat in Cabinet, in ministries of Sir H. Campbell-Bannerman (1905) and Mr. Asquith (1908), the salary of his post being raised during his tenure from £2000 to £5000 to mark its increase in importance. The extreme Labour views which he at first held have gradually approximated to those of the orthodox member of the Liberal party. In office, without having inaugurated any great measures of reform, he has set an example of efficient administration.

BURNS, ROBERT (1759-96), Scot. poet; s. of William Burness, a small farmer who lived in a clay cottage built with his own hands at Alloway, near Ayr. Robert, first of seven children, was b. Jan. 25; he went to school at the age of six, and was afterwards taught by a village tutor, named Murdoch. His f. was always a poor man, and unsuccessful in all his ventures, but he was of studious habits, and this trait seems to have been transmitted to his son, for during his early youth the poet steeped his mind in the Eng. classics, and so laid the foundation of that virile prose style which afterwards became remarkable. He also mastered the first six books of Euclid, and even dabbled in Latin. Meantime the f. had removed to Mount Oliphant, a larger farm, and here Robert, at the age of fifteen, became his f.'s assistant, and led for the following ten years a life of hard toil. The elder B. died when Robert was twenty-five years of age, and for some years afterwards he, and his bro. Gilbert, stuck to farming at Lochlea, and at Mossgiel, but misfortune attended their efforts.

Yet, 'it was at Mossgiel,' says W. E. Henley, that the enormous possibilities in B. were revealed to B. himself; and it was at Mossgiel that he did nearly all his best and strongest work. The revelation once made, he . . . wrote masterpiece after masterpiece, with a rapidity, an assurance, a command of means, a brilliancy of effect, which make his achievement one of the most remarkable in Eng. letters.' During this period were written *The Jolly Beggars*, *Hallowe'en*, *Holy Willie's Prayer* (a classic attack on the 'Auld Lichts'), *The Holy Fair*, *Scotch Drink*, *Address to the Deil*, the poems to *The Louse*, *The Mouse*, and *The Mountain Daisy*, and many another gem of imperishable fun, satire, or song. In *The Jolly Beggars* B. sets forth his creed:—

> 'What is title? What is treasure?
> What is reputation's care?
> If we live a life of pleasure
> Does it matter how or where?'

Defiance of opinion is one of most charming themes of B.'s verse, and one of the most evil elements in his life. Meanwhile, this 'amazing peasant of genius,' whose early youth had been one of Calvinistic rigour, had begun to pay the penalty for his excesses of every kind. In 1788 he married Jean Armour, whom he had seduced. To mend his fortunes he booked a passage for Jamaica, but changed his mind, took Ellisland farm, near Dumfries, again failed, and soon after became an exciseman at Dumfries, where he tragically dissipated the remains of his unique powers. 'His death (July 21), in his thirty-seventh year,' says R. L. Stevenson harshly, 'was indeed a kindly dispensation. It is the fashion to say he died of drink; many a man has drunk more, and yet lived with reputation, and reached a good age. That drink and debauchery helped to destroy his constitution, and were the means of his unconscious suicide, is doubtless true; but he had failed in life, and had lost his power of work. . . . He had chosen to be Don Juan, he had grasped at temporary pleasures, and substantial happiness and solid industry had passed him by.'

B.'s first vol. of poems was pub. at Kilmarnock in 1786. This brought him the admiration of Edinburgh society, and a profit of £20. Scott, minutely describes B., particularly mentioning his poetic and glowing eye, his simplicity and dignity. It may be noted that, like Shakespeare, B. borrowed from every writer he had ever read—matter, phrase, and metre. To Robert Fergusson, in particular, he owed a large debt, which he honourably acknowledged by placing a memorial-stone over the grave of the young poet in Edinburgh.

The authoritative edition of the *Poetry of Robert Burns* is ed. by W. E. Henley and T. F. Henderson (with Memoir), known as the 'Centenary Burns,' pub. by T. C. & E. C. Jack, Edinburgh, 4 vols., 1896-97, reprinted 1901; unsurpassed study by Carlyle in the *Essays*; see also *Some Aspects of Robert Burns*, in R. L. Stevenson's *Familiar Studies of Men and Books*.

BURNSIDE, AMBROSE EVERETT (1824-81), Amer. soldier; invented a breech-loading rifle (1856); commander of Army of the Potomac (1862); Gov. of Rhode Island (1866-69); Republican member of U.S. Congress (1875-81).

BURNTISLAND (56° 4′ N., 3° 14′ W.), coaling port on Firth of Forth, Fife, Scotland. Pop. 4707.

BURR, AARON (1756-1836), Amer. statesman; resigned army through ill-health (1779); admitted to Bar (1782); attorney-general of New York State (1789-91); U.S. senator (1791-97); identified himself with democratic republicans; devoted himself to practice of law after 1812.

BURRA (33° 42′ S., 138° 59′ E.), town, S. Australia; site of Burra Burra copper mine, now disused.

BURRARD INLET (49° 18′ N., 123° 26′ W.), harbour, S.W. British Columbia.

BURRIANA (39° 52′ N., 0° 6′ W.), seaport, Spain; oranges. Pop. 13,000.

BURRITT, ELIHU (1810–79), Amer. humanitarian; a blacksmith who made himself master of a great number of languages; lectured throughout America and Europe on peace and universal brotherhood.

BURRO, small Amer. donkey, used as pack-animal.

BURROUGHS, GEORGE (d. 1692), Amer. preacher; held charges at Salem, Falmouth, and Wells. In 1692 he was charged with witchcraft by members of his congregation, condemned, and executed at Salem.

BURROUGHS, JOHN (1837–). Amer. writer on natural history,—*Locusts and Wild Honey*, etc.

BURSCHEID (51° 5′ N., 7° 6′ E.), town, Rhenish Prussia; woollens. Pop. 6323.

BURSCHENSCHAFT, an association of Ger. students which was formed early in the XIX. cent. to promote morality and patriotism.

BURSLEM (53° 3′ N., 2° 12′ W.), market town, Staffordshire, England; birthplace of Josiah Wedgwood; pottery. Pop. (1911) 44,153.

BURTON, SIR FREDERICK WILLIAM (1816–1900), Irish artist; travelled much abroad, devoting special study to the Old Masters, and was afterwards for some twenty years director of the London National Gallery; knighted, 1884.

BURTON, JOHN HILL (1809–81). Scot. historian and advocate; wrote *History of Scotland* (1870), *Life of David Hume* (1846), *The Bookhunter* (1862), *The Scot Abroad* (1864), and other works.

BURTON, SIR RICHARD FRANCIS (1821–90), Eng. explorer and Orientalist; b. Barham House, Hertfordshire; joined Indian army (1842) and applied himself to study of Oriental life and languages; made a perilous pilgrimage to Mecca (1853); explored interior of Somaliland (1854) and lake regions of equatorial Africa (1857–58). Burton was app. British consul at Fernando Po (1861), Santos (1865), Damascus (1869), Trieste (1871); he was a voluminous author, and his translation of *Arabian Nights* (pub. 1885–88) is a striking testimony of his intimate knowledge of Eastern life. *Life*, by his wife (1893).

BURTON, ROBERT (1577–1640), Eng. writer; b. Leicestershire; ed. Oxford and held studentship at Christ Church till death; *The Anatomy of Melancholy* (1621), his *magnum opus*, is full of erudition and quotation; his magnificent prose style transcends his matter.

BURTON, WILLIAM EVANS (1804–60), Eng. actor and dramatist. One of his plays, *Ellen Wareham* (1833), achieved a great vogue in England.

BURTON-UPON-TRENT (52° 48′ N., 1° 39′ W.), market town, municipal and county borough, Staffordshire and Derbyshire, England; breweries celebrated since 1630; ironworks. Pop. (1911) 48,275.

BURU (3° 30′ S., 126° 30′ E.), one of Molucca islands, Dutch E. Indies; mountainous, thickly wooded, and fertile; cajeput oil. Pop. *c.* 15,000.

BURUJIRD (33° 54′ N., 48° 48′ E.), town (and province), Persia; cottons, felts. Pop. *c.* 25,000.

BURY (53° 35′ N., 2° 18′ W.), market town, on Bolton canal, Lancashire, England; cotton spinning and weaving, also bleaching, dyeing, and print works; paper-making; freestone quarries, coal mines. Pop. (1911) 58,649.

BURY, JOHN BAGNELL (1861–), Eng. historian; became regius prof. of Modern History at Cambridge (1902), having previously held professorships at Trinity Coll., Dublin; has written histories of Greece and Rome, and other scholarly works.

BURY, RICHARD DE, see AUNGERVILLE.

BURY ST. EDMUNDS (52° 15′ N., 0° 43′ E.), market town, Suffolk, England; named after Edmund the Martyr, in whose honour Canute founded abbey, 1020; two fine Gothic churches; celebrated grammar school; agricultural implements; cattle, wool, cheese. Pop. (1911) 16,785.

BURYING BEETLES, see under POLYMORPHA.

BUSACO (40° 24′ N., 8° 14′ W.), village, Portugal. On the S. slopes of Serva de Bussaco Wellington defeated the French, Sept. 1810.

BUSBY, cylindrical fur head-dress worn by hussars and Royal Horse Artillery, and a similar feathered bonnet worn by Highland infantry.

BUSBY, RICHARD (1606–95), Eng. schoolmaster and clergyman; ed. Westminster School, of which he became headmaster in 1639. His success as head of the famous school was very great, but he was notorious for his flogging, and it was his boast that he had birched sixteen bp's.

BUSCH, JULIUS HERMANN MORITZ (1821–99), Ger. publicist; after extensive travels in Europe, America, and the East he entered the public service, and from 1870 until the chancellor's death, he was closely associated with Bismarck, upon whose life and times he pub. several books.

BUSCH, WILHELM (1832–), Ger. artist-humorist.

BÜSCHING, ANTON FRIEDRICH (1724–93), Ger. geographer; was a prolific writer, his chief work being *Erdbeschreibung* (an Eng. trans. appeared in 1762).

BUSHEY (51° 38′ N., 0° 22′ W.), town, Hertfordshire, England. Pop. (1911) 6980.

BUSHIRE, BANDER BUSHIRE (28° 59′ N., 50° 50′ E.), chief seaport, Persian Gulf, on sandy peninsula; extensive trade with Europe and East; exports opium, mother of pearl, carpets; imports cotton piece goods, sugar, tea, woollen and silk goods, iron; land terminus Indo-European telegraph line; occupied by British during Persian War, 1856–57. Pop. *c.* 20,000.

BUSHMEN, South African aborigines approaching extinction; short of stature, complexion of a dirty yellow; the skin hard and dry, and with little body-hair; while the males are slim almost to emaciation, there is much steatopygy amongst the women. The only dress of the men is a strip of skin about the loins. They are great hunters, and very swift of foot. Their food consists of the half-cooked flesh of wild animals, insects, honey, and roots. They are also inveterate smokers. By nature they are savage and fearless, nomadic in their habits, gifted with considerable intelligence, and possessing ability in drawing and music. When civilised they prove very reliable.

Stow, *Native Races of S. Africa*.

BUSHNELL, HORACE (1802–76), Amer. divine; modified traditional Calvinism of his time.

BUSHRANGERS, see THEFT.

BÜSÎRÎ (1211–94), celebrated Arabian poet who wrote poems in praise of Muhammad.

BUSIRIS (classical myth.), Egyptian king, the offspring of Poseidon and Lyssianassa.

BUSK, GEORGE (1807–86), Eng. surgeon, zoologist, anthropologist, and palæontologist; Hunterian prof. of Comparative Anat. and Physiology (1856), Royal Coll. of Surgeons; pres. Royal Coll. of Surgeons (1871).

BUSK, HANS (1815–82), Eng. lawyer; organiser of Army Volunteer system, and author of *Navies of the World*.

BUSKEN-HUET, CONRAD (1826–86), Dutch author and critic; wrote *Lidewijde*, a novel, and several series of criticisms pub. under the title of *Literary Fantasies*.

BUSKIN, or *cothurnus*, the thick-soled, high, laced boot worn by Gk. and Roman tragedians; comedians wore a light shoe called *soccus* (sock).

BUSLAEV, FEDOR IVANOVICH (1818–98), Russ. philologist; prof. of Russ. Lit. at Moscow; author of *Historical Grammar of the Russian Tongue* (1858) and numerous other works.

BUSRA, BASSORA (*q.v.*).

BUSS, FRANCES MARY (1827–94), Eng. educationist; head of the North London Collegiate School for Ladies; was of a magnetic personality, and famed as a pioneer of reformed education for girls.

BUSSA (10° 45′ N., 4° 22′ E.), town, on Niger, N. Nigeria; here Mungo Park died, 1806.

BUSSAHIR, BASHAHR, BISAHIR (31° 30′ N., 78° 20′ E.), hill state, Punjab, India; tributary, Brit. Government. Area, 3862 sq. miles. Pop. 75,000.

BUSSY, ROGER DE RABUTIN, COMTE DE (1618–93), Fr. writer; cousin of Madame de Sévigné; famous for his adventures; was several times a prisoner in the Bastille. His *Mémoires* and correspondence are extremely lively and amusing, and are full of valuable hist. material.

BUSTARD (*Otis*), genus of land-fowl numerous species of which are distributed in the Old World, and one in Australia. *O. tarda* was formerly common in Great Britain, and has been preserved as a game bird, but the native race became exterminated in the middle of the XIX. cent. Occasionally some find their way to S.E. England from the Continent. The finely plumed adult male measures about 8 ft. between the tips of the wings; the female is smaller.

BUSTO ARSIZIO (45° 37′ N., 8° 52′ E.), town, Lombardy, Italy; church designed by Bramante; cotton manufactures. Pop. 20,000.

BUTCHER, SAMUEL HENRY (1850–1910), Brit. classical scholar.

BUTCHER-BIRDS, see SHRIKES.

BUTE (55° 50′ N., 5° 12′ W.), island, Firth of Clyde; separated from Argyllshire by KYLES OF BUTE; coast rocky, numerous bays; undulating interior; highest altitude, Kames Hill, 875 ft.; several small lochs—principal, Loch Fad; excellent crops; fisheries; quarries; salubrious climate; chief town, Rothesay. Pop. 12,000.

BUTE, BUTESHIRE (55° 40′ N., 5° 10′ W.), county, Firth of Clyde, comprising isles of Bute, Arran, the Cumbraes, Holy Isle, Pladda, Inchmarnock; area, 139,658 acres. Pop. (1911) 18,186.

BUTE, JOHN STUART, 3RD EARL OF (1713–92), Brit. Prime Minister; succ. to earldom (1723); gained favour of Frederick, Prince of Wales (1747), and after Frederick's death (1751) obtained great influence over young prince, on whose accession (1760) he rose to power. In March 1761 he became Sec. of State, and in Nov. Prime Minister. His nationality, character as a favourite, advocacy of royal supremacy, and peace policy, made him very unpopular; he resigned (April 8, 1763), and withdrew from court (Sept.). Of a dilettante temperament, inexperienced in politics; his weak ministry was marked by gross corruption and intimidation.

BUTEO, see BUZZARDS, HAWK FAMILY.

BUTHROTUM.—(1) (39° 45′ N., 20° E.) modern Butrinto (*q.v.*); seaport, Epirus, founded by Helenus, s. of Priam. (2) town, Attica, mentioned by Pliny the Elder.

BUTLER (41° N., 79° 58′ W.), town (and county), Pennsylvania, U.S.A.; petroleum. Pop. (1910) 20,728.

BUTLER, Irish family. Their ancestor, Theobald Walter, eldest bro. of Hubert Walter, abp. of Canterbury (1193), received hereditary office of butler to lord of Ireland (hence surname of descendants). James Walter became Earl of Ormonde (1328). In XV. cent. the Irish earldom was for a time forfeited, but subsequently Sir Piers B., heir-male of Ormonde earls, received grant of Irish estates as Earl of Ossory and Ormonde (1537–38). James B. was cr. a marquess (1632). From 1825 revived Irish marquessate descended in direct line.

BUTLER, ALBAN (1710–73), English R.C. priest; author of *Lives of the Saints.*

BUTLER, BENJAMIN FRANKLIN (1818–93), Amer. administrator, soldier, and lawyer; admitted to Massachusetts Bar (1840); delegate to Democratic national conventions (1848–60); member of Massachusetts House of Representatives (1853), of state senate (1859), and a Republican representative in Congress (1867–74, 1876–79); major-general U.S. Volunteers during Civil War.

BUTLER, CHARLES (1750–1832), Eng. legal and miscellaneous writer; pub. some fifty works, including *Horæ Biblicæ* (1797), *Horæ Juridicæ Subsecivæ* (1804), *Book of the Roman Catholic Church.*

BUTLER, GEORGE (1774–1853), D.D., master of Harrow and dean of Peterborough; was f. of **George B.** (1819–90), D.D., principal of Liverpool College and writer on theological subjects, and of **Henry Montagu B.** (1833–), D.D., master of Trinity Coll., Cambridge, from 1886.

BUTLER, JOSEPH (1692–1752), Anglican theologian and philosopher; ed. at Oxford; prebendary of Rochester, 1733; Clerk of the Court to Queen Caroline, 1736; bp. of Bristol, 1738 (soon after dean of St. Paul's in addition); bp. of Durham, 1750. His *Analogy of Religion* (pub. 1736) is often regarded as one of the greatest intellectual achievements of Anglicanism. He wrote against Hobbes's school and combated the then fashionable Deism. Beginning with the future life and moral government of the world, he goes on to Revelation and the importance of Christ's death, not merely the influence of His teaching; finally asserts that the fact that Christianity cannot be absolutely proved and is not universally accepted is no fatal objection. B. has been described as a wise rather than a learned man; he had little influence at first, but in XIX. cent. his greatness was realised.

Life, by Collins; Fitzgerald; Spooner; Whyte. Edit. of B.'s works, by Gladstone (1896).

BUTLER, NICHOLAS MURRAY (1862–), Amer. educationist; pres. of Columbia Univ., New York; founded *The Educational Review*; pub. *The Meaning of Education, True and False Democracy, The American as he is*, etc.

BUTLER, SAMUEL (1612–80), Eng. satirical poet; s. of a small Worcestershire farmer; ed. King's School, Worcester; became a justice's clerk, and was subsequently in the service of the Countess of Kent, John Selden, Sir Samuel Luke, the Earl of Carbery, and the Duke of Buckingham. During these various secretarial occupations he had unique opportunities of observing men and manners, and it is this wide knowledge of life which makes his famous doggerel satire, *Hudibras* (a burlesqued knight), so lastingly attractive. The first part of the poem was pub. 1663, the second in 1664, and the third part in 1678. It consists of some ten thousand verses, and though perhaps little read now, its witty passages have become merged in everyday language; it contains such well-known couplets as—

> 'Compound for sins they are inclined to
> By damning those they have no mind to.'

> 'What makes all doctrines plain and clear?
> About two hundred pounds a year.
> And that which was proved true before
> Prove false again? Two hundred more.'

B. is said to have been neglected by the Court, and died in comparative poverty.

BUTLER, SAMUEL (1774–1839), Eng. ecclesiastic and scholar; as headmaster raised Shrewsbury School to a high state of efficiency; app. bp. of Lichfield (1836); edit. works of Æschylus, and pub. a *Sketch of Modern and Ancient Geography* (1813).

BUTLER, SAMUEL (1835–1902), Eng. author; grandson of the above, whose life he wrote; made a competence in New Zealand, and used his experience of colonial life in *Erewhon, or over the Range* (1872). His other writings include works on Shakespeare's sonnets, the authorship of the *Odyssey*, and a novel (posthumously published), *The Way of All Flesh.* An artist and musician, he exhibited at the Royal Academy, and composed oratorios in manner of Handel.

BUTLER, WILLIAM ALLEN (1825–1902), Amer. lawyer and writer; his satirical poem, 'Nothing to Wear' (1857), was translated into French and German; prose works include a labour study, *Domesticus.*

BUTLER, WILLIAM ARCHER (1814–48), Irish and author; wrote *Lectures on the History of Ancient Philosophy* (1856); and his *Sermons* (1849) are remarkable for their brilliant style.

BUTLER, SIR WILLIAM FRANCIS (1838–1911),

Brit. soldier and traveller; served in Red River Expedition (1870–71), Ashanti (1873–74), Zulu War, and Egyptian and Sudan campaigns; Commander-in-Chief in S. Africa (1898); author of *The Great Lone Land* (1872) and other works.—LADY BUTLER (*née* Elizabeth Thompson) has painted many famous battle-pictures, among the most popular of which are *The Roll Call*, *The Dawn of Waterloo*.

BUTLERAGE was an Eng. custom of levying a duty of one tun of wine for the king's use out of every twenty landed in England. It was changed to a tax of two shillings per tun in the reign of Edward I.; and fell into disuse in 1809.

BUTO, name given by the Greeks to the Egyptian snake-goddess Uto, who is generally represented as a serpent, sometimes winged, and wearing the crown of Lower Egypt.

BUTRINTO (39° 45′ N., 20° E.), seaport town, Albania; ruins of Buthrotum (*q.v.*) in neighbourhood.

BUTT, ISAAC (1813–79), Irish Nationalist leader; was perhaps the most prominent lawyer of his day, and was engaged in all the leading cases bearing upon Irish affairs; entering Parliament, his abilities soon raised him to the front rank amongst the Irish Protestants, and he inaugurated at Dublin (1870), and became the leader of, the Home Rule agitation.

BUTTE (46° N., 112° 30′ W.), largest city, Montana, U.S.A.; important gold, silver, and copper-mining centre; quartz mills, smelters. Pop. (1910) 39,165.

BUTTER, preparation made from fatty constituents of milk, which is either allowed to stand till cream comes to surface, or 'separated' artificially; fatty particles made to coalesce by churning. 'Fresh' b. contains more water and less fat than kind to which much salt has been added; chief butter-exporting countries, Denmark and Australia.

BUTTERFIELD, DANIEL (1831–1901), Amer. soldier; served in the Civil War, and in the second Bull Run campaign; later was Chief of Staff in the Army of the Potomac, serving in the campaigns of Gettysburg and Chancellorsville; author of *Camp and Outpost Duty* (1862).

BUTTERFIELD, WILLIAM (1814–1900), Eng. architect of Gothic tastes.

BUTTER-FISHES, see BLENNIES.

BUTTERFLIES, see LEPIDOPTERA.

BUTTERFLY FISHES (*Chætodontidæ*), small, flattened bony fishes with diverse brilliant and beautiful coloration; common about shore rocks and coral reefs in tropical and subtropical seas.

BUTTER-ROCK, soft and greasy exudation of alum and iron from certain rocks.

BUTTEVANT (52° 14′ N., 8° 40′ W.), town, Cork, Ireland.

BUTTMANN, PHILIPP KARL (1764–1829), Ger. philologist; pub. critical editions of Demosthenes and other classical authors, but is chiefly remembered by his Gk. Grammar (*Griechische Grammatik*), which has been trans. into English.

BUTTRESS, see ARCHITECTURE.

BUTYL ALCOHOLS, four organic compounds of the same composition ($C_4H_{10}O$) but different properties; *isobutyl a.* smells like fusel oil, in which it occurs.

BUTYRIC ACID ($C_4H_8O_2$), an organic acid contained in butter, with a powerful and unpleasant smell, which is noticed when butter becomes rancid, as the b. a. then separates from its union with glycerine; B.P. 163° C.; S.G. 0·975. This is *normal* b. a. ($CH_3CH_2CH_2COOH$).—*Isobutyrica* ($(CH_3)_2CHCOOH$), B.P. 155° C.; S.G. 0·97.—*Ethyl Butyrate* ($C_3H_7CO_2C_2H_5$), BUTYRIC ETHER, PINE-APPLE OIL, like most esters, has a fruity odour, and is used as a substitute for natural pine-apple essence (the flavour of which is probably due to natural butyric ether) in sweets.

BUXAR, BAXAR (25° 30′ N., 84° E.), town, Shahabad district, Bihar and Orissa, India; native army defeated by British, 1764. Pop. *c.* 14,000.

BUXINE, alkaloid obtained from box-leaves ($C_{14}H_{22}NO_2$).

BUXTON (53° 15′ N., 1° 55′ W.), town, Peak district, Derbyshire, near head of Wye Valley; celebrated mineral springs, natural hot baths; chief building, 'The Crescent,' erected by Duke of Devonshire, 1780; Devonshire Hospital for poor patients; numerous hydropathics, fine gardens. Pop. (1911) 10,025.

BUXTON, SYDNEY CHARLES (1853–), Eng. Liberal statesman; Postmaster-Gen., with seat in Cabinet, 1905; pres. of Board of Trade, 1911.

BUXTON, SIR THOMAS FOWELL, Bart. (1786–1845), Eng. brewer and philanthropist; ed. Trinity Coll., Dublin; m. Hannah, sister of Elizabeth Fry; became partner in the firm of Truman, Hanbury, & Co., London brewers; M.P. for Weymouth (1818–37); devoted himself to prison reform and the abolition of slavery in the Brit. colonies, the latter of which he saw pass into law in 1833.

BUXTORF, JOHANNES (1564–1629), Ger. Hebrew scholar; author of *Manuale Hebraicum et Chaldaicum* (1602), *Synagoga Judaica* (1603), and numerous similar works.

BUXTORF, JOHANNES (1599–1664), Rabbinic scholar; s. of above; pub. a *Lexicon Chaldaicum et Syriacum*, a Hebrew *Concordance*, etc.

BUYS-BALLOT, CHRISTOPH HEINRICH DIEDRICH (1817–90), Dutch meteorologist.

BUZOT, FRANÇOIS NICOLAS (1760–94), Fr. revolutionist; was a prominent figure amongst the Girondists, and was some time pres. of the Criminal Tribunal; was proscribed with others of his party (1793), and, after living in hiding, committed suicide.

BUZULUK (52° 48′ N., 52° 14′ E.), town, Samara, Russia; live stock, cereals, copper. Pop. 20,000.

BUZZARD, group of birds of prey distinguished from the eagles in having a relatively shorter head and a straighter beak. *Buteo vulgaris* used to be common in England, and the rough-legged b. (*Archibuteo lagopus*) occasionally visits in winter.

BYBLOS, modern JEBAIL (34° 8′ N., 35° 38′ E.), ancient town, Phœnicia; centre of worship of Adonis.

BYELAYA TSERKOV (49° 46′ N., 30° 9′ E.), town, Kiev, Russia; commercial centre; machinery; corn. Pop. 54,300.

BYELEV, BIELEFF (53° 48′ N., 36° 10′ E.), town, Tula, Russia; oil. Pop. 9600.

BYELGOROD (50° 36′ N., 36° 37′ E.), walled town, Russia; candles, leather. Pop. *c.* 23,000.

BYELO-OSERO (60° 10′ N., 37° 30′ E.), lake, Novgorod, Russia.

BYELOPOLYE, BIELOPOL (51° 7′ N., 34° 25′ E.), town, Kharkov, Russia. Pop. 15,500.

BYELOSTOK (53° N., 22° 35′ E.), town, W. Russia; cotton mills. Pop. (1910) 81,060.

BYEZHETSK (57° 46′ N., 36° 43′ E.), town, on Mologa, Russia; iron goods. Pop. 10,000.

BY-LAWS, originally the word by-law meant a law made by the local authority for the regulation of a town. It now means any law, rule, or regulation affecting the public, made by any corporation, or company, in pursuance of powers conferred by Act of Parliament. These by-laws must not contravene the law of the land, and in making them the corporation, or company, must not exceed the powers conferred by Parliament.

BYNG, GEORGE, see TORRINGTON, VISCOUNT.

BYNG, JOHN (1704–57), Brit. admiral; sent to relieve Minorca, which French had attacked, he withdrew without fighting a battle; in consequence, Fort St. Philip surrendered; B. was tried and shot (March 14, 1757).

BYNKERSHOEK, CORNELIUS VAN (1673–1743), Dutch jurist; author of *De foro legatorum* and numerous other legal works.

BY-PRODUCTS, secondary substances produced in manufacturing others; coal-tar is a b. of gas manufacture, and yields aniline dyes, saccharin, essences for perfumes, and drugs such as phenacetin and anti-

pyrin; the hard layer of carbon which adheres to roof and sides of gas-retorts provides the carbon rods for arc lights; and all ammonia salts are made on large scale from the 'ammoniacal liquor' of the gasworks. Hydrochloric acid is a b. of alkali manufacture, glycerin of soap; and grain from brewery provides animal food.

BYRD, WILLIAM (1543–1623), Eng. composer; shared with Tallis the post of organist to the Chapel Royal; composed masses, part-songs, madrigals, etc., and his work takes high rank in the lit. of music. A number of his compositions have been pub. in recent times, but much of his work still remains in manuscript.

BYRGIUS, JUSTUS, see BURGI, JOST.

BYROM, JOHN (1692–1763), Eng. poet and hymnologist; b. Kersal Cell, Manchester, where his famous hymn, *Christians, Awake*, was written. He was a fellow of Trinity Coll., Cambridge; F.R.S. (1724); and besides writing numerous poems and hymns was the inventor of a system of shorthand. He was a devoted adherent of the Pretender, and was the author of the famous Jacobite toast:—

> 'God save the King!—I mean the faith's defender!
> God bless (no harm in blessing?) the Pretender!
> Though which Pretender is, and which is King,
> —God save us all—that's quite another thing!'

B.'s *Journals and Remains* have been pub. by the Chetham Society.

BYRON ISLAND.—(1) (1° 25′ S., 177° 54′ E.) island, Gilbert group, Oceania. (2) (47° 44′ S., 75° 14′ W.) island, Patagonia, S. America.

BYRON, GEORGE GORDON, 6TH LORD (1788–1824), Eng. poet; b. in Holles Street, London, (Jan. 22, 1788). He came of an old Derbyshire family, notorious for its stormy history. His great-uncle and predecessor in the title ('the wicked Lord B.') was tried by the Peers in 1765 for the murder of Mr. Chaworth, but found guilty of manslaughter only; and his grandfather, Admiral B. ('Foul-Weather Jack'), sailed round the world with Anson. His f. was a dissolute scamp who m. (as his second wife) Catherine Gordon of Gight, a small Scot. heiress, and squandered all her fortune. After his f.'s death in 1791, B. lived with his mother (a violent, foolish woman, who made him exceedingly unhappy), chiefly in Aberdeen. He received his education first at Harrow and then at Trinity Coll., Cambridge, where he made the acquaintance of Hobhouse, afterwards Lord Broughton, and led a very riotous life. About this time he fell in love with Mary Chaworth, the heiress of his great-uncle's victim, and was rejected by her—a disappointment that had some bearing on his subsequent life.

In 1807 he published *Hours of Idleness*, which was 'out up' by Brougham in the *Edinburgh Review*. In retaliation Byron wrote in 1809 his satirical poem, *English Bards and Scotch Reviewers*, and then set out on his tour through Europe, including in his travels Spain, Portugal, Greece, and the Ægean Islands. On his return he issued (in 1812) the first two cantos of *Childe Harold*, describing his travels, and 'found himself famous.' For the next few years he was the darling of London society, contracting numerous liaisons with married women (notably Lady Caroline Lambe, wife of Lord Melbourne) and publishing his Oriental poems, *The Giaour* (1813), *The Corsair*, and *Lara* (1814), and *The Siege of Corinth* (1816). In Jan. 1815 he married Miss Milbanke, an heiress; in Dec. of the same year his dau., Ada, was born, and his wife left his house. The reasons of this separation are not known. Being cast off by society, B. went abroad and settled near Geneva, where he met and came under the influence of Shelley, and formed an intimacy with Mrs. Shelley's step-sister, Claire Clairmont, who became the mother of Allegra Byron. At Geneva he wrote the fine Wordsworthian canto iii. of *Childe Harold*, *The Prisoner of Chillon*, and began *Manfred*. From Geneva he went to Milan, thence to Venice, where he spent two years of ceaseless dissipation, and wrote *Mazeppa*, and the first two cantos of *Don Juan*, his masterpiece.

From his life in Venice he was rescued in 1819 by the Countess Guiccioli, with whom he lived for the next four years at Ravenna, Pisa, and Genoa. During this time he continued *Don Juan* and wrote his plays, *Marino Faliero* (1820), *The Two Foscari*, and *Cain* (1821), and his burlesque of Southey, *The Vision of Judgment* (1821). At the instigation of Shelley (whom he met again in Pisa), in 1822 he entered into partnership with Leigh Hunt in editing *The Liberal*, which was, however, a failure. After Shelley's death, he raised money for the Gk. insurrectionists, and sailed to Missolonghi, where he died of fever, April 19, 1824. B.'s poetry has lately suffered undue eclipse; his earlier poems are garish and insincere, and his style is always slipshod, but his later poems show not only sympathy with the stormy side of nature, but also great powers of wit and satire. His *Don Juan* is not only the cleverist satirical poem in English lit., but one of the most ingenious displays of rhyming in the language.

The Poetical Works of Lord Byron, with Memoir by E. H. Coleridge (1905); *Letters and Journals of Lord Byron*, edit. by Thomas Moore.

BYRON, HENRY JAMES (1834–84), Eng. dramatist and actor; first editor of *Fun*; wrote numerous comedies and extravaganzas, and achieved remarkable success with *Our Boys*, which had a three years' run at the Vaudeville Theatre (Jan. 1875–April 1879). Another popular success was *The Upper Crust*, written for J. L. Toole.

BYRON, HON. JOHN (1723–86), Eng. vice-admiral; 2nd s. of 4th Baron B.; grandfather of poet; sailed round the world with Anson; the elements were generally unfavourable to his naval engagements, and he won the sobriquet of 'Foul-Weather Jack'; Gov. of Newfoundland, 1769.

BYRON, JOHN BYRON, 1ST BARON (d. 1652), Eng. cavalier; was a loyal supporter of Charles I. in the Civil War, and fought at *Edgehill*, *Newbury*, and *Marston Moor*; held Chester during a long siege; d. at Paris.

BYSSUS, see under LAMELLIBRANCHIATA.

BYTOWN, former name of OTTAWA (*q.v.*).

BYZANTINE EMPIRE, EASTERN EMPIRE, LOWER (OR LATER) ROMAN EMPIRE.—The Byzantine Empire was founded by CONSTANTINE THE GREAT, who in 326 A.D. moved his capital to BYZANTIUM, henceforth called Constantinople. The double change which had fallen upon the Rom. Empire was marked by the city's dedication in 330 by Christian bp's to the Virgin Mary. The pagan mistress of the world had become a Christian state and was to develop into a merely Eastern power. It remained the bulwark of civilisation throughout the Dark and Middle Ages, and then the Italianate-Gk. city, in its turn overrun by barbarian conquerors, became the parent of the Renaissance (*q.v.*).

The modern view differs from that of Gibbon, who called his history of the B. E. its *Decline and Fall*. From its foundation, 326, to its capture by Turks, 1453, the B. E., allowing for differences of race, prospered, or the reverse, after the normal fashion of a mediæval state. For some time the Rom. Empire remained intact, although on Constantine's death the system of Eastern and Western Augustus was reverted to, but in the V. cent. it finally lost its western provinces. Visigoths, crossing the Danube, won the great victory of *Adrianople*, 378. Goths and Vandals streamed into Europe and the legions withdrew from realm after realm. In 476 Romulus Augustulus, who had deposed Julius Nepos, was displaced by the Teutonic ruler Odoacer, and the Rom. Empire in the West came to an end. The Eastern Empire had meanwhile successfully repelled Teutonic attacks (the Goths being massacred and expelled by the populace at Constantinople, 401), became an object of great reverence to

the new Teutonic kingdoms, and served, until its fall, the purpose of European outpost against Asiatic invasions.

The Emperor JUSTINIAN (ruled 527–65), lawgiver and builder of Santa Sophia, with the aid of his generals Belisarius and Narses, reconquered some western provinces, including Rome; his court exhibited Alexandrian splendour and vice; his wars and extravagance brought about the decline of VII. cent., when Italy was recaptured by Lombards, Slavs and Bulgarians settled in Balkan peninsula, Avars captured Dacia, Pannonia, etc. Persians attacked Syria, sacked Jerusalem (614) and assaulted Constantinople, and after defeat of Persians, Saracens conquered Egypt and Syria and threatened Asia Minor. Territory was permanently reduced; civilisation decayed.

LEO THE ISAURIAN (717–40) by a series of victories fatally weakened the Saracens. The MACEDONIAN DYNASTY (867–1056) ruled the empire in its last great age; the Saracens became a negligible power; Constantinople became the trading centre of the world; Bulgaria became a Christian, dependent state, BASIL II., 'Slayer of the Bulgarians,' reducing it, 1018; Russia became Christian ally. The empire steadily declined after the Macedonian rule; the Seljukian Turks under Alp Arslan won the great battle of *Manzikert*, 1071, taking Emperor Romanus IV. prisoner, and founded Turk. kingdom of Rūm. The appeal of Emperor ALEXIUS COMNENUS I. (1081–1118) to Christian princes for aid against the Turks brought about the First Crusade. The greed and self-seeking of the Crusaders ultimately caused the B. E.'s fall.

The empire had also to face Christian aggression in Italy; with aid of Venice the Normans were for some time kept in check, but ultimately founded a state in southern Italy and Sicily. The reign of ISAAC ANGELUS, one of the last Comnenians, proved fatal to the empire. Bulgaria successfully revolted against his taxation; he was temporarily deposed; and in 1204 Venice diverted the Fourth Crusade against Constantinople; the capital was sacked, and the empire dismembered by the Crusaders.

The Greeks for some time elected a titular emperor, and in 1261 the Emperor MICHAEL PALEOLOGUS captured Constantinople, but with difficulty maintained his position. The empire finally fell before the attack of Ottoman Turks, who captured Philadelphia, 1393, and overran Bulgaria. After some delay Constantinople was besieged, 1422. Europe in terror sought to assemble a crusading army, but the sole aid against the infidel was given by Hungary. In 1453 a new and final siege commenced. CONSTANTINE XI. died fighting, and on the following day the city was stormed. The combined attack of East and West had at length proved fatal, and the capital of Gk. Christendom had finally passed into the infidel's possession.

The Rom. emperor of the East retained much of the power of the *pontifex maximus*, presiding at ecclesiastical councils, ratifying and making canon law. The patriarch, nominal head of the Church, usually proved obedient. Until the loss of the West the see of Constantinople was subordinate to that of Rome, but the former soon became independent and took differing course on many doctrines. The Gk. patriarch was excommunicated by Pope Leo IX., 1054, and the schism has never been more than temporarily healed.

Gibbon, *Decline and Fall of the Roman Empire*; Bury, *History of the Later Roman Empire* (1889, 2 vols.); Oman, *The Byzantine Empire* (1892); Pears, *Destruction of the Greek Empire* (1904); Foord, *The Byzantine Empire* (1911).

Byzantine Architecture, see ARCHITECTURE.

BYZANTIUM (41° 2′ N., 28° 58′ E.), town, on site of modern Constantinople, at entrance to Bosporus; founded in 667 B.C. by Gk. colonists from Megara; taken by Persians, 515 B.C.; some time under control of Athens, V. cent. B.C.; independent from IV. cent.; destroyed by Severus, 196 A.D.; rebuilt as Constantinople (*q.v.*), 330 A.D.

C, the third letter of the Latin alphabet; originally there was no distinction between this letter and G. As a numeral the letter signifies 100.

ÇA IRA, a famous Fr. street ballad which was popular at the time of the Revolution.

CAB (from Fr. *cabriolet*), a two- or four-wheeled vehicle used in France as early as the XVII. cent.; first introduced into England about 1820. Originally this kind of carriage was a high, two-wheeled gig, with movable hood, accommodating two persons. A later development of the vehicle was the HANSOM, patented by an architect named Hansom, in 1834. Four-wheeled cabs, or *growlers*, first came into use in England about 1836; motor-cabs in 1897.

CABAL, small group of persons united in a cause which calls for intrigue; especially Cabal whose names—Clifford, Arlington, Buckingham, Ashley, Lauderdale, who carried out Charles II.'s unpatriotic Fr. policy—formed anagram CABAL.

CABALLERO, FERNÁN (1796–1877), Span. novelist; *nom de plume* of CECILIA FRANCISCA LARREA, author of numerous hist. and other stories which achieved great popularity. Her most famous work, *La Gaviota* (1849), was trans. into most European languages.

CABANIS, PIERRE JEAN GEORGE (1757–1808), Fr. physician and author; prof. of Hygiene (1795), prof. of Legal Med. and History of Med. (1799), École de Médecine, Paris; friend and physician of Mirabeau; one of the leaders of the Revolution.

CABARRUS, FRANÇOIS (1752–1810), Fr. financier; spent most of his life in Spain, where he acted as Minister of Finance under the Bonaparte régime.

CABATÚAN (10° 52′ N., 120° 28′ E.), town, Panay, Philippine Islands; rice. Pop. c. 18,000.

CABBAGE, vegetable; the wild c. (*Brassica oleracea*), native to Britain, is the ancestral species of all cultivated varieties of c's, kales, broccoli, and cauliflowers; thrives in deeply-dug, well-manured clay or loam soil, which should be rolled before planting and frequently stirred and hoed afterwards. For succession they are sown Jan. (in frames), March (in open), for summer and autumn use; and again June, July, Aug., for winter and following spring and summer; they are planted when about 3 in. tall, 1 to 2 ft. apart each way. Enemies include: Club, or 'finger-and-toe,' caused by maggot of cabbage weevil—remedied by deep digging, stirring of soil, liming; caterpillars of cabbage butterfly—removed by hand-picking; slugs—by trapping.

CABBALA, see KABBALAH.

CABEIRI (classical myth.), minor deities, represented as dwarfs, who were the objects of secret worship, chiefly in the Gk. islands of Lemnos and Samothrace.

CABER-TOSSING, Scot. athletic sport, consisting in throwing the trunk of a tree, about 20 ft. long, so that it falls on the ground with the smaller end pointing directly away from the thrower. The winner is he who throws with best style and correctness; in America, in the so-called Scottish-American style of c.-t., the winner is he who throws the caber farthest.

CABES, see GABES.

CABET, ÉTIENNE (1788–1856), Fr. communist; wrote a *Histoire de la Révolution de 1830*; established a communist colony on the Red River, Texas, which proved a failure.

CABINDA, see KABINDA.

CABINET, in one sense was the name formerly given to the private audience-chamber of a monarch, or other public person, as the 'king's cabinet,' and from this source is derived its political use ('member of the Cabinet'), the governing body, dating from William III., which meets the head of a state to discuss national affairs. In Pitt's time it consisted of himself and seven peers, 1783; numbers gradually increased; C. of 1905 had six peers and thirteen commoners; present C. consists of twenty-one, headed by Prime Minister and including Lord Chancellor, First Lord of Admiralty, Secretaries of State, Presidents of Committees of Council, and other officials.

Since Queen Anne's time the custom of monarchs attending C. meetings has lapsed; precedent set by George I., whose ignorance of English prevented him from taking any part in proceedings.

U.S. Cabinet consists of nine Ministers who do not sit in either House; chosen by and under authority of President.

CABINET NOIR (Fr.), Fr. Government office, where the letters of obnoxious or suspected persons were secretly opened. The practice was in vogue from the XVII. cent. down to the Napoleonic period.

CABLE.—(1) large, strong rope, usually of 3 or 4 strands of hemp, jute, or coir, or of wire and chain, such as are used for ships' anchors. Chain c's are generally made in eight lengths of 12½ fathoms each, shackled together. (2) nautical measure = 200 yards, *e.g.* length of 100 fathoms, or one-tenth of a nautical mile.

CABLE, GEORGE WASHINGTON (1844–), Amer. novelist; has made a special study of Creole life in Louisiana; author of *Old Creole Days* (1879), *The Grandissimes* (1880), *Madame Delphine* (1881), *Dr. Sevier* (1884), etc.

CABOT, GEORGE (1751–1823), Amer. politician; a leading authority in commercial affairs; in politics a Federalist, and member of the 'Essex Junto,' was bitterly attacked by more advanced Republicans.

CABOT, JOHN (1450–98), Ital. navigator; b. Genoa; naturalised at Venice (1476); settled in Bristol (1490); subsequently sailed from Bristol (May 2, 1497) under letters patent received from Henry VII. (1496); discovered Cape Breton Island; sailed again (May 1498), explored southern coast of Greenland and reached modern Baffin Land, which he believed to be mainland of Asia; sailed farther along coast, but returned to England (autumn, 1498). His s. **Sebastian** (c. 1474–1557) took part in 1497 expedition; after life of travel became gov. of London Company of Merchant Adventurers (1551).

Beazely, *John and Sebastian C.: the Discovery of North America* (1898).

CABRA (37° 29′ N., 4° 29′ W.), town, Cordova, Spain; Moorish antiquities; wine. Pop. 13,100.

CABRAL, PEDRO ALVAREZ, CABRERA (d. c. 1501), Portug. navigator; planted Portug. flag in Brazil, which he called Santa Cruz, 1500.

CABRERA (39° 5′ N., 2° 55′ E.), one of Balearic Islands, Spain.

CABRERA, RAMON (1806–77), Span. Carlist general (1833–40 and 1848–49); b. Tortosa; exiled for participation in Carlist conspiracies, and subsequently submitted to Alfonso XII.; d. in London.

CABUL, see KABUL.

CACAO, see COCOA.

CACCAMO (37° 55′ N., 13° 37′ E.), town, Palermo, Sicily; agate, beryl, jasper. Pop. 11,274.

CACCINI, GIULIO (1550–c. 1614), Ital. composer; deeply influenced by Renaissance and pioneer of classical opera.

CÁCERES (39° 40′ N., 6° 15′ W.).—(1) province, Spain; sheep- and pig-rearing. Area, 7667 sq. miles.

Pop. (1910) 395,499. (2) capital of province, ancient *Castra Cæcilia*; Rom. antiquities. Pop. 17,000.

CACHALOT, see SPERM WHALE.

CACHAR, KACHAR (24° 45′ N., 92° 50′ E.), district, Assam, India; area, 2063 sq. miles. Pop. 414,800.

CACHET, LETTRE DE, Fr. writ corresponding to Eng. Close Writ (*q.v.*); signed with king's name, countersigned by a Sec. of State, and closed by royal seal (*cachet*); so-called XVI. cent. onwards; previously variously known as letters close, letters of the little signet, *lettres du petit cachet.*

CACHOEIRA (12° 30′ S., 39° 5′ W.), town, Bahia, Brazil; commercial centre; cigars. Pop. 12,600.

CACIQUE, CAZIQUE, name given to chiefs of native tribes of Central and S. America.

CACODYL, KAKODYLE, organic compound of carbon, hydrogen, and arsenic.

CACTUS (= prickly plant), green, succulent, mostly leafless spiny plants, with globular, columnar, flattened, or angled, often grotesquely shaped stems, and sessile, usually large and showy, flowers, natives exclusively of tropical America; formerly classed into one genus, Cactus; now subdivided into about 18 genera, comprising about 1000 species. The most commonly cultivated in greenhouses are *Cereus, Opuntia, Phyllocactus, Mammilaria.* The fruit of *Opuntia ficus indicæ,* the prickly pear or Indian fig, is eaten in America and S. Europe, and the fleshy stems of *Melocactus* and others are eaten by cattle in dry districts of S. America. Some species (e.g. *Cereus*) attain a height of 50 ft.

CACUS (classical myth.), giant, s. of Vulcan, who inhabited cave of Aventine Hill; slain by Hercules.

CADAHALSO, JOSÉ DE (1741–82), Span. author and soldier; spent several years in European travel and study; killed at Gibraltar (1782); author of a tragedy, *Don Sancho Garcia* (1771); also of poems and satires; *Works* (Madrid, 1823).

CADAMOSTO, ALVISE DA (1432–77), Venetian explorer; entered the Portug. service under Prince Henry the Navigator; discovered the Cape Verde Islands; famed for his explorations of the coast of W. Africa and the rivers Gambia and Senegal.

CADDIS-FLY, name for neuropterous insects of the family Phryganeidæ. The elongated larvæ live in water, and surround themselves with a tube consisting of small fragments of gravel, wood, etc., agglutinated by the secretion from a 'spinning gland.' See NEUROPTERA.

CADDO, small N. Amer. Indian confederacy, occupying a district of Oklahoma. They are a people of considerable intelligence and of industrious habits.

CADE, JACK (d. 1450), Eng. rebel; leader of the Kentish insurgents (1450). He marched on London with 20,000 men, and after defeating a force sent against him by Henry VI., entered the city. His triumph was short-lived. Driven out of London by the citizens, his followers dispersed, and he became a wanderer; was captured, and d. of wounds received in the struggle.

CADELL, FRANCIS (1822–79), Scot. naval officer who explored the river Murray, Australia (1850–59); murdered by crew while sailing to Spice Islands.

CADELL, ROBERT (1788–1849), partner in Constable's publishing house, Edinburgh, which he resuscitated after its failure.

CADENABBIA (45° 49′ N., 9° 14′ E.), village, on Lake Como, Italy; popular resort.

CADENCE, the act of modulation; the gradual fall of the voice at the end of a phrase or sentence.

CADENCY, see HERALDRY.

CADER IDRIS (52° 42′ N., 3° 54′ W.), mountain ridge, Merionethshire, Wales; peak, 2914 ft.

CADET, younger son of an influential family; official name of a youth being trained as an officer in the Brit. navy; youth undergoing a system of military training.

CADI, Muhammadan ecclesiastical judge who administers the canon law of Islam.

CADILLAC (44° 15′ N., 85° 26′ W.), city, Michigan, U.S.A.; lumber-mills. Pop. 8375.

CADIZ (10° 56′ N., 122° 19′ E.), town, Negros island, Philippines; sawmill.

CADIZ (36° 30′ N., 5° 40′ W.), province, Andalusia, southern Spain; bordering Atlantic and Strait of Gibraltar; mountainous; well watered; active industries; sherry wine, fishing, fruit; in south is Cape Trafalgar, where Nelson fought and d., 1805. Area, 2834 sq. miles. Pop. (1910) 470,068.

CADIZ (36° 32′ N., 6° 17′ W.), famous port, Spain; on narrow tongue of land projecting into Atlantic; founded by Phœnicians *c.* 1100 B.C.; Roman *Gades*; burned by Drake, 1587; has two cathedrals, various educational institutions, and watch-tower (100 ft.); exports wine, salt, corks, canary seed, tunny-fish, olives, olive oil; graving docks, shipbuilding yards, sugar factory, ammonia, and chemical manure works, manufactures of glass, woollens, hats. Pop. (1910) 67,306.

CADMIUM (Cd = 111·9), rare metallic element, chemically resembles zinc, obtained from zinc blende by distillation; in colour like tin, but harder, ductile, and malleable. S.G. 8·6, M.P. 315°, B.P. 860°; its sulphide (CdS), or 'cadmium yellow,' used as a pigment.

CADMUS, legendary founder of Thebes; s. of Agenor, king of Phœnicia and bro. of Europa; m. Harmonia, dau. of Ares and Aphrodite, and is said finally to have become king of Illyria.

CADOUDAL, GEORGES (1771–1804), Fr. Chouan leader; during the Revolution a very active partisan of the royalists, and refused all overtures of Napoleon, who sought to win him over; eventually captured and executed in Paris.

CADRE, list of officers of ship or regiment.

CADUCEUS (classical myth.), the wand or staff of Hermes ('the herald, Mercury'), messenger of the gods; also recognised by the Greeks as the herald's mark of office.

CADZOW, see HAMILTON (Scot. family).

CÆCILIA, S. American species of primitive worm-like Batrachia (*q.v.*) of the order Gymnophiona.

CÆCILIUS, Gk. rhetorician, who fl. at Rome during the Augustan age; only fragments of his numerous works remain; edit. by Ofenloch (1907).

CÆCILIUS STATIUS (d. 168 B.C.), Rom. comic dramatist, fragments of whose plays are to be found in Ribbeck and Aulus Gellius.

CÆCINA, AULUS (d. 79 A.D.), Rom. general; noted for ambition and treachery; entered the service of Galba, but transferred himself to that of Vitellius, and was defeated by Suetonius at *Cremona*; later he found favour with Vespasian, but, entering into a conspiracy against him, was put to death.

CÆCUM, see DIGESTION (Anatomy).

CÆDMON (*c.* 660), the first Eng. poet. All that we know of him is drawn from Bede, who tells us that he was a Northumbrian herdsman, who received miraculously the gift of song and wrote several poems on Biblical subjects, finally dying in Whitby Abbey. Of his works in their original Northumbrian dialect only the nine opening lines of a *Hymn on the Creation* exist to-day. When the Northumbrian missionaries evangelised the Old Saxons of Germany they taught them C.'s poems, whence arose the Old Saxon poem on the *Heliand* (or 'Saviour'), and another on *Genesis,* which was trans. into the West Saxon dialect of England. These two fine poems, Old Saxon *Heliand,* and West, or Anglo-Saxon, *Genesis,* give us a distant impression of C.'s powers; *Genesis* influenced Milton in his writing of *Paradise Lost.*

CAEN (49° 11′ N., 0° 21′ W.), city, Calvados, France; on Orne and Odon; ancient capital of Lower Normandy, univ. founded by Henry VI. of England; Hôtel de ville; museums; principal churches, St. Étienne, La Trinité (1066), and St. Pierre; founded by William the Conqueror; taken by English, 1346 and 1417; retaken by French, 1743; lace, cider, dairy produce, etc. Pop. (1911) 46,934.

CÆRE (41° 59′ N., 12° 6′ E.), ancient city, Italy; Etruscan ruins; modern Cerveteri.

CAERLEON (51° 37′ N., 2° 58′ W.), town, Monmouthshire; Roman ruins, notably a large amphitheatre known as 'King Arthur's Round Table.' Through Tennyson C. has become associated with the exploits of King Arthur.

CAERPHILLY (51° 35′ N., 3° 14′ W.), market town, Glamorganshire, Wales; ruins of fine XIII.-cent. castle; coal, ironworks. Pop. (1911) 32,850.

CÆSALPINUS, ANDREAS (1519–1603), Ital. scientist; was physician to Clement VIII., and the most famous botanist of his day.

CÆSAR, name of family of Rom. *gens Julia,* to which belonged Julius C.; assumed by his adopted son, Octavius, first Rom. Emperor, and became synonymous with imperial ruler; from 136 borne by Emperor's successor designate; revived in form, KAISER, when king of Germans became Holy Rom. Emperor in Middle Ages; adopted as TSAR, or CZAR, by Russ. Emperor.

CÆSAR, GAIUS JULIUS (102–44 B.C.), Rom. general and dictator; bound to democrats by family ties, although of patrician blood, he distinguished himself in army in East and in third Mithradatic War. Identifying himself with democrats, he became curule ædile (65 B.C.), pontifex maximus (63), prætor (62 B.C.). In 60 B.C. he persuaded Pompey and Crassus to support him ('First Triumvirate') against the oligarchy in his Consulate (59 B.C.). He carried an Agrarian Law and secured governorship of Gaul for five years. By 51 B.C. he had reduced Gaul to a tribute-paying province. In 56 B.C. his command in Gaul, which should have expired March 1, 54 B.C., was renewed till 49 B.C.

After Crassus' death (53 B.C.), Pompey drifted apart from C. He passed a law 'de jure magistratuum' (52 B.C.) which made it possible to call C. to account for unconstitutional acts. The quarrel between C. and Pompey subsequently ended in Pompey's defeat (48 B.C.). Having defeated S. of Mithradates at *Zela* (47 B.C.), C. returned to Italy. His victory of *Thapsus* (46 B.C.) was death-knell of Pompeian cause. In July he received the dictatorship for ten years. Next year he crushed a rising in Spain, and then returned to Rome and undertook reorganisation of Roman state. His measures were moderate and practical. He revived the Gracchan designs of transmarine colonisation, extended local self-government, encouraged agriculture, and reformed provincial administration, but his government gradually tended towards undisguised absolutism, and he was assassinated (March 15, 44 B.C.). A brilliant and original soldier, a forceful administrator and great statesman, C. founded the new monarchy at Rome. His assassination could not prevent the Empire. — See ROME (Ancient History).

Julius Cæsar, Hilary Hardinge (Jack, 1912); *Julius Cæsar,* Wardo Fowler (1892); *History of Rome,* Mommsen and others.

CÆSAR, SIR JULIUS (1557–1636), Eng. judge; famed for his generosity.

CÆSAREA MAZACA (38° 40′ N., 35° 20′ E.), ancient city, Cappadocia, Asia Minor; modern Kaisarieh.

CÆSAREA PALÆSTINA (32° 30′ N., 34° 50′ E.), seaport, Palestine; founded by Herod I., 13 B.C.; now ruins.

CÆSAREA PHILIPPI, C. PANEAS (32° 12′ N., 35° 42′ E.), town, on Jordan, foot of Mount Hermon, Palestine; now Banias.

CÆSAREAN SECTION, the operation for removal of a fœtus from the womb by means of abdominal section, so called from a story of its being practised at the birth of Julius Cæsar.

CÆSARION (47–30 B.C.), Cæsar's putative son by Cleopatra; put to death by Augustus.

CÆSIUM (Cs = 132·9), alkali metal, similar to potassium, discovered by spectroscope in Dürkheim water; spectrum has two sky-blue lines (*Cæsius,* blue); occurs in mineral pollux; isolated by electrolysis of its fused cyanide.

CÆSTUS, boxing-glove used by the ancient athletes.

CÆSURA (lit. 'a cut'), in prosody, a pause usually in the middle of a line of verse, but variable, according to the form of stanza, thus:—

While fávour fed my hópe, || delight with hópe was bróught;

or,

At once, || as far as ángel's ken, || he víews
The dísmal situátion || wáste and wíld.

CAFFEINE, THEINE ($C_8H_{10}N_4O_2.H_2O$), alkaloid obtainable from coffee, tea, guarana, Paraguay tea, kola nut, and cocoa (in small quantity); white, silky, crystalline substance; powerful heart stimulant.

CAFFIERI, JACQUES (1678–1755), Fr. metal-worker; the most famous craftsman of his period in metal-work, and largely patronised by Louis XV. and other eminent persons. The Wallace Collection contains fine examples of his work.

CAGLI (43° 32′ N., 12° 37′ E.), town, Italy; bp.'s see. Pop. 3300.

CAGLIARI (39° 13′ N., 9° 6′ E.), capital of Sardinia, on bay, S. coast; fortified; large harbour, dockyards; seat of univ.; residence of viceroy and abp.; old castle, cathedral; remains of Rom. amphitheatre; grain, wine. Pop. (1911) 61,013.

CAGLIARI, PAOLO, see VERONESE.

CAGLIOSTRO, ALESSANDRO, COUNT (1743–95), Ital. alchemist and charlatan; real name, Giuseppe Balsamo; travelled widely, making money by alchemy; d. in prison.

CAGNOLA, LUIGI (1762–1833), Ital. architect; designed the Arco della Pace, the Porta di Marengo, and the Chapel of Santa Marcellina, all at Milan, and numerous other architectural works.

CAGOTS, a scattered race found in Gascony, Brittany, and Basque provinces. During Middle Ages they were shunned as outcasts.

CAHER (52° 22′ N., 7° 55′ W.), market town, on Suir, Tipperary, Ireland.

CAHITA, N. Amer. Indian tribes living in Mexico.

CAHOKIA, tribe of N. Amer. Indians, near St. Louis.

CAHORS (44° 26′ N., 1° 27′ E.), city, Lot, France; on rocky peninsula, almost surrounded by river Lot; ancient bridge; univ. founded by Pope John XXII.; united with Toulouse Univ., 1751; native place of Gambetta and poet Marot; bp.'s see; wine, brandy. Pop. 14,000.

CAIATA (41° 10′ N., 14° 20′ E.), ancient city, Campania, Italy; bp.'s see; modern Caiazzo.

CAICOS ISLANDS, see TURKS AND CAICOS ISLANDS.

CAIETÆ PORTUS (41° 12′ N., 13° 35′ E.), ancient seaport, Formiæ, Italy; favourite Rom. resort; modern Gaeta.

CAILLIÉ, RENÉ AUGUSTE, CAILLÉ (1799–1838), Fr. traveller; penetrated to Timbuktu (1827–28); pub. *Journal of Travels through Central Africa.*

CAIMAN, see ALLIGATOR.

CAINE, THOMAS HENRY HALL (1853–), Eng. novelist and dramatist; b. Runcorn; ed. as architect, but turned to journalism and novel-writing; has pub. *The Shadow of a Crime* (1885), *A Son of Hagar, The Deemster,* and numerous other novels. He has also dramatised several of his stories, which have achieved immense popular success.

CAIQUE, pointed Turkish skiff used on Bosporus.

CAIRD, EDWARD (1835–1908), Scot. philosopher and theologian. His bro. **John** (1820–98) was noted preacher and neo-Hegelian philosopher.

CAIRD, SIR JAMES (1816–92), Scot. writer on agriculture, and Liberal politician.

CAIRN, rough chamber composed of unhewn stones, probably always constructed for burial purposes, and in the Brit. Isles and France of Iberian or Celtic origin; sometimes contained dolmens (*q.v.*).

CAIRNES, JOHN ELLIOT (1823–75), Irish

barrister and writer on political economy; ed. Trinity Coll., Dublin; was successively prof. of Political Economy at Dublin (1856), Queen's Coll., Galway (1861), and Univ. Coll., London (1866); wrote, besides essays, *Character and Logical Method of Political Economy* (1857); *The Slave Power* (1862); *Essays in Political Economy, Theoretical and Applied* (1873); and *Some Leading Principles of Political Economy, newly expounded* (1874).

CAIRNGORM, ornamental yellow stone, like topaz, found in fine granite of Cairngorm Mts., in Scot. High lands, and elsewhere.

CAIRNS (16° 54′ S., 145° 44′ E.), seaport, Trinity Bay, Queensland; minerals, sugar. Pop. 3600.

CAIRNS, HUGH M'CALMONT CAIRNS, 1ST EARL (1819–85), Brit. politician; b. Cuttra, County Down, Ireland; M.P., 1852; became Solicitor-General, Attorney-General, Lord Justice of Court of Appeals, Lord High Chancellor; continued in last office till 1880; became Viscount Garmoyle and Earl C., 1878; fine orator.

CAIRNS, JOHN (1818–92), Presbyterian theologian; moderator, United Presbyterian Synod, 1872.

CAIRO (30° 2′ N., 31° 15′ E.), capital, Egypt (*q.v.*), on right bank of Nile near Delta; built partly on hill-slope, surrounded by old walls on N. and E.; highest part occupied by citadel which contains viceregal palace, public offices, arsenal, and Mehemet Ali's magnificent mosque, and is commanded by forts on Mokattam Hills. Newer portion is European in style, with wide streets. Older part has narrow streets, but contains many beautiful mosques of which Gami'a Sultan Hassan and Gami'a-ibn-Tulun are finest examples of Arabic arch. Also in old C. is 'Granary of Joseph,' consisting of seven towers. C. has observatory, Arabic Museum, library, ancient gates, aqueduct connecting citadel with Nile; at Bulak is famous museum of antiquities; Khedival palace in centre of city; palace of Gesireh in N.W. is now hotel. C. is centre of Muhammadan learning, and has Muhammadan Univ. (founded, 988). Inhabitants include Turks, Berbers, Fellahin, Copts, Arabs, Abyssinians, Jews, Nubians. C. produces textiles. Old C. or Fostat founded by Sultan Amru, *c.* 642; new town, Al Kahirah, founded on present site, *c.* 973; citadel built by Saladin, 1176; conquered by Turkey, 1517; taken by French, 1798; passed to Turks, 1801, from whom it came to Mehemet Ali, ancestor of present Khedive. Pop. 654,476. Poole, *Cairo*.

CAIRO (37° N., 89° 10′ W.), city, Illinois, U.S.A., at junction of Mississippi and Ohio; important manufactures; lumber. Pop. (1910) 14,548.

CAISSON.—(1) in engineering, name given to large wooden or iron sort of box used in construction of piers of bridges; open at bottom, and is connected with surface of the water by a cylindrical shaft. In it excavation is carried on, and to prevent the water leaking in, compressed air is used. The c. is made to descend as work proceeds, and the pier is built on its upper platform. In some cases the c. actually contains the pier, the construction being carried on inside, and the c. removed when the pier is finished. **Caisson Disease**, effect of being exposed to high atmospheric pressures, *e.g.* in compressed air chamber of c., manifested by pains, embarrassment of breathing, paralysis, and other disagreeable symptoms. (2) military term applied to an ammunition chest, or a mine formed by burying powder in a case or an ammunition wagon. (3) a boat-shaped gate, used to close the entrance to a dry dock. The c. is placed in position and then filled with water, which causes it to fit tightly in its place.

CAITHNESS (58° 6′ to 58° 38′ N., 3° 1′ to 3° 53′ W.), county in extreme N.E. of Scotland; area, 686 sq. miles; bounded by Pentland Firth, Atlantic, North Sea, Sutherlandshire; surface hilly in S. and W.; highest peaks, Morven, Scaraben; watered by Wick, Forss, Thurso; has extensive moorlands and numerous lochs; chief towns, Wick (capital), Thurso; important fisheries off coast; produces blue flagstones; manufactures tweeds, rope, farm implements, machinery; exports farm produce, whisky, fish. Caithness belonged to Norwegian kings in Middle Ages. Pop. (1911) 32,008.

CAIUS, JOHN (1510–73), Eng. physician; b. Norwich; studied abroad; enlarged and refounded Gonville Hall, Cambridge (now Caius Coll.), 1557, and elected master (1559).

CAIVANO (40° 55′ N., 14° 19′ E.), town, S. Italy; glass. Pop. 11,460.

CAJAMARCA, CAXAMARCA (7° 6′ S., 78° 35′ W.), city (and department), Peru; ancient city of Incas; thermal baths; woollens. Pop. (town) 12,000; (department) 350,000.

CAJATAMBO, CAXATAMBO (10° 35′ S., 77° W.), town (and province), Peru. Pop. (province) 450,000.

CAJETAN, GAETANUS (1470–1534), cardinal, scholastic theologian; b. Gæta; protagonist of Luther, but believed in reform.

CALABAR (*c.* 4° 26′ N., 7° 13′ E.), district, Guinea Coast, Africa, between Kamerun and Niger delta; produces palm oil, rubber, ivory, ebony; extremely unhealthy; includes towns of C., formerly styled Old C., which stands on C. River and has Presbyterian mission, and New C., a port on New C. River.

CALABAR BEAN, seed of *Physostigma venenosum*; contains alkaloid (*physostigmine*) used medicinally; in tetanus, chorea, and as stimulant for increasing glandular secretion and peristaltic motions of intestine; also as local application for the eye, causing contraction of pupil, relieving ocular paralysis resulting from diphtheria, conjunctivitis of infants, corneal ulcers; formerly used by natives of C. in witchcraft.

CALABOZO (8° 58′ N., 67° 35′ W.), town, Venezuela; bp.'s see; cattle. Pop. 3700.

CALABRESELLA, Ital. card game, in which three persons take part, the eights, nines, tens being removed from the ordinary pack.

CALABRIA (39° N., 16° 30′ E.), compartment, Italy (area, 5819 sq. miles); between Tyrrhenian and Ionian Seas; surface mountainous, crossed by Apennines; large forests; grain, rice, fruits, flax; minerals include marble, salt, copper, gypsum; important fisheries; belonged to Rome in III. cent. B.C.; formed part of kingdom of Two Sicilies; long infested by brigands; subject to earthquakes. Pop. *c.* 1,400,000.

CALADIUM, genus of leafy tropical plants, suitable for hothouse cultivation.

CALAFAT (43° 59′ N., 22° 59′ E.), town, on Danube, Rumania; Turks defeated Russians, Jan. 1854. Pop. 7500.

CALAH, ancient city, Assyria, on peninsula formed by Tigris on W.; now ruins.

CALAHORRA (42° 17′ N., 1° 59′ W.), town, Logroño, Spain; bp.'s see; grain, tanneries; ancient *Calagurris*. Pop. 10,000.

CALAIS (50° 57′ N., 1° 50′ E.), seaport, Pas-de-Calais, France, on Strait of Dover; strong fortress; centre of passenger traffic with England and Continent; good harbour; chief buildings, Notre Dame Church, Hôtel de ville, old town hall; captured by English, 1347; retaken by French, 1558; fisheries. Pop. (1911) 72,322.

CALAIS (45° 9′ N., 67° 19′ W.), seaport, Maine, U.S.A.; lumber. Pop. (1910) 6116.

CALAMIANES (11° 35′ N., 119° 55′ E.), islands, Philippines; honey, timber. Pop. *c.* 18,000.

CALAMINE ($ZnCO_3$), mineral, zinc carbonate, rhombohedral grey, yellow, or buff-coloured crystals; used as a pigment in ceramic painting; name also applied to hydrous zinc silicate or smithsonite.

CALAMY, EDMUND, 'THE ELDER' (1600–66), Eng. Presbyterian theologian; member of Westminster Assembly; ejected, 1662; his s. **Edmund**, 'THE YOUNGER,' was f. of **Edmund** (1671–1732), Nonconformist historian.

CALAÑAS (37° 31′ N., 6° 54′ W.), town, Andalusia, Spain; copper. Pop. *c.* 8300.

CALARASHI (44° 12′ N., 27° 15′ E.), town, on Danube, Rumania; annual fair. Pop. 11,000.

CALASCIBETTA (37° 33′ N., 14° 18′ E.), town, Caltanisetta, Sicily; wine, silk, olive oil. Pop. 9100.

CALASIAO (16° N., 120° 15′ E.), town, Luzon, Philippine Islands; woven fabrics. Pop. 14,000.

CALATAFIMI (37° 54′ N., 12° 51′ E.), town, Sicily. Pop. 11,400.

CALATAYÚD (41° 25′ N., 1° 40′ W.), town, Saragossa, Spain. Pop. 11,500.

CALATIA, ancient town, Via Appia, Campania, Italy.

CALATRAVA (38° 40′ N., 4° 15′ W.), plain, New Castile, Spain. *C. la Vieja* ruined town and fortress, N.E. of Ciudad Real, Spain.

CALBAYOG (12° 5′ N., 124° 40′ E.), town, Philippine Islands; hemp. Pop. (1910) 15,900.

CALBE, KALBE (52° 39′ N., 11° 23′ E.), town, on Saale, Prussian Saxony; textiles, paper. Pop. 12,300.

CALCAREA, see under SPONGES.

CALCAREOUS ROCK, rock in which lime is predominant; generally of aqueous origin, they are remains of organic life; *e.g.* corals, foraminifera. C. SOIL produced by disintegration of c. rock; difficult of drainage owing to lime retaining water.

CALCHAS, famous soothsayer at the time of the Trojan War; after encountering Mopsus, who proved his superior in divination, he is said to have destroyed himself.

CALCIFEROUS FORMATION, one of the subdivisions of Lower Silurian system of N. America; contains c. sandstones, a subdivision of the carboniferous strata.

CALCINATION, CALCINING, process (now called *oxidation*) of heating various metallic ores in furnaces or heaps for the extraction of metals.

CALCITE, mineral, calcium carbonate ($CaCO_3$) crystallised in hexagonal form; occurs abundantly as limestone, marble, chalk, also as stalactites, stalagmites, talc spar, Iceland spar (purest form), nail-head and dog-tooth spar. C. is decomposed by heat into calcium oxide and carbon dioxide, effervesces when treated with acids, liberating carbon dioxide. Used in glass-working, iron-smelting, preparation of lime, and as building stone.

CALCIUM (Ca, 39·9), metallic chemical element; S.G. 1·58; light yellow, lustrous, ductile, and malleable; easily oxidises in air, burns brilliantly, forming calcium oxide or lime. Decomposes water with liberation of hydrogen. Abundant in nature combined with metallic bases as *carbonate*, $CaCO_3$ (limestone, chalk, marble), *phosphate*, $Ca_3(PO_4)_2$ (minerals apatite and phosphorite), *fluoride*, CaF_2 (fluor spar). Occurs dissolved in most natural waters as carbonate or sulphate (calcium phosphate), causing hardness in bones, egg-shells (carbonate). Metal is obtained by decomposing calcium chloride by electric current.

CALC-SINTER, CALCAREOUS TUFA, carbonate of lime found in stalagmites and stalactites (*q.v.*).

CALCULATING MACHINES, instruments designed to perform various calculations mechanically.

(i) **Addition machines.**—Practically all comprise a series of discs or cylinders marked with the numbers 0 to 9, all but one of which are covered with a plate. If a number (say 6) of such discs are arranged side by side, any number of 6 digits may appear. The rotation of the discs is effected by pressing certain keys, and the discs are so geared that a complete rotation of any one disc is made to move the next on its left through the space corresponding to 1 unit. Thus numbers may be added together. In money-addition machines the numbering of the discs and also the gearing is modified to suit the money system used. Addition machines may be adapted to effect multiplication, a key being so arranged that on pressing this key and those corresponding to the number to be multiplied, the number may be added any number of times.

(ii) **Multiplication machines.**—The Steiger-Egli machine is a true multiplication machine which will give the product of two 8-figure numbers, the quotient of one number by another, or square-roots.

(iii) **Difference machines.**—The elaborate difference machine of Babbage was designed to effect such operations as the calculation of values of functions such as $y=a+bx+cx^2+dx^3+ex^4$ for $x=1, 2, 3$, etc.

(iv) **Analytical machines** of various types have been invented for analysing periodic curves into their Fourier components. The first of these was that of Lord Kelvin, but many improvements have since been made, two of the best being that of Henrici and Coradi, and that of Michelson & Stratton.

Slide rules are designed for performing all kinds of logarithmic calculations. Essentially they consist of a fixed scale A, the graduations of which are proportional to the logarithms of the numbers from 1 to 10. By the use of an exactly similar sliding scale B, the logarithms of numbers may be added or subtracted.

Planimeters are instruments for determining mechanically the area of a given figure. A tracing point is guided round the figure, and the area can then be read off in appropriate units on the recording apparatus of the instrument. The simplest is that of Amsler. A bar A is fixed at one end by a needle point, and can turn about that point. A second bar B is hinged to A, and carries a wheel (with counting apparatus) near the hinge, and the tracing point at the other end, the axis of the wheel being parallel to B. As the tracing point is moved round the given figure, the wheel partly slips and partly rolls over the paper, and the total rotation is for a certain position of the figure proportional to the area of the figure; in other cases the value recorded by the instrument has to be added to or subtracted from a constant, depending on the dimensions of the instruments. Another type is the *Hatchet Planimeter* of Prytz. It consists simply of a curved knife-edge rigidly connected to a tracing point in the line of the knife-edge. It gives, with a little practice, very satisfactory results.

Integrators.—Various instruments have been designed to effect mechanically the integration of functions. If the pointer is guided along the curve $y=f(x)$, the instrument gives the curve $Y=\int y dx$.

CALCULUS OF VARIATIONS.—Object of this is to find maxima and minima values of expressions involving integrals, the expressions being supposed to vary by assigning different *forms* to the functions denoted by the dependent variables. The method of finding such max. and min. values is analogous to that of finding ordinary max. or min. values by the Differential Calculus. Let V denote a given function of x, y, $\frac{dy}{dx}, \frac{d^2y}{dx^2}, \ldots$ and let $U=\int_{x_0}^{x_1} V dx$, x_1 and x_0 being given limits. The value of U cannot be found without knowing what particular function y is of x; but without knowing this we can find δU, the increment of U by ascribing to y an arbitrary increment or *variation* δy, and from this we can deduce the conditions for a maximum or minimum value of U. The simplest problem to be so treated is to find the shortest line between two points.

Another, first proposed by John Bernoulli in 1696, which gave rise to the c. of v., is to find the curve of quickest descent from one given point to another. This problem is known as a *brachistochrone*. Another is to find the shape of a solid of revolution experiencing minimum resistance in moving through a fluid, the resistance being assumed to be a normal pressure proportional to the square of the cosine of the angle between the normal to the surface and the direction of motion. Problems of *relative* maxima and minima also are dealt with by the variation method; as, given the length of a curve, find its form so that the depth of the centre of gravity may be a maximum.

See *Calculus of Variations*, Jellett; *History of Progress of Calculus of Variations during Nineteenth Century*, Todhunter.

CALCUTTA (22° 35′ N., 88° 24′ E.), chief commercial centre and former capital of Brit. India; on left bank of Hugli (*q.v.*); capital of Bengal. Public buildings include Government House, Public Library, Univ. (founded 1857), and many schools; fine park—Maidan—with numerous statues and Marble Memorial to Queen Victoria; Fort William, nucleus of C., is near centre of town. C. dates from 1686; founded by Job Charnock; attacked and captured by Surajah Dowlah, nawab of Bengal, 1756, when 146 Europeans were imprisoned (June 20) in *Black Hole of C.*, from which only 23 emerged alive next day; retaken by Clive, Jan. 1757; capital of India, 1772–1912, when superseded by Delhi. A railway and canal centre, C. manufactures jute, cotton, iron; port has 45 % of Indian trade; graving docks; exports cotton, rice, spices, rubber, oils, seeds, tea, opium, hemp, jute. Pop. (1911) 1,222,313.

Blechenden, *Calcutta, Past and Present* (1906).

CALDECOTT, RANDOLPH (1846–86), Eng. artist and book-illustrator; attained fame by humorous drawings in *Graphic* and illustrations to Washington Irving's books, and of nursery stories.

CALDER (55° 52′ N., 3° 33′ W.), district, W. Midlothian, including Mid-Calder, West Calder.

CALDER, SIR ROBERT, Bart. (1745–1815). Brit. admiral; b. Elgin, Scotland; defeated Villeneuve, off Finisterre (1805); Commander of Portsmouth (1815).

CALDERON DE LA BARCA, PEDRO (1600–81), the greatest of Span. dramatists; b. Madrid; adopting the profession of arms, saw service in Flanders and elsewhere; wrote plays, and was patronised by Philip IV.; later entered the priesthood, but was eventually recalled to court, and continued his dramatic work for the remaining years of his life. A prolific writer (118 of his plays are still extant), he has been classed by Schlegel with Homer, Dante, and Shakespeare. Eng. trans. include *Six Dramas of Calderon*, by E. Fitzgerald (1853); *Six Plays of Calderon*, by Denis MacCarthy (1853); followed by further instalments in 1861, 1867, 1870, and 1873; and a fragment of *The Magician* by Shelley; later trans. being those by Norman Maccoll, 1888. See SPAIN (Literature).

Life, by Hasell; *Life-Work of C.*, by Merejkowski.

CALDERON, PHILIP HERMOGENES (1833–98), well-known Span. painter; keeper of Royal Academy (1887).

CALDERON, RODRIGO (d. 1621), Span. adventurer; b. Antwerp; became sec. to Duke of Lerma and subsequently to Philip III. (till 1611); cr. Count of Oliva, and in 1614 Marques De Las Siete Inglexias; incurred hatred from his insolence. When Uceda's cabal drove Lerma from court, C. was arrested, tortured, and afterwards executed.

CALDERWOOD, DAVID (1575–1650), Scot. divine; banished for resisting attempts of James VI. to establish episcopacy in Scotland; wrote *Altare Damascenum*, a criticism of claims of episcopacy.

CALDERWOOD, HENRY (1830–97), Scot. philosopher; prof. of Moral Philosophy at Edinburgh (1868); author of *The Philosophy of the Infinite* (1854), etc.

CALEDON (34° 12′ S., 19° 27′ E.), town, Cape Province, S. Africa; thermal springs.

CALEDON (29° 30′ S., 27° 20′ E.), river, S. Africa; rises near Mont aux Sources; flows S.W.; joins Orange River.

CALEDONIA, name given by the Romans to that part of Scotland which was to the N. of the Roman wall running between the Firths of Forth and Clyde. The name first occurs in Lucan (64 A.D.). It has been the habit of Scott, and other modern poets, to include the Lowlands also under the name.

CALEDONIAN CANAL (57° 5′ N., 4° 50′ W.), in counties Inverness and Argyll, joining Lochs Dochfour, Ness, Oich, Lochy, and connecting North Sea with Atlantic Ocean; opened, 1823; largely used by fishing fleets; favourite tourist route.

CALENBERG, KALENBERG (52° 30′ N., 9° 30′ E.), district, Prussia; former principality, Hanover.

CALENDAR, method of dividing time into hours, days, weeks, months, years, etc. Name is derived from Roman 'Kalends,' the first day of every month.

The periodical occurrence of certain terrestrial and celestial phenomena originated the first division of time, but this natural method of division has certain disadvantages which in certain cases, as with the month, have caused arbitrary divisions to be adopted. The alternations of light and darkness gave the *solar day*, the moon's cyclic changes gave the *lunar month*, and the periodic motion of the earth round the sun, evidenced by the seasons, gave the *solar year*. The division of the day into 24 hours, and the aggregation of 7 days to the week have no astronomical basis.

Day.—The day has been divided into 24 hours from the earliest times, but different nations have adopted different methods both as regards starting and the counting of the hours. Thus the Babylonians began the day at sunrise, the Jews at sunset, the Egyptians and Romans at midnight, a method adopted by most modern peoples. The civil day in most countries is divided into two portions, each of 12 hours, and so the abbreviations A.M. (*ante meridiem*) and P.M. (*post meridiem*) are required to denote hours before and after noon. In Italy afternoon hours (1, 2, 3, . . . 11 p.m.) are called 13, 14, 15, . . . 23 o'clock. For astronomical purposes, 24 hours are counted continuously from midnight (from midday, up to 1885). See DAY.

Week, a period of 7 days, and possibly due originally to the number of planets known to the ancients; but origin is very doubtful. English names of days of week are of Anglo-Saxon origin. The Latin names are preserved, with modifications, in the modern French names of the days of the week.

Month originally meant the time of one revolution of the moon, but has since become an arbitrary division of the year, on account of the difference of about 11 days between 12 lunations and the solar year.

Year.—The civil year is regarded as commencing at different times by different nations, but the European system is gradually extending. The astronomical year is the time of the earth's revolution round the sun—365 days 5 hours 48 min. 46 sec. mean solar time. See TIME.

The calendar now generally adopted is that due to the Romans. At the time of Julius Cæsar the difference between the civil and astronomical years was about two months, this being due to negligence in the observance of the somewhat complicated system in use before, which was adopted from the Greeks. Cæsar, taking the astronomical year as 365¼ days, adopted a simpler arrangement, fixing the number of days in the alternate months January, March, May, July, September, and November as 31, the other months, with the exception of February, each having 30 days. February was ordinarily to have 29 days, but 30 every fourth year. This was altered in the time of Augustus, the month Sextilis being called after him and given 31 days. So others were changed, and the present anomalous system arose. The *Julian calendar* continued in use till 1582, by which time the cumulative error of about 11¼ min. amounted to 10 days. The correction was made by Pope Gregory XIII., and hence we have the *Gregorian calendar*. Pope Gregory ordained that the years 1600, 1700, etc., should only be reckoned as leap-years when multiples of 4 after omitting the two cyphers, which amounts to counting three days in 400 years less than reckoned in the Julian calendar. If our present value of the solar year be correct, the error of the Gregorian calendar will only amount to 1 day in about 3320 years.

Calends (Lat. *Kalendæ*), first day of Rom. months. Greek C's, being non-existent, meant 'never.'

The *New Style* (n.s.; *i.e.* Gregorian) was adopted late by Prot. countries; in Britain by Calendar

Act, 1750, when day following Sep. 2 was made Sep. 14. Gk. Church (in Russia, Greece, etc.) still retains Julian calendar (*Old Style*: o.s.). Documents, etc., are sometimes doubly dated (old and new style), *e.g.* April 20 / May 3. In Fr. Revolution, National Convention decided to begin a new era with Sep. 22, 1792 (foundation of Republic). Year was to be of 12 months (viz. Vendémiaire, Brumaire, Frimaire, Nivose, Pluviose, Ventose, Germinal, Floréal, Prairial, Messidor, Thermidor, Fructidor) of 30 days each; there were to be 5 festival days at end—to Virtue, Genius, Labour, Opinion, Rewards; Revolution Day was to be added every fourth year. Napoleon restored the Gregorian calendar, 1806.

The *Jewish* year consists of 12 lunar months, an additional month being intercalated at intervals.

The *Muhammadan* year also has 12 lunar months, but, as they do not intercalate, there is no correspondence between months and seasons.

In *Hindu* calendar solar year regulates civil affairs in Bengal and part of Madras; lunar year is used for domestic and religious purposes over all India. Each of the 12 months begins with the sun's entering a sign of Hindu zodiac. First day of year is our April 12.

Ecclesiastical calendar.—Partly based on the solar year and partly on the lunar month; thus we get some feasts 'fixed,' others 'moveable.'

Easter is the most important feast, as it determines others. Method of fixing date very complicated, but tables (see Book of Common Prayer) are available, giving date for any year. Easter is Sunday next after the 14th day of the paschal moon, and must lie between March 22 and April 25. Other principal Church feasts depending on Easter are:—

Septuagesima Sunday	9 weeks	before Easter.
First Sunday in Lent	6 ,,	
Ash Wednesday	46 days	
Rogation Sunday	5 weeks	after Easter.
Ascension Day	40 days	
Whitsunday	7 weeks	
Trinity Sunday	8 ,,	

Dominical Letter.—Putting letters A, B, C, D, E, F, G, with the first seven days of January, the dominical or Sunday letter for the year is that corresponding to Sunday.

Golden Number.—19 Julian years are equal to 235 lunar months; so a table of the moon's phases for 19 years will serve for any year when its number in the cycle is known. This number is the *Golden Number.* To find the golden number, add 1 to the date, divide by 19; the remainder is the golden number, or, when no remainder, golden number is 19.

Epact.—Denotes age of moon at beginning of year—once of importance in computing Easter. See ANOMALY.

CALENDERING, smoothing or glazing of textile fabrics by rollers; the finishing by pressure of linen and cotton goods and paper.

CALGARY (51° N., 114° W.), oldest city, Alberta, N.W. Canada; founded, 1884; commercial centre. Pop. (1911) 43,736.

CALHOUN, JOHN CALDWELL (1782–1850), Amer. statesman; graduated at Yale (1804); admitted to Bar, and acquired large practice; entered Congress (1811) and soon became active supporter of the measures which led to the war with Great Britain; was Sec. of War under Pres. Monroe (1817–25); Vice-Pres. of U.S.A. (1825–32). C. was regarded as the mouthpiece of the Southern States in national affairs, and was a warm advocate of slavery. To his own slaves he was the most indulgent of masters. C. also held the State's right of nullification, *i.e.* preventing operation of a Federal law. His integrity of character and kindliness of disposition secured to him a large following of personal friends.

CALI (3° 25′ N., 76° 45′ W.), town, Colombia, S. America; commercial centre. Pop. 16,000.

CALIBRATION, the process of ascertaining the place and amount of variation in a scientific instrument. If the bore of a thermometer tube varies in width, variation in bore will introduce an error. The process is also applied to burettes used in chemical analysis, stretched wires used in potentiometers and arrangements such as the Wheatstone Bridge, sets of weights used for balances of high accuracy, spectroscopes used for determination of length of light-waves, galvanometers intended to give the absolute measure of a current, etc.

Watson, *Text-Book of Practical Physics.*

CALICO, grey or bleached cotton cloth; c., when printed upon, is known technically as 'print'; name derived from town of Calicut (Madras), where cotton cloths were made, XVI. cent.

CALICUT (11° 15′ N., 75° 49′ E.), seaport town, Madras, Brit. India; first Ind. port visited by Europeans; anciently a flourishing city and trade centre; gave name to calico, a former important manufacture; ceded to British, 1792; chief exports, coffee, spices, and timber. Pop. (1911) 78,417.

CALIFORNIA (32° 20′ to 42° N., 114° 20′ to 124° 25′ W.), state, U.S.A., on Pacific coast; bounded N. by Oregon, E. by Nevada, Arizona, S. by Mexico, W. by Pacific; area, 158,360 sq. miles, of which 2188 are water. Surface generally consists of two great mountain systems running lengthwise through state, with a broad valley between them. These mountains are the Sierra Nevada in the E. and the Coast Range along the coast; chief peaks of former, Mt. Whitney, Fisherman Peak; of latter, San Bernardino, San Jacinto. In the S. is the Tehachapi range uniting the two great systems. The central valley is remarkable for beauty, and is called the Great Valley of C.; it is over 500 miles long and from 40 to 60 miles wide. It is drained by the Sacramento and the San Joaquin, which flow respectively through the N. and S., and, uniting in lat. 38° 3′ N., enter Suisin Bay to N. of San Francisco. Other rivers are the Feather and American R's, tributaries of Sacramento; the Merced, Stanislaus, and other tributaries of the San Joaquin; Eel R. in N.W., Salinas and Santa Maria in S.W. Chief lakes are Tulare, Owens, Mono, Tahoe, Honey, Goose, Klamath. In the S. are depressed desert regions. Chief towns are San Francisco Los Angeles, Oakland, Sacramento (capital), San Diego, Pasadena, San José, Alameda. Climate is cold and wet in N., but in S. dry and semi-tropical.

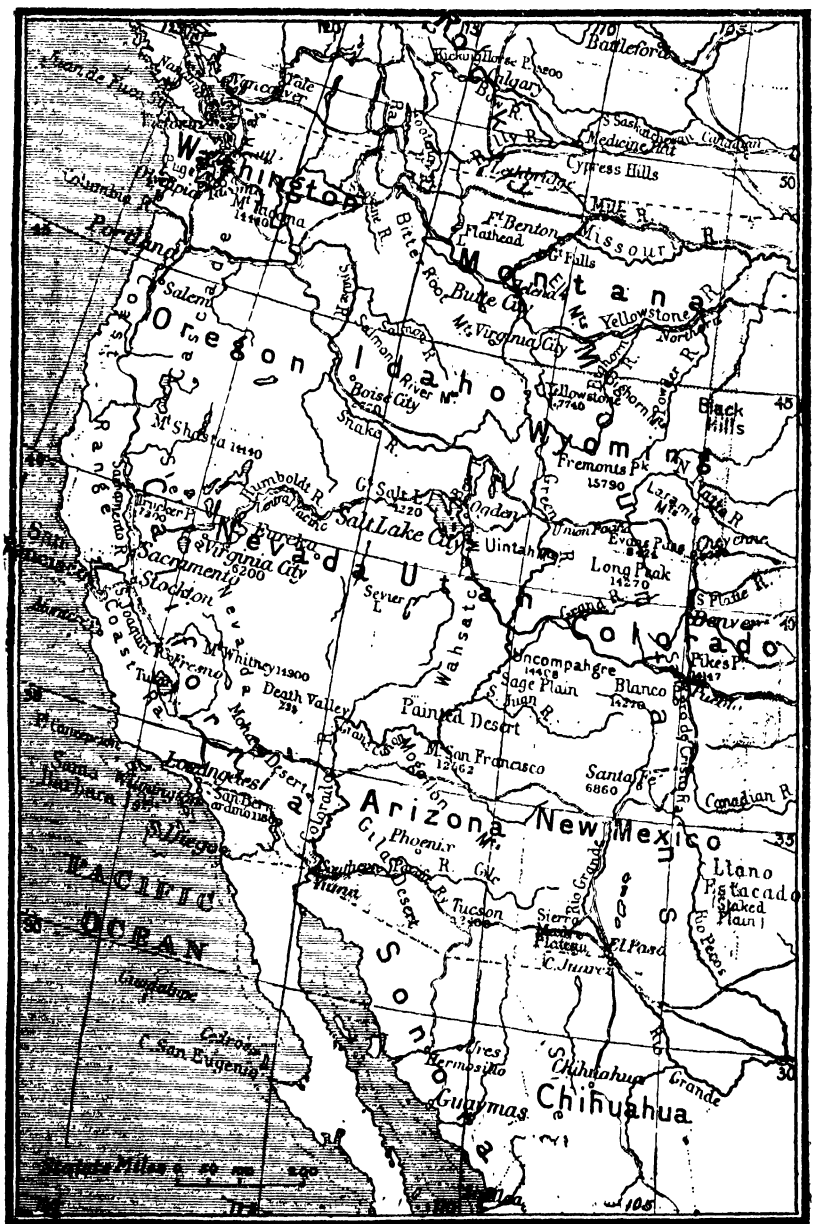
Sierra Nevada is chiefly of Archæan, Coast Range of Cretaceous, formation; while valley belongs to Tertiary and Quaternary periods. Flora includes redwood and mammoth trees, wild-oats, alfalfa, and great variety of flowering shrubs. Fauna includes grizzly bears, pumas, wolves, deer, lizards, woodpeckers, quails.

History.—The coast of C., or Upper C. as it was called in contradistinction to the Mexican territory of Lower C., was explored by Juan Cabrillo in 1542–43; it was visited by Drake in his voyage of 1579; and three years later an expedition under Sebastian Vizcaino explored Monterey and San Diego Bays, and anchored near Point Reyes in the old port of San Francisco. In XVIII. cent. various missionary settlements were established in the country by the Spaniards; they obtained no grants of land from the Span. government, but later acquired great wealth. The first missionary expedition arrived at San Diego in 1769, where a Franciscan mission was established; others were founded at Monterey in 1770, at San Francisco in 1776; and eventually there were twenty-one religious communities in the country, the last being that founded at Sonoma in 1823. Towns were also established, San José dating from 1777, Los Angeles from 1781.

The Indians were taught agricultural arts; no trade with foreigners was at first allowed, but in 1806 a Russ. official obtained commercial concessions, and in 1812 a Russ. trading station was founded at Ross; foreign trade became very extensive from about 1822, in which year Mexico attained independence; from this time till 1846 C. was subject to Mexican rule, although practically autonomous. From about 1831

patriotic party arose; and after fifteen years of discontent, political feuds, and jealousy against Mexico, a rising occurred in 1844; independence was declared in 1846 by some Amer. settlers, who captured Sonoma in that year. Subsequently Amer. forces seized Monterey and other places, ultimately conquering whole of C., which became a territory of U.S.A. in 1848. Gold was discovered in 1848, which resulted in great influx of men from all over the world. A constitution was formed in 1849, and C. was admitted to the Union in the following year. C. sent 1½ million dollars to Federalists at time of Civil War, and some volunteer forces. Since that time country has greatly developed; railways and canals have been extended and commerce has vastly increased. Great numbers of Chin. labourers immigrated here from about 1850; further immigration was prohibited by Anti-Chinese bill in 1891. In 1906 occurred terrible earthquake at San Francisco (*q.v.*). Most important recent events have been labour strikes and anti-Japanese legislation.

Executive is in hands of gov., assisted by lieut.-gov. and five ministers; legislative power vested in Senate of 40 members and Assembly of 80 members, former elected for four, latter for two, years. C. has woman suffrage. The State sends 2 Senators and 11 representatives to Congress. Among religions Rom. Catholicism has greatest following.


Washington
Oregon
Idaho
Montana
Wyoming
Nevada
Utah
Colorado
Arizona
New Mexico
PACIFIC OCEAN
Sonora
Chihuahua
Portland
Salem
Boise City
Helena
Butte City
Yellowstone
Black Hills
Fremonts Pk
Salt Lake City
Ogden
Uinta
Virginia City
Carson
Sacramento
Stockton
San Francisco
Mt Whitney
Death Valley
Painted Desert
Mojave Desert
Los Angeles
San Diego
Santa Fé
Phoenix
Tucson
El Paso
Rio Grande
Llano Estacado
Canadian R.
Pikes P.
Long Peak
Uncompahgre
Sage Plain
Blanco
Guaymas
Hermosillo
Ures
C. San Eugenio
Mt Shasta
Mt Hamilton
Mt San Francisco
Mt Graham
Sierra Madre
Sierra Nevada
Cascade Range
Coast Range
Colorado R.
Columbia R.
Missouri R.
Yellowstone R.
Rio Pecos
Rio Gila
Gila Desert
Colorado Desert
Great Basin
Great Salt L.
Humboldt R.
Truckee R.
Carson R.
Owens L.
Mono L.
Klamath L.
Malheur L.
Harney L.
Lahontan
Winnemucca L.
Abert L.
Summer L.
Goose L.
Mud L.
Tulare L.
Buenaventura R.
Virgin R.
Gila R.
Bear R.
Bitter Root Mts
Cypress Hills
Medicine Hat
Calgary
Battleford
Kicking Horse Pass
Flathead
Ft Benton
Great Falls
Bighorn R.
Laramie R.
Platte R.
Arkansas R.
Rio Colorado
Rio Virgen
Rio Mohave
Rio Salado
Rio Verde
Rio Yaqui
Rio Mayo
Rio Fuerte
Rio Sinaloa
Rio Grande
Rio Nazas
Rio Conchos
Rio Salinas
Rio Sabinas
Rio Bravo
Rio Pecos
Rio Colorado
Rio Gila

Hittell, *History of California* (San Francisco, 1885–95); Royce, *California* (New York, 1886); Greenhow, *History of Oregon and California* (1844).

CALIFORNIA, LOWER (30° N., 109° 53′ W.), peninsula, territory of Mexico, between Gulf of California and Pacific Ocean; mountainous; water and vegetation scarce, but valleys produce maize and wheat; horses and cattle reared; Spaniards settled here in XVII. cent.; gold and silver mining and pearl-oyster fishing. Pop. (1910) 52,244.

CALIGULA, see GAIUS CÆSAR.

CALIPH, name given to successors of Muhammad. The story of the Muhammadan chiefs who bore the name of caliph falls into three dynasties: (1) The four caliphs who severally succ. Muhammad; (2) the Omayyad caliphs; (3) the Abbasid caliphs.

Muhammad, dying without male issue, was succ. (632 A.D.) by ABU-BEKR (*q.v.*), f. of Ayesha, the prophet's wife; at his death (634) he nominated OMAR, another relative, as his successor; Omar was stabbed by a slave (644), and a select council app. OTHMAN, a high official, as third caliph, who was in turn succ. by ALI, s. of Abu Taleb, murdered by a fanatic in 661.

The reign of each of these four rulers had been largely occupied with warfare, and before the death of Ali a new competitor for the caliphate had entered the field in the person of Moawiya, gov. of Syria, who claimed to succeed his cousin Othman, and, having subdued Persia, Syria, Egypt, and Yeman, deposed Ali's s., Hassan, and seized the caliphate.

Omayyad Caliphs: MOAWIYA (661–80), who made the title of caliph hereditary, was their first ruler of the line of the Omayyads, and their capital was Damascus. This dynasty lasted until 750, when it was in turn overthrown by a powerful family (Abbasides) descended from Abbas, uncle of Muhammad.

Abbasid Dynasty: ABÛL ABBAS (750–54), the first caliph of the line, was followed by his bro., Abu Jaafar Almansôr (754–75), who established the seat of Empire at Bagdad; succ. by his s., Almahdi (775–85); Alhadi (785–86); followed in turn by Harun er Raschid, 'the Just' (786–809). Of all these potentates by far the most famous is the last mentioned, whose name has been made familiar throughout the world by means of the *Thousand and One Nights*.

CALIPPIC PERIOD, three Metonic cycles of 6940 days each and 6939 days in addition; suggested by astronomer Calippus; coincides with six Julian years. See CALENDAR.

CALIVER, XVI.-cent. firearm.

CALIXTINES, see HUSSITES.

CALIXTUS, name of three popes: CALIXTUS I. (217–22), said to have been a slave originally.—CALIXTUS II. (1119–24), a noble Burgundian, chosen Pope at Cluny, and displaced the Anti-Pope, Gregory VIII.—CALIXTUS III. (1455–58), a Spaniard (Alphonso de Borgia), owed his advancement in the Church to Alfonso V. of Aragon.

CALIXTUS, GEORG, CALLISEN (1586–1656), Ger. theologian; sought to broaden basis of Lutheranism.

CALLANDER (56° 14′ N., 4° 12′ W.), small town, on Teith, Perthshire, Scotland; tourist centre.

CALLAO (12° S., 77° 15′ W.), chief seaport of Peru; fine harbour; exports guano, chemicals, coffee, rice, cocaine, wool, salt, sugar, hides, tobacco; imports coal, machinery, flour, wheat, rice, etc. Old town was destroyed by earthquake, 1746. Notable buildings are old fortress (now custom house) and prefecture. Pop. 40,000.

CALLCOTT, SIR AUGUSTUS WALL (1779–1844), Eng. artist; famed for landscapes; R.A. (1810); knighted, 1827.

CALLCOTT, JOHN WALL (1766–1821), Eng. composer and musician; won reputation as composer of glees; his *Musical Grammar* (1806) was long regarded as a standard work.

CALLERNISH (58° 12′ N., 6° 42′ W.), village, Lewis, Scotland; in district are four stone circles.

CALLIAS, tyrant of Chalcis; friend of Demosthenes.

CALLIAS and HIPPONICUS, heads of an Athenian family who were hereditary torch-bearers at the Eleusinian mysteries.

CALLICHTHYS, see CAT-FISHES.

CALLIMACHUS (fl. 250 B.C.), Gk. poet; wrote large number of poems, his elegies being especially esteemed; app. librarian of Alexandrian library by Ptolemy Philadelphus.

CALLINUS (630–560 B.C.), earliest Gk. elegiac poet.

CALLIOPE, Muse of Epic poetry.

CALLIPHORA, see under HOUSE-FLY.

CALLIRRHOE (classical myth.), dau. of god Achelous; wife of Alcmæon.

CALLISTHENES (IV. cent. B.C.), Gk. historian; pupil of Aristotle; accompanied Alexander the Great into Asia, and wrote an account of the expedition; also histories of the wars of the period.

CALLISTO (classical myth.), a nymph; dau. of Lycaon; with her son, Arcas, transformed into a constellation.

CALLISTRATUS, name of (1) Grammarian (fl. II. cent. B.C.); (2) Athenian poet; (3) Gk. rhetorician (fl. *c.* III. cent.).

CALLOT, JACQUES (1592–1635), Fr. engraver; b. Nancy; left home at age of twelve to pursue his studies in Italy; patronised by Cosimo II. of Florence; executed designs for Louis XIII. of France, and other crowned heads.

CALLOVIAN, lowest section of Oxford Oolite rocks, called also Kellaway Rock, a calcareous sandstone with characteristic fossils (*Ammonites callovienses*).

CALMAR, see KALMAR.

CALMET, ANTOINE AUGUSTIN (1672–1757), Fr. Benedictine; wrote numerous commentaries on the Bible.

CALMUCKS, see KALMUCK.

CALNE (51° 27′ N., 2° W.), market town, Wiltshire, England; site of castle of kings of Wessex; bacon-curing is chief industry. Pop. (1911) 3539.

CALOMARDE, FRANCISCO TADEO, DUKE (1775–1842), Span. statesman who encouraged illiberal policy of Ferdinand VII.; supported Carlists.

CALOMEL (mercurous chloride), Hg_2Cl_2, found naturally as the mineral called horn-quicksilver, or prepared from a mixture of mercury and corrosive sublimate; a yellowish-white crystalline powder, heavy, and tasteless; used in med. as a purgative, being antiseptic and a bile stimulant.

CALONNE, CHARLES ALEXANDRE DE (1734–1802), Fr. statesman; after filling various legal appointments under Crown, was summoned (1783) to take charge of national finances, and endeavour to replenish royal treasury; met with ill success, and was dismissed and exiled by Louis XVI. (1787); returned to France (1802) by permission of Napoleon.

CALORESCENCE, term describing the optical phenomenon that, when invisible heat rays are focused by a lens upon charcoal, the latter is heated to incandescence, the heat rays being converted into visible rays.

CALORIE and **CALORIMETRY**, see HEAT.

CALOTTE (Fr.), cap worn over priestly tonsure, hence symbol of priest; Fr. association formed by men of high rank in XVII. cent. for merciless criticism of society, and named from the c., which they sent to objects of their criticism as symbolic covering for their exposed faults.

CALPE (36° 9′ N., 5° 21′ W.), promontory, Spain; now called Gibraltar (*q.v.*).

CALPURNIA, childless wife of Julius Cæsar; tradition records her pleading with Cæsar not to go abroad on fatal Ides of March.

CALPURNIUS, TITUS, Rom. poet; wrote eclogues in manner of Theocritus; lived about time of Nero.

CALTAGIRONE (37° 12′ N., 14° 33′ E.), city, Catania, Sicily; bp.'s see; manufactures pottery. Pop. (1911) 44,547.

CALTANISETTA (37° 27′ N., 14° 2′ E.), town,

Sicily; cathedral; is centre of sulphur industry; has mineral springs. Pop. (1911) 41,320.

CALTROP, small iron ball fitted with sharp spikes; strewn on ground before opposing force in battle to check cavalry charge.

CALUIRE-ET-CUIRE (45° 48′ N., 4° 52′ E.), town, on Saône, France; perfume and pottery. Pop. 10,800.

CALUMET, Fr. name for 'peace-pipe' of Amer. Indians; its being offered to strangers was signal mark of hospitality.

CALUMPIT (14° 48′ N., 120° 50′ W.), town, Luzon, Philippine Islands; important market; chief product is rice. Pop. 15,000.

CALVADOS (49° 5′ N., 0° 20′ W.), maritime department, N.W. France; principal rivers are Touques, Dives, Orne, and Vire; soil generally fertile, and provides pasturage for the cattle and horses raised; butter, cheese, and cider produced; textiles manufactured; fisheries productive; iron, coal, and granite found; capital, Caen; area, 2197 sq. miles. Pop. (1911) 396,318.

CALVAERT, DENIS, Dionisio Fiammingo (d. 1619), Dutch painter; master of Domenichino.

CALVARY ('place of skulls'), place where Christ was crucified; 'a Calvary,' representation of Crucifixion.

CALVÉ, EMMA (1866–), Fr. *prima donna*; principal parts in Carmen, Pêcheurs de Perles, Sapho.

CALVERLEY, CHARLES STUART (1833–84), Eng. poet and scholar; brilliant univ. career both at Oxford and Cambridge; pub. *Verses and Translations* (1862); *Verse Translation of Theocritus* (1869); *Fly-Leaves* (1872). As a writer of light verses and parodies he is unsurpassed.

CALVERT, GEORGE, see Baltimore.

CALVERT, SIR HARRY, Bart. (d. 1826), Eng. general; served under Cornwallis in Amer. War; adjutant-general (1799); received baronetcy (1818).

CALVES' HEAD CLUB, formed shortly after his execution to deride the memory of Charles I.; existed until 1734.

CALVI (42° 34′ N., 8° 44′ E.), fortified seaport, Gulf of Calvi, Corsica; captured by British (1794); retaken by Corsicans (1795).

CALVIN, JOHN (1509–64), Reformer; b. Noyon (Picardy), July 10; s. of Gérard C. Intended by his f. for the Church, he was app. (1521) to a chaplaincy in the cathedral of his native town. Later he continued his education in Paris, achieving brilliant success in his grammatical and philosophical studies. In 1527 he received the curacy of St. Martin de Marteville, and later that of Pont l'Évêque, near Noyon. A year later C. decided to withdraw himself from the Church, and went to Orleans to study law. In 1529 he removed to Bourges to pursue his studies under the noted Andrea Alciati. Here also he began the study of Greek under Melchior Wolmar, and first imbibed the doctrines of the Reformation. Though there is some uncertainty as to when C.'s conversion actually took place, it is believed that he began to preach in support of the 'new learning,' as it was called, while still at Bourges. In 1531 he was again in Paris, where, in the following year, he pub. his first book—a Latin commentary on Seneca's *De Clementia*.

C. appears by this time to have given up all thoughts of adopting the law as a profession, and as Paris had now become a centre of the reformed faith, he found much there to occupy his attention. But, before long, the persecution of the Protestants began, and C. and many others were compelled to seek safety in flight. Thereafter he led a wandering life for some years, devoting much time to study, and began the writing of his *Institutes of the Christian Religion*. Amongst other towns he visited Orleans and Poitiers, and at the latter place gathered around him many adherents of the new religion. C. at twenty-five had sacrificed all other interests for the reformed faith, and his influence became very great. In 1536 he was followed to Geneva by his chief supporters, and here they issued a Prot. Confession of Faith, through the influence of which a strict morality took the place of loose living. Within two years, however, owing to a reaction against his severe rule, Calvin again found himself a wanderer. But, after three years spent in theological study at Strassburg, he was recalled to Geneva, where, except for a brief interval, he lived for the rest of his life.

Though C.'s influence now increased year by year, he was continually engaged in fierce controversies with enemies of the new faith, one of the most notable being that with regard to Election and Predestination with Albert Pighius. Though C. formed his religion on Luther's theol. and that of other earlier reformers, it was he who systematised the doctrine of Protestantism, and established a proper basis of ecclesiastical discipline.

His exhausting labours could not but have their effect on his naturally frail constitution. Early in the year 1564 his health began rapidly to decline, and he died on May 27, in his fifty-seventh year. During his residence at Strassburg he had married Idelette, widow of Jean Stordeur, of Liége, to whom he was much devoted. She, however, predeceased him, and their only child, Jacques (b. in 1542), lived but a few days. C.'s attitude towards those who were opposed to his religious or doctrinal views was often marked by the greatest intolerance, and the relentless manner in which he procured the condemnation of Servetus must ever remain as a blot upon his memory.

Life, by Walker (1906); *Life and Times*, by Penning (Eng. trans., 1912).

CALVISIUS, SETHUS (1556–1615), Ger. chronologist; pub. *Opus Chronologicum* (Leipzig, 1605).

CALVO, CARLOS (1824–1906), Argentine historian; wrote number of books relating to history of the South Amer. republics; Minister at Berlin (1885).

CALW, Kalw (48° 41′ N., 8° 45′ E.), town, on Nagold, Württemberg, Germany; manufacture of textiles staple industry; trade in timber with Netherlands. Pop. 5250.

CALX, see Flower.

CALYDON, ancient town, Ætolia; legendary scene of hunting of Calydonian boar.

CALYDONIAN BOAR.—In Gk. myth. Calydon, capital of Ætolia, was wasted by boar sent by Artemis in revenge for sacrifice omitted by King Œneus; in one story, adopted by Swinburne, Atalanta (*q.v.*) took chief part in the chase.

CALYPSO (classical myth.), dau. of Oceanus; Odysseus, when shipwrecked on Ogygia, of which she was queen, stayed there seven years.

CALYPTOBLASTEA, see under Hydromedusæ.

CALYPTRÆA, see under Gastropoda.

CALYX, see Flower.

CAM, contrivance, generally a projecting part of a wheel, for converting rotary into rectilinear motion; used in petrol and gas engines to open inlet and exhaust valves.

CAM (52° 5′ N., 0° 10′ E.), river, Cambridgeshire, England; joins Ouse.

CAM, DIOGO, Cão, Portug. traveller; first European to explore the Congo (*c.* 1482).

CAMACHO, JUAN FRANCISCO (1824–96), Span. statesman; his drastic financial reforms made him unpopular.

CAMAGÜEY (21° 23′ N., 77° 56′ W.), city and province, both formerly Puerto Principe, Cuba. Pop. 30,000; (province) 140,000.

CAMALDOLESE, Camaldulians, order of Eremite monks, founded by St. Romuald (*c.* 950), at Camaldoli, in the Apennines. The monks, who wear a white habit, dwell in separate huts, and only meet together for divine service and for meals. C. monasteries still exist in Italy.

CAMARACUM, see Cambrai.

CAMARGO, MARIE ANNE (1710–70), Fr. ballet-dancer; made her début in Paris (1726), and took the public by storm; portrait in Wallace Collection.

CAMARGUE (43° 20′ N., 4° 41′ E.), island, Bouches-du-Rhône, S.E. France; region marshy and unhealthy.

CAMARILLA, body of unofficial councillors of sovereign; especially clique which swayed Ferdinand VII. of Spain, 1814–20.

CAMARINA, ancient town, S. coast of Sicily; founded from Syracuse, 599 B.C.; complete destruction dates from A.D. 853.

CAMBACÉRÈS, JEAN JACQUES RÉGIS DE, DUKE OF PARMA (1753–1824), Fr. statesman; leaned to side of mercy at trial of Louis XVI.; member of Committee of General Defence (1793); pres. of Committee of Public Safety (1795); Second Consul (1799); later made Arch-Chancellor of France.

CAMBALUC, old name of city of Peking, meaning 'City of the Emperor'; was for a short period an abp.'s see; sometimes spelt 'Cambalu'; thus Longfellow writes of 'the Golden City of Cambalu.'

CAMBAY (22° 18′ N., 72° 30′ E.), seaport, capital of small native state of C., Bombay, India, on Gulf of C.; formerly important commercial city; commerce fallen away owing to harbour silting; famed for manufacture of agate and carnelian ornaments. Pop. 31,780.

CAMBAY, GULF OF (22° N., 72° E.), inlet, W. coast Brit. India; rapid tides; sandbanks.

CAMBERT, ROBERT (1628–77), Fr. musician; bandmaster to Charles II. of England (1673); his opera, *Pomone*, was produced in London.

CAMBIASI, LUCA (1527–85), Genoese artist; accepted commission from Philip II. of Spain to paint series of frescoes in the Escorial.

CAMBODIA, CAMBODGE (12° N., 105° E.), Fr. protectorate, S.E. Asia, bordering on Gulf of Siam; area, 67,723 sq. miles. Surface generally is alluvial plain of Mekong R., with mountain ranges and detached peaks in N.E. and W.; one arm of Mekong flows to Tonle Sap, great lake in C. and Siam, subject to extraordinary fluctuations. Chief towns are Pnom-Penh, Kampot. Climate is warm, subject to monsoons; some districts malarial. C. produces rice, sugar-cane, betel, tobacco, indigo, pepper, maize, cinnamon, coffee, cotton, vanilla, mulberry, cacao. Industries include manufactures of silk, pottery, bricks, matting; cattle raised.

C. is ruled by native king under Fr. protection. Inhabitants include Khmers, Chinese, Annamese, Malays, and there are some uncivilised mountain tribes; chief religion, Buddhism. C. was powerful state under Khmers, attaining zenith in early mediæval period; various ruins remain of former greatness; Fr. protectorate formally established, 1867. Pop. 1,200,000.

CAMBON, JULES MARTIN (1845–), Fr. barrister and diplomat; gov.-gen. of Algeria (1891); ambassador at Washington (1897), Madrid (1902), and Berlin (1907).

CAMBON, PAUL (1843–), Fr. Ambassador to Court of St. James's since 1898; bro. of above; Grand Cross of the Legion of Honour; member of Fr. Academy of Science.

CAMBON, PIERRE JOSEPH (1756–1820), Fr. statesman; prominent figure at period of Revolution; voted for death of Louis XVI.; severely criticised certain actions of Marat and Danton, and incurred hatred of Robespierre; at Restoration was exiled, and d. in Belgium.

CAMBORNE (50° 13′ N., 5° 18′ W.), market town, Cornwall, England; tin and copper mines. Pop. (1911) 15,829.

CAMBRAI (50° 10′ N., 3° 12′ E.), fortified town (ancient *Camaracum*), on Scheldt, Nord, France; abp.'s seat; principal buildings, cathedral containing monument of Fénelon, town hall, theological seminary, library; celebrated for fine linen manufactures; name 'cambric' derived thence. Pop. 15,600.

CAMBRIA, ancient Lat. name of Wales, county of the Cymri.

CAMBRIAN SYSTEM, term applied to the earliest fossiliferous geological system overlying the Archæan or Pre-Cambrian system, the oldest of the Geological Record, and overlaid by the Silurian system. It derives its name from Cambria (*i.e.* Wales), where it is specially well developed, attaining in places a thickness of 12,000 ft. Outcrops also occur in Shropshire, Warwickshire, Malvern Hills, Cumberland, eastern Ireland, and north-western Scotland. It is met throughout Europe at intervals from Scandinavia to Bohemia, and occupies vast areas of eastern North America. The Cambrian rocks consist of grits, sandstones, greywackes, quartzites, and conglomerates, with thick groups of shales and slates. In Scotland limestones are prevalent, and in America limestones, greensands, and dolomites, with masses of volcanic rocks.

Fossils are numerous and, although the earliest discovered forms of life, they show an advanced development pointing to still lower, lost, or undiscovered ancestors. The most characteristic fossils are the Trilobites (Crustacea), Paradoxides, Olenus and Olenellus, and the Brachiopod *Lingula Davisii*, from the Port Madoc slates. The only discovered plants are regarded as Algæ (Eophyton). The system in Britain is subdivided as follows:—

Upper	Tremadoc slates.	
	Lingula flags	(Olenus zone).
Lower	Menevian series	(Paradoxides zone).
	Harlech series	(Olenellus zone).

Sir Archibald Geikie, *Text-Book of Geology*; Jukes-Brown, *Handbook of Historical Geology*.

CAMBRIC, fine linen cloth first manufactured at Cambrai, France.

CAMBRIDGE (52° 12′ N., 0° 7′ E.), town, Cambridgeshire, on Cam; famous as Univ. town. **Cambridge Univ.** is said to have been founded or restored by Sigebert of East Anglia and revived by Edward the Elder; became important early in XIII. cent.; obtained papal recognition, 1231. Colleges in order of foundation are: (1) *Peterhouse*, founded 1284 by Hugh de Balsham, bp. of Ely; (2) *Clare*, founded 1326 by Richard de Badew, refounded by Lady Elizabeth, sister of Gilbert, Earl of Clare; (3) *Pembroke*, founded as Valence-Mary Coll., 1347, by Mary de St. Paul, widow of Aylmer de Valence, Earl of Pembroke; Henry VI. was great benefactor to this college, and is called second Founder; (4) *Gonville and Caius*, founded 1348 by Edmund Gonville, rector of Terrington; name and situation changed by William Bateman, Bp. of Norwich, who was second Founder; third Founder was John Caius, M.D., who in 1558 obtained Royal Charter establishing his foundation; (5) *Trinity Hall*, founded 1350 by William Bateman, Bp. of Norwich; (6) *Corpus Christi*, founded 1352 by two societies, the Guilds of Corpus Christi and of Blessed Virgin Mary; (7) *King's*, founded 1441 by Henry VI.; (8) *Queens'*, founded 1448 by Margaret of Anjou, queen of Henry VI., refounded by Elizabeth Woodville, wife of Edward IV., 1465; (9) *St. Catharine's*, founded 1473 by Robert Wodelarke, D.D., Chancellor of Univ.; (10) *Jesus*, founded 1496 by John Alcock, Bp. of Ely; (11) *Christ's*, founded 1505 by Lady Margaret Countess of Richmond and Derby, mother of Henry VII.; (12) *St. John's*, founded 1511 by the same; (13) *Magdalene*, founded 1519 by Thomas Baron Audley of Walden; (14) *Trinity*, founded 1546 by Henry VIII., by combining and extending two earlier foundations, Michaelhouse (1324) and King's Hall (1337); (15) *Emmanuel*, founded 1584 by Sir Walter Mildmay, Chancellor of Exchequer; (16) *Sidney Sussex*, founded 1594 under will of Frances, Dowager Countess of Sussex; (17) *Downing*, founded 1800 by Sir George Downing. There are two women's colleges, *Girton* and *Newnham*. Pop. (1911) 40,028.

CAMBRIDGE (38° 31′ N., 76° 16′ W.), city on Choptank, Maryland, U.S.A.; trades in lumber;

canned fruits, and is shipping port for fish. Pop. (1910) 6407.

CAMBRIDGE (42° 22′ N., 71° 7′ W.), city, Massachusetts, U.S.A.; contains Harvard Univ., oldest univ. in U.S.A., founded 1636; has observatory, Archæological and Nat. Hist. Museums, botanic gardens; manufactures furniture, pianos, chemicals, soap, etc.; has printing presses, foundries; fine public parks. Americans encamped here in War of Independence while British held Boston. Pop. (1910) 104,839.

CAMBRIDGE (40° 3′ N., 81° 35′ W.), city, Ohio, U.S.A.; coal, iron, and oil found. Pop. (1910) 11,327.

CAMBRIDGE, EARLDOM AND DUKEDOM OF, title dates back to Norman times, and was almost invariably bestowed upon members of the reigning house. It lapsed in the person of George II., but was revived in 1801 and bestowed on **Adolphus Frederick**, Duke of Cambridge (1774–1850), 7th s. of George III., who was also Earl of Tipperary and Viceroy of Hanover; at his death was succ. by his s., **George William Frederick Charles** (1819–1904); served in Hanoverian and later in Brit. army; present at *Alma*, *Balaklava*, *Inkerman*, and *Sevastopol*; app. Commander-in-Chief in 1856, which position he held until 1895, being advanced to rank of Field-Marshal in 1862; m. Louisa Fairbrother, who took the name of Fitzgeorge.

CAMBRIDGE, RICHARD OWEN (1717–1802), Eng. poet; wrote mock-epic, the *Scribleriad* (1751).

CAMBRIDGESHIRE (52° 15′ N., 0° 10′ E.), inland county, England; bounded N. by Lincoln, E. by Norfolk, Suffolk, S. by Essex, Hertford, W. by Bedford, Huntingdon, Northampton; greatest length, 48 miles; breadth, c. 30 miles; area, 864 sq. miles; surface generally flat, fens in N. Chief rivers are Ouse, Cam, Nene, Lark; many canals. Capital is Cambridge. C. produces wheat, hemp, flax, corn, beans, and other crops; dairy produce; sheep and cattle raised; industries include brewing, malting, milling, brickmaking, potteries, lime burning, paper. In E. is Newmarket, famed for racing. C. was occupied by Romans, of whose occupation traces remain; suffered during civil wars of Stephen, John, and Henry III.'s reigns; supported Parliament in Civil War of Charles I.'s reign. Pop. (1911) 128,325.

CAMBUSLANG (55° 50′ N., 4° 10′ W.), town, on Clyde, Lanarkshire, Scotland; large steel and iron works. Pop. 15,000.

CAMBYSES, s. of Cyrus the Great, founder of Persian Empire; succ. his f. c. 529 B.C., conquered Egypt in 525, and after an unsuccessful attempt against Ethiopia, d. in Syria; the name has become associated with a bombastic style, thus Shakespeare speaks of 'in King Cambyses vein.'

CAMDEN (39° 53′ N., 75° 6′ W.), city, port of entry, on Delaware, New Jersey, U.S.A.; railway centre; has several dry docks and shipyards; manufactures iron wares, machinery, textiles, shoes. Pop. (1910) 94,538.

CAMDEN (34° 17′ N., 80° 27′ W.), town, on Wateree River, S. Carolina, U.S.A.; scene of two battles between Americans and British, 1780 and 1781; cotton, grain, rice produced. Pop. (1910) 3569.

CAMDEN, CHARLES PRATT, 1ST EARL (1714–94), Lord Chancellor of England; 3rd s. of Sir John Pratt, Chief Justice of King's Bench; through Pitt's influence made attorney-general; knighted (1762) and made Chief Justice of the Common Pleas; raised to peerage (1765); prominent figure at time of John Wilkes' prosecution.

CAMDEN, JOHN JEFFREYS PRATT, 1ST MARQUIS (1759–1840), only s. of 1st earl; under Pitt's ministry made Lord-Lieutenant of Ireland; Chancellor of Cambridge Univ.; K.G.

CAMDEN, WILLIAM (1551–1623), Eng. antiquary; ed. London and Oxford, afterwards spent considerable time travelling about England collecting materials for his *Britannia* (1586); headmaster, Westminster School (1593); Clarencieux King-at-Arms (1597). The famous *Britannia* is a survey of Brit. Isles, written in Latin; trans. into English, 1610. Camden Society founded, 1838.

CAMEL FAMILY (*Camelidæ*), includes Camels and Llamas, and forms by itself the group *Tylopoda* among even-toed Ungulates (*Artiodactyla*). They are long-necked, long-limbed, and large-bodied animals, with only the third and fourth digits persisting. The place of hoofs, which are poorly developed, is taken by thick pads of skin. Camels and their relatives ruminate, but the first and second compartments of the stomach are peculiar in having pouches in their walls, wherein fluid can be retained and used at will. They differ from all mammals and resemble the lower vertebrates in possessing oval instead of circular red blood corpuscles.

Only two species of *Camelus* exist—the two-humped Bactrian Camel (*C. bactrianus*), still found wild in the desert area of Central Asia, and the wholly domesticated Arabian Camel or Dromedary (*C. dromedarius*), with a single lump of fat, found throughout Africa and S.E. Asia. In S. America occur the Llamas (*Lama*), valuable on account of their wool, with two wild species, the larger Guanaco or Huanaco, and the smaller Vicunga; and the domesticated true Llama and Alpaca.

CAMEL-FLIES, see Snake-Flies.

CAMELFORD (50° 37′ N., 4° 40′ W.), town, Cornwall, England; traditionally associated with King Arthur. Pop. (1911, rural district) 7385.

CAMELLIA, order *Ternstræmiaceæ*, evergreens; includes greenhouse species *C. Japonica*, with numerous varieties: *C. reticulata* (introduced from China) and *C. oleifera*.

CAMELODUNUM, modern Colchester, Brit. town and later Rom. colony; destroyed in rising of Boadicea (61 A.D.), but rebuilt; walls remain.

CAMELOT, seat of King Arthur and the Round Table; supposed to be in Cornwall.

CAMEOS, see Gem.

CAMERA, word meaning an 'arched room,' and applied to private rooms in court, whence 'in camera,' the private hearing of a case; criminal cases may not be so heard, nor may adult persons be ordered out of court during a public hearing. See also Photography.

CAMERA LUCIDA, optical instrument used for perspective drawing.

CAMERA OBSCURA, darkened chamber, having aperture, furnished with lens and mirror, through which light enters and forms images of external objects on surface opposite; referred to in Bacon's *De Augmentis Scientiarum*. See also Photography.

CAMERARIUS, JOACHIM (1500–74), Ger. classical scholar.

CAMERARIUS, RUDOLF JAKOB (1665–1721), Ger. physician and botanist; prof. of Med. and head of botanic gardens at Tübingen (1687); investigated reproductive organs of plants.

CAMERINO (43° 8′ N., 13° 4′ E.), city, Italy; cathedral and univ. (1727). Pop. 12,000.

CAMERON, JOHN (1579–1623), Scot. theologian; Principal of Glasgow Univ. (1622); later lived chiefly at Saumur; founder of Calvinist sect known as 'Cameronites.'

CAMERON, SIMON (1799–1889), Amer. politician; Sec. for War under Lincoln (1860); Minister to Russia (1862); possessed great organising ability.

CAMERON, VERNEY LOVETT (1844–94), African traveller; pub. *Across Africa* (1877), and, with Sir Fredk. Burton, *To the Gold Coast for Gold* (1883).

CAMERON OF LOCHIEL, SIR EWEN (1629–1719), Highland chieftain; head of Clan Cameron; knighted (1681); served with Dundee at *Killiecrankie* (1689); man of vast strength and size (see Scott's *Lady of the Lake*, v.); grandson, Donald, shared in the '45 rebellion.

CAMERONIANS, sect of Scot. Covenanters, later known as Reformed Presbyterians, founded by Richard Cameron (1648–80); the Cameronian Regiment was formed from their body.

CAMEROON, see KAMERUN.

CAMILING (15° 40′ N., 120° 27′ E.), town, Luzon, Philippine Islands; sugar, rice, Ind. corn, and timber. Pop. 23,000.

CAMILLA, queen who led the Volsci against the Trojans in the *Æneid*.

CAMILLUS, MARCUS FURIUS (d. 365 B.C.), Rom. dictator and soldier; won victories over the Volsci and Etruscans; repelled Gaulish invasion (367).

CAMISARDS, Huguenot peasants of the Cevennes, who from 1702 onwards maintained an armed resistance against the *Dragonnades*. The persecution began as early as 1681, when Louis XIV. quartered dragoons in Prot. houses to compel them to renounce their faith. The name is derived from the smock (*camise*) worn over the armour in night attacks to distinguish friends from enemies.

Bray's *Revolt of the Protestants of the Cevennes* (1870).

CAMOENS, LUIS DE, CAMÕES (1524-80), Portugal's greatest poet; b. Lisbon, of noble descent; graduated at Coimbra Univ., of which he was an 'honourable poor student'; removed to Lisbon at age of eighteen, and became a tutor. In 1544 he made the chance acquaintance of Caterina de Ataide, a girl of thirteen, in attendance upon the queen. For Caterina C. conceived a violent passion, which she appears to have reciprocated, but her parents discouraged the affair, which ultimately led to the poet being banished from Lisbon. C. had already written a number of poems inspired by his love for Caterina, and others were produced during his absence. In 1547 he entered the army, and for over two years was at Ceuta, where he lost the use of his right eye in a skirmish.

He returned to Lisbon in 1550, and, finding no employment, he seems for three years to have led a disorderly life; was imprisoned for assault upon a royal servant, and was only released upon volunteering for service in India. After seeing Caterina for the last time, the poet shipped for Goa in 1553, and did not return to Portugal for sixteen years. During this period of foreign service C. wrote his masterpiece, *The Lusiads*, on the explorations of Vasco da Gama. It consists of ten cantos, written in hendecasyllabic *ottava rima*. On one occasion the soldier-poet was shipwrecked, and lost everything but his manuscript. The poem, with a dedication to King Ferdinand, appeared in 1572, and was an immediate success. But the remander of C.'s life was passed in poverty, and he died of plague, in a public hospital.

Burton, *Camoens: Life and his Lusiads* (1881).

CAMOMILE, see CHAMOMILE.

CAMORRA, see THEFT.

CAMORTA ISLAND (8° 15′ N., 93° 38′ E.), one of Nicobar Islands, Bay of Bengal.

CAMP (Lat. *campus*, plain), in modern use, applied to a temporary tented settlement, as opposed to bivouac; ancient Rom. c's (*castra*) were strong, permanent forts, usually built on an eminence. They were laid out in a symmetrical way like the Roman town, into which the permanent c's (*castra stativa*) often developed. The c. formed a great square of just over a mile, and was bounded by mound (*agger*), surmounted by palisade (*vallum*); the cavity left without by throwing up the mound was part of the fortification, viz. the ditch (*fossa*). The tents, separated from the fortifications by the *intervallum*, were divided into two parts by the *Via Principalis*, at either end of which were the principal issues from the fort; on one side were the officers' quarters, with the *Prætorium* in the centre, on the other side the legions; from the *Prætorium*, on the *Via Principalis*, the *Via Prætoria* traversed the soldiers' quarters (in the midst of which it was intersected by the *Via Quintana*) to the *Porta Prætoria*.

CAMPAGNA DI ROMA (42° N., 12° 10′ E.), low, undulating plain surrounding Rome, nearly corresponding to ancient Latium; uncultivated and unhealthy.

CAMPAN, JEANNE LOUISE HENRIETTE (1752–1822), confidante of Marie Antoinette; remained with queen until taken away at sacking of Tuileries; after the Terror established a school at St. Germain; wrote *Mémoires sur la vie privée de Marie Antoinette*; pioneer of training girls in domestic economy.

CAMPANELLA, TOMMASO (1568–1639), Ital. philosopher and poet; was for some time a Dominican; attempted reform of philosophy; opposed Scholasticism, relying rather upon ancient systems, and devoted to study of nature; imprisoned twenty-seven years as rebel against Span. tyranny in Naples, and detained by Inquisition; liberated in 1629; found a patron in the pope and later in Richelieu; sonnets trans. into English by J. A. Symonds (1878).

CAMPANHA (21° 53′ S., 45° 11′ W.), town, Minas Geraes, Brazil; thermal springs. Pop. 6500.

CAMPANIA (41° N., 14° 40′ E.), territorial division, Italy; includes provinces of Avellino, Benevento, Caserto, Naples, Salerno. C. borders on Tyrrhenian Sea; area, *c.* 6400 sq. miles; much of surface occupied by Apennines; highest peaks, Monte Cervato, Alburno, Montagna del Matese; Vesuvius; some fertile plains and valleys; drained by Volturno, Sele, etc.; noted for beautiful scenery and fertility; produces oranges, olives, chestnuts, wine, wheat, maize, pulse, hemp; sulphur found in large quantities, and petroleum; agricultural districts have dense population. C. was invaded in early times by Greeks, who founded Naples and Cumæ; conquered by Etruscans, who founded Capua and were subdued by Samnites; came under Rom. control, IV. cent. B.C.; favourite resort of rich Romans; belonged to kingdom of Naples till 1860; area, 6290 sq. miles. Pop. (1911) 3,347,925.

CAMPANI-ALIMENIS, MATTEO (*c.* 1678), Ital. mechanician; invented noiseless clock and illuminated dial-plate; wrote on horology and telescopes.

CAMPANILE (Lat. *campana*, a bell), large bell-tower belonging to, but usually detached from, church; they are found throughout Italy, the most noted being Giotto's Tower (Florence), St. Mark's (Venice), and the 'leaning tower' of Pisa. Giotto's campanile, built 1334, stands 275 ft. high, is in five storeys, the outer surface being encased in three colours of marble, and it was originally intended that a spire, 90 ft. high, should rise from the present summit. Still loftier (396 ft.) is Cremona c. The Pisa tower is an example of the round c.

CAMPANULA (Lat. *campana*, bell), genus of plants of family Campanulaceæ, having bell-shaped corolla; several species called *Canterbury Bell*.

CAMPASPE, renowned beauty, mistress of Alexander the Great; heroine of Lyly's *Alexander and C.*

CAMPBELL ISLAND (*c.* 55° S., 190° W.), desolate volcanic island, S. of New Zealand.

CAMPBELL, Scot. Highland clan; probably Celtic tribe. From Duncan, Lord C. (cr. 1445), have descended the Marquesses and Dukes of Argyle (*q.v.*), the Earls and Marquesses of Breadalbane (*q.v.*), and the Earls of Cawdor.

CAMPBELL, ALEXANDER (1788–1866), Amer. evangelist; pres. of Bethany Coll.; preached throughout England, Scotland, and U.S.A.

The **Campbellites**, or DISCIPLES OF CHRIST, are a sect formed (*c.* 1812) from the Baptists, giving more importance to immersion; they have *c.* 5000 members in Britain and *c.* 600,000 in U.S.A. Name also given to followers of John M'Leod C., of Row, Dumbartonshire, also called Rowites, who established church at Glasgow, 1833.

CAMPBELL, BEATRICE STELLA, MRS. PATRICK CAMPBELL (1865–), Eng. actress; first success at Adelphi Theatre (1892); created part of *Second Mrs. Tanqueray* (1893) at St. James's.

CAMPBELL, COLIN, BARON CLYDE (1792–1863), served in Peninsular War, America, Sikh War, 1848, Crimea, and Ind. Mutiny; relieved Lucknow and received a peerage and pension.

CAMPBELL, GEORGE (1719–96), Scot. philosopher; sometime pres., Marischal Coll., Aberdeen; author of *Dissertation on Miracles* (1763); *Philosophy of Rhetoric* (1776); *New Translation of the Gospels* (1778).

CAMPBELL, JOHN (1708-75), Scot. author; abandoned law for lit.; pub. *Lives of British Admirals* (1742-44), *Political Survey of Britain* (1744), and many other works; Hon. LL.D., Glasgow (1745).

CAMPBELL, JOHN CAMPBELL, BARON (1779-1861), Lord Chancellor of England; wrote *Lives of the Lord Chancellors of England*, 7 vols. (1849); also *Lives of the Chief Justices of England*.

CAMPBELL, JOHN FRANCIS (1822-85), Gaelic scholar; author of *Popular Tales of the West Highlands* (1860-62).

CAMPBELL, JOHN M'LEOD (1800-72), Scot. evangelist and author; wrote *Nature of the Atonement* (1856); *Thoughts on Revelation* (1862).

CAMPBELL, LEWIS (1830-1908), Scot. classical scholar; eminent for his trans. from Plato, Æschylus, and Sophocles.

CAMPBELL, REGINALD JOHN (1867-), Brit. Congregational minister; ed. for Church of England, but became Congregational minister; succ. Dr. Parker at City Temple, London (1903), where he championed the *New Theology*.

CAMPBELL, THOMAS (1777-1844), Scot. poet; b. Glasgow; went to Edinburgh, where Sir Walter Scott, Jeffrey, and John Leyden were amongst his contemporaries. His most ambitious poem, *The Pleasures of Hope*, appeared in 1799. Its success was immediate, but it is now forgotten. Campbell was a laborious writer. He will live by virtue of his patriotic lyrics, of which *Ye Mariners of England* and *The Battle of the Baltic* are amongst the finest in the language; *Life*, by Beattie (1849), Hadden (1899).

CAMPBELL-BANNERMAN, SIR HENRY (1836-1908), Brit. statesman; 2nd s. of Sir James Campbell, Bart., Lord Provost of Glasgow. He assumed the name of Bannerman on inheriting property from his maternal uncle, Henry Bannerman. Ed. at Glasgow Univ. and Trin. Coll., Cambridge, he entered Parliament as Liberal member for Stirling in 1868; Sec. to Admiralty (1882-84); Chief Sec. for Ireland (1884-85); Sec. for War in Mr. Gladstone's (1886) ministry, and filled same office (1892-95); knighted (1895). On the retirement of Sir William Harcourt from the leadership of the Opposition (1898), Sir Henry was chosen to take his place. Sir Henry was called upon to form a cabinet on Dec. 4, 1905; resigned the premiership owing to failing health in April 5, 1908, and d. on April 22. During his occupation of office there were passed the Trades Disputes Act, Small Holdings Act for England, and Deceased Wife's Sister Act (1907). Though by no means a brilliant statesman, by his personality he won the respect and esteem of all parties.

CAMPBELTOWN (55° 26′ N., 5° 36′ W.), seaport, Argyllshire, Scotland, on peninsula of Kintyre; whisky distilleries and fisheries. Pop. (1911) 7626.

CAMPECHE, CAMPEACHY (19° N., 90° W.), state, Mexico, occupying S.W. part of Yucatan peninsula; area, 18,000 sq. miles. Pop. (1910) 86,706.

CAMPECHE (19° 50′ N., 90° 33′ W.), seaport, on Bay of C., capital of C. state; shallow harbour; chief exports, logwood, hides, and wax; cigars manufactured. Pop. (1910) 16,864.

CAMPEGGIO, LORENZO (1464-1532), Ital. cardinal; made bp. of Salisbury by Henry VIII., and was also abp. of Bologna; chiefly notorious for his connection with the divorce of Catherine of Aragon. His private instructions from Rome were to defer a final settlement of the case, in following which he displeased the king; hence Henry's final rupture with the pope.

CAMPER, PETER (1722-89), Dutch anatomist, prof. of Med., Surgery, and Anat. at different univ's in Holland; later was engaged in politics.

CAMPERDOWN, town *c.* 30 miles N. of Amsterdam; off it Brit. fleet under Duncan gained victory over Dutch, 1797. The victor was cr. Viscount Duncan of C.; in 1831 his s., Robert Dundas, was cr. earl of C.

CAMPHAUSEN, OTTO VON (1812-96), Prussian statesman; Minister of Finance (1869); warm advocate of free trade principles; received order of Black Eagle (1895).

CAMPHAUSEN, WILHELM (1818-85), Ger. artist; famous for his battle pictures, many of his subjects being taken from XVII.-cent. history; also portraits of modern Ger. celebrities.

CAMPHENE, see TERPENES.

CAMPHORS, chemical compounds used medicinally as diaphoretics and antispasmodics. LAUREL CAMPHOR ($C_{10}H_{16}O$) is volatile, white, crystalline, semi-transparent; M.P. 175°, B.P. 204°; soluble in alcohol and ether; obtained from wood of *Laurus camphora* of China, Japan. BORNEO CAMPHOR ($C_{10}H_{18}O$), obtained from *Dryobalanops camphora*, has similar properties.

CAMPHUYSEN, DIRK RAFAELSZ (1586-1627), Dutch artist; his landscapes, though small, are much valued.

CAMPI, GIULIO (1500-72), Ital. artist and founder of a school; his principal works are to be found in the Church of St. Margaret, Cremona.

CAMPILLO, JOSÉ DEL (1695-1743), Span. statesman; rose from lowly origin to be Prime Minister; did much to reform collection of taxes.

CAMPINAS (22° 35′ S., 46° 48′ W.), city, São Paulo, Brazil; coffee and sugar plantations. Pop. 16,000.

CAMPION, EDMUND (1540-81), Eng. Jesuit; after taking deacon's orders in Church of England he joined the Society of Jesus; was sent with Robert Parsons to conduct a mission in England (1580), and led a hunted life in various parts of the country; executed at Tyburn; beatified, 1886.

CAMPION, THOMAS (1567-1620), Eng. poet and musician; his several *Bookes of Ayres* (words and music by himself) constitute his title to be considered in the front rank of Jacobean lyric poets; also wrote number of masques.

Songs and Masques, edit. by A. H. Bullen (1903); *Complete Works* (Clarendon Press, 1908).

CAMPISTRON, JEAN GALBERT DE (1656-1723), Fr. dramatist; wrote plays in manner of Racine, and the libretto of an opera, *Acis et Galathée*; held official post under Duc de Vendôme; member of Academy (1701).

CAMPO (2° 25′ N., 9° 58′ E.), trading station, Kamerun, Ger. W. Africa.

CAMPO FORMIO (46° 1′ N., 13° 11′ E.), town, N. Italy; treaty between Austria and France signed here, 1797.

CAMPO SANTO, consecrated burial-ground in Italy and Spain.

CAMPOAMOR Y CAMPOOSORIO, RAMON DE (1817-1901), Span. poet; secured reputation as a writer of epigrams under the name of *Doloras*, in which humour and philosophy are blended.

CAMPOBASSO (41° 33′ N., 14° 41′ E.), city (and province), Italy; famous for cutlery. Pop. 11,000.

CAMPOBELLO.—(1) (37° 38′ N., 12° 43′ E.) town, Trapani, Sicily; old quarries. Pop. 9000. (2) (37° 15′ N., 13° 56′ E.) town, Girgenti, Sicily; sulphur. Pop. 11,000.

CAMPOMANES, PEDRO RODRIGUEZ, COUNT (1723-1802), Span. statesman; sometime president of the Council of Castile; translated *Voyage of Hanno the Carthaginian*, and published several original works.

CAMPOS (21° 42′ S., 41° 20′ W.), city, on Parahyba, Rio de Janeiro, Brazil; has trade in sugar, coffee, brandy. Pop. 30,000.

CAMPOS, ARSENIO MARTINEZ DE (1831-1900), Span. general, through whose efforts Alfonso XII. was restored to Spanish throne.

CAMPULUNG (45° 15′ N., 24° 57′ E.), town, Rumania; summer resort; was first capital of Walachia in XIV. cent. Pop. 13,000.

CAMUCCINI, VINCENZO (1773-1844), Ital. artist; famous chiefly for hist. pictures, of which his *Assassination of Cæsar* and *Death of Virginia* may be instanced.

CAMUS, ARMAND GASTON (1740–1804), Fr. revolutionist; member of Council of the Five Hundred.

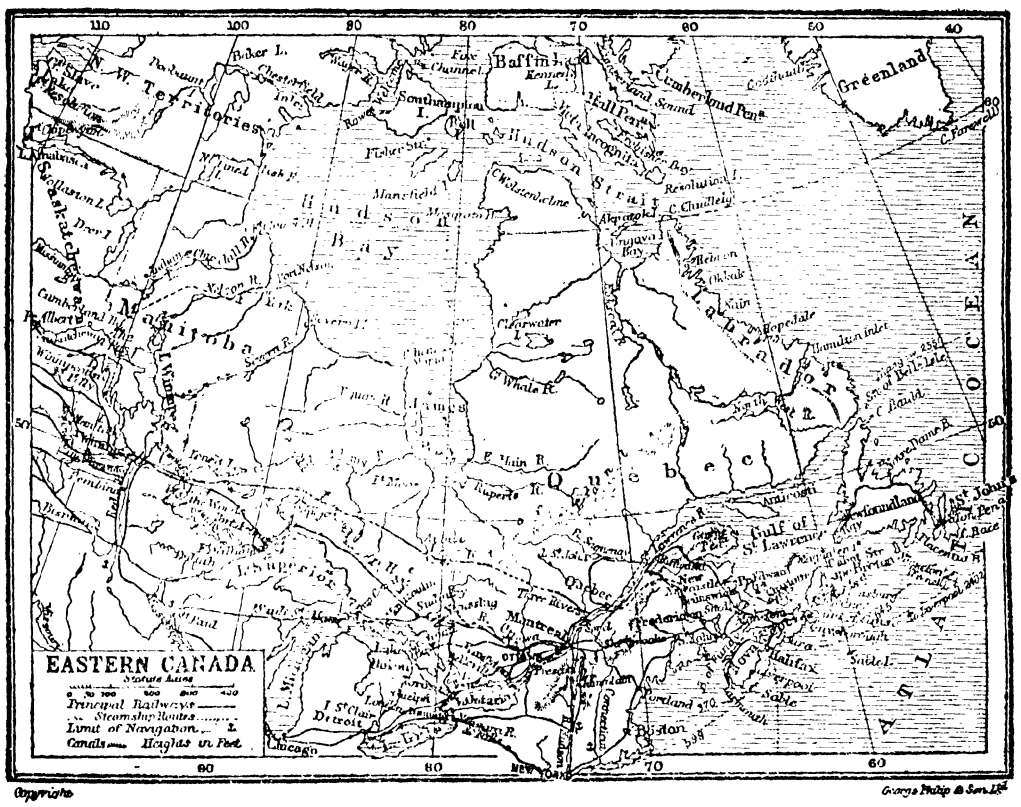
CANAAN, name applied first to coast regions of Palestine and district drained by Jordan, later given to whole of Palestine W. of Jordan.

CANAANITES, general term often applied in Old Testament to the heathen peoples dwelling between Jordan and Mediterranean; they worshipped Astarte and Baal, and sacrificed children in their heathen rites.

CANADA (41° to 72° N., 57° to 141° W.), Brit. overseas Dominion, covering all the northern half of N. America except Alaska and Newfoundland (*q.v.*); includes long fringe of islands in N. and N.E., stretching towards Pole; bounded N. by Arctic Ocean, E. by Atlantic and Newfoundland, S. by United States, W. by Alaska and Pacific Ocean.

The E. coast is broken up by Hudson Strait and Bay, James Bay, Gulf of St. Lawrence, Bay of Fundy; of Rockies, is enormous stretch of fertile prairie land, important for wheat-growing and stock-rearing; districts E. and W. of this are in many parts densely wooded. N. is partly plateau, partly plain, sloping to N. and valuable only for minerals and fur-bearing animals. Great northern and north-eastern stretch drained by Upper Yukon; Mackenzie, Coppermine, Great Fish or Back Rivers, flowing to Arctic; Churchill, Nelson, Albany, entering Hudson Bay; E., S., and centre drained by St. Lawrence and its tributaries (Ottawa, etc.), Red River, Assiniboine, Saskatchewan; S.W. by Fraser and upper waters of the Columbia. Climate varies greatly; is generally one of extremes. Temperature in centre ranges from 44° to 88° F.; rainfall sufficient everywhere. Extreme length is *c.* 2100 miles, width, 3600 miles; area, *c.* 3,730,000 sq. miles.

History.—About 1000 A.D. Norse explorers from Greenland established in C. a settlement whose situation

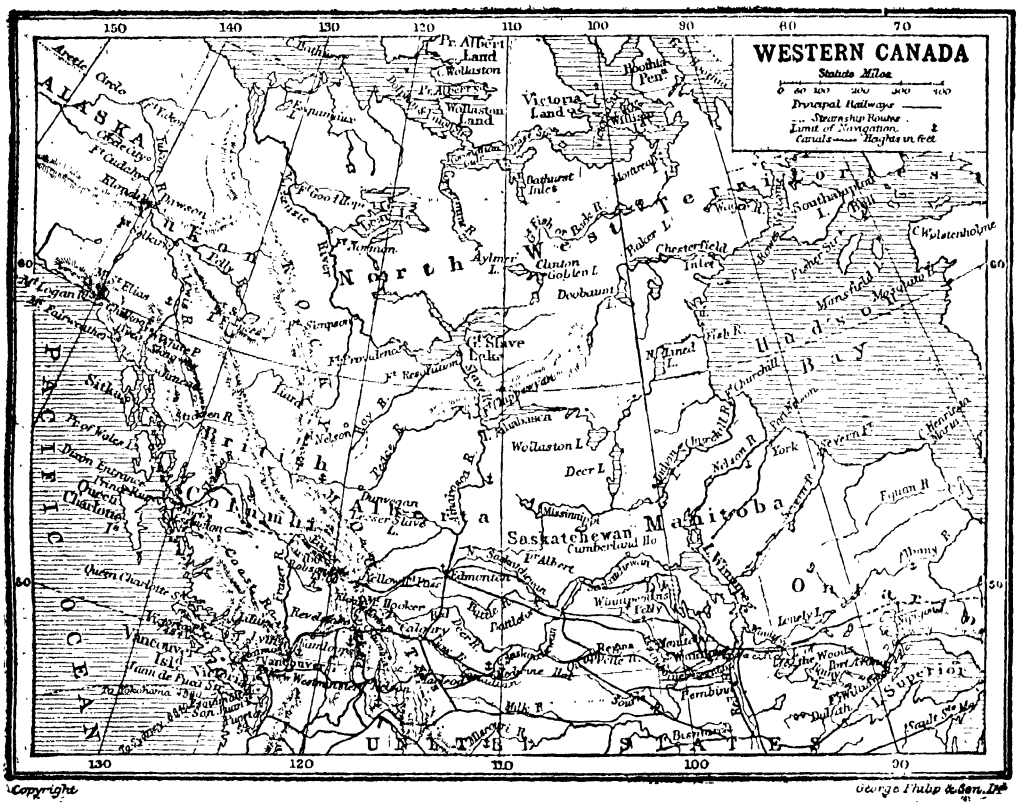


importance of first three as harbours lessened by ice in winter, of last by height of tides and strength of tidal currents; W. coast much broken, fringed with islands; N. coast commercially useless on account of latitude. S.E. is cut up by chain of great lakes—biggest fresh-water area in world; largest are Lakes Superior, Michigan, and Huron.

Along E. coast, by Labrador, Cape Breton Island, and Nova Scotia, are low hills; while S.E. of St. Lawrence basin is bounded by northern extension of Appalachians, with height of *c.* 4000 ft. Along N.W. of St. Lawrence basin, of Great Lakes, and of their northern feeders, stretch Laurentian Plateau and Laurentian Range, with heights of from 1000 to 3000 ft. From N.N.W. to S.S.E., towards Pacific coast, run Rocky Mountains and parallel Selkirk and Cascade Ranges, with great intervening valleys and with average height of *c.* 8000 ft.; highest peaks, Mts. Hooker (15,700 ft.), Murchison (15,789), Brown (16,000). Between Laurentian Range, N. of Lake Superior, and foothills is unknown; but they were soon overwhelmed and their settlement destroyed by Indians, who remained in undisputed possession until coming of European explorers late in XV. cent. John Cabot was first to reach E. coast of Canada in 1497, and his son Sebastian afterwards carried out further explorations. First settlements, however, were made by French; great part of coast was explored by corsair Verrazano in 1524, and ten years later Cartier formally annexed country in name of Fr. king, exploring St. Lawrence R. in 1535. The colony he tried to establish, with aid of Lieut.-Gen. Roberval, proved a failure, as also were later settlements made by Marquis de la Roche in 1598 and by Chauvin and Pontgravé in 1599. In 1603 Samuel de Champlain received royal charter, and in 1604 he with Sieur de Monts established settlement at St. Croix, afterwards removed to Port Royal in Acadia; in 1608 he founded Quebec, and later a trading centre at Montreal, and discovered several lakes. His support of Hurons against Iroquois in 1609

and 1615 excited hostility of latter to France, so that when, later on, war broke out with England they supported Eng. arms.

In 1613 Port Royal was plundered and burnt by the Eng. seaman, Argall, but was later rebuilt. In 1621 English made attempt at settlement in Acadia, calling it Nova Scotia. In 1625 first Jesuit missionaries came to C., and for some time exercised great influence in conduct of affairs. Richelieu established Company of New France in 1627, to which management of affairs in C. was entrusted. English took Port Royal in 1628, Quebec in 1629; but in 1632, by Treaty of St. Germain-en-Laye, these, with whole of Acadia, were restored to France. Champlain, who had been taken prisoner by English, returned to C. in 1633, acting as gov. until his death in 1635. Permanent settlement was made at Montreal in 1642, one of founders, Laval, becoming bp. of C. and head of Church. In 1654



suspecting which, Frontenac sent parties of Indians and French to attack Eng. settlements; several massacres occurred, and Eng. colonists determined on war. War lasted, except for short truce in 1697, until 1713, when it ended with Treaty of Utrecht, whereby Canada, Isle Royal, and St. John's Island remained to France, and Britain obtained Nova Scotia, Newfoundland, and Hudson Bay Territory. Formal establishment of Brit. government took place, 1719. Period of peace ensued, during which French fortified Cape Breton. After outbreak of war between France and Britain this was taken by British in 1745, but was restored to France in 1748, by Peace of Aix-la-Chapelle. Before long relations again became strained, and in 1755 all Fr. Canadians were expelled from Nova Scotia by Brit. gov., Lawrence. War broke out soon afterwards, and lasted till 1763. French under Montcalm had most success in first two years, took Oswego and Fort William Henry; but later tide turned in favour of British, who took Louisburg in 1758 and afterwards captured Prince Edward Island. In 1759 Quebec (*q.v.*) fell to Brit. force commanded by Wolfe, who was killed in action; soon afterwards Montreal surrendered; and in 1763 peace was concluded by Treaty of Paris, whereby whole of C. was ceded to Great Britain; declared Brit. province, Murray becoming governor.

Acadia was again captured by British, but it was restored to France by Treaty of Breda, 1667. Meantime management of Company of New France came to an end, their charter being cancelled by Louis XIV. in 1663, when C. became a Crown Colony. Administration was now carried out by Gov., assisted by Intendant and Supreme Council. First gov., De Mézy, came to loggerheads with Bp. Laval, and was ordered to France, but died suddenly. For a time De Tracy acted as Viceroy, and reduced Mohawks to submission. Frontenac, who became gov. in 1672, was unrivalled in his treatment of the Indians; during his administration Mississippi was explored, and English made further settlements in Hudson's Bay and other districts. He was recalled in 1681; his successor, Denonville, was guilty of treachery towards the Iroquois, who in revenge organised terrible massacre of La Chine, 1689. The recall of Denonville followed, and Frontenac returned once more.

Meantime English made an alliance with Iroquois;

C. and Nova Scotia did not join in rising of Amer. colonies against mother country in 1776, and had no share in War of Amer. Independence. In 1791 the Constitutional Act was passed, dividing old province of Quebec into Upper and Lower Canada, each with its own governor. Discontent broke out in Lower C., and friction between Fr. and Brit. inhabitants. In 1812 occurred war with U.S.A., which lasted till 1814. In 1837 Fr. rising in Lower C. was repressed, and in 1841 Upper and Lower C. were reunited, while Nova Scotia and other maritime provinces still had separate governments. In 1867 federal union was formed by Upper

and Lower C., Nova Scotia, and New Brunswick, as Dominion of Canada, which was joined in 1871 by Brit. Columbia, and in 1873 by Prince Edward Island; Hudson Bay Territory had been acquired in 1869.

In 1869–70, and again in 1885, occurred risings among French half-breeds, causes of which were partly racial, partly religious, the mutineers fearing that the French language and R.C. religion would be superseded; leader was Louis Riel, who after suppression of second rising was tried and executed. Dispute with U.S.A. concerning fishery rights was settled by treaty, 1888, and in 1892 a treaty was arranged between Canada, U.S., and Great Britain concerning sealing in Bering Sea; further disputes on this subject were settled by award in 1897, in which year also occurred the great rush to Klondike consequent on discovery there of gold. In 1896 Manitoba was agitated by religious education disputes, which were settled by arrangement; and in this year Laurier became first R.C. premier. In 1898 a Conference met at Quebec on question of Alaskan boundary, which was finally defined by treaty with U.S.A. in 1903. Pacific cable to Australia was completed, 1902. New provinces Alberta and Saskatchewan were created out of N.W. Territories in 1905; in 1912 Ungava was assigned to Quebec, and N.W. Territories S. of 60° N. were divided between Ontario and Manitoba.

There are many sources of wealth. Central district is one of great wheat areas of world; 200,000,000 bushels were produced from 10,000,000 acres, 1912; cattle-rearing, fruit-growing, dairying are important industries; great quantities of timber; extensive fisheries—lobster, salmon, herring, cod, mackerel; mineral deposits are valuable, including gold, coal, copper, nickel, silver, petroleum, asbestos, lead, iron. Exports include lumber, cheese, cattle, wheat, flour, bacon, fish, apples, skins, furs, sheep, butter, eggs, beef, paper, wood pulp, leather, etc.; imports—textiles, machinery, iron and steel manufactures, clothing, salt, coal, chemical products, etc. Canada has system of protection, but there is a preferential tariff in favour of U.K. and some of her colonies. Railway mileage in 1912 was *c.* 26,000 and is rapidly extending; Canadian Pacific Railway, running from Montreal to Vancouver, not counting innumerable branches, has a length of 2906 miles, and was opened in 1885; other leading lines are Canadian, Northern, and Grand Trunk Pacific from Moncton, New Brunswick, to Prince Rupert on Pacific coast (begun, 1904, with Government aid). Besides navigable rivers and great lakes, there is fine system of canals; shipping is of great importance. Telegraphic and postal communications are good.

The Dominion was formed by confederation between 1867 and 1873 of all Brit. N. Amer. colonial possessions, except Newfoundland, and coast strip of Labrador between Hudson Strait and Gulf of St. Lawrence forming part of that colony. Executive consists of Gov.-Gen., representing Brit. Crown, and Privy Council; legislative vested in Parliament of two houses, Senate and House of Commons, former having 87 and latter 221 members. Senators are nominated for life by Gov.; Commons elected for five years by popular vote. The nine provinces, Ontario, Quebec, British Columbia, Nova Scotia, New Brunswick, Manitoba, Alberta, Saskatchewan, and Prince Edward Island have each a lieut.-gov. and parliament, and administer their own local affairs (see FEDERATION). The chief religion is Roman Catholicism, but Methodism, Presbyterianism, and Anglicanism have large followings. Education (which is under provincial control) is free and compulsory, and there are twenty universities, one or more in each province (see UNIVERSITIES). Militia service is compulsory between ages of 18 and 60. The Canadian Government offered 3 Dreadnoughts to mother-country in 1912. A Royal Canadian Navy will probably be organised in the near future to guard Atlantic and Pacific coasts.

Inhabitants include Brit., Fr., and other European nationalities, Indians, and Chinese. Immigration continues with great rapidity; in 1910–11, 311,084 settlers arrived, the greatest numbers of whom came from U.S.A. and the U.K. There are some 1,600,000 French-speaking Canadians, and over 110,000 Indians. The total pop. (1911) was 7,204,838.

Bramley-Moore, *Canada and her Colonies* (1911); Griffith, *Dominion of Canada* (1911).

CANAL, artificial waterway for navigation purposes, drainage, or irrigation, the term usually being restricted to channels for navigation. C's were used by the Egyptians, Chinese, and other Eastern nations long before Christian Era, these early c's being mostly all at one level. The progress of the c. was slow until the introduction, in the XIV. or XV. cent., of the *lock*. A lock consists of a water-tight chamber closed at each end by gates, and separating two reaches of a c. By means of sluices this chamber can be filled to the level of the upper reach, or emptied to the level of the lower, so that barges can be admitted from either reach and raised or lowered to the level of the other. The time and water expended in passing through locks has caused them to be replaced on many c's by other devices, such as two iron chambers filled with water and exactly balancing one another. One chamber rises as the other descends, thus raising or lowering a vessel as required. The water-supply of a c. is kept up by natural or artificial reservoirs, water-weirs being provided to take any excess. Stop-gates divide the c. into sections which can be emptied separately for repairs.

Among famous c's are the *Bridgewater C.* (Worsley to Manchester), opened 1761, the first great c. in England; *Manchester Ship C.* (Manchester to Eastham on the Mersey, 35½ miles, cost nearly 13½ millions sterling), opened, 1894, by Queen Victoria; vessels can enter or leave it at half-tide; has minimum bottom width of 120 ft., depth of 26 ft.; Eastham locks have 20 ft. on sill at low water, rising to 36 ft.; crossed in a swing aqueduct (opened for passage of masted vessels) by Bridgewater C.; *Kaiser Wilhelm C.* (Kiel to Baltic, 70 miles); width being increased to 144 ft. and depth to 36 ft. for latest battleships; *Amsterdam Ship C.* (Amsterdam to N. Sea, 16½ miles); *Sues C.* (q.v.); *Panama Canal* (q.v.).

CANAL DOVER (40° 33′ N., 81° 28′ W.), city, Ohio, U.S.A.; foundries, flour-mills. Pop. (1910) 6621.

CANALE, ANTONIO, CANALETTO (1697–1768), Ital. artist; National Gallery, London, contains examples of his work.

CANANDAIGUA (42° 52′ N., 77° 18′ W.), town, on Canandaigua Lake, New York State, U.S.A.; summer resort; agricultural implements. Pop. (1910) 7217.

CAÑAR (*c.* 3° S., 78° 30′ W.), province, Ecuador; silver. Pop. 64,000.

CANARY ISLANDS (27° 45′ to 29° 15′ N., 13° 30′ to 18° W.), group of volcanic islands, belonging to Spain, off N.W. coast of Africa, 62 miles from mainland. There are seven large islands, La Palma, Hierro, Gomera, Teneriffe, Grand Canary, Fuerteventura, Lanzarote; area, *c.* 2808 sq. miles. Climate is delightful; lowest temperature, 48°, highest, 95° F.; rainfall moderate. Islands produce onions, fruits (bananas, etc.), cochineal, wine, tobacco, vegetables; all exported. Imports include cottons, woollens, coal, flour, machinery, timber, hardware, etc. Chief town is Las Palmas, Grand Canary. Great conical peak of Teneriffe (12,198 ft.) is visible 140 miles off. C. Islands discovered by European explorers in XIV. cent.; were then inhabited by Berber people. Various Span. expeditions were sent from time to time, whole archipelago being ultimately annexed by Spain. Pop. (1910) 419,809.

Brown, *Madeira and Canary Islands* (1901); Pitard and Proust, *Îles Canaries* (1909).

CANCALE (48° 51′ N., 1° 50′ E.), watering-place, France; extensive oyster-fishing. Pop. 7000.

CANCELLARIA, see under GASTEROPODA.

CANCER (*Carcinoma*), a malignant growth originating from epithelium, *i.e.* the cellular tissue covering

a surface or lining a tube or cavity of the body; it is most frequently found in the skin, in various parts of the alimentary canal, in the breast or the womb, and the uro-genital system generally. A c. has no definite limits, and may infiltrate all the tissues in its vicinity, while it is also liable to spread by the lymphatic vessels and veins and cause so-called secondary growths in different parts of the body.

Since 1792, when the first c. wards were established at the Middlesex Hospital, London, investigation of the causes and cure of c. has made great progress, and numerous institutions in various parts of the world are devoted to this work, prominent among them the Cancer Research Institute, London, directed by Dr. Bashford. Yet, although several theories have been put forward, the cause of c. is not yet exactly known; one authority considers that c. cells are embryonic cells accidentally shut off, another that they are fragments of reproductive tissue, another that the connective tissue has lost its ability to hold the proliferation of the c. cells in check, another that their growth is caused by a parasite, but none of these theories has been proved beyond doubt. The only treatment is to remove by surgical operation the growth and the tissues around, lymphatic vessels in connection with it, and all lymphatic glands in the vicinity, it being safer to cut away too much rather than too little. It is believed that cancer is increasing, for reasons which are not fully understood, although the eating of meat, and particularly tinned meats, is suggested as a cause.

The chief varieties of c. are: *scirrhus*, a hard and very fibrous type of c.; *encephaloid*, a soft, cellular c., which grows rapidly; *squamous epithelial* c., growing from surfaces, such as the skin and mucous membrane of the mouth and œsophagus, which have a particular type of covering cell-layer; *columnar epithelial* c., growing from a different type of covering cell, *e.g.* of stomach; *rodent* c., originating in the glands of the skin.

CANCER, a northern (and the 4th zodiacal) constellation, chiefly noted for containing the cluster *Præsepe* (or the 'Beehive'), which, next to the Pleiades, is the most conspicuous star cluster in the heavens.

CANCIONERO, name given to collection of songs made in Spain and Portugal in Middle Ages, Portug. name being *cancioneiro*.

CANDA GALLI, Esopus Grit, occurs in lower strata of Ulsterian epoch—part of Devonian middle division, in N. America.

CANDAHAR, see Kandahar.

CANDELABRUM, originally a stand on which lamps were placed; oldest known is the bronze one to bear the Minerva lamp at the Erechtheum, Athens; term now often applied to a collection of hanging lights.

CANDIA (35° 20′ N., 25° 9′ E.).—(1) old name for Crete (*q.v.*). (2) seaport city, Crete; formerly capital; oil and soap. Pop. (1911) 26,185.

CANDIDO, PETER, name assumed by **Peter de Witte** (1548–1628), Flemish architect and painter.

CANDLE, rod of tallow, wax, or like matter surrounding a wick, and used for lighting purposes; tallow seems to have been the earliest substance used, and c's made from it are mentioned by Apuleius; wax c's were used by the Romans; in the Middle Ages, both in London and Paris, the business of c.-making gave rise to two distinct guilds—the Wax chandlers and the Tallow chandlers.

CANDLE FISH, see under Salmon Family.

CANDLEMAS, festival held Feb. 2 to commemorate the Presentation of Christ in the Temple and the Purification of the Blessed Virgin. In the R.C. Church it has been the custom at Mass to bless the candles on that day for use during the whole year.

CANDLISH, ROBERT SMITH (1806–73), Scot. theologian; minister of St. George's, Edinburgh; occupied chair of divinity at New College, and was some time principal; one of leaders of the party which, after 1843 Disruption, became known as the Free Church of Scotland.

CANDOLLE, AUGUSTIN PYRAME DE (1778–1841), Swiss botanist; b. Geneva; prof. of Bot., Montpellier (1810), and Nat. Hist., Paris (1816); promulgated natural system of plant classification.

CANDON (17° 7′ N., 120° 28′ E.), town, Luzon, Philippine Islands; rice, tobacco, indigo grown; cotton, silk, etc., manufactured. Pop. 20,000.

CANDY, see Kandy.

CANEA (35° 30′ N., 24° E.), fortified seaport, capital (1841), and chief commercial town of Crete; small but good harbour; exports soap, oil, and wax; ancient *Cydonia*. Pop. (1911) 24,399.

CANELONES (34° 29′ S., 56° 8′ W.), department, Uruguay; area, 1833 sq. miles. Pop. 92,000.

CANEPHORUS (Gr. *kanephoros*, basket-carrier), Gk. woman who carried the elements of religious sacrifices; seen in sculptured reliefs.

CANGA-ARGUELLES, JOSÉ (1770–1843), Span. statesman; Minister of Finance, 1820.

CANGAS DE ONIS (43° 2′ N., 5° 5′ W.), town, Oviedo, Spain; coal-fields, copper mines. Pop. 9000.

CANGAS DE TINEO (43° 14′ N., 6° 32′ W.), town, Oviedo, Spain; woollen goods. Pop. (1910) 23,104.

CANGUE, Cang, wooden collar in which Chinese offenders have to sit in the streets.

CANICATTI (37° 20′ N., 13° 52′ E.), town, Sicily; sulphur. Pop. 24,700.

CANICULA, see Canis Major for *Sirius* (the dog-star); **Canicular days**, the *dog-days*, days in hottest period of year when Sirius used to rise just before sun; but this conjunction does not, owing to precession of the equinoxes, now come in dog-days.

CANIDÆ, see Dog Family.

CANINI, GIOVANNI AGNOLO (1617–66), Ital. artist and designer; representative works in church of San Martino a' Monti, Rome.

CANIS MAJOR (Lat. 'Greater Dog'), constellation visible in S. sky during winter; supposed to be one of the dogs of Orion the Huntsman, the other being *Canis Minor*. C. M. is chiefly remarkable because it contains Sirius, the dog-star, the brightest star visible from the northern hemisphere, whose distance is calculated to be about 47 billions of miles.

CANITZ, FRIEDRICH RUDOLF LUDWIG, FREIHERR VON (1654–99), Ger. diplomatist; P.C. under Elector Frederick III.

CANKER WORMS, caterpillars of two species of Geometer Moths (*Anisopteryx*), which do much harm to the leaves of fruit and other trees in U.S.A.

CANNA (57° 5′ N., 6° 30′ W.), island, Hebrides, Scotland.

CANNÆ (41° 18′ N., 16° 7′ E.), ancient town, Apulia, Italy; here Hannibal defeated Romans with great loss, 216 B.C.

CANNANORE, Kananore (11° 51′ N., 75° 25′ E.), seaport, Madras, India; headquarters of military division. Pop. 27,800.

CANNES (43° 32′ N., 6° 56′ E.), watering-place, Alpes-Maritimes, France; salubrious climate; fashionable winter resort; has extensive flower farms for distillation of perfumes. Pop. 30,000.

CANNIBALISM, Anthropophagy, custom of eating human flesh; held by some writers to have been habit of primitive man, but on this point there is much divergence of opinion. So advanced a race as the Aztecs of Mexico were addicted to c.; and in modern times the New Guineans, the Battas of Sumatra, and the Maoris of New Zealand were much given to the practice. In the Polynesian Islands the custom was rampant, but has been practically stamped out by the efforts of missionaries.

CANNING, preserving meat, fish, fruit, etc., in tins heated to expel air and kill bacteria, and then hermetically sealed; U.S.A. is chief centre.

CANNING, CHARLES JOHN, EARL (1812–62), Brit. statesman; Conservative member for Warwick (1836); Under-Sec. for Foreign Affairs (1841); Postmaster-General (1853); Gov.-Gen. of India (1856) during period of Mutiny.

CANNING, GEORGE (1770–1827), Eng. statesman, whose f. claimed descent from the famous Bristol merchant, William Canynge; ed. Eton and Oxford; entered Parliament as member for Newport [I. of W.] (1794); Under-Sec. of State (1796); made reputation as orator (1798) by his speeches in support of abolition of slave trade; Treasurer of Navy (1804); Minister for Foreign Affairs (1807); Ambassador to Lisbon (1814); Pres. of Board of Control (1816); Prime Minister, in succession to Lord Liverpool (1827); one of the most brilliant and witty orators of his time; see *Canning and his Times*, by Marriott (1903).

CANNING, SIR STRATFORD, see STRATFORD DE REDCLIFFE.

CANNIZARO, STANISLAO (1826–1910), Ital. chemist; b. Palermo; prof. of Chem., Alessandria (1851), Genoa (1855), Palermo (1861), Rome (1871); confirmed Avogadro's law of gaseous molecules.

CANNOCK (52° 42′ N., 2° 2′ W.), market town, Staffordshire, England; coal-fields. Pop. (1911) 28,588.

CANNON, name now almost obsolete, but used until recent times for heavy ordnance (*q.v.*); during XVI. cent. name was only applied to largest pieces of field artillery, of which the Cannon-Royal was chief.

CANNON, JOSEPH GURNEY (1836–), Amer. Congressman; barrister, 1858; Republican member of Congress, 1873–91, 1893–1903, 1903–13; Speaker, House of Representatives (1903–11).

CANNSTATT, KANNSTATT (48° 47′ N., 9° 14′ E.), town, Württemberg, Germany; has warm mineral springs; iron and cotton industries. Pop. 33,000.

CANO, ALONZO (1601–67), Span. painter, sculptor, and architect; court-painter to Philip IV.; many of his pictures are to be seen in Madrid.

CAÑO, JUAN SEBASTIAN DEL (d. 1526), Span. circumnavigator of the globe; commanded Magellan's expedition from Philippines home, 1521–22.

CANO, MELCHIOR (1525–60), Span. Dominican bp.; exercised great influence over Philip II., whom he advised to resist the temporal papal encroachments; writer of famous book on Apologetics.

CANOE, name, of Carib origin, for light boat pointed at each end. The early British c's were 'dug-outs,' and made from single trees. The N. Amer. Indians' c. is made of a frame of light wood, covered with birch-bark, stitched with fibre, and gummed; other c's have been made with canvas outer cover.

CANON, Church dignitary, holding prebend in a cathedral, the presentation being usually vested in the crown, abp., or bp. There are also honorary c's, who receive no revenue from the chapter's fund; and minor c's, who are required chiefly to sing the cathedral service. During the monastic period in England the c's lived together in religious houses. One such order was the Canons Regular, or Augustinian Canons.

CAÑON, deep gorge cut out by river. Most famous is that of Colorado River, U.S.A.

CANON, in music, composition in which the parts take up melody in succession; decision of Church Councils (see CANON LAW); ecclesiastical payment; rule of logic.

CANON LAW, body of ecclesiastical law, the canon being a decision of an ecclesiastical council or synod confirmed by the pope or the sovereign power in a state. The early C. L. of R.C. Church, the *jus antiquum*, was composed of the so-called Apostolical Canons, the canons of the Fathers of the Church, of the seven universally recognised œcumenical councils, and of the chief synods. The first collections, made IX.–XII. cent., were followed by the *Decretum Gratiani* (pub. 1144), a private collection, a true copy of other decrees, encyclical letters, etc. It was written by the Benedictine monk Gratian as a *Concordia discordantium canonum*, which obtained papal approval though not official acceptance. It circulated the Donation of Constantine and the rest of the False Decretals. The expression *jus canonicum* is first found at this time.

The decretals from the time of Gratian to the last decade of the XII. cent. were collected by Bernardo Circa, bp. of Faenza, but the *jus novum* or *corpus canonicum* begins with the Decretals of Pope Gregory IX. (*c.* 1233), five books drawn up by his chaplain, the Dominican, St. Raymund of Pennaforte (*b. c.* 1175), with papal sanction. There followed a sixth book of Decretals (*Sextus Decretalium*, or *the Sext*), drawn up, 1298, under Boniface VIII.; the *Constitutiones Clementinæ*, pub. by Pope Clement V. at the Council of Vienna (1308), and by John XXII., 1317, the latter adding chapters known as *Extravagantes*. *Extravagantes Communes* emanated from succeeding pontiffs before the XVI. cent. and are included in the *Corpus* as appendices. The decrees of the Council of Trent and later o's stand outside the *Corpus* and are known as *jus novissimum*, by which the C. L. has been greatly modified.

The early functions of the Eng. Clerical Convocations (which meet for provinces of Canterbury and York, in upper and lower houses, whenever Parliament assembles) have been matter of controversy; their pre-Reformation decrees were known as provincial constitutions and formed part of the provincial C. L. In 1536 Parliament decreed that, until revision of the C. L., canons not opposed to the king's prerogative or the law of the land should continue in force. The Hampton Court Conference (1604) drew up a new code, accepted by James I. and revised with additions, 1640, but never ratified by Parliament. An important member of the Eng. *Corpus* is the *Book of Common Prayer* as finally issued (1661).

Phillimore, *Ecclesiastical Law*; Laurin, *Introductio in Corpus Juris Canonici*.

CANONESS, an order (instituted VIII. cent.) of female devotees living together in religious houses. They took vows of obedience and chastity, but their rules were somewhat less strict than those of nuns.

CANONISATION, see SAINT.

CANONS, BOOK OF, book of injunctions for the Scot. Church drawn up by Scot. bp's (1636) under Anglican influence; caused Presbyterian discontent.

CANOPUS (astron.), see ARGO.

CANOPY, covering, such as that borne over crowned heads; in arch., the carved stone projections over tombs or monuments.

CANOSA (41° 13′ N., 16° 4′ E.), town, S. Italy; cathedral; occupies site of ancient *Canusium*, one of chief commercial towns of Italy.

CANOSSA (44° 34′ N., 10° 27′ E.), village, Italy; the ancient ruined castle is scene of Emperor Henry IV.'s humiliation before Pope Gregory VII. in 1077.

CANOVA, ANTONIO (1757–1822), Ital. sculptor; b. Passagno, near Venice; ancestors for several generations had been stone-cutters. At age of eight he executed two marble shrines, and displayed such remarkable promise that he was taken under the patronage of a Venetian senator, Falieri, who placed him in the care of Torretto, a well-known sculptor, with whom he remained several years. In 1779 C. went to Rome and found a new patron in the Venetian ambassador, Zuliano. Here, amongst other works, he produced his great statues of 'Apollo,' 'Theseus vanquishing the Minotaur,' 'Cupid and Psyche,' and the colossal cenotaph to Clement VIII. C.'s fame was now well established throughout Europe, and wealth and honours were thrust upon him. Judged by the severe standard of the ancients the work of C. is marked by a certain amount of artificiality, but this very defect, if such it be, was the chief factor in his success. His personal character exhibited many attractive qualities, and the vast sums he acquired by his art were chiefly expended in acts of benevolence. See SCULPTURE.

CANOVAS DEL CASTILLO, ANTONIO (1828–97), Span. statesman; filled many offices of state, and became Premier (1874); in earlier life pub. hist. novel, *Las Campanas de Huesca*; assassinated by anarchist.

CANROBERT, FRANÇOIS CERTAIN (1809–95), Fr. marshal; saw much foreign service in early life; commanded division at *Alma*, and was present at *Inkerman* and *Sevastopol*; commanded 4th army corps in Franco-Ger. War, distinguishing himself at *Gravelotte*.

CANSO, GUT OF (45° 35′ N., 61° 20′ W.), channel, between Cape Breton Island and Nova Scotia.

CANT, ANDREW (*c.* 1590–1663), Scot. priest, prominent in stirring Scotland up against Eng. Service Book.

CANTABILE, in music, evenly and at moderate pace.

CANTABRI, pre-Aryan race of N. Spain; found 25 B.C., when they fought with Romans.

CANTABRIAN MOUNTAINS (43° N., 6° W.), in N. of Spain, extending eastwards from Pyrenees to Atlantic coast; highest peak, Peña Vieja (8745 ft.); forests; rich coal-fields.

CANTACUZINO, celebrated Rumanian family of noble Byzantine origin, of which Gheorge C. (b. 1837) is the descendant; Prime Minister (1905–7).

CANTAGALLO (22° S., 42° 28′ W.), town, Rio de Janeiro, Brazil; staple industry is coffee-growing.

CANTAL (45° N., 3° E.), department, Central France, formed from S. part of old province Auvergne; surface mountainous; centre occupied by volcanic group, highest point, Plomb du C. (*c.* 6093 ft.); chief rivers, Alagon, Truyère, and Cère; numerous hot mineral springs; rich pasturage for cattle-rearing; coal and antimony found; butter and cheese made; area, 2231 sq. miles. Pop. (1911) 223,361.

CANTARINI, SIMONE (1612–48), Ital. painter of devotional school.

CANTATA (Ital.), story with musical setting, usually opening with chorus, followed by arias and recitatives, and ending with a chorale; examples by Bach, Carissimi, Mendelssohn, Weber, Brahms, and others.

CANTEEN, military refreshment house in barrack, where beer, provisions, and small-wares are served to soldiers—bread and meat being supplied direct.

CANTERBURY (51° 16′ N., 1° 4′ E.), town, on Stour, Kent, England; archiepiscopal and metropolitical see, abp. being primate of all England, owing to Augustine's settling in C., the capital of Æthelbert's kingdom; long a place of pilgrimage (cf. Chaucer's *Canterbury Tales*). Magnificent cathedral shows all architectural styles from Early Norman to Perpendicular; founded as Christchurch by St. Augustine, late VI. cent.; several times injured by Danes; enlarged and rebuilt at various dates; burnt in 1067; present building begun by Lanfranc (1070); choir burned (1174); restoration supervised by William de Sens; completed in present form by 1495; has crypt with vaulted roof, which contained tomb of St. Thomas and was used as place of worship by Huguenot refugees in XVI. cent.; consists of nave, choir, central and choir transepts with chapels, presbytery with apsidal chapels, eastern ambulatory, main apsidal chapel, Becket's tower, central and two western towers, south porch; has gorgeous shrine of Thomas Becket; some beautiful old stained glass; buildings attached to cathedral are deanery, chapter-house, baptistery, treasury, cloisters. C. has also some old churches; manufactures damask. Pop. (1911) 24,628.

Withers, *Cathedral Church of C.* (1901).

CANTERBURY (43° 47′ S., 40° 45′ E.), district, New Zealand; area, 14,040 sq. miles; cereals, cheese, butter, wool, hides, frozen meat. Pop. (not including Maoris, 1911) 173,185.

CANTERBURY, CHARLES MANNERS-SUTTON, 1ST VISCOUNT (1780–1845), Speaker of House of Commons (1817).

CANTHARIDEA, Spanish Flies, Blister Beetles, iridescent greenish malodorous insects of S. Europe, containing an irritating principle, *cantharidin*; are collected from the branches of lilac, privet, elder, etc., to be used medicinally for raising blisters and as a hair wash, and they act as a violent poison when taken internally. The green colour of the insect is due to chlorophyll.

CANTICLES, short songs or hymns, such as the *Benedicite, Magnificat, Nunc Dimittis,* etc. The name is more particularly applied to the *Song of Solomon* (*Song of Songs*). The title is derived from the first line of the book ('The Song of Songs, which is Solomon's'), but it is not to be assumed that the C's were written by Solomon. Rather it is held that the collection was the work of a scribe who had chosen a selection of the songs such as are used (to this day in N. Syria) during the several days given up to wedding festivities, and, the authorship being unknown, a great name was added, as the Hebrews disliked anonymity.

The earliest opinion held with regard to the character of the book was that it was an allegory dealing with the spiritual marriage between God and His bride, the faithful Israel (or, later, the Church). From the days of Origen onwards, this was the interpretation put upon the *Song of Songs.* Amongst mediæval writers it may be noted that St. Bernard devoted eighty-six sermons to the consideration of this aspect of the work; and, in later times, John Wesley held that the book could not possibly apply to a human love, or physical marriage, but that it must be considered allegorically.

A later development was the idea held that the *Song* was an example of the Hebrew drama, or a poem of purely natural affection. Viewed in this light, the interpretation put upon it was that Solomon had carried away a maiden, beloved of a shepherd, to his harem in Jerusalem, and that in the opening of the book he is seeking to prevail upon the girl to forget her rustic lover and yield to his advances. Another interpretation is that the songs were addressed by the maiden to her absent lover, and that her singing so works upon the king's feelings that he sets her free, and the book is supposed to end with the celebration of the lovers' reunion.

Proverbs, Ecclesiastes, and Song of Solomon (The Century Bible, Jack), by Rev. Prof. G. Currie Martin.

CANTILEVER, bracket for supporting balcony; pier in bridge-building; in both uses the length is much greater than the depth. See Bridge.

CANTILUPE, THOMAS DE, ST. (1218–82), Eng. prelate; Chancellor of England (1265); bp. of Hereford (1275); advice much valued by Edward I.; canonised, 1330.

CANTILUPE, WALTER DE (d. 1265), bp. of Worcester; supporter of Simon de Montfort.

CANTON, heraldic term for rectangular division less than quarter of shield, placed at either corner.

CANTON (23° 12′ N., 113° 15′ E.), city, China; capital of Kwang-Tung province; port on C. River; surrounded by walls; has inner wall dividing it into old town on N. and new town on S.; great number of natives live in boats; educational centre; has two remarkable pagodas, one 1300, other 1000 years old, and great number of temples; manufactures silk, hardware, cotton, porcelain, glass, paper, ivory carving, etc.; exports silk, sugar, tobacco, matting, glass bangles, buttons, eggs, tea, cassia, camphor, silverware, etc.; imports opium, paraffin, metals, flour, general goods; taken by British, 1857; held by Brit. and Fr. allies till 1861. Pop. (1910) 900,000.

CANTON (40° 33′ N., 90° W.), city, Illinois, U.S.A.; agricultural implements. Pop. (1910) 10,435.

CANTON (40° 35′ N., 75° 12′ W.), town, on Grasse river, New York; seat of St. Lawrence Univ.; has flour- and saw-mills. Pop. (1910) 2701.

CANTON (40° 50′ N., 81° 27′ W.), city, Ohio, U.S.A.; extensive industries in steel and iron. Pop. (1910) 50,217.

CANTON, term for division or district, as in France and Switzerland.

CANTON, JOHN (1718–72), Eng. natural philosopher; F.R.S.; made important electrical discoveries.

CANTONMENT, distribution of troops in villages, or buildings when engaged in active operations, under the surveillance of guards and sentries; in India, the c. system has led to the establishment of permanent military settlements, with barracks, officers' houses, bazaars, etc.

CANTÙ, CESARE (1804–95), Ital. historian; commissioned by a Turin publisher to write a universal

history, he completed it in six years, in 72 vol's; during a term of imprisonment he wrote a novel, his only writing materials being toothpick, candle-smoke, and pieces of rag.

CANUSIUM (41° 13′ N., 16° 4′ E.), ancient city, Apulia, Italy; became subject to Rome, 318 B.C.; modern Canosa.

CANUTE THE GREAT, CNUT, KNUT (995–1035), king of England; s. of Sweyn Forkbeard of Denmark. His f. had driven Ethelred the Unready into exile, and had compelled the English to accept him as king, but on the death of Sweyn (1014) the English restored Ethelred, and Harold, Sweyn's elder s., having been proclaimed king of Denmark, C. became a landless adventurer. He at once made war upon the Eng. king, who died 1016, and continued the struggle against Edmund Ironside, his successor. After C.'s victory at Assandun Edmund agreed to a treaty at Olney, by which he kept the south and C. received the north of the country. Upon Edmund's death (1017) C. was accepted as king of all England. He became ruler of a small empire in 1028 by succeeding to the thrones of Norway and Denmark, and the popular idea of his greatness is illustrated by the tale of his ordering the waves to retire, with the purpose of rebuking his courtiers' flattery. The king of Scotland did him homage (1031). He ruled England as a native ruler, by Edgar's laws. The four earldoms, Wessex, Mercia, East Anglia, Northumbria, were formed by him (1017).

Larson, *Canute the Great.*

CANUTE VI. (1163–1202), king of Denmark; s. of Valdemar I.; did much to extend Dan. territory.

CANVAS, coarse unbleached cloth made from hemp or flax, used for tents, sails, and art purposes; manufacture of Eng. sailcloth began, 1590.

CANYNGE, WILLIAM (1399–1474), Eng. merchant; mayor and M.P. for Bristol; entertained Edward IV.; restored the Church of St. Mary Redcliffe.

CANZONE, Ital. verse form, of which the chief masters were Petrarch and Leopardi; employed also by Drummond of Hawthornden and Schlegel.

CÃO, DIOGO, see CAM.

CAOUTCHOUC, see RUBBER.

CAP, head-covering; C. OF LIBERTY is the *bonnet phrygien* of the Fr. republic; C. AND BELLS were insignia of the professional fool, and school children formerly had to wear a FOOL'S C. as punishment; the judge wears a BLACK C. when pronouncing death sentence. C.-À-PIE (*c. à pied*), 'from head to foot.'

CAP HAITIEN (19° 45′ N., 72° 14′ W.), seaport town, and former capital of Haiti (*q.v.*), West Indies; exports coffee. Pop. 30,000.

CAPACITY, legal term; an infant, lunatic, or intoxicated person is incapable of making legal agreement.

CAPE, piece of land jutting out into the sea; Cape of Good Hope is called 'The Cape'; short armless outer covering fastening in front.

CAPE BRETON ISLAND (45° 28′ to 47° 3′ N., 59° 41′ to 61° 36′ W.), Nova Scotia, Canada; separated from mainland by Gut of Canso; cut in two by Bras d'Or Lake and a ship-canal; length, 100 miles; breadth, 85 miles; area, 3975 sq. miles; produces grain, timber, coal, salt, marble, limestone, granite; important fisheries; shipbuilding; connected with mainland by Intercolonial Railway; first colonised by French, 1712; ceded to Britain, 1763. Pop. (1911) 122,084.

CAPE COAST CASTLE (5° 15′ N., 0° 30′ W.), seaport town and fort, Gold Coast, Brit. W. Africa; formerly capital; under Brit. Government since 1843; exports gold-dust, palm-oil. Pop. (1911) 11,269.

CAPE COD (42° 5′ N., 70° 10′ W.), peninsula, Massachusetts, between C. C. Bay and Atlantic.

CAPE COLONY, see CAPE OF GOOD HOPE.

CAPE OF GOOD HOPE, PROVINCE OF THE, formerly Cape Colony (23° 40′ to 34° 51′ S., 16° 24′ to 30° 15′ E.), part of Brit. empire forming extreme S. of Brit. S. Africa and of African continent; bounded N. by Ger. S.W. Africa and Bechuanaland protectorate, N.E. by Transvaal, Orange Free State, Basutoland, Natal, S.E. and S. by Southern Ocean, W. by Atlantic Ocean. Running parallel with coast, and about 150 miles distant from it, is series of mountains known by various names of Drakensberg, Stormberg, Sneeuwberg, Nieuwveld, Roggeveld, and Kamiesberg Mountains, with elevations of 11,000 to 6000 ft. From coast to these surface rises by three terraces divided by subsidiary mountain ranges, large part of third terrace being occupied by Great Karroo, a long treeless plateau, with bare table-topped hills, sloping from 4000 ft. on W. to 3000 on E., and covered with scrubby karroo bush. Southern Karroo or second terrace resembles Great Karroo, and both have great fertility under irrigation.

Coast terrace and hilly country in E. have grassy plains and woodlands. To N. of great range of mountains surface slopes to valley of Orange River, and plateau of interior beyond. Eastern part of province has rainfall of 28 to 25 in., centre, S. coast, and Karroo, 25 to 9 in., Great Karroo and country N. and N.W. of it, 9 in. or less. No large river except Orange, which rises in mountains in E. Western districts have winter, and eastern summer, rains. Mean temperature ranges from 51° to 79° F. Greatest length of province, *c.* 800 miles; breadth, *c.* 860 miles; area, 277,151 sq. miles.

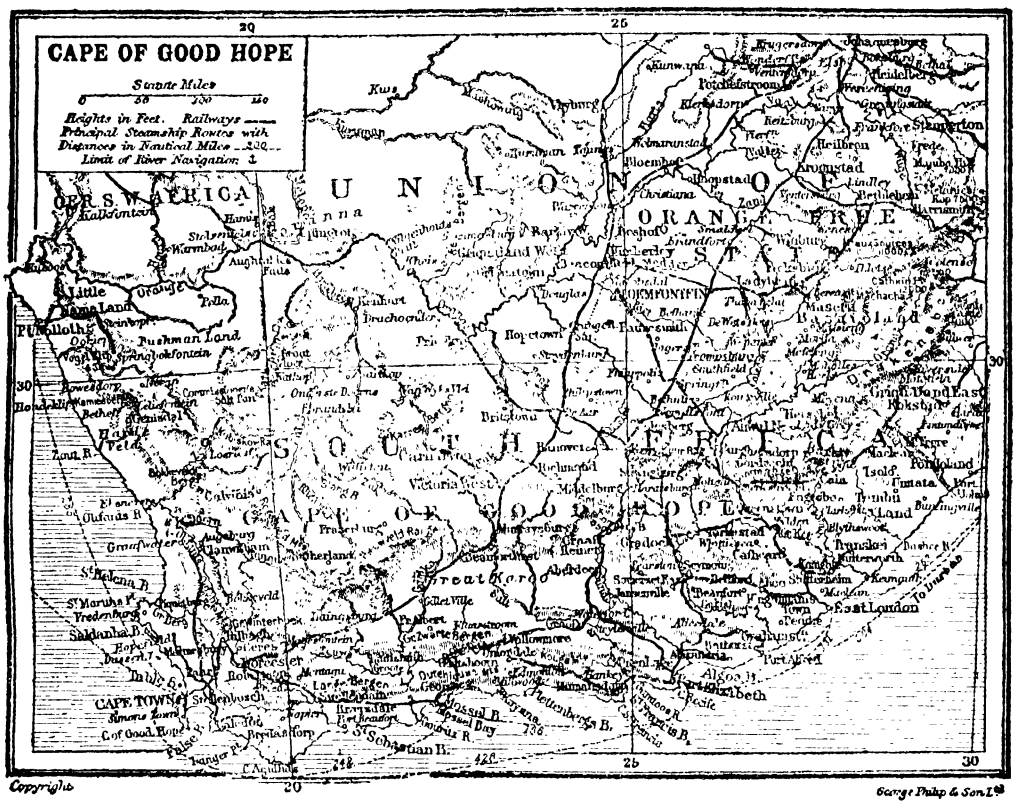
Purely provincial affairs are in hands of Provincial Council, which is subject to the Parliament of the Union of South Africa; chief executive officer—Administrator.

History.—Cape of Good Hope was first discovered by Portug. navigator, Bartholomew Diaz, in 1486, and was again doubled by Vasco da Gama in 1497–99. No Portug. colonies, however, were established here, and first European nation to make settlement were the Dutch, who in 1652 under Van Riebeck established a fort on coast of Table Bay. They used it only as calling station for their ships going to East Indies, and colonists were not encouraged to settle.

In 1685 the revocation of the Edict of Nantes had the result of sending about three hundred Huguenots to seek refuge at the Cape. The country was then governed by the Dutch East India Co., whose rule was so severe that the settlers gradually removed as far as possible into the interior in order to avoid taxation and tyrannical regulations. Great numbers of Hottentots were killed and their lands annexed. During administration of William Adrian van der Stel, gov. from 1699 to 1704, discontent arose among the burghers and complaints were made, with result that those implicated were persecuted by Van der Stel, some being banished or sent back to Holland. In 1707 discontent was still rife, and various efforts at pacifying the burghers were made by Dutch government; but their instructions were not carried out by Dutch East India Co., who continued their policy of oppressive taxation and exclusion of burghers from foreign trade. Hence the latter continued to move farther away from centre of government. Dutch control of Cape lasted for nearly a cent. and a half. In 1780, however, Britain, having declared war against Holland, who was allied with France, arranged to send fleet against Cape; this was carried out next year, when the British were defeated by a Fr. fleet before reaching their destination. Fifteen years later the British made another and successful invasion and captured Cape in 1795; ruled by Britain until 1803, when it was restored to Holland, the Dutch East India Co. being now superseded by the Batavian republic, who governed for three years; when, war having again broken out, British once more took Cape Colony, which was formally surrendered to her by treaty in 1815.

The British then began the systematic colonisation of country. Several struggles with Kaffirs had already taken place, and for some time hostilities continued, wars breaking out from time to time. One occurred in 1817–19, when Kaffirs were defeated by

Graham; and in 1834 another broke out; great massacres followed, and many Hottentots were killed; ultimately the Kaffirs were defeated by Sir Harry Smith, and peace was concluded in 1835. Meantime all slaves had been emancipated in 1834, which roused discontent among the Boers; and in 1835 many of the latter set off on what is called the *Great Trek*, crossed Orange River, and eventually established the Transvaal Republic and Orange Free State. In 1846 occurred another war with Kaffirs, who were defeated by British, and acknowledged that country west of Kei River was British by right of conquest. In 1847 Brit. right to district between Kei and Keiskamma was proclaimed by Sir Harry Smith, now gov. Hostilities again broke out in 1850, when some British settlers were massacred by Kaffirs in Chumie Valley; gov. was for time cut off from his friends in Fort Cox, but made a dash for it, and rode to King William's heralding an age of bliss; result was that starvation and famine ensued, and in spite of Brit. attempts at relief, many thousands succumbed, and many more left the country. Brit. Kaffraria was annexed to Cape in 1865, Basutoland in 1871; latter was afterwards taken under direct control of Brit. crown. Griqualand West was also annexed in 1871, and subsequently incorporated with Cape Colony, its diamond mines forming great source of wealth. Discovery of diamonds in various districts resulted in further development of country from 1867 onwards. During administration of Sir Bartle Frere, gov. 1877–80, occurred another Kaffir war, which was soon suppressed. War in Basutoland in 1880 led ultimately to establishment of that country as crown colony. Walfish Bay was annexed in 1884; Port of St. John's in same year was incorporated with Cape Colony; and in 1885 Tembuland, Bomvanaland, and Gcaleka-



Town under fire. War continued till 1853, when it was ended by General Sir George Cathcart, who succ. Sir Harry Smith as gov. in 1852. Meantime great discontent had been caused by Earl Grey's proposal in 1848 to establish a penal settlement at the Cape; agitation was so pronounced that idea was abandoned in 1850; this led to desire on part of colonists for representative government, and in 1854 constitution was established, with two elective chambers, first parliament being opened by Gov. Darling in that year.

Under Sir George Grey, gov. 1854–61, various improvements were carried out; he ameliorated the conditions by which land was held by natives, supported missions, and began opening up the country by roads and construction of railway. During his administration occurred an extraordinary political movement among Kaffirs; a seer prophesied that if they killed all their herds and refrained from cultivating crops, all white men would on a given day disappear from the country and all dead Kaffirs reappear, land became integral parts of colony. Meantime the first Boer War had occurred in 1881; this resulted in foundation of Afrikander Bond, which aimed at establishing Afrikander nation and removing Brit. control. Pondoland was added to Cape Colony in 1894, and in 1895 occurred annexation of British Bechuanaland. Cecil Rhodes was Prime Minister in 1890–96, and had great share in development of colony. In 1899–1902 the great Boer War occurred, and for a time Cape Colony was invaded. Cape Colony was united with Natal, Transvaal, and Orange River Colony in 1910, as the Union of S. Africa; and became the Province of the Cape of Good Hope.

Resources.—Chief source of wealth is diamond mines, centre being at Kimberley in Griqualand W.; rich copper deposits in Namaqualand; coal in E., manganese and tin near Cape Town; iron, zinc, lead. Sheep and Angora goats are reared in large numbers, producing great quantities of wool and mohair; cattle, horses, mules, donkeys bred; lucrative ostrich-farming carried

on. Maize, millet, wheat, barley are cultivated; grapes, peaches, apricots, nectarines, figs, oranges, olives, pine-apples, bananas, tomatoes, and other fruits and vegetables grown; wine, brandy, and raisins produced; manufactures unimportant; exports include diamonds, wool, mohair, ostrich feathers, copper ore, regulus, and precipitate, raw hides, sheep and goat skins, maize; imports, clothing, iron, coal, textiles, leather, carriages, books, furniture, paper, tobacco, grain, hardware, cutlery, tools, provisions, liquors, etc. Railway mileage is c. 3500.

INHABITANTS include Dutch, English, and other European nationalities; in western districts are greatest number of Dutch, in eastern of English. The Boers are descended from early Dutch colonists and Huguenot exiles from France. Natives include Bantus, or Kaffirs, Hottentots, Bushmen, Griquas, etc. Many of Bantus are people of fine physique; Hottentots are short, and Bushmen are lowest S. African race. There are also numbers of Indians and Malays, and of 'coloured' people (*i.e.* half-castes). Chief religion of whites is Protestantism (Dutch Reformed Church, Anglican, Presbyterian, etc.). Education is obligatory for European children. Cape Town is provincial capital and seat of Union Parliament. Pop. (1911) 2,563,024, of whom 583,000 are white. See SOUTH AFRICA.

Burton, *Cape Colony To-day* (1907); Colvin, *The Cape of Adventure* (1911).

CAPE OF GOOD HOPE (34° 24′ S., 18° 29′ E.), promontory, S. Africa, first sighted by Diaz, 1486, and called 'Cape of Storms'; rechristened by king of Portugal; lighthouse.

CAPE MAY (39° 5′ N., 74° 52′ W.), watering-place, on Atlantic, Cape May County, New Jersey, U.S.A.; lighthouse, sea-bathing, fishing. Pop. (1910) 2471.

CAPE PENINSULA (34° 56′ S., 18° 27′ E.), peninsula, S. Africa, on N. of which stands Cape Town.

CAPE RACE (46° 40′ N., 53° 5′ W.), cape, S.E. Newfoundland.

CAPE TOWN (34° 56′ S., 18° 28′ E.), Mother City of South Africa; capital of Province of Cape of Good Hope, and seat of Legislature of Union of South Africa; beautifully situated on Table Bay at foot of Table Mountain; many fine suburbs; excellent harbour and docks. Notable buildings include old Dutch Castle, Government House, Houses of Parliament, Museum, Library, several colleges; mosques; observatory; seat of R.C. and Anglican bp's, and of univ.; exports wool, diamonds, ostrich feathers, gold, wine, ivory, hides, skins; imports textiles, hardware, general goods; founded by Dutch, 1652; taken by British, 1806. Inhabitants include Europeans, natives, coloured people (half-castes), Malays, and Indians. Pop., without suburbs (1911), 67,170.

CAPE VERDE (14° 48′ N., 17° 33′ W.), most westerly cape, Africa, between Gambia and Senegal River.

CAPE VERDE ISLANDS (16° 30′ N., 24° W.), group of fourteen islands belonging to Portugal, W. of Cape Verde, off W. African coast; area, 1480 sq. miles. Largest, Santiago; capital, Praia. Surface is mountainous; generally volcanic, Fogo being composed of single volcano, occasionally active; little water except in ponds and wells; climate hot; rainy season, Aug. to Oct.; vegetation abundant in spite of severe droughts; produce coffee, cinchona, sugar, tobacco, indigo, maize, oranges, grapes, jams, orchil, millet; cattle, pigs, goats, mules and asses raised; salt, amber, turtles; administered by gov., resident at Praia. Inhabitants are Portuguese, negroes, half-breeds. C. V. Islands were discovered in 1456 by Portuguese, who established colony here, 1499; granted to Prince Ferdinand, 1562; long used as penal settlement. Pop. 150,000.

CAPEFIGUE, JEAN-BAPTISTE HONORÉ RAYMOND (1801–72), Fr. historian; wrote history of France, and of the Jews; and numerous biographies of many famous women.

CAPEL, ARTHUR CAPEL, BARON, Eng. loyalist; strong supporter of Charles I; beheaded, 1649; wrote *Daily Observations, or Meditations.*

CAPEL CURIG (53° 6′ N., 3° 50′ W.), hamlet, E. Carnarvonshire, Wales, near Bettws-y-Coed; resort of tourists and anglers.

CAPELIN FISH, see under SALMON FAMILY.

CAPELL, EDWARD (1713–81), Eng. Shakespearean commentator; pub. his critical edition of the poet in 10 vol's (1768); associated with Garrick in adapting *Antony and Cleopatra* for stage.

CAPELLA, ALPHA AURIGÆ, first magnitude star in constellation of Auriga; of pearly hue, C. has been found by spectroscope to be a close double star.

CAPELLA, MARTIANUS MINEUS FELIX (fl. V. cent.), author of mediæval scientific compendium, *Satyricon.*

CAPENA, ancient town, Etruria; founded from Veii; afterwards subject to Rome.

CAPERCAILZIE, COCK-OF-THE-WOODS, *Tetrao urogallus,* large species of grouse (*q.v.*) inhabiting pine woods. The beautifully plumed male is larger than the female, and is noted for its song and fighting proclivities during courtship in spring. The fowl provides sport in Scotland, Sweden, Germany, and Austria.

CAPERNAUM, city of Galilee; home of Christ's manhood; location undecided.

CAPERS, flower-buds of *Capparis spinosa,* plant of bramble tribe, grown in Sicily and Southern France; prepared as pickle.

CAPET, 3rd Frankish dynasty, founded by Hugh Capet (987), who made Paris the Fr. capital. The throne passed to the female line, the house of Valois, in the person of Philip VI. (1328), but the inheritors of the Fr. throne were always considered C's, and after the Fr. Revolution Queen Marie Antoinette (*q.v.*) was addressed as Madame C. The different houses are distinguished as *Capétiens* (987–1328), *Capétiens Valois* (1328–1589), *Capétiens Bourbons* (1589–1848). See FRANCE (*History*).

CAPGRAVE, JOHN (1393–1464), Eng. priest and chronicler; his *Nova legenda Angliæ* was printed by Wynkyn de Worde (1516).

CAPILLARITY.—The particles forming the surface layer are in a condition different from those in the interior of a liquid; this layer is in a state of tension, and its action resembles that of a thin elastic membrane stretched tightly over the surface. In the interior of the liquid, a molecule is subject to attractive forces exerted by all the molecules immediately surrounding it. On the average these forces are in equilibrium and have no sensible effect on the motion of the molecule. But a molecule in, or very close to, the surface is acted on only by forces which attract it downwards. Hence, the free surface of a liquid tends to reduce itself to the least possible area, *e.g.* a raindrop tends to assume the form of a sphere, because a sphere is the form in which a given volume has the least possible superficial area. This tendency of the surface of a liquid to assume the minimum area possible means that it is in a state of tension, and the force acting is termed SURFACE TENSION. It is measured by the number of units of force which it exerts across unit length of a line drawn across the surface of the liquid; *e.g.* the surface tension of pure water is c. 75 dynes per centimetre, or about 3 grains weight per inch.

The behaviour of liquids in tubes of very fine bore is said to be due to capillarity, but is an effect of surface tension. Place a drop of olive oil on a surface of water. The surface tension of olive oil exposed to air is 35 dynes per centimetre; that between olive oil and water is 20·6, between water and air, 75; the tension of the water-air surface is therefore greater than the other two combined, and the oil is drawn out over the water surface. On the other hand, if a water drop be placed on a surface of chloroform, the tension of the water-air surface is greater than the others; and in consequence the water does not spread,

but is gathered into a flat drop. Consider the case of a glass tube of fine bore, both ends open, with its lower end dipped vertically below the surface of water. The water rises in the tube to a height which depends on the internal radius of the tube. At the surface layer of water inside the tube, three tensions are acting: water-air, water-glass, and glass-air, and these must be in equilibrium when the water has reached its highest point. The result is that the water in the tube stands so that the angle between its surface and that of the glass is nearly zero (*i.e.* when the glass is clean and the water is pure). Consequently, the water in the tube assumes a surface which is concave upwards. Owing to this concavity, there must be a greater pressure on the concave than on the convex side, and hence the water immediately under the surface films must be under a lower pressure than the atmospheric pressure on the concave side. The water in the tube must therefore stand at a higher level than the water outside the tube. With tubes of narrower bore the concavity and the difference of pressure are greater, hence the height the water reaches is greater; *e.g.* in a tube of internal diameter $\frac{1}{10}$ inch, the water rises about half an inch: if the diameter is $\frac{1}{100}$ inch, the rise is over 50 inches. With mercury, the tensions are such that the surface makes an angle of *c.* 130°, consequently the surface inside the tube is convex upwards. Hence there is a greater pressure under the convex surface, and therefore the inside level is below that outside the tube. These principles explain capillary phenomena generally, *e.g.* the entry of water through the micropyle of a seed, the absorption of water by a lump of sugar or a piece of blotting-paper, the rise of oil in a lamp-wick, etc. The ascent of sap in trees or plants is not due to capillary forces, as commonly supposed, but to osmosis.

CAPISTRANO, GIOVANNI DA (1385–1456), Ital. friar who preached crusades against infidels; relieved Belgrade, besieged by Turks, 1456.

CAPITAL is wealth employed to make profit. Its economic functions are to assist the labourer with tools and materials, and to enable the capitalist to accumulate wealth which he can dispose of to his own advantage. Thus the function of c. is not to maintain the labourer, for wages are not paid out of c., but out of the wealth which the labourer has been employed to create. **Fixed c.** is term applied to wealth not exhausted by the single act of production, *e.g.* railways, machinery, buildings, etc.; circulating c. is term applied to raw material in use for other purposes. Both definitions are unsound though in common use. **Capitalism** is the commercial system which makes labour dependent on c.

CAPITAL, in architecture, the head of a column, which supports the abacus.

CAPITAL PUNISHMENT, infliction of the death penalty, practically confined now, in England, to punishment of the crimes of murder, or high treason. The method of execution amongst the ancient Greeks and Romans was by the axe or sword. The first recorded instance of beheading in Britain took place in 1076, and the last person so executed was Lord Lovat (April 9, 1747). In the case of persons of common rank the sentence was usually carried out with disgusting barbarities. Disembowelling was not abolished until 1814; nor drawing and quartering until 1870. Decapitation is still employed in Germany, France, Sweden, Denmark, and China. The present method of execution in Britain is by hanging. The report of a royal commission, app. in 1864, resulted in the abolition of public executions. Formerly in Great Britain, and particularly in the XVIII. cent., the death penalty was adjudged for the most trifling crimes, such as stealing goods of the value of five shillings, or rifling a rabbit-warren. Of recent years it has been virtually abolished in cases of infanticide.

The reform of the criminal laws has been largely due to the strenuous efforts of such men as Sir Samuel Romilly and Sir James Mackintosh. In the Eng. army and navy the death sentence (theoretically) may still be given for such offences as desertion, gross neglect of duty, cowardice before an enemy, or violence to a superior officer. In some of the United States of America (as in Italy, Switzerland, Portugal, Holland, and certain other European States) the death penalty has been abolished altogether; in others it is inflicted for murder, train wrecking, arson, and rape. It is carried out in New York, Ohio, and Massachusetts by electrocution, in the other States by hanging.

CAPITALS, chief towns and seats of government of countries or states. Principal capital cities of world are: **Abyssinia**, Adis Abeba; **Afghanistan**, Kabul; **Algiers**, Algiers; **Argentina**, Buenos Aires; **Australia** (Commonwealth), on site of Yass Canberra (temporarily at Melbourne); **Austria**, Vienna; **Bavaria**, Munich; **Belgium**, Brussels; **Bolivia**, La Paz; **Brazil**, Rio de Janeiro; **British Columbia**, Vancouver; **Bulgaria**, Sofia; **Canada**, Ottawa; **Ceylon**, Colombo; **Chile**, Santiago; **China**, Peking; **Colombia**, Bogota; **Costa Rica**, San José; **Cuba**, Havana; **Denmark**, Copenhagen; **Ecuador**, Quito; **Egypt**, Cairo; **England**, London; **France**, Paris; **Germany**, Berlin; **Great Britain**, London; **Greece**, Athens; **Guatemala**, Guatemala la Nueva; **Haiti**, Port-au-Prince; **Holland**, Amsterdam; **Honduras**, Tegucigalpa; **Hungary**, Buda-Pesth; **India**, Delhi; **Ireland**, Dublin; **Italy**, Rome; **Japan**, Tokio; **Liberia**, Monrovia; **Luxembourg**, Luxembourg; **Mexico**, Mexico; **Montenegro**, Cettinje; **Morocco**, Fez; **Newfoundland**, St. John's; **New South Wales**, Sydney; **New Zealand**, Wellington; **Nicaragua**, Managua; **Norway**, Christiania; **Ontario**, Toronto; **Panama**, Panama; **Paraguay**, Asuncion; **Persia**, Teheran; **Peru**, Lima; **Portugal**, Lisbon; **Prussia**, Berlin; **Quebec**, Montreal; **Queensland**, Brisbane; **Rhodesia**, Salisbury; **Rumania**, Bucharest; **Russia**, St. Petersburg; **Salvador**, San Salvador; **Santo Domingo**, Santo Domingo; **Saxony**, Dresden; **Scotland**, Edinburgh; **Servia**, Belgrade; **Siam**, Bangkok; **South Africa** (Union of), Pretoria (administrative seat), Cape Town (legislative seat); **South Australia**, Adelaide; **Spain**, Madrid; **Sweden**, Stockholm; **Switzerland**, Bern; **Tasmania**, Hobart; **Turkey**, Constantinople; **United States**, Washington; **Uruguay**, Montevideo; **Venezuela**, Caracas; **Victoria**, Melbourne; **Western Australia**, Perth; **Württemberg**, Stuttgart.

CAPITO, WOLFGANG (1478–1541), Ger. reformer; was a Benedictine, but, influenced by Luther, became a leader of reformed faith in Strassburg.

CAPITOL.—(1) the citadel of ancient Rome on the summit of one of the Seven Hills, the Capitoline; contained temples of Jupiter, Juno, and Minerva. The present C. was designed by Michael Angelo. (2) seat of U.S.A. National Congress, Washington.

CAPITULARY (*capitulaire*), name given to the laws emanating from the Carolingian kings of the Franks, the most famous being those of Charlemagne and Louis I.; of great importance in history of law and philologically.

CAPITULATION, in military use, act of surrender under conditions stipulated of a town or fortress to an enemy, the leader of the latter having, by international law, power to make terms except in case of political demands of the defeated; also provision by which Christians in Muhammadan countries enjoy legal independence of the State in which they reside, being subject to consular courts.

CAPIZ (11° 40′ N., 122° 50′ E.), town and province, N. coast, Panay, Philippine Islands; exports rice, sugar, cotton, and tobacco. Pop. 14,000. Area (prov.), 1631 sq. miles. Pop. 224,000.

CAPO D'ISTRIA (45° 33′ N., 13° 44′ E.), fortified town on rocky island, Gulf of Trieste, Austria; cathedral; salt-works. Pop. 8300.

CAPO D'ISTRIA, GIOVANNI ANTONIO, COUNT (1776–1831), Russ. statesman; b. Corfu; after treaty of Tilsit (1807), when Ionian republic

passed into the hands of Napoleon, he refused offers made by France, and entered service of Russia; elected Pres. of Gk. Republic (1827); murdered by fanatic tribesmen.

CAPPADOCIA (*c.* 39° 20′ N., 36° E.), district in Asia Minor, to W. of Armenia, extending from Taurus to Black Sea. C. was province of Persia, when it included the region which afterwards became kingdom of Pontus; the remainder was an independent kingdom under Gk. kings for about 300 years, and became a Rom. province after the death of last king, Archelaus, in 17 A.D. It was early converted to Christianity. Chief town was Mazaca, later called Cæsarea.

CAPPEL, KAPPEL (47° 13′ N., 8° 31′ E.), small town, Zürich, Switzerland. R.C. force defeated Protestants, 1731.

CAPPEL, LOUIS (1585–1658), Fr. Huguenot divine; member of distinguished family; studied at Saumur and Oxford; prof. of Hebrew at Saumur, and later of Theol.; pub. *Critica Sacra*, 1650.

CAPPELLO, BIANCA (1548–87), Grand-Duchess of Tuscany; of noble birth, and famed for beauty, she married a clerk at age of fifteen; later became mistress, and afterwards wife, of Grand-Duke Francesco.

CAPPONI, GINO, MARCHESE (1792–1876), Ital. statesman and writer; Prime Minister under Grand-Duke Leopold II. of Tuscany; made Senator by King Victor Emmanuel (1860); became blind, 1844, but continued work on his great history of Florence (pub. 1875).

CAPPONI, PIERO (1447–96), Florentine statesman and soldier; employed by Lorenzo de' Medici, after whose death he became leader of the republic; killed (1496) during war with Pisans.

CAPRAIA (43° 2′ N., 9° 50′ E.), island of volcanic origin, N.W. coast of Italy; belongs to Genoa province; centre of anchovy fisheries.

CAPRELLIDÆ, see MALACOSTRACA.

CAPRERA (41° 12′ N., 9° 28′ E.), island, Strait of Bonifacio, N.E. coast of Sardinia; residence and burial-place of Garibaldi.

CAPRI (40° 32′ N., 14° 15′ E.), rocky island at entrance to Bay of Naples; ancient *Capreæ*; area, *c.* 6 sq. miles; highest point, Mont Solari (1920 ft.); contains two towns, Capri and Anacapri, which till 1876 were separated by a rock-hewn flight of stairs; a road has since been made; W. of Capri is the celebrated 'Blue Grotto'—limestone cavern; Rom. antiquities are found; wine and olives exported. Pop. 7000.

CAPRIC ACID ($C_{10}H_{20}O_2$), a fatty acid, B.P. 268° C., S.G. 0·911, with odour suggesting goats (*Capræ*), found in butter, etc.

CAPRICCIO (Ital. 'caprice'), impressionist musical composition.

CAPRICORNUS, THE GOAT, tenth zodiacal constellation; alpha Capricorni is a third magnitude double star.

CAPRIVI, GEORG LEO VON, COUNT (1831–99), Ger. soldier and statesman; brilliant service before Metz and in Orleans campaign; app. Chancellor and Foreign Minister, 1890.

CAPSTAN, appliance used on board ship for moving heavy weights, or winding cables. C. works on principle of wheel and axle, consisting in simplest—now obsolete—form, of timber column like truncated cone revolving on a spindle fixed in deck and worked by bars fixed in upper end; now, generally, steel or iron, driven by steam or electricity, or replaced by steam winches.

CAPTAL, feudal title of the noble heads of Epernon, Trene, Puychagut, and Buch; thus, Jean de Grailly, friend of Black Prince, was 'Captal de Buch.'

CAPUA (41° 6′ N., 14° 12′ E.), fortified town, Caserta, Italy; seat of abp.; has cathedral erected IX. cent.; partly built on site of ancient city, Casilinum, traditionally founded by Etruscans and united with Rome *c.* 340 B.C. Ancient C. was important city in III. cent. B.C., rivalling Rome and Carthage in luxury. During 2nd Punic War C. went over to enemy and was wintered in by Hannibal, 216–15; recaptured by Rome in 211 B.C.; afterwards became favourite resort; ruined by Arabs, 840; ruins include part of large amphitheatre, theatre, baths, and thermæ. Pop. 11,000.

CAPUCHIN, or SAPAJOU MONKEYS (*Cebus*), a genus of New World monkeys of family Cebidæ (*q.v.* under PRIMATES); found from Central America to south of Brazil, and often in menageries.

CAPUCHIN FRIARS (from *capuche*, cowl), an offshoot from the Franciscans (officially styled 'Friars Minor of the Order of St. Francis, Capuchin'), founded in early part of XVI. cent. by Matteo di Bassi, who adopted a pyramidal hood, grew a beard, went barefoot, and generally reverted to a more rigid system of living than was then observed by the Franciscans. The religious authorities attempted to suppress these innovations, but they were eventually ratified by Clement VII. (1528). The Capuchins wear a brown habit, and are still a flourishing body in many parts of the world.

CAPULETS AND MONTAGUES, Veronese families unknown to history. Their story as told in Shakespeare's *Romeo and Juliet* is taken from Bandello, whose account of the Cappelletti and Montecchi was trans. into Eng. verse (1562) by Brooke.

CAPUS, ALFRED (1858–), Fr. novelist and dramatist; prolific writer both of stories and plays.

CAPUT MORTUUM (Lat. 'dead head'), name given by early chemists to residue of substance after escape of all gases; later, spiritless object.

CAR NICOBAR (9° 21′ N., 92° 56′ E.), one of Nicobar Islands, Bay of Bengal.

CARABIDÆ, see under CARABOIDEA.

CARABINEERS, CARBINEERS, name, of Fr. derivation, originally borne by 6th Dragoon Guards, armed with carbine, 1692, and known as 'the King's Carabineers.'

CARABOBO (10° 10′ N., 67° 30′ W.), state, Venezuela, S. America, bordering Caribbean Sea; fertile soil; produces coffee, fruit, sugar, and maize; capital, Valencia. Area, 1794 sq. miles. Pop. 169,313.

CARABIDEA, or ADEPHAGA, a suborder of beetles, distinguished by their five-jointed tarsi, their filiform antennæ, and their carnivorous habits. They are speedy of movement and have well-developed jaws. Amongst them are the huge and beautiful Ground Beetles (*Carabidæ*), including the Bombardier (*Brachinus*), so called because when irritated it ejects an unpleasant fluid which, immediately volatilising, resembles a puff of smoke; Tiger Beetles (*Cicindelidæ*), found all the world over, which run down their insect prey by speed of foot; Carnivorous Water-Beetles (*Dytiscidæ*), with flattened, oar-like hind-legs, common in most ponds and ditches.

CARACAL (44° 8′ N., 24° 21′ E.), town, Rumania. Pop. 12,000.

CARACAL, see under CAT FAMILY.

CARACALLA, MARCUS AURELIUS ANTONINUS (186–217), Rom. emperor; s. of Septimius Severus; noted for his cruelties and extravagance; made war on Dacian Goths and the Alamanni; built arch of S. Severus in forum.

CARACAS (10° 31′ N., 67° 5′ W.), city, capital of Venezuela, built on S. slope of Avila, surrounded by mountains by which it is separated from its port, La Guaira, 6 miles N.; healthy climate; abp.'s seat; has a cathedral and univ.; subject to earthquakes; centre of export trade in cacao and coffee. Pop. 75,000.

CARACCI, see CARRACCI.

CARACCIOLI, Neapolitan family, prominent XV. cent. onwards. **Prince Francesco C.** (1752–99) was admiral of the Parthenopeian Republic.

CARACCIOLO, FRANCESCO, PRINCE (1732–99), Neapolitan admiral; learned seamanship under Rodney and Hotham; became commander of Ferdinand IV.'s navy; later turned revolutionist, fell into hands of Nelson, condemned aboard *Foudroyant*, and hanged from yardarm of *Minerva*.

CARACTACUS (*c.* 48–51 A.D.), Brit. chieftain who

held Roman invaders at bay, but was later taken prisoner and sent to Rome.

CARADOC SERIES, geological term; series of sandstones, shales, and grits, thickness 4000 ft.; subdivision of Lower Silurian system occurring in Shropshire.

CARAFFA, ANTONIO (1539–91), cardinal; prominent at Council of Trent.

CARAFFA, GIOVANNI PIETRO (1476–1559), of noble Neapolitan family, became Pope Paul IV. (1555), quarrelled with Philip II. of Spain for tolerance of Protestants, and afforded a glaring example of nepotism.

CARALES (39° 8′ N., 9° 5′ E.), ancient town, S. Sardinia; modern Cagliari; has remains of Rom. amphitheatre, baths, aqueduct; Carthaginian-Rom. necropolis with Rom. and Punic rock tombs; founded by Phœnicians; became stronghold of Carthaginians; taken by Romans, III. cent. B.C.; conquered by Goths, V. cent. A.D., by Saracens, VIII. cent.

CARAMEL, substance formed when sugar is heated to 212°.

CARAN D'ACHE (1858–1909), pseudonym of EMMANUEL POIRÉ, Fr. caricaturist and book illustrator.

CARAPACE, a protecting shell, as that of crabs, of Limulus (the King Crab), of tortoises, or of armadillo.

CARAPEQUA (25° 56′ S., 57° W.), town, Paraguay, S. America; cotton, sugar-cane, and tobacco chief products. Pop. 15,000.

CARAT.—(1) weight of 4 grains troy, used in weighing precious stones. (2) $\frac{1}{24}$th part of any weight of gold alloy; an object said to be 18 c. gold, contains 18 parts pure gold to 6 parts alloy.

CARAUSIUS, MARCUS AURELIUS (250–293 A.D.), native of Belgic Gaul who entered Rom. service, and finally set up as independent ruler in Britain.

CARAVACA (38° 4′ N., 1° 53′ W.), town, Murcia, Spain; celebrated for sacred cross with marvellous healing power, which is preserved in church; has ruined castle; ironworks. Pop. 15,800.

CARAVAGGIO, MICHELANGELO AMERIGHI DA (1569–1609), Ital. artist; *b.* Caravaggio; treated religious subjects with coarse realism.

CARAVAGGIO, POLIDORO CALDARA DA (1492–1543), Ital. artist; friezes in Vatican.

CARAVAN, band of traders travelling together on camels for mutual protection against predatory Bedouins and others; number of camels varies from about 30 to 1000; file is often preceded by an unladen ass, and first camel is gaily decorated.

CARAVANSERAI, public quadrangular building, for shelter of caravans and travellers generally, in parts of Asia; central court, with fountain, is open to the sky; entered by single large gateway, protected by strong doors and chains.

CARAVEL (or carvel), name of the 'great ships,' with high castellated sterns, used by Spaniards and Portuguese in XV. and XVI. cent's.

CARAVELLAS (17° 40′ S., 39° 14′ W.), seaport town, state of Bahia, Brazil; exports coffee, cocoa-nuts, and fish oil. Pop. 4000.

CARBALLO (43° 14′ N., 8° 43′ W.), town, Corunna, Spain; hot sulphur springs in district. Pop. 13,000.

CARBERRY HILL, ridge *c.* 7 miles S.E. of Edinburgh; occupied by Eng. left wing before battle of Pinkie, 1547; scene of surrender of Mary, Queen of Scots, to nobles before her imprisonment at Lochleven, 1567.

CARBIDE, carbon and metal compound; calcium c. and lithium c. generate acetylene (*q.v.*) gas used for lighting purposes.

CARBINE, name of XVI.-cent. firearm, somewhat shorter than musket, and used chiefly by cavalry; still survives as name of a weapon shorter than rifle.

CARBOLIC ACID, PHENOL (C_6H_5OH), colourless, crystalline solid of characteristic smell and caustic taste, S.G. 1·09, M.P. 42°, B.P. 183°. Extracted from coal-tar, first as sodium phenate by mixing with soda, the phenol next separated by sulphuric acid and purified by fractional distillation. Used in med. as a disinfectant and antiseptic, as a spray, lotion, ointment, or dressing, also internally (in weak doses) for arresting fermentation in alimentary tract; also used for preparation of salicylic acid and for preparation of picric acid (*Trinitrophenol*), from which the explosive *Lyddite* is prepared.

CARBON (C, 12), chemical element existing in various conditions distinguished by different properties or qualities. These include the diamond, graphite, and amorphous charcoal. The *diamond* is the hardest known solid, S.G. 3·5, occurring in transparent, highly refractive, octahedral crystals, used as a gem and for cutting glass. *Graphite* (plumbago or black lead), S.G. 2·6, is found in the form of solid grey-black, lustrous, six-sided plates, and used as a lubricant, for polishing iron and for pencils. There are several varieties of *amorphous carbon*, obtained by combustion in a limited air supply of animal and vegetable tissues, comprising charcoal (wood and bone), a black, soft, porous solid, S.G. 1·6—2, a good absorbent of gases, hence used as deodorant, while bone charcoal also removes colours and is used in sugar refining; coke, the residue of gas coal; lampblack, deposited from burning oils. Coal is an impure natural form of c. All forms of c. agree physically in being tasteless, inodorous, infusible, and insoluble in any known liquid, and chemically in that the same weight of any one form yields the same weight of c. dioxide gas when burnt in oxygen or air.

Oxides.—C. burned in excess of oxygen gives the gas c. dioxide, CO_2; in deficiency of oxygen the gas c. monoxide, CO. CO_2 is poisonous to animals, but is main food of plants; used for aerating waters.

CARBON BISULPHIDE (CS_2), chemical product; heavy, colourless, volatile liquid; S.G. 1·292, B.P. 46; poisonous; inflammable; disagreeable smell; prepared by passing sulphur vapour over red-hot charcoal; used as solvent for gums, caoutchouc, sulphur, iodine.

CARBON PAPER, thin paper coated on one side with pigment; used for duplicating written or typewritten matter.

CARBON PROCESS, one of most permanent of photographic printing processes; based on fact that gelatine, when impregnated with bichromate of potash, becomes insoluble in hot water after exposure to light. By mixing pigments with the gelatine, prints in any colour are obtained.

CARBONARI, THE ('charcoal-burners'), members of secret revolutionary societies in Italy, Spain and Portugal, and France, where they were known as the *charbonniers*, during early XIX. cent. Amongst members of the Ital. branch were Mazzini, Silvio Pellico, and Lord Byron. Their aims were republican in France, nationalist in Italy; every effort was made by the Austrians to stamp them out in Italy, where they greatly contributed to winning of Ital. freedom.

CARBONATES (salts of carbonic acid), widely distributed in nature, commonest being calcium carbonate ($CaCO_3$), *e.g.* limestone, chalk, marble; all insoluble except those of alkali metals; decomposed by heat into carbon dioxide and the metallic oxide. **Bicarbonate** is a salt in which only one of the hydrogen atoms of the acid is displaced (*e.g.* $NaHCO_3$), an acid c.

CARBONDALE (41° 31′ N., 75° 36′ W.), city, Pennsylvania, U.S.A.; rich anthracite coal-fields. Pop. (1911) 17,040.

CARBONEAR (47° 52′ N., 53° 9′ W.), seaport, Newfoundland. Pop. 3540.

CARBONIFEROUS SYSTEM is the term applied to the great division of geological strata which contains the Coal Measures. It overlies the Devonian (Old Red Sandstone) and is overlaid by the Permian system, and attains sometimes a thickness of 20,000 ft. It is represented in Europe by the coal-fields of Britain,

Belgium, Westphalia, North and Central France, Bohemia, and S. Russia, and occupies vast tracts of N. America, Australia, and New Zealand. It presents two well-marked subdivisions—a lower mainly of marine formation, and an upper of freshwater origin, the order of succession and constitution of the sections in Great Britain being shown as follows (from the surface downwards): 1. *Coal Measures*—Sandstones, shales, ironstones, fire-clays with interstratified workable coal-seams (this is called UPPER C.); 2. *Millstone Grit*—Grits, flagstones, sandstones, shales with thin coal-seams; 3. *Carboniferous Limestone*—Limestones, shales, sandstones with thin coal-seams (these are called LOWER C.).

FOSSILS fall under two types, viz.: 1. *Marine* (of the Limestone section) include corals, crinoids, molluscs, crustacea, fish (shark order); 2. *Freshwater and Terrestrial* (of Coal Measures)—*Plants*: Tree ferns, giant equisetums, lycopods, conifers. *Animals*: Molluscs, scorpions, insects, ganoid fishes, and giant amphibians (Labyrinthodonts).

The characters and disposition of the Carboniferous strata suggest their formation during periods of subsidence alternating with rest, while the vegetable remains indicate a warm, moist, and equable climate.

Sir A. Geikie, *Text-Book of Geology* (1898); A. J. Jukes Brown, *Handbook of Historical Geology* (1686).

CARBONITE, an explosive; 25 % nitroglycerine and 75 % wood meal, alkali nitrates, and sulphur.

CARBORUNDUM (SiC), silicide of carbon; crystalline solid, colourless when pure, commercially brown to black from impurities, very hard, prepared by heating sand with coke in electric furnace; used for polishing metals, jewels, and glass.

CARBOXYL, see ACID.

CARBOY, large glass bottle used by drysalters for holding corrosive liquids.

CARBUNCLE, in med., a spreading inflammation of the deeper layers of the skin, followed by suppuration and sloughing, and the c. may burst upon the surface. The patient is often feverish, cannot sleep, and quite ill for some weeks. The treatment is to relieve the pain with opium, and excise the c., swabbing the wound with carbolic acid, and packing with gauze.

CARBURETTOR, part of internal combustion engine using liquid as fuel; converts liquid into gas, mixes with it air making it explosive, and supplies this gas to the engine.

CARCAGENTE (39° 8′ N., 0° 29′ W.), town, on Júcar, Valencia, Spain; linen and silk manufactured. Pop. 12,800.

CARCANET.—(1) a necklace; (2) neck chain by which prisoners were attached until abolition of penalty, 1832.

CÁRCAR (10° 5′ N., 123° 35′ E.), town, Cebú, Philippine Islands; sugar. Pop. (1910) 32,000.

CARCASSONNE (43° 13′ N., 2° 20′ E.), town, Aude, France; on Aude; splendidly preserved and complete mediæval rampart; fortress restored by Napoleon III.; Church of St. Lazarus contains tomb of Simon de Montfort; scene of massacre of Albigenses, 1210; bp.'s see; cathedral (XIII. cent.); celebrated for manufacture of woollen cloth; wine. Pop. (1910) 30,689.

CARCHARIAS, see SHARKS and DOG FISHES.

CARDAN, CARDANUS, HIERONIMO, CARDONO (1501–76), Ital. physician, mathematician, and astrologer; studied med. at Pavia and Padua, and while a physician at Milan and afterwards prof. of Med. at Padua he wrote important works on math's, as well as a well-known work on astrology which brought him European fame. He visited Scotland and England in 1551, writing an account of the court of Edward VI. Banished from Milan, he became a prof. at Bologna, but was deprived of his chair by the Pope on the ground of heresy, and spent the rest of his life in Rome, writing his autobiography, *De Vita Propria*, which is considered one of the most valuable and interesting works of its kind.

CARDBOARD, stiff paper or pasteboard formed by pasting together several layers of paper; BRISTOL BOARD is used for pen-and-ink sketches, wash drawings, etc.

CARDENAS (23 N., 81° 12′ W.), town and port, Cuba; chief export, sugar. Pop. (1910) 28,576.

CARDIFF (51° 28′ N., 3° 10′ W.), city, seaport, on Taff, Glamorgan, Wales; has XII.-cent. castle, which was besieged by Cromwell in 1648, now residence of Lord Bute; town was almost destroyed during siege by Owen Glendower in 1404. Among outstanding features are South Wales Univ. Coll.; free library, museum, Baptist theological college, hospital, etc.; several parks, including Cathay Park, where are magnificent new town hall, municipal buildings, and law courts, and Univ. of Wales offices; suburb is Llandaff. Great manufacturing and trading centre; exports enormous quantities of coal, also iron, tinplate, etc.; industries include shipbuilding, smelting, iron and steel works, brewing, manufacture of chemicals, etc.; imports ores, provisions, live cattle, esparto; has large cold-storage accommodation and magnificent docks. Pop. (1911) 182,280.

CARDIGAN (52° 5′ N., 4° 39′ W.), seaport, market town, on Teifi, Cardiganshire, Wales; has ancient church of St. Mary, and remains of XII.-cent. castle; has coasting trade; fishing is important industry; exports bricks, tiles, earthenware, etc. Pop. (1911) 3578.

CARDIGAN, JAMES THOMAS BRUDENELL, 7TH EARL OF (1797–1868), Brit. lieut.-general; commanded 15th, and later 11th, Hussars; was of a brutal and overbearing temper, and generally unpopular, but spent immense sums of money on his regiment; led the famous charge of the 'Light Brigade' at *Balaclava*.

CARDIGANSHIRE (52° 5′ N., 4° 36′ W.), maritime county, S. Wales; bounded by Merioneth, Montgomery, Radnor, Brecknock, Carmarthen, Pembroke, and Cardigan Bay; area, 692 sq. miles; surface generally mountainous, except along coast; highest peak, Plinlimmon; chief rivers, Teifi, Aeron, Towy, Rheidol, Ystwith. Soil is chiefly clay, loam, or peat; produces wheat, barley, oats, and other crops; cattle, sheep, and horses raised; minerals include lead, zinc, silver, copper, slate; manufactures gloves, woollens; chief towns, Cardigan, Aberystwith, Lampeter. C. was occupied by Romans; invaded by Danes in X. and XI. cent's; by Normans in 1092; annexed to England by Edward I., 1284. Pop. (1911) 59,877.

CARDINAL, of chief importance. **C. numbers** are 1, 2, 3, etc., distinguished from the ordinals (*i.e.* the 'ranked' numbers), 1st, 2nd, 3rd, etc. The **c. points** of the compass are N., S., E., and W.; of the heavens, zenith (*q.v.*) and nadir. The **c. signs** are Aries, Cancer, Capricornus, and Libra.

Cardinal Virtues, prudence, fortitude, justice, temperance; the theological virtues, faith, hope, and charity, are sometimes added.

CARDINAL BIRD, a name applied to several scarlet birds on account of their plumage; but probably originally to the North American bunting (*Cardinalis virginianus*), a common cage-bird.

CARDINAL FISHES (*Apogonidæ*), small, brightly-coloured, perch-like bony fishes; common in warm seas, venturing even into fresh water.

CARDINALS, R.C. dignitaries, next in rank to the Pope. The Sacred College of C's, since the time of Sixtus V., consists of a number of members not exceeding seventy, viz.: six c.-bp's, of which the Bp. of Ostia is dean; fifty c.-priests; and fourteen c.-deacons. All cardinals are chosen by the Pope, and the c's themselves choose the Pope, taking control of the affairs of the Church during any temporary vacancy of the Holy See. A c.'s hat is conferred personally by the Pope, who also bestows upon the c., at the same time, the sapphire ring of his office. A consistory of c's usually meets fortnightly, under the presidency of the Pope.

CARDING, process in cotton-spinning, performed by card-room operatives, and consisting of combing or 'carding' the fibres in parallel lines preparatory to further treatment. Improvements were introduced by Peel, Arkwright, and others.

CARDONA (41° 57′ N., 1° 40′ E.), town, Barcelona, Spain; celebrated mountain of rock-salt near C. Pop. 3900.

CARDS, PLAYING, the origin of card-games is obscure, and their invention has been ascribed to the Egyptians, Arabs, Chinese, and Hindus. Cards were manufactured in England, Germany, and Italy in the early part of the XV. cent.; importation was forbidden by Edward IV.; and a tax was first imposed by James I.

CARDUCCI, BARTOLOMMEO (1560–1610), Ital. artist; worked in Spain, and patronised by Philip III.

CARDUCCI, GIOSUÉ (1836–1907), one of greatest Ital. poets; prof. of Lit., Bologna; followed classic tradition; his *Hymn to Satan* marks his intellectual leadership of revolt against Romanticism.

CARDWELL (18° 15′ S., 146° 5′ E.), seaport, Rockingham Bay, Queensland, Australia; dugong-fishing.

CARDWELL, EDWARD (1787–1861), Eng. theologian; b. Blackburn, Lancs; ed. Oxford; Camden prof. of Ancient History (1825); rector of Stoke Bruern (1828); pub. *Lectures on the Greek and Roman Coinage* (1833), *Documentary Annals of the Reformed Church of England* (1839), *Reformatio Legum Ecclesiasticarum* (1850), etc.

CARDWELL, EDWARD CARDWELL, VISCOUNT (1813–86), Eng. statesman; s. of Liverpool merchant; member for Clitheroe (1842); Sec. for Colonies (1864); Sec. for War (1868); instituted short-service system and army reserve; raised to peerage (1874).

CAREENING, to turn a ship on its side, usually for cleaning or repairing; hence to clean or repair.

CARÊME, Fr. form of *Quadragesima*, Lent.

CAREW, BAMFYLDE MOORE (1693–*c.* 1770), Eng. vagabond, 'the king of the gipsies.'

CAREW, GEORGE (d. 1613), Eng. diplomatist; ambassador to Poland and to France; wrote *Relation of the State of France* (Henry IV.).

CAREW, RICHARD (1555–1620), Eng. antiquary and translator; b. St. Antony, Cornwall; trans. first five cantos of Tasso's *Jerusalem Delivered* (1594); best known for his *Survey of Cornwall* (1602), interesting, apart from its intrinsic value, as a compendium of country life in Elizabethan age.

CAREW, THOMAS (1595–1645), Eng. poet; b. West Wickham, Kent; ed. Oxford; abandoned law for court employment, and was much favoured by Charles I.; one of most brilliant of Cavalier poets, he will live by virtue of a few incomparable lyrics.

Carew's *Poems*, edit. by Arthur Vincent (1899).

CAREY, HENRY (d. 1743), Eng. poet and musician; reputed s. of Marquis of Halifax; chiefly remembered for his songs, of which *Sally in Our Alley* is best known; also wrote innumerable burlesques, farces, and musical pieces; there is no evidence that *God Save the King* was written by him, though he is often said to have been the author.

CAREY, HENRY CHARLES (1793–1879), Amer. economist; s. of Matthew Carey, also writer on political economy; pub. *Principles of Political Economy* (1837–40); *Principles of Social Science* (1858–59); originally 'free trader,' but later favoured 'protection.'

CAREY, ROBERT, 1st Earl of Monmouth (*c.* 1560–1639), Eng. soldier; younger s. of Henry, 1st Lord Hunsdon; *Memoirs* (pub. 1759).

CAREY, WILLIAM (1761–1834), Eng. Orientalist and missionary; b. Paulerspury, Northamptonshire; worked in early life as shoemaker; became Baptist minister at Leicester; one of founders of the Baptist Missionary Society; went as missionary to India; studied Sanskrit, Punjabi, Bengali, and other languages and dialects, into which he trans. the Bible, and of which he compiled dictionaries.

CARGADOS ISLANDS, St. Brandon Islands (16° 20′ to 16° 50′ S., 56° 26′ to 59° 41′ E.), in Indian Ocean; dependency of Mauritius (*q.v.*).

CARGILL, DONALD (1610–81), Scot. Covenanter; wounded at *Bothwell Bridge*; beheaded at Edinburgh.

CARIA (*c.* 37° 20′ N., 28° 30′ E.), in ancient geog., district bordering on Ægean, S.W. Asia Minor; much of surface mountainous; watered by Mæander; belonged to Lydia, subsequently to Persia; conquered by Alexander of Macedon, 334 B.C.; later became Rom. province; chief towns were Miletus, Halicarnassus, Cnidus; noted for pirates in Rom. times.

CARIACAS, see under Deer Family.

CARIACO (10° 30′ N., 63° 41′ W.), town, Venezuela, near head of Gulf of C.; cotton. Pop. 7000.

CARIBA, or CARIBE FISHES (*Serrasalmo*), small deep-bodied fishes found in the warm rivers of tropical and sub-tropical America; they have sharp chisel-teeth, and are exceedingly bloodthirsty, attacking in crowds any living thing that ventures near their haunts; on this account they have been called Dogs-of-the-Water.

CARIBBEAN SEA (15° N., 73° W.), between Antilles and Central and S. America; connected by Strait of Yucatan with Gulf of Mexico; formed by subsidence of earth's crust, of which depression forming Mediterranean basin is regarded as continuation.

CARIBBEE ISLANDS, Lesser Antilles (16° N., 61° 30′ W.), chain of islands, eastern side of Caribbean Sea, forming portion of West Indies.

CARIBE, see Cariba.

CARIBS, natives of West Indies and Spanish Main, now chiefly settled in Nicaragua and Honduras; name given by Columbus.

CARICATURE (Ital. *caricatura*), drawing, painting, or description in which individual characteristics are so exaggerated, or distorted, as to appear ridiculous. The word was first employed in English in *Christian Morals*, a posthumous book by Sir Thomas Browne. It is also to be found in its Ital. form in *The Spectator* (1712). There is evidence in carvings and papyri that the art of c. was employed to a limited extent by the Greeks, Romans, and Egyptians. It was not, however, until the Middle Ages that its use became widespread throughout Europe; it was then usually expressed in the form of gargoyles and grotesque decorations in ecclesiastical architecture. Its most notable early exponent was Hans Holbein (1498–1554), in his *Dance of Death*.

C. was practised to some extent in England during the Tudor and Stuart periods, but it was not until the XVIII. cent. was well advanced that the art may be said to have flourished. This period saw the rise of William Hogarth (1697–1764); James Gillray (1757–1815); and Thomas Rowlandson (1756–1827); later came George Cruikshank (1792–1878)—all giants in their particular medium of social satire. The later development of the art may be said to have begun with the founding of *Punch* (1841), which produced a number of brilliantly clever caricaturists. The familiar cover was designed by Richard Doyle (1824–83), and other artists associated with the early days of the paper were John Leech, Tenniel, Keene, and Du Maurier. To these have succeeded on the staff of *Punch*, and other illustrated journals, Linley Sambourne, E. T. Reed, Raven Hill, Sir F. C. Gould, Phil May, Leslie Ward ('Spy'), Tom Browne, Harry Furniss, Max Beerbohm, and numerous others of brilliant accomplishments.

C. began to flourish in France about 1830, when the journal, *La Caricature*, was founded, and the most notable workers in this genre have been Daumier, Grandville, Monnier, Garvani, Decamps, Charlet, Traviès, Raffet, Isabey, Giraud, 'Caran d'Ache' (Emmanuel Poiré), and others. In America the art has been largely developed in the journal called *Puck*. In Germany the caricatures contained in the *Fliegende Blätter*, *Simplicissimus*, and *J[illegible]*

Thomas Wright, *History of Caricature* (1865); M. H.

Spielmann, *History of Punch* (1895); Paston, *C. in XVIII. Century.*

CARIGARA (11° 20′ N., 124° 35′ E.), town and port, N. coast, Leyte, Philippine Islands; cotton manufactures. Pop. 14,000.

CARIGNANO, PRINCES OF, younger branch of house of Savoy; Charles Albert, prince of C., succ. as king of Sardinia, 1830, and was f. of Victor Emmanuel II., king of Italy (1860).

CARIGNANO (44° 55′ N., 7° 40′ E.), town, on Po, Turin, Italy; silk. Pop. 4500.

CARILLON, series of bells tuned to a scale.

CARIMATA, KARIMATA.—(1) (*c.* 1° 34′ S., 109° E.) islands, Malay Archipelago, W. of Borneo; area, 57 sq. miles. (2) chief island of C. group. (3) strait between Borneo and Billiton.

CARINA, see ARGO.

CARINARIA, see under GASTROPODS.

CARINI (38° 8′ N., 13° 11′ E.), town, Palermo, Sicily; near ruins of ancient Hyccara. Pop. 12,907.

CARINTHIA (46° 45′ N., 14° E.), Austrian duchy and crown land; area, *c.* 4000 sq. miles; surface mountainous; watered by Drave; capital, Klagenfurt; produces lead and iron ores; manufactures iron and steel goods, machinery, rails; rye, oats, and wheat grown; horses, cattle, and sheep raised; has belonged to Austrian royal house since 1335. Pop. (1910) 396,200.

CARINUS, MARCUS AURELIUS (*c.* 283 A.D.), Rom. emperor; was a man of dissolute habits, and his life was stained with many crimes.

CARIPE (10° 15′ N., 63° 25′ W.), town, Bermúdez, Venezuela; has remarkable caverns, which are inhabited by the guacharo bird, the young of which are killed for their oil.

CARISBROOKE (50° 42′ N., 1° 20′ W.), town, Isle of Wight, formerly capital; mediæval stronghold; ruined castle was prison of Charles I., 1647–48.

CARISSIMI, GIACOMO (1604–74), Ital. composer; writer of numerous oratorios; believed to be originator of Chamber Cantata; *Jephthah* is regarded as his masterpiece.

CARLÉN, EMILIE (1807–92), Swed. novelist; Eng. trans's of her works are common; her dau., Rosa C. (1836–83), was also a well-known writer.

CARLETON PLACE (45° 16′ N., 76° 12′ W.), town and port, Ontario, Canada; woollens. Pop. 4000.

CARLETON, WILLIAM (1794–1869), Irish novelist; s. of a small farmer in Co. Tyrone. He is chiefly remembered by his *Traits and Stories of the Irish Peasantry* (1830–33), but also wrote many novels of Irish life and character.

CARLILE, RICHARD (1790–1843), Eng. freethinker; b. Ashburton; s. of a shoemaker, and by trade a tinsmith; was greatly influenced by reading Thomas Paine's *Rights of Man,* and thereafter devoted himself to the publication and dissemination of freethinking lit., for which he was condemned to various terms (altogether nine years) of imprisonment.

CARLILE, WILSON, Anglican clergyman who founded mission known as Church Army, 1882.

CARLING SUNDAY, 5th Sunday in Lent, so called from dish of fried carlings (dried peas) eaten on that day; old line, 'Carling, Palming, Paste Egg Day,' was remembrancer of three consecutive Sundays.

CARLINGFORD (54° 2′ N., 6° 12′ W.), seaport and market town, County Louth, Ireland; oyster-fishing.

CARLINGFORD, CHICHESTER SAMUEL FORTESCUE, BARON (1823–98), Brit. statesman; Pres. Board of Trade (1871); Lord Privy Seal (1881); Pres. of Council (1883); title extinct.

CARLISLE (54° 53′ N., 2° 50′ W.), town, Cumberland, England; seat of bp.; has fine cathedral founded by William Rufus, who also built the castle; grammar school founded by Henry VIII.; iron foundries; manufactures textiles, tinplate, shoes; belonged to Romans, many traces of whose occupation remain; sacked by Danes, 875; added to England by William Rufus; many times besieged by Scots; besieged by Bruce, 1315; by Leslie, 1644–45. Pop. (1911) 46,432.

CARLISLE (40° 10′ N., 77° 17′ W.), county seat, Cumberland Co., Pennsylvania, U.S.A.; seat of Dickinson Methodist College (1783); bombarded by Confederates, July 1863; manufactures boots and shoes; railway cars. Pop. (1910) 10,303.

CARLISLE, EARLDOM OF, title which has been held by two different Eng. families. JAMES HAY (d. 1636), cr. Earl of C., 1622, a favourite of James VI. of Scotland and I. of England, acted as English envoy on several diplomatic missions abroad. His second wife, Lucy, Countess of C. (1599–1660), was a famous beauty and political intriguer in the reign of Charles I. The first Earl of C. was succ. by his s., JAMES, who d. without issue (1660), the peerage thus becoming extinct.

It was revived by Charles II. and conferred (in 1661) upon CHARLES HOWARD (1629–85), who had been a prominent supporter of Cromwell, but used his influence in support of the royal restoration. The title descended to his s., EDWARD (1646–92), who was succ. by his s., CHARLES (1674–1738), succ. by his s., HENRY (1694–1758). FREDERICK HOWARD (1748–1825), Earl of C., s. of Henry, the 4th earl, was a noted politician, app. viceroy of Ireland (1780–82); known as author of poems and of two highly esteemed tragedies. He was guardian of Lord Byron, the poet. GEORGE HOWARD (1773–1848), Earl of C., s. s. of 5th earl, was, as Lord Morpeth, a prominent member of the House of Commons, and, after he had succ. to the peerage, was in the cabinet under Canning and Grey. GEORGE WILLIAM FREDERICK HOWARD (1802–64), Earl of C., s. s. of 6th earl, was a politician of note, a member of the cabinet under Melbourne and Russell, and twice viceroy of Ireland (1855–58 and 1859–64). He was the author of poems and other works, and a popular lecturer on literary subjects. He was succ. in the title by his brother, Rev. WILLIAM GEORGE HOWARD (d. 1889). GEORGE JAMES HOWARD (1843–1911), 9th Earl of C., grandson of 6th earl, was a Liberal politician, an artist, and a well-known art patron.

CARLISTS, adherents of **Don Carlos** of Spain (1788–1855), bro. of Ferdinand VII., whose infant dau. Isabella, despite the Salic Law, was proclaimed queen after his death; civil war ended with defeat of the C., 1840; the grandson of Don Carlos, Carlos VII., revived claim, but an attempt to enforce it was defeated, 1876.

CARLOFORTE (39° 12′ N., 8° 18′ E.), town, island of San Pietro, west coast Sardinia; fisheries. Pop. 8000.

CARLOMAN, name of three Frankish rulers.—(1) s. of Charles Martel, bro. of Pippin the Short (d. 754); (2) king of Franks, s. of Pippin the Short, bro. of Charlemagne (751–71); (3) king of France (d. 884), s. of Louis II. (the Stammerer).

CARLOS I. (1863–1908), king of Portugal (3rd ruler of the Braganza-Coburg line), succ. 1889; determined to assert the power of the crown and put an end to the tyranny of party leaders like Castro and Ribeiro; he therefore suspended the constitution (1907) and app. Señor Franco dictator; for this step he was assassinated in Lisbon, together with his e. s., Louis (Feb. 1, 1908). He was succ. by his younger s., **Manuel II.** (b. 1889), who was dethroned by the republican party (1910), and sought refuge in England.

CARLOS, DON (1545–68), Prince of Asturias; s. of King Philip II. of Spain and his first wife, Maria, dau. of John III. of Portugal. He grew up indolent and vicious, and developed signs of insanity. He was placed in confinement by his f., and died mysteriously during his period of incarceration. He was betrothed (1559) to Elizabeth, dau. of Henry II. of France, but she shortly afterwards became his f.'s third wife.

Prescott, *History of the Reign of Philip II.*

CARLOS, DON (1788–1855), 1st Carlist claimant to Span. throne; s. of King Charles IV.; held prisoner in France by Napoleon (1808–14); d. at Trieste.

CARLOS, DON (1848–1909), claimed Span. throne

as Don Carlos VII.; s. of Don John of Bourbon, grandson of above; lived a wandering life in various countries; lack of decision was fatal to his pretensions, and the throne continued to be held by Alfonso XII. and XIII.

CARLOW (52° 45′ N., 6° 50′ W.), inland county, Ireland; area, 346 sq. miles; soil fertile; stock raising carried on; surface flat or slightly undulating; produces limestone, marble; drained by Barrow with tributary Burren, and Slaney with tributary Derreen; capital, Carlow. Pop. (1911) 36,151.

CARLOW (52° 50′ N., 6° 55′ W.), county town, Carlow County, Ireland, at confluence of Burren and Barrow; R.C. cathedral; ruined XII.-cent. castle; flour mills. Pop. 6500.

CARLSBAD, KAISER-KARLSBAD (50° 13′ N., 12° 53′ E.), town, Bohemia; fashionable watering-place, noted for mineral springs of which most remarkable is Sprudel; this has numerous orifices, and temperature of 164° F.; mineral waters and C. salts are largely exported; named after Charles IV. (1347-78). Conference of Ger. ministers and officials held here, 1819, at which resolutions (*Carlsbad decrees*) for the suppression of Liberal agitation were passed. Pop. 14,640.

CARLSCRONA, see KARLSKRONA.

CARLSKAMN (56° 10′ N., 14° 52′ E.), fortified town, Sweden. Pop. 7200.

CARLSRUHE, see KARLSRUHE.

CARLSTADT, ANDREAS RUDOLF BODENSTEIN (1480–1541), Ger. reformer; was preacher and prof. of Theol. at Wittenberg, and became one of the leading Reformers. His extreme views and drastic methods, however, brought him into conflict with Luther and the Elector Frederick, and he was compelled to leave Saxony; eventually became prof. of Theol. at Basel (1534).

CARLTON (53° 10′ N., 0° 50′ W.), town, Nottinghamshire, England. Pop. (1911) 15,585.

CARLTON CLUB, Conservative Club founded by Duke of Wellington, 1832; present premises, 94 Pall Mall, London.

CARLUKE (55° 44′ N., 3° 51′ W.), parish, Lanarkshire, Scotland; coal and iron. Pop. (1911) 9619.

CARLYLE, ALEXANDER (1722–1805), Scot. preacher; minister at Inveresk (Midlothian) from 1748; moderator of General Assembly (1770). He witnessed the battle of *Prestonpans* (1745), and his *Autobiography* (pub. 1860) is valuable as a commentary on the Scot. life of his period; friend of many notable men; called 'Jupiter Carlyle' owing to impressive appearance.

CARLYLE, THOMAS (1795–1881), Scot. historian, essayist, and philosopher; b. Ecclefechan, Dumfriesshire; second s. in a family of ten children of James Carlyle, stonemason, and later small farmer. He was ed. at the parish school, Annan Academy, and, in 1809, became a student of Edinburgh Univ. Here he acquired little beyond a slender knowledge of the classics and a moderate success in math's. He had intended entering the ministry, but this idea was abandoned, and he was app. mathematical master at Annan Academy, exchanging later to a school at Kirkcaldy, where he met and formed a lasting friendship with Edward Irving, master of a rival school.

By 1818 C. was back in Edinburgh, where he studied law and took private pupils. Law, in its turn, was abandoned, but the teaching was continued for some years. Next he embarked upon a literary career, was engaged by Dr. Brewster to write articles for the *Edinburgh Encyclopædia*, and received £50 for a trans. of Legendre's *Geometry*. At this period he also wrote his *Life of Schiller*, translated Goethe's *Wilhelm Meister*, visited London and Paris, making the acquaintance of Coleridge, Hazlitt, and others, and received the first of a series of encouraging letters from Goethe. In 1826 he m. Jane Baillie Welsh, and they set up housekeeping at Comely Bank, Edinburgh. Here C. wrote *Specimens of German Romance* (4 vol's), and became a contributor to the *Edinburgh Review*. Two years later C. moved to his wife's property at Craigenputtock, where he wrote *Sartor Resartus*, and maintained the household for six years by his contributions to the reviews.

In 1834 the Carlyles settled at Cheyne Row, Chelsea, which remained their home for the rest of their lives. His masterly *French Revolution* was pub. in 1837; *Sartor Resartus*, 1838; *Chartism*, 1839; *Heroes and Hero-Worship*, 1841; *Past and Present*, 1843; *Oliver Cromwell*, 1845; *Latter-Day Pamphlets*, 1850; *Frederick the Great*, 1858–65. In 1865 C. was elected Lord Rector of Edinburgh Univ., delivering a Rectorial Address the following year, but the gratification which this brought him was shattered immediately after by the sudden death of his wife. Thenceforth his output of work was small, and he lived more or less in retirement. C. exercised a more powerful influence upon the lit. and the religious, ethical, and political views of his time than any contemporary Eng. writer. His work is remarkable for its qualities of humour, sarcasm, and profound insight, and his vivid and picturesque style is distinctly characteristic of the man. In his disposition C. was often irritable, hasty, and inconsiderate, afflicted as he was by chronic dyspepsia, yet these defects scarcely served to hide a noble and tender nature; and it embittered his later years to learn, after his wife's death, how much she had suffered from his lack of sympathy and appreciation.

Froude's *Thomas Carlyle: a History of the First Forty Years of his Life* (1882); *Thomas Carlyle: History of his Life in London* (1884); *Carlyle's Reminiscences*, edit. by Froude (1881); Maclean Watt, *Thomas Carlyle* (Jack, 1912); Ireland, *Life of Jane Welsh Carlyle* (1891).

CARMAGNOLA (44° 51′ N., 7° 42′ E.), town, Turin, Italy; with cathedral; silk. Pop. 12,000.

CARMAGNOLA, FRANCESCO BUSSONE, COUNT OF (1390–1432), Ital. adventurer; entered military service as a boy under Gian Galeazzo Visconti, Duke of Milan; slighted by Gian's successor, Filippo Maria Visconti, he transferred his services to the Venetian Republic; later, being suspected of treacherous dealings with Visconti, he was tried, found guilty, and beheaded.

CARMAGNOLE.—(1) form of vest worn by the revolutionaries who, in 1792, came to Paris from South of France to assist in the Revolution. (2) song and dance indulged in by the Republicans at popular gatherings.

CARMARTHEN (51° 52′ N., 4° 19′ W.), county town and port, on Towy, Carmarthenshire, Wales; ancient *Maridunum*; old castle now forms county gaol; grammar school; Presbyterian coll.; iron foundries; salmon fisheries. Pop. (1911) 10,221.

CARMARTHENSHIRE (51° 55′ N., 4° 10′ W.), maritime county, S. Wales; bounded N. by Cardigan, E. by Brecknock, S.E. by Glamorgan, S. by Carmarthen Bay, W. by Pembroke; area, 918 sq. miles. Surface generally is mountainous, marshy round coast; highest peak, Carmarthen Van; chief rivers, Towy, Teifi, Amman; produces oats, wheat, barley; dairying carried on; horses, sheep, and cattle raised; minerals include coal, lead, copper, iron, slate; manufactures leather, woollens; county town, Carmarthen; has Druidical and Roman remains; suffered from Dan. invasions; opposed Normans; conquered by Edward I. Pop. (1911) 160,430.

CARMATHIANS, militant Muhammadan sect of X. cent.

CARMAUX (44° 3′ N., 2° 7′ E.), town, Tarn, France; extensive coal-fields. Pop. 11,000.

CARMEL, MT. (32° 45′ N., 35° 2′ E.), mountain ridge, Palestine, stretching 14 miles S.E. to N.W. and terminating abruptly in rocky headland, Mediterranean coast; highest point, 1742 ft.; richly wooded slopes; numerous caves; scene of deeds of prophets Elijah and Elisha.

CARMELITES ('White Friars'), mendicant order, founded on Mount Carmel (whence the convents are called 'Carmels') in XII. cent.; dress, brown habit with white cloak and scapular; C. nuns instituted during XV. cent.; there were about forty friaries of the order in England at time of dissolution of monasteries.

Gasquet, *English Monastic Life.*

CARMEN SYLVA, see ELIZABETH, of Rumania.

CARMONA (37° 29′ N., 5° 41′ W.), ancient town, Andalusia, Spain; many Moorish and Rom. antiquities. Pop. 18,000.

CARMONTELLE, name given to LOUIS CARROGIS (1717–1806), Fr. portrait painter, engraver, dramatist, and author of two books of witty *Proverbes.*

CARNAC (47° 36′ N., 3° 4′ W.), village, Morbihan, France; remarkable on account of number of monolithic alignments in its neighbourhood, one group from Ménec extending towards Kermario, reappearing at Kermario and possibly previously stretching as far as the alignment at Kerlescant. The monoliths, of granite, are arranged in avenues and vary in height from 18 to 3 ft. The Scottish archæologist, JAMES MILN, undertook excavations in this district (1874–80), and discovered evidences of Roman and pre-Roman settlements. See STANDING STONES.

CARNARVON (53° 9′ N., 4° 16′ W.), seaport, watering-place, capital of Carnarvonshire, N. Wales; castle founded by Edward I. (1284); birthplace of Edward II.; Princes of Wales were formerly invested here, the ceremony being revived in 1911 when the investiture of Edward, Prince of Wales, took place; exports slate and copper ore. Pop. (1911) 9119.

CARNARVON, EARLDOM OF.—The earldom was cr. and conferred upon Robert, Baron Dormer of Wyng (1628), who was killed at *Newbury* (1643), and it became extinct on the death of his s. Charles (1709). It was held by the family of Brydges, Dukes of Chandos (1714–89), and was conferred in 1793 upon Henry Herbert, Baron Porchester, by whose descendants it is still held.

CARNARVONSHIRE (53° 2′ N., 4° 10′ W.), maritime county, N. Wales; bounded by Irish Sea, Denbigh, Merioneth, Cardigan Bay, Carnarvon Bay, Menai Strait; area, 572 sq. miles; surface mountainous; in centre is Snowdon, 3560 ft.; watered by Conway and smaller streams; produces oats, barley; cattle and sheep raised; minerals, slate, lead, zinc; belonged to Romans; resisted Saxons, Normans, English. Pop. (1911) 125,049.

CARNATIC, KARNATAK (8° 10′ to 16° N., 77° 20′ to 80° 17′ E.), old subdivision of India, on Coromandel coast; now part of Madras presidency; was scene of great struggle for supremacy in India between France and Britain in XVIII. cent.; it formed dominions of Nawabs of Arcot, and was conquered by Britain in 1783, being formally annexed to Brit. empire in 1801; climate extremely hot; crossed by Western Ghats; watered by Penner, Kaveri, and other streams; chief towns, Madras, Pondicherry.

CARNATION (*Dianthus caryophyllus*), herbaceous perennial; flower bright-coloured (originally flesh-coloured), fragrant; requires rich, light, well-prepared soil; sown in April in pans in cold frame, but propagated preferably by cuttings or 'layering'; planted out in Sep.; *Malmaison* variety has handsomest flowers; Tree or Perpetual-blooming c's are greenhouse favourites; pests—blight and rust, c. maggot, wireworm.

Carnations and Pinks, by Cook, etc. (Present-day Gardening).

CARNAVALET, L'HÔTEL, museum, Paris; so called by corruption of name of Mme de Kernevenoy, who purchased it, 1578; acquired by the state, 1866.

CARNEADES (214–129 B.C.), Gk. sceptic philosopher; pupil of Diogenes; the gist of his system of reasoning is that all matter is the result of natural forces; there is no finality in truth, since all experience is relative, and we do not see things as they are, but rather according to the impressions which they make upon us.

CARNEGIE (40° 25′ N., 80° 7′ W.), borough, Allegheny County, Pennsylvania, U.S.A.; steel and iron works. Pop. (1910) 10,009.

CARNEGIE, ANDREW (1837–), Scot.-Amer. millionaire philanthropist; b. Dunfermline, Scotland, whence his f. emigrated to Allegheny, Pennsylvania, U.S.A. Through his business ability in the iron and steel industries, oil, railways, etc., he rose from poverty to great wealth and power. He has applied his wealth to useful purposes, including gifts of public libraries throughout Britain and America; church organs to numerous Scot. churches; swimming-baths; £2,000,000 (1901) to pay fees of Scot. students and endow research at the Scot. Univ's; £3,000,000 (1905) to provide pensions for univ. and college prof's in the U.S.A., Canada, and Newfoundland (*The C. Foundation*); £2,000,000 (1901) to found the *Carnegie Institute*, Pittsburgh, U.S.A., and the same sum (1902) for foundation of *C. Institution*, Washington; 'Hero Funds' in the U.S.A., Britain, and France, for the pecuniary assistance of persons injured (or, when killed, for the assistance of their dependants) in saving life; a palace at The Hague for the Court of Arbitration; £2,000,000 (1910) to hasten abolition of international war (*C. Peace Fund*); in addition to numerous minor benefactions in America and in his native town of Dunfermline.

Alderson, *From Telegraph Boy to Millionaire* (1902).

CARNELIAN, a translucent red variety of chalcedony; chiefly found in India.

CARNESECCHI, PIETRO (1508–67), Ital. scholar; enjoyed the patronage of Clement VII. and other influential members of the Medici family, but later, becoming a convert to some of Luther's doctrines, he fell a victim to the Inquisition, and was beheaded.

CARNIC ALPS (46° 42′ N., 12° 30′ E.), S.E. continuation of Alps, between Venetia, Italy, and Tyrol and Carinthia, Austria.

CARNIOLA (46° N., 14° 30′ E.), hilly province of S.W. Austria-Hungary, among Alps and along Upper Save; area, 3856 sq. miles; has valuable forests. C.'s wealth lies in minerals; quicksilver mines important; iron, lead, zinc, lignite found; ironworks, linen manufactures; sends twelve representatives to Reichsrath. Pop. (1910) 525,995.

CARNIVAL (Lat. *carni vale*, farewell to flesh), festival held in R.C. countries during several days preceding Lent. In S. of France and Italy, processions, masques, and 'battles of flowers' take place; a notable c. is held at Rome; there is a striking change to religious solemnity on Ash Wednesday, first day of Lent; relic of c. in Eng. Shrove Tuesday.

CARNIVORA, the CARNIVORES, or FLESH-EATERS (Lat. *caro, carnis*, flesh; *vorus*, devouring), perhaps the most interesting of the orders of mammals (*q.v.* for general relationship), containing, as it does, lions, tigers, and leopards, wolves and dogs, bears, badgers, otters, seals, and many other creatures attractive on account of their elegance, beauty, and swiftness, and even of their very ferocity.

To their habit of feeding upon flesh—a habit all but universal in the order—can be traced their most characteristic features. Teeth are well developed; especially large and strong are the curved, pointed eye-teeth, or *canines*, adapted for fixing on and retaining hold of living prey, and the sharp, cutting 'carnassial' back teeth. The toes, which are four or five in number, are tipped with sharp, curved claws, sometimes retractile and obviously fitted for fixing and tearing. To prevent danger of slipping, the lower jaw of carnivores can move only directly up and down, without any sideways motion, owing to the elongated hinge which connects it with the skull; and evidence of the powerful jaw motion is given by the wide bony (*zygomatic*) arch which bridges the skull from cheek almost to ear, and gives room for the passage of the large muscle which works the lower jaw. Shoulder-bones are absent or incomplete; and the upper surface of the brain is well convoluted, an indication of mental power.

The habits of carnivores are familiar. They are mainly terrestrial, living in forest trees, in the thick scrub and underwood, or burrowing in the earth, but some are amphibious, as the otters; and seals and walruses are predominantly aquatic.

Carnivores are generally nocturnal animals, and lie

in wait for their prey or follow it by stealth. The greater number hunt singly or in couples, but some, such as dogs and wolves, congregate in packs to pursue and run down their quarry. Mammals, from the largest to the smallest, supply them with food; many catch birds, and oddities of diet are presented by the fish-eating otters and seals, the latter feeding also upon crustaceans and molluscs, and, in the case of Antarctic species, on penguins. Not all carnivores are confirmed flesh-eaters, however, for in summer many of the bears limit their diet to fruits and honey.

Carnivores have colonised the whole world from the snows of the Arctic circle to the border of the Antarctic continent; only in Australia and New Zealand are they absent. They are most numerous and often of larger size in the jungles of the tropics, but the largest living carnivore is the almost extinct long-snouted elephant seal, or 'sea-elephant' (*macrorhinus*), of the South Pacific, which may reach a length of about 20 feet.

Carnivores are of considerable value to man, for, apart from their indirect uses in destroying vermin, they furnish the greater part of the world's fur supply. A few have been tamed and kept as pets or as man's assistants, especially dogs, but their fierce nature usually offers an insurmountable barrier to complete domestication.

The Order **Carnivora** is divided into two sub-orders:—

Sub-Order I., FISSIPEDIA.—Carnivora with digits separate and distinct, with free limbs; adapted to terrestrial life; including the cat, civet, aardwolf, hyæna, dog, bear, raccoon, and weasel families (*qq.v.*).

Sub-Order II., PINNIPEDIA.—Carnivora with digits united by a web of skin into a fin-like paddle, hind limbs directed backwards and placed close to body; adapted to aquatic life; including seals and walruses (*qq.v.*).

Lydekker, *Handbook to Carnivora.*

CARNOT, LAZARE HIPPOLYTE (1801–88), Fr. statesman; s. of L. N. M. Carnot; elected deputy for Paris (1839), and became principal leader of the party against Louis Philippe; declared in favour of the Republic, and, under Lamartine, became Minister of Education; was made life senator by the National Assembly, 1875.

CARNOT, LAZARE NICOLAS MARGUERITE (1753–1823), Fr. general; of republican views, he voted for the death of Louis XVI.; member of Committee of Public Safety; app. Minister of War (1800); Minister of the Interior during the Hundred Days; spent his later years in scientific study.

CARNOT, MARIE FRANÇOIS SADI (1837–94), Pres. of Fr. Republic; s. of L. H. Carnot (*q.v.*); ed. as civil engineer, but later entered National Assembly; held positions of Minister of Public Works (1880), Minister of Finance (1885), elected Pres. (1887). His term of office, which included the opening of the Paris Exhibition (1889), proved very popular. He was assassinated by an Ital. anarchist, at Lyons.

CARNOUSTIE (56° 31′ N., 2° 41′ W.), watering-place, Forfarshire, Scotland. Pop. (1911) 5358.

CARNUNTUM, ancient Pannonian town, near Vienna; ruins remain; Rom. military centre during wars against Germans, and important trading station; demolished by Magyars, IX. cent.

CARNUTES, Celtic people who lived in Central Gaul, between the Loire and the Seine, whose capital was Orleans (*Genabum*).

CARO, ANNIBALE (1507–66), Ital. poet; employed by the Gaddi and Farnese families; trans. the *Æniad* (1581); also wrote a comedy, canzoni, sonnets, and some light verse.

CARO, ELME MARIE (1826–87), Fr. philosopher; opposed to Positivism; pub. *L'Idée de Dieu* (1864), *Le Matérialisme et la Science* (1868), and numerous other works of a philosophical and literary character.

CAROL, a religious song, originally accompanied by dancing. For this reason most of the old c's were set to dance tunes. Such songs came into vogue when it was usual at Christmastide to give a representation, with lay figures, in churches and private houses, of the stable-birth of the child Jesus, which the religious accompanied with singing and dancing. The earliest collection of c's was printed by Wynkyn de Worde (1521), and contained the famous Boar's Head Carol, *Caput apri defero.*

Songs and Carols, ed. by T. Wright (1847); A. H. Bullen, *Carols and Poems* (1885).

CAROLINA, CAROLINAS, old Brit. Colony in N. America, now forming States of North and South Carolina.

North Carolina (35° 40′ N., 79° W.), a S.E. Atlantic state of U.S.A.; bounded N. by Virginia, W. by Tennessee, S. and S.W. by South Carolina and Georgia, E. and S.E. by Atlantic; length (E. to W.), *c.* 500 miles; breadth, *c.* 200 miles; total area, 52,250 sq. miles; area of water surface, 3670 sq. miles. Coast is fringed with sand reefs, with three outstanding capes—Hatteras, Fear, and Lookout; water shallow in Pamlico, Currituck, Albemarle Sounds, etc., which makes navigation very dangerous. Surface is mountainous in W. and S.E.; Great Smoky Mt's, Black Mt's, Bald Mt's, Blue Ridge, etc.; highest peaks, Black Dome or Mount Mitchell (6711 ft.), Clingman Dome (6619 ft.), Mt. Love (6443 ft.), Mt. Buckley (6599 ft.), Balsam Cone (6671 ft.), and others. Coastal plain region is level and swampy; central part undulating.

Chief rivers are: Broad, Cape Fear, Roanoke, Neuse, Chowan, Tar, Yadkin, Pamlico, Hiawassee, Catawba (many navigable); shallow lakes in coastal districts; several small swamps (Great and Little Dismal, Angola, Alligator, etc.). Climate of mountain region is exceptionally fine, central part healthy; fever near swamps in coastal region; mean annual temperature in mountain region, 56° F., central region, 60° F., coast region, 61° F.; mean annual rainfall, *c.* 53 in.

Fauna includes deer, racoons, opossums, wolf; numerous reptiles (rattlesnake, moccasin, cotton-mouth, etc.); flora varied: many subtropical species, and also those of milder regions; extensive forests, especially pine, in E.; trees include elm, cypress, cedar, oak, birch, beech, hemlock; large fields of rhododendrons.

History.—Settlements were made by Raleigh on Roanoke Island, 1585, 1587; territory between lat. 30° and 36° granted by Charles I. to Sir Robert Heath, 1629; same territory with some extension given to Earl of Clarendon and several favourites of Charles II., 1663; permanent settlement made by Virginians, *c.* 1660; famous 'Fundamental Constitution' drafted by John Locke for proprietary government, 1669; N. C. became a royal province, and N. and S. Carolina were divided, 1729; N. C. played a leading part in the War of Independence (1775–83) and Civil War (1861–65); one of original 13 states of Union.

N. C. is administered by gov. and General Assembly consisting of Senate (50 members) and House of Representatives (120 members), elected for two years; sends 10 Representatives and 2 Senators to Congress. N. C. is divided into 98 counties. Principal towns, Raleigh (capital), Wilmington (principal port), Charlotte, Ashville, Greensboro, Winston, Newbern. Methodists predominate; then Baptists. Elementary education is compulsory in some counties; Univ. of N. C., State Agricultural and Mechanical Colleges, Trinity Coll. at Durham; Shaw Univ. at Raleigh, Biddle Univ. (Charlotte), Agricultural and Mechanical Colleges (Greensboro), etc., for coloured students.

Agriculture is main occupation; principal products, cereals, cotton, tobacco, cotton-seed oil, potatoes, timber; industries of cotton goods, furniture, flour, lumber, etc.; minerals unimportant; valuable fisheries (shad, oyster, etc.). Pop. (1910) 2,206,287 (including *c.* 700,000 negroes).

Ashe, *History of North Carolina* (1908).

South Carolina (32° 3′ to 35° 13′ N., 78° 30′ to 83° 15′ W.), S.E. state, U.S.A.; bounded N. and N.E. by

North Carolina, S.E. by Atlantic, W. by Georgia; area, 30,570 sq. miles. Surface is level in E., where a low-lying plain extends a considerable distance inland from the coast; undulating in centre, and mountainous in W., reaching an extreme height of *c.* 3550 ft. in Mt. Sassafras, on boundary between N. and S. Carolina, drained by Great Peedee (with Little Peedee and Lynches), Santee (with Saluda, Broad, Wateree), and Edisto R's. The W. part is of Archæan formation, the middle Secondary and Tertiary, and the E. recent. The climate is healthy and temperate, but the coast regions suffer at times from cyclones.

S. C. is said to have been discovered by Span. explorers early in XVI. cent., and was first permanently colonised by English in 1670; in 1729 it was separated from N. Carolina, and became a royal province; took an active part in Amer. War of Independence; was the first state to secede from the Union before the Civil War in 1860; was readmitted to Union in 1865. The enfranchisement of negroes led to many abuses, and caused much disaffection among the whites; but in 1895 new regulations were passed, which had the effect of disqualifying many negroes, thus securing political supremacy of the whites.

Administration is carried out by a gov., assisted by a lieut.-gov. and six ministers; legislative power is vested in a Senate of 42 members (elected for four years by popular vote), and a House of Representatives of 124 members (elected for two years in same way). The state sends two Senators and seven Representatives to the Federal Congress.

Chief towns are Columbia (capital), Charleston (chief port), Greenville, and Spartanburg. Principal industry is agriculture; produces wheat, maize, oats, rice; live stock extensively raised; cotton and tobacco grown in large quantities. Minerals include phosphate rock, clay products, granite, gold, silver. There are excellent fisheries, and lumbering is carried on. Manufactures include cottons, timber, and lumber products, fertilisers, cotton-seed oil, etc. Education is free but not obligatory; Columbia is seat of State Univ. Chief religious denominations are Methodist and Baptist. Pop. (1910) 1,515,400.

Ravenel, *Charleston: the Place and the People* (1906); Weber, *History of South Carolina.*

CAROLINE ISLANDS (0° to 10° N., 136° to 164° E.), archipelago, Pacific Ocean, consisting of about 680 small islands, of which Babelthouap, Yap, Rouk, and Ponape are most important; these are volcanic, most of others coral; climate temperate; produce copra, sugar-cane, cocoa-nuts, bread-fruit; belonged to Spain till 1899, when ceded to Germany; area, *c.* 400 sq. miles. Pop. *c.* 39,000. See Christian, *C. Islands* (1899).

CAROLINE POETS, Eng. poets of time of Charles I. and Charles II. Term usually applied to lyrists, Carew, Crashaw, Herrick, Marvell, Lovelace, Suckling.

CAROLINE, AMELIA AUGUSTA (1768–1821), queen of George IV., m. George, then Prince of Wales, 1795; Princess Charlotte born following year. After his accession, George attempted to procure a divorce on the ground of adultery, but failed; he directed that her name should be omitted from the liturgy, and she was excluded from the coronation ceremony. She died nineteen days later.

CAROLINE, WILHELMINA, OF ANSPACH (1683–1737), George II.'s queen; supported Walpole against the 'Patriots' and 'Boys.'

CAROLINGIANS, Carlovingians, family, descended from Charlemagne, which ruled France, 751–987 A.D., when it was overthrown by Hugh Capet (*q.v.*). See France (*History*).

CAROLUS-DURAN, CHARLES DURAND (1837–), most prominent Fr. portrait painter; influenced by Manet (*q.v.*).

CARORA (9° 50′ N., 70° W.), town, Venezuela; exports hides, leather, and rubber. Pop. 8000.

CAROUGE.—(1) (46° 37′ N., 6° 47′ E.) town, Vaud, Switzerland. (2) (46° 11′ N., 6° 8′ E.) town, Geneva, Switzerland. Pop. 7437.

CARPACCIO, VITTORIO (*c.* 1490), Ital. artist; pupil of Lazzaro Bastiani of Venice; painted series of pictures illustrating lives of the Virgin, St. Ursula, and St. Stephen.

CARPATHIAN MOUNTAINS (*c.* 46° 40′ to 49° 30′ N., 17° 20′ to 26° E.), great mountain range of S.E. Europe, curving round E. Hungary and Transylvania; length, *c.* 800 miles; form watershed between Black Sea and Baltic; chief ranges are Transylvanian Alps, Central and Little C., White Mountains, Beskids; highest peak, Gerlsdorfspitze, in Central C. (*c.* 8700 ft.); covered with timber—oak, beech, fir—up to 4000 ft.; rich in minerals—coal, silver, copper, lead, iron, salt, petroleum; geological formation chiefly granite, crystallines, and sandstone; numerous small tarns in Central C.; crossed by many passes, including Iablunka and Roteturm passes.

CARPEAUX, JEAN BAPTISTE (1827–75), Fr. sculptor; b. Valenciennes; studied at Rome; executed group (*Dancing*) for Paris Opera-House; statue of Watteau; numerous busts; and fountain in Avenue de l'Observatoire, Paris.

CARPELS, see Flower.

CARPENTARIA (15° S., 140° E.), large gulf, N. Australia, between Capes Arnheim and York.

CARPENTER BEES (*Xylocopa*), solitary bees which burrow and build rows of cells in solid wood, an egg being deposited in each.

CARPENTER, EDWARD (1844–) Eng. author; ed. Cambridge; took Orders, but relinquished them (1874); devoted himself to Socialist movement; wrote *Towards Democracy, Days with Walt Whitman.*

CARPENTER, MARY (1807–77), Eng. social reformer; founder of reformatory schools in England; devoted her life to the service of destitute children, and was largely instrumental in improving the administration in regard to elementary education.

CARPENTER, WILLIAM BENJAMIN (1813–85), Eng. physiologist and naturalist; b. Exeter; M.D. (1839), F.R.S. (1844), Fullerian prof. of Physiology, Royal Institution (1856); pres. of Brit. Assoc. (1872); promoted deep-sea exploration and microscopic studies.

CARPENTRAS (44° 3′ N., 5° 3′ E.), town, on Auzon, Vaucluse, France; Rom. arch; has fragments of ancient fortifications; cathedral (1405); silk spinning, cottons and woollens. Pop. 10,443.

CARPENTRY, the trade of one who constructs the wooden framework of buildings as distinct from joiner's work, which is of a lighter character, *i.e.* doors, windows, etc. In shipbuilding c. includes joinery. In theatres the stage carpenter constructs the wooden framework of scenery.

See Tredgold, *Carpentry*; Tarbuck, *Encyclopædia of Practical Carpentry and Joinery.*

CARPET SNAKE, see under Snakes.

CARPETS, textile floor-coverings, of which the principal styles are Persian, Turkey, Kidderminster, Brussels, Wilton, Tapestry, and 'royal' and 'patent' Axminster. When c's were first used cannot be exactly ascertained, but it is clear, from fragments which have been discovered, that they were in use amongst the Egyptians at a very early period, and they were most certainly used by the early Greeks and Romans.

Persian and Turkey 'pile' c's are of very ancient manufacture, and are made upon primitive looms by a process of knotting on warp threads tufts of woollen yarn which are held together by the weft. As the c. in a Persian palace or dwelling was the principal article of furniture, and was used for table, chair, and bed, it naturally followed that, apart from its decorative use, it should be made as soft and comfortable as possible. Hence the wonderful pile c's which came from these Eastern looms, remarkable also for their durability. C's are to be found in Persian palaces at the present time which have been in constant use for 300 years. Indian pile c's are made by same process as those of Persia, and the early ones have similar designs; modern Indian carpets are less beautiful owing to Western influence, which has debased the patterns.

In regard to c's of Brit. make, reference must first be made to *Kidderminster* c's, which were the first machine-made c's. They have no pile, and are reversible, the yarn threads lying flat upon the surface. *Brussels* c. is made by a process of interweaving worsted threads in the warp with a linen network; *Wilton*, or 'velvet pile,' is made in a similar manner, but the loops are cut and so form a yielding surface; *Tapestry* carpet, invented at Edinburgh (1832), is similar to Brussels in that its surface is composed of looped worsted yarn; and the two makes of *Axminster* are produced by the use of wool chenille upon a basement of hemp, linen, or cotton.

F. R. Martin, *History of Oriental Carpets before 1800*; *Oriental Carpets*, pub. by Austrian Commercial Museum (Eng. ed. by Clarke); Bevan (edit. by), *British Manufacturing Industries* ('*Carpets*,' by C. Chesser).

CARPI.—(1) (44° 46′ N., 10° 52′ E.) town, Modena, Italy; cathedral; manufactures silk, straw hats. Pop. 7400. (2) village, near Verona, Italy, where Prince Eugene defeated French, 1701.

CARPI, GIROLAMO DA (1501–56), Ital. artist; close student of Correggio, whose style he reproduced; best pictures to be found at Bologna, Ferrara, and Rovigo.

CARPINI, JOANNES DE PLANO (d. 1252), Ital. friar; companion of St. Francis of Assisi; explored the Mongol Empire, and wrote an account of his travels.

C. R. Beazley, *Dawn of Modern Geography*.

CARPOCRATES, II.-cent. Gnostic; member of a licentious sect who claimed to have the only true knowledge of religion; personal actions, good or bad, were matters of indifference, according to their creed, and the cultivation of the passions was to be commended; said to have been a Jew of Alexandria.

CARPS (*Cyprinidæ*), an important family containing about 1300 species, many of them game-fishes. They have toothless mouths, but specialised teeth on the lower pharyngeals, small barbels or none; are generally of small size, with large scales, and are exceedingly prolific; found in rivers and ponds all over the world, except Australian region, Madagascar, and S. America. In Britain there are 16 species, some being favourite angling fishes; the Roach, absent from Ireland; the Rudd or Red-eye, which replaces it there as a sporting fish, though it is less common in Great Britain; gregarious Minnow—all species of Leuciscus, as are also the Chub and Dace (*qq.v.*). Others are the Bream (*Abramis brama*)—a familiar 'coarse fish' which may weigh 12 lb.; the Bleak (*Alburnus lucidus*), absent from Scotland and Ireland, from the scales of which artificial pearls are made; the minute 4-inch-long shy Loach (*Nemachilus barbatulus*); and the Carp, Goldfish, Barbel, and Tench. One of the largest of the family is the Mahaseer, or Mahseer (*Barbus mosal*), an Ind. food and game-fish, which may be 6 ft. in length and bear 'scales as large as the palm of the hand.'

CARPUS, the wrist. See SKELETON.

CARPZOV, name of burgher family of Saxony whose members held important positions in XVII. and XVIII. cent's; two members were distinguished legists, two prominent theologians, and one an important statesman.

CARRACCI, LUDOVICO (1555 ?–1619), and his nephews. AGOSTINO (1557 ?–1602) and ANNIBALE (1560 ?–1609), Bolognese artists, founders of Eclectic school, which looked to Michelangelo for movement, Raphael for composition, the Venetians for colour, and Correggio for light and shade; nine works in National Gallery.

CARRANZA, BARTOLOMÉ (1503–76), Span. theologian; accompanied Philip of Spain to England on the occasion of his marriage to Queen Mary, and made strenuous efforts to revive the old religion; later, because of his attempts at Church reform, fell under the ban of heresy and was twice imprisoned.

CARRARA (CARRARESI), tyrants of Padua in XIV. cent.; JACOPO DA CARRARA (a village near Padua), elected lord (1318); Cangrande della Scala took Padua from Jacopo's nephew, who recovered it, 1336; his nephew UBERTINO, great patron of arts; FRANCESCO (lord, 1350–92), unsuccessful in war, d. a Milanese prisoner; his s. recovered Padua, 1390, but he and house fell before Venetians.

CARRARA (44° 5′ N., 10° 5′ E.), cathedral town, Tuscany, Italy; famous for white marble (*q.v.*) quarries since Roman times. Pop. 18,126.

CARREL, JEAN BAPTISTE NICOLAS ARMAND (1800–36), Fr. soldier and journalist; became sole edit. of *Le National*, the democratic mouthpiece; killed in duel.

CARREÑO, DON JUAN, DE MIRANDA (1614–85), Span. court painter; imitator of Velasquez in portraiture.

CARRERA, JOSÉ MIGUEL (1785–1821), leader on nationalist side at beginning of Chile revolution.

CARRIACOU, largest of the Grenadines, W. Indies; area, 6913 acres. Pop. (1911) 6886.

CARRIAGE, vehicle, for carrying goods or persons, usually on wheels, and employed from the earliest historic times; anciently called chariot, or car. A famous example was the funeral car designed by Hieronymus to convey the body of Alexander from Babylon to Alexandria. It occupied two years in building; was 18 ft. long by 12 ft. wide, mounted on massive wheels, and drawn by 64 mules. The Roman chariots, closed in front and open behind, were often profusely ornamented with gold and precious stones. The war chariots of the ancient Britons, open in front and closed behind, had scythes bound to the axle-trees. Although some sort of vehicle was in use in England in mediæval times, and carriages were known in Europe at least at the beginning of the XV. cent., the earliest coach in England was built for the Earl of Rutland in 1555. By 1601 these vehicles were so commonly used as to provoke complaints from the Thames watermen, and early in the XVII. cent. there were over 6000 in the neighbourhood of London. Hackney coaches were instituted in London in 1625. Steel springs were first used about 1670, before which time the body of the carriage was suspended from straps, while indiarubber tyres were introduced in 1852.

C's with four or more wheels, for two or more horses or mules, require an annual *licence* costing £2, 2s.; if fitted for one horse only, the licence is £1, 1s.; if one horse and fewer than four wheels, the cost is 15s., and this is the licence for hackney c's, *i.e.*, c's plying for hire. Wagons or carts for trade purposes *only*, if solely constructed and *adapted* for such purposes, and bearing name and address of owner in letters at least 1 inch in length, require no licence. Armorial bearings on a c. require licence (£2, 2s.); motor cars not exceeding 6½ horse-power, £2, 2s.; not exceeding 12, £3, 3s.; not exceeding 16, £4, 4s.; and increasing to £42 for 60 and over.

Thrupp's *History of Coaches* (1877).

CARRICK (55° 10′ N., 4° 40′ W.), southerly district, Ayrshire, Scotland; Prince of Wales is Earl of C.

CARRICKFERGUS (54° 43′ N., 5° 48′ W.), seaport, N. side Belfast Lough, County Antrim, Ireland; formerly a walled town; has XII.-cent. castle; landing-place of William III., 1690; flax spinning, and oyster fisheries. Pop. 4200.

CARRICKMACROSS (53° 58′ N., 6° 43′ W.), market town, County Monaghan, Ireland; lace.

CARRICK-ON-SHANNON (53° 57′ N., 8° 5′ W.), town, on Shannon, capital County Leitrim, Ireland.

CARRICK-ON-SUIR (52° 21′ N., 7° 24′ W.), town, Tipperary, Ireland; ruins of XIV.-cent. castle; manufactures woollens and linens; slate quarries. Pop. 5400.

CARRIER, term for any persons or company conveying goods for hire by land or by water; subject to the conditions of various parliamentary enactments, beginning with the Carriers Act, 1830.

CARRIER, JEAN BAPTISTE (1756–94), Fr. politician; one of most bloodthirsty leaders in the Terror.

CARRIÈRE, EUGÈNE (1849–1906), Fr. artist; mass-impressionist; great portrait painter.

CARRIÈRE, MORITZ (1817–95), Ger. philosopher; advocate of Christian truths, free-will, and the immutability of natural laws.

CARRINGTON, 1ST EARL, see LINCOLNSHIRE, 1ST MARQUESS OF.

CARRION BEETLES, see under POLYMORPHA.

CARROLL, CHARLES, 'of Carrollton' (1737–1832), Amer. statesman; educ. in France; adopted description 'of Carrollton' from family estate; one of delegates sent to persuade Canadians to join war, 1776; signed Declaration, Aug. 2, 1776; U.S. Senator, 1789; one of Md. and Va. boundary commission, 1799.

CARROLL, JOHN (1735–1817), abp. of Baltimore; prominent and influential figure in R.C. body in U.S.A.

CARROLL, LEWIS, see DODGSON.

CARRON (56° 2′ N., 3° 48′ W.), village, Stirlingshire, Scotland; site of well-known ironworks.

CARRONADE, heavy ship's gun, designed by General Melville in 1759, and called a 'smasher.' Though not used in the Brit. navy until 1779, it had been manufactured for some time at the Carron Ironworks, in Stirlingshire, whence it got its later name; calibre from 12 to 68 lb.; mounted on a carriage without trunnions, moved on a slide; as naval weapon long obsolete.

CARROT (*Daucus carota*), vegetable; order *Umbelliferæ*; its reddish roots used as vegetable and cattle food; also for poultices, being slightly stimulating.

CARROUSEL, PLACE DU, Parisian square with monument to Gambetta; named from fête given by Louis XIV. (1662).

CARSE, Scot. geographical term for low-lying fertile regions, generally in river beds: *e.g.* C. of Gowrie in Perthshire and Forfarshire, and C. of Stirlingshire in valley of Forth.

CARSEBRECK (*c.* 56° 16′ N., 3° 50′ W.), curling-pond, Perthshire, Scotland, between Dunblane and Auchterarder.

CARSIOLI (*c.* 42° 10′ N., 13° E.), ancient city, Via Valeria, Italy.

CARSON CITY (39° 20′ N., 119° 46′ W.), capital of Nevada, U.S.A.; gold and silver mines. Pop. 2466.

CARSON, SIR EDWARD HENRY (1854–), Irish Unionist politician; Solicitor-Gen. (for Ireland, 1886–92; England, 1900–5); prominent in Ulster Anti-Home Rule Campaign, 1912–13.

CARSON, KIT (1809–68), Amer. hunter and scout; b. Kentucky; from youth inured to wild frontier life; accompanied Frémont as guide on exploring expeditions (1842–46); during Civil War served as chief scout for the Federals. If all the stories of his prowess are true, he must have been a modern Bayard. Carson City is named after him. *Life*, by Burdett.

CARSTARES, WILLIAM (1649–1715), Scot. preacher; confidant of William of Orange and court chaplain; later principal of Edinburgh Univ.; successively minister of Greyfriars' and St. Giles'; several times moderator of General Assembly.

CARSTENS, ASMUS JACOB (1754–98), Ger. artist; chief exponent of modern Ger. historical school of painting.

CARTAGENA, CARTHAGENA (37° 35′ N., 0° 56′ W.), fortified port and great naval arsenal, S.E. Spain, on Mediterranean; large harbour; exports metals and metal ores, fruits, wine, etc. 'New Carthage' was founded by Hasdrubal (*q.v.*), 242 B.C.; episcopal see; XIII.-cent. cathedral, old castle, observatory; besieged, 1873–74. Pop. (1910) 102,519.

CARTAGENA, CARTHAGENA (10° 22′ N., 75° 32′ W.), fortified seaport city, capital of Bolivar, Colombia, S. America; on sandy island, connected with mainland by bridges; has good harbour, but since rise of Sabanilla commercial importance has declined; canal to Calamar reopened, and return of prosperity is probable; cathedral and univ. founded, 1533; burned by Drake, 1585; exports cattle, tobacco, sugar. Pop. 37,000.

CARTAGO (9° 54′ N., 83° 41′ W.), capital of C. province, Costa Rica, Cent. America, at foot of volcano Irazu; produces coffee and bananas. Pop. 6000.

CARTE BLANCHE (Fr. 'blank card'), card signed by person permitting recipient to inscribe upon it his own conditions; hence, a free hand.

CARTE, THOMAS (1686–1754), Eng. historian; pub. *Life of the Duke of Ormonde* (1736); *History of the Revolutions of Portugal* (1740); *History of England*, 4 vols. (1747–55). His writings are careful, learned, and dull.

CARTEL, written agreement as to exchange of prisoners; challenge to fight.

CARTER, ELIZABETH (1717–1806), Eng. poetess and miscellaneous writer; probably the most learned woman of her time; she was proficient in Greek, Latin, Hebrew, Arabic, and all modern European languages; pub. *Poems on Particular Occasions* (1739); *Poems on Several Occasions* (1762); trans. Epictetus (1758); was friend of Dr. Johnson, Walpole, Richardson, and Burke.

CARTERET, SIR GEORGE (1610–80), Eng. Royalist; b. Jersey; s. of Helier de Carteret; was made Lieut.-Gov. of Jersey by Charles I.; later the island became the refuge of Prince Charles, after his flight from Scilly, and of many other Royalists. C. was compelled to surrender to Parliament after a long siege in 1651. He then sought refuge in France, but, after the Restoration, held various offices under Charles.

CARTERET, JOHN, see GRANVILLE.

CARTERET, PHILIP (d. 1796), Eng. explorer who discovered several Pacific islands, one of which is named after him.

CARTESIAN PHILOSOPHY, see DESCARTES.

CARTHAGE (36° 53′ N., 10° 5′ E.), famous ancient city, N. Africa, situated N. of Tunis on peninsula jutting into Mediterranean. C. was first established as trading station by Phœnicians *c.* IX. cent. B.C.; became great commercial centre; engaged in struggle in Sicily in V. cent. B.C.; many of Sicilian cities were then centres of Gk. civilisation; Gelo of Syracuse defeated Carthaginians, 480 B.C. Towards end of cent., C. made another attempt on Sicily; eventually driven back by Dionysius the Elder; again defeated by Timoleon of Corinth, 343 B.C.; later renewed attempt; in III. cent. B.C. captured considerable dominions in island. C. came into conflict with Rome *c.* 264 B.C., when first Punic War broke out; this began in Sicily and became contest for possession of that island; war ended 241, when C. was utterly defeated and had to cede Sicily to Rome. City was greatly injured by insurrection soon afterwards.

Second Punic War broke out, 219; Hannibal (*q.v.*) inflicted terrible defeats on Rome; Carthaginians eventually defeated by Scipio at *Zama*, 201 B.C.; C. became dependent state; had to give up all European territories, also had to pay annual tribute to Rome for fifty years, and to agree to wage no war without Rome's consent. C. continued to prosper, thus exciting jealousy in Rome, which in 149 B.C. seized opportunity given by the fact that C. had taken up arms against Numidia to declare war. Third Punic War ended in 146 B.C., when C. was utterly destroyed by Romans, and became Rom. province; later city on site, important Rom. city; ruined by Arabs, 647 A.D.

Church and Gilman, *Carthage* (1886); Davis, *C. and her Remains* (1861); Moore, *C. of the Phœnicians* (1905).

CARTHAGE (37° 12′ N., 94° 19′ W.), city, Missouri, U.S.A.; extensive manufactures; lead and zinc mines. Pop. (1910) 9483.

CARTHAGENA, NEW CARTHAGE, Spain. See CARTAGENA.

CARTHUSIANS, monastic order (white habit), founded by St. Bruno (b. 1030, Cologne; d. 1101) at La Grande Chartreuse, near Grenoble, France, in 1086. The rules of the order are very severe; meat is never eaten; fasting is frequent; and the monks spend the greater part of their time in the solitude of their separate hermitages. At the period of the Fr. Revolution the property of the C's was confiscated, but upon their return to France in 1816 as a means of subsistence they commenced the manufacture of the famous

liqueur with which their name is associated. They were again expelled from France in 1903.—The name C. is also given to a schoolboy at the Charterhouse (*q.v.*) School.

The Carthusians, anon. trans., from Fr. (1902).

CARTIER, SIR GEORGES ÉTIENNE, Bart. (1814–73), Canadian statesman; from 1858–62 was, with Sir John Macdonald, joint-Premier of Canada; had much to do with the promotion of the Grand Trunk and Canadian Pacific Railways.

CARTIER, JACQUES (1491–1557), Fr. navigator; made three voyages to America, and discovered the St. Lawrence River. See CANADA.

CARTILAGINOUS FISHES, see under FISHES.

CARTOGRAPHY, see MAP.

CARTOON (Ital. *cartone*, pasteboard).—In painting, study or design, drawn in full size upon strong paper, to serve as model for transferring or copying, and used in the making of mosaics and tapestries, and in fresco-painting. For the last-named purpose the figures were formerly cut out and fixed upon the wall-space, and their outlines traced in the plaster with a pointed instrument. Notable examples by the old masters are those by Raphael (in South Kensington Museum), and others by Leonardo da Vinci and Michelangelo, which now only survive in engravings. In modern times the term is generally applied to political and satirical drawings in such journals as *Punch*.

CARTOUCHE (Fr.), roll of paper or other material containing charge of powder and shot for hand firearms; the later word 'cartridge' is a corruption of the foregoing; also, in arch., the volute of Ionic capital.

CARTRIDGE, cylindrical case containing explosive charge and ball for small-arms; case containing explosive only for cannon. See AMMUNITION.

CARTWRIGHT, EDMUND (1743–1823), Eng. inventor; bro. of John Cartwright (*q.v.*); poet, rector of Goadby-Marwood, and prebendary of Lincoln; later entered commerce, and invented the power-loom, for which Parliament voted him £10,000.

CARTWRIGHT, JOHN (1740–1824), Eng. political reformer; entered navy, and served under Hawke, Byron, and Palliser; major of Nottinghamshire Militia for seventeen years; worked for universal suffrage and annual parliaments.

CARTWRIGHT, THOMAS (1535–1603), Eng. Puritan; Lady Margaret prof. of Divinity, and Fellow of Trinity Coll., Cambridge, both of which offices he was deprived of by John Whitgift (vice-chancellor) because of his opinions regarding the Anglican Church; several times imprisoned for religious opinions.

CARTWRIGHT, WILLIAM (1611–43), Eng. dramatist; ed. Oxford, and took orders; junior proctor (1643); was intimate with Ben Jonson; wrote *The Royal Slave* (music by Lawes), acted at Christ Church before King and Queen (1636); *The Lady Errant*; *The Siege*; and *The Ordinary*.

CARUCAGE (Lat. *caruca*, 'plough'), mediæval tax (first assessed, 1198) based upon the CARUCATE, a multiple of the bovate; 8 to 12 carucates, according to the nature of the soil, made a knight's fee, the unit of taxation.

CARUPANO (10° 36′ N., 63° 16′ W.), seaport town, state Bermúdez, Venezuela; coffee, sugar. Pop. 10,000.

CARUS, KARL GUSTAV (1789–1869), Ger. anatomist, physiologist, and psychologist; lecturer on comparative anatomy at Leipzig (1811), director of a military hospital (1813), and prof. in coll. of med. at Dresden (1814); author of numerous works, and an authority on art, etc.

CARUS, MARCUS AURELIUS (282–83 A.D.), Rom. emperor; prefect of Prætorian guards; succ. Probus as emperor; undertook an expedition against Persians; conquered Mesopotamia.

CARUSO, ENRICO (1874–), Neapolitan operatic singer; foremost tenor early XX. cent.; among chief rôles—Canio (*Pagliacci*), Mario (*Tosca*), Rodolfo (*Bohème*); C. is also a caricaturist.

CARVAJAL, ANTONIO FERNANDEZ (d. 1659), Portug. Jew; settled in England during reign of Charles I. He was the first naturalised Eng. Jew, and was often employed by Cromwell in political matters.

CARVAJAL, LUISA DE (1568–1614), Span. lady who conducted a R.C. propaganda in England; owing to friction with England was recalled (but d. in London before she could return).

CARVER, JOHN (d. 1621), was one of the 'Pilgrim Fathers,' and first gov. of their colony.

CARVER, JONATHAN (d. 1780), Amer. traveller; pub. in London *Travels through the Interior Parts of North America in the Years 1766–68*, which was trans. into German, French, and Dutch.

CARVIN (50° 28′ N., 2° 56′ E.), town, Pas-de-Calais, France. Pop. 7000.

CARY, ALICE (1820–71) and **PHŒBE** (1824–71), Amer. poets; contemporary with Poe and Greeley.

Poetical Works of A. and P. Cary (Boston, 1886).

CARY, ANNIE LOUISE (1842–), MRS. C. M. RAYMOND, Amer. contralto; sang chief mezzo-soprano and contralto rôles in grand opera, Europe and U.S.A.; her 'Amneris' (*Aïda*) extraordinary success; m. 1882 and retired.

CARY, HENRY FRANCIS (1772–1844), Eng. author and translator; b. Gibraltar; ed. Oxford; famous for trans. of Dante's *Divina Commedia* (1805–14), highly praised by Coleridge; trans. also Aristophanes' *Birds* and Pindar's *Odes*; wrote lives of poets.

CARYATIDES, draped female Gk. figures, executed in early times by Praxiteles and others, and used in arch. to support an entablature; in later times such figures were employed as supports of ship's poop and quarter-deck. Male figures are called 'Atlantes.'

CARYOPHYLLACEÆ, order of dicotyledonous plants; herbaceous; stems swollen at joints; sepals, petals; stamens 5, ovary 1, free central placenta, stigmas 2–5; includes genera: *Dianthus* (Pink), *Lychnis* (Campion), *Saponaria* (Soapwort), *Cerastium* (Chickweed), *Stellaria* (Stitchwort); many favourite garden varieties, *e.g.* Carnation, Sweet William.

CASABIANCA, RAPHAEL, COMTE DE (1738–1825), Fr. general; served under the revolutionary government in Italy (1794–98); made count (1806); rejoined Napoleon during the Hundred Days.—**Casabianca, Louis** (1752–98), nephew of above, succ. Admiral Brueys in command of the *Orient* at battle of *the Nile*. His s., Giacomo, aged ten, was hero of Mrs. Hemans' *The Boy stood on the Burning Deck*.

CASABLANCA (33° 37′ N., 7° 34′ W.), seaport, Morocco, on Atlantic coast; Arab. Dar-el-Baida; exports, wool, wax, maize, goat-skins; imports, sugar, cotton, calico; bombarded and occupied by French, 1907. Pop. 35,000.

CASALE MONTFERRATO (45° 7′ N., 8° 27′ E.), town, Piedmont, Italy; fine cathedral (founded VIII. cent.); manufactures silk.

CASALPUSTERLANGO (45° 11′ N., 9° 38′ E.), town, N. Italy; Parmesan cheese. Pop. 6500.

CASAMICCIOLA (40° 44′ N., 13° 55′ E.), spa, Ischia, Italy; thermal mineral springs; ruined by earthquake, 1883; since rebuilt. Pop. 3750.

CASANOVA, GIOVANNI JACOPO (1725–98), Venetian adventurer; of good birth and brilliant parts; actor in early life, later abbé, journalist, diplomatist. He travelled widely in Europe, and was decorated with the order of the Golden Spur by the pope.

Casanova's *Mémoires*, 8 vols. (Paris, 1885).

CASAS GRANDES (30° 5′ N., 108° 3′ W.), town, Mexico; ancient Ind. settlement; extensive ruins.

CASAUBON, FLORENCE MÉRIC (1599–1671), Eng. scholar; s. of Isaac C. (*q.v.*); declined Cromwell's invitation to write history of Civil War; edit. *Meditations* of Marcus Aurelius, and wrote several original works.

CASAUBON, ISAAC (1559–1614), Fr. scholar; b. Geneva, of Huguenot parentage; prof. of Greek at Geneva, and later at Montpellier; royal librarian in Paris to Henry IV. (1598), but after assassination of king came to London, and was made Prebendary of Canterbury (1610). C. possessed little originality as a

writer, but had amassed a wonderful store of learning, and his merits as a commentator are very great. He edited Aristotle, Diogenes, Laertius, Theophrastus, Strabo, Theocritus, Polybius, Persius, and Suetonius.

Mark Pattison, *Life* (1875 and 1892).

CASCADE MOUNTAINS (45° N., 121° W.), mountain range, extending northwards through Oregon and Washington into Brit. Columbia; principal peaks about 14,000 ft.; numerous extinct volcanoes; heavily and extensively wooded; name derived from cascades formed by Columbia River in cutting way through range.

CASE, JOHN (d. 1600), Eng. physician and philosopher; authority on Aristotle and on music; author of several works.

CASEÏN, organic compound, one of constituents of milk (*q.v.*).

CASELLI, GIOVANNI (1815–91), Ital. scientist who invented pantelegraphy.

CASEMATE (military), bomb-proof chamber; (arch.) moulding in cornice.

CASERTA (41° 3′ N., 14° 22′ E.), town (and province), Campania, Italy; magnificent palace, founded by Charles III., 1752, and old cathedral; large silk works in vicinity. Pop. (1911) 33,455. Province, area, 2033 sq. miles. Pop. (1911) 788,370.

CASE-SHOT, military projectile, consisting of light metal case containing bullets; originally called 'canister-shot.'

CASHEL (52° 31′ N., 7° 53′ W.), city, Tipperary, Ireland; seat of R.C. abp. and Prot. bp.; many interesting ruins, comprising XII.-cent. cathedral, castle, chapel, round tower, ancient cross, exist on 'Rock of Cashel'; famous 'Synod of Cashel' held here in 1172; Henry II. received homage of king of Limerick at C.

CASHMERE, see KASHMIR.

CASILINUM (41° 7′ N., 14° 13′ E.), ancient city, Campania, Italy; modern Capua (*q.v.*).

CASIMIR III., THE GREAT (1310–70), king of Poland; s. of Wladislaus Lokietek; after a somewhat licentious youth he became a beneficent ruler, and a firm and wise political and social reformer. He was the founder of Cracow Univ. (1364).

CASIMIR IV. (1427–92), king of Poland; member of the Jagiello family, and distinguished for his moderation and political sagacity; one of the greatest rulers of his period, his private life was marked by great austerity, while his unbounded generosity to his dependants was proverbial.

CASIMIR-PÉRIER, see PÉRIER.

CASIMIR-PÉRIER, JEAN PAUL PIERRE (1847–1907), 5th Fr. pres.; elected (1894) after assassination of Pres. Carnot, but resigned after six months.

CASINO (Ital.), pleasure-house; now usually applied to a gaming-saloon, as that at Monte Carlo; name of a card-game.

CASINUM, ancient town, Via Latina, Italy.

CASKET LETTERS, see MARY, QUEEN OF SCOTS.

CASORIA.—(1) (40° 53′ N., 14° 17′ E.) town, Naples, Italy. Pop. 12,725. (2) (41° 20′ N., 14° 6′ E.) town, Torre de Lavoro, Italy.

CASPARI, KARL PAUL (1814–92), Ger. theologian and scholar; best known as author of an *Arabic Grammar*; also wrote commentaries on Old Testament, etc.

CASPE (41° 14′ N., 0° 4′ W.), town, Spain; sulphur baths. Pop. 8000.

CASPIAN SEA (43° N., 49° 30′ E.), on borders of Europe and Asia, and surrounded E., W., and N. by Russia and S. by Persia, is largest inland sea in world; length, over 700 miles; breadth, 130 to 300 miles; area, 170,000 sq. miles. It is 90 ft. below sea-level, is tideless, has no outlet; shallow in N. (3 to 12 fathoms), deeper in S. (420 to 516 fathoms); northern part frozen in winter; receives waters of Volga, Ural, Emba, Kur, Terek, Atrek, Gürgen, Sefid-Rud, Aras, and other rivers; is believed to have been formerly connected with Sea of Aral; valuable fisheries—sturgeon, salmon, perch, carp, etc.; canals connecting upper waters of Volga with Lake Ladoga and the Düna give through communication to Baltic Sea; seal-hunting is carried on in N.; navigated by various lines of steamers. Chief port, Astrakhan.

CASQUETS (49° 44′ N., 2° 24′ W.), group of granite rocks, N.W. of Alderney, Channel Islands; have light-houses with revolving lights. Here *White Ship* was wrecked, 1119.

CASS, LEWIS (1782–1866), Amer. soldier and statesman; served in war of 1812; Sec. of War (1831–36); Sec. of State (1857); wrote *History of U.S. Indians* (1823).

CASSABA (38° 25′ N., 28° 4′ E.), town, vilayet Smyrna, Asia Minor; exports cotton, melons.

CASSAGNAC, ADOLPHE GRANIER DE (1806–80), Fr. journalist; first an Orleanist, he later became a supporter of the Empire, and his vehement style frequently involved him in duels and lawsuits.

CASSANDRA (classical myth.), dau. of Priam and Hecuba; loved by Apollo, who promised her any gift if she would yield to his desires. She asked for the gift of prophecy, but, having received it, she refused to fulfil her promise, and Apollo, by way of revenge, ordained that all her predictions should be disbelieved. She became the spoil of Agamemnon after the sack of Troy.

CASSANO (45° 21′ N., 9° 31′ E.), town, Milano, Italy; here French defeated Austrians, 1705; Austrian and Russians defeated French, 1799. Pop. 9000.

CASSANO ALL' IONIO (39° 47′ N., 16° 17′ E.), town, Calabria, Italy, with warm sulphur springs. Pop. 6700.

CASSATION, COURT OF, Fr. court of appeal; formed by the *Chambre des requêtes*, *Chambre Civile*, and *Chambre criminelle*, which unite to form the supreme court of appeal, the *Conseil supérieur de la magistrature*.

CASSEL (50° 47′ N., 2° 27′ E.), town, Nord, France; machinery, hosiery. Pop. 3222.

CASSEL, KASSEL (51° 19′ N., 9° 31′ E.), city, Hesse-Nassau, Germany, on Fulda; has old palace of electoral princes, and museum built 1769, which has fine library; newer part of town regularly laid out, with wide streets; important industrial centre, manufactures machinery, mathematical instruments; textiles, iron ware, etc. Pop. (1910) 153,196.

CASSELL, JOHN (1817–65), Eng. publisher; s. of a Manchester tavern-keeper; self-educated; apprenticed to a joiner; went to London (1836) to follow his trade; became active temperance worker; set up as tea and coffee merchant (1847); and later turned publisher; founder of firm, Messrs. Cassell, Petter, & Galpin, now Messrs. Cassell & Co. Ltd.

CASSIA, VIA (42° 40′ N., 12° E.), ancient high-road, Italy, between Florence and Rome.

CASSIANUS, JOANNES EREMITA (360–448), religious recluse; one of earliest founders of conventual establishments; spent several years amongst the ascetics in the Egyptian deserts; was ordained deacon by St. Chrysostom at Constantinople (403); founded at Marseilles the abbey of St. Victor and a convent for nuns; wrote *Collationes Patrum Sceticorum*.

CASSICUS, see CASSIQUE.

CASSIDARIA, see under GASTROPODA.

CASSINI, Ital. family of astronomers, chief of whom were: (1) GIOVANNI DOMENICO (1625–1712), prof. of Astron., Bologna (1650), astronomer-royal, France (1671–1711); (2) JACQUES C. (1677–1756), s. of above, and successor to his appointments; F.R.S. (1696).

CASSIODORUS, FLAVIUS MAGNUS AURELIUS (*c.* 490–585 A.D.), Syrian author; founded two monasteries at Squillace for the advancement of learning; wrote on history, politics, theology, and grammar. His *Variæ* is a chief source of knowledge regarding the Ostrogothic rule in Italy.

CASSIOPEIA (classical myth.), wife of Cepheus, king of Ethiopia, and mother of Andromeda; in astronomy, a northern constellation, the chief stars of

which outline letter W. C. is in the Milky Way, and in it the famous temporary star, *Tycho's Star*, was discovered n August 1572.

CASSIQUE (*Cassicus*), perching birds which take the place of the Old World starlings in America. They are characterised by a shield at the base of the bill.

CASSIS, see under GASTROPODA.

CASSITERIDES ('Tin Islands'), name given by Phœnicians, Greeks, and Romans to group of islands generally identified as the Scilly Isles.

CASSITERITE (SnO_2), tinstone or stannic oxide, commonest tin ore, containing 79 % metal; found in Cornwall, Borneo, Mexico, Australia; used for extraction of metal; also for preparation of mordants employed in calico printing.

CASSIUS, GAIUS (d. 42 B.C.), Rom. prætor; member of plebeian family, which had once held patrician rank; one of the murderers of Julius Cæsar; in the war which followed he was routed at *Philippi*, and, giving up all hope, he commanded his freedman to slay him.

CASSIUS, SPURIUS, VISCELLINUS, Rom. consul disliked by nobles as demagogue; introduced first *Lex agraria* (486 B.C.).

CASSIVELLAUNUS, Brit. king, who offered a valiant defence to Julius Cæsar during his second invasion (54 B.C.), but was compelled to capitulate, and promised tribute to the conqueror.

CASSOCK (Fr. *casaque*), originally a long, loose robe worn by soldiers and horsemen; nowadays a black variety is used by priests.

CASTAGNO, ANDREA DEL (1390–1457), Ital. painter, the secret of whose colouring is lost and has given rise to many legends.

CASTALIA, famous spring which rises on Mount Parnassus, near Delphi; sacred to Apollo and the Muses.

CASTANETS, percussion musical instruments, consisting of small hollow shells of hardwood or other substance, bound together with loop fitting on thumb and forefinger; much used in dances from times of the Early Greeks and Romans, and introduced into Europe by the Moors.

CASTAÑOS, FRANÇOIS XAVIER DE (1756–1852), Span. general who forced French to make humiliating capitulation of Baylen, 1808.

CASTE (Lat. *castus*, pure), term now usually associated with classes of Hindu society. A development of Brahmanism, c. had originally four chief divisions—the Brahmans, a sacerdotal class; Kshatriyas, military; Vaisyas, agricultural; and the Sûdras, who were servants of the three preceding classes. Out of these have grown many other sub-classes. C. in modern India has proved a serious obstacle to civil progress and religious reform by the restrictions and limitations it imposes upon marriage, trade, or profession, and the amenities of social intercourse. Time, however, is gradually breaking down these restrictions.

Sherring's *Hindu Tribes and Castes* (1872).

CASTELAR Y RIPOLI, EMILIO (1832–99), Span. statesman; prof. of History and Philosophy in univ. of Madrid (1856); removed from his professorship for his attacks on the government (1865); took part in the rising of 1866, was condemned to death, but made his escape to France, returning to Spain in 1868, on the success of the Revolution. In 1873 C. was app. dictator by the Cortes, but a year later he was compelled to resign, and when the Spaniards declared in favour of Alfonso XII. he found safety in flight. He returned in 1876, and again took part in political life, but finally retired in 1893. C. was a brilliant orator, but ineffectual as a politician.

CASTELBUONO (37° 53′ N., 14° 6′ E.), town, Palermo, Sicily; site of former monastery. Pop. 10,761.

CASTELFIDARDO (43° 29′ N., 13° 31′ E.), town, Ancona, Italy. Pop. 9100.

CASTELFRANCO DELL' EMILIA (44° 36′ N., 11° 3′ E.), town, Emilia, Italy; silk trade. Pop. 14,000.

CASTELFRANCO VENETO (45° 40′ N., 11° 57′ E.), fortified town, Venetia, Italy; birthplace of Giorgione; scene of Austrian defeat by French, 1805. Pop. 3700.

CASTELL, EDMUND (1606–85), Eng. Oriental scholar; ed. Cambridge; spent eighteen years in compiling his *Lexicon of the Seven Tongues*; became Prebendary of Canterbury and prof. of Arabic at Cambridge.

CASTELLAMARE DEL GOLFO (38° 5′ N., 12° 55° E.), town, Trapani, Sicily; olive oil, anchovies, wine. Pop. 21,000.

CASTELLAMMARE DI STABIA (40° 40′ N., 14° 25′ E.), fortified seaport, Campania, Italy, on Bay of Naples; ancient *Stabiæ*; bp.'s see; mineral springs; popular resort. Pop. 36,500.

CASTELLANA (40° 52′ N., 17° 12′ E.), town, Bari, Italy. Pop. 11,500.

CASTELLANETA (40° 38′ N., 16° 57′ E.), town, Lecce, Italy; seat of bishopric. Pop. 11,000.

CASTELLIO, SEBASTIANUS (1515–63), Swiss Biblical critic; trans. Bible into Lat. and Fr.

CASTELLO BRANCO (39° 52′ N., 7° 30′ W.), walled town, Beira, Portugal; seat of bp.; has ruined castle and Rom. antiquities; trade in marble; woollens, wine, and oil. Pop. 7292.

CASTELLO DE VIDE (39° 24′ N., 7° 27′ W.), town, Alemtejo, Portugal; textiles. Pop. 5150.

CASTELLO, BERNARDO (1557–1629), Ital. artist; b. Genoa; intimate with poet Tasso; was employed by the Duke of Savoy, and at Rome, but much of his work is to be found at Genoa.

CASTELLO, GIOVANNI BATTISTA (d. *c.* 1569), Ital. artist, architect, and soulptor; painted *Martyrdom of St. Sebastian, Christ as Judge of the World*, etc.; at invitation of Philip II. went to Madrid (where he died), and was app. architect of the king's palaces.

CASTELLO, VALERIO (1625–59), Ital. artist; s. of Bernardo C.; excelled as a painter of battle-scenes; his *Rape of the Sabines* is in the Palazzo Brignole at Genoa.

CASTELLO BRANCO, CAMILLO (1825–90), Portug. novelist; produced upwards of 200 vol's in several departments of lit., but chiefly remarkable for his novels; made viscount, and received government pension.

CASTELLÓN DE LA PLANA (40° 7′ N., 0° 20′ W.), province, E. Spain; occupies strip of Mediterranean coast; surface mountainous; principal exports, fruit and fish; area, 2495 sq. miles. Pop. (1910) 322,210.

CASTELLÓN DE LA PLANA (37° 59′ N., 0° 5′ W.), town and port, capital of C. province; manufactures brandy, sailcloth, and linen; is centre for exports of oranges, wine, etc. Pop. (1910) 33,296.

CASTELNAU, MICHEL DE (1520–92), Fr. diplomatist and soldier; accompanied Mary Stewart to Scotland, and used every endeavour to effect a reconciliation between the Scots queen and Elizabeth; performed brilliant military services in France; was ten years ambassador to court of Queen Elizabeth, and sought to bring about a marriage with the Duke of Alençon.

CASTELSARRASIN (44° 3′ N., 1° 5′ E.), town, Tarn-et-Garonne, France; foundries. Pop. 7000.

CASTELTERMINI (37° 15′ N., 13° 30′ E.), town, Girgenti, Sicily; sulphur and salt mines. Pop. 13,050.

CASTELVETRANO (37° 41′ N., 12° 46′ E.), town, Trapani, Sicily; wine, oil, silk. Pop. 24,510.

CASTIGLIONE DELLE STIVIERE (45° 23′ N., 10° 29′ E.), town, Lombardy, Italy; at C. French defeated Austrians, 1796. Pop. 3542.

CASTIGLIONE OLONA (*c.* 45° 46′ N., 9° 6′ E.), town, Lombardy, Italy.

CASTIGLIONE, BALDASSARE (1478–1529), Ital. diplomatist and author; known as 'the perfect courtier'; was attached to the court of Guidobaldo Malatesta, Duke of Urbino, by whom he was sent on a mission to Henry VII. of England. He wrote Latin

and Ital. poems of rare quality, and a prose treatise, *Il Cortegiano* (1528). His portrait, by Raphael, is in the Louvre.

CASTIGLIONE, GIOVANNI BENDETTO (1616–70), Ital. artist; painted portraits, hist. scenes, and landscapes; many of his works are to be found in Rome, Genoa, Venice, Florence, and Naples; the Louvre contains eight examples.

CASTILE, Castille (42° N., 4° W.), old kingdom, Spain, consisting of plateau region, and divided into provinces of Old and New C.; watered by Douro, Tagus, Guadiana; surrounded by mountain ranges; became kingdom, XI. cent., later united with Leon; united with Aragon in 1479. See Spain: *History*.

CASTILHO, ANTONIO FELICIANO DE (1800–75), Portug. poet, etc.; blind from his sixth year; pub. *Primavera* (1822), *Amor e Melancholia* (1823), *A noite de Castello* (1836), *Cuimes do bardo* (1838)—volumes of bucolic and romantic poetry.

CASTILLO SOLÓRZANO, ALONSO DE (1584–1647), Span. novelist, poet, and dramatist; distinguished for versatility and graceful style; pub. several picaresque novels, vol's of humorous verse, and dramas.

CASTILLON (44° 52′ N., 0° 1′ W.), town, Gironde, France; French defeated English, 1453. Pop. 3300.

CASTLE (Lat. *castellum*, fortress), word introduced into England by the Normans to describe a stone defensive building, which took the place of the Saxon *burh*, a timber palisade encircling the top of a mound, which was the only kind of fortification then known in Britain. William I. introduced the square stone keep of which the 'White Tower' in the Tower of London is a notable example. Upwards of 100 ft. square, with walls of rubble and mortar, 15 ft. in thickness, such a structure was practically impregnable against the battering weapons of that day. A more common type of the Norman c., however, was the 'shell-keep,' an encircling stone wall, in place of the wooden palisade. Living apartments and offices were afterwards built against the inner sides of these walls, while from the large central space sprang the keep, or *donjon*, square or round; this, being very strongly built, and usually containing the well, served as the last defence of the garrison if the outer defences were carried.

G. T. Clark, *Mediæval Military Architecture in England*.

CASTLE, EGERTON (1858–), Eng. author; on staff of *Saturday Review*, 1885–94; author of *The Jerningham Letters*, *The Secret Orchard*, and with Agnes Castle of *Incomparable Bellairs*, *French Nan*, etc.

CASTLE DONINGTON (52° 52′ N., 1° 22′ W.), town, Leicestershire, England; manufactures hosiery and silk; breweries.

CASTLE DOUGLAS (54° 57′ N., 3° 56′ W.), market town, Kirkcudbright, Scotland; manufactures agricultural implements, and has large sheep and cattle marts. Pop. (1911) 3016.

CASTLE RISING (52° 48′ N., 0° 28′ E.), village, Norfolk, England; remains of famous Norman castle of XII. cent.

CASTLEBAR (53° 52′ N., 9° 17′ W.), town, capital of County Mayo, Ireland; market for agricultural produce; scene of massacre of Eng. garrison by Irish, 1641. Pop. 4000.

CASTLECARY.—(1) (51° 0′ N., 2° 31′ W.) town, Somerset, England. Pop. (1911) 5233. (2) (55° 58′ N., 3° 58′ W.) old castle near Falkirk, Stirlingshire.

CASTLECONNEL (52° 43′ N., 8° 29′ W.), town, on Shannon, County Limerick, Ireland; good salmon-fishing centre.

CASTLEFORD (53° 44′ N., 1° 21′ W.), town, on Aire, West Riding, Yorkshire, England; glass-works. Pop. (1911) 23,101.

CASTLE-GUARD, in feudal times the great barons were required to provide knights to guard royal castles, but eventually a money payment was imposed upon them, known as 'castle-guard rent.'

CASTLEMAINE (37° 4′ S., 144° 14′ E.), town, Victoria, Australia; gold-mines were among first discovered in Australia. Pop. 5704.

CASTLEREAGH, VISCOUNT, see Londonderry, 2nd Marquess of

CASTLETON (53° 21′ N., 1° 47′ W.), village, Peak district, Derbyshire, England; ruined 'Castle of the Peak' built by William Peveril; fluor-spar mines.

CASTLETOWN, Bally Cashtel (54° 4′ N., 4° 40′ W.), town (former capital), Isle of Man; Castle Rushin (X. cent.) now a prison; seat of King William's College.

CASTOR AND POLLUX (classical myth.), also called 'The Dioscuri,' twin sons of Zeus and Leda; presided over games; patrons of hospitality; protectors of sailors, who sacrificed to them when they came to the masthead as a fire (St. Elmo's Fire). C. and P. names of two bright stars in constellation *Gemini*; C. is a double star, but P. is brighter.

CASTOR OIL, oil obtained from the seeds of a plant, *Ricinus communis*, belonging to the order Euphorbiaceæ, grown in most tropical and sub-tropical countries. The seeds are very poisonous, and the oil is obtained from them by crushing or by decoction, and purified. It is viscid, colourless, with slight characteristic smell and taste, and is used medicinally as a purgative.

CASTORIDÆ, Beaver Family, see Beaver.

CASTRÉN, MATTHIAS ALEXANDER (1813–53), Finnish philologist; undertook adventurous journeys through Lapland and Siberia; pub. several valuable works on philology.

CASTRES (43° 36′ N., 2° 14′ E.), town, on Agout, Tarn, France; interesting buildings; fine promenades; XVI.-cent. Huguenot stronghold; woollen fabrics. Pop. 19,800.

CASTRIES (13° 45′ N., 61° W.), port, capital, St. Lucia, W. Indies; exports sugar. Pop. (1911) 6266.

CASTRO, Kastro.—(1) (39° N., 26° 45′ E.) capital of Mitylene (Lesbos), Ægean Sea. Pop. 20,000. (2) (39° 53′ N., 25° 2′ E.) town, Lemnos, Ægean Sea.

C. is name of towns in other Ægean islands.

CASTRO DEL RIO (37° 43′ N., 4° 31′ W.), town, S. Spain; textiles. Pop. 11,821.

CASTRO URDIALES (42° 35′ N., 3° 18′ W.), seaport, Santander, Spain; old castle; sardine fisheries and iron-mining are chief industries. Pop. 14,191.

CASTRO Y BELLVIS, GUILLÉN DE (1569–1631), Span. dramatist; wrote *Las Mocedades del Cid*, *Fuerza de la Costumbre*, *El Prodigio de los Montes*; his *Comedias* were pub. 1618–21.

CASTRO, CIPRIANO (1863–), ex-Pres. of Venezuelan Republic after deposing Andrade, 1899–1906; his aggressive foreign policy led to futile Ger. and Brit. naval demonstration, 1903.

CASTRO, INEZ DE (d. 1355), alleged wife of Peter I. of Portugal, who, while still known as the Infante Dom Pedro, became enamoured of her. The growing influence of her family incurred the hatred of other nobles, and by a party of these (or by the Infante's f.) she was stabbed to death in the palace at Coimbra.

CASTRO, JOÃO DE (1500–48), Portug. Viceroy of the Indies; notable voyageur and soldier; friend of St. Francis Xavier, in whose arms he died at Goa.

CASTRO, VACA DE (d. 1558), Span. governor of Peru (1538), from which he extorted much wealth for Spain.

CASTRO-GIOVANNI (37° 32′ N., 14° 18′ E.), town, Caltanissetta, Sicily; ancient *Enna*; cathedral (1307); ruined fortress; produces rock salt. Pop. 23,500.

CASTROVILLARI (39° 47′ N., 16° 13′ E.), town, S. Italy; wine. Pop. 9000.

CASTRUCCIO-CASTRACANI (1281–1328), duke of Lucca (1327); Ital. mercenary captain who served with the Hapsburgs against the Papacy.

CASTS, replicas of an object; obtained by forming a mould of plaster or wax and filling it with the material desired (plaster or metal); when this hardens the mould is chipped off; founding (*q.v.*) is casting of large metal objects.

CASTUERA (38° 41′ N., 5° 36′ W.), town, Badajoz, Spain. Pop. 7000.

CASUAL WARDS, see POOR LAW.

CASUARINA, genus of trees, chiefly Australian, with long, leafless, jointed branches; yields hard, valuable timber, used chiefly for inlaying, and known as beef-wood.

CASUISTRY, ecclesiastical case law or moral science; sprang up in the R.C. Church with the system of confession, made obligatory by Lateran Council, 1215. C. has taken sinister meaning from ingenuity displayod in arguing away ambiguous acts.

CASUS BELLI, term in international law for offence which makes war justifiable.

CAT, name for a family of carnivora (*Felidæ*), comprising lion, tiger, leopard, puma (for all of which see below under CAT FAMILY), wild cat, etc., but usually restricted to the latter species (*Felis catus*), the domestic cat (*F. domestica*) and other small forms, such as the Nubian gloved cat (*F. maniculata*). The domestic cat, of which the tabby (usually grey, with light stripes), tortoise-shell, Angora, Manx, Maltese, Persian (with green eyes and silverish fur), Blue Persian (slate-grey with amber eyes), and Spanish are among the better-known varieties, has been a companion of man since the dawn of society, and figured largely in the folk-lore of Aryan and other nations, and was associated with magic and religion. Although the domestic c. when running wild assumes the habits and colouring of the wild c., evidence tends to show that the former is a distinct species.

C. shows, inaugurated in London, 1871, are still held annually. There are also shows in Scotland in connection with the Scot. C. Club, and in the provinces.

Simpson, *Book of the Cat* (1903); Rule, *The Cat*.

CAT FAMILY (*Felidæ*), a family of carnivores (sub-order, *Fissipedia*), with about 85 species scattered all over the world, except in Australia, New Zealand, and Madagascar. They are characterised by their completely retractile claws, their short faces, and the reduced number of their cheek teeth, which typically number 4 in the upper and 3 in the lower jaw. Among the cats the best known is the **Lion** (*Felis leo*), characterised by its uniform tawny colour, and by the shaggy mane that ornaments the head and neck of the male. The lion sleeps by day in thickets or dense reeds, and prowls at night in search of the large animals —antelopes, giraffes, camels, buffaloes, and such-like— that form its prey. Although now confined to Africa, Persia, and North-West India, lions were formerly found, in historic times, throughout southern Asia and south-eastern Europe, and fossil remains (Pleistocene) have been found even in Britain.

Closely related to the lion, but differing in its striped coat and lack of mane, is the **Tiger** (*Felis tigeris*), which is found only in Asia—but there from the snows of Manchuria to the south of India. The individuals inhabiting the colder regions have long, thick coats, very different from that of their tropical brethren.

The **Leopard** (*Felis pardus*), also known as PARD and PANTHER, is less numerous than the preceding species and is spotted with dark brown and black, the spots often arranged in circles. It occurs throughout Africa and the greater part of Asia, and its bones have been found in British caves.

The **Snow Leopard** or OUNCE (*F. uncia*), with longer and paler fur than the last, inhabits the lofty plateaus and mountains of Central Asia, 9000 to 18,000 feet above sea-level.

Less important and less imposing Old World cats are the smaller TIGER CATS of tropical Asia and Africa; the South African SERVAL (*F. serval*), short tailed, large eared, black spotted; the CLOUDED LEOPARD, HUNTING LEOPARD, or CHEETAH, and common WILD CAT (*qq.v.*); the CARACAL or PERSIAN LYNX (*Lynx caracal*), with bright yellow-brown unspotted fur and black-tipped tail, found in Western Asia and Africa; and the true LYNXES (*Lynx*), with long limbs, short tail, and ears with a tuft of hairs at the tip, some of which occur both in Europe and Asia.

The New World cat fauna also includes true lynxes, confined to North America, but its most important members are the leopard-like **Jaguar** (*Felis onca*), fond of climbing and feeding upon monkeys, and the smaller PUMA or COUGAR (*F. concolor*), known to Americans as the 'panther.' The two last occur from Patagonia to the U.S.A., but while the northern boundary of the former is limited by N. Mexico, the former extends to New England. Smaller arboreal species roam the woods of tropical America, passing, on account of their spotted fur, under the name of ocelot cats, or sometimes 'tiger cats'; examples are *Felis jaguarundi* and *F. eyra*, respectively rather larger and rather smaller than the domestic cat.

The remains of more than 80 species of the cat family have been found as fossils in Tertiary deposits. The most interesting is the extinct SABRE-TOOTHED TIGER (*Machærodus*), which had compressed, saw-edged teeth, 7 inches in length, and has been traced in the Argentine and Brazil.

Elliot, *Felidæ* (1883); Lydekker, *Cats*.

CAT ISLAND.—(1) (30° 11′ N., 89° 1′ W.) island, Mississippi. (2) (24° 30′ N., 75° 30′ W.) island, one of Bahamas, W. Indies. Once wrongly supposed to be first landing-place of Columbus in America.

CATACHRESIS, term of rhetoric for misplacement of words, *e.g.* mixed metaphor and 'Malapropism.'

CATACOMBS, Rom. subterranean burial-places, consisting of galleries with recesses for tombs, closed after burial with an inscribed stone; the most famous is that under the Appian Way, used also as a place of refuge by the early Christians. The c's of Paris were originally stone quarries, but in 1787 the authorities began to transfer to this receptacle the bones from the cemeteries.

CATAFALQUE (Ital. *catafalco*, scaffold), temporary structure used in funerals either as a canopy when a body is laid in state, or a similar covering for a funeral car.

CATALANI, ANGELICA (1780–1849), Ital. prima donna; first appearance in London (1806), where she reigned as public favourite for about seven years; met with great success in all the European capitals; noted for her charity and kindness; founded free singing school at Florence.

CATALAUNUM, see CHÂLONS-SUR-MARNE.

CATALEPSY, see TRANCE.

CATALEXIS, term in prosody for omission of syllable required for full feet of verse.

CATALONIA (*c.* 41° 35′ N., 2° E.), former principality and province, N.E. Spain, now comprising Barcelona, Tarragona, Lerida, and Gerona; surface mountainous and wooded; watered by numerous streams; these, together with a good system of artificial irrigation, render C. chief manufacturing and agricultural region of Spain; called the 'Lancashire of Spain'; produces cereals; cotton, silk, and woollen goods manufactured; conquered by Philip V., 1714; held by France, 1808–13. See SPAIN.

CATALYSIS.—In chem. a substance which initiates or accelerates chemical interaction between other substances, without itself undergoing change, is termed a *catalytic* agent, or said to act by catalysis; thus manganese dioxide, in preparation of oxygen from potassium chlorate, causes oxygen to be liberated more rapidly and at much lower temperature.

CATAMARAN (word of Tamil origin: *catta*, to tie, *maram*, wood), name of a surf-boat, propelled by sails or oars, consisting of two or more logs of wood lashed together, much used in E. and W. Indies and S. America; also used erroneously to describe a scolding woman.

CATAMARCA (*c.* 28° S., 67° W.), province, Ar
ine Republic; surface mountainous, with fertile va'
rich in minerals, gold, silver; area, 47,531 sq.
Pop. estimated (1910) 110,317.

CATAMARCA (27° 59′ S., 67° 7′ W.), town, capital

of C. province, Argentine Republic; exports flour and wine. Pop. 7400.

CATAMOUNT, CATAMOUNTAIN, properly 'cat of the mountains'; applied to the Common Wild Cat, the Puma, and the Lynx.

CATANIA (37° 28′ N., 15° 5′ E.), town, E. coast of Sicily; has cathedral dating from Norman times; rebuilt in 1693 after earthquake; observatory, univ., remains of Rom. amphitheatre, aqueducts, theatres, baths; former Benedictine monastery has library and museum of antiquities; manufactures textiles; has frequently suffered from earthquakes and eruptions of Etna. Pop. (1911) 211,699. Province, area, 1917 sq. miles. Pop. (1911) 783,862.

CATANZARO (38° 55′ N., 16° 37′ E.), city, Calabria, Italy; has cathedral and ruined castle; manufactures silk, velvet, and woollen goods. Pop. (1911) 34,340; (province) 484,616.

CATAPHRYGIANS, nickname of followers of Phrygian zealot Montanus. See MONTANISM.

CATAPULT (Lat. *catapulta*), military weapon, somewhat like a huge crossbow, but mounted on a stand, used by Greeks and Romans to discharge arrows, stones, etc.; forked stick, provided with elastic, used by boys for throwing stones.

CATARACT, see EYE.

CATARGIN, LASCAR (1823–99), Rumanian statesman; was twice pres. of the Council, and promoted many useful administrative reforms.

CATARRH, inflammation of a mucous membrane, accompanied by swelling, congestion, and an increase of the secretion. The term is commonly applied to such inflammation in the respiratory and nasal passages, or 'common cold.' This is treated by taking a purgative, *e.g.* calomel, then hot bath and bed. Dover's powder is sometimes recommended. A tonic and change of air complete the cure.

CATARRHINI, CATARRHINE APES, see under PRIMATES.

CATASTASIS (Greek), division of the classical drama which consists of protasis, epistasis, c., and catastrophe; in rhetoric, part of a speech giving outline of matter in hand.

CATAUXI, cannibal Indian tribe of W. Brazil.

CATAWBAS, nearly extinct tribe of Indians, dwelling in neighbourhood of Catawba river, S. Carolina; 'Catawba Wine,' made from grapes from near river, has been praised by Longfellow.

CATEAU, LE, LE CATEAU CAMBRÉSIS (50° 4′ N., 3° 22′ E.), town, Nord, France; textiles, beer, sugar. Treaty concluded here between England, France, and Spain, 1559. Pop. 10,700.

CATECHISM, a book of instruction, in the form of questions and answers; not necessarily of a religious character, but generally used in that application. Amongst Church catechisms may be mentioned that of Luther (1529); the Anglican, contained in the Book of Common Prayer, and the Heidelberg, used by the Dutch Church; Longer and Shorter Catechisms by Peter Canisius, S.J., 'The Penny Catechism' (England), used by Roman Catholics; and the famous Presbyterian *Shorter Catechism.*

CATECHU, CUTCH, extract from acacia plants, is of two kinds: (1) pale cutch, from *Uncaria gambier*; and (2) black cutch, from *Acacia catechu.* Both are bitter and astringent, and used in tanning and dyeing.

CATECHUMENS, name given in the early Christian Church to converted Jews and heathens who were undergoing instruction preparatory to receiving the rite of baptism.

CATEGORY (Gk. *katēgoria*, accusation, assertion), Aristotle's ten categories are an attempt to classify the possible assertions (*predicates*) about anything (*subject*). Such assertions may tell us what the subject is (*Substance*), what it is like (*Quality*), how much or how many (*Quantity*), how it is related to something else (*Relation*), where (*Place*) or when (*Time*) it is, its *Condition* (a more permanent) or *State* (a more transient), whether and how it is acting (*Action*), and whether anything and what is being done to it (*Passivity*). See ARISTOTLE.

CATEL, CHARLES SIMON (1773–1830), Fr. composer; helped to found the *Conservatoire* (1795).

CATERAN, old collective term for Highland cattle-raiders.

CATERHAM (51° 17′ N., 0° 6′ W.), town, Surrey, England; large barracks in vicinity. Pop. (1911) 10,841.

CATESBY, ROBERT (1573–1605), Eng. conspirator; descended from C., instrument of Richard III.; of good family and abilities; suffered much as R.C. recusant under Queen Elizabeth, and, when James I. would not restore Roman Catholicism, organised the Gunpowder Plot (*q.v.*); fled and was shot.

CAT-FISHES, SILUROIDS, large group of over 1000 fishes, so named on account of numbers of feelers round the mouth; found almost wholly in the fresh waters of temperate and tropical regions. One of the most interesting is the mail-coated S. Amer. (*Callichthys*), which in the dry season moves overland in search of water, or burrows in the mud. Both sexes are said to guard the nest and eggs until the young are hatched.

CATGUT, tough material used for strings of violins, guitars, etc., and made principally from sheep's intestines, which, after being thoroughly cleansed, scraped, and exposed to antiseptic fumes, are twisted into cords.

CATHARI, CATHARS, CATHARISTS (Gk. *katharos*, pure), religious sect (persecuted as heretics), spread over E. and W. Europe during the Middle Ages. In the E. they were called *Bogomili* and *Paulicians*, in the W., *Albanenes Bulgari*, and, in S. France, *Albigenses.* The C. all held a more or less modified Manichæanism. Holding the essential sinfulness of the flesh and the material world, they denounced marriage and property, kept long fasts, and of animal food ate only that which was supposed not to have been produced sexually (*i.e.* fish). C. were distinguished as *credentes*, believers; and *perfecti*, perfect. The latter formed the governing part of the sect, a priesthood which is thought to have included women as well as men. The Perfect had received the *Consolamentum*, the Baptism of the Spirit, which removed original sin.

Döllinger, *Beiträge zur Sektengeschichte* (1890); Lea, *History of the Inquisition* (1888).

CATHAY, name by which China was known in mediæval times.

CATHCART (55° 50′ N., 4° 16′ W.), town, Renfrewshire, Scotland; has sandstone quarries; near site of battle of *Langside* (1568). Pop. (1911) 15,205.

CATHCART, SIR GEORGE (1794–1854), Eng. soldier; s. of Earl Cathcart; Wellington's aide-de-camp at *Quatre Bras* and *Waterloo*; served in Crimea and was killed at *Inkerman*; buried where he fell, a spot which was called in his honour, 'Cathcart's Hill.'

CATHCART, WILLIAM SCHAW, 1ST EARL CATHCART (1755–1843), Brit. general; commander-in-chief in Ireland (1803); commanded land forces at *Copenhagen* (1807), for which services received title of viscount; ambassador to Russia (1813–14); accompanied Tsar Alexander during campaigns (1813–14); cr. earl (1814).

CATHEDRAL (Gk. *cathedra*, chair), church containing a bp.'s throne. The c. is under the control of the dean (*q.v.*) and a chapter of canons or prebendaries; by them, after the issue of a *congé d'élire* from the Crown, the bp. is chosen. The bp. is visitor of the c., of which there are forty in England and Wales. In mediæval documents the c. is translated *ecclesia episcopalis*; the generic name for a church, *domus dei*, contracted to *dom* (still Ger. name for c.), became for a time special name of a c.

Atkinson, *Eng. and Welsh Cathedrals* (1912); Butler, *Scot. Cathedrals* (1901).

CATHERINE, the name of six saints in R.C. hagiology, the most famous being (1) **St. Catherine of**

Alexandria, who upbraided the Emperor Maximinus for his cruelties and worship of false gods, for which she was scourged and cast into prison. The legend runs that she converted the empress and all who approached her; was eventually beheaded, and buried on Mount Sinai, upon which site Justinian I. built a monastery to commemorate her martyrdom She frequently appears in art, accompanied by the wheel (*St. C.'s wheel*) on which she was broken, and receiving the ring of espousal from the Child Jesus. Her memory is preserved in England in the C. wheels (fireworks) of Nov. 5. In France she is the patron of young girls; her feast-day is Nov. 25, and at the age of 25 the *jeune fille* 'coiffs' St. C.; an old maid being said to have '*coiffé* St. C.' (2) **St. Catherine of Siena** (1347–80), youngest of 25 children of a dyer named Giacomo di Benincasa; dedicated herself to the religious life from her seventh year; she took a prominent part in the religious polemics of her day, and it was entirely through her exertions that Gregory XI. was induced to return to Rome from Avignon; she nursed the plague-stricken, and was venerated for her gentleness. She has been described by a noted writer as 'one of the most wonderful women that have ever lived.'

Gardner, *Saint Catherine of Siena* (1907).

CATHERINE I. (1683–1727), empress of Russia; dau. of a peasant; m. a Swedish dragoon; subsequently became mistress of Prince Menshikov, at whose house she was seen by Peter the Great, who made her his mistress, and later, his wife. She changed her name from Martha to Catherine on being received into the Greek Church; was crowned with solemn state, and declared Peter's successor. Like Peter, she was a barbarian of genius, gave him valuable aid in his reforms, and enjoyed wide popularity with the Russian people. After his death (1525), she lived a life of great excess, but with Menshikov's aid maintained the prosperity of the country.

CATHERINE II. (1729–96), empress of Russia; b. Stettin, of which her f., the Prince of Anhalt-Zerbst, was gov.; m. Arch-Duke Peter of Russia (1745), an ignorant sensualist, who frequently ill-treated her. Thus mated and living in the vile court of the Empress Elizabeth, C.'s immoralities soon became as flagrant as those of her husband. The latter succ. Elizabeth as Peter III. (*q.v.*) in 1761, and one of his first actions was to declare their s., Paul, illegitimate. Peter was murdered (1762), and C., who was supposed to have had a hand in the business, was declared empress. Notwithstanding her entire lack of morality, C. was a woman of great ability, and governed her country very successfully.

Catherine's *Memoirs* (Eng. trans., 1859); *Romance of an Empress*, by Waliszewski (1894).

CATHERINE DE' MEDICI (1519–89), queen of France; dau. of Lorenzo de' M.; wife of Henry II., and mother of Francis II., Charles IX., and Henry III. C. exercised no influence during the reign of her husband, who was dominated by his mistress, Diane of Poitiers, but during the rule of her three sons she was all-powerful. The inveterate foe of the Protestants, she was directly responsible for the murder of Admiral de Coligny and the wholesale Massacre of St. Bartholomew. C. introduced the ballet into France, and loved sumptuousness and magnificence; at the same time she was fearless, treacherous, and relentless in character, loved by none and feared by all.

Sichel, *C. de' Medici* (1905); *Later Years* (1908).

CATHERINE OF ARAGON (1485–1536), queen-consort of Henry VIII.; his first wife; dau. of Ferdinand and Isabella of Castile and Aragon; m., when 16, Arthur, Prince of Wales, who died 2nd April 1502; subsequently m. his bro., Henry VIII. (1509), to whom she bore six children, Queen Mary I. (*q.v.*) being the only one who survived. Henry having obtained a divorce (1533), C. passed into retirement, and died at Kimbolton Castle, Huntingdonshire. Outside the four years 1529–33, C. is anything but a prominent figure in history; she seems to have been popular in the country, but to have done nothing for the chroniclers to record. In 1529, however, she became the central figure in a tragedy poignantly narrated by Cavendish in his *Life of Wolsey*; there appears the speech in which she vainly implored Henry to pity 'a woman and a stranger born out of your dominion.' This part of *Henry VIII.* is generally allowed to be in the Shakespearean canon.

Froude, *Divorce of Catherine of Aragon* (1891).

CATHERINE OF BRAGANZA (1638–1705), queen-consort of Charles II. of England; dau. of John IV. of Portugal, who settled Bombay upon her at her marriage. She bore no children, and there were suggestions of divorce, but the country was pleased with the Portuguese alliance as a pledge of enmity to Spain. She remained loyal and devoted to the gay monarch, and felt much grief at his death; still living in England at the time of the Revolution, she returned later to her own country, where she died.

CATHERINE OF VALOIS (1401–37), queen-consort of Henry V. of England; dau. of Charles VI. of France; she m. Henry (1420), and bore a s. (Henry VI.) in the following year. After Henry's death (1422) she m. Owen Tudor, a Welsh gentleman, by whom she had three sons, one of whom, Edmund, Earl of Richmond, was the f. of Henry VII.

CATHODE, see ELECTRICITY (ELECTROLYSIS).

CATHOLIC APOSTOLIC CHURCH, religious sect due to preaching of Edward Irving, though not constituted by him; formed, 1831, and reconstituted, 1835; it has a central church in Gordon Square, London, W.C., and other churches in Britain and U.S.A. Its type of worship is Catholic rather than Protestant, and it recognises Rom., Gk., and Anglican Orders.

CATHOLIC CHURCH, term used in the early cent's to indicate the Christian Church as a whole. Its application in modern times is a matter of dispute, for while Roman Catholics hold that they alone are C's, an influential section of the Church of England, claiming an essential unity with the pre-Reformation Church, for this reason claims also the title C. See ROMAN CATHOLICISM.

CATHOLIC EPISTLES (or GENERAL E.), applied to *James*, 1 and 2 *Peter*, *Jude*, and 1, 2, and 3 *John*; title first found at end of II. cent., due, probably, to their being addressed to Christians in general (except 2 and 3 *John*, which are included because of close connection with 1 *John*).

CATHOLIC LEAGUE, formed 1609 under the influence of the Counter-Reformation; counterblast to Prot. Evangelical Union, founded 1608; both associations played prominent part in Thirty Years War (*q.v.*).

CATHOLICS, OLD, see OLD CATHOLICS.

CATILINA, LUCIUS SERGIUS, CATILINE (*c.* 108–62 B.C.), Rom. conspirator; of poor patrician family; having held all lower public offices, he was an unsuccessful candidate for the consulship (65 B.C.). Two years later he organised a revolutionary plot, but his designs were frustrated by the vigilance of the Consul Cicero, in a conflict with whose troops C. was killed; noted for his bravery and military talents. His life was the subject of tragedies by Ben Jonson and Crébillon.

CATINAT, NICOLAS (1637–1712), marshal of France; served in the Flanders campaign (1676–78); conquered Savoy (1690); during War of Span. Succession was placed in command of the Ital. operations, but, after a reverse at *Carpi* (1701), was superseded by Villeroy.

CATION, see ELECTRICITY (ELECTROLYSIS).

CATLIN, GEORGE (1796–1872), Amer. student of the Indians, whom he carefully portrayed with brush and pen.

CATO STREET CONSPIRACY, 1820; plot to murder Lord Castlereagh; considered responsible for

Tory repressive measures, the conspirators meeting in Cato St., London; conspirators hanged or transported.

CATO, DIONYSIUS, supposed author of the *Catonis Disticha de Moribus*, who is believed to have lived during the III. or IV. cent. A.D., though nothing is known of his life. The work consists of aphorisms, written in dactylic hexameters, which enjoyed considerable vogue during the Middle Ages. Caxton pub. an Eng. translation by Benedict Burgh.

CATO, MARCUS PORCIUS, THE CENSOR (234–149 B.C.), Rom. statesman; distinguished himself at the capture of Tarentum (209), and in the second Punic War; elected Censor (184), and Consul (195). He was severe in his habits of life, strove hard to stem the tide of luxury, and earnestly desired a return to the primitive ways of a pastoral life. Of his many writings *De Re Rustica* is alone extant.

CATO, MARCUS PORCIUS, OF UTICA (95–46 B.C.), Rom. philosopher, known as *Uticensis* to distinguish him from his great-grandfather, 'the Censor'; belonged to the Stoic school, and was distinguished by his morality in a very corrupt age. In the war between Cæsar and Pompey he attached himself to the cause of the latter, and stabbed himself in Utica rather than fall into the hands of the conqueror. C. is the subject of a tragedy by Addison.

CATO, PUBLIUS VALERIUS (b. 100 B.C.), Rom. grammarian and poet of the Alexandrian school. Besides grammatical works, he wrote a number of poems, but, above all, is noteworthy for influence he exercised upon public opinion in regard to the lit. of his day.

CATORCE (23° 50′ N., 101° 2′ W.), town, Mexico; tin and silver mines. Pop. 10,000.

CATS, JACOB (1577–1660), Dutch poet; familiarly known as 'Father Cats'; b. Brouwershaven (Zeeland), where a statue was erected to his memory in 1829; ed. for law; ambassador to London, 1627; was knighted by Charles I. He was author of several vol's of poetry of a didactic and humorous character, which were immensely popular in Holland. He also wrote his autobiography (pub. at Leyden, 1734).

CATSKILL (42° 43′ N., 73° 53′ W.), town, New York State, U.S.A., on Hudson River; summer resort; manufactures woollens. Pop. (1911) 5296.

CATSKILL MOUNTAINS (42° 12′ N., 74° 20′ W.), group of mt's, state of New York; highest summits about 4000 ft.

CATTARO (42° 23′ N., 18° 33′ E.), fortified seaport, Dalmatia, Austria, at head of bay of C., enclosed by Montenegrin mountains; has spacious harbour; seat of R.C. bp.; formerly capital of small republic; joined Venice, 1420; finally ceded to Austria, 1814. Pop. 3100.

CATTEGAT, KATTEGAT (56° 50′ N., 11° E.), arm of N. Sea, separating Jutland from Sweden.

CATTERMOLE, GEORGE (1800–68), Eng. artist; b. Dickleburgh, Norfolk; chiefly known as a water-colour artist and book illustrator, but after 1850 he painted numerous pictures in oils; he excelled in treatment of hist. and military subjects; illustrated Waverley Novels.

CATTI, CHATTI, Germanic tribe of Rhine district, mentioned by Romans in III. cent.

CATTLE, a name applied to domesticated members of the ox family (*q.v.* for discussion of wild relatives). These include only the humped cattle, or Zebus (*Bos indicus*), of India, and the many varieties of straight-backed cattle referable to the single species *Bos taurus*. It is impossible to deal with the many races of the latter which have arisen through peculiarities of habitat, or more often through the efforts of breeders, but a few typical examples may be mentioned. Throughout the hilly districts of Wales and Scotland occur rather small-bodied, active cattle, with shaggy coats and generally well-developed horns. They are particularly suited for existence in cold climates and on hard, coarse food. Welsh cattle belong to the Anglesea, Merioneth, Glamorgan, and Pembroke races; the Highland cattle of Scotland are known also as Kyloes; and Shetland has a hardy and peculiarly diminutive race of its own.

The most common of pure-bred Scottish cattle are the black polled or hornless varieties known as Aberdeen-Angus and Galloway, the absence of horns in which appears to be entirely due to selective breeding. Well-known English races are the Herefords, the North Devons, and the Shorthorn, Durham, or Teeswater cattle. Famous for the quality of their milk are the smaller Jersey, Suffolk, and Ayrshire breeds. Between these pure breeds there are innumerable crosses, those in which Shorthorns take part being especially common and popular on account of their combined feeding and milking qualities.

CATTOLICA ERACLEA (37° 26′ N., 13° 23′ E.), town, Girgenti, Sicily; sulphur, salt. Pop. 8150.

CATULLUS, GAIUS VALERIUS (*c.* 87–54 B.C.), the greatest of Rom. lyric poets; his works consist of 116 poems, varying in length from a few lines to upwards of four hundred lines, some written in hexameter and elegiac measure, the greater number being brief lyrics. Perhaps most perfect of his poems are the series, covering a period of several years, addressed to Clodia, sister of Publius Clodius Pulcher, whom he has immortalised under the appellation of 'Lesbia.'

Eng. trans. by Sir T. Martin (1863), Ellis (1871), Munro (1878 and 1905); Davies, *Catullus, Tibullus, and Propertius*.

CAUB, KAUB (50° 5′ N., 7° 46′ E.), town, on Rhine, Pruss. province of Hesse-Nassau, Germany; exports wine; Blucher and his army crossed Rhine at C., Jan. 1, 1814.

CAUCA (*c.* 5° N., 77° W.), department, Colombia, S. America; rich in minerals; has most productive platinum mine in America; capital, Popayán; area, 20,403 sq. miles. Pop. 215,000.

CAUCASIA, CAUCASUS (38° to 46° N., 38° to 50° E.), part of Russia; bounded N. by series of lakes and depressions connecting Kuma and Manyoh rivers, E. by Caspian Sea, S.E. by Persia, S.W. by Asia Minor, W. by Black Sea; area, 182,500 sq. miles; includes Georgia, Circassia, part of Armenia, Akkhasia, Mingrelia, Shirvan, Daghestan. Surface consists of steppes and prairies in N., mountainous district in centre, with the valley of the Rion and Kur rivers separating the Great from the Little Caucasus, and the Trans-Caucasian highlands in the S. Chief rivers are Kur, flowing to Caspian, Rion to Black Sea, Kuban, Terek, and Kuma in N.; chief lake, Gokcha; chief towns, Tiflis, Kars, Batum, Achalzich, Baku, Poti; highest peaks, Mts. Elbrux and Kasbek.

History.—C. belonged in part to Romans and subsequently to the Byzantine Empire. Later it was invaded in succession by various barbarian tribes. Repeated attempts at conquest were made by Russia in the XIX. cent., by whom most of it was annexed or subdued by 1864.

In N. corn is largely grown; cattle raised, and vines cultivated. Central region is well wooded, with forests on the mountain slopes; and in valleys cereals, vines, mulberries, and many fruit trees are cultivated. Trans-Caucasia produces cotton trees, wheat and barley, and on coast, fruits, tobacco, cereals. Minerals include coal, naphtha, sulphur, copper, lead, salt, manganese. There are some mineral springs. Industries include shipping, silk and cotton manufactures, distilling, production of sugar; exports silk, cereals, timber, metal, carpets, etc.

C. is a general government, administered by a gov.-gen. who represents the Tsar; it is subdivided into five governments. The people are of many different races; in northern prairies are Russians, in central mountainous district Circassians, in Trans-Caucasia Georgians, Armenians, Kurds, Turks, Tatars, and other nationalities. Pop. (1910) 11,735,100.

Baddeley, *Russian Conquest of the Caucasus* (1908).

CAUCASUS (42° 30′ N., 45° E.), mountain range, Russia, extending from Taman peninsula, between

Azov and Black Sea, to Caspian; total length, *c.* 940 miles; forms boundary between Europe and Asia. At point equidistant from both seas range is divided by Darial Pass into two sections; immediately to W. is highest part of system, sometimes known as Central C., which extends as far as Mt. Elbrux; from Mt. Elbruz to Sea of Azov is Western C. To E. of Darial Pass is Eastern C., broadest part of system, which extends to Caspian; here peaks are lower and range is more broken by valleys. Highest peaks are Mt. Elbruz (*c.* 18,400 ft.), Dikhtan (*c.* 17,000 ft.), Koshtantau (16,900 ft.), Kasbek (*c.* 16,550 ft.).

Main chain is composed chiefly of granites and crystallines with sandstone and limestone deposits; some of highest peaks volcanic in origin, but range has no active volcanoes though earthquakes are frequent, and there are hot springs. Height of snowline is *c.* 9800 ft. in W., 12,200 in E.; many large glaciers; largest, Devdorak, Bezingi; no lakes. Climate and vegetation differ on N. and S. slopes; S. slopes have splendid forests, produce European fruits, figs, pomegranates, almonds, etc., in central and lower reaches. Fauna includes wolf, bear, jackal, fox, ibex. Minerals are iron, copper, manganese, lead, silver, coal, sulphur, naphtha. Rivers are Kuban, Terek, Kur. Broad valley separates Great from Little C. in Armenia, where highest peak is Alagoz.

Freshfield, *Exploration of Caucasus*; A Wanderer, *Notes on Caucasus*.

CAUCHON, PIERRE (d. 1442), Fr. ecclesiastic; bp. of Beauvais (1420); driven from his see (1429) owing to his overbearing manners, he attached himself to the interests of Henry VI. of England. He bears the inglorious distinction of having been the accuser and judge of the Maid of Orleans, whom he afterwards handed over to the secular authorities. He was excommunicated after death by Calixtus IV. and his body thrown into a ditch.

CAUCHY, AUGUSTIN LOUIS, BARON (1789–1857), Fr. mathematician, prof. of Math's, École Polytechnique (1815), Collège de France, and Univ. of Paris; prof. Mathematical Astron. (1848).

CAUDEBEC LES ELBEUF (49° 15′ N., 1° 4′ E.), town, Seine Inférieure, France; woollens; Rom. remains. Pop. *c.* 11,300.

CAUDEBEC-EN-CAUX (49° 31′ N., 0° 41′ E.), town, Seine-Inférieure, France; interesting early XV.-cent. church and other antiquities; tanneries.

CAUDINE FORKS, FURCULÆ CAUDINÆ (*c.* 41° N., 14° 30′ E.), two mountain gorges in ancient Samnium, Italy, leading to and from plain surrounded by mountains; here Samnites forced Romans to surrender, by barring both exits against them after they entered the valley, 321 B.C.

CAUDLE (O. Fr.), a hot drink consisting of gruel, wine, and spice.

CAUL, a close-fitting woman's cap, often of gold net, worn from XIV. to XVI. cent's; a portion of the membrane enveloping the fœtus, and sometimes covering the child's head at birth; such children are supposed to have a very fortunate future; these cauls are also held to be a safeguard against drowning, and they have often been sold for high prices. The fringe beneath the head of a halberd was also known as a 'caul.'

CAULAINCOURT, ARMAND AUGUSTIN LOUIS, MARQUIS DE (1773–1827), Fr. general and statesman; as an aristocrat he was imprisoned during the Revolution, but escaped, and eventually rose to eminence under Napoleon, who made him Duke of Vicenza, of which title he was afterwards deprived. He accompanied the Emperor in the Russ. campaign. During the 'Hundred Days' he acted as Foreign Minister.

Souvenirs du Duc de Vicence (1837–40).

CAUSATION, conception of operation of causes throughout universe. In metaphysics, sequence of cause and effect leads back to infinite series, whence Problem of First Cause; in psychology, the problem of the origin and validity of the notion. According to Locke, causation implies power, due to reflection on ourselves as causes; Hume affirms causation subjective, expectation due to custom; Mill, the invariable and unconditional sequence between phenomena.

CAUSEWAY (old form, 'causey'), mound or embankment across marshy ground; paved highway; cobbled pathway.

CAUSSADE (44° 9′ N., 1° 32′ E.), town, Tarn-et-Garonne, France.

CAUSSES (44° 30′ N., 3° 20′ E.), series of limestone plateaus, near head-waters of Tarn, southern France.

CAUSTIC is the term applied to a powerful irritant drug which, when applied locally to a part of the body, kills the part to which it is immediately applied, and causes dilatation of the blood-vessels in the area surrounding; *e.g.* nitric acid (concentrated), silver nitrate, arsenious acid, zinc chloride.

CAUSTICS, the envelope of luminous rays after reflection or refraction. Reflection c's may be observed on the surface of milk in a tumbler placed in direct sunlight.

CAUTERETS (42° 54′ N., 0° 7′ W.), town, France; mineral spring.

CAUTIN (39° S., 72° 30′ W.), province, S. Chile, S. America; capital, Temuco; produces wheat and cattle; area, 6377 sq. miles. Pop. 165,000.

CAUTION, Scot. legal term for warrantor, bail, and proviso in deed.

CAUTIONARY TOWNS, Briel, Flushing, Rammekins, and Walcheren, towns pledged by the Dutch in 1585 to Queen Elizabeth in return for loans for Span. War; freed, 1616.

CAUVERY, KAVERI (12° 20′ N., 75° 34′ E.), river, S. India; rises in W. Ghats, flows S.E. through Mysore and Madras, enters Bay of Bengal; forms extensive delta; total length, *c.* 472 miles; ancient *Chaberis*.

CAUX (45° 45′ N., 0° 35′ E.), district, Seine-Inférieure, France.

CAVA DEI TIRRENI (40° 42′ N., 14° 42′ E.), town, Salerno, Campania, Italy; cathedral; manufactures silks, woollens, linens. Pop. 5300.

CAVÆDIUM (Lat.), central court in a Roman house.

CAVAGNARI, SIR PIERRE LOUIS NAPOLEON (1841–79), Brit. military administrator; s. of Fr. and Irish parents; b. Stenay (France), became naturalised as Englishman, and entered East India Co.'s service; served in Oudh campaign; deputy-commissioner of Peshawar (1877); app. government-resident at Kabul, where he was murdered by mutinous Afghans, Sept. 3, 1879. He received the Star of India, and was made K.C.B.

CAVAIGNAC, JEAN BAPTISTE (1762–1829), Fr. politician; f. of Louis Eugène C.; voted in Convention for death of Louis XVI.; held several smaller administrative offices; was prefect of the Somme during the 'Hundred Days'; proscribed as a regicide at restoration, and spent later years at Brussels.

CAVAIGNAC, LOUIS EUGÈNE (1802–57), Fr. general; won distinction in Algeria, where he spent 16 years, being app. gov.-gen. of Algeria in 1848. Returning to Paris in same year, having been elected to the National Assembly, he quelled formidable insurrection (June 23–26). He was a candidate for the presidency of the republic, but was defeated by Louis Napoleon.

CAVAILLON (43° 51′ N., 5° E.), town, on Durance, Vaucluse, France; with XII.-cent. church and Rom. remains; ancient *Cabellio*; silkworms are reared, and silk is important item in trade. Pop. 5750.

CAVALCANTI, GUIDO (1250–1300), Ital. poet; m. Beatrice Uberti, and was head of the Ghibelline faction; was a friend of Dante, who praised his sonnets and *Canzone d' Amore*.

CAVALIER, term used in Shakespeare's day for a swaggering gallant, and in this sense applied by the Puritans of the XVII. cent. to the adherents of Charles I. It was, however, adopted as a title of honour by the Royalists, who dubbed their opponents 'Roundheads.'

CAVALIER, JEAN (1681–1740), Fr. Camisard

leader; b. Ribaute; s. of a peasant; ed. secretly by his mother as a Prot.; joined the Camisards (July 1702), and soon became their leader. When peace was established he came to England, later taking service under Peterborough in Spain. In 1726 he pub. his *Memoirs*; made Lt.-Gov. of Jersey (1738).

CAVALIERE, EMILIO DEL (b. 1550), Ital. composer; employed at court of Francis I. of Tuscany (1588–97); first composer of sacred musical dramas, or 'oratorios,' as they came to be called later.

CAVALIERI, FRANÇOIS-BONAVENTURE, Ital. scientist associated with Galileo.

CAVALLI, FRANCESCO (d. 1676), Ital. composer; as a youth he became a singer at St. Mark's, Venice, was later organist there, and subsequently *mæstro di cappella*; was first Italian to popularise opera, upwards of twenty of his own compositions in this kind being preserved in the library of St. Mark's.

CAVALLINI, PIETRO (1279–1364), Ital. artist; b. Rome; studied under Giotto; executed a large Crucifixion fresco at Assisi; some of his best work is to be found in Santa Cecilia in Trastevere, Rome.

CAVALLOTTI, FELICE (1842–98), Ital. democratic reformer and poet; fought in Garibaldian troops (1860 and 1866); pub. lampoons against monarchy in Milanese newspapers (1866–72); twelve years leader of reform party; fought over thirty duels, in the last of which, with Count Macola, he was killed.

CAVALRY, general name for mounted troops, whose employment in warfare dates back to very early times. To Sesostris, who flourished in Egypt sixteen cent's B.C., is attributed the earliest formation of a regular army. There is no evidence to show that he employed horse-soldiers, and from his time to rise of Persian Empire there was little development in military science. The Persians, however, who introduced the system of mass formation, included squares of c.; and the Greeks made considerable use of mounted soldiers.

In mediæval times the mounted division of an army was provided by the knights and their followers, armed with lance, sword, or battle-axe; but when, later, firearms came into use, it was the custom of the mounted men to gallop forward, and, having fired their pistols, either retreat for the purpose of reloading, or follow up the attack with swords or other arms. The dragoon was evolved from this method of fighting, for the value of mounted soldiers able to act as infantry was quickly recognised, and consequently dragoons armed with the musket were largely employed down to recent times.

At the present day c. forms a large proportion of the Brit. army, of which the regiments of Life Guards, Horse Guards, Dragoon Guards, and Lancers are classed as *heavy* c., while the Hussar regiments are known as *light* c.; all armed with magazine rifles and swords; there is also a very large native force of light Indian C., armed with lances, or sabres, and carrying magazine rifles.

U.S.A. c. is largest of any great army relative to infantry; organised in 15 regiments, each of 866 total peace strength, armed with rifle, sabre, and automatic revolver.

See TACTICS; also *Cavalry in Action in Wars of the Future*, H. Rees; *Cavalry on Service*, Rees; *Cavalry, its History, Management, and Uses*, Roemer (New York).

CAVAN (54° N., 7° 21′ W.), county, Ulster, Ireland; bounded by Fermanagh, Monaghan, Meath, Westmeath, Longford, Leitrim; area, 746 sq. miles; surface undulating; N.W. mountainous; watered by Annalee, Blackwater, Erne, Woodford; mineral springs; soil poor; agriculture chief industry; distilling, linen-bleaching; chief town, Cavan. Pop. (1911) 91,071.

CAVAN (53° 59′ N., 7° 22′ W.), market town, capital of C. County, Ireland; has remains of XIV.-cent. abbey.

CAVANILLES, ANTONIO JOSÉ (1745–1804), Span. ecclesiastic and botanist.

CAVATINA (Ital.), a simple melody as distinguished from the *aria* in operas or oratorio.

CAVE, EDWARD (1691–1754), Eng. publisher; founded (1731) and edited (as 'Sylvanus Urban, Gent.') the *Gentleman's Magazine*, which brought him a large fortune. He gave Dr. Johnson his first literary employment as parliamentary reporter for the magazine.

CAVE, WILLIAM (1637–1713), Eng. ecclesiastic; made canon of Windsor (1684), and was chaplain to Charles II.; he pub. (1677) *Apostolici* (Lives of the Fathers) and *Scriptorum Ecclesiasticorum Historia Literaria* (1688).

CAVEAT (Lat.), 'let him beware'—as to file a *caveat* in a probate court opposing the proving of a will; to enter a *caveat* against the granting, or renewal, of a patent. *C. emptor*, a legal maxim which means that a purchaser (*emptor*) must look after himself, the seller not being bound to disclose secret faults, though he may not conceal them.

CAVENDISH, LORD FREDERICK (1836–82), Brit. statesman; younger s. of Duke of Devonshire; became Chief Sec. for Ireland, 1882; assassinated in Phœnix Park, Dublin.

CAVENDISH, GEORGE (1500–62), Eng. historian; famous for his *Life* of Cardinal Wolsey, whom he served as gentleman-usher, and attended up to the time of his death. The work was not pub. until 1641, but it was freely circulated in MS. during C.'s lifetime, and was used by Shakespeare in *Henry VIII.*

CAVENDISH, HENRY (1731–1810), Eng. chemist and physicist; b. Nice; discovered hydrogen (1766), described its properties (1781), demonstrated composition of water and of nitric acid; determined density of the earth by 'Cavendish Experiment'; became member of Royal Soc., 1760; pub. researches in its *Philosophical Transactions.*

CAVENDISH, THOMAS, CANDISH (1555–92), navigator; b. Trimley, near Ipswich; sailed with Grenville to Virginia (1585); sailed from Plymouth (1586) with three ships, and, with John Davis, he was third circumnavigator of the globe, completing the voyage in little over two years.

CAVENDISH, SIR WILLIAM (1505–57), ancestor of Dukes of Devonshire; enriched from spoils of the monasteries; husband of celebrated 'Bess of Hardwicke,' afterwards Countess of Shrewsbury.

CAVIARE (now pronounced in three syllables), the salted roe of the sturgeon, prepared in Russia as a table delicacy, and known in Western Europe certainly as early as the XVI. cent., as is evidenced in the reference to it in Shakespeare's *Hamlet.*

CAVITE (14° 35′ N., 120° 50′ E.), fortified seaport, capital of C. province, Luzon, Philippine Islands; naval station; large tobacco factory. Pop. port, 5000; province, 136,000

CAVOUR (44° 46′ N., 7° 23′ E.), town, Piedmont, Italy. Pop. 6817.

CAVOUR, CAMILLO BENSO, COUNT (1810–61), Ital. statesman; b. Turin, of noble descent; ed. for army, but his liberal opinions proved incompatible with a military career, and he retired, 1831; took up agriculture and did much to improve economic conditions of Piedmontese; travelled in France and England, and closely studied the Brit. constitution, which he greatly admired; entered political arena, 1848, and was successively Minister of Agriculture, Commerce, Marine, and Finance; became Premier, 1852. In 1858 he entered into a secret treaty with Napoleon with a view to driving the Austrians out of Italy; he encouraged the efforts of Garibaldi; and the dream and struggle of his life was to found a united Italy, which he lived to see an accomplished fact. C. was one of the greatest statesmen of modern times.

Cadogan, *Cavour* (1907).

CAVY FAMILY (*Caviidæ*), a New World family of Rodents, with about 20 species. They are generally less than a hare in size and resemble in appearance the GUINEA-PIG (*Cavia*), which is a domesticated species;

but the S. American CAPYBARA (*Hydrochœrus capybara*) is the largest living rodent, reaching a length of 4 ft.

CAWDOR (57° 32′ N., 3° 55′ W.), village, Nairnshire, Scotland; C. castle is supposed scene of traditional murder of King Duncan by Macbeth, 1040.

CAWNPORE, KANPUR (26° 28′ N., 80° 24′ E.), chief town, district of C., United Provinces, Brit. India, on Ganges; important railway centre; military station; memorial gardens and church commemorate massacre of Europeans by Nana Sahib, July 1857; manufactures leather goods, and has large trade in grain. Pop. (1911) 178,557.

CAXIAS (5° 7′ S., 42° 50′ W.), town, Maranhão, Brazil. Pop. 25,000.

CAXTON, WILLIAM (1422–91), first Eng. printer; b. in the Weald of Kent; apprenticed to a London mercer, after whose death he went to Bruges to complete his apprenticeship, was successful in business, and became gov. of the Company of Merchant Adventurers in the Low Countries. Afterwards he entered the service of Margaret, Duchess of Burgundy, sister of Edward IV., and about this time he learned the art of printing. Returning to England in 1476, he set up his printing-press at the Red Pale in the Almonry of Westminster. His first book known to have been printed in England was the *Dictes and Sayings of the Philosophers* (1477); but he had already printed in English at Bruges the *Recuyell of the Historyes of Troye* (1474), and the *Game and Playe of Chesse*. He printed, among other books, the principal works of Chaucer, Gower, Lydgate, and Sir Thomas Malory's *Morte d'Arthur*, and was himself the translator of numerous works.

Blades, *Biography and Typography of C.*

CAYENNE (4° 56′ N., 52° 20′ W.), fortified seaport, capital of Fr. Guiana, on C. Island, at mouth of C. River; exports gold, woods, spices; gives name to well-known pepper; formerly Fr. penal settlement. Pop. 12,600.

CAYENNE PEPPER, preparation from species of capsicum (principally *Capsicum fastigatum*), the fruits being known as chillies. C. is hot and pungent, due to presence of alkaloid *capsicine*; used as spice and stimulant in medicine.

CAYES, LES (18° 12′ N., 73° 30′ W.), port, Haiti, W. Indies; coffee. Pop. 12,000.

CAYEY (18° N., 66° 24′ W.), town, Porto Rico; summer resort; produces coffee and tobacco. Pop. 4000.

CAYLEY, ARTHUR (1821–95), Eng. mathematician; b. Richmond (Surrey); senior wrangler and Fellow of Trinity Coll., Cambridge (1842); Sadlerian prof. of Math's (1863); delivered famous address, Brit. Association (1883); wrote extensively on mathematical subjects.

CAYLUS, ANNE CLAUDE PHILIPPE, COMTE DE (1692–1765), Fr. archæologist; b. Paris; served in Span. War of Succession; travelled in Greece, Italy, England, and Germany, collecting antiquities; was a noted engraver; his chief publication was *Recueil d'Antiquités égyptiennes, étrusques, grecques, romaines, et gauloises* (7 vols., 1752–67).

CAYLUS, MARIE MARGUERITE, MARQUISE DE (1673–1729), Fr. writer; mother of Mme de Maintenon, and author of scandalous *Souvenirs*.

CAYMAN, see ALLIGATOR.

CAYMAN ISLANDS (19° 44′ N., 79° 44′ and 80° 26′ W.), three islands, Caribbean Sea, N.W. of and under government of Jamaica; discovered by Columbus; staple production, turtles.

CAZALLA DE LA SIERRA (37° 56′ N., 5° 51′ W.), town, Seville, Spain. Pop. 9000.

CAZEMBE, hereditary name of African chief originally occupying territory between the Mweru and Bangweulu lakes. From the XVIII. cent. onwards the C. was a ruler of great power and influence. David Livingstone visited the C. in 1868. The country now forms part of Rhodesia and the Belgian Congo, and the latter division is the centre of a thriving copper industry.

CAZIN, JEAN CHARLES (1840–1901), Fr. landscape artist; spent some time in England, and his earlier pictures were influenced by Pre-Raphaelite movement; later successes, *Souvenir de fête* (1881) and *Journée faite* (1888); officer of Legion of Honour.

CAZORLA (37° 55′ N., 2° 57′ W.), town, Jaen, Spain. Pop. 6000.

CAZOTTE, JACQUES (1719–92), Fr. author; held official appointments until middle life, when he turned his attention to authorship; wrote romances, Oriental tales, and narrative poems; was best known as author of a fantastic romance, *Diable amoureux* (1772).

CEARÁ (5° S., 39° W.), maritime state, N. Brazil area, 40,247 sq. miles; has Serra Grande and Serra Araripe in W.; drained by Jaguaribe, Acarahu; capital, Fortaleza; climate healthy, but hot; droughts occur; produces coffee, cotton, medicinal plants, sugar, fruits, wax, rubber; cattle raised; minerals include iron, copper, salt. Pop. 890,000.

CEAWLIN (d. 593), king of West Saxons; obtained many victories over the Brit. kings; destroyed Uriconium (near Wrekin) and Pengwyrn (Shrewsbury); was himself finally overcome, and d. in obscurity.

CÉBÈS (fl. V. cent. B.C.), disciple of Socrates in Plato's *Dialogues*.

CEBIDÆ, family of Primates (*q.v.*).

CEBÚ (10° 20′ N., 123° 57′ E.), port of entry, Cebú Island, Philippines; chief commercial city; cathedral; exports hemp, tobacco, sugar. Pop. 31,500.

CECCANO (43° 33′ N., 13° 21′ E.), town, Rome, Italy. Pop. 10,000.

CECCO D'ASCOLI (1257–1327), Ital. encyclopædist and poet; is chiefly known as author of the *Acerba*, an encyclopædic poem in four books covering the entire gamut of the then known arts and sciences, morals, etc. (numerous editions); tried for impiety at Florence, found guilty, and burned at the stake.

CECIL, noble Eng. family, of which there are two distinct branches. WILLIAM CECIL, Lord Burghley, Queen Elizabeth's great minister; b. Bourne (Lincoln); belonged to the Stamford Cecils; he m. (1) Mary Cheke, by whom he had a s., Thomas, cr. by James I. 1st Earl of Exeter; m. (2) Mildred Cooke, who bore him a s., Robert, cr. by James I. Lord C. of Essendene, Viscount Cranborne, and Earl of Salisbury (1605). Thus the Hatfield Cecils are a younger branch of the family. A marquessate was given to the 10th Earl of Exeter (*i.e.* the Stamford line) in 1801, who m. Sarah Hoggins, a Shropshire farmer's dau.; their story has been celebrated in song by Tennyson. This elder branch of the family is still established at Burghley.

CECILIA, ST., Christian martyr; festival, Nov. 22; patron of music and blind persons. According to Fortunatus, bp. of Poitiers, she suffered martyrdom in Sicily, under Marcus Aurelius, some time between 176 and 180. A church to perpetuate her fame existed at Rome in the IV. cent., and has been several times rebuilt. She has been the theme of many artists, and Dryden's famous ode, and others of less note, were written to celebrate her festival.

CECROPS, mythical founder of Athens and teacher of arts of civilisation to Attica.

CEDAR, tree of order Coniferæ; *Cedrus libani* (cedar of Lebanon), *Cedrus deodara* (sacred deodar of India), *C. atlanticus* (N. Africa), furnish excellent timber; that of *C. libani* was used in building of Solomon's temple; *C. deodara* supplies a turpentine beneficial for skin diseases; *Juniperus Bermudiana* and *Cedrela toona* (a West Indian species) yield cedar wood which is used for pencils, etc.

CEDAR CREEK (39° 5′ N., 78° 26′ W.), stream, Virginia, U.S.A.; flows E. into N. fork of Shenandoah; scene of defeat of Confederates by Federals, Oct. 19, 1864.

CEDAR FALLS (42° 32′ N., 92° 27′ W.), city, on Cedar, Iowa, U.S.A.; cereals produced. Pop. (1910) 5012.

CEDAR RAPIDS (41° 57′ N., 91° 40′ W.), city, on Cedar, Iowa, U.S.A.; railway and manufacturing centre; extensive flour-mills. Pop. (1910) 32,811.

CEDILLA, mark ¸ placed under letter c (soft) in French.

CEFALU (38° 1′ N., 14° 3′ E.), seaport, Palermo, Sicily; ancient *Cephalœdium*; cathedral and ruined castle; chief industries, marble-quarrying and fishing. Pop. 11,788.

CEGLIE (40° 40′ N., 17° 31′ E.), town, Italy. Pop. 17,000.

CEHEGIN (38° 5′ N., 1° 48′ W.), town, Murcia, Spain; wine, olive oil, and hemp chief products; fine black marble quarries in vicinity. Pop. 10,000.

CELÆNÆ (38° 5′ N., 30° 20′ E.), ancient city, Phrygia; residence of Xerxes.

CELANO (42° 7′ N., 13° 35′ E.), town, Aquila, Italy; birthplace of Thomas of Celano, Latin poet. Pop. 7600.

CELAYA (20° 34′ N., 100° 28′ W.), town, Mexico; carpets, textiles. Pop. (1910) 23,112.

CELEBES (2° 20′ S., 120° 20′ E.), island of Great Sunda group, Dutch East Indies, on equator; separated from Borneo by Strait of Macassar, and bounded N.E. and S. by Celebes Sea, Molucca Sea, and Sunda Sea respectively; area, 71,470 sq. miles; curiously shaped, four long finger-like peninsulas radiating N.E., E., S.E., and S., with mountain ranges running down each; highest peaks, Bonthain, Donda; drained by Sadang and other streams; chief lake, Paso; climate healthy except along coast; rainfall not excessive. C. produces sago palms, cocoa-nuts, coffee, nutmegs, tobacco, sugar-cane, cotton; exports also rubber, gums, pearls, trepang, tortoiseshell, edible birds'-nests, sandalwood, ebony, teak; coal, iron, copper, tin, and sulphur found. Portuguese founded settlement at Macassar, 1525; expelled in 1660 by Dutch, whose authority has been recognised by native princes since early XIX. cent. Pop. *c.* 800,000. See MALAY ARCHIPELAGO.

CÉLESTE, MADAME (1815–82), Fr. dancer and actress; managed Adelphi and Lyceum.

CELESTINA, LA, alternative title of the *Comedia de Calisto y Melibea*, an anonymous Span. dramatic romance which was popular in Europe during XVI. cent. (Eng. trans. by James Mabbe, 1631).

CELESTINE, name of five popes.—CELESTINE I., pope, 422–32, sent Palladius and St. Patrick to preach in Ireland. CELESTINE V., pope in 1294, abdicated same year; imprisoned by Boniface VII.; canonised, 1313; founded *Celestines*, ascetic order of Benedictines; they wore white robe with black hood, scapular, and mantle; are now almost extinct.

CELESTINE ($SrSO_4$), native sulphate of strontium; occurs in Sicilian sulphur mines; transparent and finely crystalline; bright blue, red, and yellow; used in manufacture of fireworks.

CELIBACY, the unmarried state, is in several religions held to be necessary to the highest human perfection. Before Christianity it had taken root in Buddhism, and the Essenes, a Palestinian monastic order, also practised it. In the Jewish Church priests were bound to continence at certain times only. Christ commended voluntary c., and St. Paul, while insisting on the excellence of virginity, assumed the right of bp's and priests to marriage. By the II. cent. the taking of vows of chastity had become a pious custom. In the IV. cent. Pope Damasus insisted on the c. of bp's, priests, and deacons of the Western Church; but for some cent's the papal decretals were ignored. In the XII. cent., however, the marriage of those in Holy orders was declared null and void, and this was confirmed by the Council of Trent. In the Eastern Church c. has never been adopted, and the practice of the modern Gk. Church is to allow candidates for Holy orders to get married, if they wish, before ordination. Marriage after ordination is not permitted, and bp's are recruited from the unmarried clergy.

H. C. Lea, *History of Sacerdotal Clergy* (1907).

CELL, a unit mass of living matter usually containing a nucleus. All plants and animals are built up of cells and their products, the simplest organisms (*Protozoa* and *Protophyta*) and the male and female elements (*gametes*) being single cells. In size cells may vary from structures only discernible through high power lenses to large eggs distended with yolk. The simplest form of cell is a sphere, but under varying conditions it may be oval, polygonal, star-shaped, or assume thread-like or other shapes.

A cell essentially consists of the *cytoplasm* (cell-substance) which is composed of foam-like or fibrillar living matter (protoplasm (*q.v.*)), and carbohydrates, yolk globules, fats, or pigments (*metaplasm*); the *nucleus*, which plays an important part in the metabolism (*q.v.*) of the cell, especially in reproduction, usually consists of a network of strands, a coiled thread, or bodies (*chromatin*) which are stainable with certain dyes, and a less stainable substance (*achromatin*). In many nuclei one or more round bodies or vacuoles (*nucleoli*) have been observed, which seem to collect the waste matter produced by the metabolism of the cell; the *centrosome*, a 'center of energy,' seems to direct the division of the cell. The *cell-wall* is a less essential structure, composed of cellulose in most plant cells, while certain animal cells may form a cuticle or secrete a sheath usually consisting of chitin.

In a growing cell the mass increases proportionately more than the surface, so that the latter is unable sufficiently to absorb oxygen or nutriment, and to get rid of the waste matter, therefore cells generally divide at a definite limit of growth. In some cases the division is merely a cleavage of the nucleus (*amitosis*) followed by that of the cytoplasm, but generally a complicated process known as *mitosis* or *karyokinesis* takes place. The following are the principal stages: (1) Nucleus 'resting'; chromatin is scattered, two centrosomes being surrounded by a *centrosphere*. (2) Chromatin arranged in a coil which breaks up into *chromosomes* (each species of plants and animals having a definite number); centrosomes form 'diasters' connected by a 'spindle.' (3) Chromosomes become attached to fibres of the spindle. (4) Centrosomes move to lie opposite to one another; chromosomes arranged in the equator of the spindle. (5) Each chromosome splits in two. (6) Daughter chromosomes separate and move towards the spindle poles; the latter divide in readiness for the next karyokinesis. (7) Spindle and asters are disappearing; chromosomes grouped at spindle poles; constriction of cell body. (8) Division complete; nuclei resting as in stage (1). See CYTOLOGY, EMBRYOLOGY, TISSUE.

E. B. Wilson, *The Cell in Development and Inheritance* (2nd ed., 1900); O. Hertwig, *Allgemeine Biologie* (Jena, 1906).

CELLE (52° 38′ N., 10° 3′ E.), town, on Aller, Hanover, Prussia; manufactures tobacco, woollen yarn, etc. Pop. 22,000.

CELLIER, ALFRED (1844–91), Eng. composer; b. Hackney; was conductor at Princes Theatre, Manchester (1871–75), where in 1874 he produced his popular *Sultan of Mocha*. His greatest success was *Dorothy*, produced at the Gaiety Theatre, London, in 1886. His other operas, *Doris* (1889) and *The Mountebanks* (1892), were comparative failures.

CELLINI, BENVENUTO (1500–71), Ital. artist, metal-worker, sculptor, and flautist. Nothing but his famous and inimitable *Autobiography* can do justice to his many-sidedness. He was b. at Florence; s. of musical instrument maker; apprenticed to a goldsmith; then took up flute-playing, and became one of the Pope's court musicians. He enjoyed considerable patronage as a metal-worker under Clement VII., but his penchant for brawling led to his constant change of domicile, and he lived at Siena, Pisa, Rome, and Florence, changing his profession as often as his place of residence. Amongst other exploits he claimed to have shot the Constable

de Bourbon with his own hand during the attack on Rome, 1527. Perhaps his greatest work as sculptor is the bronze group, *Perseus holding the head of Medusa*, in the Loggia dei Lanzi, Florence.

Trans. of *Autobiography* by J. A. Symonds (1887), by Roscoe (1904).

CELLULOID, dried solution of gun cotton (pyroxylin) and oil; obtained by treating cellulose with nitric and sulphuric acids; first made by Parkes of Birmingham (*c.* 1856); not acted upon by atmosphere or water; can be coloured and, when plastic, at 175° F., moulded; when hard can be carved and turned; highly inflammable; used for collars, combs, buttons, billiard balls, etc.

CELLULOSE forms the chief component of vegetable cell wall and hence of all vegetable tissues, and is the product of the vital activity of plants in building up their structure from carbon dioxide and water. It is, in chemical constitution, a carbohydrate representable by the formula $(C_6H_{10}O_5)^n$, and is obtainable pure from cotton or linen fibre by boiling out impurities with alkali, alcohol, or ether. Cotton, wool, and ordinary filter paper are nearly pure forms of C. It is a white opaque substance appearing under microscope as a fretwork of thin flattened tubes, is insoluble in water, alcohol, ether, and dissolves in an ammoniacal solution of copper hydroxide. It yields a blue colour when treated with dilute sulphuric acid and iodine, becomes viscous when treated with strong sulphuric acid, and if then diluted with water and boiled is converted into dextrose (grape-sugar). Unsized paper dipped into strong sulphuric acid is converted into 'parchment paper' or 'vegetable parchment.' Strong nitric or preferably nitro-sulphuric acid converts it, after being dried, into an inflammable nitrate or nitric ether used for explosives as *gun-cotton* and *pyroxylene*.

C. is soluble in alkaline thiocarbonates, the solution, called *viscose*, being used for spreading on cloth or paper, a coating of c. being deposited by its evaporation. Besides being the source of valuable derivatives c. itself is used in the fibrous state as cotton, linen, hemp, and jute in textile industries, and as a pulp, obtained from wood or esparto grass, in the manufacture of paper.

Cross and Bevan, *Researches on Cellulose*.

CELSIUS, ANDERS (1701–44), Swed. physicist; prof. of Astronomy, Upsala, 1730–44; measured arc of the meridian in Lapland; devised the centigrade thermometer.

CELSUS (II. cent. A.D.), Platonic philosopher and opponent of Christianity, which he attacks in his *True Word*; see J. A. Froude, *Short Studies*, iv.

CELSUS, AULUS CORNELIUS, see ANATOMY, MEDICINE, SURGERY.

CELTIBERIA, name given by Greeks and Romans to large district in N.E. Spain, peopled by the Celtiberi tribes who were formed by intermixture of Celtic invaders with Iberians in Spain (*q.v.*).

CELTS was the name given by classical writers to all people living north of the Alps. In British history it is applied to the tall, fair-haired, blue-eyed race that invaded Britain from Gaul about the VI. cent. B.C., dominated and coalesced with the Iberian people it found there (to whom it taught the use of iron), founded the states overthrown by the Romans, and finally after the Anglo-Saxon invasions in the V. cent. is popularly supposed to have been exterminated in England and survived only in Ireland, Wales, Man, the Scottish Highlands, and Cornwall, while a section crossed from the south to France and founded the Celtic State of Brittany (Armorica).

Celtic Languages.—These comprise Irish, Welsh, Manx, Gaelic, Cornish, and Breton, all members of a common Indo-European linguistic family, but dividing themselves into two groups called Goidelic and Brythonic, closely related and having many similarities in vocabulary and grammatical construction, especially in inflectional forms and initial mutation, but differing essentially in changing prehistoric initial *qv* into *c* and *p* respectively. Irish (Erse) is the parent of the Goidelic group, which comprises also Gaelic and Manx. In the Brythonic group, but not so closely related, are Welsh, Breton, Cornish, very alike in their oldest forms, but diverging later under the influence of neighbouring tongues. All with the exception of Cornish are living languages. Over half a million people speak Breton only, and in one of the four dialects of which *Léon* is the purest and *Cornouaillais* the most widely spread. (Grammar and Lexicon by Le Gonidec.)

Celtic Literature.—Cornish, Manx, and Gaelic have but a small literature. In the first, apart from lists of words and proper names, we have the Bodmin Gospels and a few religious plays or interludes dating from the XV. to the XVII. cent. Manx likewise can claim chiefly ballads and carols of a semi-religious type. Scottish Gaelic literature was purely Irish literature until the XVIII. cent., when the Jacobite invasions and the loss of Gaelic independence caused the growth of an independent literature having Jacobitism, religion, and a melancholy sentiment of love and lament for the Highlands and their fortunes as its chief themes. The most prominent authors were Mary Macleod (1558–1693), Alexander Macdonald (d. 1710), and especially James Macpherson (1736–96), who published Gaelic poems falsely purporting to be by the enigmatical Ossian and dragging the true work into undeserved disrepute and fiercely prolonged contention. The two most important pieces of old Breton are the mystery plays, *The Mystery of St. Nonna* and *The Great Mystery of Jesus*, which come (at latest) from XIV. cent. But there are collections of ballads (*gwerzion*) and songs (*sonion*), pub. in XIX. cent. by La Villemarqué and Luzel.

Irish Literature in the early and middle periods is the most prolific of all Celtic literatures. The earliest survivals date from the V. to the XI. cent., and consist of glosses upon the Gospels and Fathers, hymns, services of the Mass, homilies, and calendars. They are collected in the *Thesaurus Palæohibernicus* of Stokes and Strachan. Middle Irish literature is particularly rich. We have annalistic works such as *Tigernach*, *Loch Ke*, the *Annals of Ulster*, *Chronicon Scotorum*, and the *Book of the Four Masters*, in collections dating from the XI. to the XVII. cent. Other historical prose is the saga called *Cogad Gœdil re Gallaib*, describing the triumph of Brian Borumha over the Norsemen at Clontarf, the *Triumph of Turlough O'Brien* (1459), by John MacCraith, dealing with the history of Munster, and the famous *History of Ireland to the Norman Conquest*, by Geoffrey Keeting (1570–1646).

But Middle Irish is most famous for its epic literature, both prose and verse, which is found in the *Book of the Dun Cow* (*Lebor nah-Uidre*, XII. cent.), the *Book of Leinster* (XII. cent.), the *Yellow Book of Leccan* (XIV. cent.), the *Book of Ballymote* (XV. cent.), and the *Leabhar Breac* (*Speckled Book*, XVI. cent.). These are all transcriptions of much older matter, and contain miscellaneous historical, genealogical, and legendary lore, many breezy short stories like the 'Tale of the Three Young Clerics,' and especially the stories of the 'Ulster Cycle,' of which the most important is the great *Tain Bo Cualnge*, or the 'Raid of the Dun Cow.' This relates how the king and queen of Connaught invaded the lands of Conchobar, king of Ulster, when the whole of the Ulstermen were stricken by a periodical sickness caused by enchantment, and how they were repelled by the single might of the demi-god Cuchulinn, the central hero of the cycle, who from his youth had performed superhuman feats, running down deer on foot and killing opponents by the shock of his club on the earth, or paralysing them by horrible physical contortions such as contracting his eye to a pin point or expanding it to the size of a lake. The tale is long, but written with spirit and humour, and its barbaric splendour and pagan sentiments are little softened by the Christianised versions that have come down to us.

The cycle is formed by other tales that have gathered round it as amplifications of its prominent persons and events, of which the most dramatic is the 'Tale of Bricriu's Feast,' the most beautiful the *Tain Bo Fraech*, and the 'Tale of the Life and Death of Deidre.' The *Yellow Book* and the *Dun Cow* also contain versions of the mythical story of the voyage of Bran and his companions in search of beauty, happiness, and immortality.

In the XII. cent. there originates a Fenian or Ossianic Cycle around the personalities of the poets Finn and Ossian, which eventually superseded the Ulster Cycle, although it was really inspired by it. The most famous of the Ossianic ballads is in the *Book of the Dean of Lismore*, by James Macgregor and his brother Duncan (1512–26), which is a Scottish compilation.

Middle Irish verse, apart from the poems of the Ulster and Ossianic Cycles, is still under investigation, but much matter of a lyrical nature has been collected and published by Kuno Meyer and Douglas Hyde, such as Meyer's *Four Irish Songs of Summer and Winter* and Hyde's *Around the Fire*. Much of it is heroic and bardic, in praise or lament of patrons, and written in highly elaborate and artificial metrical forms. But by the XVII. cent. this slowly vanishes, and a line of poets appears using vowel rhyme and accent and adopting modern topics, until the Gaelic League in recent years revived an interest in past literature, attempting to stop the deterioration that set in through the corrupting influence of English.

Welsh Literature, like the Irish, has early specimens of glosses of the IX. and X. cent's. It has also the remains of exceedingly ancient epic verse in the productions of the cynfeirdd, Aneurin Taliessin, and Myrddin or Merlin, and Llywarch Hen, whose works are probably in part an agglomeration of the works of many forgotten bards singing of the British heroes who opposed the advance of the Anglo-Saxons in the V. cent. onwards. It is all said to date before the X. cent. The resistance to the Normans in the XII. cent. caused a national revival, expressing itself in a literary revival. Of this the poems of Meilir and his descendants, Gwalchmai, Einion, and Meilir, and of the musical Cynddelw and the princely Owen Cyfeiliog and Howel ap Owen were the signal. Its prose monument was the lively and graphic *Life of Gruffydd ap Cynan*, the patron of the movement. The XIII. cent. maintained the traditions of the XII., inspired by the successes of the Llewelyns against the English, and ended with the touching eulogy written by Gruffydd yr Ynad Coch upon the last of the Welsh princes. All of this verse is bardic, and written in a rigid artificial elaborate framework of alliteration, assonance, and internal rhyme.

Until the end of the XIV. cent. Wales was voiceless, and then the Renascence found and the influence of French and Provençal verse produced in *Dafydd ap Gwilym* a poet of the very first rank, who brought his favourite form of the cowydd (rhyming couplets in seven syllables) to its perfection in his voluptuous but infinitely artistic and tender verses. This represented a movement to modify the cramping effects of earlier styles, but by the middle of the century a reaction set in, stimulated perhaps by a revival of the old-fashioned type of poems of war and patronage during the palmy days of Owen Glendower. This produced poets of the pure bardic type writing in the closed metres, among whom David ap Edmund was prominent as the sponsor of the restored style. Gutyn Owen, a popular favourite Tudur Aled, Robin Ddu O Fon, and Lewis Glyn Cothi and Gruffydd Hiraethog. Middle Welsh, like Irish, has its cycle of romances in the 'Tales of the Mabinogion,' preserved for us in the *White Book* and in the *Red Book of Hergest*. Part of these are later versions of very ancient compositions betraying a pagan origin and part a Welsh contribution to the mediæval tales of chivalry. In the latter the central hero is King Arthur, whose renown had been revived in the XII. cent. by Geoffrey of Monmouth. Research has shown that Irish and French influences have affected both classes of stories, but their perfection of style and their artistic treatment are unique.

Welsh literature has shown greater vigour, versatility, and purity than any other Celtic literature, continually increasing its scope and resisting the corroding influence of English to modern times. It was aided by the revival of prose literature in the XVI. cent., when Salesbury translated the New Testament in 1567 and Bishop Morgan (d. 1604) translated the Bible into Welsh, and thus standardised the language and led the way in a series of translations and adaptations of English religious works like Kyffin's *Deffyniad Y Ffydd*, Morgan Llwydd's *Llyfr Y Tri Aderyn*, Theophilus Evans's *Drych Y Prif Œsœdd*, and Ellis Wyn's *Gwelidigæthu Y Bardd Cwsg*. At any rate, beginning with Huw Morus (1622–1709) and Lewis Morus (1700–65), a sustained revival set in, producing the greatest master of the closed metres, Goronwy Owen (1722–69), William Williams of Pant y Celyn, a hymnologist of transcendent power; Twm o'r Nant (Thomas Edwards), of lesser calibre, but the most popular author of interludes and ballads; Dr. Lewis Edwards, essayist and theologian (1809–87); and Daniel Owen, novelist (1836–95). This movement never lost force, because it had emancipated itself from the bardic narrowness and appealed to the people at large. A new line of popular poets, mostly of humble origin and avocation, writing in the free metres or in looser adaptations of the old, brought the Welsh lyric to perfection. Their number is great and their work possessed of lasting merit, but it will suffice to mention Ieuan Glan Geirionydd (1795–1855), Ceiriog (1832–57), and Islwyn (1832–78), who was perhaps the greatest of all Welsh poets of the XIX. cent.

Maclean, *Literature of the Celts* (1902); Macneill, *Literature of the Highlanders* (1892); Morrice, *Manual of Welsh Literature* (1909); Hull, *Text-Book of Irish Literature* (1908); Rhys, *Celtic Britain* (1908).

CEMENT is a material used for sticking things together, and therefore might include gum, glue, paste, plaster of Paris, mortar, etc. The term, however, generally implies *hydraulic* c., which sets under water. This consists of silicates of lime and alumina, with smaller quantities of magnesia, oxide of iron, etc., and may be made from volcanic tufas, blast furnace slag, or wholly artificial mixtures. The chief c. is *Portland* c. (yielding a product resembling Portland stone); its composition is as follows (Blount): silica, 21·76 %, insoluble matter, 0·78, alumina, 6·77, ferric oxide, 3·43, lime, 62·06, magnesia, 1·14, sulphuric anhydride, 1·55, carbon dioxide and water, 1·72, alkalis and loss, 0·79.

The available materials for c.-making, which may be chalk, limestone, marl, clay, shale, etc., are employed in proportions determined by their composition; an Eng. mixture is 3 parts of chalk to 1 of Medway mud. The ingredients are mixed into a thick paste called *slurry*, ground wet, and dried into a tough cake which cracks into blocks ready for roasting in kilns heated with coke to 1500° C. The mass nearly fuses, forming *clinker*, a solid solution believed to contain tricalcium silicate (Ca_3SiO_5) and aluminate ($Ca_3Al_2O_6$), which is ground till floury. Fineness and specific gravity (3·15) are criteria of c.

The power to harden while wet distinguishes c. from mortar, whose hardening follows drying, and is due to carbonation of lime. When mixed into a paste with water, c. stiffens in a time varying from a few minutes to some hours, but gradually hardens over a longer period.

The following changes are believed to take place during hardening:—

$$2Ca_3SiO_5 + 9H_2O = (CaSiO_3)_2.5H_2O + 4Ca(OH)_2$$

$$Ca_3Al_2O_6 + Ca(OH)_2 + 11H_2O = Ca_4Al_2O_7.12H_2O.$$

The former reaction, including both hydrolysis and hydration, probably accounts for the hardening, which, like the setting of plaster of Paris, is due to transition

to a less soluble, crystalline form, through the medium of water. Uses: For pavements and tanks, for making concrete for docks, harbours, bridges, lighthouses, foundations of buildings, and reinforced or steel concrete (*q.v.*).

Cement Manufacture in Great Britain, W. H. Stanger and B. Blount.

CÉNACLE, Fr. name for gathering at the 'Last Supper'; afterwards applied to literary clubs, especially *Romantiques* gathered round Victor Hugo.

CENCI, BEATRICE (1577–99), Ital. parricide; b. Rome. Her f., Francesco C., a man of great wealth and an adjudged criminal from his eleventh year, was murdered while asleep by two assassins hired by his wife, Lucrezia, Beatrice, and several sons. The two women were found guilty, and beheaded. Beatrice's defence was that her f. had forcibly committed incest with her, but the charge rests entirely on the unsupported statement of her advocate, Farinaccio, who is known to have made false statements. Beatrice's own life was not free from error, and she made provision in her will for the care of 'a certain poor boy,' said to have been an illegitimate son.

Article in *Edinburgh Review* (1879); P. B. Shelley, *The Cenci*.

CENIS, MT. (45° 17′ N., 7° E.), peak of Alps, between France and Italy; the pass, 6700 ft. high, is much used; over it a road was constructed by Napoleon. Near M. C. is tunnel of same name; 8 miles long; cost *c.* £3,000,000.

CENOBITES, monks who, like the Benedictines, live a common life in conventual foundation, as opposed to anchorites (hermits or eremites) who live in solitude.

CENOTAPH ('empty tomb'), commemorative monument or tablet to person buried elsewhere; originally employed in cases where the bodies of persons could not be recovered, such as death in foreign wars, or by drowning.

CENSOR.—(1) Title of two Rom. officials whose business was to register the citizens and assess their property, and to regulate morals and conduct. (2) An official in the univ's of Oxford and Cambridge who is responsible for the conduct of the non-collegiate students.

CENSORSHIP.—(1) **Press.**—In Tudor times the Company of Stationers regulated printing under control of Star Chamber. Milton in *Areopagitica* protested against Parliament's c. It was abolished, 1695, The John Wilkes case, 1764, and 'Junius' prosecution, 1770, confirmed right of press to criticise king and Parliament; and in 1835 pressmen were admitted to parliamentary debates.

(2) **Drama.**—In Elizabethan times the Government regulated plays through the Master of the Revels; in James II.'s reign the Lord Chamberlain became censor. C. was mainly political. In 1642 the theatres were closed by the Puritans. In Charles II.'s reign grossness in plays was general. The modern c. dates from 1737, when Walpole muzzled Fielding, who in plays criticised politics; the Act of 1737 limited the number of theatres. By the Theatres Act, 1843, a play must be licensed by the Lord Chamberlain before public performance; penalty for breach of Act, £50 and forfeiture of theatre licence. Parliamentary committees, 1866 and 1909, vindicated system. Supporters of c. claim that it is necessary to protect public morality; opponents declare that it trammels original thought. Modern plays banned include Ibsen's *Ghosts*, Maeterlinck's *Monna Vanna*, Shaw's *Mrs. Warren's Profession*, Barker's *Waste*.

CENSUS, a numbering of the people; formerly used also for the purpose of assessment of property. Some such method has been in use from the earliest times, though in the beginning it was chiefly employed to ascertain the fighting strength of a tribe or people. It was under the Rom. Empire, however, that the system was first established upon a thorough basis. The c. was then taken every five years. During mediæval times, and even down to the XVIII. cent., there were religious objections raised to the taking of a c., in support of which the disaster which overtook David was quoted (1 *Chronicles* 21), beginning, 'And Satan stood up against Israel, and provoked David to number Israel.' Some such dread, and the fear of making Britain's enemies acquainted with the limit of her fighting strength, was the cause of a c. bill being thrown out, which was introduced into Parliament in 1753; but a second bill successfully passed through both Houses in 1800. The first decennial c. for Gt. Britain was taken in the following year. Sweden, in 1749, was the first country to undertake a complete c. in modern times; an American c. was taken in 1790; and a French in 1801. C's are now taken every ten years in U.S.A., Russia, Italy, Austria, Belgium, Norway, India, and the Brit. colonies; in France and Germany every five years; and in some other countries at irregular periods. By an Act of 1906 a *Census of Production* of trade is to be taken periodically.

CENT, Amer. coin, value $\frac{1}{100}$th part of dollar (*i.e.* ½d.); it is contraction of Fr. **centime** (Lat. *centesimus*), $\frac{1}{100}$th part of franc.

CENT JOURS, LES, HUNDRED DAYS, see FRANCE (HISTORY).

CENTAUR (classical myth.), hybrid creature, half horse, half man. Also name of a S. constellation (*Centaurus*); has ten stars brighter than the third magnitude; *Alpha Centauri*, inferior only to Sirius and Canopus in brilliance, is the nearest star (25 billions of miles distant), and is a revolving double star.

CENTERING, wooden structure over which a stone arch is built.

CENTERVILLE (40° 43′ N., 92° 23′ W.), city, Iowa, U.S.A.; coal mines. Pop. (1910) 6936.

CENTIGRADE, see THERMOMETER.

CENTIMETER, see WEIGHTS AND MEASURES.

CENTIPEDE, see MYRIAPODA.

CENTLIVRE, SUSANNA (d. 1723), Eng. playwright and actress; wife of Joseph C., Queen Anne's cook; author of *The Perjured Husband* (1700), *Love at a Venture* (1706), *The Busybody*, *A Bold Stroke for a Wife*, *The Wonder*, and other plays.

CENTNER, see WEIGHTS AND MEASURES.

CENTO (44° 44′ N., 11° 16′ E.), town, Ferrara, Italy. Pop. 4500.

CENTRAL AFRICA PROTECTORATE, see BRITISH CENTRAL AFRICA.

CENTRAL AMERICA, see AMERICA.

CENTRAL CITY (39° 53′ N., 105° 39′ W.), town, Colorado; gold and silver mines.

CENTRAL FALLS (41° 52′ N., 71° 23′ W.), city, Rhode Island, U.S.A.; cotton, wool. Pop (1910) 22,754.

CENTRAL INDIA (24° N., 78° E.), political agency, Brit. India; area, 78,774 sq. miles; bounded N. by Rajputana, United Provinces, E. by Chota-Nagpur, S. by Central Provinces, W. by Bombay; comprises about seventy native states, of which Gwalior, Indor, Rewah, Bhopal, and Bundelkhand are most important; large part of surface rugged; drained by Ken, Nerbudda, Son, and other streams; chief mountains, Vindhyas, Kaimur Hills; produces opium, tobacco, rice. Pop. (1911) 9,356,980.

CENTRAL PROVINCES AND BERAR (18° to 24° N., 76° to 85° E.), province, India; bounded N. by Central India and Chota-Nagpur, E. by Bihar and Orissa, Madras, S. by Hyderabad, W. by Bombay; area, 100,345 sq. miles. Surface generally is mountainous; chief ranges, Satpura, Maikal, drained by Nerbudda, Tapti, Mahanadi, Indravati, Wardha, and other streams; climate hot; considerable rainfall, rainy season, June to Sept.; irrigation supplied by tanks in C. P.; B. has ample rainfall. They produce rice, cotton, millet, wheat, oil-seeds, oranges; minerals include coal, iron; manufactures cottons, iron goods; chief towns, Nagpur, Jabalpur, Amraoti; administered by chief commissioner, app. by gov.-gen. Great majority of inhabitants are Hindus; other religions, Islamism, Christianity. Sagar and Nerbudda were annexed by British, 1818, and other territories were

added later; present province formed in 1903 by union of Central Provinces and Berar. Pop. (1911) 13,916,308.

CENTRALIA (38° 32′ N., 89° 10′ W.), city, Illinois, U.S.A.; fruit-canning, coal mines. Pop. (1910) 9680.

CENTRALISATION, concentration of power in hands of central government. In the early Middle Ages the king had two objectives, the extension of his rule to the natural boundaries of his kingdom, and the imposition of his authority within those boundaries. The early success of the rulers of Spain, England, and France against the centrifugal tendencies of feudalism secured prosperity which contrasts markedly with the misfortunes which befell disunited Germany and Italy until the XIX. cent. Socialism as set forth in *The Great State* would mean complete c. within national boundaries.

From the point of view of world politics, however, modern history has been a process of decentralisation. The Rom. Empire gave birth to the mediæval idea of a universal State and Church. This idea was temporarily destroyed by the movement towards sectional c. (the growth of modern nationalities), and by the Reformation, which broke up Christendom into sects, accentuating local differences. The *philosophes* of the XVIII. cent. (deists or agnostics) abhorred nationality, but Edmund Burke made a brilliant attack on the whole school, and in his *French Revolution* resuscitated localism, a favourite theme of Belloc and Chesterton.

CENTRIFUGAL PUMP, see PUMP.

CENTUMVIRI, Rom. judicial body originally numbering 100 members; retained under the Empire.

CENTURION, officer in the Rom. legion; commanded division called *centuria*, originally composed of 100 foot-soldiers; early lost numerical connection.

CENTURIPE, formerly CENTORBI (37° 35′ N., 14° 53′ E.), town, Catania, Sicily; Rom. antiquities. Pop. 10,800.

CEORL, member of class in A.S. society between serfs and eorls; the richer c's were named thegns; the landless c. tended to sink into serf class.

CEOS (37° 37′ N., 24° 21′ E.), island, one of Cyclades, Ægean Sea; modern Zea; belongs to Greece.

CEPHALODISCUS, see under PTEROBRANCHIA.

CEPHALONIA (38° 15′ N., 20° 35′ E.), one of Ionian Islands, Greece; area, 290 sq. miles; surface mountainous; highest peak, Megas Soros; capital, Argostoli; produces currants, olive oil, wine, grain, pulse; belonged to Rom. and Byzantine Empires; to Venice (1350–1797), subsequently to France, Britain, and finally to Greece (since 1864). Pop. 71,235.

CEPHALOPODA, CUTTLEFISH, the fifth and highest class of the Mollusca, containing well-developed creatures, which in habit, appearance, and structure differ greatly from their brother molluscs.

They are free-swimming creatures, bilaterally symmetrical, but in all, except the Pearly Nautilus (see below), the shell, characteristic of most molluscs, is invisible—buried within the body. The most striking feature of C., and that which has received most attention in legendary lore, is the presence of a ring of 'arms' which surround the head and bear on their surface many strong suckers, or, in Nautilus, tentacles. Strange stories have been told of the size and strength of the arms of cuttlefish, and, indeed, they scarcely exceed the truth; for it has been calculated from captured fragments that, in the neighbourhood of Newfoundland, specimens of *Architeuthis* may exceed 50 feet in total length, and may possess 'arms' 30 to 40 feet long. Indeed, an Irish specimen has been found with 30-foot arms and eyes nearly a foot and a half across.

In the midst of the arms lies the mouth, with strong, horny, beak-like jaws and a rasping radula; and on the sides of the very distinct head are two large, complicated, and highly efficient eyes. Other senses—hearing, or, at least, balancing, and smell—are present; and so delicate is the general nervous mechanism that the slightest irritation, or even the change from one colour of environment to another, causes fleeting changes in the colour of the skin—a faculty which has protective value. Beneath the head, as it were, is another structure of great interest—the 'siphon' or 'funnel,' a complete or partial tube formed from part of the 'foot.' Through the funnel water can be expelled with considerable force, so that the animal moves backwards through the sea in a series of jerks. Behind the head is the solid-looking globular or elongated body, sometimes bearing fleshy fins. This shelters highly developed gills and vascular system, with simple hearts which drive the bluish blood to gills and body. Worthy of mention also is a peculiar rectal gland—the 'ink-sac'—containing dense inky colouring matter, which the creature ejects in order to conceal its retreat in a cloud of darkness.

C. are marine animals found in all seas; a few are found near the coast, especially in spring-time at the spawning season, but the majority prefer deeper water, some inhabiting the bottom in almost 2000 fathoms, while others sail the open sea. They creep with humped back upon the sea-floor by means of their arms, or swim horizontally backwards through the water by use of their funnel, their long arms streaming in 'rear.' C. are exceedingly fierce and voracious. They are altogether carnivorous, and feed upon molluscs, crabs, and fishes, which they occasionally follow in schools, sometimes completely ruining local fisheries by reason of their numbers and destructiveness. The sexes are separate, and in spring the females of some species approach the shore and attach their eggs in bunches to seaweeds. Others lay huge globular floating masses of eggs in the open sea.

C. are of some, though not of great, value to man. On many of the European coasts they are used as food, the arms of cuttlefish when cooked being alleged to resemble lobster in flavour. From the ink-sac a writing-ink—'sepia'—was obtained, and it is said that this formed the base of China or India ink and other paints. It is interesting to recollect that Cuvier drew his illustration of the structures of various cuttles with the 'ink' obtained from the animals themselves. The internal 'bones' of cuttles, again, are powdered, the powder or 'pounce' being used for polishing articles of bone and ivory and as an ingredient of tooth-powder. And lastly, the shells of the Pearly Nautilus are stripped of their outer layers and become iridescent ornaments of great beauty.

The class CEPHALOPODA is divided into two main groups or orders—

Order I., **Tetrabranchia** (Gk. *tetra*, prefix=four; *brangchia*, gills), C. with four gills. Although the class was abundantly represented in prehistoric seas, judging from the numerous shells which occur as fossils in rocks from the Silurian to the Tertiary age, it is now represented by only one living genus, NAUTILUS, found in the Indian and Pacific Oceans. This—the Pearly Nautilus—has many curious features. It is protected by a large spiral shell composed of many chambers, in the last formed of which the body of the animal rests, although a tube of skin—the siphuncle—runs through all the chambers. The arms bear tentacles in tiny sheaths, instead of suckers, and the eye is simple, without lens, having only a pin-hole aperture through which light-rays pass to the retina behind, bathed by the sea water, which also enters. The shell of Nautilus stripped of its outer layers is beautifully pearly, and is often cast on the shores of the Indian and Pacific Oceans after storms.

The extinct AMMONITES, the remains of which are popularly called 'snake-stones,' were distinguished by the wavy sutures on their shells, the Nautiloids by their simply curved sutures.

Order II., **Dibranchiata** (Gk. *di*, prefix=two; *brangchia*, gills), C. with only two gills. These fall into two easily distinguished groups—

Sub-Order 1, **DECAPODA**, with 10 arms, 8 shorter and 2 longer; body long, with fins, and an internal 'shell'; suckers on stalks. Examples—the common CUTTLEFISH or SQUID (*Sepia*), and the extinct Belemnites,

the fossil shells of which, known popularly as 'thunder-bolts,' are common in some clays of Liassic age.

Sub-Order 2, OCTOPODA, with only 8 similar arms; body dumpy and rounded, no 'shell' except in the Paper Nautilus (*Argonauta*), where a shelly brood chamber is formed; suckers without stalks. The most familiar example is the common OCTOPUS (*Octopus* or *Polypus*), frequent in British seas.

CEPHALUS (classical myth.), s. of Thessalian king Hermes; accidentally shot his wife, Procris, and thereupon took his own life by leaping into the sea.

CEPHEUS (classical myth.), king of Ethiopia, f. of Andromeda, who was saved from the sea-monster by Perseus. C. is name of less conspicuous N. constellation adjoining Cassiopeia; *Mu Cephei*, a fourth-magnitude star ('the garnet star'), probably the reddest star visible in N. hemisphere with unaided eye.

CEPHISSUS (38° 2′ N., 23° 44′ E.), river, ancient Greece.

CERAM, SERANG (3° S., 130° E.), largest island, Moluccas group, Dutch East Indies, W. of New Guinea; traversed E. to W. by mt. chain; numerous streams and forests; exports sago, rice, tobacco, sugar-cane; area, 7000 sq. miles. Pop. 100,000.

CERAMICS, the study of the art of pottery (*q.v.*).

CERBERUS (classical myth.), the triple-headed dog who guarded the door of Hades, permitting all to enter, but none to escape.

CERCHNEIS, see HAWK FAMILY.

CERCOCEBUS, see under CERCOPITHECIDÆ.

CERCOPITHECIDÆ, OLD WORLD MONKEYS AND BABOONS, a family of monkeys confined to the Old World, whose general structural characters are mentioned in article PRIMATES. Many have cheek-pouches, in which they can store fruits previous to consumption; those without cheek-pouches feed mainly on vegetation; probably the most familiar of monkeys, owing to their abundance and wide distribution, and to the readiness with which some can be tamed. Of the 174 known species we can mention only a few examples: the LANGURS (*Semnopithecus*), slender monkeys, with very long tails and no cheek-pouches, found in South-Eastern Asia, common in India and Burma. The PROBOSCIS MONKEY (*Nasalis*), with very long tail, and absurdly long nose, no cheek-pouches, ochre-yellow in colour, an inhabitant of Borneo. Thick-pouched monkeys, with arms and legs nearly equal in length, are the GUENONS (*Cercopithecus*), including several oval-headed, stiff-whiskered species such as the red PATAS MONKEY of Senegambia, the greenish VERVET MONKEY of Cape Colony, and the GRIVET; or the round-headed, soft-whiskered forms with black fur intermingled with yellow, such as the familiar and pretty MONA MONKEY, with white-spotted hips, and the DIANA MONKEY, with long pointed white beard, both West African; or beardless individuals, such as the PLUTO or BLACK-BELLIED MONKEY of Angola. Very similar are the MANGABEYS or WHITE-EYELID MONKEYS (*Cercocebus*) from West Africa, whose name indicates their recognition mark.

The Macaques (*Macacus*) which, with the exception of the Barbary Ape of Gibraltar and North Africa, are confined to Asia, have longer muzzles and larger bare patches on the buttocks and are less slender than the Mangabeys, which otherwise they resemble. Very similar to the true Baboons (*q.v.*), on the other hand, is the long-faced, black-furred BLACK APE (*Cynopithecus*) from the island of Celebes, and the dark, shaggy-maned GELADA BABOON (*Theropithecus*) of Abyssinia.

Lastly, among the true Baboons (*Cynocephalus*)—fierce-tempered, long-faced creatures with nostrils projecting to the tip of the muzzle, and large bare buttock-patches, often brightly coloured—are to be reckoned the South African CHACMA, or PIG-TAILED BABOON, grey-black in colour, and without mane on neck, and the familiar and hideous Mandrill, with large head, short tail, and blue, purple, and scarlet-coloured muzzle and buttocks.

CERDIC (d. 534), Saxon chief, who landed in Hampshire about 495, and, after winning many victories over Britons, became king of W. Saxons (519).

CEREALS, see GRASS.

CEREBELLUM, see BRAIN.

CEREBRO-SPINAL FLUID, see BRAIN, SPINAL COLUMN.

CEREBRO-SPINAL MENINGITIS, see MENINGITIS.

CEREBRUM, see BRAIN.

CEREMONIES, MASTER OF, see CHAMBERLAIN.

CERES, Latin name of the goddess of agriculture (Greek, DEMETER); usually represented with ears of corn round her head, poppies in her left hand, and a sceptre in her right. Her dau., Proserpine (Persephone), when gathering flowers in the vale of Enna, was carried off to Hades by Pluto, the god of the under-world. The **Cerialia**, feast-day of C., was held on April 19 in celebration of fertility of earth.

CERIGNOLA (41° 15′ N., 15° 53′ E.), town, Foggia, Italy; here the Spaniards defeated French, 1503, establishing Spain's supremacy in Naples. Pop. 36,000.

CERIGO, see CYTHERA.

CERIGOTTO (35° 50′ N., 23° 18′ E.), small Gk. island, Ionian group; ancient *Ægila*; Gk. *Antikythera*.

CERINTHUS, philosopher who became prominent in the latter years of the Apostle John. He held that Jesus was the natural offspring of Joseph and Mary, and that the world was created by angelic powers, and not by God.

CERIUM (Ce=141·2), metallic element; occurs in Norway with metals *Lanthanum* and *Didymium* in rare pink-coloured mineral *Cerite*, a silicate of the three metals; C. is of iron-grey colour, malleable; S.G. 5·5.

CERNUSCHI, HENRI (1821–96), Ital. economist; b. Milan; spent most of life in France; specialist on bimetallism; pub. *Mécanique de l'échange* (1861), *Le Bimétallisme en Angleterre* (1879), etc.

CERRETO (41° 16′ N., 14° 35′ E.), cathedral town, Benevento, Italy; wines. Pop. 5000.

CERRO DE PASCO, PASSO (10° 48′ S., 76° 12′ W.), town, Peru; silver mines. Pop. 6500.

CERRO GORDO, mountain pass on road between Vera Cruz and Mexico City, where Mexicans defeated by Americans (1847) under General Scott.

CERTALDO (44° 33′ N., 11° 2′ E.), town, Florence, Italy; Boccaccio's birth- and death-place. Pop. 9000.

CERTIORARI, WRIT OF, issued by Chancery for holding of a new inquisition when finding of first jury is questioned.

CERUMEN, wax of the ear (*q.v.*).

CERUSSITE, mineral consisting of lead carbonate; found in Devon, Cornwall, and Cumberland, as right prismatic twin-crystals; transparent or translucent, colourless, yellow, brown, or black.

CERVANTES SAAVEDRA, MIGUEL DE (1547–1616), Span. novelist, dramatist, and poet; b. Alcalá de Henares; s. of Rodrigo de C., an apothecary-surgeon; studied under Juan Lopez de Hoyos, a Madrid prof. of *belles-lettres*. In 1568 C. entered the service of Cardinal Acquaviva, who had been sent on a mission to Philip II. at Madrid, returning with him to Rome. In 1570 he enlisted as a private soldier, serving under Don John of Austria and other great military leaders. He was severely wounded at the battle of *Lepanto* (1571), took part in the naval battle off *Navarino* (1572), and was at the capture of Tunis (1573). In 1575 C. was granted leave to return to Spain, but the fleet in which he sailed was captured, off Marseilles, by Algerine pirates. The captives, including C. and his younger bro., Rodrigo, were all disposed of as slaves, C. becoming the property of a Gk. renegade, Dali Mami. C. made many attempts to escape, but it was not until five years had elapsed that his family were able to secure his freedom by ransom.

After his return he devoted several years to further military service, but finally abandoned arms for lit. His first publication was a pastoral romance, *Galatea*

(1585), which apparently did not attract much notice. At this time he married. He now turned his attention to the stage, and produced between twenty and thirty plays, but without achieving any substantial success. He was made deputy-purveyor to the fleet at Seville (1587), a post which he exchanged for that of collector of revenues in Granada (1594). One may assume that he gave more attention to poetry than to accounts, for in 1597 he was cast into prison at Seville because of a monetary deficiency. He was eventually released upon finding security for the restoration of the money, but was not reinstated. Little is known of the events of his life from this period until 1603, when he is known to have been living at Valladolid, but it is believed that during his imprisonment his world-famous romance, *Don Quixote*, was begun. The first part of this great work was pub. at Madrid (1605). It was intended as a satire upon the ultra-chivalric romances of the period, and met with an instant success. The second part of the book appeared in 1615, and contains the author's most mature work. Had C. never written this masterpiece he would have secured a high place in Span. lit. by virtue of his *Novelas Exemplares*, to name only one phase of his work. Of the immortal *Don* it may safely be said that it is much more widely read at the present time than it was three hundred years ago.

Lives by J. Fitzmaurice-Kelly (1892), H. E. Watt (1894), and by A. F. Calvert (1905).

CERVERA, PASCUAL CERVERA Y TOPETE (1839–1909), Span. admiral; commanded a squadron of four ships in the Span.-Amer. War (1898), which, being opposed to a greatly superior force, was destroyed at *Santiago de Cuba*. He was afterwards tried, but acquitted of blame.

CERVETRI (41° 59′ N., 12° 6′ E.), ancient city, Italy; has Etruscan rock tombs.

CERVIDÆ, see DEER.

CESAREVICH (more correctly, *Tsesarevich*), heir-apparent to Russ. throne. The Cesarewich Handicap, founded at Newmarket in 1839, was named after the C. (later Alexander II.), who visited England in that year.

CESARI, GIUSEPPE (1568–1640), Ital. artist of the 'Idealist' school, who spent many years in the execution of frescoes in the Capitol of Rome.

CESAROTTI, MELCHIORE (1730–1808), Ital. poet, b. Padua; known chiefly as a translator of Homer and Ossian; author of a poem, *Pronea*, addressed to Napoleon; also numerous prose works on Gk. lit., taste, and the poetic art.

CESENA (44° 8′ N., 12° 18′ E.), town, Forlì, Italy; cathedral; exports wine, silk. Pop. 7700.

CESNOLA, COUNT LUIGI PALMA DI (1832–1904), Ital. archæologist and diplomatist; carried out fruitful excavations in Cyprus and wrote its history.

CESPEDES, PABLO DE (1538–1608), Span. artist and poet; a fine specimen of his work is a *Last Supper* at Cordova, his native place, and other examples are to be found at Seville and Madrid. He also wrote a didactic poem on *The Art of Painting*, which was greatly esteemed.

CÉSPEDES Y MENESES, GONZALO DE (d. 1638), Span. novelist; wrote a *Historia de Felipe IV.* (1631) and several novels.

CESSIO BONORUM (Lat.), term in law for voluntary 'ceding of goods' by debtor as alternative to distraint.

CESTIUS, LUCIUS, Gk. rhetorician, who flourished at Rome during the age of Augustus, but who invariably used Latin as the medium of his declamations; examples of his work are to be found in Seneca.

CESTODA, see TAPEWORMS.

CETACEA, mammalian order, including whales and dolphins. They are characterised chiefly by their fishlike form, essential because of their aquatic habits; the possession of paddle-like fore-limbs (flippers); the absence of external hind-limbs; by a layer of fat (blubber) beneath the skin, and their habit of living together in herds or 'schools.' They chiefly feed on the minute organisms composing the plankton (*q.v.*), and some species on small fish, cephalopoda (*q.v.*); the grampus even attacks seals. The order is generally divided into two suborders, one, the **Mystacoceti**, comprising the whales with baleen (whalebone), such as the hump-back (*Megaptera*), the common whale (*q.v.*) (*Balæna*); the other, **Odontoceti**, being represented by toothed genera such as the cachalot or sperm whale (*Physeter*), the grampus, the dolphin (*q.v.*) (*Delphinus*), the porpoise (*Phocæna*), and the narwhal (*Monodon*). The Zeuglodonta, discovered in Eocene strata, have been supposed to show affinities to recent cetacea.

CETEWAYO (d. 1884), Zulu king; s. of King Panda, whom he deposed (1873); was required by the Brit. Government to disband his strong army and to give promises to live at peace with his neighbours. The promises were not kept, and the Government was openly defied, and as a consequence Lord Chelmsford invaded Zululand with 13,000 men (Jan. 11, 1879); the disasters of *Isandhlwana* and *Rorke's Drift* followed, but the Zulus were signally defeated at *Ulundi* (July 4). C., who had become a fugitive, was afterwards captured, his kingdom being divided amongst a number of his chiefs. He was eventually restored to part of his kingdom, but, being defeated by his enemies, took refuge in the Native Reserve, where he died.

His son, **DINIZULU**, attempting to become king, was exiled to St. Helena (1889), but allowed to return (1898). In 1907 he was imprisoned on suspicion of being implicated in a Zulu revolt, being sentenced (1909) to four years' imprisonment. The incident created considerable ill-feeling between the home government and Natal.

CETINA, GUTIERRE DE (1518–72), Span. soldier and poet; saw military service under Charles V. in Italy and Germany, but spent many years of his life in Mexico, where he d.; wrote sonnets and other poems in the Ital. manner (under pen-name, VANDALIO).

CETONIA, see CHAFERS.

CETORHINUS, see under SHARKS and DOG-FISHES.

CETTE (43° 23′ N., 3° 42′ E.), fortified seaport, Hérault, France; has spacious harbour and extensive shipping trade; chief trade is in fish, wine, brandy. Pop. (1911) 33,049.

CETTINJE, CETTIGNE (42° 45′ N., 19° E.), capital of Montenegro (*q.v.*), in fertile valley, surrounded by mountains; residence of the prince and metropolitan; has several times been burnt by Turks. Pop. 5300.

CEUTA (35° 54′ N., 5° 17′ W.), fortified seaport, on small peninsula, N. of Morocco, opposite Gibraltar; military and convict station; castle occupies highest point of a mountain, 636 ft. (the ancient *Abyla*); cathedral; Span. possession since 1508. Pop. (1910) 13,000.

CEVA (44° 22′ N., 8° 4′ E.), town, on Tanaro, Piedmont, Italy.

CÉVENNES (44° 15′ N., 3° 44′ E.), mountain range, S. France, extending from Canal du Midi, north-eastward to Canal du Centre; divided into N. and S. Cévennes; separate basins of Loire and Garonne from those of Rhône and Saône; highest point, 5753 ft.

CEYLON (5° 56′ to 9° 46′ N., 79° 36′ to 81° 58′ E.), island and Brit. crown colony at S. extremity of India; consists largely of undulating plains, but S. part is mountainous in interior; extreme length, 226 miles; width, *c.* 145 miles; area, 25,333 sq. miles; separated from India by Gulf of Manaar and Palk Strait, with width of 32–120 miles. These openings have between them chain of islands so close together and with such shallow water between that it has been proposed to carry railway across. Highest mountains are Pedrotallagalla (8300 ft.) and Adam's Peak. C. is drained by Mahavillaganga, which flows N.E., entering sea near Trincomali. Chief towns are Colombo (capital), Galle, Trincomali, Kandy. Climate is cooler than in India, and healthy except on coast; N.E. and S.E. get little rain and need irrigation, but S.W. is damp, as it has rainfall of both monsoons. In geological structure gneiss is predominating formation, and there are marine deposits in W.

History.—In V. cent. B.C. the Singhalese dynasty was established in C. by invasion of Hindus under Vijaya. Under his successors, country prospered and attained remarkable degree of civilisation. Buddhism was introduced in III. cent. B.C. In early XVI. cent. settlements were made by Portug. traders, but in 1656 Portuguese were expelled by Dutch. In 1795 Brit. force sent to C., captured Dutch forts; in 1802 C. was ceded to Britain by Dutch in exchange for Java, and in 1815 whole island came under Brit. control.

C. is administered by gov., who is assisted by Executive Council of six members and Legislative Council of seventeen members. For administrative purposes island is divided into nine provinces, each under government agent; provinces are Northern, North-Western, Western, North-Central, Central, Eastern, Southern, Uva, Sabaragamuwa.

A considerable amount of iron and plumbago is obtainable; anthracite, gold, monazite, mica, thorium, rubies, sapphires, topazes, and other gems produced; pearl fishery important government monopoly, as is salt-making. Vegetable products include tea, coffee, cinchona, cinnamon, cacao, tobacco, cardamoms, cocoa-nuts, areca-nuts, rubber, camphor, rice. All these are exported, also cocoa-nut oil, coir, copra; horses, cattle, sheep, goats, and pigs raised; elephants exported to India; imports cottons, iron, machinery, coal, salt fish, provisions, liquor.

Inhabitants include, besides Europeans, Singhalese, Tamils, Moormen, Eurasians, Malays, and Veddahs. By far greater number are Singhalese, who belong to S., Tamils to N. Veddahs are aborigines. Principal religions are Buddhism, Hinduism, Islamism, Christianity. Education is controlled by government. Pop. 1911) 3,592,397.

Emerson Tennent, *Ceylon* (1860); Willis, *Ceylon* (1907); Cave, *Book of Ceylon*; Farrer, *In Old Ceylon*; Ferguson, *Ceylon Handbook*.

CEZIMBRA (38° 26′ N., 9° 6′ W.), town, Estremadura, Portugal. Pop. 6000.

CHABAROWSK, see KHABAROVSK.

CHABAS, FRANÇOIS-JOSEPH (1817–82), Fr. Egyptologist.

CHABAZITE, mineral; hydrated silicate of aluminium and calcium ($AlSi_2O_6 + CaSiO_3 + CH_2O$), occurring in rhombohedral crystals, colourless or brownish-yellow, lining cavities in ancient lava rocks (Giant's Causeway, Faroes).

CHABLAIS (46° 17′ N., 6° 35′ E.), district, Haute-Savoie, France; produces wine, fruit, cheese.

CHABLIS (47° 50′ N., 3° 47′ E.), town, Yonne, France; produces famous wine of same name (white Burgundy).

CHABOT, PHILIP DE, COUNT OF CHARNY (d. 1543), admiral of France; was held in great favour by Francis I., who made him gov. of Burgundy, and bestowed on him many high offices. His only serious rival for power was Anne de Montmorency, and there was a lifelong conflict between the two. His magnificent tomb is in the Louvre.

CHABRIAS (IV. cent. B.C.), famous Athenian general.

CHABRIER, ALEXIS EMMANUEL (1841–94), Fr. composer. *Gwendoline* was produced at Brussels (1886), and later at the Grand Opéra, Paris; and *Le Roi malgré lui* at the Opéra Comique (1887). C. was also the composer of a number of pianoforte pieces.

CHACMA BABOON, see under CERCOPITHECIDÆ.

CHACO (27° S., 61° W.), government, N. Argentina, bordering river Bermejo and forming part of district, El Gran Chaco; area, 52,741 sq. miles. Pop. 28,000.

CHACONNE, a Span. dance of XVII. cent., in slow three-four measure.

CHAD (d. 672), Eng. saint; pupil of St. Aidan; became abbot of Lastingham; later made bp. of Mercia, and fixed his see at Lichfield; famed for his humility and saintly life.

Bede, *Ecclesiastical History*.

CHAD, LAKE, TSAD (13° 30′ N., 14° E.), lake in West Central Africa; area, c. 10,400 sq. miles, varying according as season is wet or dry; 830 ft. above sea-level; N.E. and part of S. shore are in Fr. sphere, part of S. shore in Ger. Kamerun, S.W. shore in Brit. Northern Nigeria; water fresh; fish, turtles, water-fowls, and crocodiles abound.

CHADDERTON (53° 33′ N., 2° 9′ W.), town, Lancashire, England; cotton manufactures, coal mines. Pop. (1911) 28,305.

CHADERTON, LAURENCE (d. 1640), Puritan preacher and educationist; had a distinguished career at Cambridge, and became first Master of Emmanuel Coll.

CHADWICK, SIR EDWIN (1800–90), Eng. social reformer; assisted in drafting Poor Law report (1834); report on 'Sanitary Condition of the Labouring Population' (1842); commissioner of Board of Health (1848–54).

CHÆREMON.—(1) Stoic philosopher and grammarian; in 49 A.D. he became one of the tutors to Nero; author of a *History of Egypt*, and treatises on astron., astrology, and grammar. (2) (IV. cent. B.C.) Athenian dramatist, whose *Centaurus* is commented upon by Aristotle.

CHÆRONEIA, ancient city, Bœotia, Greece; remains of theatre and small temple exist; birthplace of Plutarch; famous as site of battle in which Greeks were defeated by Philip of Macedon, 338 B.C.

CHÆTOGNATHA, ARROW-WORMS, class of translucent marine animals attaining a length of up to 2½ in. The body is divided by septa into three divisions, and shows certain affinities to the Annelida. *Sagitta* and *Spadella* are two species common in the plankton of the sea.

CHÆTOPODA (Gk. *chaitē*, hair; *pous, podos*, a foot), BRISTLE-WORMS.—This great class includes the majority as well as the most familiar of 'worms.' All are ringed or segmented, often with the external rings continued in partitions across the body-cavity and cutting off similar segments; and all bear large or small, many or few, bristles—chitinous setæ embedded in skin-pits.

The Bristle-Worms fall into three orders, one of which, MYZOSTOMIDA, a small group, may be dismissed with the remarks that its members are degenerate forms which live upon the discs and arms of Feather Stars (crinoids), causing the formation of galls. The larva, however, shows Bristle-Worm characters, and the adult bears five pairs of parapodia—structure typically Polychæt (see below). The most important groups, however, are the Sea-Worms, or POLYCHÆTS, and the Earth-Worms, or OLIGOCHÆTS, containing individuals so diverse in appearance and in habit that they had best be considered separately.

Order I. POLYCHÆTA (Gk. *polus*, much; *chaitē*, hair), SEA-WORMS, are for the most part marine Bristle-Worms, only a few freshwater inhabitants (such as *Lumbriconereis* from Trinidad) being known. They are distinguished by possessing many bristles (hence the general name) set on processes of the body known as parapodia. They have a distinct head with sensory tentacles, minute eyes, and a horny 'jaw' apparatus within the mouth. The sexes are generally separate, and the young form develops into the adult through a metamorphosis. Of the marine Polychæts a few are parasitic, a few live in friendly association with star-fishes and other worms, and a few transparent gelatinous forms (such as *Tomopteris*) float in the open sea. But the vast majority live in shallow water near the shore, after the most diverse fashions. Some hide beneath stones or crawl over the bottom by means of their parapodia; in others the parapodia are modified into leaf-like paddles, as in *Phyllodoce*, the 'Paddle-Worm' of British coasts, by which they swim with undulating motion; a few bore homes for themselves in chalk or limestone (*Polydora*); the common Lug-Worm (*Arenicola*), a favourite bait, forms 'castings' by burrowing in sand; and many build for themselves

limy tubes (*Serpula*), or transparent quill-like tubes (*Hyalinœcia*), or patchwork tubes of sand and mud grains, or shell fragments (*Sabellaria, Terebella*).

Their food also differs much. A few are vegetarians, feeding on seaweed, some extract the organic matter from sand they swallow, but the majority are carnivorous, devouring Sponges, Crustacea, other worms, and such-like. Besides the normal mode of reproduction, budding often occurs, even a long chain of young individuals at various stages remaining attached to the parent stock as in *Autolytus*. Polychæta are often brilliantly and beautifully coloured, and some are phosphorescent. Apart from their value in the sea as forming a great part of the food-supply of certain fishes, Polychæta are made use of by man as bait for fishes, and even as food—the strange Palolo worm being captured for this purpose at definite lunar times by the Samoans and Fijians.

Order II. OLIGOCHÆTA (Gk. *oligos*, few; *chaitē*, hair), EARTH-WORMS, are distinguished from Polychæta by their terrestrial habit, by their rare setæ, their lack of parapodia and 'jaw' apparatus, by their indefinite head, without tentacles, by their hermaphrodite character, and by the fact that the young form develops directly into the adult.

Although 'Earth-Worm' as a general name describes the group, a few simple forms inhabit fresh water (*Microdrili*), or are amphibious. The majority burrow in earth, feeding upon the organic matter contained in the soil they swallow, and by their feeding and burrowing opening the ground to the beneficent action of the weather, to the great advantage of gardener and agriculturist.

CHAFERS (*Scarabæidæ*), a huge family of Lamellicorn beetles, comprising *c.* 13,000 species, found all over the globe. Many of the males are armed with horns. They include the Sacred Beetle of the Egyptians (*Scarabæus sacer*), which feeds ingloriously upon dung; and in Britain, the Cockchafer (*Melolontha vulgaris*), the larva of which is exceedingly destructive to crops, and the Rose Chafers (*Cetonia*).

CHAFFARINAS, ZAFFARINES (35° 10′ N., 3° W.), group of small islands, off N. coast Morocco, belonging to Spain.

CHAGNY (46° 56′ N., 4° 47′ E.), town, France; wines. Pop. 4700.

CHAGOS (5° S., 72° E.), Brit. group of islets, Ind. Ocean; dependency of Mauritius.

CHAGRES, river, flows across Isthmus of Panama; at mouth on N. coast of Isthmus is port of C.

CHAILLU, PAUL BELLONI DU (1835–1903), Fr. traveller and author; made numerous discoveries in zoology, anthropology, and geography in his extensive African travels.

CHAIR, article of domestic furniture. Though of great antiquity, c's, now so common, did not come into general use until about the XVI. cent. Before that period, chests, stools, and benches formed the usual seat of ordinary persons, the c. being more in the nature of a state seat used only by persons of rank. Ancient Egyptian c's were generally of carved and gilded woods, inlaid or decorated with ivory; Rom. c's were frequently of marble; and the c. of Dagobert, preserved in the Louvre, is of bronze. Mediæval c's were usually low, with arm-rests terminating in the heads of beasts or birds, and were without backs. The oldest known Eng. c. is that of Edward I. (1239–1307), at Westminster. It is of oak, and is used in the coronations of Brit. monarchs. Up to the middle of the XVII. cent. the c's of all countries were usually without upholstery, which, when introduced, developed into the gorgeous productions of the XVIII. cent.

CHAITYAS, see ARCHITECTURE (INDIAN).

CHALCEDON, CALCHEDON (*c.* 40° 55′ N., 29° 5′ E.), ancient town, Bithynia, Asia Minor, on Bosporus, opposite Byzantium. THE COUNCIL OF C., held here in 451 A.D., declared its belief in the duality of the natures united in the one Person of Christ, the doctrine now held by the vast bulk of Christians; and fixed ecclesiastical jurisdiction of Rome and Byzantium.

CHALCEDONY, CALCEDONY (S_1O_2), variety of *native silica*, found in translucent masses, with waxy lustre, coloured veins, rings, or spots; common examples, pebbles and agates.

CHALCIS (38° 28′ N., 23° 27′ E.), chief town, island of Eubœa, Greece, on Euripus; flourishing town and colonising centre in ancient times; belonged successively to Athenians, Macedonians, Romans, and Turks. Pop. 10,958.

CHALDÆA (*c.* 35° N., 45° E.), ancient country, between Tigris and Euphrates Rivers, Asiatic Turkey; an immense plain of extremely fertile soil; produces wheat, barley; has palm forests; abode of civilised races for many cent's; empire dated from remote antiquity; destroyed *c.* 2300 B.C. See BABYLON.

CHALDEE, language in which some portions of the Books of *Daniel* and *Ezra* were written, said to have been the vernacular language of Babylon.

CHALDRON, coal or coke measure, generally about 36 bushels in England.

CHALFONT ST. GILES (51° 38′ N., 0° 34′ W.), village, Buckinghamshire, England; here Milton wrote part of *Paradise Lost*.

CHALGROVE (51° 41′ N., 1° 6′ W.), village, Oxford, England; here Royalists defeated Roundheads, 1643; Hampden killed.

CHALICE, primarily the eucharistic wine-cup; but also name for an ordinary goblet.

CHALIER, JOSEPH (1747–93), Fr. Jacobin leader.

CHALK, a soft, pure white limestone composed of shells of microscopic marine animals, mostly *Foraminifera*, and rich in fossils (corals, sponges, molluscs); geologically forms distinguishing feature of the Upper Cretaceous formation, being represented in England by the N. and S. Downs, York and Lincoln Wolds, Salisbury plain, Chiltern Hills; used for writing, preparation of lime, Rom. cement, putty.

CHALKHILL, JOHN, Eng. poet, of whose life nothing is known. Two songs, stated to be by him, are quoted in Walton's *Compleat Angler*; and a long poem, *Thealma and Clearchus*, bearing his name as author, appeared in 1683.

Saintsbury's *Minor Poets of the Caroline Period* (1906).

CHALLEMEL-LACOUR, PAUL AMAND (1827–96), Fr. philosophical writer and statesman.

'CHALLENGER' EXPEDITION, scientific expedition (1872) fitted out by Brit. government for investigation of fauna and flora of deep sea. Its results fill 50 vol's.

CHALLONER, RICHARD (1691–1781), Eng. R.C. bp.; ed. Douai; bp. of Hammersmith (1741), later Vicar-Apostolic of London district; pub. *Catholic Christian Instructed* (1737), *Memoirs of Missionary Priests* (1741), *Britannia Sancta, Garden of the Soul*, etc.

CHALMERS, ALEXANDER (1759–1834), Scot. writer and edit.; *Biographical Dictionary* still used.

CHALMERS, GEORGE (1742–1825), Scot. antiquarian; b. Fochabers (Elgin); visited America (1763), and settled in Maryland as lawyer, but returned to Scotland on the outbreak of the War of Independence. He wrote numerous antiquarian and political works, also several biographies, but is chiefly remembered for his contribution to Scot. history, *Caledonia*, of which, however, only three vol's appeared ere his death.

CHALMERS, GEORGE PAUL (1833–78), Scot. landscape painter of heavy Romantic school.

CHALMERS, JAMES (1841–1901), Scot. missionary; b. Ardrishaig; spent ten years at Raratonga, S. Pacific (1866–76), as representative of London Missionary Society. He exercised great influence over the natives. Later he transferred to New Guinea. He was killed by cannibals at Goaribari Island.

CHALMERS, THOMAS (1780–1847), Scot. preacher and philanthropist; ed. St. Andrews, and entered the ministry, officiating at Kilmeny (Fife) and later at Glasgow, where his preaching made him

famous. In 1823 he became prof. of Moral Phil. at St. Andrews, and in 1828 prof. of Divinity at Edinburgh. He was one of the chief promoters of the Free Church of Scotland, and became its first Moderator. He possessed a character of great simplicity and nobility, and much of his time during his later years was given to philanthropic work.

CHALONER, SIR THOMAS (1521–65), Eng. state official; held various court appointments under the Protector Somerset and Queen Mary, and acted as ambassador for Queen Elizabeth on several occasions. He was the intimate friend of Burghley, and employed his leisure in the composition of pastorals and Latin verses, which were held in some repute.

CHALONNES-SUR-LOIRE (47° 21′ N., 0° 46′ W.), town, France. Pop. 4500.

CHÂLONS-SUR-MARNE (48° 59′ N., 4° 20′ E.), city, on Marne, France; ancient *Catalaunum*; seat of bp.; principal buildings, XIII.-cent. cathedral of St. Etienne, church of Notre Dame, Hotel de Ville (1772); formerly famous for manufacture of woollen cloth; has large trade in champagne. Napoleon III. formed celebrated camp of C. for training of troops, about 17 miles N.E. Here Attila was defeated by Romans and Franks, 451 A.D., which saved W. Europe from falling into hands of Huns. Pop. (1911) 31,367.

CHALON-SUR-SAÔNE (46° 47′ N., 4° 52′ E.), Saône-et-Loire, France; manufacturing and commercial town; ancient *Cabillonum*; cathedral is of XIV. cent.; has copper and iron foundries. Pop. (1911) 31,550.

CHALUKYA, Ind. dynasty, founded by Pulakesin I., which fl. in the Deccan (550–750 A.D.), and again (973–1190). **Chalukyan style**, see ARCHITECTURE (INDIAN).

CHALUMEAU, Old Fr. musical wind-instrument or shawm; pipe of a bagpipe; Fr. chemical instrument for blowing on a flame to raise its temperature.

CHALYBAUS, HEINRICH MORITZ (1796–1862), Ger. philosopher; prof. of Philosophy in Kiel Univ.; pub. *Historische Entwickelung der spekulativen Philosophie von Kant bis Hegel* (1837); Eng. trans. by Tulk (1854) and Edersheim (1854).

CHALYBEATE WATERS, see MINERAL WATERS.

CHALYBITE ($FeCO_3$), mineral consisting of iron carbonate; a common iron ore, yellowish-brown rhombohedral crystals found in Devonshire, Cornwall, Cumberland.

CHAM, second s. of Noah (*q.v.*).

CHAM (49° 14′ N., 12° 38′ E.), town, Bavaria. Pop. 4200.

CHAMÆLEON, genus of lizards characterised by the peculiar structure of its skeleton and skull, the soft small-scaled skin with power of changing colour, circular eyelids, long, slender tongue which it protrudes exceedingly quickly to catch insects, prehensile tail, digits adapted for grasping the branches of trees in which the c. lives. Several species occur in Africa and one in Andalusia.

CHAMBA (32° 29′ N., 76° 10′ E.), native hill state, Punjab, India; traversed by Ravi and Chenab Rivers; chief industries, agriculture and grazing; copper, iron, and slate plentiful; capital, Chamba; area, 3216. Pop. 1911) 134,351.

CHAMBAL (*c.* 24° N., 75° 26′ E.), tributary of Jumna River, Central India; rises in Vindhya Mts.

CHAMBERLAIN, official appointed by a sovereign or corporation to undertake performance of ceremonial duties. The **Lord Chamberlain** is a court official whose institution dates back to the XIV. cent., or earlier. He has control, assisted by the *Vice-C.*, over a great number of the court servants, the royal wardrobe, selects tradesmen, etc., issues invitations to state functions, and is the licenser of theatres and plays. **The Lord Great C.** is an hereditary household magnate, the old *camerarius regis*, whose office is now held jointly by the Marquess of Cholmondeley and the Earls of Ancaster and Carrington; he has a station in the palace, control of ceremonies, care of sword of state, etc.

CHAMBERLAIN, JOSEPH (1836–), Brit. statesman; b. London; e. s. of Joseph C., master of the Cordwainers Company; ed. at Canonbury, and Univ. Coll. School, London; joined his cousin, Joseph Nettlefold, in a screw-making business; retired (1874) and devoted his energies to political work. He married thrice; unsuccessful as Liberal candidate for Sheffield, 1874; Mayor of Birmingham, 1873–76; responsible for many local reforms, *e.g.* municipalisation of gas and water supply, erection of improved municipal buildings, abolition of much slum property, laying out of open spaces for recreation; returned unopposed for Birmingham as John Bright's colleague, 1876.

C. entered Gladstone's Cabinet as Pres., Board of Trade (1880), and was largely responsible for Bankruptcy Act (1883), Patents Act, and Franchise Act (1884); returned for W. Birmingham again (1885), but objecting to Gladstone's Home Rule policy resigned his seat in the Cabinet (March 15, 1886). Thereafter he became leader of the 'Liberal Unionists.' In 1895, C. became Colonial Sec. in Lord Salisbury's Cabinet, and advocated old age pensions; as Colonial Sec., 1895–1900, was strongly imperialistic and was in great measure responsible for the negotiations which ended in the Boer War (1899–1902). When Mr. A. J. Balfour (*q.v.*) succ. Lord Salisbury as Premier (July 1902) C. again became Colonial Sec., but withdrew, 1903, having adopted a policy of 'Tariff Reform' not entirely compatible with his chief's programme. In 1906 he ceased to take an active part in politics, owing to illness, but was returned unopposed for W. Birmingham, 1910. He was instrumental in founding Birmingham Univ. (1900) and became its first chancellor. A. Mackintosh, *Life* (1906).

CHAMBERLAIN, JOSEPH AUSTEN (1863–), e. s. of Joseph C. (*q.v.*); Unionist M.P., E. Worcestershire, since 1892; Civil Lord of Admiralty, 1895–1900; Financial Sec. to Treasury, 1900–2; Post master-Gen., 1902–3; Chancellor of Exchequer, 1903–6.

CHAMBERLAIN, JOSHUA LAWRENCE (1828–), Amer. soldier and educationist; held various professorships before entering Federal army (1862); fought in important battles, and was six times wounded; governor of Maine, 1867–70; pres. of Bowdoin Coll. (1871–83); pub. *Maine: Her Place in History* (1877); edit. *Universities and Their Sons* (1898).

CHAMBERLAIN, SIR NEVILLE BOWLES (1820–1902), Eng. field-marshal; s. of Sir Henry Chamberlain, Bart.; served in first Afghan War (1839–42), Gwalior campaign (1843), Punjab cam (1848–49), distinguished himself at siege of where he was wounded.

G. W. Forrest's *Life* (1909).

CHAMBERLAYNE, WILLIAM (1619–79), Eng. poet; physician by profession; fought on Royalist side during Civil War; pub. *Pharonnida*, narrative poem in 5 books (1659), an important work in history of prosody, containing many poetical gems, but bad in construction, *Love's Victory*, tragi-comedy (1658), *England's Jubilee* (1660).

CHAMBERS, EPHRAIM (*c.* 1680–1740), Eng. encyclopædist; b. Kendal; apprenticed to a London globe-maker; later devoted his whole time to the production of his *Dictionary of Arts and Sciences*, pub. 2 vol's, 1728. A Fr. trans. inspired Diderot and D'Alembert to produce their *Encyclopédie*, and C.'s work was not without influence on Dr. Samuel Johnson.

CHAMBERS, GEORGE (1803–40), Eng. marine artist; b. Whitby; s. of a sailor, was himself apprenticed to the sea; later he became a house-painter, took drawing lessons, and produced small marine pictures. Afterwards he moved to London, and became a scene-painter; elected associate of Water Colour Soc. (1834), and member (1836).

CHAMBERS, ROBERT (1802–71), Scot. author and publisher; b. Peebles; opened a book-stall in Leith Walk, Edinburgh (1818); later joined his bro.

William as partner in the firm which bears their names; was a frequent contributor to *Chambers's Journal*, and author of *Traditions of Edinburgh* (1824), *History of the Rebellions in Scotland* (1828), *Vestiges of the Natural History of Creation* (1846), *Book of Days* (1862–64), and many other works.

CHAMBERS, ROBERT WILLIAM, (1865–), Amer. novelist; works include *Cardigan*, *The Fighting Chance*, *The Cambric Mask*; painter also.

CHAMBERS, WILLIAM (1800–83), Scot. author and publisher; b. Peebles; elder bro. of Robert C., and, like him, began life as a small bookseller in Edinburgh; founder of firm, Messrs. W. & R. Chambers; began publication of *Chambers's Journal* (1832); famed for public munificence; restored St. Giles' Cathedral; twice Lord Provost of Edinburgh; author of minor antiquarian works.

CHAMBERS, SIR WILLIAM (1726–96), Brit. architect; spent some of his early years in China, acquiring a knowledge of the art and arch. of that country. Later studied arch. in Italy, and upon his return to London found constant employment as architect and furniture-designer. He designed many houses for the nobility, the buildings at Kew (of which the pagoda remains), and the state coach for George III. (Victoria and Albert Museum).

CHAMBERSBURG (39° 53′ N., 77° 41′ W.), town, Pennsylvania, U.S.A.; has several machine-shops, foundries, and breweries. Pop. (1910) 11,800.

CHAMBERTIN, red wines obtained from Gevrey-C., France.

CHAMBÉRY (45° 34′ N., 5° 54′ E.), town, France, capital of former Duchy of Savoy (*q.v.*); cathedral, seat of abp.; manufactures silk-gauze, etc. Pop. 16,000.

CHAMBON-FEUGEROLLES (45° 23′ N., 4° 20′ E.), town, Loire, France. Pop. 11,600.

CHAMBORD (47° 38′ N., 1° 33′ E.), famous château Loir-et-Cher, France; begun by Francis I.; served as royal residence.

CHAMBORD, HENRI CHARLES FERDINAND, COMTE DE (1820–83), Fr. Royalist; s. of Duc de Berry; grandson of Charles X.; b. seven months after his f.'s assassination; claimed Fr. crown and title of Henry V.; m. Archduchess Maria Theresa, but had no issue, and thus the Comte de Paris, representing the Orleans branch of the Bourbons, became heir to his claims.

CHAMBRE ARDENTE (Fr.: 'the fiery chamber'), inquisitorial court established in France by Francis I. (1535) for trial of heretics, and abolished in 1682. Its work was similar to that of the Holy Office in Spain, and the chamber was particularly active during the reign of Henry II.

CHAMBRE INTROUVABLE, *i.e.* 'non-such'; name applied by its critics to reactionary Fr. Chamber of Deputies, 1815–16.

CHAMELEON, see CHAMÆLEON.

CHAMFER, architectural term for the planing of an angle, much seen in Gothic mouldings.

CHAMFORT, SEBASTIEN ROCH NICOLAS (1741–94), Fr. author; natural s. of a grocer named Nicolas; b. Clermont (Auvergne); took active part in the Revolution, and was involved in numerous troubles by his bitter speeches; is chiefly remembered by his *Maximes et Pensées*, which have been favourably compared with those of La Rochefoucauld.

CHAMIER, FRÉDÉRIC (1796–1870), novelist; served in navy until 1833; captain, R.N. His nautical stories were very popular; pub. *Life of a Sailor* (1832), *Ben Brace* (1836), *The Arethusa* (1837), *Jack Adams* (1838), *Tom Bowling* (1841), *Jack Malcolm's Log* (1846); edit. James' *Naval History* (1837).

CHAMISSO, ADELBERT VON (1781–1838), Ger. poet and botanist; pub. *Frauen Liebe und Leben* (1830), lyrical poems, set to music by Schumann; *Peter Schlemihl* (1813), a weird tale (trans. into Eng. by W. Howitt), and numerous botanical treatises.

CHAMOIS, *Rupicapra tragus* (Ger. *Gemse*), a goat-like type of antelope (*q.v.*), with small horns, inhabiting the Pyrenees, Alps, Carpathians, Caucasus, and the mountains of W. Asia. They occur in herds of up to twenty, and display remarkable agility and keenness of scent and sight. The leather made from their skin was the original *shammy* leather.

CHAMOMILE, CAMOMILE, medicinal herb (*Anthemis nobilis*), common in Britain; dried flowers made into 'c. tea' possess excellent tonic and stomachic properties.

CHAMONIX, CHAMOUNI (45° 56′ N., 6° 51′ E.), mountain valley and village, Haute-Savoie, France, at foot of Mont Blanc; glaciers; tourist resort.

CHAMP DE MAI, Frankish national meeting-place for political purposes under Carolingian kings. Under the Merovingians this was the **Champ de Mars.**

CHAMPAGNE (48° 30′ N., 4° E.), old province, France, now included chiefly in Marne, Ardennes, Haute-Marne, Aube. Surface largely consists of chalk downs; in N. and E. are vineyards producing champagne wines. C. was feudal state in mediæval times; united to Fr. crown by marriage of Philip IV. with Jeanne of Navarre in 1284. See WINES.

CHAMPAGNE, PHILIPPE DE, CHAMPAIGNE (1602–74), Fr. painter of valued portraits.

CHAMPAGNEY (47° 44′ N., 6° 41′ E.), town, Haute-Saône, France. Pop. 4100.

CHAMPAGNY, JEAN BAPTISTE NOMPÈRE DE (1756–1834), Fr. diplomatist, statesman, and historian; Minister of Foreign Affairs (1807); favoured restoration of Bourbons.

CHAMPAIGN (40° 7′ N., 88° 16′ W.), city, Illinois, U.S.A.; has an Industrial Univ.; railway workshops and foundries. Pop. (1910) 12,421.

CHAMPARAN, CHUMPARUN (26° 50′ N., 84° 30′ E.), district, Tirhut division, Bihar and Orissa, India; area, 3531 sq. miles. Pop. 1,800,000.

CHAMPAUBERT (48° 53′ N., 3° 47′ E.), district, France, where Napoleon defeated Prussians and Russians, 1814.

CHAMPERICO (14° 25′ N., 91° 40′ W.), port, Guatemala; railway terminus.

CHAMPERTY, legal term for illegal collusion by which one person agrees to pay costs of lawsuit in which he is not a litigant on condition of dividing the profits.

CHAMPFLEURY, pseudonym of **Jules Fleury-Husson** (1821–89), Fr. novelist and art critic; wrote valuable *Bibliographie céramique*.

CHAMPIGNY, commune of the Seine; scene of battles between French and Prussians, 1870.

CHAMPION, one who represents or contends in the cause of another. Thus in the Middle Ages a priest, a woman, or an old or otherwise enfeebled person could nominate a 'champion' as their representative in any quarrel or passage of arms. The 'King's Champion' was an officer who, after a coronation in England, summoned to single combat any person who dared dispute the sovereign's title to the throne. The office was of very early origin, and continued until after the coronation of George IV.

CHAMPIONNET, JEAN ÉTIENNE (1762–1800), distinguished Fr. general of the Revolution.

CHAMPLAIN (44° 30′ N., 73° 25′ W.), lake between states of New York and Vermont, U.S.A.; area, 500 sq. miles; numerous affluents; contains about fifty islands; drains N. by Richelieu River into St. Lawrence; communicates with Hudson River by C. Canal; scene of two naval battles between British and Americans, 1776 and 1814.

CHAMPLAIN, SAMUEL DE (1567–1635), Fr. colonial agent and writer of travels; sent on exploring expedition up St. Lawrence (1603); made settlement at Port Royal (1604), but was forced to retire; established first European colony at Quebec (1608); discovered Lake 'Champlain,' and started Fr. conflict with 'Five Nations' of Indians; made trading settlement (1611) at Mont Royal (Montreal); *Life*, by Dix (1905), Dionne (1905).

CHAMPLEVÉ, surface in which hollows are made to receive enamels; hence applied to enamel work.

CHAMPOLLION, JEAN FRANÇOIS (1790–1832), and his bro., **Jacques Joseph C.-Figeac** (1778–1867), Fr. archæologists; the former a pioneer in study of Egyptian hieroglyphics.

CHAMPS ELYSÉES, Parisian thoroughfare, from the Arc de Triomphe to the Place de la Concorde; formed from the open country in XVIII. and XIX. cent's; now promenade of rank and fashion.

CHANCEL, eastern portion of church building, occupied by the altar, accommodating the choir and clergy. It is often separated from the nave by a carved wood or wrought-iron chancel-screen. See CHANCELLOR.

CHANCELLOR, title in England of head of legal profession. The name *cancellarius* was given by Romans to official who in law courts sat at 'chancel' or screen separating public from judge and counsel; in Byzantine Empire notaries were called *cancellarii*; title retained by barbarian states who imbibed Rom. law, and given to subordinate legal officials, over whom was *archi-cancellarius*; the keeper of the Royal Seal, who developed in England into the *Lord High C.* The name has been since applied to keepers of seals of many organisations; title lost in most European countries, and applied in Germany to chief political (not legal) official. In England the office existed from Saxon times, and became next in importance to justiciarship in time of Henry II.; equitable jurisdiction dates from 1280, when petitions to king were referred to chancellor; in reign of Edward III. he ceased to follow the court, and petitions were directed to him straight; later, keepership of Great Seal sometimes separated from chancellorship. *Ireland* has still a Lord C. For office of *Lord C. of Scotland*, that of Keeper of Great Seal was substituted at the Union (1707).

Chancellorship of Exchequer originated with separation of Exchequer from Chancery in the time of Henry III.; **Chancellorship of Duchy of Lancaster** with Act of Parliament, when Duke of Lancaster succ. to the throne, decreeing that lands of the Duchy should be separately administered.

Chancellor of a diocese, univ., etc., is primarily keeper of seals of diocese, etc.

CHANCELLOR, RICHARD (d. 1556), Eng. explorer in Russia, Archangel, etc.

CHANCELLORSVILLE (38° 14′ N., 77° 36′ W.), village, Virginia, U.S.A.; here Confederates defeated Federals, 1863.

CHANCE-MEDLEY, legal term for offence which is partly matter of chance; does not include crimes of passion.

CHANCERY DIVISION, successor to the old Chancery Court, is presided over by the Lord Chancellor; in it there are six judges. The Chancery Court was formerly notorious for its slow administration, but there is now no division of the High Court where cases are so promptly heard; in it alone there are practically no arrears. The business with which the C. D. deals is regulated by section 34 of the Judicature Act, 1873: (1) The administration of the estates of dead persons; (2) dissolution of partnerships and the taking of partnership and other accounts; (3) mortgages, with their redemption and preclosure; (4) the raising of portions or other charges on land; (5) the sale and distribution of the proceeds of property, subject to any lien or charge; (6) trusts, both charitable and private, and their execution; (7) the rectification or setting aside or cancellation of deeds or other written documents; (8) the specific performance of contracts between vendors and purchasers of real estate, including contracts for leases; (9) the partition or sale of real estates; and (10) the wardship of infants and the care of infants' estates.

CHANCRE, see SYPHILIS.

CHANDA (19° 50′ N., 79° 20′ E.), town, Nagpur division, Central Provinces, India; cotton, silk. Pop. 16,000.

CHANDAUSI (28° 27′ N., 78° 49′ E.), town, Moradabad district, United Provinces, India; cotton. Pop. 28,000.

CHANDERI (*c.* 24° 43′ N., 78° 8′ E.), town, Central India; formerly fortified. Pop. 4100.

CHANDERNAGORE, CHANDARNAGAR (22° 52′ N., 88° 25′ E.), town, on Hugli, Bengal, India; Fr. possession and settlement; manufactures cotton cloth; taken by Brit., 1757 and 1816; finally restored to France, 1816. Pop. 24,500.

CHANDLER, HENRY WILLIAM (1828–89), Eng. classical scholar; ed. Pembroke Coll., Oxford, of which he became fellow; prof. of Moral Philosophy (1867); curator of Bodleian (1884); pub. *Practical Introduction to Greek Accentuation* (1862), and was a leading authority on works of Aristotle.

CHANDLER, RICHARD (1738–1810), Eng. antiquary; pub. large work on *Ionian Antiquities* (1769), *Life of Bishop Waynflet* (period of Henry VI.), *Travels in Greece, History of Ilium*, etc.

CHANDLER, SAMUEL (1693–1766), Eng. Nonconformist preacher; was a Presbyterian, and famed for his learning; for about forty years conducted a meeting-house in Old Jewry; pub. *Vindication of the Christian Religion* (1725), *Reflections on the Conduct of Modern Deists* (1727), *Vindication of the Old Testament* (1740), and other controversial works.

CHANDOR (20° 19′ N., 74° 17′ E.), town, Bombay, India; captured by British, 1804, 1818. Pop. 5500.

CHANDOS, title of an Eng. barony held by the Brydges family, 1554–1719; in the latter year it was raised to a dukedom, and so continued until 1789, when it became extinct. It was revived and added to the dukedom of Buckingham in 1822, with which it became extinct, March 26, 1889.

CHANDOS, SIR JOHN (d. 1369), Eng. military commander; fought at *Cambrai* (1337), *Crécy* (1346), *Poitiers* (1356), where he saved life of the Black Prince. He won the victories of *Auray* (1364), and *Navaret* (1367). He was held in great estimation by Edward III., who made him a Knight of the Garter, and Seneschal of Poitou. He was killed at *Lussac*.

CHANDPUR (29° 10′ N., 78° 19′ E.), town, United Provinces, India. Also name of several places in Bengal. Pop. 13,000.

CHANDRAGUPTA MAURYA, SANDROCOTTUS (*c.* 321–296 B.C.), Ind. king; conquered the Punjab and other districts, and made himself paramount throughout India.

CHANGARNIER, NICOLAS ANNE THÉODULE (1793–1877), Fr. general and politician; distinguished in Algeria and in the Franco-Prussian War.

CHANG-CHOW (24° 28′ N., 117° 42′ E.), walled city, province of Fu-Kien, China; silk. Pop. 500,000.

CHANG-CHOW (31° 52′ N., 119° 47′ E.), town, Kiang-Su, China. Pop. 360,000.

CHANGRA, KANGHARI (40° 35′ N., 33° 40′ E.), town, Kastamuni vilayet, Asia Minor; ancient *Gangra*; fruit. Pop. 7000.

CHANG-SHA (28° 22′ N., 112° 50′ E.), town, Hunan, China; site of Yolo Coll. Pop. 300,000.

CHANNEL ISLANDS, ÎLES NORMANDES (49° 20′ N., 2° 30′ W.), Brit. islands in Eng. Channel, off coast of Normandy; largest are Jersey, Guernsey, Alderney, Sark, Herm; area, 75 sq. miles; produce large quantities of fruit, flowers, and vegetables, which are exported to England; important cod, lobster, and oyster fisheries; famous for special kind of cattle, each island having its particular strain; climate mild. Jersey and Guernsey (the latter including Alderney and Sark) are each administered according to their own laws by a military lieutenant-governor and a bailiff (who presides over the parliament or 'states'), app. by the Crown. Alderney has a parliament, and both Alderney and Sark have courts of justice subordinate to Guernsey. Jersey and Guernsey have local copper coinage. Taxes and customs duties are very low.

History.—C. Islands are said to have been inhabited successively by Celts, Romans, Saxons, Goths, and

Franks in early times; granted to Dukes of Normandy in X. cent.; united with Eng. crown since Norman Conquest; frequently invaded by French, who, however, failed to subjugate them. In Civil War Jersey supported Charles I., Guernsey the Parliament. Last Fr. attack occurred in 1781. Victor Hugo came here as refugee in 1852.

Inhabitants are of Norman stock; official language is French, though English is taught in schools; the country people speak a Norman-French dialect, resembling that spoken in England in the time of William the Conqueror. Religion, Protestantism. Militia service is compulsory. Pop. (1911) 96,900.

Ansted and Latham, *Channel Islands* (new ed., 1893); Carey, *Channel Islands* (1904).

CHANNING, WILLIAM ELLERY (1780–1842), Amer. preacher and author; b. Newport, Rhode I.; graduated at Harvard, and became a tutor in Virginia; was app. (1803) pastor of the Federal St. Congregational Church, Boston, a position he held till death. He was especially noted for his powerful advocacy of social reforms. During 1821–23 he visited Europe, and while in England made the acquaintance of Wordsworth and Coleridge. His works include *Remarks on the Life and Character of John Milton* (1826), *Life and Character of Napoleon Bonaparte* (1827–28), *Character and Writings of Fénelon* (1829), *Essay on Self-Culture*.

CHANSONS DE GESTE (songs of deeds), long narrative verse-cycles written in France during XI.–XIII. cent's, describing adventures of knightly heroes. The earliest, and perhaps greatest, is the *Chanson de Roland* (XI. cent.). There are several cycles dealing with the exploits of Charlemagne and his knights, Ogier the Dane, and others. In one of these, *The Pilgrimage to Jerusalem*, the Alexandrine verse was first used in French.

CHANT ROYAL, Fr. mediæval verse-form, somewhat like the *ballade*, consisting of sixty lines, in five strophes and an envoi, and having only five rhymes; much used for songs in praise of the Virgin.

CHANTABUN (12° 28′ N., 102° 20′ E.), town, C. province, Siam; rubies, sapphires.

CHANTADA (42° 37′ N., 7° 47′ W.), town, Lugo province, Spain; tiles, tanneries. Pop. 5000.

CHANTAL, STE. JEANNE FRANÇOISE DE (1572–1641), Fr. lady who founded the Order of the Visitation; grandmother of Mme de Sévigné (*q.v.*); feast-day, Aug. 21.

CHANTILLY (49° 9′ N., 2° 27′ E.), town, on Nonette, Oise, France; formerly celebrated for manufacture of lace; has magnificent Renaissance château, destroyed by Revolutionaries, 1793, rebuilt by Duc d'Aumale, and presented to Fr. Institute, 1886; horse-racing centre. Pop. 4900.

CHANTONNAY (46° 41′ N., 1° 4′ W.), town, Vendée, France. Pop. 4100.

CHANTREY, SIR FRANCIS LEGATT (1782–1841), Eng. sculptor; b. Norton, Derbyshire; s. of a carpenter; as a wood-carver in his early years acquired a knowledge of painting and sculpture; m. his cousin, Miss Wale (1807); exhibited a head of Satan at the R.A., 1808; and quickly rose to fame; elected A.R.A. (1815) and R.A. (1818); knighted (1835). A fine example of C.'s work is the *Sleeping Children*, in Lichfield Cathedral; and his best-known statues are those of George Washington, at Boston; George III., in London Guildhall; George IV., at Brighton; Pitt, in Hanover Square, London; John Dalton, at Manchester, etc.

C., having no children, left the bulk of his fortune, after the death of his widow, in trust to the R.A. for 'the purchase of works of fine art' by Brit. artists, or by foreign artists who have completed their work within the U.K. Lady C. died in 1875. The administration of the **Chantrey Bequest**—which usually produces a yearly income of upwards of £2000—has been the subject of much criticism in recent years, with the result that a committee of the House of Lords (1904) sat to inquire into the subject, and made certain recommendations which, it was hoped, would prevent further dissatisfaction.

Arthur Fish, *Chantrey and his Bequest* (1904).

CHANTRY.—(1) oratory founded for chanting masses for the departed or prayers for the living according to terms of bequest. (2) in XVI. cent. chapel below rank of parish church.

CHANUTE (37° 40′ N., 97° 27′ W.), city, Kansas, U.S.A.; natural oil and gas; extensive industries. Pop. (1910) 9272.

CHANZY, ANTOINE EUGÈNE ALFRED (1823–83), Fr. general; served at *Magenta* and *Solferino* (1859); in Syrian campaign (1860–61); commanded second army of the Loire in the Franco-German War (1870); gov. gen. of Algeria (1873–79); ambassador to Russia (1879–81); nominated for Pres. of the Republic (1879), receiving one-third of the votes.

CHAPEL HILL (35° 57′ N., 79° 3′ W.), town, N. Carolina, U.S.A.; seat of N. Carolina University; cotton mills. Pop. (1910) 1149.

CHAPELAIN, JEAN (1595–1647), Fr. poet; author of epic, *La Pucelle*, which occupied him for twenty years.

CHAPEL-EN-LE-FRITH (53° 21′ N., 1° 58′ W.), market town, Derbyshire, England; paper-making and cotton industries. Pop. (1911—rural district) 16,557.

CHAPELLE, appellation of **Charles Emmanuel Luillier** (1626–86), Fr. poet and wit of classical school.

CHAPLAIN, clergyman who officiates at court, or in private chapels; in workhouses and hospitals, etc.; there are also bp.'s c's, army c's, and navy c's.

CHAPLIN, CHARLES JOSUAH (1825–91), Fr, society portrait-painter.

CHAPLIN, HENRY (1841–), Eng. politician; b. Blankney, Lincolnshire; ed. Harrow and Ch. Ch., Oxford; won the Derby (1867) with 'Hermit'; M.P. (Conservative) for Mid-Lincolnshire (1868–1906) and for Wimbledon (since 1907); chancellor of duchy of Lancaster (1885–86); pres. of Board of Agriculture (1886–92); pres. of Local Government Board (1895–1900); leader of the Tory Protectionist wing of the Conservative party, and took a prominent part in Mr. Chamberlain's Tariff Reform campaign.

CHAPMAN, GEORGE (1559–1634), Eng. dramatist and translator; b. near Hitchin; ed. Oxford; wrote numerous plays, of which the earliest was *The Blind Beggar of Alexandria* (1596), followed by *Bussy d'Amboise*, *All Fools*, *Gentleman Usher*, *Monsieur d'Olive*, *Eastward Hoe* (with B. Jonson), etc. As a dramatist he possesses some humour, but his work for the most part is somewhat heavy. His name will live by virtue of his great translation of Homer; *Iliad* (1611), *Odyssey* (1616).

CHAPONE, HESTER (1727–1801), Eng. letter-writer and essayist; dau. of Thomas Mulso, a Northamptonshire gentleman; admirer and correspondent of Samuel Richardson; m. a solicitor, John C.; wrote *Letters on the Improvement of the Mind* (1772).

CHAPPE, CLAUDE (1763–1805), Fr. engineer who with his brother, **Ignace Urbain Jean C.** (1760–1829), invented the telegraph.

CHAPPED HANDS, see CHILBLAINS.

CHAPPELL, WILLIAM (1809–88), Eng. music editor and publisher; partner in Messrs. Chappell & Co.; noted for his collection and publication of *Popular Music of the Olden Time* (1855–59).

CHAPRA, CHUPRA (25° 46′ N., 84° 46′ E.), chief town, Saran district, near junction of Gogra and Ganges, Bihar and Orissa, India; indigo. Pop. 47,000.

CHAPTAL, JEAN ANTOINE CLAUDE (1756–1832), Fr. chemist and statesman; prof. Chem., Montpellier (1781); minister of Interior (1800–4), minister of Commerce (1811); founded Fr. Chamber of Commerce.

CHAPTER.—(1) assembly of members of a religious house (conventual c.) or order (in a provincial or general c.); (2) body which with the dean is governing body of a collegiate or cathedral church. Name is

probably derived from the portions of the Rule or the Scriptures read out when this body came together. The members of c's were termed canons, or prebendaries, the latter being of inferior status; under Ecclesiastical Commissioners Act, 1840, all members of c. of cathedral and collegiate churches in England and of St. David's and Llandaff churches, Wales, received status of canons.

Chapter-house, building where a cathedral or monastic chapter meets; used sometimes as place of sepulture, as at Wells and Westminster.

CHAPU (30° 35′ N., 121° 10′ E.), seaport, province of Chekiang, China; formerly had important trade with Japan.

CHAR, name for several palatable fishes of the genus *Salmo* occurring in clear mountainous lakes, *e.g.* in Scandinavia, Switzerland, Westmoreland, Scotland, Ireland, and Wales.

CHARCHARODON, see under SHARKS and DOG-FISHES.

CHARCOAL, form of amorphous carbon; (1) *wood* c., prepared by limited or smothered combustion of wood; black, porous solid used for fuel, gunpowder, filters, crayons, and as a deodorant; (2) *animal or bone* c., obtained by charring bones, used as a decoloriser in sugar-refining. See CARBON.

CHARCOT, JEAN MARTIN (1825–93), Fr. physician, prof. of Pathology in medical faculty of Paris, and physician at the Salpêtrière (1860); made investigations on neurology, hypnotism, etc.

CHARD (50° 53′ N., 2° 59′ W.), market town, Somersetshire, England; lace. Pop. (1911) 4568.

CHARD, JOHN ROUSE MERRIOTT (1847–97), Eng. soldier; hero of *Rorke's Drift*. Ordered to S. Africa during the Zulu War of 1879, he was in command of this small post on the Buffalo River, when news reached him of the disaster at Isandhlwana (Jan. 22). His garrison consisted of Lt. Bromhead and about 100 men, besides the sick in hospital, and, expecting an immediate attack, he hastily improvised defences, and succeeded in keeping 3000 Zulus at bay until help arrived. This spirited defence secured the retreat of Chelmsford's column, and both C. and Bromhead were afterwards awarded the V.C.

CHARDIN, SIR JOHN (1643–1713), Fr. traveller; b. Paris; s. of a jeweller; spent many years in Eastern travel; settled in London (1681), and was knighted by Charles II.; went to Holland (1683) as representative of East India Company; pub. *The Travels of Sir John Chardin into Persia and the East Indies* (London, 1686); buried in Westminster Abbey.

CHARENTE (45° 40′ N., 0° 10′ E.), inland department, France, formed principally from old province Angoumois; traversed by Charente; surface undulating, wooded hills, sandy plains; exports wheat, brandy (cognac); capital, Angoulême (*q.v.*); area, 2305 sq. miles. Pop. (1911) 346,424.

CHARENTE (45° 55′ N., 1° 10′ W.), river, France; enters Atlantic.

CHARENTE-INFÉRIEURE (45° 45′ N., 0° 40′ W.), maritime department, W. coast, France, nearly corresponding to old provinces of Saintonge and Aunis; includes islands of Ré and Oléron; well cultivated; good pastures; exports brandy and salt; oyster and pilchard fisheries important; capital, La Rochelle; area, 2791. Pop. (1911) 450,871.

CHARENTON-LE-PONT (48° 47′ N., 2° 25′ E.), town, on Marne, France; manufactures artificial flowers, porcelain. C. in French is equivalent of Eng. 'Bedlam.' Pop. 17,980.

CHARETTE (1763–96), name of leader of rebels of La Vendée; fell at Nantes.

CHARGÉ D'AFFAIRES, fourth grade of diplomatic agent, usually sent in place of an ambassador. His credentials are endorsed by the foreign minister, and not by the sovereign.

CHARGING ORDER, in Eng. law, order of court making a debt chargeable upon stocks or other funds of the debtor.

CHARIBERT (d. 567), Frankish king; s. of Clotaire I.; notorious for dissolute habits; on death of his f., received as his share of the kingdom Paris, Rouen, Tours, Bordeaux, and several other towns.

CHARIDEMUS (d. 333 B.C.), Gk. mercenary who, in 351, led the Athenians against Philip II. of Macedon, in the Chersonese.

CHARING CROSS, district, W. end of Strand, London; site of old village of Charing and one of the crosses erected by Edward I. in memory of Queen Eleanor.

CHARIOT, ancient horse vehicle used by Greeks, Romans, Egyptians, Assyrians, Persians, etc., first in war, but later only in games and processions. These conveyances were without springs of any kind, the body resting on the axle.

CHARIOTEER, see AURIGA.

CHARITÉ-SUR-LOIRE (47° 11′ N., 3° 2′ E.), town, France. Pop. 5200.

CHARITY, act of benevolence, inspired by love for one's fellow-men, particularly the poor and suffer- gifts to benevolent institutions; leniency in judging persons and their actions, and an inclination to put the best construction upon the words or works of others. 'Charity,' says Addison, 'is a habit of goodwill, or benevolence, in the soul, which disposes us to the love, assistance, and relief of mankind.' Among all civilised peoples, from the earliest times, the demands which the poor and outcast have upon their richer brethren have always been recognised to a greater or less degree. Consequently, in the Middle Ages, when the Church dominated all public life throughout Europe, it naturally followed that the monastery and the friary, whose inmates endeavoured to emulate the Christ-life, should devote much of their revenue and time to relieving the wants of the poor or destitute. Thus it came about that the different kinds of monastic institutions in England continued to be the chief distributors of c. until the time of their dissolution under Henry VIII. Of institutions devoted to charitable purposes in London alone the oldest is St. Bartholomew's Hospital, founded 1123; while St. Katherine's Hospital is a close second, having been instituted in 1145. Many of the educational charities belong to the XVI. cen amongst which may be named St. Paul's School (1509), Christ's Hospital (1553), and Merchant Taylors' School (1561). Since the establishment of these early charitable institutions, great numbers of others have come into being in various parts of the country.

To proceed to the consideration of the modern distribution of charity, it is indisputable that indiscriminate almsgiving is productive of much waste of mone[illegible] and, further, that it encourages imposture and idleness, which it should be the primary aim of charitable workers to eradicate. Apart from work undertaken at large by the State, it should be the business of private benevolent workers to remove, if possible, the cause of distress, and not so much attempt to provide the necessaries of life, which is the work of the Government, but to remove the causes of destitution, and, by placing means of employment within reach of the fallen, attempt to restore their independence and self-respect, and so revive an interest in life.

The **Charity Commissioners** are a body constituted n 1853, under the Charitable Trusts Act of that year, to undertake the better administration of charitable trusts in England and Wales. The business of this permanent board is to supervise the expenditure of charity trustees; to exercise control over capital; to prepare schemes for the modification of trusts, if need arises; and to appoint trustees, etc.

The **Charity Organisation Society** was founded in London in 1869, and affiliated with various societies in the provinces, the Colonies, and America for improving the conditions of the poor. The Society endeavours to do this by encouraging co-operation between charitable trusts, or persons, and the Poor

Law officials; by the dissemination of sound and practicable views on the administration of charitable work; by securing proper investigation into all claims and such-like matters. Above all, the Society endeavours to make the assistance given of permanent value by avoiding such means of assistance as may lessen the self-respect of the recipient. The office of the Society is Denison House, 296 Vauxhall Bridge Road, S.W. The first Charity Organisation Society in U.S.A. was founded in 1877, at Buffalo, N.Y., and there now exist Bureaux of Charities, Associated Charities, and similar organisations in some 150 cities. See POOR LAW.

Tudor's *Charitable Trusts* (1906); Loch's *Charity Organization* (1890); Devine's *Principles of Relief*, and Henderson's *Modern Methods of Charity* (1904).

CHARIVARI (Fr.), hideous din caused by beating on tin kettles, etc., and employed as a mock-serenade in the case of unpopular weddings in mediæval France. Later, as the medium of ridicule, became the name of a Parisian journal established 1832; from which is derived the sub-title of the Eng. *Punch*.

CHARKHARI (25° 30′ N., 79° 50′ E.), native state, Bundelkhand, Central India; area, 703 sq. miles. Pop. 130,000.

CHARLEMAGNE, CHARLES THE GREAT, CHARLES I. (742–814), King of the Franks, Emperor of the West, and perhaps greatest figure of the Middle Ages; s. of Peppin the Short, King of the Franks, and Bertha, dau. of Count Charibert of Laon; place of his birth unknown, and it is uncertain whether his parents were then married. In 768 King Peppin divided his kingdom between his sons, Charles and Carloman, and on the latter's death in 771 the elder son became sole King of the Franks. In 772 he conducted a war against the Saxons, who threatened the Frankish frontiers, and advanced as far as the Weser, when he was recalled to the aid of Pope Adrian I., who was in conflict with Desiderius, the Lombard king. C. had married a dau. of this monarch, but repudiated her because she bore him no offspring, afterwards uniting himself with Hildegarde, an Alemannian princess. Desiderius was endeavouring to compel the Pope by force of arms to establish the sons of Carloman in their f.'s territory.

C. crossed the Alps with two large armies, and succeeded in conquering the Lombard kingdom (774), which he added to his possessions. During the years immediately following he was constantly engaged in warfare. He won a victory over the Saxons, who acknowledged him as their king; was called to Spain (778) as intermediary between the Moors and Arabs, where he secured considerable territory, but lost Roland, Oliver, and other knights in the famous fight at the Pass of Roncesvalles. On Christmas Day, 800, C. was crowned emperor by Pope Leo III., and saluted as Carolus Augustus; the remaining years of his life were chiefly devoted to the consolidation of his great empire, and an attempt to revive Rom. civilisation, encouraging Alcuin (*q.v.*) in establishment of schools and commencing codification of the laws in the famous Capitularies (*q.v.*); buried at his capital, Aachen; his empire was soon after his death dismembered.

In personal appearance C. is said to have been tall and of a robust frame, with handsome features. He was sparing in his diet, loved hunting and other manly exercises, and was devoted to his children. Though he was unable to write, he read Latin and Greek, and was greatly interested in history and astronomy. As a soldier his successes were due rather to his ability as an organiser than personal brilliance in the field. His descendants, the 'Carolingians,' reigned over France until the death of Louis V. (985). His exploits, real and imaginary, were the subject of a cycle of romance.

Mombert, *History of Charles the Great* (1888); and *Life*, by Hodgkin (1897).

CHARLEMONT, JAMES CAULFEILD, 1ST EARL OF (1728–99), Irish statesman; man of fearless and resolute character, with literary and artistic tastes; prominently associated with Grattan in the assertion of Irish independence.

CHARLEROI (50° 25′ N., 4° 27′ E.), town, on Sambre, Hainault, Belgium; collieries, iron foundries; taken by French, 1794. Pop. (1910) 28,177.

CHARLEROI (*c.* 40° 10′ N., 79° 52′ W.), borough, on Monongahela, Pennsylvania, U.S.A.; glass factories. Pop. (1910) 9615.

CHARLES I. and II., Kings of Great Britain and Ireland.

CHARLES I. (1600–49), King of Gt. Britain and Ireland; 2nd s. of James I.; b. Dunfermline; succ. March 27, 1625; m. Henrietta Maria of France (May 1625). C. dissolved his first two Parliaments because of their opposition to his favourite Buckingham (*q.v.*). Funds for war with France and Spain were raised by a forced loan, and enforced by penalty of imprisonment. In 1628 a third Parliament compelled the king to redress the grievances stated in the *Petition of Right*, viz. forced loans, arbitrary imprisonment, illegal billeting of soldiers, and commissions of martial law. Early in 1629 Parliament attacked C. for levying tonnage and poundage, and for furthering Abp. Laud's innovations in religion. For eleven years C. ruled without Parliaments, raising money unconstitutionally. In 1634 he began to levy 'ship money.' The king's unpopularity was increased when the Scots rose in arms (1639) against a determined attempt to impose upon them the Eng. Church service.

Advised by his chief supporter Wentworth, now Earl of Strafford, C. summoned a Parliament (*Short Parliament*, April 13–May 5, 1640), which refused supplies, and was dissolved. In Aug. C. was defeated in the Second *Bishop's War* against the Scots, and in Nov. again summoned Parliament (*Long Parliament*). C. consented to various reforms, and was forced to sign a bill of attainder against Strafford, who was beheaded May 12, 1641. The violence of the extremists in pressing for the abolition of Episcopacy (*Root and Branch Bill*, May 1641) threw moderates on the side of the king. In Oct. C. sought help in Scotland, but failed, and his enemies took the opportunity of passing the *Grand Remonstrance* (Nov. 22), by which they proposed to monopolise the government themselves.

Following an attempt to arrest five members with an armed force in the House of Commons (Jan. 4, 1642), C. abandoned the capital (Jan. 10). The N. and N.W. were strongly Royalist, and on Aug. 22 C. set up his standard at Nottingham. After an indecisive battle at *Edgehill*, Oct. 23, C. was victorious (in 1643) at *Adwalton Moor*, *Roundway Down*, and *Cropredy Bridge*. At the end of the year the Scots gave their help to Parliament, while the Royalists were reinforced by the army from Ireland. On July 2, 1644, Prince Rupert was defeated at *Marston Moor*, and the North fell to Parliament. The Parliamentary army, remodelled by Cromwell, gave the Royalist cause its deathblow at *Naseby* (June 14, 1645).

In April 1646 C. sought the protection of the Scots, who surrendered him to the Eng. Parliament. The army, now divided against the Parliament, seized C. and imprisoned him at Carisbrooke. The Royalists rose in Wales and Kent, and Parliament, largely Presbyterian, negotiated with the king, but its action was nullified by the army. A High Court of Justice was, however, appointed by the Rump of Independents to try the king, and he was beheaded as a traitor at Whitehall, Jan. 30, 1649. C. had many noble traits, but had little appreciation of men and forces. In private life he was strongly affectionate, he was sincerely religious, and he faced death with heroic courage.

S. R. Gardiner, *History of the Great Civil War*; Adams, *The White King*.

CHARLES II. (1630–85), King of Gt. Britain and Ireland; s. of Charles I.; b. London; took part in Civil War and retired to France. Ormonde in Ireland and Montrose in Scotland took up arms for C., but he repudiated both in order to gain support of Covenanters; landed in Scotland, 1650, and was crowned at Scone. After defeat of Presbyterians at Dunbar, C. discarded their aid and marched south with Huntly;

defeated at Worcester, fled to France, and wandered over W. Europe till he was recalled to England in 1660. After passing a decree of indemnity he endeavoured to gain toleration for his fellow-Roman Catholics, and incidentally for Nonconformists, but Parliament passed various intolerant measures, 1661–65. Venner's rebellion gave an excuse for maintaining a standing army. Episcopacy was re-established in Scotland and the Covenanters persecuted—a good instance of C.'s perfidy; another is his dismissal of Clarendon, his adviser since long before his accession, to satisfy popular discontent at the Dutch War, 1665–67. Clarendon was succeeded by the Cabal ministry (*q.v.*), but the history of the rest of C.'s reign is one of deception and intrigue. He secretly received money from Louis XIV. for support against Holland, and at the same time countenanced a treaty with Holland and Sweden.

The 'Popish Plot' was successful in arousing opposition to Roman Catholicism, and an Exclusion Act was introduced debarring them from reigning—directed against James, Duke of York. Charles's astuteness secured its defeat. He died a Roman Catholic. Compared with his father, C. is a poor person indeed. He was profligate, untrustworthy, thoroughly insincere, but he knew when to bend to public opinion, and this pliability, coupled with geniality and air of frankness, secured his popularity.

CHARLES I.–VII., Holy Rom. Emperors; for Charles I., see Charlemagne.

CHARLES II., THE BALD (823–77), Holy Rom. Emperor and King of the West Franks (modern France); s. of Emperor Louis the Pious; succ., 843; **Charles I.** of France.

CHARLES III., THE FAT (832–88), Holy Rom. Emperor and King of the West Franks; s. of Emperor Louis; succ. his bro's in the inheritance of his f.'s territories; was crowned Rom. emperor by Pope John VIII. in 881; but was deposed by his nobles, 887; reckoned as **Charles II.** of France.

CHARLES IV. (1316–78), Holy Rom. Emperor and King of Bohemia; b. Prague; s. of King John of Bohemia; fought at *Crécy* (1346), where his f. was killed; largely extended Bohemian territory, and was noted for the exemplary wisdom of his government; he founded the first Ger. univ. at Prague (1348), and promoted agriculture and various industries.

CHARLES V., CHARLES QUINT (1500–58), Holy Rom. Emperor and King of Spain (Charles I.); b. Ghent; s. of Philip of Burgundy and Joanna, dau. of Ferdinand and Isabella of Spain. From his f. he inherited the Low Country dominions and Burgundy, and through his mother he became heir to the kingdoms of Spain and Naples, and the rich possessions in Span. America. On the death of King Ferdinand (1516) C. left the Netherlands for Spain, where he was recognised as joint ruler with his mother, who had now become hopelessly insane; and on the death of his paternal grandfather, the Emperor Maximilian, in 1519, he was elected Emperor of Germany, the rival candidate being Francis I. of France. By virtue of his great possessions C. became the most influential political figure of his time, and thus began the intense rivalry between himself and Francis I., which dominated the history of W. Europe during the next quarter of a century. The conflict was waged in many quarters, but most decisively in Italy, where the French were dispossessed of the duchy of Milan, and finally driven out of Italy altogether. In 1525, however, Francis again entered Italy, occupied Milan, but was taken prisoner at *Pavia*, and, being carried to Madrid, was only released upon signing a treaty in which he resigned all his claims and pretensions, being further required to aid C. in the suppression of heresy. In this year (1526) C. married Isabella, sister of John III. of Portugal, to whom he is said to have been greatly devoted, and who became the mother of Philip II. of Spain.

Like his notorious s. (Philip II.), C. was a religious zealot, and a relentless opponent of Lutheranism. It was, therefore, his earnest desire to witness the restoration of Ger. allegiance to the See of Rome. In this dream, however, he was doomed to disappointment, for the Peace of Augsburg (1555), brought about by the formidable Prot. opposition under Maurice of Saxony, compelled him to acquiesce in the establishment of Protestantism over the greater part of Germany. This blow to his hopes, and his declining health, led to his abdication in favour of his s. Philip (1556), and he retired to the monastery of San Yuste, in Estremadura, where he lived in great seclusion, but continued to direct the policy of his successor.

C.'s features were ugly, but he possessed a graceful and handsome figure; he was simple in his dress, was fond of children and animals, and had a fine appreciation of music and painting. He left two illegitimate children: a dau. named Margaret, and a son, who became famous as Don John of Austria.

Robertson, *Life of Charles V.*; and Sir W. Stirling-Maxwell's *Cloister Life of Charles V.*

CHARLES VI. (1685–1740), Holy Rom. Emperor s. of Emperor Leopold I.; his claim to the throne of Spain, on the death of Charles II., brought about the War of the Span. Succession. He was proclaimed emperor (1711) on the death of his bro., Joseph I.; though he acquired much Span. territory by the Treaty of Utrecht, it was only to relinquish it in later years; an unsuccessful Turkish campaign increased his misfortunes. An only s. died in infancy, and the succession was secured to his dau., Maria Theresa, by the Pragmatic Sanction.

CHARLES VII. (1697–1745), Holy Rom. Emperor and Elector of Bavaria; s. of Elector Maximilian Emmanuel, whom he succ., 1726, having m. Maria Amelia, dau. of Emperor Joseph I. He became one of the claimants in the War of the Austrian Succession, refusing to recognise the 'Pragmatic Sanction' (1713), by which Charles VI. had secured to his own dau., Maria Theresa, the succession of the Hapsburg dominions. He proclaimed himself King of Bohemia (1741), and was elected emperor (1742), but was eventually driven even from Bavaria.

CHARLES I.–X., Kings of France. In some chronologies Charlemagne and Charles the Bald are reckoned as Charles I. and II. of France, in others, Charles the Bald and Charles the Fat.

CHARLES III., THE SIMPLE (879–929), King of France; s. of Louis 'the Stammerer'; his reign was chiefly notable for the treaty of peace (911) by which he conferred upon Rollo, a Norman chief, and his heirs, the hereditary dukedom of Normandy. At a later date his nobles revolted, and C. being captured, was kept a prisoner in the castle of Péronne for several years, until his death.

CHARLES IV., THE FAIR (1294–1328), King of France; youngest s. of Philip IV.; succ. his bro., Philip V., as King of France and Navarre (1322); being by lack of revenue, he put public offices to auction. He rendered aid to his sister Isabella in the overthrow of her worthless husband, Edward II. of England. C. was the last of the direct line of Capetian kings.

CHARLES V., THE WISE (1337–80), King of France; s. of John II.; his f. was captured at *Poitiers* (1356), but C. escaped, and ruled in his f.'s stead during John's long captivity in England. He came to the throne in 1364, and, with the aid of Bertrand du Guesclin, succeeded in clearing France of the mercenary bands which ravaged the country, sending them against the English in Spain, and finally driving the English out of the greater part of France. The country groaned under his heavy taxation, but, on the other hand, C. gave France a navy, encouraged the development of the mercantile marine, restricted the power of the nobles, built the Bastille, erected palaces, and made a valuable collection of books and articles of vertu.

CHARLES VI., LE BIEN-AIMÉ (1368–1422), King of France; s. of Charles V.; succ. his f. when twelve, the government of the country being in the hands of his uncles, the Dukes of Anjou, Berry, Burgundy, and

Bourbon; he m. Isabeau of Bavaria, dau. of Stephen II. (1385); was crowned in 1389. Henry V. of England (1414) having formed an alliance with the Duke of Burgundy, revived the Eng. claim to Fr. throne, and won the victory of *Agincourt* (1415); compelled C. to sign Treaty of Troyes, m. Katherine, dau. of the Fr. king, and was acknowledged heir to the throne. C. was, throughout his life, subject to fits of insanity.

CHARLES VII., THE INDOLENT, later THE VICTORIOUS (1403–61), King of France; s. of Charles VI.; his title to the throne of France was disputed by Henry VI. of Eng., N. France being ruled by the Duke of Bedford, until the advent and successes of Joan of Arc eventually gave C. rule over the entire kingdom. It is to the lasting shame of this king that he made no effort to save Joan from her fate. See FRANCE (*History*).

CHARLES VIII. (1470–98), King of France; s. of Louis XI.; succ. at age of thirteen; m. Duchess Anne of Brittany (1491); was an utterly vain and worthless king, his head being filled with vague dreams of military glory, which never came to fruition.

CHARLES IX. (1550–74), King of France; 3rd s. of Henry II. and Catherine de' Medici; succ. his bro., Francis II. (1560). He appears in his earlier years to have had the makings of a man, but was spoilt by his upbringing. He submitted, easily for the most part, to the empire of his mother, who lured him from his attachment to the gallant Admiral de Coligny, and was, throughout his short life, his evil genius, compelling him, amongst other things, to sanction the Massacre of St. Bartholomew.

CHARLES X. (1757–1836), King of France; reigned 1824–30; 3rd s. of the Dauphin, Louis, grandson of Louis XV., and younger bro. of Louis XVI. and Louis XVIII.; before his accession known as Count of Artois. His youth was marked chiefly by dissipation and boundless extravagance; succ. Louis XVIII., but his short reign involved him in frequent troubles with his people, chiefly by reason of his incompetency. He abdicated (1830), and was succ. by Louis Philippe, Duke of Orleans. On two occasions of exile C. took up his residence at Holyrood Palace, Edinburgh.

CHARLES I.–IV., Kings of Spain. For Charles I., see Emperor Charles V.

CHARLES II. (1661–1700), King of Spain; s. of Philip IV.; was feeble from birth, and grew u ignorant and incapable, and d. of senile decay. He was twice m., but left no issue, and was the last Hapsburg to occupy the Span. throne. He bequeathed the throne to Philip, Duke of Anjou, grandson of Louis XIV., which action gave rise to the War of the Span. Succession.

CHARLES III. (1716–88), King of Spain; s. of Philip V. and Elizabeth Farnese; succ. his bro., Ferdinand VI. (1759). He cherished a lifelong detestation of England, but showed a progressive policy, introduced many reforms, and displayed a real zeal for improving the conditions of his people. He expelled the Jesuits, reduced the Inquisition to a state of inactivity, encouraged trade, and built many of the finest buildings of modern Spain.

CHARLES IV. (1748–1819), King of Spain; 2nd s. of Charles III. and Maria Amelia of Saxony. His elder bro. was an imbecile, and therefore incapable of ruling, while C. was probably the most foolish king who ever occupied the Span. throne. He became practically a puppet in the hands of his unscrupulous wife, Maria Luisa of Parma, and her favourite, Emmanuel Godoy, who ruled the country. His fleet was destroyed by Nelson at Trafalgar. He abdicated at Napoleon's suggestion, accepted a pension from the emperor, and died at Rome.

CHARLES I.–XV., Kings of Sweden; regarding Charles I.–VIII. little historical is known.

CHARLES IX. (1550–1611), King of Sweden; s. of Gustavus Vasa; was recognised as king, 1600; crowned, 1607; during his short reign he was engaged in wars with Russia and Denmark, which were continued, after his death, by his s., Gustavus Adolphus. He aimed at the foundation of a great Prot. kingdom. Personally C. is said to have been hard, cruel, and violent; notwithstanding his faults he was the people's hero.

CHARLES X. (1622–60), King of Sweden; s. of John Casimir, Count Palatine of Zweibrücken, and Catherine, dau. of Charles IX.; succ. his cousin, Queen Christina, who resigned in his favour (1654); m. Hedwig Leonora, dau. of Frederick III., Duke of Holstein-Gottorp (1654). Of a warlike spirit, C. in 1655 overran Poland. Later he compelled the Elector of Brandenburg to surrender Pomerania; subsequently obtaining a second conquest over the Polish army in the three days' battle of *Warsaw* (July 28–30, 1656). Next he invaded Denmark, crossed both the Great and Little Belt over the ice with a large army, and forced the cession of great territories as price of peace. Later, when attacking Copenhagen, he was beaten off, as the Danes were assisted by the Dutch and the Prussians; and when preparing for a further war he died suddenly at Gothenburg.

CHARLES XI. (1655–97), King of Sweden; only s. of Charles X.; was only four years of age at his f.'s death, and up to the time of his majority at the age of seventeen his education was sadly neglected. But, upon his accession, he threw himself diligently into the business of administration; won two great victories over his hereditary enemies the Danes, and thereby restored the prestige of his country; and proved his right to be considered one of the greatest of Swed. kings.

CHARLES XII. (1682–1718), King of Sweden; s. of Charles XI.; succ., 1697. A hostile league was formed in 1699 by Russia, Denmark, and Poland for the overthrow of Sweden, but C., in spite of his youth, landed near Copenhagen, and compelled the Dan. king to sue for peace. Next he turned his arms against the Tsar Peter I., and with about 9000 men routed 50,000 Russians at *Narva* (Nov. 30, 1700). Then he proceeded to the reduction of Poland, dethroned Augustus II., and compelled the election of Stanislaus Leszezynski as King of Poland. His subsequent operations against Russia were unsuccessful, and he became a prisoner to the Turks, whose aid he had unsuccessfully sought. He contrived, however, to escape, and in a brief space of time was busy preparing an expedition against Norway, during the progress of which he was killed by a stray shot before the fortress of Fredrikshald. C. had many personal characteristics which were calculated to render him popular with the Swed. people. He was brave to recklessness, despised rank, dressed simply, lived on the coarsest food, and shared with his soldiers all the hardships of war.

Voltaire, *Histoire de Charles XII.*; R. N. Bain, *Charles XII.* (1895).

CHARLES XIII. (1748–1818), King of Sweden and Norway; s. of Adolphus Frederick, King of Sweden. By the union (1814) C. became King of Sweden and Norway. He served with distinction, as Admiral of the Fleet, in the Russo-Swedish War (1788).

CHARLES XIV. (1763–1844), King of Sweden and Norway; his name was Jean Baptiste Bernadotte; s. of Henri Bernadotte; b. Pau; entered Fr. army (1780); won speedy promotion during progress of Fr. Revolution; commander of army in La Vendée (1800–1); made Marshal of France under the Empire; gov. of Hanover (1804–5). He was adopted as heir by Charles XIII., whom he succ. 1818.

CHARLES XV. (1826–72), King of Sweden and Norway; s. of Oscar I.; became regent (1857); succ. his f. as king (1859); m. Louisa, dau. of Prince Frederick of the Netherlands. He promoted many useful reforms in the administration, and personally attained some eminence both as poet and artist.

CHARLES I.–III., Kings of Navarre. For Charles I., see Charles IV. of France.

CHARLES II., THE BAD (1332–87), King of Navarre; s. of Jeanne II., Queen of N., and Philip, Count of Evreux; m. Jeanne, dau. of King John II. of France. Through both his parents he was descended from Fr. kings, and thus was a rival claimant with Edward III. of England for Fr. throne. He possessed insinuating manners, but was cruel, dissolute, and unscrupulous.

CHARLES III., THE NOBLE (1361–1425), King of Navarre; s. of above. His reign was memorable for its peace and the improved economic conditions which his care brought about; he m. Leonora, dau. of Henry II. of Castile.

CHARLES I. and II., Kings of Naples and Sicily.

CHARLES I. (1226–85), King of Naples and Sicily, and Count of Anjou; s. of Louis VIII. of France, and bro. of St. Louis; accompanied the latter on a crusade in Egypt (1248); received crown of Naples and Sicily from Clement IV. (1266); made himself by conquest one of most powerful European sovereigns. But his greed, ambition, and cruelty raised up enemies everywhere, and his vast empire dwindled gradually away. He died of fever at Foggia, when preparing an expedition against Sicily.

CHARLES II. (1250–1309), King of Naples and Sicily; s. of preceding; was a prisoner in the hands of King Peter of Aragon at time of his f.'s death, but was released later on condition that he resigned crown of Sicily to Aragon. C. afterwards made unsuccessful attempts to recover the island. He spared no expense in his efforts towards the improvement of the city of Naples.

[illegible]RLES (1771–1847), Archduke of Austria; b. Florence; s. of Emperor Leopold II.; gov. of the Netherlands (1790); was engaged in battles with the French from his twenty-first year; defeated Masséna at *Caldiero* (Italy) in Oct. 1805; was several times opposed to Napoleon, whom he defeated at *Aspern* and *Esslingen* (1809).

CHARLES ALBERT (1798–1849), King of Sardinia; succ. his cousin, Charles Felix, 1831; during early part of reign much exercised in combating secret societies, particularly Mazzini's 'Young Italy'; founded liberal constitution, devoted to administrative reforms, and encouraged art, science, and letters; abdicated (1849) in favour of e. s., Victor Emmanuel, who afterwards became first King of Italy.

CHARLES ALEXANDER (1712–80), Prince of Lorraine; s. of Leopold, Duke of Lorraine; m. Marianne, sister of Maria Theresa of Austria; became commander-in-chief of Austrian army, and performed many brilliant services; was also gov. of Austrian Netherlands.

CHARLES AUGUSTUS (1757–1828), Grand-Duke of Saxe-Weimar; m. Princess Louise of Hesse-Darmstadt; patron of art, science, and letters; intimate friend of Goethe.

CHARLES, CAROL (1839–), King of Rumania; Prince of Hohenzollern-Sigmaringen; elected prince of Rumania, 1866; was proclaimed king, 1881; m. Princess Elizabeth of Wied (1869), better known as 'Carmen Sylva'; their only child d. (1874), and the heir to the throne is the king's nephew, Prince Ferdinand, who m. Marie, dau. of the Duke of Saxe-Coburg.

CHARLES, CHARLES IV. (1421–61), Navarrese prince; s. of Queen Blanche of Navarre and her husband, John (II.), who, after her death, seized the crown to exclusion of Charles; trans. Aristotle's *Ethics* into Spanish.

CHARLES EDWARD STEWART, PRINCE (1720–88), 'THE YOUNG PRETENDER,' s. of James, 'Old Pretender'; b. Rome; took part in Don Carlos' expedition against Naples, 1734; attempted, with French help, invasion of England, but was driven back by storm, 1744; landed in Scotland, 1745, and obtained support first of Lochiel then of many Highland chiefs; defeated Cope at Prestonpans, Sep. 20; took Carlisle; reached Derby, Dec. 4; compelled to retreat by desertion of troops; marched north, defeating Hawley at Falkirk; utterly defeated at Culloden by Duke of Cumberland, April 16, 1746. After five months' wandering C. took ship to France, whence he was driven, 1748; wandered over Europe intriguing, but meeting with coldness; m. Louise of Stolberg, 1772; separated, 1784; d. Rome. C. was brilliant, versatile, and courageous, but profligate; romantic interest attached to his name has formed subject of many Highland poems, and there are still Jacobite societies.

CHARLES EMMANUEL I. (1562–1630), Duke of Savoy; succ. his f., Emmanuel Philibert (1580); m. Catherine, sister of Henry of Navarre; upon the murder of Henry III. of Valois, C. aspired to Fr. throne, but the recognition of the King of Navarre as Henry IV. of France put an end to his hopes.

CHARLES LE BON (1084–1127), Count of Flanders; s. of King Knut IV. of Denmark; was named as heir to the countship of Flanders by his cousin, Baldwin VII., whom he succ. in 1119; was an earnest supporter of the cause of Christianity, and laboured tirelessly for the welfare of his people; murdered in church of St. Donat, Bruges.

CHARLES LEOPOLD (1643–90), Duke of Lorraine; nephew of Charles IV.; his duchy was occupied by the French, and he failed, after strenuous efforts, to recover its possession; he was also twice an unsuccessful candidate for the crown of Poland, which eventually was bestowed upon John Sobieski, in 1674, with whom he was later intimately associated in resisting the Turkish invasion of Europe.

CHARLES MARTEL, *i.e.* 'THE HAMMER' (688–741), Frankish king; natural s. of Pippin II., mayo of the palace under the last Merovingian kings; was grandfather of Charlemagne; memorable for having stemmed tide of Moslem conquest; but for his efforts, Gibbon tells us, 'perhaps the interpretation of the Koran would now be taught in the schools of Oxford.' He was succ. by his sons, Carloman and Pippin the Short.

CHARLES OF BLOIS (1319–64), Duke of Brittany; s. of Guy of Châtillon, Count of Blois; m. Jeanne, dau. of Guy of Brittany, in whose right he claimed the duchy of Brittany. He was killed at *Auray* (1364). C. was noted for his piety, and received canonisation.

CHARLES OF GUISE (1525–74), Cardinal of Lorraine; the cunning, ambitious, and unscrupulous bro. of Francis, Duke of Guise; exercised considerable influence at the courts of Henry II. and Francis II., but fell into disfavour with Catherine de' Medici, and was dismissed the court.

CHARLES THE BOLD (1433–77), Duke of Burgundy; s. of Philip the Good; m. Margaret of York, his third wife, and was thus bro.-in-law of Edward IV. of England; succ. to the duchy in 1467. During the greater part of his life, he was engaged in conflict with the Fr. king (Louis XI.), whose vassal he was, and his ambition was to raise Burgundy into a powerful kingdom. Possessing great strength and a handsome person, brave and reckless to a fault, he was undoubtedly the most conspicuous military figure of his age. He was killed at the siege of Nancy, Jan. 5, 1477.

Ruth Putnam, *Charles the Bold* (1908).

CHARLES, COUNT OF VALOIS (1270–1325), Fr. military leader, who distinguished himself in many battles in Guienne and Flanders. His s., Philip, became King of France (1328), founding the Valois dynasty.

CHARLES, ELIZABETH (1828–96), Eng. novelist; dau. of John Rundle, M.P.; m. Andrew P. Charles (1851); wrote about fifty books, including a story written around Martin Luther, *The Chronicles of the Schönberg-Cotta Family* (1862), which enjoyed an immense vogue in England and abroad.

CHARLES, THOMAS (1755–1814), Welsh

Methodist preacher and writer; pioneer of Sunday Schools in the principality; issued *Biblical Dictionary* (in Welsh), 4 vols., 1805–11.

CHARLES'S WAIN, see URSA MAJOR.

CHARLESTON (32° 55′ N., 80° W.), town, S. Carolina, situated on point of land between Cooper and Ashley Rivers, which, uniting, form fine harbour. Regularly laid out, many fine houses and gardens. Public buildings include city hall, custom-house, arsenal; there are military and musical academies, and a Medical College. Seat of Catholic bp.; many fine churches and charitable institutions. Several parks and pleasure resorts. Important commercial centre; manufactures fertilisers, clothing, etc.; exports cotton, rice, lumber, phosphates. Founded 1670 by English colonists. Successfully besieged by English, 1780. Civil War broke out here by seizure of Fort Sumter by S. Carolinians, 1861. Suffered from earthquake, 1886. Pop. (1910) 58,833.

CHARLESTON (39° 30′ N., 88° 14′ W.), city, Illinois, U.S.A. Pop. (1910) 5884.

CHARLESTON (38° 21′ N., 81° 32′ W.), capital of West Virginia, U.S.A.; vicinity produces bituminous coal, salt. Pop. (1910) 22,996.

CHARLESTOWN (42° 22′ N., 71° 4′ W.), former city, Middlesex County, Massachusetts; since 1874 a district of Boston; sugar refineries. Here the battle of *Bunker's Hill* was fought, 1775, British ruining the town, which was afterwards rebuilt.

CHARLESTOWN (17° 8′ N., 62° 35′ W.), town, Nevis, W. Indies.

CHARLET, NICOLAS TOUSSAINT (1792–1845), Fr. artist and designer; served in the National Guard; later adopted the artist's profession, and excelled in military subjects.

CHARLEVILLE (49° 47′ N., 4° 42′ E.), town, on Meuse, Ardennes, France; manufactures hardware, leather, and beer. Pop. 18,772.

CHARLEVOIX (45° 19′ N., 85° 17′ W.), summer resort, Michigan, U.S.A.; trade in lumber.

CHARLEVOIX, PIERRE FRANÇOIS XAVIER DE (1682–1761), Fr. Jesuit historian; travelled frequently for his order in America and elsewhere; wrote *History of the Church of Japan*, Eng. trans. 1715), *History of San Domingo* (1730), *History of Paraguay* (1756), *History of Canada*, Eng. trans. (1769).

CHARLOTTE (35° 17′ N., 80° 39′ W.), city, N. Carolina, U.S.A.; seat of Biddle Univ. for negroes; manufactures cotton and machinery. Pop. (1910) 34,104.

CHARLOTTE AMALIE, ST. THOMAS (18° 24′ N., 64° 56′ W.), port, St. Thomas, Danish W. Indies. Pop. 8600.

CHARLOTTE, PRINCESS, AUGUSTA (1796–1817), only child of Prince George of England (Geo. IV.) and Caroline of Brunswick; contracted to William of Orange and m. Leopold of Saxe-Coburg, but left no issue.

CHARLOTTENBURG (52° 32′ N., 13° 17′ E.), town, Prussia; virtually a suburb of Berlin; has royal palace; famous Technical College; manufactures china, beer, iron goods. Pop. (1910) 305,978.

CHARLOTTESVILLE (38° 3′ N., 78° 28′ W.), city, Virginia, U.S.A.; seat of Univ. of Virginia, founded by Thomas Jefferson; manufactures agricultural implements. Pop. (1910) 6756.

CHARLOTTETOWN (46° 14′ N., 63° 10′ W.), capital of Prince Edward Island; fine harbour; has woollen factory and iron foundry. Pop. 12,100.

CHARMETTES (c. 45° 30′ N., 5° 50′ E.), village, Savoie, France; near Chambéry.

CHARNER, VICTOR-JOSEPH (1797–1869), Fr. admiral distinguished in Chin. expeditions.

CHARNOCK, ROBERT (d. 1696), Eng. R.C. priest; was concerned in the plot to assassinate King William III. at Turnham Green, Feb. 1696; arrested, found guilty, and hanged in the following month.

CHARNOCKITE, important group of igneous rocks, found India, Ceylon, Madagascar, parts of Africa, France, Norway, Germany, S. America, and Scotland. The tombstone of JOB CHARNOCK (d. 1693), the founder of Calcutta, was made from this stone, and Dr. T. H. Hallam named it after him. The rocks are regarded as belonging to the Archæan age.

CHARNWOOD FOREST (52° 15′ N., 1° 18′ W.), barren hill tract, N.W. Leicestershire, rising to elevation of 912 ft.

CHAROLAIS (46° 26′ N., 4° 16′ E.), district, Saône-et-Loire, France; wines, cereals, live stock.

CHAROLLES (46° 26′ N., 4° 16′ E.), town, Saône-et-Loire, France; noted cattle and pottery. Pop. 3176.

CHARON (classical myth.), s. of Erebus and Nox; a minor deity whose business it was, for payment of an obolus, to ferry souls of the departed across the Styx to the infernal regions.

CHARPENTIER, FRANÇOIS (1620–1702), Fr. man of letters; pub. *Vie de Socrate* (1650); trans. Xenophon's *Cyropædia* (1658) and other works.

CHARPENTIER, GUSTAVE (1860–), Fr. composer; b. Alsace-Lorraine; studied violin; best-known work, romantic opera *Louise*; also wrote *Julien*.

CHARPENTIER, JACQUES (1524–74), Fr. scholar thought to have murdered Ramus.

CHARRON, PIERRE (1541–1603), Fr. theologian; after studying for law entered the Church, became canon, and was app. preacher in ordinary to Marguerite of Valois. He attacked the League in his *Discours Chrétiens* (1589); championed Catholicism in *Les Trois Vérités* (1594), while his *De la Sagesse* (1601) brought down upon him the charge of atheism. He lived on intimate terms with Montaigne.

CHARRUA, tribe of S. Amer. Indians, now almost extinct.

CHART, marine map, showing the nature of the sea floor, with soundings for use of the seafaring population. The Brit. Admiralty c's are issued by the hydrographic office; prepared with extreme care, with constant reference to surveys of other nations, and, as far as possible, are kept up to date.

CHARTE CONSTITUTIONELLE, the Magna Carta of France, obtained from Louis XVIII. (1814) and expanded after Revolution, 1830.

CHARTER, a written instrument, conferring certain privileges, granted by the Crown, the most famous example in Eng. history being Magna Carta given by King John. C's are now chiefly granted to Univ's, corporations, public companies, and similar bodies. The term is also used in the sense of 'to hire,' as to charter a vessel; and was used by Shakespeare in the sense of license ('chartered libertine').

CHARTER OAK, tree (supposed to be 1000 years old) at Hratford, Conn., till blown down (1856), in hollow of which colonists hid colonial charter to evade surrendering it to New England governor-general.

CHARTERED COMPANIES are trading corporations existing under a charter from a sovereign power, usually for a fixed period, and limited by clearly defined regulations. Such companies existed amongst foreign nations long before they were instituted by Eng. merchants. The Hanseatic League, which maintained its Eng. branch at a place known as the Steel Yard, on the Thames embankment, until the yard was closed by Queen Elizabeth, dates from the XIII. cent. Eng. trading companies came into existence under Elizabeth. The most famous was the EAST INDIA COMPANY, instituted for the purpose of opening up an Eng. trade with India and the Far East. It received its first charter in 1600, and became the ruling power in India, and it was not until 1858 that its powers were finally absorbed by the Crown.

Second only in importance is the HUDSON'S BAY COMPANY, which was established in 1670, when Charles II. granted a charter to Prince Rupert and seventeen other speculators, who were described as 'the Governor and Company of Adventurers of England trading into Hudson's Bay.' Other early companies were the Turkey and Russian Companies;

while later institutions have been the NATIONAL AFRICAN Co. (1881), which secured the lower Niger for Brit. trade, the BRIT. NORTH BORNEO Co. (1881), Royal Niger Co. (1886), which enjoyed all rights of government in its territories until they were incorporated with N. and S. Nigeria (1900), the IMPERIAL BRIT. EAST AFRICA Co. (1888; see BRITISH EAST AFRICA) and the BRIT. S. AFRICA Co. (1889), formed under auspices of Cecil Rhodes, which secured Rhodesia (*q.v.*) for England.

CHARTERHOUSE (Eng. form of *Chartreuse*), famous London school occupying the site of a Carthusian monastery founded by Sir Walter de Manny (1371). The school itself was founded and endowed under the will of Thomas Sutton (1532–1611), a London merchant. The number of foundation scholars was at first limited to 40, but has since been increased to 60. In 1872 new school buildings were erected at Godalming, and a portion of the old Charterhouse now accommodates the boys of Merchant Taylors' School.

CHARTERS TOWERS (20° 6′ S., 146° 6′ E.), town, Devonport County, Queensland, Australia; gold mines. Pop. (1911) 17,298.

CHARTIER, ALAIN (d. 1430), Fr. poet; was sec. to Charles VII.; famous for his poems, *Le Lay des Quatre Dames*, *Débat du réveille-matin*, *La Belle Dame Sans Merci*, etc. A prose work, *Le Curial*, was trans. and pub. by Caxton.

CHARTISM, popular movement demanding (1838) universal suffrage, vote by ballot, annual parliaments, payment of members, and abolition of property qualification—'The People's Charter'; Parliament refused to receive their petition; came to a head in 1848, when a huge procession was massed, but the strategic disposition of troops about London overawed the demonstrators, and the menace passed away.

CHARTRES (48° 26′ N., 1° 29′ E.), city, Eure-et-Loir, France; formerly capital of Beauce; seat of bp.; cathedral of Notre Dame is one of most magnificent in France; scene of coronation of Henry IV., 1594; obelisk to memory of General Marceau; taken by Germans, 1870; hosiery, leather manufactured. Pop. 19,232.

CHARTREUSE, see CARTHUSIANS, CHARTERHOUSE.

CHARTREUSE, LA GRANDE, formerly mother house of Carthusians, founded by St. Bruno (1084). The present building, dating only from XVII. cent., is situated in the mountainous country *c.* 13 miles N. of Grenoble. The monks were expelled, 1793; returned, 1816; again expelled in 1904, and are now settled at Lucca and Tarragona. The profits from their world-famous liqueur have been almost entirely devoted to church-building and benevolent purposes.

CHASE, SALMON PORTLAND (1808–73), Amer. statesman; sec. of Treasury under Lincoln (1861–64); promoted establishment of national banking system.

CHASE, SAMUEL (1741–1811), Amer. jurist; opponent of Stamp Act; chief judge of Maryland Court (1791); later justice of Supreme Court of U.S.A.

CHASING, the art of ornamenting metals by means of a snarling-iron and other tools.

CHASLES, VICTOR PHILARÈTE (1798–1873), Fr. man of letters; librarian of the Bibliothèque Mazarine; prof. of Lit. in Collège de France; wrote for Eng. reviews and *Revue des deux mondes*, and was the author of many books on literary subjects.

CHASSELOUP-LAUBAT, FRANÇOIS, MARQUIS DE (1754–1833), Fr. military engineer; performed brilliant service in Napoleonic campaigns, and was made general of division; cr. peer and knight of St. Louis by Louis XVIII.

CHASSEPOT, Fr. breech-loading rifle (used 1866–74), invented by A. A. CHASSEPOT (1833–1905); superseded by the Gras rifle in 1874.

CHASSERIAU, THÉODORE (1819–56), Fr. painter; combined Romantic colouring with Classical subjects.

CHASTELARD, PIERRE DE BOSCOCEL DE (1540–63), Fr. poet; page to Marshal Damville, in whose train he accompanied Mary Stewart to Scotland; afterward entered Mary's service at Holyrood; nourished a passion for the queen, which she is said (with little probability) to have encouraged, but, having twice been discovered hiding in her room, was arrested and hanged.

CHASTELLAIN, GEORGES (d. 1475), Burgundian historian; served in the Anglo-Fr. wars, and later was frequently employed in diplomatic missions between the courts of France and Burgundy. His *Chronique*, which he left in an unfinished MS. state at his death, is invaluable as an authority upon the persons and events of his time.

CHASTELLUX, FRANÇOIS JEAN, MARQUIS DE (1734–88), type of old Fr. noblesse, distinguished soldier, and wit.

CHASUBLE, a liturgical vestment, sleeveless, with a hole for the head, of silk or velvet; worn for celebration of Mass. The colours vary according to season, and the shapes are various. The 'Gothic' c. falls in folds over the shoulders and comes to a point both at back and front, while the 'Roman' rests on the shoulders and is rounded back and front. See VESTMENTS.

CHÂTEAU, Fr. mediæval name for castle; the town houses of the nobility and other distinguished persons being known as *hôtels*, thus, 'Hôtel de Guise,' 'Hôtel de Richelieu,' etc.

CHATEAUBRIAND, FRANÇOIS RENÉ, VICOMTE DE (1768–1848), Fr. author; b. St. Malo; ed. Dol and Rennes; served short time as ensign; spent eight months in N. America (1791), and recorded his impressions in *Voyage en Amérique*. Upon arrest of Louis XVI. he returned to France, and joined army of *émigrés*; left for dead at *Namur*, but succeeded in making his way to London, where for several years he maintained himself by teaching and translating. During this period he wrote his famous romance, *Atala* (1801), dealing with the Indians and prairie life of N. America; and another story, *René* (1802), which established the author's fame as a prose-poet. His other works include *Génie du Christianisme* (1802), a vindication of the R.C. Church; *Les Martyrs* (1809), prose epic of the days of Diocletian; *Itinéraire à Jérusalem* (1811); *Adventures du Dernier des Abencérages* (1826); and his posthumous autobiography, *Mémoires d'outre Tombe*. He held diplomatic posts under Napoleon, and was later ambassador to Berlin, London, and Rome, but his career as a statesman was a failure. As a writer of poetic prose C. is incomparable, and no writer of the Romantic school has ever approached the grandeur and fascination of his finest descriptive passages.

Sainte-Beuve, *C. et son groupe littéraire* (1860); Faguet, *Les Écrivains du XIXe Siècle* (1887).

CHÂTEAUBRIANT (47° 43′ N., 1° 22′ W.), town, on Chère, Loire-Inférieure, France; leather. Pop. 5945.

CHÂTEAUDUN (48° 5′ N., 1° 19′ E.), town, Eure-et-Loir, France; manufactures blankets; has mediæval castle, which was originally built in X. cent., and was stronghold of Counts of Dunois. Pop. 5600.

CHÂTEAU-GONTIER (47° 50′ N., 0° 42′ W.), town, Mayenne, France; has linen and woollen manufactures. Pop. 7100.

CHÂTEAULIN (48° 12′ N., 4° 4′ W.), town, Finistère, France. Pop. 4000.

CHÂTEAUMEILLANT (46° 34′ N., 2° 11′ E.), town, France. Pop. 4000.

CHÂTEAUNEUF, name of eleven towns and villages in France.

CHÂTEAUNEUF, LA BELLE, court name for RENÉE DE RIEUX, dau. of a Breton noble, Jean de Rieux, Seigneur de Châteauneuf. She was maid of honour to Catherine de' Medici, and the Duc d'Anjou

became infatuated with her. The queen-mother wished to marry him to Queen Elizabeth of England, and La Belle C. was therefore banished from court.

CHÂTEAUPONSAC (46° 8′ N., 1° 16′ E.), town, France. Pop. 4000.

CHÂTEAURENARD PROVENCE (43° 53′ N., 4° 52′ E.), town, France. Pop. 7500.

CHÂTEAU-RENAULT (47° 36′ N., 0° 55′ E.,) town, France. Pop. 4300.

CHÂTEAU-RENAULT, FRANÇOIS LOUIS DE ROUSSELET, MARQUIS DE (1637–1716), Fr. admiral; after service in army he transferred to the navy, and was sent in command of expeditions against the Barbary corsairs; commanded the Fr. ships at *Bantry Bay*; in charge of a squadron at *Beachy Head* (1690); during the War of the Span. Succession had to convoy the Amer. treasure-ships. His ships were destroyed or captured at *Vigo Bay* (1702), by an Eng. fleet under Sir George Rooke.

CHÂTEAUROUX (46° 49′ N., 1° 42′ E.), town, on Indre, France; manufactures of woollen goods, iron, leather, and tobacco. Pop. 24,957.

CHÂTEAUROUX, MARIE ANNE, DUCHESSE DE (1717–44), Fr. courtesan; dau. of the Marquis de Nesle; after the death of her husband, the Marquis de la Tournelle, in 1740, she became mistress to Louis XV.

CHÂTEAU-THIERRY (49° 2′ N., 3° 21′ E.), town, on Marne, Aisne, France; has cathedral and ruined castle; birthplace of La Fontaine. Pop. 7100.

CHÂTELAIN (Fr.), in Carolingian times, a high court officer; later, the custodian of a feudal castle.

CHÂTELAINE, female keeper of a castle; hence, from the custom of carrying a bunch of keys at her girdle, is derived the modern name of the 'lady's companion.'

CHÂTELET, name used in mediæval France for a fort which was not inhabited; also applied to a criminal court abolished in 1790.

CHÂTELET (50° 25′ N., 4° 32′ W.), town, on Sambre, Hainault, Belgium; coal and potteries. Pop. 13,000.

CHÂTELLERAULT (46° 49′ N., 0° 33′ E.), town, Vienne, France; cutlery. Pop. 17,962.

CHATHAM (51° 23′ N., 0° 32′ E.), town, naval port, on Medway, Kent, England, adjoining Rochester, Brompton, and Gillingham; has important fortifications, and immense dockyards covering over 500 acres, and extending over 3 miles; also great wet docks and graving docks. Other important buildings are the arsenal; infantry, Royal Marine, engineer, and artillery barracks; military hospitals, schools, and convict prison; shipbuilding, sawmills, brickworks. Pop. (1911) 42,256.

CHATHAM (47° 2′ N., 65° 31′ W.), town, port of entry, on Miramichi, New Brunswick, Canada; chief industries, lumber trade and fisheries. Pop. 5000.

CHATHAM (42° 27′ N., 82° 20′ W.), city, port of entry, on Thames, Ontario, Canada; mills, foundries, and large export trade. Pop. 10,770.

CHATHAM ISLANDS (44° 20′ S., 176° E.), Brit. group in S. Pacific Ocean, consisting of three islands (*Chatham*, the largest, 38 miles long) and several rocky islets; dependency of New Zealand; total area, 375 sq. miles; coasts rocky; surface hilly, undulating, fertile; discovered by Lieut. Broughton, 1791; inhabitants chiefly Maoris; chief industry is stock-rearing, and wool is exported.

CHATHAM, WILLIAM PITT, 1ST EARL OF (1708–78), Brit. statesman; b. Westminster (Nov. 15), and ed. Eton and Trinity Coll., Oxford. Suffering from ill-health, he travelled abroad, and then entered the army. But in 1735 he became M.P. for Old Sarum, and in the Commons vigorously attacked Walpole. In 1746 Pitt became Vice-Treasurer of Ireland, and then Paymaster-General. In 1751 he was dismissed from office for speaking against a government proposal. In 1756, however, he became Sec. of State and Leader of the House. In 1757 he was dismissed, but was reinstated as practical though not nominal head of the Government. The administration of 1757–61 is famous in Brit. history for the successes of Wolfe in Canada and Clive in India, and for the Seven Years War, in which Pitt supported Frederick the Great. He opposed the peace of 1763, but from this time on he was frequently very ill, and unable to take part in public affairs. He retired from office, but came back to form a ministry, he himself being Lord Privy Seal, in 1766. He was then cr. Earl of Chatham. During most of his term of office he was ill, and his conduct was somewhat strange. He resigned in 1768. He appeared in the House of Lords again in 1770, and before his death vigorously opposed the government policy towards America. He was a great orator, and a brilliant if in some ways mysterious personality.

Harrison, *Chatham* in 'Twelve English Statesmen'; Lord Rosebery, *The Early Life of Chatham*; Green, *Life* (1901).

CHÂTILLON-SUR-SEINE (47° 53′ N., 4° 33′ E.), town, on Seine, Côte d'Or, France; C. congress between Napoleon and allies, 1814; iron foundries. Pop. 4900.

CHATSWORTH (55° 24′ N., 1° 37′ W.), village, Derbyshire, England. C. Hall, seat of Duke of Devonshire, has fine grounds, gardens, library, and art collection; for several years Mary, Queen of Scots, was imprisoned here.

CHATTANOOGA (35° N., 85° 21′ W.), town, Tennessee, U.S.A., on Tennessee R.; important railway centre and manufacturing town; has cotton-mills, foundries, steel works, blasting furnaces; manufactures carriages, furniture, bricks, tiles, wire, nails, chemicals, etc.; extensive trade in lumber, grain, coal, etc. Public buildings include two opera-houses, library, custom-house, various colleges and univ's. There is fine park and National Cemetery. Town was well-nigh destroyed in Civil War; Grant gained victory here in 1863. Pop. (1910) 44,604.

CHATTEL, any kind of property other than freehold.

CHATTERIS (52° 27′ N., 0° 2′ E.), market town, Cambridgeshire, England; breweries, engineering and rope-making works. Pop. (1911) 5259.

CHATTERJI, BANKIM CHANDRA (1838–94), Ind. novelist; modelled his hist. stories on Scott.

CHATTERTON, THOMAS (1752–70), Eng. poet; b. Bristol; posthumous s. of a schoolmaster; ed. Colston's School; apprenticed to a solicitor; was reckoned a dull boy at school, but afterwards developed an intense love for archaic lit. When the new bridge was opened at Bristol (1768), C. contributed to *Felix Farley's Journal* an alleged description of the opening of the earlier bridge by a XV.-cent. monk, Thomas Rowley. Shortly afterwards he entered into correspondence with Horace Walpole, drawing his attention, amongst other matters, to a number of poems by Rowley, which he claimed to have discovered in a muniment chest of the Church of St. Mary Redcliffe. Specimens of these he submitted to Walpole, who at first wrote to him in a most courteous manner, but some of his learned friends, to whom they were submitted, pronounced them to be forgeries. Whereupon ensued a number of bitter letters on the part of C., while Walpole treated the boy with silent contempt and neglect.

The poet, with a few pounds in his pocket, quitted Bristol for London (April 1770), where he found a precarious employment as a writer of political squibs and songs for Ranelagh Gardens. On August 25, after starving for a week, he committed suicide by taking arsenic in his garret at 4 Brook Street, Holborn, and received a pauper's burial. C.'s work is very unequal, and though he courted fame by imposition, a few of his ballads and lyrics are amongst the most precious things of their kind in Eng. lit. Amongst these may be named *The Bristowe Tragedy*, *The Balade of Charitie*, and the Minstrel's Song in *Ælla*. He was one of the

founders of modern romantic poetry, and his influence upon Coleridge was very considerable. He was inordinately ambitious, of a proud and independent spirit, and of an affectionate disposition. Despite his faults, to posterity he is the 'heaven-born genius' of Coleridge's tribute—'the marvellous boy . . . that perished in his pride.'

Poetical Works (Aldine edn.), edited by Prof. W. W. Skeat; also in 'Canterbury Poets' Series; biographies by Masson (1874), Russell (1909), Ingram (1910).

CHATTI, Ger. tribe, which, during the period of the Roman Empire, dwelt in the neighbourhood of the river Weser.

CHAUCER, GEOFFREY (c. 1340–1400), the first great Eng. poet; s. of a London vintner. Nothing is known of his early years until, in 1357, he appears as page to the Duchess of Clarence. In 1359 he was following the war in France, and was captured, but ransomed in the following year. Six years later he married Phillipa Roet, a lady attending the Duchess of Lancaster. In 1367 he was a valet to the king, and later esquire. Subsequently he again served in the Fr. wars, and was frequently employed in diplomatic missions abroad. He was app. Comptroller of the Customs of Wool, Skins, and Leather in 1374; Comptroller of Petty Customs of the Port of London (1382); and other offices and varying fortunes followed. Thus he occupied a position of honour and substance during the greater portion of his life, and that his work was held in some estimation in his lifetime is evidenced by his burial in Westminster Abbey.

In person the poet was inclined to stoutness, with a fair beard, and a somewhat sly or 'elvish' expression of countenance. His works include *The Book of the Duchess, The House of Fame, Troilus and Criseyde, The Legend of Good Women*, and probably the *Romaunt of the Rose*, and numerous minor works, several of doubtful authorship. The work upon which his fame chiefly rests is *The Canterbury Tales*, begun about 1373, and left incomplete at his death. The various tales are equally remarkable for their lyrical and decorative qualities, the knowledge of life which they display, keen insight into character, playful satire, and joyous humour. Besides an absolute poetic position irrespective of date, C. is important for his influence on language and metre. That English was substituting French in common use is shown by the statute of 1362 that English should be employed in the law courts, but there were many dialects of English, and this first great vernacular literature helped to create a central speech. In prosody C. gave an example of the first regular verse, the octosyllabic couplet.

Works, edit. by Skeat (1894); also in the 'Aldine Classics,' edit. by R. Morris; biography by A. W. Ward (1879), Legouis (1913).

CHAUDESAIGUES (44° 51′ N., 2° 59′ E.), village, Cantal, France, with celebrated mineral springs.

CHAULIEU, GUILLAUME AMFRYE DE (1639–1720), Fr. poet.

CHAUMETTE, PIERRE GASPARD (1763–94), Fr. revolutionist; member and pres. of Commune (1792), he attacked the Girondists (1793); accused by Robespierre and executed (1794).

CHAUMONT (48° 6′ N., 5° 8′ E.), town, Haute-Marne, France; gloves. By Treaty of C. (1814), U.K., Austria, Prussia, and Russia agreed to continue war against France. Pop. 12,200.

CHAUNCEY, ISAAC (1772–1840), Amer. naval commander, entered U.S.A. navy, 1798; took a prominent part in war of 1812, taking command on Lake Ontario.

CHAUNCY, CHARLES (1592–1672), Anglican divine; went to America, 1637; pres. of Harvard, 1654; his great-grandson, CHARLES (1705–87), Amer. divine, wrote several works.

CHAUNY (49° 38′ N., 3° 14′ E.), town, Aisne, France; glass-polishing works; scene of heavy fighting in Hundred Years War. Pop. 10,547.

CHAUTAUQUA (42° 12′ N., 79° 30′ W.), village, summer resort, on Lake C., W. New York, U.S.A.; centre of religious, educational, and social movement founded in 1874 by Mr. Lewis Miller and Bp. Vincent. Pop. 4000.

CHAUVELIN, BERNARD FRANÇOIS, MARQUIS DE (1766–1832), Fr. politician; though an aristocrat, and Master of Wardrobe to Louis XVI., took part in the Revolution, and became member of the Council of State under Napoleon.

CHAUVIGNY (46° 35′ N., 0° 38′ E.), town, Vienne, France; interesting antiquities.

CHAUVIN, ÉTIENNE (1640–1725), Huguenot theologian at Rotterdam and Berlin.

CHAUVINISM, term used in Napoleon's days for hero-worship of the emperor; derived from Nicholas Chauvin; exaggerated patriotism, jingoism.

CHAUX-DE-FONDS, LA (47° 6′ N., 6° 50′ E.), town, Neuchâtel, Switzerland; centre of watch-making industry. Pop. (1912) 38,600.

CHAVES (41° 44′ N., 7° 33′ W.), town, Portugal; famous for hot saline springs; ancient *Aquæ Flaviæ*. Pop. 6463.

CHAWADIS, see ARCHITECTURE (*Indian*).

CHAZELLES, JEAN MATHIEU DE (1657–1710), Fr. hydrographer; carried out surveys of the Mediterranean.

CHEADLE (53° 26′ N., 2° 13′ W.), town, Cheshire, England; printing and bleaching works. Pop. (1911) 9914.

CHEADLE (52° 59′ N., 1° 59′ W.), market town, Staffordshire, England; extensive collieries in vicinity.

CHEBISHEV, PAFNUTIY LVOVICH (1821–94), renowned Russ. mathematician; pub. researches on prime numbers, rectilinear motion, theory of integrals, and many other subjects. He was a foreign member of the Royal Soc.

CHEBOYGAN (45° 40′ N., 84° 28′ W.), city (and county), Michigan, U.S.A.; sawmills. Pop. (1910) 6859.

CHECKERS (Amer.), game of draughts (*q.v.*).

CHEDDAR (51° 17′ N., 2° 47′ W.), village, Somersetshire, England; famed for its cliffs and caves; cheese (*q.v.*).

CHEDUBA, MAN-AUNG (18° 40′ N., 93° 30′ E.), island, E. coast, Bay of Bengal, forming part of Arakan; famous for petroleum wells; chief export, rice; area, 240 sq. miles. Pop. 24,000.

CHEESE, article of food manufactured by separating solid from liquid parts of milk, which is heated to *c.* 80° Fahr., and rennet (an extract from calf's stomach which possesses power of curdling milk) is poured in; milk curdles and yellowish fluid (whey) appears on surface, and after more heating and stirring whey is drained off. The curd is then cut and allowed to stand to become acid, then salted and pressed. The richness of c. depends on quality of milk and amount of fat collected in curd (sometimes as much as 45 %); inferior c., made of skim-milk, is much poorer in fat and therefore of less value.

C. is used as food in Britain, but in countries such as Switzerland and France it forms a staple article of diet; best known varieties, Stilton, Cheddar, Cheshire, Dorset (Eng.), Camembert, Limburg, Gruyère, Gouda, and Gorgonzola.

CHEETAH, HUNTING LEOPARD (*Cynælurus jubatus*), animal of the cat family; claws not retractile; body covered with small black spots; occurs in Africa, Persia, India, where it has been trained for hunting antelopes and other game.

CHEFOO, see CHI-FU.

CHEH-KIANG (29° N., 120° E.), E. province, China, bordering Pacific Ocean; hilly, fertile; tea and silk chief exports; principal cities, Hang-chow and Ning-po; area, 36,670 sq. miles. Pop. *c.* 12,000,000.

CHEKE, SIR JOHN (1514–57), Eng. scholar; tutor to Edward VI.

CHELLIAN, in palæo-ethnology, term for an epoch characterised by remains of 'Neandertal' man, rhinoceros, elephant, cave bear, etc., and crude

flint implements discovered at Chelles (France), held to be the earliest evidence of human life in the Quaternary period.

CHELMSFORD (50° 44′ N., 0° 28′ E.), market town, capital of Essex, England; has grammar school, founded by Edward VI. (1551); industries, electrical engineering, agricultural produce; C. corn and cattle markets are among largest in county. Pop. (1911) 18,008.

CHELMSFORD, FREDERIC THESIGER, 1ST BARON (1794–1878); Eng. politician; Q.C., 1834; Solicitor-General and knighted, 1844; Attorney-General, 1845; sat in Parliament; cr. baron, 1858; Lord Chancellor, 1858–59, 1866–68.

CHELSEA, W. district, London, England; on N. bank of Thames, communicating with Battersea by three bridges; residence of numerous celebrities, including Sir Thomas More, Katherine Parr, Walpole, Swift, Leigh Hunt, Carlyle, Turner, Rossetti, Whistler; formerly famous for porcelain; most notable building is C. Royal Hospital, for invalid soldiers, designed by Wren (built 1682–90). Pop. (1911) 66,404.

CHELSEA (42° 23′ N., 71° 2′ W.), city, Massachusetts, U.S.A.; rubber goods. Pop. (1910) 32,452.

CHELTENHAM (51° 55′ N., 2° 5′ W.), watering-place and market town, on Chelt, Gloucestershire, England; mineral springs discovered, 1716; has medicinal baths, winter gardens, public parks; among notable educational institutions are grammar school, founded 1576; Cheltenham Coll. for boys, founded 1842; Ladies' Coll., associated with Miss Beale (*q.v.*); two training colleges for teachers, and many private schools. Pop. (1911) 48,944.

CHELYABINSK, Tchelyabinsk (55° 20′ N., 61° 15′ E.), town, Orenburg, Russia; tanneries and distilleries. Pop. 62,000.

CHELYS, ancient Gk. lyre.

CHEMISTRY is the science of the composition and transformations of material substances. It is closely related to physics, which deals with the general properties of substances, and the phenomena they display. It underlies geol. and mineralogy, bot., zool., and physiology, since these sciences deal with phenomena which ultimately depend on the specific properties and reactions of the different substances with which c. deals.

History.—The ancient Greeks recognised four 'Elements': Earth, Water, Air, Fire; and believed that matter was atomic. The Egyptians worked in metals, and made glass and pigments. 'Chemia,' the old name for Egypt, gave the name to the science. The Arabians developed the Egyptian learning, and called it *Alchemy* (VII. cent.). The Alchemists searched for the Philosopher's Stone, which might turn base metals into gold; and, notwithstanding error and fraud, they enriched c. during nearly 1000 years. The *Iatrochemists*, (1525–1650), led by Paracelsus, taught that 'the object of c. is not to make gold, but to prepare medicines.' Thus the quest of the *elixir vitæ* replaced that of the Philosopher's Stone. During the phlogistic period (1650–1770), the experimental foundations of the science were laid, in spite of the error which regarded *phlogiston* as the elemental principle of combustibility present in all combustible substances. The discovery of oxygen by Scheele (1773) and Priestley (1774), of the compound nature of water by Cavendish (1781), together with the interpretation of these facts by Lavoisier, overthrew the phlogiston theory, and established the foundations of scientific c.

The elucidation of the laws of chemical combination, and their embodiment in Dalton's atomic theory (1807), and the establishment of the molecular theory by Gay Lussac and Avogadro (1811), made possible our knowledge of the structure of chemical compounds, which was developed chiefly in the domain of organic c. by the discovery of isomerism (Liebig, Wöhler, and Berzelius, 1823), the recognition of compound radicles (Gay Lussac on cyanogen, Liebig and Wöhler on benzoyl, Bunsen on cacodyl), the discovery of substitution (Dumas), the theory of types (Gerhardt, Würtz, Hofmann, Williamson), the doctrine of valency (Frankland, 1852), and the introduction of structural formulæ (Couper, Kekulé). Of the greatest importance has been the growth of our knowledge of the elements and their atomic weights. The labours of Berzelius sufficed to show the untenability of Prout's hypothesis, that the elements are condensations of hydrogen; and the laws of specific heat (Dulong and Petit, 1819) and isomorphism (Mitscherlich, 1819), together with method of vapour density according to Avogadro's hypothesis, furnished the three recognised methods for deriving atomic weights from analytical data. The most accurate work in this field was that of Stas (1840 to 1880); and the establishment of reliable atomic weights justified comparison between them. This resulted in the great generalisation known as the periodic law (Newlands, 1864; Mendeléeff, Lothar Meyer, 1869).

The isolation of the metals of the alkalis and alkaline earths by Humphry Davy (1807–8) led to the electrochemical theory and dualistic hypothesis of Berzelius. The latter was an error, rectified by the establishment of unitary views by Dumas; but the study of electrolysis by Faraday has been followed by the modern theory of electrolytic dissociation, which forms so important a part of physical c. The synthesis of urea from an inorganic source by Wöhler, in 1828, destroyed the old idea of 'vital force,' which assumed that carbon compounds produced within a living organism were elaborated by a force not available outside the organism. A distinction is still drawn between *inorganic* and *organic* c., but the latter is now regarded simply as the c. of the compounds of carbon, which, being so numerous and complex, are conveniently classified and studied apart from those of the other elements. So extraordinary has been the development of organic c., that the synthetic carbon compounds number at least 150,000.

Chemical Action.—When two elements or compounds are brought together they may simply form a mechanical mixture, in which the molecules of each remain intact, or they may react and form a third substance (or substances) with quite different properties from the substances giving rise to it. In the latter case the molecules have broken up, and the atoms have reunited in a different manner. This constitutes chemical action, or the redistribution of atoms when different kinds of matter are brought together. Atoms may redistribute themselves in several ways. The two molecules may simply unite to form one complex molecule. An atom of one molecule may exchange places with an atom of another molecule. If the atoms of each of the original substances are identical, *i.e.* if the substances are elements, then a compound is produced from the elements which compose it. This is *synthesis*. If the compound is brought into contact with something which breaks it down into its elements, such a resolution is called *analysis*. Synthesis and analysis are the most common forms of chemical action.

Mere contact may bring about chemical action, but usually the process is hastened by some form of external energy—heat, light, etc. Chlorine and hydrogen may be kept in the dark for years without uniting, but on exposure to sunlight, instantaneous chemical action occurs, with a loud explosion. Oxygen can be obtained from potassium chlorate at a much lower temperature if it is previously mixed with manganese dioxide. Manganese dioxide undergoes no change itself, but it hastens the chemical action. Such substances are called *catalytics*. Some chemical actions are reversible. Alcohols and acids heated together form esters and water. When the water reaches a certain percentage chemical reaction takes place, and alcohol and acid are regenerated.

Certain actions, however, will not take place without moisture. Ammonia and hydrochloric acid in the gaseous state unite very readily under ordinary conditions, but if the gases are dry no action takes place.

Chemical action is accompanied either by the absorption or evolution of heat. When heat is absorbed, the action is called *endothermic*, and it takes place more readily at high temperatures. The compounds formed are unstable. *Exothermic* reactions are accompanied by the evolution of heat, the compounds formed are stable at ordinary temperatures, and unstable at high temperatures. The Law of Mass Action is: 'Chemical action is proportional to the active mass of each substance taking part in the change.' No destruction of matter accompanies chemical action.

Inorganic Chemistry, E. C. C. Baly (Jack, 1912).

Chemical Compounds.—CLASSIFICATION.—With one or two exceptions, all the elements form compounds with oxygen, called oxides. Broadly speaking, non-metals form acidic oxides, or anhydrides, which combine with water, forming acidic hydroxides or oxyacids; whilst metals similarly form basic oxides and hydroxides, or bases. Compounds of sulphur and sodium are typical.

Thus $\begin{cases} S+O_2=SO_2, \text{ acidic oxide = sulphurous anhydride.} \\ SO_2+H_2O=H_2SO_3, \text{ acidic hydroxide or oxyacid = sulphurous acid.} \end{cases}$

$\begin{cases} 4Na+O_2=2Na_2O, \text{ basic oxide.} \\ Na_2O+H_2O=2NaOH, \text{ basic hydroxide or base.} \end{cases}$

Soluble basic hydroxides are alkalis, but many are insoluble in water.

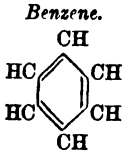
Hydracids, such as hydrochloric acid, HCl, contain no oxygen, and therefore possess no anhydride. But hydrogen, not oxygen, is the essential element in an acid. Acids of each kind react with bases forming salts with elimination of water, thus:—

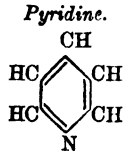
$$2NaOH+H_2SO_3=Na_2SO_3+2H_2O.$$
$$NaOH+HCl=NACl+H_2O.$$

Within the scope of this brief outline the chief inorganic compounds can be included; for they are oxides, acids, bases or salts, or compounds closely related thereto.

Carbon compounds are more diversified; but the fundamental class is that of the hydrocarbons, from which many of the others are directly derived. Carbon atoms combine together to form chains and rings, but the rings may include other elements within them. So three great groups of compounds are recognised, of which the following are typical:—

Hexane. $H_3C.CH_2.CH_2.CH_2.CH_3$ — Chain compound.

Benzene.  — Carbocylic compound.

Pyridine.  — Heterocyclic compound.

The simplest derivatives of the hydrocarbons (RH), where R = *e.g.* C_2H_5 or C_6H_5, are halides (R.Cl, R.Br, R.I), alcohols and phenols (R.OH), aldehydes (R.COH), ketones (R.CO.R), monocarboxylic acids (R.COOH), esters (R.COOR[1]), acid chlorides (R.COCl), amides (R.CONH$_2$), primary amines (R.NH$_2$), sulphonic acids (R.SO$_3$H), nitro-compounds (R.NO$_2$). Among other important derivatives are di- and poly-hydric alcohols and phenols, di- and poly-carboxylic acids, carbohydrates, substituted amides, secondary and tertiary amines.

General Principles.—The first problem of general c. is to determine the atomic weights of the elements; the next to investigate the conditions under which compounds are formed. The periodic law indicates what kinds of compounds certain elements may be expected to form, as well as what their properties are likely to be. The properties of organic compounds, however, are determined, not so much by the elements present in them, for these are few in kind, as by the number and mode of arrangement of their atoms within the molecule.

The relationship between physical properties and chemical constitution thus becomes an extensive problem of general c. The following physical properties of compounds have been examined: capillarity, viscosity, molecular volume, specific heat, melting-point, boiling-point, optical properties including refractive and dispersive power, absorption of light with or without visible colour, fluorescence, specific and magnetic rotatory power. An example will show the method and value of these investigations. The molecular refractive power of a substance is the sum of the atomic refractive powers of its constituent elements. The observed molecular refractive power for lactic acid ($CH_3.CHOH.COOH$), in which one of the three oxygen atoms is assumed to be linked differently from the other two, is 31·87; whilst the calculated value is 31·80. This agreement shows the use of molecular refractive power in deciding chemical constitution. For if these three oxygen atoms had been arranged differently from what was assumed, molecular refraction would have revealed the fact.

Thermochemistry.—Matter is always associated with energy, and the manifestation of energy frequently accompanies chemical change. To every mass equation there belongs a corresponding energy equation, expressing in heat units or *calories* the heat energy evolved or absorbed during the reaction.

Consider the reaction: $Pb+I_2=PbI_2$, to which there corresponds the energy equation: $Pb+I_2=PbI_2+398K$. (K=heat necessary to raise 1 gram of water 1° C.) The latter equation signifies that when 1 gram-atom of lead (207·1 g.) combines with 2 gram-atoms of iodine (253·8 g.), 398 calories are evolved; or that 1 gram-molecule of lead iodide contains an amount of energy represented by 398K less than its component elements separately contain. The *heat of formation* of lead iodide is thus said to be 398K. A thermochemical equation does not state the total energy content of any substance, for, except in the case of radium (*q.v.*), the energy content of the atoms themselves is quite unknown.

If during the formation of a compound from its elements heat is developed, the compound is *exothermic*; if absorbed, *endothermic*. Acetylene is an endothermic hydrocarbon. Important applications of thermochemical principles are: the measurements of heats of neutralisation of acids and alkalis, and the heats of combustion of solid, liquid, and gaseous fuels. The measurements are carried out in some form of calorimeter.

PHASE RULE.—The Phase Rule is a method of studying the conditions of equilibrium between substances in different physical states. For example: water and water-vapour are in equilibrium at any temperature within a certain range when the vapour is under a specific pressure corresponding to the temperature. But ice, water, and water-vapour can remain together in equilibrium only at one temperature to which a specific vapour pressure corresponds. The equilibria between a solid and its solid and gaseous decomposition products (*e.g.* $CaCO_3 \rightleftarrows CaO+CO_2$), or the different allotropic forms of an element, and also the phenomena presented by hydrated salts, have been elucidated by means of the phase rule.

PROPERTIES OF SOLUTIONS.—An analogy exists between the processes of evaporation and solution, and also between the properties of gases and of solutions. Thus *osmotic pressure*, by which a substance in solution tends to diffuse into the pure solvent, and which is made apparent by the use of a membrane permeable by the solvent but not by the dissolved substance, is closely analogous to gas pressure by which a gas tends to diffuse into space. For the gas equation: $pv=RT$ is applicable to solutions; R has the same value [illegible] ...ve equal osmotic pressures, and osmotic, like gas pressure varies inversely as specific volume, and directly as absolute temperature.

The *vapour pressure* of a solvent is lowered and the

boiling-point consequently raised, whilst the freezing-point is lowered in proportion to the amount of non-volatile substance in solution. Further, equimolecular solutions have the same boiling- and freezing-points. These facts enable the molecular weights of substances in solution to be determined by *ebulliscopic* and *cryoscopic* methods respectively.

The properties of aqueous solutions of *electrolytes*, that is, of acids, bases, and salts, are anomalous from the above point of view, and suggest the existence in solution of more molecules or parts of molecules than would have been anticipated. It is believed on this account that *electrolytic dissociation* or *ionisation* has taken place; then, when dissolved in water, the electrolyte spontaneously separates more or less into parts called *ions*, which exist independently in solution, possessing equal and opposite charges of electricity. It is these ions which are conveyed by the energy of the current and separated at the electrodes during *electrolysis*.

The idea of electrolytic dissociation underlies the modern interpretation of those properties of solutions on which chemical analysis depends.

Thomsen, *Thermochemistry*.

Chemical Dynamics, or the theory of chemical change, forms an important branch of general chemistry. Consider the reversible reaction :—

$$AB + C \rightleftarrows AC + B.$$

The effectiveness with which C displaces B from combination with A depends upon the relative affinities or powers of attraction of B and C for A, and also upon the relative proportions in which the components of the reaction are present. A relatively small affinity may be compensated for by a relatively large molecular concentration, and *vice versa*. So chemical action depends on both affinity and active means. Active mass depends on physical conditions; insolubility and volatility profoundly influence it by rendering material unavailable, and so determine the direction and extent of chemical change. When, however, differences of physical condition are absent, a state of dynamic equilibrium is established by the operation of the above two factors.

The speed at which chemical equilibrium is attained, or, more generally, the velocity at which chemical transformation takes place, increases rapidly with rise of temperature, is influenced by the medium in which the reaction is carried out, and by the presence of catalytic agents (*q.v.*).

Chemical Analysis embraces all processes by which the chemical composition of substances is investigated. There are two fundamental divisions: qualitative and quantitative. By qualitative analysis the constituent elements or radicles of a chemical compound or mixture are identified; by quantitative analysis their proportions are estimated.

QUALITATIVE ANALYSIS.—The methods for the qualitative analysis of inorganic substances consist of: I. Preliminary examination by dry reactions; II. systematic examination for basic and acidic radicles.

Method II., which is analysis proper, consists of identification: *A.*, by volatile products obtained by treatment of the substance with acids and alkali; *B.*, by reactions in solution. In *A.*, volatile acids, or their decomposition products, and ammonia are detected. In *B.*, suitable solutions are prepared and tested for metallic and acidic radicles by the production of precipitates or characteristic colour changes. Groups of metals are successively precipitated by group-reagents, and the metals in these groups separated by means of the differences in solubility of certain compounds. Acidic radicles are identified in solution by similar, but less systematic, methods.

On account of their greater variety, the qualitative analysis of organic compounds is less stereotyped. The behaviour of substances towards heat, acids, alkalis, oxidising, reducing, and substituting agents, the elements they contain, and their physical properties furnish the chief evidence on which their identity is established.

QUANTITATIVE ANALYSIS *may be*: I. *Gravimetric*; II. *Volumetric*. I. In *gravimetric* analysis a constituent part of a substance is estimated by separating and weighing it in a pure state; or, more often, by preparing and weighing a chemically pure derivative of the substance. II. *Volumetric* analysis may deal with (*A.*) liquid solutions or (*B.*) gases. *A.* The volumetric analysis of liquid solutions involves definite chemical reactions between measured volumes of them and of solutions of standard strength, the completion of such reactions being shown by suitable indicators. The operations, which are called titrations, include acidimetry, alkalimetry, and colorimetry, and reactions of oxidation, reduction, and precipitation. *B. Gasometric* analysis includes estimations of the diminution in volume of mixtures of gases caused by absorption or combustion, and measurements of the volumes of gases evolved in definite chemical reactions.

The analysis of natural and technical products may be highly specialised, but includes one or more of the above processes.

Methods and Results of Modern Research.—Rubidium, cæsium, thallium, indium, gallium, and helium have been discovered by spectrum analysis, other rare elements have been investigated, and the composition of the sun and stars made known. Argon has been isolated from the air, and by low temperature research has been separated from neon, krypton, and xenon; whilst terrestrial helium has been liquefied at about 4° C. above absolute zero. Radium has been obtained from pitchblende; and thence has arisen the new science of radioactivity, which investigates atomic disintegration and the constitution of the atoms. By high temperature research the diamond has been prepared, and a large class of new compounds obtained. Electrochemistry has provided the means of obtaining aluminium and other metals and commercial products, as well as effecting the fixation of atmospheric nitrogen for plant food. Rare earths have been employed for incandescent gas mantles, and the metals tantalum and tungsten for metallic filament lamps.

The study of the constitution of organic compounds has led to the synthesis of sugars, terpenes, glucosides, alkaloids, and other vegetable products, including indigo and alizarin, and the preparation of innumerable dyes, as well as drugs, perfumes, antiseptics, explosives, and substitutes for ivory, india-rubber, etc. Our knowledge of ferments, enzymes, and catalysts has increased and borne fruit in pure and applied chemistry.

CHEMNITZ (50° 50′ N., 12° 55′ E.), town, on Chemnitz, Saxony, Germany; one of leading industrial commercial centres; has important locomotive and engineering works; manufactures cottons and woollens. Pop. (1910) 287,807.

CHEMNITZ, MARTIN (1522–86), Lutheran divine; lecturer at Wittenberg, then pastor at Brunswick; wrote against Calvinism and helped to maintain dogmatic standards in Lutheranism.

CHEMOTAXIS (biol.), the reaction of bacteria, protozoa, and zoospores of Algæ with chemical substances (carbon dioxide, acids, alkalis) in solution, being either attractive (positive c.) or repellent (negative c.). The term chemotropism is applied to the sensitive movement of certain plant organs either towards or from a chemical stimulus.

CHEMULPO (37° 24′ N., 126° 37′ W.), town, W. coast of Korea; scene of first naval battle of Russo-Jap. War (1904); treaty port opened, 1883. Pop. 25,000.

CHENAB (30° 50′ N., 71° 54′ E.), one of the 'five rivers,' of Punjab, India; rises in Kashmir range, N.W. Himalayas, and joins Jhalum at Timmu; ancient *Acesines*.

CHÊNEDOLLÉ, CHARLES JULIEN PIOULT DE (1769–1833), Fr. poet.

CHENERY, THOMAS (1826–84), Eng. scholar; prof. of Arabic, Oxford; later, editor of *The Times*.

CHEN-HAI, CHINHAI (29° 58′ N., 121° 45′ E.), town, Cheh-kiang, China, on Hangchow Bay; taken by British, 1841.

CHÉNIER, ANDRÉ DE (1762–94), Fr. poet; served for short time in army, afterwards travelled in Italy, and imbibed strong sympathy for Gk. idyllic poetry; wrote *La Jeune Tarentine* and other poems in manner of Theocritus. In 1790 C. took part in Revolution, first on side of Constitutionalists, but, disgusted with their excesses, wrote *Ode* in praise of Charlotte Corday; aided Malesherbes in defence of Louis XVI.; later, arrested and guillotined. In prison wrote famous *Jeune Captive* and satirical poem, *Iambes*. All his work is marked by exquisite workmanship, imagination, and feelings for nature, in which latter quality he anticipated the Romantic school.

CHÉNIER, MARIE-JOSEPH BLAISE DE (1764–1811), Fr. poet, dramatist, and politician; bro. of above.

CHENONCEAUX (47° 20′ N., 1° 4′ E.), village, on Cher, Indre-et-Loire, France; famous château is delightfully picturesque, transitional structure, showing survival of late Gothic mingled with early Renaissance forms; residence of Diane de Poitiers.

CHENOPODIUM, GOOSE-FOOT, genus of herbs (order Chenopodiaceæ) so called from the shape of the leaves of some species; *C. bonus-Henricus*, good King Henry, being a well-known Brit. representative.

CHEOPS (Gk. form of *khufu*), an Egyptian king; founder of the fourth dynasty; famous as builder of the Great Pyramid, which still survives; date, according to some, 3969–3908 B.C., others, *c.* 2900 B.C. (Herodotus, quite incorrectly, later).

CHEPSTOW (51° 38′ N., 2° 41′ W.), market town and port, on Wye, Monmouthshire, England; has ruins of XI.-cent. castle; salmon fisheries.

CHEQUE, written order on a banker, signed by a person having an account with the bank; formerly sometimes spelt 'check.'

CHER (47° N., 2° 30′ E.), department, Central France; formed part of old province, Berry; chief rivers, Cher and Loire; surface generally flat; fertile; extensive pastures, fine timber; coal and iron mines; grain, porcelain; area, 2819 sq. miles. Pop. (1911) 337,810.

CHERAT (33° 50′ N., 72° 1′ E.), hill cantonment and sanatorium, Peshawar district, N.W. Frontier Province, India.

CHERBOURG (49° 38′ N., 1° 37′ W.), fortified town and seaport, Manche, France, at mouth of Divette on north coast of peninsula Cotentin; roadstead protected from north by magnificent breakwater over two miles in length; has extensive docks and arsenal; but C.'s chief importance is derived from its naval and commercial harbours; chief industries, shipbuilding, rope-making, tanning, etc.; dairy and poultry produce. Pop. (1911) 43,731.

CHERBULIEZ, CHARLES VICTOR (1829–99), Fr. novelist and essayist; belonged to Swiss family distinguished as scholars.

CHERCHEL (36° 33′ N., 2° 10′ E.), seaport, N. coast Algeria; agricultural wine-growing centre; has extensive ruins of former cities; ancient *Cæsarea*. Pop. 9000.

CHERCHEN, oasis and town, Eastern Turkestan.

CHERIBON, TJERIBON (6° 55′ S., 118° 26′ E.), town, N. coast, island of Java, Dutch East Indies; sugar, coffee, and rice chief products. Pop. 52,000.

CHERKASY (49° 26′ N., 32° 8′ E.), town, on Dnieper, Kiev, Russia. Pop. 30,000.

CHERNIGOV, TCHERINGOV (51° 40′ N., 32° E.), government, Little Russia, traversed by Dnieper and Desna; cereals and tobacco chief products; area, 20,232 sq. miles. Pop. (1910) 2,975,500.

CHERNIGOV (51° 29′ N., 31° 19′ E.), town, on Desna, Russia; capital of C. government; abp.'s seat; XI.-cent. cathedral. Pop. (1910) 31,920.

CHEROKEES, tribe of N. Amer. Indians of the Iroquois family, now occupying reservations in the U.S.A. Many have adopted Christianity, and have made such progress in education and civilisation as to be able to support a native newspaper.

CHERRAPUNJI (25° 15′ N., 91° 45′ E.), village, Kashi Hills district, Assam; has heaviest known rainfall in world; average, *c.* 500 in. per annum.

CHERRY, trees and shrubs with serrate leaves and white blossoms belonging to the plum genus (*Prunus*), and derived from two species, the wild or dwarf c. (*Prunus cerasus*) and the gean (*Prunus avium*). Many varieties are cultivated for the red fleshy fruit containing a kernel. The c. is used for eating and in the preparation of the liqueurs, kirschwasser, ratafia, and maraschino, and the kernel of the perfumed c. (*P. mahaleb*) is used in perfumery and confectionery. Cherry wood is employed by cabinetmakers and in the manufacture of tobacco pipes, walking-sticks, etc.

CHERRY VALLEY, summer resort, New York State, U.S.A.; scene of massacre by Indians, 1778; has sulphur springs.

CHERRYVALE (37° 15′ N., 95° 32′ W.), city, Kansas, U.S.A.; has ironworks, and produces natural oil and gas. Pop. (1910) 4304.

CHERSO (44° 59′ N., 14° 25′ E.), Austrian island, Gulf of Quarnero, Adriatic Sea; forms part of Istria; wine. Pop. 9000.

CHERSONESE (Gk. *Chersonesos*, peninsula), name used specially of 'Tauric Chersonese,' now called the Crimea; it was colonised by the Gks. in V. cent. B.C.; the city of *Cherson* (conquered by the Romans) was of commercial importance in the later empire, and lasted till the XIV. cent.

CHERTSEY (51° 24′ N., 0° 30′ W.), market town, Surrey, England; remains of Benedictine abbey (founded VII. cent.); agricultural produce. Pop. (1911) 13,819.

CHERUBIM (Hebr. plural of *Cherub*), celestial spirits mentioned in Old Testament; usually represented as winged children. Bacon states that in celestial hierarchy the c., angels of light, come next in order to the seraphim, angels of love.

CHERUBINI, MARIA LUIGI CARLO ZENOBIO SALVATORE (1760–1842), Ital. composer; b. Florence; his earliest work was performed in Italy, but, after visiting London, he finally settled in Paris as director of the Conservatoire; operas were popular during his lifetime, but fame now chiefly rests upon his sacred compositions; *Requiem in C minor* regarded as his masterpiece.

CHÉRUEL, PIERRE ADOLPHE (1809–91), Fr. historian; made special study of the XVII. cent., and particularly the Mazarin period.

CHERVIL, small umbelliferous plant; one species, *Anthriscus*, used as salad by ancients; another, *Chærophyllum bulbosum*, has large edible root; only Brit. variety is *C. temulentum*, with hairy stem and white umbels.

CHESAPEAKE, bay on E. coast, U.S.A.; celebrated for its oysters; scene of naval engagement between French and Brit. fleets, 1781; name of vessel defeated by *Shannon* under Broke, 1813.

CHESELDEN, WILLIAM (1688–1752), Eng. anatomist and surgeon; introduced several new methods of operation; friend of Sir Isaac Newton and of Pope.

CHESHAM (51° 42′ N., 0° 37′ W.), market town, on Chess, Bucks, England; wooden ware manufactured from beech of surrounding district. Pop. (1911) 8204.

CHESHIRE (53° 15′ N., 2° 30′ W.), maritime county, N.W. England; bounded N. by Lancashire, N.E. by Yorkshire, E. by Derbyshire, S.E. by Staffordshire, S. by Shropshire, S.W. by N. Wales, N.W. by Irish Sea; area, 1007 sq. miles. Greater part of surface is undulating plain, with fine woods and number of small lakes; watered by Mersey, Dee, and other rivers; soil generally fertile; market-gardening and dairying carried on, cheese largely produced; manufactures textiles, leather, thread, gloves, etc.; shipbuilding. Minerals include salt, coal, ironstone.

Chief towns are Chester (capital), Birkenhead, Macclesfield, Stockport, Crewe. C. belonged to Romans; formed part of kingdom of Mercia in IX. cent.; became earldom under Canute, palatinate under William the Conqueror; united to Eng. crown by Henry III., 1265; again became palatinate under Henry IV.; governed by king's eldest sons as Earls of Chester; has monastic remains; is crossed by Roman roads. Pop. (1911) 676,356.

CHESHUNT (51° 48′ N., 0° 3′ W.), town, on Lea, Hertfordshire, England; nursery and market-gardening, brick-making. Pop. (1911) 12,956.

CHESIL BANK (50° 37′ N., 2° 32′ W.), remarkable ridge of sand and pebbles, on coast of Dorsetshire.

CHESNELONG, PIERRE CHARLES (1820–94), Fr. politician; favoured the establishment of Catholic univ's, and opposed the government measures for secularising education.

CHESNEY, CHARLES CORNWALLIS (1826–76), Brit. colonel and author; prof. of Military History at Sandhurst, 1858; pub. *Campaigns in Virginia and Maryland* (1863), *Waterloo Lectures*, first critical account of that campaign (1868), *Essays in Military Biography* (1874).

CHESNEY, FRANCIS RAWDON (1789–1872), Brit. major-general; chief advocate of construction of Suez Canal; explored Euphrates and Tigris, 1831–37, proving practicability of new trade-route from Syria to India; wrote travels.

CHESNEY, SIR GEORGE TOMKYNS (1830–95), Brit. general, administrator, politician, and author; distinguished in Indian Mutiny; pres. of Engineering Coll., Calcutta; helped to establish Royal Indian Civil Engineering Coll., Cooper's Hill, Staines; first pres., 1871–80.

CHESS.—The origin of this game, which is popular throughout the civilised world, is lost in antiquity, but there seems reason for believing that it came from India, and was introduced into Persia about the VI. cent. Then it was acquired by the Arabs, and through them it probably came to be introduced into Europe during the earlier crusading period. Perhaps the earliest writer on the game was a XII.-cent. Dominican friar, Jacobus de Cessolis, whose treatise was first trans. into French and thence into English, and printed by Caxton (1474) under the style of *The Game and Playe of the Chesse*. William I. is said to have been a chess-player, and it was undoubtedly a popular form of amusement amongst the Eng. nobility in very early times. In course of time various changes in the game were evolved, and its present laws date back to about the XVI. cent. The game is played between two persons on a board of 64 squares, alternately black and white. Each player has 16 pieces—king, queen, two bishops, two knights, two castles (or rooks), and eight pawns. The pieces of one player are black, of the other white. The opponents, facing one another across the board, must each have a white square on his extreme right. They draw for colour. The pieces of each player are arranged in two rows: eight pawns in the front row; at either end of the back row a castle, next to each castle a knight, next to each knight a bishop; and on the two centre squares the king and queen. The queen always stands upon a square of her own colour.

The game is always opened by white moving a piece, and the game is played afterwards in alternate moves. The object of each player is to capture his opponent's king. All the pieces are capable of capturing pieces of the opposite colour in various manners to be described below. In attacking the king with any piece the player must give warning by saying *Check!* and the next move of his opponent must be to place his king out of check: (1) by moving him to another square out of check; (2) by interposing another piece of his own colour between the king and the checking piece; or (3) by capturing the checking piece. If a player is unable to place his king out of check in any of the three manners, his king is *checkmated*, and the game is lost. If a player, whose king is not in check, has no alternative left but to move it into check, he is *stalemated*, and the game is drawn. Thus it will be seen that a king may never be really captured, for the game stops short of the move by which he would be captured. An opponent's piece is captured in the following manner. As no two pieces may stand on the same square, a player cannot move one of his own pieces on to a square already occupied by one of the same colour. If, however, the square is occupied by one of his opponent's pieces he may move his own piece on to that square (subject to the rules below) and capture his opponent's piece, *i.e.* remove it from the board for the rest of the game.

The pieces are moved, and make captures in the following manner: Pawns may only move forwards in a straight line—never backwards or sideways. In making their first move they may, however, advance two squares in a straight line. After their first move they may only move forward one square at a time. They can capture other pieces only by moving diagonally forward into a square occupied by the opposing colour. A pawn which succeeds in crossing the board must be exchanged, before the game is continued, into any other piece. The other pieces, unlike the pawns, may move backwards or forwards, and capture in the same way as they move. The *King* may only move one square at a time, but in any direction. It may not move into a checked position, and when once checked, must be extricated in the very next move, or the game is lost. No two kings may stand in adjacent squares. If the king and either one or other of the castles have not yet been moved, and the space between them is clear, the king may, once only, be *castled*, i.e., he is moved two squares towards the castle, which is then placed in the adjacent square on the opposite side of him. The *Queen* may move in a straight line in any direction, vertically, horizontally, or diagonally. The *Bishop* moves in a straight line diagonally in any direction. The *Castle* moves in a straight line vertically or horizontally in any direction. The *Knight* moves in any direction, first a square horizontally, or vertically, and then a square diagonally. It is the only piece that may jump other pieces in its pathway. It may also capture or check the king over the heads of other pieces.

Howard Staunton's *Chess Player's Handbook, Companion, and Chess Praxis*; Mason's *The Art of Chess*, etc.

CHEST, see THORAX, RESPIRATORY SYSTEM.

CHEST, oblong wood or metal box. Formerly a more important article of furniture than now, it was emblazoned and otherwise decorated; it was used for the storage of household requisites and valuables, and carried from place to place; 'marriage-chests' contained the bride's household linen; the 'chest of drawers' is a later development.

CHESTER (53° 12′ N., 2° 52′ W)., capital, Cheshire, on Dee; port, great railway centre; surrounded by ancient walls; has old Gothic cathedral dedicated to St. Werburgh (dating from XI. cent.). Other important buildings are bp.'s palace, and church of St. John (VII. cent.), both outside walls; Blue-Coat School (founded 1700), grammar school founded by Henry VIII.; modern castle (built 1786) on site of old building, which dated from William the Conqueror's reign; many old timbered houses of XVI. cent.; Gothic town hall, free library, museum, market hall; several public parks; manufactures cheese, leather, gloves, boots, shoes. C. was an important station (Deva) under Romans, of whom traces remain; site of mint in Middle Ages; taken by Roundheads after three months' siege, 1645. Pop. (1911) 39,038.

CHESTER (39° 52′ N., 75° 20′ W.), city, on Delaware, Pennsylvania, U.S.A.; is seat of Pa. military coll.; shipbuilding is chief industry. Pop. (1910) 38,537.

CHESTER, EARLDOM OF.—Chester was formed

into county palatine (of which there was only one other in England) for Gherbod, a Fleming (1070); held by Hugh d'Avranches, nephew of William I., and his heirs until 1237, since when, except for Simon de Montfort's brief tenure (1264–65), it has been granted to kings' eldest sons.

CHESTERFIELD (53° 14′ N., 1° 26′ W.), market town, Derbyshire, England; Gothic church of All Saints and St. Mary contains ancient monuments, and has remarkable twisted spire, 230 ft. high; Trinity Church is burial-place of George Stephenson; industries include iron- and brass-founding, and manufactures of cotton and silk. Pop. (1911) 37,429.

CHESTERFIELD, PHILIP DORMER STANHOPE, 4TH EARL OF (1694–1773), Eng. statesman and author; s. of Philip, 3rd earl; M.P. for St. Germains, 1715; became earl, 1726; went as ambassador to The Hague, 1728; Lord-Lieutenant of Ireland, 1744, and ruled with firmness and moderation; Sec. of State, 1746–48; he then retired. His *Letters to his Son*, i.e. his natural s., Philip, he having no children by his wife, Melusina, natural dau. of George I., are the best literary production of the age of Walpole. They are frank to impropriety, and cynical, but a compendium of wisdom and craft. *Life*, by Craig (1907).

CHESTER-LE-STREET (54° 52′ N., 1° 35′ W.), town, Durham, England; collieries, ironworks. Pop. (1911) 14,713.

CHESTERTON (52° 18′ N., 0°), village, on Cam, forming N.E. suburb of Cambridge, England; boat-building and tile manufacture.

CHESTERTON, GILBERT KEITH (1874–), Eng. author and journalist; has written on Dickens, Browning, Bernard Shaw, etc.; several novels and miscellaneous works; a journalist of distinction, art critic, brilliant satirist, and paradoxical writer.

CHESTNUT (*Castanea sativa*), large tree of the order *Fagaceæ*, with large serrated lanceolate leaves and yellowish catkin. The timber is somewhat like oak, and used for gate-posts, etc., while the fruit (chestnuts), ground to a meal and made into a porridge, are roasted or boiled as a vegetable, or candied or preserved (*marrons glacés, crême de marrons*). The tree is a native of Mediterranean countries, and an allied species, *C. americana*, occurs in N. America.

The HORSE-CHESTNUT (*Æsculus hippocastanum*), a beautiful tree, is frequently planted in avenues, on account of its large foliage and 'candelabra' of white or red flowers. The wood is soft, and used as fuel, for making charcoal, and common carpentry. Three seeds or nuts are enclosed in one capsule, and are used for feeding stock, and for the manufacture of a burning-oil.

CHETHAM, HUMPHREY (1580–1653), Eng. merchant; sheriff of Lancashire and collector of ship-money under Charles I.; founder of Chetham's Hospital, Manchester, for forty poor boys, and the famous library connected with it, containing many rare books and MSS.

CHETTLE, HENRY (1565–1607), Eng. dramatist and satirist; wrote *Jane Shore*, *Hoffmann*, *The Blind Beggar of Bethnal Green*; also satires.

CHEVALIER, MICHEL (1806–79), Fr. economist; prof. in the Coll. de France; helped to bring Britain and France into better commercial relations; wrote economic works.

CHEVALIER, ULYSSE (1841–), Fr. priest and bibliographer; authority on mediæval history.

CHEVAUX-DE-FRISE, military device, first used in the Dutch War of Independence, consisting of planks in which swords and spikes were fixed, to impede cavalry.

CHEVERUS, JEAN LOUIS ANNE MAGDELEINE LEFEBVRE (1768–1836), Fr. divine; went to America, 1796; bp. of Boston, 1808; back in France, 1823; abp. of Bordeaux, 1826.

CHEVIOT HILLS (55° 18′ N., 2° 30′ W.), range of hills forming border between England and Scotland, extending 35 miles N.E. to S.W.; highest point, 2676 ft.; numerous ruins and border 'peels'; famed for valuable breed of sheep.

CHEVREUL, MICHEL EUGÈNE (1786–1889), Fr. chemist; pupil of Vauquelin, whom he succ. as prof. of Organic Chem. and director of the Paris natural history museum; celebrated for his researches on colours, fats, and saponification; foreign member and Copley medallist of the Royal Society.

CHEVRON, a figure shaped thus ∧ forming the highest part of the framework of a house; a similar figure upon a heraldic shield; a badge of rank, or good conduct, in the military, naval, and other services.

CHEVROTAIN, MOUSE-DEER, tiny, hornless, slightly deer-like, artiodactylous mammals, family Tragulidæ, comprising several species in tropical Asia, W. and E. Central Africa.

CHEYENNE (41° 9′ N., 104° 40′ W.), city, capital of Wyoming, U.S.A.; coal and iron mines in district. Pop. (1910) 11,320.

CHEYENNE, tribe of N. Amer. Indians of the Algonquian family, now living in reservations in Oklahoma and Montana.

CHEYNE, THOMAS KELLY (1841–), Anglican theologian; authority on Old Testament exegesis; prof. at Oxford.

CHÉZY, ANTOINE LÉONARD DE (1773–1832), noted Fr. Orientalist.

CHHATARPUR (24° 55′ N., 79° 45′ E.), chief town, native state, Chhatarpur, Bundelkhand, Central India, coarse cutlery and paper. Pop. (state) 156,139; (town) 13,000.

CHHATTISGARH (*c.* 21° 20′ N., 82° E.), S.E. division, Central Provinces, India, comprising districts of Raipur, Bilaspur, and Drug. Area, 21,240 sq. miles. Pop. 2,642,983.

CHHINDWARA (22° 3′ N., 79° E.), town and district, Nerbudda division, Central Provinces, India; cotton cloth. Area, 4631 sq. miles. Pop. 407,927. Pop. (town) 9736.

CHIANA (42° 50′ N., 12° 7′ E.), river, Tuscany, Italy; conducted by canals into Arno and Tiber; ancient *Clanis*; originally tributary of Tiber.

CHIAPAS (16° 25′ N., 93° W.), Pacific state, Mexico, W. of Guatemala; mountainous; immense forests; maize, sugar; capital, Tuxtla Gutierrez. Area, 27,230 sq. miles. Pop. (1910) 438,843.

CHIAVARI (44° 19′ N., 9° 19′ E.), town, Genoa, Italy; lace and silk. Pop. 10,500.

CHIAVENNA (46° 19′ N., 9° 23′ E.), town, Lombardy, Italy; cotton and pottery. Pop. 3200.

CHIBOUQUE, long Turk. tobacco pipe.

CHICACOLE (18° 17′ N., 83° 56′ E.), town, Ganjam, Madras, India. Pop. 18,500.

CHICAGO (41° 58′ N., 87° 36′ W.), city, Illinois, at S. end of Lake Michigan, on small river C., the two branches of which unite in middle of city, thus dividing it into N., W., and S. sides; regularly laid out, with wide streets crossing each other at right angles; many fine parks, which almost surround city, and are controlled by three special boards, one for each division of town; include Lincoln Park on N. side, Jackson Park on S. side (where Columbian Exposition was held, 1893); some fine public buildings, including town hall, art institute, museum, library, auditorium, R.C. and Prot. cathedrals. Among educational institutions are North-Western and Lake Forest univ's, R.C. coll., medical coll., various theological seminaries, many schools. *University of Chicago* (opened 1892) is unsectarian, except the theological school, which is Baptist; extensive buildings, with accommodation for students; faculties — arts, literature, science, divinity, medicine, law, education, commerce, administration; fine library. Charitable institutions include numerous hospitals, dispensaries, asylums, mission settlements; many hotels and theatres. Municipal administration is carried out by mayor and council of 70 members, elected for two years. There are boards of health and education; other principal

departments are those of public works, finance, law, police, and fire.

History.—Earliest settlement was made at Fort Dearborn in 1804; this was annihilated by Indians in 1812 and rebuilt four years later; still quite small village in 1830, with log houses; but henceforward it developed rapidly, owing chiefly to construction of Illinois and Michigan canal and development of lake trade; became city, 1837, when had about 4000 inhabitants. By 1850 population had increased to over 29,000, and by 1870 to over 300,000. In 1871 occurred a terrible fire which destroyed great part of city, sweeping over area of over 2000 acres; subsequently rebuilt in stone and brick instead of wood. Columbian Exposition held here in 1892–93; Iroquois theatre burnt, 1903.

C. is one of busiest commercial centres in world, acting as distributing centre to, and collecting centre from, large district increasing in wealth and population. Natural advantages of situation, railway, and waterway facilities, and enterprise and keen commercial spirit of its merchants have made it what it is. Trade in grain, flour, and pork is enormous, surpassing anything else of kind in world; there are factories and workshops connected with hog- and beef-packing, soap, rolling-mills, foundries, machinery, wagons, agricultural implements, cars, bridges, tanneries, boot-making, electric supplies, jewellery, furniture, pianos, breweries, tobacco, clothing, furs, printing, bakeries, coffee and spice mills, all turning out products to large value. Cold storage in connection with perishable goods is amply provided and carefully regulated. Pop. (1910) 2,185,283.

Kirkland, *The Story of Chicago* (1904); Andreas, *History of Chicago* (1886).

CHICHELEY, HENRY (1364–1443), Eng. prelate; an ecclesiastical lawyer in the Court of Arches, he became archdeacon of Dorset and chancellor of Salisbury Cathedral, 1402; bp. of St. David's, 1407; abp. of Canterbury, 1413—about the time of the persecution of the Lollards (*q.v.*). He was involved in a dispute with Pope Martin V., which was personal rather than ecclesiastical. He founded St. Bernard's Coll. at Oxford, superseded by St. John's, and in 1438 the famous All Souls' Coll., a college which is now a grammar school at Higham Ferrars, and he may have inspired the foundation of Eton and King's.

CHICHEN-ITZA (*c.* 20° 13′ N., 88° 12′ W.), ancient ruined city, Northern Yucatan, Mexico; ruins.

CHICHESTER (50° 51′ N., 0° 47′ W.), episcopal city, Sussex, England, between South Downs and an inlet of Eng. Channel; has old octagonal market cross and remains of ancient walls. Holy Trinity Cathedral (founded XI. cent.) has detached belfry and contains interesting relics. Modern buildings include Council House, Guildhall, Corn Exchange. C. was destroyed by Ælla, V. cent., and rebuilt by Cissa, his s., king of Sussex; wooden ware; agricultural produce, breweries, and tanneries. Pop. (1911) 12,594.

CHICHESTER OF BELFAST, ARTHUR CHICHESTER, BARON (1563–1625), lord-lieutenant of Ireland, 1604–14; was fairer to the Irish Catholics than the Eng. government approved; cr. Baron C. in 1613.

CHICKAMAUGA (34° 45′ N., 85° 20′ W.), small river, rises Walker County, Georgia, U.S.A., flows N.W., enters Tennessee above Chattanooga; here Confederates defeated Federals, Sept. 19–20, 1863.

CHICKASAWS, tribe of N. Amer. Indians of the Muskhogean family, who assisted the Confederates in the Amer. Civil War; now dwelling in reservations at Oklahoma.

CHICKASHA (35° 3′ N., 97° 57′ W.), city, Oklahoma, U.S.A.; trade centre for corn, cotton, live stock, etc., of district. Pop. (1910) 10,320.

CHICKEN-POX (*Varicella*), specific contagious disease, manifested by slight fever, and by successive crops of little vesicles mainly on the chest and neck. Children of 2–6 years are chiefly attacked. Treatment is to give soothing applications for the itching, and tonics and nourishing food in convalescence.

CHICLANA (36° 25′ N., 6° 10′ W.), town, Cadiz, Spain; mineral springs. Pop. 10,768.

CHICOPEE (42° 9′ N., 72° 35′ W.), town, on Connecticut, Massachusetts, U.S.A.; cotton, firearms, rubber goods. Pop. (1910) 25,401.

CHICORY (*Cichorium intybus*), perennial plant (order Compositæ) with bright blue flowers occurring in the north temperate zone chiefly on chalky soils, and cultivated in Yorkshire, Holland, Belgium, France, and Germany. Its leaves are used as a salad, and the roots are dried, roasted, ground, and decocted as a substitute for, or addition to, coffee.

CHIDAMBARAM (*c.* 11° 24′ N., 79° 44′ E.), town, South Arcot district, Madras, India; sacred temples. Pop. 20,000.

CHIEMSEE (47° 50′ N., 12° 25′ E.), largest lake, Bavaria; length, 8½ miles.

CHIENG-MAI (18° 50′ N., 99° 2′ E.), town, on Me-ping, Chieng-Mai, N. Siam; centre of teak trade. Pop. *c.* 100,000.

CHIERI (45° 1′ N., 7° 49′ E.), town, Turin, Italy; ancient *Carea*; Gothic cathedral; silks. Pop. 12,500.

CHIETI (42° 21′ N., 14° 10′ E.), city (and province), Italy; abp.'s seat; cathedral; woollens and cottons manufactured. Pop. (1911) 25,628.

CHIFF-CHAFF, small warbler (*Sylvia hippolais*), of S. Europe; visits England in summer. So called from its constant repetition of two notes.

CHI-FU, CHEFOO (37° 31′ N., 121° 25′ E.), seaport, N. coast, province, Shantung, China; coaling station. The *Chefoo Convention* (1876), between Britain and China, gave to Britain certain commercial rights, threw open four treaty ports, and promised protection to foreigners in China. Pop. 50,000–100,000.

CHIGOE, see JIGGER.

CHIGWELL (50° 38′ N., 0° 5′ E.), village, Essex, England.

CHIH-LI, PE-CHI-LI (*c.* 38° 30′ N., 115° E.), N.E. province, China, bordering Gulf of Chih-li on east; forms immense plain watered by Pei-ho, Hun-ho, and Lan-ho; mountainous N. and W.; contains Peking, capital of China; coal, iron, and silver found; cereals and cotton produced. Area, 120,500 sq. miles. Pop. *c.* 25,000,000.

CHIHUAHUA (29° N., 106° W.), state, Mexico; hot, dry climate; in east large tracts are devoid of vegetation; traversed in west by Sierra Madre, which form fruitful valleys of good pasture. C. is rich in minerals, gold and silver mining being principal industry. Area, 87,828 sq. miles. Pop. (1910) 405,265.

CHIHUAHUA (28° 32′ N., 106° 15′ W.), city, capital of C. state, Mexico; chief occupation, mining; manufacture of cottons and woollens. Pop. (1910) 39,061.

CHILAS (35° 25′ N., 74° 16′ E.), fort, on Indus, N.W. Frontier Provinces, India.

CHILBLAINS, irritating inflammation of the skin, usually at the fingers ('chapped hands') or toes; caused by cold in those whose circulation or general nutrition is deficient; treatment is to apply iodine or ichthyol to affected part, and take tonics, *e.g.* strychnine or iron, internally.

CHILD, FRANCIS JAMES (1825–96), Amer. scholar; prof. of English at Harvard.

CHILD, SIR FRANCIS (1642–1713), Eng. banker; founder of Child's Bank; formerly a goldsmith; Lord Mayor of London (1699); afterwards entered Parliament.

CHILD, SIR JOHN (d. 1690), Anglo-Indian official; was in the East India Co. service, and became gov. of Bombay; subsequently involved in a quarrel with the Moguls.

CHILD, SIR JOSIAH (1630–99), an Eng. merchant who became a director of the East India Company in 1677, then gov.; cr. baronet in 1678; wrote works on economics.

CHILD, LYDIA MARIA (1802–80), Amer. author and slavery abolitionist.

CHILDEBERT I., CHILBERT, s. of Clovis; reigned 524–58 over part of Franco. **Childebert II.**, king of Austrasia, 570–95. **Childebert III.**, king, 695–711; all three were of the Merovingian race.

CHILDERS, HUGH CULLING EARDLEY (1827–96), Brit. statesman; Sec. for War (1880–82), during which period occurred the Egyptian and Boer Wars; Home Sec., 1886; retired from active parliamentary work, 1892.

CHILDERS, ROBERT CÆSAR (1838–76), Eng. Orientalist.

CHILDREN.—*Employment of Children Act*, 1903, forbids: (1) employment of children in certain occupations; (2) trading in streets by children under eleven; (3) employment of children after 9 p.m. *Prevention of Cruelty to Children Act*, 1904, renders punishable assault or ill-treatment of children under sixteen by persons over that age, in whose charge they are; and imposes restrictions concerning their employment in dangerous performances, or in singing, selling, etc., in public places. *Children Act* of 1908 defines cruelty to children as wilful neglect, abandonment, or ill-treatment, the offence being possible only by persons over sixteen in charge of child under that age; it also imposes restrictions on employment of children.

Children's Courts.—Courts of summary jurisdiction for hearing charges against children or young persons, or hearing applications for orders or licences relating to such persons where their attendance is necessary. Only newspaper representatives and those directly concerned can be present. See also BABY.

Children's Games are naturally of great antiquity; of use in study of folk-lore. Singing games play important part; players (generally girls) either form circle or two lines facing each other, representative of occasions of rejoicing; boy's games usually mimic contests, survival of fighting.

CHILDRENITE ($Al(FeMn)(OH)_2PO_4+H_2O$), mineral occurring as translucent pale yellow to dark brown orthorhombic crystals in Cornwall, Devon, and Connecticut.

CHILDS, GEORGE WILLIAM (1829–94), Amer. publisher and philanthropist.

CHILE, CHILI (17° to 55° 58′ S., 75° 30′ to 67° W.), republic, S. America, lying along W. coast between main chain of Andes and Pacific; greatest length, 2650 miles; breadth varies from 60 to 200 miles; area, 279,901 sq. miles; bounded N. by Peru, E. by Bolivia and Argentina. Surface generally slopes from E. to W., and also from N. to S., Andes being higher in N. than in S.; average height of Andes about 9000 ft., highest peak, Aconcagua (22,867 ft.). Many of these mountains are dormant or sub-dormant volcanoes. From E. to W. there is slope of Andes, central valley tableland, Coast Cordillera, coastal strip; first slopes down as it passes southward and finally dips under sea so that Coast Cordillera takes form of chain of islands parallel to southern third of coast and curving S. round Tierra del Fuego; Juan Fernandez Island, W. of Valparaiso, also belongs to C. Chief rivers are Maipu in valley tableland at Santiago, Biobio at Concepcion, and Valdivia. Flora includes cacti, palms, peumo trees, cypress, eucalyptus. Fauna includes guanacos, pumas, chinchilla, polecat, lizards, frogs, buzzards, parrots, etc. Largest towns are Santiago (capital) and Valparaiso.

History.—Prehistoric inhabitants of C. were Yaghans, savages of degraded type, and other tribes of whom most important were Araucanians. Northern districts conquered by Incas of Peru in first half of XV. cent., their control lasting until a cent. later. After Spaniards had conquered Peru, they turned their attention to C., first expedition being undertaken by Almagro in 1535 without much success. He was followed by Valdivia, to whom the foundation of Santiago in 1541 is due. He also established the towns of Concepcion, Imperial, Villa Rica, and Valdivia, but was ultimately taken, tortured, and killed by the Indians in revenge for the cruelty with which he had treated them. Warfare between Spaniards and Araucanians continued intermittently for two and a half cent's, and was characteristic of whole colonial period, during which the gov's of C. were generally nominated by viceroys of Peru. A treaty of peace was concluded in 1640, but wars again broke out at various dates. Under O'Higgins, gov. from 1788 to 1795, considerable progress was made; agriculture, irrigation, commerce, and labour conditions were all improved, and many public buildings erected.

The movement for independence began about 1810, after the abdication of Span. king, Ferdinand VII., which followed the Fr. invasion of Spain. The gov., Carrasco, was compelled by an assembly of patriots to hand in his resignation, and a new system of government was established; abolition of slavery was one of first laws passed. For some time fighting was carried on with Spaniards; and internal disputes also occurred between rival patriotic parties. For short time, from 1814 to 1817, Span. authority was restored; but in Feb. 1817 the Chilians, under Bernardo O'Higgins and San Martin, completely defeated Span. forces at *Chacabuco*; an assembly was summoned and O'Higgins became director. Spaniards were again defeated at *Maipo* in 1818, in which year Chilian independence was formally proclaimed. New republic was recognised by U.S.A. shortly afterwards; independence not recognised by Spain until 1844. O'Higgins abdicated in 1823, when Ramon Freire became pres., and a constitution was framed, which has since been twice modified. After Freire's administration came to an end in 1826 there was a succession of presidents, each of whom ruled only a short time. Under Pinto, pres. 1827–29, some progress was made; army was reorganised, educational system improved, and financia reforms carried out. During his administration disputes occurred between rival political parties. Don Joaquin Prieto was pres. from 1831 to 1841; his famous minister of state, Portales, enforced the new constitution framed in 1833, and put down revolts and disorders with great severity, all revolutionists being banished from the country. Many of these sought refuge in Peru.

On the announcement that Peru and Bolivia intended to unite as one republic, C. declared war against them; and the Confederates were defeated by Chilians under Bulnes at *Yungay* in 1839. Bulnes became pres. in 1841; under his administration no revolutions occurred, and country enjoyed period of peace, during which great progress was made. He was succeeded as pres. by Manuel Montt, whose administration was marked by civil war and riots, both of which he succeeded in suppressing; in his time educational and commercial matters were improved, banks founded, and many charitable institutions established. In 1861 Perez became pres.; in his time occurred dispute with Spain, against whom war was declared by Peru, Chile, Ecuador, and Bolivia; Valparaiso suffered bombardment in 1866, but the Spaniards withdrew soon afterwards, and active hostilities ended in 1869.

In 1870 expeditions were sent against the Indians, who had again been troublesome; they were defeated, and peace was concluded. Boundary dispute with Bolivia in 1879 led to long war with Peru, called the *War of the Pacific*. The first battles were at sea, and Chilian navy was victorious. Peruvians and Bolivians were completely defeated at *Dolores* in 1879, and again at *Miraflores* in 1881; other victories, both by land and sea, were won by Chilian arms, and war ended with peace treaties in 1883, whereby C. acquired Antofagasta from Bolivia, Tacna and Tarapaca from Peru. In 1891 civil war again broke out, during Balmaceda's presidency; his party being defeated at *Coñcoñ* and *La Placilla*, he committed suicide, and Jorge Montt became pres. During Riesco's administration boundary dispute with Argentina was settled in 1902, award being made by King Edward VII.

Government is republic on model of U.S.A., pres. holding office five years; legislative vested in Congress, consisting of Senate and Chamber of Deputies; the former has 37 members elected by popular vote for six years; latter, 108 members, elected by popular vote for three years. Pres. is assisted in executive by council of state of eleven members and cabinet of six ministers.

Inhabitants include Spaniards, French, English, and other European nationalities. Natives are Araucans, Fuegians, Changos. State religion is Roman Catholicism. Education is free, but not obligatory. Military service is compulsory.

Soil of valleys in central provinces is very fertile; over half population engaged in agriculture, producing wheat and other cereals, rearing sheep, cattle, growing vines, oranges, figs, olives, and other fruits, beetroot, producing silk. In S. and islands are dense forests; in N. are enormous deposits of nitrates, which are great source of wealth. Other minerals include salt, borax, copper, silver, manganese, gold, cobalt, iron, sulphur, coal. Industries include copper-smelting, sugar-refining, tanning, manufacture of soap, candles, chemicals, boots, shoes, textiles. Among exports are copper, nitrates, guano, wool, silver ore, grains, flour, skins, furs, borax, caoutchouc, coffee, cotton, Peruvian bark, manganese ore, sugar, vegetables; among imports—textiles, metals, coal, machinery, oilcloth, cordage, tools, earthenware, leather, paper, spirits, scientific instruments, cod-liver oil, pianos, etc. Railway mileage in 1910 was *c.* 3570; C. is well provided with telegraphic communications. Pop. (1910) *c.* 3,415,000.

Scott Elliot, *Chile* (1907); Wright, *Republic of Chili* (1905); Hancock, *History of Chile* (1893); Holdich, *Countries of the King's Award* (1904).

CHILIASM, belief in the coming of a millennium or golden age.

CHILLAN (36° 4′ S., 71° 57′ W.), city, Chile; has ot sulphur springs. Pop. 35,000.

CHILLIANWALLA (32° 39′ N., 73° 38′ E.), village, on Jhelum, Punjab, Brit. India; scene of battle between Brit. and Sikhs, Jan. 13, 1849.

CHILLICOTHE (39° 47′ N., 92° 34′ W.), city, Mo., U.S.A.; flour-mills, iron foundries. Pop. (1910) 6265.

CHILLICOTHE (39° 17′ N., 82° 58′ W.), city, Ohio, U.S.A.; has railway workshops and carriage factories. Pop. (1910) 14,508.

CHILLINGWORTH, WILLIAM (1602–44), Anglican divine; ed. Oxford; became R.C., then Prot. again, but had scruples about signing Thirty-nine Articles; pub. *The Religion of Protestants a Safe Way to Salvation* (1637); chancellor of Sarum, 1638.

CHILOÉ (*c.* 44° S., 74° W.), southern province, Chile, including large island of same name, off coast, and several smaller islands; capital, San Carlos; area, 8580 sq. miles. Pop. 95,000.

CHILPERIC I. (d. 584), Frankish king; was a dissolute tyrant who repudiated his first wife and murdered his second; was assassinated whilst hunting.

CHILTERN HILLS (51° 36′ N., 1° W.), range of chalk hills, in S.E. Oxfordshire, Buckinghamshire, and borders of Bedfordshire and Herts, England; highest point, 905 ft., near Wendover.

CHILTERN HUNDREDS, by Eng. law a Member of Parliament cannot resign his seat, but if he accepts an office of profit under the Crown he *ipso facto* vacates it. Any one who wishes to resign, therefore, petitions for a nominal office, *e.g.* to be made Steward of the Chiltern Hundreds (viz. Stoke, Burnham, and Desborough, in Buckinghamshire), or the Manor of Northstead.

CHILWA (15° 5′ S., 35° 50′ E.), shallow lake, S.E. Africa; length once 40 miles, gradually drying up.

CHIMÆRA (classical myth.), fire-breathing monster, having head of lion, body of goat, and tail of dragon; wrought great havoc in Lycia; slain by Bellerophon on his winged horse, Pegasus.

CHIMAY (50° 2′ N., 4° 17′ E.), town, Hainaut, Belgium; marble quarries. Pop. 3400.

CHIMBORAZO (1° 29′ S., 79° 5′ W.), extinct craterless volcano, Ecuador; 20,498 ft. above sea-level, 11,000 ft. above plateau; capped with snow. C. name also of province to S.; area, 5544 sq. miles. Pop. *c.* 123,000.

CHIMERE, CHYMERE, an ecclesiastical vestment worn by Anglican bp's over the rochet; shaped like a gown without sleeves; generally of black satin, for convocation it is of scarlet cloth; thought to be a survival of the mantelletta worn by cardinals, bishops, and certain other R.C. prelates.

CHIMESYAN, small tribe of N. Amer. Indians now living in Skeena district of Brit. Columbia.

CHIMKENT (42° 15′ N., 69° 50′ E.), town, health resort, Syr-Darya, Asiatic Russia; taken by Russians, Sep. 1864. Pop. 11,000.

CHIMPANZEE (*Anthropopithecus troglodytes*), anthropoid ape of the forests of tropical Africa; is less fierce and more docile than the gorilla.

CHINA (18° to 52° N., 74° to 135° E.), republic, E. Asia; bounded N.W. and N. by Russia; E. by Russia, Korea, Yellow Sea, Eastern Sea; S. and S.W. by South China Sea, Fr. Indo-China, Burma, India; W. by Turkestan, Afghanistan, Kashmir; includes China Proper and the dependencies of Manchuria (*q.v.*), Mongolia (*q.v.*), Tibet (*q.v.*), and E. Turkestan (*q.v.*); area, *c.* 4,300,000 sq. miles.

China Proper (18° to 47° N., 98° to 135° E.) is bounded N. by Mongolia and Manchuria, E. by North Pacific, S. by Burma, Fr. Indo-China, and China Sea, W. by Tibet; area, *c.* 1,530,000 sq. miles. Along the E. is great plain, broken only by hilly peninsula of Shantung; elsewhere surface is mountainous, or hilly plateau. Principal mountains are Yun-ling in Sze-chuen, Nan-ling in Kwang-si, Tai-shan in Shantung, Pe-ling in Kansu, Wa-shan in Shen-si, Mo-hi in Fu-kien, Sung-shan in Honan, Hang-shan in Shansi, Hang-shan in Hunan. N. is drained by Hoang-ho and its tributaries, centre by Yang-tse-kiang and tributaries, S. by Si-kiang and tributaries. Hoang-ho rises in Kuen-lun mountains, flows N.E. through Tibet, Kansu, S. Mongolia, between Shansi and Shensi, and through Honan and Shantung into Gulf of Pechihli. Yang-tse-kiang also rises in Kuen-lun range, and flows S.E. through Tibet, Sze-chuen, Yunnan, Hupeh, Kiangsi, Anhwei, Kiangsu, into Pacific. Si-kiang rises in Yunnan, flows through Kwangsi and Kwangtung, unites with Pe-kiang and Tung-kiang, and enters South Sea near Lappa. An interesting topographical feature is the *Great Wall*, which stretches along Chihli, Shansi, Shensi, a Kansu, and was built as a means of defence in t III. cent. B.C., since when it has been lengthened at various dates. The climate varies greatly; temperature in N. ranges from 23° to 80° Fahr. at ordinary heights, in S. from 60° to 85° Fahr.; everywhere is sufficient rain for agriculture, with wet winds off sea in summer and dry winds from interior in winter.

History.—In earliest times C. was inhabited by various aboriginal tribes who were conquered by the Chinese sometime in the III. millennium B.C. Of early history of nation before VIII. cent. B.C. little is known, except from traditions collected and transmitted by Confucius and Mencius. Legendary records begin with Fu Hsi, who is generally considered founder of Chin. history, and is said to have reigned in XXIX. cent. B.C. Of his successors, Yao became king in 2356 B.C.; he is generally regarded as model ruler, as is his successor Shun. Shun was succeeded by Yü, who is said to have founded first Chin. dynasty and to have extended his kingdom. Yü's successors were superseded in 1766 by T'ang, prince of Shang, who defeated the then king and established a new dynasty which lasted till XII. cent. B.C. Of this dynasty there were 28 kings, during whose reigns little of importance occurred. The last was Chon Hsin, who was defeated by Wu Wang of Chon in 1122, when the Chon dynasty was established, which continued until 255 B.C.

Under the *Chon* rulers the feudal system was established and whole country was divided up into vassal states, many of which afterwards became powerful kingdoms; in this period art and lit. attained considerable

development, and the three great Chin. philosophers, Laotze, Confucius, and Mencius, lived and produced their works. Interstate war was almost continuous, and in III. cent. B.C. the vassal kingdom of Tsin or Ch'in attained great power, ultimately deposing the Chon emperor, Nan Wang, and establishing on imperial throne the *Tsin* dynasty, which endured until 206 B.C., providing five rulers, of whom most important was Tsin Shih Huang-ti. He consolidated his empire by abolishing feudalism and establishing a new system of government; his other principal exploits were the building of the Great Wall in the northern provinces, and the attempt to burn all Chin. classical lit. The Tsin line did not endure long after his death; rebellion broke out, and resulted in establishment of *Han* dynasty, about 206 B.C. First Han emperor was Liu Pang, who repealed the proclamation as to burning the classics; he assumed name of Kao Ti; during his reign several invasions and rebellions occurred, which he succeeded in suppressing. His son and successor, Hui, died young, by that of T'ang in 618. First *T'ang* emperor was Kao Tsu, who carried out religious and educational reforms. His son and successor, T'ai Tsung, strengthened and reformed the army and encouraged learning; he also extended his dominions. He was followed by his son, Kao Tsung, whose wife, the Empress Wu Hon, was notorious for her cruelty, and after her husband's death ruled for over twenty years. The T'ang dynasty lasted until 907; under it Chin. dominions were greatly enlarged, but in VIII. and IX. cent's serious rebellions occurred; after its fall there were five short-lived dynasties, the last of which came to an end in 960, in which year the *Sung* line was established by Chao K'uang-yin, who took name of T'ai Tsu and ruled till 976. The Sung period was the great age of Chin. lit., and endured until 1279. In XI. cent. various reforms in financial matters were carried out. In XII. cent. the Kins, a Tartar race, became powerful; they attacked and defeated the Chinese in 1125, and the northern provinces were ultimately yielded to them.



and in 179 B.C. Wen Ti became emperor. He instituted a less barbarous system of punishments than had previously been customary, and in his reign various invasions occurred. One of his successors, Wu Ti (140–86 B.C.), was a mighty warrior who enlarged his empire by conquests.

I.–XII. Century A.D.—The Han line came to an end about 220 A.D., after which the country was for a time divided into three kingdoms. In 265 A.D. Ssuma Yen established the Western Tsin dynasty in the north, taking name of Wu Ti; he afterwards subdued the south, consolidating the empire for short time; his successors were defeated by some of the northern tribes, and later the whole of the north was conquered by the Tartars. In 317 Yüan Ti (a descendant of Ssuma I., grandfather of Ssuma Yen) founded the Western Tsin dynasty in the south; this lasted till 420 when it was overthrown by Liu Yü, founder of Sung dynasty. From this time till 618 there were many dynasties, none of which lasted long; the last of these, the Sui dynasty, was superseded

XIII.–XVIII. Century.—Later in XII. cent. the Mongols appeared, and struggle between them and the Chinese began, which ended in the establishment of *Mongol* dynasty by Kublai Khan in 1279, when Ping Ti, the last Sung emperor, committed suicide. Kublai Khan assumed title of Shih Tsu, the dynasty he founded being called *Yüan*. Under him great splendour was attained by China, boundaries of which were greatly extended by conquests. He died in 1294; and the dynasty ended in 1368, when a revolution occurred, which resulted in the flight of the Mongol emperor Shun Ti, and the establishment of the *Ming*, a Chinese dynasty. The first Ming emperor, T'ai Tsu (Hung Wi), carried out various reforms and added to his dominions. At his death a struggle took place between his son and grandson, former ultimately becoming emperor, as Ch'eng Tsu. In XV. cent. occurred a Mongol invasion, when emperor Ying Tsung was taken and kept prisoner for a time. Under Ming emperors learning was encouraged; in XVI. cent. appeared the

first Portug. traders; and latter occurred another Mongol invasion.

The dynasty endured until 1644, when the Manchus, having been appealed to for aid in putting down a rebellion, placed a *Manchi* prince upon the throne, and thus established the Ch'ing or Tsing line of emperors. This prince reigned as Shih Tsu Chang until 1662, when K'ang Hsi became emperor. K'ang Hsi succeeded in consolidating his empire; conquered Tibet and Formosa; encouraged learning; d. in 1723, succ. by Yung Cheng, who persecuted Roman Catholic missionaries in C. Yung Cheng's s., Ch'ien Lung, acceded in 1736; in his reign several insurrections took place, including a rebellion in Mongolia; Eastern Turkestan was annexed to the empire, and war occurred with Burma and other states and tribes; he abdicated in 1796, when his s., Chia Ch'ing, became emperor. In his reign many secret societies were formed, one of which, the *White Lily*, raised a rebellion and twice tried to assassinate the emperor. The latter d. in 1820, succ. by his s., Tao Kuang, in whose reign occurred first war with Great Britain.

XIX.–XX. Century.—Brit. trade in China had hitherto been entirely in hands of East India Company, whose monopoly expired in 1834, when the Brit. Government determined to take it into their own hands, and sent Lord Napier as representative. He was not able to accomplish anything, nor was his successor, Captain Elliot. Relations were already somewhat strained when the question of opium traffic brought matters to a head. This had been declared illegal in 1796; in 1839, Liu Tse-hsü became commissioner to put an end to it, and demanded the surrender of all opium in foreign merchants' hands. Captain Elliot handed over all supplies held by Brit. merchants, but refused to accede to other demands, and eventually war broke out in 1840, lasting until 1842. In that year peace was concluded by Treaty of Nanking, whereby Britain received Hong-kong and a large money indemnity, and Canton, Amoy, Shanghai, Fu-chow, and Ning-po were declared open to foreign trade. Treaties of same nature were subsequently concluded with U.S.A. and France.

Tao Kuang died in 1851, succ. by his s., Hsien Fêng, in whose reign the *T'aiping rebellion* was first important event. This had first broken out in 1850, under leadership of Hung Hsiu-ch'üan, whose object was to supersede Confucianism by Christianity and to overthrow the Manchus. Several towns were seized by rebels in 1850, and in 1853 they captured Wu-chang and Nanking and advanced on Peking. Force was then raised by Li Hung-chang, and eventually the rebels lost some of the cities they had taken, their territories being reduced to small district near Nanking.

Before the final suppression of the T'aipings, however, there occurred another war with Great Britain, This broke out in 1856, when the *Arrow*, a ship under Brit. flag, was boarded and some of her crew seized by Chinese. The British were supported by the French; and the allies in 1857 advanced on Canton, which was taken in that year. Peace was concluded in 1858 by Treaty of Tientsin, whereby other ports were opened to foreign trade, an indemnity was paid by Chinese, and tariff was modified, while Great Britain also obtained right to send resident minister to Peking. The treaty, however, was not held to in all particulars, and hostilities again broke out. Allied British and French were defeated at *Taku* in 1859; but in 1860 they captured Pehtang, Tangku, and the forts at Taku, and fought and won battle at *Palikiao*. Peace was concluded by Treaty of Peking in 1860, in which further concessions were made by Chinese.

Hsien Fêng d. soon afterwards, whereupon, his heir being a child of four, T'ung Chih, the reins of government were assumed by the Empress Dowager and Prince Kung. Meantime the T'aiping rebellion remained unsuppressed; the rebels had increased their territories during the war with Britain, and as there was some danger of their seizing Shanghai a force was raised by that city to resist them. This was organised and led by two Americans and two Britons in succession, the last of whom was Charles George Gordon, who accepted the command in 1863. He reorganised his forces and brought them to a high pitch of discipline. After the capture of Soochow, Gordon resigned in consequence of Li Hung-chang's treacherous behaviour towards those rebels who surrendered; but subsequently he again took command. Soon afterwards, the rebellion was ended by the capture of Nanking, and the imperialist forces were disbanded. Other rebellions occurred in various provinces, but were suppressed.

In 1870 occurred an outbreak at Tientsin, in which a massacre of nuns took place and numbers of foreigners were killed by mob. In 1873 the emperor, T'ung Chih, granted personal interview to foreign ministers for first time. He was succeeded in 1875 by Kwang Hsü, his cousin; but the Empress Dowager, T'ung Chih's mother, continued to rule. In 1884 war broke out with France, which ended in 1885 by treaty whereby French acquired control of Annam and Tongking. War with Japan broke out in 1894 owing to C.'s refusal to urge reforms in Korea. Success followed Jap. arms; Port Arthur and Weihaiwei were taken, and the Chin. fleet annihilated at the *Battle of The Yalu*; and war ended in 1895 with Treaty of Shimonoseki, whereby China paid a large indemnity to Japan, ceded Formosa to her, and declared independence of Korea. After this war, which showed weakness of C., various European powers exacted from her commercial concessions, and encroached upon her dominions: Kiaochau was seized by Germany; Great Britain and Russia respectively obtained leases of Weihaiwei and Port Arthur. The empress in 1898 compelled her nephew to transfer the imperial authority to herself; and soon afterwards she put down the reform party which had then arisen.

The *Boxer* risings began in 1899; their aim being to expel foreigners. Various massacres occurred, in which missionaries and native converts to Christianity were specially singled out. Foreign Legations of Peking were besieged, and a relief force composed of Brit., Ger., Fr., Amer., Russ., and Jap. soldiers, after heavy fighting at Tientsin and other places, entered the city in Aug. 1900. Peace was concluded in same year, and C. had to make many concessions, but lost none of her territory. During war between Japan and Russia, which broke out in 1904, C. maintained neutrality; this war ended in 1905, when both Japan and Russia agreed to evacuate Manchuria and restore it to China.

Since then many important reforms have been carried out in C. Many government offices were abolished as useless, and a new system of education introduced; army has been reorganised, railways increased, etc. Emperor Kwang-Hsü died on Nov. 14, 1908, and the Dowager Empress a day later—an ominous event; in Dec., Pu Yi became emperor at age of two. In 1911 the emperor's three advisory councils were abolished, and a Cabinet and Privy Council established instead. In Dec. 1911 the regent abdicated, and in Feb. 1912 an edict was published announcing the abdication of the emperor; and thus on Feb. 12, 1912, China became a republic.

Literature. Most important of old Chin. works are those known as the Five Classics; these are, according to the great authority on Chin. lit., Professor Giles: (1) The *Shu Ching*, an hist. work composed of many old documents and fragments collected by Confucius in VI. cent. B.C., some of them dating back to III. millennium B.C. (2) The *Shih Ching*, or Book of Odes, also collected from early writings by Confucius, and giving information concerning pre-Confucian manners and customs. (3) The *I Ching*, a book of essays on philosophical and other subjects, attributed to Wen Wang, who lived in XII. or XIII. cent. B.C., and was ancestor of long line of kings.

(4) The *Li Chi*, a work on social matters, edit. by two men called Tai. (5) The *Ch'un Ch'iu*, an account of Lu from VIII. to V. cent. attributed to Confucius. This work is augmented by a commentary by an otherwise obscure writer named Tso, called the *Tso Chuan*. Next to the Five Classics in importance are the Four Books; these are (1) the *Lun Yü*, containing many precepts of Confucius and giving information concerning him; (2) the *Book of Mencius*, or the words and actions of Mencius, a IV.-cent. B.C. disciple of Confucius; (3) the *Ta Hsüeh*, a work on political and social matters, written probably by Confucius and one of his followers; (4) the *Chung Yung*, on conduct, ascribed to K'ung Chi. Confucius, who was born in 551 B.C., is generally considered father of Chin. lit., but there were many other important writers who flourished between the VI. and III. cent's B.C. Of these Lao Tzu, a philosophical writer of VI. cent., was important as the founder of Taoism, which is described in a work called *Tao-te-ching*, sometimes ascribed to him. In IV. cent., Chuang Tzu was important philosophical writer who followed Lao Tzu; and the poet Chü Yüan also flourished at this time. Among III.-cent. writers the essayist Han Fei Tzu and the philosopher Hsün Tzu may be mentioned; and to II. or I. cent. belongs a forged work under name of Lieh Tzu, which is still widely read. Between 200 B.C. and 200 A.D. flourished many writers, among them the poets Mei Sheng and Liu Heng, the historian Ssu-ma Ch'ien, the philosophers Yung Hsuing, Wang Ch'ung and Ma Jung; and during this period there were many Buddhist writers who came to C. from India. Towards the end of this era there lived a group of poets, of whom Wang Tsan may be mentioned.

After the close of the Han dynasty in 220 A.D. there ensued a period of several cent's during which there were few outstanding names in Chin. lit.; a group of poets flourished in the III. cent.; of IV.–V.-cent. poets, T'ao Ch'ien is best known, and of VI.–VII. cent., Hsieh Tao Heng. In early VII. cent. the T'ang dynasty was established, during which there was great development of literary activity. Li Po, who lived in the VIII. cent., is generally considered the greatest Chin. poet; he was a court favourite, and wrote many poems at the emperor's command, was of dissipated habits, and met his death by drowning. His contemporary, Tu Fu, was also a great poet. Han Yü, who lived 768–824, was a philosopher, essayist, and poet; he was also a great statesman, as was his contemporary, the poet Po Chüi. After the close of the T'ang dynasty there ensued a short period of decline in lit., during which, however, block-printing was invented by Feng Tao.

Under the Sung emperors, whose dynasty was established in 960, there was another great period of literary production, which has been termed the Augustan age of Chin. lit. Sze-ma Kwang (1019–86) was a famous historian whose chief work was the *T'ung Chien*. Another great name of this era is that of Chu Hsi (1130–1200), who wrote a commentary on Confucius and some hist. and philosophical works. Encyclopædias were first produced under the Sungs, and some dictionaries also appeared. Plays and novels were first written under the Mongol emperors in the XIII. and XIV. cent's, but during their rule there was a decline in poetry. Under the Ming emperors, 1366–1644, the writing of novels became more important, and many appeared, majority of which are anonymous. This period saw few great poets; but there was considerable development of encyclopædic writing, and works on med., philosophy, lit., and agriculture appeared.

Under the Manchus, whose dynasty was established in 1644, the short story attained great perfection at the hands of Pu Sung-Ling, who, a master of style, wrote a collection of these in the XVII. cent. which was pub. in the XVIII. cent. In the XVII. cent. the *Hung Lou Meng*, the greatest Chin. novel, was written. Other important productions of this era are various encyclopædias, a concordance, and a dictionary. There is a great number of proverbs, and many of the *facetiæ* have a great family resemblance to those found in Eng. comic papers.

Art.—Chin. art is perhaps best known to Europeans in its forms of hand embroidery on silk and other fabrics, and enamelling on metal. Some of the jars made of *cloisonné* enamel are very beautiful; among others, those of blue enamel on silver may be mentioned. Painting is a very old art in C.; it is largely conventional, no shadows being put in. Sculpture includes carvings on ivory, jade, wood, and other substances. Porcelain was discovered many cent's B.C., and is still made in great perfection. The most outstanding feature of Chin. arch. is the tent-like roof.

Education.—Before 1905 education led to an elaborate system of examinations for state employment. Since then Western methods have obtained. Peking has a univ. and medical school; in Tientsin are a univ., industrial school, medical colleges, mission schools. In 1911 the chief univ's of England and America promoted a scheme to establish a modern univ. in Central China. Elementary and secondary schools are rising all over C., and technical instruction in engineering, agriculture, etc. is advancing, while special attention is given to military education.

Government.—China became a republic in Feb. 1912; before that it was a monarchy, executive being in hands of emperor, whose rule was somewhat autocratic. There is now a Cabinet, composed of Ministers of State, and a Privy Council. Ministries are ten in number, including those of Foreign Affairs, Finance, Education, War, Navy, Laws, Interior, Agriculture and Commerce, Communications, Dependencies. There are also several departments, such as the revenue council, the board of astronomy, and the ceremonies department, which are part of the central administrative system. C. is for local administration divided into twenty-two provinces; these are Chihli, Shantung, Kiangsu, Cheh-kiang, Fukien, Kwangtung, Shensi, Kansu, Sin-kiang, Sze-chuen, Kweichau, Yunnan, Kwangsi, Shansi, Honan, Anhwei, Kiangsu, Hupeh, Hunan, in China Proper; Fengtien, Kirin, Heilung-kiang, in Manchuria. These are ruled by governors and deputy-governors.

Inhabitants generally are of Mongolo-Tartar stock, of which there are many different tribes; there are English Portuguese and other Europeans, and considerable number of Japanese and Americans. Chinese are yellow in colour, have black, straight hair, obliquely set eyes, and high cheek-bones. Among the upper classes the feet of the women are bound up during their early years; but attempts at preventing this are being made. The men have greater part of their head shaved, but wear a long pigtail growing from the crown; pigtails are being abolished under new régime. There is little distinction in dress, both sexes wearing loose coats and wide trousers. Rice is the principal article of diet; edible birds' nests are among greatest luxuries. A great deal of tea is drunk, and opium-smoking is largely indulged in, although now in course of suppression. Infanticide was at one time extremely common, especially in case of girls, most families killing all their offspring except two boys and one girl. This state of things has recently improved, and, as a rule, young children are not murdered except in times of famine. The state religion is Confucianism, but other faiths are tolerated; Buddhism, Taoism, Muhammadanism, and Christianity are all well represented. Ancestor-worship is extremely important, and enters greatly into daily life of people. Educational system is being reformed; primary schools are kept up by state; but education is not yet obligatory.

C. is meanwhile an agricultural country; soil everywhere fertile, producing large crops of wheat, barley, maize, millet, beans, and peas, chiefly in N., rice mainly in S. Other important vegetable products are mul-

berries, for silkworm rearing; these are found almost everywhere, but chief silk-producing districts are middle E., middle W. and S. Tea is found in middle W., centre, S., and S.E.; sugar, indigo, cotton, in S.; opium used to be grown almost everywhere (for international arrangements see under OPIUM); oil-seed plants, rhubarb, tobacco, ginseng, cinnamon, gum-producing shrubs. C. is extremely rich in minerals, especially coal, greatest quantities of which are found in Shansi and Hunan; rich deposits of iron, copper, quicksilver, china clay, lead, tin, silver, etc. Working of these is limited, owing to difficulties of access and transit. Industries are many; most important are winding, weaving, and embroidery of silk, production of porcelain and lacquered wares, grass-cloth, carving in wood, ivory, bone, iron, steel, and other metal goods, paper, ink, bells, gongs, etc. Wheat and rice are milled, and lately cotton-milling has become important. Imports include cotton goods, opium, kerosene, sugar, metals, woollens, flour, cigarettes, dyes, soap, paint, etc.; exports silk (raw and woven), tea, raw cotton, hides, skins, tobacco, wool, sugar, beans, bean-cake, oil, rhubarb, sesame. Most of wool exported goes to U.S.A. Chief imports received by Britain are silk, tea, furs; chief goods received from Britain are cottons, woollens, iron, soap, machinery, coal, chemicals, etc. The Imperial Customs Service, organised by Sir Robert Hart (*q.v.*) in 1863, collects the revenue of the coast trade. Railway mileage in 1911 was 5820; while over 2000 miles were in process of construction. Pop. c. 350,000,000; including dependencies, c. 380,000,000.

China Year-Book (1912); Boulger, *History of China* (1898); Parker, *China Past and Present* (1903); Giles, *Chinese Literature* (1901); Bushell, *Oriental Ceramic Art* (1889); Hardy, *John Chinaman at Home* (1905).

CHINA, see POTTERY.

CHINA INK, see INK.

CHINA SEA, part of Pacific Ocean, stretching from Corea to Siam; three sections—Yellow Sea between China and Corea, E. China Sea occupying middle portion, S. China Sea from Formosa to Philippines.

CHINANDEGA, CHINENDEGA (12° 38′ N., 87° 36′ W.), town (and department), W. Nicaragua; bananas, sugar-cane, and cotton cultivated. Pop. 11,000.

CHI-NAN-FU (36° 40′ N., 117° E.), town, capital of Shan-tung, China; commercial centre. Pop. 300,000.

CHINCHA ISLANDS (13° 45′ S., 76° 28′ W.), group of three rocky islands off coast of Peru; formerly noted for large deposits of guano.

CHINCHEW, TSUAN-CHOW (24° 58′ N., 118° 32′ E.), seaport, Fo-kien, China; tea and sugar exported.

CHINCHILLA (*C. lanigera*), rodent about the size of a squirrel living in high altitudes in Peru and Chile, burrowing among loose rocks; prized for its soft pearly grey fur.

CHINDE (18° 33′ S., 36° 30′ E.), port, at mouth of Chindo R., Portug. E. Africa; only navigable mouth of Zambesi; chief port for Zambesi valley and Nyasaland; exports coffee and rubber. Pop. c. 3000.

CHINDWIN (c. 25° N., 95° E.), river, Burma; principal tributary of Irrawadi; rises Patkoi Hills; flows S.; joins Irrawadi between Mandalay and Pagan; navigation difficult owing to whirlpools and sandbanks.

CHINDWIN (c. 22° 30′ N., 95° E.), two districts (Upper and Lower), Sagaing division, Upper Burma; hilly; valuable teak wood forests; extensive coalfields; indigo and rice cultivated; areas, 19,062 and 3480 sq. miles. Pops. 154,551 and 276,383.

CHINESE LABOUR, see ASIATIC QUESTION.

CHINGFORD (51° 38′ N., 0°), village, Essex, England; tourist resort; ancient ruined church.

CHINGLEPUT, CHENGALPAT (12° 42′ N., 80° 1′ E.), town (and district), Madras, India; soil poor, badly watered; town noted for pottery manufacture; C. taken from French by British, 1752. Pop. 10,700.

CHINKIANG (32° 10′ N., 119° 30′ E.), treaty port, on Yangtsze-kiang, Kiang-su, China; taken by British, 1842. Pop. 200,000.

CHINON (47° 10′ N., 0° 14′ E.), town, Indre-et-Loire, France; ruins of ancient royal castle; birthplace of Rabelais; trades in brandy and red wine. Pop. 4183.

CHINOOK, tribe of N. Amer. Indians of Oregon; name of warm wind experienced on lower E. slopes of the Rocky Mts.

CHINSURA (22° 53′ N., 88° 23′ E.), town, on Hugli, Bengal, India; military station; ceded to British by Dutch, 1825. Pop. 29,383.

CHINTZ, gaily-printed, glazed calico, used for hangings, curtains, etc.

CHIOGGIA, CHIOZZA (45° 12′ N., 12° 17′ E.), seaport, Italy; built on piles in Venetian lagoon, connected by bridge with mainland; has cathedral (built XVII. cent.) and old corn-hall; seat of bishopric; has fortified harbour; fisheries important; has shipbuilding yards; manufactures of bricks, sails, etc.; flax-spinning carried on. Pop. 30,563.

CHIOS, CHIO (38° 25′ N., 26 E.), island, in Ægean Sea, off W. coast, Asia Minor; mountainous; salubrious climate; subject to earthquakes; fertile and well cultivated; antimony mines and marble quarries. C. was colonised by Ionians; became province of Rome II. cent. B.C.; held by Genoese, 1346; by Turks, 1566; scene of massacres by Turks, 1822. Chief town, CHIOS, is by tradition the birthplace of Homer. Wine, figs, and gum mastic are chief exports; area, 250 sq. miles. Pop. c. 70,000.

CHIPMUNK (*Tamias striatus*), N. Amer. ground squirrel having cheek pouches; has dark bands on its back. See SQUIRREL.

CHIPPENDALE, THOMAS (d. 1779), Eng. furniture maker; the most famous cabinetmaker of his period; work characterised by solidity; though long held in great estimation, eventually gave place to designs of Sheraton and others.

CHIPPENHAM (51° 28′ N., 2° 6′ W.), town, on Avon, Wiltshire, England; noted for grain and cheese-markets; cloth manufactures. Pop. (1911) 5332.

CHIPPEWA FALLS (44° 56′ N., 91° 28′ W.), city, Wisconsin, U.S.A.; railway centre. Pop. (1910) 8893.

CHIPPING CAMPDEN (52° 3′ N., 1° 47′ W.), small market town, Gloucestershire, England; formerly famous wool mart.

CHIPPING NORTON (51° 56′ N., 1° 33′ W.), market town, Oxfordshire, England; woollens and gloves. Pop. (1911) 3972.

CHIQUITOS, native S. Amer. tribes inhabiting Bolivia.

CHIROMANCY, another name for palmistry (*q.v.*).

CHIRON (classical myth.), one of the Centaurs; lived on Mount Pelion; famed for wisdom.

CHIRONOMIDÆ, see BLOOD-WORMS.

CHIROPODIST, in modern usage, one who attends to the feet and their ailments; the older and, from the derivation, correct meaning includes the care of both hands and feet.

CHIROPTERA, or **Bats**, order of mammals of nocturnal habits, having the fore-limbs modified as wings for flight. The wing is formed of a fold of skin stretched over the elongated fingers and extending between the hind limbs and the tail. The thumb is short and clawed, and does not take part in the formation of the wing. The thumb and toes (which are also clawed) are used for suspending the animal when not flying, the latter being practically their only method of locomotion. The sense organs are well developed, especially the ears, the remarkable 'nose leaves' round the nostrils occurring in some species, and the whisker hairs of the snout. The order is divided into two sub-orders. The *Megachiroptera* or fruit-eating bats occur in tropical and sub-tropical countries of the eastern hemisphere, and include the *flying foxes*, in which the tail is not contained in the membrane between the legs. The larger sub-order, *Microchiroptera* or insect-eating bats, include all the smaller types in which the tail is either included

in or lying along the interfemoral membrane. They occur in tropical and temperate countries of both hemispheres, the pipistrelle (*Vesperugo*), *Vespertilio*, the horse-shoe bats (*Rhinolophus*), the blood-sucking vampires (*Desmodus*), the so-called vampires (*Vampyrus*), which, however, live on insects and fruit, are typical representatives.

CHIRU (*Pantholops Hodgsoni*), Tibetan antelope with woolly fawn-coloured hair and a swollen muzzle; the bucks have long slender horns with ridges.

CHISLEHURST (51° 25′ N., 0° 4′ E.), urban district, Kent, England. The mansion of Camden Place was the residence of Napoleon III., who d. there 1873. Pop. (1911) 8668.

CHISWICK (51° 28′ N., 0° 9′ W.), town, Middlesex, England; market gardens. Pop. (1911) 38,705.

CHITA (52° 2′ N., 113° 37′ E.), town, on Chita, capital of Transbaikalia, E. Siberia. Pop. 11,500.

CHITALDRUG (14° 14′ N., 76° 26′ E.), fortified town, Mysore, India; woollen manufactures. Pop. 5000.

CHITON, genus of marine mollusca occurring from Silurian times onwards and belonging to the sub-class *Polyplacophora* or *Isopleura*, which, together with the sub-class *Anisopleura* (which includes snails, whelks, and limpets), form the class Gasteropoda. Several species occur on Brit. coasts. The elongated body is bilaterally symmetrical both externally and as regards the inner organs, and the back is covered by a shell consisting of eight plates which are usually jointed on one another so that the animal can roll itself up. Like the snail, it has a muscular foot with which it can sluggishly creep about. The species are usually vegetarian and have a ribbon-shaped tooth or radula in the mouth.

CHITRAL (*c.* 36° N., 72° E.), small native state, S. of Hindu Kush Mts., N.W. Frontier Province, Brit. India; occupies fertile valley of Chitral River; capital, CHITRAL; came under Brit. control, 1895; is of great strategical importance as it commands principal passes over the Hindu Kush. Pop. *c.* 50,000.

CHITTAGONG (22° 21′ N., 91° 53′ E.), port, on Karnaphuli, Bengal, India; commercial centre. Pop. 22,140.

CHITTUR (13° 13′ N., 79° 8′ E.), town, N. Arcot, Madras, India. Pop. 11,000.

CHITTY, SIR JOSEPH WILLIAM (1828–99), Eng. judge.

CHIUSI (43° 2′ N., 11° 57′ E.), town, Siena, Italy; ancient *Clusium*; Etruscan antiquities. Pop. 6000.

CHIVALRY, the spirit and practice of knight-errantry; also, in Eng. law, feudal tenure by knight's service; in modern use it means courtesy and consideration, particularly towards women.

CHIVASSO (45° 12′ N., 7° 52′ E.), town, Turin, Italy; XV.-cent. cathedral; important fortress formerly. Pop. 4400.

CHIVE (*Allium schœnoprasum*), perennial plant allied to the onion, cultivated for its leaves, which are used in cookery.

CHLAMYDOPHORUS, genus of armadillo (*q.v.*); Pichiciago (*C. truncatus*) is found in W. Argentine.

CHLOPICKI, GREGORY JOZEF (1772–1854), Polish general; distinguished himself at battles of *Busaco*, *Casabianca*, *Eylau*, and *Saragossa*; wounded at *Smolensk*, 1812.

CHLORAL (CCl_3CHO), oily liquid with bitter taste and pungent smell; B.P. 94·4° C., Sp. G. 1·512; prepared by the action of chlorine on alcohol; water converts it into a hydrate.—**Chloral Hydrate** is a white crystalline substance, used in med., usually in the form of a syrup, as a hypnotic, producing a safe and natural sleep.

CHLORATES, the salts of chloric acid ($HClO_3$). They are all decomposed by heating liberating oxygen, and dissolve in water. *Potassium chlorate* ($KClO_3$), crystallising in colourless tablets, is the most important, and is used for manufacturing oxygen, matches, and fireworks, and in med. Large doses are poisonous, but a solution is valuable in treating ulcerative stomatitis, tonsillitis, and pharyngitis, probably owing to the action of nascent oxygen.

CHLORINE (Cl=35·5), greenish yellow gaseous element of very unpleasant odour, M.P. −102°, B.P. −34°, soluble in water, and noted for its bleaching properties. Its chemical properties resemble those of the other halogens (*q.v.*), and it occurs in nature chiefly in the form of sodium chloride (salt), carnallite, and sylvine. It is prepared by the action of hydrochloric acid on manganese dioxide, and on a large scale in the manufacture of alkali (*q.v.*) by the Leblanc process.

CHLORITE, group of greenish minerals closely resembling micas and consisting of hydrous silicates of magnesium, aluminium, and ferrous iron. They occur as alteration products of amphibole, biotite, and pyroxene in igneous and schistose rocks. A few of the more important representatives are clinochlore, corundophilite, penninite, and prochlorite.

CHLOROFORM ($CHCl_3$), colourless liquid with a distinctive and pleasant smell and taste; B.P. 61·2° C., Sp. G. 1·525°; prepared by the action of bleaching powder on alcohol. Chief use is as an anæsthetic, being the most generally useful one known. See ANÆSTHESIA.

CHLOROPHYLL, the green colouring matter of plant cells. It is only developed in chloroplasts exposed to the light and when iron and magnesium are present, and is essential in the formation of carbohydrates. It is soluble in alcohol, ether, etc., and the solution is fluorescent. Chemically, c. is related to the proteids, and contains both green and yellow (xanthophyll) pigments, and is frequently masked, as in many algæ, by red, brown, yellow, or blue pigments.

CHLOROSIS, in med. a type of *Anæmia* (*q.v.*); in bot. the loss of colour in a part or whole of a plant.

CHLORPICRIN, NITROCHLOROFORM ($C.NO_2.Cl_3$), heavy, colourless, pungent liquid, B.P. 112°, obtained by the action of chlorine on picric acid or of nitric acid on chloroform.

CHMIELNICKI, BOGDAN (*c.* 1593–1657), Cossack leader; after several crushing defeats of the Polish army became master of Poland, and champion of the orthodox party, cruelly persecuting Jews and Roman Catholics; defeated in 1651, and finally in 1654.

CHOATE, JOSEPH HODGES (1832–), Amer. diplomatist; b. Salem, Mass.; became successful lawyer; ambassador to Great Britain (1899–1905); fostered friendly relations between the two powers.

CHOATE, RUFUS (1799–1859), Amer. lawyer and politician; noted as an orator, speaking specially on the Tariff.

CHOBE (18° S., 22° 42′ E.), W. tributary, Zambesi, Central Africa; discovered by Livingstone, 1851.

CHOCTAWS, large tribe of N. Amer. Indians of the Muskogean family, now living in Oklahoma; they sided with the Confederates in the Civil War.

CHODKIEWICZ, JAN KAROL (1560–1621), Polish general; won the victory of *Kirkolm* over the Swedes in 1605; fought also against Muscovy, 1617, and against the Turks, dying during the campaign.

CHODOWIECKI, DANIEL NICOLAS (1726–1801), Ger. artist and engraver.

CHOERILUS.—(1) Gk. tragic poet, contemporary with Æschylus; (2) an epic poet who fl. V. cent. B.C.

CHOIR AND CHORAL SINGING, terms used with reference to ecclesiastical or secular bodies of singers; many c's and choral unions in Britain, notably in Lancashire and Yorkshire.

CHOISEUL, CÉSAR, DUC DE (1602–75), Fr. marshal.

CHOISEUL, ÉTIENNE FRANÇOIS, DUC DE (1719–85), Fr. statesman; served in army, 1741–48; became ambassador at Rome, 1753, and at Vienna, 1757, then duke and peer of France; directed the foreign affairs of France with great ability, till 1770, when he fell from power and retired.

CHOISEUL-STAINVILLE, CLAUDE ANTOINE

GABRIEL, DUC DE (1760–1838), Fr. Royalist soldier.

CHOISY, FRANÇOIS TIMOLÉON, ABBE DE (1644–1724), Fr. author; famous for his *Mémoires*.

CHOKING is caused by obstruction of larynx, *i.e.* top of windpipe, frequently due to piece of food; if acute, the mouth should be opened and the forefinger inserted to remove obstruction; if this fails, windpipe must be pierced in order to secure respiration; suffocation often occurs in this way.

CHOLERA, a very fatal disease, the symptoms of which occur in three stages: first, violent vomiting and diarrhœa, with liquid colourless stools and severe cramps; second, the individual becomes collapsed, the pulse hardly perceptible, the skin dry and cold, the body of a livid colour, while the vomiting and cramps still continue; third, if death does not take place before this, there is a reaction, the pulse is stronger, the temperature rises, the bowels are usually constipated, and the urine scanty. This stage is followed by great weakness, which retards recovery and may even cause a fatal ending. There are two main schools of treatment, the one aiming at getting the toxins out of the system by every possible means, and the other making its chief object the cessation of the diarrhœa, and so keeping up the strength. The patient must at any rate be kept warm in bed, hot baths may be found of benefit in the second or cold stage, while saline intra-venous injections will assist in overcoming the stage of collapse; cramps and other secondary symptoms may be treated as they arise. Inoculation against cholera, introduced in 1893–94, is now practised to a considerable extent and with much success in India, an antitoxin being prepared from the attenuated virus according to the method of Haffkine.

The cause of c. is a specific organism, the common bacillus or vibrio, discovered by Koch. The disease is endemic in the delta of the Ganges, and from time to time, for reasons which have not yet been fully ascertained, it becomes epidemic and is carried in waves, north, west, and east, going as far as Europe on the one hand and America on the other. It appeared in England in 1831–32, causing over 2500 deaths, and also in the latter year on the Continent, the mortality reaching many thousands. In 1837 it raged throughout Italy (causing 24,000 deaths in Palermo alone), and reached Berlin, while in 1849 it invaded England, London alone having 13,000 deaths from the disease. There was a severe outbreak in the north of England in 1853, and it again reached London in the autumn of 1854. In 1865 about 50,000 deaths were caused by it in Constantinople, and it only declined after the outbreak of the great fire which destroyed the worst parts of the city; cases also appeared in Italy, France, and Spain, and in 1866, in the south of England, a relief fund being raised in London. In 1883 the disease appeared in Egypt, causing deaths among the Brit. troops, spreading in 1884–85 to France (5000 deaths), Italy, and Spain (over 91,000 deaths), and in 1886 to Austria and Hungary, while in the same year there were 37,000 deaths in Japan. In 1892 there was a severe outbreak in Persia (60,000 deaths), Russia (260,000 deaths), Rumania, Austria and Hungary, France (3000 deaths), Spain, Belgium, Hamburg (7600 deaths), and eastern seaports of England. In 1894 there was another epidemic in Russia, reaching also Austria and Germany. In 1897 there was an outbreak on a P. & O. liner which arrived at Plymouth, causing 4 deaths, infection being conveyed by fruit from Port Said. In 1908–9 there was a severe epidemic at St. Petersburg and elsewhere in Russia.

The season in which it has always occurred in Britain has been the late summer and autumn.

It is communicated by contamination with evacuations from the bowel, which may have got into drinking water through cesspools, etc., or the infection may be from soiled clothes, rags, etc.

The means of prevention, as may be gauged from a knowledge of the sources of infection, are simply cleanliness, general hygiene, and attention to sewage disposal and water supplies.

Wall, *Asiatic Cholera*; *Local Government Board Reports*, 1892–95.

CHOLET (47° 3′ N., 0° 51′ W.), town, department Maine-et-Loire, France; manufacture of linen, woollen fabrics, chief industry. Pop. 15,335.

CHOLON (10° 40′ N., 106° 30′ E.), town, Fr. Indo-China; commercial centre; extensive rice trade. Pop. 40,000.

CHOLONES, S. Amer. Indian tribe inhabiting the Amazon valley.

CHOLULA (19° 2′ N., 98° 14′ W.), ancient town, Puebla, Mexico; has remarkable pyramidal temple, covering area of about 45 acres, dedicated to god Quetzalcoatl. Pop. 6899.

CHONDROSTEI, see under FISHES.

CHOPIN, FRÉDÉRIC FRANÇOIS (1810–49), Polish composer and pianist; b. near Warsaw; settled in Paris, 1831; of delicate health and highly nervous nature; formed intimate relations with George Sand, and friendships with Heine, Berlioz, Liszt, and other famous contemporaries; most works for pianoforte: original poetic style of great lyric beauty, with marked Polish characteristics; sonatas, ballads, études, nocturnes, preludes, polonaises, valses, etc.

Niecks, *C. as Man and Musician*.

CHORALE, Ger. hymn-tune.

CHORD, in music. See HARMONY.

CHORDATA, see VERTEBRATA.

CHOREA, ST. VITUS'S DANCE, nervous disorder occurring most commonly in children, characterised by irregular jerking movements of the muscles of the limbs and trunk, usually most marked in the fingers and toes; the child seems very restless and makes grimaces. There is inco-ordination of movements,—for instance, the hand carrying something to the mouth does not reach its goal,—the speech is often impaired, mental symptoms may be present, and the affected muscles are weak; the heart may be affected, the action rapid and irregular, or valvular lesions may be present. The cause of chorea is now believed to be a micro-organism, the diplococcus of rheumatism, and other manifestations of rheumatism may be present in the condition, *e.g.* pericarditis, arthritis, tonsillitis. A few weeks to a few months is the usual duration of an attack, but recurrences are common. The treatment is rest, both physical and mental, a light, nutritious diet, plenty of fresh air. The salicylates are administered, as in rheumatism with success; bromide of potassium and chloral are useful sedative drugs in this condition, arsenic is a most valuable tonic, while massage and electricity are employed with benefit.

CHORIAMB, a metrical foot of four syllables, two short between two long, viz. — ∪∪ —.

CHORICIUS (fl. 490–518 A.D.), Gk. rhetorician.

CHORLEY (53° 38′ N., 2° 38′ W.), market town, Lancashire, England; cotton manufactures, coal mines. Pop. (1911) 30,317.

CHORLEY, HENRY FOTHERGILL (1808–72), Eng. musical critic, author, and librettist.

CHORLU, TCHORLAU (41° 12′ N., 27° 48′ E.), town, on Chorlu, European Turkey; carpets. Pop. 8000.

CHOROGRAPHY, chart, or description of a region or district; 'topography' is now the usual term.

CHORUM (40° 25′ N., 35° E.), town, vilayet of Angora, Asia Minor. Pop. 13,000.

CHORUS, a band of people singing together, or a composition that is sung by a number of people together. In ancient Gk. drama the chorus consisted of a number of people on the stage who either explained the action of the play, or commented on the events portrayed. Sometimes the chorus addressed, and was addressed by, the actors.

CHOSE IN ACTION, Eng. legal term, designating the right to sue for damages, legacies, copyrights, etc.

CHOSEN, KOREA (*q.v.*).

CHOSROES I., king of Persia (531–579); went to war with the Rom. Empire, then under Justinian; a wise ruler, tolerant of Christianity though himself Zoroastrian.

CHOSROES II., king of Persia (590–628); at first successful, but afterwards defeated by the Romans under Heraclius; great neither as a king nor a man.

CHOTA NAGPUR, Chutia Nagpur (*c.* 24° N., 48° E.), division, Bihar and Orissa, India, comprising five Brit. districts and several tributary states; mountainous; forest-covered; rich in minerals; rice, lace, coarse silk; area, 27,101 sq. miles. Pop. 4,900,000.

CHOUANS, Fr. Royalists, who, after the Revolution, strove to maintain the Royal cause in Brittany Cadoudal, the leader, was executed (1804).

CHOUGH (*Pyrrhocorax graculus*), member of Crow family (*q.v.*); very red feet; rare in Britain.

CHRÉSTIEN, FLORENT (1541–96), Fr. poet and satirist.

CHRÉTIEN DE TROYES (*c.* 1150), Fr. poet.

CHRISM, oil (generally mixed with balm), used in R.C. Church, after being blessed by a bp. (on Maundy Thursday), for anointing in Baptism, Confirmation, Ordination, etc.

CHRIST, 'anointed'; title applied specially to **Jesus Christ** (*q.v.*).

CHRIST, WILHELM VON (1831–1906), Ger. classical scholar.

CHRISTADELPHIANS, sect founded in U.S.A., 1848; believe in immortality for the faithful only; now *c.* 3000 members.

CHRISTCHURCH (50° 44′ N., 1° 47′ W.), town, Hampshire, England, at junction of Avon and Stour; famous for mediæval priory church, and ruins of Norman castle; watch and clock chains. Pop. (1911) 5104.

CHRISTCHURCH (43° 30′ S., 172° 30′ E.), city, Canterbury, New Zealand; bp.'s see; cathedral, government buildings, hospital, museum; active trade in agricultural produce and wool; frozen and tinned meat exported. Pop. (1911) with suburbs, 80,193.

CHRISTENING, see Baptism.

CHRISTIAN II. (1481–1559), king of Denmark, Norway, and Sweden; succ. his f. as king of Denmark and Norway, 1513; showed his determination to rule, and deeply offended the nobles by his patronage of the middle classes. War broke out with Sweden, and at length C. managed to defeat the Swedes at the battle of *Upsala* in 1520; he then was crowned king of Sweden, and carried out a treacherous massacre of his opponents. He was a strong and able monarch, but his autocracy deeply offended his people, and he was deposed in 1531, spending his later years in prison.

CHRISTIAN III. (1503–59), king of Denmark and Norway; succ. in 1533. C. was a strong Lutheran, plundered the Catholic Church and enriched the nobles. He was a strong and careful ruler, and Denmark prospered under him.

CHRISTIAN IV. (1577–1648), king of Denmark and Norway; succ. to the throne, 1588. C. set to work to reorganise the army and navy; went to war with Sweden in 1613, and later with the Empire; was utterly defeated in 1626, and was obliged to form an alliance with Gustavus Adolphus; made peace in 1629. In his later years he was never really successful, and was defeated in war with Sweden.

CHRISTIAN V. (1646–99), king of Denmark and Norway; though popular with the lower classes, was weak and despotic; engaged in a fruitless war with Sweden; killed in hunting accident.

CHRISTIAN VII. (1749–1808), king of Denmark and Norway; m. Caroline Matilda, dau. of Frederick, Prince of Wales; was weak, abandoned, and became partially insane.

CHRISTIAN VIII. (1786–1848), king of Denmark; succ. **Frederick VI.**, 1839. His short reign was marked by improvements in administration and finance.

CHRISTIAN IX. (1818–1906), king of Denmark; s. of Frederick William, duke of Schleswig-Holstein-Sonderburg-Glücksburg; succ. his distant cousin, Frederick VII., as king, 1863; his oldest dau., Alexandra, became wife of Edward VII.

CHRISTIAN X. (1870–), king of Denmark; s. of Frederick VIII., whom he succeeded.

CHRISTIAN CATHOLIC CHURCH, religious community; founded by J. A. Dowie (*q.v.*); *c.* 12,000 members.

CHRISTIAN CONNECTION, Amer. sect, split off from Methodist Church, 1793; now *c.* 100,000 adherents.

CHRISTIAN ENDEAVOUR, societies first formed, 1881; especially for young people of various denominations; founded by Rev. F. E. Clark (Maine, U.S.A.); over 4,000,000 members.

CHRISTIAN OF BRUNSWICK (1599–1626), Prot. bp. of Halberstadt; fought in Thirty Years War.

CHRISTIAN SCIENCE, a religious system, originated in America in 1866 by Mrs. Mary Baker Glover Eddy, which teaches that since man's essential nature is spiritual, the body of man being an exact manifestation of his mind, therefore a perfect knowledge of the nature and essence of God not only prevents but cures bodily disease, which is a subjective state of error. *Science and Health, with Key to the Scriptures*, by Mrs. Eddy, the text-book of the system, was first pub. in 1875; several hundred editions have subsequently appeared, and many hundreds of C. S. churches have been established in America and in Europe. The doctrine of the cure of disease by faith which Christian Scientists propound has provoked attacks, and has even led to indictments for man-slaughter, but, while the ill-advised efforts of bigoted adherents may have led at times to disastrous results, there is no doubt that in many conditions, particularly those affecting the nervous system, faith-healing may work cures where medical science may fail.

CHRISTIANIA, Kristiania (59° 54′ N., 10° 43′ E.), capital, Norway; situated on C. Fjord; seat of Parliament and supreme law courts. Other important buildings are royal palace, univ., citadel, arsenal, town hall, observatory; seat of bishopric; has old cathedral; manufactures woollens, cotton yarns, tobacco, liquors, paper, oil; has fine harbour; exports timber, fish, textiles, matches. Pop. (1910) 241,834.

CHRISTIANITY, the religion professed by the followers of Jesus Christ. It has more adherents than any other single faith, though less than half the world is Christian. Christianity is an *historical* religion (for this and other points, see below, Church History), and, like some other great religions, looks back to an historic founder. Externally it belongs to the same group as Judaism, from which it sprang, and Muhammadanism, an offshoot, partly Jewish, partly Christian in origin, with other elements besides. It is therefore a monotheistic faith, but differs from other forms of monotheism in the supreme place in which it places its Founder. Though Christological controversies have rent the Church and are not yet settled, the Church has felt her Lord to be more than human, though His claim to Deity has been denied by Monarchians and Unitarians. Then the question of the relation of the Son to the Father arises, and the doctrine of the Trinity tries to solve the problem.

That Christ is in some sense our Saviour is generally held, though the Atonement seems to be capable of endless restatement. Belief in future reward and punishment is likewise found in all forms of Christian theology. Baptism and the Eucharist are almost universal, but about other matters there is endless divergence. But there are certain clearly marked types of Christianity. I. **Catholicism**, reaching its most developed form in the R.C. Church. The Gk. and Eastern Churches, though in some ways different, largely resemble the Roman and the Anglican Churches. The claim of the latter to Catholicity is denied by Rome; it approaches in government and practice the Rom. and Gk. Churches, but its theology is more

Protestant. Catholicism is sacerdotal and sacramental, making essential the preservation of the threefold order (bishops, priest, and deacons), and making Baptism and the Eucharist generally essential to salvation, though the Rom. Church recognises seven sacraments. For Catholics the ultimate authority is the Church, the mind of which is expressed in the decrees of its Councils. Greeks and Anglicans recognise only the undivided Church, while the Rom. Church accepts later Councils, *e.g.* Council of Trent, 1565, and the Vatican Council of 1870, which are binding and accept the infallibility of the Pope.

II. **Protestantism** was based originally on the doctrine of the sufficiency of Scriptures, but the doctrinal position of Prot's now varies greatly, and there is considerable latitude in Biblical criticism, etc. A recent phenomenon in theology is what is called 'Liberalism,' *i.e.* the laying of great emphasis on freedom and development of thought, and on the ethical side of religion rather than on doctrine, government, or sacrament. Though this is largely Protestant in origin, it has in 'Modernism' sprung up in the R.C. Church. Prot. Church government is either Presbyterian, *i.e.* government by elders, or independent, each congregation is autonomous, *i.e.* is governed from below, not, as in Catholicism, from above.

Christianity claims to be universal, *i.e.* it can and should be adopted by all men at all times and under all conditions. It also claims to be an absolute religion, that is, a final and supreme revelation of eternal truth, and to be supernatural in that it reveals things beyond our world of sense, though its truths may be only realised by degrees. See CHURCH HISTORY, (*infra*), RELIGION.

Bethune Baker, *Outlines of the History of Christian Doctrine*; Harnack, *What is Christianity?*; Tyrrell, *Christianity at the Cross-Roads.*

Church History.—To trace completely the history of the Christian Church would be to tell the story of Judaism, to which it owes its birth, of Greek thought, which has exerted such an influence on Christian theology, and of the various political institutions, particularly the Roman Empire, with which it has come in contact. This can hardly be done, but certain principles of study can be laid down, and its main divisions indicated. The beginning of Christianity lives in the life and work of Jesus Christ and the belief in His Resurrection. Jesus had claimed to be Messiah and to come again to judge the world, hence Christianity was at first eschatological (see ESCHATOLOGY), *i.e.* expectant of the end of the world. At first, too, it was entirely Jewish, but the work of St. Paul won the Gentiles equal rights in the Church. Meanwhile Christianity was but one of a welter of rites, cults, and philosophies competing for influence in the Rom. Empire—an Empire compounded of Rom. government and Gk. culture. Christians moved in the same spheres of thought as they lived in the same cities as other men, hence there are parallels between the Christian and other religions, and some direct borrowing on each side. Herein lies the importance of Comparative Religion for Christian origins.

Several tendencies were now at work: (1) Greater systematising of dogma, culminating in the Great Councils of the Church, especially Nicæa (325 A.D.), and Chalcedon (461 A.D.), definition generally resulting from the crystallising of inherited belief. Most of the early controversies turned on the person and work of Christ. (2) The centralising of Church authority, first in the monarchical episcopate reached in early II. cent., then in the power of the great patriarchates, culminating in the supreme authority gained in the West by the See of Rome. (3) With the development of dogma and Church government came that of ritual, worship, and (generally) of ecclesiastical life. Besides internal development the first three cent's of Christianity saw bitter and frequent conflict with the State. By the conversion of Constantine and the recognition of Christianity as the State religion of the Rom. Empire, the Church had won, and now had the still mightier task of winning to real allegiance to Christ those who acknowledged her sway. While the Church was perse-

[illegible]

with her triumph came nominal conversions. After t onslaught of the barbarians and the collapse of the W. Empire the Church set herself to the task of civilising and converting them. Though her work was noble it must never be forgotten that whole tribes were baptized *en masse* and thus their Christianity was superficial.

The Middle Ages saw Catholicism dominant not only in religion but in politics, and from XI. to XIII. cent's the Papacy wielded enormous power. The growth of the monastic and mendicant orders is likewise most important.

In the XV. and XVI. cent's came the Renaissance (*q.v.*), when there arose a split (seemingly final) in Western Christendom. Theological questions were mingled with political till the XVII. cent., but the XVIII. was anti-religious. Thus the French Revolution endeavoured to sweep away Christianity, which was identified with the *ancien régime.*

The XIX. cent. saw most important movements in Christian history; science and the growth of hist. criticism questioned old positions, yet there were frequent outbursts of religious life, *e.g.* the Oxford Movement, the Salvation Army, Christian Science. The XX. cent., with the deeper understanding both of past history and of religious psychology, will probably have no less important results.

Christianity existed outside the Rom. Empire. Recent research has shown how widespread was the Nestorian Church in Asia till crushed by Islam, and Oriental Churches still survive. The Gk. Churches have remained little changed since the VI. cent., and the Russian Church has been formed on their model. But Asia and Africa have never been thoroughly Christianised.

Horton, *The Early Church*; Harnack, *Mission and Expansion of Christianity* (1908), *History of Dogma* (1893); Hunt and Stephens, *History of the Eng. Church* (9 vols., 1901–10); Adeney, *Gk. and Eastern Churches* (1908); Burkitt, *Early Eastern Christianity.*

CHRISTIANSAND (58° 8′ N., 7° 55′ E.), seaport, on fjord of Skagerrack, S. Norway; timber, fish. Pop. (1910) 15,291.

CHRISTIANSUND (63° 10′ N., 7° 45′ E.), seaport, Romsdal County, N.W. coast of Norway; exports wood, fish products, and butter. Pop. (1910) 13,201.

CHRISTIE, RICHARD COPLEY (1830–1901), Eng. scholar; wrote *Étienne Dolet, the Martyr of the Renaissance* (1880).

CHRISTINA (1626–89), queen of Sweden, dau. of Gustavus Adolphus; succ., 1632, and took the reins of government herself in 1644; was able and brilliant, but self-willed; quarrelled with her chancellor, Oxenstjerna. In 1654 she abdicated, joining later the R.C. Church; d. in obscurity in Rome.

CHRISTINA, MARIA CHRISTINA HENRIETTA DESIRÉE FÉLICITÉ RÉNIÈRE (1858–), queen-mother of Spain; *née* Archduchess of Austria; m. late King Alphonso XII., 1879; regent for her s., Alphonso XIII., until 1902.

CHRISTISON, SIR ROBERT, Bart. (1797–1882), Scot. physician, toxicologist, and medical jurist; prof. of Forensic Med. (1822), of Med. and Clinical Med. (1832) in Edinburgh Univ.; made important researches in toxicology and pathology.

CHRISTMAS ('Christ-Mass').—The festival of the birthday of Jesus Christ was at first closely connected with the Epiphany, celebrated on Jan. 6. The observance of Dec. 25 only dates from IV. cent. and is due to assimilation with the Mithraic festival of the birthday of the sun. Dec. 25 was, too, according to Bede, a pagan festival in ancient Britain. The real day of Christ's birth is unknown. Owing to this, its ob-

servance was condemned by the Puritans, New Year's Day being celebrated instead in Scotland to-day.

CHRISTMAS ISLAND (10° 31′ S., 105° 33′ E.), island, Ind. Ocean, S.W. of Java; dependency of Straits Settlements.

CHRISTMAS ROSE, see HELLEBORE.

CHRISTOPHER, ST., commemorated in the West on July 25, was martyred in the Decian persecution, c. 250 A.D.; many legends about him.

CHRISTOPOULOS, ATHANASIOS (1772–1847), Gk. lyric poet.

CHRIST'S HOSPITAL, the *Blue-Coat School*, founded by Edward VI.; transferred to Horsham, 1902; has now about 800 boys.

CHRISTY, HENRY (1810–65), Eng. archæologist and ethnologist; travelled extensively in Europe and N. America, where he made many discoveries and got together a very fine archæological collection (now in Brit. Museum).

CHROMATIC SCALE, musical term for a scale in semitones.

CHROMIC ACID (H_2CrO_4), an acid formed like sulphuric acid from a trioxide (CrO_3); forms CHROMATES with the formula K_2CrO_4. Other salts are known as BICHROMATES and TRICHROMATES according as the combining metal has one or two additional molecules of the trioxide; thus a bichromate would be XCr_2O_7.

CHROMITE, CHROMIC-IRON ORE ($FeCr_2O_4$), iron-black mineral, occurring in compact or granular masses or as octahedral crystals in the Urals, New Zealand, U.S.A., and Unst. It is the chief source of chromium and its compounds.

CHROMIUM (Cr = 52), metallic element, occurring only in combination, chiefly as chromite ($Cr_2O_3.FeO$), chromeochre (Cr_2O_3), crocoisite ($PbCrO_4$), and a few other minerals. Many of its compounds have striking colours, and are used in dyeing, etc. Its principal use is as a constituent of chromium steel. According to the valence of its molecules it forms salts termed chromous, chromic, chromates, and dichromates.

CHROMOSPHERE, reddish gaseous layer outside the photosphere of the sun, shown by the spectroscope to consist of incandescent hydrogen and helium. It is particularly visible during a total eclipse. A corresponding layer round stars is also termed c.

CHRONICLE, hist. record, often compiled by several hands. The early Christian c's were written in Gk. and Latin. The Anglo-Saxon C. was commenced in King Alfred's reign and ended in Stephen's.

CHRONICLES, BOOK OF, in Eng. Bible follows *1* and *2 Kings*, but in the Hebrew Canon comes with *Ezra* and *Nehemiah* 'last of all.' These three form one work covering the whole of history from Adam to 432 B.C. *Chronicles* thus covers the same ground as *Genesis* to *Kings*, from which there are considerable extracts, but much is missed out, *e.g.* the patriarchal history is given very shortly, and the later history of the kingdom of Israel (as distinct from Judah) is omitted.

The date of C. is probably *c.* 330 B.C., and the author very likely a Levite. Additions—genealogies, etc.—are described as being from the 'Book of the Kings of Judah and Israel,' etc. The historicity is not so sure as that of *Kings*, for the writer of C. looks at the early monarchy from the standpoint of a later age. The literary style is late and peculiar.

Harvey-Jellie, *1 and 2 Chronicles* (Century Bible).

CHRONOGRAPH, instrument for recording a period of time. The *stop-watch* is used for time-keeping in races, by doctors, and for scientific purposes; it can be stopped at any moment by pressing a button. The *Ballistic Pendulum* was used by early experimenters for finding the velocity of a bullet, which was fired into a wooden shield attached to the bob of the pendulum. The bob was moved by the impact, the motion being recorded by a movable rod. From this record, and a knowledge of the time of a small oscillation of the pendulum and the weights of the bob and bullet, the velocity was calculated. Modern c's consist of electrically controlled mechanism. It is required, for example, to find the time a sound takes to travel from A to B. The same mechanism driven by the same current is fitted up at each place. When the sound reaches A it moves a delicate drum and breaks the connection, resulting in a mark being made on a moving surface; the same happens at B. Since both surfaces are started together and move at the same *known* speed, the time interval is easily ascertained by placing them alongside each other and measuring the length of surface between the two marks. To measure a small fraction of a second, a tuning-fork of known frequency is employed—an attached stylus making a trace of the vibrations on a moving blackened glass surface. If, for instance, the fork's frequency is 256, and eight vibrations are traced, the time taken must be $\frac{1}{32}$ second.

CHRONOLOGY, science that treats of time, and is concerned with arrangement of historical events in order of time and determining the intervals between them. It is necessarily based on method of measuring or computing time by regular divisions or periods, according to the revolution of the earth or moon. (See TIME.) As there can be no exact computation of time or placing of events without a fixed starting-point, dates are in every case referred to some arbitrary point or *epoch*, which forms the beginning of an *era*. Most epochs are selected on account of some notable event which occurred, or was supposed to have occurred, at the time in question. Thus the Jews reckoned time from the Creation, which they dated at 3760 B.C. The Creation has been the starting-point of many chronologies, but among Christians the birth of Christ is now generally adopted, dates before that event being denoted by the letters B.C. (Before Christ), and dates after that event by the letters A.D. (Anno Domini, or In the year of the Lord), which are often omitted.

The method of computing from the time of the birth of Christ was first introduced in the VI. cent. A.D., and was adopted generally in Christian countries by the year 1000 A.D. It is not certain that the birth of Christ took place at the usually accepted date; it is believed by some to have occurred perhaps four years earlier. The only epoch with an astronomical basis is the Julian epoch, 4713 B.C., based on the coincidence of the solar, lunar, and indictional periods. The *indictional period* is a period or cycle of fifteen years, relating to some judicial acts, probably the publication of tariffs of the taxes which took place at stated intervals. The Cæsarian indiction fell on the 8th day before the kalends of October, or Sep. 24.

The paucity of ancient records of contemporary events renders the construction of accurate chronologies of ancient times extremely difficult, if not altogether impossible; but modern archæological research has already considerably modified the opinions of a decade ago, and is gradually leading to definite outlines of the history of the nations of whom any records have been preserved. Thus it is now fairly certain that the historical period of such nations as the Egyptians and Babylonians was at least 5000 years B.C., and there is evidence of a high state of civilisation in Mesopotamia at least 7000 years B.C. Increased knowledge of Assyrian and Babylonian records has led to the rejection of some accounts hitherto regarded as authentic. Thus it is now certain that the Hebrew record of the *Book of Daniel* is far from accurate in the portions dealing with Babylonian history. Belshazzar, for instance, was never king, and was, moreover, not the son of Nebuchadrezzar (fl. 604–564 B.C.) (misspelt Nebuchadnezzar), but a son of a certain Nabonidos, who usurped the throne, and was the fourth king after Nebuchadrezzar, the three intermediate kings not being mentioned in Daniel.

Classical history is also being modified as the result of archæological research. Thus, instead of the mythical so-called 'Heroic Age' of Greece, we now have historical

records of a definite 'Mycenæan Age,' and also, from researches in Crete, of a pre-Mycenæan Age. See GREECE (*History*).

Several epochs have been already mentioned; others are met with among various nations. Ussher, Bossuet, and others dated the Creation at 4004 B.C. The *Era of Constantinople*, adopted in Russia, dates from the Creation, fixed at 5508 B.C. Among the Greeks, the Olympic games, which occurred every fourth year, served as a basis, each group of four years being an *Olympiad*; the starting-point was the year in which Coræbus was victor in the Olympic games—776 B.C.

The Romans started their chronology from the date of the supposed founding of their city (*Ab Urbe Condita*, A.U.C.), April 21, in 3rd year of 6th Olympiad, *i.e.* 753 B.C.

The *Muhammadan Era*, or *Era of the Hegira*, in common use among the Muhammadan nations, dates from the *Hegira*, or flight, of Muhammad from Mecca to Medina, July 16, 622 A.D.

The most important eras of *Hindu Chronology* in use at present time are the *Kaliyuga*, an astronomical era reckoning from 3102 B.C., but only founded, by astronomers, early in V. cent. A.D.; the *Saka* era, a hist. era which dates from 78 A.D., and is in use in S. India; and the *Vikramaditya* (founded 58 B.C.), the hist. reckoning used in N. India. There are also two religious eras, which reckon from the supposed deaths of the respective founders of religions—the Jain era, reckoning from 528 B.C., and the Buddhist from 544 B.C.

The *Persian Era* or *Era of Yazdegerd* starts at the accession of Yazdegerd III., June 16, 632 A.D. The *Chinese* reckon time in cycles of 60 years, but do not number the years in any one cycle. Each cycle is divided into two subordinate cycles of 10 and 12 years respectively, each year of each subordinate cycle having a definite name. By combining the names for any particular year in each cycle different names are obtained for each year of the major cycle. The starting-point of the first cycle is usually taken as 2277 B.C. See CALENDAR.

Chronologies and Calendars, J. C. Macdonald.

CHROTTA, probably the oldest of European stringed musical instruments; supposed to be identical with the 'crwth' or 'crowd.' It is mentioned by Fortunatas in 609.

CHRUDIM (49° 58′ N., 15° 47′ E.), town, Bohemia, Austria; sugar, beer, cloth; horse markets. Pop. 13,200.

CHRYSANTHEMUM (*C. sinense*), popular garden plant of the order Compositæ, with beautiful flowers, cultivated in many varieties, such as the Jap., Chin., and pompom kinds, with many shades of colour and different habit. It was introduced into Europe from China in the XVIII. cent.

Stevenson, *Chrysanthemums* (Jack, 1912).

CHRYSENE ($C_{18}H_{12}$), coal-tar product, crystallising in colourless plates or octahedra, which show a violet fluorescence. M.P. 250°.

CHRYSIPPUS (280–*c.* 206 B.C.), Stoic philosopher; b. Cilicia. See STOICS.

CHRYSOBERYL ($BeAl_2O_4$), hard yellow or green gem-stone, found chiefly in Brazil, U.S.A., and Ceylon. A cloudy opalescent variety is known as cymophane, and when cut is a valuable 'cat's-eye' (*q.v.*).

CHRYSOCOLLA ($CuSiO_3.2H_2O$), bluish green mineral of opal-, emerald-like, or earthy texture, occurring as encrustations or masses in the upper parts of copper-ore veins, from which it is derived.

CHRYSOLITE, a yellowish gem-stone, being a transparent variety of olivine (*q.v.*). Darker green stones are called Peridote (*q.v.*).

CHRYSOPRASE, apple-green variety of chalcedony, used in jewellery; found in Silesia, the Urals, India, and U.S.A.

CHRYSOSTOM (345–407), generally called St. John C.—one of the greatest Gk. Fathers, baptized *c.* 369, lived some time the life of a recluse; was deacon and priest at Antioch; bp. of Constantinople, 398, but exiled, 404; wrote *De Sacerdotio*, a treatise on the priesthood, and many *Homilies* on books of the Bible; belonged to the Antiochene school; called C. or Golden Mouthed because of oratorical gifts.

CHUB (*Leuciscus cephalus*), fresh-water fish of the family *Cyprinidæ*, found in England and northern Europe generally; other fish of the same family are given this name in America.

CHUBB, CHARLES (d. 1845), Eng. locksmith, made improvements on 'detector' locks patented by his bro., Jeremiah Chubb, and invented burglar- and fire-proof safes. Further improvements were made on his locks, etc., by his s., JOHN CHUBB (1816–72).

CHUBUT (*c.* 44° S., 67° W.), territory, S. Argentine Republic, between Atlantic and Andes; area, 93,427. Pop. 29,500.

CHUDE, Russ. name for Esthonian tribes in Siberia.

CHUGUYEV, CHUGUIEV, town of strategic importance in Kharkov, Russia. Pop. 12,000.

CHUKCHI, small Christianised tribe inhabiting a district of N.E. Siberia; habits polygamous.

CHULALONGKORN (1853–1910), king of Siam; succ., 1868; abolished slavery; developed education and the study of med.; introduced social improvements; visited England, 1897.

CHUMBI VALLEY (27° N., 88° 30′ E.), valley, Chola range, Himalayas, leading from Sikkim eastwards into Tibet.

CHUNAR, CHUNARGHUR (25° 5′ N., 82° 55′ E.), town, on Ganges, Mirzapur, United Provinces, India; ceded to Britain, 1768. Pop. 9926.

CHUNCHO, tribe of warlike S. Amer. Indians occupying a forest tract in central Peru.

CHUNGA, see SERIEMA.

CHUNGKING (29° 38′ N., 107° 2′ E.), river port, at junction of Kialing and Yangtse-kiang, China; commercial centre. Pop. 598,000.

CHUPATTY, Hindu unleavened bread. These cakes were passed from hand to hand among natives before outbreak of Indian Mutiny, and are said to indicate disaffection.

CHUQUISACA (*c.* 20° S., 62° W.), department, S.E. Bolivia; S. America; agriculture, stock-raising, silver mines; area, 26,400 sq. miles. Pop. (1911) *c.* 250,000. The capital, Sucre, was called C. till Declaration of Independence. Pop. 23,500.

CHURCH, see RELIGION, CHRISTIANITY.

CHURCH, FREDERICK EDWIN (1826–1900), Amer. landscape artist.

CHURCH, GEORGE EARL (1835–1910), Amer. geographer; explored the Amazon (1868–79), and became prominent authority on geography of S. and Central America.

CHURCH, RICHARD WILLIAM (1815–90), Anglican ecclesiastic; ed. Oxford; fellow of Oriel, 1836; dean of St. Paul's, 1869, where he reorganised the cathedral and became one of the most prominent men in the Church; wrote several works on religious and literary subjects.

CHURCH, SIR RICHARD (1784–1873), soldier; entered the army in 1800, served in Egypt, in 1817 app. lieut.-general in the Neapolitan army, and from 1827 commander-in-chief of Gk. army; resigned in 1829, but spent his life in Greece, dying in Athens.

CHURCH ARMY, Anglican organisation, founded 1882 by Rev. Wilson Carlisle for work in slums and among criminals; workers are working men and women licensed by the bp.; it has labour bureaus.

CHURCH CONGRESS, annual assembly, first held, 1861, for discussion of Anglican problems; has no formal authority.

CHURCH HISTORY, see CHRISTIANITY.

CHURCH OF ENGLAND, see ENGLAND, CHURCH OF.

CHURCH RATE, tax for maintenance of parish churches, formerly compulsory in England, but not since 1868.

CHURCHILL (57° 30′ N., 95° W.), river, Saskatchewan, Canada; 925 m. long; flows N.E. through series of lakes; enters Hudson Bay.

CHURCHILL, CHARLES (1731–64), Eng. satirist and clergyman; author of the *Rosciad* (1761), an amusing satire on contemporary stage; friend of John Wilkes; a man of dissipated habits.

CHURCHILL, LORD RANDOLPH HENRY SPENCER (1849–95), Brit. statesman; s. of 7th Duke of Marlborough; elected M.P. for Woodstock (Conservative), 1874; became prominent as an independent Conservative; with Gorst, Drummond Wolff, and (occasionally) A. J. Balfour formed 'Fourth Party,' c. 1880; became the pioneer of 'Tory democracy'; Sec. of State for India (1885) in Salisbury administration; Chancellor of the Exchequer (1886) and leader of the House of Commons; resigned owing to differences with his colleagues; became independent again, then travelled till his health gave way. *Life*, by Winston S. C.; monograph, by Rosebery.

CHURCHILL, WINSTON (1871–), Amer. novelist; author of *Richard Carvel*, 1899, *Coniston*, 1906, *Mr. Crewe's Career*, 1908; Member of N.H. legislature, 1903 and 1905.

CHURCHILL, WINSTON LEONARD SPENCER (1874–), Brit. Liberal statesman; c. s. of Lord Randolph C.; soldier, war correspondent, in Boer War; left Conservative Party, 1906. Under-Sec. for Colonies, 1906–8; Pres. of Board of Trade, 1908–10; Home Sec., 1910–11; First Lord of Admiralty (1911–).

CHURCHING OF WOMEN, ceremony for women after child-birth, necessary in Rom. but optional in Anglican Church; service in Prayer Book.

CHURCHWARDEN, lay representative of the parish appointed for certain functions, including collection and charge of offertory, care and upkeep of church buildings, maintenance of order during divine service. In many parishes one is appointed by incumbent and one elected by parishioners.

CHURCHYARD, ground adjoining a church, used for burials; legal difficulties have arisen on rights of burial, as parishioners and incumbents have certain privileges.

CHURCHYARD BEETLES, see HETEROMERA.

CHURCHYARD, THOMAS (d. 1604), Eng. poet; pub. *Churchyard's Chips* (1575), etc.

CHURL (A.S., *ceorl*), man; a freeman of low rank; after the Conquest became a serf; in modern use, an ill-mannered fellow, a boor.

CHUSAN (30° 15′ N., 122° 30′ E.), island, largest of a group off E. coast, China; rice.

CHUTNEY, Ind. condiment containing sweet fruits, acids, etc.

CHUVASHES, tribe, somewhat resembling the Finns, dwelling in Eastern Russia.

CHYLE, term applied to the partly digested food in the small intestine. See DIGESTION.

CHYME, see DIGESTION.

CIALDINI, ENRICO (1811–92), Ital. soldier and diplomatist; in command of the troops opposed to Garibaldi (1862), whom he defeated at *Aspromonte*.

CIBBER, CAIUS GABRIEL (1630–1700), Dan. sculptor; settled in England; f. of Colley C.

CIBBER, COLLEY (1671–1757), Eng. actor and dramatist; joined Betterton's company at Drury Lane (1690); made great reputation as Lord Foppington in Vanbrugh's *Relapse*; eventually became associated with management of Drury Lane; prepared numerous adaptations of Shakespeare's plays; his own plays had also considerable vogue, and include *Love's Last Shift*, *The Careless Husband*, *She Would and She Would Not*. His famous *Apology* (1740) is of considerable value for its criticism of the contemporary stage, and for sidelights upon persons of eminence; he succ. Eusden as poet laureate in 1730, although his gift as an *esprit moqueur* gave him little claim to the bays; attacked by Pope in the *Dunciad*.

CIBBER, THEOPHILUS (1703–58), Eng. actor and dramatist; s. of the above; famous as actor and manager at Drury Lane and Covent Garden; d. by shipwreck. His wife, SUSANNAH MARIA C. (1714–66), was a tragic actress and vocalist.

CIBORIUM, originally the altar-canopy; later the casket hanging therefrom, containing the Eucharistic wafer; subsequently Latin name for drinking-vessel.

CIBRARIO, LUIGI, COUNT (1802–70), Ital. historian and statesman; served King Charles Albert of Savoy; in 1855 became Minister for Foreign Affairs.

CICADA, homopterous insects of the family Cicadidæ, with a wide head, stout body, and large clear wings. The males are noted for their shrill call, which is produced by two membranes in the thorax, which are vibrated by powerful muscles. The larvæ live underground, and the life cycle may extend over many years. The c. are abundant in tropical and warm countries, and one species occurs in England.

CICERO, MARCUS TULLIUS (106–43 B.C.), Rom. orator and statesman; b. at Arpinum and studied under Molo at Rhodes. C. served under Sulla in the Civil War, 89 B.C. His legal work began in 81 B.C.; in 80 he had the courage to defend S. Roscius, who was accused of parricide at the instance of Sulla's freedman. In 70 he prosecuted Gaius Verres for his oppression of Sicily. From 68 we have the help of his letters for much of the secret history of his times. In 66 he was prætor; in 63 he became consul, and his term of office is famous for his suppression of the Catilinarian conspiracy. By his execution of the Catilinarian conspirators he had incurred the enmity of the democrats, and owing to the scheming of P. Clodius was obliged to go into exile in 58. He returned to Italy next year; opposed Cæsar and was compelled to recant in the *De Provinciis Consularibus*. In 52 he defended Milo for the murder of Clodius. In 50 he became gov. of Cilicia, and was annoyed at having to leave Rome, where he suppressed a revolt. He returned to Rome in Jan. 49 at the outbreak of the Civil War; after some hesitation he threw in his lot with Pompeius. Seeing further resistance useless, after the battle of *Pharsalus* he went to Brundisium, and thence to Rome in 47, as Cæsar was anxious to be on friendly terms with him. He was much distressed at the death of his dau., Tullia, in 46. After Cæsar's murder he joined the Republican party, delivering the two *Philippics*. He was among those proscribed, and was killed near Formiæ on Dec. 7, 43.

C.'s works are more extensive than those of any other ancient writer. His *Letters* to his friend, Atticus, and others are most valuable both for revealing his personality and for the history of his times. His speeches are numerous, many of them of great political and constitutional importance. His chief oratorical works are the *Brutus* and *De Oratore*. He wrote also many philosophical and political works, *e.g.* the *De Finibus*, *De Natura Deorum*, *De Officiis*, *De Republica*, and *De Legibus*.

His letters show a many-sided, able, and versatile personality, with distinct traits of vanity and weakness, but one that wins the sympathy of most historians (Mommsen is the great exception).

Strachan-Davidson, *Life of Cicero*; the most convenient complete edition of Cicero's works is that in Oxford Classical Texts.

CICERO, QUINTUS TULLIUS (120–43 B.C.), was bro. and correspondent of Marcus Tullius C.

CICERONE, person who acts as guide to museums and similar places; derived from the name of Cicero, the famous Rom. orator.

CICHLIDÆ, large family of Acanthopterygian fishes inhabiting fresh and brackish water of tropical countries, where they are used for food. They are remarkable for their complex nursing habits and high development of parental care.

CICOGNARA, LEOPOLDO, COUNT (1767–1834), Ital. antiquary and art critic.

CID, THE (Arabic *El Seid*, the lord), name of a famous character in Span. history and romance. So much has his story been overgrown with legend that some have doubted whether he ever really existed;

but it seems clear the original was RODRIGO DIAZ, b. c. 1030, called *the Cid*. He played a prominent part in the struggles of his day, fighting now for Christians, now for the Moslems, but as a freebooter rather than a religious or political leader; d. 1099. He has become the theme for a large body of Span. romances from the XI. to the XIX. cent's; subject of Corneille's play.

CIDER, beverage consisting of the fermented juice of apples, made chiefly in south-western England, northern France and Germany, and the U.S.A. The fruit is crushed and the juice run into vats, where it is fermented, and afterwards put into casks and stored in a cool place. The best c. is made from a mixture of varieties of apples, and from late apples rather than early.

CIENFUEGOS (22° 11′ N., 80° 33′ W.), seaport, Santa Clara, Cuba; spacious harbour, cathedral, military and government hospitals; commercial centre of sugar and tobacco trade. Pop. 35,000.

CIEZA (38° 18′ N., 1° 25′ W.), town, Murcia, Spain; paper mills. Pop. 13,700.

CIGNANI, CARLO (1628–1719), Ital. artist.

CIGOLI, LUDOVICO CARDIA DA (1559–1613), Ital. artist, architect, and poet.

CILIA (biol.), hair-like processes on cells which keep up a lashing or vibratory motion, either for the purpose of moving the cell itself, as in the case of many unicellular organisms, or for creating a current in the surrounding fluid, as in the mucous membranes of the respiratory passages.

CILIATA, unicellular organisms with permanent cilia, which vary in size and distribution and are used in locomotion and for wafting food particles to the 'mouth.' *Paramæcium*, *Stylonychia*, *Stentor*, and *Vorticella* are types with different arrangements of the cilia occurring in stagnant water and in fusions. The *Opalinidæ* have no 'mouth' or contractile vacuole and are parasitic in the rectum of Amphibians. See PROTOZOA.

CILICIA (c. 36° 30′ N., 34° E.), old division, S.E. Asia Minor, bordering on Mediterranean; now forms part of vilayet of Adana; chief rivers, Pyramus, Calycadnus, Sarus; produces grain, wine, timber; chief town, Tarsus; was ruled by native princes; subsequently belonged to Persia; inhabited later by pirates, who were subdued by Pompey, 66 B.C.

CILLI (46° 14′ N., 15° 16′ E.), town, on Save, Styria, Austria; ancient Rom. colony; ruined castle; warm mineral springs. Pop. 6713.

CILLI, ULRICH, COUNT OF (1406–56), ruled Hungary during youth of Ladislaus V.; rich, ambitious, and unscrupulous; assassinated by Laszlo Hunyadi.

CIMABUE, GIOVANNI (1240–1302), Ital. artist; generally credited with having revived the art of painting in Italy after the neglect of the Dark Ages; undoubtedly the founder of the Florentine school, which produced Raphael, Michelangelo, and Da Vinci. His mosaics at Pisa and his frescoes at Florence are world-famous. See PAINTING.

CIMAROSA, DOMENICO (1749–1801), Ital. composer.

CIMBRI, Germanic tribe inhabiting peninsula of modern Jutland; among earliest of northern barbarians to come into conflict with Rome; first recorded appearance in history, 113 B.C., when they defeated the Rom. consul at Noreia; they then poured boldly over Rhine, Danube, Ebro, and Alps into Rom. territory until finally crushed by Marius in the battle of the Raudine Plains, 101 B.C.

CIMICIFUGA, genus of herbaceous plants (order Ranunculaceæ) of N. temperate countries. The roots of *C. racemosa* or black cohosh (snake-root) is sometimes used medicinally in the treatment of dyspepsia, amenorrhœa. See GYNÆCOLOGY.

CIMMERII, a nomadic people, referred to in Homer's *Odyssey*; supposed to live in perpetual dark.

CIMON (c. 507–449 B.C.), Athenian statesman; fought against the Persians at *Salamis*; in 464 the Athenians sent an unsuccessful expedition to Messenia, and C. was 'ostracised' for his share in the matter; d. in Cyprus.

CINCHONA, name for trees of the order *Rubiaceæ*; natives of Western S. America cultivated in India, Ceylon, and East Indies for their bark, which contains alkaloids of great medicinal value, the most important being quinine (*q.v.*). Decoctions of the bark have been used for many centuries against malarial fever.

CINCINNATI (39° 8′ N., 84° 29′ W.), second largest town of Ohio, on N. bank of Ohio R.; built partly on plain bordering river, partly on two terraces above plain, with semicircle of hills behind, on which are some picturesque suburbs. C. has important public buildings, including city hall, chamber of commerce, government buildings, court-house, Masonic Temple, library, museum, music-hall. There are R.C. and Prot. cathedrals, C. being archiepiscopal see of R.C. church and episcopal see of Prot. church; many churches and synagogues; has univ., various R.C. seminaries and colleges, art school, and other educational institutions; numerous charitable institutions, including many hospitals and homes; fine system of parks; largest is Eden Park, near river; Burnet Woods in centre, with zoological gardens to N.E.; important trading and industrial centre. Chief industries are transporting of grain and trade in pork; there are great stock-yards and slaughter-houses; also foundries, machine shops, factories for manufacture of clothes, furniture, leather, shoes, tobacco, cutlery, saddlery, carriages, etc.; famous for decorative pottery and woodcarving; large river and canal traffic; great railway centre. C. is administered by mayor and council; first laid out in 1789; has frequently suffered from floods. Pop. (1910) 363,591.

CINCINNATUS, LUCIUS QUINCTIUS (fl. 458 B.C.), Rom. hero; twice dictator; won a signal victory over the Æquians; famed for simplicity of life.

CINDERELLA, heroine of a fairy-tale, which, with variations, is common to a number of languages. That known in England is a trans. of Perrault's Fr. version.

CINEAS, Thessalian mentor of Pyrrhus, king of Epirus.

CINEMATOGRAPH or KINEMATOGRAPH (Gk. *kinēma*, movement, and *-graphos*, written), apparatus which exhibits series of photographs which to the observer gives the effect of a picture in continuous motion.

The c. is really a complicated piece of apparatus originating in the *Zoetype*, or wheel of life, with which our grandfathers amused themselves. Successive photographs of a running horse were first obtained in 1877. These were taken by a row of cameras, the shutters of which were automatically opened at succeeding fractions of a second. It was not until the invention, in 1890, by Marey, of the celluloid roll film, however, that modern cinematography became possible. Nowadays 16 to 50 pictures are taken per second, and for an hour's exhibition anything up to 165,000 are needed. Cinematography has been put to scientific use by photographing minute forms of life as seen through microscope.

CINERARIA, garden plant, allied to *Senecio*, with heart-shaped leaves and white, red, or purple, frequently variegated, flowers in clusters; native of S. Africa.

CINGALESE, SINHALESE, natives of Ceylon (*q.v.*).

CINGOLI (43° 23′ N., 13° 13′ E.), town, Macerata, Italy; ancient *Cingulum*. Pop. 14,000.

CINNA, LUCIUS CORNELIUS, Rom. patrician; follower of Marius; elected consul (87 B.C.); killed by mutineers (84 B.C.) when undertaking expedition against Sulla. His dau. Cornelia m. Julius Cæsar.

CINNABAR (HgS), the only important ore of mercury, occurring in reddish masses or in brilliant red rhombohedral crystals of the hexagonal system, chiefly in Spain, Istria (Austria), Servia, California, Nevada, Peru, Kwei-chow (China). It is used as a pigment (vermilion) for the extraction of mercury.

CINNAMIC ACID, PHENYLACRYLIC ACID, ($C_6H_5CHCHCoOH$), compound crystallising in colourless needles or prisms, M.P. 133°, occurring in Peru and Tolu balsams and storax. It has the physiological effect of increasing the leucocytes in the blood.

CINNAMON, the dried inner bark of the small evergreen tree, *Cinnamomum Zeylanicum*, of a light yellowish brown colour, of peculiar aromatic taste and odour; used in cookery as a spice and in med. as a stomachic. The oil distilled from the bark is used medicinally and in the preparation of liqueurs and perfumes.

CINNAMON STONES, HESSONITE, red-orange variety of garnet found as pebbles in Ceylon.

CINNOLIN ($C_8H_6N_2$), poisonous oily base, crystallising from ether-white silky needles; M.P. *c.* 24°. The compound is isomeric with phthalazine.

CINO DA PISTOIA (1270–1336), Ital. poet; friend of Dante.

CINQ-MARS, HENRI COIFFIER RUZÉ D'EFFIAT, MARQUIS DE (1620–42), Master of the Horse to Louis XIII.; engaged in an abortive attempt to overthrow Richelieu; was condemned and executed; subject of a novel by A. de Vigny.

CINQUE PORTS, name given to the five ports of Hastings, Romney, Hythe, Dover, and Sandwich; to these Winchelsea and Rye were added, and other small places incorporated, the whole forming a jurisdiction for the defence of the coast of Kent and Sussex. Their first charter was granted by Edward I., and they received various rights; the jurisdiction still survives with modified privileges.

CINTRA (38° 56′ N., 8° 23′ W.), town, Portugal, on N. slope of Serra da C.; pleasant climate; resort of wealthy bourgeoisie of Lisbon; interesting Moorish relics; by 'Convention of Cintra' (1808), France undertook to evacuate Portugal. Pop. 6000.

CIPHER, see CRYPTOGRAPHY.

CIPRIANI, GIOVANNI BATTISTA (1727–85), Ital. artist and engraver; did much decorative work in England.

CIRCA, BERNARD, see CANON LAW.

CIRCAR, an Indian name for one of the subdivisions of a province, specially applied to those of the Madras presidency, 'the Northern Circars'; they became British, 1823.

CIRCASSIA (*c.* 44° N., 40° E.), district, W. Caucasus; bounded N. by Kuban R., S.W. by Black Sea; now included in Black Sea Territory and Kuban province of Russia. Circassians are noted for beauty, and belong to Muhammadan religion. They were finally subdued by Russia in 1864, when numbers of them emigrated to Turkey.

CIRCE (classical myth.), sorceress who lived on the island of Æsea. Ulysses, in his wanderings, landed there, and she changed some of his companions into pigs. Ulysses, however, persuaded her to remove the spell, after which he stayed with her for a year.

CIRCEO (41° 11′ N., 13° 3′ E.), promontory (1775 ft.), on Tyrrhenian Sea, W. coast, Italy; said to have been abode of Circe; favourite seaside resort in ancient times; Rom. antiquities are to be seen.

CIRCLE, a plane figure enclosed by a curve called the circumference, all the points on which are the same distance from a fixed point within, called the centre. The c. is the curve which encloses the largest area within a given perimeter (length of line enclosing the area). The following are some properties of the c.:—

No matter what the size of the c., the ratio of the circumference to the diameter is always the same. This ratio, called π, has been calculated to hundreds of decimal places (for methods of calculating π, see any book on Advanced Trigonometry); correct to eight decimal places π is 3·14159265 . . ., but for all practical purposes the value $\frac{22}{7}$ is sufficiently accurate.

The area of the c. is π times the square of the radius (πr^2), and is found by dividing the c. into a large number of very small triangles, the apex of each being at the centre and the base forming a small portion of the circumference.

The c. is divided into 360 degrees (written 360°); two diameters drawn so as to divide the c. into four equal parts will thus make an angle of 90° with each other, and similarly with other angles.

The c. is a Conic Section (see CONIC SECTION), and may be considered as an ellipse in which the foci are at the centre and the eccentricity is zero. The general equation of a c. is of the second degree with no term in xy, and in which the coefficients of x^2 and y^2 are equal, as $x^2+y^2+ax+by+c=0$. In polar co-ordinates the equation is $r^2-2r\rho\cos(\theta-a)+\rho^2-a^2=0$, where (r, θ) are the co-ordinates of any point, (ρ, a) those of the centre, and a the radius.

Euclid, book iii.; Casey's *Sequel to Euclid*; Briggs and Bryan, *Co-ordinate Geometry of Right Line and Circle.*

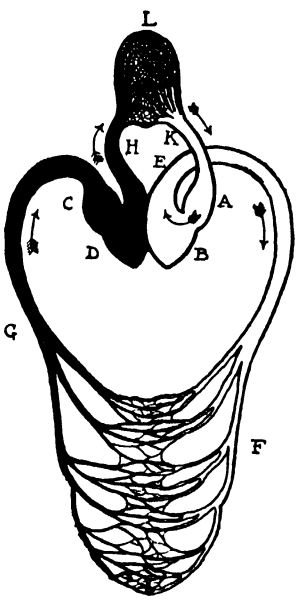
CIRCLES, STONE, see STANDING STONES.

CIRCLEVILLE (39° 37′ N., 82° 57′ W.), city, on Scioto, Ohio, U.S.A.; agricultural implements. Pop. (1910) 6744.

CIRCUITS, in Eng. law, territorial divisions in which assize courts must be held at stated towns and times. Eng. c's are South-Eastern, Midland, North-Eastern, Northern, Oxford, North Wales, South Wales, Western, Chester. There are five c's in Ireland, three in Scotland. Assizes are held four times yearly in England, and twice or three times in Scotland. The same judge attends all assizes in one circuit, those held in summer and winter being more important than the Easter and autumn courts. In U.S.A. there are both State and Federal c's.

CIRCULAR NOTE, document addressed by a bank to its foreign agents for payment of money to a person named.

CIRCULATORY SYSTEM.—The function of the circulatory system is to convey nourishment by means of the *blood* to all parts of the tissues of the body. The nourishment consists of oxygen and of the nutritive substances derived from the food; the oxygen is obtained from the air through the lungs, and the nutritive substances from the alimentary canal either directly through the blood stream or by the intermediary of the lacteals and the lymphatic system. After having nourished the tissues, the blood becomes impure, and part of the impurities is got rid of by the kidneys (urea and other salts), part by the skin (urea and other salts in smaller amount), and part, before which it must first return to the heart, by the lungs (carbon dioxide), while superfluous water is got rid of by all three modes.



CIRCULATORY SYSTEM (DIAGRAMMATIC). The arrows indicate the direction of the blood flow, from the lungs (*L*) by the pulmonary veins (*K*) to the left auricle (*A*) and left ventricle (*B*) of the heart, through the aorta (*E*) to the arteries and capillaries of the body (*F*); from the capillaries and veins of the body by the great veins (*G*) to the right auricle (*C*), thence to the right ventricle (*D*), and by the pulmonary artery (*H*) back to the lungs.

The circulatory system consists of two distinct sets of tubular vessels; one set conveys the blood from the left side of the heart to the tissues of the body, and, after it has given up its

nourishment to the tissues, back to the right side of the heart, while the other set conveys the blood from the right side of the heart to the lungs, where it gives up carbon dioxide and obtains oxygen, and then back to the left side of the heart, from which it is conveyed in the first set of blood-vessels again, and so on.

The organs of the circulatory system include the *heart*, the *arteries*, the *veins*, and the *capillaries*.

The *heart* is a cone-shaped, hollow, four-chambered, muscular organ, about the size of the closed fist, which is situated in the central part of the chest, between the two lungs and resting upon the diaphragm, and it acts as the central pump which propels the blood through the blood-vessels. It is completely ensheathed by a double membranous bag, the *pericardium*, which binds it down to the upper surface of the diaphragm.

The upper and posterior chambers of the heart, or the *auricles*, are the receiving chambers for the blood—the *right auricle* receiving the impure blood from the great veins of the body, and the *left auricle* receiving the purified blood from the lungs. Each auricle communicates with the corresponding lower and anterior chamber, or *ventricle*, the propelling chamber for the blood, but there is no communication between the right and left sides of the heart, which is practically a double organ. The *right ventricle* pumps the impure blood to the lungs, where it is purified; and the *left ventricle* pumps the impure blood through the *aorta*, the main arterial blood vessel, to the different parts of the body.

The *arteries*, or tubular blood-vessels which convey the blood from the heart to the tissues, have walls composed of three coats—an outer coat of fibrous tissue with some elastic fibres, a middle coat of muscular fibres, arranged circularly, and an inner coat of elastic fibres, delicate connective tissue, and a smooth internal layer of endothelial cells. The arteries of the body consist of two sets—those which convey the blood to the tissues of the body, termed the arteries of the *systemic circulation*, and those which convey the blood to the lungs, termed the arteries of the *pulmonary circulation*. The main arterial trunk of the systemic circulation is the *aorta*, which commences at the left ventricle of the heart, passes for a short distance upwards, and then curves downwards through the thorax and down the middle of the posterior wall of the abdomen as far as the level of the fourth lumbar vertebra, giving off important branches in all directions. The main trunk of the pulmonary circulation is the *pulmonary artery*, which conveys 'venous' or impure blood from the heart to the lungs, and commences at the right ventricle of the heart and branches to enter the substance of the two lungs.

The *veins* are the vessels which convey the blood from the tissues back to the heart, and their walls are similar in structure to the walls of arteries, the outer coat being composed of fibrous tissue and elastic fibres, the middle coat, which is much slighter than the corresponding coat of arteries, containing muscular fibres, and the inner coat of elastic fibres, slight connective tissue and an internal layer of endothelial cells. In the interior of veins are found pouch-shaped valves, usually in pairs, composed of a fold of the endothelial layer, the purpose of which is to prevent the backward flow of blood in the sluggish blood-stream of the veins. The most important veins of the systemic circulation are the *superior vena cava*, which collects the impure blood from the upper parts of the body, and the *inferior vena cava*, which collects it from the lower parts of the body, both opening into the right auricle of the heart. The chief veins of the pulmonary circulation are the pulmonary veins, four in number, conveying 'arterial' or purified blood from the lungs to the heart, and opening into the left auricle of the heart.

The *capillaries* are vessels of much smaller size which connect the terminations of arteries with the beginnings of veins, and, ramifying amid the tissues and organs of the body, bring the nourishing blood-stream into close relation with the tissues. The walls of the smaller capillaries are formed of a single layer of endothelial cells, while the larger capillaries have an additional investing sheath of connective tissue.

CIRCUMCISION, cutting off the foreskin; practised by Jews and Muhammadans and by the Christian Abyssinians as a religious rite, as well as more generally to-day as a hygienic measure. It was practised in Egypt in very ancient times, and has also been found to be a custom as a preliminary to marriage in aboriginal tribes in different parts of the world.

Feast of the C. held on Jan. 1 in Anglican, R.C., and Eastern Churches to celebrate the c. of Jesus Christ.

CIRCUMFERENCE, see CIRCLE.

CIRCUMVALLATION, LINES OF, obsolete term for entrenchments surrounding a fortress.

CIRCUS (Latin and Gk. 'ring' or 'circle'), in ancient Rome was a building adapted for chariot-racing; the *Circus Maximus* was the most famous; seats were arranged in tiers, special seats being reserved for persons of dignity. Chariots decked with different colours were raced round the c., valuable horses being used. There were also the *Circus Flaminius* and the *Circus Neronis*; races were held on public festival days.

The *Circus* popular for the last hundred years is too well known to need description.

CIRCUS, harriers. See HAWK FAMILY.

CIRENCESTER (51° 43′ N., 1° 57′ W.), market town, on Churn, Gloucestershire, England; site of Rom. *Corinium*; church of St. John the Baptist contains numerous ancient brasses, interesting monuments, old glass; has museum of antiquities and Agricultural College; bacon-curing, cutlery. Pop. (1911) 7632.

CIRILLO, DOMENICO (1739–99), Ital. physician; chosen as pres. in Neapolitan revolution of 1799, and, after surrender to Royalist forces, was hanged; wrote several books.

CIRQUE, a corrie, or steep semicircular recess in a mountain, due to glacial erosion.

CIRRIPEDIA, see under ENTOMOSTRACA.

CIRTA (36° 20′ N., 6° 33′ E.), ancient city and fortress, Numidia, Africa; fell into decay IV. cent. A.D.; rebuilt by Constantine the Great; modern Constantine.

CISALPINE REPUBLIC, see ITALY (*History*).

CISSEY, ERNEST LOUIS OCTAVE COURTOT DE (1810–82), Fr. general; took part in the Crimean and Franco-Ger. Wars; noted for rigour in suppression of Commune; sometime Minister of War.

CIS-SUTLEJ STATES (*c.* 30° 55′ N., 75° 54′ E.), name formerly given to division, S. of Sutlej, Punjab, India.

CISTERCIANS, religious order of monks and nuns, following the rule of St. Benedict, and founded by St. Robert, abbot of Molesme, Langres, 1098, in the forest of Cîteaux (Lat. *Cistercium*), France. Within a cent. the C. possessed 800 important abbeys on the Continent, and before the Reformation numerous convents in Britain. Silence, abstinence from flesh meat, manual labour, chanting of the office, and common life (extending even to common dormitories) are included in the rule. The Trappists, C. of the Reformed Order, number *c.* 4000, and C. of the Common Observance, *c.* 1000 members.

CISTUS, ROCK-ROSE, family of dicotyledons, found mostly in Mediterranean countries; thalamiflora; some are resinous.

CÎTEAUX (47° 9′ N., 5° 5′ E.), village, Côte d'Or, France; celebrated for abbey, headquarters of Cistercian order, founded 1098.

CITHÆRON (38° 13′ N., 23° 30′ E.), mountain range separating Bœotia from Megaris and Attica; figures in numerous Gk. myths.

CITHARA, ancient stringed musical instrument, of the lyre kind; invented before Christian era.

CITIUM, KITION (35° 2′ N., 33° 35′ E.), ancient Phœnician city, Cyprus; name generally taken to include island of Cyprus.

CITRIC ACID, Oxytricarballylic Acid ($C_3H_4(OH)(COOH)_3$), tribasic acid, crystallising in colourless rhombic prisms, of an agreeable sour taste; M.P. 150°; occurs in lemons, citrons, oranges, gooseberries, and other fruits. Its salts are called citrates. C. a. is used in calico printing, in the preparation of beverages, and in medicine as a refrigerant and antiscorbutic, and to reduce obesity. The citrates increase the alkalinity of the blood, and iron and quinine citrate is a valuable tonic.

CITRUS, genus of evergreen shrubs and trees (order Rutaceæ) with fragrant white blossoms and sometimes with axillary thorns, bearing luscious edible fruit with a tough skin or peel. Natives of tropical Asia, they are now widely cultivated in Mediterranean countries, Madeira, W. Indies, Florida, and California, the principal species being the lemon (*C. limonum*), the citron (*C. medica*), the lime (*C. limetta*), the Seville orange (*C. vulgaris*), the sweet orange (*C. aurantium*), the mandarin (*C. nobilis*), the kumquat (*C. japonica*), the shaddock (*C. decumana*).

CITTÀ DELLA PIEVE (42° 57′ N., 12° E.), town, Perugia, Italy; birthplace of Perugino. Pop. 6736.

CITTÀ DI CASTELLO (43° 27′ N., 12° 14′ E.), town, on Tiber, Perugia, Italy; cathedral; picture-gallery. Pop. 6061.

CITTÀ VECCHIA, Città Notabile (35° 52′ N., 14° 23′ E.), fortified city, Malta; bp.'s see; cathedral. Pop. 6152.

CITTADELLA (45° 38′ N., 11° 47′ E.), town, Padua, Italy; has cathedral, and is trade centre for agricultural produce of district. Pop. 3627.

CITTERN, stringed musical instrument, very popular during XVI. and XVII. cent's. It had an oval-shaped body, with flat back, a longish neck, and was played with the fingers.

CITY, in U.K. the term is applied to towns which either are or have been episcopal sees, and by royal authority to other large towns; it is sometimes applied to central part of a large town, *e.g.* city of London. In U.S.A. term denotes towns enjoying certain form of municipal government; in some states a c. may have under 2000 inhabitants.

CIUDAD BOLIVAR (8° 8′ N., 63° 57′ W.), city, river port, on Orinoco; capital of Bolivar, Venezuela; commercial centre; cattle, tobacco. Pop. 13,000.

CIUDAD DE CURA, see Cura.

CIUDAD JUAREZ (31° 47′ N., 106° 25′ W.), town, on Rio Grande, Chihuahua, Mexico; has large transit trade with U.S.A., having a customs station. Pop. 7000.

CIUDAD PORFIRIO DIAZ (28° 44′ N., 100° 30′ W.), town, on Rio Grande, Coahuila, Mexico; on border of Texas. Pop. 6000.

CIUDAD REAL (39° 5′ N., 3° 50′ W.), province, Spain; traversed E. to W. by Guadiana; wide undulating plains; dry climate; rich in minerals, iron, silver, copper, lead; sheep and cattle rearing; brandy, wine; area, 7620 sq. miles. Pop. (1910) 380,565.

CIUDAD REAL (38° 59′ N., 3° 58′ W.), town, Spain; woollen cloth, gloves. Pop. 15,255.

CIUDAD RODRIGO (40° 36′ N., 6° 32′ W.), fortified town, Salamanca, Spain; is episcopal see and has XII.-cent. cathedral; surrendered to Marshal Ney, 1810; recaptured by British under Wellington (1812), who for this received title of Duke of C. R. and other honours. Pop. 8930.

CIVET FAMILY (*Viverridæ*), a family of carnivores (*q.v.*), containing about 150 species, confined to the Old World; with long flexible bodies, long faces, and rather short legs. They include the Fossa (*Fossa*), a peculiar creature, 5 feet long, confined to Madagascar; the Genets (*Genetta*), ranging over southern Europe, and Asia, and Africa, with brownish-yellow or greyish fur, marked by darker spots and stripes; the weasel-like Linsangs (*Linsang* and *Poiana*) of Asia and Africa; the arboreal palm civets (*Paradoxurus*), and mungooses, mongooses, or ichneumons (*Herpestes*, etc.) from the same areas, the latter group, however, having a single representative in Spain; and the true civets, bintourongs and meerkat (*Suricata*).

CIVIDALE DEL FRIULI (46° 4′ N., 13° 25′ E.), town, on Natisone, Venetia, Italy; ancient *Forum Julii*; has notable cathedral and museum of antiquities; silk. Pop. 4174.

CIVIL LAW, local law of a state, more particularly that derived from the Rom. *jus civile*, and distinct from international law.

CIVIL LIST, the name given in U.K. to that portion of the national expenditure which goes to the upkeep of the king and royal family, with the various expenses of the crown. Until the reign of William and Mary all the national expenses, other than those of war, were grouped together, but then the sum of £700,000 a year was set aside, not only for the personal expenses of the sovereigns and the royal household, but for pensions and the civil service. When George III. came to the throne a certain fixed sum was settled for the C. L., not as heretofore the sources of revenue, and the surplus, should there be any, was no longer to go to the king. In the reign of William IV. the crown was relieved of all that really belonged to the expenses of Government, and the C. L. became solely for the upkeep of the royal family.

CIVIL SERVICE, name for public officials who administer civil affairs. Principal departments are Treasury, Privy Council Office, Home Office, Foreign Office, Board of Agriculture, Education Department, Scottish Office, Post Office; Indian and Colonial C. S. also included. Originally C. S. posts were given by minister of department in question; there was no qualifyi[illegible] by influence. In 1855 examinations were established, and since 1870 appointments have been made according to results of open competitive examinations. The system is administered by commissioners, who arrange the subjects for examination, and must ascertain that the candidate is within the age limits prescribed and a fit and proper person to be entrusted with public employment. Service is in two divisions. Examinations for first-class clerkships, Indian and Colonial Services are held simultaneously, candidates being allowed to compete for all three. Examinations resemble those of univ's, include classics, math's, science, economics, philosophy, modern languages; age limit, 22 to 24; salaries, £200 to £1000. Successful candidates in Ind. C. S. must spend another year in England and pass final examination in Ind. law, language, etc., and in riding. Medical test must also be passed. In second division, examinations resemble ordinary school examinations; include usual school subjects, history, geography, French, Latin, etc.; salaries, £70 to £500. Women are employed chiefly in post office, but also in Customs, Boards of Education and Agriculture, etc. In U.S.A. appointment of Civil Servants is constitutionally vested in pres., but competitive system is now largely employed.

CIVILIS, CLAUDIUS, famous Batavian leader in revolts against Romans during rule of Nero and Vespasian.

CIVILISATION is the condition of advanced nations, as compared with that of savage and barbarous peoples; it is result of long evolutionary processes and its history is that of material and moral development of mankind. There are, however, two movements always going on in all communities—one progressive, the other retrogressive: if former is predominant, community advances; if latter, it stands still or degenerates. Generally speaking, community which is continually in contact with other c's progresses; while one that is isolated either retrogrades or remains stationary; good example of stationary c. is China, where it dates back to several millennia B.C., but has made little advance throughout many cent's.

Chief physical influences which have affected c. are

climate, food, soil, and general aspect of nature. One of first factors in social development is accumulation of property. So long as each man must work to live, and consumes as much as he produces, neither science nor organisation can be created; but as soon as production surpasses consumption there grows up beside working class an intellectual class which creates science on which progress of c. depends. Accumulation of property depends on energy of worker and also on return obtained for work; of these causes first depends on climate, second on fertility of soil. An examination of history shows that no people has of itself attained c. unless one of these conditions was favourable; thus in Asia c. was limited to district of fertile alluvial soil, stretching from E. China to Asia Minor. In N., where soil was unproductive, Mongols and Tartars remained in barbarous state until comparatively recent date. Arabs made little progress owing to the poverty of their soil until they were enabled, by their conquests of Persia, Spain, and Lahore, to accumulate wealth. Eastern c. generally was thus due to fertility of soil; in W., favourable climatic conditions were more important factor; in Europe, climate developed energy and was favourable to work.

Progress of c. has from time to time received great impetus from discoveries and practical inventions. Earliest and perhaps most important was discovery of uses of fire in prehistoric times; before this discovery man lived chiefly on fruits and nuts, but after it animal foods were added to his diet. Another and much later invention was that of system of writing, which must have occurred in VII. millennium B.C., and was important step in human progress. In modern times, exploration, intercommunication of advanced races, progress of science and invention (especially in steam and electricity) have promoted c. amazingly.

Avebury, *Origin of Civilisation* (1902); Seignobos, *History of Civilisation* (1908); Buckle, *History of Civilisation in England.*

CIVITA CASTELLANA (42° 17′ N., 12° 26′ E.), town and episcopal see, Rome, Italy; with cathedral and citadel; near site of ancient city, Falerii. Pop. 5265.

CIVITA VECCHIA (42° 6′ N., 11° 48′ E.), seaport town, on Mediterranean, Rome, Italy; episcopal see; Rom. relics; ancient *Portus Trajani.* Pop. 12,000.

CLACKMANNAN (56° 7′ N., 3° 45′ W.), county town, on Devon, Clackmannanshire, Scotland; ancient market cross; ruins of Clackmannan Tower, once seat of Bruces; has spinning mill; coal mines.

CLACKMANNANSHIRE (56° 7′ N., 3° 46′ W.), smallest county, Scotland; lies between Ochil Hills and Forth; area, 55 sq. m.; surface partly flat (carse), partly undulating and hilly; fertile soil; well cultivated; uplands afford excellent pasturage; rich in minerals; towns—Alloa, Clackmannan, Alva, Dollar, Tillicoultry; principal stream, Devon; coal extensively mined; woollen manufactures; distilleries. Pop. (1911) 31,121.

CLACTON-ON-SEA (51° 48′ N., 1° 9′ E.), watering-place, Essex, England. Pop. (1911) 9777.

CLAIRAUT, ALEXIS CLAUDE (1713–65), Fr. mathematician and astronomer; author of *Théorie de la figure de la terre* and *Théorie de la lune*; accompanied an expedition to Lapland for measuring the meridian.

CLAIRON, LA (1723–1803), eminent Fr. actress.

CLAIRVAUX (46° 35′ N., 5° 42′ E.), village, Aube, France; site of famous Cistercian abbey, founded by St. Bernard, 1115; C. has important ironworks.

CLAIRVOYANCE is power claimed by spiritualistic 'mediums,' of seeing things invisible to ordinary persons, when in hypnotic condition; astuteness of professional mediums has rendered scientific investigation on the subject extremely difficult. See SPIRITUALISM.

CLAM, family of bivalves found in mud and gravel bottoms; giant c. (*Tridacna gigas*) is often 3 or 4 feet in length; soft c. (*Ohama arenaria*) is considered a delicacy in parts of U.S.A.

CLAMECY (47° 27′ N., 3° 31′ E.), town, at confluence of Yonne and Beuvron, France; manufactures, textiles, leather. Pop. 4722.

CLAN (Gaelic *Clann*), the name given in Scotland and Ireland to a group of families often living together as a community. In ancient Ireland several 'septs' or communities formed a c., and each sept was divided into several households. Alike in Scotland and Ireland the Celtic tribalism which a real c. system necessitates was overlaid by Anglo-Norman feudalism, though it maintained itself in Scotland side by side with the mediæval baronage and then of modern developments down to the XVIII. cent. Owing to the support given by some c's to the Pretender, a determined effort was made to root out the c. system, and the wearing of Highland dress was forbidden. C. feeling, however, still survives among a group of families (not always all of the same name) and the 'chief' is looked up to with veneration.

Scottish Clans and their Tartans, Edinburgh.

CLANRICARDE, ULICK DE BURGH, 1ST EARL OF, s. of Ulick, Lord Clanricarte, of old Anglo-Norman house; cr. Earl of C., 1543; obtained grants of land from Henry VIII.; d. 1544.

CLANRICARDE, ULICK DE BURGH, MARQUESS OF (1604–57 or 1658), succ. his f. as 5th earl, 1635; sat in Short Parliament of 1640; was R.C. and supported Charles I.; commanded royal forces in Connaught; surrendered to Parliament in 1653; believed in religious toleration, and has been described as 'perhaps the most unsullied character in the history of Ireland.'

CLANVOWE, SIR THOMAS, Eng. poet; contemporary of Chaucer, and the supposed author of *The Cuckoo and the Nightingale.*

CLAPARÈDE, JEAN LOUIS RENÉ ANTOINE, ÉDOUARD (1832–70), Swiss zoologist; prof. of Comparative Anat. at Geneva; made biological investigations, especially on Annelidæ, in Norway, the Hebrides, Bay of Biscay, and at Naples.

CLAPPERTON, HUGH (1788–1827), Scot. explorer; from 1822 explored North and Central Africa; crossed the Niger, and d. in Sokoto, 1827.

CLAQUE, body of people who are hired to applaud in Fr. theatres; system dates from ancient times; organised in France beginning of XIX. cent.

CLARE (52° 50′ N., 9′ W.), maritime county, Munster, Ireland; area, 1200 sq. miles; bounded N. by Galway, E. by Tipperary, S. by Shannon estuary, W. by Atlantic; surface generally hilly, with some level tracts; bogs in W.; drained by Shannon and Fergus; chief lake, Lough Derg, on eastern boundary; coast precipitous and much indented; chief islands, Aran Isles; chief town, Ennis; important fisheries round coast; sheep and cattle raised; no important manufactures; chief crops, oats, potatoes. Minerals include iron, manganese, lead; mineral springs occur in several places. There are many old fortified castles. Pop. (1911) 104,064.

CLARE, name of an historic Eng. house, which came to England with the Conqueror, acquired estates in the eastern counties, on the Welsh border, and then in Ireland. EARL GILBERT (d. 1314), was last in male line; the 'Honour of Clare,' owing to marriage of the ultimate heiress with Lionel, s. of Edward III., became vested in the Crown.

CLARE, JOHN (1793–1864), Eng. poet; author of *Poems of Rural Life* (1820), *The Village Minstrel, The Rural Muse,* etc.; d. insane.

CLARE, JOHN FITZGIBBON, 1ST EARL OF (1749–1802); M.P. for Dublin Univ., 1778; cr. baron, 1789, and earl, 1795; at the outbreak of the Irish rebellion he urged strict measures, but in several cases showed clemency afterwards; was strongly against the Catholics and concessions generally, and increasingly so after the Union.

CLARE, ST. (1194–1253), disciple of St. Francis; abbess of San Damiano, Italy, a convent of *Poor Clares* (enclosed, contemplative order), which she, with St. Francis, founded.

CLAREMONT (43° 22′ N., 73° 23′ W.), city, New Hampshire, U.S.A.; manufactures cotton, woollen, and rubber goods. Pop. (1910) 7529.

CLARENCE, DUKES OF.—(1) LIONEL (1338–68), third s. of Edward III.; m. Elizabeth de Burgh (heiress of the Clares, *q.v.*); his dau. and heiress, Philippa, m. Edmund, Earl of March. (2) THOMAS (*c.* 1388–1421), second s. of Henry IV. (3) GEORGE (1449–78), bro. of Edward IV.; perished in Tower. (4) WILLIAM, afterwards William IV. (5) ALBERT VICTOR (1864–92), eldest s. of Edward VII.; cr. duke, 1890.

CLARENCEUX, one of the two Kings-of-Arms in England; has jurisdiction over all England south of Trent.

CLARENDON, CONSTITUTIONS OF, a code of laws, promulgated at Clarendon (1164) by Henry II., for the purpose of settling differences between Church and State.

CLARENDON, EDWARD HYDE, 1ST EARL OF (1609–74), Eng. statesman; s. of Henry Hyde, of Dinton, Wilts; ed. at Oxford, and called to the Bar in 1633. He vigorously opposed the king's attempted absolutism for several years, and supported Strafford's overthrow. He was not, however, prepared to go to the extreme length of the Parliamentary party, and was on the king's side at the outbreak of the Civil War. Though supporting Charles, he did not always see eye to eye with him. He left England in 1648, and was one of Charles II.'s companions and advisers in exile. He was cr. earl at the Restoration, but became unpopular owing to his dau.'s marriage with the Duke of York (afterwards James II.). He was not himself in favour of such measures of religious intolerance as are contained in the *Clarendon Code*, but his idea was comprehension, hardly toleration. He was partly responsible, even if indirectly, for the defeat of the Eng. fleet by the Dutch in the Medway in 1667. He was unpopular with the extreme Royalists (for his support of the 'Act of Indemnity') and with the Presbyterians, and had annoyed the king; fell from power, being deprived of the Great Seal, and went into exile; d. at Rouen, a disappointed man. He is famous both for his political career and his *History of the Great Rebellion*; also wrote an Autobiography.

Sir Henry Craik, *Life of Clarendon* (2 vols., 1911).

CLARENDON, GEORGE WILLIAM FREDERICK VILLIERS, 4TH EARL OF (1800–70), Brit. statesman; grandson of the 1st earl of the Villiers creation; app. attaché to Brit. Embassy at St. Petersburg. In 1833 he was minister to the court of Spain, and strongly supported the Liberals there. In 1840 he became Lord Privy Seal and Chancellor of the Duchy of Lancaster, then pres. of the Board of Trade, and Viceroy of Ireland (1847–52), where he ruled very wisely; Foreign Minister (1883); Brit. plenipotentiary at the Congress of Paris (1856). He was Foreign Minister again (1865–70), dying in office.

CLARENDON, HENRY HYDE, 2ND EARL OF (1638–1709), Eng. politician; s. of 1st earl; M.P. for Wilts, 1661; became earl, 1674; Lord-Lieutenant of Ireland, 1685–87; opposed James II.'s Declaration of Indulgence, but was hostile to William and Mary; was imprisoned for intriguing, 1691.

CLARENDON PRESS, old name for Oxford University Press; founded 1672; Bible printing-house.

CLARENDON TYPE, see PRINTING.

CLARET, Eng. name for red Bordeaux wines.

CLARETIE, JULES ARSÈNE ARNAUD (1840–), Fr. dramatist, novelist, historian, and man of letters; director of the Comédie Française since 1885.

CLARI, GIOVANNI CARLO MARIA (*c.* 1745), Ital. composer of church music.

CLARINET, CLARIONET, wooden instrument with a single reed; three varieties: C, A, and B flat.

CLARK, SIR ANDREW, Bart. (1826–93), Scot. physician, practised in Aberdeen and afterwards in London with much success; pres. of Royal Coll. of Physicians (1888); author of several medical works.

CLARK, CHAMP (1850–), Amer. politician; chairman of National Democratic Convention at St. Louis, 1904; congressman, 1893, and from 1897; speaker, 1911–13; his speech in favour of reciprocity with Canada as a step towards annexation instrumental in causing its rejection by Canada.

CLARK, FRANCIS EDWARD (1851–), Amer. Congregationalist divine; founded Young People's Society of Christian Endeavour.

CLARK, GEORGE ROGERS (1752–1818), Amer. soldier; app. lieut.-col. on Amer. frontier, 1778; owing to him much of the North-West became American; his services were scarcely recognised, and he d. disappointed.—**Clark, William** (1770–1838), his bro., entered U.S.A. army, 1792; led an exploring expedition (1803–6) down the Columbia River.

CLARK, SIR JAMES, Bart. (1788–1870), Scot. physician; investigated health resorts and mineral waters of the Continent; author of several medical works.

CLARK, JOHN BATES (1847–), Amer. economist; author of *The Philosophy of Wealth* (1885), *Wages* (1889), *The Control of Trusts*, etc.

CLARK, JOSIAH LATIMER (1822–98), Eng. inventor and electrician, concerned in improvement of telegraphs, submarine cables, etc.

CLARK, THOMAS (1801–67), Scot. chemist; prof. of Chem., Marischal College, Aberdeen (1833); made investigations on the composition of various waters.

CLARK, WILLIAM GEORGE (1821–78), Eng. scholar; founded Clark lectureship, Trinity Coll., Cambridge; one of editors of *Cambridge Shakespeare*.

CLARKE, ADAM (1762–1832), Wesleyan preacher and Oriental student; edited Rymer's *Fœdera*.

CLARKE, SIR ANDREW (1824–1902), Brit. administrator; entered army, 1844; held various appointments in Australia, N. Zealand, Straits Settlements, India, and in army at home; retired, 1886.

CLARKE, CHARLES COWDEN (1787–1877), Eng. author and scholar; author of *Shakespeare's Characters* (1863), etc.—His wife, **Mary Cowden Clarke** (1809–98), compiled a valuable *Shakespeare Concordance* (1844–45), wrote *Girlhood of Shakespeare's Heroines*, etc.

CLARKE, EDWARD DANIEL (1769–1822), Eng. traveller and mineralogist; travelled in Europe, Palestine, and Egypt, collecting valuable statues, manuscripts, etc.; prof. of Mineralogy at Cambridge (1808); pub. works on travel and archæology.

CLARKE, SIR EDWARD GEORGE (1841–), Eng. lawyer and politician; originally a reporter; called to the Bar, and became a counsel of the first rank; entered Parliament (1880); knighted (1886); Solicitor-General (1886–92).

CLARKE, JAMES FREEMAN (1810–88), Amer. Unitarian theologian and vigorous opponent of slavery; a spiritual and learned man; wrote *Ten Great Religions*.

CLARKE, MARCUS ANDREW HISLOP (1846–81), Australian author; wrote *For the Term of his Natural Life*; also dramatic pieces.

CLARKE, MARY ANNE (d. 1852), Eng. courtesan; wife of a stone-mason; became mistress of Frederick, Duke of York, s. of George III.; the *liaison* led to a public scandal; eventually received a pension.

CLARKE, SAMUEL (1675–1759), Eng. divine and philosopher; among most important works are his Boyle Lectures, *On the Being and Attributes of God* (1704), and his correspondence with Leibnitz (1717). In his ethical doctrine he maintains that moral principles are as directly evident to reason as mathematical principles, and he enunciates three 'rules of righteousness' as claiming natural and necessary assent, viz.: (1) that we should venerate God; (2) that we should treat our fellows with Equity and Love; and (3) that we exercise Prudence about ourselves.

CLARKE, WILLIAM BRANWHITE (1798–

1878), Brit. geologist and clergyman; studied the geol. of Suffolk and Dorsetshire; emigrated to New South Wales and became the founder of Australian geol.; he made the first discovery of gold (1841), of tin (1849), and of the diamond (1859) in Australia, and contributed other researches valuable to the development of that country and to science.

CLARKSON, THOMAS (1760–1846), Eng. anti-slavery agitator; travelled to collect evidence on subject, and got bill brought into House of Commons; in 1789 went to France to urge his anti-slavery propaganda, and met with some success; he continued his work till death. See SLAVERY.

CLARKSVILLE (36° 33′ N., 87° 24′ W.), chief city, Tennessee, U.S.A.; important tobacco market. Pop. (1910) 8548.

CLASSES OF SOCIETY.—Solo class arrangement of modern times tends to become that of rich and poor, but historically the four divisions of royal, noble, gentle, and simple are important. First class may be absent; in many countries, as France and Germany, second and third form the one class of nobles, and in others, as England, third and fourth form one class of commoners. Thus the *von* and the *de* employed by every member of Ger. and Fr. territorial families or families that have been ennobled is mark of nobility which the lesser members share with head of family. In England, on the contrary, there is no such thing as nobility of blood: children of peers are commoners as rights of blood go. Foreign idea of nobility of blood is, however, very old; class distinctions, preserved throughout ages, often as deep as racial distinctions, and perhaps in their origin due to conquest of one state by another, as may be seen in mild form by establishment of Norman upper and Saxon lower class in England after Norman conquest; unlikely that such deep cleavages as seen in Greece and Rome should have had origin in mere property differences. History of many Grecian states, Rome, and many modern nations is a long struggle between well-born and base, in which latter establish their political equality. Grecian and Roman nobility represented families who first settled in the state, under whom was democracy composed of descendants of families subjugated by first settlers, brought into the city from towns subsequently conquered, or debased in blood by debt, crime, etc. First democratic reforms were introduced into Athens by *Seisachtheia* of Solon, *c.* 594, and extended by Cleisthenes, *c.* 508 B.C.; many of Ionian cities established democracies, but Dorian states retained oligarchic social and political constitution. Roman plebeians gradually won entire political equality, but could not hold chief religious posts, nor did social distinctions die out; the enlightened Mæcenas, we learn from Horace, would associate with a freedman's son, though not with a freedman, but the *Satires* are full of evidence of strong class feeling. Modern Romance nations inherit idea of nobility of blood, but it is complicated by Teutonic social arrangement, by property, *i.e.*, in early times, land; under feudalism this developed into aristocracy, which is different from nobility; Eng. upper class is an aristocracy rather than a nobility.

CLASSICS.—The term *classic* is generally applied to any standard lit., particularly to that of ancient Greece and Rome. When the so-called 'Classical Age' of Greece was over (about 300 B.C.), the Gk. writers became objects of study as they are to us, and a 'science' of classical scholarship grew up. In the 'Alexandrian Age' (300–1 B.C.), the library at Alexandria became a centre of classical study, and its librarians scholars and editors. Zenodotus edited *Homer*, and Aristophanes of Byzantium other poets besides; later came Didymus, with whom the 'Alexandrian Age' ends. The Alexandrians had a regular canon, beginning with Homer and ending with Polybus. Contemporary with the school of Alexandria was that of Pergamum, during the III. and II. cent's B.C.

When Rome had conquered Greece, Greek was the language of the eastern half of the Empire, and Rome had much to learn from Greece in letters, as the Romans had never been a literary people. Hence Rom. lit. followed Gk. models, and educated Romans of this and succeeding times all knew Greek. The 'Augustan Age' was one which produced not only the greatest Latin lit. but some literary criticism. Longinus wrote *On the Sublime*, and Dionysius of Halicarnassus criticised Demosthenes. In the next five cent's there were several grammarians, among them were Herodian and Theodosius of Alexandria. In Latin scholarship during these cent's, or just before, a great name is that of Varro (116–27 B.C.). Virgil and Horace, who had themselves absorbed so much of Gk. culture, soon became regular authors for critical study. Quintilian was not only a great authority on oratory, but wrote on the lit. of his own country as well. One of Suetonius' works, now lost, was used in the VII. cent. by Isidore of Seville. Later, important work was done by Symmachus, Apollinaris Sidonius and Boethius, who stands on the border-line between classical and mediæval culture.

The Middle Ages are sometimes referred to as if during the whole of that period a total eclipse of classical learning and everything pertaining to ancient civilisation took place, only to be brought to light again at the Renaissance. Though there is much truth in this, it must not be pressed too far, for there never was a period when the study of Greek became totally extinct in the West; nevertheless, Gk. scholars were only few, and while Latin remained the dominant literary language till the XVI. cent., much of the best Latin lit. was entirely forgotten and neglected. Greek was studied in Ireland in the VII. and VIII. cent's, and in England was introduced by Theodore of Tarsus (d. 690), abp. of Canterbury. Owing to the work of Alcuin, there was some classical study at the court of Charles the Great. Aristotle was translated into Arabic in the East, and his works, being taken to Spain by the Moors, were translated into Latin, and then studied by the Schoolmen in Paris and elsewhere. Greek was studied in England by Bp. Grosseteste (d. 1253) and by Roger Bacon (d. 1294), who wrote a *Gk. Grammar*.

The Renaissance began in Italy in the XIV. cent., and ancient MSS. were eagerly sought for, and in the XV. cent. much Greek was read in Italy; but in the XVI. cent. the New Learning found its chief home north of the Alps. The greatest of Renaissance scholars was Erasmus, who taught and studied in England, France, Italy, and Switzerland. Since then classical scholarship has gradually progressed, becoming more scientific, aiming at exact knowledge of the past rather than exact imitation of classical forms of lit. in the present. There have been many famous classical scholars in England, France, and Germany. During the XVI. and XVII. cent's France produced most, in the XVIII. England, and now Germany; but when scholars like Prof. Gilbert Murray and the late Sir R. C. Jebb can be pointed to, there is no cause for fear of the future of classical studies in Britain.

Sandys, *A History of Classical Scholarship*; Jebb, in *Cambridge Mod. Hist.*, vol. i.

Classics in Schools.—The teaching of Classics in schools in England has been regular since the XVI. cent., and the great public schools especially have always maintained since then a tradition of classical scholarship. Much was done by Dr. Arnold of Rugby to widen classical study, but in the last half-cent. there has been continuous debate as to the advisability of devoting so much time to the study of Greek or Latin, or both. Most large schools now have a 'classical' and a 'modern' side. In Oxford and Cambridge Greek is still compulsory, but in the newer univ's it is not so. The consensus of the best opinion seems to be that it is often desirable to teach some Latin to boys where Greek is not so essential. Continental conditions are largely similar to English.

CLASTIDIUM (mod. Casteggio) (*c.* 45° 2′ N., 9° 8′ E.), ancient fortified town, Gallia Cispadana, Italy; scene of victory of Marcellus over Gauls, 222 B.C.

CLAUBERG, JOHANN (1622–65), Ger. philosopher.

CLAUDE, JEAN (1619–87), Fr. Prot. theologian; left France at revocation of Edict of Nantes, 1685.

CLAUDE OF LORRAINE, CLAUDE GELLÉE (1600–82), Fr. landscape artist; examples in Louvre and National Gallery.

CLAUDET, ANTOINE FRANÇOIS JEAN (1797–1867), Fr. scientist; introduced daguerrotype photography into England, and invented several instruments concerned with photography.

CLAUDIANUS, CLAUDIUS (*c.* 396), Latin epic poet; wrote the *Raps of Proserpine*, also panegyrics.

CLAUDIUS, name of a great Rom. *gens*, containing both patricians and plebeians; among well-known members of it were: (1) APPIUS SABINUS REGILLENSIS, founder of the *gens*, *c.* 504 B.C.; (2) APPIUS, patrician consul, 471 and 451 B.C.; (3) APPIUS, patrician consul, 307 B.C.; (4) APPIUS, friend and correspondent of Cicero.

CLAUDIUS, TIBERIUS CLAUDIUS DRUSUS NERO GERMANICUS (10 B.C.–54 A.D.), Rom. emperor; s. of Drusus, and nephew of Emperor Tiberius; became emperor, 41 A.D.; said to have been poisoned by his wife, Agrippina, mother of Nero.

CLAUDIUS, MARCUS AURELIUS, Roman Emperor (268–70 A.D.); defeated Goths—hence called Gothicus.

CLAUDIUS, MATTHIAS (1740–1815), Ger. popular poet (*nom de plume*, ASMUS).

CLAUSEL, BERTRAND, COUNT (1772–1842), Fr. soldier; served in Revolutionary campaign, 1791, and in Peninsular campaign; after Restoration, served under the Bourbons; marshal of France, 1831.

CLAUSEN, GEORGE (1852–), Eng. landscape artist; A.R.A. (1895), R.A. (1908).

CLAUSEWITZ, KARL VON (1780–1831), Prussian general; fought in Rhine campaign, 1793–94; in campaign of Jena, 1806; a prisoner two years; helped to reorganise Prussian army, 1809–12; fought for Russia in 1812, and then served in Prussian army in Waterloo campaign; wrote many military works.

CLAUSIUS, RUDOLF JULIUS EMMANUEL (1822–88), German physicist; prof. of Physics at military school in Berlin (1850), Univ. of Zürich (1855), Würzburg (1867), Bonn (1869); founder of the science of thermodynamics; formulated many new and now-accepted physical theories.

CLAUSTHAL, KLAUSTHAL (51° 48′ N., 10° 20′ E.), mining town, Harz Mts., Hanover, Germany; chief mines, silver and lead. Pop. 9000.

CLAVICHORD, early keyboard musical instrument, precursor of the piano. The keys operated on quills which plucked the strings.

CLAVICLE, see SKELETON.

CLAVIÈRE, ÉTIENNE (1735–93), Fr. politician and financier.

CLAVIJO, RUY GONZALEZ DE (d. 1412), Span. traveller; visited Timur at Samarkand

CLAVIJO Y FAJARDO, JOSÉ (1730–1806), Span. journalist; theme of Goethe's play.

CLAW, term designating horny epidermal end of digits of birds, mammals, etc.; in ungulates c's are flattened into hoofs; applied also to chelæ of arthropods.

CLAY, a soft rock, plastic when wet, of varying composition and character, the principal constituent being an extremely fine-grained hydrous aluminium silicate, such as kaolin and muscovite, decomposition products of felspars. Chlorite, derived from hornblende, augite, or biotite also enters into the formation of clays, together with calcite, epidote, quartz, and other minerals reduced from their position as rock-constituents to a fine-grained state. Most clays are water-borne, and form deposits in lakes and the sea, often in uniform layers (mudstone). Some easily split into leaflets or laminæ, and are known as shales, which frequently contain organic products such as paraffin oil. A few of the more important clay rocks are *red c.*, which forms in the deepest parts of the ocean, and is the most extensive deposit known; *china c.*, consisting mainly of kaolin, is the purest; *brick c.* and *fire c.* vary very much in constitution. Wind-borne, fine calcareous c. is known as loess.

CLAY, CASSIUS MARCELLUS (1810–1903), Amer. politician; took part in anti-slavery agitation; served in Mexican War; minister to Russia, 1861–69; republican, democrat, then republican again.

CLAY, CHARLES (1801–93), Eng. surgeon, introduced the operation of ovariotomy, and did much to advance abdominal surgery generally.

CLAY CROSS (53° 10′ N., 1° 25′ W.), town, Derbyshire, England; centre of coal and iron district. Pop. (1911) 8365.

CLAY, FREDERIC (1838–89), Eng. composer of operas and songs.

CLAY, HENRY (1777–1852), Amer. statesman; entered legal profession, 1797; in 1803 elected to Kentucky legislature, and in 1806 to U.S.A. Senate. In 1811 he was elected to U.S.A. House of Representatives, and served as Speaker several times; helped to urge on the war with Britain of 1812. From 1808 onwards he was a pioneer of Protection. His great idea was the maintenance of the Union, and this led him to try to mediate in the slavery question, so that he was mistrusted by slaveholders and abolitionists alike. He made unsuccessful attempts to be Pres. of the U.S.A. He won renown as a magnificent orator.

C. Schurz, *Henry Clay*, in 'American Statesmen' Series.

CLAYMORE, Highland, cross-hilted, two-edged broadsword.

CLAYS, PAUL JEAN (1819–1900), Belg. marine painter.

CLAYTON, JOHN MIDDLETON (1796–1856), Amer. politician; Chief-Justice of Delaware (1837–39); Sec. of State (1849–50); noted for association with 'Clayton-Bulwer Treaty' (1850).

CLAYTON-BULWER TREATY between the U.S.A. and Gt. Britain about projected canal across Nicaragua; its stipulations were: (1) neither party to obtain exclusive or unequal control; (2) canal to be neutral; (3) powers to extend their protection to other communications across the isthmus; (4) neither to get help of neighbouring states; it was superseded by Hay-Pauncefote Treaty of 1902.

CLAY-WITH-FLINTS, deposits of clay with whole flints or fragments and pebbles, occurring in patches in the south of England, and corresponding to the *argile silex* of the Paris basin, indicating a mingling of lower Eocene beds and chalk.

CLAZOMENÆ, ancient Ionian town, on Gulf of Smyrna, Asia Minor.

CLEANTHES (III. cent. B.C.), poet and philosopher; b. Assos; worked as drawer of water by night to earn fee as Zeno's pupil. See STOICS.

CLEARCHUS (fl. V. cent. B.C.), Spartan leader; gov. of Byzantium when citizens opened their gates to Alcibiades (409 B.C.).

CLEARFIELD (41° 2′ N., 78° 26′ W.), town (and county), Pennsylvania, U.S.A.; iron foundries. Pop. (1910) 6851.

CLEARING-HOUSE (Railways).—An association of which most of the railways of England and Scotland are members. It deals with through traffic, *i.e.* where passengers and goods are carried in one journey over lines belonging to two or more companies, and settles what portion of the fares and charges should be allotted to each of the companies concerned. See also BANKS.

CLEAT, block fastened to upright structure to keep in position slanting support; double-ended peg for attachment of ropes.

CLEATOR MOOR (54° 31′ N., 3° 31′ W.), town, Cumberland, England; coal and iron mines. Pop. (1911) 8302.

CLEAVERS, CATCHWEED, GOOSEGRASS (*Galium aparine*), common plant (order Rubiaceæ), in waste

places and hedges, with a four-sided stem bearing whorls of narrow leaves and white flowers, and covered with short hooked hairs.

CLEBURNE (32° 21′ N., 97° 21′ W.), town, Texas, U.S.A.; large railway workshops; foundries and flour-mills; centre of prosperous farming and fruit-growing region. Pop. (1910) 10,364.

CLECKHEATON (53° 44′ N., 1° 43′ W.), town, West Riding, Yorkshire, England; woollen goods; machinery. Pop. (1911) 12,867.

CLEETHORPES (53° 34′ N., 0° 2′ W.), watering-place, on North Sea, Lincolnshire, England. Pop. (1911) 21,419.

CLEF (Lat. *clavis*, key), mark in musical notation, which determines pitch of notes; two c's in general use, treble or G, bass or F; alto and tenor c's used in orchestration.

CLEFT PALATE, a congenital deformity due to incomplete development of the roof of the mouth, the cleft usually being in the middle; operative treatment should be carried out as early as possible.

CLEGGS, see GAD-FLIES.

CLEISTHENES (fl. 500 B.C.), Athenian statesman, member of the exiled family of the Alomæonidæ. About the year 508 B.C. or soon after he began his democratic reforms, in which his object was to complete the work of Solon, in which the clan organisation, with its disadvantages, still remained. He divided Attica into three regions—the city, coast, and inland, and each of these into ten groups or *Trittyes*. Out of these thirty trittyes he formed ten tribes, taking one group from each of the three regions to form a tribe. Thus the clan system was avoided. He next substituted a new Council of Five Hundred instead of the old Council of Four Hundred, with definite administrative, deliberative, and judical functions. He further carried out franchise reforms, and introduced 'ostracism.' He prepared the way for the glory of Athens under Pericles.

J. B. Bury, *History of Greece*.

CLEITOR, CLITOR (37° 54′ N., 22° 7′ E.), town, Arcadia, ancient Greece; celebrated fountain whose waters were said to give a distaste for wine.

CLELAND, WILLIAM (d. 1689), Scot. soldier and poet; killed at *Dunkeld*.

CLEMATIS, genus of ranunculaceous shrubby climbing plants; many species; c., with large white or violet flowers, in gardens; *C. Vitalba*, 'Traveller's *Joy*,' is common on light chalky soils in England.

CLEMENCEAU, GEORGES BENJAMIN EUGÈNE (1841–), Fr. statesman, journalist, and medical man; member of National Assembly from 1871; edit. *L'Aurore*; radical reformer, supporting Gambetta, Dreyfus, and carrying Separation Bill; Prime Minister, 1906–9, being defeated on naval question after dramatic scene with Delcassé.

CLEMENCÍN, DIEGO (1765–1834), Span. politician and scholar.

CLEMENT, name of fourteen popes and two anti-popes: for **Clement I.**, see separate article below. **Clement IV.**, GUIDO LE GROS (1265–68), Fr. knight, soldier, and advocate; ordained after death of his wife; supported Charles of Anjou against Manfred. **Clement V.**, BERTRAND DE GOT (1305–14), abp. of Bordeaux; consented to suppression of Templars at instigation of Philip the Fair of France, 1311. **Clement VI.**, PIERRE ROGER (1342–52), Fr. Benedictine monk; purchased Avignon; patron of art and letters. **Clement VII.**, GIULIO DE' MEDICI (1523–34), Florentine; pronounced against Henry VIII.'s divorce from Catherine, 1534, after long delay, and excommunicated Henry. Rome was sacked by the Germans, 1527. **Clement VIII.**, IPPOLITO ALDOBRANDINI (1592–1605), Florentine; instituted the Forty Hours' Devotion; Giordano Bruno burnt at Rome, 1600, under his authority. **Clement IX.**, GIULIO ROSPIGLIOSI (1667–69), Lombard; brought about Peace of Aix-la-Chapelle, 1668. **Clement XI.**, GIOVANNI FRANCESCO ALBANI (1700–21), Umbrian; organised the Church in the Philippine Islands, and general missionary work. **Clement XII.**, LORENZO CORSINI (1730–40), Florentine; elected at 78; issued first papal decree against Freemasons, 1738; though stricken with blindness, an indefatigable worker. **Clement XIII.**, CARLO DELLA TORRE REZZONICO (1758–69), Venetian; contended against demand of Fr. government for suppression of Jesuits. **Clement XIV.**, GIOVANNI VINCENZO ANTONIO GANGANELLI (1769–74), Franciscan Italian; humble birth; consented to suppression of Jesuits, 1773.

History of the Papacy, by Barry, Ranke.

CLEMENT I., SAINT, CLEMENT OF ROME, first pope of whom there is definite historical knowledge, one of the Apostolic Fathers; author of an epistle to the Corinthians; d. *c.* 100. A literature (wrongly) bearing his name, and famous for that reason, has come down to history (**Clementine Literature**):—

II. Clement.—It was probably written in Alexandria about 130 A.D. It is generally included in the group of writings loosely called 'Apostolic Fathers.'

Epistles to Virgins (2), written against spiritual unions between members of opposite sexes leading the monastic life—a practice common in Syria in the III. cent.; written in Syriac about this time.

Clementine Homilies and *Clementine Recognitions*, two works evidently related to each other and derived from a common source, the Periodoi (Circuits) of Peter. There was also a letter, attributed to Clement, to James, the Lord's brother. These probably had their origin in Syria about 265 A.D., and were intended to win converts to Christianity. The *Homilies* and *Recognitions* were composed about a century later. They illustrate Jewish Christianity in Syria, a type which soon became swamped by Catholicism. Owing to their attribution to Clement, they became famous, and from them is ultimately derived the legend of Faust. Their importance was exaggerated by the Tübingen school of criticism.

Hort, *Clementine Recognitions*.

CLÉMENT, FRANÇOIS (1714–93), Fr. historian.

CLÉMENT, JACQUES (1567–89), Fr. Dominican; murdered Henri III.

CLEMENT OF ALEXANDRIA, one of the most brilliant of the Gk. Fathers, was head of the Alexandrian school (*q.v.*), *c.* 190–203 A.D.; he wrote a trilogy of connected works: (1) *A Word of Exhortation to Greeks* (*i.e.* Gentiles), in which he dwells on the antecedents to Christianity in the better types of heathenism; (2) *The Schoolmaster*, specially directed to those baptized in their youth, and now under the tuition of the Word; (3) *Clothes-bags* (*Stromateis*), a guide to deeper Christian philosophy. C. also wrote a commentary on the Scriptures, but this survives only in fragments (the others in full). His theological thought is broad and spiritual.

Swete, *Patristic Study*; Bigg, *Christian Platonists of Alexandria*.

CLEMENTI, MUZIO (d. 1832), Ital. composer and pianist.

CLEOMENES I., king of Sparta; reigned 520–488 B.C.; won great victory over the Argives; helped Athenians to expel Peisistratidæ; did much to strengthen power of Sparta.

CLEOMENES II., king of Sparta; reigned 370–309 B.C.

CLEOMENES III., king of Sparta; his reign (235–219 B.C.) was of military and political importance.

CLEON (d. 422 B.C.), Athenian statesman; headed opposition to Pericles in 430; after Pericles' death became democratic leader; displayed enmity against Athenian nobility and against Sparta; captured Spartans in Sphacteria, 425; killed at Amphipolis.

CLEOPATRA (69–30 B.C.), queen of Egypt; succ. her f., Ptolemy Auletes XIII.; fascinated Julius Cæsar and then Mark Antony, at whose death she committed suicide.

CLEOPATRA'S NEEDLE, see OBELISK.

CLEPSYDRA, see CLOCK.

CLERESTORY, upper storey of church over the nave, pierced with windows.

CLERGY, term used for ministers as opposed to laity; its singular is 'clerk,' still formally used in ecclesiastical sense.

CLERGY, BENEFIT OF, see BENEFIT OF CLERGY.

CLERK (Lat. *Clericus*), name first given to a person in religious orders; later, included laymen associated with ecclesiastical buildings. In mediæval times the clergy were practically the only persons capable of secretarial work; hence modern use of term in sense of a penman or bookkeeper.

CLERKE, AGNES MARY (1842–1907), Eng. astronomical writer; author of *A Popular History of Astronomy during the XIX. Century* (4th ed., 1902), *The System of the Stars* (2nd ed., 1905), *Modern Astronomy* (1895); *Modern Cosmogonies* (1906), and numerous other valuable works and articles.

CLERKENWELL, northern parish in borough of Finsbury, London, England; centre of watchmaking and jewellery manufacture. Pop. (1911) 87,976.

CLERMONT (49° 25′ N., 2° 20′ E.), town, on R. Brèche, Oise, France; interesting mediæval buildings; burned by Eng., 1359 and 1415. Pop. 4000.

CLERMONT-FERRAND (45° 46′ N., 3° 5′ E.), city, Puy-de-Dôme, France; Roman *Augustonemetum*; formed by union in 1731 of ancient Clermont and Montferrand; bp.'s see; most notable edifices are XIII.-cent. Gothic cathedral; church of Notre-Dame-du-Port, museums of antiquities and natural history; has famous mineral springs. First crusade was declared here by Pope Urban II. at the ecclesiastical council of 1095. Chief manufactures, preserves, semolina, chemicals, rubber goods; important grain market. Pop. (1911) 65,386.

CLERMONT L'HÉRAULT (43° 38′ N., 3° 25′ E.), town, Hérault, France; manufactures army cloth and woollen goods. Pop. 5300.

CLERMONT-TONNERRE, Fr. historical family, founded in XI. cent.; many members famous; Gaspard de C.-T. cr. duke and peer of France, 1775.

CLERUCHY, an Athenian colony in a foreign country, where former inhabitants were exterminated, conquered, or given pecuniary compensation; the cleruchs kept their rights as Athenian citizens.

CLETUS, another form of Anacletus (*q.v.*).

CLEVEDON (51° 26′ N., 2° 52′ W.), watering-place, Somersetshire, England. Pop. (1911) 6111.

CLEVELAND (41° 29′ N., 81° 39′ W.), city, Ohio, U.S.A., on S. shore of Loch Erie, and on Cuyahoga R., which forms inner harbour; northern terminus of Ohio canal; great railway centre; well laid out, with broad streets crossing each other at right angles. Public buildings include city hall, court-house, post-office, Case Library, various colleges and asylums, R.C. cathedral; great number of beautiful parks, of which Rockefeller Park is largest, extending along valley of Doan, and connecting Wade and Gordon Parks. C. is chief centre in U.S.A. for iron ore; great lumber and coal trade; iron manufacture in all branches, from ships and bridges to sewing-machines and screws; petroleum refineries, meat-packing establishments, manufacture of clothing, paint, chemicals, etc. City is administered by mayor elected every two years, and council. Inhabitants include large number of British, German, and other European nationalities. C. was first laid out, 1796; importance dates from third decade of last cent. when channel was cut across bar at mouth of river. Pop. (1910) 560,663.

CLEVELAND, BARBARA VILLIERS, DUCHESS OF (1641–1709), Eng. courtesan; wife of Roger Palmer (cr. Earl of Castlemaine) and mistress of Charles II., by whom she was cr. Duchess of C., 1670; a very beautiful, but vicious, woman; by Charles II. she had three sons: CHARLES FITZROY, Duke of Southampton, and Cleveland, HENRY, Duke of Grafton, GEORGE, Duke of Northumberland, and one or two daughters.

CLEVELAND, JOHN (1613–58), Eng. satiric poet; devoted adherent of Charles I.; poems had immense vogue in XVII. cent.

CLEVELAND, STEPHEN GROVER (1837–1908), pres. of the U.S.A.; b. New Jersey; s. of a Presbyterian clergyman; called to the Bar, 1859. He became assistant district attorney, 1863, and sheriff, 1869, being Democratic candidate and gov., 1882. C. was elected pres. for 1885–89. He opposed many bills passed by Congress, particularly one which would have enormously swollen the pensions. He next set himself to reform the tariff. Being again nominated for the presidency, he was defeated, and retired till his election again for 1893–97. His term of office was marked by a financial crisis and a dispute with Great Britain. He lived in retirement from 1897 till his death in Princeton, New Jersey.

CLEVES, KLEVE (51° 47′ N., 6° 9′ E.), town, Rhenish Prussia; formerly capital of duchy of C.; ancient ruined castle of the Schwanenburg, former residence of dukes, is associated with legend, 'Knights of the Swan'; warm mineral springs; leather, tobacco. Pop. 16,465.

CLEVES, ANNE OF, see ANNE OF CLEVES.

CLICHTOVE, JOSSE VAN (d. 1543), Catholic theologian; controversialist of Luther.

CLICHY, CLICHY-LA-GARENNE (48° 55′ N., 2° 19′ E.), town, on Seine, France; chemicals. Pop. (1911) 46,676.

CLICK BEETLES, see under POLYMORPHA.

CLIFF-DWELLINGS, habitations in New Mexico and Utah, U.S.A., placed in almost inaccessible positions on rock-faces, sometimes hollowed out of limestone; access by removable ladder, or steps hewn in rock; often invisible from ground.

Nordenskiöld, *Cliff-Dwellers in the Mesa Verde* (1893).

CLIFFORD, Eng. barony; ROBERT DE CLIFFORD summoned to Parliament as baron, 1299; killed at *Bannockburn*, 1314; the barony has now passed out of the original line.

CLIFFORD, JOHN (1836–), Nonconformist minister and politician; ed. Univ. Coll., London; Baptist minister since 1858; well known as Liberal politician, and as a 'passive resister' after Education Act (1902).

CLIFFORD, WILLIAM KINGDON (1845–79), Eng. philosopher and mathematician.

CLIFFORD OF CHUDLEIGH, THOMAS CLIFFORD, 1ST BARON (1630–73), lord treasurer of England; served in navy from 1664; cr. baron, 1672, then lord treasurer; resisted Test Act of 1673, and as a R.C. followed Duke of York into private life. C. was a sincere man, though a bad counsellor.

CLIFTON (51° 27′ N., 2° 37′ W.), western suburb of Bristol, Gloucestershire, England, on Avon; mineral springs; Rom. relics.

CLIMACTERIC, the period of life of a woman known in medicine as the 'change of life' or the *menopause*. It takes place about the age of 45 to 50, and is marked by the involution and loss of function of the generative organs. The word is also used generally as meaning a critical period.

CLIMATE.—It has been known from the earliest times that the atmospheric conditions in different parts of the earth are not the same, and the earth was early divided into zones or belts, each distinguished by certain conditions of temperature, moisture, etc., occupying a particular position with reference to the sun. But when the daily, annual, and monthly variations in the atmosphere are considered these divisions are not satisfactory, for local physical features, mountains, lochs, etc., become important. It has been found that each place has a certain series of atmospheric conditions each of which is termed the *weather*. The average weather is termed the *climate* and the study of weather conditions *climatology*. The facts regarding weather are mostly derived from *meteorology*, which is the study of the physics of the atmosphere. Climatology expresses meteorological data in simpler language so that its facts can be utilised

by the farmer, planter, and breeder. Crops, industry, and health depend on climate, and therefore a study of its variations is important.

Climatology records the temperature, moisture, pressure, winds, and evaporation which occur, and considers the regular and irregular variations from the average conditions. The maximum and minimum temperatures, the rainfalls, the frequency, direction, and velocity of winds and the probability of occurrence of any condition are all important matters to agriculturists. The relationships between climate and plants are being most minutely worked out so that the climate can be deduced from the tissues of plants as these show modifications which enable them to withstand heat, cold, drought, ice, and water. Certain diseases are known to be associated with particular weather conditions because certain insects and parasites flourish in these conditions. If the local physical features are altered by drainage the disease vanishes.

Three chief varieties of climate are recognised: *Marine* or *Oceanic*, where the land warms readily and cools readily. The water warms slowly and little, but does not cool easily. This retards the maximum and minimum changes, giving a cool spring, warm autumn, and only slight seasonal changes. The water thus acts as a source of warmth in the winter months. Abundant evaporation from the surface of the ocean causes higher humidity, larger amount of cloudiness, with a heavier rainfall than is found on continents. Climate is equable, damp, and cloudy. The air is cleaner and purer and moves more rapidly than over continents.

Continental climate is severe. The coldest month is Jan. and the warmest July. The air is drier and dustier than in marine districts. The amount and frequency of the rainfall are diminished, but the diminution depends largely on the local physical features of the place, and on the prevailing winds. Winds are less in velocity, and calms are more frequent. There is abundant sunshine, less humidity, and severe maximum and minimum temperatures, which are borne well on account of the dryness of the air. Weather changes do not occur abruptly as a rule.

Desert climate may be regarded as a type of severe continental climate. High winds are common by day, but the nights are calm and cold. Occasional downpours of rain occur on the borders of the desert, and may cause flooding. The excessive range of temperature causes the rocks to split up. The wind storms drive the sand against them, and the continual friction polishes them. The plants of the region are peculiarly suited to its climate, having a greatly reduced leaf surface, hairs, very thick skin coated with wax, and various other devices to prevent evaporation.

There are several other recognised types of climate. *Coast* climate is intermediate between ocean and continental. The prevailing winds have a very important effect in controlling it. If they come from the ocean the climate inclines towards the ocean type; if from shore it is a modification of the continental. There are three seasons in the *Monsoon* climate—one hot, one cold, one wet, during the summer monsoon. In India the winter monsoon blows off shore, the summer one on shore. A monsoon climate also occurs in Eastern Asia. In a *Mountain* or *Plateau* type of climate the height and obstructive effect of the mountains are very important modifying factors. There is a decreased temperature and humidity, and the wind velocity is higher than on the continent. The air is cleaner, purer, and drier. The night temperature is warm because the cold air collects in the valleys below.

Uniformity of climatic features distinguishes the *Torrid Zone*. There are no seasons. Life is regulated by the rainfall. There is a high uniform temperature. Periodic phenomena depending on the daily and annual march of the sun predominate. Cyclones are the only events which have an important economic result, for the destruction they work often takes years to repair. They are restricted to certain regions and special times. The *Temperate Zone* is characterised by marked changeableness of weather. The mean temperature and physiological effects are intermediate between those of the Torrid and *Polar Zones*. The weather changes are apparently irregular and haphazard, but they occur fairly systematically. The winds are the important controls. The seasons are classified by temperature. Except the rather meagre data brought back by recent Arctic and Antarctic expeditions, there is no account of Polar climate. It may be said that the temperate regions have provided the most highly developed human societies, probably because the climate has required a more strenuous cultivation of plants and animals. In the Mediterranean area early man must have had not only to clear forests before he sowed and planted, but to bring water to his fields.

The British Isles have a very typical maritime climate, because the ocean on the west coast is unusually warm, and the winter winds as a rule blow towards them from the warm region of this ocean. The summer temperature is diminished by winds from the colder northern regions. Brit. weather is unique in its variability. This is ascribed to areas of low pressure, which come from the Atlantic and pass over the islands towards the Baltic. In front of these are warm southerly winds, and behind them are cold northerly winds. The warming of the air lowers the pressure, and the cooling of it raises the pressure, so that there is a continual eastward displacement due to air at high pressure travelling to regions of low pressure. The depression causes a storm, after which the temperature falls. This denotes that the colder winds behind it have reached the islands. If the temperature rises again it denotes that warm southerly winds are sweeping across in front of a depression. There also occur periodically areas of high pressure, which remain stationary till displaced by the areas of low pressure. The effect of these differs according to the season at which they occur. In winter they cause very cold, bright, fine weather. In summer they are warm. The climate of N.W. Europe is greatly influenced by the Gulf Stream. In Januar[illegible] of this region but also of E. Siberia is comparatively high.

Croll, *Climate and Time*; Bartholomew, *Physical Atlas*; Lempfert, *Weather Science* (People's Books, 1912).

Acclimatisation, the process by which animals or plants are gradually adapted to—and so are able to live and thrive in—a climate different from that to which they originally belong. Acclimatisation may be through modification of an individual plant or animal, or by the production of offspring which are better able to thrive in the new climate. A single variation of a plant or animal has been found to flourish better than its fellows under severe conditions of climate, and by careful cultivation of this particular individual and its descendants a type of the species is evolved which is hardier and more adapted to the climate, and which may have actual structural change in the direction of adaptation to new conditions. In order to acclimatise plants or animals most successfully in an extreme climate it is best first to transfer a large number of the species to a climate midway between the old conditions and the new, and select the most healthy individuals at this first stage for transference to the more remote climate, exposing them first to the milder, and then the ultimate healthy selection to the more severe conditions.

Many interesting experiments have been made in America and Australasia. The sparrow has thriven so well in N. America that it is now a nuisance, as is the rabbit in Australia and New Zealand. The camel is well acclimatised in some of the desert districts of N. America and Australia, various species of trout, etc., flourish in the rivers of New Zealand, while the Australian eucalyptus and other trees grow well in California, and the tea-plant thrives in U.S.A.

Similar examples are common in Europe and all over the world.

In regard to man, while sudden transition to an extreme climate may often be harmful, yet there is no doubt that if the transference is gradual, in a few generations man can become acclimatised in every extreme of climate, while sometimes, *e.g.* in some of the pure white races of S. America, the new people may be actually superior in physique to the old stock. Modern sanitation and hygiene have removed most obstacles to man's acclimatisation, which have most often been tropical parasitic diseases that his unaccustomed body was unable to resist, *e.g.* malaria, yellow fever.

Darwin, *Animals and Plants under Domestication*; Waitz, *Introduction to Anthropology*.

CLIMAX, JOHN (525–600), mystical theologian, abbot at Mount Sinai; wrote *Ladder of Paradise*.

CLIMBING FERN, HARTFORD FERN (*Lygodium palmatum*), is a favourite greenhouse ornamental climber, with a long stem bearing palmate fronds.

CLIMBING PLANTS are those which, owing to inability to support themselves on their own stems, seek artificial means; hop, ivy, convolvulus are common examples in Britain, while 'monkey-ropes' and lianes are found all over the tropical world.

CLINCHANT, JUSTIN (1820–81), Fr. soldier; served in Algerian campaigns (1847–52); in Crimean and Mexican Wars; was general of brigade in Army of Rhine (1870); surrendered at *Metz*, but ultimately escaped.

CLINICAL MEDICINE, see MEDICINE.

CLINKER-BUILT, see BOAT.

CLINOCLASITE ($(CuOH)_2AsO_4$), mineral occurring in blue-green crystals as a decomposition product of copper ore, in Cornwall, Devon, Saxony, Utah.

CLINOMETER, apparatus for gauging angle of slope of surface; consists of graduated arc with pendulum; sometimes compass-attachment is used by geologists.

CLINTON (43° 1′ N., 75° 24′ W.), village, New York, U.S.A.; seat of Hamilton Coll.; ironworks. Pop. (1910) 1236.

CLINTON (38° 20′ N., 93° 50′ W.), city, Missouri, U.S.A.; potteries, flour. Pop. (1910) 4992.

CLINTON (42° 27′ N., 71° 42′ W.), township, on Nashua, Massachusetts, U.S.A.; extensive manufactures of ginghams, carpets, machinery. Pop. (1910) 13,675.

CLINTON (41° 50′ N., 90° 19′ W.), city (and county), Iowa, U.S.A.; seat of Wartburg Coll.; numerous mills; furniture, paper. Pop. (1910) 25,577.

CLINTON, DE WITT (1769–1828), Amer. politician; admitted to Bar, 1790; private sec. to his uncle, leader of the Republican party; became member of N. York Assembly, of U.S. Senate; mayor of N. York; opposed slavery, championed education, pressed forward Erie Canal scheme, and ultimately opened canal.

CLINTON, GEORGE (1739–1812), Amer. soldier; fought in war against Britain, 1775–80; gov. of New York; unsuccessful as candidate for Presidentship.

CLINTON, SIR HENRY (*c.* 1738–95), Brit. soldier; fought in Seven Years War and in Amer. War; gov. of Gibraltar, 1794.

CLINTON, HENRY FYNES (1781–1852), Eng. chronologist; pub. treatises on classical chronology.

CLINTONITE, BRITTLE MICAS, group of minerals between micas and chlorites, containing less silica than the former (and no alkalis) and less water than the latter; include margarite, chloritoid, xanthophyllite, brandisite, seibertite.

CLISSON (47° 6′ N., 1° 20′ W.), town, Loire-Inférieure, France; at confluence of Sèvre Nantaise with Moine.

CLISSON, OLIVIER DE (1336–1407), Fr. soldier; fought under Bertrand du Guesclin in campaigns against English, and succ. him as Constable of France (1380); acquired vast wealth and power.

CLITHEROE (53° 53′ N., 2° 23′ W.), market town, on Ribble, Lancashire, England; has remains of XII.-cent. castle; grammar school founded 1554, and a technical school; Stoneyhurst Coll. for R.C. students is 5 miles S.W.; cotton and paper mills; lime-works.

CLITOMACHUS (II. cent. B.C.), Gk. philosopher.

CLITUMNUS (42° 45′ N., 12° 43′ E.), small river, Umbria, Italy; enters Tinia, a tributary of Tiber.

CLIVE, CAROLINE (1801–73), Eng. authoress; several vol's of verse and successful novels.

CLIVE, KITTY (1711–85), Eng. comic actress; acted under Cibber and Garrick at Drury Lane; friend of Horace Walpole.

CLIVE, ROBERT CLIVE, BARON (1725–74), Brit. statesman and general; b. at Styche, Shropshire, Sep. 29. At school he was unruly, and in consequence was sent to India in 1743. C. went by way of Brazil, where he learnt Portuguese, reaching Madras in 1744. He entered the army in 1747, and, after various small actions, he won great distinction at the siege of *Arcot* in 1751. War with the French broke out again in 1756. C. had been in England for three years, and returned as gov. of Fort St. David. Then occurred the famous incident of the *Black Hole of Calcutta* (see CALCUTTA). C. defeated the Nawab's troops, and, after several months spent in negotiations, he won the great victory of *Plassey* (June 1757). He followed this up by other victories, and established Brit. supremacy in Bengal. He returned to England in 1760, and was cr. baron in 1762. He sailed again for India in 1765, and in less than two years accomplished much in the civil administration of India; he raised the salaries of officials, and prohibited the accepting of gifts from natives. His health obliged him to return to England, and there violent attacks were made on his public administration and his private character; these were partly occasioned by his administrative reforms and cutting down of illicit gains. He defended himself vigorously, but morbid depression overcame him and he committed suicide. Despite his faults (which are often exaggerated), C. ranks high as a Brit. empire-builder.

Sir A. J. Arbuthnot, *Lord Clive* (1899); Sir C. Wilson, *Lord Clive* (1890); G. B. Malleson, *Lord Clive* (1890); F. M. Holmes, *Four Heroes of India* (1892); Lord Macaulay, *Essay on Clive*.

CLOACA, Roman sewer; *Cloaca Maxima* (VI. cent. B.C.), is famous.

CLOCK, instrument for measuring time, and showing on a dial hours, minutes, and sometimes also seconds. The earliest time-measurer was undoubtedly some form of sun-dial, in which the progress of the sun was registered by a shadow thrown upon a graduated plate. The sun-dial was followed by the *Clepsydra*, or water-clock, which measured the hours by the quantity of water discharged through a small hole in the containing vessel. The sand-glass worked on the same principle, sand or powdered egg-shells taking the place of water, as in the familiar egg-boiler. The date of the invention of the c. proper is very uncertain, for the references to the early instruments of Boethius, Pacificus, and others are so vague as to leave it doubtful whether they were wheel-and-weight clocks or some form of water-clock.

The earliest c. of which we have a full description was made in 1379 by a German named Henry de Wyck, and erected in Paris for Charles V. In this c. a cylinder was set in motion round its axis by the uncoiling of a cord carrying a weight, this motion being successively communicated to a series of toothed wheels, ending in the escapement wheel. The teeth of the escapement wheel acted upon two small levers called pallets, which projected from and formed part of an upright spindle on which was fixed the regulating balance. The cylinder also set in motion a wheel to which were attached the hands of the c. The balance was loaded with two weights, which resisted the unwinding of the cord, and the c. was regulated by increasing or decreasing the distance of the weights

from the spindle. This construction formed the basis of practically all c's up to the application of the pendulum as a regulating power, which was accomplished by Huygens about 1657. The value of the pendulum as a regulating power lies in the fact that its oscillations all take substantially the same time, and after this date all c's with any pretensions to accuracy were fitted with a pendulum. The accuracy of a pendulum as a regulator depends upon its being always the same length, and with the simple pendulum serious errors arise from its expansion or contraction with variations in temperature. To obviate this defect, *compensating pendulums* were constructed, the most important being the 'gridiron' and the 'mercurial' pendulums. The 'gridiron' pendulum, invented by Harrison in 1726, is made of alternate bars of two different metals. When heated, one set of bars expands upwards and the other downwards, and the lengths of the bars are so proportioned that one expansion exactly counteracts the other. In Graham's 'mercurial' pendulum, invented 1715, the bob consists of a glass cylinder containing mercury. When a rise in temperature causes the metal rod to lengthen, the mercury simultaneously expands upwards, thus raising the centre of inertia and counteracting the lengthening of the rod.

Other great improvements upon Huygens' c. were made, notably in the escapement, or mechanism which transforms the rotatory wheel motion into the oscillatory motion of the pendulum. Huygens' c. required a light pendulum and large arcs of oscillation, and an improved arrangement, known as the 'crutch' or 'anchor' escapement was invented by Hooke about 1666. This device allowed of a much heavier pendulum with smaller arcs of oscillation, and is still largely used. Early in the XVIII. cent. an improved form known as the 'dead beat' escapement was made by Graham. This gives greater accuracy than the 'crutch' escapement, by obviating any recoil. Other escapements have been invented to remedy small errors in the previous forms, but these are used mainly in c's for special purposes where absolute accuracy is required. In small portable c's and watches, where the motive-power is a mainspring, the motion is chiefly regulated by the escapement and balance-wheel, the gradual weakening of the motive force as the spring uncoils being adjusted by a contrivance called the 'fusee.' The balance-wheel is compensated for variations in temperature on the principle of the 'gridiron' pendulum. Various modifications of the escapement in spring c's and watches have been introduced, amongst which may be mentioned the 'lever' escapement so much used in English watches, and the 'detached' escapement as used in chronometers.

Portable c's were first mentioned in the early part of the XIV. cent., but the exact date of their introduction is uncertain.

There is great variety in the striking arrangements of c's, from simple strokes at the hour to most elaborate chimes. Striking c's are technically known as c's, the non-striking ones being called *timepieces*. Performing c's were very popular in the XV. and XVI. cent's, and are still made. In some of these a procession of figures appears at certain intervals, while others have large bronze figures which strike the hours with hammers upon gongs.

In order to facilitate the keeping of a uniform time, the exact astronomical time as ascertained at observatories is very often communicated to the public by means of a time-ball, which is electrically dropped exactly at one o'cock.

[illegible]t in perfect agreement with a standard c. by means of electricity. The method consists essentially in transmitting at regular intervals a current of electricity from the standard c. to the pendulums of the copying c's, which are thus retarded or accelerated as may be required in order to beat with the standard c. The primary c. is as a rule not electrically driven, but is an ordinary astronomical c., the pendulum of which makes and breaks the current in a circuit.

The largest turret c's for public use have hands 8 or 10 feet long, and the hours are struck on a bell which may be heard at a distance of several miles. Illuminated c. dials to show the time at night were first introduced in the early part of the XIX. cent.

David Glasgow, *Watch and Clock Making* (1885); F. J. Britten, *Watch and Clock Makers' Handbook, Dictionary, and Guide* (11th ed., 1907); Cunynghame, *Time and Clocks* (1906).

CLODIUS, PUBLIUS (*c.* 93–52 B.C.), Rom. politician; won notoriety for penetrating into mysteries of 'Bona Dea'; secured banishment of Cicero; became a demagogue; killed in brawl with Milo.

CLOGHER (54° 25′ N., 7° 11′ W.), market village, County Tyrone, Ireland; cathedral.

CLOISTER was originally the general name for an entire conventual building, and in this sense is frequent in Eng. lit. Later applied to the covered ambulatory, the roof of which was supported upon pillars and open arches, surrounding the quadrangle of a monastery, and here many of the duties of a religious house were carried on, *e.g.* copying and illuminating manuscripts, training novices, etc. The cloisters of many Eng. cathedrals are still in a perfect state of preservation, one of the finest examples being Gloucester; they are also to be seen at Eton and Winchester Schools, and in some of the Oxford Colleges.

CLONAKILTY (51° 37′ N., 8° 50′ W.), seaport, market town, County Cork, Ireland; breweries, corn-mills. Pop. 3000.

CLONES (54° 13′ N., 7° 17′ W.), market town, County Monaghan, Ireland; interesting ruins; formerly lace-making centre; agricultural produce.

CLONMACNOISE (53° 20′ N., 7° 59′ W.), town, on Shannon, King's County, Ireland; seat of religion and learning in ancient times; numerous remarkable antiquities.

CLONMEL (52° 22′ N., 7° 41′ W.), market town, on Suir, County Tipperary, Ireland; besieged by Cromwell, 1650; birthplace of Sterne; has flour- and breweries; exports grain, cattle, butter. Pop. 10,000.

CLOOTS, JEAN BAPTISTE DU VAL DE GRÂCE, BARON VON (1755–94), Fr. Revolutionist, known as ANACHARSIS CLOOTS; violent anti-Christian; member of Convention, 1792; guillotined through Robespierre's influence.

CLOQUET (46° 42′ N., 92° 27′ W.), town, Minnesota, U.S.A.; lumber and paper mills. Pop. 3000.

CLOSE, MAXWELL HENRY (1822–1903), Irish clergyman and geologist; leading authority on glacial geol. of Ireland; pres. of Royal Geological Soc. of Ireland (1878).

CLOSE WRIT (*Literæ Clausæ*, letters close), letter from Crown to individual. Closed and sealed outsic's, unlike letters patent (*q.v.*); enrolled on Close Roll.

CLOSURE, expedient for facilitating parliamentary business; any member may move c., which means that division be taken forthwith; introduced into Fr. Chamber, 1882, and House of Commons, 1885, where it has been used systematically since 1911, proceedings being automatically stopped at stated time.

'Kangaroo c.' means that Chairman of Committee selects amendments to be discussed; a dangerous parliamentary device.

CLOT, ANTOINE BARTHÉLEMY, CLOT BEY (1793–1868), Fr. physician; founded hospital and medical school near Cairo; made a bey, and later a general, by Mehemet Ali; app. head of the Egyptian medical administration.

CLOTAIRE, name of four Frankish kings: **Clotaire I.** (d. 561), s. of Clovis; king of Soissons, 511; of all Gaul, 558; also of part of Germany. **Clotaire II.** (d. 629), king, 584; **Clotaire III.**, king, 657–73; **Clotaire IV.**, king of Austrasia, 717–19.

CLOTILDA, ST. (d. 544), dau. of Chilperic, king

of Burgundy; m. Clovis, king of Franks, whom she helped convert to Christianity.

CLOUD, an elevated mist formed by the condensation of aqueous vapour in the air. Several classifications have been brought forward, the following being established by an international committee in 1896: A. *Upper clouds*, average altitude, 9000 metres; (1) cirrus; (2) cirrostratus. B. *Intermediate c.*, 3000–7000 m.; (3) cirrocumulus; (4) altocumulus; (5) altostratus. C. *Lower c.*, 2000 m.; (6) strato-cumulus; (7) nimbus. D. *Clouds of diurnal ascending currents*; (8) cumulus, 1400–1800 m.; (9) cumulo-nimbus, 1400–3000 or 8000 m. E. *High fogs* under 1000 m.; (10) stratus.

Clement Ley, *Cloudland* (1894); A. W. Clayden, *Cloud Studies* (1906).

CLOUDBERRY (*Rubus Chamæmorus*), a kind of raspberry, bearing large white flowers and orange-yellow edible fruit; grows in N. temperate regions; is marketable in Sweden and Denmark.

CLOUDED TIGER, CLOUDED LEOPARD (*Felis macroscelis*), member of cat family living in forests of the E. Indies and S. Asia; the greyish-brown body, up to 4 ft. in length, marked with stripes, rings, and spots.

CLOUET, FRANÇOIS (d. 1572), Fr. miniature artist; s. of Jean C. (*q.v.*); was a painter of eminence, and executed portraits of Henri II., Mary of Scots, and other notables.

CLOUET, JEAN (d. 1541), Fr. miniature artist.

CLOUGH, ANNE JEMIMA (1820–92), Eng. educationist; dau. of a Liverpool cotton merchant; sister of A. H. Clough (*q.v.*); became associated with school started at Cambridge (1871), which developed into the famous Newnham College (1880), of which Miss C. became the first principal.

CLOUGH, ARTHUR HUGH (1819–61), Eng. poet; b. Liverpool; spent his childhood in America; returning to England, was ed. at Rugby, under Dr. Arnold, and at Oxford. He was made a fellow of Oriel, but resigned in 1848, owing to religious difficulties. In this year he pub. his most famous poem, *The Bothie of Tober-na-Vuolich*, the description of an Oxford reading-party in the Highlands, written in hexameter verse. In 1854 he became an examiner in the Education Office; six years later his health began to fail, and he d. at Florence. Arnold's *Thyrsis* was written in his memory.

S. Waddington, *Arthur Hugh Clough: A Monograph* (1883).

CLOVELLY (51° N., 4° 24′ W.), fishing village, N. coast of Devonshire, England; on cliff 400 ft. high.

CLOVER (*Trifolium*), leguminous plant embracing about 300 species, with characteristic leaf with three leaflets (trefoil), important for pasturage and fodder. As a crop (*q.v.*) plant it occupies the third year in the four-course rotation, white c. (*T. repens*), red c. (*T. pratense*), crimson c. (*T. incarnatum*), and alsike (*T. hybridum*) being a few of the more important species. The medick and lucerne (*Medicago*) are closely allied.

CLOVES, the dried flower-buds of the tropical tree *Caryophyllus aromaticus* (order Myrtaceæ), cultivated in the Moluccas, Java, Sumatra, Zanzibar, and the W. Indies; used as a spice and for preparation of the aromatic and pungent *essential oil of cloves*. The latter finds application in cookery, the manufacture of liqueurs, and in dentistry as a local anæsthetic.

CLOVIO, GIORGIO GIULIO (1498–1578), Ital. artist.

CLOVIS (c. 466–511), Frankish king; succ. his f., Childeric I., as king of the Salian Franks, 481; defeated Rom. general Syagrius, 486; m. Christian Burgundian princess Clotilde, 493; conquered Alemanni, baptized a Christian, 496; defeated Visigoths, became champion of orthodox faith against the Arians, and king of all the Franks.

CLOYNE (51° 52′ N., 8° 7′ W.), market town, County Cork, Ireland; seat of R.C. bp.; Prot. see founded by St. Colman, VI. cent., but united to Cork, 1835; has XIV.-cent. cathedral.

CLUB, the name given to an assembly of persons who meet together for the promotion of some common object of interest; also to the building in which such meetings are held. C's existed amongst the ancient Greeks and Romans, the members of which used to share meals, and perhaps the most notable were the religious c's, whose members were pledged to make sacrifice to some particular deity. The earliest known Eng. c. was called 'La Court de Bone Compaignie' in the reign of Henry IV. The poet Occleve was a member. Not until the reign of Elizabeth did the literary or convivial c. become an established institution. The most famous c. of this period was that established by Sir Walter Raleigh at the Mermaid Tavern, of which Shakespeare and most of the other poets and dramatists of the age were members. Ben Jonson founded a similar c. at the Devil Tavern. The next great period of Eng. club-life came into existence with the development of coffee-houses in the XVIII. cent. Prominent amongst the c's of this period were White's (1698), Brooks's (1764), Boodle's (1762), and The Cocoa Tree (1746). The famous *Literary Club* was founded by Dr. Johnson in 1764. The flourishing c's of the present day are too numerous to mention, but it may be noted that 'The Athenæum' was founded in 1824 by Sir Walter Scott and his friends. A notable feature of present-day club-life is the increasing number of ladies' c's.

Col. Ivey, *Clubs of the World* (1880); Nevill's *London Clubs* (1911).

CLUB-FOOT, TALIPES, a general name including several types of deformities of the foot: *talipes equinovarus* is the commonest form, in which the heel is slightly elevated, the foot inverted, and the person walks on the outer border; *talipes equinus*, in which the heel is drawn up, and the person walks on the heads of the metatarsal bones; *talipes calcaneus*, in which the front of the foot is drawn up, and the person walks on the heel; *talipes valgus*, in which the foot is everted, and the person walks on the inner border; *pes cavus*, in which the arch of the instep is greatly exaggerated. There may be combinations of several of these. Talipes may either be congenital, due to faulty development of one or other of the bones at the heel, or acquired, due usually to infantile paralysis. The treatment is persistent care and manipulation, begun as early as possible; operation may be necessary.

CLUNY, CLUGNY (46° 26′ N., 4° 39′ E.), town, Saône-et-Loire, France; formerly seat of celebrated Benedictine abbey, remains of which are Abbot's Palace and ruins of Abbey Church (begun 1089). C. has also two old churches of XII. and XIII. cent's. Pop. c. 4100. The Cluniacs were a subdivision of Benedictine Order, founded here in X. cent.; they eventually had large number of houses (variously estimated at from under 400 to over 2000). At time of suppression of monasteries number had decreased to 32.

CLUPEA, see HERRING FAMILY.

CLUSERET, GUSTAVE PAUL (1823–1900), Fr. politician and soldier.

CLUSIUM (43° N., 11° 54′ E.), town, Siena, Italy; near site of modern Chiusi; ancient capital of Etruria; many sepulchral remains, and some underground passages; several thousand Etruscan inscriptions in district; in museum of antiquities are Etruscan and Gk. vases, etc.; declined after Italy was invaded by barbarians.

CLUWER, PHILIP (1580–1623), Ger. historian and geographer.

CLYDE, river, W. of Scotland; rises in S. borders of Lanarkshire; enters Firth of C. at Dumbarton (106 miles); navigable for liners, up to Glasgow; of great commercial importance and principal ship-building centre in world; has four celebrated falls, near Lanark, where river descends about 250 ft. in few miles; upper valley famous for 'Clydesdale' horses; orchards; iron and coal fields.

Munro and Hunter, *The Clyde* (1907).

CLYDE, BARON, see CAMPBELL, COLIN.

CLYDEBANK (55° 54′ N., 4° 12′ W.), town, on Clyde, Dumbartonshire, Scotland; shipbuilding; sewing-machine works. Pop. (1911) 37,547.

CLYSTER, ENEMA (*q.v.*).

CNIDUS (36° 40′ N., 27° 30′ E.), ancient ruined city, on coast of Caria, Asia Minor; modern Tekir; colonised by Dorians; flourishing commercial centre; temples contained many celebrated works of art; centre of Aphrodite worship; scene of naval victory of Persians over Spartans, 394 B.C.

CNOSSUS, GNOSSUS, KNOSSUS (*c.* 35° 18′ N., 25° 5′ W.), ancient city, Crete, on Cæratus; reputed capital of King Minos; colonised by Dorians; afterwards became Rom. colony; vicinity associated with numerous Gk. legends; since 1900 site of important excavations.

COACHING, favourite mode of travelling from XVII. to early XIX. cent.; first mail-coach between London and Bristol, 1784; rendered dangerous by highwaymen, Hounslow Heath, favourite waylaying-ground; many amateur c. clubs formed, notably the Four-in-Hand Club, founded 1856.

COAHUILA (27° 45′ N., 101° 45′ W.), northern state, Mexico, bordering Texas; rich in minerals; large crops of cotton, Ind. corn; silver and gold mining; area, 62,375 sq. miles. Pop. (1910) 367,652.

COAL.—Scientifically the term coal is confined to a compact black rock containing 75–85 % of carbon. It burns readily with a bright flame, leaving behind it varying quantities of ash and cinder. C. exists as seams or beds, sandwiched between strata of sandstone, shale, and fire-clay in the formations of the Palæozoic, Secondary, and Tertiary ages. It consists of the vegetation of an age when flora was almost entirely represented by forests of club-mosses and ferns reaching a height of 50 ft. and more. Very thin sections of c. show when magnified woody fibres and spore cases. The fire-clay was the soil into which penetrated the roots of the plants. During this period the surface of the earth was sinking and swamps were formed on the débris of these forests. These swamps became filled with mud in which after a time vegetation grew and the process was repeated. Thirty c.-beds have been found in one place of an aggregate thickness of 105 ft., and it has been calculated that each foot of c. represents 500 years' formation. When it is stated that tropical vegetation would give 50 tons of carbon per acre during a growth of 100 years, and that this spread over an acre would not be half an inch thick, the luxuriance of the ancient forests may be understood.

Dead vegetation acted on by water and pressure in the absence of air is converted into lignite and c. The chief gases formed are supposed to be carbon dioxide, which becomes carbonic acid, and carburetted hydrogen. Water is formed during the process. In the first stage the product may be regarded as *peat*, and in the last stage as *anthracite*, for, with the evolution of gas, the proportion of carbon becomes greater. Anthracite has a metalloid lustre, and contains 90 % of carbon. It burns with great heat, giving off no smell or smoke. Probably its gaseous constituents were driven off through the ages. C. is of great economic value, and its distribution is restricted. Holland and Denmark have no coal, Sweden and Italy very little, that in China and Persia is scarcely worked. Four-fifths of the world's c. is produced in Great Britain, the U.S.A., and Germany. It is calculated that all the available Brit. c. will be exhausted in 600 years.

There are six large coal-fields in Britain, and on these are many large manufacturing towns. To the south-east of a line drawn from the Severn to the Wash no c. appears on the surface. There are four well-marked varieties. *Caking* c. from Newcastle fuses together and burns in a compact mass; the *splint* c. from Scotland, difficult to break and to light, gives a clear and lasting fire; the *Staffordshire* c. burns easily, has a white light ash, leaves but few cinders, and does not cake; *cannel* c. burns with a clear flame and crackles as it burns; it is largely employed to manufacture illuminating gas. Anthracite burns with a red heat and is very hard and smokeless, hence its use in war-vessels where concealment is important.

Coal-fields.—Yorkshire produces about 42 million tons; Northumberland and Durham, 33 millions; these fields ship to all parts of the world what is not consumed in the ironworks and shipyards. South Wales supplies anthracite to the coaling stations. Scotland sends to the shipbuilding ports, ironworks, and Ireland. Lancashire is the cotton coal-field. The Staffordshire coal-fields supply the potteries and Birmingham. There are large c. deposits throughout the Brit. empire, especially in Canada and Australia. Coaling stations have been established in all parts of the world, for the convenience of steamers and war-ships.

Coal-mining.—Some coal-pits such as those in Belgium are 3500 ft. deep, and in some districts mines run out far under the sea. Before the introduction of the steam-engine many mines were rendered useless by being flooded with water from the springs they traversed. After the steam-engine gave sufficient power to pump the water out, these shallow excavations were transformed into deep mines. Deep workings require to be very carefully ventilated by steam-fans in order that fire-damp or marsh-gas may be carried away, as it is apt to give rise to explosions. The risk is also reduced by the use of Davy safety lamps, through which the flame cannot pass. Dry c. dust is also a frequent cause of explosion.

C. seams may crop up on a hill or along a valley. Usually they are reached by pits or shafts sunk vertically downwards, from which galleries are excavated to follow each seam. If the c. seam is in a valley the tunnel is made with an upward slope to allow water to drain off. Seams only an inch or so thick may be worked. The average thickness in the Brit. fields is 3 to 5 ft., though they may be from 30 to 60 ft. thick.

C. in the native state is used as fuel for heating and for driving engines, steamboats, and machines. When c. is subjected to destructive distillation, gas, the chief illuminating agent, is obtained, and as a by-product coal-tar. From it the aniline dyes are manufactured, and these have almost replaced the natural dyes while exceeding them in range and vividness. It is said that 2000 distinct shades can be made from a ton of c. Benzene, an organic liquid with great solvent properties, has many industrial and laboratory applications. The phenols are perhaps the most powerful and satisfactory antiseptics which exist. Drugs like antipyrin, acitanilid, and phenacetin, paving substances, coaling preparations, explosives, perfumes, and ammonia are other derivatives.

H. W. Hughes, *Text-Book of Coal-Mining* (1893); R. Meldola, *Coal, and what we get from it* (1891); E. A. Martin, *The Story of a Piece of Coal* (1896); J. A. Phillips, *Metallurgy* (1891).

COALBROOKDALE (52° 37′ N., 2° 27′ W.), town, Shropshire, England; ironworks.

COAL-FISH (*Pollachius carbonarius*), edible fish of the family *Gadidæ*, found on European and American coasts of North Atlantic Ocean.

COALING STATIONS.—Naval warfare requires the means of replenishing vessels with coal, and Britain has secured the best coaling ports in the world. A royal commission was app. to investigate them in 1878. The defence of Brit. coaling stations really lies with the navy—Gibraltar is the only real 'fortress.' It has now become possible to coal a fleet at sea, and hence some prefer the term, 'secondary base,' to 'coaling station.'

COALITION, political term designating the combination for common ends of two or more political factions against another section; examples are the Great C., 1782; and that formed by Liberals, Labour and Nationalists against Conservatives, 1910– ; must be distinguished from non-party system; in c. politicians still retain their party, and, the end aimed at by the c. achieved, may separate once more into opposite factions.

COAL-TAR.—The importance of this substance was realised only when Faraday discovered benzene and Perkin isolated the first aniline dye, mauve. When coal is heated beyond its decomposition point without access of air (destructive distillation), three products are obtained: (1) dried residue, (2) evolved gases, (3) condensed distillate. The last separates into two layers: (1) holds a small portion of the distillate in solution, and consists of water either previously existing in the coal or produced during the destructive distillation; (2) a viscid, dark-coloured oil, sometimes heavier, sometimes lighter than (1). This is c.-t. Its quality and quantity are influenced by the temperature at which the decomposition is carried on. At low temperatures the hydrocarbons produced are mostly fatty, at high temperatures aromatic. The quality of the coal and the shape of the gas retorts are other factors which alter the nature of the products, since if the gas retort is so shaped that the gases are kept in contact with the hot walls much decomposition results.

C.-t. is a complex mixture of chemical compounds, all of which have not yet been isolated. It is employed as a coating for preserving stone, iron, and timber. Mixed with dry lime and clay, it forms asphalt for paving. The dyeing industry consists today of the successful isolation and utilisation of its compounds. It provides excellent antiseptics and analgesics. Commercial ammonia is manufactured as a by-product.

COALVILLE (52° 46′ N., 1° 7′ W.), town, Leicestershire, England; coal mines. Pop. (1911) 18,550.

COAST DEFENCE.—This must always depend on the general naval strength of a power. With the general naval developments of recent years the problem of c. d. has taken on a new phase. Up to the bombardment of Alexandria in 1881 signalling, searchlights, and torpedoes were rudimentary. The improvements in guns have been most important, both in velocity and range, so that it is possible to have fewer guns and greater distances between forts than heretofore. Much has been done too in the strengthening and concealment of forts and the guns which defend them. Two kinds of submarine mines have been adopted, 'observation' and 'contact' mines, also the Brennan torpedo, which is worked from the shore. Various methods of defence against torpedo-boat attack have been devised; there is generally a line of searchlights, then a lighted area defended with quick-firing guns, then timber obstacles fastened with chains. For the communication of information and orders between forts, an elaborate telephone and telegraph system is used. Each fortress has a commander with a staff under him, and large forts are divided into sections; the forts are in communication with naval signal-stations in the neighbourhood.

COASTGUARD, naval force formed to suppress smuggling; used also as naval reserve and to assist shipwrecked vessels.

COAT OF ARMS, see HERALDRY.

COATBRIDGE (55° 52′ N., 4° 3′ W.), town, Lanarkshire, Scotland; large ironworks. Pop. (1911) 43,287.

COATESVILLE (39° 58′ N., 75° 50′ W.), borough, Pennsylvania, U.S.A.; ironworks; silk and woollen mills. Pop. (1910) 11,084.

COATI, COATI MUNDI (*Nasua*), genus of mammals allied to the raccoon, living in Mexico, Central and S. America, and characterised by their long flexible snout; they live on trees and feed on insects and lizards.

COBALT (Co=59), lustrous, greyish-white, ductile, metallic element, M.P. 1530°, occurring chiefly in smaltite or speiss-cobalt ($(Co,Ni,Fe)As_2$), cobaltite (CoAsS), linnæite (Co_3S_4), and skutterudite ($CoAs_3$); obtained by converting the ores into oxides by roasting, and reducing the latter by heating with carbon or aluminium. C. forms two series of compounds, cobaltous and cobaltic, and complex salts with ammonia known as cobaltammines, characterised by their red or blue colour. They are used as stains or pigments in pottery and glass-making.

COBALTITE (CoAsS), mineral occurring in compact masses or in lustrous, metallic, silver white, or greyish-reddish cubic crystals. Found chiefly in Scandinavia, Cornwall, and Westphalia, and used for the preparation of smalt.

COBAN (15° 40′ N., 90° 15′ W.), town, on Cojabón, Guatemala; coffee. Pop. 6351.

COBAR (31° 30′ S., 145° 35′ E.), town, N. S. Wales, Australia; copper and gold mines. Pop. 3371.

COBBETT, WILLIAM (1766–1835), Eng. politician; served in army, 1784–91; in 1792 went to Philadelphia, where he attacked Amer. institutions, for which he was fined; returned to England, 1800; attacked the Irish Government and developed Radical views; imprisoned, 1809–11, for protesting against flogging of militia; was elected M.P. for Oldham in 1830, and again 1834; broke down in health and d. next year; wrote works on history and politics, and contributed extensively to periodicals; a good stylist and vigorous controversialist. *Life*, by E. I. Carlyle (1904); *Life and Letters*, by Melville (1912).

COBBOLD, THOMAS SPENCER (1828–86), Eng. scientist; lecturer on bot. at St. Mary's hospital, London, on zool. and comparative anat. at the Middlesex hospital; Bot. prof. at Royal Veterinary Coll.; an eminent authority on parasites and parasitic diseases.

COBDEN, RICHARD (1804–65), Brit. statesman; s. of a Sussex farmer. His education at Midhurst Grammar School was scanty, and when about fifteen he went into a warehouse in London. He was for some time a commercial traveller, and in 1830 went to Manchester as a cotton printer. He had become interested in political and economic questions, and in 1835 pub. a pamphlet, *England, Ireland, and America, by a Manchester Manufacturer*. He then paid a visit to the U.S.A., and travelled in the East. He returned in 1837, was elected M.P. for Stockport, and devoted all his energies to the anti-Corn-Law agitation. After the repeal of the Corn Laws in 1846, Sir Robert Peel acknowledged Cobden as the man to whom success was due. C. then travelled abroad, and interested himself in the promotion of peace among European nations; protested against the animosity towards France in 1852, and opposed the Crimean War. He then attacked Brit. action in China, and lost his seat. He arranged a commercial treaty between Britain and France in 1860, and was greatly honoured in both countries. In a short time he broke down in health, and died. Great tributes were paid to his memory in the House.

He did not always foresee accurately the results of his own work, but his honesty and ability won him the greatest respect in, as also since, his lifetime.

Morley, *Life of Cobden*; a full biography.

COBET, CAREL GABRIEL (1813–89), Dutch writer on classics.

COBHAM (51° 24′ N., 0° 25′ E.), village, Kent, England; church contains collection of ancient brasses.

COBIJA, PUERTO LA MAR (22° 32′ S., 70° 15′ W.), small seaport town, Antofagasta, Chile; exports gold.

COBLE, lug-sailed fishing-boat used on Eng. coast (N.E.), with rudder projecting below the bottom.

COBLENZ, KOBLENZ, ancient *Confluentes* (50° 21′ N., 7° 35′ E.), fortified city, capital of Rhine province, Germany, at junction of Rhine and Moselle, opposite fortress Ehrenbreitstein. C. has numerous ancient buildings and several churches, including church of St. Castor (founded 836; rebuilt XII. cent.); C. belonged to Treves from 1018 till taken by France, 1794; assigned to Prussia, 1815; made seat of govt. of Rhine province, 1822; wines, pianos. Pop. (1910) 56,478.

COB-NUT, fruit of W. Indian *Omphalea trianda*; large hazel-nut.

COBOURG (43° 58′ N., 78° 15′ W.), city, Ontario, Canada; foundries, woollen mills. Pop. 4000.

COBRA, COBRA DI CAPELLO (*Naja tripudians*),

poisonous snake of tropical Asia, especially India; attains a length of almost 6 ft., and is remarkable for its hood formed by the skin of the neck being expanded by the anterior ribs, bearing a white spectacle-mark on the back. It is exhibited by Ind. snake-charmers. *N. haje* is the African cobra, or spy-slange.

COBURG (50° 15′ N., 12° 59′ E.), manufacturing town, on Itz, Germany; alternate capital with Gotha of Saxe-Coburg-Gotha; chief buildings, Ehrenburg Palace (1549), residence of Duke of Saxe-Coburg-Gotha; ancient castle of Coburg (XI. cent.) contains relics of Luther; various monuments, including statue of Prince Albert, erected by Queen Victoria, 1865; important trade in cattle. Pop. (1910) 23,789.

COCA, Cuca (*Erythroxylon coca*), shrub of order Erythroxylaceæ, growing in S. America. The leaves are a powerful stimulant, and are chewed, with an alkali, by the natives, who, under its influence, can go for several days without food. *Cocaine* (q.v.) is obtained from the leaves.

COCAINE ($C_{17}H_{21}NO_4$), alkaloid obtained from leaves of coca plant (*q.v.*); white crystalline substance, bitter, slightly soluble in water; exceedingly valuable as local anæsthetic; causes dilatation of pupil of eye; strongly poisonous.

COCANADA, Coconada (16° 57′ N., 82° 15′ E.), seaport, Madras, India; rice, cotton, and sugar exported. Pop. 47,866.

COCCEIUS, JOHANNES, Koch (1603–69), Dutch theologian; prof. at Bremen, Franeker, and Leiden.

COCCIDIA, order of Protozoa, belonging to the class Sporozoa, are parasites in cells, mainly of tissues associated with the digestive system, of annelida, arthropoda, mollusca, and vertebrata. They undergo a complex life-cycle, and that of *Coccidium schubergi*, parasitic in the intestine of the centipede *Lithobius forficatus*, is typical for many species. A cyst ('oocyst') containing 'spores' is swallowed by the host along with its food, and dissolved, the liberated spores dividing into two forms, the sickle-shaped adult coccidium ('sporozoite'), which by active movement enters a cell of the intestine, and coming to rest assumes a rounded shape ('trophozoite'), and assimilates the contents of the cell. The nucleus of the trophozoite divides into a number of daughter nuclei, each surrounded by protoplasm. The 'schizonts' thus formed assume a shape like the sporozoites, burst from the exhausted cell, and actively enter fresh cells of the intestine of their host. The 'merozoites,' by which name the parasites are known at this stage of their life-cycle, now repeat the same process while destroying the cells. After a few days, however, instead of becoming schizonts some of the merozoites develop into two different kinds of elements, round passive macrogametes (female) and slender active microgametes (male), bearing a flagellum. Fertilisation (amphimixis) takes place, and the resulting cell ('zygote') surrounds itself with a membrane forming an 'oocyst.' The latter may pass from the host, and the nucleus and the protoplasm of the zygote form four 'spores,' each of which divides into two 'sporozoites,' which are liberated in the intestine of a new host.

COCCINELLIDÆ, see Polymorpha.

COCCULUS INDICUS, name for brown, dried berries of the climbing shrub *Anamirta cocculus*. Its active principle, picrotoxin, is a powerful poison, and is used in an antiparasitic ointment, and internally to check night-sweats in phthisis.

COCCUS, see Bacteriology.

COCCYX (Anat.), the tail end of the vertebral column in man, consisting of four vertebræ—more or less fused.

COCHABAMBA (17° S., 65° W.), central department, Bolivia, S. America; occupies extensive plateaus among offshoots of E. Cordilleras; grain, rubber; area, 23,321 sq. miles. Pop. *c.* 420,000.

COCHABAMBA, Oropesa (17° 25′ S., 65° 45′ W.), city, Bolivia, S. America; bp.'s see; cottons, woollens. Pop. 28,000.

COCHEM (50° 10′ N., 7° 8′ E.), town, on Moselle, Germany; wines. Pop. 3819.

COCHERY, LOUIS ADOLPHE (1819–1900), Fr. statesman; supported revolution of 1870.

COCHIN (*c.* 10° N., 76° E.), native state, India, between Malabar and Travancore, a small portion of S.W. angle bordering Arabian Sea; surface generally occupies sloping plains; watered by numerous rivers forming series of shallow lagoons, subject in wet seasons to sudden swells; communication chiefly by boat; teak forests; rice; capital, Ernakulam; area, 1362 sq. miles. Pop. (1911) 918,639.

COCHIN (9° 58′ N., 76° 17′ E.), seaport town, Malabar district, Madras, India; formerly capital of Cochin State; taken from Dutch by British, 1796; shipbuilding. Pop. *c.* 20,000.

COCHIN, DENYS MARIE (1854–), Fr. Conservative politician and author.

COCHIN-CHINA (8° 35′ to 11° 43′ N., 104° 25′ to 107° 35′ E.), Fr. possession, S.E. Asia; bounded N. by Cambodia and Annam, S.E. by South China Sea, W. by Gulf of Siam; area, *c.* 20,000 sq. miles; surface mainly broad plain; mountainous in N.; watered by Mekong, Dongnai, and other rivers; climate subject to monsoons. Majority of inhabitants are Annamese; religion, Buddhism. Country has gradually come under Fr. control since 1862; education is good, there are many schools, medical and secular; Saigon, the chief town, is lit by electricity, and in other respects is modern; area, 21,988 sq. miles. Pop. (1911) 3,050,785.

H. Russier et H. Brenier, *L'Indochine Française* (1910).

COCHINEAL, reddish dye-stuff, prepared from the hemipterous insect *Coccus cacti*, living on the cactus *Opuntia coccinellifera* of Mexico and Peru. Since carmine and other colouring agents can be obtained from c., the insect has been cultivated, in Algiers, Spain, Canary Islands, for commercial purposes; dye used for confectionery and biological laboratory stains.

COCHLEA, see Ear.

COCHRANE, THOMAS, see Dundonald, Earl of.

COCK, EDWARD (1805–92), Eng. surgeon; pres. Royal Coll. of Surgeons (1869); introduced new and valuable modes of operation.

COCKADE, bunch of ribbon worn in the hat. *Black* c's were worn in George II.'s army; *white* by Jacobites. In 1798 green c's were worn by the Fr. revolutionaries; these were replaced later by the tricolour.

COCKAIGNE, LAND OF, imaginary land where all is idleness and luxury.

COCKATOOS, *Cacatuidæ*, parrot-like birds which differ from the parrots in bearing a crest of feathers, and in their quiet white, grey, and black colouring; found only in the Australian region and the Philippines. The popular name imitates the call of some species.

COCKATRICE, fabulous monster, said to have been hatched by a reptile from a cock's egg; its look was said to cause death. In mediæval art the c. represents sin generally.

COCKBURN, SIR ALEXANDER JAMES EDMUND (1802–80), Lord Chief Justice of England; ed. Trinity Hall, Cambridge; called to Bar, 1829; in 1834 was made member of Commission of Inquiry into corporations of England and Wales; Q.C., 1841; became famous as a counsel; elected M.P. for Southampton, 1847; Solicitor-General, 1850; Attorney-General, 1851; Chief Justice of Common Pleas, 1856; was a brilliant orator.

COCKBURN, ALISON (1713–94), Scot. poet; wrote one version of *Flowers of the Forest*.

COCKBURN, SIR GEORGE, Bart. (1772–1853), Brit. admiral.

COCKBURN, LORD HENRY THOMAS (1779–1854), Scot. judge; shared with Jeffrey the leadership of Scot. Bar; Solicitor-Gen. for Scotland (1830); author of *Life of Jeffrey*, and *Memorials of his Time* (1856),

a fine picture of Edinburgh society; contributed to *Edinburgh Review*.

COCKCHAFER, large subterranean beetle (*Melolontha vulgaris*), very destructive to trees, as it feeds on the roots near which it has been laid; killed by bats and rooks. See CHAFERS.

COCKER, EDWARD (1631-74), Eng. teacher who compiled the famous Cocker's *Arithmetick* (1678); hence the phrase, 'according to Cocker.'

COCKERELL, CHARLES ROBERT (1788-1863), Eng. architect.

COCKERILL, WILLIAM (1759-1832), Eng., afterwards naturalised Fr., inventor; first to establish wool-spinning factories on Continent. — **Cockerill, John** (1790-1840), s. of above, extended former business, established great iron foundries; constructed several continental railways.

COCKERMOUTH (54° 40′ N., 3° 22′ W.), market town, on Derwent, Cumberland, England; ruined castle; Wordsworth's birthplace; woollens. Pop. (1911) 5203.

COCK-FIGHTING, sport of 'cocking' with gamecocks; prohibited in Britain (1849).

COCKLE (*Cardium*), genus of bivalve molluscs containing numerous species, the common c. (*C. edule*) being gathered for food. The shell is rounded, ribbed, and shaped like a heart when viewed from one end.

COCKLE, SIR JAMES (1819-95), Eng. mathematician and lawyer; Chief Justice, Queensland (1863), retiring to England (1879); performed research in higher algebra; pres., London Mathematical Soc. (1888).

COCKNEY, native of London; the 'Cockney school of poetry' was the name levelled at Keats, Leigh Hunt, and others. 'Cockney' accent is the term applied to pronunciation of lower classes; it is illustrated in Albert Chevalier's 'Coster' songs.

COCK-OF-THE-ROCK (*Rupicola*), genus of northern S. American birds (family Cotingidæ), about size of pigeon; orange plumage and high crest.

COCK-PAIDLE, see LUMPSUCKERS.

COCKPIT.—(1) floor of building, surrounded with rising seats, where cock-fighting took place. (2) after-part in one of lower decks of ship, set aside for wounded during a battle.

COCKROACH (*Blattidæ*), family of orthopterous insects, with flattened body and long antennæ. Many species troublesome in houses; have an offensive smell. *Stylopyga orientalis* is the common black 'beetle' common in northern countries. *Periplancta americana* is sometimes found on ships. Fossil c's have been discovered in Carboniferous rocks.

COCK'S-COMB (*Celosia*), herbaceous annual (order Amarantaceæ), cultivated in various species for its large plume-like mass of red or purple flowers.

COCKTON, HENRY (1807-53), Eng. novelist; author of *Valentine Vox* and *Sylvester Sound*.

COCO DE MER, DOUBLE COCO-NUT (*Lodoicea Sechellarum*), variety of palm found chiefly in Seychelles Islands; fruit is extremely large and takes years to ripen.

COCOA, CACAO, pulverised seeds of the evergreen tree *Theobroma cacao*, order Sterculiaceæ; native of tropical America, cultivated in W. Indies, W. Africa, Ceylon, and E. Indies. The fruit, a 'pod' of the shape of a gherkin up to 10 in. in length, contains five cells, in each of which is a row of up to twelve seeds packed in a pulp. The seeds or 'beans' are extracted and fermented in covered barrels or under leaves, thus losing their bitter flavour. When dried and polished they are ready for the market. After roasting are gently crushed, the product being known as '.' The latter contain up to 50 % of fat, which is extracted in powerful hydraulic presses and used for pharmaceutical purposes. Although a rich beverage can be obtained by boiling nibs in water, the ordinary cocoa, consisting of the finely powdered and prepared seeds partly dissolved but the greater part suspended in boiling water, is more palatable. The dietetic value of c. is due to fat, starch, and nitrogenous matters contained and to the stimulating effect of the alkaloid theobromine, allied to the theine and caffeine of tea and coffee.

COCO-NUT PALM (*Cocos nucifera*), palm-tree found growing to as great a height as 100 feet in tropical Asia, Africa, America, and especially the islands of the Pacific. Coco-nut is a pleasant food; 'milk' contained in c.-nut is a refreshing drink; 'arrack,' a spirituous liquor, is produced from flowers; the timber is used in buildings; coir (*q.v.*), copra (*q.v.*), and a valuable oil are obtained from various parts of the nut.

COCOON, silky covering spun by various types of larvæ; silkworms' c. of special commercial value. See SILK.

COCOS ISLANDS, see KEELING ISLANDS.

COCYTUS (*c.* 39° N., 21° E.), river, Epirus, Greece; tributary of Acheron.

COD (*Gadus callarias*), soft-finned fish, typical of the family *Gadidæ*, found chiefly in the N. Atlantic waters, much valued as a food and for the oil obtained from it; usually fished for by hand-lines or trawl. C. weigh generally about 10 lb., but have been found weighing as much as 70 lb. The female is very prolific, sometimes producing eight or nine million eggs in spawning season.

CODE, a compilation, or digest, of laws, often associated with the name of a particular person, such as the 'Justinian C.,' the 'Draconian C.,' the 'Clarendon C.,' the 'Code Napoléon,' etc.; system of rules governing conduct or etiquette ('code of honour'); table of signs, flags, etc., used in signalling ('Morse C.' and others).

CODE CIVIL, CODE NAPOLÉON, is the standing body of law in France; drawn up by Pothier, Cambacérès, and others, and issued under direction of Napoleon, 1804 (who altered several clauses), it unified and simplified local laws and legal procedure.

CODICIL, see WILL.

COD-LIVER OIL, oil obtained from the liver of the cod (*Gadus morrpua*) commercially by a process of steaming; contains some acids not found elsewhere in animals. Taken either pure or in emulsions, it is very easily absorbed, and invaluable in building up the frame after wasting diseases like tuberculosis.

CODRINGTON, CHRISTOPHER (1668-1710), Eng. colonial gov. and soldier; founder of C. Coll., Barbadoes.

CODRINGTON, SIR EDWARD (1770-1851), Brit. admiral; entered navy, 1783; served in war with France, at *Trafalgar*, off Spain, in America, and in Greek War of Independence; cr. K.C.B., 1815; admiral, 1837.

CODRUS, see ARCHON.

CODY, WILLIAM FREDERICK (1846–), Amer. scout and showman; famous shot ('Buffalo Bill').

CODY, COLONEL S. F. (1862–), Amer. aviator; first man to fly in Britain; first in War Office Aeroplane Competition, Aug. 1912.

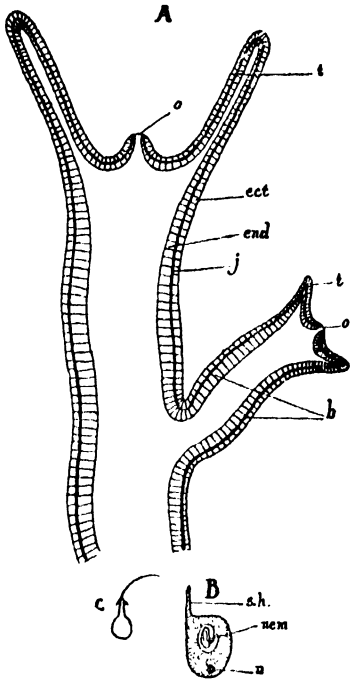
CO-EDUCATION, see EDUCATION.

COEFFETAU, NICOLAS (1574-1623), Fr. Catholic divine; wrote *History of Rome*.

COEHOORN, MENNO, BARON VAN (1641-1704), Dutch soldier and military engineer; took part in war against France, 1673 onwards; distinguished himself under Marlborough, especially at *Namur*, 1692, and at capture of Bonn and siege of Huy, 1703; wrote works on fortification (*q.v.*).

CŒLENTERA, group of animals including zoophytes, jelly-fish, sea-anemones, corals, etc., being marine, with the exception of a few freshwater species (*e.g. Hydra*). They are characterised by the absence of a body cavity (cœlom) apart from the digestive cavity (enteron), and their body wall consists of two layers of cells (ectoderm and endoderm) with a supporting jelly-like middle layer (mesogloea). They mostly possess stinging cells. Some c. show a polypoid or

tubular and sedentary, often colonial, type and a medusoid or free-swimming type. The principal



CŒLENTERA. *A*, diagrammatic longitudinal section of a simple Cœlenterate with a bud attached; *B*, a stinging-cell (cnidoblast) with a nematocyst inside; *C*, a discharged nematocyst; *b*, bud; *ect*, ectoderm; *end*, endoderm; *j*, jelly; *n*, nucleus; *nem*, nematocyst; *o*, mouth; *s.h.*, sense hair; *t*, tentacle.

classes are: Hydromedusæ, Scyphomedusæ, Anthozoa, Ctenophora (*qq.v.*).

COELLO, ALONSO SANCHEZ (1515-90), Span. artist.

COELLO, ANTONIO (*c.* 1610-52), Span. poet and dramatist.

COEN, JAN PIETERSZOON (1587-1630), gov.-gen. of Dutch East Indies.

CŒNACULUM, room for supper, *e.g.* where Last Supper was eaten.

CŒNURUS, a larval tapeworm (*q.v.*).

CŒNWULF (d. 821), king of Mercia, a division of England (796).

CŒUR, JACQUES (*c.* 1395-1456), Fr. merchant; founder of trade between France and the East; in 1436 went to court of Charles VII. and assisted in purifying the coinage; became very wealthy and powerful; his enemies brought about his overthrow in 1450; C. was imprisoned, escaped, and received by Pope in Rome; d. on expedition against Turks.

COFFEE, the seeds of evergreen shrubby trees of the genus *Coffea* (order *Rubiaceæ*), particularly of the species *C. arabica* and *C. liberica*. The beverage has been known in Abyssinia for probably more than a thousand years, and the plant was introduced into Arabia in the XV. cent. and later became more extensively cultivated in tropical Asia and America. Its white and fragrant flowers grow in clusters in the axils of the leaves. The fruit is a red, fleshy berry resembling a cherry, and containing seeds in a yellowish pulp. The seeds are enclosed in a membrane (endocarp) called the 'parchment,' and each seed in a finer covering known as 'silver skin.' The pulp is removed either after drying the 'cherries' in the sun or in the wet method by water and special machinery; the seeds are subsequently dried, the parchment and silver skin removed by rollers, rubbing, and winnowing, and the beans are ready for shipping. They are sorted out into various grades to ensure uniformity in roasting. Roasting and grinding should be carried out shortly before the decoction is made. The valuable physiological action of c. as a stimulant of the nervous and vascular system is to a great extent due to the alkaloid caffeine. C. is frequently adulterated, chiefly with chicory. The latter is widely used on account of its rich brown infusion with hot water, which gives 'body' to weak c. Arabian c. is called *mocha*. The principal c. exporting countries in order of importance are Brazil, Venezuela, Guatemala, Dutch East Indies, Colombia, Brit. India, Haiti. The consumption of c. per head per annum is approximately: Holland, 15 lb.; Germany, 7 lb.; France, 5 lb.; Austria-Hungary, 2 lb.; U.K., 1 lb.

Look, *Coffee: its Culture and Commerce in all Countries* (1888).

COFFEE-HOUSES, predecessors of the modern club; first opened in Constantinople during XVI. cent.; introduced into England, 1650, France, 1671, and soon into other European countries; they formed a resort for men of fashion, and different houses were patronised by different cliques; Addison patronised Button's, gamblers resorted to Jonathan's in Change Alley, Scotsmen flocked to the British in Cockburn Street. C.-h. were means of circulating news before the introduction of daily papers.

COFFER, chest for valuables; mediæval Ital. marriage-coffers were often carved, inlaid, and otherwise richly decorated; also term for a certain panel in architecture.

COFFERDAM, a water-tight enclosure of clay and piles, from which the water is pumped, in a river, etc., in order to construct foundations for bridges, piers, etc.; also a water-tight appliance on the side of a ship to facilitate repairs under water.

COFFEYVILLE (37° 2′ N., 95° 37′ W.), city, on Verdigris, Kansas, U.S.A.; bricks, flour; ships grain. Pop. (1910) 12,687.

COFFIN, receptacle for the dead. The ancients used c's made of baked clay; stone came later into use, and lead c's were common during Middle Ages. Wooden shells came into general use during the XVII. cent., before which time the poor were buried merely in grave-clothes.

COG, round-bodied, trading ship of mediæval times.

CŌGERS HALL (1755), debating society holding meetings in various London taverns; Wilkes, Dickens, and other public men among members.

COGNAC (45° 41′ N., 0° 19′ W.), town, Charente, France; brandy. See SPIRITS.

COGNITION, term used to denote state of conscious knowledge of anything, whether physical or not.

COGNIZANCE, BADGE, see HERALDRY.

COHN, FERDINAND JULIUS (1828-98), Ger. botanist; prof. of bot., Breslau (1859); founder of the science of bacteriology; did invaluable research on bacteria, algæ, and fungi, and pub. many notes on these and allied subjects.

COHOES (42° 45′ N., 73° 46′ W.), city, at confluence of Mohawk and Hudson, New York State, U.S.A.; cotton and woollen mills. Pop. (1910) 24,709.

COHORT, in Rom. army military body about 600 strong, or tenth part of legion; loosely, a body of armed men.

COIF, part of insignia of serjeants-at-law; white piece of cloth with smaller black portion superimposed, placed on top of wig; formerly used to be skull-cap.

COIMBATORE (10° 59′ N., 76° 59′ E.), district, Madras, India; flat country hemmed in by mountains on N., W., and S.; watered by Cauvery and tributaries; area, 7860 sq. miles. Pop. 2,201,752. Capital, COIMBATORE, on Noyil; ceded to Britain, 1799; exports cotton, cereals, cattle, and hides. Pop. 53,080.

COIMBRA (40° 13′ N., 8° 24′ W.), town, on Mondego, Beira, Portugal; formerly capital of Portugal and burial-place of many early kings; bp.'s see; has two cathedrals; famous univ. (founded 1288); library and military coll.; grain, fruit. Pop. 18,144.

COIN (36° 44′ N., 4° 50′ W.), town, on Séco, Málaga, Spain; marble quarries.

COINS, as legal medium of exchange, replaced metal ingots *c.* 720 B.C.; first struck in Asia Minor, bearing head of lion; Gk. coins bore head of god, or scene from mythology, as well as name of city; some are beautifully designed; gold, silver, copper, brass used; in mediæval times the habit of clipping coins led to much annoyance, as coin was seldom its full face value; William III. permanently introduced milled edges, though milled c. were issued by Charles I., 1637. Modern Brit. gold coins are £5, £2, £1, 10s.

Gardner's *Catalogue of Greek Coins* (1883); Head, *Historia Numorum* (1887).

Coining.—Every person commits a felony who makes, gilds, or silvers any current coin; or who files, clips, or alters any coin with intent to make it pass for current gold or silver coin; or who imports any counterfeit coin from beyond the seas; or has in his possession any of the implements used in coining. The coining of *good* money, without permission of the Crown, is also a crime.

COIR, fibrous substance obtained from external husk of coco-nut; used for making matting, etc.

COIRE, CHUR (46° 51′ N., 9° 31′ E.), town, Grisons, Switzerland; ancient *Curia Rhætorum*; many interesting specimens of mediæval arch.; bp.'s see; centre of transit trade in wine, tobacco, and clocks. Pop. (1912) 15,100.

COKE, the product obtained by depriving coal of volatile constituents through heating it in ovens, air being excluded. It is hard, porous, and of a semi-metallic lustre, and consists essentially of carbon. It is manufactured in ovens of different construction. In the beehive-oven, so-called from its shape, the required heat is supplied by the partial combustion of the coal. The retort and condensing ovens of various patterns are more economical, and permit the collection of the valuable by-products—gas, tar, ammonia. C. is used in metallurgy, chemical industry, for domestic fuel, etc.

COKE, SIR EDWARD (1552–1634), Eng. barrister; ed. Trinity Coll., Cambridge; called to Bar, 1578; his abilities were soon recognised; elected M.P. and Speaker, 1593; Attorney-General, 1594; Crown lawyer in trial of Raleigh, and remembered for brutality to accused; Chief Justice of Common Pleas, 1606; vigorously defended common law against royal prerogative; offended king, and was imprisoned, 1620; retired, 1628; famous as a legal writer.

Johnson, *Life of Sir Ed. C.*; Woolrych, *Life of C.*; Campbell, *Lives of the Chief Justices.*

COKE, SIR JOHN (1563–1644), Eng. politician; Sec. of State (1625–39).

COKE, THOMAS (1747–1814), Anglican clergyman, then follower of Wesley; became Methodist bp. in America, 1787; anti-slavery worker.

COLBERT, JEAN BAPTISTE (1619–83), Fr. statesman. In 1651 he was employed by Cardinal Mazarin, and quickly rose in influence. After Mazarin's death in 1661 he entered the employment of Louis XIV., and was made superintendent of buildings, 1664, controller-general, 1665, and minister of marine, 1669. He reformed the burdensome taxation, making it, to a certain point, juster and more economical. He did much to raise the prosperity of France, strengthened the navy, and was interested too in lit. and art. His sending men to be galley slaves is a serious blot on his character. Owing to the rivalry of Louvois his influence with Louis waned shortly before his death.

Lavisse, *Histoire de France*; and *Cambridge Modern History*, vol. v.

COLBERT DE CROISSY, CHARLES, MARQUIS (1625–96), Fr. diplomatist; Intendant of Alsace, 1658; represented France at conference of Aix-la-Chapelle; ambassador to London, 1668.

COLBURN, HENRY (d. 1855), Eng. publisher; founded *New Monthly Magazine*, 1814.

COLBURN, ZERAH (1832–70), Amer. engineer; nephew of C., the mathematical prodigy; edit. successively of *The Railroad Advocate* (New York), *The Engineer*, and *Engineering* (London).

COLCHAGUA (34° 35′ S., 71° W.), province, Central Chile, between Argentina and Pacific, S. America; capital, San Fernando; stock-raising, mining; area, 3849 sq. miles. Pop. (1910) 159,421.

COLCHESTER (44° 34′ N., 73° W.), town, on Lake Champlain, Vermont, U.S.A.; cotton and woollen goods. Pop. (1910) 6450.

COLCHESTER (51° 53′ N., 0° 24′ E.), market town, river port, on Colne, Essex, England; site of first Rom. colony in Britain (*Camulodunum*); before conquest, seat of Brit. king, Cunobelin (Shakespeare's Cymbeline); ancient Rom. walls almost entire; museum of Rom. antiquities; castle—largest specimen of Norman arch. in England; remains of Augustinian Priory; many churches; grammar school (founded 1539) and a military dépôt; market for oyster fisheries and agricultural produce. C. was besieged by Fairfax, 1648. Pop. (1911) 43,463.

COLCHESTER, CHARLES ABBOTT, 1ST BARON (1757–1829), Eng. politician; Speaker of House of Commons.

COLCHICUM, MEADOW SAFFRON (*Colchicum autumnale*), plant of order Liliaceæ, with purple flowers, growing in rich soils in England, Ireland, middle and southern Europe generally. The dried and powdered corm, or bulbous root used as a drug, causes an increased amount of bile to be poured into the intestine, and is a specific for gout; poisonous in large doses; active principle is an alkaloid *colchicine.*

COLCHIS, ancient name of district of Asia Minor, eastern end of Black Sea, S. of Caucasus; nearly corresponding to former province *Mingreli* (modern Kutais); in Gk. myth. home of Medea and sorcery; land of 'Golden Fleece'; after Mithridatic war, became subject to Rome; annexed by Russia, 1866.

COLCOTHAR, name for reddish-brown ferric oxide obtained as a residue from distillation of ferrous sulphate in the manufacture of fuming sulphuric acid; used as a polishing powder and as a pigment (Ind. red).

COLD, low temperature, a decrease of the rapid molecular vibration which causes heat. The absolute zero or temperature at which there is no heat cannot be obtained practically. It is −273°. The nearest approach to it is liquid helium, which boils at 4°·3 absolute.

COLD HARBOR (37° 36′ N., 77° 16′ W.), Virginia, U.S.A.; scene of battles between Federals and Confederates, 1862 and 1864.

COLDEN, CADWALLADER (1688–1776), Scots-Amer. physician, botanist, and politician; was acting-gov. of New York at outbreak of War of Independence, and supported Brit. Government.

COLDEN, CADWALLADER DAVID (1769–1834), Amer. lawyer and politician; grandson of above.

COLDSTREAM (55° 40′ N., 2° 19′ W.), town, on Tweed, Berwickshire, Scotland; 'Coldstream Guards' raised here, 1650, by Gen. Monck.

COLDWATER (41° 54′ N., 85° 2′ W.), city, Michigan, U.S.A.; Portland cement; agricultural implements. Pop. (1910) 5945.

COLE, THOMAS (1801–48), Amer. landscape artist.

COLE, VICAT (1833–93), Eng. artist; A.R.A. (1870); R.A. (1880); *Pool of London*, in Tate Gallery.

COLEBROOKE, HENRY THOMAS (1765–1837), Eng. Orientalist; wrote *Sanskrit Grammar*, etc.

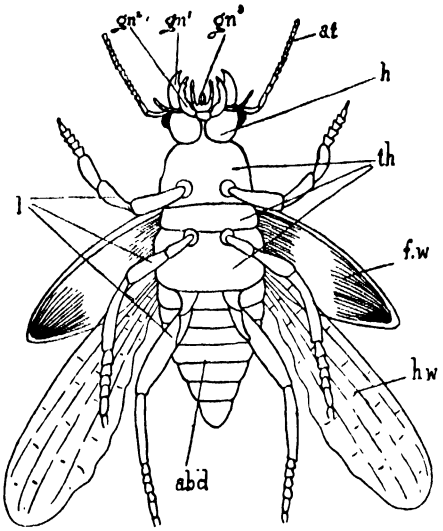
COLEMANITE, $Ca_2B_6O_{11}5H_2O$, Californian mineral occurring massive or in brilliant monoclinic crystals, of commercial value as source of borates and boracic acid. Varieties are priceite, ulexite, and pandermite; the last is found in Asia Minor.

COLENSO (28° 44′ S., 29° 50′ E.), village, Natal, S. Africa; scene of Brit. repulse in Boer War, Dec. 1899.

COLENSO, JOHN WILLIAM (1814–83), Anglican ecclesiastic; bp. of Natal, 1853; translated New Testament into Zulu; pioneer in 'Higher Criticism'; pub. works on Pentateuch and was excommunicated

by bp. of Cape Town, who consecrated a rival bp.; wrote works on math's.

COLEOPTERA, order of insects (Hexapoda) including the beetles and weevils, altogether about 150,000 species, characterised by the modification of the anterior pair of wings into hard horny covers (elytra) for the membranous posterior pair, which are folded underneath when not in use. In species with terrestrial habits the hind wings are greatly reduced in size, and the elytra frequently become fused to form an armour for the abdomen. The jaws are adapted for biting, the mandibles often being powerfully developed, those of the stag-beetle being a well-known example.



A BEETLE VIEWED FROM BELOW. *at*, single pair of antennæ; *abd*, abdomen; *f.w.*, fore wing; *gn*¹, *gn*², *gn*³, the three pairs of gnathites; *h.w.*, hind wing; *h*, head; *l*, walking legs; *th*, thorax.

As a rule the integument of the beetle is hard and horny, and the prothorax is movable on the mesothorax. The c. undergo complete metamorphosis (are holometabolic). The larvæ are more or less active grubs, and the inactive pupæ have their appendages free, not fixed to the body as in the case of butterfly pupæ. The development sometimes occupies many years. Some families are aquatic, as the Dytiscidæ and Hydrophilidæ. Stag-beetles, chafers, weevils, ladybirds, glow-worms, and click beetles are a few of the more representative families.

W. W. Fowler, *Coleoptera of the British Islands* (5 vols., London, 1887-91); J. L. Leconte and G. H. Horn, *Classification of Coleoptera of N. America* (Smithsonian Institute, Washington, 1883).

COLEPEPER, JOHN COLEPEPER, 1ST BARON, CULPEPPER (d. 1660), Eng. politician; at first against the king, but changed for fear of revolution; fought in Civil War; accompanied Charles II. in exile.

COLERAINE (55° 8′ N., 6° 41′ W.), seaport, market town, on Bann, Londonderry, Ireland; linen; salmon fisheries. Pop. 6500.

COLERIDGE, HARTLEY (1796–1849), Eng. poet; e. s. of Samuel Taylor C.; ed. Oxford; became writer for the magazines, and a schoolmaster at Ambleside; lacking stability, he failed in all his occupations. In his poetry he showed a marked kinship to Wordsworth, and left several sonnets of high literary quality; one of the most brilliant conversationalists of his day.

COLERIDGE, JOHN DUKE COLERIDGE, 1ST BARON (1820–94), Lord Chief Justice of England; ed. at Eton and Balliol Coll., Oxford; called to the Bar, 1846; Liberal M.P. for Exeter, 1865; showed ability at the Bar and in the House; took part in the first Tichborne trial; became Chief Justice of Common Pleas and baron in 1873; Lord Chief Justice, 1880; was a great speaker and a refined and scholarly man.

COLERIDGE, SIR JOHN TAYLOR (1790–1876), Eng. judge; nephew of Samuel Taylor C.; f. of the first Baron C., Lord Chief Justice of England.

COLERIDGE, SAMUEL TAYLOR (1772–1834), Eng. poet; b. Ottery St. Mary, Devon, where his f. was vicar; ed. Christ's Hospital, and Jesus Coll., Cambridge; got into debt, and enlisted in the dragoons, but was bought off by his family. C. and Southey married two sisters (Sara and Edith Fricker), and proposed to found a 'pantisocratic' settlement in America, but the scheme was abandoned. At Nether Stowey, Somerset, C. had Wordsworth for neighbour, and there they planned their joint-work, the *Lyrical Ballads* (1798), to which C. contributed *The Ancient Mariner*; here also he wrote the first part of *Christabel*, and *Kubla Khan* (pub. 1816). An earlier vol., *Poems on Various Subjects*, had appeared in 1796. C. had become a Unitarian, and, after the Somerset period, acted for some time as preacher. He spent a year in Germany, where he became interested in metaphysics. In 1779 he was in London, writing for the *Morning Post*; made his home at Keswick (1800), and pub. his trans. of Schiller's *Wallenstein*; went to Malta in search of health (1804); afterwards travelled in Italy. In 1808 he lectured on Shakespeare at the Royal Institution, London. His drama, *Remorse*, was produced at Drury Lane in 1813. His later publications include *Biographia Literaria*, *Sibylline Leaves*, *Aids to Reflection*, *The Constitution of Church and State*; and other works were pub. posthumously. In 1796 he became a victim to laudanum, which wrecked his health and literary faculties. He was long dependent for money upon the generosity of friends and admirers. C. has left us poetry, small in quantity, but of the noblest quality, which ranks him amongst the greatest writers in the Eng. tongue. No finer ballad poetry was ever written than *The Ancient Mariner*; *Christabel* and *Kubla Khan* are works of the highest metrical and imaginative beauty, and several shorter pieces are marked by the most exquisite literary charm.

J. D. Campbell, *Life of S. T. C.* (1894); H. D. Traill, *Coleridge*, English Men of Letters Series.

COLERIDGE, SARA (1803–52), Eng. poetess and miscellaneous writer; dau. of Samuel Taylor C.; pub. several translations from foreign authors; also *Pretty Lessons in Verse*, and a fairy tale, *Phantasmion*.

COLERIDGE-TAYLOR, SAMUEL (1875–1912), Brit. musician; s. of Eng. mother and W. African father; set *Hiawatha* to music; wrote *The Atonement*, a cantata; early death cut short promising career.

COLESBERG (30° 34′ S., 25° 33′ E.), town, C. province, Cape Province, S. Africa.

COLET, JOHN (1467–1519), Eng. Renaissance scholar; lectured on St. Paul at Oxford; one of pioneers of Humanistic movement; refounded St. Paul's School, 1512.

COLET, LOUISE (1810–76), Fr. lady novelist and poet.

COLEUS, genus of tropical herbs or shrubs with labiate flowers and ornamental foliage, for which various species have been cultivated in gardens.

COLFAX, SCHUYLER (1823–85), Amer. politician; member of Congress (Republican), 1855–69; Vice-Pres. of U.S.A., 1869–73; suspected of corruption, he retired into private life, 1872.

COLIC, a vague medical term, applied to sudden spasmodic pain in the abdomen; if the patient seems collapsed, the condition is not really c., and is usually very serious (perforation of an organ, acute intestinal obstruction, peritonitis, etc.), and a doctor must be sent for at once. C. may frequently be accompanied by vomiting or diarrhœa and quickening of the pulse; and it is usually classed under three heads—abdominal, renal, and hepatic c.

ABDOMINAL C. is distinguished by a twisting pain,

mainly round the umbilicus, and is often due to intestinal irritation caused by hard, undigested food. It may be due to lead-poisoning (*q.v.*), when other characteristic symptoms will be present.

RENAL C. is due to the passage of a stone, or *calculus*, along the ureter, which leads from the kidney to the bladder. The pain is very characteristic, and shoots downwards from the loin to the thigh and testicle on the same side.

In HEPATIC C. the pain shoots upwards to the right shoulder and backwards, and is due to the passage of a gall-stone along the bile-duct. Jaundice usually follows H. C.

COLIGNY, GASPARD DE (1519–72), Fr. Huguenot leader; of noble Burgundian family; after much active service in Fr. army, he became colonel-general and was famous as military reformer; made admiral of France (1552); defended Saint-Quentin in siege of 1557, and, on the town's being taken, was imprisoned and finally ransomed. Meanwhile C. had become a Huguenot. On death of Louis, prince of Condé, at *Jarnac*, he became leader of Prot. armies; after Peace of St. Germain he returned to court and became favourite of Charles XI. Huguenot influence at court brought reaction, and result was Massacre of St. Bartholomew, in which C. was slain.

A. W. Whitehead, *Gaspard de Coligny, Admiral of France* (1904); C. Merki, *L'Amiral de Coligny* (1909).

COLIMA, small Pacific state, Mexico; surface mountainous; fertile soil; on N. frontier is volcanic peak Colima (12,750 ft.); stock-raising, coffee; area, 2273 sq. miles. Pop. (1910) 77,704. Chief town is COLIMA. Pop. (1910) 25,148.

COLIN, ALEXANDRE (1526–1612), Flemish sculptor.

COLL (56° 37′ N., 6° 31′ W.), island, Inner Hebrides, W. coast of Mull, Scotland.

COLLAR, neckwear, in modern times usually of linen, but formerly of lawn and lace, succeeding the Elizabethan ruff; also applied to a livery, or decorative badge, as the 'C. of the Garter' and other orders of knighthood. In the Middle Ages a squire was cr. by investiture with a c. and spurs. Great lords and their followers were known by their rich collars, *e.g.* at the time of Wars of the Roses.

COLLAR-BONE, see SKELETON.

COLLATIA (41° 57′ N., 12° 41′ E.), ancient town, Latium, Italy.

COLLÉ (43° 25′ N., 11° 7′ E.), town, Siena, Italy; bp.'s see; cathedral; glass-works. Pop. 5791.

COLLÉ, CHARLES (1709–83), Fr. song-writer and dramatist.

COLLECTIVISM, modern Socialistic term signifying joint ownership and administration of capital by a community.

COLLEGE (Lat., *collegium*), originally a society, body, or corporation of persons engaged in common pursuits; a body of clergy living in common on a foundation; a society of persons joined together for educational purposes (see UNIVERSITIES).

COLLEMBOLA, family of wingless insects, named by Lord Avebury; *Podura*, which frequents stagnant water, is common type.

COLLEONI, BARTOLOMEO (1400–75), Ital. soldier; fought in turn for Venice and Milan.

COLLETTA, PIETRO (1775–1831), Neapolitan general; wrote *History of Naples*.

COLLEY, SIR GEORGE POMEROY (1835–81), Eng. general; killed at *Majuba*. Butler, *Life* (1899).

COLLIER, ARTHUR (1680–1732), Eng. philosopher; held living of Langford Magna, Wilts, from 1704; became student of Descartes; wrote *Clavis Universalis*, denying (1) that because external world seems real, it therefore is so; (2) that it is real. His thought resembles Berkeley's.

COLLIER, JEREMY (1650–1726), Anglican ecclesiastic; staunch Tory and supporter of Stewart cause, for which he got into trouble during reign of William III.; obliged to go into exile some years; wrote numerous works; attacked immorality and profanity of the stage.

COLLIER, JOHN PAYNE (1789–1883), Eng. man of letters; Elizabethan student; notorious as forger of XVII.-cent. annotations to Shakespeare folio.

COLLIN, HEINRICH JOSEPH VON (1771–1811), Austrian dramatist and song-writer.

COLLIN D'HARLEVILLE, JEAN FRANÇOIS (1755–1806), Fr. dramatist.

COLLING, CHARLES (1751–1836), and **ROBERT** (1749–1820), Eng. cattle-breeders, best known for improving the shorthorn breed by scientific breeding.

COLLINGWOOD (44° 30′ N., 80° 20′ W.), town, Ontario, Canada; lumber, grain. Pop. 6000.

COLLINGWOOD (37° 50′ S., 144° 50′ E.), city, on Yarra-Yarra, N.E. suburb of Melbourne, Australia. Pop. 33,000.

COLLINGWOOD, CUTHBERT COLLINGWOOD, BARON (1750–1810), Brit. naval commander; b. Newcastle-on-Tyne; served in Amer. War, 1774; he was at the battle of *Cape St. Vincent*, 1797; made vice-admiral, 1799, and went to the Mediterranean; most celebrated for his part in the victory of *Trafalgar*, where he led one line of ships, in the *Royal Sovereign*. He was cr. baron just afterwards. His health failed, but he remained at sea, dying on board the *Ville de Paris*.

COLLINS, ANTHONY (1676–1729), Eng. deist; b. Hounslow; ed. Cambridge; intimate friend of Locke; advocated free-thinking as a cure for atheism.

COLLINS, JOHN CHURTON (1848–1908), Eng. author; prof. of Eng. Lit., Birmingham; a voluminous writer on literary subjects, and a good critic.

COLLINS, MORTIMER (1827–76), Eng. author; wrote *Sweet Anne Page* and other novels; also light verse.

COLLINS, WILLIAM (1787–1847), Eng. artist; painter of *genre* pictures; A.R.A. (1815); R.A. (1820); f. of Wilkie C., novelist.

COLLINS, WILLIAM WILKIE (1824–89), Eng. novelist; achieved popular success with *The Woman in White* (1860) and *The Moonstone* (1868).

COLLODION, viscid fluid made by dissolving gun-cotton or pyroxylin in a mixture of alcohol and ether; the evaporation of the solvents leaves a tenacious film; used in preparation of photographic films, and in surgery as a coating for wounds.

COLLOT D'HERBOIS, JEAN MARIE (1750–96), Fr. Revolutionary leader; at first an actor; member of the Commune, 1792; pres. of Convention, 1793.

COLLUSION, legal term for compact made by two people that, for improper purposes, one should bring an action against the other.

COLLYER, ROBERT (1823–1912), Amer. divine, Methodist, then Unitarian; famous preacher and anti-slavery worker.

COLMAN, GEORGE (1732–94), Eng. dramatist and scholar; wrote *The Clandestine Marriage*, *The Jealous Wife*, etc.; also trans. from Terence and Horace.

COLMAN, GEORGE, THE YOUNGER (1762–1836), Eng. dramatist; s. of above; author of *The Heir at Law* and other popular and amusing dramas; examiner of plays (1824–36).

COLMAN, ST. (d. 676), bp. of Lindisfarne, 661; then in Iona and Ireland.

COLMAN, SAMUEL (1832–), Amer. landscape artist.

COLMAR, KOLMAR (48° 6′ N., 7° 19′ E.), town, Germany; capital of Upper Alsace; became imperial city, 1226; Fr. possession, 1681–1871; centre textile weaving. Pop. (1910) 43,808.

COLNE (53° 53′ N., 2° 10′ W.), market town, Lancashire, England; textiles. Pop. (1911) 23,693.

COLOCYNTH, BITTER APPLE (*Citrullus colocynthis*), plant belonging to natural order *Cucurbitaceæ*; c. of commerce is prepared from the dried and peeled fruit; acts on the liver and gall-bladder as a biliary stimulant; used, generally combined with other

drugs, as a drastic purgative. The active principle is colocynthin ($C_{56}H_{84}O_{23}$).

COLOGNE, Köln (50° 55′ N., 6° 55′ E.), town, Rhenish Prussia, on Rhine; one of principal western fortresses of Germany. From its position at head of Rhine navigation for sea-going vessels, as centre of rail and river systems, and being near rich coal and iron field, C. has great commercial importance archiepiscopal see; has magnificent Gothic cathedral built between 1248 and 1447, but not completed unti 1880; several other fine churches, Gothic town-hall, Gürzenich Hall, Tempelhaus, and other interesting buildings; zoological and botanical gardens; manufactures cottons, woollens, beet-sugar, chemicals, spirits of wine, eau-de-Cologne, tobacco, machinery, chocolate, carriages, porcelain, soap. C. was Rom. colony in reign of Claudius; taken by Franks in V. cent.; annexed to Ger. empire in IX. cent.; great trading centre in Middle Ages, and powerful member of Hanseatic league; C. University (founded 1389) was famous in XV. cent.; gradually declined, and ceased to exist after foundation of Bonn Univ. (1797); taken by French, 1794; restored to Prussia, 1814. Pop. (1910) 516,167.

Helmken, *Köln und seine Sehenswürdigkeiten* (20th ed., 1903); H. Keussen, *Historiche Topographie der Stadt Köln im Mittelalter* (1906).

COLOMB, PHILIP HOWARD (1831–99), Brit. vice-admiral; b. Scotland; entered navy, 1846; served in Mediterranean, China, Burma, Crimean War, etc.; retired, 1886; did much for the advancement of naval signals and naval tactics; became one of the best naval historians, showing great insight into problems of naval warfare.

COLOMBES (48° 56′ N., 2° 14′ E.), town, 7 miles N.N.W. of Paris, France; petroleum refineries; vinegar. Pop. 23,061.

COLOMBEY (49° 6′ N., 6° 18′ E.), village, Lorraine, Germany; scene of battle between Germans and French, Aug. 1870.

COLOMBIA (12° 25′ N. to 3° S., 68° to 79° 10′ W.), republic, S. America; bounded N. by Panama, Caribbean Sea, Venezuela, E. by Venezuela, Brazil, S. by Ecuador, W. by Pacific; area, c. 480,000 sq. miles; extreme length, 950 miles; width, 640 miles. From Pasto in S.W. corner Cordilleran ranges spread out like ribs of fan; along Pacific coast Cordillera de Chocó is low, and valley to E. is drained S. to Pacific by San Juan R., N. to Atlantic by Atrato. Main ranges are Western, Central, and Eastern Cordilleras; intervening valleys drained by Cauca and Magdalena Rivers. These valleys are richly wooded; coffee, maize, tobacco, and cacao are cultivated. Great plains or *llanos* in E. are drained by head-waters of Orinoco.

Climate varies greatly, ranging from tropical to arctic conditions; rainy season, Oct. to Dec.; dry season, Dec. to Feb. Most of inhabitants live on plateaux, which are treeless but well-watered prairies, of which those of Antioquia and Bogotá are most important. Capital, Bogotá, stands on latter, 8694 ft. above sea-level.

History.—Original inhabitants of C. were Indians, some of whom at time of coming of Spaniards were partially civilised, while others were still in primitive condition. Spaniards first appeared in first half of XVI. cent.; in 1525, Bastida established their first settlement at Santa Marta, and eight years later another was made by Heredia at Cartagena; he made several successful expeditions in search of gold. Quesada took Bogotá (1537), the capital of the Chibcha tribe, and named the surrounding district New Granada. New Granada was at first incorporated with Peru, but attained separate existence in 1564 when it became a Presidency. For nearly two hundred years Indians were cruelly oppressed by Span. conquerors; one-seventh were forced to work in mines as slaves under wretched conditions; but in 1729 slavery was abolished. In 1740, New Granada was for the second time made a viceroyalty—it had been one for short time from 1718—and so continued until it attained independence in 1810. Principal events under Span. rule were introduction of Inquisition; importing of negroes from Africa to supersede Indians in mines; attacks by English, French, and other nations. The Viceroys, by tyrannical and unjust measures, finally drove people to insurrection in 1810, when revolution occurred, Bogotá first declaring independence. War ensued; lasted nine years before Spaniards were finally overcome; leader of rebels being Simon Bolivar, a Spaniard, and liberator of Colombia, Panama, Venezuela, and Ecuador, which he unified as Republic of C. At his death they again separated, and Colombia and Panama became Republic of New Granada. Santander was first pres.; administration of his successor, Obando, was marked by first of succession of civil wars and administrative changes. Panama seceded from republic, 1856; Antioquia, 1857. In 1861 occurred another change, and republic was now called United States of C.; this lasted till 1886, when it again became Republic of C. Revolts occurred in 1895 and 1900, latter resulting in civil war, which lasted till 1903. Panama (*q.v.*) again seceded in 1903, in time of Marroquin's administration. Since 1905 efforts have been made to settle by arbitration the boundary dispute with Peru and Ecuador.

Lower levels produce rice, sugar-cane, bananas, indigo, resins, rubber, copaiba, cocoa, vegetables, ivory, dye-woods, medicinal plants; in more temperate zone are found cinchona tree, coffee, figs, while higher up, wheat, other grains; and potatoes are cultivated; on llanos in E. cattle are reared. Country is rich in minerals, gold, coal, iron, salt, copper, lead, platinum, zinc, antimony, sulphur, cinnabar, rock salt, arsenic, marble, lime, gypsum, petroleum, precious stones; valuable pearl fisheries along coast. Manufactures include pig-iron, rails, castings, sugar, sheeting, candles, soap; exports—coffee, cocoa, hides, cotton, mahogany and other furniture woods, drugs, caoutchouc, cattle, etc.; imports clothes, hats, boots and shoes, machinery, matches, textiles, etc. Railway mileage is over 600. Several rivers are navigable or partly so.

Government is by pres., with Congress consisting of Senate and House of Representatives. Senate has 35 members, House of Representatives, 92 members, who are elected by popular vote for four years. Pres. holds office four years.

Inhabitants include Spaniards, Indians, negroes, and many cross-breeds; there is little race animosity, probably because the gradations between white and coloured are too fine for distinction. Chief religion is R.C.; education free, but not compulsory. Pop. (estimated) *c.* 5,000,000.

Petre, *Republic of Colombia* (1906); Hall, *Colombia* (1871).

COLOMBIER, PIERRE BERTRAND DE (1299–1361), Fr. cardinal.

COLOMBO (6° 56′ N., 79° 59′ E.), capital and principal seaport, Ceylon, on W. side of island; extensive trade; magnificent artificial harbour; port of call for Eastern steamers; coaling station; seat of R.C. and Anglican bp's; many fine buildings; Portug. settlement, 1517; taken by Dutch, 1656; by British, 1796; spices, fibres, tea, and coffee. Pop. (1911) 182,058.

COLON.—(1) Anatomical term denoting the part of the large intestine extending from the cæcum to the rectum; (2) in punctuation, the mark (:) used to separate parts of a sentence complete in themselves, but less independent than a full stop (.) would denote.

COLON, Aspinwall (9° 23′ N., 79° 23′ W.), seaport, Panama, on Limon Bay, W. side of Manzanilla Island; spacious harbour; Atlantic terminus of Panama railway and Panama canal; unhealthy climate; U.S.A. control sanitation and quarantine. Pop. (1910) 19,300.

COLON (22° 43′ N., 80° 45′ W.), town, Cuba; sugar.

COLONEL, see OFFICER.

COLONIA, see URUGUAY.

COLONIAL CONFERENCES held in London, 1887, 1896, 1902, 1907, 1911, to discuss matters of Imperial interest.

COLONIAL OFFICE, THE, DOWNING ST., is the government department in London which transacts all business relating to the Brit. colonial possessions. It is administered by a Sec. of State for the Colonies, parliamentary Under-Sec., and an extensive permanent staff. The office of Colonial Sec. was cr. in 1854, the duties having hitherto been undertaken by the Home Sec., and subsequently by the Sec. for War. In 1907 the administration of the C.O. was rearranged by Lord Elgin under the following divisions: (1) *Dominions Division*, dealing with matters affecting the interests of the self-governing dominions; (2) *Crown Colonies Division*, controlling the administration of the colonies indicated and the Protectorates; and (3) *General Division*, which deals with such matters as education, currency, postal service.

COLONNA, one of the most important families in Rome from the XII. cent. onwards; in frequent strife with other houses; still exists.

COLONNA, GIOVANNI PAOLO (d. 1695), Ital. composer of church music.

COLONNA, VITTORIA (1490–1547), Ital. poet; famous for her amatory and elegiac poems, and blamelessness of her life in a corrupt age; devoted wife of Marquis of Pescara; held in great estimation by Michael Angelo.

COLONSAY (56° 4′ N., 6° 12′ W.), island, Inner Hebrides, Scotland; close to isle of Oronsay, landing-place of St. Columba (563).

COLONY, foreign possessions of any country. The Greeks were enterprising colonists, and their c's extended from the Crimea to Spain; they were virtually independent, and had strong sense of liberty; Rom. c's were military in origin, and consisted of families and troops planted in newly acquired territory.

The modern c. is land inhabited mainly by emigrants and descendants of the early settlers; some of them are almost self-sufficient though their manufactures are still limited. For method of government employed in various c's, see BRITISH EMPIRE.

COLOPHON, ancient city, on coast of Asia Minor; 15 miles N.W. of Ephesus; and reputed birthplace of Homer.

COLOPHON, see BOOK.

COLORADO (37° to 41° N., 102° to 109° W.), west central state of U.S.A.; bounded N. by Wyoming, Nebraska; E. by Nebraska, Kansas; S. by Oklahoma, New Mexico; W. by Utah; area, 103,948 sq. miles. Surface shows two natural divisions, great plains in E., mountains in W., where Rocky Mountains cross the state in several ranges, of which most important are Front, Park, and Saguache; highest peaks—Blanca Peak, Mt. Harvard, Gray's Peak, all over 14,300 ft. Chief rivers are Grand with affluent Gunnison in W., Yampa in N.W., Arkansas and South Platte with their affluents in E. Between some of mountain ranges are valleys called parks, occupying site of former lakes. Capital is Denver. Climate varies with elevation; generally healthy; rainfall slight.

History.—C. was originally inhabited by Indians, traces of whom remain in form of cave-dwellings; explored in part by Spaniards in XVIII. cent.; about half of district bought from France by U.S.A., 1804; explored by Amer. travellers, Pike and Long, in early XIX. cent.; western part belonged to Mexico till 1848, when it was ceded to U.S.A.; almost unknown when discovery of gold in 1859 resulted in great influx of colonists and foundation of towns of Denver and Boulder; organised as territory in 1861; admitted as State to Union (1876).

C. is pre-eminently a mining country; produces immense quantities of gold and silver; large deposits of lead, iron ore, copper, anthracite, and bituminous coal; also produces zinc, petroleum, bismuth, mica, tungsten. Mineral springs occur in various places. Agriculture has improved since development of system of irrigation; wheat, oats, maize, barley, potatoes, hay produced; fruits and vegetables grown; sugar-beet largely cultivated. Horses, cattle, sheep, and pigs raised in considerable numbers. Industries include metal smelting and refining, meat-packing, flour-milling, brewing, dairying, manufacture of machinery, cars, beet-sugar. Railway mileage in 1911 was 7559.

C. has Senate of 35 members, and House of Representatives of 65 members; former elected for four, latter for two, years; executive is in hands of Gov., assisted by Lieut.-Gov. and five officials; represented in Congress by two Senators and four Representatives. Education is state-controlled and compulsory. Chief religion is Roman Catholicism. Inhabitants include whites, Chinese, Indians, negroes (*c.* 12,000). Pop. (1910) 799,024.

James, *Wonders of C. Desert* (1912).

COLORADO BEETLE, potato-destroying insect of the Chrysomelidæ family, found in N. America; hundreds of eggs are laid by the female on the inferior surface of potato leaves; full-grown insect is over a third of an inch long, and of a mottled orange colour; enormous havoc done among potato crops, 1859; killed by Scheele's-green.

COLORADO RIVER (32° 4′ N., 114° 25′ W.), river, South-Western U.S.A.; formed by union of Green and Grand Rivers; Green, the more important headstream, rises in Wyoming, joins Grand S.E. of Utah. C. flows S.W. through elevated tableland and southern part of Utah into Arizona; afterwards separates Arizona on E. from Nevada and California on W.; enters Gulf of California; course forms several remarkable cañons of great depth; *Grand Cañon* of the C. (attaining height of 6000 ft.) extends over 200 miles in length; total length of river, 2000 miles.

C. E. Dutton, *Tertiary Hist. of the Grand Cañon Districts*; Dellenbaugh, *Romance of the C. River* (1903) and *Canyon Voyage* (1908).

COLORADO RIVER (*c.* 39° S., 64° W.), river, Argentine Republic, S. America; rises in eastern slopes of Andes; flows generally S.E. to Atlantic.

COLORADO SPRINGS (38° 48′ N., 104° 50′ W.), city, at foot of Rocky Mountains, Colorado, U.S.A.; fashionable summer and health resort; pleasant climate; Manitou mineral springs in vicinity; seat of C. Coll. (founded 1874). Pop. (1910) 29,078.

COLOSSÆ, city, on Lycus, Phrygia; important in ancient times; site of Early Christian church to which Paul wrote his epistle.

COLOSSEUM, THE, see ARCHITECTURE.

COLOSSIANS, EPISTLE TO THE, one of the Pauline Epistles; early evidence in its favour is supported by critics, who are less inclined than formerly to deny its genuineness. The purpose of writing was to counteract the effects of a heresy which had considerable influence there, but what exactly it was is unknown—probably some Judaising tendency, tinged with Oriental speculation.

Martin, in *Century Bible*.

COLOSSUS, name for statues of immense size, and particularly the bronze statue of Helios, 70 cubits in height (over 100 ft.), which stood near Rhodes harbour. Erected about 280 B.C., it was thrown down by an earthquake some 60 years later.

COLOUR.—Bodies owe their colour to the light which they reflect. White light is made up of many c's, and if it falls on a green body all the coloured rays except green are absorbed by the body, while the green light is reflected. A plate of red glass allows red light only to pass through. Coloured rays differ only in the frequency of ether vibrations which they set up, and the structure of the retina enables the eye to distinguish between these. Blue and yellow paints when mixed

are green, because green rays are the only rays reflected by both and not absorbed by either.

Complementary c's are any two which combine to make white, *e.g.* blue and yellow, red and green. *Primary* c's are the chief c's of the spectrum; they are red, orange, yellow, green, blue, indigo, violet (Newton's theory); red, blue, and green (Young-Helmholtz theory). See LIGHT, SPECTROSCOPY.

COLOUR-BLINDNESS, inability to distinguish between various colours; varies from total c.-b. to a confusion of delicate shades; green and red frequently confused; state generally hereditary and incurable; may be produced by disease. See EYE.

COLOUR-SERGEANT, highest non-com. infantry officer of company; attends the colours on parade; also acts as pay-sergeant.

COLOURS, MILITARY, flags borne by regiments. They correspond to the *vexillum* of Rom. armies, and the 'banner' of the feudal lord. They developed on modern lines in the XVIII. cent. In the Brit. Army each battalion has two colours—the King's and the Regimental. They are not now carried into battle as formerly. The presenting of new colours is an elaborate ceremony. Many foreign regiments have colours similar to those of Brit. regiments.

COLOURS OF ANIMALS are due in some cases to light effects owing to the structure of parts, *e.g.* the metallic lustre of the plumage of certain birds, the scales of wings of some butterflies, and the brilliant tints of some annelida. Again, the c's of animals may be the results of pigmentation—many problems of pigment physiology still await solution; but it is known that some pigments are derived from waste products—uric acid and bile—*e.g.* the pigmentation of the wings of some butterflies. Others are respiratory pigments, *e.g.* the hæmoglobin of the red blood corpuscles of mammals, and hæmocyanin occurring in molluscs and many crustacea giving rise to a green coloration (*e.g.* in oysters). Most of the pigments of a yellow, orange, or red colour are 'lipochromes' occurring chiefly in crustacea, but also in echinoderma, fishes, and birds. Chlorophyll (*q.v.*) occurs in some protozoa, sponges, and cœlentera, and has the same function as in plants. The uses of colours in animals may be classified as due to protective purposes in the struggle for existence and as secondary sexual characters. Protective coloration may serve for concealment either for defence or aggression. The arctic ermine, hare, fox, and polar bear are inconspicuous owing to their resemblance to snow; the desert animals, antelopes, camels, lions, are also typical examples of protective colouring. Animals not possessing the latter could not hide from their enemies or their prey, and the species would become extinct. Certain butterflies and caterpillars resemble leaves and twigs in colour, and are thus likely to escape the notice of predatory birds. Some animals (*e.g.* toads, insects) are very conspicuous by a vivid, mostly yellowish coloration which would seem disastrous, but as they are unpalatable, their colour serves as a protection. One species of tropical Amer. butterfly survives because of its resemblance to an unpalatable species in form and manner of flying. The preference for the 'fittest' and most brightly coloured males by the females during courtship has led to the bright plumage of birds and the coloration in certain fish, while the females on whom the care of the offspring devolves have no conspicuous colouring. The colour of certain animals change with the season, *e.g.* the ptarmigan and the Alpine hare become white in winter. In a very cold winter the weasel and stoat may become pure white in coat.

E. B. Poulton, *The Colours of Animals* (1890); M. I. Newbigin, *Colour in Nature* (1898); Geddes and Thomson, *Evolution of Sex*.

COLSTON, EDWARD (1636–1721), Eng. philanthropist; a Bristol merchant who made enormous sums of money, much of which he devoted to charitable foundations; a strong high churchman and Tory.

COLT, SAMUEL (1814–62), Amer. inventor of the revolver, the first model for which he made as a boy. Patented and put on the market in 1837, the weapon only began to be appreciated in 1847, when, through General Zachary Taylor, the Amer. Government ordered a supply for the Mexican wars; subsequently millions were manufactured in Colt's factories.

COLT'S-FOOT (*Tussilago Farfara*), plant of order Compositæ, with yellow flowers, common in England; leaves are sometimes smoked for asthma.

COLUGO, FLYING LEMUR (*Galeopithecus*), order of arboreal vegetarian mammals of the Malay Archipelago and Philippines, about the size of a cat, and sometimes classified with the Insectivora. Their fore- and hind-limbs are connected with a broad fold of skin which serves as a parachute with which the animals can effectively glide through the air from tree to tree.

COLUMBA, ST. (521–97), spent his early life in Ireland; in 563 came to evangelise Scotland, founding a monastery at Iona, where he d.; he did noble work among the Picts, though his life has been overgrown with myth.

COLUMBAN, ST. (543–615), b. Ireland; preached in Switzerland and Italy.

COLUMBIA (40° 2′ N., 76° 23′ W.), town, on Susquehanna, Pennsylvania, U.S.A.; manufactures machinery, silk goods, etc. Pop. (1910) 11,454.

COLUMBIA (39° N., 92° 23′ W.), city, Missouri, U.S.A.; seat of Univ. of Missouri; other colleges are the Agricultural Coll., Christian Coll., and Stephen's Coll. (for women); C. is market for grain and farm products. Pop. (1910) 9662.

COLUMBIA (34° 2′ N., 80° 57′ W.), city, capital of S. Carolina, on Congaree R. at head of navigation; seat of Univ. of S. Carolina; various colleges; cotton-mills; ironworks. Pop. (1910) 26,319.

COLUMBIA (35° 38′ N., 87° 2′ W.), city, on Duck R., Tennessee, U.S.A.; important live stock centre; manufactures cotton and woollen goods. Pop. 5754.

COLUMBIA, BRITISH, see BRITISH COLUMBIA.

COLUMBIA, DISTRICT OF, see WASHINGTON (D.C.).

COLUMBIA RIVER, OREGON (46° 10′ N., 123° W.), large river, N. America, 1400 miles long; rises in Brit. Columbia, on western slope of Rocky Mountains; flows irregularly, generally S.W., through Washington; forms part of N. boundary of Oregon and Washington; enters Pacific; principal affluents, Clark's Fork and Snake River; navigation interrupted by numerous falls and rapids, but by steamers and intermediate railways goods can be conveyed a distance of 500 miles up; salmon fisheries.

COLUMBIA UNIVERSITY, New York City, first founded as King's Coll. in 1754; called Columbia Coll., 1784; various other institutions founded from time to time have been amalgamated with it; schools of med., law, applied science, chem., engineering, arch., journalism, and pharmacy; connected also with theological coll's; called 'Columbia Univ.,' 1896.

COLUMBIDÆ, see PIGEON FAMILY.

COLUMBINE (*Aquilegia*), perennial herbaceous plant (order Ranunculaceæ) with divided leaves and long-stalked white, red, or blue drooping flowers with five spurred petals.

COLUMBINE, Harlequin's dau. in early Ital. comedy.

COLUMBITE ($(FeMn)(NbTa)_2O_6$), mineral occurring in black lustrous crystals in N. America, Greenland, the Urals, and Bavaria, and of interest on account of the element columbium (niobium) having been discovered in 1801 as one of its constituents.

COLUMBIUM, original name, used chiefly in U.S.A., given by its discoverer, Hatchett, to the element niobium so called by A. Rose, who rediscovered it.

COLUMBUS (32° 23′ N., 84° 59′ W.), city, on Chattahoochee, Georgia, U.S.A.; extensive cotton factories. Pop. (1910) 20,554.

COLUMBUS (39° 10′ N., 85° 51′ W.), city, Indiana,

U.S.A.; has extensive tanneries; manufactures agricultural implements and furniture. Pop. (1910) 8813.

COLUMBUS (33° 27′ N., 88° 47′ W.), city, Mississippi, U.S.A.; cotton-mills and cotton-seed oil factories. Pop. (1910) 8988.

COLUMBUS (39° 59′ N., 83° W.), capital, Ohio, U.S.A., on Scioto R.; important commercial and industrial centre; trades in grain, live stock, wool, coal, iron; manufactures carriages, machinery, shoes, regalia, soap, etc.; has State Univ., Lutheran Univ., medical colleges, various hospitals and charitable institutions, public parks; became capital of Ohio, 1816. Pop. (1910) 181,511.

COLUMBUS, CHRISTOPHER, Cristoforo Colombo or Cristobal Colon (*c.* 1446 or 1451–1506), discoverer of America; b. Genoa; s. of a wool-comber; C. was in trade, and in 1474 went to Chios, and in 1476 to England. He gradually formed the idea of discovering a western passage to Asia; like others of his time, he did not know the girth of the earth, and believed Asia stretched farther eastwards than it does. After gaining the support of Queen Isabella of Castile, he set sail on his first voyage on Aug. 3, 1492, with three ships. On Oct. they first came to land at the Bahama Islands, and spent three months in the West Indies. C. then returned and was welcomed by Ferdinand and Isabella. On a second voyage in 1493 he discovered more islands, and founded the city of Isabella in Hispaniola. Returning to Cadiz in 1496, C. again set sail, 1498, discovering Trinidad, and the estuary of the Orinoco. C., however, had failed dismally in governing his new Span. colonies, and for a while fell from court favour. But on his return in 1500 he was welcomed again. He set out on his fourth and last voyage in 1502, sailing, among other places, to Cuba and Jamaica. He returned in 1504, and *d.* two years later. His remains, transferred from one place to another, are now in Seville Cathedral.

C. was a tall and good-looking man. He accomplished much, but his subsequent voyages added comparatively small discoveries to his first achievement. He never realised that he had discovered a new continent.

C.'s elder bro., **Bartolomeo** (d. 1514), was deputy-gov. of Hispaniola and a geographer; the second bro., **Diego** or **Giacomo** (d. 1515), was a Castilian statesman. Christopher's s., **Diego** (c. 1480–1526), accompanied him on his second voyage, and became gov. of the Indies; his s., Luis (1520–72), was for a time Duke of Veragua. **Fernando** (1488–1539), illegitimate s. of Christopher, accompanied him on his fourth voyage, and is supposed to have written the *Vida del Almirante.*

E. J. Payne, *History of the New World called America* (1902); Markham, *Life* (1892).

COLUMELLA, LUCIUS JUNIUS MODERATUS, writer on agriculture; b. Gades, Spain; flourished in Rome in I. cent. A.D.

COLUMN, ARMY, march-formation of troops; c. of fours in which men are four abreast; battalion in c. has companies two deep, separated by distance equal to front of company; quarter c. signifies interval of six paces.

Fighting in c., a favourite device of Napoleon, is now in disfavour owing to range and speed of loading of modern artillery.

COLURE (astron. and geog.), either of two great circles of the celestial sphere intersecting at right angles at the poles, one passing through the equinoxes, the other through the solstices.

COLVILLE, JOHN (*c.* 1540–1605), Scot. Presbyterian theologian, then (probably) R.C.

COLVIN, SIR SIDNEY (1845–), Eng. literary and art critic; keeper of prints, Brit. Museum; edit. R. L. Stevenson's letters and works, etc.

COLWYN BAY (53° 17′ N., 3° 43′ W.), watering-place, on Irish Sea, Denbighshire, N. Wales.

COLZA OIL, obtained from the seed of a variety of cabbage (*Brassica campestris*), cultivated chiefly in France, Belgium, Holland, Germany; used as lubricant for machinery, and in lamps; the seed, after expression of oil, used as food (oil-cake) for cattle.

COMA, prolonged loss of consciousness in which the beating of the heart and the breathing, which is usually slow and difficult, are the only signs of life; the person cannot move, cannot be made to feel or hear anything, and the limbs fall back helplessly when lifted. The most usual causes are: injury to the head, apoplexy, heatstroke, various brain affections, diabetes, anæmia, poisoning by opium or alcohol. C. is distinguished from syncope (*q.v.*) by being much more severe and prolonged.

COMA BERENICES, Berenice's Hair, small constellation of N. hemisphere between Leo and Boötes.

COMANA (*c.* 40° 20′ N., 36° 56′ E.), city, Pontus, Asia Minor; celebrated temple, dedicated to the moon goddess.

COMANA, Chryse or Aurea, *i.e.* the golden (*c.* 38° 40′ N., 36° 34′ E.), ancient city, Cappadocia, Asia Minor; celebrated temple, dedicated to Ma, Nature goddess; chief priests took rank next after the king.

COMANCHES, N. Amer. Indian tribe now living in Oklahoma; formerly very warlike.

COMAYAGUA (14° 27′ N., 87° 39′ W.), town, Honduras, Central America, on Ulua R.; has cathedral and coll.; declined since 1827; was capital up to 1880. Pop. 6000.

COMBACONUM, see Kumbhakonam.

COMBE, ANDREW (1797–1847), Scot. physician and physiologist; younger bro. of George Combe (*q.v.*), the phrenologist, whom he supported in his theories; author of several works on physiol

COMBE, GEORGE (1788–1858), Scot. phrenologist and educationist; wrote *The Constitution of Man* (1828).

COMBE, WILLIAM (1741–1823), Eng. humorist; wrote *Tours of Dr. Syntax.*

COMBERMERE, STAPLETON COTTON, 1ST VISCOUNT (1773–1865), Brit. soldier; saw service in Flanders, India, Peninsular War, etc., till 1826; cr. baron, 1814; viscount, 1826; field-marshal, 1855.

COMBINATORIAL ANALYSIS. — Early work on this subject is given by Euler in *De Partitione Numerorum.* Considerable advances were made by Jacobi, by Warburton, who utilised the theory of finite differences, and by Sir John Herschel, who introduced the idea and notation of the circulating function. Cayley, Sylvester, and MacMahon made notable additions, to the latter being due the method of symmetric functions, which has important applications to the theory of permutations and combinations; he also gave us the 'Partition Analysis,' applying it to the solution of special problems in arithmetic and algebra. MacMahon's method of differential operators has for its leading idea the designing of a function and of an operator so that, when the operator is performed upon the function, a number is reached which enumerates the solutions of the given problem. The problems dealt with by this method are usually connected with lattices. Combinatorial analysis deals mainly with the distribution of objects, either all unlike, or consisting of groups of like objects, into classes.

Permutations and Combinations thus form one branch, and the formulæ for these may be deduced from the general theory; but they may be obtained directly. The different arrangements (regard being had to the order of such arrangement), each containing r things, which may be made from n unlike things, are known as the *permutations* of the n things r at a time. The different ways of making a selection of r things from n unlike things (without regard to the order of selection or arrangement) are called the *combinations* of the n things r at a time. The former is denoted by the symbol ${}_nP_r$, the latter by ${}_nC_r$.

${}_nP_r = n(n-1)(n-2) \ldots (n-r+1)$; for in making up any arrangement of r things, the first place may

be filled in n ways, the second in $(n-1)$ ways, the third in $(n-2)$ ways, and so on; and since each way of filling up any one place may be associated with *any* of the ways of filling the remaining places, the total number of the possible arrangements is the product $n(n-1)(n-2) \ldots (n-r+1)$.

Denoting by $\lfloor n$ or $n\,!$ (read as 'factorial n') the product $n(n-1)(n-2) \ldots 3.2.1$, we have ${}_nP_n = n\,!$. Hence we deduce ${}_nC_r = \frac{n(n-1)(n-2) \ldots (n-r+1)}{r\,!}$; for each combination of r things gives rise to $r\,!$ permutations, and $\therefore {}_nP_r = {}_nC_r \times r\,!$. It is easily seen that ${}_nC_r = \frac{n\,!}{r\,!\,(n-r)\,!}$, from which it is obvious that ${}_nC_r = {}_nC_{(n+r)}$.

If the n things are p of one kind, q of another, r of another, etc., the number of permutations of the n things, all being taken, is $\frac{n\,!}{p\,!\,q\,!\,r\,!\ldots}$. The number of combinations $\propto$ together in this case is the coefficient of $x^\propto$ in the expansion of $(1+x+x^2+\ldots+x^p)(1+x+\ldots+x^q)(1+x+\ldots+x^r)\ldots$

P. A. MacMahon, *Combinatory Analysis.*

COMBUSTION, or burning, a chemical process associated with light and heat, or the union of different substances with oxygen. Animal life may thus be considered a c. of protoplasm.

COMÉDIE FRANÇAISE, see THÉÂTRE FRANÇAIS.

COMEDY (Gk. *kômos*, a village festival, *aeidein*, to sing), refined humour as distinct from the broadness of farce and burlesque, and generally applied to plays of a light character which end happily; often a humorous criticism of the foibles of society, and consequently didactic; formerly applied to a tale, or narrative, cf. Dante's *Divina Commedia.* See DRAMA.

COMENIUS, JOHN AMOS, KOMENSKI (1592–1671), educationist; s. of Moravian parents; ed. Herborn and Heidelberg; bp. of Moravians, 1632; wrote *Didactica Magna, Orbis Sensualium Pictus*, a child's picture book; an evangelical realist.

COMET, a nebulous body consisting of a bright 'nucleus' surrounded by a haze or 'coma' with a long luminous train or 'tail,' and moving in an elongated orbit round the sun. The tail is usually directed away from the sun, and increases as the comet approaches perihelion. About 800 c's are known, some moving in elliptical orbits and, therefore, reappearing at certain intervals, for instance, *Halley's* c. in periods of 76 years, *Encke's* in periods of 3 years, *Tuttle's* in 14 years, etc., while others seem to describe a parabola or hyperbola and do not return. Shooting stars and some meteorites seem to be the result of disintegration of c's. Spectroscopic observation has revealed the presence in c's of hydrocarbons, also of sodium and iron.

G. F. Chambers, *Comets* (2nd ed., 1911).

COMFREY, see BORAGINACEÆ.

COMILLA, KUMILLA (23° 28′ N., 91° 7′ E.), chief town, on Gumti, Tippera district, Bengal, India. Pop. 19,169.

COMINES, COMMINES (50° 46′ N., 2° 59′ E.), town, Flanders, on borders of France and Belgium, divided by river Lys; spinning of flax, wool, and cotton. Pop. 7294.

COMINES, PHILIPPE DE, COMMINES (*c.* 1445–*c.* 1511), Fr. hist. writer; b. Flanders; at the court of Duke of Burgundy, and of Louis XI. and Charles VIII. of France; author of *Memoirs* (1464–83 and 1494–95).

COMISO (36° 57′ N., 14° 36′ E.), town, Syracuse, Sicily; site of ancient fountain of Diana; pottery and cotton manufacture. Pop. 22,000.

COMITIA, name applied to the popular assemblies of ancient Rome (as distinct from a *concilium*, any kind of meeting, and *contio*, an assembly for an announcement), summoned for official or legislative purpose. The earliest was the *comitia curiata*, in which the people assembled according to 'curiæ,' or parishes; later, it was only formal, and called together for the ratification by the people of certain official acts; the *comitia centuriata*, assembled on a military basis, elected the magistrates and declared war; the *comitia tributa*, assembled by territorial tribes, performed much of the work of government; the *concilium plebis* contained plebeians only.

Greenidge, *Roman Public Life*; Abbot, *Roman Political Institutions.*

COMITY OF NATIONS, recognition of the laws of one country by another for purposes of convenience and necessity, *e.g.* an English firm in France must conform to Fr. laws.

COMMANDER, officer in Brit. navy between rank of 1st lieutenant and captain. **C.-in-Chief**, supreme acting officer of Brit. army until 1904, when office was abolished. **C. of the Faithful**, title of Caliphs; first assumed by Omar I. (634–44).

COMMANDERY, a division of land in the property of the Knights of St. John.

COMMEMORATION, ENCÆNIA, annual celebration at Oxford, marking completion of degrees, presentation of honorary distinctions, recitation of prize essays, etc.; usually held on third Wednesday after Trinity Sunday.

COMMENSALISM, zoological term indicating the dwelling together of organisms of different species; good example is anemone, which affixes itself to the acquired shell of the hermit-crab, and defends it by stinging-threads in return for the current-producing powers of hermit-crab, which enable it to obtain its food; c. occurs also in bivalves; frequently develops into parasitism.

COMMENTRY (46° 15′ N., 2° 45′ E.), town, Allier, France; coal-fields. Pop. 8084.

COMMERCE.—From very early times there has been traffic between nations, and at any rate some communication between distant countries can be traced almost in prehistoric times. The records and remains of ancient Assyria show a highly developed commercial intercourse with neighbouring lands. Nevertheless, as compared with modern times, ancient c. was always scanty and uncertain. Thus there were trade routes between Europe and India, but the traffic cannot have been great. The Phœnicians were the great naval and commercial people of early times, in contrast to the Romans, who hated the sea. Later the commerce of the Mediterranean all fell under the sway of Rome, and the 'pax Romana' made trade at long distances possible. With the break-up of the Empire and the decay of the old civilisation, everything was disorganised, and when mediæval commerce developed it was on different lines. The position of Venice at the head of the Adriatic, and the enterprise of her inhabitants, made her a commercial centre between Western Europe and the Levant. In the North, the Hansa towns and the Netherlands were the chief carriers of the mediæval world.

The discovery of America opened up wide possibilities, and at first the wealth of the New World went to Spain and Portugal. Spain, however, declined, for her prosperity was not really on a firm basis, and the bulk of commercial activity now fell to other peoples. Britain took the lead in opening up N. America, and also in the trade with India. The XIX. cent. witnessed an enormous development, not only of Brit. commerce, but of that of many other nations besides.

Webster, *A General Hist. of Commerce* (1903); Cunningham, *Growth of Eng. Industry and Commerce* (4th ed., 1907).

COMMERCIAL TREATIES.—In classical times treaties of trade and commerce were made. Agreements were made frequently in the Middle Ages about commercial transactions. Commercial treaties more like those now made appear from the XII. cent., for then several European cities, the most important, perhaps, Venice and Genoa, rise into prominence. England made a treaty with Norway in 1217, and then others with various countries.

Naturally, a treaty was generally simply an arrangement between two states, and sometimes it took the form of granting to another nation privileges already enjoyed by one—the 'most favoured nation' principle. Of modern developments the most important is that of the intimate connection of commercial treaties with tariffs, whereby the tariff is a means of bargaining between two countries. International trade in Europe has been regulated by a series of tariffs since 1906. Commercial treaties are generally only made for a few years.

COMMERCY (48° 46′ N., 5° 35′ E.), town, on Meuse, France; iron-working, embroidery, etc. Pop. 5109.

COMMERS, social gathering amongst Ger. students.

COMMINATION, ancient service of Anglican Church, said on Ash Wednesday; announces God's judgment against sinners.

COMMISSARIAT, army department responsible for the supply of provisions, forage, clothes, etc.

COMMISSION, the entrusting of a duty to any person, or the document containing the authority to do so; the term is also used for a body performing the duty of an individual. To give a commission, *i.e.* a bribe to the agent of any person, is a criminal offence punishable by fine or imprisonment. A 'Royal Commission' is a body app. by the Crown to inquire into some special subject. A c. in the army is a certificate raising to rank of **Commissioned Officer**, *i.e.* an officer of or above rank of sub-lieutenant. Sergeants and corporals are NON-COMMISSIONED OFFICERS (N.C.O.), while schoolmasters, etc., are Warrant Officers.

COMMISSIONAIRE, member of a corps of pensioned soldiers who performs service as doorkeeper, messenger, etc., in banks and business offices; corps founded by Sir Edward Walter, 1859.

COMMITMENT, the written instrument instructing the removal of a prisoner to a place of custody; 'committal' is the court's decision or sentence.

COMMODORE, temporary rank given in the Brit. navy to captain in command of a squadron.

COMMODUS, LUCIUS ÆLIUS AURELIUS (161–92), Rom. emperor; s. of Marcus Aurelius; succ., 180; became a tyrant.

COMMON LAW, the body of Eng. customary law, as distinct from that embodied in Acts of Parliament. It is derived from the customary laws which prevailed in Saxon times, viz. the Dane Law, Mercian Law, Wessex Law. During the Norman period the king's court selected such of these customs as were generally applicable to the whole country, and rejected the rest. Some of this common law is as ancient as the Early Britons, and Blackstone has pointed out that 'however compounded, and from whatever fountains derived, it has subsisted immemorially in this kingdom.' Judges have always sought to apply to new combinations of circumstances, as they arose, the rules of law which were found in these ancient legal principles and judicial precedents.—THE COURTS OF COMMON LAW were three in number—Court of Common Pleas, Court of King's Bench, Exchequer Court. By the Judicature Acts (1873–76) the three became divisions of High Court of Justice, and now form the King's Bench Division, presided over by Lord Chief Justice.

COMMONS, waste lands whose proprietor has his title limited by rights of other persons who enjoy pasturage of their animals, heath, turf, soil, etc., in what is generally described as a 'reasonable amount'; but these rights may comprise the whole of certain products. C. illustrate the union of township and manorial organisations in development of England. In primæval Saxon townships householders held arable, meadow, and waste land in common, dividing products, but while separate ownership developed in respect to other land the 'waste' remained common. After the development of manors, the right of commoners clashed with the lord of manor's claims, and the *Statute of Merton* (1235) enacted that the owner of manor should be lord of the woods, wastes, and pastures of the township, but must observe commonable rights of his under-tenants, these rights being fixed by amount of their holdings and henceforth regarded as appurtenant to the holdings. Attempt of lords of manors to oust commoners by inclosure of c. has been of economic and political importance to present day. Common-field system was attacked in XVI. cent. by landowners who wished to make fortunes from large sheep-farms, and in XVIII. and XIX. cent's largely disappeared through introduction of farming on larger scale. Parliament lent its aid, Inclosure Acts being passed, 1709–1801, when there was a general Inclosure Act, and again until 1845 when the present Act (since amended) was passed. In latter half of XIX. cent., however, the Commons Preservation Soc. was formed, with result that parliamentary aid is now given to protection of c. as open spaces for public recreation.

G. Williams, *On Rights of Common* (1880); Sir W. Hunter, *The Preservation of Open Spaces* (1896).

COMMONWEALTH, system of popular government; the term is applied to Eng. state between death of Charles I. (1649) and Restoration (1660), during which parliament and the army were supreme. In U.S.A. any one of the United States is a c., *e.g.* the C. of Virginia. C. of Australia (*q.v.*) was formed on Jan 1, 1901, by federation of separate colonies.

COMMUNE, small Fr. administrative division.

COMMUNE, mediæval term applied to municipal corporations which developed in Middle Ages; in many particulars exempt from common law, some of them became city-states. The various barbarian tribes which overran the Rom. Empire often left fortified towns standing, and in these mediæval c. sprang up; sometimes, however, an artificial town was organised, generally to be distinguished by its symmetrical planning—central market-place, relation of streets, etc.

For development of c. in England, see BOROUGH. In Germany, fortified Rom. towns were usually in X. cent. seats of bishoprics and ruled by bp's with civil and military as well as ecclesiastical jurisdiction over town and district. The chief liberty of the town was that its inhabitants could not be impleaded outside its bounds, and an important enactment for the country at large was that runaway serfs who dwelt in town for a year and a day became free. Corporations developed XI. to XIII. cent's, obtaining imperial charters of liberties; town council (*Rat*), composed of burghers and burgomasters, imposed fines for breach of peace and levied duties, while merchants became incorporated in guilds. Encroachment of towns on privileges of bp's and nobles led to wars and establishment of many imperial cities, under immediate control of emperor; these were nearly all disfranchised, 1815, having decayed.

In Italy, c. was also head of bishopric, but important difference was that it was also seat of nobles, inhabitants being classified as *capitani*, chief nobles, *valvassori*, landowners dependent on the *capitani*, and the industrial class (*popolo*, the people). Lombard merchants were important in VIII. cent.; their cities obtained imperial charters, and in XII. cent. defeated emperor in war, using quarrels between papacy and empire to consolidate their power. C. was composed of popular assembly, council, and executive body of 12 *consules*. Establishment of *podestà* as head of the city led to tyrannies of Visconti of Milan, Scala of Verona, Carrara of Padua, etc. Florence saw many battles between her democracy and nobles and final establishment of rule of Medici; Venice became ruled by small oligarchy of nobles and merchants; Rom. municipal freedom was overthrown by popes and not reinstated until modern times.

Fr. municipalities in south resembled those of Italy in constitution, but generally remained *villes consulaires*; those of north resembled Ger. c. or Eng.

borough, often having *mayeur, burgenses*, etc. Span. towns became of importance through acting as outposts against Moors.

Commune of Paris (1871), see FRANCE (*History*).

COMMUNION, see EUCHARIST.

COMMUNISM, name given to scheme of political organisation based on holding of property in common, and intended as remedy for social inequality. Its teaching is to be found in Plato's *Republic*, where equality of opportunity is advocated, and provision of necessaries by state puts an end to competition. War of poor against rich began in England in XIV. cent., and grievances of poor found expression in XVI. cent. in writings of Latimer and Sir Thomas More, the *Utopia* of the latter following Plato's *Republic* in communistic teaching. Various communities have been founded in New World on communistic principles; earliest was settlement at Watervliet (1776) by the 'Shakers' (*q.v.*), imitated by other religious bodies, and in the XIX. cent. by followers of social reformers. Extreme communists oppose social organisation in families. See SOCIALISM.

W. A. Hind, *Amer. Communities* (2nd ed., 1902); Nordhoff, *Communistic Societies of the United States* (1875).

COMMUTATION, act of exchange, particularly the exchange of one penalty for another.

COMNENUS, name of family which ruled Byzantine Empire from mid-XI. cent. to beginning of XIII. cent., and Trebizond from beginning of XIII. cent. to mid-XV. cent.

COMO (45° 48′ N., 9° 3′ E.), city, capital of prov. Como, Lombardy, Italy, at S.W. extremity of Lake Como; ancient *Comum*; bp.'s see; chief edifices—cathedral (1396–1732) and town-hall, both of marble; number of fine churches; interesting Rom. relics; destroyed by Milanese, 1127; rebuilt by Barbarossa, 1155; birthplace of two Plinys; district rich in orange groves and olives; manufactures silk, satin, gloves. Pop. (1911) 44,146.

COMO, LAKE OF (46° N., 9° 15′ E.), lake, Lombardy, Italy; ancient *Larius Lacus*; traversed by river Adda N.E. to S.W.; beautiful scenery; *c.* 30 miles long; tourist resort.

COMORIN, CAPE (8° 4′ N., 77° 35′ E.), in Travancore; southern extremity of India.

COMORO ISLANDS (11° 30′ S., 43° 30′ E.), group of volcanic origin belonging to France, in Mozambique channel, between E. coast of Africa and N.W. coast of Madagascar; area, *c.* 800 sq. miles; principal islands, Great Comoro, Anjuan, Mayotte, and Mohéli; mountainous; loftiest heights, 8500 ft.; fertile soil; inhabitants, Arabs, Malagasy, negroes; religion, Muhammadan; coco-nut palm oil; discovered 1591, by Eng. navigator Lancaster; chief exports, cane sugar and vanilla. Pop. *c.* 96,000.

COMPANIES, CHARTERED, see CHARTERED COMPANIES.

COMPANIES, LIABILITY.—A **Joint-Stock Company** is an association of seven or more persons who contribute an amount of capital, in the same or different proportions, for carrying on a particular business with a view to profit. Such a company is either limited or unlimited:—

UNLIMITED COMPANIES.—In these the liability of the members is unlimited, each shareholder being liable, to the full extent of his property, for debts incurred by the company. Moreover, should any shareholders prove unable to pay their fair proportion of the loss, the other shareholders are bound to make up the deficiency so long as any property remains to them. The liability, however, of each member ceases at the end of a twelvemonth from the time he withdraws from the company. Such companies are now rare.

LIMITED COMPANIES.—These are limited either by (*a*) guarantee or (*b*) shares. In (*a*) each member of the association makes himself responsible for an amount not exceeding a certain fixed sum. In (*b*) the liability of each shareholder is limited to the nominal value of the shares that he holds. When his shares are once fully paid up, he has no further liability.

A limited company differs from a *partnership* in the following particulars: (1) The property of the company is not the property of the members, and their goods cannot be seized for the debts of the company; while in a partnership firm, the property of the firm is the property of the partners in common, and their private property can be seized for the debts of the firm. (2) A shareholder in a limited company is not an agent of the company, and it is in no way liable for the acts of the shareholders; but a partner is the agent of his fellow-partners, and they are liable for his contracts or for his fraud or other things done by him in the scope of the partnership business. (3) Shares in a limited company are as a rule transferable, unless the regulations of the company restrict transfer; but a partner cannot transfer his share without the consent of his fellow-partners. (4) On the death of a partner the partnership is dissolved, but the death of a shareholder does not terminate the existence of a limited company. (5) Lastly, the number of persons forming a partnership must not exceed twenty (ten in banking), whereas in a limited company the number of members must never be less than seven, but they may be as many as the number of shares into which the capital is divided.

COMPANIES, LIVERY, see LIVERY COMPANIES.

COMPARATIVE ANATOMY, the science which treats of the structure of animals (including man), and at the same time compares the structure of different animals with one another. The term is being gradually abandoned, since all biological science now adopts comparative methods.

COMPARETTI, DOMENICO (1835–), Ital. philologist; Hon. D.C.L. (Oxon.).

COMPASS, a magnetised needle balanced on a fine point above a card. The needle will set itself so as always to point in the same direction—to the magnetic N. and S. Owing to this property, it is of great value to the navigator. In a modern ship's c. the *needle* consists of eight light magnetised strips of steel, placed parallel to each other like the steps of a ladder, and fastened together by silk threads. Such a compound needle is more reliable, and is also steadier in a heavy sea than is a single needle. The *card* is frequently a thin aluminium rim, on which a paper scale divided into the 32 *points* of the c. is fixed. The c. (consisting of needle and card) is contained in a copper bowl, supported on gimbals (concentric rings), which keep it horizontal no matter how the ship pitches. The iron and steel of which the ship is built affect the c.; this is corrected by a process known as 'swinging the ship,' as a result of which masses of soft iron or magnets are distributed near the c. so as to counteract the ship's magnetic effects. In the *Liquid* or *Spirit* c., the card floats on a mixture of water and alcohol. Card and needle turn together. Very great steadiness is obtained with this form of instrument.

In the latest form of c.—the *Gyro* c.—the gyrostatic principle is applied (see GYROSTAT). By means of a gyro wheel the axis of the whole combination is kept parallel to the earth's axis, and the instrument thus shows both latitude and the ship's course. The c. is unaffected by the ship's magnetism or by surrounding masses of iron, and may be used to control a number of suitably placed dials. The c. is supposed to have been used in China about 3000 years ago, but it was not heard of in Europe until the XII. cent. About the beginning of the XIV. cent. Flavio Gioja, an Italian, invented a c. of eight points. Columbus discovered the magnetic declination (1492) of the c.

Scoresby's *Compass in Iron Ships* (1855); **Towson, *Practical Information on Deviations of the C.*** (1886).

COMPASS PLANT (*Silphium laciniatum*), N. Amer. prairie plant, the leaves of which point N.

and S. so as to avoid the midday heat. The name is also applied to *Lactuca scariola*, the ancestor of the cultivated lettuce.

COMPAYRÉ, JULES GABRIEL (1843–), Fr. educationist.

COMPENSATING PENDULUMS, see CLOCK.

COMPENSATION is money paid as reparation for injuries received or other losses by reason of sickness, accident, etc. In Britain it can be claimed under the Workmen's Compensation Act (1906) by employees who have been injured in the course of their employment; it can also be claimed against railway companies, tramway corporations, by others who have received personal injuries. C. is also paid for extinction of liquor licences; and for land or property taken over by public for improvement purposes.

COMPIÈGNE (49° 25′ N., 2° 50′ E.), town, on Oise, France; formerly fortified; favourite residence of Fr. kings; chief building is Royal Palace, erected by Louis XV. and now used as a museum of antiquities; there are some interesting churches and a fine Gothic hôtel de ville; Joan of Arc made prisoner of the English at siege of C. (1430); canvas, rope-making, boat-building, and distilling are chief industries. Pop. 13,439.

COMPOSITÆ, the largest order of flowering plants. Their florets are packed into heads (*capitula*) surrounded by an involucre of bracts. In some (*e.g.* dandelion) the florets are alike, in others (*e.g.* daisy) the outer ray-florets are larger than the inner disk florets. The capitula are a remarkable adaptation for pollination by insects, a great number of florets being pollinated by a single insect. The sunflower, dahlia, chrysanthemum, Michaelmas daisy, cornflower, chicory, hawkweed, colt's-foot, thistle, and golden-rod are common examples.

COMPRESSIBILITY, see ELASTICITY.

COMPRESSION (astron. and geog.), the ellipticity or polar flattening of the earth and other planets; (engineering) the compressing of remaining steam or gas in the cylinder of an engine after the exhaust to reduce the velocity of the piston on its return stroke.

COMPROMISE, MEASURES OF (1850), agreement between N. and S. States of America by which five questions concerning slavery were settled: two to satisfaction of N., two to satisfaction of S., while the fifth was balanced.

COMPTON, HENRY (1632–1713), Anglican divine; bp. of Oxford, 1674, of London, 1675.

COMPULSORY SERVICE, see CONSCRIPTION.

COMPURGATOR, the precursor of the modern juryman. Under the Anglo-Saxon law an accused person could produce twelve persons to declare on oath their belief in his innocence.

COMTE, AUGUSTE, ISIDORE AUGUSTE MARIE FRANÇOIS XAVIER (1798–1857), Fr. philosopher; b. Montpellier, where he worked in the École Polytechnique, but quarrelled with his master; went to Paris (1816), where he lived on very slender means; came into friendly relations with Saint-Simon in 1818, but after a time rebelled against him, thinking Saint-Simon tried to keep him too much under his influence. C. married Mlle Caroline Massin in 1825, but the marriage was not happy; in 1826 had attack of insanity, but recovered; pub. first vol. of *Positive Philosophy* in 1830, the sixth and last coming out in 1842; then ceased to live with his wife but gave her an allowance; became acquainted with Mme Clotilde de Vaux in 1845, and was deeply affected by her death a year later; pub. his *Positive Polity* and *Positivist Calendar*, the latter in imitation of the Catholic Calendar of Saints. In his lectures C. promulgated his new 'Religion of Humanity.' The *Catechism of Positivism* came out in 1852.

C.'s work, despite its diverse elements, can be regarded as a unity. He had written a *Plan of the Scientific Works necessary to reorganise Society* in 1822, in which he pointed out the coexistence of two tendencies, one to the break-up of old institutions, the other to new forms of social evolution. He became imbued with great admiration for the Catholic Church, and wanted to adapt the methods and principles of the mediæval Church to new social conditions, for a Religion of Humanity. He desired to imitate closely the organisation and rites but not the doctrines of Catholicism. He formulated the *Law of the Three States*, according to which knowledge was (1) theological (belief in supernatural government of the world), (2) metaphysical (objects are ruled by external but abstract force), (3) positive (law explains everything). He arranged the sciences in order, beginning with math's and ending with sociology; each depended on the one preceding, and sociology, the most advanced, was the last to be understood. This arrangement was adversely criticised by Herbert Spencer and others. In his later works he raises Humanity to the place held by God in Monotheism. Amongst other ideas, he believed in the enormous importance of women in the social state. His system, despite its brilliance and suggestiveness on many points, has not as a whole won very wide acceptance. Positivist societies exist in England and France; among prominent Eng. Positivists is Mr. Frederic Harrison.

H. D. Hutton, *Comte's Theory of Man's Future* (1877), *Comte, the Man and the Founder* (1891), *Comte's Life and Work* (1892); J. Watson, *Comte, Mill, and Spencer* (1899).

COMUS (classical myth.), divinity (son of Bacchus and Circe); supposed to preside over festive proceedings; the title of a masque written by Milton.

COMYN, JOHN (d. 1306), Scot. baron, known as *Red Comyn*; murdered by Robert Bruce in Dumfries Church.

CONANT, THOMAS JEFFERSON (1802–91), Amer. baptist theologian; author of works on Old Testament; prof. in several theological coll's.

CONATION, according to some, same as feeling; to others, a mental state caused externally, or one leading to action. See PSYCHOLOGY.

CONCA, SEBASTIANO (1679–1764), Florentine artist.

CONCARNEAU (47° 53′ N., 3° 53′ W.), seaport, on Bay of La Forêt, France; sardine fisheries. Pop. 7631.

CONCEALMENT OF BIRTH, see BIRTH.

CONCEPCIÓN (*c.* 37° S., 72° 15′ W.), important province, S. Chile, between Argentine and Pacific; has splendid commercial position; is an agricultural and cattle-raising district; produces wheat, flour, and wool; its wines are famous; has also valuable coal mines; principal port, Talcahuano. Area, 3311 sq. miles. Pop. (1910) 225,054.

CONCEPCIÓN (36° 49′ S., 72° 3′ W.), city, S. Chile; bp.'s see; has noteworthy cathedral; is centre of rich agricultural region; flour-mills, furniture factories, distilling and brewing. Pop. 62,000.

CONCEPCIÓN, VILLA CONCEPCIÓN (23° 33′ S., 57° 30′ W.), town and river-port of Paraguay, on Paraguay R., S. America; tea is chief export. Pop. (1910) 15,000.

CONCEPT, an idea, without particular details; more generally, any idea.

CONCEPTION, see REPRODUCTIVE SYSTEM.

CONCEPTUALISM, scholastic philosophical term denoting position intermediate between Nominalism and Realism.

CONCERTINA, small wind instrument, with two rectangular keyboards and bellows; invented by Sir Charles Wheatstone (1829).

CONCERTO, musical term for a composition designed to display the skill of the performer and the capabilities of his instrument; is accompanied by full orchestra; consists of three movements of different character, its form being derived from the Sonata.

CONCH, term for the shells of marine molluscs, particularly [illegible] often used as a horn or for ornamental purposes;

name is applied to natives of the Florida Keys and Bahamas, who feed on shell-fish.

CONCILIATION BOARD, see ARBITRATION.

CONCINI, CONCINO, MARSHAL D'ANCRE (d. 1617), Florentine adventurer; gained wealth and dignity under Louis XIII. of France; eventually assassinated.

CONCLAVE (Lat. *conclave*, apartments locked with one key).—(1) Term applied in original sense until middle of XVIII. cent. (2) Assembly held for solemn or secret purpose, this meaning arising from (3). (3) Technical term for sitting of coll. of cardinals in Rom. Church to elect Pope. Bp. of Rome was elected by people in earliest times; this led to bloodshed, erections of anti-popes, and invocation of state interference; gradually Emperor became chief influence at papal appointments and insisted on power to ratify elections; Pope Clement II. confirmed right of election by lay prince (1046). In latter half of XI. cent., however, Hildebrand's reforms resuscitated papacy, and in 1059 a papal bull enacted that cardinals with advice of clergy should elect pontiff and people should ratify their choice; Lateran Council (1179) gave election to cardinals alone, enacting that Pope could not be app. without consent of two-thirds of college; to prevent prolonged vacancies cardinals were shut up until decision was made; Council of Lyons, 1274, established system (which later became law) of allowing cardinals in c. no private apartment, no communication with outside world; moreover, their food-supply was cut down gradually, so that starvation might force them to make a decision.

CONCORD (43° 10′ N., 71° 30′ W.), town, capital of New Hampshire, U.S.A.; extensive manufactures; textiles, machinery; celebrated granite quarries. Pop. (1910) 21,497.

CONCORD (42° 23′ N., 71° 23′ W.), town, on Concord R., Massachusetts, U.S.A.; favourite residence of Emerson, Hawthorne, Thoreau, the Alcotts; scene of opening conflict of Amer. War of Independence, April 19, 1775. Pop. (1910) 6421.

CONCORD (35° 25′ N., 80° 23′ W.), city, on Rocky R., N. Carolina, U.S.A.; seat of cotton manufactures. Pop. (1910) 8715.

CONCORD, BOOK OF, name given to five Lutheran Confessions, the last, issued 1580, being *Formula Concordiæ*.

CONCORDANCE, term used of compilations (generally of the Bible) which give all words or phrases arranged alphabetically with a list of passages where they occur. The first one was compiled in XII. cent. A.D.; a Hebrew one by a Rabbi appeared in XV. cent. The most famous English C. is Cruden's, first pub. 1737 and frequently revised.

CONCORDAT, the term applied to agreements between the ecclesiastical and secular powers, specially between the R.C. Church and the State in different countries in mediæval and modern times. When Church and State were practically coterminous, as they were in the Middle Ages, and the Church claimed not only sacred and spiritual but other authority besides, *e.g.* jurisdiction over all offences committed by clerics, clash between the religious and secular arm was inevitable. This reached a height in the famous Investiture Controversy between the popes and emperors, terminated by the *Concordat of Worms*, 1122. Another famous concordat was that between Pope Pius VII. and Napoleon in 1801. This was repudiated by the Fr. Republic in 1905. Agreements have been made between the Roman See and various European countries. The right of the State to nominate to important benefices is sometimes recognised, or at any rate the right of objection.

CONCORDIA (classical myth.), Rom. divinity, representing peace and friendship.

CONCORDIA (45° 44′ N., 12° 52′ E.), small ancient town, Venetia, Italy; important under the Romans; cathedral; the see was transferred to Portogruaro, 1339.

CONCRETE, a solidified mixture of sand, gravel, and stone fragments with cement or lime used in engineering and architecture. The pebbles, sand, etc., called the *aggregate*, are thoroughly mixed with the *matrix* (the best being Portland cement) and a certain amount of water. The result is a plastic mass which can be moulded into any shape and size, such as slabs for paving, blocks for breakwaters weighing hundreds of tons, foundations of buildings, floors, walls, tanks, conduits, etc. It sets very hard, and is one of the most durable materials known; it is, therefore, much used for sea-walls. Its lack of tensile strength essential for beams, arches, columns, piles, etc., is overcome by introducing into the mould steel bars or a network of bars according to the purpose for which it is required, and when set the steel c., *i.e.* armoured or *reinforced* c., beats masonry for stability, fireproof qualities, and economy. In the case of thin walls, however, the boarding necessary for moulding and the better quality aggregate necessary makes the construction more expensive than brickwork. The invention of reinforced concrete has revolutionised civil engineering and architecture.

Taylor and Thompson, *A Treatise on Concrete, Plain and Reinforced* (1905); Warren, *Handbook of Reinforced Concrete* (1906).

CONCRETE, philosophical term meaning something which can be seen or felt, as opposed to abstract, which is only supposed. Thus 'blind man' is concrete; 'blindness' is abstract.

CONCRETIONS (geol.), rounded or irregular masses formed in sandstones, impure limestones, shales, and other sedimentary rocks, by the aggregation of calcium carbonate, calcium phosphate, silica, round fragments of shells, bone, or other material; (med.) pathological solid secretions in the human body, *e.g.* gall-stones and bladder-stones.

CONCUSSION, see BRAIN.

CONDE, JOSÉ ANTONIO (1766–1820), Span. Orientalist.

CONDÉ, LOUIS DE BOURBON, PRINCE OF (1530–69), Fr. Huguenot leader; murdered at *Jarnac* after having surrendered.

CONDÉ, LOUIS II. DE BOURBON, PRINCE OF (1621–86), Fr. general known as *the great Condé*. As Duc d'Enghien, at age of 22, C. won decisive battle of *Rocroy* against Spain, an important step towards ascendancy of France (1643), and great victories against Empire, 1644–46; succ. as prince, 1646, and his great territories and abilities made him a dangerous noble; supported regency against Fronde, 1649, but was arrested, 1650; new Fronde obtained his release, and he led armies against government forces, 1651–58. C. was pardoned by Louis XIV., and distinguished himself in his wars; not deficient as strategist, but fame chiefly rests on spirited conduct of a battle and absolute control of men.

Lord Mahon, *Life of Condé* (1845); Duc d'Aumale, *Histoire des Princes de Condé* (Eng. trans., 1872).

CONDÉ, PRINCES OF, Fr. house of Bourbon assumed this title XVI. to XIX. cent's, from their estate of Condé-sur-l'Escaut.

CONDÉ-EN-BRIE (49° 1′ N., 3° 33′ E.), small town, Aisne, France; ruined castle.

CONDENSATION, see LIQUEFACTION OF GASES.

CONDENSER, apparatus for compressing gases; instrument for concentrating an electric charge; a lens or system of lenses to concentrate light, especially in a microscope or optical lantern; appliance used in manufacturing woollens; appliance for condensing exhaust steam of steam-engine.

CONDÉ-SUR-L'ESCAUT (50° 27′ N., 3° 24′ E.), town, on Scheldt, Nord, France; industries—boat-building, tanneries, brewing, etc. Pop. 4960. See CONDÉ, PRINCES OF.

CONDÉ-SUR-NOIREAU (48° 53′ N., 0° 33′ W.), town, at confluence of Noireau and Drouance, Calvados, France; cotton-spinning. Pop. 6591.

CONDILLAC, ÉTIENNE BONNOT DE (1715–80), Fr. philosopher; took orders, but devoted all

his time to study of philosophy; follower of Locke and friend of Rousseau; wrote *Essai sur l'origine des connaissances humaines*; *Traité des sensations* is his greatest work. C. contends that everything is due to sensation, and nothing to heredity. Though himself religious, his thought, while clear, is hard and unspiritual; his work influenced subsequent Eng. philosophers, but owing to Romantic Movement and other causes he is no longer accepted as guide.

CONDITION, legal term implying a provision that in unforeseen circumstances certain changes regarding a previous obligation shall be made; in logic, denotes the necessary antecedent of a cause, *e.g.* in affixing a postage stamp the moistening of the gum is the cause, the adhesive property of the gum is the condition.

CONDITIONAL FEE, term in common law for a fee, or estate, granted to particular heirs.

CONDITIONAL LIMITATION, the grant of an estate to a person for a particular period; or on condition of his fulfilling certain requirements.

CONDOM (43° 57′ N., 0° 22′ E.), town, S.W. France; trades in grain and brandy. Pop. 4056.

CONDOR (*Sarcorhamphus gryphus*), large bird of prey inhabiting the Andes of S. America. It can fly at great altitudes (over 20,000 ft.), and sail in the air without flapping the wings, which may measure 10 ft. between the tips. The head and neck are devoid of feathers. C's are exceedingly voracious, and gorge themselves with carrion—sheep, calves, etc.—till they are dazed, when they can be easily caught.

CONDORCET, MARIE JEAN ANTOINE NICOLAS CARITAT, Marquis de (1743–94), famous Fr. *doctrinaire* and distinguished mathematician; assisted with Fr. *Encyclopédie*; became member of Academy of France, 1782; wrote (1785) on laws of chance, *Vie de Turgot*, 1786, *Vie de Voltaire* (whose disciple he in many ways was), 1787; and while concealed in Paris during Terror gave complete expression to political views in *Progrès de l'esprit humain*, which pictures existing states and churches as greatest enemies of society. Chosen member of Legislative Assembly, 1790, C. advocated educational system since adopted (1792); drew up memorandum for suspension of king and calling of National Convention of which he was member; opposed execution of king and many other acts of Convention, and was proscribed.

Lord Morley, *Critical Miscellanies* (1871–77); Ellis, *The Centenary of Condorcet* (1894).

CONDOTTIÈRE (Ital.), military commander who hired out the services of himself and band. Mercenary forces played important part in warfare from XIII. to XVI. cent., especially in wars of Ital. communes by whom name was bestowed.

CONDUCTION, ELECTRIC, when the terminals of a galvanic cell are connected together by a metallic wire, an electric current passes through the wire, and the wire is said to *conduct* electricity. The case is analogous to the flow of water in a pipe which connects two cisterns at different levels. The amount of water flowing per second will be greater in proportion to the difference of levels, and will be less in proportion to the resistance to flow, which is offered by the pipe. Similarly, in the case of an electric current, the difference of electromotive forces at the ends of the wire, and the resistance of the wire, are the all-important factors. The relationship is expressed by *Ohm's Law*, which states that the amount of current is proportional to the electromotive force acting, and inversely proportional to the resistance, and is symbolically expressed by the equation $C=\frac{E}{R}$, where C is the current in amperes, E the electromotive force in volts, and R the resistance. The unit of resistance is known as the *ohm*, and is defined as the resistance of a uniform column of pure mercury, 106·3 centimetres long, and weighing 14·4521 grams, the measurements being taken at 0° C. The *specific resistance* of a substance at any given temperature is the resistance, expressed in ohms, between two opposite faces of a centimetre cube of the substance at the given temperature. The reciprocal of the specific resistance is known as the electric *conductivity* or *conductance*.

The resistance of metals depends on a number of conditions. Firstly, on the chemical purity of the specimen: in general, small admixtures of other metals increase the resistance. Secondly, on the temperature: resistance of a pure metal increases nearly proportionally to the absolute temperature, although there is evidence to show that it vanishes before the zero of absolute temperature is reached. Thirdly, on the physical state of the substance: annealing of a metal generally alters its specific resistance. Fourthly, the resistance generally changes when the material is subjected to stresses such as compression or torsion. Fifthly, it also changes in certain cases when the substance is exposed to magnetising forces. Alloys have, as a rule, a greater resistance than any of their constituents, and with increase of temperature their increase in resistance is much smaller than in pure metals. The passage of a current through any conductor is accompanied by the development of heat. *Joule's Law* states that the rate at which heat is developed is jointly proportional to the square of the current strength and the resistance; *i.e.* if a current of strength C flows through a conductor of resistance R, the heat developed is C^2R per unit time.

With regard to conduction in liquids, the chief fact is that when it takes place chemical changes are always produced. For example, if a current be made to pass through a solution of sodium chloride (common salt), chlorine gas appears at the point where the current (according to the usual convention) enters the solution, while the sodium, liberated at the point where the current leaves the solution, is acted on by the water present so as to form hydrogen, which is thus set free at that point. This process is known as Electrolysis (*q.v.*), and the species of conduction involved is known as *electrolytic conduction* in order to distinguish it from *metallic conduction* referred to above.

Both forms of conduction may be satisfactorily explained by the electronic theory which has been brought forward prominently in recent years. According to it, a conductor of pure metal contains atoms which carry a charge of positive electricity and also contains a large number of negatively charged particles, termed *electrons*, which are free to move among the atoms. The motions of the electrons may be regarded in the same way as that of the molecules in a gas are regarded by the kinetic theory of gases. Taken on the average, they will have a certain mean velocity, will collide with each other and with the positively charged atoms, and between two successive collisions each will have traversed a certain mean free path in a certain time. In the ordinary condition of the conductor, when no current is passing through it, the velocities of the electrons will be distributed equally in all directions in space; but if the conductor be included in a galvanic circuit, the electromotive force thus applied induces them to travel, on the whole, in the direction of that force. The positively charged atoms are, however, not free to move except through small distances from their mean positions, and hence the electrons move relatively to the atoms. It is this motion of the electrons which constitutes a current of electricity. The theory shows that the conductivity is proportional to the number of electrons in unit volume of the substance and to the length of their mean free path. Apart from the influence—supposed to be small—of the second of these two factors, it follows that good or bad conductors of electricity differ by having more or fewer electrons, respectively, per unit volume. As a rule, substances which conduct electricity well also conduct heat well, and this is quite in agreement with the electronic theory, according to which the ratio of the two conductivities, thermal and electric, should be the same for all pure metals. Experiment shows that

this is the case, at least for all the better conducting metals. For an explanation of the mechanism of conduction in liquids, see ELECTROLYSIS.

In ordinary circumstances gases do not conduct electricity. But a gas may easily be rendered conducting in a variety of ways. If it is exposed to the action of Röntgen rays, cathode rays, rays from uranium or radium, ultraviolet light, electric spark discharge, contact with incandescent metals, or if it is mixed with the products of combustion from flames, it can conduct electricity for some time after the action which produced conductivity has ceased, but this conducting power always diminishes and finally disappears. When in the conducting state the gas is said to be *ionised*. Conduction in such cases presents certain peculiarities. In the first place, it does not follow Ohm's Law unless the electromotive force is very small. Second, the conducting power may be removed by various methods, such as filtration of the gas through glass-wool, bubbling it through water, passing it through a metallic tube, or passing a current of electricity through it. These and other facts show that conduction in an ionised gas is due to the presence of particles, that these particles are electrified, and that their electrifications are both positive and negative. The diminution and ultimate disappearance of conducting power is due to the recombination (and, therefore, neutralisation) of oppositely charged particles, or *ions* as they are called. It has been found that the electric charge on a negative ion is the same as the charge on a hydrogen ion in electrolytic conduction, and that the mass of a negative ion or particle is about $\frac{1}{1000}$ of a hydrogen atom.

The principles of electric conduction in metals find their widest application in the distribution of electric energy for the purposes of lighting, heating, and power.

Russell, *Theory of Electric Cables and Networks*; Campbell, *Modern Electrical Theory*; J. S. Thomson, *Electricity and Matter*; Clark, *Mathematical and Physical Tables*; Munro and Jamieson, *Electrical Rules and Tables*; Kempe, *Electrical Rules and Tables*.

CONDUCTION OF HEAT is the propagation of heat from one body to another, with which it is in contact, or from molecule to molecule in a homogeneous substance. Heat is considered to increase the vibration of the molecules of a substance, but no visible motion of the matter takes place. The increased vibration of the warmer molecules must be by impact handed on to the neighbouring colder molecules, so that heat flows from the part of higher temperature to that of lower temperature. Gases, liquids, and solids conduct heat. Solids can be shown to conduct heat by heating one end of a long iron bar in which thermometers are placed at intervals. The thermometer nearest the source of heat rises first, and the others follow in succession. From this method the conductivity, *i.e.* the quantity of heat which passes through a section in unit time, can be calculated. This varies for different substances, but there is no substance which is a total non-conductor of heat. Substances which are good conductors feel cold, because they conduct the heat rapidly away from the body. Wood is not a good conductor. It does not feel as cold as iron, for instance, and a blazing stick can be held quite comfortably, even with the flame close to the hand, whereas an iron rod, held in the fire, grows uncomfortably hot in a minute or two. Wool is used for clothing because it is a bad conductor of heat, and the spaces in it are filled with air, also a bad conductor.

The difference in conducting power can be shown by fixing studs with wax on to two rods of the material to be tested. These are jointed and heated at the junction. The stud drops off the best conductor first.

Liquids possess poor conductivity, and this is important for animal and plant life in lakes. Water is cooled from the top. The surface water cools to 4°, and sinks till the whole of the water is at 4°. As it cools still further, it grows lighter and floats, finally freezing, but owing to the poor conductivity the water at the bottom is rarely colder than 4°. It is difficult to estimate the conductivity of liquids, because the process is interfered with by connection. As a rule, good conductors of electricity are good conductors of heat. The conduction in gases is almost negligible.

CONDYLURA, see under MOLE FAMILY.

CONE (geom.), solid bounded by a circular or other closed curving base and a surface obtained by connecting every point on the circumference of the base with a point outside, called the vertex. A *right circular* c. is obtained by rotating a right triangle round one of the sides enclosing the right angle.

CONECTE, THOMAS, Fr. monk who denounced prevailing corruptions; burnt as heretic, 1434.

CONEGLIANO (45° 53′ N., 12° 17′ E.), town, Venetia, Italy; cathedral; manufactures silk and woollen fabrics; noted for its wine. Pop. *c.* 6000.

CONEY ISLAND (40° 39′ N., 74° W.), island (favourite watering-place) at entrance to New York Harbour, at S.W. extremity of Long Island.

CONFALONIERI, FEDERICO, COUNT (1785–1846), Ital. patriot; opposed Austria's annexation of Lombardy; implicated in revolt of Piedmont against Austria, 1821; imprisoned till 1836; exiled till 1840.

CONFARREATIO, most ceremonious form of marriage amongst patrician ancient Romans.

CONFEDERATE STATES OF AMERICA.—Title assumed by Southern States of America—Alabama, Arkansas, N. Carolina and S. Carolina, Florida, Georgia, Louisiana, Mississippi, Texas, Tennessee, Virginia (excluding W. Virginia)—when seceding from United States, 1860–61. The secession was not regarded in South as revolution, but exercise of right of individual states to withdraw from compact of Union, the great doctrine of Southern party being 'State rights.' Chief reasons of secession were: (1) legislation of Congress against slavery, which Southern States could not afford to abandon; (2) superiority of North in population, and, as a result, (3) superiority in House of Representatives and consequent Northern control of politics and commerce of South (protective legislation, beneficial to North but harmful to South, was the rule). On election of Pres. Lincoln, the Northern nominee (1860), S. Carolina declared for secession. United States refused to acknowledge Confederate States (1861), and after four years of war recovered seceded States for the Union. The constitution of Confederate States, though allowing large amount of State rights, was, like that of United States, government by central Congress (held at Richmond, in Virginia) composed of Pres. (elected for 7 years, a longer time than in Union), Executive Council (the members of which had greater power than Upper House in Union), and House of Representatives. Anti-slavery legislation was forbidden. See UNITED STATES: *History*.

Cambridge Mod. Hist., vol. vii. chs. 14–19 (1903); J. E. Chadwick, *Causes of the Civil War*; J. K. Hosmer, *The Appeal to Arms*; J. W. Burgess, *The Civil War and the Constitution*.

CONFEDERATION, term signifying alliance of independent communities, *e.g.* North German Confederation; C. of the Rhine (1805) was alliance of Bavaria, Württemberg, and other states with France; later (1806), sixteen states joined Napoleon in a c., which lasted till 1813. See also FEDERATION, UNITED STATES, CANADA.

CONFESSION, tomb of a confessor or martyr (e.g. *Confession of St. Peter*), or generally now sacramental c. of sins in R.C. Church. It is held to be necessary for the remission of grievous sin. C. is of various kinds, but it is commonly defined as the avowal of one's own sins made to a duly authorised priest for the purpose of obtaining their forgiveness through the power of the keys. The 4th Lateran Council, 1215, laid down a precept that once a year should be the minimum of confession. The necessity of c. is denied by Prot.

Churches, but its use, under certain circumstances (i.e. for relief of mind when sick), is encouraged by the Church of England.

CONFESSIONAL, like confession, may mean the tomb of a martyr; or more generally, the place for the hearing of auricular confession in the R.C. Church; generally a slight wooden structure. It has two (or three) doors and a partition. The priest, seated, hears the pentitent's confession through a small grating of wire or zinc.

CONFESSOR, one who hears a confession, in R.C. Church necessarily a priest; or one who testifies to his faith.

CONFIRMATION, the rite in the Christian Church which follows baptism, a giving of the Holy Ghost; in Western Christendom performed by the laying on of hands (and in the R.C. Church anointing with chrism) by the bp. In the Eastern Churches the bp. only consecrates the oil with which the parish priest anoints candidates.

C. of Bishops, the consent of a superior authority to their appointment; according to the Council of Nicæa the sanction of the Metropolitan was required; from XII. cent. onwards it was declared to belong to the pope. The popes gradually came also to present to all bishoprics, instead of the older mode of election and confirmation. In the Anglican Church confirmation is merely formal.

CONFOLENS (46° 1′ N., 0° 39′ E.), town, at confluence of Vienne and Goire, Charante, France; gloves.

CONFUCIUS—Romanised form of K'UNG TSZE—(*c.* 550–478 B.C.), Chin. philosopher and reformer; b. in state of Lu, part of modern province of Shan-tung; descended from famous prehistoric Chang monarch Hwang-ti, and s. of Shuh-liang Heih, a distinguished officer, over 70 years of age at birth of C. C. passed youth of poverty, became teacher at twenty-two; child pupils were gradually replaced by band of disciples, whom he gave voluntary instruction; made chief magistrate of city of Chung-tu about 498; wonderful virtue and power exercised universal influence, but he fell before the machinations of external foes, and was forced to withdraw from Chung-tu, and abandon attempt to carry out political theories. His attempts to persuade princes to become model rulers also failed, and, although he wandered throughout China and won great fame, he remained in private life until his death.

No philosophical writings by C. are known of, but his disciples and descendants collected his sayings, the most important of their works being *Ta-hio* (The Great Subject), *Tchoung-young* (The Invariable Mean), and *Lun-yii* (Philosophical Discourses). These form three of the four classics learned by heart in the state schools of China. C. taught veneration of past and imitation of antique virtues, superiority to ambition (saying that the fool complained of not being known by men, the wise man of not knowing men), charity, forgiveness, repentance, example in preference to preaching. He founded Chin. philosophy, although his teaching was practical, not abstract, and his disciples complained that he left them no word on the nature or end of man. He annotated and arranged the chronicles and lit. of China, and his *Spring and Autumn*, a brief abridgment of Chin. history, is regarded as a Chin. classic, though judged of little merit by European scholars. He lies buried in K'ung cemetery, adjoining city of K'iuh-fow, where his descendants (said to number 50,000) live. This spot is Mecca of China.

E. H. Parker, *Life and Labours of C.*; Alexander, *C., the Great Teacher* (1890); Legge, *Religions of China* (1880); Degroot, *Religion of the Chinese* (1910).

CONGÉ D'ÉLIRE (Fr.), leave to elect; technical term for royal licence to dean and chapter of cathedral church to elect bp. to vacant see.

CONGER, see EELS.

CONGESTION, superfluity of blood in an organ due to pathological reasons; may be venous (passive), *e.g.* c. caused by ligaturing arm and preventing veins from returning blood to the heart, or arterial, active caused by dilatation of arteries, as in blushing; may also occur in cases of debility to back and posterior portion of lungs, when it is called *hypostatic* c.

Treatment usually takes the form of gentle friction and pressure to induce freer circulation, or removal of cause of obstruction and internal administration of drugs.

CONGLETON (53° 10′ N., 2° 14′ W.), market town, Cheshire, England; principal manufacture, silk; several coal mines and iron foundries in district. Pop. (1911) 11,310.

CONGLOMERATE, name for rocks consisting of rounded shingle or pebbles of hard material (granite, gneiss, limestone, etc.), embedded in a fine-grained matrix (sand). They are a typical shore formation and are imperfectly stratified, their age being sometimes determined by fossils found in the pebbles. Rocks composed of angular fragments cemented together are known as breccias.

CONGO (6° 4′ S., 12° 15′ E.), largest river in Africa; formed by union, in lat. 6° 25′ S., of two streams, Luapula, which issues from Lake Bangweulu and flows through Lake Mweru, and Lualaba, which has its source in Lokinga Mountains. C. then flows N. as far as equator, when it curves to N.W. as far as lat. 2° N., after which it turns S.W., entering sea at Banana; length, *c.* 2500 miles; drains area of *c.* 1,600,000 sq. miles. Basin is depressed region bordered by mountains, and not improbably represents former inland sea. Principal tributaries are Lukuga and Aruwimi from E., Ubangi and Sanga from N., Lomami and Kassai from S. Lukuga is outlet from Tanganyika, and joins C. near its formation by union of head-streams. Kassai, the chief southern tributary, has numerous affluents, and joins C. near Ngato. From its mouth the C. is navigable to Matadi (*c.* 100 m.), from Matadi to Stanley Pool (*c.* 200 m.), rapids make navigation impossible; from Stanley Pool to Stanley Falls (*c.* 1200 m.) it is navigable for boats of small draught.

Livingstone discovered upper reaches, called by natives the Luapula and Lualaba (1871). H. M. Stanley, five years later, proved these upper reaches to be part of the C., and in 1880 explored the river with Belgian expedition.

H. M. Stanley, *Congo and its Free State* (2 vols., 1885), *Through the Dark Continent* (2 vols., 1878); M. Roby, *My Adventures in the Congo* (1911); Sir H. Johnston, *George Grenfell and the Congo* (1908), *River Congo from Mouth to Bolobo* (1895).

CONGO, BELGIAN, CONGO BELGE (6° S., 14° 40′ E.), Belg. colony, comprising practically basin of river Congo; bounded N. by French Equatorial Africa, Sudan, E. by Brit. and Ger. E. Africa, S. by Rhodesia, Angola, W. by Atlantic, Fr. Equatorial Africa; area, *c.* 909,654 sq. miles. Surface generally is depression, which not improbably was formerly occupied by inland sea; great part covered by trackless forests, and surrounded by highlands and hills. Chief river is Congo (*q.v.*), with affluents, Kasai-Sankurru, Chuapa, Lolongo, Boloko, and others; chief lakes, Leopold II., Tumba in W.; Tanganyika, Mweru, are on E. boundary; chief settlements, Boma (capital), Banana, Leopoldville, Vivi, Matadi. Climate is tropical. Congo is controlled by colonial ministry of Belgium; administered by gov.-gen., who represents king, and is assisted by vice-governors-general; divided for administrative purposes into twelve districts, each under commissioner.

History.—CONGO FREE STATE was founded by Leopold II., king of the Belgians, as a neutral independent state. The work of exploration of district had been carried out chiefly by Stanley; who was financed by Leopold II. Various treaties were concluded with natives whereby Belgium acquired considerable amount of territory, and the districts thus acquired were combined as state, which was recognised by other powers in 1884–85, when, as the

result of the Berlin Conference, Leopold II. of Belgium was app. king, promising to keep country open to trade of all nations and to put down slavery. Leopold's first action was the war against the Arabs, who carried on trade in slaves and ivory; having expelled them, he obtained permission from other powers to levy taxes on pretext of carrying out various improvements; taxes he levied were so heavy that traders of other nations were all ruined and gave up business. Leopold then proceeded to organise the state as a great rubber-producing private estate; rubber had to be produced by natives as no other race could stand the intense heat of the forests; and Leopold's system was one of payment by results, consequence being that agents had great incitement to enrich themselves at expense of natives; who in some cases were treated with horrible cruelty. By 1904 public opinion on the subject had become so strong that a commission was app. to inquire into the matter. Since then atrocities have ceased, at least in more accessible districts. The State was annexed to Belgium, 1908.

There are many tropical fruits; rubber and palm oil produced in large quantities; coffee, tobacco, maize, rice, corn, and cacao are grown, and cattle are bred. Other products are ivory, palm kernels, gums, copal, beeswax, sorghum, camwood. Principal exports are rubber, gold, ivory, palm oil, cocoa, copal, coffee. Among imports are arms, machinery, wines, spirits, provisions, clothing, etc. Rich copper mines are now being extensively worked in Katanga district. Communications include railway from Matadi to Stanley Pool, another in Mayumbe, and one from Rhodesian frontier to Elizabethville (the copper district); while others are being made. The Congo and its tributaries are navigable to an extent of 5500 miles.

Natives are of Bantu-Negroid stock, and include many tribes, of which most important are Warua and Manyema; some natives are cannabalistic, and there are several pigmy tribes. Each tribe has its own dialect. Native religion is animism; there are many Christian missions. Pop. *c.* 15½ millions, of which about 3400 are Europeans (Belgians, British, Portuguese, Italians, Swedes, etc.).

Davis, *Congo and Coasts of Africa* (1908); Descamps, *New Africa* (1903); Alexis, *Notre Colonie en 1910*.

CONGO FREE STATE, see CONGO, BELGIAN.

CONGREGATION, assembly of worshippers in any church; term used variously of some religious orders (not taking solemn vows) or assemblies in the R.C. Church.

CONGREGATIONALISM, see FREE CHURCHES.

CONGRESS, literally, an assemblage, term used especially in diplomacy. Its chief non-diplomatic use is for the U.S.A. Congress, a legislative assembly corresponding to Parliament. In diplomacy the term is applied to an assembly of the representatives of sovereign states, particularly the Great Powers, such as the C's of Vienna, 1814–15, and Berlin, 1878; their work really comes under the sphere of International Law.

CONGREVE, RICHARD (1818–99), Eng. Positivist.

CONGREVE, WILLIAM (1670–1729), Eng. dramatist; b. Bardsey, Yorkshire; plays include: *Old Bachelor* and *The Double Dealer* (1693), *Love for Love* (1695), *The Mourning Bride* (1697), *The Way of the World* (1700); defended morality of stage against Jeremy Collier (*q.v.*); wrote some masques and artificial lyrics.

C. was the greatest of Restoration dramatists; a master of dialogue and intrigue; a fine tragedian. Gosse, *Life* (1888).

CONGREVE, SIR WILLIAM, Bart. (1772–1828), Eng. inventor; invented the war rocket (1805), formerly much used, a hydro-pneumatic canal lock, and many other mechanical contrivances; M.P. for Plymouth (1820); controller of the Royal Laboratory.

CONIBOS, MANOAS, Amer. Indian tribe in Peru.

CONIC SECTION, curve in which a plane intersects a cone. All the possible resulting curves obtained thus, are: *pair of intersecting straight lines, circle, ellipse, parabola,* and *hyperbola*. Geometrically, the last three curves are defined as: the locus of a point moving so that the ratio of its distance from a fixed point, called the *focus*, to its distance from a fixed straight line, called the *directrix*, is constant. This ratio, called the *eccentricity*, is less than, equal to, and greater than, unity, for the ellipse, parabola, and hyperbola respectively. The circle is a particular case of the ellipse. Analytically, a conic section is represented by an equation of the second degree of the form $ax^2+by+cy^2+dx+ey+f=0$.

See books by Smith (1898), Macaulay (1906, 2nd ed.).

CONIES, see PROCAVIA.

CONIFERS, see GYMNOSPERMS.

CONINE, CONIINE ($C_8H_{17}N$), alkaloid obtainable from the hemlock plant; oily liquid with characteristic and penetrating taste and smell; B.P. 166° C.; a powerful poison.

CONINGTON, JOHN (1825–69), Eng. scholar; trans. Vergil's *Æneid*.

CONISTERIUM, room in which ancient wrestlers were sanded after being anointed.

CONJEEVERAM, KÁNCHIVARAM (12° 50′ N., 79° 45′ E.), town, Chingleput district, Madras, Brit. India; one of most sacred cities of Hindus; several large temples, numerous pagodas; captured by Clive, 1752. Pop. 46,164.

CONJUGAL RIGHTS, RESTITUTION OF.—Where one party to a marriage has withdrawn from cohabitation without lawful cause, the other may petition for 'the restitution of conjugal rights.' If the Court grants a degree, and the respondent disobeys it, the petitioner can then obtain a decree of judicial separation on the ground of desertion.

CONJUNCTION (astron.), the apparent nearest approach of two heavenly bodies having the same longitude or right ascension. It is termed *inferior* when two planets are between the sun and the earth, and *superior* when on the side of the sun most distant from the earth.

CONJURING is the art of performing tricks which mystify the observer, but are merely due to sleight of hand or skilfully devised apparatus. Many of these, such as fire-eating, swallowing molten metal, and similar tricks, were performed in very early times, but, whereas the old magicians laid claim to supernatural powers, the modern performer does not scruple to admit that all his mysteries are entirely the result of trick. Amongst the most successful performers of the past may be named Comus (late XVIII. cent.), Jules de Rovère, Préjean, Olivier, and Robert Houdin. Of late years the conjurer has been greatly assisted by the increased knowledge of science, and has availed himself of the use of electricity, magnetism, and optics—such performers as J. N. Maskelyne and David Devant being especially notable for their success.

J. N. Maskelyne, *Oriental Magic* (1891); Devant, *Conjuring*.

CONKLING, ROSCOE (1829–88), Amer. politician; fine orator; quarrel with Blaine divided Republican party in Congress.

CONNAUGHT (53° 44′ N., 9° W.), province, W. Ireland, comprising counties of Mayo, Galway, Leitrim, Roscommon, and Sligo; mountainous in west; principal river, Shannon; fine scenery; formerly one of Irish kingdoms, ruled by O'Connors; divided into counties about 1580. Area, 6845 sq. miles. Pop. (1911) 609,966.

CONNAUGHT, DUKE OF, ARTHUR WILLIAM PATRICK ALBERT (1850–), s. of Queen Victoria; has held various military appointments; app. Gov.-Gen. of Canada, 1911.

CONNEAUT (41° 57′ N., 80° 34′ W.), city, Ohio, U.S.A.; mills, tanneries. Pop. (1910) 8319.

CONNECTICUT (41° to 42° 3′ N., 71° 55′ to 73° 50′ W.), state, U.S.A.; one of New England states of Union; bounded N. by Massachusetts, E. by Rhode Island, S. by Long Island Sound, W. by New York; area, 5004 sq. miles. Surface generally consists of three great river-valleys, Connecticut flowing through middle of state, Thames through E., and Housatonic through W. Other rivers are affluents of these. In E. and W. are hilly districts; highest peaks, Bear and Gridley Mountains. Chief towns are Hartford (capital), New Haven, Bridgeport. Climate is temperate.

History.—Dutch settlement was established at Hartford in 1633, and soon afterwards an Eng. trader founded trading station at Windsor. Wethersfield was settled by colonists from Massachusetts Bay in 1634, and in 1639 united with Hartford and Windsor as Connecticut colony. Meantime, in 1635 fort was established at Saybrook, called after Lord Saye and Sele, who had obtained patent for this district in 1631. In 1637 the Pequot Indians were subdued, and in 1638 Puritan colonists made settlement at New Haven. Saybrook was united to C. in 1644. Charles II. granted autonomy by charter in 1662, when New Haven was annexed to C. C. repudiated allegiance to Mother Country in 1776, and became independent state. New constitution was framed in 1818, whereby Church and State were disunited. C. has greatly developed since Civil War, in which it supported Union.

River valleys are fertile, especially that of Connecticut R.; produce maize, rye, oats, potatoes, wheat, buckwheat, and great quantities of hay; tobacco largely cultivated; fruits produced, including apples, peaches; horses, cattle, sheep, and pigs raised; dairying carried on; fine lobster fisheries along coast. Minerals include brownstone, iron ore, copper, lead, tungsten, nickel, lime, cobalt, trap-rock. Mineral springs occur in various places. C. is great industrial state, manufacturing cottons, woollens, silks, paper, machinery, clocks, brass goods, rubber articles, hosiery, leather, etc.; watch-making at Waterbury, firearms and machinery at Bridgeport, hats at Danbury. Chief harbours are Stonington, Mystic, New London.

Executive is in hands of Gov., assisted by Lieut-Gov. and three officials; legislative power vested in General Assembly, consisting of Senate of 35 and House of Representatives of 255 members, elected for two years. C. sends two Senators and five representatives to Congress. Education is free and obligatory. Chief religion is Roman Catholicism. Inhabitants include whites, negroes (c. 16,000), Asiatics, Indians; whites comprise persons of Brit., Ger., and Canadian birth. Pop. (1910) 1,114,756.

Johnston, *Connecticut* (1887); Palfrey, *History of New England* (1890).

CONNECTICUT RIVER (43° 35′ N., 72° 20′ W.), river, New England, U.S.A.; rises extreme N. of New Hampshire, flows S., forming boundary between New Hampshire and Vermont, through Massachusetts and Connecticut, and enters Long Island Sound at Saybrook.

CONNECTIVE TISSUES, tissues of the body which support and hold together the other tissues, composed of a large proportion of intercellular compared with cellular elements. This intercellular material may consist mainly of white fibres with a varying number of elastic fibres, or it may be cartilaginous or bony. Where the white fibres predominate, running closely together, the tissue is called *fibrous tissue*; found in positions where strength is required to resist strain, *e.g.* joint ligaments. When the fibres interlace, leaving more or less space between each other, the tissue is known as *areolar tissue*; found, *e.g.*, just beneath the skin, joining it to the deeper structures. There may be fat deposited to a considerable extent in the cells of the tissue, which is somewhat dense, with the cells close together, and it is then called *adipose tissue*; found beneath the skin, around certain organs, etc. Where the fibres which predominate are elastic fibres, *i.e.* composed of a substance *elastin*, which makes them springy or elastic, the tissue is named *elastic tissue*; found, *e.g.*, in the *ligamentum nuchæ* at the back of the neck.

Cartilage (q.v.) and *Bone* (q.v.) are also examples of connective tissue.

CONNELLITE ($Cu_{19}(ClOH)_4SO_{16}.15H_2O$), rare mineral occurring in tufts of blue needle-shaped crystals with other copper minerals, in Cornwall and S. Africa.

CONNELLSVILLE (40° 2′ N., 79° 36′ W.), town, on Youghiogheny, Pennsylvania, U.S.A.; coke, iron manufactures. Pop. (1910) 12,845.

CONNEMARA (53° 23′ N., 9° 30′ W.), wild, picturesque district, W. division, County Galway, Ireland.

CONNERSVILLE (39° 38′ N., 85° 9′ W.), city, Indiana, U.S.A.; wagons, carriages. Pop. (1910) 7738.

CONNOR, BERNARD, O'Connor (1666–98), Irish physician and author; physician to the king of Poland.

CONNOTATION, in logic signifies all the attributes implied by any term, as distinguished from its *denotation* (q.v.).

CONODONTS, sharp conical fossils said to be teeth of fish of lamprey species, or of denticles annelid type; found in Palæozoic strata.

CONOID (geom.), solid or surface formed by revolution of a conic section about its axis; a circle, ellipse, parabola, and hyperbola generating the solids or surfaces known as sphere, spheroid, paraboloid, and hyperboloid respectively.

CONOLLY, JOHN (1794–1866), Eng. physician; founded an association along with two others (1832) which afterwards became the British Medical Association; while resident physician at Hanwell (1839) introduced modern treatment of non-restraint of the insane.

CONON, celebrated Athenian general who defeated the Lacedæmonians at *Cnidus* (394 B.C.).

CONON of Samos (fl. III. cent. B.C.), Gk. mathematician and astronomer; friend of Archimedes; compiled a calendar; wrote seven books on astronomy, and was an authority on curves (conic sections). He is credited with having given the name *Coma Berenices* (q.v.) to that constellation.

CONQUEST, total defeat of enemy, often followed by annexation of whole or part of his territory. International law recognises title of conqueror; only pretext for interference of neutral states is that their interests are affected, directly or by alteration of 'balance of power.'

CONRAD (d. 955), Duke of Lorraine; the 'Red Duke.'

CONRAD, or **CONRADIN,** the Younger (1252–68), king of Jerusalem and Sicily; last of Hohenstaufens; excommunicated, 1267; beheaded by Charles of Anjou.

CONRAD II. (c. 990–1039), Emperor of Holy Roman Empire (1027); great-grandson of Otto I., reviver of Rom. Empire; extended boundaries of Germany, completing absorption of 'Middle Kingdom' by winning Burgundy, 1032; reunited Italy and Germany; fought against Poles and Hungarians; a strong ruler, but encouraged later disunion by granting smaller tenants under empire their lands in fee; founder of line of Salian or Franconian emperors.

CONRAD III. (1093–1152), first Hohenstaufen king of Germany; elected, 1127; king of Italy, 1128; displaced by rival Lothair, but restored, 1138; faced by rebellions in both Germany and Italy; able ruler, but failed to establish unity in realms because of overwhelming difficulties; started on Second Crusade, but returned, sick.

CONRAD IV. (1228–54), Ger. king.

CONRAD, JOSEPH (1856–), novelist, naturalised Englishman; full name, J. C. Korzeniowski; b. Bland; holds mate's certificate; wrote *The Nigger of the Narcissus*, and popular sea and other stories.

CONRAD OF MARBURG (1180–1233), Ger. ecclesiastic, renowned as preacher, particularly against 'heretics,' at court of St. Elizabeth of Hungary.

CONRART, VALENTIN (1603–75), Fr. scholar; one of founders and first sec. of Fr. Academy.

CONSALVI, ERCOLE (1757–1824), Ital. statesman and ecclesiastic; chamberlain of pope, 1783; organised papal army to meet armies of Fr. revolution; imprisoned in Castle of St. Angelo, 1798; deported to Naples and escaped; made cardinal-deacon and chief minister on instatement of Pope Pius VII., 1800; by his diplomacy offensive articles were omitted by Napoleon from *Concordat* between France and Rome; resigned on account of further steps of Napoleon against Church; plenipotentiary at Congress of Vienna; reorganised Papal States.

CONSANGUINITY, blood relationship, distinct from affinity, which is marriage relationship; direct c. is between parents and children, collateral between brothers, sisters, etc.; Roman and papal law prohibited marriages between relatives within certain limits; custom relaxed after Reformation; a table of kindred and affinity still appears in the Prayer Book. See MARRIAGE.

CONSCIENCE, term generally used to describe that sense which enables man to differentiate between right and wrong.

CONSCIENCE, HENDRIK (1812–83), Flemish novelist; b. Antwerp; wrote *Lion of Flanders* and numerous popular romances.

CONSCIOUSNESS, word implying full mental power and perception; opposed to unconsciousness (produced by sleep, drugs, or accident), in which mental powers are in abeyance. See PSYCHOLOGY.

CONSCRIPTION, choosing by lot men for national army; system obtained in Europe from Napoleon's time; now practically superseded by UNIVERSAL SERVICE, which demands service from all men with exception of physically unfit, only sons of widows, etc. The peace strength of the army is first settled (in Germany as early as 1871 this was arranged on a percentage of the general population), then when youths present themselves automatically at the legal age, a sufficient number is chosen to balance the time-expired soldiers. Under c. a conscript could find a substitute or pay for exemption. Among European armies still recruited by c. are (1913) Belgian and Dutch. All the Powers except Britain and U.S.A. have universal compulsory service; Australia has adopted it, and Lord Roberts heads a movement to introduce it into Britain. See also ARMY.

CONSECRATION, the making holy any person, place, or thing, has been common in most religions. The idea is that he or it is specially set apart for divine [illegible]s; a person or thing may likewise be 'devoted' to evil. Holiness is therefore a sort of supernatural quality which can be conferred by ceremonial. More loosely, c. is used of devoting to a special purpose without a necessary supernatural or sacramental element. Thus we speak of a person 'consecrating' his life to certain work. In the R.C. Church bp's are 'consecrated,' whereas priests are 'ordained.'

Frazer, *Golden Bough*; Robertson Smith, *Religion of the Semites*.

CONSEIL DE FAMILLE, in France, seven persons chosen to conduct a minor's affairs.

CONSERVATION OF ENERGY, see ENERGY.

CONSERVATIVE PARTY, in Gt. Britain, the political party which seeks to preserve unity of existing institutions; 'Conservative' first applied to *Tory* Party, 1830; the UNIONIST PARTY, formed by a split in Liberal Party owing to Home Rule, supported C. P. in power and in opposition from 1886; the two formed an alliance, 1895, and united their organisations, 1911–12. The party's programme (1913) includes Preservation of the Union, Tariff Reform and Imperial Preference (many Free Traders dissenting), strong navy. During period 1837–1913 Liberals held office for 47 and the Conservatives for 29 years. C. Premiers who have held office are Disraeli, 1868, 1874–80; Salisbury, 1885, 1886–92, 1895–1900, 1900–2; Balfour, 1902–5.

CONSERVATOIRE, school of music; c. established in Italy in V. cent.; modern c. at Milan (founded 1808); C. de Musique, Paris (1795).

CONSETT (54° 51′ N., 1° 52′ W.), town, Durham, England; collieries; ironworks. Pop. (1911) 11,209.

CONSHOHOCKEN (40° 7′ N., 75° 22′ W.), town, on Schuylkill, Pennsylvania, U.S.A.; cotton and woollen mills. Pop. (1910) 7480.

CONSIDÉRANT, VICTOR (1808–93), Fr. socialist; founded a community, La Réunion, Texas.

CONSIDERATION, legal term used in contract law for an act of concession.

CONSISTORY, at first the audience chamber of the Rom. emperors, then the audiences themselves; used later of episcopal tribunals, but now practically only of the Papal C., consisting of the pope and the coll. of cardinals. These meetings are mostly formal, their deliberative functions having been dropped.

CONSISTORY COURTS, held in England by bishops to try offences against ecclesiastical law; archbishop is court of appeal.

CONSOLS, CONSOLIDATED ANNUITIES, stock issued by government in return for money lent; made uniform by Consolidated Annuities Act (1749). See NATIONAL DEBT.

CONSORT (Lat. *consors*, partner), associate, particularly spouse, applied to husband or wife of Brit. sovereign; queen c. has position regulated by law.

CONSPIRACY (Lat. *conspiratio*), illegal agreement between two or more persons to act unlawfully or to commit acts which become unlawful when performed by more than one person. Such acts fall under these headings: (1) Conspiracy to commit actionable offence. (2) False charging of another with actionable offence from malice or wish to blackmail. (3) Conspiracy for injuries, such as raising price of goods in markets, etc., and obtaining goods under false pretences. (4) Conspiracy to pervert course of justice. (5) Attempts to profit corruptly by working of the law.

CONSTABLE (M.E., from O. Fr. *conestable*, from Late Lat. *comes stabuli*, count of the stable).—(1) Title of head groom of stable under later Rom. emperors, applied early by Frankish kings to chief household official; this usage became general. (2) Different national usages in nearly all of which there is military idea: (*a*) In France, title of commander-in-chief of army, regulator of tournaments, etc., until 1627; office revived for short period under Napoleon. (*b*) Prominent Eng. mediæval military official, keeper of a fortress; former officer of 'hundred' and township; member of police force. (*c*) Hereditary Scot. official with legal powers.

CONSTABLE, ARCHIBALD (1774–1827), Scot. publisher; pub. a number of Sir Walter Scott's works.

CONSTABLE, HENRY (1562–1613), Eng. poet; best known for his sonnets.

CONSTABLE, JOHN (1776–1837), Eng. artist; b. East Bergholt, Suffolk; f. was a miller, and in this employment many of C.'s earlier years were spent; first exhibited at Royal Academy (1802); A.R.A. (1819) and R.A. (1829). C. became one of England's greatest and most individual landscape artists. Amongst most famous works are *Flatford Mill*, *The Leaping Horse*, *The Cornfield*, and *Dedham Vale*.

Hind, *Constable* (Masterpieces in Colour).

CONSTABLE, SIR MARMADUKE (d. 1518), Eng. military leader; fought at *Flodden*.

CONSTANCE, KONSTANZ (47° 39′ N., 9° 11′ E.), town, Baden, Germany, at exit of Rhine from Lake Constance; fragments of ancient walls (IV. cent.); chief edifices, cathedral (founded XI. cent.), old Dominican convent (now a hotel), XIV.-cent. Kaufhaus; 'Council of Constance' met here, 1414–18; textiles. Pop. (1910) 27,591.

CONSTANCE, COUNCIL OF, an irregular council of the Church, held at Constance (Baden) from Nov. 1414 to April 1418, to end the dissensions in the Church, and repress the doctrines of Wycliff and John Huss. Pope John XXIII. was deposed by the

Council, and his rivals Gregory XII. and Benedict XIII. were forced to resign. Martin V. was then elected to the Papacy, and as he did not unreservedly approve the acts of the Council, it is held to be only partly œcumenical. Wycliff's teaching was condemned, and Huss and Jerome of Prague burnt at the stake, in spite of safe conducts from the emperor.

CONSTANCE, LAKE, BODENSEE (47° 35′ N., 9° 25′ E.), between Switzerland and Germany; traversed by Rhine S.E. to N.W.; area, *c.* 205 sq. miles; Rom. *Lacus Brigantinus.*

CONSTANT, BENJAMIN (1845–1902), Fr. artist noted for his portraits, and studies of Eastern subjects.

CONSTANT DE REBECQUE, HENRI BENJAMIN (1767–1830), Fr. publicist and orator, of Swiss origin; adopted democratic ideal of society in default of better; member of côterie of Madame de Staël, with whom he had long *liaison*; supported Directory by writings; afterwards enemy of Napoleon, but drew up *L'Acte additionnel aux constitutions,* 1814; won fame as orator in Chamber of Deputies, 1819.

CONSTANTIA (34° 3′ S., 18° 27′ E.), district, Cape of Good Hope, S. Africa, on N.N.E. slopes of Table Mountain; wine.

CONSTANTINE, name of many Rom. emperors.—**Constantine I.,** FLAVIUS VALERIUS CONSTANTINUS (*c.* 288–337), *the Great*; illegitimate s. of Emperor Constantius I. Already famous as general, he was proclaimed *Augustus* by army at his f.'s death (306), but waited six years before seizing supreme power; epoch-making rule; Christianity not only tolerated but made state religion; an incorrect tradition ascribes C.'s conversion to his mother, Helena; capital removed, 326–30, from Rome to Byzantium (*Constantinople*); reign shows completion of process by which Rom. republic became absolute despotism, C. entailing rule on his family, creating new nobility, and leaving mere shadow of power to senate; period of prolific legislation. His s., **Constantine II.** (317–40), acquired name *Alemannicus* from victories over Alemanni.—**Constantine IV.** (emperor, 668–85) repulsed attacks of Arabs and extorted tribute from them, but was forced to allow Bulgars to colonise modern Bulgaria, 679. He summoned 6th Œcumenical council, which condemned Monothelitism.—**Constantine V.** (emperor, 740–75), iconoclast; held synod, 754, forbidding image-worship, and exiled monks as upholders of same, with result that Rom. Church permanently severed connection with Constantinople; able soldier and general.—His grandson, **Constantine VI.** (emperor, 780–97), aged 10 at his accession, was completely ruled by mother, Irene, and blinded after disastrous rule.—**Constantine VII.** (905–59), '*Porphyrogenitus*' (born in the purple), Byzantine emperor and writer of important books of history, war, law, agriculture, etc.—**Constantine VIII.** (joint-emperor, 976–1025, sole ruler, 1025–28), decadent; empire controlled by eunuchs.—**Constantine IX.** (1042–54) lost Lombardy. Turks made appearance.—**Constantine X.** (1059–67) finally lost Ital. possessions; inroads of Turks and Magyars.

CONSTANTINE (d. 410 A.D.), Rom. soldier in Britain, who usurped the purple during reign of Honorius; afterwards defeated and put to death.

CONSTANTINE (36° 20′ N., 6° 33′ E.), fortified town, Algeria; situated on rocky hill, with ravines surrounding it on three sides; episcopal see; has citadel, mosques, Bey's palace; manufactures woollens, leather goods; Rom. remains; was important city of Numidia; sacked, 311 A.D.; rebuilt by Constantine; taken by French, 1837. Pop. (1911) 65,173.

CONSTANTINE, PAVLOVITCH (1779–1831), Russ. grand-duke; second s. of Tsar Paul I. of Russia; commander-in-chief in Poland; hated by Polish nationalists; aimed at founding Polish dynasty; renounced claim to succeed bro., Alexander, as tsar; reorganised army; forced to fly during military insurrection at Warsaw, 1830.

CONSTANTINOPLE (41° 2′ N., 28° 58′ E.), capital of Turkey and Ottoman Empire; built on several hills; uniquely situated, and one of most beautiful cities in Europe. C. is surrounded on three sides by water; Sea of Marmora and Bosporus on S. and E.; W. side is walled; and on the N. side, the inlet called the *Golden Horn* separates C. Proper (called by Turks *Istambol* or *Stambol*) from Christian C., forming a safe, spacious, and deep harbour, about five miles long and half a mile broad, bridged at two points. Christian C. is on the N., and comprises: (1) Galata, the merchants' quarter (in which is the Genoese Tower of Galata, used for giving fire-alarms); (2) Pera, the aristocratic quarter containing embassies and consulates, the ill-paved Grande Rue with its fine shops, cafés, restaurants, hotels; Pera is reached by tunnelled railway; (3) Top-hane (with cannon factory), mostly inhabited by Turks; it embraces the beautiful Palace of Dolma-bagche on banks of Bosporus. Stambol lies to the S., and contains most of the finest buildings, *e.g.* the Mosque of St. Sophia built in Byzantine style and originally intended for a Christian church, but converted into mosque by Muhammad II.; outside it is plain, but interior, with its dome, marbles, mosaics, is of marvellous beauty. There are scores of other mosques, a magnificent one being that of Sultan Muhammad, the Conqueror, standing on the site of Church of the Holy Apostles. In Stambol is Hippodrome with remains of Gk. architecture. In extreme N.E. stands the Seraglio, within whose high walls were the Divan and Harem of former sultans, and whose famous gate (*Sublime Porte*) has given its name to the Sultan's government; a new Seraglio was built by Abdul Mejid N. of the old one. The streets are mostly ill-paved and crooked; the houses are low and small, and business is transacted in bazaars.

C. was founded, as *Byzantium* (q.v.), in VII. cent. B.C.; rebuilt and made capital of Rom. Empire by Constantine the Great—hence the name; capital of Byzantine or Eastern Empire for over 1000 years; captured by Venetians and Crusaders (1203–4); taken and made capital of Ottoman Empire by Muhammad II. in 1453—'Fall of C.' (see RENAISSANCE); in course of history besieged by Sassinians, Persians, Saracens, Russians, Romans, and Turks. Pop. *c.* 1,200,000.

Grosvenor, *Constantinople* (1895); Pears, *Destruction of Gk. Empire and Capture of Constantinople* (1903); Hutton, *Constantinople* (1900).

CONSTANTINOPLE, COUNCILS OF.—The chief are: (1) the second œcumenical council, 381, confirming articles of Nicene Creed and granting metropolitan status to bishoprics of Alexandria, Antioch, Thrace, Pontus, and Ephesus.—(2) The fifth œcumenical c., 553, condemning the 'Three Chapters.'—(3) The sixth œcumenical c., 680–81, condemning Monothelitism.—(4) Synod of 869, considered by Latin Church as eighth œcumenical c.; declared in favour of Ignatius against Photius for bishopric of Constantinople.—(5) Synod of 879 regarded by Gk. Church as eighth œcumenical c.; declared for Photius.

CONSTANTIUS, FLAVIUS VALERIUS (*c.* 250–305 A.D.), Rom. emperor.

CONSTANTZA, KUSTENDJI (44° 12′ N., 28° 41′ E.), seaport, on Black Sea, Rumania; near ruins of Tomi; Ovid's place of exile; large transit trade in grain and petroleum through railway to Bucharest.

CONSTELLATION, group of stars. From the earliest times stars have been segregated by man into artificial groups, which have been given names, chiefly derived from animals and Gk. mythology. Northern c's are Andromeda, Aquila (Eagle), Auriga (Charioteer), Boötes (Ploughman), Camelopardus (Giraffe), Canes Venatici (Hunting Dogs), Cassiopeia, Cepheus, Coma Berenices (Berenice's Hair), Corona Borealis (Northern Crown), Cygnus (Swan), Delphinus (Dolphin), Draco (Dragon), Equuleus (Foal), Hercules, Lacerta (Lizard), Leo Minor (Little Lion), Lynx (Lynx), Lyra (Lyre), Ophiuchus or Serpentarius (Serpent-

Holder), Pegasus, Perseus, Sagitta (Arrow), Serpens (Serpent), Triangulum (Triangle), Ursa Major (Great Bear), Ursa Minor (Little Bear), Vulpecula et Anser (Fox and Goose). **Zodiacal c's**: Aquarius (Water-Carrier), Aries (Ram), Cancer (Crab), Capricornus (Goat), Gemini (Twins), Leo (Lion), Libra (Scales), Pisces (Fishes), Sagittarius (Archer), Scorpio (Scorpion), Taurus (Bull), Virgo (Virgin). **Southern c's**: Antlia [Pneumatica] (Air-Pump), Apus (Bird of Paradise), Argo (Ship), Calum (Sculptor's Tool), Canis Major (Great Dog), Canis Minor (Little Dog), Carina (Keel), Centaurus (Centaur), Cetus (Sea-Monster), Chamæleon, Circinus (Compasses), Columba Noachi (Noah's Dove), Corona Australis (Southern Crown), Corvus (Crow), Crater (Bowl), Crux Australis (Southern Cross), Dorado (Sword-Fish), Eridanus, Fornax Chemica (Chemical Furnace), Grus (Crane), Horologium (Clock), Hydra (Sea-Serpent), Hydrus (Water-Snake), Indus (Indian), Lepus (Hare), Lupus (Wolf), Malus (Mast), Mons Mensæ (Table Mountain), Microscopium (Microscope), Monoceros (Unicorn), Musca Australis (Southern Fly), Norma (Rule), Octans (Octant), Orion, Pavo (Peacock), Phœnix, Pictor (Painter), Piscis Australis (Southern Fish), Puppis (Stern), Reticulum (Net), Sculptor, Scutum Sobieskii (Shield of Sobeski), Sextans (Sextant), Telescopium (Telescope), Toucan, Triangulum Australe (Southern Triangle), Vela (Sails), Piscis Volans (Flying Fish). See ASTRONOMY.

Royal Hill, *Stars and Constellations* (1910).

CONSTIPATION, condition in which the fæces are retained unduly in the bowels, through interference with the digestive functions, due frequently to sedentary habits, change of diet or habits, nervous diseases, diseases affecting the general system, *e.g.* anæmia, Bright's disease, and to other similar causes. The treatment is to take a glass of water before breakfast, and occasionally a teaspoonful of liquid cascara sagrada at bedtime; the diet is regulated so as to include plenty of fruit and vegetables, regular exercise is advised, and the attempted evacuation of the bowels daily at a fixed time.

CONSTITUTION (Lat. *constitutio*, regulation, especially imperial order. Equivalents of imperial *constitutiones* are to be found in Eng. mediæval 'Constitutions' of Clarendon, etc.).—Political organisation; founded not merely on law, but custom. Chief forms are: monarchical, aristocratic, and democratic. The commencement of theorising as to their relative advantages is to be found in Aristotle's *Politics*.

'Constitution of Athens,' a treatise written on papyrus, found in Egypt, and now in Brit. Museum, is considered by scholars to be a copy of a work on the Athenian C. written by Aristotle (d. 322 B.C.). It has been edit. and pub. (1891).

U.S.A. and France are examples of written c's, U.K. of unwritten c. 'Constitutional' action is action in accordance with c.; 'constitutional' party, party which strives to keep c. intact, but 'constitutional' government has acquired different meaning from use of Brit. politics. It signifies limitation of power of head of government by representatives of the governed in similar manner to limitation of power of Brit. crown by Parliament.

Lord Courtney, *The Eng. Constitution* (1910); Bryce, *The Amer. Commonwealth* (new ed., 1911).

CONSUBSTANTIATION, doctrine promulgated by Martin Luther, that the body and blood of Christ are present with the substance of the bread and wine in Holy Communion; opposed to transubstantiation (*q.v.*).

CONSUETUDINARY.—(1) Legal term for customary law; (2) name of a book of ritual.

CONSUL.—(1) Title of two chief magistrates of Rom. republic. The office was established at fall of the monarchy; power of monarch remained to consuls, but was limited by their only holding office for one year, their responsibility to people at end of office, and the fact that one C. could nullify acts of his partner. They had command of army, control of foreign affairs, appointment of treasurers. Dates were given by naming the C's of the time. Twelve lictors carried before them *fasces* and axe, symbols of supreme judicial power. With aristocratic constitution of early republic, C's, who were chosen by retiring C's and confirmed by people, were always patricians. *Lex Licinia* (367 B.C.) ordained that one C. should always be plebeian. Enactments granting right of appeal from decisions of C's, codification of laws, establishment of tribunate of *plebs*, *censors*, *prætor*, and *curule ædiles* marked gradual transition of Rom. constitution from oligarchy to democracy. In crises they either received extraordinary powers or were superseded by a *dictator*. Retired C's governed provinces as *pro-consuls*. Under Empire their election was transferred first to senate, then to emperor; their numbers were increased; their powers lost. Napoleon revived title, being called FIRST CONSUL till his coronation, 1804.

(2) Representative of a state in a foreign country to protect trade of its subjects, collect commercial information, and carry out further printed instructions. He has powers of public notary, and in some countries holds consular courts for Brit. subjects in accordance with 'capitulations.' This use of word C. originated in mediæval trading cities of Italy, which commenced to send C's far afield at close of XI. cent.; the system was speedily imitated, and became universal in XVI. cent.; organised in XIX. cent.

'CONSULATE OF THE SEA' (or *Book of the Consulate*), Catalan treatise on maritime customs, first pub. in XV. cent.

CONSUMPTION, term popularly used for the process of destruction of the tissue of the lung due to tuberculosis (*q.v.*); in political economy, that part of the subject dealing with the use of wealth as [illegible] of wealth.

CONSUS (classical myth.), Rom. agricultural deity.

CONTAGION, term designating communication of disease-germs by contact or from breathing or excretions; C. Diseases Acts, 1865, 1867, 1868, providing medical supervision of prostitutes living in certain naval or military centres to prevent spread of venereal diseases, have since been repealed.

CONTANGO, Stock Exchange term for a system of deferred payment, as when a dealer agrees to buy stock (which he does not want) at a fixed price in the hope that the price will rise before the purchase is completed. If the price rises he will make a profit, since it must be delivered at the price originally agreed upon. The contract, however, is usually one not for delivery of stock, but for the payment of 'difference' between the contract and the market price.

CONTARINI, Venetians, who through several cent's were distinguished for public service, several holding office of Doge.

CONTAT, LOUISE FRANÇOISE (1760–1813), Fr. actress.

CONTÉ, NICOLAS JACQUES (1755–1805), Fr. painter and inventor; introduced military balloons; invented pencils of mixture of graphite and clay, a barometer, and many other contrivances; showed prolific inventive genius on Napoleon's expedition to Egypt.

CONTEMPT OF COURT is an insult to a Court of Justice, or any defiance or resistance to its authority. If the attempt be committed in the face of the Court, the offender may be instantly apprehended and imprisoned at the discretion of the judges, without any further proof or examination. Doing anything calculated to prejudice a fair trial of any case, or the disobedience of a judicial order, or the interference with the due course of justice, amounts to contempt of court. Commenting in a newspaper on the facts of a case which is proceeding at the time, especially if it be in a way calculated to influence the jury, and writing letters about such a case to the judge and jury

who are trying it, are instances of gross contempt of court.

CONTI, NICOLO DE' (early XV. cent.), Venetian traveller; explored India, Malay Archipelago, etc.; returned by 'Ciampa,' possibly Indo-China, Aden, Jidda, and Cairo; arrived at Venice, 1444; gave valuable account of S. Asia.

CONTI, PRINCES OF.—Fr. title taken from estate of Condé family at Conti-sur-Selles; held by many distinguished members of family of Condé. FRANÇOIS (1558–1614), 1st marquis and prince, supported League against Guises; ARMAND DE BOURBON (1629–66), general and writer, bro. of great general, Condé, was leader of Fronde, but became reconciled to Mazarin; his c. s. married dau. of Louis XIV., but younger, FRANÇOIS, also distinguished soldier, satirised king as '*roi du théâtre*' and was banished; last prince, LOUIS FRANÇOIS JOSEPH (1734–1814), exiled by Revolution.

CONTINENT, term in physical geog. for each of the larger continuous masses of land on earth's surface; recognised in modern geog. as six—Eurasia, Africa, N. and S. America, Australia, and Antarctica; formerly reckoned as two, the Old and New; the former comprising Eurasia and Africa, the latter N. and S. America. C. in a wider sense includes outlying islands, *e.g.* the British Isles and Iceland form part of C. of Europe. In Britain the term 'the Continent' is applied to the rest of Europe.

CONTINENTAL SHELF, submarine plain, not more than 600 ft. below sea-level, surrounding most continents, especially of the N. hemisphere; narrow round the S. continents except between Tasmania, Australia, and New Guinea, and between S. America and the Falkland Islands. The steep descent from the c. s. to the ocean depths is termed the continental slope.

CONTINENTAL SYSTEM, see BERLIN DECREES.

CONTOUR LINE, on maps, line where (horizontal) plane at a certain elevation intersects surface of the land.

CONTRABAND (Ital. *contrabando*, action contrary to law).—(1) Smuggling; (2) goods smuggled; (3) 'contraband of war,' *i.e.* goods forbidden by international law to be supplied by neutrals to belligerents and liable to confiscation. Jurists disagree as to nature of such goods, and their liability to confiscation on way to neutral port, but destined for enemy. At second Hague Conference agreement was made that postal correspondence, whether on neutral or belligerent ship, was inviolable, and must be dispatched except when from or to a blockaded port. Opinion was given by Institute of International Law, 1896, that *conditional* c. should be abolished, but belligerent should have right to seize articles which might serve for war or peace on way to enemy's port; and, as to destination, goods were liable to confiscation if neutral port was only stage to enemy's port. *International Conference of London*, 1908–9, includes foodstuffs under conditional c., if shipped to a fortified place or hostile base, and not consigned direct to a neutral port.

CONTRACT, an agreement entered into between two or more persons sanctioned by law, by which agreement each undertakes to do, or to abstain from doing, a specified act or acts, in consideration of the other or others doing, or abstaining from doing, some other act or acts. It is true that every c. is an agreement, but not every agreement is a c. The law demands before an agreement becomes an enforceable c. that certain requirements shall be fulfilled, such as the legal capacity of the parties, the legality of the object aimed at, and, in some cases, the way in which the c. is evidenced. C's may be divided into three classes: (1) c's by matter of record; (2) c's under seal, which are sometimes spoken of as *specialities*; and (3) c's not under seal, which are called *simple*, or *parole*, c's. (1) are those founded on the authority of a court of record; (2) those made by deed—generally speaking, they require no consideration to support them; (3) those made simply in writing, or by word of mouth.

Sir W. R. Anson, *Eng. Law of Contract* (1910); Bell, *Principles of Scots Law* (1899).

CONTRACTILE VACUOLE, in one-celled organisms, spherical cavity with liquid or minute radiating canals, periodically formed and discharged; acts like kidney as conveyor of waste matter in metabolism of Protozoa.

CONTRADICTION, PRINCIPLE OF, one of laws of thought regulating all valid reasoning; that the same attribute cannot be at the same time affirmed and denied of the same subject (Aristotle). See LOGIC.

CONTRAFAGOTTO, DOUBLE BASSOON, wood-wind instrument of the double reed order, the use of which dates back to very early times.

CONTRALTO, the lowest or deepest musical voice among boys and women.

CONTREXÉVILLE (48° 9′ N., 5° 51′ E.), village, Vosges, France; mineral springs; health resort.

CONVENT, society of persons living a religious life in a monastery or nunnery. To apply word to a building is erroneous.

CONVENTION, military term signifying temporary truce, as C. of Cintra (1008); also used for custom which has grown out of practice and experience of society; the C. Parliament was assemblage of M.P's after James II.'s flight, 1688.

CONVENTION, THE NATIONAL, Fr. assembly (1792–95) for drawing up republican constitution; elected by suffrage of all self-supporting Frenchmen of legal age; app. fresh pros. every fortnight; gradually assumed executive powers; had famous committees of Public Safety, General Security, Education, etc., which reorganised army and internal administration.

CONVERSANO (40° 58′ N., 17° 7′ E.), town, Apulia, Italy; bp.'s see; cathedral (XI. cent.). Pop. 14,000.

CONVERSION, term used in theol., logic, and law. Under the first heading it refers to the acceptance of Christianity by a heathen mind, or the change from one faith to another; under the second, the act of interchanging the terms of a proposition; under the third, the unauthorised transference of another's property into a different medium.

CONVEX, term for exterior of curved surface, opposed to *concave*.

CONVEYANCING, legal term employed in the transfer of real property by means of written instruments. There were formerly several ways in which freehold land might be conveyed, but since the Real Property Act (1845) the usual method is by deed of grant. The deed must be 'signed, sealed, and delivered' by the parties to the conveyance. The 'seal' is frequently nothing more than a wafer stuck on to the deed; and to effect 'delivery' all the person need do is to touch the seal with one finger, and say, 'I deliver this as my act and deed.' Witnesses are not absolutely necessary, but it is better to have them. The deed must bear a stamp in accordance with the Stamp Act (1891). The deed itself is a very important and formal document, and under no circumstances can a layman be advised to draw it up. If the property transferred is leasehold, it should also generally be conveyed by deed, but in this case the deed is called a 'lease,' or an 'assignment of lease,' according to the circumstances.

CONVEYORS, appliances for moving materials such as grain, coal, coke, minerals, etc., chiefly in a horizontal or slightly inclined direction. The earliest known form of c. is probably the Archimedean screw (*q.v.*); and *worm* c's are built on the same principle, usually consisting of a steel spiral blade or set of blades revolving in a pipe or trough. They are economical for short distances, and may also be used for mixing dry substances, *e.g.* cement and sand. For conveying grain over long distances in granaries, etc., *band* c's are very efficient, consisting of endless bands of rubber or canvas running over two terminal and various intermediate rollers. The speed varies between 400 and 600 ft. per minute, according to the weight of the different materials which would be

blown off at higher speeds. For delivering material at any point, 'throw-off carriages' are used, consisting of a frame with rollers which raise the band and then lower it to form an S curve, shooting the grain, etc., over the top roller into a hopper or chute. For conveying coals the band is usually curved to form a trough along the upper (loaded) side by two guide rollers inclined towards the central, horizontal roller. Linked steel plates are used as belts when hard or hot material, such as ore, clinker, or coke are to be conveyed. A modification of band c. are bucket c., which can be used as elevators, and consist essentially of endless ropes or chains to which buckets are attached at suitable intervals, either rigidly or free-moving, being suspended above their centre of gravity. They are chiefly used for coke, grain, and as dredgers. The simplest forms of c. are *rope-* and *cable-ways*, which are economical and efficient, especially in circumstances where a permanent way is impracticable, as in transporting material in broken and mountainous country or in coaling ships at sea. A variation is *telpherage*, in which a two-wheeled truck is suspended from and running on a monorail or steel cable, propelling itself by an electromotor taking the current from a wire or live rail. The chief advantages of telpherage are: no obstruction of the ground by trucks, high speed, and easy combination with hoisting and tipping methods. See CRANE, ELEVATORS.

CONVOCATION (Lat. *convocatio*, calling together). —(1) Act of summoning assembly, or assembly so summoned. (2) Name of provincial synods in Church of England, which sit contemporaneously with Parliament, being summoned by respective abp's by virtue of royal writ; composed of upper house of bp's and lower house of deans, archdeacons, and representatives of cathedral chapters, provost of Eton, two proctors elected by beneficed clergy from each diocese of southern province, and two proctors elected by archdeacon from each see in province of York; origin is obscure; important in history of Eng. constitution as opponent to tyranny of crown; refused under Edward I. to assemble unless summoned through abp., or to pay 'aids' not granted by c.; clergy in XIV. cent. refused to attend Parliament instead of c.; often summoned c. without royal writ; Henry VIII. obtained 'Act of Submission,' putting an end to independent legislation of c.; used to reform Church in XVI. and XVII. cent's; separate taxing abolished, 1665; XVIII.-cent. period of faction, prorogation 1741-1852, reform 1852 onwards.

CONVOLUTA, a Turbellarian worm (*q.v.*).

CONVOLVULACEÆ, order of herbaceous, shrubby, or twining plants, comprising about 1000 species in 40 genera, widely distributed, mainly in the tropics. The bindweed, with tubular flowers (*Convolvulus arvensis*), *Calystegia soldanella* (the sea bindweed), and the parasitic dodder are the common Brit. representatives. A Madagascar type, *Humbertia*, forms a tree (*Ipomœa Batatas*), produces sweet tubers, and is an important food plant in some tropical countries.

CONVULSIONS, violent and spasmodic contractions of the body, either continuous or alternating with relaxations, symptomatic of epilepsy (*q.v.*), uræmia (*q.v.*), and other diseases, or in infants due to nervous irritation from teething, gastro-intestinal troubles, rickets, etc. During the c. a few inhalations of chloroform are often given, or the infant is plunged into a hot bath, or an emetic (*q.v.*) is administered if caused by overloading the stomach, and the cause is treated on general principles.

CONWAY (53° 17′ N., 3° 50′ W.), market town and seaport, on estuary of Conway, Carnarvonshire, Wales; surrounded by high walls with battlements and towers; river crossed by fine bridges; C. castle (built by Edward I., 1284), is famous ruin. Pop. (1911) 5242.

CONWAY, HENRY SEYMOUR (1721-95), Eng. general and statesman; deprived of army command for supporting popular party in Wilkes case; constitutional question being raised as to legality of this. Crown withdrew from its position; opposed North's Amer. policy and brought about his resignation; field-marshal, 1793.

CONWAY, HUGH (1847-85), Eng. novelist; *nom de plume* of F. J. Fargus, author of *Called Back* (1883) and other successful novels.

CONWAY, MONCURE DANIEL (1832-1907), Amer. preacher, lecturer, and man of letters.

CONWAY, SIR WILLIAM MARTIN (1856-), Eng. mountaineer and writer on art.

CONYBEARE, WILLIAM DANIEL (1787-1857), Eng. geologist; grandson of John C., bp. of Bristol; first to describe *Plesiosaurus*, discovered by Mary Anning; pub. numerous research memoirs and *Outlines of the Geology of England and Wales*; F.R.S.; Wollaston Medallist, Geol. Soc., 1844.

CONYBEARE, WILLIAM JOHN (1815-57), Eng. clergyman and scholar.

COODE, SIR JOHN (1816-92), Eng. engineer; superintended construction of Portland and Colombo harbours; consulted by Colonial governments; member of Suez Canal Commission, 1889-91; pres. of the Institution of Civil Engineers; K.C.M.G.

COOK, ALBERT STANBURROUGH (1853-), Amer. scholar; prof. of Eng. Language and Lit., Yale.

COOK, EDWARD DUTTON (1829-83), Eng. dramatic critic and novelist.

COOK, ELIZA (1818-89), Eng. popular poet.

COOK ISLANDS, HERVEY ISLANDS (20° 45′ S., 159° W.), group in Pacific Ocean, S.W. of Society Islands; principal islands are Rarotonga, Mangaia, Aitutaki, Atiu; dependency of New Zealand; discovered by Capt. Cook, 1777; chief products, coffee, fruits, cocoa-nuts. Pop. (1911) *c.* 7000.

COOK, JAMES (1728-79), Eng. navigator; apprenticed to shipowners of Whitby; entered navy, 1755; lieut. of *Endeavour*, which sailed for S. Pacific, 1768; explored coasts of New Zealand and Eastern Australia, of which he took possession in name of Britain, naming New South Wales; returned by Cape of Good Hope; sent out as commander of *Resolution*, 1772; marvellous voyage of discovery, in which old idea of southern continent was destroyed, and anti-scorbutic precautions prevented usual heavy death-roll of expedition; slain on last voyage (1776-79).

Kitson, *Capt. James Cook, the Circumnavigator* (1907).

COOK, THOMAS (1808-92), Eng. excursion agent; commenced, 1841; extended excursions over Europe by 1865; U.S.A. and Palestine, 1869; Egypt and Sudan later. Son, John Mason, became partner, and grandsons now carry on business.

COOKE, GEORGE FREDERICK (1756-1811), Eng. Shakespearean actor; rival of Kemble.

COOKE, JAY (1821-1905), Amer. banker; floated war loan (1861) for Union; organised national banks and kept up government credit.

COOKERY, the preparation of food by heat, is said to date from Neolithic times. Before fire was known, the only way of dressing meat was by exposing it to the sun; but after its discovery fire was used first for drying and afterwards for cooking flesh. The chief disadvantage of this primitive method was that those parts of the meat which came in direct contact with the fuel were blackened and besmirched, and to obviate this, spits were passed through it and it was raised to a height above the fire—the method of grilling or broiling, the chief mode known to the ancient Greeks of the Homeric epoch, being thus invented.

The Greeks gave considerable attention to gastronomic pleasures, and Athenian travellers were constantly introducing new dishes, and improved methods of cooking, from other lands. Their system of cooking and dressing food was in turn copied by the Romans. The era of modern cooking dates back to the period of the Ital. Renaissance. Ital. methods were introduced into France by Catherine de' Medici, who brought cooks from her own country. Under Louis XIV. and Louis XV. cooking became an art. Fr. methods soon found their way into England, and

cookery books began to appear as early as the first half of the XVI. cent.

In ROASTING, whereby the nutritive qualities are best preserved, the meat is exposed to the direct influence of the fire by placing it before an open grate, basting it frequently, and keeping it in motion to prevent scorching of any part. Owing to the now general disuse of open grates, roasting is now practically superseded by BAKING, *i.e.* cooking in the oven, the chief difference from roasting being that the fumes are not carried off.

BOILING is cooking by means of hot water, which, according to Liebig, should be boiling before the meat is immersed. STEWING is simmering in a small quantity of water in a closed vessel, and requires less heat than boiling. BROILING or GRILLING is cooking on a gridiron directly over a bright clear fire, and resembles roasting in effect. FRYING is cooking in boiling fat; there are two methods, *sauté* or dry frying in a shallow pan with a small quantity of fat, and deep frying in a large quantity. STEAMING is carried out by placing meat in a double cooker or in a jar placed in a saucepan of boiling water. BRAISING is stewing meat slowly with vegetables in a covered pan. A modern system, practised and taught by M. Soyer, is cooking by 'paper bag.'

Florence B. Jack, *Domestic Arts* (8 vols.), *Cooking for Invalids.*

COOKSTOWN (54° 39′ N., 6° 45′ W.), market town, County Tyrone, Ireland; manufactures linen. Pop. 4000.

COOKTOWN (15° 27′ S., 145° 25′ E.), seaport, on Endeavour, Queensland, Australia; gold and tin mining in district.

COOKWORTHY, WILLIAM (1705–80), Eng. potter; discoverer of Eng. china clay.

COOLGARDIE (30° 57′ S., 121° 10′ E.), town, W. Australia; gold-fields are among richest in colony. Pop. 4000.

COOLIE, an Ind. or Chin. unskilled labourer or porter. After the abolition of slavery there was an extensive demand for c. labourers, and they are employed in large numbers in many Brit. colonies. See ASIATIC QUESTION.

COOMA (36° 13′ S., 149° 9′ E.), town, N. S. Wales, Australia; large trade in furs; small gold-field in district.

COOMASSI, see KUMASI.

COOPER, ABRAHAM (1787–1868), Eng. artist; R.A. (1820); battle scenes and animals.

COOPER, ALEXANDER (d. 1660), Eng. miniature artist.

COOPER, ASHLEY, see SHAFTESBURY.

COOPER, SIR ASTLEY PASTON (1768–1841), Eng. surgeon; practised with great success in London; prof. of Comparative Anat. to Royal Coll. of Surgeons (1813); pres., Royal Coll. of Surgeons (1827 and 1836); performed famous operation of tying the abdominal aorta for aneurism (1817); author of several surgical and anatomical works, the best known on hernia.

COOPER, CHARLES HENRY (1808–66), Eng. antiquary; wrote *Annals of Cambridge,* etc.

COOPER, JAMES FENIMORE (1789–1851), Amer. novelist; famous for his *Leather-Stocking* series of tales, including *The Pioneers* (1823), *Last of the Mohicans, The Prairie, The Pathfinder,* etc.; translated into many languages.

COOPER, PETER (1791–1883), Amer. inventor, iron manufacturer, etc.; introduced new processes for getting iron; constructed first steam-engine in America; established (1859) COOPER UNION in New York for advancement of art and science.

COOPER, SAMUEL (1609–72), Eng. miniature artist.

COOPER, THOMAS (1805–92), Chartist poet and lecturer; wrote his *Purgatory of Suicides* in gaol.

COOPER, THOMAS (1517–94), Eng. ecclesiastic and author.

COOPER, THOMAS (1759–1840), Amer. prof. of Chem., dismissed for materialistic views; student of philosophy and economics.

COOPER, THOMAS SIDNEY (1803–1902), Eng. artist; R.A. (1867); famous for cattle studies.

COOPERAGE, name given to a traffic at sea in liquors and tobacco among North Sea fishermen; rendered illegal by Acts of 1888 and 1893.

COOPERAGE, the trade of making wooden casks to contain liquids or dry goods, dates back to very early times. Casks intended to contain wine, spirits, beer, etc., are made of oak.

CO-OPERATION, system of working together of a number of persons for the cheapening of goods, or for promoting some branch of industry, founded by Robert Owen (1771–1858). The term embraces two distinct ideas: (1) c. in consumption, and (2) c. in production. (1) This is the system by which the worker seeks to spend his income to the best advantage, the system in which the proprietors of a shop are its customers, thus doing away with the middleman, and enabling the consumer to get cheaper commodities. (2) The unity of capital and labour by such means that the employer is unnecessary. The workers, either by means of their own, or borrowed capital, become their own employers. The profits which would otherwise be annexed by the employer go to swell the wages of the labourer, who is thus stimulated to exert himself to the utmost.

The Eng. 'Co-operative Wholesale Society' (founded 1863) is a combination of smaller societies, all of which hold members' shares. This extensive trading concern owns steamships and tea plantations; manufactures boots, clothes, hosiery, furniture, grocery, and practically everything required in domestic life. The 'Scottish Wholesale Society,' founded 1869, follows similar lines, and engages extensively in production. Under the co-operative system in its retail working, all customers, as shareholders, receive their share of the profits in the form of dividends.

The Agricultural Organisation Society (founded 1901) promotes agricultural co-operation, and has met with considerable success in the formation of local societies, and generally in supplying information and other help in regard to the best methods of management. The co-operative movement in relation to agricultural products has perhaps been most markedly successful in Denmark, where the articles of export include butter, bacon, eggs, and meat—butter being by far the most important article of produce. Beginning in a quiet way amongst the smaller agriculturists, the system quickly spread, and now includes many of the largest holders of land. Co-operative banks which afford capital to small producers are common on the Continent, especially in Italy and Germany, and have now been introduced into India, England, Ireland, and other parts of the Brit. Empire.

Holyoake's *History of Co-operation* (1906); Beatrice Potter, *The Co-operative Movement in Great Britain* (1910); Pizzamiglio, *Distributing Co-operative Societies* (trans. by Snell, 1910).

COOPERSTOWN (42° 42′ N., 75° W.), village, New York State, U.S.A., on Susquehanna, at exit from Otsego Lake; summer resort. Pop. (1910) 2484.

COORG (11° 56′ to 12° 45′ N., 75° 25′ to 76° 13′ E.), province, Brit. India; area, 1582 sq. miles; bounded N. and E. by Mysore, S. and W. by Madras; capital, Merkara. Most of surface is covered by forests; crossed by W. Ghats; watered by Cauvery and its affluents. C. produces coffee, rice, cinchona, cardamom. Natives are called Kodagas; most of them are Hindus; other religions, Muhammadanism, Animism. C. is administered by chief commissioner; was a native princedom and was annexed to Britain in 1832; has many ancient ramparts. Climate is comparatively cool; abundant rainfall. Pop. (1911) 174,976.

COORNHERT, DIRCK VOLCKERTSZOON (1522–90), Dutch politician and theologian.

COOT (*Fulica atra*), bird belonging to rail family,

frequents inland waters and estuaries of the Old World; expert swimmer, diver, and flier; builds its nest between reeds; favourite water-fowl for shooting; other species in America, Africa, and Australia; *F. newtoni*, in Mauritius, extinct.

COOTE, SIR EYRE (1726–83), Brit. general; distinguished himself in India in Seven Years War, and (1781) defeated Hyder Ali at Porto Novo.

COPAIBA, COPAIVA, aromatic acrid balsam or oleo-resin procured from trunk of *Copaifera Lansdorfii*, a tree of N. South America; oil used therapeutically as urino-genital antiseptic, and formerly as expectorant in bronchitis.

COPAL, hard, brown to colourless resin, obtained from *Trachylobium* and other trees of S. America and Africa; on the mainland coast of Zanzibar a wide deposit of valuable fossil c. is being exploited by digging it up from the soil in lumps of various sizes; used as chief constituent of varnishes.

COPALITE, COPALINE, hard yellow resinous substance found near Highgate in London Clay.

COPÁN (14° 41′ N., 89° 28′ W.), ruined Ind. city, on Rio Copán, W. Honduras.

COPARCENARY, TENANCY IN, legal term relating to joint inheritance of an estate by two heirs. The heir at law is usually an eldest son, but for females there is no rule of primogeniture, and when an estate is left to daughters they hold the property as *coparceners*.

COPE (O.E. *cape*), a vestment worn by R.C. and by some Anglican clergy, in processions, at vespers and on other ceremonial occasions of lower importance than the Mass. It is composed of a semicircular piece of material draped over the shoulders and fastened in front; the name *pluviale* (rain-cloak), by which it is known in the Rom. Church, shows its origin, and the shield-shaped cloth on the shoulders has developed from original hood.

COPE, EDWARD DRINKER (1840–97), Amer. palæontologist; curator, Academy of Natural Sciences; served on U.S. Geological Survey, subsequently prof. of Geol., Univ. of Pennsylvania; discovered more than 500 species of extinct vertebrates.

Memoir by H. D. King, *Amer. Geologist* (Jan. 1899).

COPELAND, HENRY (fl. 1760), famous Eng. cabinet-maker.

COPENHAGEN, KJÖBENHAVN (55° 41′ N., 12° 37′ E.), capital of Denmark; situated on E. shore of Zealand (large island in the Sound), with suburbs, called Christianshavn, on island of Amager, connected at two places. The channel between C. and Slottsholm Island forms a spacious harbour and great naval station, which, with forts to seaward and fortifications with canals for flooding land approaches, renders C. an important stronghold; promenades on site of old fortifications and extensive suburbs outside; ancient citadel in N.E. Frederikshavn is now useless. Portion of town, cut off by canals, forms Castle Island or Slottsholm, with public buildings including Royal Palace of Christiansborg, Ministry buildings, Univ. (founded by Christian I., 1479), Royal Library, Thorwaldsen Museum. Other important buildings are a cathedral (with statue of Christ and Apostles and a baptismal font, partly executed by Thorwaldsen), Trinitatiskirke (with round tower and spiral incline), Rosenborg Castle (*c.* 1610–24; with Regalia), Charlottenborg Palace (1624; used as Academy of Arts), and museum (with unrivalled northern antiquities); the new Town Hall and the Sculpture Museum; Eng. Church. Principal public square—where twelve streets meet (statue of Christian V. in centre)—constitutes heart of city.

C. started as a fishing village (*c.* 1043); haven erected by Bp. Absalon (*c.* 1100) as a refuge from northern pirates; made capital by King Christopher (1443); partially burned in 1788–94 and 1795; at C. Nelson defeated the Danes (1801), and in 1807 Lord Cathcart captured C. and the Dan. fleet after four days' bombardment. Free port established, 1894. Exports include dairy produce, grain, porcelain, pianos, clocks, mathematical instruments, chemicals, sugar, and beer. C. is centre of Scandinavian lit. and learning. Pop. without suburbs (1911), 462,161.

Rasmussen, *Copenhagen and Environs* (1893).

COPEPODA, see ENTOMOSTRACA.

COPERNICUS, NICOLAUS, KOPPERNIGK (1473–1543), Polish astronomer; studied at Cracow, Bologna, Padua, and Ferrara; undertook the duties of physician administrator of a diocese and various other political work. At the same time he created a new conception of astron., enunciated in his treatise, *De revolutionibus orbium cœlestium* (pub. 1543). His theory that the earth and other planets revolve round the sun, now a truism, at the time gave rise to a keen controversy, especially among the Rom. clergy.

Leopold Prowe, *Nicolaus Coppernicus* (Berlin, 1883–84).

COPIAPÓ (27° 21′ S., 70° 32′ W.), town, on Copiapó, Chile; important mining centre. Pop. 9301.

COPING, crowning, or capping, course of a wall.

COPLAND, ROBERT (fl. 1515), Eng. author and printer.

COPLESTON, EDWARD (1776–1849), Eng. ecclesiastic; bp. of Llandaff.

COPLEY, JOHN SINGLETON (1737–1815), Anglo-Amer. artist; portraits and hist. subjects.

COPPÉE, FRANÇOIS EDOUARD JOACHIM (1842–1908), Fr. author; was a prolific writer of poetry, plays, and novels, some of his work being marred by excessive sentimentality.

COPPÉE, HENRY (1821–95), Amer. author and educationist.

COPPER (Cu=63·6), reddish, lustrous, tenacious, malleable, ductile metallic element, with high conductivity of heat and electricity. Sp. G., *c.* 8·9; B.P. *c.* 1085°; M.P. *c.* 2100°. It tarnishes (oxidises) in the air, especially on heating, from red to dark brown and black, and imparts a green colour to the Bunsen flame. Its salts are whitish when anhydrous, otherwise blue or green, and are poisonous. Copper sulphate is used medicinally as a caustic, astringent, and emetic. C. has been known and utilised from the earliest times, and is widely used for domestic utensils (not without danger), boiler tubes, fire-boxes, ships' bottoms (formerly), in engraving, for electrical appliances, wires, etc., and in alloys (bronze, brass, gun-metal, etc.).

It is found in the pure state in ores, soils, mineral waters, in seaweed and in animals, particularly in the blood of molluscs. Pure C. occurs in crystals of the cubic system or dendritic masses, the largest known deposits being near Lake Superior. The principal ores are chalcopyrite ($CuFeS_2$), c. glance (Cu_2S), indigo c. (CuS), purple c. ore (Cu_2FeS_3), cuprite (Cu_2O), malachite ($CuCO_3Cu(OH)_2$).

There are three principal methods of extracting c. from its ores and compounds. In the *dry methods* the sulphide ores containing up to 15 % of c. are roasted to eliminate impurities, such as antimony and arsenic, then smelted to a mixture known as 'matte.' This is smelted with coke and siliceous matter to slag off the iron contained, and re-smelted in reverberatory furnaces, blast furnaces, or Bessemer converters. The product is termed 'coarse c.' (75 % to 95 %), which is refined by oxidation and subsequent 'poling' or reduction process by means of the carbon formed by stirring the molten metal with wooden poles. The greater part of refining, however, is nowadays performed electrolytically. The *wet methods* are used for extracting c. from poor ores (under 1 %), and mainly consist in converting them into chlorides by roasting them with common salt, which are dissolved out. Refining is carried out by the processes mentioned above. The steadily increasing demand for pure c. in electrical industry has stimulated the perfection of *electrolytic methods*. The main principle underlying the latter is that, when two pieces or plates of metal (*e.g.* copper) dipping in a solution of c. salts are connected with an electric current, pure metallic c. is deposited on one of the plates, the cathode.

The principal copper-producing countries are the U.S.A. (with more than 60 % of the world's total), the Brit. Empire, Spain, Mexico, Japan, the Ger. Empire, Chile, Russia, and Belg. Congo. See METALLURGY.

H. J. Steven, *Copper Handbook* (annual); *The Mineral Industry* (annual); E. D. Peters, *Principles of Copper-Smelting* (New York, 1907); M. Eissler, *Hydrometallurgy of Copper* (London, 1902).

COPPER GLANCE (Cu_2S), soft dark grey mineral, also occurring in six-sided, frequently twinned crystals; ore found in the upper parts of copper deposits.

COPPERAS ($FeSO_4.7H_2O$), green vitriol or ferrous sulphate, blue-green crystals, used for manufacture of ink, in tanning and dyeing.

COPPERHEADS, opprobrious term applied to the democratic party during Amer. Civil War.

COPPERMINE (66° 40′ N., 115° 30′ W.), river, Canada; rises in Lake Providence, flows N.W., and enters Coronation Gulf, in Arctic Ocean; not navigable; discovered by Hearne, 1771.

COPPER-PYRITES, CHALCOPYRITE ($CuFeS_2$), important copper ore, brass-yellow tetragonal crystals, often mixed with iron pyrites, occurring in N. America, Spain, S.W. England, Central Germany, and elsewhere. When tarnished with a blue iridescence the mineral is known as 'peacock ore.'

COPRA, broken, dried kernel of cocoa-nut exported from Pacific islands for manufacture of cocoa-nut oil.

COPROLITES, fossilised dung often containing bones and teeth of extinct animals, mainly reptiles and fishes, occurring in Lias and younger formations. When found in large quantities, as in Cambridgeshire and Suffolk, they are exploited for fertilising purposes as phosphates.

J. J. H. Teall, *The Natural History of Phosphatic Deposits*, Proc. Geol. Assoc., xvi. (1900).

COPTOS (*c.* 26° N., 32° 53′ E.), ancient city, on Nile, Egypt; modern Kuft; starting-point of several routes to Red Sea; had extensive trade with Arabia and India in perfumes and incense; site of excavations by Petrie, 1894.

COPTS (from Arab. *Kibt*, from Gk. *Aigyptioi*, Egyptians), Christian sect of modern Egyptians, descended from ancient Egyptians; probably, except for early Gk. intermixture, pure race, as religious differences prevented intermarriage with Arabs. They constitute less than $\frac{1}{15}$ population of Egypt, greater number of inhabitants embracing Muhammadanism after Arab invasion and losing appellation 'Egyptians'; distinguished from Muhammadan inhabitants, who also preserve Egyptian type with Arab intermixture, by smaller build and pallor, due perhaps to their refusal to perform rougher kinds of labour, and their employment as fine craftsmen, clerks, etc. Egypt was Christianised at an early date; the religious difference which made C's distinct people broke out in V. cent.; Council of Chalcedon, 451, condemned Monophysitism. C's clung to this heresy, and have ever since made it cardinal doctrine; separated from general progress of Church, their ritual is interesting as preserving ancient forms; influence of Brit. occupation has been to modify Coptic characteristics in dress, customs, and religious conservatism. Language is ancient Egyptian modified by Gk., there being formerly many dialects; not employed in Lower Egypt since X. cent., nor Upper Egypt since XIV.; preserved in lessons of Christian service, but afterwards explained in Arabic, their present tongue; handwriting keeps Gk. uncial; lit. chiefly patristic; modern movement to revive Coptic led by C., Claudius Labib.

Dowling, *The Egyptian Church* (1909); Butler, *Coptic Churches of Egypt* (new ed., 1910); J. Leipoldt, *Geschichte der Christlichen Literaturen des Orients* (1907).

COPYHOLD is customary tenure in which the copyholder is entitled to the property subject to the performance of certain duties. The rights and duties of copyholders vary according to the particular manor to which they are attached. The owners can generally dispose of their property by will, and if they die intestate, it descends to the customary heir, who may, or may not, be the same as the heir-at-law. On the death of a copyholder intestate, and without heirs, the property escheats, not to the crown, but to the lord of the manor.

COPYRIGHT is the sole and exclusive right to produce or reproduce copies of an original literary, musical, dramatic, or artistic work. By the British Copyright Act of 1842 the duration of c. in literary, dramatic, and musical works was the term of the author's life, and seven years after his death, or forty-two years from the date of the first publication, whichever was the longer period; for engravings and prints, twenty-eight years; for paintings, drawings, and photographs, the life of the author, and seven years afterwards. With regard to dramatic work, under this Act, it may be noted that the author of a novel was somewhat unfairly dealt with. Thus any person was at liberty to dramatise a work of fiction for his or her own benefit without obtaining the consent of the original author, provided that the latter had not already produced a dramatic version of his story. By the Copyright Act of 1911 it is, however, provided that the c. in a literary, dramatic, musical, or artistic work shall subsist during the full term of the author's life and a period of fifty years after his death. In the case of photographs, musical records, perforated rolls, and similar productions, it is provided that the c. shall subsist for a period of fifty years from the making of the negative, plate, or other medium from which the contrivance was derived. The Act also reserves to an author or dramatist the sole right to turn his novel into a play, or his play into a novel. In joint authorship, c. endures for the lifetime of the author who dies first, and for fifty years after his death, or during the life of the author who dies last, whichever period is the longer. Where wife and husband are joint authors in any work, the wife's interest becomes her separate property. With regard to the fifty years' reservation of c. after an author's death, there is, however, a clause which provides that if a work is withheld from the public, or pub. at a prohibitive price, a licence may be obtained for publication or performance, subject to the payment of royalties to the proprietors of the c.

INFRINGEMENT.—C. may be infringed by the unauthorised publication or sale of an exact and complete copy of an original work, a trans. of the same, a colourable imitation, or, indeed, by making excerpts from it. There is no c. in an idea, and none in news; but forms of expression used to describe the idea or news are capable of c. Again, there can be no c. in the title of a work; but if any one uses for his own work a title calculated to lead other people to believe that it is the work of some one else who has pub. something under the same name, he may be liable to an action for fraud. There is no c. in facts, but if originality of statement or treatment is accorded to the facts, such statement or treatment is capable of c. An author cannot escape the consequences of infringement by the fact that in his work there is some original matter in addition to the matter which has been copied. An *abridgment* of a c. work need not necessarily be an infringement; it would, however, be an infringement if it were a mere colourable imitation of the original work, and calculated to injure the sale of such work. Quotations, again, from a c. work may, or may not, constitute infringement. They would be looked upon as infringements if used merely as a cloak to the utilisation of the labours of another. Where c. has been infringed the owner of the same may seek redress in an injunction to restrain further infringement, an action for damages, or both means. The Courts will not grant injunctions where the infringements are trivial in character, and the amount of damages recoverable would depend largely on the extent to which the plaintiff had been injured by the infringement. The costs of all parties in any legal proceedings in respect of infringement of c. are in the absolute discretion of the Court; and an action cannot be commenced after the

expiration of three years from the date of infringement.

G. S. Robertson, *Law of Copyright* (1912); H. A. Hinkson, *Copyright Law* (1910); William Brigg, *Law of International Copyright* (1906).

International C.—By Convention of Berlin, 1908, a Copyright Union was signed by Britain, Germany, France, Belgium, Denmark, Italy, Norway, Sweden, Spain, Portugal, Switzerland, Monaco, Luxembourg, Japan, Hayti, Liberia, Tunis. A native of one of these countries enjoys in the others the privileges obtaining under c. laws there.

In U.S.A. by Act of 1909 c. is granted to an author for 28 years from date of publication, and then for another 28 years to him or his widow and family. All c. works must be printed and bound in U.S.A. A foreigner secures Amer. c. if his country extends to Amer. authors the rights of c. it grants to its own citizens.

COQUELIN, BÉNOÎT CONSTANT (1841–1909), the greatest Fr. actor of modern times. His bro., **Ernest Alexandre Honoré, Coquelin Cadet** (1848–1909), also won fame as an actor and writer of monologues.

COQUEREL, ATHANASE JOSUÉ (1820–75), Fr. Prot. preacher and author.

COQUEREL, ATHANASE LAURENT CHARLES (1795–1868), Fr. Prot. preacher and author.

COQUEREL, CHARLES AUGUSTIN (1797–1851), Fr. man. of letters.

COQUES, GONZALEZ (1614–84), Flemish artist.

COQUET (55° 20′ N., 1° 35′ W.), river, Northumberland, England; rises in Cheviot Hills; enters North Sea at Alnwick Bay.

COQUIMBO (29° 50′ S., 71° 20′ W.), seaport (and province), Chile; chief industry, copper-mining. Pop. of town, 12,106; province, c. 181,000.

COR ANGLAIS, alto or tenor oboe, with a range one-fifth lower than the ordinary variety.

CORACLE, ancient Brit. boat made of a wicker frame covered with skin.

CORAÈS, ADAMANTIOS (1748–1833), Gk. patriot and scholar.

CORAL, the hard, chiefly limy skeletons of certain Cœlentera (*q.v.*), notably the millepores, the madrepore or reef corals, the horny Antipatharia, and the Alcyonaria, which include the dead-men's-fingers (*Alcyonium*), the organ-pipe c. (*Tubipora*), the sea-pen (*Pennatula*), the red c. (*Corallium*) and blue c. (*Heliopora*). The most important c's are the Madreporaria, which form c. rocks, reefs, and islands in tropical seas ordinarily between 30° N. and S. of the equator. Reefs may either be fringing an island or be separated from the land by a shallow lagoon channel (barrier reef), or from a ring-shaped *atoll* with a central lagoon. As c's are killed by fresh water and deposits of mud and sand, they find more food and grow fastest on the seaward side of the reef, and a channel is left opposite to the mouth of a creek or river. Since c. cannot live below a certain depth, c. islands must have been formed on submarine peaks rising to about 40 fathoms below sea-level (Chamisso's theory), or raised to that height by the constantly falling débris of marine organisms (Sir J. Murray), or by volcanic action. Another explanation (Darwin's) holding good for a few atolls is that islands have gradually subsided, the fringing reef c. growing accordingly, and thus forming an atoll. It is certain, however, that the rate of growth of c. is considerable, under favourable conditions up to 9 in. per annum.

C. Darwin, *The Structure and Distribution of Coral Reefs* (1889); J. Murray, *On the Structure and Origin of Coral Reefs and Islands* (1879–80); W. Savile Kent, *The Great Barrier Reef of Australia* (illustrated) (1893).

CORALLIAN, a not very clearly defined subdivision of the Middle Oolite of the Jurassic (*q.v.*) period, consisting chiefly of grits and limestone composed of coral (Coral Rag); well developed in the cliffs near Weymouth.

CORAM, THOMAS (1668–1751), Eng. philanthropist; established the Foundling Hospital.

CORATO (41° 8′ N., 16° 25′ E.), city, Apulia, Italy. Pop. 41,739.

CORBEIL (48° 36′ N., 2° 26′ E.), town, department of Seine-et-Oise, France; has important flour-mills, printing-works, and paper-works. Pop. 9632.

CORBEL (arch.), term for stone bracket supporting a superincumbent weight.

CORBET, RICHARD (1582–1635), Eng. poet and bp.; held sees of Oxford and Norwich; wrote satires.

CORBIE, a raven. **Corbie-steps,** or *crow-steps,* term in arch. for gable decoration, by which the sloping sides of the gable mount stepwise to the apex.

CORBRIDGE (54° 58′ N., 2° 1′ W.), market town, on Tyne, Northumberland, England; market gardens.

CORBULO, GNÆUS DOMITIUS (fl. I. cent. A.D.), Rom. general; made canal between Meuse and Rhine, and won great successes against Parthians; committed suicide at Nero's order.

CORCYRA, ancient name of Corfu (*q.v.*).

CORDAY, D'ARMONT, MARIE ANNE CHARLOTTE (1768–93), heroine of Fr. Revolution. Of noble family of Normandy; carefully educated; absorbed Rom. republican ideas and, emulating Brutus, assassinated Marat as the tyrant who had overthrown the Girondins; guillotined.

CORDELIERS, CLUB OF THE, a prominent organisation at time of Fr. Revolution; its leaders were Danton, Marat, Hébert, Camille Desmoulins; when Robespierre executed leaders (1794) the club declined.

Cambridge Mod. Hist., vol. viii. (1907).

CORDES (44° 3′ N., 1° 58′ E.), town, Tarn, France.

CORDILLERA, Span. term for chain or ridge of mountains; first applied to chains of the Andes, S. America; now applied to ranges in N. and Central America.

CORDITE, smokeless, buff-coloured, heat-and damp-resisting explosive consisting of 58 % nitro-glycerin, 37 % gun-cotton, and 5 % mineral jelly (mark I.), used in cartridges for small-arms and ordnance in the Brit. army and navy. A modification known as cordite M.D., 65 % gun-cotton, 30 % nitro-glycerin, and 5 % mineral jelly, is also used on account of its higher velocity, more even pressure, and less erosion of the bore of a gun. C. is manufactured by working pulped gun-cotton and nitro-glycerin together with acetone, a volatile substance, into 'paste,' and then with mineral jelly into 'dough.' This is pressed through dies of the diameter required; the thinner cords thus formed (hence the name) are dried slowly and wound up on reels, and cut up later for small-arms cartridges. The thicker varieties (up to half an inch) are cut into lengths of about 3 ft. and used for guns of large calibre. See Explosives.

CÓRDOBA (*c.* 31° S., 65° W.), province, Argentine Republic; chiefly pampa land; watered by Primero, Segundo; metals found; chief industry is cattle-rearing. Area, 62,160 sq. miles. Pop. (1910) 572,894.

CÓRDOBA (31° 24′ S., 64° 6′ W.), city, capital of C. province, Argentine Republic, on Rio Primero; founded 1573; has handsome cathedral and univ. (1613); formerly centre of Jesuit learning. Pop. (1910) 60,000.

CÓRDOBA (18° 42′ N., 96° 50′ W.), town, Vera Cruz, Mexico; important coffee-producing centre. Pop. (1911) *c.* 70,000.

CÓRDON, cord, band, sash, etc., used in personal adornment; thus the *Cordon bleu* was the ribbon of the Fr. Order of the Holy Spirit. The word is also used to describe the defences of a protected area.

CORDOVA (38° N., 5° W.), province, S. Spain; occupies fertile valley on slopes of Sierra Morena; traversed by Guadalquivir; industries, sheep-farming; fruit- and olive-growing; chief town, Cordova. Area, 5299 sq. miles. Pop. (1910) 490,647.

CORDOVA, Córdoba (37° 52′ N., 4° 48′ W.), town, Spain, capital of province C., on Guadalquivir; with Moorish walls, VIII.-cent. bridge, gorgeous cathedral (VIII. cent.; formerly mosque), and other

fine churches; remains of Moorish palace; arena, library, museum; once famed for *Cordovan* (goat leather), now textile fabrics, silverware, etc. Roman *Corduba* was founded II. cent. B.C.; magnificent city under Moorish rule, VIII.–XIII. cent.; taken by Ferdinand of Aragon, 1236; birthplace of Senecas, Lucan, and Averroës. Pop. (1910) 64,407.

CORDOVA, GONZALO FERNANDEZ DE (1453–1515), Span. soldier; figured in subjugation of Portugal and of the Moors under Ferdinand and Isabella; sent (1495) to recover Naples from France, and restored Ferdinand of Naples (1498), winning title of 'Great Captain' (*El Gran Capitan*); led Span. forces in conquering Naples for Spain and France. C.'s methods mark an epoch in history of war.

CORDUS, AULUS CREMUTIUS, Rom. historian under Tiberius; wrote on Augustan Age.

CORDYLOPHORA, see HYDROMEDUSÆ.

COREA, see KOREA.

COREGONUS, see SALMON FAMILY.

CORELLI, ARCANGELO (1653–1713), Ital. composer and violinist.

CORELLI, MARIE (1864–), Eng. novelist; her first story was *A Romance of Two Worlds* (1886), and her later stories have achieved wide popularity.

CORENZIO, BELISARIO (d. 1643), Ital. artist.

CO-RESPONDENT, in divorce petition person charged by husband with having committed adultery with latter's wife.

CORFE CASTLE (50° 37′ N., 2° 3′ W.), town, Isle of Purbeck, Dorsetshire, England; ruined castle was scene of murder of Edward the Martyr, 978; besieged by Roundheads, 1643.

CORFINIUM, chief town of the Peligni, Samnium, ancient Italy; capital of Allies in Social War (90 B.C.).

CORFU (39° 35′ N., 19° 50′ E.), island of Greece; largest and most important of Ionian group, in Mediterranean, separated from Albanian coast by strait about 2–14 miles broad; length, 40 miles; breadth, 20; area, 277 sq. miles; divided into three districts by mountain ranges; highest point, 3000 ft.; beautiful scenery; large olive groves, vineyards, cypress plantations, oranges, citrons, figs, silk, salt, sulphur, honey, marble, etc. Ancient *Corcyra* was a Corinthian colony, founded VIII. cent. B.C.; quarrel with Corinth led to Peloponnesian Wars (*q.v.*); under Venice, XV.–XVIII. cent.; under Brit. protection, 1815–64, when joined kingdom of Greece. Pop. *c.* 100,000.—**Corfu**, seaport on E. coast; good harbour, royal palace, library, etc. Pop. 30,000. See IONIAN ISLANDS.

CORI (41° 38′ N., 12° 53′ E.), town, Rome province, Italy; ancient *Cora*; many Rom. antiquities exist. Pop. 7363.

CORIANDER, fruit of *Coriandrum sativum*, an umbelliferous plant. The extracted oil is used as a stomachic stimulant, the young leaves in cookery.

CORINGA (16° 50′ N., 82° 15′ E.), small seaport, on N. mouth of Godavery, Madras, Brit. India.

CORINNA (fl. 500 B.C.), Gk. poetess; rival of Pindar; famed for her beauty.

CORINTH (37° 55′ N., 22° 57′ E.), ancient and modern city, Greece, on Gulf of C., S.W. of Isthmus of C. (*q.v.*). New C. has arisen since destruction of old town by earthquake, 1858; lies some 3 miles distant from ancient site; and, notwithstanding completion of Isthmian Canal (1893), has regained little of C.'s historic prosperity and splendour; exports currants, oil, wax, honey, wheat, etc.

History.—From earliest times C. played a leading rôle in Gk. history; its geographical situation gave it great maritime and commercial importance; its industries (copper-work, dyeing, weaving, etc.) brought it riches; its colonies (*e.g.* Corcyra and Syracuse) spread its fame abroad; its architecture constituted the most decorative order of Gk. architecture; its luxuriance was proverbial. Amer. archæologists have recently excavated some of its famous fountains, temples, theatres, etc. The lofty Acrocorinthus (ancient natural fortress) overlooks the ruins. A long-established oligarchy was overthrown, *c.* 650 B.C., by Cypselus, who, followed by Periander (*q.v.*), maintained a beneficent tyranny till *c.* 585, and raised C. to pitch of prosperity and power. C. took creditable part in Persian War; joined Sparta against rival Athens in Peloponnesian War (*q.v.*), 431; joined Thebes, Athens, and Argos against Sparta in *Corinthian War*, 395–392; sacked by Romans, 146 (works of art removed to Rome); rebuilt by Cæsar, 46 B.C.; St. Paul's visit, *c.* 50 A.D.; taken by Alaric, 396; by Normans, 1147; by Turks, 1459; Venetians, 1687; Turks again, 1715; finally recovered by Greeks, 1822. Pop. 4000.

CORINTH, ISTHMUS OF (37° 50′ N., 23° E.), separates Gulf of C. from Gulf of Ægina; connects Morea with Attica; ship canal opened, 1893.

CORINTH (34° 55′ N., 88° 33′ W.), city, Mississippi, U.S.A.; played important part in Civil War campaigns. Pop. (1910) 5020.

CORINTHIANS, EPISTLES TO THE.—Letters by St. Paul to Christians of Corinth, forming two books of New Testament. Clement of Rome makes mention (*c.* 95) of Epistle of Paul to C's, and these books are quoted by various writers in II. cent. Modern 'Dutch school' questions authorship and puts forth theory, for which there seems little evidence, that it was written by miscellaneous writers in II. cent. General difficulty is felt in accepting *II. Corinthians* 6^{14}–7^{1} and chapters 10–13 as part of original epistle, although written by St. Paul. Epistles are important as adding to biography of St. Paul in *Acts*, for contemporary picture of early Church, and for doctrinal points. First Epistle was written (54–58) during St. Paul's stay at Ephesus after he left Italian-Gk. city of Corinth, where he founded Christian Church in middle of I. cent.; it deals with advisability of celibacy, mixed marriages, lawfulness of eating meat offered to idols, status of women, and political position of Christians. Second Epistle was written a year later for building up Church after internal dissensions and preaching of 'false prophets.' Pseudo-Epistle of C's to St. Paul and reply of apostle, not included in Bible canon, were recognised by Church of Syria in IV. cent., but discovered to be part of II.-cent. compilation of *Acts of St. Paul*.

Prof. Massie, *I. and II. Cor.* (1910); Lias, *I. Epistle of Cor.*; Plummer, *II. Epistle of Cor.*

CORINTO (12° 28′ N., 87° 2′ W.), seaport, Nicaragua, Central America; large export trade.

CORIOLANUS, GAIUS (GNÆUS) MARCIUS, general in mythical period of Rom. history. The legend, probably invented to explain capture of Corioli, is recounted in Plutarch's *Lives* and Shakespeare's *Coriolanus*.

CORIOLI, ancient city, Latium; capital of the Volscians; taken by Coriolanus, 493 B.C.

CORIPPUS, FLAVIUS (VI. cent. A.D.), Rom. epic poet.

CORISCO (0° 50′ N., 9° 30′ E.), bay, Coast of Guinea, West Africa.

CORISCO (0° 55′ N., 9° 22′ E.), small island, belonging to Spain, at mouth of Corisco Bay (*q.v.*); exports ebony and logwood.

CORK (51° 54′ N., 8° 28′ W.), maritime county, Munster; largest and farthest S. in Ireland; generally hilly—in the W. mountainous and boggy, and in the E. rich and fertile. A mountain range divides C. into parallel basins through which flow the rivers, Cork, Blackwater, Lee, and Bandon. There are many small lakes in the W. The coast, which is exceedingly indented, is about 250 miles long, has many beautiful bays, some of which run from 3 to 25 miles inland. The chief are Bantry, Dunmanus, Baltimore, Glandore, and Cork Harbour; large number of islands off the coast, the most notable being Cape Clear Island, most southerly point of Ireland. Dairy-farming is extensively carried on. Minerals include coal, iron, and copper; at Mallow there is a thermal magnesian spring. Most important manufactures are leather, tweeds, whisky, and porter. Principal towns are Cork,

Queenstown, Kinsale, and Youghal. Area, 2890 sq. miles. Pop. (1911) 391,190.

CORK, outer layer of the bark of the cork tree (*Quercus suber*), growing in W. Mediterranean countries, cultivated in Spain and Portugal. It is cut every eight or ten years, and is used for many purposes on account of its lightness, elasticity, and relative imperviousness to air and liquids; not used to stop bottles till XV. cent.

CORK, RICHARD BOYLE, 1ST EARL OF (1566–1643), Eng. statesman; bought in 1602 Sir Walter Raleigh's Irish lands (12,000 acres), in Cork, Waterford, and Tipperary, and developed their resources, building roads and fortresses, and encouraging manufactures, mining, and agriculture; Earl of C., 1620; app. Lord Justice, 1629; Lord High Treasurer, 1631; predominance in Ireland ended with Strafford's appointment as Lord Deputy under Charles I.; f. of Robert Boyle, the natural philosopher (*q.v.*).

CORK AND ORRERY, MARY, COUNTESS OF (1746–1840), Irish lady, famous for her literary *salons*.

CORLEONE (37° 49′ N., 13° 17′ E.), town, Palermo, Sicily; two mediæval castles and some interesting churches; also mineral springs. Pop. 14,803.

CORMENIN, LOUIS MARIE DE LA HAYE, VICOMTE DE (1788–1868), Fr. jurisconsult and democratic politician; wrote legal works, including *Questions de droit administratif*; advocated universal suffrage and election reform.

CORMON, FERNAND (1845–), Fr. artist.

CORMONTAIGNE, LOUIS DE (1697–1752), Fr. military engineer. See FORTIFICATION.

CORMORANT (*Phalacrocorax*), large water-bird of the order Ciconiiformes, widely distributed. The common c. (*P. carbo*) breeds on the Brit. coasts, and is used for catching fish in Japan and China, also formerly in Britain. The green c., or shag (*P. graculus*), is smaller, and does not often venture inland.

CORN, originally meaning grain, now seed of cereals, wheat (England), oats (Scotland and Ireland), maize (U.S.A.).

CORN, horny outgrowth of epidermis due to pressure, especially on the toe. Well-fitting foot-gear will prevent the growth, and the general treatment consists in paring off the corn after soaking with hot water, and painting afterwards with collodion solution of salicylic acid. In case of suppuration the treatment is the same as in case of abscess (*q.v.*).

CORN LAWS, State regulations of traffic in corn. The principle of intervention in trade was approved in England until XIX. cent., and has been advocated in late years by Tariff Reformers. Earliest legislation was directed against export in order to ensure home supply. In XV. cent. government had already begun to legislate against consumer in interest of producer; corn law of 1436, 1st statute with avowed aim of raising prices, allowed exportation when corn fell below fixed price; followed by statute, 1463, forbidding import when prices were below price at which export was permitted. Dearth of corn, consequent high price and low rate of wages maintained by statute caused permanent discontent of labourers; social reformers of XVI. cent. preached against exploitation of poor consumer in favour of farmer and landlord. Statute of 1436 was re-enacted, 1554, modified, 1562; export, almost prohibited, 1570, again allowed conditionally, 1603. High prices after Civil War compelled reduction of duties, 1663, but system of keeping up prices was subsequently reverted to. Great collapse of prices after Napoleonic wars caused Act of 1815, placing prohibitive duties on imported corn to relieve agricultural distress and with idea of making Britain self-sufficing in this necessary article. Agriculture improved, other nations retaliated, and manufacturing interest became stronger than agricultural in politics. Dearth, 1826, caused suspension of import duty and commencement of Anti-Corn Law agitation; *Anti-Corn Law League* formed, 1838, by Cobden and others; supported by Peel, who passed Bill, 1846, by which corn duties above 1s. ceased, 1849; all duties abolished, 1869.

Mary A. Marks, *The Corn Laws: A Popular History* (1910).

CORNARO, CATERINA (1454–1510), queen of Cyprus by bequest of husband, James III., who died 1473; Venetian republic compelled her to abdicate, and annexed Cyprus, 1489.

CORNARO, LUIGI (1467–1566), Venetian writer on health.

CORNBRASH, rubbly fossiliferous limestones forming thin band of rocks from Yorkshire to Weymouth, of Bathonian series of Eng. Jurassic formation.

H. B. Woodward, *The Jurassic Rocks of Britain*.

CORNCRAKE, see RAIL FAMILY.

CORNEA, see EYE.

CORNEILLE, PIERRE (1606–84), Fr. dramatist and poet; b. Rouen; s. of a legal official; ed. for the Bar, but eventually devoted his attention to playwriting, his earlier pieces meeting with little success. Then he entered the service of Cardinal Richelieu as one of the 'five poets' of the great minister, who employed some of his leisure in making indifferent plays, in which he was assisted by his literary staff. C.'s independent spirit, however, could not long rest satisfied with such mean employment, and he left the Cardinal's service. His *Médée* appeared in 1635, and met with some acceptance, but *Le Cid* (his masterpiece), produced in the following year, achieved immediate success, notwithstanding the underhand efforts of Richelieu to damn the play. It was followed by *Horace* (1639) and *Cinna* in the same year; *Polyeucte* (1640); and *La Mort de Pompée* (1641). In 1642 appeared *Le Menteur*, a comedy, which is the equal of many of Molière's. Other plays produced by him were: *Heraclius*, *Don Sanche d'Aragon*, *Andromède*, *Œdipe*, *Attila*, *Tite et Bérénice*, etc. He was associated with Molière and Quinault in the writing of the opera *Psyché* (1671), which contains some of his finest lyrical work. He was the father of Fr. drama; one of the greatest, if not the greatest, of Fr. tragic writers, and a pioneer of Fr. comedy. In breaking with the stilted style of earlier writers of tragedy, C. led the way towards the later romantic drama. His great work brought him little monetary return, and in his later years he was superseded in public favour by Racine.

Lanson's *Corneille* (Grands Écrivains Français) (1898).

CORNEILLE, THOMAS (1625–1709), Fr. dramatist; bro. of Pierre C.; wrote about forty plays, including *Ariane*, *Comte d'Essex*, *Timocrate*, etc.

CORNELIA (II. cent. B.C.), famous as 'the mother of the Gracchi'; dau. of Scipio Africanus.

CORNELIUS, CARL AUGUST PETER (1824–74), Ger. poet and composer.

CORNELIUS, PETER VON (1784–1867), Ger. artist; founder of the modern Ger. school; famous for his frescoes.

CORNELL UNIVERSITY, educational establishment at Ithaca, New York. When public grant of lands to separate states for technical educational purposes was made (1862), EZRA CORNELL, a New York senator, added 500,000 dollars to the New York fund on condition it was applied to foundation of only one institution, and gave his home and lands at Ithaca for site; incorporated, 1865; opened, 1868; beautifully situated on hill overlooking New York, with Cayuga Lake to north and hills to south; fine grounds, library, and museum; does good work in chemistry and engineering; non-sectarian; non-resident professors among whom have been Louis Agassiz, James Russell Lowell, George William Curtis, and Theodore W. Dwight.

CORNET.—(1) During XVI. and XVII. cent's was the name applied to the junior officer who carried the colours in a cavalry troop, also to the troop itself, hence 'cornet of horse.' (2) Brass wind-instrument fitted with pistons which, being depressed, either singly

or in combination, produce with the natural notes of the tube a complete scale.

CORNETO TARQUINIA (42° 16′ N., 11° 46′ E.), town, Rome province, Italy; occupies site of ancient Tarquinii; has Romanesque church of XII. cent. and a museum of Etruscan antiquities. Pop. 7219.

CORNFLOWER (*Centaurea cyanus*), blue flower, order Compositæ.

CORNICE, in arch. topmost moulded projection of a column, or wall.

CORNIFICIUS, supposed author of work, *Rhetorica*, written during dictatorship of Marius.

CORNING (42° 9′ N., 77° 9′ W.), city, on Chemung, New York State, U.S.A.; has extensive glass-works. Pop. (1910) 13,730.

CORNING, ERASTUS (1794–1872), Amer. publicist.

CORN-SALAD (*Valerianella olitoria*), or LAMB'S LETTUCE, annual plant, substitute for lettuce in France and Italy.

CORNU, MARIE ALFRED (1841–1902), Fr. physicist; improved methods for determining velocity of light; received numerous scientific honours.

CORNUCOPIA, 'the horn of plenty,' symbolical of prosperity.

CORNUS (*c.* 40° 7′ N., 8° 32′ E.), ancient city, W. coast of Sardinia; taken by Romans, 215 B.C.

CORNWALL (45° 3′ N., 74° 48′ W.), town, port of entry, on St. Lawrence River, Ontario, Canada; has cotton and woollen mills; celebrated lacrosse club. Pop. 6704.

CORNWALL (50° 26′ N., 4° 40′ W.), most south-westerly county of England; great promontory, bounded N. and N.W. by Atlantic; E. by Devon; S. and S.W. by Eng. Channel; most southerly point, Lizard Point; most westerly, Land's End; area, *c.* 1350 sq. miles; 25 miles W. by S. lie *Scilly Islands*, included in C. Scenery is diverse; in W. are broken and picturesque hills and *tors*; remarkable pile of rocks called the Cheese-wring; Cornish moors, bare, dreary, desolate. Long well-wooded valleys descend moorlands with small rivers. The Tamar (bounding C. in N.), Exe, Camel, and Taw are most important rivers. Coast is almost entirely rockbound, with unsurpassed cliff scenery. About 70 % of land is cultivated, chiefly oats; large numbers of cattle reared; market-gardening in Penzance district. Most important minerals are tin, mined extensively from very early times (largest mine, Dolcoath), copper, granite, fine slate, and pitchblende for radium. Principal ports are Falmouth—in large estuary—Penzance and Hayle; important fisheries and brisk coasting trade. C. is exceedingly rich in prehistoric antiquities. Cromlechs called *quoits* are largest and most important known; monoliths, circles, avenues of stone, hut-dwellings, caves, cliff-castles, hill-castles, and ancient Christian crosses, most of these antiquities being near Land's End. St. Michael's Mount, with castle (1047) on its summit, is a granite rock in Mount's Bay, not far from Penzance. Pop. (1911) 328,131.

Baring-Gould, *A Book of Cornwall*.

CORNWALL, EARL OF, RICHARD PLANTAGENET (1209–72), 2nd s. of King John; commander-in-chief of Crusaders, 1240–41; elected king of the Romans, 1256, but speedily overthrown; aided Eng. king against barons.

CORNWALLIS, CHARLES, 1ST MARQUESS (1738–1805), Brit. general; with his surrender of Yorktown, 1781, Amer. War of Independence ended.

CORNWALLIS, SIR WILLIAM (1744–1819), Brit. admiral; served under Hood and Rodney, and distinguished himself in wars against Fr. Revolution; vice-admiral, 1794; admiral, 1799.

CORO (11° 23′ N., 69° 40′ W.), city, Venezuela, near Bay of C.; important commercial centre for coffee, hides, tobacco, timber, and dyewoods. Pop. 9000.

COROLLA, see FLOWER.

COROMANDEL COAST (13° N., 80° E.), name formerly given to part of eastern seaboard of India (approximately what is now the province of Madras), on west shore of Bay of Bengal.

CORONA (astron.), luminous envelope round the sun outside the chromosphere, only observable during total solar eclipses; c. borealis and australis, constellations in N. and S. hemispheres; (meteor.) halo round the moon or sun due to diffraction by particles of moisture or dust; (arch.) projecting part of cornice, protecting the wall from weather; (bot.) appendages on inner side of corolla of flowers like daffodils and jonquils.

CORONACH, Gaelic dirge for the dead in Scot. Highlands; known in Ireland as 'keening.'

CORONADO, FRANCISCO VASQUEZ DE (*c.* 1500–*c.* 1545), Span. discoverer; in 1540–42 led Span. force to explore New Mexico, and made settlements in Kansas.

CORONATION (O. Fr. from Lat. *corona*, crown), ceremony of crowning sovereign as symbol and consummation of investiture with rule. Rom. emperors received no crown at accession owing to faint lingering of republican feeling. Barbarian states which grew up on ruins of Rom. empire retained, until Christianised, Teutonic custom of elevating ruler on shield, bearing him thrice round assembled tribes, placing spear in his hand and fillet ('diadem') round his head: Eng. c. procession, etc., and practice under Fr. monarchy of showing king to people, are relics of this custom. Mediæval and modern anointing and crowning are derived from *Old Testament* through Christian Church. Service set forth in *Liber Regalis* was followed in England at c. of Edward II. and until Reformation; translated and retained with exception of substitution of communion service for Mass; modified, 1685, and considerably changed, 1689; since shortened.

CORONER, important civil officer whose duty is to inquire into the cause of death of any person suspected of having come to a violent, or unnatural, end. He holds office for life; must be a 'fit person,' but not necessarily a medical man; and must appoint a deputy. In Scotland the duties are performed by a procurator-fiscal.

CORONIUM, unknown element in sun's corona, with characteristic green spectroscopic line.

COROT, JEAN-BAPTISTE CAMILLE (1796–1875), Fr. artist; one of the most individual and poetical of landscape painters; fine examples of his work are in the Louvre, the Wallace Collection, and the Glasgow Gallery.

Allnutt, *Corot* (Masterpieces in Colour).

CORPORAL, non-commissioned military officer, below sergeant; 'ship's c.' is petty officer under master-at-arms.

CORPORAL PUNISHMENT.—The infliction of punishment by one person on the body (*corpus*) of another is not permitted in the U.K., except in particular cases. These exceptions include c. p. by parents and guardians, teachers, and employers of apprentices. In any case the chastisement must not be excessive, otherwise the person concerned would be guilty of a serious offence. Punishment aboard ship is subject to the Merchant Shipping Act (1894).

CORPORATION in Eng. law consists of two kinds—sole and aggregate. A c. *sole* consists of one person, the holder of a public office, and his successors, *e.g.* abp. or vicar. A c. *aggregate* is a society of persons authorised to act as one person. A corporate body must always bear a corporate name by which it sues and is sued, and it must possess a common seal to be applied to its legal documents. It can inherit property, and hold it in perpetuity, being unaffected by the death of its individual members, if only care be taken to fill vacancies according to its constitution.

CORPULENCE, OBESITY, abnormal accumulation of fat in the body under the skin or around certain of the organs, where normally there is a certain small amount of fat. The condition is often hereditary, and also due to habits of over-feeding or over-drinking,

especially heavy alcoholic liquors, or to too little exercise and sedentary habits. C. may be reduced by a diet eliminating starchy foods, meat and fish being substituted, reducing the amount of liquid, alkaline waters being taken, along with regular exercise. Extract of thyroid gland has considerable effect in many cases.

CORPUS CHRISTI (27° 50′ N., 97° 32′ W.), seaport, Texas, U.S.A., on Corpus Christi Bay; shipping centre; exports fruit and fish. Pop. (1910) 8222.

CORPUS CHRISTI, FEAST OF, *i.e.* feast of the Body of Christ, on first Thursday after Trinity; observance enjoined by R.C. Church in XIII. cent. in connection with doctrine of transubstantiation.

CORPUSCLE, see BLOOD.

CORRAL, word used in parts of America for horse or cattle enclosure; also for a waggon defence against Indian raids.

CORREA, genus of Australian evergreen shrubs cultivated in European gardens.

CORREA DA SERRA, JOSÉ FRANCISCO (1750–1823), Portug. scientist and politician.

CORREGGIO, ANTONIO ALLEGRI (1494–1534), Ital. artist, head of the Parma school of painters; distinguished by wealth of invention, boldness of design, clever treatment of light and shade; unequalled in flesh-painting; works mostly executed at Padua, Parma, and at Correggio, whence he derived his professional name. Padua and Parma have still some of his magnificent frescoes. The National Gallery contains his *Ecce Homo, Cupid, Mercury, and Venus,* and other pictures; fine examples can be seen in the Louvre, at Dresden, Naples, Berlin, and Vienna.

Sturge Moore's *Correggio*; Meyer's *Antonio Allegri*; Ricci's *Life and Times of Correggio.*

CORRENTI, CESARE (1815–88), Ital. revolutionary politician.

CORRÈZE (45° 20′ N., 1° 45′ E.), department, Central France; formed from southern part of old province Limousin; surface hilly and mountainous; chief rivers, Dordogne, Vezère, and Corrèze; soil poor; climate variable; coal, iron, granite, wine, and timber; agriculture and cattle-raising; capital, Tulle. Area, 2273 sq. miles. Pop. (1911) 309,646.

CORRIB, LOUGH, lake, W. Ireland, in counties of Galway and Mayo; drains by river Corrib to Galway bay; length, 27 miles; extreme breadth, 7 miles.

CORRIE, name given in Scot. Highlands to a circular or semicircular hollow in a mountain-side, generally surrounded by steep cliffs. A stream usually issues from lower part.

CORRIENTES (28° S., 58° W.), province, Argentine Republic, S. America, between rivers Paraná and Uruguay; forms vast plain; northern districts largely covered by swamps and lagoons; exports include timber, cotton, tobacco, cattle, and horses. Area, 32,580 sq. miles. Pop. (1911) 395,268. Capital is CORRIENTES, on Paraná; port and commercial town. Pop. 20,000.

CORRIGAN, MICHAEL AUGUSTINE (1839–1902), Amer. R.C. abp. and scholar.

CORROSIVE SUBLIMATE, MERCURIC CHLORIDE ($HgCl_2$), white small rhombic crystals, fairly soluble in hot water; M.P. 288°; B.P. 303°; powerful poison and antiseptic.

CORRUPT PRACTICES, offences against the Corrupt and Illegal Practices Prevention Act (1883), which regulates parliamentary and municipal elections. These offences include bribery, treating, undue influence, personation, and false declaration of election expenses. The offence, however, must be committed with a corrupt motive; otherwise it is an 'illegal' practice. The commission of c. p. by a candidate, or his agents, makes the election void.

Jeaf, *Corrupt and Illegal Practices Prevention Acts* (1910).

CORRY (41° 57′ N., 79° 40′ W.), city, Pennsylvania, U.S.A.; district rich in petroleum; famous mineral springs. Pop. (1910) 5991.

CORSAIR, Barbary sea-rover of former days, authorised by Saracen government.

Stanley Lane-Poole, *The Barbary Corsairs* (1890).

CORSICA, ÎLE DE CORSE (42° 11′ N., 9° E.), island belonging to France; fourth largest in Mediterranean; separated from Sardinia in S. by Strait of Bonifacio; over 100 miles long and 50 miles broad; area, *c.* 3370 sq. miles. Capital is Ajaccio (*q.v.*). E. coast is exceedingly regular, but W. deeply indented by series of gulfs—Valinco, Ajaccio, Sagone, Porto, Calvi, and Santo Fiorenzo. The interior is overrun with mts., which reach greatest height in centre; chief summits—Cinto (*c.* 8880 ft.), in N.W.; Rotondo (*c.* 8600 ft.), in centre; Pagli-Orba (*c.* 8280 ft.) A large plain, fertile but marshy, extends from E. coast to foot of mts. Immense tracts of splendid forests—notably of chestnut trees and olives—have been reduced. Higher up are Alpine pastures with many sheep and goats. Most important agricultural products are grain, olives, wines, fruits (notably lemons), and potatoes. Agriculture is a staple industry; timber largely exported; important fisheries, also coral-fishing; several small lead, copper, and antimony mines; minerals include granite, porphyry, jasper, serpentine, alabaster, and marble. Climate is salubrious, except on E. coast, where the plain is malarious. Chief ports are Bastia, Ajaccio, and Calvi; C. is an important torpedo-station of Fr. navy. Although a department of France, its pop. is almost entirely Italian; vendetta long prevailed. C. was colonised by Phocæans, then by Phœnicians (VI. cent. B.C.), and in III. cent. B.C. Romans superseded Carthaginians; invaded by Vandals (456 A.D.), Goths, Saracens (852), and Lombards; for a time part of Frankish kingdom; passed to Pisans (*c.* 1100); after long struggle, mastered by Genoese (*c.* 1560), who sold C. to France in 1768; temporarily liberated by Paoli (*q.v.*), and occupied by British (1794–96); restored to France, 1815. Napoleon was a native of Corsica. Pop. (1911) 288,820.

L. H. Caird, *Hist. of Corsica* (1899); Renwick, *Romantic Corsica* (1909).

CORSICANA (32° 2′ N., 96° 19′ W.), city, Texas, U.S.A.; centre of wheat- and cotton-growing district. Pop. (1910) 9749.

CORSINI, family of Florentine nobles, dating from XII. cent.

CORSSEN, WILHELM PAUL (1820–75), Ger. philologist.

CORT, CORNELIS (1533–78), Dutch engraver.

CORTE (42° 17′ N., 9° 9′ E.), town, Corsica; seat of Paoli's government in XVIII. cent.; marble quarries. Pop. 5425.

CORTE-REAL, JERONYMO (1533–88), Portug. epic poet.

CORTES, name given to Span. Parliament; composed of Senate and Congress, of equal authority. Senate consists of (1) hereditary senators; (2) life senators nominated by Crown; (3) senators elected by people. Members of Congress are elected by people, and their number is in proportion of one member to 50,000 people. Portug. legislative chambers are also called the Cortes.

CORTES, HERNANDO (1485–1547), Span. Conquistador; took charge of colonists sent to Mexico (*q.v.*), 1519; founded Vera Cruz; was worshipped as god by subjects of Montezuma, emperor of Mexico; seized Montezuma and finally subdued Mexico, 1521; granted by Charles V. large province with title of marquis; discovered Lower California, 1536; d. in disgrace. Grasping and cruel, but with military genius and initiative, C. was an important extender of Span. colonial empire.

Prescott, *History of the Conquest of Mexico* (1903); MacNutt, *Life of Cortes* (1909).

CORTLAND (42° 36′ N., 76° 11′ W.), city (and county), New York State, U.S.A.; chief manufactures, wire and wire-cloth, wire-netting, carriages, and wagons. Pop. (1910) 11,504.

CORTONA (43° 17′ N., 11° 59′ E.), town, Arezzo,

Italy; enclosed by ancient Etruscan walls; principal buildings are a XII.-cent. cathedral (with fine works of art), several interesting churches, and a museum of Etruscan antiquities; C. was one of the twelve leading cities of Etruria. Pop. 3667.

CORUMBÁ (19° S., 57° 20′ W.), fortified town and port, on Paraguay, Brazil, S. America. Pop. 10,000.

CORUNDUM (Al_2O_3), the hardest mineral except the diamond, occurring in several varieties — the ruby, sapphire, Oriental amethyst, topaz, emerald. Common c. is found in grains in sand (India), and in igneous rocks in U.S.A., and is used for bearings in watches and scientific apparatus, and for grinding. Emery (*q.v.*) is impure c.

CORUNNA, Coruña (43° 22′ N., 8° 25′ W.), fortified seaport, capital of C. province, Spain, on small bay, N.W. coast; commodious harbour; has two old churches (XII. and XIII. cent.), two hospitals, arsenal, barracks, cigar factory; sailing port of Armada, 1588; burned by English under Drake, 1598; scene of battle, Jan. 16, 1809, in which Sir John Moore fell after defeating the French; exports wine, fish, and agricultural produce; imports coal and manufactured goods. Pop. (1910) 46,570.

CORUNNA, Coruña (43° N., 8° 30′ W.), N.W. province, Spain; bounded N. and W. by Atlantic Ocean; district is mountainous and generally fertile; extensive fisheries; chief exports—farm produce, fish; area, 3051 sq. miles. Pop. (1910) 658,201.

CORVÉE, unpaid labour due from tenant to noble in feudal times; tax in form of compulsory labour (road-making, etc.).

CORVEY, ancient Benedictine abbey, on Weser, 1 mile N.E. of Höxter, Westphalia, Germany; founded 228; first occupied by monks from Corbie in Picardy.

CORVIDÆ, Crow Family (*q.v.*).

CORVINUS, JÁNOS (1473–1504), prince of Slavonia; natural s. of Hungarian king, Matthias Hunyadi.

CORVUS, Crows (*q.v.*).

CORVUS, MARCUS VALERIUS (370–270 B.C.), Rom. general.

CORWEN (52° 59′ N., 3° 24′ W.), market town, on Dee, Merionethshire, Wales. Pop. (1911) 7375.

CORWIN, THOMAS (1794–1865), Amer. statesman.

CORY, WILLIAM JOHNSON (1823–92), Eng. poet; *Ionica* (1858).

CORYATE, THOMAS (1577–1617), Eng. poet; noted pedestrian; *Coryate's Crudities* (1611).

CORYBANTES (classical myth.), attendants upon Rhea, mother of Zeus, and associated with her orgiastic worship.

CORYDON (38° 13′ N., 86° 6′ W.), town, Indiana, U.S.A.; has sulphur springs; health resort.

CORYPHÆUS, chorus-leader in Gk. drama.

COS, Stanchio (36° 50′ N., 27° 10′ E.), island, Ægean Sea, W. of Asia Minor, belonging to Turkey; surface partly mountainous, partly fertile and well cultivated; fine climate. Chief town, Cos (pop. 4000), on N.E. coast, near site of temple of Æsculapius; small harbour; birthplace of Appelles, Ptolemy Philadelphus, and Hippocrates; exports wine and raisins. Pop. 10,000.

COSA, ancient city, Etruria, S.W. coast of Italy.

COSEL, Kosel (50° 20′ N., 18° 10′ E.), town, on Oder, Prussian Silesia, Germany; tanneries. Pop. 7499.

COSENZ, ENRICO (1812–98), Ital. general.

COSENZA (39° 19′ N., 16° 17′ E.), town (and province), Italy, at junction of Crati and Busento; has a Gothic cathedral, a fine court-house, and a ruined castle; trades in wine, oil, silk, etc.; in XVI. cent. was centre of persecution by Inquisition of the Waldenses. Pop. 14,921.

COSHOCTON (40° 18′ N., 81° 52′ W.), city (and county), on Muskingum, Ohio, U.S.A.; iron foundries. Pop. (1910) 9603.

COSIN, JOHN (1594–1672), Anglican divine and theological writer; forced to fly in Civil War; made bp. of Durham, 1660.

COSMAS (1045–1215), Bohemian historian.

COSMAS, Indicopleustes (VI. cent. A.D.), noted traveller of Alexandria who upheld Ptolemaic theory of geographical configuration of earth.

COSMATI, Rom. family of craftsmen noted in XIII. cent.; their architecture, sculpture, and mosaics can be seen in many churches at Rome.

COSMIC, relating to the universe. Cosmic physics is applied to the wider issues of astrophysics, including terrestrial phenomena.

COSMOGONY, term designating theory regarding origin of the universe; Jewish account found in *Genesis* 1 is paralleled by Zoroastrian conception of creation on basis of mere volition of supreme deity; Egyptians thought universe sprang from egg; Greeks ascribed world to work of Creator, but Lucretius (*q.v.*), the most advanced Rom. cosmogonist, advanced an atomic theory. In modern times there is a strong tendency to admit or waive belief in original guiding power, but to explain actual creation scientifically. In Nebular Theory, supported by Kant, Herschel and others laid stress on rotation of earth and stars to suggest probable formation. The question is still open to speculation.

COSNE (47° 26′ N., 2° 58′ E.), town, Nièvre, France; has woollen mills and iron manufactures. Pop. 5653.

COSSA, LUIGI (1831–96), Ital. economist.

COSSA, PIETRO (1830–80), Ital. dramatist; wrote tragedies on classical subjects and Ital. history.

COSSACKS, Russ. subjects who are bound to do military service of twenty years per man, and in return have received large grants of land on frontiers and considerable amount of autonomy; they inhabit the S. and E. of Russia, and are divided into two main branches, the C's of Little Russia and C's of the Don; because of defending frontier they pay no taxes; the best Russ. cavalry, and the strong arm of Russ. autocracy; notorious for brutality in quelling social disorder.

COSSIMBAZAR, Kasimbazar (24° 8′ N., 88° 19′ E.), decayed city, on Bhagirathi, Murshidabad district, Bengal, India; site now a swamp; former important centre of cotton- and silk-weaving; chief Eng. agency in Bengal at end of XVII. cent.

COSTA, GIOVANNI (1826–1903), Ital. landscape artist.

COSTA, LORENZO (1460–1535), Ital. artist.

COSTA, SIR MICHAEL ANDREW AGNUS (1808–84), composer and conductor; b. Naples; settled in England, 1829.

COSTA RICA (10° N., 84° W.), republic of Central America, stretching from sea to sea, and bounded by Nicaragua and Panama; capital, San José; area, *c.* 23,000 sq. miles. The country is generally mountainous, with many volcanoes; coast is flat, with dense forest-lands on Atlantic slopes. Principal products are coffee and bananas. Other exports include cocoa, tortoise-shell, and hides. New rubber plantations are proving productive. C. yields valuable timber—dye-woods, cedar, mahogany, fustic, etc. Sugar and rice are cultivated. Gold is mined in places; silver, copper, and other metals also found. Railway system connects San José with Atlantic and Pacific ports; branch lines run N. and S., and connect the 'Banana Lands.' C. R. is divided into seven provinces. There are *c.* 3500 aborigines; religion, R.C. C. R. (Rich Coast) was taken by Spaniards early in XVI. cent. C. R. revolted against Span. rule, and became an independent state (1821); formed part of Confederation of Central America (1824–29); now governed by Pres. and Congress; in May 1910 an earthquake destroyed city of Cartago. Pop. (1911) 388,266.

Calvo, *Republic of Costa Rica* (1890).

COSTAKI, ANTHOPOULOS (1835–1902), Turk. diplomatist.

COSTANZO, ANGELO DI (1507–91), Ital. historian and poet; wrote valuable history of Naples; lover of Vittoria Colonna.

COSTELLO, DUDLEY (1803–65), Eng. novelist and journalist.

COSTELLO, LOUISA STUART (1799–1870), Eng. poetess and hist. writer; sister of above.

COSTERMONGER, itinerant street trader; corruption of 'costard-monger,' seller of 'costard' apples.

COSTS, legal term for expenses incurred, and for professional help given by a lawyer to client.

COSTUME (Med. Lat. *costuma*, from Lat. *consuetudo*, custom), term which meant at first any fashion, but in modern use is only applied to personal clothing and adornment. The motives of wearing clothes for ornament and as a protection for the vital parts seem to be coeval, although, as ornament requires less apparatus of civilisation than clothes, even skins, tattooing, etc., probably preceded the primitive loin-cloth; the idea of decency seems only to be evolved by agelong covering of the body. The loin-cloth, tied in front, was worn by the ancient EGYPTIANS. It was succeeded by a close-fitting, frock-like garment, reaching below the knees, leaving both arms free, and the right shoulder uncovered. The BABYLONIANS wore a short skirt, suspended from the waist, leaving the upper portion of the body exposed, a style of dress also adopted by some of the Egyptians. A later development amongst these Eastern peoples was a close-fitting, embroidered garment, reaching down to the ankles, often with sleeves, but sometimes without. The footwear consisted of sandals. The hair was generally full and long, and often confined with a fillet. The earliest kind of headgear was a close-fitting circular cap, succeeded by a high conical bonnet, sometimes with ear-flaps.

Greek.—The Gk. men of the Mycenæan Age wore the loin-cloth, but the women developed a complete dress with flounced lower part. The most characteristic garment of the succeeding Greeks was the *peplos*, or 'Doric dress,' a large square of cloth, folded, and fastened on the right shoulder with a brooch; the waist was generally encircled by a girdle through which the long folds might be drawn up to prevent trailing, giving a characteristic overlap. Another garment of importance was the Ionian *chiton*, a close-fitting linen shift, or tunic, which in some cases reached only to the knees, but generally to the feet. The *pallium*, a loose mantle, is also found. Peasants' and herdsmen's garments were of sheepskin or leather. Sandals were the usual foot-gear; high boots were favoured for travelling and the chase. For hair, see separate article. Much use was made of rings, bracelets, necklaces, brooches, and ear-rings of precious metals, enamel, or bronze, and jewelled.

Roman dress differed little from the Gk. The Etruscan sarcophagus in the Brit. Museum shows the Ionian dress; the *subligaculum*, or loin-cloth, was early superseded by the *tunica*, similar to the Gk. *chiton*, which became the everyday wear of both sexes, but later only of men. The *toga*, full-dress garment for special occasions, was in early times the habit both of men and women. It was a large, almost circular, piece of woollen cloth, draped round the form similarly to the *peplos*, with one end thrown over the left shoulder and fastened by brooch and girdle. Both the *tunica* and *toga* were, as a rule, plain white, but stripes of purple and scarlet marked the rank of senators and others. An embroidered *tunica* and purple *toga* were adopted by Julius Cæsar as the permanent imperial costume. Women abandoned both *tunica* and *toga* for the *stola*, a long tunic with ornamental border and neck; at first sleeveless. Cloaks were worn in bad weather, sometimes with hoods. Sandals and shoes and high boots of red or black leather, according to rank, are found as in Greece. Hats were not used; hair was dressed in the Gk. fashion; jewellery was worn by both sexes.

Ancient British.—When Cæsar landed on the shores of Britain he found the more uncivilised tribes clad in skins; they are said to have smeared their bodies with woad. But the inhabitants of Kent wore striped or checkered frocks, or kilts, so that their dress was very similar to the Highland costume, which is still called 'the Garb of Old Gaul.' Their winter garments consisted of dyed tunics, close-fitting *bracæ*, or trousers, which now make almost their first appearance, and short cloak (*sagum*). The female dress may be judged from Dio Cassius' description of Boadicea, who wore her light hair flowing about her shoulders; was clad in a dyed tunic, over which was draped a coarse robe, fastened with a *fibula*. The Druids wore full robes of white; the Bards, blue; the Ovates (medicine-men and astronomers), green. Later the Brit. chiefs adopted the Rom. habit; and the women assumed a long under-tunic reaching to the feet, and a short outer one, with loose, half-sleeves.

Anglo-Saxon and Anglo-Danish.—The dress of the Anglo-Saxon kings and leaders was a plain tunic, short cloak, fastened with a *fibula*, long hose, drawn up over short trousers, and cross-gartered. Better-class women wore a long gown with loose sleeves, over which a super-tunic was worn. The ordinary dress was a linen shift and plain gown for women; tunic and belt for men. Cloaks and caps were for bad weather; all wore shoes, except slaves, who went barefoot. As regards ecclesiastical dress, the c. of an abp. of this period consisted of chasuble, pall, dalmatic, stole, and alb. With the coming of the Danes little change took place. Their favourite colour was black; their national emblem, the raven. Later they adopted tunics of white linen or coloured cloth, and furred mantles were not uncommon.

Norman and Plantagenet.—There was practically no change in the habits of the people under the rule of William the Conqueror. Under William II., however, extremes of fashion set in; men began to wear long cloaks, trailing gowns with loose sleeves, and fantastically pointed shoes. Women affected a tightly laced bodice, and a gown with hanging sleeves. The labouring class still kept the loose tunic, cloak pinned at the shoulder, caps, brimmed hats, and flat bonnets. The *dalmatic*, a wide-sleeved, lengthy gown, became the regal costume under Henry I., and remained so through several reigns. Henry II. introduced the short Angevin mantle; rich furs began to be popular with the wealthy classes, and the long gowns, though of simple design, were made of cloth of gold and rich damasks. Under Edward III. (1327–77) great changes took place. Amongst the nobles the long robes and tunics gave place to the long hose and *cote-hardie*, a close-fitting garment reaching to the mid-thigh, and buttoned down the front, with half-sleeves, to display the long sleeves of an under-vest. This was worn by both sexes. The use of furs and the more expensive cloths was regulated by rank and wealth. Ermine was the royal fur, while few of the nobility were permitted other than miniver. The *Order of the Garter* was instituted in this reign. In place of the *cote-hardie*, women sometimes wore a short spencer-jacket, edged with fur, according to rank. Sartorial luxury made many steps forward under Richard II., the greatest fop of his day. Parti-coloured c's were introduced as early as the reign of Edward II., but under Richard II. they became the prevailing fashion. It was during this reign, too, that the long, pointed shoes, called *crackowes*, reached ridiculous length, and were fastened about the knees with chains. Details of the extravagant fashions of the period may be found in Chaucer's *Canterbury Tales*, written towards the close of Richard's reign. Little further change took place until the time of Henry VI., when the male c. included short, tight jackets, pleated down the back, sleeves very full at the shoulders, and girded round the waist. Sometimes a long, low-necked gown with hanging sleeves was worn. Tight-fitting long hose was the general wear; hats of many shapes. These fashions continued under Edward IV., but the men's short jackets became exceedingly short. The long steeple head-dresses of the women, sometimes three-quarters of an ell in height, were amongst the more extravagant fashions of the period.

Tudor.—With the accession of Henry VII. a much simpler style of c. became the vogue. Henry himself wore a simple, short furred gown, long hose, and flat, wide cap. Shoes were very broad-toed; embroidered lawn shirts became popular, and to display these the slashing of doublets and hose became fashionable. Women wore gowns cut square at the neck, with stomachers and rich girdles, from the front of which hung long pendants. The Eng. dress in the time of Henry VIII. is familiar from Holbein's portraits. The 'bluff' king is represented with short hair, trimmed whiskers, flat, round cap, with plume at one side, puffed and slashed upper-stocks, cloth hose, velvet jerkin, and handsome outer-coat of cloth of gold or other rich material. And the fashion set by the king prevailed generally. It may be noted that the flat, round cap worn in this reign was still fashionable under Edward VI. and Mary, and survives as the headgear of the 'Blue-Coat' boy; the waistcoat is first mentioned during Henry's reign, and was then a sleeved garment, like that worn by the railway porter of the present day. Under the Stowarts and Georges the waistcoat reached to the knees. In Elizabeth's time the upper-stocks developed into 'trunk hose'; the doublet was deprived of its skirts, and took the shape of a peascod; the shirt, with embroidered neck, gave place to the ruff, the flat cap to the conical hat. The characteristic feminine garments were the enormous starched tiers of ruff and frill (imitated by men) round the neck, the stomacher, and the Span. farthingale introduced by Mary and now become immense. Men, influenced by these, brought tightly fitting coats to a point over baggy, padded breeches.

These fashions remained pretty constant under the **Stewarts**. Puritan influence was directly small, but indirectly may have helped to refine fashionable taste. The grotesque ruff gave place to deep 'Vandyke' collars of lace, and many Elizabethan distortions were succeeded by really becoming modes. The plumed cavalier, however, loved to emphasise the difference between himself and the Roundhead in his simple apparel of sober colour. In the reign of Charles II. 'petticoat breeches,' worn for some time in France, were a common mode; they were wide, puffed, beribboned garments, tapering down to just above the calf, where they were fastened; high-heeled shoes and steeplechase hat with coronal of feathers are characteristic of the courtier of this period. Women's bare shoulders sloped down beneath ringlets to a short, tight bodice, which expanded at the high waist into the amplitude of a slightly hooped skirt. Collars over the shoulders had become usual by the close of the century, when the long waist and even the stomacher had reappeared.

Georgian dress for men shows knee-breeches appearing slightly below 'three-quarters' coat, buttoned with many buttons, without collar, and with deep, wide cuffs; under the coat is the waistcoat on which much fancy was expended, surmounted by the long, soft cravat; shoes, usually square-toed, were adorned by buckles which were an important feature. The hoop of women's dress had attained immense size by the middle of the century. The classical influence of the Fr. Revolution (see HAIR) brought in, on the contrary, clinging robes, sometimes damped in order to show the limbs, the high 'Empire' waist, sandals, etc., and had an important permanent effect in an ideal of simplicity of fashion.

Men's dark-coloured clothes, which became usual in the **XIX. cent.**, are perhaps ascribable to the continued mourning worn in Europe through the slaughters of the Napoleonic wars, but black was a favourite colour of Beau Brummel. The frock-coat, waistcoat, and top-hat, from which the present articles are derived, are first to be seen in the arbiter of taste, Count d'Orsay, although his lightly starched linen neckcloth, rising to the ears and almost engulfing the chin, has given way to the narrow, stiffly starched variety.

Linen shirts were worn by both sexes from a time preceding the Conquest, poor folks wearing coarse canvas, or dowlas. In the days when silk stockings were the fashion, three pairs were often worn in cold weather; and false calves were by no means uncommon. Folding fans have been in use since the days of Elizabeth. The modern woman's *blouse* was copied from the famous Garibaldi Red Shirt (c. 1846). The *crinoline* was first worn in 1856. The *petticoat* was originally a man's outside coat, later an under-tunic, and a 'petticoat of red damask' was worn by Henry V. 'An apron' is a corruption of 'a napron.' A 'bodice' is a corruption of 'bodies,' stays being originally called a 'pair of bodies.' Men's loose collars were introduced about half a cent. ago. The evening, or 'swallow-tail,' coat is merely a 'cut-a-way' garment developed from the frock-coat. The 'trews,' or tartan trousers, are an essential part of the Highland dress, and were worn by 'Prince Charlie.' 'Cossack' trousers were first worn in England about 1816, but tight-fitting trousers continued in favour for long afterwards. In the earlier years of the XIX. cent. the wig became rare; and the soldiers abandoned their pigtails in 1808. The first umbrella used in England was in 1750, but it was not generally adopted until about a quarter of a cent. later. The first silk 'top-hat,' as the successor of the 'beaver-hat,' was seen in London in 1797.

Robes, or official costume.—The origin of domestic and official livery is obscure, but by the XIII. cent. the magnate gives his official 'a robe of the robes of his esquires,' usually twice a year (the *roba hibernalis* and *roba æstiva*), at fixed times. Numerous stipulations to do so are to be found in charters of XIV. cent., when payments for robes of royal servants frequently occur in Exchequer accounts. Whether robes at that date were considered as livery or robes of state, they were the parent of livery and possibly of robes of state. The peer's 'vesture of honour' is mentioned at the close of the XIV. cent., and 50 years later king and peers are found wearing 'Parliament robes' of scarlet trimmed with miniver (now ermine); and strips of fur, in number according to rank, already appear on the peer's right shoulder. The custom of wearing Parliament robes became gradually disused, and they are now donned only at the opening of Parliament and on some other special occasions. The ordinary members of the Lower House have no Parliament robes, but the Speaker always wears a black silk gown (damask, with gold lace, on special occasions) and a full-bottomed wig; and the clerks at the table wear barrister's gowns and wigs.

CORONATION robes do not appear until the XVI. cent. At Henry VII.'s coronation, when the king wore crimson velvet and ermine (then an exclusively royal fur), the peers dressed according to their fancy. At Anne Boleyn's, however, nearly all the peers wore crimson velvet furred with ermine, powdered according to their degree; and state dresses of scarlet trimmed with lettice had already appeared for peeresses. By the close of the XVII. cent. STATE robes were regulated by the Earl Marshal. The robes of the ORDERS OF CHIVALRY originated like those of City companies, as symbols. Those of the Order of the Garter (founded c. 1348) were originally a blue cloth mantle with surcoat and hood embroidered with garters; after many changes they are now a mantle of deep blue velvet lined with white taffeta, fastened by cordons of blue and gold, the star embroidered on the left breast; hood of crimson velvet; hat of black velvet lined with white taffeta, plumed with white ostrich feathers, and a tuft of heron's feathers in the centre, all fastened to the hat by a band of diamonds. The robes of the Order of the Thistle are surcoat and hood of cloth of silver under mantle of dark green velvet; of St. Patrick, azure blue lined with white satin, with trunk hose of white satin; of the Bath, crimson lined with white satin, with white satin trunk hose, and white boots topped with red. The robes of the Order of the Star of India are mantle of light blue satin fastened

at the neck with tassels of light blue silk and silver bullion; the mantle of St. Michael and St. George is of Saxon blue satin, lined with crimson silk, fastened by cordons of blue and scarlet silk with gold bullion; the mantle of the Order of the Indian Empire is of imperial purple satin, lined with and fastened by a cordon of white silk, with purple silk and gold tassels attached.

LEGAL ROBES.—Lawyers appear to have had no distinctive robes until the XIV. cent., when the coif, the old symbol of the Bar, had become appropriated to them. It was a white bonnet tied under the chin, and worn by judges and serjeants-at-law until the adoption of the wig by judges in the late XVII. cent., after which it passed out of use, an amusing attempt to represent it by a white patch on the wig being for some time made. The present use of the black cap is found in the middle of the XVI. cent. The parti-coloured robes worn by serjeants-at-law from the XIV. to the XVIII. cent. disappeared before the abolition of that rank. The judge from the first might not wear a parti-coloured gown; he wore a cloak in place of the serjeant's hood, and his cape was furred with miniver instead of budge. The present judges of High Court wear wig, scarlet gown and casting-hood, black belt, and on ceremonial occasions tippet furred with ermine, and full-bottomed wig. The robe of the Lord Chief Justice is trained. The judges of the King's Bench have black or blue gown furred with ermine, and scarlet casting-hood. The Lord Chancellor has a black gown with train. The gown of the barrister is thought to have originated at the same time as the wig—the close of the XVII. cent.

ACADEMIC robes are found in the XIV. cent., and differ according to univ. and degree taken. MUNICIPAL robes appear in the XIII. cent., and various London gilds had liveries by the XIV. cent., when scarlet became the usual colour for the robes of mayor and aldermen, though violet and black were sometimes worn, as they still are. The Lord Mayor of London has now a crimson velvet state robe worn in presence of the sovereign, a black state robe with gold lace worn at special city functions, and scarlet robes for most ceremonials; aldermen, sheriffs, and recorders usually wear scarlet.

Shaw's *Dresses and Decorations of the Middle Ages*; Planché's *Cyclopædia of Costume*; Fairbolt's *Costume in England*.

COSWAY, RICHARD (1742–1821), Eng. artist; most distinguished miniaturist of his day.

CÔTE D'OR (47° 30′ N., 4° 40′ E.), department, E. France, formed of part of old province of Burgundy; surface elevated and well wooded in N.; chief rivers, Seine, Saône, and Armançon; good pastures; important vineyards; famous Burgundy wines produced; fertile valleys and plains; chief industries, sheep and cattle rearing; iron and steel manufactures; capital, Dijon. Area, 3392 sq. miles. Pop. (1911) 350,044.

COTENTIN, THE, peninsula (length, *c.* 55; breadth, *c.* 26), formed by Bay of St. Michel and Gulf of Carentan, France; fertile and good pasture ground for cattle; in mediæval times was owned by Dukes of Normandy; is now part of department of La Manche; chief town, Cherbourg.

COTES, ROGER (1682–1716), Eng. mathematician; friend of Newton; first Plumerian prof. of Astron. and Natural Philosophy, Cambridge.

CÔTES-DU-NORD (48° 25′ N., 2° 50′ W.), department, France, bordering Eng. channel, forming part of ancient province of Brittany; traversed by chain of hills, running S.E. to N.W.; coast much indented; rivers short and navigable; good pastures; chief occupation, fishing; capital, St. Brieuc. Area, 2786 sq. miles. Pop. (1911) 605,523.

COTGRAVE, RANDLE (fl. 1611), Eng. lexicographer; sec. to Lord Burghley.

CÖTHEN, KÖTHEN (51° 45′ N., 11° 58′ E.), town, Anhalt, Germany; formerly capital of duchy of Anhalt-Köthen; industries include iron-founding and manufacture of machinery. Pop. (1910) 23,416.

COTMAN, JOHN SELL (1782–1842), Eng. landscape artist.

COTONEASTER, genus of rosaceous shrubs bearing red berries, cultivated in gardens.

COTOPAXI (0° 48′ S., 78° W.), mountain, Andes, Ecuador, S. America; loftiest active volcano in world (*c.* 19,600 ft.). Earliest recorded eruption occurred in 1533; most disastrous, 1768; first complete ascent made by Reiss, 1872; later by Whymper, 1880.

COTRONE (39° 8′ N., 17° 8′ E.), seaport and episcopal see, Catanzaro, Italy; ancient *Crotona*; has old castle; exports oranges and olives. Pop. 7902.

COTSWOLD HILLS (51° 50′ N., 2° 5′ W.), range, Gloucestershire, England, extending S.W. to N.E. for upwards of 50 miles, separating basin of Lower Severn from sources of Thames; highest points—Cleeve Cloud, 1134 ft., and Broadway Hill, 1086 ft.; famous breed of sheep raised.

COTTA, BERNHARD VON (1808–79), Ger. geologist; pro. of Geol. at the Bergakademie in Freiberg. The translation of his *Treatise on Lithology* (1866) stimulated Brit. research.

COTTA, GAIUS AURELIUS (*c.* 124–73 B.C.), Rom. democratic statesman, one of foremost orators of age of Cicero; consul, 75 B.C. His bro., LUCIUS AURELIUS COTTA, was also democratic statesman.

COTTA, JOHANN GEORG (1631–92), Ger. publisher; founder of a firm which flourished through several generations; since transferred.

COTTABUS, ancient Gk. game, very popular at convivial gatherings, several cent's B.C. The object was for a person, whilst in a reclining position, to throw a quantity of wine from his drinking-cup, which, without scattering, should strike a given object.

COTTBUS, KOTTBUS (51° 44′ N., 14° 21′ E.), town, on Spree, Prussia; important railway junction and trading centre; chief industry, cloth manufacture. Pop. (1910) 48,643.

COTTENHAM, CHARLES CHRISTOPHER PEPYS, EARL OF (1781–1851), Eng. Lord Chancellor.

COTTET, CHARLES (1863–), Fr. artist; portraits, landscapes, Breton fisher scenes.

COTTIN, MARIE, 'SOPHIE' (1770–1807), Fr. novelist; wrote *Élisabeth, ou les Exilés de Sibérie*, etc.

COTTINGTON, FRANCIS, BARON C. (1578–1652), Eng. statesman and diplomatist; exercised great influence with James I., and encouraged Span. alliance; made Chancellor of Exchequer, 1629; Master of Court of Wards, 1635; encouraged exactions of Charles I., and followed king in Civil War.

COTTLE, JOSEPH (1770–1853), Eng. bookseller; friend of Coleridge and Southey; bought poems from them, including Southey's *Joan of Arc*; wrote interesting *Early Recollections* (1837), and some verse.

COTTON.—Great Britain leads in c. manufacture, and the chief centre is in Lancashire, where the atmosphere possesses the exact amount of moisture all the year round necessary for spinning. Raw c. is imported at Liverpool, spinning takes place around Manchester, weaving near Preston; *c.* £100,000,000 worth of c. is annually converted into cloth in Lancashire.

The raw material is a vegetable fibre of the cotton plant. The flower, resembling that of the hollyhock, leaves a green pod which grows to the size of a hen's egg; bursting, it discloses a mass of white material resembling wool, which protects the seeds. This woolly mat is the raw c. There are several varieties of cotton plant; some are bushes of from 3 to 4 ft. high, while others grow much larger. One variety—known as the c. tree—may be from 15 to 20 ft. Some of the plants are annuals, others biennials or perennials. They grow in India and Egypt, but N. America supplies most of Britain's c. Microscopically, c. fibres resemble hollow and flattened reeds. They are about 2 in. in length, the length being known as the 'staple'; 1 lb. of raw c. can make a thread of 1000 miles in length.

In N. America the annual c. shrub is most cultivated. The seeds are sown each spring in rows about 4 ft.

apart, and in June the flower appears; in July or August the 'bolls' burst. Formerly *picking* was done by slave labour. The fibres are gathered by hand and placed in a sack slung round the picker's neck; some gather 100 to 300 lb. daily, including the seeds. The removing of the seeds, *ginning*, is carried out by a machine called a *gin*. The saw gin, invented by Whiteley (1792), consists of 60 or 70 circular saws mounted on a shaft. Each saw moves in a slit through which the teeth draw the fibres, leaving the seeds to fall into a pan. The seeds when pressed afford c. *oil*, and the husks and pulp are made into cakes for cattle food.

After ginning, the c. is pressed, by hydraulic power, into bales of about 480 lb., which are wrapped in sacking and bound with iron hoops. At the mills the raw c. is thrown into a 'bale-breaker,' where spiked rollers tear it apart. It is passed on to the *cleaning-room*, where seeds, dead leaves, dust, and other impurities are removed by the opening-machine. The scrutcher further cleans the c. and rolls it into a thick sheet, the 'lap,' which weighs about 40 lb. Before spinning, the c. fibres must be straightened into line by the *carding*-machine, which gives the cotton a further cleaning. The carding-machine is a wheel about 3 ft. broad and 4 ft. in diameter, covered with strips of canvas in which are set fine-pointed steel wires, about 600 to sq. inch, above this are iron strips (also covered with pointed steel wires) called *flats*, as long as wheel is broad, and forming an endless chain, 1½ in. broad. Whole chain is passed round rollers at each end and revolves more slowly than the cylinder. Thistles (Lat. *carduus*) were formerly used for straightening the fibres.

From the carding-machine the c. emerges in a flat ribbon *c.* 1 in. wide and ¼ in. thick, the 'sliver.' It is still compressed, and has to be lengthened out by a *drawing*-machine consisting of several sets of rollers, revolving at different speeds, *i.e.* the second pair moves faster than the first, the third faster than the second, and so on. The sliver is consequently stretched slightly. Were the sliver pulled out to its finished length by one set of rollers only, it would break. Should a sliver break in lengthening, the machine is immediately stopped by an electrical device. Drawing is carried out 6 times before the sliver is of uniform thickness and strength; it is then passed through a *slubbing* frame, which again draws it out, winds it on a bobbin, and gives it a slight twist.

Before spinning, the c. has to pass through an intermediate frame and a roving frame, which repeat the process of the slubber, making the finished 'roving,' free from all inequalities, resemble a coarse and twisted thread. It has yet to be twisted and drawn many times before being ready for weaving.

A *fabric* consists of the 'warp,' or length-wise threads, and the 'weft,' or top and bottom threads, which cross and intersect the warp threads. The warp threads are wound on to the warper's bobbin, and at this stage may be dyed. From these bobbins the thread is wound on to a slasher's beam some 4 ft. broad. In fixing, the threads are passed through the teeth of a comb the width of the beam. When the beam is filled, the threads are strengthened by being sized — by passing through boiling paste of flour and water. The threads from four slasher's beams are then taken and rewound on a weaver's beam, and after sizing are passed through rollers and dried by steam. The slasher's beam contained 500 threads $\frac{1}{10}$th in. apart and therefore the weaver's beam has 2000 threads $\frac{1}{40}$th in. apart, the distance varying according to the fineness of the cloth desired.

The processes preparatory to weaving may be carried on in storeyed buildings, but *weaving* is always done in 'sheds,' with glass roofs to allow the maximum amount of light to fall on the looms. A shed may contain as many as 2000 looms, on each of which mechanical 'picking-sticks' jerk backwards and forwards — shooting the shuttle across the warp — some 200 times per minute. The whole principle of weaving depends on the placing of weft threads alternately over and under the cross-threads. Later operations include washing, boiling (in soda-ash solution), bleaching, souring, squeezing, opening, starching, drying, wetting or calendering, folding, and pressing. If the cloth is to be printed it is done after the 'opening' process, and then steamed to 'fix' the colours. See Wilkinson, *The C. Plant*; Taggart, *C. Spinning*; Lister, *C. Manufacture*.

COTTON, CHARLES (1630–87), Eng. poet and translator; was friend of Isaak Walton, and wrote second portion of *The Compleat Angler*; also produced the standard trans. of *Montaigne's Essays*.

COTTON, GEORGE EDWARD LYNCH (1813–66), Eng. educationist; head of Marlborough Coll.; bp. of Calcutta.

COTTON, JOHN (1585–1652), Anglo-Amer. puritan; vicar of Boston, Lincoln, 1612–32; forced to emigrate, and became minister of First Church of Boston, New England; great influence on religious development in New England.

COTTON, SIR ROBERT BRUCE (1571–1631), Eng. antiquary and politician. 'Cotton House,' on site of present House of Lords, was meeting-place of antiquarian soc. C. was associated with researches of Camden and Speed; his MSS. now in Brit. Museum.

COTTON-GRASS (*Eriophorum*), member of *Cyperaceæ* family, so called from cotton-like processes developed from the perigone which encloses the ovary; used, but not extensively, for stuffing cushions, etc.; of little value as fodder.

COTYLEDON, see DICOTYLEDON.

COTYS (fl. 382–358 B.C.), king of Thrace; notorious tyrant.

COUCH-GRASS (*Triticum repens*), tough, many-rooted plant; grows well in sandy soil and makes moderate hay, but oftener becomes a weed.

COUCY-LE-CHÂTEAU (49° 31′ N., 3° 19′ E.), village, Aisne, France; ruined feudal castle (XIII. cent.), now state property.

COUCY, LE CHÂTELAIN DE (XII. cent.), Fr. *trouvère*.

COUES, ELLIOTT (1842–99), Amer. naturalist, writer on ornithology and theosophy; founder of Amer. Ornithologists' Union.

COUGAR, see under CAT FAMILY.

COULOMB, CHARLES AUGUSTIN DE (1736–1806), Fr. physicist; b. Angoulême; served in corps of engineers, Martinique; invented *Torsion Balance*; wrote *Théorie des Machines Simples* (1779).

COULOMMIERS (48° 50′ N., 3° 5′ E.), town, Seine-et-Marne, France; chief industry, printing; large trade in cheeses. Pop. 4876.

COUMARIN ($C_9H_6O_2$), organic compound extracted from tonka bean and sweet woodruff; M.P. 67°; B.P. 290°. Artificial c. occasionally used in perfumery.

COUNCIL (Lat. *concilium*, assembly), assembly summoned to settle disputed ecclesiastical points; useful in early days of Church for codification of doctrine, and important later in adjustment of relations of Church and State. Chief forms of c. held are general, patriarchal, provincial, papal, national, and diocesan. C. held at Jerusalem, mentioned in *Acts* and *Galatians*, is considered as parent and precedent; in later II. cent., Churches of Asia Minor assembled to discuss doctrines of Montanus, and system speedily developed. General (*œcumenical*) C's originated in IV. cent., Constantine summoning synods to Rome and Arles to discuss Donatism, and C. of Nicæa (325) to dispose of Arianism. A dispute arose later as to the authority of C's: the papal party denying the validity of its decisions until ratified by pope, who in XI. cent. acquired sole right to summon General C. During the schism (1378–1417), cardinals held C. of Pisa (1409); papal or ultramontane party attacked at C. of Constance (1414–18) and later at C. of Basel, reformers asserting that General C. was superior to pope; ultramontanists triumphed at C. of Florence (1439), and confirmed papal position at Lateran C. of 1616.

H. R. Percival, *The Ecumenical Councils* (1900); *Hist. of Christian Councils*, trans. from German of Hefele and Hergenröther; Kaye, *The Council of Nicæa* (1910).

COUNCIL BLUFFS (41° 18′ N., 95° 58′ W.), city, Iowa, U.S.A.; railway centre; manufactures iron, bricks and tiles, and agricultural implements. Pop. (1910) 29,292.

COUNT (Lat. *comes*), Eng. word to express foreign title equivalent to 'earl.' Rom. emperors' councillors were called *comites*, and councillors entrusted with special departments of administration received titles such as C. of Africa, or C. of the Saxon Shore. The title was retained by the Franks, whose kingdoms rose on the ruins of the Rom. Empire. Besides c's of various territorial divisions, there were c's of palace, stable, etc., *comes stabuli* degenerating into 'constable.' These offices, though they often became hereditary, were not necessarily so. In France from X. cent., c. became generic title of nobility. In Germany in XII. cent. the c. (*graf*) received definite status, modified by other considerations, such as his rank as a landowner. There are now many degrees of *graf*, the lowest being little more than acknowledgment of noble birth. The same is the case in Italy, but its use is more strict in Spain.

COUNTERFEITING, the crime of making and uttering sham coin or paper money with intent to defraud.

COUNTERPOINT, musical term for one melody played against another; point is old term for note; 'plain c.' consists of melody with one of five types of variation; in 'double c.' two melodies are employed.

COUNTERSCARP, the besiegers' side of a ditch, in fortification.

COUNTERSIGN.—(1) Military password to be given when sentry challenges; (2) additional signature to a document.

COUNTY, administrative division in U.K., U.S.A., and Brit. colonies. After the conquest, this Norman appellation replaced in many cases Saxon 'shire.' Some of modern c's originated in Saxon, others probably in Dan. times, and others in I. cent. after Norman conquest.

COUNTY COURT.—This court is derived from a petty court instituted in Alfred the Great's reign, but reconstituted under the County Courts Act (1846). Several later Acts have extended its powers, notably the County Courts Act (1903), which came into operation Jan. 1, 1905. Hitherto, in most cases, its jurisdiction had been limited to cases in which the amount claimed did not exceed £50. But now the C. C. may deal with all personal actions where the debt, demand, or damage claimed is not more than £100, or where the debt or demand claimed is reduced by an admitted set-off to £100. A C. C. judge must be a barrister of seven years' standing.

COUP D'ÉTAT, successful attempt made by ruling power to gain supreme control; a good example is Louis Napoleon's effort in 1851.

COUPLET, two consecutive lines of verse which rhyme with each other; more especially lines in which sense is complete with end of second line. *Heroic Couplet* (decasyllabic), greatly favoured from Restoration onwards, was perfected by Dryden and Pope.

COUPON (Fr. *couper*, to cut off), document entitling holder to some benefit; warrant attached to bonds, etc.

COURANTE, dance of Fr. and Ital. origin. In the Suite it is generally found with 'doubles' or variations.

COURAYER, PIERRE FRANÇOIS LE (1681–1776), Fr. R.C. theologian.

COURBET, GUSTAVE (1819–77), Fr. artist; celebrated for landscapes and seascapes, including *The Valley of the Loire*, *The Wave*, *Bathers*, etc.; met with much popular success as an artist, but incurred trouble by the cultivation and expression of democratic theories.

COURBEVOIE (48° 51′ N., 2° 19′ E.), town, on Seine, France; bleaching and wagon-building. Pop. 25,330.

COURCELLES (50° 27′ N., 4° 22′ E.), town, Hainault, Belgium; coal and iron. Pop. 17,000.

COURCELLE-SENEUIL, JEAN GUSTAVE (1813–92), Fr. economist.

COURCI, JOHN DE (d. *c.* 1219), Anglo-Norman employed by Plantagenet kings in Ireland; subdued and fortified large part of Ulster.

COURIER, PAUL LOUIS (1773–1825), Fr. author and democratic politician; imbibed ideals of Gk. republics, and laid aside his noble title 'de Méré'; works valuable for style and record of manners.

COURLAND, KURLAND (*c.* 55° 45′ to 57° 40′ N., 21° to 27° E.), province, Russia, between Gulf of Riga on N., Kovno on S. Surface generally level; is drained by nearly 100 rivers; numerous lakes and forests. Majority of inhabitants are Letts and Protestant; chief occupations, agriculture and stock-raising. In XIII. cent. C. formed part of Livonia; later became independent duchy; finally united with Russia, 1795; capital, Mitau. Area, 10,435 sq. miles. Pop. (1910) 741,200.

COURNOT, ANTOINE AUGUSTIN (1801–77), Fr. mathematician; advocated mathematical consideration of economic problems.

COURSING, the ancient sport of hunting the hare, by sight, with greyhounds.

COURT, ANTOINE (1696–1760), Fr. Huguenot; reorganiser of Fr. protestantism after persecution by Louis XIV.; established important seminary at Lausanne.

COURT BARON, O.E. manorial administration, now usually directed by steward of estate.

COURT DE GÉBELIN, ANTOINE (1728–84), Fr. scholar.

COURT LEET, Old Eng. court for punishment of criminal and petty offences.

COURT OF ARCHES, see ECCLESIASTICAL (JURISDICTION).

COURT OF COMMON PLEAS, department of High Court of Justice now vested in King's Bench Division.

COURTENAY, name of noble Devonshire family, which presumably drew origin from Courtenay in France. REGINALD (d. 1194), who m. heiress of Okehampton, Devonshire, is first ancestor of Eng. line whose existence can be proved; his great-great-grandson, HUGH, inherited earldom of Devon, 1293; was summoned to Parliament as baron, 1299; and confirmed as Earl of Devon or Devonshire, 1335. The family held the earldom of Devon with short intervals until 1556, when, on death unmarried of Edward, Earl of Devon, the title was considered extinct. In 1831, however, House of Lords decided that it had merely been dormant, and declared WILLIAM, Viscount C. of Powderham, earl, as heir of above Edward, Earl of Devon, and earldom has descended to Sir Charles Pepys C. Members fought at *Crécy* and *Agincourt*, and on Lancastrian side in Wars of Roses. On marriage of WILLIAM C. with dau. of Edward IV. they became Yorkists, entertained hopes of Crown under Tudors, and incurred attainder. Among most prominent of the house were WILLIAM, abp. of Canterbury, 1381–96, great opponent of Lollards; his s., RICHARD, bp. of Norwich, who, as chancellor of Oxford, prevented archiepiscopal visitation of univ.; and PETER, bp. of Exeter (1478–87), who assisted in overthrow of Richard III.

COURTHOPE, WILLIAM JOHN (1842–), Eng. man of letters; prof. of Poetry, Oxford (1895–1901); has pub. *History of English Poetry* (6 vols.).

COURT-MARTIAL, court composed of army or navy officers to try offences against army or navy rules, or to administer martial law. Martial law (codified, 1879) is now administered by virtue of annual Army Act.

COURTNEY, LEONARD HENRY (1832–), BARON C. OF PENWITH (1906), Brit. politician and

political writer; prof. of Political Economy, Univ. Coll. London (1872-75); Under-Sec., Home Office (1880-81); Under-Sec. for Colonies (1881-82); Sec. to Treasury (1882-84); deputy-Speaker (1886-92). A Unionist until Transvaal War, when he showed pro-Boer sympathies; later opposed Tariff Reform and joined Liberal party; strong advocate of proportional representation. His bro., JOHN MORTIMER, is a Canadian statesman; another bro., WILLIAM PRIDEAUX, author and compiler of bibliographies.

COURTOIS, JACQUES (1621-76) and **GUILLAUME** (1628-79), Fr. artists.

COURTRAI (50° 49′ N., 3° 15′ E.), town, on Lys, West Flanders, Belgium; ancient *Cortoriacum*; chief buildings, Hôtel-de-ville (1527), churches of Notre Dame and St. Martin; linen, lace; here French were defeated by Flemings in *Battle of Spurs*, July 11 1302. Pop. 36,000.

COURVOISIER, JEAN JOSEPH ANTOINE (1775-1835), Fr. politician.

COUSIN, JEAN (1500-90), Fr. artist; famed for subject pictures, including *The Last Judgment* (Louvre); painted glass in Sainte Chapelle, Vincennes; also a sculptor and wood-engraver.

COUSIN, VICTOR (1792-1867), Fr. philosopher; founder of modern *Eclectic School*; b. Paris; ed. under Royer-Collard and Maine de Biran; lectured in Sorbonne, Paris, 1815; identified with struggles of his country for civil and intellectual liberty; contributed to settlement of social problems then agitating men's minds. In 1820 C. was suspended from chair for liberal opinions; replaced, 1827, and lectured on Hegel to crowded assemblies; chief works, *Translations of Plato*, in thirteen vols., essays on Abelard Pascal, Locke, *History of Philosophy*.

C. sought to incorporate the truths of all schools in one system; borrowed from Leibnitz the maxim, 'Systems are true by what they affirm, false by what they deny.' All philosophical systems may be classed under four heads—Idealism, Sensationalism, Scepticism, Mysticism. The Scot. thinkers deny all metaphysics, the Germans founded an *à priori* metaphysics on the notion of the Absolute; a middle way is to base metaphysics on psychology, avoiding the defects of sensationalism by reflection into the depths of the soul, rigorous examination of every fact of consciousness and deduction of all that appears logically warrantable. In psychology, Kant's arguments are employed against Locke's empiricism. But Kant affirmed our necessary ideas and *à priori* conceptions due to the subjective laws of our minds. C. maintained an impersonal reason, something common in all men, not variable like the will, or relative like the senses. Reason is subjective only when reflective; when spontaneous, the Absolute with which it is identified is immediately grasped; subjectivity disappears in the spontaneous act of the pure reason. This theory is distinguished from Schelling's *Intellectual Intuition* by the psychological point of approach. In the lectures of 1828 C. advances further towards Absolute Idealism; history is the development of three ideas, the Infinite, the Finite, the Relation between them. Afterwards, his speculations are remodelled on Cartesian lines, with psychology as his basis; philosophy becomes a struggle against erroneous doctrines rather than a pure science, and to be allied with religion; the authority of Common Sense is more and more admitted.

J. Simon, *Victor Cousin* (Eng. trans. by Masson); Barthélemy St. Hilaire, *Victor Cousin* (1895).

COUSTOU, NICOLAS (1658-1733), **GUILLAUME**, *père* (1677-1746), and **GUILLAUME**, *fils* (1716-77), Fr. sculptors.

COUTANCES (49° 2′ N., 1° 26′ W.), town, on Soulle, Manche, France; bp.'s see; has famous cathedral of Notre Dame of XIII. cent. Pop. 7000.

COUTANCES, WALTER OF (d. 1207), Eng. ecclesiastic and diplomatist.

COUTHON, GEORGES (1755-94), orator of Fr. Revolution; as member of National Convention voted for death of Louis XVI.; advocated arrest of Girondists; was guillotined with Robespierre in the 'Terror.'

COUTTS, THOMAS (1735-1822), Eng. banker; founder of Coutts & Co.

COVELLITE (CuS), blue earthy copper ore, formerly termed indigo-copper, also occurs in hexagonal crystals; found in copper veins as alteration product of copper glance in Chile, Montana, Wyoming, Saxony.

COVENANT, an agreement between states or persons; the written instrument containing the terms of agreement; in Old Testament God's promises to man, on the condition of man's obedience and faith.

COVENANTERS, Scot. political party which held principles laid down by Scot. covenants (*q.v.*); persecuted after Restoration of 1660; defeated at *Rullion Green* (1666); won battle against Claverhouse at *Drumclog* (1679), but were defeated at *Bothwell Brig*, three weeks later.

Mathieson, *Politics and Religion in Scotland* (1902); Hewison, *The Covenanters* (1910).

COVENANTS, SCOTTISH, the *National Covenant* (1581) and the *Solemn League and Covenant* (1643). The former was a declaration of Prot. as against R.C. principles, but in 1638, when it was attested in Greyfriars' Churchyard, Edinburgh, the point of issue was the rejection of Laud's Episcopal Prayer-Book. The latter was the agreement the Scot. Estates and General Assembly made with the parliamentary forces of England during the Civil War; its main object was the establishment of Presbyterianism in Scotland, England, and Ireland. Charles II. signed both o's.

COVENT GARDEN, near Charing Cross, London; originally 'convent' garden, Westminster Abbey; now one of the most important fruit, flower, and vegetable markets in England.—**Covent Garden Theatre**, opened in 1732, became rival of Drury Lane; there Mrs. Siddons took leave of stage, and Macready first acted; through it Wagner's music was introduced to London; destroyed by fire (1808), and second building also destroyed (1856); present building is centre of grand opera in London.

Wyndham, *Annals of Covent Garden Theatre* (1906).

COVENTRY (52° 26′ N., 1° 30′ W.), market town, on R. Sherbourne, Warwickshire, England; the ruined abbey, once a magnificent Benedictine monastery, was founded XI. cent. by Earl Leofric and Lady Godiva (*q.v.*); has several fine old churches; noted since Middle Ages for wool and dyeing trade; now chief seat in U.K. for manufacture of motor-cars and bicycles, also ribbons and watches. Pop. (1911) 106,377.

COVENTRY, SIR JOHN (*c.* 1640-82), Eng. politician; made a slighting remark about Charles II., and was waylaid by a band of ruffians who slit his nose. This incident led to passing of *Coventry Act*, forbidding mutilations.

COVENTRY, THOMAS (1578-1640), 1st BARON (*c.* 1628), Eng. lawyer; attorney-general, 1621, lord keeper, 1625; in king's name reprimanded Commons, 1626; advocated levy of ship-money (1634), and other arbitrary acts, but on whole supported moderation; ability extolled by Clarendon.

COVENTRY, SIR WILLIAM (*c.* 1628-86), Eng. statesman; s. of Thomas, 1st Baron C. Although very young, commanded force for king in Civil War; app. sec. to Duke of York at Restoration; commissioner of navy, 1662; lost favour of Duke of York through opposing Clarendon; sent to Tower for challenging Buckingham to duel; refused to return to public life; ability and virtue praised by Burnett, Pepys, Evelyn, Temple, and Marvell; firm opponent of Cabal, and father of moderate political school. The *Character of a Trimmer* was dedicated to him by its author (his nephew), being a description of his position.

COVERDALE, MILES (*c.* 1488-1569), Eng. translator of Bible; Yorkshireman, probably from Coverdale; one of band of Cambridge scholars who

met at White Horse Tavern to discuss theology. His translation of Bible (far inferior to Tyndale's) was pub., 1535; parts subsequently incorporated in *Authorised Version*; prohibited, 1542; famous preacher under Edward VI.; made bp. of Exeter, 1551. See BIBLE.

Conant, *Hist. of Eng. Bible Translation* (1910).

COVILHÃO (40° 17′ N., 7° 31′ W.), town, Castello Branco, Portugal; manufactures cloth and hats. Pop. c. 15,000.

COVILHÃO, PERO DE, COVILHAM, Portug. traveller of late XV. and early XVI. cent's; sent out by government to explore Abyssinia ('the land of Prester John') and made many discoveries in Africa and India.

COVINGTON (38° 59′ N., 84° 28′ W.), city, at junction of Ohio and Licking Rivers, Kentucky, U.S.A.; manufactures cotton and tobacco; important agricultural and live stock trading centre. Pop. (1910) 53,270.

COWBRIDGE (51° 28′ N., 3° 27′ W.), market town, Glamorganshire, Wales; has cattle fairs.

COWDENBEATH (56° 7′ N., 3° 20′ W.), town, Fifeshire, Scotland; principal industry, coal-mining. Pop. (1911) 14,029.

COWELL, JOHN (1554–1611), Eng. jurist.

COWEN, SIR FREDERIC HYMEN (1852–), Eng. composer and conductor; operas, oratorios, etc.; knighted, 1911; Mus. Doc. (*honoris causa*), Cambridge and Edinburgh.

COWES (50° 46′ N., 1° 17′ W.), seaport town, watering-place, on N. shore of Isle of Wight; headquarters of Royal Yacht Club; celebrated regattas. Pop. (1911) 9635.

COWLEY, ABRAHAM (1618–67), Eng. poet; supported the Royalist cause, and afterwards lived in France some years as sec. to Henrietta Maria. He is chiefly remembered by virtue of his *Pindaric Odes* and some fine elegies; and his prose essays continue to hold a high place in Eng. lit. Like other transition poets, C. enjoyed immense but unenduring popularity.

COWLEY, HANNAH (1743–1809), Eng. dramatist and poet; wrote *The Belle's Stratagem* (1782) and other successful plays.

COWLEY, HENRY RICHARD CHARLES WELLESLEY, EARL (1804–84), Eng. diplomatist.

COWLEY FATHERS, Anglican religious society of devotees, founded (1865) at Cowley St. John (Oxford).

COWPENS (c. 35° 2′ N., 81° 50′ W.), town, South Carolina, U.S.A.; scene of defeat of British by Americans, Jan. 17, 1781.

COWPER, WILLIAM (1731–1800), Eng. poet; s. of a clergyman; ed. for the Bar; early developed symptoms of brain weakness, which rendered a settled occupation impossible. He subsequently retired to the village of Olney (Bucks), where the good genius of his life was Mary Unwin, widow of a friend. He collaborated with the Rev. John Newton in writing the *Olney Hymns*. In this environment he amused himself with his tame hares and other pets; wrote *The Task* (1785), the ballad of *John Gilpin*, and other poems. His verse fills the transition period between the classicism of Pope and the nature poetry of Wordsworth, and therefore C. stands as a landmark in Eng. lit. In addition he was a great letter-writer.

Life, by Southey (1836), Goldwin Smith (E.M.L., new ed., 1910), Thos. Wright (1896).

COWPER, WILLIAM (c. 1665–1723), 1ST EARL C. (1718), Eng. lawyer and politician; app. Lord Keeper, 1705; first Lord Chancellor, 1707–10 and 1715–18; showed ability and fairness; helped to conduct impeachment of Sacheverell and approved impeachment of Earl of Oxford.

COWPER-TEMPLE, WILLIAM FRANCIS (1811–88), s. of Earl Temple; M.P., 1835; vice-president of Committee on Education; prominent in debates on Education Act of 1870; created baron, 1880.

COWRY (*Cypræa*), genus of marine gasteropoda; shells of *C. moneta* and *C. annulus* used as currency in Pacific and Eastern seas, other species as ornaments.

COWSLIP, common European plant, *Primula veris*, with small and delicate flower; appears early in spring, and is somewhat like primrose (*q.v.*), though differing in the umbelliferous arrangement of its flowers; *c. wine* is distilled from the flowers.

COW-TREE (*Brosimum galactodendron*), Venezuelan tree of order Moraceæ, allied to bread-fruit tree; exudes nourishing milky juice when incision is made.

COX, DAVID (1783–1859), Eng. landscape artist; s. of a blacksmith; found most of his best subjects in N. Wales.

COX, SIR GEORGE WILLIAM, Bart. (1827–1902), Eng. clergyman and author.

COX, JACOB DOLSON (1828–1900), eminent lawyer, historian, politician, and general; formed one of 'Radical Triumvirate' of Ohio State, especially advocating women's rights; gov. of Ohio, 1866–67; commanded troops in Union service, 1860–64.

COX, RICHARD (c. 1500–81), Eng. divine; engaged to obtain vote of Univ. of Oxford for king's divorce, 1530; subscribed the *Institution of a Christian Man* (1537); reformer under Edward VI.; made bp. of Ely by Elizabeth, but resigned, 1580; intolerant, even daring to oppose the queen.

COX, SAMUEL (1826–93), Eng. Baptist preacher; founded *The Expositor*.

COX, SAMUEL HANSON (1793–1880), Amer. Presbyterian preacher.

COXCIE, MICHAEL (1499–1592), Flem. artist.

COXE, HENRY OCTAVIUS (1811–81), Eng. clergyman and scholar; librarian of Bodleian, Oxford.

COXE, WILLIAM (1747–1828), Eng. historian.

COXWELL, HENRY TRACEY (1819–1900), Eng. aeronaut; encouraged ballooning for meteorological and military purposes.

COYOTE (*Canis latrans*), prairie wolf of western N. America; with heavy fur; hunts in packs, and possesses characteristic howl.

COYPEL, ANTOINE (1661–1772), Fr. artist; member of distinguished family of painters.

COYPU (*Myopotamus coypu*), S. American aquatic rodent.

COYSEVOX, CHARLES ANTOINE (1640–1720), Fr. sculptor.

CRAB, term for decapod crustaceans with a short abdomen (tail) inturned under the thorax, which is covered by a more or less flattened shell or carapace. This sub-order, Brachyura, also includes forms with a soft (uncalcified) tail, such as the hermit-crabs. C's are generally adapted for life at the sea-bottom, but shore and land c's (*Gecarcinidæ*) can spend a large part of their lives outside the sea, having modified gill cavities acting as lungs. *Cancer pagurus* of European coasts and *Callinectes sapidus* of the Atlantic coast of N. America are economically important as edible c's. Most c's pass through a free-swimming larval stage called a *Zœa*, which through successive moults develops into the adult. See MALACOSTRACA.

CRABBE, GEORGE (1754–1832), Eng. poet; after early struggles he was befriended by Burke, Fox, and others, took orders, and, receiving patronage of the Duke of Rutland and Lord Thurlow, devoted his leisure to production of poetry. His *Parish Register*, *The Borough*, *The Village*, *The Library*, and other works are marked by homely realism, in which he was a master.

René Huchon, *George Crabbe and his Times* (Eng. trans., 1907); *Life*, by George Crabbe, his son (1834), Canon Ainger (E.M.L., 1902).

CRACOW, KRAKAU (50° 4′ N., 19° 56′ E.), city, on Vistula, Galicia, Austria; formerly capital and still chief intellectual and art centre of Poland. Notable buildings include Gothic cathedral, on Wawell (a hill), where Polish kings were crowned and buried; St. Mary's (founded 1226); royal castle; univ. (founded 1364), museums, etc.; chief industries—chemicals, tobacco, cloth, leather, agricultural imple-

ments, etc. C. was capital of Poland (*q.v.*), 1320–1609; fell to Austria, 1795; made capital of small free state, 1815; annexed by Austria, 1846. Pop. (1910) 151,886.

Lepszy, *Cracow* (London, 1912).

CRADDOCK, CHARLES EGBERT (1850–), Amer. novelist; pseudonym of MARY NOAILLES MURFREE.

CRADOCK (32° 11′ S., 25° 52′ E.), town, Cape Province, S. Africa; centre of wool industry; large trade in ostrich feathers. Pop. (1911) 6500.

CRAG, Celtic word applied to isolated rocks and jutting peaks of rocky headlands.

CRAIG, JOHN (*c.* 1512–1600), Scot. Calvinist; became Knox's colleague, 1562, and took important part in abolition of Episcopacy and drawing up of National Covenant, 1580–81.

CRAIG, SIR THOMAS (d. 1608), Scot. poet and jurist.

CRAIGIE, PEARL MARY TERESA (1867–1906), Eng. novelist and dramatist; wrote under name of JOHN OLIVER HOBBES.

CRAIK, DINAH MARIA, *née* MULOCK (1826–87), Eng. novelist; wrote *John Halifax, Gentleman* (1857), and numerous popular stories.

CRAIK, GEORGE LILLIE (1798–1866), Eng. scholar; wrote *History of English Literature and the English Language* (1861), which is still valued.

CRAIL (56° 16′ N., 2° 37′ W.), coast town, Fife; summer resort; fisheries. Pop. (1911) 1592.

CRAIOVA, KRAJOVA (44° 19′ N., 23° 50′ E.), town, formerly capital of Little Walachia, Rumania; chief commercial town, west of Bucharest; principal trade is in cereals, cattle, fish, and leather. Pop. (1910) 46,000.

CRAMBO, old Eng. rhyming game, described in Strutt's *Sports and Pastimes.*

CRAMER, JOHANN BAPTIST (1771–1858), Ger. composer, pianist, and music-publisher; settled in England.

CRAMER, JOHN ANTONY (1793–1848), Eng. scholar and geographer.

CRÄMER, KARL VON (1818–1902), Bavarian politician.

CRAMP, painful spasmodic contraction of muscles, usually of the limbs, the calf of the leg being most frequently affected; due to some obscure nervous derangement. Generally it occurs when the muscles are fatigued, and it is common in parturition, in cholera, and in persons of a gouty tendency. When the calf is attacked by c. the leg should be straightened and the foot turned forcibly upwards, to stretch out the calf muscles. *Writer's c.* affects the fingers so that they cannot be used, and should be treated by massage and electricity, and exercise of the affected parts. *Bather's c.* is a term used incorrectly to cover a number of causes of a swimmer's sinking, heart failure being the most likely and most general.

CRAMP-RINGS, rings blessed by Edward the Confessor and his successors, and supposed to cure epilepsy and cramp.

CRANACH, LUCAS (1472–1553), Ger. artist; court painter at Wittenberg, of which town he became burgomaster; formed a friendship with Luther, of whom he painted several portraits. His subjects are chiefly scriptural, marked by force and originality; he excelled in portraiture, and has been ranked only below Dürer. Examples of his work are to be seen at Berlin, Munich, and the National Gallery.

Wilmot Buxton, *German, Flemish, and Dutch Painters* (1879); Muther, *Lucas Cranach* (1902).

CRANBERRY (*Oxycoccus* or *Vaccinium Oxycoccus*), genus of prostrate evergreen shrubs with edible berries, growing in peaty or marshy districts of N. and Central Europe and N. America, cultivated for its fruit, especially in U.S.A., where an acre has been made to yield up to $300 annually.

CRANBROOK (51° 6′ N., 0° 32′ E.), market town, Kent, England; large trade in malt and hops. Pop. (1911) 6393.

CRANBROOK, GATHORNE GATHORNE-HARDY, EARL OF (1814–1906), Brit. statesman.

CRANDALL, PRUDENCE (1803–89), Amer. educationist.

CRANE (*Grus communis*), large wading bird of the family *Gruidæ,* popularly confused with the heron; performs extensive migrations, and is gradually disappearing from civilised countries. During courtship and flight it utters sonorous trumpeting sounds, probably facilitated by the trachea curving underneath the hollow of the breastbone.

CRANE, machine by which a load may be raised or lowered vertically and moved horizontally. When the machine lifts vertically only it is called a winch, hoist, or lift, and when coal, cereals, and other materials are moved, not in loads, but continuously, the appliance is termed a *conveyor* (*q.v.*). Cranes may be classified as revolving or non-revolving. Manual, hydraulic, steam, and electric power is used, the latter especially in travelling c's. The jib and derrick c. consist mainly of a revolving pillar or mast for the slewing movement, a jib which may be lowered or raised for the vertical movement, and the tackle passing from a winding drum along and over the end of the jib, and provided with a hook for attaching the load. Davits are an example of c. where jib and mast are in one piece. Portable c's are mounted on trucks or gantries, *e.g.* running on rails alongside harbour quays. Travelling c's consist of a bridge resting on wheels running on rails, say on two opposite walls of a shed, and the jenny or crab carrying the hoisting mechanism which runs on rails along the bridge. Many varieties of c. have been constructed, *e.g.* the Titan crane, a combination of the travelling and revolving type, used in constructing piers and breakwaters.

A. Böttcher, *Cranes* (trans. by A. Tolhausen, London, 1908).

CRANE, STEPHEN (1870–1900), Amer. author and journalist.

CRANE, WALTER (1845–), Eng. artist; chiefly famous for decorative work and book illustrations, all marked by strong individuality; also successful writer and lecturer upon art.

CRANIOMETRY, the measurement of skulls, for comparison of the skulls of men with those of monkeys and other animals, or for comparison of the skulls of different races and different branches of the races of mankind. There are various methods of comparing skulls, the chief being (*a*) by comparison of length, breadth, and height of the skull, the standard of maximum length being taken at 100, so that $100 \times \frac{\text{breath}}{\text{length}}$ is the *breadth* or *cephalic index,* and skulls are termed, according as the cephalic index is above 80, between 75 and 80, and below 75, *brachycephalic, mesaticephalic,* and *dolichocephalic*; (*b*) by comparison of the amount of cubic capacity of the skull cavity, the average being 85 cubic inches; (*c*) by comparison of the degree of the angle of projection of the jaws, prominent jaws signifying a lower type, the degree being termed the *gnathic index.* Modern anthropologists in many cases regard a very great number of skull measurements necessary for proper comparison, and various delicate instruments have been devised for taking the measurements with exactness. Peter Camper (1722–89), the Dutch anatomist, was the first to institute scientific c., and his standard of comparison was the *facial angle,* obtained by drawing one line from the centre of the forehead to the most prominent part of the upper jaw, immediately above the incisor teeth, and another to make an angle with it, from the entrance to the ear to the base of the opening of the nose.

Duckworth, *Morphology and Anthropology*; Keane, *Ethnology.*

CRANIUM, see SKULL.

CRANK, arm or U-shaped part fixed at right

angles to a shaft or axle by which circular motion may be converted into reciprocating motion and *vice versa*. Originally meaning crooked, the term is also popularly applied to extreme faddists or monomaniacs.

CRANMER, THOMAS (1489–1556), Eng. ecclesiastic; b. at Aslacton, Nottinghamshire; became fellow of Jesus Coll., Cambridge; m. a relative of landlady of Dolphin Inn (which caused later report that he was an innkeeper), who soon d.; became reader of divinity lecture in Jesus Coll., and univ. examiner in Theol.; expressed opinion that king should take advice of univ's as to validity of his marriage with Katharine of Aragon instead of depending on papal decision. Summoned by king, C. was ordered to draw up his view of case, and employed in obtaining opinions in favour of divorce; made Archdeacon of Taunton; took advanced step for churchman of marrying, 1532; like many Eng. abp's, was consecrated Abp. of Canterbury (1533) without having previously held high office in Church; held court and pronounced king's marriage invalid, May 23, 1533; helped to enforce king's supremacy over Church; declared king's marriage with Anne Boleyn invalid, 1536; opposed Six Articles, 1539; carried out his Prot. views under Edward VI.; after signing recantations under Mary, died a brave death, thrusting offending hand first into flames. Of bold views but personal timidity, C's great title to fame is his part in Book of Common Prayer of Church of England.

Life, by Innes (1899), Pollard (1905), Mason (1910).

CRANNOG, name applied to stockaded islands, numerous in ancient times in Ireland and Scotland; two in Bute were the first discovered in Scotland, and C. of Lagore first in Ireland; similar to Swiss lake-dwellings; relics indicate occupation in Iron Age; wooden huts (with log floors and layers of earth) built and fortified on islands in lochs.

CRANSAC (43° 31′ N., 2° 19′ E.), town, Aveyron, France; coal and iron-mining centre. Pop. 5000.

CRANSTON (*c.* 41° 15′ N., 71° 28′ W.), town, Rhode Island, U.S.A.; includes several manufacturing villages. Pop. (1910) 21,107.

CRANWORTH, ROBERT MONSEY ROLFE, BARON (1790–1868), Eng. Lord Chancellor.

CRAPE (Fr. *crêpe*), silk fabric, finished both in soft and crisp forms; there is also an imitation c., made from cotton.

CRASH, technical name for roller-towel cloth.

CRASHAW, RICHARD (1613–50), Eng. poet; s. of a Puritan preacher, but later joined R.C. Church; his *Steps to the Temple* (1646) and other religious poems show much genuine, almost great, poetry, but his work is marred by over-indulgence in the conceits of the 'metaphysical school.'

CRASPEDOTE, see HYDROMEDUSÆ.

CRASSULACEÆ, order of herbs or small shrubs, living in dry or rocky parts, with succulent stems and leaves, which provide a water store against drought. *Sedum*, *Sempervivum*, and *Cotyledon* are Brit. representatives of the order, which comprises about 15 genera and 500 species; widely distributed, chiefly in S. Africa.

CRASSUS, surname in Rom. plebeian *gens* Licinia. Important members are PUBLIUS, consul, 131 B.C., noted as scholar and orator; LUCIUS, also orator; PUBLIUS, consul, 97 B.C., author of sumptuary law; MARCUS is best known as *Dives* ('the rich'), because of his skill in acquiring wealth. In 60 B.C. he with Cæsar and Pompey formed the 'First Triumvirate'; he was killed in war with the Parthians (53 B.C.).

CRATER, see VOLCANO.

CRATES (fl. 470 B.C.) Athenian comic writer and actor.

CRATINUS (fl. 423 B.C.), Gk. comic poet.

CRATIPPUS, Gk. historian who supplemented Thucydides.

CRAU (43° 36′ N., 4° 50′ E.), stony district, S. France, occupying western part of Bouches-du-Rhône.

CRAUCK, GUSTAVE (1827–1905), Fr. sculptor.

CRAUFURD, QUINTIN (1743–1819), Scot. antiquary and historian.

CRAUFURD, ROBERT (1764–1812), Scot. commander; distinguished himself in Peninsular War, leading march of 'Light Brigade' (1809), and after battle of *Fuentes d'Onoro* (1811) made major-general; slain at *Ciudad Rodrigo*.

CRAVAT, laced neckcloth worn during XVII. and XVIII. cent's.

CRAVEN, WILLIAM (1608–97), EARL OF C. (1664), Eng. Royalist; s. of lord mayor of London; inherited large fortune; cr. Baron C. of Hampstead Marshall, 1627; fought for Elector Palatine in Thirty Years War; assisted Charles I. with money; received honours and emoluments from Charles II.; of small ability.

CRAWFORD, EARLDOM OF.—Scot. family, Lindsay of C., in Clydesdale, has held this earldom (premier in Scotland) since 1398, when rights of Earls Palatine were attached to fee of C. DAVID, 3rd earl, excommunicated by bishop of St. Andrews; ALEXANDER, 4th earl, called 'the Tiger' and 'Earl Beardie'; DAVID, 5th earl, cr. Duke of Montrose, 1488, but lost title same year, fighting for James III.; ALEXANDER, e.s. of 8th earl, disinherited, 1537, for numerous crimes; known as 'the wicked Master of C.'; DAVID, 12th earl, called 'the prodigal earl,' imprisoned to prevent ruin of race, and also called the captive earl'; strong royalists in Civil War, but advocated Revolution, 1688; JOHN (1702–49), the 'gallant earl,' distinguished soldier and 'finest nobleman of his time'; ALEXANDER WILLIAM (1812–80) wrote *Lives of the Lindsays*, etc. JAMES LUDOVIC (1847–1913), distinguished scientist and philatelist. Earldom united with that of Balcarres in XIX. cent.

CRAWFORD, FRANCIS MARION (1854–1909), Amer. novelist; b. in Italy, and long residence there made him thoroughly Ital. in literary spirit; he was a journalist in India for a time, and in early novels paints Oriental life.

CRAWFORD, WILLIAM HARRIS (1772–1834), Amer. lawyer and political leader; pres. of U.S. Senate, 1812–13; author of law limiting term of service of public officials to four years.

CRAWFORDSVILLE (40° 3′ N., 86° 50′ W.), city, Indiana, U.S.A.; seat of Wabash Coll.; manufactures machinery, wagons, carriages, etc.; valuable mineral springs in district. Pop. (1910) 9371.

CRAWFURD, JOHN (1783–1868), Scot. Orientalist.

CRAYER, GASPARD DE (1582–1669), Flem. artist.

CRAYFISH (*Astacus*), widely distributed freshwater crustaceans of the order Macrura, resembling lobsters. *A. pallipes* is an omnivorous inhabitant of Eng. and Irish rivers. The *Parastacidæ* are equatorial crayfishes.

CRAYON, coloured chalk used for drawing. Crayon, or pastel drawing, first came into use during XVII. cent.

CREASY, SIR EDWARD (1812–78), Eng. historian.

CREATIONISM, the theory that each individual human soul is separately created, as opposed to *Traducianism*, the doctrine that human souls are propagated by generation.

CRÉBILLON, PROSPER JOLYOT DE (1674–1762), Fr. tragic dramatist; wrote *Atrée et Thyeste*, *Rhadamiste et Zénobie*, *Pyrrhus*, *Catilina*, *Le Triumvirat*, etc. His s., CLAUDE (1707–77), was a novelist.

CRÉCY (50° 16′ N., 1° 52′ E.), village, Somme, France, near Abbeville; famous for victory of English under Edward III. and Black Prince over Philip VI.'s forces, Aug. 26, 1346; Fr. army suffered terrible losses.

CREDENCE TABLE, small side-table, used in churches, upon which the Eucharistic vessels and unconsecrated elements are placed.

CREDENTIALS, letters of authority which ambassadors and similar officials carry to foreign courts.

Freese, *A Short Popular History of Crete* (1897); Mitchell, *The Greek, the Cretan, and the Turk* (1897).

CRETINISM, disease due to congenital absence of the thyroid gland or of its functions, arising in early childhood. It is endemic in certain districts, especially in some of the valleys of Switzerland, Derbyshire being the part of England where it is most common, and it is found all over the world. Unhealthy surroundings and food, a family history of insanity, intemperance, goitre, or cretinism predispose to it. The disease has very characteristic features: the affected child is small and stunted, the face round and stupid, the eyes heavy, the mouth open with the tongue hanging out, the voice squeaky. The hair is coarse and abundant, the skin dull-coloured, thick, and in folds, the abdomen hanging like a bag; hernia is common, while the genital organs are undeveloped. The child walks in a waddling and clumsy manner, and, although it may live for twenty or thirty years at most, its intelligence does not develop beyond that of a child of two or three. Under suitable treatment, however, a rapid improvement, physically and mentally, takes place, especially when the treatment is begun at an early stage, and the cretin usually becomes quite normal. Extract of thyroid gland is given either in the liquid form or in tabloids, in very carefully regulated doses, and this is continued for the whole of the life of the affected individual, taking the place of the normal secretion of the gland. The environment should be changed for a more favourable one, and plenty of nutritious food given.

CRETONNE, printed cotton cloth, similar to chintz, but heavier.

CREUSE (46° 2′ N., 2° E.), department, Central France; chief river, Creuse; surface hilly; climate cold and damp; soil poor, except in valleys, where leading industry is cattle- and sheep-rearing; coal found; principal products—chestnuts, potatoes, fruit. Area, 2164 sq. miles. Pop. (1911) 266,188.

CREUTZ, GUSTAF FILIP, COUNT (1729–85), Swed. poet.

CREUZER, GEORG FRIEDRICH (1771–1858), Ger. philologist.

CREVASSE, deep fissure in a glacier; breach in the bank of a river, especially 'levee' of the lower Mississippi.

CREVIER, JEAN BAPTISTE LOUIS (1693–1765), Fr. hist. writer.

CREVILLENTE (38° 15′ N., 0° 47′ W.), town, Alicante, Spain; famed for melons. Pop. 10,726.

CREWE (53° 7′ N., 2° 27′ W.), town, Cheshire, England; important junction station of London & N.W. Railway; has extensive railway workshops. Pop. (1911) 44,970.

CREWE, EARL OF, ROBERT OFFLEY ASHBURTON CREWE-MILNES (1858–), Brit. statesman (Liberal); s. of Lord Houghton; Lord Lieut. of Ireland (1892–95); Lord Pres. of the Council (1905–8); Sec. of State for Colonies (1908–10); Sec. of State for India (1910–).

CREWKERNE (50° 53′ N., 2° 48′ W.), town, Somersetshire, England; manufactures cloth and webbing. Pop. (1911) 3939.

CRIB, child's bed, with raised sides; a trans., or key, of a school text-book; slang term for stealing, and also for a post or employment.

CRIBBAGE, game played with a complete pack of fifty-two cards, a c. board, and four pegs for scoring. It is usually played between two persons, and the game is 61 up.

Mair's *Short Rules for Cribbage.*

CRICCIETH (52° 56′ N., 4° 14′ W.), watering-place, Cardigan Bay, Carnarvonshire, Wales.

CRICHTON, JAMES, 'THE ADMIRABLE CRICHTON' (1560–c. 1582), Scot. scholar, whose versatility has become proverbial; s. of Robert C., Lord-Advocate of Scotland; tradition states that he successfully carried on a debate in twelve languages in Paris, and next day won a match in a tournament; outstanding philosopher, mathematician, theologist; composer of Latin verses; a fine swordsman; a man of great beauty; killed in a street brawl.

Sir Thomas Urquhart, *Discovery of a Most Excellent Jewel*; Tytler, *Life of Crichton.*

CRICKET (Gryllidæ), family of Orthopterous insects allied to the Locustidæ; long hind legs used for jumping; the males give their characteristic chirp by rapidly rubbing ridges of the nervures of the wing cover across nervure of opposite wing; varieties are the field c., house c., and mole c., the latter adapted for burrowing with its strong shovel-like fore legs.

CRICKET, open-air game played by two sides of eleven players each, with bats, ball, and wickets, a batsman defending the wickets against the ball bowled by a player on the other side, while the other members of the bowler's side are in different positions in the field to catch the ball. The object of the batsman is to make as many runs as possible between the wickets after he has struck the ball, before his wickets are put down by the ball on its being returned by one of the opposing players. The game in its present state has been developed from an old game played in England in the XIV. cent., and the game is mentioned—from the middle of the XVI. cent. under the name of 'cricket'—in a number of works up to the commencement of the XVIII. cent., from which time its history can be easily followed. At this period wagering on the game was common, large sums of money changing hands over the results of matches. Public opinion gradually discountenanced such betting. The famous Hambledon Club was founded in 1750, and lasted until 1791. Earlier clubs were the St. Albans Club (1661) and the London Club (1700), the latter playing its matches at the well-known Artillery Ground in Finsbury, where Kent played All England in 1746. The Marylebone Cricket Club (M.C.C.) arose on the breaking up of the White Conduit Club in 1787, and played matches on the first ground known as Lord's, at what is now Dorset Square, in Marylebone, removing afterwards to near Regent's Park, and later still to St. John's Wood, the present *Lord's* ground.

The first laws of the game were drawn up by the London Club in 1744 and revised by the M.C.C. in 1788; the latter club remained thenceforth the ruling authority of the game up to the present day, the rules having been revised and altered by it from time to time.

The first bats used in the game were curved like a hockey stick, this type being used up to the first years of the XIX. cent. when the blade of the bat was made straight so as to defend better against the newer style of bowling. The present style of bat is made in two parts; handles made of several pieces of cane and other material are spliced into a blade of willow, the length of the whole being not more than 38 in., the width of the blade 4¼ in., while the weight is generally about 2 lb. 4 oz. or 2 lb. 5 oz. The ball is made of a centre of cork with layers of twine and cork shavings around it, with a covering of red leather sewn on, the weight being not more than 5¾ oz. and not less than 5½ oz. The wicket was in the early stages of the game merely a hole in the ground into which the fielders tried to put the ball before the batsman could get to it, then two stumps with a cross-stick were used instead of the hole, another stump in the middle being added later. According to the present rules the wicket is 8 in. wide, composed of three stumps 27 in. in height, while the old cross-stick is now composed of two parts, called the bails, each 4 in. in length, balanced in grooves on the top of the stumps, and, when in position, projecting not more than ½ in. above the stumps. There are two wickets, opposite and parallel to one another, 22 yds. apart. Four feet in front of the wicket, and parallel with it, is a line marked with whitewash, the 'popping crease,' defining the batsman's ground,

within which he cannot be put out by being stumped or run out. In a line with the wickets is another whitewashed line 4 ft. on each side of the wicket, with short lines at right angles at the ends, the 'bowling crease,' outside the limits of which the bowler must not bowl.

Two batsmen are sent in at a time by the batting side, one retiring when he is put out to give place to the next, until ten of the side have been put out, when, there being no partner left for him, the last man retires also, being said to be 'not out.' The game is won by the side which scores the greatest number of 'runs,' each side having two innings alternately (in less important matches frequently only one innings each), but a side, with a lead of 150 runs in a three-day match, or 100 runs in a two-day match, or 75 runs in a one-day match, may insist on the other side's playing its second innings after its first. A run is scored by a batsman hitting the ball to such a distance that he and his partner can run across to the opposite wickets and reach the respective popping creases before the wicket is put down by the fielders returning the ball.

There are a number of different ways in which a batsman can be put out: (1) he may be 'bowled' by the bowler striking his wicket and dislodging a bail; (2) 'caught' by a fielder catching the ball before it touches the ground after the batsman has hit it; (3) 'stumped' by the fielder behind the wicket, or wicket-keeper, striking his wicket and dislodging a bail when the batsman is out of his ground, *i.e.* beyond the popping crease; (4) out 'leg-before-wicket,' by obstructing a ball, which would have struck the wicket, by any part of his body except the hand and forearm; (5) 'run out' by a fielder striking the wicket and dislodging a bail when the batsman is out of his ground, usually in attempting a run, the batsman nearer the wicket which is struck being out; (6) 'hit wicket,' by the batsman striking the wicket and dislodging a bail; (7) by the batsman 'handling the ball'; (8) hitting the ball twice in the attempt to score; (9) 'obstructing the field.'

The side opposing the batting side is arranged on the field in different positions for the purpose of keeping down the number of runs and getting the batsmen out. One is the bowler; one fields immediately behind the batsman's wicket, mainly to catch the balls missed by the batsman, and is protected with pads adapted to the legs and padded gloves; while the other nine are arranged by the bowler or the captain, in a manner depending on the style of bowling and, to some extent, on the batsman. Formerly there were stereotyped positions which the fielders took up, but, mainly owing to the influence of the early Australian teams visiting Britain, these have been abandoned to a great extent. Thus a fast bowler will usually have, in addition to the 'wicket-keeper' behind the wickets, a 'point' at right angles to the pitch, on the batsman's right, three 'slips' behind the batsman between point and wicket-keeper, a 'third man' farther out in the field between point and the slips, 'cover-point' farther out than point and about midway between the wickets, 'mid-off' between cover-point and the bowler, 'long-off' behind and on the left of the bowler, with generally only one fielder on the batsman's left, usually at 'mid-on,' opposite mid-off. The fielders change position at the end of every 'over' of six balls, when another bowler bowls from the opposite end of the pitch. In former times the only style of bowling permissible was underhand; 'jerking' was not allowed, and the arm had to be kept away from the side. Round-arm bowling, in which the arm was held out horizontally, was introduced about the beginning of the XIX. cent., and over-hand bowling, developing from round-arm, was legalised in 1864, being the method in practically invariable use to-day. There are various methods of producing 'break' by twisting the ball as it leaves the hand so that it changes direction immediately it touches the ground.

County cricket began to gain its present importance some time after the middle of the XIX. cent., and first-class cricket includes the matches of the first-class county elevens, the Oxford and Cambridge univ. elevens, the M.C.C. eleven, the Gentlemen's and the Players' representative elevens, the eleven representing England, and such more or less representative matches as are recognised as first-class by the M.C.C. The first-class counties include Derbyshire, Essex, Gloucestershire, Hampshire, Kent, Lancashire, Leicestershire, Middlesex, Northamptonshire, Notts, Somerset, Surrey, Sussex, Warwickshire, Worcestershire, and Yorkshire, while there is also a second-class county championship competition. A player is qualified to play for the county of his birth, or for that in which he has resided for at least two years.

With the appearance of professionalism interest in village and club cricket has declined to some extent, and the game has become much more spectacular, particularly since the introduction of international cricket. In 1859 a team was taken out to America by George Parr, while in 1861 a professional team under H. H. Stephenson visited Australia, and by 1876 three teams had visited America and four Australia. In 1878 a representative Australian team came over to England and defeated a very powerful M.C.C. eleven by dismissing them for 33 and 19 runs in the two innings, as a result of which the 'test matches' were instituted between the full strength of Australia and England, the first taking place in 1880. Since that time visits have been exchanged every year or two between Australia and England, and the representative eleven of Australia is recognised as being at least equal to the representative eleven of England. In 1894 and 1901 teams from South Africa also visited England and met with some success, while Eng. teams returned the visits, and the South African side which came over in 1904 was so decidedly powerful that test matches were arranged for the 1907 team. In 1912 teams from Australia and South Africa engaged in a triangular contest with England in the mother-country, England being triumphant. Teams from the U.S.A., from the West Indies, and from India have also visited this country from time to time, and in addition to those countries Eng. sides have toured in New Zealand, Argentina, Portugal, and Holland.

Cricket flourishes in Scotland, where there is a county championship, and where representative elevens have met Australian and other touring elevens on almost equal terms; and in Ireland, where county cricket is also in a very healthy state and touring elevens have met strong opposition, while one or two Irish cricketers have played for the Gentlemen of England and representative M.C.C. elevens; and in Denmark, Sweden, and other European countries, as well as in every Brit. colony, the game has much popularity.

Cricket, in the Badminton Library, by A. G. Steel and Hon. R. H. Lyttelton; *Jubilee Book of Cricket* (1897), by K. S. Ranjitsinhji; *Cricket in Many Climes*, by P. F. Warner; *Cricket Scores and Biographies*, by Lillywhite, with *Marylebone Cricket Club Scores and Biographies*; and the *Rules* of the game are pub. yearly in various annuals.

CRICKHOWELL (51° 52′ N., 3° 39′ W.), market town, Brecknockshire, Wales.

CRICKLADE (51° 38′ N., 1° 51′ W.), market town, on Thames, Wiltshire, England; agricultural produce.

CRIEFF (56° 22′ N., 3° 50′ W.), town, summer resort, on river Earn, Perthshire, Scotland; manufactures woollen goods; Drummond Castle, famous for beauty of its gardens, is in neighbourhood. Pop. (1911) 5571.

CRIMEA (45° 20′ N., 34° 15′ E.), peninsula of Russia between Black Sea and Sea of Azov, joined by isthmus of Perekop; area, c. 10,000 sq. miles. Balaklava and Sebastopol have good harbours. C.

is divided into two regions by the Salghir, its largest river; in N. pastureland; in S. forests and mild health-resorts; capital, Simferopol; famous for *Crimean War*. Products include grain, tobacco, wines, and fruit. C. was held by Turks from 1475; taken by Russians, 1783.

Crimean War (1853–56), European war so-called from seat of final actions. Russia proposed to Britain (1844) division of territories of Turkey, 'the sick man of Europe,' and seized Moldavia and Walachia, 1853, with result that Turkey declared war; Brit. and Fr. fleet sailed to Bosporus to overawe Russia; Turk. fleet destroyed at *Sinope*, 1853, and Britain and France declared war, 1854; Sardinia joined Allies, 1855. Baltic campaigns took place, 1854–55; coasts blockaded. Russ. fleet took refuge in Sebastopol harbour on Black Sea. As Turks were found able to defend European Turkey, where first allied contingents were sent, it was decided to attack Sebastopol by land allies landed, Sept. 1854, 30 miles N. of Sebastopol after victory above heights of river *Alma*, where Russ. force blocked way, flank march was made to Balaklava harbour within sight of Sebastopol and connection with allied fleet; battle of *Balaklava* in Oct. memorable for heroic charge of Brit. Light Brigade, two-thirds of which were slain; battle of *Inkerman* in Nov. called the 'soldiers' battle' from disorganised fighting; heavy losses but total defeat of Russians; army closed on *Sebastopol*; siege of nearly a year; wretched commissariat conditions prevailed; nursing arrangements were organised by FLORENCE NIGHTINGALE (*q.v.*); French stormed *Malakoff* fort, Sept. 1855, and Russians streamed out of Sebastopol; war ended with *Peace of Paris*, 1856, by which Russia restored conquests and engaged to build no arsenals and have no warships in Black Sea.

Kinglake, *The Invasion of the Crimea* (9 vols., 1890).

CRIMINAL LAW, the code of enactments for the punishment of crimes of commission or omission which affect the safety of the state, its sovereign head, or individuals; also offences against public justice, peace, trade, morals, and health. A *crime* is an act which is punishable by law. As an example of a crime by simple omission the neglect of children by their parents or guardians may be mentioned. For an act to be a crime it is necessary that the doer shall have a genuine intention to do the act. This criminal intention is generally referred to as 'the guilty state of mind,' and unless this is present the law does not regard the act as a crime, except in certain cases where the law says that the doing of an act is a crime irrespective of the intention of the wrong-doer, *e.g.* offences against the licensing laws, committing nuisances, and the like. When a criminal intention is present, we say the person is actuated by malice. Breaches of the c. l. are divisible into (1) offences punishable upon summary conviction, *i.e.* without the intervention of a jury, and (2) indictable offences, *i.e.* such crimes as can only be adequately punished after trial by jury. Such crimes are called indictable because the accusation must be formally set down in writing as preliminary to a trial before jury. The charges thus preferred in writing constitute an *indictment*, and the *counts* of an indictment are its several parts, charging distinct offences. Indictable offences are tried at quarter sessions, at the assizes, or in the King's Bench Division of the High Court. No act committed by a lunatic is a crime; but a person is presumed to be sane and responsible for his acts until the contrary is proved.

In Eng. law crimes are divided into 'Felonies' and 'Misdemeanours.' The difference between them does not depend upon their gravity or seriousness; it is purely historical. Before the Felony Act (1870) certain crimes at Common Law brought with them the loss or forfeiture of goods. Felony was in past times an act for which a man lost or gave up his 'fee' or estate. The only practical distinction between felony and misdemeanour is that for felony arrests may be made by private persons acting without judicial authority. The chief felonies are murder, treason, arson, rape, and theft. The word 'misdemeanour' may be said to apply to all those crimes and offences for which the law has not provided a particular name.

In U.S.A., while criminal procedure is generally founded upon the Brit. system, c. l. is milder and the accused has more safeguards. Prosecution is by public official at public expense; but criminal appeal was allowed long before it was in Britain. In some states capital punishment is abolished.

Sir J. F. Stephen's *History of Criminal Law* and *Digest of the Law of Criminal Procedure* (1883); Kenny, *Outlines of Criminal Law* (1905).

CRIMINOLOGY, term applied to a science which is a branch of sociology and anthropology, dealing with crime and criminals. It owes its origin to the researches of CESARE LOMBROSO (1836–1909), prof. of Forensic Medicine and Psychiatry at Turin, who, after long investigation of imprisoned criminals, developed the theory of the criminal type, a class of individual predestined to crime and recognisable by physical, psychical, and moral characteristics. His theories have been disputed, and they cannot be said to be proved, but they have at least been the means of calling attention to the subject and of introducing more logical and more humane treatment of criminals. C. is now being approached by the biometrical statistical methods introduced by the Eugenics school, and there is hope that definite and trustworthy results will thus be obtained.

Lombroso, *L'Uomo Delinquente* (5th ed., 1897) and *The Female Offender* (1910); Havelock Ellis, *The Criminal* (new ed., 1910); Ferri, *Criminal Sociology* (1910); Douglas Morrison, *Female Offenders* (1910).

CRIMMITZSCHAU, KRIMMITSCHAU (50° 49′ N., 12° 28′ E.), town, on Pleisse, Saxony, Germany; chief industries, manufacture of buckskin and wool-spinning. Pop. (1910) 28,818.

CRIMP, one who undertakes to supply men for the army and navy without authority; extortionate keepers of sailors' lodging-houses; formerly applied to persons who decoyed, drugged, and kidnapped men for the sea or military service.

CRINAGORAS OF MYTILENE (fl. 45–26 B.C.), Gk. epigrammatist.

CRINOIDEA, see ECHINODERMATA.

CRINOLINE, originally horse-hair cloth used to stiffen women's skirts; later a bell-shaped underskirt with steel hoops; became fashionable about 1856.

CRINUM, genus comprising many species of bulbous tropical plants of order Amaryllidaceæ; can be cultivated in moist hothouses.

CRIPPLE CREEK (40° 44′ N., 105° 8′ W.), city, Colo., U.S.A.; is gold-mining centre. Pop. (1910) 6206.

CRISA, CRISSA (*c.* 38° 28′ N., 22° 27′ E.), city, Phocis, ancient Greece, S.W. of Delphi.

CRISPI, FRANCESCO (1819–1901), Ital. statesman; took popular part in Sicilian revolution, 1848, in Mazzini plot at Milan, 1853, and in Garibaldi movement, which he organised, 1860; minister of interior, 1877; supported monarchy as means of Ital. unity, and worked to make Rome real capital; became chief minister, 1887, and as such opposed firm front to France; gave balance to Ital. politics at critical moment, and obtained consideration of foreign powers.

CRISPIN, the patron saint of shoemakers. According to legend, two Rom. brothers, Crispin and Crispinian, settled at Soissons, in Gaul, and were beheaded (287) for preaching the gospel. During their mission they supported themselves as shoemakers. The battle of *Agincourt* was fought on the anniversary of St. Crispin's Day, Oct. 25, 1415.

CRITICISM, the art of expressing an unbiassed judgment, particularly in relation to lit. or the fine arts. Aristotle, by virtue of his *Poetics* and *Rhetoric*, may be regarded as the pioneer of literary c. amongst

the ancients, though Plato and some earlier Gk. writers had produced works somewhat in the nature of c. Longinus, a later Gk. critic, wrote *On the Sublime*, one of the greatest critical books of the world. Quintilian, at a later date, took high rank as a literary critic. Ital. c. began with Dante's *De Vulgari Eloquio*, and was continued by many Ital. writers in XVI. cent. In XVII. cent. France took up neo-classic c., and its influence reached England. In England literary c. began about the middle of the XVI. cent., and much critical work of a very high character was produced during the three cent's following, amongst the leading writers being Dryden, Johnson, Hazlitt, Coleridge, Ruskin, Matthew Arnold, to name but a few. Lessing's critical writings hold an important place in Ger. lit.; and amongst great Fr. critics may be named Malherbe, Boileau, Voltaire, Diderot, Sainte-Beuve, and Taine.

Saintsbury, *History of Criticism* (3 vols., 1905); Spingarn, *Renaissance Criticism* (1899); Gregory Smith, *Elizabethan Critical Essays* (1897).

CRITTENDEN, JOHN JORDAN (1787–1863), Amer. lawyer and statesman; Attorney-General, 1841; gov. of Kentucky, 1848–50; strong upholder of the Union, but advocated concessions to Southerners. His s., GEORGE BIBB (1812–80), was distinguished Confederate general, and another s., THOMAS LEONIDAS (1815–93), was a lawyer and Federal general.

CRIVELLI, CARLO (fl. 1480), Ital. artist.

CROATIA-SLAVONIA (45° N., 18° E.), kingdom forming part of Hungary; bounded by Adriatic on S.W. and separated from Hungary Proper on N.E. by rivers Drave and Danube; total area, c. 16,400 sq. miles; capital, Agram (Zagrab). C.-S. is mountainous, with plains in N.E.; coast districts have mtn. ranges—Velebit Planina and Kapela—and include portion of highlands known as the Karst (famous for deep valleys and subterranean watercourses); farther inland are Eastern Alps. There are extensive marshes. C.-S. is intersected by the river Save. Earthquakes are frequent in Agram district. The Croatian seaboard of 84 miles has few good harbours (Fiume not being included in C.-S.).

History.—The Croats, a Slavonic tribe, invaded C.-S. in VII. cent.; maintained an independent kingdom, X.–XI. cent's; subject to kings of Hungary, XII. to early XVI. cent's; from 1526 partly Turkish, partly Austrian; in XVIII. cent. almost entirely subject to Austria; as 'Illyrian Provinces' partly under Fr. rule, 1809–13; great national movement begun against Hungarian domination, 1840; constitutional struggle of Serbo-Croats against other races of Austria-Hungary still proceeding. C.-S. is represented by 40 members in Hungarian House of Representatives, and 3 delegates to House of Magnates. Purely provincial affairs are controlled by the national Diet of C.-S., which meets annually at Agram and consists of 90 members. C.-S. is administered by a gov., called the 'Ban.'

Soil is fertile; staple crops being wheat, maize, pulse, potatoes, flax, hemp, tobacco, etc. Wine is largely produced, and a peculiar plum brandy. Timber is an important product. Swine are reared in the oak forests of Slavonia; and cattle, sheep, and horses are bred. Agriculture is the main industry. There are no extensive manufactures, but cotton and beautiful silk fabrics are produced.

About 90 per cent. of inhabitants are Croats and Serbs; there are a good many Germans, but few Hungarians. Seventy-five per cent. of people are R.C.; only other church of any standing is Gk. Church. Croatian dialects belong to the Slavonic (*q.v.*) branch of Indo-European languages; the literary tongue (Serbo-Croatian) is the same as in Servia (*q.v.*). Pop. (1900) 2,416,304; (1910) 2,621,954. See HUNGARY, AUSTRIA-HUNGARY.

CROCIDOLITE, fibrous amphibole mineral found in Griqualand West, S. Africa (*Cape asbestos*). When altered by deposition of silica it can be polished, and is known as hawk's-eye (blue) or tiger-eye—variation of quartz cat's-eye—(brown-golden); used for ornamental purposes.

CROCIDURA, see SHREW FAMILY.

CROCKETT, DAVID (1786–1836), Amer. politician and adventurer.

CROCKETT, SAMUEL RUTHERFORD (1860–), Scot. novelist; author of *The Stickit Minister*, *The Raiders*, and other successful stories.

CROCKFORD, WILLIAM (1775–1844), founder of Crockford's gaming club.

CROCODILIA, order of carnivorous freshwater reptiles including crocodiles, alligators, and gavials. The true crocodiles may attain a length of about 20 feet, and occur in Africa, tropical Asia, Central America, and W. Indies. A kind of plover was said by Herodotus to be associated with the Nile c., by getting food from its teeth and warning it of danger. The alligators have shorter and broader heads, and occur in N. and S. America. The huge gavials or gharials have long snouts, and occur in India. Fossil c. are known from ancient Triassic strata onwards.

CROCOITE ($PbCrO_4$), reddish crystallised mineral, occurring in the Urals, Philippines, Tasmania, and Mashonaland. The element chromium was discovered by Vauquelin's assaying of c.

CROCUS, genus, comprising about 70 species, of hardy cormous plants of the order Iridaceæ, belonging to Europe, W. Asia, and N. Africa. Many varieties are cultivated for spring, autumn, and winter flowering.

CRŒSUS, king of Lydia (560–546 B.C.), proverbially wealthy. He subdued the whole of Ionia, but finally his kingdom fell before Cyrus, king of Persia.

CROFT, SIR HERBERT, Bart. (1751–1816), Eng. scholar and miscellaneous writer.

CROFT, SIR JAMES (d. 1590), Eng. statesman; Lord Deputy of Ireland, 1551; employed in Scot. affairs by Queen Elizabeth; twice imprisoned for treason.

CROFT, WILLIAM (1678–1727), Eng. composer; chiefly church music.

CROFTER, a small farmer who rents a small holding or 'croft'; term generally applied in N. and N.W. Scotland. Majority occupy, in separate tenancy, a small plot of arable land and combine to rent pasture on mountains. High rents, insecurity of tenure, etc., led to passing of *Crofters Act*, 1886, for their protection. The Crofters Commission app. under the Act settled fair rents, cancelled certain arrears of debt, and assigned c. 50,000 acres for enlarging crofts.

CROKER, JOHN WILSON (1780–1857), Brit. Conservative statesman and writer; said to have introduced word 'Conservatives'; typical contributor to *Quarterly Review*, penning condemnation of *Endymion* for that magazine; wrote *Stories for Children from the History of England*, model of Scott's *Tales of a Grandfather*.

CROKER, RICHARD (1842–), Amer. politician, and Derby winner (1907).

CROKER, THOMAS CROFTON (1798–1854), Irish antiquary and humorous writer; pub. *Fairy Legends*, *Popular Songs of Ireland*, etc.

CROLL, JAMES (1821–90), Scot. scientist; in spite of poverty and ill-health heroically strove to further science; keeper of Andersonian Museum, Glasgow; app. to Scot. Geological Survey; pub. many philosophical and geological works.

CROLY, GEORGE (1780–1860), Eng. clergyman and miscellaneous author.

CROLY, JANE CUNNINGHAM, JENNIE JUNE (1831–1901), Anglo-Amer. journalist and author; founded New York Women's Press Club, 1889; author of *Jennie Juneiana*, *Talks on Women's Topics* (1864), *For Better or Worse* (1875), etc.

CROMAGNON RACE, type of supposed early Neolithic man; remains found in France.

CROMARTY (57° 41′ N., 4° W.), seaport, Ross and Cromarty, on Cromarty Firth, Scotland; birthplace of Hugh Miller, geologist; fisheries.

CROMARTY, GEORGE MACKENZIE, 1ST EARL OF (1630–1714), prominent Scot. statesman and

writer; cr. Earl of C., 1703; helped to bring about Union of England and Scotland.

CROMARTY FIRTH (57° 41′ N., 4° 10′ W.), inlet of North Sea, connecting with Moray Firth and extending into county of Ross and Cromarty; fine natural harbour, with two 'Sutors of Cromarty' (400–500 ft. high; *c.* 1500 yds. apart) guarding the entrance.

CROMARTYSHIRE, see ROSS AND CROMARTY.

CROME, JOHN (1769–1821), Eng. landscape artist; known as 'old Crome'; leader of 'Norwich school.'

CROMER (52° 56′ N., 1° 16′ E.), watering-place, Norfolk, England. Pop. (1911) 4074.

CROMER, EARLDOM OF, see BARING.

CROMER, EVELYN BARING, 1ST EARL OF (1841–), Brit. statesman and ambassador; commissioner of Egyptian public debt, 1877–79; controller-gen. in Egypt, 1879–80; financial member of Ind. Council, 1880–83; Royal Agent and Consul-General in Egypt and minister plenipotentiary, 1883–1907. Owing to his advice Egypt temporarily surrendered Sudan; but recovered it through Kitchener's means when other states threatened to annex it, 1896–98. He reorganised Egyptian education, finance, irrigation, and general administration, and in 1906 received the Order of Merit. His literary works are *Modern Egypt* (2 vols., 1908), *Ancient and Modern Imperialism* (1910), *The Situation in Egypt* (1910). In politics he is a Unionist Free Trader.

CROMLECH, see STANDING STONES, BARROWS.

CROMORNE, wood wind-instrument, consisting of long straight pipe, the lower end being curved like the handle of a walking-stick; used throughout Europe XIV. to XVII. cent's.

CROMPTON (53° 32′ N., 2° 8′ W.), northern suburb, Oldham, Lancashire, England; cotton mills and collieries. Pop. (1911) 14,758.

CROMPTON, SAMUEL (1753–1827), Eng. cotton spinner; invented spinning-mule for muslin yarns.

CROMWELL, HENRY (1628–74), Eng. administrator; younger s. of Oliver C.; able and reforming ruler in Ireland; made Lord-Deputy, 1657; Lieut.- and Gov.-Gen., 1658–59.

CROMWELL, OLIVER (1599–1658), Eng. statesman; b. at Huntingdon; great-grandson of Richard Williams, who assumed name Cromwell after patron and kinsman Thomas, minister of Henry VIII.; nephew of Sir Oliver C. of Hinchingbrook, and cousin of Hampden and St. John; ed. at Sussex Coll., Cambridge, then a nursery for Puritanism. C. soon showed popular sympathies in public life at Huntingdon and Ely; underwent long period of religious depression, which ended in 'light'; he was member for Cambridge in Short and Long Parliaments (1640), and was already 'much hearkened unto' by anti-Episcopalians. He was foremost in securing military forces of country for Parliament, often acting without previous authorisation of Parliament.

C. commanded under Essex at *Edgehill* (1642); became colonel (1643), and used religious fervour of troops to outrival devotion of royal forces; app. one of four colonels of horse under Manchester, and distinguished himself at *Winceby* (1643); became lieut-gen. and member of Committee of Both Kingdoms; assisted in capture of Lincoln and other towns; commanded left wing at *Marston Moor*, and was generally considered author of victory, winning from Prince Rupert nickname of *Ironsides* for troops (1644).

A dispute now rose between C. and Manchester as to ultimate aim of war; the latter, having no idea of deposing Charles, was supported by Scots and Presbyterians in his army; rest of army, composed of Puritans of various new sects, looked to C. (already called 'the great Independent'), whose views went further. C. persuaded Parliament to appoint committee to bring about union between Presbyterians and Independents, but at end of year charged Manchester before House of Commons with wilfully obstructing military success; Manchester, in reply, accused C. of animosity to aristocratic institutions and showing favour to Independents alone. C., however, secured 'Self-denying Ordinance' (1645) for remodelling army. Sir Thomas Fairfax was appointed gen., and C. (exempted from new law) lieut.-gen. C. commanded right wing and all the cavalry at *Naseby* (1645), routed king's left, completed defeat of centre, and pursued flying army. When the war ended (1646), a quarrel ensued between army and Parliament, and in June 1647 C. joined army, the king having been seized, probably by his orders, in May. A council of war corresponded with Parliament and offered terms to the king. On flight of Charles to Carisbrooke, C. forced Parliament to abandon attempt at compromise; and, exasperated by second Civil War which followed, he denounced 'Charles Stewart, that man of blood.' Dissensions followed in Parliament after king's death; Pride's 'Purge' made Independents supreme, and after suppression of fanatical 'Levellers,' Parliament became C.'s instrument.

Appointed Lord-Lieutenant and Commander-in-Chief for Ireland, C. subdued Drogheda, Wexford, and great part of sea coast (1649); ruthless slaughter or transportation avenged Prot. blood shed by Irish; inland towns were conquered in 1650; laws against Catholicism were enforced. C. was made Commander-in-Chief against party of Charles II. in Scotland (1650); great victories of *Dunbar* (Sep. 3, 1650) and *Worcester* (Sep. 3, 1651) ended Civil War. Long Parliament was denounced and dismissed by C. (1652), and he as Commander-in-Chief became Dictator. He summoned 'Little Parliament,' which introduced anarchical measures, with result that Conservative members insisted on resignation of powers to C., again Dictator, and he was made Protector (Dec. 1653). The Church was reformed; would-be ministers were examined by '*triers*,' Presbyterians, Baptists, and Independents being eligible; oaths and other vices were prohibited. The Court of Chancery was reformed also, and condition of Scotland improved. Peace was made with Holland, which submitted to Navigation Act. C. championed Vaudois, and Blake's successes against Spain led to acquisition of Dunkirk. England acquired a great name in Europe, and a large party besought C. to become king; C. refused the title owing to army's objection. He was buried in Westminster Abbey, but exhumed and hanged at Restoration.

C., it has been said, was greater than his work. A Puritan who suddenly achieved power to establish the Kingdom of God on earth, he was statesman enough to attempt to do so in only small measure. It is not generally held now that he was a hypocrite. About 5 ft. 10 in. in height, with large head, red, puffy face, and harsh voice, he yet deported himself well as head of State, 'without any indecency through the want of custom.'

Oliver Cromwell, Hilda Johnstone (1912); *Life*, by Carlyle, Frederick Harrison (1888), Firth (1900), Morley (new ed., 1910), Rosebery (1910), Roosevelt (1910).

CROMWELL, RICHARD (1626–1712), Protector of England (1658–59), s. of Oliver C., and succ. his father as Protector, but being violently opposed by army was forced to retire; moderately well-gifted, but without capacity for ruling; was unmolested after Restoration, and lived as a country gentleman.

CROMWELL, THOMAS (*c.* 1485–1540), Eng. statesman; s. of Walter Cromwell, blacksmith, fuller, innkeeper, and brewer of Putney; fought in Ital. wars; employed as merchant, money-lender, and solicitor; in Wolsey's service (1520); M.P. (1523); ruthless but efficient agent in carrying out suppression of lesser monasteries (1525); won general applause (1529) by fidelity to fallen Wolsey; supreme in Henry VIII.'s councils (1532–39). His policy was to increase royal power and subordinate the Church; foreign policy was to secure alliance of Prot. princes of Germany against R.C. powers, from whom Eng.

religious settlement was in danger until 1540; Earl of Essex (1540). He fell on failure of Henry's marriage with Anne of Cleves, which he brought about, and was executed.

Merriman, *Life and Letters of Thomas Cromwell* (1904).

CRONJE, PIET ARNOLDUS (1840–1911), Transvaal general; defeated British at *Magersfontein* (1899); captured at *Paardeberg* (1900).

CRONSTADT, see KRONSTADT.

CROOKES, SIR WILLIAM (1832–), Eng. chemist and physicist; discovered the element thallium, invented the radiometer (*q.v.*), and investigated electric discharges in exhausted tubes. He conducted researches on the composition of rare earths, artificial production of diamonds, and the fixation of atmospheric nitrogen; received numerous honours, scientific and public; O.M. (Order of Merit), 1910; pres. of the Chemical Soc. and other societies.

CROOKSTOWN (47° 48′ N., 96° 38′ W.), city, Minnesota, U.S.A.; market for grain and lumber. Pop. (1910) 7559.

CROP, top of plants, therefore meaning harvest; the pouchlike enlargement (ingluvies) of a bird's gullet; equivalent to outcrop (geol.); whole untanned hide; short-stocked whip with leather loop; closely cut hair.

CROPSEY, JASPER FRANCIS (1823–1900), Amer. landscape artist.

CROQUET, game played by two or more players, who, by means of mallets, drive balls, made of wood or a composition material, and distinguished by different colours for the different players, through a series of hoops and against each of two pegs set in a particular pattern on a lawn. The game is a development from the game of *paille-maille*, originated in southern France about the XIII. or XIV. cent's, and popular in England in the time of the Stewarts, the modern game of c. being introduced from France into England about 1852. The All England Croquet Club was formed in 1866. After a decade of great popularity the game declined in favour, lawn-tennis (*q.v.*) taking its place, but revived again about 1897, when the Croquet Association, which controls the game in Britain and holds championship meetings, was founded. The ground marked out for play should be 35 yds. by 28 yds., the hoops six in number, standing 1 ft. high and 4 in. across, and the pegs two in number, standing 1½ ft. high and of 1½ in. diameter (for the arrangement of hoops and pegs, see larger works). The object of the game is for the player to strike his ball through each of the hoops and against each of the pegs in a definite order, his progress being retarded by the balls of his opponents and assisted by those of his partners. If he succeeds in scoring a point, *i.e.* strikes his ball through a hoop or against a peg, he is entitled to another stroke. When he strikes his ball against another ball which is in play he is entitled to two more strokes, and must lift his own ball and place it in contact with that which he struck, strike his own ball so that the other moves, and then proceed to attempt to score the next point. It is by alternating the above strokes that a good player scores a succession of points, or a 'break,' and makes a rapid progress through the hoops.

See *Laws of Croquet*, pub. annually by the Croquet Association; *Modern Croquet Tactics*, Locock.

CRORE, a hundred *lakhs*.

CROSBY, HOWARD (1826–91), Amer. Presbyterian minister, writer, and social reformer; preached total abstinence from alcohol. His s., ERNEST HOWARD (1856–1907), lawyer and social reformer, wrote books of verse against war, etc.

CROSIER, bp.'s crook, or pastoral staff, carried before him at religious ceremonials.

CROSS (Lat. *crux*, cross), in its most usual form the intersection of two straight lines at right angles, † (*crux immissa*); varieties are St. Andrew's C., X (*crux decussata*); Greek C., where the lines intersect equally at right angles, ✚; Egyptian C., shaped like letter ☥; while more elaborate c's are Patriarchal, Lorraine, Tau, and Nowy quadrant. The C. was a constant theme in prehistoric art and an important pagan symbol. Egyptian or *Tau* Cross, shaped like Gk. capital T, is frequently found in Egyptian art; arrangement of lines seen in *svastika* 卐, a Buddhist symbol, is found on Etruscan tombs. The C. is an ancient emblem in many countries, and was adopted as Christian symbol. Crucifixion was the old form of punishment in East, and was early used by Romans. After crucifixion of Christ, C. at once became favourite badge of Christians, and under Constantine, to whom it is said to have appeared in vision, obtained the place of a symbol of Christian Church. It is of great importance in Christian art, and *sign of C.* was early used for exorcism. Helena, mother of Constantine, is said to have discovered Christ's C., and Rom. Church celebrates feast of *Invention of Holy Cross* on May 3, but since 1895 recognition has been made of an earlier claim to its discovery than Helena's. At the feast the relic of the c. kept in the Church of S. Croce in Gerusalemme at Rome is offered to view. Feast of Exaltation of the Holy C., Sep. 14, is said by some to commemorate the erection of churches by Helena on the sites of her discovery and of Holy Sepulchre, by others to commemorate the day of appearance of the C. to Constantine.

Besides the crosses named, there are numerous others of various significations, amongst which are the 'Celtic C.,' in which a circle is included in the upper portion; the 'Runic C.,' used by the Norsemen to define boundaries, and also erected over the tombs of heroes; the twelve varieties of c. employed in heraldry; the 'Red C. of Geneva'; the 'Maltese C.,' in which the ends are broadened; the c. upon coins; the Fr. C. of the Legion of Honour, conferred upon persons of distinguished abilities; the Brit. 'Victoria C.' (V.C.), a bronze decoration, instituted in 1854, and awarded for valour in war; the 'fiery c.' of the Scot. Highlands, consisting of small wooden c., the extremities of which had been charred and dipped in the blood of a goat, and used for the purpose of mustering the clans. In astronomy there are the 'Northern C.,' formed by four stars in Cygnus; and the 'Southern C.,' a brilliant star group, seen in the S. hemisphere, first reckoned a constellation in 1679. Town crosses were originally pulpits, or were memorials of great events. Later they became elaborate structures, *e.g.* Winchester Market C., Edinburgh Mercat C. 'The Cross' in many Scot. towns at the present day is a square at the centre of the town.

Rimmer, *The Ancient Stone Crosses of England* (1875); Ashton and Baring-Gould, *Legendary History of the Cross* (1887).

CROSS RIVER (*c.* 5° 30′ N., 8° E.), river, West Africa; rises in mountains of Kamerun, enters Bight of Biafra through Calabar estuary.

CROSS ROADS, BURIAL AT, custom of disposing of bodies of criminals as nearest approach to consecrated burial.

CROSS SPRINGER, term in arch. for the point from which a vaulted rib starts.

CROSSBILL (*Loxia*), genus of birds belonging to the finch family, living in cone-bearing trees of Europe, Asia, and N. America. The curious bill, in which the mandibles are crossed, is adapted for the extraction of seeds from fir-cones, apples, or other fruits.

CROSS-BREEDING, see BREED.

CROSSEN, KROSSEN (52° 3′ N., 15° 3′ E.), town, on Oder, Prussia, Germany; manufactures woollen goods; brisk shipping trade in wine and fruit. Pop. (1910) 7588.

CROSSING, see BREED.

CROSSING, term in arch. for the point wherein the nave and transept meet.

CROSSKEY, HENRY WILLIAM (1826–93), Eng. clergyman and geologist; authority on Brit. glacial geol.

CROSSOPTERYGII, see under FISHES.

CROSSOPUS, see SHRUB FAMILY.

CROTCH, WILLIAM (1775–1847), Eng. musician and composer.

CROTON OIL, prepared by grinding the seeds of the euphorbiaceous tree, *Croton Tiglium*, is a viscid, brownish-yellow, acid, malodorous fluid; powerful irritant, used in med. as a violent purgative, and, mixed with Cajiput oil and alcohol, as a blister-raising liniment, *e.g.* in acute bronchitis.

CROTONA (39° 8′ N., 17° 8′ E.), ancient Gk. town, E. of Lucania, Italy; founded by Achæans, 710 B.C.; residence of philosopher Pythagoras; modern Cotrone.

CROTONIC ACID ($C_4H_6O_2$) crystallises in needles, M.P. 72°, B.P. *c.* 180°. Isocrotonic acid is an oil (B.P. *c.* 172°), and methacrylic acid crystals (M.P. 16°, B.P. *c.* 160°) are isomeric acids.

CROUP, term formerly applied to conditions in which there is difficulty in breathing, sore throat, hoarseness, and hard coughing, most of such cases being now recognised as of diphtheritic origin (see DIPHTHERIA). A false membrane, resembling that of diphtheria, may also be found on the throat in scarlet fever, measles, etc., but in such cases the so-called c. is merely a complication of the primary disease. The term is properly now applied only in non-infectious acute laryngitis (inflammation of the throat), in which in severe cases the mucous membrane may be very much swollen, the difficulty in breathing intense, and death may occur in a few hours. In the slighter forms, rest in bed, a steam-kettle to assist breathing, eucalyptus inhalations, and a dose of Dover's powder or sometimes ipecacuanha wine at first, as an emetic, usually effect recovery. Such cases must always be under the care of a medical man, as they may go on to the more severe forms, in which ice to suck at times gives some relief, ether is sprayed on the throat, and tracheotomy, making an artificial opening into the windpipe, is often necessary.

CROUSAZ, JEAN PIERRE DE (1663–1750), Swiss writer on philosophy and logic.

CROW FAMILY, CORVIDÆ, moderately sized, large, and strong-billed perching birds, often with black, or black and grey plumage. The 330 known species are spread over the whole world, and many are familiar in Britain. The members of the genus *Corvus* are known by their sharp-edged bill, straight beneath, curved to the tip on the upper profile: such are the large glossy raven (*C. corax*), equally common in the Old World and America; the sooty, majestic rook (*C. frugilegus*); the carrion crow (*C. corone*); the jackdaw (*C. monedula*); and the hooded crow (*C. cornix*). The long-tailed magpies have a single black-and-white representative (*Pica pica*) in Britain; the common jay (*Garrulus glandarius*), common throughout Europe, is easily distinguished by the light-blue bars on its wing feathers.

The species mentioned above, while for the great part vegetarian, also feed upon animal matter, lambs and small mammals, young birds and eggs, and carrion, but the nutcrackers (*Nucifraga*), which have long pointed bills and occur both in America and in Europe and Asia, feed on nuts and fruits.

CROW INDIANS, tribe of N. Amer. Indians inhabiting reservation in Montana; once notorious for raids on whites.

CROWBERRY, CRAKEBERRY (*Empetrum nigrum*), small heath-like shrub with edible black berries; grows in the colder parts of N. hemisphere and on the S. American Andes.

CROWE, EYRE EVANS (1799–1868), Eng. historian and journalist; author of valuable *History of France*.

CROWLAND, CROYLAND (52° 42′ N., 0° 11′ W.), market town, on Welland, Lincolnshire, England; a Benedictine abbey was founded by King Ethelbald in VIII. cent., and portion remaining is now used as parish church.

CROWLEY, ROBERT (*c.* 1518–88), Eng. printer, anti-Romanist writer, and social reformer; supported Protector Somerset, and was pioneer of Puritanism under Elizabeth.

CROWN, gold coin of Henry VIII.'s reign; since Charles II.'s days coined only in silver; value, five shillings.

CROWN, head-dress worn as badge of honour. Alexander the Great wore the first royal crown of Greece, but the crown was never a symbol of rule in republican or imperial Rome; as in Greece, victors in athletic contests received wreaths of leaves or flowers, which also rewarded success in war, and were worn on ceremonial occasions; gold later replaced early simple garland. C. has been a symbol of sovereignty since the beginning of Christian times, replacing earlier diadem. Eng. dukes and marquesses were first invested with crowns in XIV. cent. The royal crown of Britain was made in Charles II.'s reign; made of gold and studded with gems, it is surmounted with a Maltese cross, having on each point a pearl. Queen Mary wears the crown which was specially made for Queen Victoria in 1838; it contains the ruby taken by Henry V. at *Agincourt*, the sapphire from Edward the Confessor's ring, and the sapphire from the crown of Charles II. Queen Alexandra's crown bears in its centre the celebrated Koh-i-noor diamond. The Scot. crown was recovered from a chest in Edinburgh Castle in 1818, and can be seen amidst other Scot. regalia at the Castle.

The coronet, a small crown, is the state head-dress of the nobility; a duke's coronet being a gold circle surmounted by eight strawberry leaves of gold; a marquess's, silver gilt with four gold strawberry leaves; an earl's, silver gilt with eight silver balls on points, with gold strawberry leaves between; a viscount's, silver gilt with sixteen silver balls; while a baron's is silver gilt with six silver balls. Their being worn by earls dates from 1444, when Earl of Warwick received the right to wear a coronet; viscounts acquired the right under James I., and barons in 1661.

Legg, *Eng. Coronation Records* (1901).

CROWN DEBT, amounts due to the Crown, which take precedence of all other debts.

CROWN LAND, estate belonging to head of a country or state.

CROWN POINT (43° 54′ N., 73° 29′ W.), town, New York State, U.S.A.; fort captured from British by Americans, 1775; lumber manufactures.

CROWNE, JOHN (fl. 1685), Eng. dramatist.

CROWTH, CROWD, CRWTH, musical instrument of the lyre kind, used in mediæval times.

CROWTHER, SAMUEL ADJAI (1810–91), African native bp. (1864) of Niger territories.

CROYDON (51° 22′ N., 0° 6′ W.), town, Surrey, England; chiefly residential; has handsome parish church and public buildings; formerly seat of abp's of Canterbury; has excellent railway service; chief manufacture, clocks. Pop. (1911) 169,559.

CROYLAND, see CROWLAND.

CROZAT, PIERRE (1661–1740), Fr. art connoisseur; author of the *Cabinet Crozat*.

CROZET ISLANDS (46° 27′ S., 52° E.), group of uninhabited islands of volcanic origin, in S. Indian Ocean.

CROZIER, WILLIAM (1855–), Amer. military inventor; chief of ordnance, U.S. army, 1901; invented Buffington-Crozier disappearing gun-carriage; wrote text-book, *On the Construction of Ordnance*.

CRUCIFERÆ, large order of plants, widely distributed in temperate zones, whose flowers have four petals arranged like a Maltese cross and six stamens, two opposite stamens being shorter than the others. Insects generally effect the pollination. About 120 genera with 1200 species are known, many of them cultivated for food; they include cabbage, radish, mustard, stock, wallflower, charlock, shepherd's purse, and other well-known garden and field plants.

CRUDEN (57° 24′ N., 1° 52′ W.), village, on Cruden Bay, Aberdeenshire, Scotland; seaside resort.

CRUDEN, ALEXANDER (1701–70), Scot. scholar; author of *Concordance* to the Bible, pub. 1737, and

other works, chiefly religious. As a reformer of public morals he carried a sponge to efface offensive scribbling in streets, and called himself 'Alexander the Corrector'; often confined for intermittent lunacy, and of permanent eccentricity.

CRUELTY TO ANIMALS, see ANIMALS.

CRUIKSHANK, GEORGE (1792–1878), Eng. artist, caricaturist, and book-illustrator; secured immense popularity by his illustrations to Dickens, Ainsworth, Lever, etc.; work held in great estimation by Ruskin and other discerning critics.

CRUNDEN, JOHN (d. 1828), Eng. designer; noted for his *Designs of Ceilings*, etc.

CRUSADES, name for series of expeditions (XI.–XIII. cent's) for the purpose of rescuing the Holy Land from 'infidels' and extending the territory of Christianity. The immediate cause was danger to the Byzantine Empire from Seljukian Turks. Persians had conquered Mesopotamia and northern Syria and invaded Asia Minor (603–10), when the usurper Phocas was Byzantine emperor. Under his successor, Palestine was attacked, Jerusalem with the Holy Sepulchre fell into Persian hands, 614, and a Persian force seized Chalcedon, close to Constantinople. The Church took the lead in fitting out an army, and after a long, brilliant war, which was precedent for C., recovered the Holy Land, 628.

A more important precedent was established in the wars of Muhammadanism: the 'Star and Crescent' was the emblem of Holy War before the Cross. The Arabs had attacked the Byzantine and Persian Empires, and captured Jerusalem, 637. The proselytising zeal of the Arabs, however, soon died away, Christianity on the whole being tolerated and pilgrimages allowed to Holy places. With the rise of the Seljukian Turks not only Christianity but civilisation was threatened. The Turks, who had accepted Muhammadanism, established a great Mongol state in Asia under Seljuk, conquered Persia, and attacked the Eastern Empire at the period of its lowest decline. A decisive victory at *Manzikert* resulted in the capture of Jerusalem from Arabs (1071); Asia Minor was conquered; appeals were made by Emperor Alexius Comnenus to Baldwin of Flanders and Pope Urban II.

Pilgrimages to Jerusalem were naturally regarded as of greater sanctifying benefit than those to ordinary shrines, and were very often made. Under Turk. rule pilgrims were subject to great outrages; and the idea of a Holy War was taken up by Gregory VII., when the Byzantine emperor, Michael VII., begged for aid against the Turk. Envoys of Emperor Alexius appeared at Council of Clermont (1095), and Urban II. made a speech advocating aid to Eastern Empire as incident to a larger attack on the infidel. The great object was the recovery of Holy places, but C's were partly due to other motives, some of them secular. The Church conceived the idea of turning to pious use the warlike character of feudal society; rulers were glad to direct energies of turbulent nobles into distant channels; great nobles entertained visions of rule in the East. A pestilence was then raging in Europe, and dearth and civil strife made men eager to escape and try possibilities of countries reputed to be rich. Urban's speech was received with great enthusiasm; crosses of stuff were distributed among pilgrims to wear as emblem; Peter the Hermit, monk of Amiens, wandered on an ass through France and Italy, preaching a Holy War (there seems to be no authority for legend that he first inspired Urban), and headed a contingent of one of the two great divisions of the **First Crusade.**

Five contingents of 'paupers' formed the first division, of which only two contingents (under Peter the Hermit and Walter the Penniless) arrived at Constantinople. The whole company fell before the Turks on setting foot in Asia Minor (1097). The second division, that of the magnates, was under the general command of Adhemar, bp. of Puy, and papal legate, whose appointment by the pope marked Church origin of war. Chief leaders were: Godfrey de Bouillon, his bro's Baldwin and Eustace, Hugh de Vermandois, bro. of king of France, Stephen, Count of Blois, Robert, Count of Flanders, Raymond, Count of Toulouse, Bohemund, Prince of Otranto, and Tancred, Duke of Apulia; they arrived at Constantinople in 1097; their force, according to tradition, numbered 300,000 men, but probably its strength was only half that number. Alexius carefully took homage of leaders for lands they might conquer from infidels, before allowing the huge army to pass on. The moment was favourable; the population of Asia Minor and Syria, groaning under military occupation of the barbarous Turk, was ready to assist; the Seljukian Empire, extremely decentralised, was a prey to dissensions. Jerusalem changed hands in 1098, and Asia Minor was speedily restored to Byzantine Empire; Antioch was captured and retained by Bohemund, 1098, but disputed by Raymond. Baldwin was made Count of Edessa. Led by Godfrey de Bouillon, the Crusaders, their forces diminished by fever and famine, captured Jerusalem after a month's siege (1099); the papal legate being dead, Godfrey was made ruler as 'advocate of the Holy Sepulchre.' On Godfrey's death (1100) Baldwin was crowned king of Jerusalem, and enmity to Bohemund of Antioch led to support of Latin Kingdom by the Byzantine emperor; other leaders obtained feudal lordships in the midst of the enemies' country, Turks and Arabs not being completely expelled.

Second Crusade (1147–49), Latin Kingdom failed to become permanent; the Franks could not thrive in the climate, morality suffered, Eastern vices were adopted, people were alienated by despotic rule which showed worst evils of feudal system. Edessa was captured by Muhammadans (1144); and Franks appealed to Europe. St. Bernard at request of Eugenius III. preached a C.; Louis VII. of France and Conrad III. of Germany took the Cross, the overlordship of territories gained being reserved to Byzantine emperor. There was disunion from the first: Byzantine emperor could not give aid because of a war with Sicily; the north Ger. force was diverted in a separate C. against the Wends; that of England and Netherlands went to capture Lisbon; Conrad and Louis united in Holy Land with King Baldwin III. in an unsuccessful attack on Damascus and returned. The net result was further weakening of the Latin Kingdom. Damascus conquered by Turks, 1154, and regained, 1174, was taken, 1183, by Saladin, who thus united Muhammadan realms of Egypt and of northern Syria. Jerusalem fell, 1187.

Third Crusade (1189–92).—At the news of the capture of the Holy City papal letters were issued and the kings of Germany, France, and England took the Cross; 'Saladin tithe' was imposed on all who did not go, while, on the other hand, Crusaders' debts were wiped out; the finest force ever seen in the Middle Ages consequently assembled. Acre, the key to Jerusalem, already besieged by king of Jerusalem, Guy de Lusignan, was the first object of attack; Frederick Barbarossa died on the way, and the German force was almost entirely destroyed; Richard *Cœur de Lion* turned aside to conquer Cyprus, thus becoming founder of Latin Kingdom of Cyprus, but joined French, 1191, before Acre, which surrendered shortly afterwards. Philip Augustus and Richard quarrelled, and the former returned to France; Richard, unable to take Jerusalem, made a truce with Saladin, 1192, by which Christians retained only the seaboard from Jaffa to Tyre and received permission to visit the Holy Sepulchre. An important feature of this C. is lay initiative and subordinate religious element.

Fourth Crusade (1202–4).—Henry VI., emperor of Germany, took the Cross in 1195, but died (1197) before he was ready to start; from his plans, however, his real aim was to attack Byzantine Empire. Innocent III. now took up the work and sought to restore to C's the character of a Holy War lost sight of in territorial schemes; France responded, Theobald of Champagne being chief commander, and Baldwin of Flanders and

the Count of Blois being leaders. They decided to attack Egypt, chief seat of Turk. rule, as a preliminary to the recapture of Palestine; Venice lent her fleet, but once the Crusaders were embarked the schemes of Innocent III. went for naught. Persuaded by Philip of Swabia and Venetians the flotilla sailed for Constantinople, capturing Zara for Venice on its way; Constantinople was captured (1204); Baldwin of Flanders was made Byzantine emperor and the territory of Venice enlarged at expense of the Empire. Result of C. was fatal diversion of Crusaders. Clergy of north of France and Germany, in despair, imagined the scheme of CRUSADE OF CHILDREN, hoping that success might be obtained if instruments were pure; thousands of children perished or were sold as slaves (1212).

Fifth Crusade (1218–21), due to enthusiasm of Innocent III. for recapture of Holy places, was preached by him at the fourth Lateran Council, 1215; a Truce of God was proclaimed in the W., and trade with the infidel was forbidden. Emperor Frederic II. took the Cross, but delayed joining; large forces from Germany, however, and from Austria and Hungary, again set forth under leadership of John de Brienne, king of Jerusalem, for Egypt, and captured Damietta, 1219; the papal legate refused to accept terms offered by Sultan, but Crusaders were driven from Egypt, gaining nothing but the surrender of the Holy Cross.

Sixth Crusade (1228–29).—C. of territorial expansion based on alliance with infidel and under the interdict of the Church; of great interest as remarkable episode in career of Emperor Frederick II., who became titular king of Jerusalem (1225) by marriage with Isabel de Brienne. Frederick, almost certainly a polytheist or freethinker, started on the C. (1227), but, falling sick, returned to Italy, thus incurring papal excommunication, as Gregory IX. would not credit his excuse. Still under the papal ban, Frederick left Italy (1228) and made a treaty (1229) with Sultan by which, in return for toleration of Muhammadanism, he was allowed to proceed to his kingdom of Jerusalem, and Judea was ceded to the Christians. Frederick was obliged to put the crown on his own head as no priest would do so; he was absolved by the pope (1229). Frederick, however, failed in his attempt to rule Jerusalem, and was compelled to acquiesce in the independence of the Frankish baronage of that kingdom (1243). Jerusalem, laid waste by Mongolian tribes (1244), was captured by Turks in the same year, and never again came into Christian hands.

Seventh Crusade.—On news of the fall of Jerusalem, a new crusading movement started. Papacy was again at war with Emperor, and at Council of Lyons (1245) Innocent IV. preached a C. against both Frederick II. and infidels. Louis IX. (*St. Louis*) of France supplied the religious element, taking the Cross and winning adherents; Damietta fell at his approach (1249), but, as in Fifth C., further progress was impossible; being captured, he was forced to pay a heavy ransom and to restore Damietta; he went on a pilgrimage to Holy Land, and until 1254 did penance and sought to organise the Christian kingdom. Muhammadans, now weakened by pressure of Tartar tribes and Mameluke mercenaries, became supreme in Egypt, but the Latin Kingdom was torn by dissensions. The Mameluke captain, Bibars, became Sultan (1260), and conquered Jaffa and Antioch (1268).

Eighth Crusade.—Remaining towns of Holy Land being threatened by Bibars, Louis IX. again took the Cross (1270), but the crusading movement was dead; only hired soldiers and barons bound by feudal duty followed; an attack on Tunis failed, and Louis died of plague. His companion and heir, Philip the Bold, only secured his retreat by a humiliating truce. Council of Lyons (1274) in vain preached a new C.; Tripoli fell (1289) before the successor of Bibars: Acre surrendered in 1291; Cyprus alone remained under Christian rule. Capture of Rhodes by Hospitallers took place in 1310; an attack in the old crusading spirit was made on Egypt and Syria by Peter I. of Cyprus (1365–69); defensive wars waged by Christians against Turks in XIV. and XV. cent's ended (1453) in capture of Constantinople by Muhammad II.

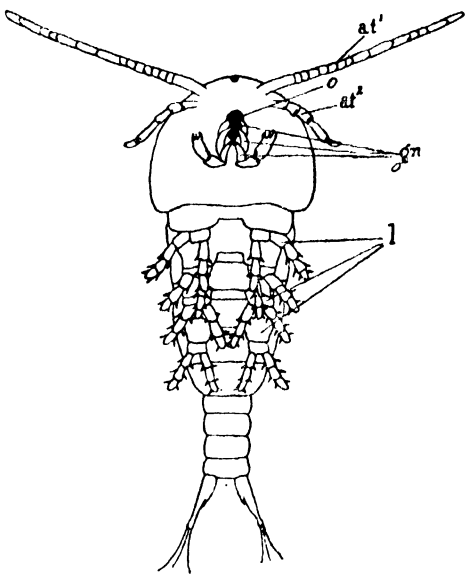
The importance of the C's in the history of civilisation lies in their opening up the East for trade, and the impetus they gave to the study of war. Systematic taxation commenced during C's; France and the papacy, having taken most important part, gained greatly in prestige. History, poetry, languages, and culture of European states were all influenced.

W. B. Stevenson, *The Crusaders in the East* (1907); T. A. Archer and C. L. Kingsford, *Crusades* (1894); G. W. Cox, *The Crusades* (1910).

CRUSENSTOLPE, MAGNUS JAKOB (1795–1865), Swed. hist. and political writer.

CRUSOE, ROBINSON, see SELKIRK (ALEXANDER), DEFOE (DANIEL).

CRUSTACEA, class of Arthropoda, comprising lobsters, crayfish, prawns, shrimps, crabs, barnacles, water-fleas, wood-lice, sand-hoppers, numerous parasitic and an enormous number of microscopical forms widely distributed in all seas as constituent of the 'plankton' (*q.v.*). It is difficult to characterise a group consisting of such diverse members, but they generally have in



A WATER-FLEA, AS AN EXAMPLE OF CRUSTACEA, VIEWED FROM BELOW. *at*¹, first antennæ; *at*², second antennæ; *gn*, gnathites (jaws); *l*, walking legs; *o*, mouth.

common a chitinous coat impregnated with carbonate of lime, two-branched appendages, the latter occurring on the abdomen as well as the thorax; and, on the whole, they live in water. Their development is usually indirect, several larval stages being passed through before attaining the adult form. The following are the more important Crustacean orders: *Branchiopoda*, including brine-shrimps and the primitive Apus. *Cladocera*, or water-fleas, chiefly freshwater, exhibit an interesting alternation of parthenogenetic and fertilised generations. *Ostracoda*, small, laterally compressed, and with a bivalve shell. *Copepoda* swim about very actively and occur in vast numbers, constituting an important part of the food-supply of fishes. Many are parasitic, *e.g.* the 'fish-lice.' *Thyrostraca*, or Cirripedia, include barnacles and acorn shells, as well as the degenerate parasite Sacculina living in the crab. The *Leptostraca* are of theoretical interest, as they probably link the higher Crustaceans with ancient Palæozoic forms. In *Isopoda* the body is flattened from above downwards, and some, the wood-lice or slaters (Oniscus) and pill-bugs (Armadillo), have a respiratory system adapted

for terrestial life. Others are parasitic, and the gribble (Limnoria) eats into wood. Asellus is a common fresh- or salt-water isopod. *Amphipoda* have a laterally flattened body, the beach-flees (Talitrus) and the aquatic Gammarus are common representatives. Phronima, Hyperia, and others are commensals, with other marine animals. The following orders have stalked eyes: *Schizopoda*, e.g. Mysis, Lophogaster, and Euphausia live in the sea, the latter having luminous organs on the eye-stalks. The *Decapoda*, with ten walking legs, comprise the best-known crustacean forms, lobsters, crabs, crayfish, shrimps, and prawns (*q.v.*) undergoing complete metamorphosis. The *Stomatopoda* are flattened and have a powerful abdomen. The *Cumacea* have unstalked eyes and are marine.

Fossil C. have been discovered from Cambrian strata.

W. T. Calman, *Life of Crustacea* (1911); Stebbing, *History of Crustacea* (1893).

CRUSTUMERIUM, ancient town, Latium, a few miles N.E. of Rome.

CRUVEILHIER, JEAN (1791–1874), Fr. anatomist; one of the foremost pathological anatomists of his country.

CRUZ E SILVA, ANTONIO DINIZ DA (1731–99), Portug. serio-comic poet.

CRYOLITE (Na_3AlF_6), mineral occurring in pearly-grey or white masses in granitic veins in Greenland; quarried for production of aluminium and manufacture of enamels and porcelains.

CRYPT, subterranean chamber in ecclesiastical building; originally a chapel attached to the tomb of saint or martyr. The c. of Canterbury Cathedral is the largest in England.

CRYPTOBRANCHUS, genus of tailed lung-breathing Batrachia of the family Amphiumidæ; three known species, *C. maximus* of Japan and Tibet being the largest living Batrachian (about 4 ft. long).

CRYPTOGAMS, see BOTANY.

CRYPTOGRAPHY, the art of writing in cipher, or secret characters. Amongst the various methods employed may be mentioned transposition of letters, the use of numerals, misplacement of words, vertical and diagonal reading, etc. The art was used by the ancient Spartans, by the Romans—particularly by Julius Cæsar—and, in later times, was largely employed by Charles I. and the Cavaliers. Francis Bacon exhibited a lively interest in the art, and laid down the dictum that a good cryptogram should be easy to write and read, impossible to detect, and should bear on the face of it nothing to suggest its being a secret message.

Pesler, *Cryptography* (1901); Admiral Beaufort, *Cryptography* (1910).

CRYPTOMERIA JAPONICA, Jap. cedar, beautiful evergreen tree of China and Japan; cultivated in sheltered parts of Britain; attains a height of 100 ft.

CRYSTAL, body naturally formed by the solidification of a liquid or gas, and bounded by symmetrically arranged plane surfaces, which are the expression of a definite structure. These surfaces meet in constant angles, which are often characteristic of certain substances. Perfect c's are slowly formed from solution (*e.g.* alum, sugar, common salt), while ice is an example of solidification of a liquid, and hoar-frost and iodine of a vapour. Minerals (*e.g.* quartz, calcite, etc.) are the best-known examples of crystallisation. According to the number and disposition of their axes, *i.e.* imaginary lines drawn parallel to certain edges, or from solid angles to the opposite faces, through the centre of the c., crystals are grouped in six systems.

(1) *Cubic system* (Regular, Isometric, Octahedral, or Tesseral)—c's with three equal axes at right angles to each other. (*a*) Cube (*e.g.* salt, galena). (*b*) Octahedron (alum, magnetite). (*c*) Rhombic dodecahedron (garnet). (*d*) Tetrahedron (blende, boracite). (*e*) Pentagonal dodecahedron (pyrites). Other forms occur besides, and frequently two or three are combined. (2) *Tetragonal system* (Pyramidal, Dimetric, or Quadratic)—c's with three axes, but only two of equal length at right angles to each other. (*a*) Ditetragonal bipyramid. (*b*) Tetragonal prism. Combinations occur, *e.g.* apophyllite, rutile. Chalcopyrite, scheelite, urea, and other substances crystallise in different classes of the same system. (3) *Orthorhombic system* (Rhombic, Prismatic, or Trimetric)—c's with three axes of different lengths at right angles; potassium permanganate, Epsom salts, and picric acid are examples of salts crystallising in this system. (*a*) Orthorhombic bipyramids (sulphur). (*b*) Prism (barytes). (*c*) Bisphenoid. (4) *Monoclinic system* (Oblique, Monosymmetric)—c's with three axes of unequal length, two of which form right angles, while the third forms an oblique angle with the others, *e.g.* gypsum, borax, amphiboles, orthoclase naphthalene, cane-sugar, milk-sugar, sodium hypophosphate. (5) *Anorthic system* (Triclinic)—c's with three unequal axes, none at right angles, *e.g.* potassium bichromate, axinite, chalcanthite. (6) *Hexagonal system*—c's with a principal axis and symmetry in three or six directions. (*a*) Rhombohedron (calcite). (*b*) Scalenohedron (calcite). (*c*) Hexagonal prism (tourmaline). (*d*) Hexagonal bipyramid (quartz). For detailed classification, see references.

The growth of c. is not always regular, and two c's may grow together or twin. *Crystallites* (q.v.) are incipient c. arrested in development. That different crystalline forms are expressions of different atomic structures is proved by the examination of the physical and chemical properties of crystal.

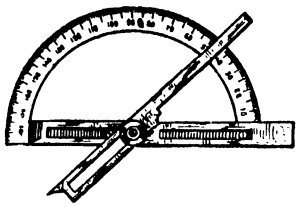
When c's are elastic, they may be deformed by pressure or tension (*e.g.* ice and the 'liquid crystals'). Hardness depends on crystalline structure, a well-known example being the two modifications of carbon, diamond and graphite. An important character is that of cleavage, many c's being cleavable in planes parallel to well-developed faces; calcite and mica show perfect cleavage. A method by which the symmetry of c's has been determined has been discovered by corroding c. by suitable solvents which leave characteristic and well-defined 'etched figures' or small pits on the faces. The optical properties of c's, their refraction and absorption of light, and their behaviour in polarised light, are of the utmost importance in determining to what species they belong, *e.g.* gem-stones, and discovering their internal structure. Crystalline symmetry is also illustrated by their electrical properties, different faces of c. acting differently under charges of heat and electricity. As regards the relations between crystalline form and chemical composition, some substances of the same chemical formula, *e.g.* calcite and aragonite, graphite and diamond, have a different form (dimorphism), other absolutely different substances chemically have the same form, *e.g.* marcasite (FeS_2) and celestite ($SrSO_4$) (homœomorphism). Chemically related substances frequently crystallise in a similar way (isomorphism), *e.g.* the mineral carbonates of calcium, cobalt, iron, magnesium, manganese, etc., all form rhombohedral crystals. See MINERAL (MINERALOGY).

W. J. Lewis, *A Treatise on Crystallography* (1899); H. A. Mier, *Mineralogy* (1902); A. E. H. Tutton, *Crystalline Structure and Chemical Constitution* (1910).

Crystallisation, process of forming crystals, usually by cooling out of a substance in state of solution. Fractional c. means the separation of different substances by their successive c.

Crystallography, science of the form, structure, and properties of crystals. Nicolaus Steno (*q.v.*) was the first to record (1669) that, although the faces of different quartz crystals varied in size and shape, the angles as measured by a goniometer, the *Contact* form being used for large crystals) between corresponding faces are constant. This fact was corroborated by Bartholinus and Huygens, who agreed with R. Hooke's suggestion that crystals were built up of spheroids. Cappeller, of Lucerne, published the earliest treatise on c's (1723), but the science was not properly founded till 1783–84, when Romé de l'Isle and Haüy discovered the symmetry of crystals to certain planes, and derived all crystals from six 'primitive

forms.' C. S. Weiss (1809) studied crystalline forms from a geometrical standpoint, and introduced a new system of classification. Lévy, Naumann, and Miller (1839) devised methods of notation which refer the planes of crystals to three axes, corresponding in direction to three edges. In 1830 Hessel proved that 32 types of symmetry are possible in crystals, which are now grouped in 32 corresponding classes, belonging to 6 systems. The importance of the optical properties of crystals was recognised by Sir D. Brewster (*q.v.*), 1828. E. von Fedorow showed (1912) that when the crystals of any substance are correctly set up and measured on the theodolite goniometer they furnish an adequate means of identification without further analysis. The crystals of 10,000 substances have been thus measured and tabulated, and in future an unknown substance (if contained in the list) will be recognised as soon as its crystals are measured. Numerous discoveries in the allied sciences of chem., physics, and mineralogy have done much towards furthering the progress of c.



Contact Goniometer (Steeg and Reuter). The crystal is placed between the two edges terminating in a point, and the edges are made to lie along the faces of the crystal by adjusting until no trace of a white sheet held behind is seen between the edges and the crystal; the angle is then shown by the lower edge of the bar crossing the graduated arc.

Tutton, *Crystallography* (1911).

CRYSTAL PALACE, THE, place of entertainment, Sydenham, London; originally stood in Hyde Park, and is mainly structure erected for Exhibition of 1851; designed by Sir Joseph Paxton.

CRYSTAL GAZING ('Scrying') is the practice of looking into a glass ball or mirror, water, etc., and seeing] pictures either of past events or those happening elsewhere. Andrew Lang concluded that neither fraud nor coincidence would account for many of the remarkable results attained, though there has been much superstition mixed up with the subject.

Lang, *Making of Religion*; Thomas, *Crystal Gazing.*

CRYSTALLITE, minute forms of crystallisation discovered in 'glassy' volcanic rocks. They may be spherical (globulites), or strung together like beads (margarites), or in groups (globospherites), or like small daggers (longulites), or like hairs (trichites). Microliths are very minute crystallic bodies, usually densely crowded together, often forming fibres or tree-like grouping.

CSENGERY, ANTON (1822–80), Hungarian publicist.

CSIKY, GREGOR (1842–91), Hungarian dramatist

CSOKONAI, MIHALY VITEZ (1773–1805), Hungarian poet.

CSOMA DE KÖRÖS (d. 1842), Hungarian philologist.

CTENOPHORA, class of Cœlentera, comprising transparent, free-swimming, generally more or less ellipsoidal, often phosphorescent sea-animals, moving with the aid of eight rows of comb-like ciliated plates arranged on meridians, provided with a well-developed jelly-like layer, 'mesoglœa,' a mouth, and ectodermic gullet, and a sense-organ at the pole opposite to the mouth. They are hermaphrodite and undergo direct development. All species except *Beroe* and its relatives are provided with retractile tentacles bearing adhesive cells, e.g. *Cydippe* and the ribbon-shaped Venus' girdle (*Cestus*). See Embryology.

CTESIAS (V. cent.), Gk. historian.

CTESIPHON (*c.* 33° 10′ N., 44° 40′ E.), ancient ruined village, on Tigris, Mesopotamia; was one of the chief cities of the Parthians.

CUBA (19° 50′ to 23° 11′ N., 74° 10′ to 84° 57′ W.), republic; largest of W. Indian islands at mouth of Gulf of Mexico, 130 miles S. of Florida, and separated from Key West by Florida Strait; area, 44,000 miles; *c.* 750 miles long; breadth, 27 to 150 miles; coast-line, *c.* 2000 miles, exceedingly dangerous for shipping owing to banks and reefs. There are numerous excellent harbours—notably Havana (*q.v.*), the capital, one of finest in W. Indies. In the Sierra de Maestra (province of Santiago) the Pico de Tarquino rises 8400 ft. These mts. are densely wooded, and contain copper, iron, and other minerals. The largest river is the Cauto (250 miles long; about a third being navigable for small craft).

The climate of C. is more temperate than in other W. Indian islands, and healthy in highlands of the interior, but fever and ague prevail on the coast. During coldest months (Dec. and Jan.) the temperature seldom falls below 50°, and during July and Aug. (the hottest months) 83° is about the maximum. There is no snow in the lowlands, and the annual rainfall varies from 40 to 160 inches. Desolating hurricanes are frequent. The agouti or cavy and insectivore are the only indigenous animals, with the exception of the bat. Birds, including migrants from U.S.A., are very numerous.

History.—C. (sometimes called 'Queen of the Antilles') is divided into six provinces, and has been an independent republic since 1902. It was discovered by Columbus on his first voyage in 1492, and in 1511 Spaniards settled at Baracoa. The natives were immediately subjected and, under cruel tyranny, speedily exterminated, and negroes were brought in. In 1519 Havana (*q.v.*) was founded. In 1846 a hurricane swept away 1872 houses and sank 216 vessels. C. progressed favourably and, being open to the world, carried on a flourishing trade; but a War of Independence broke out in 1862, and was carried on fiercely—chiefly in the E.—till 1878. Owing to continued oppression by the Spaniards, a second war broke out in 1895; the U.S.A. intervened, and as a result of the Spanish-American War (*q.v.*) the island was completely freed of Span. sovereignty in 1898, and held by Americans until 1902. In 1906 an insurrection broke out, and a U.S.A. Commission undertook provisional government till 1909, when a new Pres. assumed office.

There is a House of Representatives with 83 members; the National Congress has 24 members—4 from each of the States. There is a Cabinet, consisting of Secs. of State, of Justice, and of the Interior; Ministers of Public Works, Commerce, Agriculture, Labour, Sanitation, and Charity. The navy consists of 13 steam cutters and revenue launches. There is a Rural Guard (5000-6000) and a small regular army.

C. abounds in luxuriant vegetation, the soil being exceedingly fertile. Long tracts of forests (embracing an area of 1,250,000 acres) are rich in mahogony, cedar, ebony, fustic, etc. A considerable portion of land is devoted to cattle-breeding. About half the centre cultivated land consists of sugar plantations, sugar being C.'s most important product. Tobacco, the second largest product, is grown chiefly in the Vuelta Abajo district. The principal cereal is Indian corn; other products are rice, coffee, cotton, maize, and tropical fruits. There are copper, manganese, and iron mines; gold is found in small quantities; also asphalt, which is not worked much.

America carries on a flourishing trade with C., and has coaling-stations in the Bay of Guantanamo and Bahia Honda. The chief towns are Havana, Santiago, Matanzas Cienfuegos, Camaguey, Cardeñas.

About two-thirds of inhabitants are whites (mostly of Span. descent); R.C. religion is predominant. Pop. 2,300,000.

Clark, *Commercial Cuba* (1899); Piron, *L'Ile de Cuba* (Paris, 1898); Roosevelt, *Rough Riders* (London, 1899).

CUBE (geom.), regular solid with six equal square sides; (algebra) the third power, the volume of a cube (a^3) being the product of its side (a) taken as a

factor thrice. See ALGEBRA, EQUATION, CRYSTALLOGRAPHY.

CUBEBS, dried unripe berry of *Piper cubeba*, a tropical Asiatic (Java) climbing shrub; used in medicine, as a stimulant of mucous membranes, expectorant, and the smoke in respiratory complaints.

CUBITT, SIR WILLIAM (1785–1861), Eng. engineer; invented treadmill; designed Oxford and other canals, the Bute Docks at Cardiff, floating landing-stages at Liverpool, and other works; he was frequently consulted by foreign authorities.

CUBITT, THOMAS (1788–1855), Eng. architect, who planned many of fashionable squares of London and assisted in projection of Battersea Park. His s., GEORGE (b. 1828), Conservative politician, was cr. Baron Ashcombe, 1892.

CUCHULIN, hero of cycle of stories in oldest Irish lit.; so called after episode in his career in which he acted as watch-dog for Culann, the smith, the name signifying 'Culann's Hound.'

CUCKOLDS, see TRUNK-FISHES.

CUCKOO (*Cuculus*), bird of solitary habits, feeding on insects and caterpillars; familiar in Old-World folklore; noted for its characteristic two-syllabled call, and for foisting its parental duties of hatching and feeding the young on other birds, such as the hedge-sparrow, water-wagtail, and titlark. The fact that c.'s eggs often closely resemble those of their foster-nurses is a peculiar example of natural selection. The adult c.'s remain in the Brit. Isles between March and July, while the young follow them to warmer climes in Sept. Other genera of the same family (Cuculidæ) show parasitic habits, *e.g.* jay c. and American c. The coucal, channelbill, and anis are more divergent types.

Kirkham, *The Brit. Bird Book* (1910).

CUCKOO-PINT, LORDS AND LADIES, WAKE-ROBIN (*Arum maculatum*), plant of order Aroidaceæ; flowers arranged on a spadix and enclosed by a bract or spathe.

CUCKOO-SPIT, frothy secretion found on plants produced by the froth-fly (or frog-hopper), a small insect. Within the secretion is found the larva.

CUCUMBER (*Cucumis sativa*), widely cultivated, edible, annual creeping plant of the order Cucurbitaceæ (*q.v.*), smaller varieties being termed *gherkins*. The squirting c., *Ecballium elaterium*, yields the extremely powerful purgative elaterium.

CUCURBITACEÆ, order of tendrilled climbing plants containing about 85 genera and 650 species, with succulent, frequently edible, tough-rinded fruits, growing in temperate and warm climates. The briony, cucumbers, gourd, melon, pumpkin, marrow, and chocho are the more important representatives. The fibrous pericarp of *Luffa ægyptiaca* provides the loofah used in the bathroom and in manufacture of hats.

CUDDALORE (11° 42′ N., 79° 48′ E.), town, S. Arcot district, Madras, India; exports sugar, oil-seeds, and indigo; scene of several battles between French and British in XVIII. cent. Pop. (1911) 52,216.

CUDDAPAH (14° 29′ N., 78° 52′ E.), district, Madras, India; partly hilly, partly low-lying plains climate unhealthy; watered by Pennar and tributaries chief town, CUDDAPAH; cotton and indigo are exported. Area, 8723 sq. miles. Pop. 1,291,267.

CUDWORTH, RALPH (1617–88), Eng. divine and philosopher; the greatest of the Cambridge Platonists. His chief works were *The True Intellectual System of the Universe* (1678) and *Treatise Concerning Eternal and Immutable Morality*. Against atheism he endeavoured with enormous learning to show that belief in a single and good God underlay even pagan polytheism, and that the existence of such a God is demonstrable; against sensationalism, that there are truths of reason, *e.g.* the mathematical; and against Hobbes's ethics, that there are moral ideas and rules, independent of private interest or positive law, directly apprehended by reason.

CUENCA (2° 48′ S., 78° 51′ W.), city, Ecuador, S. America; cathedral and univ.; sugar refineries; exports Peruvian bark, hides, cheese. Pop. 30,000.

CUENCA (40° N., 2° 15′ W.), province, Central Spain; chiefly mountains and valleys, clothed with pine forests; stock-raising. Area, 6636 sq. miles. Pop. (1910) 268,458.—CUENCA, the capital, has a Gothic cathedral, and is birthplace of Molina. Pop. 11,000.

CUESTA, Mexican term for 'scarped' ridge of land, when one slope is steep and the other only slightly inclined.

CUEVAS DE VERA (37° 17′ N., 2° W.), town, on Almanzora, Spain; district rich in silver mines. Pop. 20,562.

CUIRASS (O. Fr. *cuirée*, Ital. *curazza*), piece of armour, originally leather, later any close-fitting protection for body against attack; now applied to piece of mail covering upper part of body composed of breast-plate and back-plate buckled together at sides. A *cuirassier* is a horse soldier who wears a c., *e.g.* Household Cavalry; the name cuirassier is not now used in Britain.

CUJAS, JACQUES, CUJACIUS (1520–90), Fr. jurist, famous for collections of MSS. and his own commentaries. He lectured on law at various univ's, but is chiefly associated with Bourges; first edit's of his works rare.

CULDEES, monastic order established in Ireland and Scotland from VIII. to XIV. cent., when they seem to have been incorporated with the Canons Regular. In Ireland they did pastoral work in connection with monasteries; in Scotland they were independent, each house having its religious and lay brethren.

Beveridge, *Makers of the Scot. Church* (1908).

CULEBRA (18° 20′ N., 65° 20′ W.), one of Virgin Islands, E. of Porto Rico, and dependency thereof.

CULLEN (57° 41′ N., 2° 49′ W.), seaport, on Moray Firth, Banffshire, Scotland; industries, fisheries, rope- and sail-making.

CULLEN, PAUL (1803–78), Irish ecclesiastic; Abp. of Armagh, 1849; of Dublin, 1852; cardinal, 1866; opposed extreme nationalists and sided with Brit. Government against Fenians.

CULLEN, WILLIAM (1710–90), Scot. physician; practised at Hamilton. Lecturing on chem., bot., and medical subjects at Glasgow Univ., he soon proved to be a teacher of extraordinary ability; app. to chair of med., founded for him at Glasgow; subsequently elected prof. of Chem. in Edinburgh he at the same time lectured on materia medica. He relinquished the chair of chem. on accepting successively the chairs of institutes of med. and practice of physic; pub. several standard works on medicine.

W. Thomson and D. Craigie, *Cullen's Life, Lectures and Writings* (1859).

CULLERA (39° 10′ N., 0° 15′ W.), seaport, Valencia, Spain; exports grain, fruits. Pop. 12,000.

CULLINAN (25° 35′ S., 28° 40′ E.), town, Transvaal; named after Sir Thos. Cullinan, the chairman of the company owning the diamond mines there. The famous C. diamond (discovered in 1905) was bought by the Transvaal Government for £150,000, and presented to Edward VII. While being cut in Amsterdam, a flaw was discovered, and the diamond was divided into a number of gems (including two largest brilliants in existence, viz. 516 and 309 carats). See DIAMOND.

CULLODEN (57° 30′ N., 4° 5′ W.), moor, 6 miles N.E. of Inverness, Scotland; scene of defeat of Prince Charles Edward by Duke of Cumberland, April 16, 1746 (also called *Drummossie Muir*); fine examples of stone circles on neighbouring plain of Clava.

CULM, shales and limestones in coal measures of Lower Carboniferous system; term first applied to Devonshire strata, then extended to corresponding stages elsewhere, containing the characteristic fossil *Posidonomya*.

E. A. N. Arber, *On the Upper Carboniferous Rocks of W. Devon and N. Cornwall*, Q.J.G.S., lxiii. (1907).

CULMINATION, reaching of highest point; (astron.) points where heavenly body crosses meridian.

CULROSS (56° 4′ N., 3° 38′ W.), town, on Firth of

Forth, Fifeshire, Scotland; remains of Cistercian abbey (1217); formerly extensive coal-field.

CUMACEA, see MALACOSTRACA.

CUMÆ, KYME (40° 50′ N., 15° 5′ E.), earliest Gk. colony in Italy, on W. coast, near Naples; only ruins remain of once flourishing city—Acropolis, Arco Felice (brick arch, 64 ft. high), amphitheatre, etc.; abode of famous Cumæan sibyl (see SIBYLS); probably founded by Chalcidians from Eubœa, *c.* 1050 B.C.; under Rom. rule, *c.* 350 B.C.; destroyed by Neapolitans, 1205; interesting XIX.-cent. excavations.

CUMANÁ (10° 23′ N., 64° 20′ W.), town and port, Gulf of Cariaco, Venezuela; oldest European settlement on S. Amer. continent; almost totally destroyed by earthquake, 1853. Pop. 9000.

CUMBERLAND (54° 45′ N., 3° W.), most n.-westerly county in England, bordered by Scotland and Solway Firth in N. The S.E. of the county is picturesque, with steep and rugged mts. and narrow valleys, lakes, rivers, and waterfalls. The centre is hilly; the W. and N.W. low and flat. C. comprises part of the 'Lake District,' the largest lakes being Ullswater, Derwentwater, Bassenthwaite, Thirlemere, Buttermere, Wastwater, Ennerdale. Chief mts. are Scaw Fell Pike (3210 ft.), Scaw Fell (3162), Helvellyn (3118), Skiddaw (3062), Bow Fell (2960), Cross Fell (2892). The most important rivers are Eden, Esk, and Derwent. The climate is wet and variable specially from July to Oct.; rainfall at Styhead Pass (1077 ft.), 50–244 in. There are numerous small dairies, estates, and farms. Chief towns are Carlisle (great railway centre), Cockermouth (birthplace of Wordsworth), Whitehaven, Workington, Maryport (with coal exports), Wigton, Penrith, and Keswick (a tourist resort, with two fine stone circles in neighbourhood). Cumbria was annexed to England in 1157; for centuries the scene of Anglo-Scottish warfare and Border raids. Area, 1520 sq. miles. Pop. (1911) 265,780.

CUMBERLAND (39° 37′ N., 78° 43′ W.), city, on Potomac, Maryland, U.S.A.; coal; iron and steel industries. Pop. (1910) 21,839.

CUMBERLAND (41° 55′ N., 71° 22′ W.), township, Rhode Island, U.S.A.; granite quarries; coal mines. Pop. (1910) 10,107.

CUMBERLAND, Eng. title (1525 onwards). The family of Clifford were Earls of C., 1525–1643. In 1644 Charles I. created his nephew, Rupert, s. of Frederick Elector Palatine, Duke of C.; the honour has since been given to royal persons, and now belongs to Ernest Augustus, s. and heir of the last king of Hanover, and 3rd Duke of C. of the fifth creation.

CUMBERLAND, RICHARD (1631–1718), Eng. divine and philosopher; ed. at St. Paul's and Cambridge; became bp. of Peterborough. In 1672 he pub. his clumsy but important *De legibus naturæ disquisitio philosophica*, which has been more than once translated. He sought especially to disprove Hobbes's contentions that man is naturally selfish, and that good means to the individual taken by himself simply what he wants, and to the citizen what the sovereign commands. He argues that benevolent impulses (*e.g.* the parental) are as natural as selfish impulses, and further that the natural good of man—i.e. the perfection and happiness of his nature in its highest development—is inseparable from the good of society of which he is an organic member. The good of all, or of as many as possible, is the aim of moral conduct.

CUMBERLAND, RICHARD (1732–1811), Eng. dramatist and novelist; entered diplomatic service and filled numerous government appointments; wrote several novels and epic poems of poor quality, and was a prolific writer for the stage, his plays numbering upwards of fifty. Perhaps the best is a comedy, *The West Indian* (1771). His *Memoirs* constitute a useful commentary on the times.

CUMBERLAND, WILLIAM AUGUSTUS, DUKE OF (1721–65), 3rd s. of George II.; Duke of C., 1726; distinguished general; won great fame at *Fontenoy*, 1745; put down the Jacobite rebellion, 1745–46, winning the battle of *Culloden* and stamping out revolt in the Highlands; fell into disgrace through misfortunes in Seven Years War, but ultimately regained popularity as a politician.

CUMBERLAND MOUNTAINS (36° 50′ N., 83° 10′ W.), chain, forming part of Appalachian system; extends N.E. to S.W. through eastern part of Kentucky into Tennessee; highest altitudes about 2000 ft.; very rocky; fertile valleys; variety of marbles found; numerous caverns.

CUMBERLAND RIVER (36° 50′ N., 88° W.), rises in Cumberland mountains, E. Kentucky; flows S.W. through Kentucky into Tennessee; re-enters Kentucky and joins Ohio near Smithland; course about 650 miles; navigable for steamboats to Nashville (200 miles).

CUMBRAES, THE (55° 45′ N., 4° 55′ W.), two islands, Firth of Clyde, Scotland, between Isle of Bute and Ayrshire; form part of county of Bute. *Great Cumbrae* has circumference of 10½ miles; only town, Millport, summer resort. *Little Cumbrae* has area about one square mile; lighthouse.

CUMIN, CUMMIN (*Cuminum cyminum*), annual herbaceous umbelliferous plant of Mediterranean countries and Asia; seed used for curry powder and therapeutically as carminative.

CUMMING, JOSEPH GEORGE (1812–68), Eng. clergyman and archæologist; author of work on the Isle of Man.

CUMNOCK (55° 28′ N., 4° 16′ W.), town, Ayrshire, Scotland; coal mines in New Cumnock parish.

CUNARD, SIR SAMUEL, Bart. (1787–1865), Anglo-Canadian engineer and shipowner; founder of *Cunard Line*. See STEAMSHIP LINES.

CUNAS, tribe of Panama Indians.

CUNDINAMARCA (*c.* 5° N., 72° W.), department, E. central Colombia, S. America; consists chiefly of plateaux; productive soil; coffee, tobacco, cereals. Area, 8046 sq. miles. Pop. 720,000.

CUNEIFORM, name given to a style of linear and hieroglyphic writing used by the ancients, particularly Babylonians and Assyrians. It consisted to some extent of picture-writing, thus 'foot' and 'star' were represented by drawings resembling those things. This style of writing eventually gave way to the Aramaic form of the Phœnician alphabet, but its use continued almost down to beginning of Christian era.

Booth, *Discovery and Decipherment of the Trilingual Cuneiform Inscriptions* (1902); G. Bertin, *Abridged Grammar of the Languages of the Cuneiform Inscriptions* (1910).

CUNEO (44° 23′ N., 7° 32′ E.), town (and province), Italy; formerly fortified; silk and cotton manufactures. Pop. 27,000.

CUNINA, see HYDROMEDUSÆ.

CUNITZ, MARIA (*c.* 1610–64), Silesian woman astronomer of European reputation.

CUNNINGHAM, ALEXANDER (d. 1730), Scot. scholar.

CUNNINGHAM, ALLAN (1784–1842), Scot. lyric poet and man of letters. Several of his sons were also of a literary turn of mind.

CUNNINGHAM, WILLIAM (1849–), Eng. economist; Archdeacon of Ely, 1907.

CUNNINGHAM, WILLIAM (1805–61), Scot. theologian.

CUPAR, CUPAR FIFE (56° 19′ N., 3° 1′ W.), town, on Eden, Fife, Scotland; contains several fine public buildings; Bell-Baxter school now occupies site of castle of Macduffs, Earls of Fife; agricultural centre; flax-spinning, breweries; native place of Sir David Lyndsay of the Mount. Pop. (1911) 4380.

CUPID (classical myth.), Latin name for Eros, the Gk. god of love; in sculpture and painting a nude boy, blind, winged, and carrying bow and quiver. The beautiful story of the love of C. and Psyche (*q.v.*) is an allegory of the soul's progress to perfection.

CUPOLA, in arch., dome-shaped portion of roof; shallow domed cover for guns, used in fortification.

CUPPING, method employed in surgery to draw blood to relieve a congestion or an inflammation. In dry c. a round glass vessel is heated and immediately applied to the skin, causing the serum to accumulate under it owing to the partial vacuum created. In wet c. small incisions are first made for blood-letting.

CUPRA, name of two ancient Ital. cities in Picenum.—(1) CUPRA MARITIMA (*c.* 43° N., 13° 50′ E.), on Adriatic coast; 48 miles S.S.E. of Ancona. (2) CUPRA MONTANA (*c.* 42° 58′ N., 13° 50′ E.), inland town, 10 miles S.W. of mod. Jesi; mentioned by Pliny and Ptolemy.

CUPRITE (Cu_2O), copper ore, occurring as reddish granular masses or crystals of cubic system, is produced in nature from copper sulphides; found in Cornwall, Arizona, and Urals.

CUPULIFERÆ, botanical group of trees with simple leaves and hard bracts forming cupules. Oak, beech, chestnut are typical representatives.

CURA, CIUDAD DE CURA (10° N., 67° 38′ W.), town, Aragua, Venezuela; commercial centre. Pop. *c.* 13,000.

CURAÇAO, CURAÇOA (12° 10′ N., 69° W.), island, Dutch West Indies, in Caribbean Sea; settled by Spaniards, 1527; taken by Dutch, 1634; chief town, Willemstad, on Bay of St. Anna; salt. Area, 210 sq. miles. Pop. 30,930.

CURAÇAO, liqueur manufactured, chiefly in Holland, from peel of Curaçoa orange.

CURASSOW (*Oracinæ*), large gallinaceous game-birds of S. American forests, one species (*Crax globicera*) in Central America. Females possess white crest and markings.

CURATE (Fr. *curé*), priest having the care or 'cure' of souls; now applied, in Anglican Church, to an assistant clergyman.

CURCI, CARLO MARIA (1810–91), Ital. theologian.

CURCULIONIDÆ, WEEVILS, see under RHYNCHOPHOROUS BEETLES.

CUREL, FRANÇOIS, VICOMTE DE (1854–), Fr. dramatist.

CURÉLY, JEAN NICOLAS (1774–1827), Fr. general; rose from ranks through daring feats under Napoleon; one of greatest leaders of light cavalry.

CURES (*c.* 42° 13′ N., 12° 40′ E.), ancient Sabine town, Italy; birthplace of Tatius and Numa.

CURETES (Gk. *kouretes*).—(1) Priests of Zeus and Rhea in Gk. myth. (2) A tribe which figures in Homer's *Iliad*, and is said by Strabo to have been located in Greece.

CURETON, WILLIAM (1808–64), Eng. ecclesiastic and Orientalist.

CURFEW ('Cover fire'), custom in Middle Ages of tolling a bell at sunset in summer, and 8 p.m. in winter, as a signal for people to extinguish lights and fires; said to have been introduced into England by William I. It was intended as a safeguard against fire.

CURIA, name of the thirty parts into which, according to tradition, Romulus divided Rom. people, there being ten *curiæ* in each of three tribes, ten *gentes* in each curia; members called *curiales*.

CURIA REGIS, name for a Crown Court of Appeal under the Norman kings of England. Ultimately it divided into three courts—Exchequer, Common Pleas, and King's Bench.

CURIA ROMANA, designation of legal and administrative department of papal court (*Corte romana*), the other branches of which are the civil court (*familia*) and court for ecclesiastical ceremonies (*capella*). Decrees emanating from its various subdivisions are known as Acts of Holy See in distinction from Pontifical Acts; its authority, however, emanates from pope who ratifies its acts. It was organised by Sixtus X., 1587; reorganised by Pius X., 1908. Divisions are (1) Tribunals, (2) Offices, (3) Congregations.

(1) There are three TRIBUNALS: the *Penitentiary*, which deals with matters of conscience; the *Rota*, court of ultimate appeal in civil and judicial matters; and *Signatura*, court of cassation. (2) OFFICES are reduced to *Chancery*, which issues papal bulls; *Datary*, which bestows benefices, dispensations, and other 'graces'; the *Camera apostolica*, which administers property of See; the *Palatine secretaries*, including secretariate of state, which administers home and foreign affairs and issues papal briefs, secretary of briefs to princes, and secretary of Latin letters. (3) The CONGREGATIONS are in *personal* subdivisions of Consistory, and of greatest importance. They are: Congregation of Inquisition, which deals with heresy; of the Consistory, which prepares agenda for Consistory, decides on competence of other congregations, erection of dioceses, etc.; of Papal Visitation, of Sacraments, of disciplinary matters, of Council of Trent, of Propaganda, of Index (list of forbidden books), of Liturgy, of Ceremonies, of Indulgences and Relics, of Fabric of St. Peter's, of Loretto, of Education, and of Extraordinary Ecclesiastical Business.

CURIATII, see HORATII.

CURICÓ (34° 37′ S., 71° 23′ W.), province, Chile, S. of Colchagua (area, *c.* 3000 sq. miles); fertile; rich minerals. Pop. (1910) 108,120. Capital, CURICÓ. Pop. 18,000.

CURIE, PIERRE (1859–1906), Fr. physicist; prof. of Physics at Sorbonne; m. MARIE SKLODOWSKA (1867–), with whom he jointly discovered polonium and radium (*q.v.*). In 1903 they received Davy medal of Royal Soc., and shared the Nobel prize for physics with Henri Becquerel. Mme Curie succ. her husband as director of Physics at the Faculty of Sciences in Paris.

CURIO, GAIUS SCRIBONIUS (d. 53 B.C.), Rom. statesman and general of age of Cicero; consul, 76 B.C.; oratory better than his statesmanship. His clever son of same name erected first Rom. amphitheatre.

CURITYBA, CURITIBA (25° 30′ S., 49° 30′ W.), town, Paraná, Brazil; several factories; exports maté. Pop. 50,000.

CURLEW, WHAUP (*Numenius arquatus*), long-billed bird of the family Scolopacidæ, living on northern moors and heaths in summer and sea-shores in winter, known by its peculiar cry. About twenty species are known, *e.g.* whimbrel and titterel. The stone-curlew, or thick-knee (*Œdicnemus*), comes to England in summer.

CURLING, THOMAS BLIGARD (1811–88), Eng. surgeon; pres. Royal Coll. of Surgeons (1873); introduced new surgical treatments and wrote several surgical works.

CURLING, game played on the ice by throwing rounded stones along the surface to a mark; probably of Dutch origin, but has been popular in Scotland at least from the beginning of the XVII. cent., and has latterly spread to England, Canada, Switzerland, and other countries. The stones used are round and somewhat flat, about 9 in. in diameter and from 30 to 50 lb. in weight, fitted with a handle on top; each player in the game has two, the two sides being of a variable number of players, usually four. At each end of the piece of ice, or *rink*, concentric circles are marked on the surface, the centre being termed the *tee*, and the result depends on the nearness of the stones of the respective sides to the tee, the object of the players being to displace the stones of the opposing side in favour of their own. C. is known as 'The Roaring Game'; the players clear a stone's-path with heather-brooms, and shout 'Soop! soop!' (Sweep! sweep!). Tournaments are called 'Bonspiels.'

Rev. John Kerr, *History of Curling* (1890).

CURLL, EDMUND (1675–1747), Eng. publisher; referred to in Pope's *Dunciad*.

CURRAGH (53° 8′ N., 6° 50′ W.), plain, County Kildare, Ireland; famous for its racecourse and military camp; crown property.

CURRAN, JOHN PHILPOT (1750–1817), Irish lawyer and politician; worked for Catholic emancipation and against Union; made famous speeches at Bar; noted for disinterestedness and fearlessness, eloquence and wit; became Master of the Rolls, 1806.

CURRANTS, dried, seedless berries of a dwarf variety of grape-vine cultivated in the Levant, chiefly

in Greece. Garden currants of the white, red, and black variety are fruits of deciduous shrubs of the genus *Ribes*, cultivated in Europe, Siberia, and Canada.

CURRENCY CONFERENCES, international assemblies for establishing uniform *media* of exchange. First met in Paris, 1867, at time of Exhibition; great obstacle to success in Eng. conservatism, but resulted in independent reforms of Germany and U.S.A. Bimetallism was chief subject of subsequent conferences.

CURRIE, SIR DONALD (1825–1909), Scot. shipowner; established 'Castle' Line, 1862, between Liverpool and Calcutta; Castle Line to South Africa was amalgamated with Union Line as 'Union Castle.' See STEAMSHIP LINES.

CURRIE, JAMES (1756–1805), Scot. physician; promoted hydrotherapy and prepared a standard edition of Burns.

CURRY.—(1) Method of dressing leather; (2) to rub down a horse; (3) a pungent Indian condiment of powdered chillies, coriander, etc.; (4) also a dish of meat, fish, or vegetables, etc., in which c. is an ingredient; served with rice.

CURSOR, LUCIUS PAPIRIUS (fl. 325 B.C.), Rom. dictator.

CURSOR MUNDI, Eng. XIII.-cent. religious dialectal poem, dealing with history of the world.

CURTANA, Edward the Confessor's pointless 'Sword of Mercy,' used in Eng. coronations.

CURTEA DE ARGES (45° 40′ N., 24° 40′ E.), town, on Arges, Rumania; one of ancient capitals of Walachia; bp.'s see; cathedral (built XVI. cent.) is finest specimen of Byzantine arch. in Rumania. Pop. 4210.

CURTILAGE, enclosed yard, or piece of land attached to a house; the enclosed courtyards and bailies in baronial mansions.

CURTIN, ANDREW GREGG (1817–94), Amer. statesman and diplomatist; sec. of the Commonwealth, 1854; afterwards gov. of Pennsylvania; did good service to Union in war.

CURTIS, GEORGE TICKNOR (1812–94), Amer. lawyer and writer; incurred popular odium (1852) by remanding fugitive slave to master; best-known work, constitutional history of U.S.A. His bro., BENJAMIN ROBBINS (1809–74), distinguished jurist.

CURTIS, GEORGE WILLIAM (1824–92), Amer. author and reformer.

CURTIUS, ERNST (1814–96), Ger. historian; b. Lübeck; prof. at Berlin Univ.; made excavations in Greece for Ger. Government; wrote numerous archæological works and standard *History of Greece*. His bro., GEORG (1820–85), esteemed philologist.

CURTIUS, MARCUS, Rom. legendary hero. A chasm having opened in the Forum, the soothsayers declared that it could only be filled by throwing into it Rome's best treasure; C., crying that the greatest treasure of Rome was courage, leaped on horseback into the chasm, which immediately closed up.

CURTIUS RUFUS, QUINTUS (date uncertain), Latin author; wrote life of Alexander the Great.

CURULE CHAIR, Rom. chair of state, said to have been used in very early times as an emblem of kingly power.

CURVE.—(1) May be defined as a continuous, singly-infinite system of points. A c. may be regarded as being generated by the motion of a point, which occupies in succession all the different points of the line. We may regard any c. as being defined by a relation or relations existing between the co-ordinates of the moving point, *i.e.* we represent c's by means of equations. Hence we have a means of classifying c's according to the degree of the equations which represent them. This method was due originally to Descartes. Different systems of co-ordinates (as Cartesian, Polar, Trilinear, etc.) may be employed, giving corresponding equations. We shall consider simply Cartesian co-ordinates.

(2) An equation of the first degree in x and y always represents a straight line; thus $ax+by+c=0$ is a straight line, or c. of the first order. An equation of the second degree, as $ax^2+2hxy+by^2+2fx+2gy+c=0$, always represents some conic section. Thus, if h^2 is $< ab$, the equation represents an ellipse; it represents a parabola or a hyperbola if $h^2=$ or is $> ab$, a circle if $a=b$ and $h=0$. It reduces to two straight lines, real or imaginary, if $\Delta=0$. Δ is known as the *discriminant*, and is expressed by the determinant

$$\begin{vmatrix} a, & h, & g \\ h, & b, & f \\ g, & f, & c \end{vmatrix} \equiv abc+2fgh-af^2-bg^2-ch^2.$$

A curve of the third order is called a cubic, one of the fourth order a quadric, and so on. A curve of the mth order has $\frac{1}{2}m(m+3)$ *independent* constants, and can thus be made to satisfy $\frac{1}{2}m(m+3)$ conditions. Thus a curve of order 4 can be made to pass through 14 points.

(3) Any curve of order m is cut by an arbitrary line in m points, for on eliminating y between the two equations we get an equation in x of order m, which has m roots, real or imaginary. To each of these corresponds a value of y, giving m points, real or imaginary. Some of these points may be situated at infinity, and two or more of them may coincide.

(4) The idea of points and lines at infinity plays a very important part in the theory of higher plane curves. Thus, regarding circles as limiting cases of ellipses when the major and minor axes approach equality, and regarding the fact that two ellipses may intersect in four real points, we can show that *all* circles, whether they intersect in two real points or not, pass through two imaginary points at infinity, usually called the circular points at infinity, and denoted by the letters I, J.

(5) The *class* of a curve is, in general, different from the *order* of the curve. A plane curve is of the nth class when from any point in its plane there can be drawn to it n real or imaginary tangents. The relation between the order and the class of a curve is given by one of Plücker's equations, which are relations between the numbers of various singular points, the order m and the class n.

(6) *Singular points.*—These are (i.) the *cusp*, the moving point coming to rest and reversing its motion; (ii.) the *node*, at which the moving point passes through a former position of the point, the two branches of the curve not in general coinciding; (iii.) the *stationary tangent*, the line coming to rest and then reversing the direction of its motion; (iv.) the *double tangent*, a tangent to two points of the curve. If δ is the number of double points or nodes, κ the number of cusps, τ the number of double tangents, i the number of inflections or stationary tangents, Plücker showed that the following relations hold:—

(i.) $n=m(m-1)-2\delta-3\kappa$
(ii.) $i=3m(m-2)-6\delta-8\kappa$
(iii.) $\tau=\frac{1}{2}m(m-2)(m^2-9)-(m^2-m-6)(2\delta+3\kappa)+2\delta(\delta-1)+6\delta\kappa+\frac{3}{2}\kappa(\kappa-1)$
(iv.) $m=n(n-1)-2\tau-3i$
(v.) $\kappa=3n(n-2)-6\tau-8i$
(vi.) $\delta=\frac{1}{2}n(n-2)(n^2-9)-(n^2-n-6)(2\tau+3i)+2\tau(\tau-1)+6\tau i+\frac{3}{2}i(i-1)$.

G. Salmon, *A Treatise on the Higher Plane Curves*.

CURVILINEAR, term in arch. for a kind of decorative tracery.

CURWEN, JOHN (1816–80), Eng. Nonconformist preacher; founded Tonic Sol-Fa musical system.

CURZOLA (42° 55′ N., 16° 55′ E.), island, Adriatic Sea, belonging to Dalmatia, Austria; ancient *Corcyra*; capital, CURZOLA, on E. coast; fortified; has XII.-cent. cathedral; boat-building; fishing. Pop. 17,377.

CURZON OF KEDLESTON, GEORGE NATHANIEL, EARL (1859–), Brit. (Conservative) statesman; Chancellor of Oxford Univ. (1907); app. Under-Sec. for India, 1891; Under-Sec. for Foreign Affairs, 1895; Viceroy of India, 1898. The chief events during his viceroyalty were the Tibet expedition (1904)

and unrest in Bengal (*Swadeshi* Movement and partition of Bengal); promoted education; in 1905 Lord Kitchener opposed him on question of dual control of Indian Army, and C. resigned (1906); cr. earl (1910). He wrote *Russia in Central Asia* (1889); *Persia and the Persian Question* (1892); *Problems of the Far East* (1894); *Principles and Methods of University Reform* (1909).

Lipsett, *Lord Curzon in India* (1903); Lovat Fraser, *India under Curzon* (1911).

CUSA, NICHOLAS OF (1401–64), Ger. ecclesiastic; s. of fisherman; took name from birthplace; maintained superiority of Councils over popes at Council of Basel, but changed his views; made cardinal, 1448; interesting as speculative philosopher and scientist, anticipating neo-Platonism and Copernican theory.

CUSH, son of the Biblical Ham, after whom is named the land of Cush, in Upper Egypt.

CUSHING, CALEB (1800–79), Amer. statesman, jurist, and diplomatist; originally Jeffersonian Republican, but became Whig; did great service in Southern War, codifying laws, etc., but mistrusted by party.

CUSHING, WILLIAM BARKER (1842–74), Amer. naval commander.

CUSHMAN, CHARLOTTE SAUNDERS (1816–76), Amer. Shakespearean actress.

CUSP, in arch., point where tracery intersects.

CUSTARD APPLE, edible fruit of different species of *Anona*, shrubs and trees of tropical America and India.

CUSTER, GEORGE ARMSTRONG (1839–76), Amer. general; distinguished himself in war with Confederate States; led campaigns against Indians, in last of which he and his party, including his bro., Lieut.-Col. Thomas Ward C., were massacred.

CUSTINE, ADAM PHILIPPE, COMTE DE (1740–93), Fr. general; condemned as traitor and guillotined; see remarkable memoirs of his dau.-in-law.

CUSTOMARY FREEHOLD, in law, a kind of copyhold tenure.

CUSTOMS, see TARIFF.

CUSTOS ROTULORUM, leading county justice of peace, and keeper of the records.

CUSTOZZA (45° 22′ N., 10° 47′ E.), village, Verona, Italy; scene of Austrian victories over Piedmontese, 1848, over Italians, 1866.

CÜSTRIN, KÜSTRIN (52° 35′ N., 14° 37′ E.), fortified town, Brandenburg, Prussia, at confluence of Warthe and Oder; has considerable river trade; manufactures machinery, pianos, furniture, etc. Pop. 17,400.

CUTCH, KACH (22° 47′ to 24° 40′ N., 68° 26′ to 71° 45′ E.), principality between Gujarat and Sind, forming a kind of peninsula, on W. coast of Brit. India; area, 7616 sq. miles; frequent earthquakes; governed by native chief under Brit. protection. N. and E. lies the *Runn of Cutch*, which is flooded half the year, and converts C. into an island. When not flooded, the Runn is mostly a desert with a deposit of salt. Pop. (1910) 513,529.

CUTCH, GULF OF (23° N., 70° E.), arm of Indian Ocean, between peninsulas of Cutch and Kathiawar.

CUTHBERT, ST. (d. 687), Scot. Evangelist; b. S.E. Scotland; joined Melrose Abbey, becoming prior; later prior of Lindisfarne, bp. of Hexham, and bp. of Lindisfarne; preferred hermit life; converted Scotland, from Forth to Tweed, to Christianity; biography by Bede; famed during life and after death for sanctity, asceticism, and evangelising power.

A. C. Fryer, *Cuthbert of Lindisfarne* (1880).

CUTLASS, CUTLAS, COUBTELAS, sailors' sword with curved blade; used with cutting, not thrusting, movement.

CUTLER, MANASSEH (1742–1823), Amer. Congregational preacher and educationist.

CUTLERY, general term originally applied to edged or cutting instruments. Modern c., while including forks, does not include certain cutting-tools, *e.g.* carpenter's tools—chisels, saws, etc. Surgical instruments and gardening implements (sickles, pruning-hooks, etc.) come under the term; domestic c. includes table-knives, forks, razors, scissors, pocket-knives, etc. Sheffield has long been the chief centre of the industry in England. In manufacture of knives, etc., the order is—forging, tempering, grinding, polishing, fitting, finishing. Cheap knives are made by machinery. A razor is made from a steel bar the thickness of its back; it is shaped roughly by hammer, ground, tempered, ground again, and finished by lapping and polishing. Scissor blades are made from flat steel bars. Forks are formed by dies; cheap forks are cast.

CUTTACK, KATAK (20° 29′ N., 86° E.), city, Bihar and Orissa, India, 220 miles S.W. of Calcutta; seat of Ravenshaw Coll., and famous for gold and silver filigree work; capital of CUTTACK—a district in Orissa bounded on E. by Bay of Bengal, and embracing delta of Mahanuddy. There is a canal to False Point. Pop. (1911) 51,347.

CUTTLE-BONE, see under CEPHALOPODA.

CUTTLEFISH, see CEPHALOPODA.

CUTTS OF GOWRAN, JOHN, BARON (1661–1707), Eng. writer, general, and diplomatist; distinguished in Irish wars, 1690–91, at siege of Namur, and under Marlborough; subject of Swift's *Ode to a Salamander*.

CUVIER, GEORGES LÉOPOLD CHRÉTIEN FRÉDÉRIC DAGOBERT (1769–1832), Fr. anatomist; assistant, later prof. in the Jardin des Plantes, Paris; made painstaking researches in comparative anatomy and palæontology, especially of molluscs and vertebrates and fossil reptiles and mammals. He engaged in a controversy against evolution theories propounded by Lamarck and Geoffroy Saint-Hilaire. His numerous research papers were embodied in his classical work, *Le règne animal* (1817; 2nd, 1830). He also rendered valuable national services to Public Instruction and the Fr. Prot. Church.

Sarah Lee, *Memoirs of Baron Cuvier* (1833).

CUVILLES, FRANÇOIS DE (fl. 1740), Fr. engraver and architect.

CUXHAVEN, KUXHAVEN (53° 52′ N., 8° 41′ E.), fortified town, at mouth of Elbe, Hamburg State, Germany; fine harbour; free port; sea-fishing. Pop. (1910) 14,888.

CUYABA, CUIABA (15° 30′ S., 55° 38′ W.), town, Brazil; formerly centre of rich goldfields. Pop. 36,000.

CUYAPO (15° 50′ N., 120° 43′ E.), town, Luzon, Philippine Islands; rice. Pop. 17,000.

CUYP, ALBERT (1620–91), Dutch artist; famous for landscapes. His f., JACOB GERRITZ (1575–1649), was also noted as an artist.

CUZA, ALEXANDER JOHN (1820–73), prince of Rumania; abdicated.

CUZCO.—(1) (13° 30′ S., 72° 4′ W.) city, Peru, in valley of Andes; founded by Manco Capac, XI. cent.; ancient capital of the Incas; site of famous Temple of the Sun, now occupied by Dominican convent; remains of gigantic fortress and other Inca arch.; taken by Pizarro, 1533; bp.'s see; cathedral, univ.; chief manufacture, cotton and woollen goods. Pop. 30,000. (2) department, Peru; area, 155,950 sq. miles. Pop. 329,000.

CYAMIDÆ, see MALACOSTRACA.

CYANIC ACID (CNOH), volatile acid liquid, polymerising above 0° to two solids, cyanuric acid, $C_3N_3O_3H_3$, and cyamelide (CNOH). C. a. salts are termed cyanates, ammonium cyanate being of interest, as the first synthesis of an 'organic' compound from 'inorganic' substances was carried out by Wöhler (1828) by heating it with water, thereby forming urea.

CYANIDE, a metallic salt of hydrocyanic (prussic) acid. Potassium cyanide is used in extracting gold. See PRUSSIC ACID, GOLD.

CYANITE (Al_2SiO_5), sky-blue mineral occurring as long flat crystals in gneiss and mica schists.

CYANOGEN (C_2N_2), colourless, poisonous gas,

burning with a purple flame. M.P. −34·4°; B.P. −25°. C. acts like a radicle, *i.e.* like an element in forming compounds.

CYAXARES, king of Media in late VII. and early VI. cent's B.C.; conquered Scythians and Assyrians, destroying Nineveh, 606; founded Median empire.

CYBELE (classical myth.), Phrygian goddess of fruitfulness, and mother of the gods; in Gk. *Rhea*.

CYCLADES (37° N., 25° E.), group of islands in Ægean Sea; of volcanic origin; generally mountainous; mostly fertile; among principal are Andros, Paros, Delos (*q.v.*), Melos (*q.v.*), Tinos, Myconos, Naxos, Thera, Ceos; form separate nome of kingdom of Greece; export emery. Area, 1042 sq. miles. Pop. 130,370.

CYCLAMEN, genus of primulaceous plants of Central and S. Europe; many species cultivated in Britain for their beautiful foliage and numerous winter and spring flowers. Sow-bread (*C. europæum*) grows wild in S.E. England.

CYCLING, the use of a bicycle as a means of locomotion. This pastime has undergone many changes since the early days of the XIX. cent. when the 'dandy-horse,' a two-wheeled structure propelled by [illegible] the ground with each foot in turn, afforded pleasure to the young men of the period. Pedals fixed to cranks connected with the back wheel were introduced about 1840. In the 'boneshaker' (1866) the pedals were arranged to turn the front wheel. The introduction of rubber tyres, some years later, rendered this instrument of torture somewhat less terrible, and with the adoption of one large fore wheel and a small back one, cycling was made moderately pleasant. In 1885 the 'Starley Rover,' with two wheels of equal diameter, and driven by a chain passing over a gear-wheel, revolutionised c. Later improvements have been steel wire tension spokes (1870); ball bearings (1877); Dunlop's pneumatic tyres (1888); 'free-wheel' (1901), rim-brake, changeable gear. The cycle is extensively used by the military; and cyclist corps have the dispatch of mounted infantry. For MOTOR CYCLE, see MOTOR CAR.

Sharp, *Bicycles and Tricycles* (1896); Hillier, *The Art of Ease in Cycling* (1899) and *Cycling* (1895, Badminton Library); Chalmers, *The Law as it affects Cyclists* (1899).

CYCLOID, curve traced by a point on the periphery of circle rolling in a plane along a line. When the tracing point is within the circle the resulting curve is termed a prolate, when without, a curtate c. Both the latter curves are known as trochoids.

T. H. Eagles, *Constructive Geometry of Plane Curves*.

CYCLONE, an eddy or circling current of air formed by the meeting of a polar current of cold air with an equatorial current of warm air. At the centre of the eddy the barometer is lowest. The direction of the wind is from places where the atmosphere pressure is high to places where it is low, but the centre of the c. is comparatively calm, the full force of the wind being felt where the barometric differences are most marked. The term ANTI-CYCLONE is applied to the belt of high pressure surrounding the cyclonic area. As the lowest barometrical readings indicate the centre of the c., so the highest readings mark the locality of the anti-c. Hurricanes, typhoons, and tropical storms are typical forms of c. See METEOROLOGY.

CYCLOPEAN MASONRY, name given to the rude wall-building of the ancient Greeks and Etruscans, in which huge blocks of unshaped rock were used.

CYCLOPES, or **CYCLOPS** (classical myth.), race of giants in which two sets are mentioned. Homer's C. are a wild race led by their one-eyed chief, Polyphemus. The C. of the older tradition are three Titans each with one eye in the centre of his forehead; these three forged Jove's thunderbolts.

CYCLOSTOMATA, MARSIPOBRANCHII, group of primitive eel-shaped fishes with round mouths, adapted for sucking, without jaws, without scales and paired fins, and possessing paired gill-pouches. The skeleton is wholly cartilaginous and the notochord persists throughout adult life. They are semi-parasitic, preying on fishes, and widely distributed, the hag (*Myxine*) and the lamprey (*Petromyzon*) being two divergent representative types, the extinct Ostracoderms and Palæospondylus having doubtful affinities. The lampreys, occurring in fresh water as well as the sea, suck themselves on to other fishes and rasp off the flesh with the teeth on their 'tongue,' while the hags, which are exclusively marine, are still more destructive, devouring all the soft parts and only leaving the skin and skeleton of their prey. See ANIMALS.

CYCLOSTYLE, term used in arch. in reference to building consisting of columns arranged in circular form.

CYGNUS, 'Swan' constellation of N. hemisphere between Pegasus and Lyra—61 Cygni is the nearest star except σ Centauri.

CYLINDER, surface traced by a straight line rotating round a parallel straight line as axis; also the space contained between such a surface and two parallel planes either perpendicular (right c.) or oblique (oblique c.) to the axis.

CYLLENE (37° 56′ N., 22° 24′ E.), mountain, Greece, N.E. of Arcadia; sacred to Hermes; modern Ziria.

CYMA, term in arch. for double-curved moulding.

CYMBALS, musical instruments dating from prehistoric times. The modern c's consist of thin circular metal plates (tin and copper alloy), which are clashed, or rubbed, together.

CYMOSE, see FLOWER.

CYNEGILS (d. 643), king of Wessex; Christianised.

CYNEWULF (d. 785), king of Wessex.

CYNEWULF (fl. 750), Old Eng. poet; nothing known of life; four poems, *Christ*, *Juliana*, *Helene*, and *The Fates of the Apostles*, proved to be his by insertion of his name in Runic letters in text; poetry shows feeling for nature, especially in stormy moods.

CYNICS, THE, a Gk. philosophical school founded by Antisthenes (b. c. 436 B.C.), an acquaintance of Socrates. Diogenes of Sinope (reported to have lived in a tub) is its best-known member. They held that virtue is the only good, vice the only evil, everything else indifferent or even contemptible. Hence they wished to discard all the gains of civilisation, and preached a 'return to nature,' which was often exaggerated into a dirty shamelessness. See ETHICS.

CYNIPIDÆ, see GALL-FLIES.

CYNOCEPHALUS, see under CERCOPITHECIDÆ.

CYNOPITHECUS, see under CERCOPITHECIDÆ.

CYNOSURE (Lat. *cynosura*), ancient name for the 'Little Bear' constellation; hence anything which draws the attention.

CYPERACEÆ, widely distributed order of grass or rush-like herbs, comprising about 70 genera with 3000 species; many are marsh plants. Papyrus, bulrushes, sedges, and cotton-grass are common representatives.

CY-PRÈS, see TRUSTS.

CYPRESS (*Cupressus*), genus of aromatic, dark, evergreen, cone-bearing trees, comprising 15 species of S. Europe, W. Asia, Himalayas, China, Japan, U.S.A., and Mexico. *C. sempervirens* is the characteristic tree of Mediterranean countries, and its wood was prized by the ancients for durability. Several varieties are cultivated in Britain for ornamental purposes. The tree receives its name from Cyparissus, a youth who grieved so much for a stag that the gods changed him into a c. tree; hence the association of the c. with death and mourning.

CYPRIAN, ST. (c. 200–58), bp. of Carthage; converted from paganism to Christianity; made bp. 248–49; after various conflicts between Christians and the State, C. was beheaded by order of the Emperor Valerian; one of most remarkable Fathers of the Church, and writer of treatises important for patristic history.

CYPRINIDÆ, see CARPS.

CYPRINODONTIDÆ, family of ovo-viviparous

Teleostean fishes allied to carps, but provided with teeth. The allied *Amblyopsidæ* comprise remarkable blind species living in N. American caves. See KILLIFISHES.

S. Garman, in *Mem. Mus. Comp. Zool.*, xix. (1895); C. H. Eigenmann, *Archiv für Entwickelungs mechanik*, vii. p. 545 (1899).

CYPRUS (35° N., 33° E.), third largest island in Mediterranean; 60 miles W. of Syria, 40 miles S. of Asia Minor. C. belongs nominally to Turkey, but is occupied and administered by Britain, and governed by a High Commissioner. Its length is 140 miles, including Karpas Peninsula; breadth, 60 miles; area, *c.* 3600 sq. miles. In N. are two ranges of mountains, and one in S., with Mt. Troödos (6400 ft.). In the centre is a low-lying fertile plain. Rivers are generally dry beds; torrents after heavy rains and snow melting.

History.—C. is Chittim of Old Testament; colonised by Phœnicians, *c.* 1000 B.C.; held in turn by Egyptians, Assyrians, Persians, Greeks, and returned to Egypt till 58 B.C., when it became a Rom. province. Then came Saracens and Byzantines. Taken by Richard *Cœur de Lion*, C. was presented in 1192 to Guy de Lusignan; conquered by Genoese, 1373; sold to Venetians, 1489; captured by Turks, 1571. In 1878 C. came into hands of Britain, by treaty with the Porte, and is to remain under Brit. administration until Batum and Kars are restored to Turkey by Russia. The High Commissioner is assisted by a Legislative Council (partly elected). C. is famed for its antiquarian treasures, chiefly brought to light since General di Cesnola began excavations (1866).

Irrigation is effected by wells and a canal. Climate is good, except in hot seasons, when fever is prevalent in low-lying regions. The Cyprus sheep (*moufflon*) has become exceedingly scarce. There are few wild animals, but goats overrun the island to the destruction of trees. Forests formerly yielded much material for shipbuilding, and were of some extent and fame, but have almost entirely vanished; climate and soil have suffered accordingly. Locusts (once a terrible pest) have been nearly exterminated.

C. was famed of old for copper (from which its name is derived), but little is worked now. Salt is mined and procured by evaporation. Most important products are wheat, barley, locust beans, cotton, silk, flax, tobacco, wool, gypsum, fruits, sponges, and large quantities of wine. Splendid mules are bred. Under Brit. administration the island has greatly improved, materially and otherwise.

The principal towns are Nicosia (capital), Larnaca, Limasol, Famagusta. The inhabitants mostly belong to the Gk. Church, but there are many Muhammadans. Pop. (1911) 274,100.

Hutchinson and Cobham, *A Handbook of Cyprus* (1907); Cobham, *Bibliography of Cyprus* (1908).

CYPRUS, CHURCH OF, independent but orthodox-Gk. church, its status being confirmed by general councils and the Byzantine Empire.

CYPSELUS (657–627 B.C.), tyrant of Corinth; famous builder and patron of art.

CYRANO DE BERGERAC, SAVINIEN (1620–55), Fr. soldier, novelist, and dramatist; wrote plays on classical model, and scientific-romantic stories; notorious for reckless bravery, duels, and free-thinking; subject of play by Rostand.

CYRENAICA (*c.* 31° N., 21° E.), district on N. African coast; boundaries ill-defined, but modern C. is considered larger than ancient C. Northern half in ancient history was called Pentapolis, having five considerable towns: Barca and Cyrene, inland; Hesperis (later Berenice), Apollonia, Teucheira (later Arsinoë), on coast. After some 500 years' prosperity, C. declined about 100 B.C.; interesting ruins. As result of Turco-Italian War (*q.v.*), 1911–12, C. or BENGAZI passed to Italy along with Tripoli. Area, *c.* 30,000 sq. miles. Pop. 250,000.

CYRENAICS, THE, a Gk. philosophical school founded by Aristippus of Cyrene (*c.* 435–360 B.C.), an acquaintance of Socrates. They held that the only good is the pleasure of the moment, and all else valuable only in so far as it produces pleasure. Aristippus himself, though thoroughly a 'man of the world,' valued wisdom and culture as liberating a man from external circumstances; his followers often fell either into licentiousness or into disillusioned pessimism. See ETHICS.

CYRENE (32° 46′ N., 21° 53′ E.), original capital of ancient district of Cyrenaica (*q.v.*), N. Africa; situated on crest of Jebel Akhdar, about 10 miles inland; now in complete ruins; built about middle of VII. cent. B.C., and said to have been called after a local nymph; became a great city and passed to Rome in 96 B.C.; mostly ruined before Christian era, and became deserted till Arab conquest (641 A.D.); said to have once had a population of over 100,000.

CYRIL (315–86), bp. of Jerusalem; famed for addresses to catechumens.

CYRIL (*c.* 376–444), bp. of Alexandria. As patriarch of Alexandria expelled Jews, and in zeal against heretics is said to have instigated murder of Hypatia; defeated Nestorius at Council of Ephesus, 431; works valuable in patristic literature.

CYRIL (827–69), Gk. missionary to Slavs; supposed inventor of 'Cyrillic' alphabet. His bro., Methodius, shared his life-work.

CYRILLUS (V. cent.), Gk. jurist.

CYRTO-STYLE, term in arch. for a columned circular portico.

CYRUS, name of two great Persian rulers. CYRUS THE GREAT: modern dispute as to his origin; succ. to throne of Anzan, *c.* 558 B.C.; overthrew his suzerain Astyages, king of the Medes, 550, and became sole ruler of Medes and Persians; defeated Crœsus of Lydia, and annexed Lydia, 546; overran Asia Minor; captured Babylon and annexed its dominions, 539; slain in warfare with savage tribes of eastern frontier, 528.

See *History of Greece*, by Firth, Grote, Norton, Oman.

CYRUS THE YOUNGER, younger s. of Darius II. of Persia; in Peloponnesian War gave important help to Spartans, who assisted him in attempt to overturn government of bro., Artaxerxes, and obtained insight into military weakness of Persia; slain at *Cunaxa*, 401.

CYSTICERCUS, larval TAPEWORM (*q.v.*).

CYSTITIS, see BLADDER.

CYSTOFLAGELLATA, or RHYNCHOFLAGELLATA, group of Protozoa provided with two unequal flagella, the larger forming a kind of tentacle, a pharynx and a pellicle covering the ectoplasm. Reproduction takes place by fission, and, after conjugation, by formation of spores. The apple-shaped *Noctiluca*, the disk-shaped *Leptodiscus*, and jellyfish-like *Craspedotella* occur in great numbers in the sea, manifesting their presence despite their size (0·15–1·5 mm.) by their phosphorescence at night. See PROTOZOA.

CYSTOLITH, concretion of calcium carbonate in cellulose matrix of some plant cells, as in the leaves of the india-rubber plant.

CYTHERA (36° 15′ N., 23° E.), one of Ionian Islands, S. of Laconia, Greece; modern Cerigo; in ancient times had magnificent temple to Aphrodite; surface mostly rocky; capital, Capsali; wine, corn.

CYTISINE ($C_{11}H_{14}N_2O$), alkaloid occurring in seeds of laburnum and furze.

CYTOLOGY, the branch of biology (*q.v.*) treating of the structure, functions, and life-history of cells. The study of cells as component parts of normal tissues is termed histology (*q.v.*). Hooke was the first to observe (1665) with the aid of primitive lenses small cavities in cork and kindred vegetable substances, which he called cells. After Malpighi (1674) and Grew (1682) had extended this knowledge by discovering that plant cells were provided with firm walls and contained a fluid, and Treviranus (1806) had observed the formation of tubes and vessels by the breaking down of the walls of adjoining cells, Schleiden (1838)

laid the foundations of modern c. by recognising the importance of the cell nucleus discovered by R. Brown seven years previously. To Schwann (1839) is due the discovery, already foreshadowed by J. Müller, Henle, and Purkinje, that animals likewise are composed of cells, and that embryonic cells differentiate into muscle, nerve, and other cells. Research was stimulated, and Nägeli, Kölliker, Remak, Leydig, Cohn, de Bary, and others began to realise that the cell-wall was of subordinate importance. Max Schultze finally showed that 'cell' was a misnomer, and that all plants and animals consist of unit masses of protoplasm, or living matter, frequently but not necessarily surrounded by membrane. The growing conviction that all cells originate from pre-existing cells was formulated by Virchow (1858) in his famous aphorism, *Omnis cellula e cellula*. Improvements in optical instruments and laboratory technique have progressed with the science, and names like van Beneden, Boveri, Delage, Driesch, Flemming, Haeckel, O. and R. Hertwig, T. H. Morgan, Strasburger, Weismann, and E. B. Wilson are only a few of the well-known students of modern cytology. See CELL.

CYTOPLASM, see CELL.

CYZICUS (40° 25′ N., 27° 50′ E.), ancient Gk. town, on peninsula of Mysia, Sea of Marmora, Asia Minor; besieged by Mithridates, 75 B.C.; ruined by earthquake, A.D. 1063.

CZARNIECKI, STEPHAN (1599–1665), Polish military commander; prevented conquest of Poland by Sweden, obstinately defending Cracow and repairing disaster of *Warsaw*; defeated Russia.

CZARTORYSKI, ADAM GEORG, PRINCE (1770–1861), Polish statesman; family estates confiscated at third partition of Poland; made Russ. Adjunct of Foreign Affairs (1804), and proposed erection of Polish kingdom under protection of Russia; on establishment of kingdom, largely through his means, held high office for long, but ultimately disapproved of preponderance of revolutionary party.

CZARTORYSKI, FRYDERYK MICHAL, PRINCE (1696–1775), Polish statesman; formed alliance with Russia, Austria, and England against Prussia and France, and left great name as patriot and reformer.

CZECHS, Slavic people, to number of 8,000,000, living in Bohemia (Czechy) and parts of Moravia, Silesia, and Hungary, who employ a written language different from that in general use in Bohemia.

Bourlier, *Les Tchèques* (1897); W. R. Morfill, *Grammar of the Bohemian or Czech Language* (1899), *Slavonic Literature* (1910).

CZENSTOCHOWA, CHENSTOKHOV (50° 49′ N., 19° 3′ E.), town, on Wartha, Russ. Poland; place of pilgrimage; cotton and woollen goods. Pop. (1910) 69,900.

CZERNÓWITZ (48° 17′ N., 25° 57′ E.), town, capital of Bukovina, Austria, on Pruth; seat of Gk. abp.; has cathedral and univ.; active trade in agricultural produce. Pop. (1910) 87,128.

CZERNY, KARL (1791–1857), Austrian composer and pianist; pupil of Beethoven; teacher of Liszt.

D, 4th letter of alphabet; Semitic *daleth* meant 'a door,' as did the Gk. derivative *delta*; *d* may be voiceless (e.g. *rapped*), assimilated (e.g. *gospel* = God's spell, *accept* = ad ceptum).

DA COSTA, ISAAK (1798–1860), Dutch theologian and poet.

DA GAMA, VASCO (*c.* 1460–1524), Portug. navigator; b. Sines in Alem-Tejo; first to reach India by Cape route, 1498; founded Portug. colonies on E. African coast; second voyage to Calicut, 1502; app. Viceroy of India, 1524, but d. soon after; celebrated in Camoens' *Lusiads*; gave Portugal vast power and riches, and opened door to East.

Stanley, *Three Voyages of Vasco da Gama*; Jayne, *Vasco da Gama*; Colvin, *The Cape of Adventure*.

DACCA (23° 45′ N., 90° 23′ E.), town, Bengal, India, on Burigunga River; Government headquarters for part of year (July–Sept.); capital of Eastern Bengal and Assam, 1905–12; formerly celebrated for magnificence; seat of projected teaching univ.; has a coll. and ruins of many Muhammadan public buildings; manufactures cotton cloth, gold and silver work, shell-work, and pottery; a jute-trade centre. Pop. (1911) 108,551. DACCA DIVISION has area of 15,937 sq. miles. Pop. *c.* 13,000,000. DACCA DISTRICT, area, 2782 sq. miles. Pop. *c.* 3,000,000.

DACE, DARE or **DART** (*Leuciscus vulgaris*), European cyprinoid fish living in clear, still streams. In N. America the name is applied to Minnilus, Semotilus, and other fishes of the same family.

DACH, SIMON (1605–59), Ger. poet and hymnologist.

DACIA (46° N., 24° E.), ancient land of the DACI; district of Central Europe, including E. part of Hungary Proper, Transylvania, and Rumania; bounded by Carpathians and Danube. Inhabitants were Thracians; fairly civilised when first known by Romans, who conquered them after long struggle (*c.* 100 B.C.).

DACIER, ANDRÉ (1651–1722), Fr. classical scholar.

DACIER, ANNE LEFÈVRE (1654–1720), Fr. scholar; wife of above; trans. Homer.

DACITE, volcanic rocks, allied to andesite, consisting of quartz, plagioclase, felspar, hornblende, biotite, and pyroxene; found chiefly in Hungary, Scotland, Greece, and N. America.

DACOIT, member of armed gang of Ind. robbers.

DÆDALUS (classical myth.), constructor for Minos of the Cretan labyrinth; made wings for himself and his s., Icarus.

DAFFODIL (*Narcissus pseudo-narcissus*), bulbous plant of the order Amaryllidaceæ; wild in Europe, numerous varieties cultivated as garden flowers.

Bourne, *Book of the Daffodil* (1903); Jacob, *Daffodils* (Present-Day Gardening).

DAFYDD AB GWILYM (1340–1400), see CELTS (WELSH LIT.). Lewis Jones, *Life* (1911).

DAGGER, a short, pointed, and edged weapon for stabbing; formerly part of civil costume of persons with right to bear arms; still worn in East, and by Highland officers and Brit. midshipmen.

DAGHESTAN (42° 23′ N., 46° 30′ E.), province, Russia, in Transcaucasia, extending along W. coast of Caspian Sea; area, 11,471 sq. miles; mostly mountainous; thickly wooded; well-watered; fertile valleys; dry climate; minerals found; inhabitants chiefly Lesghians; leading industry, sheep and cattle breeding; products—grain, cotton, silk, fruit; capital, Temirkhan-shura. Pop. (1910) 675,800.

DAGO, slang term for Span., Portug., and Ital. sailors and others belonging to the Mediterranean littoral.

DAGOBERT I. (d. 639), greatest of Merovingian kings; succ. his f. as king of the Franks, 629, curbed disorder of nobles and Church, encouraged art, sent out Christian missionaries, made equal alliance with Byzantine empire.

DAGON, Philistine fish-deity, worshipped at Gaza and Ashdod.

DAGUERRE, LOUIS JACQUES MANDÉ (1789–1851), Fr. painter of panoramic views; invented the diorama, and after prolonged experiments with J. N. Niepce, later alone, the *daguerrotype*, the forerunner of modern photography. The discovery was made public by Arago in 1839. See PHOTOGRAPHY.

DAGUPAN (16° 2′ N., 120° 40′ E.), town, in Gulf of Lingayen, Luzon, Philippine Islands; commercial centre; exports sugar, indigo, rice, and salt. Pop. 20,000.

DAHABEAH, Arab. name for Nile passenger boat.

DAHL, JOHANN CHRISTIAN (1778–1857), Nor. landscape artist.

DAHL, MICHAEL (1656–1743), Swed. artist; portraits at Hampton Court.

DAHL, VLADIMIR IVANOVICH (1802–72), Russ. novelist and philologist.

DAHLBERG, ERIK JOHANSEN, COUNT (1625–1703), Swed. military engineer.

DAHLGREN, JOHN ADOLF (1809–70), Amer. naval commander.

DAHLGREN, KARL FREDRIK (1791–1844), Swed. poet.

DAHLIA, genus of tuberous-rooted herbs with composite flowers indigenous in Mexico and Central America. Many varieties are popular garden plants.

Gordon, *Dahlias* (Present-Day Gardening).

DAHLMANN, FRIEDRICH CHRISTOPH (1785–1860), Ger. author and politician; app. prof. at Kiel, 1812, and stirred up patriotic feeling in Schleswig-Holstein against Denmark; obtained chair at Göttingen, 1829; banished after protest of Göttingen prof's, 1837, against dictate of king of Hanover; wrote valuable hist. works and took important part in bringing about union of Germany, 1849.

DAHLSTJERNA, GUNNO (1661–1709), Swed. poet.

DAHN, JULIUS SOPHUS FELIX (1834), Ger. poet, prof., historian, and jurisconsult; rector of Breslau Univ., 1895.

DAHOMEY (7° 25′ N., 1° 30′ E.), division of W. Africa, belonging to France; situated on coast and stretching inland; bounded by Ger. Togoland on W.; Lagos and Yoruba on E.; and by Gulf of Guinea on S.; capital, Porto Novo; area, *c.* 60,000 sq. miles. Coast (extending *c.* 80 miles) consists largely of islands and swamps, separated by lagoons and channels, and protected from the ocean by long barrier of sand, which affords good navigation. The interior is fairly level, with gentle slope and plain stretching from Great Swamp in direction of Kong Mts.; several mt. ranges; many springs and small rivers which flow into Avon and Denham lagoons; magnificent forests—baobob—palms and fruit trees. Among wild animals are the lion, elephant, leopard, hippopotamus, and monkey. Oil-palms grow generally in neighbourhood of towns, and large quantities of palm-oil are made. Important settlements are Abomey (former capital), Allada, and Sayi. People are good agriculturists and potters; many well-cultivated farms to be seen on coast.

D. state dates back to XVIII. cent.; formerly ruled by absolute monarchs who were deified; last ruler deposed by French in 1900, the kingdom having been

entirely won over by 1894. Fetish-worship formerly prevailed and serpent worship on the coast with savage and murderous rites; once notorious for slave-trading ('Slave Coast'). Pop. 749,000.

Toutée, *Dahomé, etc.* (1897), and *Du Dahomé au Sahara* (1899); *Le Dahomey* (official publication, 1909).

DAILLE, JEAN (1594–1670), Fr. Prot. preacher and controversialist.

DAIRYING is the department of farming concerned with milk and its products. Milk (*q.v.*), the most complete, and one of the most important forms of human nourishment, has, according to local circumstances, been obtained from goats, ewes, asses, mares, camels, reindeer, and other animals, but the milch-cow is the universal and best provider. Shorthorn, Polled Angus, Dutch, Jersey, and Guernsey, and numerous other cattle (*q.v.*) are specially bred for dairy purposes. According to breed and environment, cows have been known to produce more than 1000 gallons of milk in a year, but 600 gallons is a fair annual average. The milk-producing value of different foods has increasingly become the subject of scientific inquiry and application, and their manure value is also a matter of great importance in the economy of the farm. Besides grass, the natural food of the cow, cotton-seed, or other cakes, cabbages, mangels, turnips, and succulent fodder are given, and a plentiful supply of clean, cold water is essential for the production of good milk. For summer dairying calving takes place from March to May, while in the case of winter dairying cows are made to calve at all times of the year to ensure a steady milk supply. Byres for dairy cattle must be kept clean, be well ventilated, drained, and lighted, and the cows should be clean and periodically examined by a veterinarian to guard against tuberculosis and other diseases. It is a matter of course that the most scrupulous cleanliness should be observed in milking and dairying, as few substances are so easily contaminated as milk, and regularity is not only essential for economical reasons, but for the health of the cows. Even the best milking machines have failed to supersede milking by hand.

The milk is immediately removed from the cow-house to a clean, dry room where it is strained through a metal gauze and flannel or cotton cloth, and cooled to about 15° for ordinary purposes, or to 7° for shipment. The cream is either skimmed from the milk with a skimmer, or by a centrifugal separator in which the separated milk and cream are forced out at two different tubes. The separated milk by the latter method contains considerably less fat than the ordinary skim-milk, and is, therefore, of small value for feeding pigs, etc. The cream is then kept in a crock till churning-time. For infants' food the entire milk may be *pasteurised, i.e.* all germs are destroyed by heating it under exclusion of air for about fifteen minutes at a temperature below boiling point, generally 60°. It is sold in hermetically sealed bottles. *Condensed milk* is prepared by evaporating milk with cane-sugar in a vacuum to about ¼ of its original volume, and is used where fresh milk is not procurable, as at sea.

Since the new-milk trade has been increasing at an enormous rate to meet the urban demand, butter- and cheese-making has become a less important adjunct to the farm. Dairy factories, especially in America, have attained a high standard of development by manufacturing butter and cheese of a uniform quality otherwise unobtainable, besides being better able to cope with the fluctuating demand for milk. The cream is churned in an over-end or other churn till granules of *butter* appear, the *butter-milk* drawn off, and the butter when formed washed in the churn till the water used remains clear. The surplus water is squeezed out by a butter-worker and the butter made into pats. *Cheese-making* essentially consists in coagulating milk by heating it to about 30° and adding rennet; the curd is settled by cutting it with special knives. After a process of heating and stirring, the pale yellow fluid called *whey* is drawn off, the curds being cut into slabs and allowed to 'ripen.' In this process the presence of certain bacteria is essential, and in scientific dairying pure cultures are now being used. The curd is salted and pressed, and the cheese formed requires skilful attention till it is ready for the market. Dairy products such as koumiss, kephyr, and humanised milk are now prepared for invalids and children according to the latest results of bacteriological and chemical research.

The principal countries in which dairying is carried on on a large scale are U.S.A., Canada, the U.K., Denmark, Holland, France, Germany, Switzerland, Sweden, and Australasia. The importance of dairying in national economy may be estimated from the fact that in the U.S.A. 2090 million gallons of milk, 1430 million lb. of butter, and 300 million lb. of cheese from more than 17 million cows were produced in 1899. See MILK, BUTTER, CHEESE.

Up-to
Oliver's
Modern Dairy F
Industry.

DAIS, raised floor in mediæval dining-hall, where high table stood.

DAISY, GOWAN (*Bellis perennis*), common composite plant occurring in Europe, Asia Minor, and N. America. The Michaelmas and Christmas daisies are asters.

DAKAR (14° 39′ N., 17° 24′ W.), fortified town, capital of Fr. W. Africa, on Gulf of Goree, Cape Verde; magnificent harbour; chief Fr. port on W. coast. Pop. 18,447.

DAKOTA, NORTH (47° 30′ N., 100° W.), N. central state of U.S.A., bounded on N. by Canadian provinces of Saskatchewan and Manitoba, E. by Minnesota, S. by South Dakota, W. by Montana; area, *c.* 70,800 sq. miles; surface consists mainly of plateaus, undulating plains, and grassy prairies; there are no trees unless along river banks, round shores of lakes, and in sheltered spots; state in some parts well watered, chief rivers being Red River of the N., which forms E. boundary, and its affluents, Mouse (or Souris), Cheyenne, Goose, Park, and Pembina; Missouri, with tributaries Little Missouri, Big Knife, and Cannon Ball; in N.E. is sheet of salt water, Devil's Lake, or Minnewaukon. High plateau called Coteau du Missouri extends from N.W. to S.E., and divides state in two; N. D. contains no great elevations, highest ground to be found in S. of Bowman county.

First successful settlements were made at Pembina; N. D. included in country ceded to U.S.A. from France by Louisiana Purchase, 1803; territories of N. and S. Dakotas organised in 1861, and proclaimed separate states in 1889.

Governor is elected every 2 years; state has 2 representatives in each House of Federal Congress; Senate of 49, House of Representatives of 100 members.

Especially in valley of Red River soil is rich, fertile, and highly cultivated; state famous wheat-growing country; agriculture chief industry; there are extensive farms; principal crops besides wheat are barley, rye, flax, hay, potatoes, and Indian corn; in W. ranching is successfully carried on; chief minerals produced are lignite, sandstone, and clays. Manufactures include flour, paper, and dairy produce, but are of no great importance. Principal towns are Bismarck (capital), Fargo, Grand Forks, and Minot. The climate is healthy, summer is short and winter severe but dry. Pop. (1910) 577,056, including 617 negroes.

DAKOTA, SOUTH (42° 30′ to 45° 57′ N., 96° 27′ to 104° 2′ W.), N. central state, U.S.A.; bounded N. by North Dakota, W. by Montana, Wyoming, S. by Nebraska, E. by Iowa, Minnesota; area, 77,615 sq. miles. Surface generally is undulating prairie land; drained by Missouri, and its tributaries—the Grand, Cheyenne, Bad, White, and other rivers. Principal mts. are the Black Hills in S.W. Climate has great extremes of heat and cold.

S. D. was formerly included in the territory of Dakota, and was organised as a state in 1889. Ad-

ministration is carried out by a gov. and various officers of state; there are 2 representatives in each branch of Federal Congress, and the state has an elected Senate (45) and House of Representatives (104).

The chief towns are Pierre (cap.), Sioux Falls, Lead, and Aberdeen. Principal industry is agriculture; cattle, sheep, horses, mules, and pigs are extensively raised, and wheat, corn, oats, barley, rye, and flax are grown; dairy-farming is carried on, and fruits and vegetables are cultivated. Minerals include gold, silver, tin, and nickel, which occur in the Black Hills district. Manufactures include flour-milling, butter- and cheese-making. Lumbering is carried on in the forest districts of the Black Hills. Education is free and obligatory; Vermilion is seat of State Univ., and there is a Wesleyan Univ. at Mitchell. Religions in order of numerical importance are R.C., Lutheran, Methodist, Congregational, and Prot. Episcopal. The inhabitants include whites, Indians, negroes (817). Pop. (1910) 583,888.

Robinson, *Brief History of South Dakota.*

DALAGUETE (*c.* 10° N., 124° E.), town, at mouth of Tapon, E. coast of Cebú, Philippine Islands. Pop. 22,000.

DALBEATTIE (54° 57′ N., 3° 48′ W.), town, Kirkcudbrightshire, Scotland; important granite quarries in district. Pop. (1911) 3357.

DALBERG, name of Ger. noble family taken from their property of D. They received (1494) right of precedence in obtaining knighthood at coronation of emperor. Prominent members were JOHANN (1445–1503), noted patron of letters, KARL THEODOR ANTON MARIA (1744–1817), important statesman of Empire. The dau. of the last duke was mother of Lord Acton, the Eng. historian.

DALE, ROBERT WILLIAM (1829–95), Eng. Congregational minister, and important exponent of Nonconformist opinion; wrote *History of Congregationalism,* pub. 1907 by his s., SIR ALFRED W. W. DALE (1855–), principal of Liverpool Univ.

DALE, SIR THOMAS (fl. *c.* 1588–1619), Deputy-Gov. of Virginia.

DALECARLIA (61° N., 14° 30′ E.), former province, Sweden, now forming county of Kopparberg.

DALGAIRNS, JOHN DOBREE (1818–76), Eng. R.C. priest and author; formerly member of Church of England.

DALGARNO, GEORGE (d. 1687), Scot. educationist.

DALHOUSIE, FOX MAULE RAMSAY, 11TH EARL OF (1801–74), Brit. administrator.

DALHOUSIE, EARL OF, JAMES ANDREW BROUN-RAMSAY (1812–60), Brit. administrator; b. at Dalhousie Castle, in Midlothian; succ. Gladstone as Pres. of Board of Trade, 1845–46; gov.-gen. of India, 1847–56, during which time British conquered or annexed large dominions, and railways, canals, telegraphs, etc. revolutionised India; cr. marquess, 1849. After war of 1848–49 D. on his own authority annexed Punjab, organised expedition which resulted in annexation of kingdom of Pegu, 1853; introduced policy of considering native states escheats to crown on failure of heirs-male, and thus made pretext for annexation of Nagpore (1853); introduced numerous civilising measures and reformed organisation; allowed large amount of independence to greater native states. Annexation of Oude, 1856, prescribed by home government, 'well-nigh brought our Empire in the east to a setting in gloom and blood'; urged by D. as misrule of king made native rising inevitable; considered, later, crown of D.'s career.

Lee-Warner, *Life of Dalhousie* (1904); Trotter, *Lord Dalhousie*; Sir W. Hunter, *Marquis of Dalhousie* ('Rulers of India').

DALIN, OLAF VON (1708–63), Swed. poet.

DALKEITH (55° 54′ N., 3° 4′ W.), market town, Midlothian, Scotland. Dalkeith Palace is seat of Duke of Buccleuch; D. is important agricultural centre; has weekly grain-markets; carpet-making, iron- and brass-founding are chief industries. Pop. (1911) 7019.

DALKEY (53° 17′ N., 6° 7′ W.), watering-place, on Irish Sea, County Dublin, Ireland.

DALLAS (32° 46′ N., 96° 31′ W.), city, **Texas,** U.S.A., on Trinity; contains univ. and several colls.; flour and woollen mills, foundries; important centre for saddlery and leather goods. Pop. (1910) 92,100.

DALLAS, ALEXANDER JAMES (1759–1817), Scoto-Amer. statesman, lawyer, and writer; famous for success in founding Amer. bank (1817) and financial administration. His bro., ROBERT CHARLES (1754–1824), wrote *Recollections of Lord Byron.*

DALLAS, GEORGE MIFFLIN (1792–1864), Amer. lawyer, diplomatist, and statesman; leader of Conservative Democrats of North; Vice-Pres. of U.S.A., 1845–49; minister to England, 1856–61.

DALL' ONGARO, FRANCESCO (1808–73), Ital. poet and dramatist.

DALLES, THE (45° 33′ N., 121° 1′ W.), city, Oregon, U.S.A.; near T.O., name of rapids in Columbia river and hills. Pop. (1910) 4880.

DALLMEYER, JOHN HENRY (1830–83), Anglo-Ger. optician; manufactured telescopes; authority on photographic lenses; on the council of Royal Photographic and Royal Astronomical Societies. His son, THOMAS RUDOLPH (1859–1906), wrote a well-known book on *Telephotography* (1899).

DALMATIA (44° N., 16° E.), crownland, Austria; a narrow, mountainous country with numerous islands on N.E. coast of Adriatic Sea; bounded by Croatia on N., Bosnia and Herzegovina E. and N.E., Montenegro S.E.; area, 4940 sq. miles; breadth, 2–40 miles; mountain ranges include Velebit and Dinaric Alps (Dinara, *c.* 6000 ft.) and Cattaro Mts. (Orien, 6100 ft.). Coast is mountainous and indented with numerous harbours and bays, the most important being Cattaro, Ragusa, Spalato, Sebenico; many islands, including Pago, Brazza, Lesina, and Curzola. Principal rivers are Narenta in S.; Zermagna, Kerka, and Cettina. Country is mostly pasture-land and woods, and produces timber, wine, oil; shipbuilding is carried on in some islands. Iron, lignite, asphalt, and salt are found; gold formerly. Climate is warmer than rest of Austria-Hungary; sirocco felt in spring; mean annual temp., 59° on coast. Inhabitants are mostly Serbo-Croats and Italians, R.C. and Gk. in religion.

D. was conquered by Romans (*c.* 400 B.C.); occupied by Slavs in VII. cent.; passed to Venice in Middle Ages; became independent republic, then fell into Austria's possession; taken by Napoleon (1805); became united to Italy, then to Illyria, and returned to Austria in 1814. Chief towns are Zera (capital), Spalato, Ragusa; principal agricultural products, Indian corn, rye, barley, and fruits; famed for Maraschino liqueur; large quantities of fruit; few cattle reared, and little manufacturing done. A Provincial Diet with forty-three members is elected for six years and summoned annually; D. sends eleven members to Austrian Reichsrath. Pop. (1910) 645,664.

Maud Holbach, *Dalmatia* (1907).

DALMATIC, a vestment which took its name from a species of Rom. tunic worn in the first centuries of Christian era; adopted by pope and deacons, and later used by deacons and subdeacons of the R.C. Church; has wide, straight sleeves, skirt split at sides, and two vertical joined by two horizontal stripes.

DALMELLINGTON (55° 20′ N., 4° 23′ W.), village, Ayrshire, Scotland; collieries and ironworks.

DALOU, JULES (1838–1902), Fr. sculptor.

DALRADIAN, complicated series of metamorphic rocks, consisting chiefly of schists and limestones, of the Highlands of Scotland and N.W. Ireland.

DALRIADA.—(1) ancient name for a district now forming northern part of County Antrim, Ireland. (2) ancient name for part of Argyllshire, Scotland; founded by Dalriads from Ireland *c.* 500 A.D.; united with the northern kingdom of the Picts under King Kenneth, in 843.

DALRY (55° 43′ N., 4° 43′ W.), town, on Garnock, Ayrshire, Scotland; worsted-spinning and machine knitting, box- and cabinet-making. Pop. (1911) 4812.

DALTON (33° 43′ N., 83° 18′ W.), city, Georgia, U.S.A.; fruit and vegetable canneries. Pop. (1910) 5324.

DALTON, JOHN (1766–1844), Eng. chemist and physicist; b. of a Quaker family in Cumberland; became a teacher in Manchester in 1793, and there continued meteorological observations which he entered until the day before his death. D. communicated a paper to the Manchester Literary and Philosophical Soc. on colour-blindness (*Daltonism*), with which he was afflicted, and from 1801 onwards published numerous papers on the properties of gases. His most important work, however, is his enunciation of the atomic theory. He delivered courses of lectures (1803–10) at the Royal Institution, London, in Glasgow, and in Edinburgh; elected F.R.S., 1822. See Atoms.

A. Smith, *Memoir of John Dalton and History of the Atomic Theory* (1856); Roscoe and Harden, *A New View of the Origin of Dalton's Atomic Theory* (1896) *John Dalton and the Rise of Modern Chemistry* (1895).

DALTON-IN-FURNESS (54° 9′ N., 3° 12′ W.), market town, Lancashire, England; with extensive ironworks; ruins of Furness Abbey in vicinity. Pop. (1911) 10,765.

DALY, JOHN AUGUSTIN (1838–99), Amer. dramatist and theatre manager; built Daly's Theatre in London (1893).

DALYELL, THOMAS, Dalzell (*c.* 1599–85), Scot. Royalist commander; defeated Covenanters at *Rullion Green*; notorious for cruelty to Covenanters taken as prisoners.

DAM, see Reservoir.

DAMAGES, compensation claimed by persons for breach of contract, loss sustained, infringement of copyright, slander, libel, breach of promise, etc. As regards breach of contract, Baron Parke expressed the opinion that 'the rule of the common law is, that where a party sustains a loss by reason of a breach of contract, he is, so far as money can do it, to be placed in the same situation with respect to damages, as if the contract had been performed.' D. cannot be recovered if they are too remote. Nor can they be based on the intention of punishing the party who has committed the breach. But in assessing the d. respect may be paid to prospective loss arising from the refusal of the defendant to perform his contract. In regard to loss or depreciation of goods sustained by land or sea, the consignee is the proper person to claim d., unless the goods are sent on approval, when the consignor must make the claim. D. for infringement of copyright are treated under Copyright (*q.v.*).

Mayne, *On Damages* (new ed., 1909).

DAMAN, Damão (20° 23′ N., 72° 32′ E.), seaport town belonging to Portuguese, on Gulf of Cambay, Bombay, India; teak forests; cotton-weaving, fisheries; Portug. settlement since 1558. Area, 150 sq. miles. Pop. *c.* 60,000.

DAMANHÛR (31° N., 30° 30′ E.), town, Behera, Egypt; occupies site of ancient *Hermopolis*; manufactures cotton goods; important station on Cairo-Alexandria railway. Pop. *c.* 39,000.

DAMARALAND (*c.* 21° S., 15° E.), region in middle of Ger. S.W. Africa; partly mountainous; district rich in copper; cattle-rearing carried on. See German South-West Africa.

DAMASCENING, Oriental, now particularly Persian, art of ornamenting weapons and armour, by deep incision of the pattern into which gold or silver threads are hammered, the article then being filed and polished. The term is also applied to the production of a peculiar blade steel with a watered pattern, by twisting welding strips of different steel together, or by corrosion.

Hendley, *Damascening on Steel and Iron, as practised in India* (1892).

DAMASCUS (33° 30′ N., 36° 18′ E.), city, capital of Syria, beautifully situated on plain surrounded by orchards at base of Anti-Lebanon Mts., is enclosed by ruined walls with towers, and has a palace, citadel, handsome baths, mosques, and bazaars. Great mosque (VIII. cent.) was partly destroyed by fire in 1893. Most of streets are narrow, and houses ruinous. D. is great caravan centre, and manufactures embroidered goods, inlaid and metal work, jewellery. Damascus-Mecca railway was completed as far as Medina in 1908. The city is now lit by electricity and has an electric-car system. D. is sacred city to Muhammadans, and dates back to beginning of history; flourished under Jewish and Rom. rulers, but was supplanted by Bagdad in VIII. cent. Pop. 350,000.

Porter, *Damascus, Palmyra, and Lebanon* (1910); Smith, *Hist. Geography of Holy Land* (new ed., 1900).

DAMASK, figured silk, used for upholstery and hangings, originally made at Damascus; linen, or cotton, figured fabrics, generally used as table napery; adjective for 'red,' as 'damask rose.'

DAMASUS I., pope, 366–84; maintained his position with great difficulty. His forgeries of inscriptions to martyrs are archæologically important, and he encouraged the learned labours of St. Jerome.—Damasus II., pope for less than a month in 1048.

DAMAUN, see Daman.

DAME'S VIOLET, Rocket (*Hesperis matronalis*), herbaceous cruciferous plant, allied to stock and wallflower; native of temperate Asia and Europe; cultivated in gardens.

DAMGHAN (36° 10′ N., 54° 20′ E.), decayed town, Persia; large export trade in almonds. D. was destroyed by Afghans in 1723.

DAMIANI, PIETRO (*c.* 1007–72), Ital. ecclesiastic; reformed monastic life; denounced simony and marriage of priests; became cardinal (1058), and was adviser to the pope.

DAMIEN, 'FATHER' JOSEPH (1841–89), Belg. missionary to lepers of Hawaii; d. of leprosy; eulogised by R. L. Stevenson.

Clifford, *Father Damien* (1889).

DAMIENS, ROBERT (1715–57), Fr. religious fanatic; tried to murder Louis XV., and was executed after revolting torture.

DAMIETTA (31° 23′ N., 31° 48′ E.), town, Lower Egypt, on chief eastern branch of Nile; formerly important; several times taken and lost by Crusaders (XIII. cent.); exports grain and fish. Pop. *c.* 29,250.

DAMIRI (1344–1405), Arab. author; wrote *Life of Animals.*

DAMJANICH, JÁNOS (1804–49), Hungarian military commander.

DAMMAR, resins obtained from different coniferous trees of New Zealand, Australia, and E. Indies; used for manufacture of varnishes.

DAMMARTIN (49° 4′ N., 2° 35′ E.), small town, Seine-et-Marne, France.

DAMME (51° 15′ N., 3° 17′ E.), village, W. Flanders, Belgium; formerly important seaport; here, in 1213, the Fr. fleet was destroyed by an Eng. fleet; cattle-raising.

DAMOCLES (IV. cent. B.C.), flatterer at court of Dionysius, who, at a banquet, suspended a sword above Damocles' head by a single hair to show how close death is to earthly felicity.

DAMOH (23° 50′ N., 79° 29′ E.), town and district, Central Provinces, India; large cattle market. Pop. 13,555.

DAMON (*c.* 400 B.C.), Pythagorean philosopher; famed for devotion to friend and fellow-philosopher Pythias, in whose place he was ready to be executed.

DAMOPHON, famous Gk. sculptor.

DAMPIER, WILLIAM (1652–1715), Eng. navigator and author; buccaneer on Span. Main; app. commander of Eng. voyage of discovery to Australia, 1699, exploring district round Shark's Bay; surveyed east coast of New Guinea; commanded venture to South Seas in which Alexander Selkirk sailed; his accounts of voyages are admirable.

Clark-Russell, *Life of Dampier.*

DAN, Israelitish tribe, named after a s. of Jacob and Bilhah, originally settled in northern Palestine.

DAN (*c.* 33° N., 35° E.), ancient frontier city, Palestine; destroyed by Benhadad I. (*1 Kings* 15[20]).

DANA, CHARLES ANDERSON (1819–97), Amer. journalist and miscellaneous writer.

Wilson, *Life of C. A. Dana* (1907).

DANA, FRANCIS (1743–1811), Amer. lawyer and diplomatist; advocated secession from Britain and became leader of 'Sons of Liberty' in Massachusetts; assisted in organising army, and urged refusal of Brit. offers; representative to Russia, 1780–83; chief justice of Massachusetts supreme court, 1791–1806; member of Massachusetts Convention, which ratified U.S. constitution.

DANA, JAMES DWIGHT (1813–95), Amer. geologist; mathematical teacher, U.S. navy; geologist to U.S. exploring expedition to southern seas under Wilkes (1838). In 1850 he succ. Prof. Silliman, whose dau. he had married, as prof. of Natural History and Geol. at Yale Coll., and collaborated with him as edit. of the Amer. Journal of Science. Of his numerous works his *Manual of Geology* is perhaps the most widely known.

D. C. Gilman, *Life of J. D. Dana* (1899).

DANA, RICHARD HENRY (1787–1879), Amer. poet and critic.

DANA, RICHARD HENRY (1815–82), Amer. author; s. of above; wrote *Two Years before the Mast*; was an authority on maritime law.

Adams, *Richard Henry Dana* (1890).

DANAË (classical myth.), daughter of Acrisius, king of Argos, who shut her up in a tower; mother of Perseus by Zeus, who visited her in a shower of gold.

DANAÏDES, see DANAUS.

DANAO (10° 30′ N., 124° 3′ E.), town, E. coast of Cebú, Philippine Islands; centre of rich agricultural district. Pop. *c.* 16,000.

DANAUS, legendary s. of Belus, Egyptian king; f. of the fifty *Danaïdes* who married the fifty sons of Ægyptus and, at their f.'s command, murdered their husbands (with one exception) on their wedding night.

DANBURITE ($CaB_2(SiO_4)_2$), rare mineral, transparent orthorhombic crystals, found in Connecticut and other parts of U.S.A., in Grisons (Switzerland) and Japan.

DANBURY (41° 23′ N., 73° 30′ W.), city, Connecticut, U.S.A.; extensive hat factories. Pop. 20,234.

DANBY, FRANCIS (1793–1861), Eng. artist.

DANCE, the performance of a succession of rhythmic movements with the body, usually to a musical accompaniment. It is a custom which dates back to antiquity, and though amongst civilised nations it has been raised to a fine art, it constitutes an important part in the lives of most primitive and savage races (*e.g.* the war-dances of N. Amer. Indians and Zulus). Modern dancing dates back to the XV. cent., and, though often of Ital. or Span. origin, was generally refined, developed, and popularised in France. Catherine de' Medici (1519–89) introduced a number of Ital. d's at the Valois court. Amongst the most popular d's of this period were the *gaillarde*, *volta*, *branle*, the stately and beautiful *pavane*, and the *sarabande*. In some of these d's kissing played a part, and the *pavane* was usually accompanied by a *chanson*. Another famous old d. was the *courante*, from which was derived the *minuet*, the latter being brought to a high state of perfection in France. The *gavotte*, originally a peasants' d., became popular in the XVIII. cent., as also did the *cotillon*. The *lancers*, *polka*, *schottische*, *quadrille*, and *waltz* belong to the XIX. cent., though some of them, under slightly different forms, had been in use earlier. The *fandango* (XVIII. cent.) was danced by two persons, with castanets and finger-snapping. Most countries have their peasant d's, and the charming Eng. Morris d's date back to the reign of Edward III. Eng. country-d's under the Tudors were mostly kissing d's. *Sir Roger de Coverley* was popular before the close of the XVII. cent. The golden age of dancing in England was under the *régime* of Beau Nash (XVIII. cent.). Scot. national d's are the *reel* and *strathspey*; the Irish national d. is the *jig*. Within recent years d's with no pretensions to grace have been introduced, mostly from America — the *cake-walk*, *two-step*, *one-step*, *Turkey trot*, and *Ragtime*. Miss Isadora Duncan's Grecian dancing popularised classical dancing in Britain, and many artists, notably Miss Maud Allan, give rhythmical interpretations of the music of Chopin and other classical composers. Russian dancers (*e.g.* Pavlova) have brought ballet-dancing to perfection.

Vuillier, *History of Dancing* (Eng. trans., 1898); Mrs. Grove, *Dancing* (Badminton Library).

DANCE, CHARLES (1794–1863), Eng. burlesque writer; one of first to use that medium; several of his ancestors were distinguished artists and architects.

DANCOURT, FLORENT CARTON (1661–1725), Fr. dramatist and comedian.

DANDELION (*Leontodon taraxacum* or *Taraxacum officinale*), perennial composite herbaceous plant of temperate zones. In France the leaves are used for salad, and roasted roots as a substitute for coffee. An extract of the roots is used medicinally as a bile stimulant.

DANDOLO, name of noble Venetian family. ENRICO, doge, 1193–1205, succeeded in turning aside Fourth Crusade from attack on Egypt to capture of Constantinople; rewarded for aid with Crete and other possessions of Gk. Empire. Three other members of the family were doges; ANDREA (doge, 1343–54), a famous administrator, was eulogised by Petrarch.

DANDOLO, VINCENZO, COUNT (1758–1819), Ital. agriculturist; took part in the political troubles of Venice during the Napoleonic times; app. gov. of Dalmatia (1805), he improved the sanitary, agricultural, and educational conditions of the people.

DANEGELD, land tax imposed in England to provide means for resisting the Danes (X. cent.), but afterwards employed by Ethelred the Unready to buy them off; abolished in reign of Henry II.

DANELAGH, name given to district of England N. of Thames, E. of Lea, and N.E. of Watling St., ceded to Danes by Treaties of Wedmore and Chippenham, 878; N. boundary unknown, but probably D. did not extend beyond Deira; abolished by Dan. conquest of England. A large infusion of Dan. speech took place at time of D.

DANEWERK, ancient Dan. rampart in Jutland, raised as protection against Germans.

DANGERFIELD, THOMAS (d. 1685), Eng. criminal; professed discoverer of 'Meal-tub Plot.'

DANIEL, chief character of Bible Book of *Daniel*, shown by modern criticism to have been written during persecution of Antiochus Epiphanes (175–64 B.C.), not, as it purports to be, during Babylonian captivity. Partly concerned with prophecy, partly with life of D., it has been included in hagiographical, not prophetic, books of Bible. Some of it is written in Hebrew, the rest in Aramaic, and it has been suggested that it is a compilation from an uncompleted Aramaic trans. and a Hebrew original. It repeats Jeremiah's prophecy of the establishment of the Messiah's kingdom, and seems intended to comfort Jews suffering under persecution of the Seleucid king. The influence of Persia is strongly shown, *e.g.* in doctrine of resurrection, expressed for first time in *Old Testament*, and in system of angels among whom archangels Michael and Gabriel receive names. Identity of prophet is obscure; a Daniel mentioned in Book of *Ezekiel* was of great importance in the early history of the Jews, but cannot be made to agree in date; his deeds, it has been suggested, may have been confused by a writer of the time of Antiochus Epiphanes (whose narrative is full of hist. errors) with those of a hero of the time of Babylonian captivity; Josephus, pseudo-Epiphanius and Epiphanius invented accounts of the prophet; certain rabbis accepted the tradition of his return to Jerusalem and assistance in founding the Great Synagogue, others believed he died in captivity and his tomb was shown at Susa in XII. cent.

Wright, *Daniel and his Prophecies* (1905); R. H. Charles, *Daniel* (The Century Bible, 1911).

DANIEL (OF KIEV) (c. 1106), Russ. traveller and writer.

DANIEL, GABRIEL (1649–1728), Fr. historian.

DANIEL, SAMUEL (1562–1619), Eng. poet; author of the *Complaynt of Rosamund*, *Delia* (sonnets), a verse history of the Wars of Roses; he championed poetry in *A Defence of Rhyme*, and wrote court masques.

DANIELL, JOHN FREDERIC (1790–1845), Eng. physicist; inventor of *Daniell cell*, a pyrometer and hygrometer, and of a process to prepare illuminating gas from turpentine; first prof. of Chem., King's Coll., London; foreign sec. of the Royal Soc. from 1839.

DANIELL, THOMAS (1749–1840), Eng. landscape artist; R.A. (1799); Oriental scenes.

DANNAT, WILLIAM T. (1853–), Amer. figure-artist.

DANNECKER, JOHANN HEINRICH VON (1758–1841), Ger. sculptor; his *Ariadne on the Panther* (at Frankfurt) is a masterpiece.

D'ANNUNZIO, GABRIELE (1864–), Ital. writer; has achieved remarkable distinction as poet, novelist, and dramatist. His work generally is noteworthy for great beauty of style, vivid description, and keen psychological insight, but much of it is marked by a pronounced sensuousness of tone. His poems include *Primavera*, *In Memoriam*, *Canto Nova*, and *La Canzone di Garibaldi*; his novels, *Il Piacere* (The Child of Pleasure), *L'Innocente* (The Intruder), and *Giovanni Episcopo*; and his dramas, *Città Morta*, *La Gioconda*, *La Gloria*, and *Francesca da Rimini*. There are Eng. trans. of many of his works.

DANSVILLE (42° 34′ N., 77° 41′ W.), town, Livingston Co., New York, U.S.A., on Canaseraga Creek; flour and paper mills. Pop. 4000.

DANTE ALIGHIERI (1265–1321), Ital. poet; b. Florence; s. of Alighieri, a notary of good family; D. is an abbreviation of *Durante*. Little is known of his early life, except that his first meeting with Beatrice occurred at the age of nine (1274), when she was of the same age, and that both his parents were dead by the time he was eighteen. Beatrice is believed to have been the dau. of Folco Portinari; she married Simone dei Bardi, and died in 1290. At the age of eighteen the poet began to write the noble lyrics inspired by his love for Beatrice, which he collected after her death and included in the *Vita Nuova* (New Life). The death of Beatrice was followed by a period of bitter depression, which was succeeded by one of moral decline, and D. appears to have plunged into dissipation and found consolation in the gratification of an earthly passion. His delinquencies, however, were bitterly repented of, and followed by a noble atonement. A period of military service ensued. Somewhere about 1298 the poet married Gemma, dau. of Manetto Donati, by whom he had four children.

The government of Florence at this period was in the hands of the wealthy trade guilds. D. became a member of the Guild of Physicians, but the party to which he belonged was overthrown by the nobles in 1301, and, in the following year, sentence of banishment was pronounced against him. During the period of his first exile (1302–10) D. wandered over Italy, spending much time at Verona, and commenced to write his *Convivio* (Banquet) and *De Vulgari Eloquentia*. Subsequently there seemed a prospect of the poet returning to his native Florence, but the terms offered were so humiliating that they were rejected, and a fresh sentence of banishment was pronounced. D.'s closing years were happily spent under the patronage of Can Grande della Scala at Verona, and that of Guido Novella (relative of Francesca of Rimini) at Ravenna. During this period his *Divina Commedia* was written, and other works continued. His death took place at Ravenna, the result of a fever, caused by a journey to Venice, and he was buried in the Franciscan convent there. In person D. was of middle height, dark-complexioned, long-faced, aquiline-nosed, with a protruding under-lip, and black, curly hair.

As the greatest poet which Italy has produced he was supreme as an epic poet, but also distinguished as a lyric writer, as is shown in his *Canzoniere* and the lyrical portions of the *Vita Nuova*, while his minor writings, letters, etc., stamp him as one of the greatest intellectual forces the world has yet known. D., by selecting the cream of the Ital. dialects, the Tuscan dialect especially, formed a great literary language; in his opinion literary words are those used by the best society. It is, however, by virtue of his epic masterpiece that Dante chiefly lives. In this, the *Divina Commedia*, man's life after death is portrayed, the poet describing his visions of hell, purgatory, and the heavens, under the guidance first of Virgil and then of Beatrice.

Complete Eng. trans. of Dante's works in 'Temple Classics'; also trans. of the *Divine Comedy*, by Cary, Longfellow, and Plumptre; Howell's *Dante* in Jack's 'People's Books.'

DANTON, GEORGES JACQUES (1759–94), Fr. revolutionary leader who did most to bring about Reign of Terror under which he fell; became prominent as pres. of *Cordeliers* Club (*q.v.*), extreme anti-monarchical and anti-aristocratic body; probably led march of people to Tuileries; app. Minister of Justice, and afterwards became member of *Mountain* in Convention; condemned by Girondists for allowing massacre in prisons; member of Committee of Public Safety and voted execution of king; fanned rage of populace against Girondists; made Committee of Public Safety supreme and army efficient. 'Terror' now passed out of D.'s control. At first D. was protected by Robespierre, but he was subsequently abandoned, and guillotined with other 'moderates.'

Beesly, *Life*; C. F. Warwick, *Danton and the Fr. Revolution* (1909); Hilaire Belloc, *Life* (new ed., 1911).

DANTSIC, see DANZIG.

DANUBE, DONAU, second largest river of Europe, draining about 315,000 sq. miles; total length, 1740 miles. D. begins at Donaueschingen, Black Forest, at junction of Brega and Brigach (elevation, 2264 ft.); course generally eastwards; N.E. and S.E. through Germany, S.E. through Austria, S.E. and S. through Hungary, E. as boundary between Hungary and Servia and between Rumania and Bulgaria; N. through Rumania and E. as Russo-Rumanian frontier; flows into Black Sea through vast delta, chief mouths being Kilia, St. George, and Sulina. D. has innumerable tributaries, including Iller, Lech, Altmühl, Wörnitz, Regen, Isar, Inn, Enns, Wien, Marsh, Leitha, Raab, Waag, Gran, Drave, Theiss, Save, Morava, Schyl, Aluta, Isker, Sereth, Pruth. Chief towns on banks are Vienna, Budapest, Belgrade; also Ulm, Ratisbon, Passau, Linz, Pressburg, Waitzen, Orsova, Vidin, Nikopoli, Silistria, Braila. D. is navigable from Ulm to Black Sea, and is open to all nations; shipping enters at Sulina mouth (greatly improved by European Commission of the Danube—instituted 1856); famous Iron Gates rapids long hindered navigation. D. is connected with Rhine by Ludwigs canal (1844), with Elbe by Moldau and Mühl canals. D. has played a prominent rôle in history, commerce, and lit.; has served as great national frontier since days of Rom. Empire; scenery in Upper and Lower Austria is especially fine, with many historic and romantic buildings, fine mediæval and modern castles, churches, etc.

Jerrold, *The Danube* (1911); F. D. Millet, *Danube from Black Forest to Black Sea* (1892).

DANUBIAN PRINCIPALITIES, Moldavia and Walachia, see RUMANIA.

DANVERS (42° 29′ N., 71° 1′ W.), town, Massachusetts, U.S.A.; boots and shoes. Pop. (1910) 9407.

DANVILLE (40° 6′ N., 87° 38′ W.), town, Illinois, U.S.A.; extensive coal-fields. Pop. (1910) 27,871.

DANVILLE (37° 27′ N., 84° 49′ W.), town, Ken-

tucky, U.S.A.; important seat of educational institutions; produces cotton and tobacco. Pop. (1910) 5420.

DANVILLE (40° 54′ N., 76° 33′ W.), town, Pennsylvania, U.S.A.; extensive ironworks. Pop. (1910) 7517.

DANVILLE (36° 36′ N., 79° 17′ W.), city, Virginia, U.S.A.; tobacco factories and cotton mills. Pop. (1910) 19,020.

DANZIG, Dantsic (54° 22′ N., 18° 39′ E.), fortified seaport town and naval station, Germany; capital of province of W. Prussia; one of principal ports and chief commercial centres; notable edifices are—Church of St. Mary (built in XIV. and XV. cent's), Gothic townhall, and Franciscan monastery (now museum of antiquities). D. was taken from Teutonic Knights by Poles (1454); unsuccessfully besieged by Swedes (1627–29); retaken by Prussia (1793); captured by French (1807) and ceded to Prussia (1814); has large transit trade in grain, timber, and sugar; has important gun factories and shipbuilding yards. Pop. (1910) 170,347.

Simson, *Geschichte der Stadt Danzig* (1903).

DAPHNÆ (*c.* 30° 54′ N., 32° 18′ E.), ancient town, on E. arm of Nile, Egypt; modern Defenneh.

DAPHNE (classical myth.), nymph beloved by Apollo; changed by her mother into a laurel tree.

DAPHNE, genus of European and temperate Asiatic shrubs of order Thymelæaceæ, mostly evergreen with fragrant flowers and, frequently, poisonous berries; cultivated in gardens.

DAPHNEPHORIA, festival celebrated at Thebes, every ninth year, in honour of Apollo.

DAPHNIS (classical myth.), Sicilian shepherd, punished with blindness for infidelity; reputed inventor of bucolic poetry.

DARAB (28° 42′ N., 54° 25′ E.), town, Farsistan, Persia; produces dates; antiquarian remains. Pop. 5000.

DARBHANGA (26° 10′ N., 86° E.), district, Bihar and Orissa, India; consists of alluvial plain; exports rice and indigo; area, 3348 sq. miles. Pop. 2,912,611. Chief town is Darbhanga, on Little Bághmati. Pop. 65,990.

D'ARBLAY, MADAME, see Burney, Fanny.

DARBOY, GEORGES (1813–71), Fr. ecclesiastic; upheld independence of Gallican Church; made abp. of Paris (1863); killed at siege of Paris.

DARCY, THOMAS (1467–1538), Lord D. of Templehurst, Yorks; Tudor warden of marches; summoned to Parliament as baron, 1509–38; executed for part in Pilgrimage of Grace.

DARDANELLES (40° 4′ N., 26° 14′ E.), fortified town, on Dardanelles Strait, Asia Minor. Pop. 15,000.

DARDANELLES, Hellespont (40° 15′ N., 26° 30′ E.), narrow strait between Europe and Asia; connects Ægean Sea with Sea of Marmora; length, *c.* 45 miles; breadth, 1 to 5 miles; historically famous for Xerxes' crossing by a bridge of boats to enter Greece with an army of 5,000,000 (480 B.C.), which was stopped by 400 Spartans under Leonidas at *Thermopylæ*; and for Alexander the Great's crossing in 334 B.C. when invading Asia Minor. The legendary Leander swam the Hellespont near Abydos (*q.v.*) nightly to visit Hero, and was drowned at last. It is strongly fortified. By treaty (1841) no warship can pass through the D. without Turkey's consent. Yet in 1878 Britain sent a fleet through to protect Constantinople from Russia. In 1904, during the Russo-Jap. War, Russia sent the cruisers *Peterburg* and *Smolensk* through, under a commercial flag. In the Turco-Ital. Tripoli War, the D. were bombarded by Ital. warships.

DARDANUS (classical myth.), s. of Zeus and Electra; reputed founder of Trojan royal family.

DARDISTAN (36° 10′ N., 74° E.), the 'County of the Dards'; mountainous tract of country; N.W. borders of Kashmir; inhabited by race of Aryan origin.

DARES PHRYGIUS, reputed writer of a description of Trojan War, who lived before Homer.

DAR-ES-SALAAM (6° 50′ S., 39° 18′ E.), seaport and capital of Ger. E. Africa, on Ind. Ocean; fine harbour; commercial centre; exports ivory, rubber; railway being built from D. to Tanganyika. Pop. 20,000.

DARFUR (13° N., 25° E.), country in E. Central Africa, lying between Kordofan and Wadai; division of Sudan. Its limits are ill-defined; capital is El-Fasher. D. is hilly (Marra, *c.* 6000 ft.), with oasis; N. level is sandy, almost waterless; during rainy season (June to Sep.) vegetation is good; heat excessive. Chief crops are millet, rice, maize, fruits; home-grown tobacco much used by natives; inhabitants mostly Furs, Arabs, and negroes. Commerce (mostly with Egypt) is effected by caravans. From *c.* 1450 to 1874 D. was ruled by absolute sovereigns; it has been under Anglo-Egyptian rule since 1899, although its hereditary Sultan directs the management of internal affairs; formerly notorious for slave-trading. Pop. 4,000,000.

DARGAI (34° 30′ N., 71° 52′ E.), hill station, N.W. Frontier Provinces, India; scene of stirring incident in Tirah campaign.

DARGOMIJSKY, ALEXANDER SERGEIVICH (1813–69), Russ. composer.

DARIAL (42° 43′ N., 44° 41′ E.), gorge, in Caucasus, E. of Mt. Kazbek, on Georgian military road; the chief pass across Caucasus.

DARIEN, see Panama.

DARIEN SCHEME (1695), a plan to colonise the Isthmus of Darien with Scotsmen. It was formed by William Paterson (founder of the Bank of England). William III. opposed it. 1200 colonists landed at Darien; they were withstood by Spaniards and were short of provisions. Disease broke out, and only a small remnant returned to Scotland.

J. S. Barbour, *William Paterson and the Darien Company* (1907).

DARIUS, name of three Persian rulers. Darius I., *the Great* (d. 485 B.C.), seized throne, 521 B.C.; extended territories to Caucasus; great lawgiver and organiser; led immense expeditions to Greece in revenge for interference in Asia Minor; famous defeat of his general at *Marathon*, 490 B.C.—Darius II. (*Ochus*) ruled 423–404 B.C.; made alliance with Sparta against Athens.—Darius III. (*Codomannus*), beaten at *Issus* and *Arbela* (331) by Alexander the Great.

DARJEELING, Darjiling (27° 3′ N., 88° 18′ E.), district, Bengal, India, on Himalayas; partly mountain and valley; well cultivated; magnificent scenery; area, 1164 sq. miles. Pop. 249,117. Capital is Darjeeling, elevation over 7000 ft., chief health station in Bengal; tea-planting. Pop. 13,000.

DARLEY, GEORGE (1795–1846), Irish poet and critic.

DARLING (34° 30′ S., 142° E.), river, Australia; rises in Queensland; flows through N. S. Wales; joins the Murray.

DARLING, GRACE HORSLEY (1815–42), Eng. heroine; dau. of William D., keeper of Longstone lighthouse (Farne Islands); famous for share in rescue of shipwrecked crew of *Forfarshire* (1838); d. of consumption.

Grace Darling: Her True Story (1880).

DARLINGTON (54° 32′ N., 1° 34′ W.), market town, Durham, England, on Skerne, near junction with Tees; has ancient Gothic church (1160), Edward Pease Library (1885), technical coll., grammar school; woollen manufactures, iron and steel works; Stockton and Darlington Railway (opened Sep. 27, 1825) was the first passenger line on which locomotives were used. Stephenson's Locomotive No. 1 is preserved at Bank Top Station. Pop. (1911) 55,633.

DARLINGTONIA CALIFORNICA, pitcher plant of the order Sarraceniaceæ, native on Sierra Nevadas, California. The bright-coloured leaves are twisted to form an insect trap (pitcher), the prey being digested and absorbed by the leaf.

DARLY, MATTHIAS (*c.* 1741–80), Eng. caricaturist and engraver.

DARMESTETER, JAMES (1849–94), Fr. antiquary. His bro., **Arsène** (1846–88), Fr. philologist.

DARMSTADT (49° 52′ N., 8° 38′ E.), town, on Darm, Hesse, Germany; residence of grand-duke and seat of government of duchy of Hesse-Darmstadt; has several fine squares and churches; chief edifice —ducal palace (containing large library and works of art); chemicals, machinery. Pop. (1910) 87,085.

DARNLEY, HENRY STEWART, LORD (1545–67), Scot. noble; great-grandson of Henry VII.; s. of Earl of Lennox; Earl of Ross and Duke of Albany (1565); m. Mary, Queen of Scots, in 1565, being proclaimed king on previous day; father of James VI. of Scotland, I. of England; assisted in murder of Rizzio. D. was murdered at Kirk o' Field, a house on the site where Edin Univ. now stands; Bothwell was tried for the murder, but was not convicted. See MARY, QUEEN OF SCOTS.

DARRANG (26° 30′ N., 92° E.), district, Assam, India; mostly level; watered by Brahmaputra and tributaries; tea and rice. Area, 3418 sq. miles. Pop. 337,313.

DARTFORD (51° 27′ N., 0° 12′ E.), market town, Kent, England; Wat Tyler's rebellion commenced here, 1381; paper-mills. Pop. (1911) 23,609.

DARTMOOR (50° 35′ N., 4° W.), granitic plateau, S.W. Devonshire, England; mean elevation, 1500 ft.; rich in minerals and antiquities; seat of convict prison.

Baring-Gould, *Dartmoor* (1900); Cresswell, *Dartmoor and its Surroundings* (new ed., 1910).

DARTMOUTH (50° 22′ N., 3° 34′ W.), seaport, market town, Devonshire, England, near mouth of Dart; has spacious harbour; Royal Naval College; number of quaint houses of Elizabethan architecture, and remains of ancient castle; is yachting centre and coaling-station; boat-building. D. was burnt by the French in reigns of Richard I. and Henry IV.; besieged and captured by Prince Maurice in the Civil War (1643), retaken by Fairfax (1646).

DARTMOUTH (44° 40′ N., 63° 34′ W.), town, Nova Scotia, Canada; iron foundries. Pop. 5000.

DARTMOUTH COLLEGE, Amer. educational institution at Hanover, New Hampstead; developed from 'Moor's Indian Charity School,' founded 1755 by Eleazar Wheelock; named after 2nd Earl of D., its great benefactor.

DARTMOUTH, EARLDOM OF, Eng. family. Earldom was granted (1711) to WILLIAM LEGGE (1672–1750). WILLIAM (1731–1801), 2nd earl, was Sec. for Colonies at Amer. secession; being very religious, he was called 'Psalm-singer.' The family has estates in Yorks, Staffordshire, Bucks, Salop, Sussex, Kent, and Middlesex. Chief seat is Patshull House, Wolverhampton.

DARU, PIERRE ANTOINE NOEL BRUNO, COUNT (1767–1829), Fr. soldier, author, and statesman; able commissary to Napoleon's armies; Sec. of State, 1811; Minister of War, 1813; praised by Napoleon as 'enlightened, firm, and vigilant administrator.'

DARWEN (53° 45′ N., 2° 28′ W.), manufacturing town, Lancashire, England; cotton-mills. Pop. (1911) 40,344.

DARWIN, CHARLES ROBERT (1809–82), Eng. naturalist; s. of Dr. Robert Waring D., and grandson of Dr. Erasmus D. (*q.v.*). His mother was the dau. of Josiah Wedgwood (*q.v.*). After schooldays in his native town, Shrewsbury, he went to Edinburgh in 1825 to study medicine. This proved to be uncongenial, so he entered Christ's Coll., Cambridge, in 1828, with the intention of becoming a clergyman, and graduated three years later. However, his scientific proclivities, which had already been apparent in Edinburgh, received much encouragement from Prof. J. H. Henslow, botanist, and Prof. Adam Sedgwick, geologist, and through the former he received the position of naturalist for the surveying expedition of H.M.S. *Beagle*, under Capt. Fitzroy. On this celebrated voyage, visiting Cape Verde and other Atlantic islands, S. America, Pacific islands, Australia, Tasmania, and various islands in the Indian Ocean and S. Africa, D. made observations and collected material which laid the foundations for his subsequent work. On his return to England he was for several years occupied in preparing reports of the scientific results of the voyage, of which the most noted are: *Journal of a Naturalist* (1839), *Structure and Distribution of Coral Reefs* (1842), *Geological Observations* (1844 and 1846).

After marrying his cousin, Miss Wedgwood, he settled permanently in a country house at Down, in Kent, where, owing to his favourable pecuniary circumstances, he was enabled, in spite of persistent ill-health, to pursue indefatigably the researches which led to the enunciation of one of the most far-reaching theories in human history. He became more and more convinced, especially after reading Malthus *On Population*, that species were not immutable. After discussing the problem with Asa Gray (*q.v.*) and his friends Lyell and Hooker (*qq.v.*), he prepared the essay, *On the Tendency of Species to form Varieties, etc.*, which, together with an essay by A. R. Wallace, who had, independently, arrived at the same conclusions, was read at a memorable meeting of the Linnæan Society in 1858. This communication, followed by the publication, in the following year, of *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, aroused wild enthusiasm, and at the same time bitter opposition, and has inspired research in every branch of science, including that of human conduct. *The Variation of Animals and Plants under Domestication* (1868) and *The Descent of Man, and Selection in Relation to Sex* (1871), were other proofs of the vast amount of material D. had collected. He published various works on the fertilisation of plants and their movement, subjects which fascinated him greatly, and on *The Formation of Vegetable Mould through the Action of Worms* (1881). D. was always a reverent searcher after truth, and never hesitated to abandon a favourite theory when it proved to be erroneous.

His sons attained eminence in the scientific world: SIR GEORGE HOWARD (1845–1912), F.R.S., prof. of Experimental Philosophy and Astron., Cambridge. Sir FRANCIS (1848–), F.R.S., botanist, and his f.'s assistant; pres., Brit. Assoc., 1908. LEONARD (1850–), major, late R.E.; pres., Roy. Geogr. Soc., 1896; pres., Eugenics Education Soc., 1911. HORACE (1851–), F.R.S., civil engineer. See EVOLUTION.

Francis Darwin, *The Life and Letters of Charles Darwin, including an Autobiographical Chapter* (3 vols., London, 1887); Dr. A. R. Wallace, *Darwinism*; J. Arthur Thomson, *Darwinism and Human Life*; Guenther, *Darwinism and the Problems of Life*; Kellogg, *Darwinism To-day* (1910).

DARWIN, ERASMUS (1731–1802), Eng. physician and poet; practised med. at Lichfield and Derby. By his first marriage he was grandfather of Charles Darwin, by his second, of Francis Galton. He was an original thinker, an advocate of temperance, and possessed a faculty for detecting analogies in nature. He anticipated in part the theory of evolution propounded by Lamarck, and by his grandson. His chief works were: *Zoonomia* (1794–96), *Phytologia* (1799), and his poem, *The Botanic Garden* (1789).

Charles Darwin, *Life of Erasmus Darwin, an Introduction to an Essay on his Works by Ernst Krause* (1879).

DASENT, SIR GEORGE WEBBE (1817–96), Eng. journalist and translator from Scandinavian.

DASHKOV, CATHERINA ROMANOVNA VORONTSOV (1744–1810), Russ. princess, dramatist, and educationist; helped to place Catherine II. on Russ. throne; friend of Garrick, Diderot, Voltaire; founder (1783) and director (1784–96) of Russ. Academy of Sciences. There is an Eng. trans. of her memoirs.

DASS, PETTER (1647–1708), Nor. poet; author of *The Trumpet of Nordland.*

DASYURES, marsupial family of the sub-order Polyprotodontia, carnivorous, generally nocturnal animals of Australia, Tasmania, and New Guinea; among best known is Tasmanian devil.

DATE-PALM (*Phœnix dactylifera*), tree growing

wild and cultivated for its nourishing fruit from the Canary Islands to Arabia and India, and also in China and California. Besides the fruit, which is a main article of food in Turkey, W. Asia, N. Africa, and Arabia, the palm supplies timber and fuel, the leaves are used as thatch, and the fibre for making ropes.

DATIA (25° 40′ N., 78° 30′ E.), native state, Central India. Area, 912 sq. miles. Pop. 173,759. Chief town, DATIA, is walled and has several palaces. Pop. 25,000.

DATOLITE ($Ca(BOH)SiO_4$), mineral occurring in colourless or greenish white monoclinic crystals in cavities of basic igneous rocks.

DAUB, KARL (1765–1836), Ger. theologian.

DAUBENTON, LOUIS JEAN MARIE (1716–99), Fr. naturalist; assisted Buffon by writing the anatomical part of the *Histoire naturelle*; prof. of Mineralogy at the Jardin du Roi; prof. of Nat. History at the Coll. of Med.; author of numerous research papers.

DAUBENY, CHARLES GILES BRIDLE (1795–1867), Eng. scientist; travelled in S. and E. Europe to study volcanic phenomena; prof. of Chem. (1822) and of Bot. (1834) at Oxford; investigated thermal waters in U.S.A.; pub. numerous works; pres. Brit. Association, 1856.

DAUBIGNY, CHARLES FRANÇOIS (1817–78), Fr. landscape artist of Barbizon school (*q.v.*).

DAUBRÉE, GABRIEL AUGUSTE (1814–96), Fr. geologist; prof. of Mineralogy and Geol. at Strassburg, subsequently prof. and director at the École des Mines; known for his experiments in the artificial production of rocks.

DAUDET, ALPHONSE (1840–97), Fr. novelist; b. at Nimes; served as usher (vide *Le Petit Chose*); took to journalism, and experienced hard struggles; achieved fame with *Fromont Jeune et Risler Aîné*, *Jack*, *Numa Roumestan*, *Sapho*, the brilliant, humorous *Tartarin* stories, and *Les Lettres de Mon Moulin*; noted as a stylist; his play, *L'Arlésienne*, with Bizet's music, is still a favourite.

L. A. Daudet, *Alphonse Daudet* (1898).

DAULATABAD (19° 57′ N., 75° 15′ E.), decayed city,—the ancient *Deogiri*,—Hyderabad state, India; on isolated rock 600 ft. high; celebrated fortress; taken by Muhammadans, 1294.

DAUMIER, HONORÉ (1808–79), Fr. artist and caricaturist.

DAUN, LEOPOLD JOSEF, COUNT VON (1705–66), Austrian general; inflicted first defeat suffered by Frederick the Great, at *Kolin*, 1757, and was principal deterrent to Prussia during Seven Years War; prince of Thiano.

DAUNOU, PIERRE CLAUDE FRANÇOIS (1761–1840), Fr. scholar, writer, and revolutionary statesman; Girondist and member of Directory; archivist under empire and monarchy, and pioneer in study of hist. sources.

DAUPHIN.—Title of lords of Vienne who were called 'Dalphinus' (Dolphinus) in XII. and XIII. cent's. When Dauphiné came to Fr. crown (1349), title of Dauphin was bestowed on king's eldest son; crest contained a dolphin (*dauphin*).

DAUPHINÉ (44° 50′ N., 6° E.), ancient province, S.E. France; capital, Grenoble; formed part of kingdom of Burgundy; now comprised in departments of Drôme, Isère, and Hautes-Alpes. See DAUPHIN.

Guide Joanne, *Dauphiné* (Paris, 1905).

DAURAT, JEAN (1508–88), Fr. poet and scholar.

DAVENANT, CHARLES (1656–1714), Eng. economist.

DAVENANT, SIR WILLIAM (1606–68), Eng. poet and dramatist; b. and ed. Oxford; served as court page; wrote for the stage; fought on royal side in Civil War; suffered imprisonment, and is said to have been released through Milton's influence; wrote *Gondibert*, an epic poem; numerous plays, including *Siege of Rhodes*, a precursor of opera; and adaptations, e.g. *The Tempest* (with Dryden).

DAVENPORT (41° 29′ N., 90° 42′ W.), city, on Mississippi, Iowa, U.S.A.; R.C. and Prot. episcopal see; shipping port for grain and coal; extensive manufactures; iron foundries. Pop. (1910) 43,028.

DAVENPORT, EDWARD LOOMIS (1816–77), Amer. actor; his dau., FANNY D. (1850–98), popular actress.

DAVENPORT, ROBERT (fl. about 1624), Eng. dramatist; wrote *Henry I.*, *Henry II.*, and some comedies.

DAVENTRY (52° 16′ N., 1° 10′ W.), market town, Northamptonshire, England; boots and shoes. Pop. (1911) 3517.

DAVEY OF FERNHURST, HORACE DAVEY, BARON (1833–1907), Eng. judge.

DAVID (Hebrew, 'Beloved'), Hebrew king whose career is recounted in Books of *Samuel*, *Kings*, and *Chronicles*. Books of *Samuel* are earliest in date, but are themselves evidently compiled from earlier and often incompatible histories; *Chronicles*, much later, remodels story to suit in accordance with the changed ideals of a later age. D. was son of Jesse of Bethlehem in Judah; kept his f.'s sheep and practised music until called to cure the madness of King Saul by means of his harp; became a royal favourite and formed the classical friendship with king's s., Jonathan. Modern criticism accepts the evidence of *2 Samuel* 21^{19}, against his being the hero who slew Goliath, and recognises discrepancy as to the point in his career at which he was anointed king over Israel. The growing jealousy of Saul resulted in D.'s exile, and his final refuge in the cave of Adullam with kinsmen and partisans; here he was visited by Jonathan. From Adullam D. led attacks on Philistines; on Saul's being slain by an Amalekite, D. persuaded the inhabitants of Judah to accept him as king. Jerusalem, captured from Jebusites, was fortified as 'City of D.,' and received 'Ark of the Covenant,' for the shelter of which a tent was pitched, the building of temple being reserved by command of prophet Nathan for Solomon; census of people was taken, an act punished by plague; D.'s defeat of Ammonites and Moabites secured his country from external warfare. Retribution to house of Saul for slaughter of Gideonites was carried out by Jehovah's command. Further events of D.'s reign were his sin in the abduction of Bathsheba, wife of Uriah the Hittite; murder of his s. Amnon by his half-bro., D.'s s. Absalom; revolt of Absalom and Ahithophel, which drove D. from Jerusalem (he was reinstated by Gileadites). Modern critics disallow his claim to be compiler of Book of *Psalms*; many of psalms were written by him but some later than his epoch. His reign marks culmination of Jewish national prosperity; most famous king of Israel, unifier of nation and founder of capital; prophets foretold birth of Messiah from D.'s line. Bible account is of great hist. and literary importance.

Dieulafoy, *David the King* (Eng. trans., 1902); Robertson Smith, *Old Testament in Jewish Church*.

DAVID I. (1084–1153), king of Scots; s. of Malcolm Canmore and 'St.' Margaret; introduced Norman feudalism into Scotland, which he greatly consolidated and civilised; his ecclesiastical reforms earned for him the title, 'Ane sair sanct for the crown.'

DAVID II. (1324–71), king of Scotland, 1329; s. of Robert Bruce; taken prisoner by England at *Neville's Cross*, 1346.

DAVID I. OF WALES (d. 1203), lord of district round Snowdon; called by one chronicler 'king.'—DAVID II. (c. 1208–46), prince of N. Wales; forced to do homage to Henry III.—DAVID III. (d. 1283), patriot, executed by Edward I.

DAVID, ST., DEWI (c. VI. cent.), Welsh patron saint; canonised XII. cent.; festival, March 1.

DAVID, FÉLICIEN (1810–76), Fr. composer; achieved fame with *Le Désert*, a symphonic ode (1844), and later composed comic operas and oratorios.

DAVID, GERHARD, (d. 1523), Dutch artist; religious subjects.

DAVID, JACQUES LOUIS (1748–1825), Fr. artist;

painted chiefly classical subjects (e.g. *Rape of Sabine Women*) and portraits (e.g. *Madame Récamier*); an ardent revolutionist; later Napoleon's artist; d. in exile.

DAVID, PIERRE JEAN, David d'Angers (1789–1856), Fr. sculptor; b. Angers; executed pediment of Panthéon, Paris.

DAVIDSON, ANDREW BRUCE (1831–1902), Scot. linguist and pioneer of Bible criticism; pub. part of commentary on *Job* (1862); prof. of Oriental Lan- Edinburgh, and member of Old Testament Revision Committee.

DAVIDSON, JOHN (1857–1909), Scot. poet, dramatist, and novelist; won distinction with *Fleet Street Eclogues* (1893), and other vols. of verse; trans. Coppée's *Pour la couronne*, and wrote several original plays; committed suicide.

DAVIDSON, RANDALL THOMAS (1848–), abp. of Canterbury since 1903; previously bp. of Rochester and of Winchester.

DAVIDSON, SAMUEL (1806–99), Irish Biblical scholar.

DAVIDSON, THOMAS (1817–85), Scot. palæontologist; great authority on Brachiopoda.

DAVIES, DAVID CHARLES (1826–91), Welsh theologian and preacher.

DAVIES, JOHN (1679–1732), Eng. scholar.

DAVIES, SIR JOHN (1569–1626), Eng. poet; author of *Orchestra*, poem in praise of dancing, *Nosce Teipsum*, philosophical poem, *Hymns to Astræa*, etc.

DAVIES, SIR LOUIS HENRY (1845–), Canadian jurist and politician.

DAVIES, RICHARD (d. 1581), Welsh ecclesiastic; was bp. of St. Asaph, later of St. David's.

DAVILA, ENRICO CATERINO (1576–1631), Ital. soldier and historian; served crown in Fr. civil wars; wrote valuable *Istoria delle guerre civili di Francia*.

DAVIS, CUSHMAN KELLOGG (1838–1900), Amer. lawyer and politician.

DAVIS, HENRY WILLIAM BANKS (1833–), Eng. landscape artist; A.R.A. (1873), R.A. (1877).

DAVIS, HENRY WINTER (1817–65), Amer. statesman and lawyer; did much to keep Baltimore faithful to Union; urged Maryland to emancipate slaves and advocated votes for negroes.

DAVIS, JEFFERSON (1808–89), Amer. statesman; commanded Mississippi regiment in Mexican war, 1845; senator of U.S. senate, 1847; made pres. of Southern Confederacy, 1861. D. sought to prevent war by compromise, but organised efficient army under every disadvantage; offered to abolish slavery in return for recognition of Confederacy by England and France. His military tactics were not always wise, however, and he laid himself open to charge of autocracy; proposal to supersede him shortly before end of war, but General Lee refused to become dictator; taken prisoner, 1865; severity of his confinement (he lay in chains) roused general sympathy; amnesty of 1868 probably only anticipated order for release.

Life of Davis, by Alfriend (1868), Pollard (1869), Varina Davis, his widow (1891), W. E. Dodd (1907).

DAVIS, JOHN (*c.* 1550–1605), Eng. discoverer; sought north-west passage to East, passing through straits since called *Davis*, 1587; invented quadrant long used, and wrote books on navigation.

DAVIS, RICHARD HARDING (1864–), Amer. novelist and dramatist; novels include *The Princess Aline* (1896), *The Bar Sinister* (1904); and plays: *The Taming of Helen* (1903), *Galloper* (1905).

DAVIS STRAIT (67° N., 58° W.), W. of Greenland; connects Baffin Bay with Atlantic Ocean.

DAVIS, THOMAS OSBORNE (1814–45), Irish poet and journalist; a leader of 'Young Ireland' party.

DAVISON, WILLIAM (*c.* 1541–1608), Scot. statesman; app. sec. to Walsingham, 1586; accused by Elizabeth of passing on warrant for execution of Queen of Scots against her orders.

DAVITT, MICHAEL (1846–1906), Irish nationalist; became Fenian, 1865; associated with Parnell, 1879–90; several times imprisoned for sedition.

DAV-KINA, see Babylonia (Religion).

DAVOS (46° 44′ N., 9° 45′ E.), small valley, Alps, Swiss canton of Grisons; contains two villages, Platz and Dörfli; winter health-resort. Pop. 7500.

DAVOUT, LOUIS NICOLAS (1770–1823), Marshal of France, Duke of Auerstädt, and Prince of Eckmühl; distinguished in Napoleonic wars; his corps won battle of *Auerstädt* against whole Prussian army; famous disciplinarian.

DAVY, SIR HUMPHRY, Bart. (1778–1829), Eng. chemist. Apprenticed to a surgeon at Penzance, he educated himself in natural philosophy and chem., and became superintendent of Dr. Beddoes' medical 'Pneumatic Institution' at Bristol, where he investigated the physiological properties of nitrous oxide (laughing gas), after having somewhat hastily published an untenable theory of heat and light. App. lecturer in chem., later (1802) prof., at the Royal Institution in London, D. first devoted himself to agricultural chemistry. However, his main researches were in electro-chem., which won him the medal of the Fr. Institute and other scientific honours. He investigated the alkalies and alkaline earths, and isolated potassium and sodium, also boron and other elements. Spending several years on the Continent, he proved in Florence that diamond is pure carbon, and at Genoa made inquiries into the nature of the electricity of the torpedo fish. After his return to England (1816) he invented the miner's safety-lamp bearing his name; Pres. of the Royal Society, 1820–27.

Collected Works, with memoir by Dr. John Davy (1839); T. E. Thorpe, *Humphry Davy, Poet and Philosopher* (1896; new ed., 1901).

Davy Lamp, invented by Sir Humphry Davy, an oil lamp having the flame protected by a wire gauze. Air passes through the gauze, but the flame cannot pass outward, and the lamp can be carried with safety in mines where combustible gases obtain. A draught will drive the flame through the gauze, and the latest 'safety' lamps are protected by draught-shields. Electricity is superseding the D. lamp in mines.

DAWARI, tribe of Pathans in N.W. India.

DAWES, HENRY LAURENS (1816–1903), Amer. lawyer.

DAWES, RICHARD (1708–66), Eng. scholar.

DAWISON, BOGUMIL (1818–72), Ger. Shakespearean actor.

DAWKINS, WILLIAM BOYD (1838–), Eng. geologist; on Geological Survey of Great Britain (1861–69); curator of Manchester Museum, 1870; prof. of Geol. in Owens Coll. from 1872–1909; consulting geologist on questions of civil engineering; travelled in N. America and Australia; author of *Early Man in Britain*, 1880, and other works and research memoirs.

DAWLISH (50° 36′ N., 3° 28′ W.), watering-place, S. coast Devonshire, England. Pop. (1911) 4099.

DAWN, the morning twilight, from the time when the sun is 18° below the horizon to sunrise.

DAWSON (64° 37′ N., 139° 10′ W.), city, on Yukon, Klondyke, Canada; goldfields (discovered 1896). Pop. 3000.

DAWSON, GEORGE (1821–76), Eng. Nonconformist preacher and lecturer.

DAWSON, GEORGE MERCER (1849–1901), Canadian geologist; s. of Sir J. W. D.; geologist and naturalist to N. Amer. Boundary Commission; assistant director, afterwards director, Geological Survey of Canada; in charge of Yukon expedition, 1887; Dawson City owes its name to him; on Bering Sea Arbitration Board; pres. Royal Society of Canada, 1893.

DAWSON, SIR JOHN WILLIAM (1820–99), Canadian geologist; made geological researches with Sir Charles Lyell in Nova Scotia, where he was app. superintendent of education (1850); prof. of Geol. and principal, M'Gill Univ., Montreal; first pres. of the Royal Soc. of Canada; pres. of Brit. Association, Birmingham, 1866; F.R.S. His *Eozoon canadense*, in Laurentian rocks, was afterwards proved to be of mineral origin. D. was an opponent of Darwinism.

DAX (43° 42′ N., 1° 3′ W.), town, on Ardour, Landes, France; ancient *Aquæ*; hot sulphur springs; wood; rock-salt. Pop. 10,000.

DAY.—The *sidereal d.* is the time taken by earth to make one rotation in the interval between two consecutive appearances of a fixed star on the meridian; the *solar d.* is about four minutes longer, and is measured between two consecutive appearances of the sun on a meridian. The *solar d.* varies in length because of variation of earth's motion in its orbit and because equator is inclined to plane of sun's path. The average of the variations is termed the *mean solar d.*

DAYS OF WEEK.—Names are of Teutonic origin. Sunday and Monday are called after the sun and moon; Tuesday is the day of the god of Tiw (Jupiter), Wednesday of Woden, god of war, Thursday of Thor, god of thunder, Friday of Frigu, goddess of love, Saturday of Saturn, Rom. god of harvests. See CALENDAR.

DAY, JOHN (c. 1574), Eng. dramatist; collaborated with Dekker and others; chief work is *Parliament of Bees* (1641). *Works* edit. by A. H. Bullen (1881).

DAY, THOMAS (1748–89), Eng. author, eccentric, and philanthropist; wrote *Sandford and Merton.*

DAY-FLIES, see MAY-FLIES.

DAYLESFORD (37° 20′ S., 144° 13′ E.), town, Victoria, Australia; gold mines. Pop. 3500.

DAYTON (39° 5′ N., 84° 27′ W.), city, Kentucky, U.S.A.; whisky distilleries. Pop. (1910) 6979.

DAYTON (39° 41′ N., 84° 34′ W.), city, Ohio, U.S.A.; on Great Miami and on Miami canal; manufacturing centre; carriages, machinery. Pop. (1910) 116,577.

DE BARY, HEINRICH ANTON (1831–88), Ger. botanist; privat-docent, Tübingen; prof. of Bot., Freiburg, 1855; Halle, 1857; Strassburg, 1872, where he was the first rector of the new univ.; eminent authority on fungi and plant diseases; discovered that lichens represent a symbiosis of algæ and fungi.

DE COSTA, BENJAMIN FRANKLIN (1831–1904), Amer. preacher and writer on hist. subjects.

DE COSTER, CHARLES THÉODORE (1827–79), Belg. man of letters.

D'ERLON, JEAN BAPTISTE DROUET, COUNT (1765–1844), marshal of France; fought in Revolutionary campaigns, at *Jena*, *Waterloo*, and in Algeria, 1834.

DE GEER, LOUIS GERHARD, BARON (1818–96), Swed. statesman and author.

DE HAAS, MAURITZ (1832–95), Amer. artist; seascapes.

DE KALB (41° 56′ N., 88° 52′ W.), city (and county), Illinois, U.S.A.; woven and barbed wire, agricultural implements, etc. Pop. (1910) 8102.

DE KEYSER, THOMAS (1597–1667), Dutch artist.

DE LA BECHE, SIR HENRY THOMAS (1796–1855), Eng. geologist; of rare insight, induced government to establish the Geological Survey of Great Britain (director, 1835), the Museum of Practical Geol., and Royal School of Mines; Pres. of the Geological Soc., 1847; author of *The Geological Observer* (2nd edit., 1853) and numerous research memoirs.

DE LA RIVE, AUGUSTE ARTHUR (1801–73), Swiss physicist; app. prof. of Physics at Geneva, at age of twenty-two; investigated various electrical phenomena, and invented method of galvanising. When France annexed Nice and Savoy (1860) he was sent to England on a special embassy, and received guarantees for the independence of Geneva.

DE LA RUE, WARREN (1815–89), Brit. chemist and astronomer; undertook researches on solar physics and astronomical photography; invented photoheliograph; founder of a well-known firm of stationers; pres. of the Royal Astronomical and (twice) of the Chemical Soc.

DE LA WARR (La Warr), Eng. barony. ROGER DE LA W. of Isfield was summoned to Parliament as baron (1399); descendants fought in Fr. wars of Edward III. and Henry V. Barony went by marriage (1426) to family of West, who have ever since held it, with (since 1761) earldom.

DE LAND (29° 1′ N., 81° 17′ W.), town, health-resort, Florida, U.S.A.; univ.; sulphur springs.

DE LONG, GEORGE WASHINGTON (1844–81), Amer. explorer.

DE L'ORME, PHILIBERT (d. 1570), Fr. architect; one of architects of the Tuileries; largely employed by Valois kings.

DE MORGAN, AUGUSTUS (1806–71), Eng. mathematician and logician; b. Madura, S. India; s. of army officer under East India Co.; ed. Cambridge, where he studied math's under Sir G. B. Airy; fourth wrangler, 1827; unable to take his degree, because of conscientious objections to Univ.'s theological tests; on establishment of London Univ. (1828), became prof. of Math's there, and, with exception of short break, served the Univ. for over 30 years. He was a great and clear teacher—Todhunter and Routh were amongst his pupils; also did much for the development of Formal Logic and for introduction of *metric system*; chief works: *Formal Logic*; Elements of: *Arithmetic*, *Algebra*, *Trigonometry*; Treatises on *Differential and Integral Calculus.* See *Life*, by his wife (1882).—**William Frend** (1839–), s. of above, an artist in stained glass and ceramics till *Joseph Vance* (1906), and *Alice-for-Short* (1907) won him fame as novelist.

DE PERE (44° 26′ N., 88° 4′ W.), city, Wisconsin, U.S.A.; flour- and paper-mills. Pop. (1910) 4477.

DE QUINCEY, THOMAS (1785–1859), Eng. essayist; b. Manchester, and ed. at Grammar School there and at Oxford. His early life was marked by many irregularities, and while at Oxford he became a victim to the opium habit, which had disastrous effects upon his future career. About 1807 he made the acquaintance of Wordsworth, Coleridge, Lamb, and others, settled at Grasmere, edited a local paper, and contributed to *Blackwood.* He married a farmer's dau. in 1816; removed to Edinburgh in 1828, where, and at Lasswade, he spent the remainder of his life. His *Confessions of an English Opium-Eater* appeared in the *London Magazine* in 1821, and was followed by critical writings and biographical studies in *Blackwood*, *Tait's Magazine*, and other journals. His reading was very extensive, and he had great intellectual endowments. He was one of England's greatest stylists, and excelled in impassioned ornate prose, but his work is marred by digression. Masson, *Life*; H. S. Salt, *De Quincey.*

DE RUYTER, MICHAEL ADRIANZOON (1607–76), Dutch admiral; served with Van Tromp in first Dutch War with England (1653); assisted Danes against Swedes (1659); in Second Dutch War defeated Eng. fleet at N. Foreland (1665); sailed up the Thames and burned shipping (1667); in Third Dutch War he defeated combined Fr. and Eng. fleets at *Sole Bay* (1672); assisting Spain against France was wounded near Messina, and a week later d. at Syracuse.

DE TABLEY, JOHN BYRNE LEICESTER WARREN, 3RD BARON (1835–95), Eng. poet, botanist, and numismatist.

DE VERE, AUBREY THOMAS (1814–1902), Irish poet; author of *Legends of St. Patrick*, etc. His f., SIR AUBREY DE V. (1788–1846), was a distinguished sonneteer.

DE WET, CHRISTIAN (1854–), Orange Free State general and politician; famed for guerilla tactics during South African War (1899–1902).

DE WETTE, WILHELM MARTIN LEBERECHT (1780–1849), Ger. theologian; prof. at Weimar, Berlin, and Basel; pioneer of critical study of Bible, specially Old Testament.

DE WINT, PETER (1784–1849), Eng. landscape artist; of Dutch descent; noted water-colourist.

DE WINTER, JAN WILLEM (1750–1812), Dutch admiral; defeated by Admiral Duncan (1797).

DE WITT, JAN (1625–72), Dutch statesman; pensionary of Dort; grand pensionary of Holland, 1653–72. Like his f., JACOB (burgomaster of Dort),

he resolutely opposed the house of Orange; led the Republican Anti-Stadtholder party; did much for Holland in commercial struggle with England; secured Triple Alliance with England and Sweden against France, 1668; with his bro., CORNELIUS (1623–72), torn to pieces by mob on defeat of Holland by Louis XIV.

Geddes, *Administration of De Witt* (1879); Lefèvre-Pontalis, *Life of De Witt* (1885).

DEACON (Gk. *diakonos*, servant), member of lowest of three Holy Orders of Christian Church, *i.e.* bishops, priests, deacons. First indisputable mention is *Epistle to the Philippians* 1¹. In Church of England d's have all powers of priest but absolution and the consecration of bread and wine of Eucharist. In Scottish Presbyterian churches a d. is a layman elected to manage financial affairs of a church.

DEACONESS (Gk. *diakonissa*, servant), name of woman officer in the Early Christian Church; mentioned in III. cent., and continued to exist till V. They assisted in the general services of the church in the same way as deacons, except that they had no priestly powers. The office was revived in XIX. cent. in Prot. churches, hence the establishment of d. institutions by Kirk of Scotland in Edinburgh, by Church of England in London.

DEAD NETTLE (*Lamium*), genus of Labiatæ; two species—*L. album* and *L. purpureum*; square stems.

DEAD SEA (31° 30′ N., 35° 30′ E.), salt lake in S. Palestine, some 25 miles E. of Jerusalem; length, 45 miles; greatest breadth, 9 miles; depth varies from 3 ft. in S. to 1300 in N.; lies almost 1300 ft. below level of Mediterranean; receives Jordan and other streams with fertile banks; otherwise surrounded by bleak deserts and stony salt hills; precipitous mts. on E. and W. shores; no apparent outlet. Its waters evaporate in great heat, are intensely salt (25 % of salts, as compared with ordinary sea water, *c.* 5 %), and contain no animal life; Sodom (*q.v.*) and Gomorrah were near it; called in Bible Salt Sea, Sea of Plain, East Sea; also known as 'Sea of Asphalt,' 'Sea of Lot.' See PALESTINE.

Blanckenhorn, *Das Tote Meer* (1898).

DEADLY NIGHTSHADE, see BELLADONNA.

DEAD-MEN'S-FINGERS, see ANTHOZOA.

DEADWOOD (44° 27′ N., 103° 40′ W.), city, Dakota, U.S.A.; gold mines. Pop. (1910) 3653.

DEAF AND DUMB, term applied to persons who by a defect of hearing from birth, or soon after, have not acquired the power of speech, although the organs of speech are usually normal, so that the term is incorrect in denoting that two organs are affected. The defect is more common than was formerly supposed. When schools for the education of deaf-mutes were first proposed the main objection to them almost everywhere was that there would be insufficient pupils, but once established it was found that there were great numbers of applicants for admission. In 1901 there were estimated to be 15,246 deaf and dumb persons in England and Wales, 2638 in Scotland, 3971 in Ireland, and somewhat over 50,000 in the U.S.A., the proportion to the population being highest in England and Wales. Switzerland is the country with the highest proportion of deaf-mutes, there being computed to be 1 to every 408 of the population, while England and Wales have 1 to every 2132, and Holland 1 in every 2985. The proportion of deaf and dumb persons in the population is, however, diminishing yearly.

Deafness in those who are born deaf is believed to be due not to any great extent to malformation of the organs of hearing, but from exhaustive investigation it has been found that intermarriage between near blood relations has a very considerable effect on the number of children born deaf. These children are much more commonly found in communities where such intermarriage is usual than where it is not usual. In persons who become deaf later in life, various diseases are the main cause, scarlet fever being by far the most important, while various forms of meningitis of the brain and spinal cord, of brain congestion and inflammation, and typhoid fever, measles, etc., also are the causes of a great number of cases.

The education of the deaf and dumb dates from about the XVII. cent., although there are one or two instances of deaf-mutes being educated before that time. Hippocrates understood that deaf-mutes were dumb only because they did not know how to speak, and in this he was much in advance of his contemporaries, for in ancient times deaf-mute children were killed along with other defectives. The Venerable Bede tells of a deaf-mute being taught to speak by St. John of Beverley (d. 721 A.D.), but little attention was given to the subject from then till the XVI. cent., when Jerome Cardan discovered the principle that 'written characters and ideas may be connected together without the intervention of sounds,' and therefore considered the education of the deaf and dumb to be a possibility. Pedro Ponce de Leon (1520–84), a Span. Benedictine monk, actually taught deaf-mutes to speak, and in 1620 Juan Paulo Bonet wrote a work on the subject, in addition to teaching by signs and writing as well as by the mouth. In 1648 John Bulwer issued the first treatise in English on the instruction of deaf-mutes, and after him Holder, Wallis, Dalgarno (who invented a manual alphabet), and others wrote valuable contributions on the subject, and carried on the work of teaching. In 1760 Thomas Braidwood started in Edinburgh the first school in Britain for the education of the deaf and dumb (which was visited by many men of note, including Dr. Johnson on his northern journey), removing it later to the vicinity of London; while in 1765 the Abbé de l'Epée established a school in Paris and devoted his life and his fortune to the education of deaf-mutes. The first school for the deaf and dumb in America was founded in 1816 in Connecticut by Thomas Gallaudet. Charitable persons in different parts of the world organised the education of the deaf and dumb, and established schools, until in 1900, there were 450 schools with 25,800 pupils in the different countries of Europe, including 95 schools with 4222 pupils in Britain; in the U.S.A. at the same date there were 126 schools with 10,946 pupils, while other schools had been instituted in India, China, Japan, Mexico, the different countries of South America, Algeria, Egypt, and the various Brit. Colonies, in all of which a total of almost 40,000 deaf and dumb pupils were being educated, in over 600 different schools. A training college for teachers of deaf-mutes was established near London in 1885, and church services for the deaf and dumb, in which the manual alphabet is used, have also been instituted in several towns. In 1891 and 1893 Acts of Parliament were passed in Britain, making the education of deaf-mutes in Great Britain compulsory between the ages of seven and sixteen, school authorities being given the power to maintain deaf-mute children whose parents were unable to maintain them, and money grants are given by the government to help schools for the deaf and dumb, which are under the inspection of government officials.

There are two main methods of instructing the deaf and dumb—the *manual*, in which the sign language, manual alphabets, writing, and pictures are employed, and the *oral*, including lip-reading, writing, and pictures, but excluding altogether signs and manual alphabets. The *combined system* is a combination of the two, using all methods of instruction. In regard to the manual method there are two alphabets in use, the two-handed alphabet of signs being used in Britain and most of the Brit. colonies, while a one-handed alphabet is mainly used in America and the continent of Europe, and also to a small extent in England and Ireland. A speed of 120 or 130 words a minute can be obtained by the manual method. In the oral method children are first taught to pronounce the elementary sounds of the language, to recognise the form of the lips in pronouncing them,

and to associate objects and ideas with the words. The combination of sounds in longer words and the articulation of them is a matter of greater difficulty, and a course of eight or ten years is necessary for a knowledge of the language not greater than that of the average normal child of seven years or so. The combined method is valuable in that a child who finds much difficulty in the oral method will take to the manual method, and *vice versa*, the oral method being generally found the more difficult, although, of course, the great advantage is that when he has acquired speech by this method the deaf-mute can communicate with any person speaking the language of his country and is not limited to those who know the manual alphabet.

There are a number of instances of the successful education of blind deaf-mutes, instruction generally beginning by the pupil feeling the larynx and lips of the teacher, by finger-spelling into the hand, and by reading by the Braille method for the blind. Laura Bridgman and Helen Keller (*qq.v.*) are notable examples.

Report of the Royal Commission (1885); Love and Addison, *Deaf-Mutism*; Mygind, *Deaf-Mutism*; Boultbee, *Practical Lip-reading for the Use of the Deaf*.

DEÁK, FERENCZ (1803–76), Hungarian statesman; became representative to Diet, 1832; led Liberal opposition and brought about reconciliation with Austria; Minister of Justice, 1848, but opposed to Kossuth's party and retired; Hungary received constitution, 1860. Deák returned to power, 1861, and opposed extremists under Count Téléki; drew up address to emperor demanding constitution of 1848, return of exiles, etc.; repeated demand, 1866, when Austria was forced to concede it.

DEAKIN, HON. ALFRED (1856–), Australian statesman; Prime Minister of Commonwealth, 1903–4, 1905–8, 1909–10; leader of Federal Opposition, 1910–13; prominent at Colonial Conference, 1907.

DEAL (51° 13′ N., 1° 24′ E.), seaport, watering-place, on E. coast of Kent, England; one of old Cinque Ports; supposed landing-place of Julius Cæsar, 55 B.C.; has two castles built by Henry VIII. Boatmen have reputation for skill and hardihood. Chief industries are provisioning ships, boat-building. Pop. (1911) 11,297.

DEAN (Lat. *decanus*, one set over ten).—(1) Used until XV. cent. to denote leader of military force of ten men. (2) Chief of ten monks in mediæval monastery. (3) Head of chapter of collegiate or cathedral church, title being derived from monastic official. (4) Head (rural d.) of division of archdeaconry. (5) Deans of Peculiars, of the Arches, etc., whose spheres are exempt from bp.'s jurisdiction. (6) Fellows of colleges of Oxford and Cambridge, whose functions are akin to those of monastic deans. (7) President of faculty of Scot. and Ger. Univ's., *e.g.* 'Dean of Faculty of Arts' in Edinburgh Univ. (8) Pres. of Scot. Faculty of Advocates.

DEAN, FOREST OF (51° 45′ N., 2° 32′ W.), hilly district between Severn and Wye, W. Gloucestershire, England; ancient royal forest; coal and iron mines; stone quarries.

DEAN OF GUILD, in Scotland was the head of a Merchant Guild. In Edinburgh the D. of G. Court consists of the D. of G., five town councillors, and five citizens, of whom three must be builders, civil engineers, architects or surveyors. The court superintends all building, ventilation, and sanitary operations in the city. The D. of G.'s duty is to see that all buildings are erected according to law, and that dangerous structures are demolished.

DEANE, RICHARD (1610–53), Eng. regicide; naval commander; member of 'New Model'; commanded at *Naseby*, *Preston*, etc.; supported Cromwell in subjugation of Parliament; general-at-sea with Blake and Popham.

DEANE, SILAS (1737–89), Amer. diplomatist; obtained Fr. aid for revolt of colonies; long under suspicion of treachery.

DEATH, permanent cessation of vitality in the whole of the tissues of the body of an animal or plant. The immediate cause of d. may be (1) *syncope*, sudden heart failure, due to disease of the heart or circulatory system, or to shock reacting on the heart by the nervous system; (2) *asthenia*, gradual heart failure from weakening of the whole system by wasting disease or toxins in fevers, etc.; (3) *asphyxia*, when air is prevented from entering the lungs, as in drowning, suffocation, etc.; (4) *coma*, unconsciousness due to a brain lesion or poisoning of the brain through its blood supply, by, *e.g.*, opium or alcohol. D. may, of course, be due to a combination of two or more of the above four modes. The signs of d. include cessation of circulation and respiration, lowering of the body temperature; if a cut is made, the edges of the wound collapse instead of gaping as in life; rigidity of the muscles, or *rigor mortis*, comes on some time after death, and lasts for 24 or 36 hours, commencing at the face and neck; livid colours appear in the parts of the body which are lowest, depending on its position, and, later, a greenish colour appears on the abdomen.

Deaths must be *registered* within five days of occurrence by the nearest relative of the deceased, a form being filled up giving the name, age, sex, occupation, cause of death, etc., or within a fortnight if notice of d. and a medical certificate be first given to the registrar immediately after the occurrence. After a fortnight the registrar ought to call upon the person who should have registered the d. to appear before him to give the necessary particulars, and after twelve months have elapsed permission of the Registrar-General is necessary for registration.

DEATH DUTIES, taxes paid out of property left at death. By Brit. Finance Act (1894) property exceeding £100 pays 1 %; £500, 2 %; £1000, 3 %; £5000, 4 %; £10,000, 5 %; £20,000, 6 %; £40,000, 7 %; £70,000, 8 %; £100,000, 9 %; £150,000, 10 %; £200,000, 11 %; £400,000, 12 %; £600,000, 13 %; £800,000, 14 %; £1,000,000, 15 %. Charitable gifts made within a year, and other gifts within 3 years of death, are taxed.

DEATH VALLEY, desert valley, formerly bed of salt lake, in Inyo County, E. Cal., U.S.A.; depth, *c.* 430 ft.

DEATH-WATCH, see BOOK-LICE.

DEBENTURES AND DEBENTURE STOCK.—A *debenture* is a writing promising to repay a specified sum at a given date, with interest in the meantime half-yearly. It usually gives a 'floating charge' on the assets of the company as security for the loan. A floating charge means that the whole of the company's property, present and future, is security for the loan, but that the company, until the charge becomes a fixed charge or the debenture-holders enforce their rights, has power to deal with any specific part of its assets in the ordinary course of its business. *Debenture Stock* is related to debentures in much the same way as stock is to shares.

DEBORAH, a character in the *Book of Judges*, represented as encouraging Israelites against Canaanites. 'Song of Deborah' at victory of former is assigned by Higher Criticism to earliest period of Jewish literature. There are hist. difficulties in narrative.

DEBRECZEN (47° 33′ N., 21° 38′ E.), town, Hungary; centre of Hungarian Protestants; active trade; cattle markets. Pop. (1910) 92,729.

DEBT, sum of money due from one person to another. If a creditor accepts a smaller sum in discharge he can sue for the balance unless an article not money has been thrown in. Imprisonment for d. was abolished by the *Debtors Act* (1869), but default of payment in a judgment d. renders defaulter liable to six weeks' imprisonment. Actions to recover simple contract d's must be brought within six years from the time they become due or from the last acknowledgment of the d. in writing. Any person who has obtained an order for the payment of money may get the court to serve a 'Garnishee' order, attaching any d's due to the judgment debtor or any money standing to his credit at a bank.

DEBUSSY, CLAUDE ACHILLE (1862–), Fr.

composer; b. St. Germain-en-Laye; studied at Paris Conservatoire; won *Grand Prix de Rome* (1884) with cantata *L'Enfant prodigue*; influenced by Russ. music; masterpiece, *Pelléas et Mélisande*, produced, Paris, 1902; *La Mer*, *Petite Suite*, songs, pianoforte pieces, etc. Mrs. Franz Liebich, *Debussy* (1910).

DECAEN, CHARLES MATHIEU ISIDORE, COUNT (1769–1832), Fr. soldier.

DECALOGUE ('The ten words'), Ten Commandments. Term originated in Gk. Church, and was first used in English by Wycliffe. Ten Commandments are stated in *Exodus* to have been written by God on two tables of stone, broken by Moses, and afterwards inscribed on two new tables according to revelation of Jehovah to Moses on Mount Sinai. Accounts in *Exodus* and *Deuteronomy* disagree as to second tables. The division of the Commandments is uncertain; system adopted in Orthodox Eastern, Anglican, and most Calvinistic Churches is known as Philonic, from work of Gk. father, Philo; while Rom. Church, followed by Lutherans, adopted views of St. Augustine. Date of D. is agreed by Higher Criticism to be later than age of Moses, not earlier indeed than middle of VIII. cent. Meissner, *Der Dekalog* (1893).

DECAMPS, ALEXANDRE GABRIEL (1803–60), Fr. artist.

DECAPODA, a sub-order of Cephalopoda (*q.v.*).

DECAPOLIS (32° 37′ N., 35° 50′ E.), league of 10 cities E. and W. of Jordan, Palestine; enumerated by Pliny—Damascus, Philadelphia, Raphana, Scythopolis, Garada, Hippos, Dion, Pella, Gerasa, Kanatha; only Scythopolis (the capital) lay west of Jordan. Population, mainly non-Jewish, enjoyed liberal civic rights and the privilege of coinage.

DECASTYLE, temple with ten-columned portico.

DECATUR (39° 51′ N., 88° 55′ W.), city, Illinois, U.S.A.; iron and woollen manufactures. Pop. (1910) 31,140.

DECATUR, STEPHEN (1779–1820), Amer. naval commander.

DECAZES, ÉLIE (1780–1860), Fr. politician; duc (1820); prime minister (1819); faithful to monarchy, but passed reforms and excited fear of ultra-royalists; accused of murder of Duc de Berry and resigned (1820). His s., LOUIS CHARLES ÉLIE (1819–86), Duc de Glucksberg, was Orleanist member of Assembly, 1871–77.

DECAZEVILLE (44° 34′ N., 2° 14′ E.), town, Aveyron, France; coal-fields; iron manufactures. Pop. 9180.

DECCAN (*c.* 16° N., 76° 30′ E.), name applied to whole peninsula of India, S. of Vindyha mountains, between Bay of Bengal on E. and Arabian Sea on W.; sometimes limited to that portion of tableland between Nerbudda and Kistna.

DECEMBER (Lat. *decem*, ten), the tenth month in ancient Rom. calendar.

DECEMVIRS (Lat. *decemviri*, ten men), colleges or commissions of ten Rom. magistrates; drew up famous Twelve Tables of Rom. law; administered religious matters, decided as to civil rights, and allotted public land.

DECHEN, ERNST HEINRICH KARL VON (1800–89), Ger. geologist; director of the Prussian Mining Department in Bonn. His survey and geological maps of Rhenish Prussia and Westphalia greatly furthered the development of Ger. mining and metallurgical industries.

DECIDUOUS, term applied in bot. and zool. to the seasonal shedding of, *e.g.*, leaves, or hairs, antlers, etc. Milk teeth are called deciduous.

DECIMAL COINAGE, currency in which the coins are multiples of ten with regard to a standard unit. With the exception of Great Britain and India all leading countries have adopted d. c., the U.S.A. being the first (1792). See MONEY.

DECIUS, CAIUS MESSIUS QUINTUS TRAJANUS (201–51), Rom. emperor of Illyrian extraction; did much to retard advance of Goths; great persecutor of Christians.

DECIZE (46° 51′ N., 3° 29′ E.), town, Nièvre, France, on island in Loire; glass-works; ancient *Decetia*. Pop. 5000.

DECKER, SIR MATTHEW (1679–1749), Eng. writer on commerce.

DECKER, PIERRE DE (1812–91), Belg. author and statesman.

DECLARATION OF PARIS (1856).—Following agreements concluded by most of Great Powers: (1) abolishment of privateering; (2) neutral flag covers enemy's goods, except contraband of war; (3) neutral goods under enemy's flag not liable to capture; (4) blockades to be binding must be effective. Spain, America, Venezuela, and Mexico refused to agree, but when Span.-Amer. War broke out (1898), Spain and America bound themselves to respect the declaration. Bowles, *Declaration of Paris* (1901).

DECLINATION (magnetism), the angle between a magnetic needle and the geographical meridian; (astron.) angular distance between the celestial equator and a heavenly body. See MAGNETISM (TERRESTRIAL).

DECLINATION, see ASCENSION, RIGHT.

DECOLORISING, in chem. and sugar industry, the elimination of coloured impurities, usually by means of powdered charcoal, also by permanganates or sulphurous acid.

DECORATED STYLE, in arch., the second Pointed or Gothic style (XIV. cent.); seen in cathedrals of Lincoln, York, Carlisle, Ely, and in Melrose Abbey. See ARCHITECTURE.

DECREE, judgment by one in authority; in Eng. law the judgment of a court. In divorce petitions a *decree nisi* is a conditional dissolution of marriage, which may be made *absolute* six months later.

DECRETALS (med. Lat. *decretales*, i.e. *epistolæ decretales*), letters of popes issuing decrees; they form important part of canon law. 'False Decretals' include some genuine d's, but many spurious documents (*e.g.* famous 'Donation of Constantine') drawn up in IX. cent. by writer under name of Isidore Mercator, now known as pseudo-Isidore. Collection was accepted by Pope Nicholas, and became incorporated in ecclesiastical law, strengthening papacy in claims to territory and power. Authenticity was questioned in XV. cent. by Cardinal Nicholas of Cusa and Juan Torquemada; rejected by Erasmus and other great scholars of XVI. cent.; used by Protestants in XVI. and XVII. cent's for attack on papacy. Critics have since agreed as to spuriousness, or reverse of all documents of collection.

DECURION (Lat. *decurio*), Rom. title for head of *decuria*, the 10th part of *curia* (q.v.), and senators of Rom. towns and colonies.

DÉDÉ AGACH (40° 48′ N., 25° 47′ E.), seaport, on Ægean Sea, in vilayet Adrianople; timber.

DEDHAM (42° 15′ N., 71° 10′ W.), town, Massachusetts, U.S.A.; woollen goods. Pop. (1910) 9300.

DEDICATION (Lat. *dedicatio*), setting apart in honour of Deity or for sacred purpose; originates in Jewish custom, consecration of tabernacle being mentioned in *Exodus*; temple of Solomon dedicated, and Feast of D. established to commemorate reconsecration, 165 B.C., after desecration by Seleucid king. Christ recognised the Feast (*John* 10^{22-3}), and custom of d. was probably adopted by first Christians, although no mention of it is found till 314 A.D. From accounts of early historians it appears that Mass and simple service only accompanied consecration of churches. Councils of 506 and 517 provided for separate d. of altars. Annual feast early held at anniversary of d., and day of feast is now often guide to name of patron saint of church.

DEDUCTION, form of reasoning which proceeds from universal to particular, or from the more to the less general. See SYLLOGISM.

DEE.—(1) (53° 17′ N., 3° 8′ W.) River, England, rises in Lake Bala, Merionethshire; flows generally N., enters Irish Sea, N.W. of Chester. (2) (57° 5′ N., 2° 15′ W.) River, Kincardineshire and Aberdeenshire, Scotland; rises in Cairngorm Mts.; flows into North Sea at

Aberdeen. (3) (54° 55′ N., 4° W.) River, Kirkcudbrightshire, Scotland; flows from Loch Dee to Solway Firth.

DEE, JOHN (1527–1608), Eng. astrologer and alchemist; imprisoned for sorcery; afterwards patronised by Queen Elizabeth; had an adventurous life; wrote mathematical and spiritualistic works.

DEEMS, CHARLES (ALEXANDER) FORCE (1820–93), Amer. preacher, author, and social reformer; pastor, 1868–93, of Church of the Strangers, New York, founded by himself.

DEER FAMILY (*Cervidæ*), family of ruminant even-toed Ungulates with 120 species found frequenting bush and forest tracts throughout world—except Africa, S. of Sudan, and West Indies; male generally provided with antlers—branched, bony structures covered during growth with a skin or 'velvet,' without fleshy covering during breeding season, and shed yearly. Young deer are known as fawns.

Most familiar in highland woods of Britain is small graceful ROE DEER (*Capreolus*), closely related structurally, though the antlers differ much, to the REINDEER (*Rangifer*) of N. Europe and Asia. The Amer. CARIBOU and ELK or MOOSE (*Alces*), with fork-like or spiked antlers, are the true AMERICAN DEER (*Cariacus*), and the 28 species range from Patagonia to Canada. The Scot. RED DEER (*Cervus elaphus*), famous for handsome antlers, occurs also throughout Europe, N. Africa, and Asia Minor, and is closely related to the N. Amer. WAPITI (*C. canadensis*), and less closely to the FALLOW DEER (*C. dama*) of Eng. parks, a native of the Mediterranean basin; the SPOTTED or AXIS DEER (*C. axis*) and SWAMP DEER (*C. duvaucelli*), both of India, and the small MUNTJAC (*Cervulus muntjac*) of India, Burma, Malay and neighbouring islands.

Very distinct from these is the E. and Central Asian antler-less MUSK DEER (*Moschus*), with tusk-like upper canine teeth, and scent gland containing the valuable perfume musk.

DEERFIELD (42° 29′ N., 72° 36′ W.), township, Massachusetts, U.S.A.; destroyed and inhabitants massacred by French and Indians, 1704. Pop. 2200.

DEFAMATION, see LIBEL.

DEFAULT, neglect to perform an act required by law, or to appear in court in answer to legal summons.

DEFEASANCE, instrument annexed to legal document, which, being performed, annuls the deed.

DEFENCE, in Eng. law, answer to a charge; claim of justification for act committed. In regard to physical d. a person has full right to use any necessary force to protect himself from attack.

DEFENDER OF THE FAITH, *Fidei Defensor*, title borne by all Eng. sovereigns since, and including, Henry VIII., on whom it was bestowed by the Pope for writing against Luther (1521).

DEFFAND, MARIE ANNE DE VICHY-CHAMROND, MARQUISE DU (*c.* 1697–1780), Fr. authoress; presided over famous salon; considered by Sainte-Beuve best writer of time.

DEFIANCE (41° 17′ N., 84° 23′ W.), city (and county), Ohio, U.S.A.; agricultural implements. Pop. (1910) 7327.

DEFINITION, explicit statement of just those attributes, no more and no less, which are implied by a name. See LOGIC.

DEFOE, DANIEL (1661–1731), Eng. author and pamphleteer; s. of James Foe, a London butcher; acted as hosier's agent; took part in Monmouth's rebellion; afterwards found trading occupation abroad; subsequently returned to London, changed his name to Defoe; took to journalism; became bankrupt (1692), but eventually paid his creditors in full; published *The Shortest Way with the Dissenters* (1702), and for this he was convicted of seditious libel, fined, pilloried, and imprisoned by Anne's Tory Government. Harley sent him to Scotland (1706) to promote the Union of the Parliaments. Between 1704 and 1713 D. carried on his famous *Review*, written entirely by himself. Later he wrote for the *Mercator*, and was secretly paid by the Whigs for his treachery to the Jacobites. In 1719 he achieved success with *Robinson Crusoe*, which has since been acclaimed throughout the world as one of the masterpieces of Eng. prose literature. It was founded on Dampier's *Voyage round the World* (1697) and Alexander Selkirk's story of his adventures told to D. at Bristol. Other works of high literary quality are *Captain Singleton*, *Moll Flanders*, *Colonel Jack*, *Roxana*, and *Journal of the Plague Year*—the latter perhaps his masterpiece—and *Memoirs of a Cavalier*. D's style is direct and lucid, and unapproachable in realism, which is helped in a considerable degree by his frequent use of the first person. He was a great journalist; he excelled in graphic description and in forcible polemics.

Life, by Hazlitt, Minto, Masefield.

DEGAS, HILAIRE GERMAIN (1834–), Fr. artist.

DEGGENDORF, DECKENDORF (48° 51′ N., 12° 56′ E.), town, on Danube, Bavaria; church of Holy Sepulchre, visited annually by thousands of pilgrims; depôt for timber trade of Bavarian forest. Pop. 7211.

DEHRA (30° 20′ N., 78° 6′ E.), chief town, Dehra Dun district, United Provinces, India; military cantonment. Pop. 28,000.

DEHRA DUN (30° 30′ N., 78° E.), district, Meerut division, United Provinces, India, at foot of Mussourie Mountains (Himalayas); consists for most part of fertile valley (Dun) of Dehra; tea-gardens. Area, 1209 sq. miles. Pop. 178,195.

DEIOCES (*c.* 699–47 B.C.), first Median king.

DEIOTARUS (I. cent. B.C.), tetrarch of Galatia; Rom. ally against Mithradates; cause pleaded by Cicero when accused of design against Cæsar.

DEIR, DEIR-EL-ZOR (35° 20′ N., 40° 11′ E.), town, on Euphrates, Asiatic Turkey. Pop. *c.* 7000.

DEIRA, ancient Anglian kingdom; between Humber and Tees; date of foundation unknown; united with Bernicia to form kingdom of Northumbria in VII. cent.

DEISM (Lat. *deus*, god), system of 'natural' religion evolvable by reason without aid from revelation. Term *deist* was invented to distinguish a certain class of self-thinkers of XVII. and XVIII. cent's from *atheists*; etymologically it is equivalent of theist, and was considered synonymous till end of XVII. cent., but later *theists* accept certain kinds of revelation. Deism as form of rationalism is important in history of European thought, being early result of extension of outlook through scientific discoveries, Renaissance, etc. Its upholders varied in attitude towards questions of immortality, determinism, etc., but agreed in accepting God, rejecting Bible. First deists asserted pagan and eastern origin of their system, naming Confucius, the Stoics, Marcus Aurelius, Seneca, etc. The term first occurs in Bayle's *Dictionnaire* (1695–97), the work of a Fr. deist who exercised enormous influence on contemporary thought, but movement dates from writings of Montaigne. Voltaire and later Fr. deists drew ideas from Eng. philosophers. Lord Herbert of Cherbury (1538–1648) was called 'father of D.' in England, although his famous contemporaries, Bacon and Hobbes (especially the latter, whose name became synonymous with atheism), exercised even greater influence in this direction. Lord Herbert's religious beliefs were confined to God, virtue, immortality, future rewards, and punishments. The deist, Charles Blount (1654–93), adopted many of Hobbes' views, attacking Pentateuch on same lines; his name is associated with application of hist. criticism to New Testament. The influence of Shaftesbury and Bolingbroke did much to popularise D., but it went out of fashion at end of XVIII. cent. with return to 'ages of faith' of Romanticism.

Leslie Stephen, *History of Eng. Thought* in *XVIII. Cent.*; Benn, *Hist. of Eng. Rationalism in XIX. Cent.*; Robertson, *Short Hist. of Free Thought*.

DEISTER (52° 15′ N., 9° 30′ E.), chain of hills, Hanover, Germany; coal mines, sandstone quarries.

DÉJAZET, PAULINE VIRGINIE (1798–1875), Fr. actress.

DEKKER, JEREMIAS DE (1610–66), Dutch satirical poet.

DEKKER, THOMAS (*c.* 1570–1641), Eng. dramatist; wrote *Old Fortunatus*, *The Honest Whore*, *Shoemakers' Holiday*, and other plays with Webster, Massinger, Chettle, Ford, and Middleton. He attacked Jonson in *Satiromastix*. D. was one of the most prolific writers of Elizabethan period, and his work is often of high poetical quality.

Rhys, *The Best Plays of Dekker* (Mermaid Series).

'DEL CREDERE' AGENT, person who is employed to sell goods for his principal, and who gets an extra commission for guaranteeing the solvency of the buyer: *i.e.* he guarantees that no bad debts shall occur.

DELABORDE, HENRI FRANÇOIS, COUNT (1764–1833), Fr. general.

DELACROIX, FERDINAND VICTOR EUGÈNE (1799–1863), Fr. artist; leader of Fr. Romantic School; famed for classical and hist. subjects.

Paul G. Konody, *Delacroix* (T. C. & E. C. Jack).

DELAGOA BAY (26° S., 33° E.), inlet of Ind. Ocean, Portug. E. Africa, extending N. to S., over 70 miles; partly enclosed by peninsula and island of Inyack; fine natural harbour, accessible to large vessels; port of Lourenço Marques is on N.W. shore. The Delagoa Bay Railway to Transvaal (opened 1890) carries a large percentage of the Rand traffic.

DELAMBRE, JEAN BAPTISTE JOSEPH (1749–1822), Fr. astronomer; assistant in the measurement of the meridianal arc between Dunkirk and Barcelona; pub. Tables of Uranus; prof. of Astron. at the Collège de France.

DELAMER OF DUNHAM MASSEY, SIR GEORGE BOOTH, 1ST BARON (1622–84), Eng. Royalist; commanded forces of Cheshire, Lancashire, and North Wales for king; imprisoned.

DELAND, MARGARETTA WADE (1857–), Amer. novelist; author of *John Ward, Preacher* (1888), *The Awakening of Helena Richie* (1906), etc.

DELANE, JOHN THADEUS (1817–79), Eng. journalist; editor of *The Times* (1841–77).

DELANY, MARY GRANVILLE (1700–88), Eng. writer; wrote chatty *Autobiography*, but chiefly known for friendship with Swift, Burke, and Fanny Burney.

DELAREY, JACOBUS HENDRIK (1848–), Transvaal general in South African War (1899–1902).

DELAROCHE, PAUL (1797–1856), Fr. artist of *Eclectic school*; among his Eng. and Fr. hist. subjects are *Cromwell at the Coffin of Charles I.*, *The Princes in the Tower*, *Execution of Lady Jane Grey*.

DELARUE, GERVAIS (1751–1835), Fr. hist. writer.

DELATOR (Lat.), accuser or informer who reported sums due to treasury or infraction of law in ancient Rome; richly rewarded under Republic; developed into extensive spy system under Empire.

DELAUNAY, ÉLIE (1828–91), Fr. artist.

DELAUNAY, LOUIS ARSÈNE (1826–1903), Fr. actor.

DELAVIGNE, JEAN FRANÇOIS CASIMIR (1793–1843), Fr. dramatist and poet, author of *Les Vêpres Siciliennes* (1818), *Les Enfants d'Édouard* (1833), *Louis XI.* (1832).

DELAWARE (40° 15′ N., 83° 2′ W.), city (and county), Ohio, U.S.A.; seat of Ohio Wesleyan univ.; railway workshops; iron foundries. Pop. (1910) 9076.

DELAWARE (38°28′ to 39° 50′ N., 75° to 75° 46′ W.), state, U.S.A.; bounded N. by Pennsylvania, W. and S. by Maryland, E. by Delaware river, bay, and Atlantic; smallest state except Rhode Island; capital, Dover. D. is situated on plain on peninsula formed by Chesapeake Bay and Delaware River; surface mostly flat and level; shores sandy and marshy, with many creeks and bays; some parts reclaimed from sea by dykes. D. has three counties: N.—Newcastle, centre—Kent, S.—Sussex. N. is beautiful fertile district, with rolling hills and deep valleys. Long ridge running N. and S. forms watershed of state. S. is almost flat, and in some parts swampy. Rivers, small but navigable, include Brandywine, Christiana, Duck, and Murderkill; canal connects Delaware River with Chesapeake Bay.

Hudson (*q.v.*) explored D. (*c.* 1609) for the Dutch; visited (1610) by Lord de la Warr, Gov. of Virginia; Dutch colony destroyed by Indians; next settlers Swedes; again acquired by Dutch, then by English (1664); received separate legislature (1704) and executive (1710) from Pennsylvania; declared independent state (1776). Gov. holds office for four years; Senate has 15, House of Representatives 35 members. D. Coll. is in Newark; also agricultural coll. in Dover for coloured people.

Principal harbours are Wilmington, Newcastle, and Lewes. Other towns are Smyrna, Delaware City, Milford, Laurel, Seaford, and Georgetown; Wilmington also a rising manufacturing town and railway centre. Granite clays and kaolin are to be found in N., but state is chiefly agricultural. Principal productions are fruits (especially peaches, strawberries, and other small fruits) and grain; market-gardening, dairy-farming, stock-raising, and oyster-fishing carried on; forests supply fine timber. Various manufactures, including iron and steel products, ships, leather goods, cottons, flour, and paper. Area, 1965 sq. miles. Pop. (1910) 202,322.—Scharf, *History of State of Delaware*.

DELAWARE INDIANS, a once-powerful N. Amer. tribe, now inhabiting part of Oklahoma.

DELAWARE RIVER (40° 30′ N., 75° 10′ W.), Amer. river; rises in Catskill Mts., Delaware County, New York; separates Pennsylvania on W. from New York and New Jersey on E., expands into Delaware Bay; navigable up to Philadelphia; length, 400 miles.

DELAWARE WATER-GAP (40° 58′ N., 75° 8′ W.), town, summer resort, Pennsylvania, U.S.A.

DELBRÜCK, HANS (1848–), Ger. historian.

DELBRÜCK, MARTIN FRIEDRICH RUDOLF VON (1817–1903), Prussian statesman.

DELCASSÉ, THÉOPHILE (1852–), Fr. statesman; did much to develop Fr. navy and colonies; responsible for occupation of Fashoda; made colonial agreements with Britain (1904); prominent in Morocco disputes; ambassador at St. Petersburg (1913–).

DELESCLUZE, LOUIS CHARLES (1809–71), Fr. journalist and Commune leader; killed at Barricades.

DELESSE, ACHILLE ERNEST OSCAR JOSEPH (1817–81), Fr. geologist; prof. of Geol. and Mineralogy at Besançon (1845); at the Sorbonne (1850); prof. of Agriculture at the École des Mines (1864); inspector-general of mines (1874).

DELFT (52° 1′ N., 4° 22′ E.), town, S. Holland; noteworthy buildings, Prinsenhof (now museum; former residence of Counts of Orange and scene of assassination of William the Silent, 1584); town hall; Old Church (XI. cent.); New Church (1381); birthplace of Grotius (1583); in XVII. and XVIII. cent's D. was famous for pottery—'Delft Ware,' and the industry is now revived, the modern product being termed 'New Delft.' Pop. (1910) 34,388.

DELHI (28° 44′ N., 77° E.), capital of India; industrial and commercial centre of Punjab. D. was made capital of India, 1912, being selected on geographical, historical, and political grounds; it forms an imperial enclave under a Chief Commissioner; area, 557 sq. miles. The planning and laying out of the new Government buildings has been entrusted to experts; the site is to be south-west of the old city; estimated cost, £4,000,000, will certainly be exceeded; the style of arch. has been a matter of controversy. The Viceroy's first entry into the new capital (Dec. 26, 1912) was the occasion of an anarchist outrage, in which Lord Hardinge was seriously wounded by a bomb.

D. is situated on right bank of Jumna (with fine railway bridge), on high ground. Principal street (Silver Street) is busy thoroughfare with many handsome buildings. Famous palace of Shah Jehan (*q.v.*) magnificent Moslem architecture) is about a mile in circumference and has beautiful interior. Jama Masjid (Great Mosque), also work of Shah Jehan, is 'one of India's glories'; Kala Masjid (Black Mosque);

tombs of Imperial family (in suburbs); Kutab-Minar, wonderfully built tower, surrounded by miles of ruins. D. has fine public gardens; bazaars famous for shawls, precious stones, gold and silver ware; centre of wheat trade.

D. became capital of great Muhammadan Indian Empire at beginning of XIII. cent.; taken by Baber—founder of Mogul Dynasty—in 1525; captured by Lord Lake and under Brit. rule since 1803; scene of awful massacre of Europeans (May 11), and stormed and taken by small Brit. and native force after famous siege in 1857; scene of Durbars in 1877, 1903, and Oct. 1911, when George V. visited D. in person and proclaimed it capital. Pop. *c.* 400,000; D. city (1911), 232,837.

Fanshawe, *Delhi, Past and Present* (1902).

DELIA, festival and games in honour of Apollo, held in Delos, every four years.

DELIAN CONFEDERACY.—(1) Alliance of Ionian states of *Magna Græcia* against Persia, 478 B.C.; named after meeting-place of executive council at Delos; almost unique effort of autonomous Gk. states at federation. Necessity of union against Persia was perceived by Athens alone, who incurred Persian invasion by aiding Gk. cities of Asia Minor; result was great Persian defeat at *Marathon* (490), and gratitude of Ionians, which enabled Athens to establish and control confederacy. Nominally Athens was merely president of representative synod, but as Athens was brilliant naval power, and unwarlike Ionians gradually commuted services for money payments, they sank into position of tributary states. Athens divided Ægean into taxation districts of Hellespont, Thrace, Ionia, Caria, and islands. With removal of treasury from Delos to Athens pretence of confederacy came to end. Purpose was also completed; Persians had been driven from Lycia and Caria by Cimon, who finally won decisive battle at river *Eurymedon*, and Athens simply used funds of league to keep up her own position; result, successful revolt of constituent states; no charges against Athenian hegemony except acts of despotism, such as insisting on allies having democratic constitutions, and making war on seceding states; failure of her empire was due to Gk. love of autonomy.

(2) Athenian League of 378 B.C. against Sparta. Severer rule of Sparta enabled Athens to form new alliance to which Persians were not admitted, but which was joined by several barbarian states and recognised by Macedonia. Second Delian Confederacy was more of free league than first. It marked brief and final period of Athenian pre-eminence.

J. H. Marshall, *The Second Athenian Confederacy* (1905); see also general histories of Greece.

DELIBES, CLÉMENT PHILIBERT LÉO (1836–91), Fr. composer; best opera, *Lakmé*; ballets include *Sylvia* and *Coppélia.*

DELILAH, Philistine woman who betrayed Samson to his enemies (*Judges* 16).

DELILLE, JACQUES (1738–1813), Fr. poet and translator.

DELIRIUM, a temporary derangement of the brain, usually a complication of some disease, *e.g.* brain injury, fevers, poisoning by alcohol or opium; is commonly considered as of three forms: *maniacal d.*, in which there is much violence; *muttering d.*, in which the individual lies quietly, muttering incoherently in a high fever; and *d. tremens*, in which there is great restlessness and trembling, with hallucinations both of hearing and of sight. Ice to the head, sponging with cold water, with bromide of potassium or morphia internally, is the usual treatment for the first type; stimulants, and quinine for the fever, in the second; and nutritive broths and other fluids to keep up the strength, with bromide of potassium and chloral, for the third.

DELISLE, JOSEPH NICOLAS (1688–1768), Fr. astronomer; founded the observatory in St. Petersburg; app. naval astronomer in Paris; discovered a method for calculating the transit of Mercury and Venus; pub. numerous research papers.

DELISLE, LÉOPOLD VICTOR (1826–1910), Fr. historian.

DELITZSCH (51° 33′ N., 12° 20′ E.), town, on Lober, Saxony, Germany; tobacco, woollens. Pop. 10,940.

DELITZSCH, FRANZ (1813–90), Ger.-Hebrew divine of Lutheran persuasion; author of many theological works, and regarded as one of founders of Higher Criticism. His son, FRIEDRICH (b. 1850), is well-known Oriental scholar.

DELIUS, NIKOLAUS (1813–88), Ger. Shakespearean scholar and philologist.

DELLA BELLA, STEFANO (1610–64), Ital. engraver.

DELLA CASA, GIOVANNI (1503–56), Ital. poet and archbishop.

DELLA COLLE, RAFFAELLINO (fl. *c.* 1530), Ital. artist.

DELLA GHERARDESCA UGOLINO, see UGOLINO, DELLA GHERARDESCA.

DELLA QUERCIA, JACOPO (1374–1438), Ital. sculptor.

DELLA ROBBIA, LUCA (1399–1482), Ital. sculptor; after being trained as a goldsmith, turned to sculpture and executed much fine work in marble, bronze, and terra-cotta reliefs; much of it done for cathedral at Florence; held very high position in Florentine art, and his relief work gave name to a style known as 'Della Robbia ware.' His nephew, ANDREA DELLA R. (1435–1525), continued his work, and, with several other members of same family, achieved remarkable distinction.

Cavallucci and Molinier, *Les Della Robbia* (1884); Burlamacchi, *Della Robbia* (2nd ed., 1910); Illustrated Biographies of The Great Artists, *Della Robbia and Cellini.*

DELMEDIGO, Jewish family, of which most famous members were ELIJAH (XV. cent.) and JOSEPH SOLOMON (XVI. cent.).

DELMENHORST (53° 3′ N., 8° 38′ E.), town, grand-duchy of Oldenburg, Germany; woollen factories. Pop. (1910) 22,516.

DELOLME, JEAN LOUIS (1740–1806), Swiss jurist and author.

DELONEY, THOMAS, Eng. ballad-writer and silk-weaver, who, during Elizabeth's reign, wrote numerous popular broadsides on the Armada, and other national subjects.

DELORME, MARION (1613–50), Fr. courtesan; famed for wit and beauty; life dealt with by Hugo, de Vigny, and G. P. R. James.

DELOS, LITTLE DELOS (37° 24′ N., 25° 17′ E.), island, smallest of Cyclades group, in Ægean Sea; birthplace and seat of worship of Apollo ('Delios') and Artemis ('Delia'); believed to have been inhabited by Ionians; later in possession of Athens. After fall of Corinth (146 B.C.) D. became centre of commerce, and had large slave-trade; noted for art, especially bronze works. City of Delos was situated on W. of island; contained temple of Leto, besides Great Temple and oracle of Apollo. D. was protected by sanctity; there was no need of fortifications; continued to flourish till destroyed (87 B.C.) during Mithridatic war. Here was kept the treasury of the *Delian Confederacy* (q.v.); interesting Fr. excavations since 1876.

Lebègue, *Recherches sur Délos* (1876); Homolle, *Délos* (1887).

DELPHI (38° 29′ N., 22° 30′ E.), small town (originally called *Pytho*; modern *Castri*), in Phocis, Greece; famous for oracle of Apollo, in charge of Pythian priestess; situated on steep slope on S. side of Mt. Parnassus; shut in on N. by mts. Name is derived, either from eponymous hero, Delphus, or from *Adelphos* (brother), referring to twin-peaks near by, between which issued Castalian spring. D. was governed by several aristocratic families of Doric origin, from which were chosen magistrates, priests, etc. (see AMPHIC-

TYONY); principal place of worship for Apollo, whose temple stood in N.W. of town; first built of stone; burnt in 548 B.C., and rebuilt with marble front. Its marvellous store of wealth tempted Xerxes, whose attempt at possession, however, was repelled; plundered (350 B.C.) by Phocians to carry on war against Thebes; robbed later by Sulla, Nero, and others; important excavations by Fr. archæologists.—*Fouilles de Delphes.*

DELPHINIA, Athenian festival in honour of Apollo, held yearly in April.

DELPHINUS, constellation of N. hemisphere, known to the ancients.

DELSARTE, FRANÇOIS ALEXANDRE NICOLAS CHERI (1811–71), French-Amer. first operatic tenor, and then teacher of system of dramatic expression.

'DELTA,' *nom de plume* of D. Macbeth Moir (*q.v.*).

DELTA (from shape of Gk. letter Δ), any tract of land enclosed by branches of a river's mouth (*e.g.* Ganges, Nile, Mississippi, Danube); the triangular tract of land is formed by deposits of fine silt brought down by the river. The d. of the river Po advances by about 100 yards annually towards the sea.

DELUC, JEAN ANDRÉ (1727–1817), Swiss geologist and natural philosopher; emigrated to England; F.R.S., 1773; app. reader to Queen Charlotte; travelled on the Continent and was awarded the title of honorary prof. of Geol. at Göttingen; pub. memoirs on atmospheric moisture, geol., and on philosophy.

DELUGE, THE, name given to the flood which overwhelmed the world, because of the wickedness therein, as related in *Genesis* (vi.–ix.). This Biblical story, which is supposed to be founded on the Babylonian tradition, contains several inconsistencies, and is admittedly of a composite character. Indeed, flood stories are to be found in all primitive religions and traditions—notable instances being that set forth in Ind. epic, *Mahābhārata*, and the story of Deucalion (Ovid's *Metamorphoses*). While there seems to be some foundation in fact regarding a great cataclysm which overtook the world, it is almost impossible to disentangle truth from tradition. The Eng. Bible dates the D. at 2348 B.C.

Elwood Worcester, *Genesis in the Light of Modern Knowledge* (1901); Suess, *Face of the Earth* (1904); Gordon, *The Early Traditions of Genesis* (1910).

DELYANNI, THEODOROS (1826–1905), Gk. diplomatist and prime minister; great opponent of Tricoupi; equipped army against Turkey, 1885; fell, 1897, after failure of anti-Turk. ministry.

DEMADES (d. 318 B.C.), famous Athenian orator; opponent of Demosthenes; put to death.

DEMANTOID, a species of green garnet, or 'Uralian emerald.'

DEMARATUS (*c.* 520 B.C.), king of Sparta.

DEMERARA (6° 15′ N., 58° 27′ W.), county of Brit. Guiana, between Essequibo and Demerara Rivers. Pop. 171,000.

DEMETER (classical myth.), dau. of Cronus and Rhea; eventually assumed her mother's attributes and functions, and became recognised as goddess of the earth's fruitfulness. Her favour was besought for the blessing of plentiful harvests, and drought and blight were supposed to be the result of her anger. She is generally represented as a woman of majestic appearance, with flowing yellow hair, emblematical of ripened corn. She was tenderly attached to her dau., Persephone, whom Aïdes carried off to the nether world. D. was known to the Latins as Ceres.—**Demetria,** Gk. seed-time festival in honour of Demeter.

DEMETRIUS (IV. cent. B.C.), Gk. sculptor, famed for realism.

DEMETRIUS (*c.* 206 B.C.), king of Bactria.

DEMETRIUS, name of two Macedonian kings.—**Demetrius I.** (337–283 B.C.), the 'besieger,' established supremacy over Greece and Macedonia, seizing throne, 294; d. a prisoner during attempted conquest of Asia.—Rule of **Demetrius II.** (239–29), marked by first Rom. interference.

DEMETRIUS, name of 3 Syrian kings.—**Demetrius I.,** SOTER (fl. 162–50 B.C.); **Demetrius II.,** NICATOR (fl. 147–25 B.C.); **Demetrius III.** (d. 88 B.C.).

DEMETRIUS DONSKOI, Grand-Duke of Moscow (1350–89), Russ. statesman and general.

DEMETRIUS PHALEREUS (345–283 B.C.), Gk. philosopher and statesman.

DEMETRIUS, PSEUDO.—Name given to three Pretenders who claimed to be Demetrius, the heir to the Russ. empire, murdered in 1591. The first defeated army of reigning Tsar, was crowned at Moscow, 1605, but murdered, 1606; the second won great successes, failed in attack on capital, and was murdered, 1610; the third was captured and executed, 1612.

DEMIDOV, NIKITA (fl. *c.* 1720), famous Russ. armourer, favoured by Peter the Great; several descendants were distinguished in arts and sciences.

DEMISE, term commonly used for death, but the correct meaning is transfer of estate. *D. of the Crown* is its transfer to a successor without any interregnum ('The king is dead: long live the king'). Formerly anarchy theoretically obtained between the death of the sovereign and the proclamation of his successor.

DEMIURGE (Gk. *dēmos,* 'people,' and *ergon,* 'work'), among the Gnostics the creator of the world of sense, as distinguished from the higher God, the creator of the divine soul, identified with the Jehovah of the Old Testament. See GNOSTICISM.

DEMMIN (53° 54′ N., 13° 1′ E.), town, Prussia, Germany; iron foundries; trade in grain, wool, coal, and timber. Pop. 12,541.

DEMOCHARES (d. 275 B.C.), Athenian statesman; nephew of Demosthenes.

DEMOCRACY, government by the people, is opposed to autocracy or oligarchy. With Aristotle d. was *bad* government by the people. Gk. d., which excluded slaves, had no representative government: the citizens met, spoke, and voted. In Gk. and Rom. cities there were continual struggles between lower and upper classes. Ancient d. was local; modern d. governs countries. The so-called 'Failure of d.' means that the votes of a nation's citizens do not effect legislation wanted by the nation; reforms are suggested by political parties, and the people by voting endorse or negative proposals.

DEMOCRATIC PARTY, one of the great political parties in U.S.A.; originally opposed to the elements of aristocracy of wealth or position which still existed even after Declaration of Independence. The South is now nearly all Democratic, and the inhabitants of large cities largely belong to the Party. Democratic Presidents have been Jackson, 1829–37; Van Buren, 1837–41; Polk, 1845–49; Pierce, 1853–57; Buchanan, 1857–61; Cleveland, 1885–89, 1893–97; Woodrow Wilson, 1913. From 1895 to 1911 the party was in a minority in Congress. In 1911 Elections Democrats secured majority in House of Representatives and demanded eight-hours' day for Government employees, reduction of tariffs, publication of election expenses, but these were vetoed by Pres. Taft. The D. P. advocates low tariff for revenue purposes only, while antagonistic *Republican Party* supports high protective tariffs.

Woodburn, *Political Parties and Party Problems in the United States* (1903).

DEMOCRITUS (b. *c.* 460 B.C.), one of the greatest Gk. philosophers; anticipated atomic theory of matter (see ATOMS), *i.e.* matter is composed of atoms which are always in motion; held that all atoms were alike, only by arrangement and position could they form different objects, hence objects did not vary, but their varied appearances were due to our sensations.

Burnet, *Early Gk. Philosophy* (1892); Beare, *Gk. Theories of Elementary Cognition* (1906).

DEMODEX, see under MITES AND TICKS.

DEMOGEOT, JACQUES CLAUDE (1808–94), Fr. literary historian.

DEMONOLOGY, the belief in demons and study connected therewith. In many religions there have been not only good gods whose favour it was desirable to obtain, but bad gods or spirits to be mollified. The

Jews inherited from ancient Semitic religion a belief in demons to which we find occasional reference in the Bible, but during the Exile they came into contact with Persian religion in which angels and demons played a prominent part. The phenomenon (whether or supposed) of possession by an evil spirit is familiar to every reader of the New Testament, and persons at any rate believed themselves possessed. The Early Christians did not deny the existence of pagan gods, but transformed them into devils. Demons were not prominent in either Gk. or Rom. religions, but in Oriental religions devil-worship takes uncouth and sometimes cruel forms. Modern occultism has led to revival of belief in demons.

Tylor, *Primitive Culture* (4th ed., 1904); J. C. Wall, *Devils* (1904).

DEMOSPONGIÆ, see under SPONGES.

DEMOSTHENES (*c.* 384–22 B.C.), Gk. statesman and orator. Early left an orphan, D. had a small fortune from his f., but his guardians made away with most of it. He studied law, and devoted all his energies to becoming a good public speaker, at first being very bad and meeting with derision. He entered political life in 355, and henceforward devoted himself to his life's work of trying to revive the best spirit and traditions of Gk. life. D. believed that Athens was the rightful leader of Greece, and it was her mission to play this part not merely in her own interest, but in that of Greece as a whole. Philip, king of Macedon, in opposition to whom D. tried to stir up his fellow-citizens, was for him a type of what was not Gk. but barbarian. D. delivered his *First Philippic* and the three *Olynthiac Orations*, while Philip was still a foreign foe, outside Greece, his *Second* and *Third Philippic* when Philip was a power in Greece itself. This last speech has been spoken of as D.'s 'crowning effort.' From 338 to 322 D. worked loyally for Athens in her internal affairs. His speech *On the Crown* is the greatest of this period. In the political troubles after the death of Alexander the Great, D. was condemned to death. He fled to Ægina and then to Calauria, and committed suicide by taking poison.

The work of D. as a statesman and as an orator is really one; he spared no trouble in setting forth the principles he held dear. His fame as an orator and a stylist has been almost unquestioned in ancient and modern times. His style is dignified and simple, elegant and refined, and as Homer is reckoned supreme among Gk. poets, so is D. among Gk. orators. Dionysius, one of the ablest critics of antiquity, praised D. unreservedly as setting the standard for Attic prose. Of the 61 speeches attributed to D., 27 are genuine, the rest certainly spurious. There are over 170 MSS. of his works, of which one of the X. cent. is far superior to the rest.

S. H. Butcher, *Introduction to the Study of Demosthenes*; many separate editions of speeches; complete in Oxford Classical Texts. Complete Eng. trans. by Kennedy.

DEMOTICA (41° 22′ N., 26° 30′ E.), town, Rumelia; important in Middle Ages as chief market of Thrace; linen, pottery, silk, and grain exported. Pop. *c.* 9000.

DEMPSTER, THOMAS (1579–1625), Scot. historian and scholar; prof. of Classics at Bologna; author of *Historia Ecclesiastica Gentis Scotorum*.

DEMURRAGE, payment made by shipper of goods to shipowner as compensation for delay in loading or unloading a vessel; a charge made by railway companies for delay in removing goods from their wagons.

DEMURRER, in law, preliminary protest made by defendant to the effect that plaintiff had no proper cause for action; abolished in civil cases (1875), but still obtaining in criminal cases.

DENAIN (50° 20′ N., 3° 25′ E.), town, Nord, France; coal mines and ironworks; scene of Villars' victory over Prince Eugène (1712). Pop. 25,000.

DENBIGH (53° 12′ N., 3° 25′ W.), county town, Denbighshire, N. Wales; ruined XIII.-cent. castle; timber, shoes. Pop. (1911) 6892.

DENBIGH, WILLIAM FIELDING, 1ST EARL OF (*c.* 1582–1643), Eng. Royalist; of family wrongly supposed to be descended from Hapsburgs; cr. Earl of D., 1622.

DENBIGHSHIRE (53° 10′ N., 3° 30′ W.), maritime county, Wales, having Irish Sea on N., the Conway forming W., and Dee part of E. boundary; surface partly mountainous, divided into several fertile valleys; greater part of lower ground produces oats, barley, turnips; uplands form pasturage; dairy produce; rich in coal, lead, slate, limestone, and freestone; collieries and extensive ironworks; woollen manufactures. County town is Denbigh; other towns, Wrexham, Ruthin. Area, 665 sq. miles. Pop. (1911) 144,796.

DENDERA (26° 13′ N., 32° 40′ E.), village, on Nile, Upper Egypt; has celebrated temple of Hathor (dating from period of later Ptolemies), one of most magnificent and best-preserved remains of antiquity in Egypt; D. is the ancient *Tentyra*.

DENDROCOMETES, see under INFUSORIA.

DENE-HOLES, excavations in form of narrow shafts, extending frequently to considerable depth and terminating in enlarged chambers or caves; of very ancient origin; in England chiefly confined to those parts of Essex and Kent, along lower banks of Thames, and popularly attributed to the Danes or other early invaders.

DENGUE, infectious fever usually occurring in India, Africa, and tropical America; the onset is sudden, and the fever is characterised by an eruption resembling that of scarlatina, and severe pains in the joints.

DENHAM, DIXON (1786–1828), Eng. African traveller; gov. of Sierra Leone.

DENHAM, SIR JOHN (1615–68), Eng. poet; author of *Cooper's Hill* (1642) and a fine elegy on Cowley; D., Cowley, and Waller are called 'the reformers of our numbers,' but D. is the least poet of the three. Johnson, *Life*.

DÉNIA (38° 53′ N., 0° 5′ E.), seaport, on Mediterranean, Alicante, Spain; interesting Moorish relics; exports grapes, raisins, onions. Pop. 12,431.

DENIKER, JOSEPH (1852–), Fr. anthropologist; author of *Les six Races de l'Europe* (1904), *The Races of Man* (1900).

DENILIQUIN (35° 33′ S., 145° 6′ E.), town, N. S. Wales, Australia; pastoral district.

DENINA, CARLO GIOVANNI MARIA (1731–1813), Ital. historian.

DENIS, JOHANN MICHAEL (1729–1800), Austrian poet.

DENIS, ST. (III. cent.), short for Dionysius, believed to have been martyred in Decian persecution; patron saint of France; first bp. of Paris; evangelised Gauls.

DENISON (33° 45′ N., 96° 43′ W.), city, Texas, U.S.A.; cotton manufactures; important railway and trade centre for fruit and farm produce of district. Pop. (1910) 13,362.

DENISON, GEORGE ANTHONY (1805–96), Anglican theologian; ritualist and keen High Church controversialist.

DENISON, GEORGE TAYLOR (1839–), Canadian publicist and colonel; has seen much active service; wrote *History of Cavalry* (1877), *Soldiering in Canada* (1900), *The Struggle for Imperial Unity* (1909).

DENIZEN, a foreigner enjoying certain rights by letters patent; in Britain he cannot be a member of Parliament or of Privy Council, nor can he hold any military office.

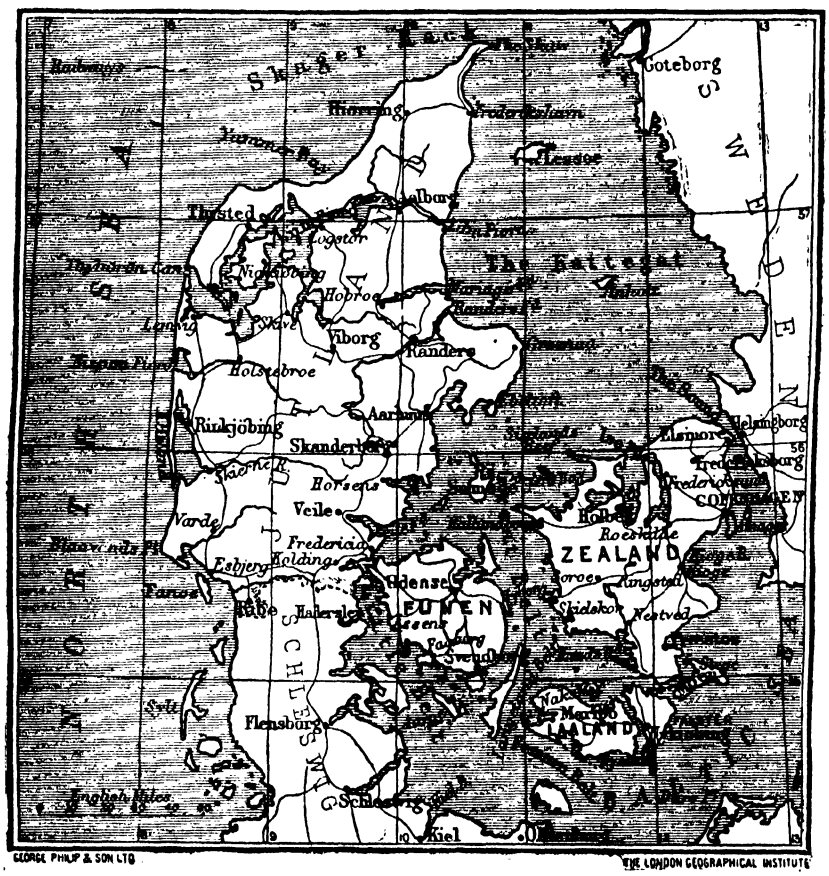
DENIZLI (37° 49′ N., 29° 2′ E.), town, Asia Minor, near ruins of Laodicea; cotton fabrics.

DENMAN, THOMAS, 1ST BARON (1779–1854), judge and politician; defended Queen Caroline (1820).

DENMARK (55° to 58° N., 8° to 15° E.), kingdom, Northern Europe; 15,360 miles in area, including the

Faroes; is partly mainland, partly archipelago. The mainland part, Jutland, is the N. part of the long peninsula extending N.W. of Germany, between the N. Sea and the Baltic, the S. part being occupied by Schleswig and Holstein. It is divided from Norway by the Skager Rack, from Sweden by the Cattegat and the Sound. The larger islands are Zealand and Fünen, the smaller Langeland, Laaland, Falstor, Moen, and, 90 miles to the E., Bornholm. The surface is generally low, and in places is protected by dykes. The climate is temperate and damp; about half of the country is in pasture, most of the remaining available land being arable; 800 miles are under wood, the beech flourishing better here than anywhere else in Europe.

History.—The mainland peninsula was known to the Romans as the Cimbrian Chersonese, it and the islands being inhabited by Cimbri and Teutones.



The first mention found of the Danes is in the VI. cent. Little information has been extracted from the Scandinavian sagas or from the early part of the *Gesta Danorum* of Saxo Grammaticus (*q.v.*), but Alfred the Great stated in the IX. cent. that the Danes inhabited Jutland, Scania, and the islands; for a cent. they had been the most prominent among the 'Northmen,' who in their Viking ships were sailing up the streams of the kingdoms of Franks and Angles, plundering and burning. In early IX. cent. the semi-mythical Norwegian dynasty of the Ynglinger was ruling over D., and one of its members, King Harold Klak, was baptized with many of his nobles at Ingelheim in 826. The pagan, Gorm the Old (d. 936), expelled this dynasty, but his s., King Harold Bluetooth, accepted Christianity in 960. The River Eider, between Schleswig and Holstein, was already established as the natural boundary of D., and Harold extended Dan. rule farther south than this point.

Harold's son, Swegen I., conquered England in 1013; Swegen's son, Cnut or Canute the Great (1014–35), ruled over England, Norway, and Denmark, and was the most powerful monarch of his time. Harold and Harthacnut, sons of Cnut, disputed over England until the death of the former (1040); D. finally lost England at the death of the latter (1042). In D. Cnut's sister's son, Svend Estridsen (1047–76), succeeded in founding the dynasty of the Estridsen, who ruled over D. for many cent's. Waldemar I. (1157–82) and Cnut VI. (1182–1202) defeated the Wends, acquired Rügen, and again reduced Norway. Waldemar II. (1202–41) ruled over the N. almost as Cnut the Great had done. The competition between Denmark and Ger. princes had already become strong, and the latter combined with Waldemar's vassals and inflicted a great defeat upon him. After his death (1241) D. was torn by strife for a cent. Waldemar IV. (1340–75) again established firm rule, increased the royal demesnes, and codified the laws. His famous daughter Margaret (1375–1412), widow of Haakon VI. of Norway, ruled over D. and Norway, and by the Union of Calmar (1397) persuaded Sweden to agree to the hegemony of D. She was beginning to suffer from the hostility of the Hanseatic League and the attacks of Holstein when her death brought the feeble Eric VII. (deposed in 1440) to the throne. After the disasters of his reign and that of his nephew, Christopher of Bavaria (1440–48), the Rigsrad elected a descendant of Waldemar II., Christian of Oldenburg (1448–81). Norway and Sweden chose other rulers and the Union came to an end.

The OLDENBURG DYNASTY ruled over D. until 1863. Christian II. (1513–23) was elected ruler of Norway and forced his rule upon Sweden; there was much craft in his methods, but he failed in justifying them by success; he sought to crush the nobles as the Tudors in England were doing, tried to make the Church while still R.C., Danish and national. The result, unfortunately, was the triumph of the nobles. Christian was deposed in favour of his uncle, Frederick I. (1523–33), the long *Adelsvælde* (rule of the nobles) was established; Norway remained to D.; but Sweden was finally separated. Christian III. (1536–59) ended the revolt of the Counts by capturing Copenhagen, 1536, and made Lutheranism the State religion. Christian IV. (1588–1648) was a gifted monarch, and saved D. in the Thirty Years War from the aggression of Sweden, until, hampered in every way by the factious

nobles, he was forced to surrender islands and provinces and open the Sound to Swed. trade (1645). This marked the end of Dan. supremacy in the N. The *Adelsvælde* was, however, drawing to a close.

In 1658 D. was forced to make further humiliating concessions to Sweden at Röskilde, only partially redeemed at Copenhagen (1660). The latter treaty was largely due to the king, and in alliance with clergy and burgesses, in opposition to the nobles, the Crown was able to establish in 1660 an hereditary, absolute monarchy. The privileges of the various orders of society were abolished. The serfs, ground down for cent's, were now protected by the Crown, and gradually became emancipated; despite frequent wars with Sweden D. prospered until the coalition of the N. powers against Britain in the Napoleonic Wars. The Brit. fleet bombarded Copenhagen in 1801 and in 1807, and confiscated the Dan. fleet until the end of the war, when D., having been driven to support Napoleon, was compelled to cede Norway to Sweden. The chief fact of the XIX. cent. in D. was the loss of Schleswig and Holstein through the deep-laid schemes of Prussia, and the growing Ger. discontent in Holstein.

On the death of Frederick VII. in 1863 the house of Oldenburg came to an end, and under the Treaty of London, Prince Christian of Schleswig-Holstein-Glücksborg, nominee of the Powers, became Christian IX. The new Duke of Augustenborg, however, whose father had agreed to the treaty, refused to acquiesce in his own disherison and assumed the title of Frederick VIII. The second episode of the Schleswig-Holstein question followed, resulting in the final loss of the duchies. The succeeding years have seen the decay of the old alliance, no longer needed, of people and Crown, and a new league of Crown and *Landsthing* against the advances of socialism. Frederick VIII. (1843–1912), bro. of Queen Alexandra of Britain, succeeded his f. (1906) and was followed by his son, Christian X. (1912–).

Literature.—Danish is a Scandinavian tongue akin to that of Sweden. An early writer of note was Saxo Grammaticus (1140–1206), whose Lat. history, *Gesta Danorum*, although not critical, is invaluable as lit. D. has also a fine collection of vernacular ballads and romances, collected in the XVI. cent., but composed at the height of the Middle Ages. As in other countries vernacular prose (except for isolated legal documents, etc.) and drama commence in the XVI. cent.; poetry after the Renaissance manner is represented by the great Anders Kristensen Arrebo (1587–1637). In the XVII. cent. Thomas Kingo (1634–1703) wrote religious verse of distinction. Ludvig Holberg (1684–1754), author of witty, polished comedies in the Fr. manner, has been called the Plautus of D.

D. felt the Romantic Movement very early. Johannes Ewald (1743–81) and Herman Wessel (1742–85), by tragedy and comedy respectively, slew the Classical School. The movement was organised by Schack von Staffeldt (1769–1826) and Ohlenschläger (1779–1850), who learned in Germany to turn back to the Middle Ages for inspiration. Blicher (1782–1848) wrote poems and stories at the height of the new manner. The mediæval revival was the great influence on Ingemann (1789–1862), the 'return to nature' the motif of Winther (1796–1876). Among the greatest of the poets was Frederick Paludan-Müller (1809–76). The chief prose writer of the movement was Hans Christian Andersen (1805–75), whose *Fairy Tales* were pub. 1835. Like other countries D. came to an end of her Romantic Movement; Schandorph (1836–1901), Drachmann (1846–1908), and Jacobsen (1847–85) illustrate the revival of classical feeling with style infinitely enriched by the experiments and achievements of the preceding school. Side by side with these pure stylists ran the realistic movement under Georg Brandes, a critic of European renown; one of its chief exponents is Pontoppidan (b. 1857). Among the many archæologists of D. are Worm, Gram, Langebek, Rask, Worsaae, Wimmer; among the few philosophers Kierkegaard.

Government is a limited monarchy; the parliament (*Rigsdag*) consists of the 'House of Aristocrats' (*Landsthing*) and Lower House (*Folkething*); 12 of the 66 members of the former are nominated for life by the Crown, the rest elected indirectly for 8 years; the members of the Lower House, who are paid, are elected under a system of male suffrage, with qualifications of age and character.

D. has a citizen army with few exemptions; the field army numbers about 50,000. A considerable amount is spent on the small fleet for coast defence.

The total exports amount to about £27,000,000 annually; the principal are butter, eggs, pork, bacon, besides sheep, hides, wool, fish, oil, machinery, paper; the U.K. receives over £15,000,000 worth. The enormous amount of dairy-produce is obtained largely by the co-operative butter factories and excellent methods of preservation.

Despite the Anglo-Scandinavian Import and Export Association, Harnegade, Copenhagen, D. receives from Germany twice the amount of imports received from Britain. The W. coast being useless owing to the shallow sea, the ports are on the E. There are 4213 miles of main road, 22,012 miles of local roads, and 2150 miles of railway (largely owned by the State) connected by steamboats or in winter by iceboats, etc.

Lutheranism became the State religion in 1536, but there is religious toleration. The archiepiscopal see is at Röskilde. Copenhagen Univ. dates from 1479; elementary education became compulsory in 1814; the country is strongly democratic.

The Faeroes are considered an integral part of D. Dan. dependencies are Iceland, Greenland, and the islands of St. Croix, St. Thomas, and St. John in the Dan. West Indies.

Chief centres of population are the capital, Copenhagen, Röskilde and Elsinore in Zealand, Aalborg and Aarhus, chief towns of Jutland, and Odense, the chief town of Fünen. Pop. (1911) 2,757,056.

R. N. Bain, *Scandinavia* (1904); Weitemeyer, *D.: its History, etc.* (1891); Brochner, *Dan. Life in Town and Country* (1903); Stefansson, *Sweden and D.* (1912).

DENNERY, ADOLPHE (1811–99), Fr. dramatist; wrote libretto of Gounod's *Faust* (1856).

DENNEWITZ (51° 58′ N., 12° 56′ E.), village, Brandenburg, Prussia, Germany; scene of defeat of French by Prussians, 1813.

DENNIS, JOHN (1657–1734), Eng. critic; ed. Cambridge; unsuccessful as playwright, he turned to literary criticism, and became involved in quarrels with Pope, Addison, and Swift; immortalised in the *Dunciad*.

DENON, DOMINIQUE VIVANT, BARON DE (1747–1825), Fr. archæologist and artist; director-general of Fr. museums.

DENOTATION, term used in logic (*q.v.*) for sum-total of objects having a given qualification.

DENS, PETER (1690–1775), Roman Catholic ecclesiastic, taught many years at Malines.

DENSITY of a substance is the mass of unit volume. It may be expressed as the mass of a cubic centimetre in grammes or of a foot in lbs. It is generally obtained by determining the ratio of the density of the substance to that of some standard substance, in which case the densities are relative and are often called *specific gravities* (q.v.). Gases are referred to hydrogen, the density of which at 0° C. and one atmosphere is taken as unity. The d. of liquids is referred to that of water at the required temperature. One cubic centimetre at 4° C. is assumed to weigh exactly one gramme, although careful experiment has ascertained it to be ·99996 gr. The d. of a liquid is obtained (1) by weighing an empty small glass bottle, called a pyknometer, subtracting this weight from its weights filled with water and with the required fluid; this gives the weights of equal volumes of the liquid and water, and the ratio, weight of liquid over

weight of water, gives the required density. (2) By weighing a solid first in water, then in the liquid, and so determining its loss of weight in each; the ratio of the loss of weights of each is equal to the ratio of the weights of equal volumes of the liquid and of water.

DENSU, CHO (1352–1431), Jap. artist, one of most famous of his country; his portrait of the priest, Shoichi Kokushi, is regarded as one of the world's greatest portraits.

DENTATUS (d. 270 B.C.), Rom. general and consul; conqueror of Pyrrhus, and of Samnites.

DENTIL, in architecture, tooth-like projecting block employed in cornices.

DENTISTRY, the science and art of the treatment of disease in the teeth, and of the replacement of them when lost, was practised by the ancient Egyptians and Greeks; and by succeeding teachers and surgeons the modern science, which reaches its most advanced stage in the U.S.A., has been evolved.

In 1878 an Act was passed in Britain forbidding those who have not undergone a course of study and taken a recognised licence or degree from assuming the title of dentist or any other title signifying registration as such.

In the treatment of disease in a tooth, a dentist either takes measures to stop the decay and repair the damage, or removes the tooth, and, in this latter case, frequently puts an artificial one in its place.

In the first case, the tooth may be subjected to *scaling*, or removing such a substance as *tartar*; to *filling* or *stopping*, in which the decayed material is entirely removed, and plugs of various materials, *e.g.* gold, porcelain, or metallic amalgams, inserted in its place; or to *capping* or *crowning*, in which part of the tooth, with the pulp, is removed, and a metallic cap or a crown, which encircles the tooth as far as the end of the root, applied.

In extraction of teeth a local anæsthetic, usually *cocaine* or its preparations, or a general anæsthetic, such as nitrous oxide or ethyl chloride, is now almost invariably used, while modern instruments have rendered the operation much more exact than formerly.

Artificial teeth are considered as partial or as complete sets, according as any natural teeth remain or not. The artificial teeth (or even a single tooth when only one tooth is required) are fastened to a *plate* or *base*, which is accurately fitted either to the natural teeth remaining or to the palate and gum. The plate is made most frequently from vulcanite or from platinum.

Dental appliances used in the various departments of D. are innumerable, and are often of intricate and beautiful design, while their manufacture is now an important industry.

Griffiths, *Dental Metallurgy* (1910); Tomes, *Dental Surgery* (5th ed., 1906); Burchard and Inglis, *Dental Pathology* (3rd ed., 1908); Johnson, *Operative Dentistry* (new ed., 1910).

DENTON (53° 27′ N., 2° 7′ W.), town, Lancashire, England; felt hats. Pop. (1911) 16,880.

DENVER (39° 48′ N., 104° 5′ W.), capital of Colorado, U.S.A., on S. Platte River; great commercial and railway centre; fine buildings, including univ., public library, museum, State Capitol, mining exchange, chamber of commerce. D. is the centre of a mining, agriculture, and stock-raising district; manufactures steel, iron, glass, shoes, paper, cotton. Pop. (1910) 213,381.

DEODAND, term (now abolished) formerly used in Eng. law for the object which had caused a person's death, and was forfeit to the king for good uses, or 'given to God.'

DÉOLS (46° 50′ N., 1° 40′ E.), town, Indre, France; X.-cent. abbey.

DEPEW, CHAUNCEY MITCHELL (1834–), Amer. orator and politician.

DEPILATORY, anything that will remove hair, by chemical or other means; electrolysis is the only satisfactory method.

DEPRETIS, AGOSTINO (1813–87), Ital. politician; follower of Mazzini; in cabinet, 1862; premier, 1881–87; carried through some reforms, but extravagant financier.

DEPTFORD (51° 29′ N., 0° 2′ E.), S.E. metropolitan borough, London, on S. bank of Thames; site of dockyards (closed 1869), now occupied by cattle markets. Pop. (1911) 109,498.

DERA GHAZI KHAN (30° 5′ N., 70° 52′ E.), town, on Indus, Derajat division, Punjab, India. Pop. 23,731.

DERA ISMAIL KHAN (31° 49′ N., 70° 52′ E.), town, near W. bank of Indus, N.W. Frontier Province, India. Pop. 31,737.

DERBENT, DERBEND (42° 2′ N., 48° 15′ E.), town Daghestan, Russia, on W. coast of Caspian; silk and cotton fabrics; fruit and madder. Pop. 14,821.

DERBY (41° 19′ N., 73° 5′ W.), city, Connecticut, U.S.A.; at junction of Housatonic and Naugatuck; iron manufactures; pianos. Pop. (1910) 8991.

DERBY (52° 55′ N., 1° 28′ W.), town, capital of Derbyshire, England, on Derwent; royal borough in XI. cent.; has Free School dating back to Henry II.; interesting churches, town hall, free library, art gallery, museum; headquarters of Midland Railway Co.; manufactures silk, lace, iron, porcelain; near supposed site of Rom. station *Derventiœ*. Pop. (1911) 123,433.

DERBY, EARLDOM OF.—Title has been held by several families: (1) **Ferrars.** ROBERT FERRARS was cr. Earl of D., 1138; d. 1139. His descendant, ROBERT, 6TH EARL, served on barons' side in wars against Henry III.; disinherited, 1266.—(2) **Plantagenet.** HENRY PLANTAGENET, s. of Edmund, s. of Henry III., was cr. Earl of D., 1337; also Earl of Lincoln and Duke of Lancaster. His dau., Blanche, m. John of Gaunt, Duke of Lancaster, s. of Edward III. Their s., HENRY, was Earl of D. before acceding to throne as Henry IV.—(3) **Stanley.** THOMAS STANLEY, who deserted Richard III. at *Bosworth*, was cr. by Henry VII. Earl of D., 1485; title held by his descendants ever since. He was also Lord of Man—a title which passed to Dukes of Athole, 1736.

Among more famous of subsequent earls have been: JAMES STANLEY, 7TH EARL (1607–51), the *Great Earl*, fought for Charles I. in Civil War; executed at Bolton; a man of fine character. EDWARD GEOFFREY SMITH STANLEY, 14TH EARL (1799–1869), strong advocate of Great Reform Bill; Chief Sec. for Ireland, 1830; from 1834 Conservative; succ. to earldom, 1851; Sec. of State for Colonies, 1833–34; Prime Minister, 1852, 1858, and 1866; vigorous opponent of disestablishment of Irish Church; good classical scholar; pub. translation of *Iliad*; fine orator. His s., EDWARD HENRY, 15TH EARL (1826–93), Sec. for Colonies, 1858, 1882–85; Sec. of State for India, 1858–59; Foreign Affairs, 1866–68, 1874–78. FREDERICK ARTHUR, 16TH EARL (1841–1908), bro., Sec. of State for Colonies, 1885–86; Pres. of Board of Trade, 1886–88; Gov.-Gen. of Canada, 1888–93; Chancellor of Univ. of Oxford. EDWARD GEORGE VILLIERS STANLEY, 17TH EARL (1865–), present earl, succ. his f.; fought in S. Africa; Postmaster-Gen., 1903–5.

DERBYSHIRE (53° 9′ N., 1° 35′ W.), county, England; bounded to N. by Yorkshire, E. by Nottinghamshire, S. by Leicestershire and Staffordshire, W. by Staffordshire and Cheshire; area, 1008 sq. miles. Surface varies greatly. In N. is grand and rugged scenery of the Peak District, where Pennine Range terminates; chief summits are Kinder Scout and Axe Edge. Owing to elevated position, soil is too poor here for cultivation, but sheep-farming is practised. Bordering on Cheshire are wide moorlands. In E. surface is gently undulating, and in S. mostly flat; here there are good crops of wheat and barley and large dairy-farms. D. abounds in picturesque scenery; valleys of Derwent and Wye being especially beautiful. Other rivers are Trent, Dove, and Dane. Chief towns are Derby (capital), Chesterfield, Glossop, Ilkeston, Ashbourne. Matlock,

Buxton, and Bakewell are popular health-resorts on account of their mineral springs. D. supplies limestone, lead, zinc, and chiefly in E. has important collieries. Manufactures include silk, cotton, elastic web, porcelain, and lace. D. has some fine old churches; ruined abbeys of Dale and Beauchief; remains of Bolsover, Duffield, and Codnor Castles; famous mansion of Haddon Hall, and Arbelow, interesting stone-circle. Pop. (1911) 560,129.

Derbyshire (Victoria County Histories); J. B. Firth, *Highways and Byways in Derbyshire* (1905).

DERBYSHIRE NECK, see GOITRE.

DERELICT, vessel abandoned by crew. See WRECKS.

DERENBOURG, JOSEPH (1811–95), Fr. Orientalist.

DERG, LOUGH (54° 40′ N., 7° 56′ W.), lough, County Donegal, Ireland; legendary scene of St. Patrick's purgatory.

DERG, LOUGH (53° N., 8° 15′ W.), lough, Counties Tipperary, Galway, and Clare, Ireland; expansion of the Shannon.

DERHAM, WILLIAM (1657–1735), Eng. theologian and scientist; elected F.R.S., 1702.

DERMOT MAC MURROUGH (d. 1171), king of Leinster; brought the English over into Ireland.

DERNA (32° 46′ N., 22° 38′ E.), small seaport, Barca, Tripoli, N. coast of Africa; ancient *Darnis*.

DÉROULÈDE, PAUL (1846–), Fr. poet, dramatist, and politician; banished for conspiracy, 1899.

DERRICK, tackle, or crane, used for hoisting purposes; derived from name of a hangman.

DERVISH, Persian for 'beggar,' applied to members of Muhammadan religious orders, and especially to members of mendicant orders. Trance and hypnotic suggestion play a considerable part among the Dervishes, who are thrown into frantic ecstasies in which they handle red-hot iron and eat reptiles with impunity; some are Antinomian, *i.e.* claim exemption from moral law.

DERWENT.—(1) (54° 12′ N., 0° 35′ W.) river, England; rises in Yorkshire Wolds, enters Ouse near Barnby. (2) (53° 10′ N., 1° 37′ W.) river, Derbyshire, England; joins Trent 7 miles S.E. of Derby. (3) (54° 38′ N., 3° 34′ W.) river, Cumberland, England; flows N. through Lakes Derwentwater and Bassenthwaite; enters Irish Sea at Workington. (4) (54° 54′ N., 1° 50′ W.) river, Northumberland and Durham, England; joins Tyne near Newcastle. (5) river, Tasmania; flows from Lake St. Clair to Storm Bay; navigable to New Norfolk.

DERWENTWATER (54° 35′ N., 3° 9′ W.), beautiful lake, Cumberland, England, S. of Keswick; an expansion of river Derwent; studded with islands.

DERWENTWATER, EARLDOM OF.—SIR FRANCIS RADCLYFFE (1625–97), cr. Earl of D., 1688.—EDWARD (1655–1705), 2nd earl, s., m. Mary, natural dau. of Charles II.—JAMES (1689–1716), s., 3rd earl, executed for complicity in rebellion of 1715; title forfeited.

DES ADRETS, FRANÇOIS DE BEAUMONT, BARON (1512–87), Huguenot soldier; became Rom. Catholic.

DES BARREAUX, JACQUES VALLÉE, SIEUR (1602–73), Fr. poet.

DES CLOIZEAUX, ALFRED LOUIS OLIVIER LEGRAND (1817–97), Fr. mineralogist; prof. of Mineralogy in Natural History Museum, Paris; carried out profound researches in crystallography.

DES MOINES (41° 34′ N., 93° 39′ W.), city, capital of Iowa, U.S.A., at confluence of Racoon and Des Moines; numerous public parks and fine public buildings, including State Capitol; others are city hall, state library, Drake Univ. (1881); Des Moines Coll. (1865); Highland Park Coll. (1890); centre of extensive manufactures; iron foundries. Pop. (1910) 86,368.

DES PÉRIERS, BONAVENTURE (d. 1544), Fr. author; sec. to Marguerite de Navarre; perhaps assisted in composition of the *Heptaméron*.

DES PRÈS, JOSQUIN (d. 1521), Fr. composer.

DESAIX DE VEYGOUX, LOUIS CHARLES ANTOINE (1768–1800), Fr. general; of noble family, but on popular side in Revolution; fought in Egypt and elsewhere; killed at *Marengo*.

DÉSAUGIERS, MARC ANTOINE MADELEINE (1772–1827), Fr. song-writer and dramatist.

DESAULT, PIERRE JOSEPH (1744–95), Fr. surgeon; his clinical teaching at the Hôtel Dieu, Paris, attracted an enormous number of pupils; pub. works on surgery.

DESBOROUGH, JOHN (1608–80), Eng. soldier; fought in Civil War on Parliamentary side; held several offices under Commonwealth; imprisoned, but set free under Charles II.

DESCARTES, RENÉ, RENATUS CARTESIUS (1596–1650), Fr. philosopher and mathematician; founder of modern rationalistic philosophy; b. of noble Touraine family; ed. at the Jesuits' school of La Flèche, where he was thoroughly trained in math's and scholastic philosophy. When twenty-three, in winter quarters at Neuberg, he first thought of the principle of method which guided all his philosophy, and discovered, also, the possibility of employing algebra to solve geometrical problems. His chief works were the *Discourse on Method* (1637); *Meditations* (1641); *Principia* (1644). His writings involved him in much theological disputation, and to avoid religious persecution he accepted invitation to become tutor to Queen Christina, and withdrew to Stockholm, where he d. a few months later.

D. anticipated several later discoveries in science, accepted a modified Copernican theory, worked on the properties of curves, and was a pioneer of the calculus; above all else, he was a mathematician, seeking to apply the geometrical method to metaphysics. The famous CARTESIAN METHOD is set out in the *Discourse on Method*, and in the *Règles*. To reach knowledge, we must first clear our minds of vague and doubtful opinion, which may be the product of tradition and authority, or vitiated by imagination and prejudice. We must follow the path of reason; starting from the simplest truths, *i.e.* 'intuitions,' which we can 'clearly' comprehend, and proceeding by 'deduction' from these to more complex cognitions, the truth of which follows since they become as clearly evident as the first intuitions. Hence the rules: (1) To accept as true only what is clearly evident to consciousness; (2) to divide each question up into as many separate questions as possible, applying the test of clearness to each part; (3) to proceed in order from the examination of the simplest objects, to that of the most complex; (4) to make exact calculations, to avoid the omission of anything essential.

In the *Meditations*, these rules are applied to the building up of his metaphysical system. He determines to doubt everything—*Dubitandum est de omnibus*—in the hope of through doubt finding certainty; whence his divergence from the Schoolmen, who believed in order to understand, and the Sceptics, who made doubt an end in itself, and not a means to surety. In this way, excluding everything due to authority and tradition, distrusting the senses as the source of illusions, thinking away all the attributes of body and mind, he reaches one certainty, indicated also by his very doubting:—I think, therefore I am—the famous *Cogito, ergo sum*. In thinking, I exist; I am a thing that thinks.

Is there, besides self, any other certainty? D. proceeds to examine his ideas, making use of another principle, Causality,—that everything must have a cause, which cause must contain as much or more reality than the effect. Now one of our ideas is that of God, as an infinite and perfect Being. But my finite thought cannot be the cause of such an effect, whence it must come from God Himself; hence God exists. Elsewhere, D. introduces another and *à priori* proof of God's existence, as given necessarily in the idea of God.

Hence we may assure ourselves of the existence of

the material world, since through God alone is the reality of our ideas guaranteed. The existence of bodies cannot be proved from the fact of our imagining them, for imagination is not pure thought, but a mode of our subjective life determined by the relation of mind to body; neither from any sensations, *e.g.* sensations may be referred to an arm that has been amputated. Yet our sensations (as above) must have a cause. This cause is not myself, since they proceed neither from my will nor my thought; it must then be either God or bodies; and of these, bodies, since otherwise, I am perpetually deceived by God.

Hence we have three realities,—God, infinite substance on which everything depends, but which itself depends on nothing; the *ego* or soul, the thinking substance; body, extended substance, these being the characteristics of soul and body which cannot be thought away. By substance, we are to understand a thing so existing as to require no other thing for its existence. But from this definition, it follows that God is the only substance, since finite mind and body depend on God. Hence these latter are not substances in the strictest sense, but relatively, requiring for their existence only God. These 'substances' are known through their essences or 'attributes,'—thought (of mind) and extension (of body); and the attributes yield further modifications, 'modes,' on the ground of which we refer to the 'qualities' of bodies, *e.g.* figure, a mode of extension, imagination, feeling, etc., modes of thought.

Mind and body are entirely opposed to each other; mind, active, free, unextended, immaterial; body, soulless, the negation of mind. In man, soul and body are present, yet not united; the soul leads an independent life and survives the destruction of the body; there is no interaction between soul and body, and a real union is impossible. Yet, in his anthropology, Descartes seems to assume a direct and real interaction. Thus he speaks of the soul as united to all parts of the body, and interaction occurring by means of the pineal gland and the 'vital' or 'animal spirits.' Animals are merely complicated material things, automata, having something inside them which sets them going, yet no self-consciousness, and therefore no soul or mind.

The philosophy of D. stands out as almost unique in reach and all-comprehensiveness; it advances in logical sequence from the methodology to the most detailed applications of its general principles; and marks a striking advance on Scholasticism, putting forward the sceptical, subjective point of view as against the formality, authority, and tradition of the latter system. Hence the decided success which it met with. Though denounced as atheism by the Fr. Jesuits and Dutch Calvinists, and attacked in other directions by Hobbes, Bp. Huet, and others, yet CARTESIANISM attracted men of the calibre of Clerselier, Arnauld, Malebranche, Geulincx, and many others. None are theological thinkers in the same sense as the Scholastics; all were Theistic thinkers, starting with the human reason, and aiming at rational explanation through the rational idea of the Deity; though from Theism the whole philosophy tends to Pantheism.

The problem of Cartesianism is a double dualism: (1) an opposition of God and the world; (2) of Mind, as thinking substance, and Body, extended substance. Descartes strove to maintain that the world existed *per se*, and that mind had a substantial existence; yet, as above, the term substance cannot in the same sense be applied both to God and to mind and body. Also, as regards mind and body, in sense and imagination are found difficulties in the conception of complete independence. In view of all these difficulties, two courses were open to Cartesians: (1) to maintain the dualistic principles as strictly as possible, and to explain away the difficulties, abandoning, if necessary, philosophical explanation; (2) to give a philosophical explanation, resigning, if necessary, the dualism.

The first course leads to the theory of Occasionalism. Mind and body retain their substantiality, and pursue their separate courses without causal connection. Mind can act on itself, but can *know* nothing and *do* nothing in relation to that which is outside it. Body can also act on body. How then is to be explained the action of mind on body and *vice versa*? Geulincx replies that such interaction is only apparent, and is to be explained by the intervention of God on the occasion of change in either mind or body; thus our volitions are the occasional causes, but God is the efficient cause of our perceptions. Also, according to Malebranche, mind knows body through God; it is not we who know, but God who knows through us. It follows from this that sorcery, spiritism, magic, etc., are but ridiculous superstitions.

The alternative course is to abandon the substantiality of mind and body, to retain them in an opposition of attributes, not of substances. God (or Nature) is the only substance, and Thought and Extension are His attributes; individual minds and bodies are passing modes. This is Spinozism and Pantheism. See SPINOZA.

Mahaffy, *Descartes*; E. S. Haldane, *Descartes, his Life and Times* (1905).

DESCHAMPS, ÉMILE (1791–1871), Fr. poet of Romantic School.

DESCHAMPS, EUSTACHE (1346–1406), Fr. lyric and patriotic poet; wrote anti-English ballads, etc.

DESCHANEL, PAUL EUGÈNE LOUIS (1856–), Fr. statesman.

DESERT, arid or barren tract either wholly or almost devoid of vegetation. Sahara is the most familiar instance in tropical regions. The condition may arise from either of two causes—excessively high temperature and consequent lack of moisture, or excessively low temperature, but the name is more frequently associated with the former.

DESERTION, act of abandonment, such as the d. of wife or children; or d. from the army or navy. The latter offence was formerly punishable by death; now by imprisonment.

DESFONTAINES, RENÉ LOUICHE (1750–1833), Fr. botanist, prof. of Bot. in Jardin des Plantes (1786); investigated the flora of N. Africa.

DESFORGES, PIERRE JEAN (1746–1806), Fr. dramatist.

DESHAYES, GÉRARD PAUL (1795–1875), Fr. geologist; prof. of Natural History in Natural History Museum, Paris; pub. works on geol., particularly on fossil molluscs.

DESHOULIÈRES, ANTOINETTE (1638–94), Fr. poet.

DESICCATION, the abstraction of water from a substance by gentle heat or by strong sulphuric acid in an air-tight chamber.

DESIDERIUS (fl. 756–774), king of Lombardy; conquered by Charlemagne.

DESLONGCHAMPS, JACQUES AMAND EUDES- (1794–1867), Fr. physician, geologist, and zoologist; prof. of Zool. at Caen (1825); pub. various scientific papers.

DESLONGCHAMPS, EUGÈNE EUDES- (1830–89), s. of above; Fr. zoologist and palæontologist; prof. of Zool. (1856) and Geol. (1861) at Caen.

DESMAISEAUX, PIERRE (1673–1745), Fr. biographer.

DESMAREST, NICOLAS (1725–1815), Fr. geologist; made numerous valuable observations and discoveries in geol., of which science he was one of the founders.

DESMARETS, JEAN (1595–1676), Fr. dramatist and poet.

DESMARETS, NICOLAS, SIEUR DE MAILLEBOIS (1648–1721), Fr. statesman; intendant of finances, 1678; from 1703 had supreme control of finances; dismissed, 1715.

DESMODUS, see VAMPIRE BATS.

DESMOND, ancient district of Ireland, including

E. part of County Kerry and W. part County Cork.

DESMOND, GERALD FITZGERALD, 15TH EARL OF (d. 1583), succ. his f., 1558; imprisoned in Tower for demeanour before Privy Council, 1562; returned to Ireland, 1564, and went to war with Sir Maurice Fitzgerald; sent to England; again in Ireland, 1573; spent rest of his life plotting, and in rebellion.

DESMOSCOLICIDÆ, minute marine worms; body ringed with distinct ridges furnished with rare pairs of bristles, by which they creep; related to the Nematode Worms.

DESMOULINS, LUCIE SIMPLICE CAMILLE BENOÎT (1760–94), Fr. journalist. On outbreak of Revolution D. supported it, stirring populace by fiery speeches and pamphlets; wrote articles urging abolition of monarchy; pub. weekly *Les Révolutions de France et de Brabant*, 1789–91; became a member of Cordeliers Club and a follower of Danton; elected to National Convention, 1793; first friend of Robespierre, but later incurred his enmity; guillotined on same day with Danton and others (April 5). His wife, who tried to save him, shared his fate.

Claretie, *Desmoulins and his Wife* (Eng. trans., 1876).

DESPARD, EDWARD MARCUS (1751–1803), Irish conspirator; naval captain; plotted (1802) to kill George III. and establish republic; hanged.

DESPENSER, HUGH LE, Eng. chief justiciar; killed at *Evesham* (1265).

DESPENSER, HUGH LE (1262–1326), Eng. courtier; s. of above; summoned to Parliament, 1295; he became favourite of Edward II. after Gaveston's death; Earl of Winchester, 1322; m. Eleanor, sister and co-heir of Gilbert de Clare, Earl of Gloucester; incurred enmity of baronage; hanged.

DESPORTES, PHILIPPE (1546–1606), Fr. poet; enjoyed Court favour.

DESPRÉAUX, see BOILEAU.

DESRUES, ANTOINE FRANÇOIS (1744–77), Fr. criminal; poisoner of Madame de la Mothe and her son.

DESSAIX, JOSEPH MARIE, COUNT (1764–1834), Fr. general.

DESSAU (51° 50′ N., 12° 13′ E.), town, on Mulde, capital of duchy Anhalt, Germany; several art collections; sugar, machinery, carpets. Pop. (1910) 56,606.

DESSEWFFY, AUREL, COUNT (1808–42), Hungarian politician and journalist.

DESSOIR, LUDWIG (1810–74), Ger. Shakespearean actor.

DESTOUCHES, PHILIPPE (1680–1754), Fr. comic dramatist; masterpiece, *Le Glorieux*.

DETAILLE, JEAN BAPTISTE (1848–1913), Fr. artist; military subjects.

DETERMINANT (in math's) is an expression written in a particular form. $\begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}$ is a d., and is but another form of writing $a_1b_2 - a_2b_1$. It consists of two rows and two columns, and is therefore said to be of the *second order*. A d. of the *third order* contains three rows and three columns, and so on for higher orders; it can be written in the form of three second order d's. Thus

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} \text{ is equal to } a_1 \times \begin{vmatrix} b_2 & b_3 \\ c_2 & c_3 \end{vmatrix} - a_2 \times \begin{vmatrix} b_1 & b_3 \\ c_1 & c_3 \end{vmatrix} + a_3 \times \begin{vmatrix} b_1 & b_2 \\ c_1 & c_2 \end{vmatrix}$$

D's give a useful method whereby the solution of simultaneous equations of several unknowns, and also the eliminant (*i.e.* the relation that must exist between the coefficients of the variables in order that the equations containing those variables may be simultaneously true), may be at once written down.

Muir, *Theory of Determinants* (new ed., 1906); Hanus, *Determinants* (1910).

DETERMINISM, ethical theory, opposite of doctrine of Free Will. D. may be more or less thorough. Some determinists admit an element of freedom, but others entirely deny freedom and moral responsibility.

DETMOLD (51° 55′ N., 8° 52′ E.), town, capital of Lippe principality, Germany; linen-weaving, tanning, brewing. Pop. (1910) 14,295.

DETROIT (42° 21′ N., 83° 5′ W.), city, Michigan, U.S.A., on Detroit River, opposite Windsor; built on flat surface, with wide, beautiful avenues and streets; one of best-kept cities in America; streets shaded by trees and intersected by small parks; Woodward and Jefferson's, principal avenues. Almost encircling city is Grand Boulevard, 150 to 200 ft. wide; many fine parks, including Belle Isle, Palmer, and Clark parks. Among public buildings are: city hall, county court-house, federal buildings, municipal museum of art, public library, St. John's Episcopal, St. Anne's, and First Congregational churches, Detroit Coll., also coll's of med., surgery, and law. Owing to central position D. has enormous shipping trade; largest cargoes, grain, lumber, and iron ore; one of chief cities in manufacture of automobiles. Other extensive industries include shipbuilding and meat-packing; manufactures brass goods, stoves, pharmaceutical preparations, alkaline products, furniture, etc. D. was founded by French in XVII. cent.; almost completely destroyed by fire, 1805. Pop. (1910) 465,766.

Powell, *Historic Towns of the Western States* (1901).

DETTINGEN (50° 2′ N., 9° 1′ E.), village, on Main, Bavaria, Germany; scene of defeat of French in 1743 by Anglo-German army. George II. was present—the last occasion on which a Brit. sovereign has commanded in person on the field of battle.

DEUCALION (classical myth.), Thessalian prince, who, when Zeus sent a deluge to destroy the earth, escaped with his wife, Pyrrha, in ark; after the flood the pair were ordered to cast stones behind them, which turned into men and women.

DEUCE (Fr. *deux*, two), two in cards; a term used in tennis; as exclamation, meaning 'the devil!' probably derived from a losing throw at dice.

DEUS, JOÃO DE (1830–96), Portug. poet; one of the greatest since Camoens.

DEUTERONOMY, BOOK OF, last of the Pentateuch, or Mosaic books—though not now, any more than the others, viewed as the actual work of Moses—consists largely of laws, specially chapters 12–26, 5–11 being introductory and 27, 28 supplementary. The laws in *Exodus* 20–23 are the foundation of D., which is parallel to *Leviticus* 17–26. The spirit of D. is not merely legal, but profoundly moral and spiritual. D. was almost certainly combined with earlier portions of Pentateuch before formulation of 'Priestly Code,' which implies a more advanced community. Date before 621. D. has peculiar words and phrases and has influenced other Old Testament books.

Driver, *Deuteronomy* in Internat. Crit. Comm; Robinson, *Deuteronomy* in Century Bible.

DEUTSCH, IMMANUEL OSCAR MENAHEM (1829–73), Ger. Orientalist.

DEUTSCH-KRONE (53° 16′ N., 16° 27′ E.), town, W. Prussia, Germany; machinery. Pop. 8000.

DEUTZ (50° 56′ N., 7° E.), town, on Rhine, Prussia, Germany; ancient *Divitia*; incorporated with Cologne, 1888.

DEUX-PONTS, see ZWEIBRÜCKEN.

DEUX-SÈVRES (46° 30′ N., 0° 20′ W.), department, W. France; formed of parts of old province of Poitou; named from two rivers by which it is traversed, Sèvre-Niortaise and Sèvre-Nantaise; textiles; agricultural and mineral products, coal, marble, granite; capital, Niort. Area, 2337 sq. miles. Pop. (1911) 337,627.

DEVA, Rom. fortress; site of modern Chester.

DEVA, beneficent spirits of the Buddhist and Hindu mythology.

DEVADATTA, s. of Suklodana, uncle of the

Buddha; joined the brotherhood; later started order of his own, extant till IV. cent. A.D.

DEVAPRAYAG, Deoprayag (30° 9′ N., 78° 39′ E.), village, Garwhal, United Provinces, India; Hindu place of pilgrimage.

DEVENTER (52° 15′ N., 6° 9′ E.), town, on Yssel, Netherlands; flourished in Middle Ages; many antique buildings; ironworks, carpet factories. Pop. (1910) 28,005.

DEVICE, contrivance, or plan; heraldic figure on shield.

DEVIL, Satan.—The latter name means in Hebrew 'enemy,' and consequently in Christian theol. the arch-enemy of God and man, represented in the Bible as having the form of a serpent, the most subtle of beasts. In Milton he appears as an outcast of heaven, the lord of hell and the apostate angels. In mediæval times he came to be represented as a goat-like figure, since the goat is the type of uncleanness. That he was supposed to be black in colour is shown in many references in lit., as in 'the little black de'il' of Burns. Other names for the d. are Apollyon, Lucifer, Beelzebub, besides various Scot. equivalents (see Burns, *Address to the De'il*). The mediæval conception of the d. is more particularly identified with Mephistopheles of the Faust legend, the incarnation of the spirit of universal scepticism and mockery.—Robert, the 'Devil,' first Duke of Normandy, was notorious for his crimes and cruelty. The 'Devil's Own' (88th Foot) were so called by Picton for their reckless bravery in the Peninsular War. What is called the 'devil's tattoo' is restless tapping on table or floor with hand or foot. In general, the term d. is applied to an assistant barrister, printer's boy, literary hack-writer.

Harnack, *History of Dogma* (1893); J. C. Wall, *Devils* (1904).

DEVIZES (51° 22′ N., 1° 59′ W.), market town, on Kennet and Avon Canal, Wiltshire, England; ruins of XII.-cent. castle; has two ancient churches; corn exchange; formerly important woollen cloth centre; grain, agricultural implements. Pop. (1911) 6741.

DEVOLUTION, WAR OF (1667–68), Louis XIV. claimed (1667) that succession to Spanish Netherlands 'devolved' upon his wife, Maria Theresa, on death of her f., Philip IV. of Spain; war speedily made good the claim, and Flanders was ceded to France by Treaty of Aix-la-Chapelle (1668). See France (History).

DEVON, EARLDOM OF, title held by Courtenay (*q.v.*) family.

DEVONIAN SYSTEM, in 1829 Sir R. Murchison and A. Sedgwick applied the name 'Devonian System' to rocks of Cornwall, Devon, and Somerset, previously known as *Old Red Sandstone*. These rocks fall between the Silurian and Carboniferous periods, and consist of different-coloured sandstones, grits, limestones, and calcareous slates; three groups, the Lower, Middle, and Upper, all containing fossil remains, including corals, crinoids, crustaceans, cephalopods, and mollusca. Middle group has richest deposit, the fossils being more abundant than in the arenaceous rocks of Scotland, Wales, and Herts, with which they are supposed to be contemporaneous.

D. rocks are found in other parts of the globe besides Devon and Cornwall, *e.g.* U.S.A., E. Canada, Nova Scotia, and Central Europe. They extend from the Ardennes into S. Belgium. Another group is cut through by the Rhine at Bingen, and yet another by the Moselle at Trèves.

A characteristic feature of the D. rocks are fossils of the broad-winged spirifers, and of trilobites, of which there are ten or twelve genera. From the vast numbers of remains of a piscatorial nature, the D. period has been called 'the age of fishes.' A remarkable group of creatures, remains of which have also been found in these rocks, are the ostracoderms. They probably belonged to a separate class of organisms between vertebrates and arthropods, although they closely resemble fishes.

In the D. rocks are found the first traces of plant life, and the remains are so prolific in some localities as actually to form thin seams of coal. They show that the plants were of such a nature as to grow, in their original state, upon the shores of lakes or lagoons. See Geology.

DEVONPORT (50° 23′ N., 4° 11′ W.), fortified seaport on E. shore of Tamar estuary, Devonshire, England; important naval and military station; has extensive dockyards; gun wharf, barracks, hospitals, naval engineering coll., technical schools; owes importance to royal dockyard (founded by William III., 1689) formerly known as *Plymouth Dock*. Pop. (1911) 81,694.

DEVONPORT (41° 9′ S., 146° 22′ E.), town, port, near mouth of Mersey, Tasmania.

DEVONSHIRE (50° 50′ N., 3° 50′ W.), county, S.W. England; bounded N. by Bristol Channel, W. by Cornwall, S. by Eng. Channel, E. by Dorset and Somerset; area, 2598 sq. miles. Coast (especially N.), is bold and rugged, with fine rock scenery. Inland surface is hilly and uneven. Special feature is wide elevated moorland of Dartmoor in S.; less elevated parts are fertile and well cultivated; South Hams especially rich in orchards; river valleys are particularly beautiful and well-wooded. D. is one of chief cattle- and sheep-raising counties, and hardy ponies graze in Dartmoor and Exmoor. D. is deservedly famous for cider and clotted cream. Chief rivers (Exe, Dart, Tamar, Teign, Taw, Torridge, and Plym) rise mostly in Dartmoor and abound in trout. Torquay, Sidmouth, and Teignmouth are health-resorts, on account of mild climate in S. Other towns are Exeter (capital), Plymouth (fine harbour), Devonport, Tiverton, Barnstable, Dartmouth, and Tavistock. Though chiefly agricultural, D. produces copper, tin, manganese, granite, slate, marble, and potters' clay. It has important prehistoric monuments in Dartmoor; several interesting castles, abbeys, and churches; finest specimens of architecture at Exeter Cathedral. D. was birthplace of Raleigh, Drake, Hawkins, Grenville, Reynolds, Coleridge, Kingsley, and other famous men. Pop. (1911) 457,343.

Devonshire (Victoria County Histories, 1906).

DEVONSHIRE, EARLDOM AND DUKEDOM OF.—The title was first given to Charles, Baron Mountjoy, 1603, who d. 1606, when it became extinct. In 1618 William Cavendish, Baron Cavendish, was cr. Earl of D. Since then the title has been held by this family. His great-grandson, William, 4th earl (1640–1707), was cr. Duke of D., 1694; supporter of William and Mary. Spencer Compton, 8th duke (1833–1908), one of the most prominent statesmen of the Victorian era; a Liberal, but split with Gladstone over Home Rule, 1886, and with Unionist leaders in 1903, adhering to Free Trade. Few Englishmen were more respected than he.

Holland, *Life of the* [8th] *Duke of Devonshire*.

DEVRIENT, LUDWIG (1784–1832), Ger. actor; famous in Shakespearean parts; three of his younger relatives also achieved distinction on the stage.

DEW, small drops of water deposited during the night on substances which possess good radiating powers and which consequently cool quickly below the temperature of the surrounding air. As a result, the air which is in direct contact with such a substance becomes cooled until the *dew point* is reached (that temperature at which the water vapour already in the atmosphere is the maximum quantity the air can hold). Any further cooling must be accompanied by condensation of water vapour. For a copious deposition of dew the sky must be clear, the atmosphere calm, and the substance near the ground.

DEWAR, SIR JAMES (1842–), Scot. chemist and physicist; first Brit. subject to receive the Lavoisier Medal (1904) of the Fr. Academy of Sciences; pres. of Brit. Association in 1902; invented cordite with Sir F. Abel. He liquefied and solidified the 'permanent' gases, oxygen, hydrogen, etc.

DEWAS (22° 58′ N., 76° 6′ E.), native state, Malwa, Central India; consists of two united states with two chiefs; capital, DEWAS. Area, 886 sq. miles. Pop. 117,216.

DEWEY, DAVIS RICH (1858–), Amer. statistician and economist.

DEWEY, GEORGE (1837–), Amer. naval officer; fought in Civil War (1861–65) and Span.-Amer. War (1898), defeating enemy in *Manila Bay*.

DEWEY, MELVIL (1851–), Amer. librarian; inventor of the 'Dewey system' of cataloguing.

DEWSBURY (53° 42′ N., 1° 38′ W.), market town, on Calder, Yorkshire, England; woollens; iron foundries, coal. Pop. (1911) 53,358.

DEXIPPUS, PUBLIUS HERENNIUS (*c.* 212–73), Gk. historian.

DEXTER, HENRY MARTYN (1821–90), Congregationalist divine in U.S.A.; wrote works on Congregationalism.

DEXTER, TIMOTHY (1747–1806), eccentric Amer. merchant.

DEY, title borne by Gov. of Tunis; also leader of Turk. Janissaries.

DHAMMAPALA, a follower of Buddha whose name is often taken by Buddhist disciples.

DHANIS, FRANCIS, BARON (1861–1909), Belg. Congo administrator.

DHAR (22° 36′ N., 75° 20′ E.), native state, Malwa, Brit. India; chief town, DHAR; rice, oil-seeds. Area, 1739 sq. miles. Pop. 142,715.

DHARAMPUR, DHURUMPUR (20° 34′ N., 73° 14′ E.), native Rajput state, E. of Surat, Bombay, India. Area, 704 sq. miles. Pop. 100,430.

DHARMSALA (32° 22′ N., 76° 15′ E.), hill station and sanatorium, Kangra district, Punjab, India; destroyed by earthquake, 1905.

DHARWAR, (15° 27′ N., 75° 3′ E.), town and district, Bombay, India; cotton and cotton manufactures. Pop. (town) 31,279.

DHOLPUR (26° 42′ N., 77° 56′ E.), native state, Rajputana, India, on N. bank of Chambal; chief town, DHOLPUR. Area, 1155 sq. miles. Pop. (1911) 263,576.

DHOW, lateen-rigged vessel used in Ind. Ocean, commonly associated with the slave trade.

DHRANGADRA (22° 59′ N., 71° 31′ E.), native state, Gujerat, Bombay, India; chief town, DHRANGADRA; copper and brass ware. Area, 1156 sq. miles. Pop. 70,880.

DHULEEP SINGH (1837–93), maharaja of Lahore; succ. 1843; deposed 1849, and pensioned by Brit. Government; became popular in Eng. society.

DHULIA (20° 54′ N., 74° 46′ E.), town, on Panjhra, Bombay, India; good trade in cotton and oil-seeds. Pop. 24,726.

DIABASE, tough, durable stone, a form of dolerite, with fine-grained crystalline structure; composed of same elements, viz. olivine, augite, and felspar; known also under names of whinstone, greenstone, toadstone, and trap; found in almost all parts of the world, among older rocks; much in demand for roadstone, owing to good wearing qualities.

DIABETES, disease characterised by a greatly increased discharge of urine. There are two forms of it: *Diabetes Mellitus*, in which there is always a quantity of sugar in the excessive amount of urine; and *Diabetes Insipidus*, in which no sugar or other abnormal constituent is found in the excessive quantity of pale, watery urine.

The cause of the former is obscure, and is supposed to be related to some condition of the pancreas. The prognosis is bad, the disease usually ending fatally, often after a prolonged course. Coma frequently comes on some time before death, and diabetic patients are very liable to pneumonia and other lung conditions. The treatment is to avoid all starchy food, *e.g.* bread and potatoes, and various suitable diets have been suggested. *Codeine* is of benefit.

The second form is supposed to be due to some disturbance of the brain centre controlling the nerves of the blood vessels, and it is sometimes produced after severe mental shock. General hygienic treatment is best, and *valerian* and the valerianates are the favourite drugs.

Kleen, *Diabetes Mellitus and Glycosuria*; Poole, *Cookery for the Diabetic*.

DIABOLO, game in which a spool-shaped top is spun and tossed on a string attached to two sticks; originated in China; popular in England at beginning of XIX. and of XX. cent's.

DIACONICON, a place in apse of a Gk. church for ecclesiastical vessels.

DIADOCHI, Macedonian leaders who defended the empire of Alexander the Great after his death.

DIAGORAS OF MELOS (V. cent. B.C.), poet, denounced for his disbelief in the Gk. divinities.

DIAGRAM (in geom.), a figure consisting of points, lines, and curves drawn for the purpose of helping a reader to follow the argument used in demonstrating a geometrical proposition. A good d. will not contain anything irrelevant, but only such points and lines as form the subject of the proposition, or are essential to the development of the argument. Points are named by letters of the alphabet (A, B, etc.). In the text, a line is referred to by the two letters naming the points which it joins (line AB, etc.), and an angle by three letters, the middle one of which is always the name of the point of junction of the two lines forming the angle (angle ABC, or CBA—sometimes written ∠ABC). As a rule the d. is carefully described in words so that the reader can therefrom construct it for himself. See GEOMETRY.

DIALECT, a local form of a standard speech, erroneously considered a corruption. It changes less than written speech. Originally hills, marshes, etc., divided a race or tribe into groups, and each group tended to develop the original language in its own way. D's have become standard literary language; East Midland d. gave English, Tuscan d. gave Italian, High German d. gave German.

DIALECTICS, logical term for the art of discussing or reasoning.

DIALLAGE, important silico magnesian rock-forming mineral belonging to the pyroxene group; characterised by its distinctly foliated structure; closely allied to augite (*q.v.*), and composed of same elements; colours: generally green or dark green, but also known grey and brown; shows bronze metallic lustre when freshly broken, and is sometimes cut and polished for ornamental purposes. Sub-species: green d., hypersthene, and bronzite; occurs in igneous rocks in Is. of Skye, Lombardy, and many other districts.

DIALOGUE, a conversation. As a literary form it was used by Plato for a didactic purpose, and Dryden in his *Essay on Dramatic Poesy* follows the same method. Landor in *Imaginary Conversations* uses d. with great success. Dramatic d. includes soliloquy, but in modern plays soliloquy is seldom used. Oscar Wilde in his comedies used brilliantly witty d., and the plays of Bernard Shaw depend almost entirely upon the sparkle of their dialogue.

DIAMANTE, JUAN BAUTISTA (*c.* 1084), Span. dramatist.

DIAMANTINA (18° 18′ S., 43° 20′ W.), city, Brazil; diamond mines. Pop. c. 14,000.

DIAMOND.—A mineral, one of the most valuable of precious stones, and the hardest substance known. Rom. writers speak of the finding of *adamas* in the sands of certain Indian rivers, and the word 'adamas' is the origin of the word diamond, to which it has been corrupted (cf. adamant and diamant).

The d. consists of pure crystallised carbon, and unlike most minerals is found in single crystals. As a rule they are of octahedron form, but have also been found in rhombic-dodecahedron and hexakis-octahedron. The colour of d's varies, the rarest being clear like glass, and sometimes this variety is tinted with

delicate hues of yellow, grey, blue, green, or red. Black d's are not unknown.

D's were probably first found in India; Golconda, near Hyderabad, is a specially noted locality. Pliny (100 A.D.) speaks of the d. as 'the most valuable of gems known only to kings,' and the collections of the Ind. princes for a long time contained the finest known specimens. About 1850 the stones were found in South America, and twenty years later in S. Africa. They have also been obtained from Algeria, Australia, Borneo, Brazil, Malacca, North Carolina, and Georgia (U.S.A.), whilst in 1829 they were found in the Ural Mountains. As a rule they are found either below the alluvial soils of rivers, as in India, or embedded in quartzy sandstone as at Minas Geraes, Brazil. D. mines are shafts sunk into the ground where 'pipes' are known to exist. These pipes are conical deposits of diamoniforous soil, which is dug out and sorted on the surface. In their virgin state the stones have a rough, dull, and uneven surface, and in fact workers in the Brazilian gold mines regarded them as nothing more than worthless pebbles until the XVIII. cent. when their true value was accidentally discovered. In 1910 the d. mines of South Africa had an output valued at almost £8,500,000. At Kimberley mines (S. Africa) the soil (blue ground) is sorted by huge machines, which take the place of manual labour. The débris is passed over a greased surface which, it has been found, will retain d's while allowing other material to slip past. The vast majority of diamonds now come from Kimberley, and by regulating the output their high price is maintained.

The d. is so hard that it is impossible to scratch it except with another d. Impure crystals and fragments, which are of no use for decorative purposes, are called bort, and in 1476 L. von Berguen of Bruges found that this might be used for engraving and polishing perfect stones. Bort is used also for polishing and faceting other precious stones, whilst small d's are used for cutting glass, drilling porcelain, and as bearings for watches. *Diamond-cutting*, a highly specialised art, is carried on chiefly at Amsterdam and Antwerp. Some famous d's are the *Koh-i-noor*, presented to Queen Victoria by E. India Company, the *Regent* or *Pitt*, one of the Fr. crown jewels, the *Star of the South*, found in Brazil, the *Cullinan* (q.v.), largest d. of good quality yet discovered, and the *Blue Hope* d. (supposed to bring ill-luck).

Experiments have been made (notably by Sir. Wm. Crookes, Mr. MacTear, and M. Moissan) to manufacture artificial d's in crucibles, and very small stones have resulted.

Streeter, *The Great Diamonds of the World*; Bauer, *Precious Stones* (1902); Williams, *Diamond Mines of S. Africa* (new ed., 1906); Sir Wm. Crookes, *Diamonds* (1909). See CARBON.

Diamond Necklace Affair, see ROHAN.

DIANA (classical myth.), Rom. goddess of war, the chase, and the moon; derived from the Gk. Artemis (*q.v.*).

DIANA MONKEY, see under CERCOPITHECIDÆ.

DIANE DE FRANCE (1538–1619), Duchess of Montmorency; natural dau. of Henry II.; m. Francis, s. of the Constable de Montmorency.

DIANE DE POITIERS (1499–1566), Duchess Valentinois; mistress of Henry II. of France, over whom she exercised great influence.

DIAPASON, Gk. term for an octave. In French it denotes musical pitch. In England name applies to certain organ stops extending throughout the whole compass of the keyboard.

DIAPER, cotton or linen cloth with woven pattern; also term in arch. for a running decoration.

DIAPHORETICS, any substances or other means in med. used to promote sweating, *e.g.* hot packs, vapour and similar baths, hot drinks; the drug *pilocarpine* is a powerful d.

DIAPHRAGM, MIDRIFF, the dome-shaped partition, partly muscular and partly tendinous, in the body between the abdominal cavity and the thoracic cavity, attached chiefly to the lumbar vertebræ and the ribs.

DIARBEKR (37° 55′ N., 40° 9′ E.), fortified town, Asiatic Turkey, on Tigris, at head of navigation; formerly a flourishing city; unhealthy climate; seat of Gk. bp.; numerous mosques, churches, bazaars; active commerce; was Rom. colony (*Amida*), 230 A.D.; captured by Turks, 1515; silk and cotton industries, and gold and silver filigree work. Pop. *c.* 38,000.

DIARBEKR (37° 55′ N., 40° 9′ E.), vilayet, Asiatic Turkey; partly mountainous; fertile; copper found; chief products, grain, cotton, tobacco. Area, 14,480 sq. miles. Pop. *c.* 471,500.

DIARRHŒA, condition in which the contents of the bowel are being almost continuously ejected, due to some intestinal irritation, or sometimes to specific disease, *e.g.* cholera, typhoid fever. Treatment in ordinary d. is to give castor oil to clear away the irritating substance; opium and astringents may be necessary if it continues.

DIARY, personal daily record of thoughts, experiences, or engagements. The early diarists apparently wrote merely for their own pleasure, and without reserve, having no thought of publication. The most famous diary is that of Samuel Pepys (1633–1703), written in cypher, and covering the period from 1660 to 1669; first pub. 1825. Other noted diaries are those of John Evelyn, Swift, Dr. Byrom, John Wesley, George Fox, and Madame D'Arblay.

DIATOMACEÆ are unicellular plants which [illegible] impregnated with siliceous matter. This is really of a double nature, and is termed a *frustule*. The two parts, or valves, overlap like a box and its lid, and show characteristic markings or striæ, due to presence of small chambers partially interrupted by minute septa. The plants are brown in colour, owing to the presence in the chromatophores of a pigment termed '*diatomin*.' They occur in vast numbers both in fresh and salt water, many living on larger aquatics, whilst others form a large proportion of both marine and lacustrine plankton. Owing to their indestructible character the frustules are found both as ocean deposits (*diatomaceous ooze*) and as diatomaceous earth (*e.g. Kieselgühr*).

DIAVOLO, FRA, MICHELE PEZZA (1771–1806), Ital. brigand; committed many atrocities in kingdom of Naples; after various adventures captured and shot.

DIAZ, NARCISSE VIRGILIO (1808–76), Fr. artist; pupil of Théodore Rousseau; woodland scenes and storms.

DIAZ, PORFIRIO (1830–), ex-pres. of Mexican republic; of humble birth; practised law; fought in War of Reform, 1854 onwards; fought against French; took Mexico city, 1862; pres., 1872–80; carried through various reforms, specially financial; pres. again, 1884; deposed, 1911. See MEXICO.

DIAZ DE NOVAES, BARTOLOMEU (fl. 1481–1500), Portug. explorer; sailed to Gold Coast, 1481; first to round Cape of Good Hope, 1487, which he named 'Cape of Storms' (*Cabo Tormentoso*); name changed to 'Cape of Good Hope' by King John of Portugal; sailed as far as Great Fish River; went to Brazil, 1500; was lost in storm. See CAPE OF GOOD HOPE.

DIAZO-COMPOUNDS are peculiar to the aromatic series, and may be regarded as salts of diazo-benzene ($C_6H_5N_2OH$). They are prepared by treating an amine of the benzene series with nitrous acid at low temperatures; they are highly explosive and very unstable substances. Owing to the number of reactions they take part in they are much used in synthetic work, especially in the investigation of the substitution products of the benzene series. They are of great value in the preparation of dyes, and they form a link in the formation of the mother-substance of the rosaniline group from paratoluidine. With alcohols they yield hydrocarbons; warmed in aqueous solution nitrogen is evolved and phenols formed; warmed with

concentrated halogen acids they give halogen derivatives.

Caius, *Diazo-Compounds* (1908).

DIBDIN, CHARLES (1745–1814), Eng. poet, composer, and dramatist; wrote about sixty plays and one hundred sea-songs, including *Poor Jack* and *Tom Bowling*.

DIBDIN, THOMAS FROGNALL (1774–1847), Eng. bibliographer.

DIBDIN, THOMAS JOHN (1771–1841), Eng. song-writer and dramatist; s. of Charles D.

DIBRA (41° 30′ N., 20° 38′ E.), fortified town, Albania. Pop. 12,000.

DIBRANCHIA, a sub-order of Cephalopoda (*q.v.*).

DIBRUGARH (27° 28′ N., 94° 57′ E.), town, near junction of Dibru and Brahmaputra, Assam, India; terminus of steam communication on Brahmaputra; coal and tea exported. Pop. 11,227.

DICÆARCHUS (fl. *c.* 320 B.C.), Gk. writer and philosopher; fragments of works survive.

DICE, small cubes having a number on each face; sum of numbers on opposite faces is 7; used in gaming; of great antiquity; Greeks' and Romans' highest throw was the 'Venus'; Greeks' worst throw was the 'wine-throw,' Romans' the 'dog.'

DICETO, RALPH DE (d. *c.* 1202), Eng. chronicler; dean of St. Paul's; works (edit. with introduction by Stubbs) specially valuable for period 1172–1202.

DICEY, EDWARD (1832–), Eng. journalist and author; editor of *Observer* (1870–89); also war-correspondent.

DICHOTOMY, in botany, a system of branching in which the main axis divides again and again into two branches.

DICKENS, CHARLES (1812–70), Eng. novelist; b. Portsea; s. of poor parents, the originals of Mr. Micawber and Mrs. Nickleby. His childhood was spent at Chatham, and later on he worked some time in a London blacking factory, passing Sunday with his father in the debtors' prison. D. was entirely self-educated. As a youth he became a lawyer's clerk, but this position he relinquished for journalism. He soon made a position for himself, first as parliamentary reporter, later as a writer of sketches (collected and pub. under the title of *Sketches by Boz*, 1836). In the same year he began the production of *The Pickwick Papers* in periodical numbers. This work was followed by *Oliver Twist* (1837), *Nicholas Nickleby* (1838), *Old Curiosity Shop* and *Barnaby Rudge* (1840), *Martin Chuzzlewit* and *The Christmas Carol* (1843), *Dombey and Son* (1846), *David Copperfield* (1849), *Bleak House* (1852), *Tale of Two Cities* (1859), *Great Expectations* (1860), *Our Mutual Friend* (1864), *Edwin Drood* (1870)—the latter unfinished—and several other works. Besides novel-writing, D. edited the magazines *Household Words* and *All the Year Round*, and gave readings from his works, which realised large sums, especially in America. The heavy strain caused by these readings, in addition to his other work, eventually caused his health to give way, and he died suddenly at Gadshill. His work must undoubtedly be classed amongst the greatest in Eng. fiction by reason of its humour, sympathy, descriptive power, keen insight into human nature, and inexhaustible store of characters, although sometimes D.'s character-drawing degenerates into caricature.

Life, by John Forster; also studies by George Gissing, Dr. A. W. Ward, and G. K. Chesterton.

DICKINSON, ANNA ELIZABETH (1842–), Amer. author and lecturer on reform.

DICKINSON, JOHN (1732–1808), Amer. politician; studied law in England; held office in Delaware and Pennsylvania; adverse to Declaration of Independence.

DICKSON, SIR ALEXANDER (1777–1840), Eng. general; principal artillery officer at *Quatre Bras* and *Waterloo*.

DICKSON, SIR JAMES ROBERT (1832–1901), Australian politician; one of chief promoters of the Commonwealth.

DICOTYLEDONS, flowering plants characterised by occurrence of two seed leaves (*cotyledons*) in the embryo, and by the secondary growth of the stem.

DICTATOR, in ancient Rome, one who was invested with special powers in an emergency when authority of consuls was not thought sufficient; like a temporary absolute monarch; Sulla and Julius Cæsar were d's.

DICTIONARY, primarily the name given to a book containing the words of a language, with their meanings, arranged in alphabetical order. But it is also now generally applied to works, arranged on similar lines, dealing with biography, dates, geography, theology, science, and numerous other subjects. An etymological d. is one in which the history and derivation of words is made the principal object. A *Glossary* differs from a d. in that the former is a list of dialectal, obsolete, foreign, or unusual words. An *Encyclopædia*, which is supposed to cover the entire circle of human knowledge, often fills the function of a d. also. Apparently the earliest d. of which there is any trace was the Homeric Lexicon (*Lexeis Homerikai*) compiled by Apollonius, a grammarian of the age of Augustus. Latin lexicography was inaugurated by Robert Stephens's *Thesaurus Linguæ Latinæ* (Paris, 1531). Another famous early d. was Bayle's *Dictionnaire Historique et Critique* (1697). Other noted works of the kind are the Ital. *Vocabulario della Crusca* (1612); that pub. by the Fr. Academy (1694); the Madrid Academy (1726–39); and the great Ger. work of the Grimm brothers, commenced in 1854. The first Eng. d. worthy of the name was that compiled by Nathan Bailey (1721–27), which formed the basis of the better-known work of Dr. Samuel Johnson (pub. in 1755). Webster's *Dictionary* was first issued in 1806, and from then to the present time, 1913, when Sir James Murray's *New English Dictionary* is still in course of publication, the output of d's has been enormous, and the need of every kind of inquirer seems to have been supplied.

DICTYS OF CRETE, supposed author of a contemporary description of the Trojan War, now existing in Latin version.

DIDACHÉ, THE, name given to an early Christian moral treatise, also called *The Teaching of the Twelve Apostles*, the MS. of which was discovered at Constantinople (1873). See APOCRYPHA.

DIDACTIC POETRY, see POETRY.

DIDEROT, DENIS (1713–84), Fr. author and encyclopædist; refused to adopt either the law or med. as profession; made a foolish marriage, and, being thrown on his own resources, became a bookseller's hack. After producing much work of a varied but ephemeral character, he was app. to the editorship of a projected Encyclopædia, the first vol. of which was pub. in 1751, and the last in 1772. During some portion of this long period he was assisted by D'Alembert and a host of other writers, but a great part of it was written by himself. Its speculative spirit was feared by the ecclesiastical party, and by their means it was suppressed in 1759, but it was afterwards continued. D. also wrote plays, novels, philosophical works, and art criticisms; he shone as a letter-writer; he was one of the greatest thinkers, writers, and conversationalists of the XVIII. cent.

Lord Morley, *Diderot* (1878); Reinach, *Diderot*.

DIDIUS SALVIUS JULIANUS, MARCUS, Rom. emperor for brief period during year 193 A.D.; supplanted by Septimius Severus.

DIDO, ELISSA, queen and reputed founder of city of Carthage. Æneas visited the city and fell in love with D.; on his departure she slew herself.

DIDON, HENRI (1840–1900), Fr. Dominican; preacher and educationist.

DIDOT, FRANÇOIS (1689–1757), Fr. publisher and printer; founder of family distinguished in same occupation down to recent times.

DIDYMI, DIDYMA, temple of Apollo, near Miletus, Asia Minor; its priests were the *Branchidæ*, tradi-

tional descendants of Branchus; destroyed by Xerxes, 481 B.C.; restored later; collapsed about XV. cent., owing to earthquake. Explorations have revealed the finest temple ruin in Asia Minor.

Pontremoli and Haussoullier, *Didymes* (1904).

DIDYMUS CHALCENTERUS, Gk. grammarian [illegible] Augustus.

DIE (44° 45′ N., 5° 23′ E.), town, Drôme, France; Rom. relics; wine, silk. Pop. 3638.

DIEBITSCH, HANS KARL FRIEDRICH ANTON, COUNT DIEBICH-ZABALKANSKY (1785–1831), Russ. field-marshal; wounded at *Austerlitz*; distinguished himself in Russo-Turk. War, 1828–29; d. in Polish campaign.

DIEDENHOFEN (49° 21′ N., 6° 9′ E.), fortified town, on Moselle, Alsace-Lorraine, Germany; railway junction; vines and fruit. Pop. 11,930.

DIEKIRCH (49° 52′ N., 6° 9′ E.), small town, on Sûre; one of the three administrative centres of Luxemburg; tourist centre. Pop. 3900.

DIELMANN, FREDERICK (1847–), Amer. artist; pres., National Acad. of Design (1899).

DIEMEN, ANTHONY VAN (1593–1645), Dutch admiral and administrator; Tasmania was originally named after him, *Van Diemen's Land*, as he was instrumental in sending out Tasman's expedition.

DIEPENBECK, ABRAHAM VAN (1599–1675), Flem. artist; pupil of Rubens; noted for window-paintings and portraits, etc.

DIEPPE (49° 56′ N., 1° 5′ E.), seaport, Seine-Inférieure, France, on Eng. Channel, at mouth of Arques; fashionable watering-place; an important port for passenger traffic with England; contains castle (now barracks); Church of St. Jacques (XIII. cent.). There is a fine commodious harbour, enlarged 1911; active foreign trade; important fisheries; shipbuilding; ivory work. D. was bombarded by Eng. and Dutch, 1694. Pop. 22,839.

Merk, *History of Dieppe* (1909).

DIERX, LÉON (1838–), Fr. poet; his collected poems (1872) were crowned by Fr. Academy.

DIES, CHRISTOPH ALBERT (1755–1822), Ger. artist, imitator of Claude Lorraine.

DIEST (50° 58′ N., 5° 3′ E.), fortified town, Brabant, Belgium; breweries. Pop. 8337.

DIESTERWEG, FRIEDRICH ADOLF (1790–1866), Ger. educationist; followed methods of Pestalozzi, and advocated unsectarian education.

DIET, word used in English to describe certain continental assemblies, *e.g.* the *Reichstag* of the Holy Rom. Empire. Its origin is to be found in the Teut. *folk-moot*, and then in the assemblies of the Franks. It was, however, a select number of princes rather than the whole body of men that became important, hence the mediæval d. included generally only nobles. The *Bundestag* of the Germanic Confederation and the *Reichstag* of the present Ger. Empire are spoken of as d's.

DIETETICS is the science of food and feeding of man in health and disease. Food is required for building up and repairing tissues, and also as a fuel to provide heat and energy, and different substances contained in food fulfil these different functions. Food is composed both of organic and of inorganic matter, the former including *proteins* (albuminous substances, *e.g.* the flesh of meat, white of egg), *carbohydrates* (sugars and starchy substances), and *fats* (animal or vegetable fats and oils), while the latter include *mineral salts* (sodium chloride or common salt, phosphates, etc.) and *water*. The substances which build and repair tissue are the proteins, the mineral salts, and water, while those which provide heat and energy are the fats, the carbohydrates, and the proteins.

The value of any food as nutrition to the body depends on several facts: the proportion of proteins, carbohydrates, and other substances present; the amount of heat it is able to produce; and the proportion of actually nutritive substances it contains, and the ease with which these are absorbed by the tissues.

The amount of food required naturally varies with different individuals under different conditions, but exhaustive investigations show the minimum dietary required by a normal adult man under moderate conditions of muscular work. Such a man excretes 16–20 grammes of nitrogen and about 320 grammes of carbon every day, and the daily amount of nutritive substances required for such a loss is 125 grammes of protein, 500 grammes of carbohydrate, 50 grammes of fat, the sum of which on analysis will be found to contain 20 grammes of nitrogen and 300 grammes of carbon, while the calorimeter shows that it will produce just over 3000 calories or units of heat. To provide the proper quantities of the above substances a mixed diet is necessary, as no single food has the correct proportion, and a suitable daily diet has been shown to be 1 lb. of bread, ½ lb. of meat, ½ lb. of fat, 1 lb. of potatoes, ½ pint of milk, ½ lb. (or 2) eggs, ½ lb. cheese. A man doing severe muscular work requires a greater amount of food than the above, enough to produce 4500–5000 calories of heat instead of just over 3000 calories.

Bryce, *Dietetics* (1912).

DIETRICH, CHRISTIAN WILHELM ERNST (1712–74), Ger. artist.

DIETRICH OF BERN, poetic name applied to Theodoric the Great (*q.v.*) (455–526); founder of the Ostragothic monarchy.

DIEZ (50° 23′ N., 8° 2′ E.), town, on Lahn, Pruss. province of Hesse-Nassau, Germany; ironworks. Pop. 4362.

DIEZ, FRIEDRICH CHRISTIAN (1794–1876), Ger. scholar, founder of Romance philology.

DIFFERENTIAL EQUATION. — Any relation such as

$$\phi(x, y, a)=0 \quad . \quad . \quad . \quad \text{(i.)}$$

where ϕ denotes some function, represents a certain family of curves, for each member of which the constant a has a particular value. The differential coefficient of y with respect to x is given by

$$\frac{\partial\phi}{\partial x}+\frac{\partial\phi}{\partial y}\cdot\frac{dy}{dx}=0 \quad . \quad . \quad . \quad \text{(ii.)}$$

in which $\frac{\partial}{\partial x}$ and $\frac{\partial}{\partial y}$ denote partial differential operators. Eliminating a between (i.) and (ii.) we get a result of the form

$$f\left(x, y, \frac{dy}{dx}\right)=0 \quad . \quad . \quad . \quad \text{(iii.)}$$

where f is a definite function depending on ϕ. The equation (iii.) is known as the *differential equation* for the family of curves. Similarly, if we start with

$$\phi(x, y, a, b)=0 \quad . \quad . \quad . \quad \text{(iv.)}$$

we reach, by a similar process, the differential equation of the second order

$$f\left(x, y, \frac{dy}{dx}, \frac{d^2y}{dx^2}\right)=0 \quad . \quad . \quad \text{(v.)}$$

The *order of a differential equation* is the order of the highest differential coefficient occurring in it. The reverse process, of passing from equations such as (iii.) and (v.) to (i.) or (iv.), is not always easy, for the steps of an elimination cannot be retraced. Hence various methods have to be adopted for the solution of differential equations, the methods depending on the type of equation dealt with.

I. DIFFERENTIAL EQUATIONS OF THE FIRST ORDER. —(i.) The equation $M dy=N dx$ can always be solved when the variables can be separated; for in this case we can change to the form $Y dy=X dx$; where Y is a function of y alone and X of x alone. Hence $\int Y dy=\int X dx+A$; A being an arbitrary constant.

(ii.) *Linear form.*—This may be written

$$\frac{dy}{dx}+Py=Q$$

where P and Q are functions of x and are explicitly independent of y.

Multiplying each side by $e^{\int P dx}$, we easily obtain

$$ye^{\int P dx} = \int Qe^{\int P dx} . dx + C$$

i.e. $$y = e^{-\int P dx} . \int Qe^{\int P dx} . dx + Ce^{-\int P dx}$$

C being an arbitrary constant.

(iii.) *Homogeneous equations* of the first order are of the form

$$M\frac{dy}{dx} = N$$

where M and N are homogeneous functions of x of the same degree.

Substituting $y = vx$, and regarding M and N as being $x^r\phi(y/x)$ and $x^r\psi(y/x)$ respectively, we get

$$\frac{dx}{x} + \frac{\phi(v)dv}{v\phi(v) - \psi(v)} = 0$$

and so

$$\log x + \int \frac{\phi(v)dv}{v\phi(v) - \psi(v)} = \text{a constant A (say).}$$

(iv.) If one of the variables does not explicitly occur, we have either

$$\phi\left(y, \frac{dy}{dx}\right) = 0 \quad . \quad . \quad . \quad (a), \text{ or } \psi\left(x, \frac{dy}{dx}\right) = 0 \quad . \quad . \quad . \quad (b).$$

In case (*a*) we solve for y or $\frac{dy}{dx}$, as may be most convenient. In the first case we have

$$y = f\left(\frac{dy}{dx}\right) \equiv f(p).$$

Differentiate with respect to x, and we get

$$p = f(p)\frac{dp}{dx}$$

which comes under the form treated in (i.). In the second case we have

$$\frac{dy}{dx} = f_1(y)$$

which again comes under (i.). Similar methods apply to case (*b*).

(v.) An important form is

$$y = px + f(p) \quad . \quad . \quad \text{(i.) (Clairaut's form)}$$

where $p = \frac{dy}{dx}$.

Differentiate with respect to x; we have

$$p = p + [x + f'(p)]\frac{dp}{dx}$$

Thus either $\frac{dp}{dx} = 0$, or $x + f'(p) = 0$.

In the first case $p = c$, a constant, and so $y = cx + f(c)$. In the second case, eliminating p between this and (i.), we get a relation between x and y containing no arbitrary constant. Hence it is not a *general* solution of the equation, but it may be a solution. $y = cx + f(c)$ represents a family of straight lines. If these lines have an envelope, the second solution, known as a *singular solution*, represents this envelope.

II. Linear Equation with Constant Coefficients.—This is of the form

$$D^n y + A_1 D^{n-1} y + \ldots + A_{n-1} D y + A_n y = V$$

where D is written for $\frac{d}{dx}$, and A_1, A_2, etc., are constants, V being a function of x. The solution of such equations consists of two parts: one, known as the *complementary function*, is the primitive of

$$f(D)y = 0 \quad . \quad . \quad . \quad . \quad . \quad (1).$$

$f(D)y$ denoting $(D^n + A_1 D^{n-1} + \ldots + A_n)y$.

The other part, known as the *particular integral*, is any solution whatever (the simpler the better) of the original equation.

The complete solution is the sum of the complementary function and the particular integral.

For discussion of this and information on *second order equations, partial differential equations*, etc., see *Treatise on Differential Equations*, by A. R. Forsyth.

DIFFRACTION OF LIGHT, see Light.

DIFFUSION (Physics).—If water be very slowly poured on top of a solution of a salt (*e.g.* copper sulphate), so as to cause no mixing, and the liquids be then left alone, it will be found that the heavier salt solution will slowly rise and the lighter liquid sink, until the strength of solution is the same throughout. This process, called *diffusion*, takes place with gases of different densities as well as with liquids, but the d. of the former is very rapid as compared with that of the latter, which is extremely slow ($\frac{1}{2}$ grm. of common salt will diffuse across a sq. cm. in a day). Graham, in 1851, was the first to experiment on the subject. He determined the rates of d. of various salts, and found great differences among them — hydrochloric acid diffuses more than 100 times as fast as caramel. He therefore classified substances like the former (chiefly salts of mineral acids) as *Crystalloids*, and substances like gum, albumen, caramel, etc., as *Colloids*.

D. also takes place if the liquids or gases are separated by a porous pot or skin (of parchment, paper, etc.), the rate having been found by Graham to be faster for the lighter substance—actually the velocities are inversely proportional to the sq. roots of the densities. A skin covered with a thin colloid film and used as a partition will stop the d. of colloids but not of crystalloids; by such means a mixture of a colloid and crystalloid in solution can be separated into its components. There is a great similarity between *diffusion* and *conduction* of heat, and similar mathematical methods are employed in both cases.

The study of d. naturally leads on to that of *osmosis*, and hence plays an important part in medical prescriptions of solutions that are applied to the skin; it further accounts for such natural phenomena as the equal distribution of salts in the sea, and that of oxygen and nitrogen at all heights in exactly similar proportions, though oxygen is the heavier gas.

Meyer, *Kinetic Theory of Gases* (1899).

DIGAMMA, obsolete Gk. letter, called 'vau,' shaped like an English *F* and pronounced as *v-w*; disappeared from alphabet *c.* 550 B.C., in some places as early as VII. cent. B.C.; was used in Homeric poems.

DIGBY, SIR EVERARD (1578–1606), Eng. conspirator; became a Roman Catholic c. 1599; joined in Gunpowder Plot, and was executed.

DIGBY, SIR KENELM (1603–65), Eng. soldier and author; s. of Sir Everard D. (*q.v.*), privateer; imprisoned for Royalist intrigues (1612); helped to found Royal Society.

Longueville, *Life of Digby* (1896).

DIGBY, KENELM HENRY (1800–80), Eng. author and archæologist; author of *The Broadstone of Honour*.

DIGENEA, a group of Trematode Worms (*q.v.*).

DIGENIS AKRITAS, BASILIUS, X.-cent. Byzantine hero.

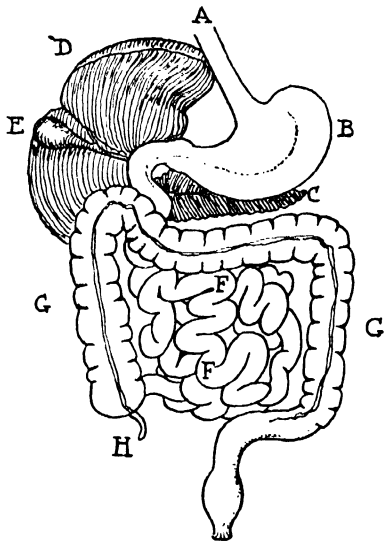
DIGEST, legal term for matter arranged under headings; an alphabetical index to cases, with succinct rules for each case.

DIGESTION, the series of changes which food undergoes in the interior of an animal so that it can be absorbed and thus nourish the body. In the *amœba*, the elementary type of animal, food is simply drawn into the interior at any part of the surface and then digested; but in higher types the digestive system has evolved into a complicated tube, the food entering at one end, nutriment being absorbed during its gradual progress under the influence of various digestive fluids, and undigested débris being ejected.

The mouth is provided with teeth — incisors and canines for biting and cutting the food in pieces, and pre-molars and molars for grinding it down so that it can be more easily swallowed. Six salivary glands, arranged in three sets of pairs, the sublingual

under the tongue, the submaxillary under the angle of the lower jaw, and the parotid in front of the ear pour their secretion into the mouth.

The cavity of the throat or *pharynx*, separated from the mouth by the soft palate above and somewhat in front, the so-called pillars of the fauces on each side, and the tonsils behind the pillars. Like the mouth, the pharynx is lined with smooth mucous membrane. Above, it is in connection with the nasal cavity, which is shut off, during swallowing, by the soft palate, while below it is continued as the œsophagus or gullet, the trachea or windpipe passing in



DIGESTIVE SYSTEM. *A*, œsophagus; *B*, stomach; *C*, pancreas; *D*, liver; *E*, gall bladder; *F*, small intestine; *G*, large intestine; *H*, appendix.

front of the œsophagus and communicating with the pharynx by the larynx, the cavity containing the voice organ; the opening is protected by the epiglottis, a little lid, projecting backwards into the pharynx, which closes down over the entrance of the larynx during the act of swallowing.

The œsophagus or GULLET, a tube about 10 inches long in the normal adult, connects the pharynx with the stomach. It has strong muscular walls and is lined with mucous membrane which secretes viscid mucus, and is thrown into longitudinal folds.

The **Stomach** is the most dilated part of the digestive system, and is the receptacle for the food after it has been masticated and swallowed. Its shape naturally alters with the degree of its distension, but when moderately distended it is pear-shaped, curved upon itself. It is situated on the left side, at the back of the upper part of the abdomen, just below the diaphragm, which is between it and the heart and left lung. It has a muscular coat, the fibres of which are arranged longitudinally, circularly, and obliquely, and is lined with mucous membrane thrown into numerous folds and containing a great number of glands which secrete the digestive juices. The submucous tissue between the muscular coat and the mucous membrane has a great number of little blood-vessels to supply the stomach generally and especially its numerous glands with nourishment. The farther, or pyloric, end of the stomach is furnished with a valve, and leads into the small intestine.

The **Small Intestine** is divided into three parts—the upper (the *duodenum*), the middle (the *jejunum*), and the lower (the *ileum*). The mucous membrane which lines the small intestine is thrown into permanent folds in the form of crescents or complete rings going transversely round the interior, diminishing in number and in prominence in the lower part. These are called the *valvulæ conniventes*, and they increase the absorbing and secreting surface area of the mucous membrane. Over the whole of the interior surface, on the valvulæ and between them, are little projections called *villi*, present in enormous numbers, but less in size and number lower down in the intestine, their function being to absorb the digested food. Scattered over the surface, also, are minute follicles, formed of lymphoid tissue, called solitary glands, which, however, are not glandular at all, their functions being probably connected with the blood. These solitary glands are here and there aggregated together, forming patches of lymphoid tissue called *Peyer's patches*; both the solitary glands and the Peyer's patches are found in greater abundance in the lower part of the intestine.

The mucous membrane also contains secreting glands in great numbers, one type branching and another simple and unbranched, which secrete the digestive fluid of the intestine.

Besides the secretion of these smaller glands there are poured into the upper part of the small intestine the secretion of the *liver* (q.v.) or bile, and the secretion of the pancreas (*q.v.*) or pancreatic juice. The bile is conveyed from the liver by two ducts, and a great part of it passes through another duct termed the cystic duct, to the gall-bladder, where it is stored.

From the gall-bladder it passes to the duodenum by way of the common bile-duct, which is joined just as it enters the intestine by the duct conveying the pancreatic juice from the pancreas.

After passing through the small intestine, the food, mixed as it is with digestive juices, passes into the **Large Intestine** through a valve termed the ileo-cæcal valve, which prevents its going back. The large intestine is short compared with the small intestine, but its diameter is very much greater. The internal surface is smooth and lined with mucous membrane, with the openings of numerous Liebe'kuhn's glands on its surface, and the so-called solitary glands are present in considerable numbers, while villi are absent. The large intestine is best considered under several divisions: the cæcum, the saccular dilatation of the intestine beyond the ileo-cæcal valve, into which opens the narrow blind tube called the vermiform appendix; the ascending colon, going up on the right side as far as the liver; the transverse colon, extending right across the front of the upper part of the abdominal cavity; the descending colon, going vertically downwards on the left side; the iliac colon, a short portion curving into the pelvis; the pelvic colon, a long loop of intestine in the pelvis; and, lastly, the rectum, which is a dilated part just above the opening of the intestine on the surface. The anus, which is the part actually opening on the surface, is usually kept tightly closed by strong circular muscles which surround it.

Digestive Processes.—The food cannot be absorbed so as to nourish the body tissues in the condition in which it enters the mouth, and the various digestive juices break it down into simpler and more soluble substances, which are able to pass into the blood and lymphatic vessels. The substances in the digestive juices which cause this transformation are called ferments or enzymes.

When the food is taken into the mouth it is broken into small pieces by the process of mastication, and at the same time mixed with the saliva, which is alkaline, from the salivary glands. The saliva serves to moisten the food and make it more easily swallowed, and also, by virtue of an enzyme, *ptyalin*, which it contains, it transforms a small part of the starch in the food into dextrin or maltose.

After being thoroughly masticated, the food is gathered on the surface of the tongue, which pushes it backwards to be seized by the muscular walls of the pharynx, and then it is quickly propelled through the pharynx and the œsophagus down to the stomach.

The upper and more dilated part of the stomach,

or the fundus, acts as a reservoir for the food, which is gradually passed along to the pyloric end. Digestion by the saliva goes on for some time in the stomach, but eventually the gastric juice, which has been produced from the gastric glands by the stimulus of the presence of food and of alkaline saliva, is sufficient to neutralise and render acid the stomach contents, thus stopping the action of ptyalin. The gastric juice converts most of the protein in the food into syntonin, albumoses, or peptones, while the fat becomes free. *Pepsin* is the enzyme in the gastric juice which causes the conversion of the protein, and free hydrochloric acid, which is necessary for the action of pepsin, and in addition prevents decomposition of the stomach contents, is also produced in the stomach. Absorption of the food takes place to a small extent in the stomach. The pyloric part of the stomach undergoes violent and rhythmic contractions so as to mix the food thoroughly with the digestive juices, and also to send it gradually through the pyloric valve to the small intestine.

As the *chyme*, i.e. the partly digested food in the stomach, comes into the duodenum it is in contact with the mucous membrane and converts the *pro-secretin* in its cells into *secretin*. This is absorbed by the blood capillaries and conveyed to the pancreas and the liver, exciting a flow of pancreatic juice and of bile. The alkaline pancreatic juice neutralises the acid chyme, and as soon as the neutralisation is complete more chyme comes from the stomach through the pyloric valve. The pancreatic juice also excites a flow of the intestinal digestive juice (*succus entericus*), which contains several enzymes in small quantity acting on the derivatives of protein and the carbohydrates in the food, and converting them into still simpler substances. The pancreatic juice contains an enzyme, trypsin, which causes a still further breaking down of the proteins, and also other enzymes which act on the carbohydrates and fats.

Bile is a solvent of the fats and fatty acids in the food. It is in the small intestine that the food is mainly absorbed, the villi being the absorbent agents; fats (which are absorbed in the form of fatty acids and glycerine) are conveyed away by the lacteal vessels of the villi, while proteins (absorbed in the form of amino-acids or, in some cases, simply as albumoses and peptones) and carbohydrates (absorbed as simple sugars) are conveyed away by the blood capillaries of the villi.

In the large intestine, to which the food next passes, digestion and absorption of food both go on to a slight extent, the digestion being probably caused by enzymes which have been carried down in the food from the small intestine. Absorption of water, however, takes place to a very considerable extent in the large intestine, and the undigested material which passes down to the rectum becomes gradually more and more solid in consistence.

In addition to the undigested débris excreted by the intestine, waste products are excreted by the kidneys, the skin, and the lungs; the urine and the perspiration contain waste products from proteins, while the carbonic acid gas excreted through the lungs is a waste product of the carbohydrates and fats, and water is excreted in the urine, in the perspiration, and also by the lungs.

Disorders.—The different parts and organs of the alimentary system are so intimately connected with one another in the process of digestion that a lesion or disease in one must have a considerable effect on the others; while the mucous membrane, lining the whole digestive tract, is in such intimate contact with the food substances which come from without that any noxious or infective constituent of the food is extremely likely to affect it, and therefore the whole digestive system, to a very considerable extent.

Stomatitis, inflammation of the mouth, and tonsillitis, inflammation of the tonsils, are treated with mild antiseptics and astringents locally and by treating the general condition. Parotitis, or mumps (*q.v.*), is an inflammation, probably a bacterial infection, of the parotid salivary gland. Catarrh frequently affects the fauces, œsophagus, stomach, and bowel, and is usually treated by dietetic measures and sometimes internal antiseptics. Tuberculosis (*q.v.*) and syphilis (*q.v.*) may affect the digestive system. The cæcum and appendix are often subject to inflammation, and medical treatment of the disease may have to yield to surgical interference. Typhoid fever (*q.v.*), dysentery (*q.v.*), and cholera (*q.v.*) are specific infectious diseases with characteristic manifestations in different parts of the intestine. Malignant growths are found in the œsophagus, stomach, pancreas, liver, and the different parts of the intestine, and surgical measures are necessary for their treatment. Animal parasites of man are most commonly found in the alimentary tract, and are treated by quassia, filix-mas, and other anthelmintics in different cases. Colic (*q.v.*), dyspepsia (*q.v.*), ulcer and other diseases of the stomach (*q.v.*), disease of the liver and gall-bladder (*q.v.*), and diseases of the pancreas (*q.v.*) are considered elsewhere. See also DIETETICS.

DIGGING WASPS, see WASPS.

DIGITALIS, in med., the leaves of the foxglove (*q.v.*), used as a drug for stimulating the heart and contracting the arteries, and as a diuretic; the action being due to three of the glucosides in the leaves, *digitoxin*, *digitalin*, and *digitalein*.

DIGNE (44° 5′ N., 6° 14′ E.), town, Basses-Alpes, France; the ancient *Dinia*; bp.'s see; cathedral; preserved fruits and confections. Pop. 7250.

DIGOIN (46° 28′ N., 4° 2′ E.), town, on Loire, Saône-et-Loire, France; pottery and porcelain. Pop. 7000.

DIJON (47° 21′ N., 5° 2′ E.), fortified town, Côte d'Or, France; has Gothic cathedral and several fine churches; Hôtel-de-ville (formerly ducal palace); Palais-de-Justice (XV. cent.); univ., schools of art and music. D. came under Dukes of Burgundy (*q.v.*), XI. cent., and for cent's was their capital; bombarded and occupied by Prussians, 1870. D. is important railway junction, lies on Canal de Bourgogne; centre of Burgundy wine industry; liqueur, beer, mustard, candles, wool, market produce. Pop. (1911) 75,640.

DILAPIDATION, in general, state of decay; in particular, it refers to an incumbent's neglect, or impairing of, ecclesiastical property.

DILEMMA, logical term indicating two suppositions, either of which leads to an unacceptable result; the suppositions are called 'horns of the d.'

DILIGENCE, in Scots law, warrants to enforce attendance of witnesses or production of documents; process of law by which persons, lands, or effects are attached as security for a debt.

DILKE, SIR CHARLES WENTWORTH, Bart. (1810–69), Eng. politician; helped to organise Great Exhibition of 1851; M.P. for Wallingford (1865); with Prof. Lindley founded the *Gardeners' Chronicle* (1841).

DILKE, SIR CHARLES WENTWORTH, Bart. (1843–1911), Eng. Liberal politician, s. of preceding; M.P. for Chelsea (1868–86); Under-Sec. for Foreign Affairs (1880–82); Pres.; Local Government Board 1882–85); appeared as co-respondent in divorce case (1885), thereby ruining a political career of highest promise; re-entered Parliament, 1892, as member for Forest of Dean. D. was proprietor of the *Athenæum* and *Notes and Queries*, and author of *Greater Britain* (1868), *Problems of Greater Britain* (1890), and, with Mr. Spenser Wilkinson, *Imperial Defence* (1897), and *The British Empire* (1899).—LADY DILKE (1840–1904), the widow of Mark Pattison (*q.v.*), m. Sir Charles D. in 1885; wrote numerous books on art, especially Fr. art.

DILLENBURG (50° 44′ N., 8° 14′ E.), town, on Dille, Pruss. province of Hesse-Nassau, Germany; birthplace of William of Orange. Pop. 5039.

DILLENS, JULIEN (1849–1904), Belg. sculptor.

DILLINGEN (48° 34′ N., 10° 30′ E.), town, on Danube, Bavaria, Germany; from XVI.–XVIII. cent., seat of Jesuit university. Pop. 6162.

DILLMANN, CHRISTIAN FRIEDRICH (1823–94), Ger. Orientalist.

DILLON, ARTHUR RICHARD, Catholic prelate of Irish descent; bp. of Evreux, 1753; abp. of Toulouse, 1758, of Narbonne, 1763; emigrated, 1790.

DILLON, JOHN (1851–), Irish naturalist; M.P. for Tipperary, 1880; since 1885 for East Mayo; several times imprisoned for violent speeches.

DIME, tenth part of Amer. dollar; approximately five pence.

DIMITY, cotton cloth, used for curtains and hangings, either white or figured.

DINAJPUR (25° 38′ N., 88° 41′ E.), town and district, Rajshahi division, Bengal, India. Pop. 13,430. District: area, 3946 sq. miles. Pop. 1,567,080.

DINAN (48° 27′ N., 2° 2′ W.), health-resort, Côtes-du-Nord, France; chief buildings, churches of St. Malo and St. Sauveur; leather and canvas manufactured; trade in grain, cider, and agricultural produce. Pop. 10,534.

DINANT (50° 16′ N., 4° 55′ E.), summer resort, on Meuse, Namur, Belgium; formerly fortified; chief edifice is Gothic church of Notre Dame (XIII. cent.); tanneries; 'Dinant' cakes; sacked by Charles the Bold, 1466. Pop. 7552.

DINAPUR (25° 38′ N., 85° 5′ E.), town, on Ganges, Patna district, Bihar and Orissa, India; military cantonment. Pop. 33,699.

DINARCHUS (d. 290 B.C.), celebrated Attic orator.

DINARD (48° 38′ N., 2° 2′ W.), seaport and watering-place, Brittany, France. Pop. 4800.

DINDIGAL (10° 21′ N., 78° E.), town, Madura district, Madras, India; fortress formerly of strategical importance; tobacco exported. Pop. 25,182.

DINDORF, KARL WILHELM (1802–83), Ger. classical scholar.

D'INDY, PAUL-MARIE-THÉODORE-VINCENT (1851–), Fr. composer; disciple of César Franck.

DINEIR (38° 8′ N., 30° 5′ E.), small town, Asia Minor; occupies site of ancient *Celænæ*.

DINGELSTEDT, FRANZ VON (1814–81), Ger. dramatist and poet.

DINGHY, rowing boat used by yachtsmen and in Navy; term originally signified small flat-bottomed craft, square at one end, now used loosely of any boat up to 14 ft. in length.

DINGLE (52° 8′ N., 10° 15′ W.), seaport, on Dingle Bay, County Kerry, Ireland; fisheries.

DINGO, see DOG FAMILY.

DINGWALL (57° 36′ N., 4° 27′ W.), chief town of Ross and Cromarty, Scotland; remains of ancient castle; monument to Sir Hector MacDonald.

DINIZULU, see CETEWAYO.

DINKA, negro tribes occupying districts in neighbourhood of White Nile; chiefly herdsmen.

DINKELSBÜHL (49° 4′ N., 10° 18′ E.), walled town, on Wörmitz, Bavaria, Germany; trade in cattle and corn; manufactures pencils and leather. Pop. 4655.

DINOCRATES, Gk. architect, patronised by Alexander the Great; designed city of Alexandria.

DINOFLAGELLATA, family of marine infusorians sometimes grouped botanically as Peridiniales; furnished with anterior and transverse flagella; occasionally have covering of cellulose.

DINOSAUR, see REPTILES.

DINOTHERIUM, see ELEPHANT.

DINWIDDIE, ROBERT (1693–1770), lieut.-gov. of Virginia, 1751–58; precipitated Fr. and Ind. War.

DIOCESE, district presided over by a bp.; used in ecclesiastical sense since IX. cent.; word originally used for one of twelve civil divisions of Empire under Diocletian; bp's take titles from cathedral sees, not d's.

DIOCLETIAN, GAIUS AURELIUS VALERIUS DIOCLETIANUS (245–313 A.D.), Rom. emperor, 284–305; reorganised Empire under two *Augusti* and two *Cæsars*; conducted the last great persecution of Christians; abdicated. His era is called *Era of* ——.—**Edict of D.,** issued 301 A.D. to regulate price of food and wages; preserved in Gk. and Latin fragments in various places.

Mason, *Diocletian* (1876).

DIODATI, GIOVANNI (1576–1649), Swiss Prot. theologian; prof. of Hebrew at Geneva, 1795; strong Calvinist; translated Bible into Italian and French.

DIODONTIDÆ, see PORCUPINE FISHES.

DIODORUS CRONUS (IV. cent. B.C.), Gk. philosopher of Megarian school (*q.v.*).

DIODORUS SICULUS, Gk. historian; fl. in times of Julius Cæsar and Augustus; wrote history of world from Creation to Cæsar's Gallic wars.

DIODOTUS, Bactrian satrap who rebelled against Antiochus II.

DIOGENES (*c.* 412–323 B.C.), Gk. 'cynic' philosopher; said to have lived in a tub; believed in enduring pain and doing without pleasure.

DIOGENES APOLLONIATES (*c.* 460 B.C.), Gk. philosopher of Ionic school; fragments of writings preserved.

DIOGENES LAËRTIUS (II. cent. A.D.), Gk. historian, and biographer of Gk. philosophers.

DIOGENIANUS, Gk. grammarian of Hadrian's reign.

DIOGNETUS, EPISTLE TO, anonymous document of II. cent., describing the ideal life of the early Church.

DIOMEDES, king of Argos; fought against Troy; figures in *Iliad*.

DIOMEDES (IV. cent. A.D.), Rom. grammarian.

DION (*c.* 408–353 B.C.), follower of Plato; banished from Syracuse by Dionysius the younger, he returned and captured the city; assassinated.

DION CASSIUS (b. 155 A.D.), Rom. historian; wrote the *History of Rome* to the period of Agrippa's death (10 A.D.).

DION CHRYSOSTOMUS (50–117 A.D.), Gk. rhetorician; called the 'Golden-mouthed'; his orations, written in Attic Greek, were distinguished by a clear and eloquent style.

DIONE (classical myth.), d. of Uranus and Ge in some accounts, of Oceanus and Tethys in others; wife of Zeus, and mother of Aphrodite.

DIONYSIUS (d. 367 B.C.), tyrant of Syracuse; cruel despot.

DIONYSIUS, 'THE YOUNGER,' tyrant of Syracuse; s. of above; succ. his f. (367); in turn supplanted by Dion (*q.v.*).

DIONYSIUS AREOPAGITICUS (*Acts* 17[34]), an Athenian converted by St. Paul; name later attached to certain writings of which there are traces *c.* 500 A.D.; they are: *Concerning the Celestial Hierarchy, Concerning Divine Names, Concerning Mystic Theology.* They are valuable in themselves, being influenced by *Neo-Platonic* mysticism, and treating of angels and sacraments. They were trans. into Latin by Erigena, and exercised considerable influence on the thought of the West.

DIONYSIUS EXIGUUS, VI.-cent. Scythian chronologist.

DIONYSIUS OF HALICARNASSUS, Gk. rhetorician and historian of the age of Augustus; one of the greatest of Gk. literary critics.

Sandys, *Hist. of Class. Scholarship* (1906).

DIONYSIUS PERIEGETES, author of time of Hadrian; wrote a geographical treatise in hexameters.

DIONYSIUS, ST. (d. 268), pope, 259, after see had remained vacant for a year owing to persecution; condemned heretical doctrines of Sabellius; ransomed Cappadocian Christians enslaved by Goths.

DIONYSIUS TELMAHARENSIS, patriarch of Syrian Jacobite Church (818–48); first a monk; made patriarch unwillingly, but a zealous prelate; wrote *Annals* (now lost) and a *Chronicle*.

DIONYSIUS THRAX (*c.* 90 B.C.), Gk. grammarian and rhetorician.

DIONYSUS (classical myth.), called by the Latins *Bacchus*, was the god of wine and revelry; s. of Zeus

and Semele; was cared for in his youth by an aged satyr, Silenus, with whom his name is often coupled. The *Dionysia*, festivals in his honour, were held throughout Greece.

DIOPHANTUS, Gk. algebraist of Alexandria; lived (probably) during III. cent.; supposed to be inventor of algebra, but this is doubtful; his analysis of theory of indeterminate problems is named after him; six books of his *Arithmetica* and work on polygonal numbers survive.

DIORITE, family of rocks resembling granite and composed of hornblende and felspar; named D. by Haüg, a well-known geologist; tough composition, in colour white, sometimes speckled with dark green or black.

DIPHILIS (342–291 B.C.), writer of Attic comedy.

DIPHTHERIA, a contagious disease, characterised by fever and a membranous exudation on the mucous surface usually of the back of the throat and the tonsils. An attack generally comes on gradually, with a sore throat, on examination found to be reddened and, sooner or later, with white patches, often accompanied by shivering and vomiting and swelling of the glands of the neck. Diagnosis of D. chiefly depends on the bacteriological examination of a swab taken from the back of the neck. The person is markedly depressed, and may go on sinking to a fatal end, or the symptoms may improve, the membrane become detached, and the throat heal, but recovery is usually slow.

The treatment is now to give the *antitoxin* in practically every case, and as early as possible; it neutralises the poisons produced in the disease, and causes in the individual a change for the better in a few hours. Disinfectants may also be sprayed on the throat. Since the introduction of the antitoxin treatment the mortality has fallen from 30–50 % to about 10 %.

The cause of the disease is a bacillus called the Klebs-Löffler bacillus after its two discoverers.

The disease is endemic in Europe and America, becoming epidemic from time to time, and it is believed to be on the increase, occurring chiefly in children, specially those under ten years of age. It may be spread through the sputum from a diphtheritic person being ejected into the air; while milk, domestic animals (*e.g.* cats), and the crowding together of children through compulsory school attendance are all frequent causes of the spreading of the disease.

Parker, *Diphtheria*; Ker, *Infectious Diseases*.

DIPHYLLA, see VAMPIRE BATS.

DIPLODOCUS, fossil REPTILE (*q.v.*).

DIPLOMACY.—The practice and theory of international negotiation has only been recognised as a distinct art or science since the end of the XVIII. cent. European d. has only been on its present footing since the Congress of Vienna, 1815. In the XVIII. cent. states were viewed pretty much as the private property of their rulers, hence there was little or nothing of that consultation of public opinion which plays so large a part in international relations now. Again, there was little desire for universal peace or real recognition of the duties of nations to one another, even as a far-off ideal. Also, communication, of course, was far slower and diplomatic etiquette elaborate. D., as we know it, could hardly exist in a feudal state, and much of European negotiation between states can be traced back in principle to those Ital. states which at the time of the Renaissance offered a contrast to the centralised monarchies around them. Venice, whose traditions were derived from Constantinople, developed this branch of statecraft greatly, and the reports of Venetian ambassadors to their home government are as remarkable for political sagacity as they are valuable to the hist. student.

Embassies were at first only temporary; Spain was the first to appoint a permanent ambassador to England—in 1487. Machiavelli in *Il Principe* had outlined his political theories with frank unscrupulousness, and Francis I. of France set to work to apply them. So lacking seemed d. in moral principle that some of the best thinkers, *e.g.* Grotius, thought it either useless or mischievous. There was no idea of the possibilities to which it might lead among a number of democratic states. An ambassador was obliged to keep up much ceremony; this and the elaborate etiquette which hedged him in made it more convenient for many states only to send agents. Members of a *Corps diplomatique* have various privileges, *e.g.* they are personally inviolable—even after war has been declared.

E. C. Grenville-Murray, *Embassies to Foreign Courts*, a history of diplomacy.

DIPLOMATICS, that branch of study which concerns itself with the diplomatic sources of history. A *diploma* in Rom. times was a licence or passport, but the term has come to be used loosely of mediæval documents as a whole. They fall into two classes: (1) public deeds, of which an enormous number of all sorts and ages, many in long continued series, are preserved in the Record Office, and (2) private deeds, which include not only those relating to individuals, but municipal deeds and charters of corporations. The documents in the Record Office are now being calendered, as it is not possible to print them all *in extenso*; the private ones are more scattered and difficult to deal with. Of foreign collections the most important is that of the Papal Chancery. Dating from very early times, it was set on a fresh footing by Pope Julius I. (337–52). Very few original documents prior to the XI. cent. have survived; the earlier ones till then are all on papyrus, after that on vellum. From then distinct and different formulæ came to be used; in the XIII. cent. the term *bull* (from *bulla*, a leaden seal) was used for all sorts of documents. Gradually more exact customs and formulæ were followed. *Briefs* (from *brevia*) are first found in the XIII. cent., when they were granted largely for indulgences. The Chancery of the Merovingian kings of France has documents going back to 625, and the earlier ones are on vellum. They consist of precepts, granting gifts, privileges, etc., and judgments. Those of the early Karlings are similar; they took a definite form in the IX. cent., become confused in the X., and are again regulated in the XI. Eng. kings of Anglo-Saxon times followed Frankish precedents in their royal charters. Some genuine ones have survived. Edward the Confessor was the first to use a great seal. William the Conqueror brought in the methods the Normans had learnt from the Capetian kings of France. Until John the kings call themselves *Rex Anglorum* (king of the English), then *Rex Anglicæ* (king of England). John called himself *Lord of Ireland*, Henry VIII., *king of Ireland*, Edward III., *king of France* (a title retained by Eng. kings till 1801).

G. F. Warner and H. J. Ellies, *Facsimiles of Royal and Other Charters in the British Museum*; various publications of the *Record Office*.

DIPLOPODA, millipedes. See MYRIAPODA.

DIPNOI, see under FISHES.

DIPODOMYS, kangaroo rat. See POCKET GOPHERS.

DIPPEL, JOHANN KONRAD (1673–1734), Lutheran theologian and scientist; invented Prussian blue.

DIPPERS, WATER-OUZELS (*Cinclidæ*), a family of 26 thrush-like perching birds, found in the neighbourhood of mountainous streams in both Old and New Worlds.

DIPSOMANIA, an insatiable craving for drink, particularly alcoholic, often occurring periodically.

DIPTERA, FLIES, insects possessing two membranous, usually transparent, wings; the major portion of the head is occupied by the large eyes, and bears the suctorial mouth parts. It is united to the thorax by a delicate neck, ensuring remarkable mobility. The larvæ are termed maggots or grubs,

and are marvellously rapid in development, this only taking a few days. Owing to their scavenging habits, flies are a great source of danger to health, some blood-sucking forms such as the mosquito (*q.v.*) and tsetse (*q.v.*) being of special interest as they are thought to transmit various tropical diseases.

Curtis, *Diptera*.

DIPTYCH, originally a tablet made to shut, containing letters, etc.; then in Christian Church names were recorded on it, and calendars and martyrologies developed.

DIR (35° 15′ N., 71° 50′ E.), independent state, N.W. Frontier Province, India; chief town, DIR.

DIRCE (classical myth.), wife of King Lycus; Antiope's sons tied her to the horns of a wild bull, which dragged her about until she perished.

DIRECTORS, persons managing a public company or trading concern for the benefit of themselves and all shareholders. A share qualification for d's is common, but not essential. If a d. parts with his qualification shares he is disqualified. If the Articles provide for remuneration, the d's may sue for it, whether the company is making profits or not. The fact that d's give their services gratuitously does not lessen their liabilities.

DIRECTORY (1795–99), committee of five which during Fr. Revolution formed executive government of France from end of Reign of Terror and death of Robespierre to Consulate of Napoleon. The extravagant pseudo-classical designs of ladies' dresses at that period were revived (1910) as 'Directoire gowns.'

DIRECTRIX, see CONIC SECTION.

DIRK, dagger, ornamented with cairngorms, worn with full Highland dress; also sword, 18 in. long, worn by Brit. midshipmen.

DIRSCHAU (54° 6′ N., 18° 45′ E.), town, on Vistula, W. Prussia, Germany; sugar factories. Pop. 41,190.

DISCIPLES OF CHRIST, Amer. Prot. Church, founded by Stone and Thomas and Alexander Campbell in 1804; offshoot from [illegible] by [illegible]rians; as regards baptism they advocate [illegible] and observe Lord's Supper; orthodox in Christology, but without elaborate doctrinal formulæ; have now over a million communicants in U.S.

DISCLAIMER, legal term signifying denial or renouncement of claim or right; statement made by patentee when he has claimed more than his due, showing what idea he does not claim under his patent.

DISCOPHORA, see LEECHES.

DISCOVERY, see POLAR REGIONS, AFRICA, and AUSTRALIA and AMERICA.

DISCUS, stone or metal disk, used for throwing in ancient Gk. athletics. At the Olympic games held in Athens (1896) d. throwing was revived as a sport.

DISESTABLISHMENT.—The idea of revolt from the State Church and desire for religious freedom were features of the Protestant reformation; feeling became acute in England during reign of Charles I.; toleration under succeeding monarchs eased the tension, but in 1869 Gladstone's ministry disestablished the Church of Ireland. Agitation for the d. of the Church of Wales led to the Welsh D. Bill, 1912, which was passed by small majority in Commons, but rejected by Lords, 1913.

DISINFECTANTS, substances which destroy bacteria and so prevent the spread of infectious disease, *e.g.* potassium permanganate, carbolic acid, sulphurous acid fumes, formaldehyde.

DISORDERLY HOUSE, BROTHEL, house where women prostitute themselves for money; is treated under English Law as a nuisance, and investigation may be made on the request of two ratepayers; search may also be made if it is suspected that a woman is being detained against her will. Many brothels in Britain are kept by foreigners, but the Criminal Law Amendment Act, 1912, which imposes heavy penalties, including flogging, on procurers, may possibly check the growth of d. h's.

DISPENSATION, remission of a law, generally used in relation to an act of the Pope such as that of granting Henry VIII. permission to marry Catherine of Aragon, his late bro.'s wife. The only act of d. now in the power of Brit. sovereigns is that of granting pardon to criminals.

DISPERSION (in optics), a term used to denote the effect produced when a beam of white light is passed through a glass prism. The resulting beam is spread out into a broad band composed of the seven primary colours. The original light is 'dispersed' owing to the different amounts by which rays of different colours are bent, when passed through a prism (see LENS). On passing the light through substances which absorb certain colours, the d. produced is abnormal. This phenomenon, termed *anomalous d.*, is the cause of the use of ruled gratings instead of glass prisms, in the study of spectra. D. is also used to signify the scattering of light at a reflecting surface.

DISRAELI, BENJAMIN, see BEACONSFIELD.

DISRAELI, ISAAC (1766–1848), Eng. author; belonged to a family of Span. Jews; f. of Earl of Beaconsfield; author of *Curiosities of Literature*, *Calamities of Authors*, etc.

DISS (52° 23′ N., 1° 7′ E.), market town, on Waveney, Norfolk, England. Pop. (1911) 3769.

DISSENTERS, 'Nonconformists,' those who dissent from the teaching of the Church of England; call themselves 'Free Churchmen.'

DISSOLUTION, the breaking up of parliament in accordance with the Parliament Act, 1911 (which limits duration of Parliaments to five years, instead of seven as previously fixed by Septennial Act, 1716), or by royal prerogative. The king dissolves parliament on the advice of the premier and cabinet.

DISTAFF, stick upon which unspun flax or wool is placed preparatory to spinning it into thread on wheel.

DISTILLATION, the conversion of substances into vapours, afterwards condensed into liquid form, is employed to separate and purify liquids, especially organic liquids. Heat converts liquids into vapour; cold converts vapours into liquid. These two processes constitute d. Solid particles, being inconvertible into vapour, are left behind. Liquids have distinct boiling-points at which they pass into vapour, so liquid impurities of lower boiling-point can be condensed and collected first, while those of higher boiling-point than the required liquid are left behind. The necessary apparatus consists of a distilling flask and a condenser. The d. *flask* has a long neck and a long, narrow side-tube. In the neck is a cork fitted with a thermometer, the bulb of which comes just below the side-tube and records the temperature of the vapour. The *condenser* is a glass tube with a glass or metal jacket with entrance and exit tubes through which cold water runs continuously. A cork bearing the side-tube from the d. flask fits into one end, while the other end dips into a collecting flask. The d. flask is heated, and when the thermometer records that the vapour is passing through the side-tube into the condenser at the boiling-point of the required liquid, a fresh collecting flask is connected. FRACTIONAL DISTILLATION.—Liquids can be separated by collecting the distillate in portions at intervals of 5° or 10°, and redistilling each portion. DISTILLATION IN STEAM.—Certain liquids decompose on boiling, but if steam is passed through them they volatilise and pass over unchanged with the steam.

Young, *Fractional Distillation* (1903); E. J. Mills, *Destructive Distillation* (1910).

DISTOMUM, the liver-fluke. See TREMATODE WORMS.

DISTRESS, in law, the act of distraining (seizing) goods by a landlord under a d. warrant for the recovery of rent.

DITHMARSCHEN, DITMARSH (54° 5′ N., 9° 10′ E.),

district, Germany, forming part of ancient duchy of Holstein, between Eider, Elbe, and North Sea; colonised from Friesland and Saxony; annexed to Prussia, 1866. Pop. 87,477.

DITHYRAMBIC POETRY, irregular form of Gk. lyric poetry, originally used in worship of Dionysus (Bacchus). A modern example is Dryden's *Alexander's Feast*.

DITTERSBACH (50° 45′ N., 16° 22′ E.), town, Prussian province of Silesia, Germany; coal mines. Pop. 11,463.

DITTERSDORF, KARL DITTERS VON (1739–99), Austrian composer and violinist; b. Vienna; ed. at Prince Joseph von Hildburghausen's expense; cr. '*von* D.,' 1773; best works: *Esther Isaac, Job* (oratorios), *Doktor und Apotheker, Betrug durch Aberglauben* (comic operas), besides orchestral and chamber music.

DIURETICS, substances which cause increase in the flow of urine, by acting on the kidneys, the blood, or blood-vessels, or the nervous system; *e.g.* caffeine, digitalis.

DIVAN, Diwan, Persian word meaning Oriental council; chamber where such meetings are held; collected works of Arabic poet.

DIVANIEH (32° N., 45° W.), small town, on Euphrates, Asiatic Turkey.

DIVERS (*Colymbidæ*), a family containing 5 species of handsome, long-necked swimming birds, found in the northern parts of the Old and New Worlds. They obtain their food by diving, and have coloured bars on the throat. Three species occur in Britain.

DIVERS AND DIVING.—The employment of naked divers for searching the sea-bottom for pearls, sponges, etc., apparently dates back to very early times, and this primitive method is still used to some extent in the East. Divers are referred to in Homer's *Iliad*; they were employed by Alexander the Great; and numerous references to them are found in the classic writers. The *diving-bell*, the earliest means of assisting the diver, is stated to have been the invention of Roger Bacon (1250). This must have been a very rude contrivance, of which no description is extant. The modern diving-bell dates from 1788 (when it was used by Smeaton at Ramsgate), and consists of a cast-iron chamber, weighing about 5 tons, supplied with air by means of a force-pump. The modern *diving-dress* consists of a suit of sheet india-rubber, covered with twill, with close-fitting vulcanised cuffs and collar; weighted boots, averaging 20 lb. each; weights on back and chest of 40 lb. each; metal helmet and breastplate (40 lb.); and strong sheathed knife at belt. The helmet is provided with glass lights at the front and sides; and air is supplied by means of a rubber tube attached to the back of the helmet. A 'life-line,' or signalling line, of Manila rope is attached to the diver's waist. A naked diver cannot remain below water longer than three minutes at the outside; a diver in patent dress can remain under water from two to four hours. The greatest depth yet reached by a diver is 204 ft. All modern warships of considerable size carry one or more trained divers and complete apparatus.

Boycott, *Compressed Air Work and Diving*.

DIVES-SUR-MER (49° 18′ N., 0° 7′ W.), watering-place, at mouth of Dives, Calvados, France; here William the Conqueror embarked for England, 1066. Pop. 3500.

DIVIDEND, income derived from profit of capital invested in stock or company; 'preference' d. paid before ordinary d.; term also used of money divided between creditors, etc.

DIVINATION, the process of seeking knowledge of unknown or future things by means of astrology, trance, crystal-gazing, and various other methods. The professed art dates back to early times, and is more or less common to civilised and uncivilised peoples, and, mixed with much charlatanism, still finds many believers.

DIVINING ROD, forked branch, usually of hazel, which is carried by the diviner, and is said to dip where water (or some mineral) is concealed in the earth. Some of the phenomena are too well authenticated to be wholly ascribed to charlatanism, and are referred to animal magnetism.

Beaven, *Tales of the Divining Rod* (1899).

DIVISION, process by which a term taken as *genus* is split up into its *species*; must be exhaustive, step by step, and avoid cross-division. See Logic.

DIVISIONAL TRAIN, see Transport and Supply.

DIVORCE, the sentence by which the marriage-tie is dissolved. In England, before the Matrimonial Causes Act (1857), d's were of two kinds: (1) a *judicial separation*, granted by the Ecclesiastical Courts; (2) a *dissolution of marriage*, which could only be obtained by the tedious and costly method of an Act of Parliament. The consequence was that only rich persons could obtain an absolute d., and so the Act was passed to place the trial of matrimonial causes within the reach of all. The husband may obtain d. if his wife commits adultery. To obtain d. the wife must prove her husband guilty of (1) incestuous adultery, *i.e.* adultery with a woman he could not marry because of consanguinity if his wife were dead; or (2) bigamy with adultery; (3) certain criminal offences; (4) adultery with cruelty, or desertion for two years. On the pronouncement of a *decree absolute* the parties are at liberty to marry again; but a clergyman of the Church of England and Ireland cannot be compelled to solemnise the marriage of any person whose former marriage may have been dissolved on the ground of his or her adultery. Divorced wives may keep their married names if they choose. When the petitioner has proved his case, the Court, in the first place, grants a *decree nisi*—that is, a dissolution of the marriage provisional upon his or her good conduct for a period, usually six months, and also that no person in the meantime shows that the decree was obtained by collusion, or the withholding of any material fact. At any time during the cause, or before the *decree absolute*, the marriage is not actually dissolved, and any adultery by the parties is matter for the cognizance of the Court. On good cause being shown, the *decree nisi* may be reversed, or further inquiry may be required. Otherwise, at the end of six months, or other period fixed by the Court, the decree is made *absolute*. Neither party is entitled to marry until the *decree absolute* has been obtained, and if either does so, the decree will be rescinded and the person doing so is guilty of bigamy.

It remains to be said that the following acts constitute bars to divorce: (1) *adultery not proved*; (2) *connivance*, which means that the petitioner actually knew that adultery was going on and took no means to prevent it; (3) *condonation*, meaning that the adultery has been condoned and cohabitation has been resumed; and (4) *collusion*, by which the petitioner and respondent, or co-respondent, arrange between themselves that no obstacles shall be placed in the way of petitioner's suit, so that the entire facts are not placed before the Court, or where a money payment is received to ensure silence, or where adultery, or the appearance of same, is arranged to present a false case.

In Scotland adultery and desertion by either husband or wife for four years form ground for d., but the divorced spouse is forbidden to marry the co-respondent with whom adultery has been committed.

In America each State has its own d. laws, except S. Carolina, which has no d. laws. In the main, the grounds for d. are similar to those obtaining in England, but in some Amer. States d. is granted on the ground of incompatibility of temperament and of habitual drunkenness.

The R.C. Church considers marriage indissoluble.

In 1909 a Royal Commission was app. to inquire into the existing Eng. d. laws, and its Majority Report (Nov. 1912) recommended, *inter alia*, equality of sexes; new grounds for d. (desertion for three years, cruelty, insanity, chronic drunkenness, penal servitude for murder); cheapening of procedure in d. court. The

Minority Report recommends that grounds for d. should not be extended, but on other points agrees with Majority Report.

G. L. Hardy, *The Law and Practice of Divorce* (1910); Lichtenberger, *Divorce: a Study in Social Causation.*

DIWAN, term used in India for native head official of a state.

DIWANIEH (31° 59′ N., 44° 58′ E.), town, built on either bank of Euphrates, Turkey in Asia; seat of government of Affech district transferred from Hillah to D., 1893; of strategic importance.

DIX, DOROTHEA LYNDE (1802–87), Amer. philanthropist; devoted herself to improving condition of paupers, criminals, and insane; continued her work in Europe.

DIX, JOHN ADAMS (1798–1879), Amer. soldier, statesman, and superintendent of schools; sec. of treasury of U.S.A., 1860; served in Civil War, 1861–65; minister to France, 1866–69; Governor of New York, 1873–75.

DIXON (41° 50′ N., 89° 29′ W.), city, on Rock, Illinois, U.S.A.; agricultural implements; shoes. Pop. (1910) 7216.

DIXON, GEORGE (d. 1800), Eng. navigator; pub. *A Voyage round the World* (1799).

DIXON, HENRY HALL (1822–70), Eng. author; under name *The Druid* wrote on sporting life.

DIXON, RICHARD WATSON (1833–1900), Eng. poet; hon. canon of Carlisle; author of *Mano, Odes,* etc.; also valuable work on Church history.

DIXON, WILLIAM HEPWORTH (1821–79), Eng. author and traveller; editor of *Athenæum* (1853–69).

DIZFUL, Diz-Pul (32° 30′ N., 48° 35′ E.), town, on Diz, Khuzistan, Persia; active trade; near ruins of Susa. Pop. 25,000.

DJAKOVO, Djakovar (45° 17′ N., 18° 20′ E.), town, Croatia-Slavonia, Hungary. Pop. *c.* 21,000.

DLUGOSZ, JAN (1415–80), Polish statesman; in service of Cardinal Olesnicki, then of King Casimir IV., abp. of Lemberg, 1478; wrote *Historica Polonica,* first great work on Polish history.

DMITRIEV, IVAN IVANOVICH (1760–1837), Russ. poet and statesman.

DNIEPER (46° 40′ N., 33° E.), river, Russia; ancient *Borysthenes*; rises in N. of Smolensk province, flows generally southward into Black Sea; principal affluents, Desna, Soj, from E.; Pripet, Beresina, from W.; length, *c.* 1300 miles. D. is navigable in sections; cataracts interrupt traffic, but engineering works have overcome these to large extent.

DNIESTER (46° 30′ N., 29° 55′ E.), navigable river, Austria and Russia; ancient *Tyras*; rises in Carpathian Mts., Galicia, flows *c.* 800 miles S.S.E., and enters Black Sea.

DOAB, Duab, Ind. name for a tract of country between two rivers; particularly land between Ganges and Jumna.

DOANE, GEORGE WASHINGTON (1799–1859), Amer. Episcopalian ecclesiastic; bp. of New Jersey, 1832; prominent in educational work.

DOBB'S FERRY (41° 2′ N., 73° 52′ W.), town, on Hudson River, New York State, U.S.A. Pop. 3445.

DOBELL, SYDNEY (1824–74), Eng. poet; belonged to the 'Spasmodic school'; his works include *The Roman, Balder,* and *England in Time of War.*

DÖBELN (51° 7′ N., 13° 7′ E.), town, Saxony, Germany; on island formed by Mulde; iron foundries. Pop. (1910) 19,627.

DOBERAN, Dobberan (54° 7′ N., 11° 53′ E.), summer resort, Mecklenburg-Schwerin, Germany; mineral springs. Pop. 5202.

DOBREE, PETER PAUL (1782–1825), Eng. scholar and critic.

DOBRITCH (43° 22′ N., 27° 47′ E.), town, Bulgaria; annual fair. Pop. (1910) 17,146.

DOBRIZHOFFER, MARTIN (1717–91), Austrian Jesuit missionary in S. America.

DOBRUDJA (44° 20′ N., 28° 30′ E.), region between lower Danube and Black Sea, Rumania; mostly marshes and steppes; assigned to Rumania, 1878. Pop. *c.* 273,000.

DOBSINA (48° 50′ N., 20° 24′ E.), small town, Hungary; iron mines. Pop. 5115.

DOBSON, HENRY AUSTIN (1840–), Eng. poet and critic; *Collected Poems* (1897). His poetry, dealing largely with XVIII.-cent. life, is marked by daintiness of form and expression; and his prose works on the same period are masterly in their kind.

DOBSON, WILLIAM (1610–46), Eng. artist; portraits of Charles I., Prince Rupert, and others.

DOCETÆ, sect of early Church, who denied the real humanity of Christ; some said what appeared as His body was a mere phantom.

DOCK, an artificial basin to receive ships for the purpose of taking or discharging cargo, or undergoing repairs. To facilitate the handling of cargo where the tidal range is large, d's are furnished with gates to retain water at a certain level. The walls are of concrete or masonry, reinforced by steel or iron; the gates, designed on the same principle as a masonry arch, of steel, iron, or wood, are built in two leaves, the meeting surface and the hinges being fitted watertight. The power used for driving the machinery in connection with the d. cranes, gates, etc., is either hydraulic or electric. The lighting is electric. The main points of good d. design demand the convenient maximum of quay length in comparison with water area, and ample space for the discharge of cargo. Sidings are provided so that passengers or cargo may be disposed of as quickly as possible. Depth of d. varies with the draught of vessel and the range of the tides. London d's, with a water area of 650 acres, are the largest in the world. A sum of 14 millions is to be spent on their further enlargement.

Tidal Docks.—Where the range of the tide is small, gates are not necessary. Such d's are called 'tidal.' A d. of this type at Immingham on the Humber, with an area of 50½ acres, was opened in 1912.

Dry Docks or *Graving Docks.*—These are for the reception of vessels to undergo repairs. A vessel having entered the d., the gates are shut and the water is pumped out, the vessel being then received on keel blocks. Repairs on the hull can then be carried out.

Floating Docks.—These are iron and steel structures for the reception of vessels for repairs. Fitted with contrivances for lifting a vessel out of the water, they are used where there is no site for a dry d. In its simplest form there is a pontoon or hollow iron box, carrying two side walls, the whole being U-shaped. Water having been admitted so as to sink the d. sufficiently to receive a vessel, the water is pumped out and the craft supported on keel blocks. The largest floating d., building at Hamburg (1913), will be capable of lifting 40,000 tons, and is 656 ft. long and 141 ft. wide over all; submergible depth, 35¼ ft.

DOCK WARRANT, certificate issued by a dock company entitling a person, named by the owner of goods in the custody of the company, to take possession of these goods.

DOCKET, summary of a document; a label; an endorsement on back of papers.

DOCKYARDS.—A dockyard is properly an establishment in which ships are constructed, repaired, and equipped. Many ships of war are now constructed by private firms, and finished in government d's. D's in England were really started by Henry VIII., first at Woolwich. At present there are d's at Portsmouth, Chatham, Devonport, Pembroke, Sheerness, Gibraltar, and Malta, and at other places in the Brit. Isles and colonies. A great naval d. is being constructed at Rosyth, on the Forth, Scotland. The coming of the 'Dreadnought' battleships has necessitated the building of floating d's. Over each d. is a superintendent who is under the general supervision of the controller of the navy. Orders are issued by the Admiralty, but the carrying out of these rests with officials, the chief of whom is the director of d's. In

U.S.A. *Navy Yards* correspond to our d's. Ger. d's have recently been considerably extended.

DOCTOR, originally a courtesy title applied to a learned person; now a univ. degree in law, divinity, medicine, science, music, letters, philosophy, etc.

DOCTORS' COMMONS, college of ecclesiastical lawyers established near St. Paul's Churchyard, London; abolished 1857.

DOCTRINAIRES, moderate royalists who supported restored monarchy in France, 1815–30; generally, theorists maintaining abstract doctrines, regardless of practical considerations.

DODD, WILLIAM (1729–77), Eng. clergyman, wrote several works; royal chaplain, 1763; executed for forgery.

DODDER (*Cuscuta*), genus of parasitic plants, order Convolvulaceæ; leafless twining stem; small flowers grow in clusters.

DODDRIDGE, PHILIP (1702–51), Eng. Nonconformist minister; pastor at Northampton, 1729; wrote *On the Rise and Progress of Religion in the Soul.*

DODDS, ALFRED AMÉDÉE (1842–), Fr. general; conquered Dahomey, 1894.

DODECASTYLE, in arch., temple with twelve-columned portico.

DÖDERLEIN, JOHANN LUDWIG (1791–1863), Ger. philologist.

DODGE, THEODORE AYRAULT (1843–1909), Amer. soldier; voluminous writer on military subjects.

DODGSON, CHARLES LUTWIDGE, LEWIS CARROLL (1832–98), Eng. humorist and mathematician; writer of *Alice's Adventures in Wonderland, Through the Looking-Glass*, etc.

DODO (*Didus ineptus*) was a flightless and extremely ungainly bird rather larger than turkey; plumage of a dark ash colour, except breast and tail, which were white, and small aborted wings, possessing yellowish white feathers with black-tipped coverts; beak large, stout, and black, tipped with pronounced horny hook; legs feathered above, yellow; heavy and short, adding to stupid appearance. As in existing flightless birds, breast-bone showed aborted keel; and coracoid and shoulder-blade met at an obtuse angle (cf. ostrich). D. was first mentioned by Dutch, XVI. cent.; in existence till latter half of XVII. cent.; ruthlessly exterminated owing to helplessness; inhabited forests; built flat open nest of grass; laid one large egg; said to have eaten pebbles; habitat, Mauritius; nearest ally, *Didus borbonicus*, formerly occurring in Réunion, also extinct; family *Dididæ*, related to *Columbidæ*, pigeons (*q.v.*).

Strickland and Melville, *The Dodo and its Kindred* (1848).

DODONA, ancient sanctuary in Epirus, N.W. Greece; temple founded by Pelasgians and dedicated to Zeus; oak tree supposed to be seat of deity; responses of oracle given by leaves rustling; consulted mainly by Ætolians, Acarnanians, and Epirots; temple and sacred oaks destroyed in 219 B.C. by Ætolians.

DODS, MARCUS (1834–1909), Scot. Presbyterian theologian and Biblical scholar; charged with unorthodoxy before Free Kirk Gen. Assembly, 1878, and acquitted; prof. at Edinburgh, 1889.

DODSLEY, ROBERT (1703–64), Eng. author and publisher; author of *Oleone* and other successful plays; founded the *Annual Register* (1759); leading publisher of his day.

DODSWORTH, ROGER (1585–1654), Eng. antiquary.

DODWELL, EDWARD (1767–1832), Eng. archæologist and traveller.

DODWELL, HENRY (1641–1711), Irish scholar and theologian.

DOG DAYS, see CANICULA.

DOG FAMILY (*Canidæ*), a family of Carnivora (*q.v.*) with over 100 species found wild in all parts of the world except New Zealand, Madagascar, the West Indies, and some of the East Indian islands. They are distinguished by their long, sharp muzzles, their long legs, ending in five and four toes on the fore and hind feet respectively; they walk on the toes alone, and these are tipped with blunt, non-retractile claws. A good skeletal character lies in the teeth, which are very numerous, usually 41, 20 being in the upper, 21 in the lower, jaw. The fur of members of the dog family is generally of a dull uniform colour, varying from white and grey to reddish-brown. They are carnivorous, feeding upon other mammals, cattle, sheep, goats, rabbits, etc., which many species hunt down in packs, or on smaller animals, such as mice, reptiles, fish, and even crabs. Most are nocturnal in habit.

The COMMON WOLF (*Canis lupus*) and its races are found only in the Northern hemisphere, but they are widely distributed over Europe, Asia, and America. They are large, fierce, and powerful animals, which hunt in packs, and, like jackals (*q.v.*) and domestic dogs, have a round eye-pupil and a bushy tail. Especially bushy are the tail and body of the North American COYOTE (*Canis latrans*), although its body is smaller and its temper is less savage than that of the common wolf. Its food consists of small mammals, such as rabbits and birds.

Of true dogs the only wild form is the Australian DINGO (*Canis dingo*), although it is probably descended from a species introduced by man to Australia at an early date. It varies in colour from red to black, and causes much destruction amongst sheep flocks.

The varieties of DOMESTICATED DOGS, many and diverse though they be, are all included under one species (*Canis familiaris*), originally descended from wolves or jackals, or both. Their differences are probably due to varied intercrossings and to the efforts of man to breed types suitable for different purposes. Only a few examples can be mentioned. Amongst wolf-like forms with moderately sharp muzzles and erect ears may be reckoned the mongrel PARIAH DOGS of Eastern European, Asiatic, and African villages, the ESKIMO DOG, the SHEEP DOG and COLLIE, and the POMERANIAN. DEERHOUNDS, LURCHERS, and GREYHOUNDS are distinguished by the fact that they hunt by sight, have long legs, and exceedingly long, sharp muzzles and slightly drooping ears. A more distinct ear-droop, associated with wider heads, thicker fur, and shorter legs, is seen in SPANIELS, SETTERS, NEWFOUNDLANDS, and RETRIEVERS; while smooth coats, deep muzzles with overlapping lips, and large, drooping ears characterise BLOOD-, OTTER-, and FOX-HOUNDS. BULL-DOGS, PUGS, and MASTIFFS have short muzzles with projecting under jaw, and TERRIERS, rough or smooth, have erect ears and a deep skull.

Several wild species exist, resembling, but differing anatomically from, the domestic dog, such as the bushy RACCOON DOG (*C. procyonoides*) of S. America, the WILD DOGS of Asia, the LONG-EARED DOG (*Otocyon megalotis*) and CAPE HUNTING DOG (*Lycaon pictus*) of S. and E. Africa, and the BUSH DOG (*Icticyon venaticus*) of Northern S. America. Lastly must be mentioned the FOXES (*q.v.*), valuable on account of their fur.

DOGE, name of chief official in republics of Genoa and Venice. About 700 A.D. the office was created in Venice. The d. held office for life, and frequent attempts were made to make the office hereditary. Gradually the people lessened the power of the d., and by the XIII. cent. the office was practically nominal; the real government was oligarchical. In Genoa the office dates from 1339. The office was abolished in both cities in 1797. See VENICE, GENOA.

DOG-FISHES, see SHARKS AND DOG-FISHES.

DOGGER BANK (54° 55′ N., 2° 30′ E.), sand-bank, centre of North Sea; extensive fisheries. In 1781 an indecisive battle was fought here between Eng. and Dutch fleets. During the Russo-Jap. War, mistaking them for hostile craft, a Russ. fleet on its way to the Far East fired on Hull trawlers (Oct. 1904), killing two fishermen and sinking a vessel. An international commission held Rozhdestvensky, the Russ. admiral, responsible, and Russia compensated the owners, the wounded, and the relatives of the dead.

DOGGETT, THOMAS (d. 1721), Irish actor;

founded (1715) sculling match for 'Doggett's Coat and Badge' for Thames watermen.

DOGMA means, in general, a principle, or doctrine, claimed to be laid down by authority. Thus a dogmatist is a person who makes positive assertions, without having the warrant of absolute evidence. In regard to the Christian religion the term is used as an authoritative expression of an article of faith, as represented by the Church's consciousness and recognised through her accumulated experience. It is also used to describe the collective body of tenets held at different periods in Church history.

Harnack, *History of Dogma* (Eng. trans., 1895–96).

Dogmatic Theology, the study of formulated doctrines of the Church; *dogma* may be viewed as the formulation by Councils or other ecclesiastical authority of what was previously only *doctrine*, i.e. belief.

DOGRA, race of Kashmir Rajputs.

DOGS, ISLE OF, peninsula, S.E. London, formed by bend of Thames opposite Greenwich; occupied by docks.

'DOGS-OF-THE-WATER,' see CARIBA.

DOG-TOOTH, zig-zag ornament common to Norman architecture.

DOL (48° 31′ N., 1° 51′ W.), town, Ille-et-Vilaine, France; XIII.-cent. cathedral; tanneries. Pop. 4708.

DOLABELLA, PUBLIUS CORNELIUS (70–43 B.C.), Rom. general; m. Tullia, Cicero's dau.; notorious for profligacy and perfidy.

DOLBEN, JOHN (1625–86), Anglican divine; dean of Westminster, 1662; bp. of Rochester, 1666; abp. of York, 1683.

DOLCE, LUDOVICO (1508–68), Ital. poet, dramatist, and translator.

DOLCI, CARLO (1616–86), Florentine artist; subjects chiefly devotional.

DOLDRUMS, region of calms near the equator, between N. and S. trade-winds.

DÔLE (47° 7′ N., 5° 30′ E.), town, Jura, France; Gothic cathedral, coll., and library; Rom. remains; iron foundries. Pop. 15,000.

DOLERITE, widely distributed igneous rock which is found associated with basalts; coarse-grained crystalline structure, occurring in dykes, sills, and lava streams. There are several varieties, including *quartz-dolerite* and *olivine-dolerite*. It is much in demand for road-making.

DOLET, ÉTIENNE (1509–46), Fr. humanist and printer; convicted of heresy and burned; *Life* by R. C. Christie.

DOLGELLY (52° 44′ N., 3° 53′ W.), market town, capital of Merionethshire, Wales; tourist resort.

DOLGORUKI, VASILY LUKICH, COUNT (1672–1739), Russ. diplomatist.

DOLHAIN (50° 36′ N., 6° E.), town, on Vesdre, Liége, Belgium; occupies part of site of ancient *Limburg*; cloth manufactures.

DOLICHONYX, see RICE BUNTING.

DOLL (of Gk. origin), diminutive of 'Dorothy'; Low. Scot. *doroty*; a child's toy. Such playthings were used by the early Egyptians, and by all races of the ancient as of the modern world.

DOLLAR, originally Ger. *thaler*, the name of a coin used in U.S.A., Canada, Newfoundland, Mexico, and other W. countries; its value is *c.* 4s. 2d. in U.S.A. and Canada. The derivation of the dollar mark ($) is doubtful; some make it a combination of the letters U.S.; others suggest a corruption of 8 (a *piece of eight*), or of P and S, the Spanish for *peso*.

DOLLAR (56° 10′ N., 3° 40′ W.), town, Clackmannanshire, Scotland; has celebrated academy (secondary school); ruined Castle Campbell; coal mines.

DOLLING, ROBERT WILLIAM RADCLYFFE (1851–1902), Anglican divine; extreme ritualist and worker in slums.

DÖLLINGER, JOHANN JOSEPH IGNAZ VON (1799–1890), Ger. theologian; ed. at Würzburg and Bamberg; prof. at Munich, 1826; devoted much time to study of ecclesiastical history, in which he became distinguished authority. Though never in sympathy with Protestantism, came, through experience of *curia*, strongly to dislike doctrine of papal infallibility; most learned and able of those who opposed papal policy which culminated in declaration of infallibility at the Vatican Council of 1870; refused to submit, and was excommunicated; declined to join Old Catholic Church, not liking idea of schism; wrote many works on Church history and doctrine.

Von Kobell, *Conversations of Dr. Döllinger*.

DOLMAN, hussar's uniform jacket; woman's cape-like coat.

DOLMEN, see STANDING STONES, BARROWS.

DOLNJA TUZLA (44° 29′ N., 18° 52′ E.), town, Bosnia; seat of Gk. bp.; considerable trade in salt, grain, live stock, timber, and coal. Pop. (1910) 11,333.

DOLOMIEU, DÉODAT GUY SILVAIN TANCRÈDE GRATET DE (1750–1801), Fr. geologist; travelled in many parts of Europe and in Egypt on geological expeditions; wrote several scientific works. Mineral *Dolomite* is named after him.

DOLOMITE, mineral occurring abundantly in the Permian system; chemical composition is: calcium and magnesium carbonate ($CaMg(CO_3)_2$); belongs to the same group of rhombohedral carbonates as calcite, and occurs as large rock masses in rhombohedral crystals, transparent and translucent; usually white or yellowish, but at times reddish-brown, green, grey, or even black. D. is also known by the names *pearl spar* and *bitter spar*. Its present name was given to commemorate some researches made by the Fr. geologist, Dolomieu (*q.v.*).

DOLOMITES, THE (46° 25′ N., 11° 50′ E.), group of limestone mts., S. Tirolese Alps; principal peak, Marmolata (*c.* 11,000 ft.).

Robertson, *Through the Dolomites from Venice to Toblach* (new ed., 1910).

DOLPHIN FAMILY (*Delphinidæ*), a family of toothed whales (*Cetacea*, q.v.) containing 63 species found in all seas. They possess teeth, usually numerous in both upper and lower jaws, and have no baleen or whalebone. There is only a single blow-hole, which is crescent shaped, the arms of the crescent directed forwards. Some of the common forms are the dolphin (*Delphinus delphis*) of the Atlantic Ocean and Mediterranean Sea, the jaws of which form a long beak; while its round-headed, beakless relatives include the Arctic narwhal (*Monodon monoceros*), with a long, horn-like tusk, in former days mistaken for the unicorn's horn; the cream-coloured white whale or beluga (*Delphinapterus leucas*), also most common in Arctic Seas; the smaller (5 feet long) gregarious porpoise (*Phocæna communis*), with dark back and white belly, found in the North Atlantic; and the black fish, pilot whale or ca'ing whale (*Globiocephalus melas*), occasionally driven ashore in hundreds by the inhabitants of Faroe and Shetland. All of the above are constant or occasional visitors to the coast of Britain.

DOMAT, JEAN (1625–96), Fr. legal writer.

DOMBES (*c.* 46° N., 5° E.), ancient division, Burgundy, France; bounded by Rhône, Ain, and Saône.

DOMBROWSKI, JAN HENRYK (1755–1818), Polish general; sometime in Fr. service.

DOME, in arch., convex roof; sometimes employed by the Romans, but a characteristic feature of Byzantine architecture. Famous d's are St. Peter's and the Pantheon, Rome; St. Sophia, Constantinople; St. Paul's Cathedral and the Albert Hall, London.

DOMENICHINO, ZAMPIERI (1581–1641), Ital. artist; b. Bologne; distinguished for his realism and as a colourist; famed also for landscapes.

DOMESDAY BOOK, Eng. survey carried out by order of William the Conqueror, contained in two vol's (which are still preserved); N.W. England, part of which was not yet conquered, is not included. Each county is divided into *hundreds*, and entries are given of all land, its owner, live stock, peasants, etc.; of inestimable value as an historical source, particularly

for genealogy and topography; by no means always easy to understand.

F. W. Maitland, *Domesday Book and Beyond.*

DOMETT, ALFRED (1811–87), Brit. poet and statesman; premier of New Zealand; friend of R. Browning, and subject of his poem, *Waring.*

DOMFRONT (48° 36′ N., 0° 40′ W.), town, on Varenne, France; ruined castle (XI. cent.); cloth manufactures. Pop. 4800.

DOMICILE, fixed place of residence; the country where one's home is. Thus, though a Frenchman may be living temporarily in England, his d. is in France. A person's civil status depends on his d.

DOMINIC, ST. (1170 - 1221), founder of Dominican Order; canon of Osma in Old Castile, 1195. From 1205–15 D. devoted himself to the Albigensian heretics of Languedoc, preaching and teaching and not resorting to violence of later Inquisition; closing years occupied in establishing his order; canonised by Gregory IV., 1234.

Herkless, *Francis and Dominic* (1901).

Dominicans, Friar Preachers, or *Black Friars* (from their habit), founded by St. Dominic, 1215; organised in two Chapters at Bologna, 1220–21; order to be governed by a master-general, to live at Rome; the rule of life was strict, and the order was to possess no property. Its spread was very wide, not only over W. Europe but in the East and Asia. D's generally controlled the Inquisition (*q.v.*). The order came to England, 1221.

The Dominican Order (1911, C.T.S.), Bede Jarrett.

DOMINICA, Dominique (15° 25′ N., 61° 20′ W.), island, Leeward group, Brit. W. Indies; surface mountainous; well covered with timber; fertile valleys, watered by numerous streams; of volcanic origin; contains sulphurous and thermal springs and famous 'Boiling Lake'; principal harbour, Portsmouth, on St. Rupert's Bay on N.W. coast; capital, Roseau; exports sugar, coffee, cocoa, limes, oils, fruit. D. was discovered by Columbus on a Sunday (*Dies Dominica*) in 1493. In 1761 Britain took the island from France, and by the Peace of Paris (1763) it was recognised as British. Fr. settlers again seized D. (1778), but in 1782 Rodney won a naval victory in the neighbourhood, and Britain again acquired the island. In 1805 a Fr. army plundered the island. Area, 291 sq. miles. Pop. (1911) 33,863.

DOMINICAL LETTER, see Calendar.

DOMINICAN REPUBLIC, see Santo Domingo.

DOMINIS, MARCO ANTONIO DE (1560–1624), Ital. theologian; bp. of Segni; abp. of Spalatro; left Rom. and joined Eng. Church (1616), becoming Dean of Windsor and master of the Savoy; returned to Rome, was seized, and d. in prison.

DOMINOES, game, which became popular in XVIII. cent., played usually with 28 oblong, ivory-faced pieces, or 'cards,' each piece being numbered from blank to 12. Consult *The Complete Dominoes Player,* and *Cavendish's Pocket Guide to Dominoes.*

DOMINUS, Latin equivalent of 'sir' or 'master,' formerly applied to knights, parsons, or landed proprietors.

DOMITIAN, Titus Flavius Domitianus, Rom. emperor (81–96 A.D.); s. of Vespasian; succ. his bro. Titus; attempted some reforms, but personally vicious; condemned his cousin, Flavius Clemens, for friendliness to Christianity; killed by a freedman.

Sir W. M. Ramsay, *The Church in the Roman Empire* (1903).

DOMRÊMY-LA-PUCELLE (48° 27′ N., 5° 40′ E.), village, Vosges, France; birthplace of Joan of Arc.

DON (57° 13′ N., 2° 0′ W.), river, Aberdeenshire, Scotland; flows into North Sea, 1½ miles N. of Aberdeen.

DON (47° 10′ N., 39° 10′ E.), river, Russia; ancient *Tanais*; rises in Lake Ivan, flows generally S. through Don Cossacks district, enters Sea of Azov, forming delta 130 sq. m. in extent; length, c. 1156 miles; important fisheries; navigable for 800 miles above mouth; in upper course connected with Volga by canal and railway.

DON BENITO (38° 55′ N., 5° 51′ W.), town, Badajoz, Spain; brandy, woollens, wheat, wine, and fruit. Pop. 16,565.

DON COSSACKS (48° 30′ N., 42° E.), government, S.E. Russia, in valley of Lower Don; belongs almost entirely to Steppe region; elevated in N. and W.; soil very fertile; mineral products—iron, salt, gypsum; agriculture, cattle breeding, fishing, important industries; extensive vineyards; ironworks, tobacco factories, tanneries, flour-mills. Area, 63,532 sq. miles. Pop. (1910) 3,496,300.

DON JUAN, Don Giovanni, hero of Span. story. He seduced a young lady and killed her father in a duel. The statue of the father ultimately dragged D. J. down to hell. The story was dramatised by Tirso de Molina, the Span. author, and has been treated by Molière, Byron, Dumas, and Mr. Bernard Shaw (in *Man and Superman*). Many operas have been composed on the theme, notably Mozart's *Don Giovanni,* and Zorilla's *Don Juan Tenorio.*

DONAGHADEE (54° 38′ N., 5° 32′ W.), seaport town, County Down, Ireland.

DONALDSON, SIR JAMES (1831–), Scot. scholar and educationist; vice-chancellor and Principal of St. Andrews University.

DONALDSON, JOHN WILLIAM (1811–61), Eng. critic and philologist.

DONATELLO, Donato di Betto Bardi (1386–1466), Ital. sculptor; b. Florence; perhaps the greatest master of the Early Tuscan school. His reliefs are well known, but his fame rests mainly upon his statues in Florence, e.g. *St. George* and *David.* See Sculpture.

Life, by Balcarres (1904), Meyer (1904), Maud Cruttwell (1911), Rhea (2nd ed., 1910).

DONATIO MORTIS CAUSA, legal term for a gift of property to become operative in event of the donor's death.

DONATION OF CONSTANTINE, traditional grant of both spiritual and temporal authority over Italy and provinces to Popes by Charles the Great; accepted as authentic in mediæval times, but now universally regarded as forgery (first attacked by Laurentius Valla, 1444); date and place not quite certain, but probably at Rome, c. 775 A.D.; spuriousness now admitted by R.C. scholars.

DONATISTS, a sect of Christians in N. Africa in the IV. cent., who separated from the Church on the election of Bp. Cæcilian of Carthage (311) over the question of the *lapsi* (lapsed), i.e. whether these Christians who had fallen away in times of persecution ought to be received back to the Church. The D's stood for merciless severity; the Councils of Arles (314) and Milan (316) pronounced against them, as also finally Carthage (411); they continued to exist till the VI. cent.

DONATUS, ÆLIUS (IV. cent. A.D.), Rom. rhetorician and grammarian.

DONAU, see Danube.

DONAUWÖRTH (48° 43′ N., 10° 46′ E.), town, at confluence of Wörnitz and Danube, Bavaria, Germany; several ancient buildings; machinery; here Allies defeated French, 1704; French defeated Austrians, 1805. Pop. 4747.

DONCASTER (53° 32′ N., 1° 8′ W.), market town, on Don, W. Riding, Yorkshire, England; originally Rom. station and the Saxon, *Dona Ceastre*; chief edifice, parish church (rebuilt, 1853); celebrated for annual race-meetings (St. Leger), dating from 1776; locomotive and carriage works of Great Northern Railway; has breweries and large agricultural trade; agricultural implements manufactured. Pop. (1911) 30,520.

DONEGAL (54° 54′ N., 7° 55′ W.), county, Ireland, in Ulster (*q.v.*); bounded N. and W. by Atlantic and Donegal Bay, S. and E. by Londonderry, Tyrone, and Fermagh; coast wild and rocky; many islands and much indented by bays; deepest, Lough Swilly;

inland, mountainous and marshy, with numerous moors, lakes, and rivers; chief river, Foyle; largest lough, Derg. D. produces granite, white marble, and freestone; manufactures include woollens and worsteds; extensive fisheries. Capital is Lifford; other towns: Ballyshannon, Letterkenny, Rathmelton, and Donegal. D. has ruins of forts, churches, castles, etc.; palace of N. Irish kings near Lough Swilly. Pop. (1911) 168,420.

Stephen Gwynn, *Highways and Byways in Donegal and Antrim.*

DONEGAL (54° 39′ N., 8° 6′ W.), market town, seaport, County Donegal, on Donegal Bay, Ireland; ruins of Franciscan monastery.

DONELSON, FORT (36° 29′ N., 87° 24′ W.), fortification, on Cumberland River, N.W. Tennessee, U.S.A.; scene of victory of Union forces, Feb. 16, 1862.

DONGOLA (18° 20′ N., 31° E.), province in Anglo-Egyptian Sudan, extending along both banks of Nile, waters fertile districts; capital is Merowé; Nubian Desert lies E.; Libyan Desert, W. The Wadi-el-Kab (*c.* 60 miles long) has good arable land; chief grain crops are durra and barley; dates extensively cultivated; fine horses bred. D. was retaken from Mahdi by Kitchener, 1896. Area, *c.* 141,000 sq. miles. Pop. *c.* 56,000.

DONGOLA, NEW (19° 10′ N., 30° 30′ E.), superseded Old D., now a ruined city, 75 miles farther up the Nile, as largest town of D. province (*q.v.*); trading centre.

DONIZETTI, GAETANO (1797–1848), Ital. composer; b. Bergamo; very rapid and prolific opera writer; over 60 operas, some of which rank among best of Ital. style; most successful—*Lucia di Lammermoor*, *The Daughter of the Regiment*, and *La Favorita*.

Hadden, *Favourite Operas.*

DONKIN, SIR RUFANE SHAW (1773–1841), Brit. general; served with distinction in Peninsula and India.

DONNAY, CHARLES MAURICE (1859–), Fr. dramatist; *L'Autre Danger*, *Éducation de Prince*, and other problem plays; member of Fr. Academy.

DONNE, JOHN (1573–1631), Eng. poet and clergyman; brought up as R.C.; ed. Oxford; studied law; accompanied Essex to Cadiz and the Azores, 1596–97; later changed his faith, pub. his anti-Catholic *Pseudo-Martyr*, was ordained, and became chaplain to James I.; held various livings, and was e Dean of St. Paul's, 1621. He was a powerful and popular preacher; pub. several vol's of sermons; and is deservedly famed for his poetry. His work in verse consists of religious poems, elegies, satires, epigrams, etc., and though his style is frequently crabbed, laboured, and artificial, his passion and imagination lend to much of his poetry a quality unsurpassed by any Eng. poet. He was the greatest of the 'Metaphysical Poets' (*q.v.*).

A. Jessopp, *Life of Donne* (1897); E. Gosse, *Life and Letters of Donne* (1899); Saintsbury and Chambers, *Donne* (Muses Library).

DONNYBROOK, S.E. suburb of Dublin; formerly a village; King John gave permission for holding an annual fair, which became notorious for rioting, and was abolished (1855).

DONOSO CORTÉS, JUAN, MARQUIS DE VALDEGAMAS (1809–53), Span. diplomatist and author.

DONOVAN, EDWARD (d. 1837), English naturalist; writer of popular books on natural history.

DOOBAUNT (63° 30′ N., 101° 30′ W.), lake, N.W. territory, Canada; receives Doobaunt, a small river, on west.

DOON DE MAYENCE, prominent figure in the Charlemagne epic cycle.

DOON LOCH (55° 15′ N., 4° 22′ W.), lake, Ayrshire, Scotland; length, 6 miles; breadth, ¼–¾ mile; surrounded by hills; through it flows river Doon.

DOORS, originally acted also as windows and were hinged with socket and peg; classic d's, either single or double, were surmounted by moulding (architrave) and often by frieze and cornice; the arch appeared in late Roman doorways. Gothic d's frequently possess central pilaster and richly ornamented portals; d. generally of wood with metal ornamentation. D's of iron are used to separate water-tight compartments on ships; folding and sliding d's are used to save space.

Doorway, one of the most important features in architecture, which has, from the earliest times, received much attention in regard to decorative effect. The d's of ancient Egyptian and Assyrian palaces and temples were generally large and splendidly ornamented. The Gk. d. was inclined inwards at the top. A characteristic feature of late Rom. arch. was the d. with semicircular head. This form was adopted in later styles of arch., and is particularly associated with the Norman. The d's of the older Eng. cathedrals are frequently of great richness and architectural beauty, but more elaborate ones are to be seen on the Continent, the portal of Reims Cathedral being a notable example.

DORAN, DR. JOHN (1807–78), Eng. writer on social history and antiquities.

DORAT, CLAUDE JOSEPH (1734–80), Fr. author; wrote novels, plays, and poems.

DORCHESTER.—(1) (50° 43′ N., 2° 25′ W.) market town, on Frome, Dorsetshire, England; occupies site of one of principal Rom. stations, *Durnovaria*; valuable Rom. remains; has grammar school, founded 1579; several fine churches, guild-hall, corn exchange, museum of antiquities, bronze statue of Barnes, Dorsetshire poet; centre of agricultural district. Pop. (1911) 9842. (2) (51° 37′ N., 1° 9′ W.) village on Thame, Oxfordshire, England; is the Rom. *Durocina*, and has a fine old abbey church. (3) (*c.* 42° N., 71° W.) southern district, Boston, Massachusetts, U.S.A.; chiefly residential; until 1869 it was a separate town of Norfolk County, on Massachusetts Bay.

DORCHESTER, DUDLEY CARLETON, VISCOUNT (1573–1632), Eng. diplomatist; ambassador to Holland (1616); supported Charles I.; cr. Viscount D., 1628.

DORCHESTER, GUY CARLETON, 1ST BARON (1724–1808), Brit. general; served in Canada under Wolfe; gov.-gen. of Canada, 1766–78; wise and tactful ruler.

DORDOGNE.—(1) (45° 5′ N., 0° 40′ E.) department, S.W. France; surface in N., mainly sterile plateaux; large area is forest, with few fertile valleys; minerals, wine, truffles. Area, 3561 sq. miles. Pop. (1911) 437,432. (2) (44° 50′ N., 0° 40′ E.) navigable river, S. France; rises on Puy-de-Sancy Mt., falls into estuary of Garonne.

DORDRECHT, DORT (51° 49′ N., 4° 40′ E.), town, on R. Merwede, province of S. Holland, Netherlands; picture-gallery; birthplace of John De Witt and two Cuyps; sawmills. Pop. (1910) 46,862. See DORT, SYNOD OF.

DORÉ, GUSTAVE (1833–83), Fr. artist and illustrator of Dante, Rabelais, Cervantes, Milton, Tennyson. *Life*, by Jerrold (1891).

DORIA, ANDREA (1466–1560), Genoese admiral; served both Charles V. and Francis I.; fought for Genoa, 1503 onwards; drove French from Genoa, and became censor, 1528; famous for naval exploits against Turkish Corsairs; suppressed conspiracies against himself; maintained the Genoese Republic until his death. See GENOA.

DORIANS, name given to one of the chief Hellenic peoples who are traditionally said to have been first settled at Doris, near Mount Parnassus, but they later occupied most of the country along the northern coast of the Gulf of Corinth, and subsequently, invading the Peloponnesus, founded the Spartan kingdom. They also founded Doric colonies in Italy, Sicily, and elsewhere. The Dorian people were distinguished by solidity of character, and their dialect and arch. by plainness and severity, in contrast with the orna'e

grace and decorativeness of the Ionians. See ARCHITECTURE, GREECE (Language).

DORIA - PAMPHILII - LANDI, Genoese family settled in Rome, descended from Andrea Doria (*q.v.*); their palace is a magnificent edifice.

DORION, SIR ANTOINE AIMÉ (1816–91), Canadian statesman and judge; Liberal leader; held office as Attorney-Gen. and Minister of Justice.

DORIS (38° 42′ N., 22° 20′ E.), in ancient geography, small mountainous district, S. of Thessaly, Greece.

DORISLAUS, ISAAC (1595–1649), Eng. judge and diplomatist; assisted in preparing charge of treason against Charles I.; murdered at The Hague.

DORKING (51° 14′ N., 1° 20′ W.), market town, on Mole, Surrey, England; gives name to breed of poultry. Pop. (1911) 7850.

D'ORLÉANS, LOUIS (1542–1629), Fr. pamphleteer and poet.

DORMER, window in a small gable which projects from the slated roof of a house; first employed about XIV. century.

DORMOUSE, small animal of nocturnal habits; common d. (*Muscardinus avellanarius*) belongs to family of Gliridæ or Myoxidæ; tawny in colour, with long, bushy tail; hibernates throughout winter; resembles squirrel in habits and food. See RODENTS.

DORNBIRN (47° 24′ N., 9° 45′ E.), town, Vorarlberg, Austria; cotton and metal goods.

DORNBURG (51° N., 11° 40′ E.), town, grand duchy of Saxe-Weimar, Germany; famous for its three grand-ducal castles.

DORNER, ISAAC AUGUST (1809–84), Ger. Prot. theologian; prof. successively at Tübingen, Kiel, Königsberg, Bonn, Göttingen, and Berlin; best-known work, *History of the Development of the Doctrine of the Person of Christ.*

DORNOCH (57° 33′ N., 4° 2′ W.), county town and royal burgh, Sutherlandshire, Scotland; part of cathedral (1245), restored (1837), forms parish church; holiday resort.

DOROHOI, DOROGOI (47° 48′ N., 26° 31′ E.), town, Moldavia, Rumania; is market for timber and produce of district; holds great annual fair. Pop. 13,074.

DOROTHEUS (fl. 530), Syrian writer on jurisprudence, who, at the instance of Emperor Justinian, prepared with others a book of *Institutes.*

DORR REBELLION, THE (1840–42), movement under T. W. Dorr to change state constitution with more equal representation in Rhode Island; government with Dorr as head elected April, dispersed June, 1842; representation is still unequal.

D'ORSAY, ALFRED GUILLAUME GABRIEL, COUNT (1801–52), Fr. man of fashion and London dandy; close friend of Countess of Blessington; he was author, painter, and sculptor; became Director of Fine Arts in Paris, but died a few days after appointment. See BEAU; also W. Teignmouth Shore, *D'Orsay: or The Complete Dandy* (1911).

DORSET, DUKEDOM AND EARLDOM OF.—William I. of England is said to have created the first Earl of D. Since then the title has been held by three famous houses: (1) JOHN BEAUFORT, eldest of John of Gaunt's children by Katharine Swynford, was cr. Marquis of D.; the title was held by several other Beauforts.—(2) THOMAS GREY, Lord Ferrers, s. of John, Lord Ferrers, by Elizabeth Woodville, queen of Edward IV., was cr. Marquess of D.; HENRY, third and last of this line, was cr. Duke of Suffolk, but beheaded and all his honours forfeited, 1554.—(3) THOMAS SACKVILLE was cr. Earl of D., 1604; notified Mary, Queen of Scots, of her sentence; wrote *A Mirror for Magistrates,* and, with Norton, *Gorboduc, or Ferrex and Porrex* (the first Eng. tragedy); CHARLES, 6th marquess, was envoy to Louis XIV. A Dukedom of D., cr. 1720, became, with other D. titles, extinct (1843).

DORSETSHIRE, DORSET (50° 50′ N., 2° 15′ W.), county, S. of England; bounded N. by Wiltshire, N.W. by Somerset, W. by Devon, S. by Eng. Channel, E. by Hampshire; area, c. 978 sq. miles; fine chalk-cliff scenery on coast. Special features are Poole harbour, Purbeck Isle (a peninsula), St. Alban's Head, Isle of Portland (connected with mainland by Chesil Bank), Portland harbour of refuge (a naval station). Inland are chalk hills or downs which afford pasture for sheep; soil is rich and well cultivated, particularly in Vale of Blackmore; there are fine orchards and dairy farms. Quarries in Purbeck and Portland supply building-stone, marble, pipe-clay; manufactures paper, flax, hemp, pottery. Principal towns, Dorchester—on Frome (county town), Bridport, Poole, Weymouth, Swanage, Wareham, and Shaftesbury. There are several ruined abbeys and castles; Sherborne, and Corfe Castle in Isle of Purbeck. D. is scene of many of Thomas Hardy's novels, and its dialect was used by Barnes, the *Dorsetshire poet.* Pop. (1911) 223,274.

Treves, *Highways and Byways in Dorset* (1906); C. G. Harper, *The Dorset Coast.*

DORT, SYNOD OF, held at Dordrecht by Dutch Reformed Church in 1618–19; upheld *Calvinism* against *Arminianism*; a most important date in history of Reformed Church.

DORTMUND (51° 32′ N., 7° 30′ E.), town, on Emster, Westphalia, Germany; has several fine old churches; is important industrial centre; extensive coal-fields; has iron and steel works and breweries. Pop. (1910) 214,333.

DORY, JOHN DORY, deep-bodied fish with protruding mouth; anterior portion of dorsal fin much enlarged; makes snoring noise owing to action of air-bladder.

DOSITHEUS, MAGISTER (IV. cent. A.D.), Gk. grammarian.

DOST MAHOMMED KHAN (1793–1863), Afghan ruler (from 1809); first of Barakzai dynasty; surrendered to Brit. forces, 1840; hostile again, 1846; made alliance 1855; d. just after capture of Herat.

DOSTOIEFFSKY, FEODOR MIKHAILOVITCH (1818–81), Russ. novelist; wrote very powerful stories dealing with peasant life and social problems, his masterpiece being *Crime and Punishment* (Eng. trans., 1885).

DOUAI (50° 22′ N., 3° 4′ E.), town, on Scarpe, Nord, France; has an arsenal and various educational institutions; in 1568 an Eng. Coll. was founded here by refugee R.C's from England; issued first Eng. version of Old Testament for R.C's (1609), the New Testament having been issued from Reims (1582); trade in corn, seed, and linen; coal-mining and brewing carried on. Pop. (1911) 36,314.

DOUARNENEZ (48° 5′ N., 4° 15′ W.), town, on Bay of Douarnenez, western France; sardine-fishing and rope-making. Pop. *c.* 14,000.

DOUBLE-BASS, stringed instrument larger than 'cello; usually with four strings, tuned in fourths; owing to unwieldiness it takes subsidiary part in orchestra, though Beethoven sometimes gives it prominence.

DOUBLEDAY, ABNER (1819–93), Amer. soldier and writer on military subjects.

DOUBLEDAY, THOMAS (1790–1870), Eng. Reform agitator and author.

DOUBLE-EYED FISH, see under KILLIFISHES.

DOUBS.—(1) (47° 10′ N., 6° 25′ E.) department, E. France, formed of part of ancient Franche-Comté; capital, Besançon; watered by Doubs and affluents; traversed by Jura mountains; good mountain pastures; plains produce wheat, oats, vines, fruit; chief industries, watch-making, iron-founding, brandy-distilling. Area, 2030 sq. miles. Pop. (1911) 299,935. (2) (47° 10′ N., 5° 25′ E.) river, E. France; rises in Jura mountains, flows N.E., joins Saône at Verdun.

DOUCE, FRANCIS (1757–1834), Eng. antiquary.

DOUGLAS.—(1) (54° 9′ N., 4° 29′ W.) seaport, capital of Isle of Man; favourite watering-place; old Castle Mona, formerly residence of Dukes of Atholl (Lords of Man), now a hotel. House of Keys, meeting-place of Manx Legislature, is at D. (2) (55° 33′ N., 3° 51′ W.) village, Lanarkshire, Scotland; has of Scott's 'Castle Dangerous.'

DOUGLAS, ARCHIBALD, 5TH EARL OF ANGUS (1449–1514), Scot. nobleman; nobles met to plot against James III.'s favourite, Cochrane, and, like mice in fable, hesitated to 'bell the cat'; D. volunteered, thus earning nickname, 'BELL THE CAT.'

DOUGLAS, SIR CHARLES, Bart. (d. 1789), Eng. admiral; introduced improvements in naval gunnery.

DOUGLAS, SIR CHARLES WHITTINGHAM HORSLEY (1850–), Brit. general; served in Afghan War (1879–80), Boer War (1881), Suakim expedition (1884); South African War (1899–1902); K.C.B. (1907).

DOUGLAS, GAVIN, GAWAIN (d. 1522), Scot. poet and bp.; third s. of Archibald, *Bell the Cat*; held the see of Dunkeld (1515–20); pub. first Eng. trans. of Virgil's *Æneid* (with prologues of his own); original allegorical poems, *King Hart*, and *The Palice of Honour*; one of leading poets in Middle Scots; romantic imagination, metrical ability, and florid vocabulary; shows genuine love of nature.

DOUGLAS, GEORGE (1869–1902), pseudonym of GEORGE DOUGLAS BROWN, Scot. author; ed. Glasgow Univ. and Oxford Univ.; wrote *The House with the Green Shutters* (1901), a powerful story and an antidote to sentimentalism of Scot. 'Kail-yaird' school.

DOUGLAS, SIR GEORGE BRISBANE SCOTT (1856–), Scot. author; wrote *Life of James Hogg* (1899), *Life of General Wauchope* (1904), etc.

DOUGLAS, SIR HOWARD, Bart. (1776–1861), Brit. general; entered army (1794); served in Peninsula (1808–9); Lord High Commissioner of Ionian Islands; gov. of New Brunswick (1823–29), and founder of Fredericton Univ. there; author of books on naval and military topics.

DOUGLAS, JOHN (1721–1807), Eng. churchman and author; held sees of Carlisle and Salisbury; edit. Captain Cook's *Journals*, Clarendon's *Diary and Letters*.

DOUGLAS, SIR ROBERT KENNOWAY (1838–), Eng. Chinese scholar; author of *Life of Li Hung Chang* (1895), *China* ('Story of the Nations,' 1899), *Europe and the Far East* (1904).

DOUGLAS, STEPHEN ARNOLD (1813–61), Amer. statesman; judge of supreme court of Illinois (1841–43); elected to Congress (1843); soon became known as one of the leaders of Democratic party; took part in quarrels over slavery, of which he did not disapprove; successfully contested senatorship with Abraham Lincoln (1858). D. was a forcible speaker and able politician.

DOUGLAS, FAMILY OF, famous in Scot. history, dates from XII. cent. SIR JAMES, 'The Good' (1286–1330), commanded part of Bruce's army at *Bannockburn* (1314); he d. in Spain while carrying Bruce's heart to Palestine. The 1st Earl of D. was William (cr. 1358). The 2nd earl, James, who was slain at *Otterburn* (1388), left no legitimate s., and the earldom went to Archibald, 'The Grim,' natural s. of Sir James, 'The Good.' His s., Archibald, became 4th earl (1372–1424); fought in France, and was slain at Verneuil. Archibald, 5th earl, d. in 1439, and his s., William, 6th earl, a mere boy, was murdered along with his bro. in Edinburgh Castle (1440). This incident—the 'Black Dinner of the Douglases'—broke the family's power, and its lands were forfeited. The D. lands proper fell to James, 'The Gross,' 7th earl. His s. William, 8th earl, restored the power of the 'Black Douglases,' and James II., alarmed at the strength of the family, treacherously murdered William at Stirling (1452). His bro., James, 9th (and last) earl, took arms to avenge William's death, was unsuccessful, and lost all his lands. The 'Red Douglases'—the Angus branch of the family—were granted the D. lands. Of this branch the best known are ARCHIBALD, 'BELL THE CAT,' 5th Earl of Angus, and his s., Gavin Douglas (*q.v.*). The D. title was restored in 1633, when Charles I. made William, 11th Earl of Angus, the 1st Marquess of D. Archibald, 3rd Marquess and 1st Duke of D., d. in 1761. His sister, Lady Jane D., m. Sir John Stewart of Grandtully. Twin sons were born, one died, and the other, after much litigation (it was alleged that he was not the s. of Lady Jane), secured the duke's estates. In 1790 he became Lord D. The title died with the 4th Lord D. in 1857.

Sir Herbert Maxwell, *House of Douglas* (1902).

DOUGLASS, FREDERICK (1817–95), Amer. (coloured) journalist, ex-slave, and anti-slavery agitator; *Life* by Booker Washington (1907).

DOUKHOBORS, a body of Russ. Nonconformist peasants, formed about 1750, holding property in common; like Quakers, reject ritual and a professional priesthood; persecuted by the Russ. Government from time to time; migrated to Cyprus (1898), thence to Canada (1899), where they number over 7000. Tolstoi sympathised with them, and they largely carry out simplicity of life and belief he advocated.

Aylmer and Maude, *The Doukhobors* (1905).

DOULLENS (50° 10′ N., 2° 20′ E.), town, Somme, France; mediæval stronghold; besieged and occupied by Spaniards (1595); restored to France (1598). Pop. 5300.

DOULTON, SIR HENRY (1820–97), Eng. potter; head of the famous Lambeth firm of drain-pipe and *Doulton ware* manufacturers.

DOUMER, PAUL (1857–), Fr. politician and administrator.

DOUMIC, RENÉ (1860–), Fr. literary critic.

DOUNE (56° 11′ N., 4° 3′ W.), town, on Teith, Perthshire, Scotland; remains of feudal castle.

DOURO, DUERO (41° 6′ N., 8° 34′ W.), river, Spain and Portugal; rises in Pico D'Urbion in Soria, Spain; flows generally W., and falls into Atlantic at Oporto; navigable to distance of 90 miles from mouth; length, *c.* 485 miles; crossed by Wellington, after desperate contest, 1809.

DOUROUCOLIS, OWL-FACED MONKEYS (*Nyctipithecus*), a genus of New World monkeys belonging to family Cebidæ (*q.v.* under *Primates*), with non-prehensile tails, nocturnal, vegetarian, and insectivorous; found in Venezuela, Brazil, Guiana, and Colombo.

DOUSA, JANUS, JAN VAN DER DOES (1545–1604), Lord of Noordwyck; Dutch scholar and politician; defended Leiden when besieged; curator of Leiden University.

DOUVILLE, JEAN BAPTISTE (d. 1837), Fr. traveller.

DOVE (52° 50′ N., 1° 50′ W.), river, Derbyshire and Staffordshire, England; rises S.W. of Buxton; joins Trent at Newton Solney.

DOVE, a term including several members of the *Columbidæ*, Brit. representatives being the stock-d., rock-d., ring-d., and, as a visitor, the turtle-d.; all are typical perchers, with compact body and powerful wings; grain feeders, with beak characterised by presence of two bare protuberances at base; easily domesticated. In Christian art the d. symbolises the Holy Ghost; also an emblem of purity or innocence, and, holding an olive branch, peace.

DOVER.—(1) (51° 7′ N., 1° 19′ E.) parliamentary and municipal borough in Kent, England; N.W. side of Straits of Dover, enclosed by chalk cliffs; historic town, important seaport, and fashionable watering-place; nearest port to France, and one of chief ports communicating with Continent. Commercial harbour has been greatly extended since 1893; great naval harbour opened, 1909. Great harbour extensions were made (1897–1900). Castle, standing on cliffs, contains ruins of Rom. lighthouse, ancient church, and keep. D. has some interesting old churches and forts, a town hall, museum, and college. Chief industries are ship-building, sail- and rope-making. D. is one of Cinque Ports, and has prominent place in history; scene of strife during civil and foreign wars. Pop. (1911) 43,647. Harbour, *Dover and its Surroundings* (1910). (2) (39° 7′ N., 75° 33′ W.) town, capital of Delaware, U.S.A.; fruit and fruit-canning. Pop. (1910) 3720. (3)

(43° 10′ N., 70° 59′ W.) city, Stafford County, New Hampshire, U.S.A.; cotton and woollen goods. Pop. (1910) 13,247. (4) (40° 53′ N., 74° 33′ W.) town, Morris County, New Jersey, U.S.A.; ironworks. Pop. (1910) 7468.

DOVER, GEORGE JAMES AGAR-ELLIS, Baron (1797–1833), Eng. hist. writer.

DOVER, HENRY JERMYN, EARL OF (d. 1708), Eng. duellist, gambler, and profligate.

DOVER, ROBERT (1575–1641), Eng. attorney; founder of the 'Cotswold Games.'

DOVERCOURT (51° 54′ N., 1° 16′ E.), watering-place, estuary of Stour, Essex, England.

DOW, GERHARD (1613–80), Dutch artist; pupil of Rembrandt; painted portraits and still life.

DOW, LORENZO (1777–1834), Amer. Methodist preacher, specially against R.C. Church.

DOW, NEAL (1804–97), Amer. soldier and temperance reformer.

DOWAGER, title given to widow to distinguish her from her son's wife; applied to ladies of rank.

DOWDEN, EDWARD (1843–1913), Irish poet and scholar; has pub. several works on Shakespeare; *Life of Shelley*; *Poems* (1876).

DOWDESWELL, WILLIAM (1721–75), Brit. politician; Chancellor of Exchequer (1765–66).

DOWER, widow's interest in real estate of deceased husband, in accordance with the Dower Act (1834).

DOWIE, JOHN ALEXANDER (1848–1907), Amer. religious leader; preached 'faith-healing'; founded Zion city on Lake Michigan, 1901. See CHRISTIAN CATHOLIC CHURCH.

DOWN (Fr. *dune*, a hill), undulating tract of land, covered with short grass, suited for pasture.

DOWN (54° 20′ N., 6° W.), county, Ulster, Ireland; bounded N. by Antrim, W. by Armagh, S. by Carlingford Lough, E. by Irish Sea. N. is hilly and fertile; in S. are Mourne Mts. and much waste land; Lagan Valley is richest in cultivation. Stock-raising and dairy-farming are carried on. Chief rivers are Lagan and Bann; principal towns are Downpatrick (county town), Newtonards, Banbridge; important fisheries and breweries; manufactures linen; some prehistoric remains. Pop. (1911) 304,589.

DOWNES, ANDREW (d. 1628), Eng. scholar.

DOWNING, SIR GEORGE (*c.* 1624–84), a preacher in West Indies; then soldier under Cromwell; resident at The Hague (1657); turned Royalist and was knighted at Restoration; cr. bart. (1663); Sec. to Treasury, 1667 (D. Street bears his name); he was a man of ability, but no principle.

DOWNMAN, JOHN (1750–1824), Eng. artist.

DOWNPATRICK (54° 20′ N., 5° 43′ W.), market town, capital of County Down, Ireland; cathedral supposed to contain remains of St. Patrick; linen.

DOWNS (50° 54′ to 51° 17′ N., 2° 32′ W. to 0° 20′ E.), two ranges of chalk hills, S.E. England. North Downs extend E. to W. from Hampshire, through Surrey and Kent to Dover. South Downs, in Hampshire and Sussex, terminate at Beachy Head.

DOWNS (51° 15′ N., 1° 28′ E.), name of a channel, E. coast of Kent, between N. and S. Foreland; forms roadstead, protected by Goodwin Sands; indecisive battle between English and Dutch fleets, 1666.

DOWNSHIRE, WILLS HILL, 1st MARQUIS OF (1718–93), Eng. politician.

DOWRY, the property which a wife brings to her husband at marriage.

DOXOLOGY (Gk. *Glory to God*), form of praise to the Deity in use in Christian Church; based on certain Scripture passages, e.g. *Isaiah* 6^3, *Matthew* 6^{13}. The *Greater D.* appears in Prayer Book in Communion Service; *Lesser D.* (based on *Matthew* 28^{19}) is sung at end of each psalm.

DOYEN, GABRIEL FRANÇOIS (1726–1806), Fr. artist.

DOYLE, SIR ARTHUR CONAN (1859–), Eng. novelist; nephew of Richard D. (*q.v.*); practised for several years as doctor; later achieved great popularity with hist. and detective stories; created the character of 'Sherlock Holmes'; wrote *The Great Boer War* (1900), several plays, and two vol's of verse.

DOYLE, SIR FRANCIS HASTINGS, Bart. (1810–88), Eng. poet; won much popularity with his military and heroic ballads.

DOYLE, JOHN ANDREW (1844–1907), Eng. historian.

DOYLE, RICHARD (1828–83), Eng. black-and-white artist; s. of JOHN DOYLE (1797–1868), the caricaturist, 'H. B.'; on staff of *Punch*; illustrated Dickens and Thackeray.

DOZSA, GYÖRGY (d. 1514), Hungarian revolutionist; drilled a rabble with intention of marching against the Turk; the landlords objected, and D.'s army turned against them. After prolonged rebellion D. was executed with revolting cruelty.

DOZY, REINHART PIETER ANNE (1820–83), Dutch Arab. scholar.

DRACHMANN, HOLGER HENRIK (1846–1908), Dan. poet and dramatist; wrote poems of fisher life, and love lyrics; and several successful plays: *Once upon a Time*, *Wayland the Smith*, etc.

DRACO (VII. cent. B.C.), Athenian archon, famous as lawgiver; tradition attributes to his laws the utmost severity, hence our adjective *Draconian*. Aristotle ascribes to him the remodelling of the *Constitution of Athens*, but modern scholars believe the Constitution to be of later date. D.'s code was cancelled by Solon.

DRACONTIUS, BLOSSIUS ÆMILIUS (V. cent. A.D.), early Christian poet.

DRAFTED MASONRY, in arch., stones with trimmed border, the centre being left rough.

DRAGASHANI (*c.* 44° 30′ N., 24° 14′ E.), town, Walachia, Rumania; wines. Pop. 4640.

DRAGOMAN (from Arab.), name used in Eastern countries for interpreter.

DRAGOMIROV, MICHAEL IVANOVICH (1830–1905), Russ. general and author.

DRAGON, fabulous monster, with griffin's head, scaly, winged body, huge claws, and barbed tail, and so represented in heraldry; common to ancient mythology, and frequently mentioned in mediæval poetry; saints and heroes were d. killers, *e.g.* Buddha, Thor, Zeus, Œdipus, Perseus, St. George, Beowulf. In Chin. and Jap. art the d. is common. It is also the name given to a species of flying or leaping lizards (*Draco volans*), and was the name of a mediæval short firearm, whence is derived 'dragoon.'

DRAGONETTI, DOMENICO (1763–1846), Ital. double-bass player.

DRAGON-FLY, ODONATA, are a group of hi developed insects possessing a long body, and a l bearing two large eyes, which rotate freely through a large angle owing to the small base of attachment. There are two pairs of wings of clear, membranous character. The insect's whole structure indicates specialisation for powerful flight. The food consists of smaller insects, captured on the wing, and held, it is believed, between the legs of the captor, whilst the useless parts are torn off, and the juicy body crushed by the powerful mouth. The nature of their food requirements makes d's inhabit reed-fringed areas of water, hedgerows, and the neighbourhood of wooded land, where their flashing metallic hues and rapid flight render them conspicuous objects. The larva, of sluggish habit, lies hidden among the vegetation of pond bottoms, and seizes its prey by means of a peculiar extensible organ termed the 'mask.'

DRAGOON, original name for a mounted soldier, who fought on foot, and was armed with a firearm called a 'dragon.'

DRAGUIGNAN (43° 32′ N., 6° 28′ E.), chief town, Var, France; olives, silk-culture. Pop. 9700.

DRAINAGE implies the drawing off of superfluous or standing water by means of channels, surface or underground. *Surface* d., in which the land is ploughed into ridges, with furrows between them into which the

water runs and is then carried into ditches, is unsatisfactory, and is now generally superseded by underground *pipe* d. D. systems must be adapted to the land, the main drain lying in the lowest natural depressions, and the parallel drains running into it along the lines of greatest slope. In flat land a fall is obtained by increasing the depth of the lower ends of the drains. The fall should be not less than 1 in 200. The main drain should be kept clear of trees and hedges, and its outlets protected by gratings. The number of parallel drains varies with the soil, a heavy, clayey soil requiring more than a light soil. D. operations are best carried out in late summer or autumn, and the cost per acre varies from £2 to £10 according to the soil and local cost of materials and labour.

Mitchell, *Handbook of Land Drainage.*

DRAKE, ADMIRAL SIR FRANCIS (c. 1545–95), Eng. seaman; b. Devonshire; took part in expeditions to Spanish Main under Hawkins; distinguished himself at San Juan de Ulloa; did great damage to Span. trade and shipping in S. America, 1572–73; first Englishman to sail round the world, 1577–80; burned shipping in Cadiz harbour, 1587; helped to defeat Armada, 1588; died at sea off Nombre de Dios.

DRAKE, NATHAN (1766–1836), Eng. physician and scholar; author of *Shakespeare and his Times* (1817), etc.

DRAKENBORCH, ARNOLD (1684–1748), Dutch scholar; famed for edit. of Livy.

DRAKENSBERG (25° S., 30° 30′ E.), mountain chain, S.E. Africa; extends from Great Fish River to Olifant's River; culminates in Mont Aux Sources, Giant's Castle, and Champagne Castle (10,000 to 11,000 ft.); numerous passes; De Beers and Van Reenen's Passes (over 5000 ft.) are crossed by railways connecting Orange Free State and Natal.

DRAMA (Gk. term meaning an act, a thing performed) is the general name for all stage lit. The Hindus, Chinese, and Japanese possessed a native d. as early as the V. or VI. cent's A.D., but it is to the Attic Greeks that one naturally turns for the beginnings of dramatic literature.

Greek Drama.—Attic tragedy grew out of the annual dithyrambic hymns and dances associated with the worship of Dionysus (Bacchus) at Athens. The word *tragedy* means 'goat-song' or 'goat-chorus,' derived from the fact that the performers originally wore goatskins to give them the appearance of satyrs. This lyrical tragedy then became transformed into primitive d. by the introduction of Ionian minstrels, called 'rhapsodes,' who recited poems upon heroic subjects, and it was by these minstrels that the Homeric cycle of poems was popularised. In course of time the rhapsode began to address himself to the chorus, thus becoming an actor, this innovation being credited to Thespis (VI. cent. B.C.), who is on this account regarded as the inventor of tragedy. Thespis is also said to have introduced the prologue. Amongst the earliest writers of Gk. tragedy were Phrynichus (512–476 B.C.), Chœrilus (524–465), and Pratinas (500–460), but it first achieved greatness in the hands of Æschylus (525–456), who introduced a second actor to the Gk. stage. He was in turn superseded in the estimation of the public by Sophocles (496–405), who added a third actor, while one of his plays, *Œdipus at Colonus*, required a fourth actor. The classic period of Attic tragedy ended its course in the dramatic work of Euripides (481–406). Briefly it may be said of these three writers that the great work of Æschylus was only surpassed by Sophocles in a somewhat stronger dramatic interest, while the plays of Euripides, though representing Gk. tragic art in the period of its decline, are distinguished by dramatic force, tender pathos, and picturesqueness of style and expression. The plays of Euripides also supplied the model for the Rom. tragic dramatists who came after.

The subjects of Gk. tragedy were taken from mythology and heroic legends. Besides single plays founded on one of these stories, Æschylus set the fashion of extending his subject over three plays, called a 'trilogy,' sometimes followed by a 'satyr-drama,' like the *Cyclops* of Euripides, which gave free play to the satyr or 'goat-chorus,' and was chiefly remarkable for a good deal of rough buffoonery. The Gk. tragic writers laid great stress upon the observance of the three dramatic *unities*: time, place, and action—that is to say, the story of the drama should not extend beyond the space of one day; there should be no change of scene; and the thread of the story should be strictly adhered to, thus linking together cause and effect.

Gk. *comedy*—comedy meaning 'village-song'—belongs to the same period as tragedy, and sprang likewise from the worship of Dionysus. In its beginnings it was associated with village festivals, in which dancing, singing, and jesting played a considerable part, and thus the comic or satiric spirit became dominant. Some of the earliest writers of comedy were Epicharmus, Chionides, Cratinus, Crates, and Eupolis. Attic 'Old' comedy, however, reached its highest quality in the work of Aristophanes, a contemporary of Euripides, whose peculiarities he persistently made it his business to satirise. For about forty years this great comic poet continued to lash his contemporaries with the whip of his keen satire. His work was succeeded by that of Alexis, Eubulus, and Antiphanes—the period being known as that of the 'Middle Comedy,' which subsequently gave place to the 'New Comedy,' the chief exponents of which were Philemon and Menander.

Such is a brief outline of the history of Gk. tragedy and comedy. The Gk. theatre, which was open to the sky, was shaped somewhat like a horseshoe, with the stage placed at the open end, and the rounded portion fitted with tiers of seats. Such theatres held from 20,000 to 30,000 spectators. The raised stage, which was narrow, was called the 'speaking-place,' and a flight of steps led down to the semicircular 'orchestra,' or dancing-place, which was reserved for the chorus. There were three entrance-doors at the back of the stage, painted scenery and hangings were used, and, subsequently, mechanical appliances to aid the ascent or descent of deities and others. The actors wore masks, and huge wigs to increase their stature, and, in tragedy, this was further assisted by wearing the *cothurnus*, a very thick-soled boot. See GREECE, *Literature.*

Latin Drama.—The Latins at an early period in their history developed a species of popular farcical play, the most distinct types of which were known as *Saturnæ*, and *Mimi*, but the d. proper was of Gk. origin, and came into existence in Rome when Livius Andronicus, a native of Tarentum, produced (240 B.C.) both a tragedy and a comedy in celebration of the victorious close of the first Punic War. Other writers immediately succeeding him were Nævius and Ennius. The plays of the three writers (of which none have survived) were modelled on the principal Gk. tragic dramatists; their plots were derived chiefly from the story of the Trojan War; and all three were also writers of comedy. The earliest Latin tragedies that remain were the work of the philosopher and rhetorician, Lucius Annæus Seneca (4 B.C.–65 A.D.), who was also the tutor of the Emperor Nero. His plays, which were adapted from Sophocles and Euripides, were chiefly remarkable for their rhetorical quality, and served as the model of the Fr. classical dramatists. The Rom. tragic period appears to have flickered out during the reign of Domitian. It has been pointed out that the earlier writers of Rom. tragedy also produced comedies, but the first author to give genuine distinction to comedy was Plautus (254–184 B.C.), who was succeeded by Terence (185–159 B.C.). Both borrowed their plots from the Greeks, but their genius in the elaboration of character and the originality of their dialogue give them a high place in dramatic lit., and later comedy owes much to them. Like Rom.

tragedy, comedy was subsequently extinguished by the stronger appeal of the arena and gladiatorial combats. See LATIN LITERATURE.

English Drama.—The decline of the d. was completed by the rise of the Christian Church, which, from the VI. to the XI. cent., remained persistently hostile to the stage, and prohibited all kinds of theatrical entertainments. Yet it is a curious fact that though the Church suppressed the d., it was subsequently the direct instrument of its revival. This was by means of *Miracle* and *Mystery* plays—dealing with Scripture history and legends of the saints—which were performed by ecclesiastics themselves in the churches throughout Europe. Miracle plays were first performed in London during the XII. cent. They reached their highest point of success when they were taken in hand by the civic trading companies of the great towns, of which Chester (1268–76) was apparently the first, though other towns followed the custom during the XIII. and XIV. cent's. Four collections of these plays—the Chester, York, Townley (Wakefield), and Coventry—still survive. The plays, in their later development, were performed upon a two-storeyed platform on wheels, the upper portion of which served as stage, and the lower as dressing-room, and this portable theatre was wheeled about the town, usually starting from the gates of a monastery. Miracle and mystery plays were succeeded by *Morality* plays, which were entirely allegorical and dealt with the conflict between good and evil. Prominent figures in these were the devil, and a buffoon, called Vice, who was the devil's lackey and tormentor. Perhaps the greatest of these morality plays was *Everyman* (*c.* 1530), which was revived in the early years of the XX. cent. Moralities date from the reign of Henry VI., and, together with miracle plays, continued to be performed until well into the reign of Elizabeth.

These were succeeded by the humorous *interludes* of John Heywood (*c.* 1500–77), of which one was *The Play of Love* (1533). *Pageants* and *masques* also belong to this period. The first Eng. comedy was *Ralph Roister Doister*, by Nicolas Udall (1505–56); and another early work of the kind was *Gammer Gurton's Needle*, printed in 1575, and sometimes attributed to Dr. Still. The earliest Eng. tragedy was *Gorboduc*, by Norton and Sackville, first acted by members of the Inner Temple before Queen Elizabeth (1562). To these succeeded a long series of *Chronicle plays* founded on Eng. history or derived from foreign sources, of which the chief exponents were Lyly, Kyd, Peele, Greene—and, by far the greatest of all, Christopher Marlowe, who has been described by Mr. Swinburne as 'the father of Eng. tragedy, and the creator of Eng. blank verse.' These writers are all dealt with under their separate heads. It may be noted, in passing, that Shakespeare, who succeeded to these bombastic playwrights, derived nearly all of his plots from these earlier plays. Shakespeare, Jonson, Beaumont and Fletcher, Webster, Massinger, Tourneur, Middleton, Ford, Dekker, and other master-dramatists belonging to the Elizabethan and Jacobean period are likewise dealt with individually elsewhere. It remains only to be said that the seed which was sown in *Ralph Roister Doister* and *Gorboduc* came to its full fruition in the plays of Shakespeare, his great contemporaries and immediate successors. Then followed a period of eclipse and silence. The Puritans closed the theatres, and the d. did not again raise its head until the restoration of Charles II. (1660).

With regard to the theatres of Shakespeare's day, they were rude circular buildings, open to the sky, with a bare stage and a plain draped scene for all purposes. Shakespeare paints his own scenery in words, hence the glorious descriptive passages in his plays. Women's parts were played by boys. There was no attempt to 'dress' a play, Elizabethan costume serving for a character belonging to ancient Greece or mediæval Italy. Thus in the great days of Elizabeth 'the play' was essentially 'the thing,' and not the trappings.

The connecting-link between the Elizabethan dramatic period and the stage of the Restoration was James Shirley (1596–1666). In *The Maid's Revenge* and other d's he proved himself to belong to the great line of the Elizabethans. The next considerable figure in the history of the English d. is John Dryden (*q.v.*), whose work belongs to the period following the Restoration. He practised the *Heroic* drama derived mainly from Fr. Romances; his *Conquest of Granada* shows the extravagance and bombast of this type. In his *Essay on Dramatic Poesy*, Dryden points out the way to subsequent dramatists. In his plays he first courted public favour with rhymed verse, but subsequently abandoned this form for blank verse. His comedies are disfigured by the immorality demanded by a licentious court and public, but in some of his tragedies there is not a little of the dignity and high purpose of the Elizabethan, and with him the Shakespearean school may be said to have ended. Amongst the rivals and immediate successors of Dryden may be named Nat Lee, Settle, Otway, Rowe, Shadwell, Wycherley, Vanbrugh, Farquhar, and Congreve. Of these only two need be referred to in particular. The work of Thomas Otway (1652–85) is distinguished in a marked degree by pathos and tenderness, and his plays, *The Orphan* and *Venice Preserved*, kept the stage until comparatively recent times. The comedies of William Congreve (1670–1729), though marked by the licentiousness of the age, are distinguished by their wit, polished dialogue, and masterly construction. The plays of Sir Richard Steele (1672–1729) and Joseph Addison (1672–1719) added no distinction to the drama. John Gay's *Beggar's Opera* (1728) may be regarded as the original of later musical extravaganza; and George Lillo's *George Barnwell* (1731) as an early example of crude melodrama. Amidst much that was worthless and trivial, the closing years of the XVIII. cent. were marked by a period of dramatic splendour due to the works of Oliver Goldsmith (1728–74) and Richard Brinsley Sheridan (1751–1816). The homespun virtue and good sense which distinguishes Goldsmith's *She Stoops to Conquer*, and the delicate wit and humour of Sheridan's three comedies, have served to keep these dramatists popular even to the present day.

The English d. of the XIX. century may be said to have been inaugurated by Lord Byron, who wrote a number of poetical d's not very suitable for stage presentation, though *Sardanapalus* has been staged within comparatively recent years. James Sheridan Knowles (1784–1862), however, enjoyed considerable vogue, and his *Virginius* and *The Hunchback* have still their admirers. The same may be said of Lord Lytton's *Richelieu*, *Money*, and *The Lady of Lyons*, which, though they now appear somewhat stilted and old-fashioned, have by no means exhausted their popularity. Confining our attention for the moment to the poetic d., we may note that Talfourd, Milman, and Sir Henry Taylor achieved a certain amount of literary celebrity in their own day. Browning's *Strafford* was produced by Macready with some acceptance; and Tennyson many times sought favour on the stage, though only *Becket* achieved a tentative success, that being due rather to the personality of Sir Henry Irving than the inherent quality of the play. Shelley's *The Cenci*, in the opinion of some critics, is the finest poetic play written since the time of the Elizabethans. Stephen Phillips, in *Paolo and Francesca* and *Herod*, is the only writer of recent times who has combined high poetic gifts with a real knowledge of stagecraft, but his later plays, such as *Nero*, showed a marked falling off from the high standard set in his earlier triumphs. Tom Taylor (1817–80) was a prolific dramatist, and obtained considerable success during a transition period

with *Still Waters Run Deep* and a series of historical plays. Of similar type was the dramatic work of W. G. Wills (1828–91), three of whose plays, *Charles I.*, *Eugene Aram*, and *Olivia*, were amongst the most successful plays produced by Irving. Dion Boucicault (1820–90) made his first success with *London Assurance*, but achieved a greater and more lasting popularity with his Irish plays, *The Colleen Bawn*, *The Shaughraun*, and *Arrah-na-Pogue*. To this period also belongs the work of Henry James Byron (1834–84), whose play, *Our Boys*, had a consecutive run of three years. He was also the successor of J. R. Planché as a prolific writer of burlesques, in which line he was followed with great success by Sir F. H. Burnand.

The turning-point in the recent history of the Eng. d. began with the comedies of T. W. Robertson (1829–71). Before the occupancy of the Prince of Wales Theatre (1865–70) by Sir Squire and Lady Bancroft, with whom were associated Sir John Hare and the Kendals, the Eng. stage was largely given up to Fr. adaptations and crude melodrama, and had brought itself into contempt with the intellectual public. The Bancrofts, however, set themselves to remedy this defect. They produced Robertson's *Society*, *School*, *Ours*, and *Caste*, in which false and mawkish sentimentality gave place to naturalness and true pictures of life. The result was that they attracted the thinking public; they reaped a golden harvest for themselves; and they gave the death-blow to the puerile rubbish which had too long held the stage. Immediately following the conclusion of the Bancrofts' triumphs at the Prince of Wales Theatre, was the entry into management at the Lyceum of Sir Henry Irving (1871), where the high and serious purpose which distinguished all his undertakings did as much, or more, for the Shakespearean and romantic drama as the Bancrofts had done for the plays dealing with modern life.

After the Robertsonian period of modern comedy the Eng. stage again succumbed to foreign influence for a short spell, but a new era in stage history was begun with the production of Sir A. W. Pinero's *Money Spinner* (1881), which, being followed by such brilliant farces from the same pen as *The Magistrate*, *Dandy Dick*, and *Sweet Lavender*, served to give their author a high place in modern dramatic lit. The last-named play was staged in 1888, and the following year witnessed the first presentation in London of Ibsen's *A Doll's House* and *Pillars of Society*, followed during the next two or three years by *Rosmersholm*, *Hedda Gabler*, and *The Master Builder*. The uncompromising realism of Ibsen's method of dealing with sociological problems quickly began to make itself felt in the work of Eng. dramatists. Forsaking farce, Pinero made a bid for popularity with *The Profligate* (1889), a play with a serious purpose, and followed this by his masterly studies of contemporary life, *The Second Mrs. Tanqueray* (1893), *The Notorious Mrs. Ebbsmith*, *The Gay Lord Quex*, *His House in Order*, and others. Mr. G. B. Shaw's *Widowers' Houses* (1892) also belongs to this period.

Contemporary with the earlier farcical comedies of Pinero were the spectacular melodramas by Paul Meritt, Henry Pettitt, G. R. Sims, and others, at Drury Lane, the Princess's, and Adelphi theatres. Under the control of Sir Augustus Harris (1879–96) Drury Lane became the chief home of melodrama, and the success which attended these productions has been continued under the management of Mr. Arthur Collins, whose principal authors have been Henry Hamilton and Cecil Raleigh. *The Lights o' London*, by Sims, was produced by Wilson Barrett at the Princess's in 1881; and other successful plays of the kind staged there were *Claudian* and *The Silver King*. Sims later wrote numerous melodramas for the Adelphi, in some of which he was associated with Robert Buchanan. The latter proved also a very successful adaptator of XVIII.-cent. novels, amongst which may be named *Sophia* (Tom Jones) and *Joseph's Sweetheart* (Joseph Andrews). Henry Arthur Jones, who began as a writer of melodrama, of which *The Silver King* is an example, proceeded later to work of a higher literary character, such as *Judah*, *The Middleman*, and *The Dancing Girl*; and subsequently, with such brilliant work as *The Masqueraders* and *The Case of Rebellious Susan*, was deservedly ranked with Pinero. Of the younger writers belonging to this period much excellent and varied work was given to the stage by Haddon Chambers, R. C. Carton, H. V. Esmond, Robert Marshall, and Basil Hood. Sydney Grundy was for long a successful purveyor of stage fare, one of his best efforts being *A Pair of Spectacles*, produced by Sir John Hare. John Davidson (1857–1909), though he wrote many literary plays, only achieved a stage success with a translation of Coppée's *Pour la Couronne*. The plays likewise of Stevenson and Henley, though admirable as lit., could never be successful upon the stage. The plays of Mr. J. M. Barrie, including *Quality Street*, *The Admirable Crichton*, *Peter Pan*, and *What Every Woman Knows*, all distinguished by a kindly humour, are amongst the most delightful productions of the modern theatre. The plays of Oscar Wilde, beginning with *Lady Windermere's Fan* (1892) and ending with *The Importance of Being Earnest* (1895), are marked by a distinctly individual style, and won public favour by their brilliant flow of epigram. A passing reference can only be made to the revolution caused in light opera by the delightful series of comic operas produced by Sir Arthur Sullivan and Sir W. S. Gilbert, which began with *The Sorcerer* (1877), the popularity of all of which still continues.

For some years past the most successful plays, from the manager's point of view, have been 'costume' melodramas and dramatised novels, of which *The Three Musketeers*, *Under the Red Robe*, *The Scarlet Pimpernel*, *Sweet Nell of Old Drury*, *Henry of Navarre*, *The Eternal City*, and *The Prodigal Son* may be quoted as examples. Side by side with these, however, there have been produced plays which have attacked social problems and abuses in a fearless manner, and for these there has latterly been a growing appreciation. We may perhaps regard Mr. George Bernard Shaw as the pioneer of this type of play. Amongst later writers the plays of Mr. Alfred Sutro have proved highly successful, and much work of excellent literary quality has been done by Mr. St. John Hankin, Mr. Arnold Bennett, Mr. Charles M'Evoy, and others. In *Waste*, and other of his plays, Mr. Granville Barker relentlessly probes modern social problems; and John Galsworthy in *Strife* and *The Silver Box* deals with similar themes. John Masefield, in *Nan*, has contributed to the stage perhaps the greatest tragedy of modern times; but in *Pompey the Great* his experiment in dealing with a classical subject in colloquial English has not been so successful.

One of the most remarkable theatrical movements of modern times was the establishment, a few years ago, in Dublin, of the Irish National Theatre, which was subsidised by Miss A. E. F. Horniman. This enterprise brought to light the works of many native Irish writers, but its most outstanding productions have been plays by W. B. Yeats, J. M. Synge, and Lady Gregory. In such plays as *Cathleen-ni-Hoolihan*, *The Hour-glass*, and *Deirdre*, Mr. Yeats has successfully exploited that vein of mysticism for which he has won a deserved reputation. Lady Gregory's plays are distinguished by boisterous humour and keen insight into Irish character. The plays of Synge (1871–1909), however, stand apart, and reveal their author as one of the most original playwrights of modern times. The brooding sorrow of *Riders to the Sea*, the remote atmosphere of *The Shadow of the Glen*, and the gorgeous rhetoric of *The Playboy of the Western World* are alike remarkable. Miss Horniman subsequently founded the first repertory theatre in the kingdom (Gaiety Theatre, Manchester). Repertory theatres have since been established at Liverpool and Glasgow. In 1908 a scheme was projected for the establishment and endow-

ment, in London, of a Shakespeare Memorial National Theatre, for the performance only of high-class d. The sum required is £500,000,

The development of d. in Europe, from the period of its decline under the Rom. Empire, may now be briefly reviewed. The revival began in **Italy** in the XIII. cent., but did not become remarkable before the XVI. cent., to which period belongs the work of Trissono, Rucellai, Guarini, Tasso, Asinari, and Torelli. To these succeeded Granelli, Bettinelli, and Metastasio, writers of high merit, who led on to the work of the supreme master of Ital. tragedy, Count Alfieri (1749–1803). Ital. comedy is represented by the work of Ariosto, Goldoni, and Gozzi, and numerous smaller writers since. Manzoni in XIX., D'Annunzio in XX., cent. imparted individuality to Ital. drama. See ITALY, *Literature*.

Spanish Drama was supreme in Europe at one period. Its Augustan age, when national drama flourished, began with the plays of Cervantes (1547–1616), and was continued by the masterly works of Lope de Vega and Calderon; after which followed a long period of silence, to be broken by the powerful dramas of Echegaray in the late XIX. cent.

In **France** the first great dramatic revival began with the associates of Ronsard, who constituted the 'Pléiade,' a leading member of which was Étienne Jodelle (1532–73), author of *Cléopâtre, Didon,* and *Eugène*. The classical d. found its great exponent in Corneille (1606–84), and the movement was developed and enriched by the plays of Racine and Voltaire. Molière (1622–73) proved himself to be one of the greatest humorists the world has produced; and the brilliant light comedies of Marivaux (1688–1763) belong to the glories of the Fr. stage. Reference must also be made to the comedies of Beaumarchais and de Musset, the domestic d. of Diderot, the romantic plays of Hugo, and the varied and excellent dramatic work produced by Scribe, Sardou, Augier, Dumas *fils*, Richepin, Rostand, Coppée, Bernstein, and the realistic Brieux. The Belgian Maeterlinck may also be mentioned under Fr. drama. See FRANCE, *Literature*.

In **Germany** the dramatic movement was slower, and from the period of the miracle plays down to comparatively modern times there is little to be recorded save the work of the Nuremberg shoemaker, Hans Sachs (1494–1576), who by virtue of his numerous homely tragedies and comedies has been described as the father of the Ger. popular d. Eng. theatrical companies visited Germany during the XVI. and XVII. cent's, but there was practically no native development until the rise to fame of Lessing (1729–81), who with *Minna von Barnhelm*—regarded as the first Ger. comedy worthy of the name—and his serious plays, *Emilia Galotti* and *Nathan the Wise*, first gave a dramatic lit. to Germany. His lead was followed and developed by the great d's of Goethe (*q.v.*), the historical plays of Schiller (*q.v.*), and the numerous exponents of the *Sturm und Drang* school. In recent times the best-known Ger. dramatists are Sudermann and Hauptmann, both members of the Naturalistic school. See GERMAN EMPIRE, *Literature*.

The **Scandinavian** d. is distinguished by the fine work of the Dan. comic dramatist, Baron Holberg; and by the realistic sociological plays of the Norwegians, Ibsen and Björnson, which, like the dramatic works of the Swede, Strindberg, belong to XIX. cent.

United States.—The first Amer. play to be produced was *The Contrast* (New York, 1786), by Royall Tyler; but the first drama of any importance was John Howard Payne's tragedy, *Brutus, or The Fall of Tarquin*. Translations, adaptations and imitations of French drama formed the bulk of staged plays during the greater part of XIX. cent., though Denman Thompson's *Old Homestead* and plays of the sort depended wholly on national and local conditions which they portrayed with remarkable fidelity. The farces of Charles H. Hayt and scenes from low life by Edward Harrington, though faulty in construction, were also native and independent. *Shore Acres* (1892), a New England drama by James A. Herne, followed but easily surpassed in art the *Old Homestead*; and Herne's later play *Griffith Davenport* (1898) was finer still—though all his plays dealt with the more obvious and plainer sides of human nature. Augustus M. Thomas (*Alabama, The Witching Hour*), Clyde Fitch (*The Climbers*, 1900; *The Girl with the Green Eyes*, 1902), William Vaughan Moody (*The Great Divide*, 1907), Eugene Walter (*The Easiest Way*, 1909), Edward Sheldon (*Salvation Nell*), Percy Mackaye (*Jeanne d'Arc*, 1906), David Belasco, William Gillette and Charles Vlein are all dramatists of ability. Bronson Howard (1842–1908), the greatest of Amer. dramatists, was much influenced by the Fr. school. His *Young Mrs. Winthrop* is a very fine piece of work, and *Saratoga*, an amusing farce, was played in Berlin.

Ward's *History of English Dramatic Literature*; C. Dibdin's *Complete History of the English Stage*; and R. W. Lowe's *Bibliographical Account of English Dramatic Literature*; Wm. Archer, *Playmaking* (1911).

DRAMBURG (50° 30′ N., 15° 45′ E.), town, on Drage, Prussia; cottons, woollens. Pop. 6106.

DRAMMEN (59° 47′ N., 10° 18′ E.), seaport town, Norway; timber; sawmills. Pop. (1910) 24,895.

DRANE, AUGUSTA THEODOSIA (1823–94), Eng. poetess and historical writer; R.C. Dominican nun at Stone (Staffs).

DRAUGHTS, game played with 'draught-men' on a checkered board; supposed to be of very early invention; some such game was played by the ancient Egyptians and Greeks. The game is played between two persons, each having twelve 'men,' or pieces, those of one player being dark, the other light. It is played on a draught-board, divided into sixty-four spaces, alternately light and dark, the pieces being placed on one colour only. Lots are cast for the choice of men; black moves first; and the object of the game is to clear off all the opponent's pieces.

DRAVE, DRAVA (45° 30′ N., 18° 45′ E.), river, Austria-Hungary; rises in Tyrol; flows generally E.; joins Danube 14 miles E. of Eszeb.

DRAVIDIAN, collective Sanskrit name for a very ancient, black-skinned tribal people, inhabiting Southern India, and their various languages. They were settled in India before the arrival of the Aryans, and now number about 58,000,000. They have about twelve languages, which include Tamil, Kanarese, Gōndī, Telugu, Malayalam. See INDIA (*Language*).

DRAWING, expression of form by means of pencil, pen, etc., is conventional, for a sketch of a pail shows an outline non-existent in the object. In pen-drawing merit depends on an artist's appealing to the imagination by using minimum of lines (*e.g.* Phil May in figure-work, Herbert Railton in arch.).

D. taught in schools includes d. and shading from still life—vases, flowers, etc.—in charcoal or B.B. pencil; *free-arm*, d. on blackboard with chalk; *designing* of panels, book-covers, etc., generally associated with colour-work. Technical classes study *machine-d.*, *building construction*, etc., in which mathematical instruments are used. See PERSPECTIVE, ILLUSTRATION.

DRAWING AND QUARTERING, treason penalty imposed in England from XIII. to XIX. cent. The culprit was first hanged, cut down alive, disembowelled, and his entrails burned; he was then beheaded and his body cut in four.

DRAYTON, MICHAEL (1563–1631), Eng. poet; wrote *Polyolbion* (1613), a gazetteer of England in verse, *The Barons' Wars, England's Heroical Epistles, Nymphidia*; wrote 'Agincourt' poem and great sonnet, 'Since there's no help, come let us kiss and part.'

DREAMS, or conscious processes during sleep, are (like sleep itself) not well understood. The savage's theory is usually that during sleep the soul may leave the body or be visited by the souls of others, living or dead; and at a later stage d's are still considered prophetic. Telepathic communication is believed to occur comparatively frequently during sleep. Dream-

less sleep is probably common; nor is the rapidity of d.-processes probably so great as is popularly supposed. Adults often forget their d's on waking, though a casual clue sometimes recalls them; children remember their d's more easily and are more liable to confuse d.-experiences with actual occurrences. D's are most commonly of objects of vision and hearing, though many kinds occur. A rare but important type is that in which the sleeper dreams that he has a d. Usually d's are distinguished as due to (1) central excitation, corresponding, *e.g.*, to memories of interesting objects, and (2) stimulation from visceral and other processes in the body—*e.g.* the 'flying' d. has been attributed to the movements of breathing—and from temperature and other external stimuli. Freud's theory that d's are the expression of a latent wish has attracted much attention: he maintains that the apparently nonsensical sequences so common in d's are really elaborate symbolism corresponding to deep-rooted wishes of which the subject may be totally unaware.

Mitchell, *About Dreaming, Laughing, and Blushing.*

DRED SCOTT CASE.—Dred Scott, a slave of Missouri, was taken to Illinois (1834) and to Minnesota (1836) where slavery was prohibited, and back again to Missouri, 1838. In 1848 he sued for freedom on ground that residence in free territories had removed his status as slave. He was non-suited by the Supreme Court, U.S.A., on ground that slaves or descendants of slaves had no status in Federal Courts.

DREDGING, operation of removing mud, silt, and other deposits from the bottom of harbours, canals, or rivers. The simplest form of dredger is the bag-and-spoon apparatus. This consists of a large spoon-shaped iron hoop, attached to which is a stout leather bag perforated with small holes. The hoop is shaped so as to scoop up into the bag the soft matter at the bottom. A chain is attached to the spoon, which is raised by a winch. For d. on a large scale, as in keeping a clear channel for large ships, or in deepening the bed of a river, the steam dredger is now universally employed. An endless chain, carrying a succession of iron buckets, passes over a frame or ladder, which is adjustable so as to regulate the depth at which the work is carried on. The buckets tear up the material at the bottom, and ascend on the upper side of the frame. When the top is reached they turn over to descend on the under side of the frame, and in so doing they empty their contents into *hoppers*, which are provided with hinged flaps at the bottom, through which the dredgings are discharged when a suitable place of deposit is reached.

Dredgers are also used for excavating and sifting soil from river beds containing gold. D. also includes the operation of dragging the sea bottom for oysters or for shells, plants, and other material for scientific observation. The oyster dredge consists of an iron frame with bag and suspending apparatus. One side of the frame is provided with a scraper, by means of which oysters are lifted and passed into the bag as the dredge is drawn over the sea bottom. The dredges used by naturalists are mostly modifications of the oyster dredge, adapted for use at great depths.

DRENTE, DRENTHE (52° 50′ N., 6° 35′ E.), province of Holland; capital, Assen; bounded N. and N.E. by Groningen, E. by Prussia, S.E. by Hanover, S. and S.W. by Overyssel, W. by Friesland; area, 1030 sq. miles; flat, sandy fenland, overrun by canals for business of peat-digging; more fertile along banks of rivers; stock-rearing; few important centres or industries owing to land and isolated position. Pop. (1910) 176,043.

DRESDEN (51° 2′ N., 13° 43′ E.), capital of Saxony, Germany; beautifully situated on Elbe; *Altstadt* on left bank, *Neustadt* on right bank, connected by fine bridges; educational, sport, and tourist centre; favourite residential resort for foreigners, especially Americans and English; within easy reach of beautiful Saxon Switzerland. Among finest buildings are royal palace with Green Vault (state treasury), Zwinger, a rococo edifice erected by Augustus the Strong (1694–1733) as Court of uncompleted palace (now a museum); magnificent royal opera house (perhaps most popular in world), royal theatre, royal picture-gallery (containing Raphael's *Sistine Madonna* and other masterpieces), Johanneum (rich in Dresden porcelain), Albertinum, and other museums; Rathaus, Frauenkirche, R.C. church, royal Belvedere concert hall on Brühl Terrace (famous promenade along Elbe bank), and royal conservatory of music. Chief manufactures are pianos, sewing-machines, leather wares, etc., and celebrated china ware (Royal factories at Meissen). D. was made capital by Henry the Illustrious, 1270; seat of Albertine line of dukes, 1485; flourished in XVIII. cent. under Augustus I. (the Strong) and Augustus II.; suffered severely during Seven Years War; famous battle of D., 1813, in which Napoleon defeated Allies. Pop. (1910) 546,882.

DRESS, see COSTUME.

DREUX (48° 44′ N., 1° 22′ E.), town, on Blaise, France; ancient *Durocasses*; from among ruins of castle rises the Chapel of St. Louis, burial-place of Orleans family; scene of defeat of Huguenots by Montmorency, 1562; boots and shoes. Pop. 7921.

DREW FAMILY, Amer. actors. **John Drew** (1825–62), b. Dublin, made first appearance in New York, 1846. His wife, **Louisa Lane D.** (1820–97), b. London, made début, Philadelphia, 1828; played Lady Teazle, 1834; most famous rôle was Mrs. Malaprop. Their son, **John** (1852), a comedian, was leading man in Daly's Company (1879); famous rôles, Petruchio, Charles Surface and leading parts in *The Liars, Richard Carvel*, etc.

DREW, SAMUEL (1765–1833), Eng. Wesleyan theologian; wrote *Essay on the Immateriality and Immortality of the Soul*; edit. the *Imperial Magazine.*

DREWENZ (53° 4′ N., 18° 55′ E.), river, Germany, rises near Hohenstein, flows S.W., and enters Vistula.

DREXEL, ANTHONY JOSEPH (1826–93), Amer. banker; founder of Drexel Institute, Philadelphia.

DREYFUS, ALFRED (1859–), Fr. soldier; Alsatian Jew; victim of shameful political plot, 1894, due to Anti-Semitism (*q.v.*); rehabilitated, 1906.

DRIBURG (51° 44′ N., 9° 3′ E.), town, Westphalia, Germany; mineral baths.

DRIFFIELD (54° N., 0° 26′ W.), market town, Yorkshire, England; oil-cake. Pop. (1911) 8680.

DRIFT (geol.), name formerly used to describe earth and rocks deposited on surface of land by icebergs or glaciers in Pleistocene epoch; (mining) direction of course of tunnels between two shafts in a mine.

DRINKING CUPS.—From the earliest times when domestic vessels of any sort were used, it is probable special ones were fashioned for drinking purposes; sometimes natural vessels were used, such as coco-nuts, or large eggs. Among remains of the New Stone and Bronze Ages, vessels have been unearthed which, it is supposed, were intended for drinking. Among the remains of Ægean and ancient Gk. civilisation, many drinking cups, some of beautiful shape, have been discovered—one, the golden cup of Mycenæ, with handles on each side. Endless shapes are found in pottery. In the Middle Ages drinking horns were frequently used, some very large; plain bowls are also found.

The finest examples, however, of cups, are the chalices of the Church; these were often richly ornamented, and of very beautiful workmanship. At the Reformation in England the chalice gave place to simpler communion cups. For common use in the Middle Ages wood was employed. Among the few gold cups that remain is that of the Eng. kings (made about 1380), which, after various adventures, has found its way into the Brit. Museum, being bought for £8000. A big drinking cup was sometimes called a *hanap*, the ancestor of our 'loving cup.' A favourite table ornament in the Middle Ages was a *nef* (Lat. *navis*, ship), the object of which was to hold napkins and cutlery; it became an article of table decoration rather than of use. Among abnormal forms were the

glass 'yard of ale,' and globe-shaped vessels—rather a favourite form in Germany. Tankards were favourites once, and tea and coffee cups are modern; the former at first had no handles.

DRISLER, HENRY (1818-97), Amer. scholar.

DRIVER, SAMUEL ROLLES (1846-), Eng. theologian.

DRIVING, act of impelling, forcing along, keeping an animal or machine in motion. The word is more generally applied to the art of directing horses or other draught animals, and as such dates back to the earliest hist. period. D., as a modern Eng. sport, may be said to have begun about the end of the XVIII. cent. with the introduction of springed carriages and macadamised roads, the latter being named after the inventor, John Loudon Macadam (1756–1836). The first amateur driving club was formed about 1807. The driving of two horses side by side is known as 'double-harness'; one behind the other, 'tandem'; four horses in couples, 'four-in-hand.'

Duke of Beaufort, *Driving* ('Badminton Library').

DROGHEDA (53° 42′ N., 6° 21′ W.), seaport, Ireland, in Louth, Leinster, on river Boyne; industries include milling, brewing, iron-casting, and tanning; manufactures linen and cotton; trades chiefly with Liverpool. Poynings' Laws were enacted here (1494). D. was stormed by Cromwell (1649); surrendered to William III. (1690); near site of *Battle of Boyne*; remains of ancient ecclesiastical buildings and town walls. Pop. (1911) 12,425.

DROIT, legal term meaning certain rights, or dues; *d's of Admiralty* are perquisites formerly belonging to Court of Admiralty, now to the nation; they include treasure, derelict, whales, goods taken from an enemy.

DROITWICH (52° 16′ N., 2° 9′ W.), town, Worcestershire, England; brine springs, 170 ft. deep and producing annually 100,000 tons of salt, have been worked since time of ancient Britons; brine-baths. Pop. (1911) 4146.

DRÔME (44° 40′ N., 5° 10′ E.), department, S.E. France; formed of parts of Dauphiné and Provence; capital, Valence; traversed by numerous streams; surface mountainou , E. and S., partly forested; valley of Rhône fertile; produces wheat, olives, fruit, and wine; minerals include iron, lignite, lead, copper; silk-worm rearing, flour-milling; iron and woollen goods. Area, 2533 sq. miles. Pop. (1911) 290,894.

DROMEDARY, see under CAMEL FAMILY.

DROMORE (54° 25′ N., 6° 9′ W.), market town, County Down, Ireland; cathedral contains tomb of Jeremy Taylor.

DRONE, name given to the large pipes in a bagpipe, each emitting a single note, the melody being supplied by the chanter.

DRONFIELD (53° 18′ N., 1° 28′ W.), town, on Drone, Derbyshire, England; collieries. Pop. (1911) 3943.

DRONTHEIM, see TRONDHJEM.

DROPSY, accumulation of watery fluid in any of the cavities or tissues of the body, most often due to heart or kidney disease. Different terms are applied to d. in different positions: *anasarca*, in subcutaneous tissues; *ascites*, in the abdominal cavity; *hydrothorax*, in the pleural cavities; *hydropericardium*, in the pericardium; *hydrocephalus*, in the cavities of the brain.

DROSTE-HULSHOFF, ANNETTE ELISABETH, COUNTESS VON (1797–1848), Ger. authoress; wrote tales and lyric verse.

DROUAIS, JEAN GERMAIN (1763–88), Fr. artist; religious and hist. subjects.

DROUET, JEAN BAPTISTE (1763–1824), Fr. Revolutionist; instrumental in capture of Louis XVI.

DROWNING, death by submersion in water or some other liquid, due to asphyxia, through the liquid's preventing air going into the lungs. It was in former times a method of capital punishment, dating at least from the Romans, the last occurrence in Britain being the drowning of the Wigtown martyrs (1685). In attempting to rescue a drowning person the rescuer should approach from behind to avoid being grasped if the person struggles, turn him on his back, and then, lying on his own back, the rescuer should swim away, holding the other at arm's length. It may be necessary to overpower the struggling person by holding him under the surface of the water by the nose and chin, or by raising his arms up from behind, with the rescuer's arms under his armpits, so that further struggling is impossible.

Artificial respiration should be attempted at once with a person who is apparently drowned, and should not be discontinued for hours until it is quite certain that resuscitation is impossible. Various methods of artificial respiration have been devised, particularly by Marshall Hall, Silvester, and Howard, but experiments and practice have shown that the method of Professor Schäfer is the best. The apparently drowned person is laid on the ground face downwards, while the person who is operating kneels astride his body at the level of the knees, facing the head. He places his hands one at each side over the lowest ribs, and throws the weight of his body forward to produce firm pressure, so that air and water are driven out of the patient's lungs. Then the operator raises his body, thus relieving the pressure, but keeping his hands in the same position, and this swaying backwards and forwards is repeated from 12 to 15 times a minute. The advantages are that the amount of air exchanged at each respiration is much greater than by any other method, water and mucus very easily find an exit through the mouth, while it is the least fatiguing method to the operator.

DROYSEN, JOHANN GUSTAV (1808–84), Ger. historian; prof. of History, Kiel, Jena, and Berlin; wrote *Geschichte Alexanders des Grossen*, *Geschichte des Hellenismus*, and *Geschichte der preussischen Politik*.

DROZ, ANTOINE GUSTAVE (1832–95), Fr. novelist; author of *Monsieur, Madame et Bébé*, etc.

DROZ, FRANÇOIS-XAVIER JOSEPH (1773–1850), Fr. scientific writer.

DRUG (21° 8′ N., 81° 15′ E.), town and district, Chattisgarh division, Central Provinces, India. Area, 3807 sq. miles. Pop. 628,885.

DRUG, any substance used as a medicine or in the composition of medicines (see PHARMACOLOGY); often particularly meaning a poison; term applied to an unsaleable article—'a drug on the market.'

DRUGGISTS, see PHARMACY.

DRUIDISM, religion of ancient Gaul; also of Britain, where it reached its highest point of development. The Druids practised divination and human sacrifice. The use of the mistletoe in England is a survival of D. Druids wore white robes and a coronet of oak. Modern D. is merely a picturesque revival.

Anwyl, *Celtic Religion* (1906); Rhys, *Celtic Britain* (3rd ed., 1904).

DRUIDS, ORDER OF, masonic society, founded in London (1781), with offshoots now in America, Australia, and Germany.

DRUMCLOG, moor on borders of Ayrshire and Lanarkshire, Scotland; scene of unimportant victory of Covenanters over king's troops under Graham of Claverhouse, 1679.

DRUMMOND, HENRY (1786–1860), Eng. politician; associated with Edward Irving (*q.v.*) in founding Catholic Apostolic Church.

DRUMMOND, HENRY (1851–97), Scot. scientist; wrote *Natural Law in the Spiritual World*, *Ascent of Man*, etc.

DRUMMOND, WILLIAM, OF HAWTHORNDEN (1585–1649), Scot. poet; ed. Edinburgh High School and Univ. Being possessed of ample private means, he devoted his life to verse-writing and mechanical invention. His best work is contained in his sonnets. He was the entertainer (1619), at his home, near Edinburgh, of Ben Jonson; his often-quoted *Conversations* with that great Elizabethan have caused much controversy, and were not intended for publication.

DRUMMOND ISLAND (46° N., 83° 40′ W.), island, Lake Huron, Michigan, U.S.A.

DRUMMOSSIE MOOR, see CULLODEN.

DRUMS, musical instruments, are of three kinds: *Bass* d's, *Kettle* d's, and *Side* d's. They consist of cylinders covered at each end with vellum. The two latter are tuned by means of screws on the rim of the instrument; the first-named is regulated by means of leather braces fixed upon the zig-zag cord round the cylinder.

DRUNKENNESS, see LICENSING LAWS, TEMPERANCE.

DRURY, SIR WILLIAM (1527–79), Eng. soldier and administrator.

DRUSES, an Eastern people, largely of Arab stock, who are traditionally said to have been established in the neighbourhood of Lebanon since the IX. cent. They now inhabit, besides the mountainous parts of Lebanon, parts of Anti-Lebanon and Hauran (Syria), and their numbers are estimated at from 100,000 to 150,000. Their religious system, which is very complex, is a mixture of Muhammadanism, Christianity, Judaism, and other creeds. They believe in one supreme, incomprehensible God, who has revealed Himself to men by numerous incarnations, the last of which was in the person of Hakim Biamrillah (996–1021 A.D.), sixth Fatimite Caliph, who announced himself as the Deity (1016) at Cairo. They are a handsome race; the women are always closely veiled; polygamy does not exist amongst them.

Lord Carnarvon's *Recollections of the Druses*.

DRUSIUS, JOHANNES (1550–1616), Flem. Orientalist.

DRUSUS CÆSAR (d. 23 A.D.), only s. of Emperor Tiberius; poisoned by his wife and her paramour, Sejanus.

DRUSUS, MARCUS LIVIUS, Rom. statesman; tribune with Gaius Gracchus, 122 B.C.; consul, 112; fought in Macedonia. His s., of same name, was tribune (91 B.C.); reformed senate; murdered (91 B.C.).

DRUSUS, NERO CLAUDIUS (38–9 B.C.), s. of Livia, and bro. of Emperor Tiberius; Rom. general; fought in Ger. campaign, 12–9 B.C.; pushed forward frontier by defeating Rhæti; m. Antonia, dau. of M. Antonius; his sons were Emperor Claudius and Germanicus, f. of Emperor Gaius (Caligula).

See *Tiberius the Tyrant*, by Traver (1902).

DRY ROT, disease which attacks timber; caused by damp, or lack of fresh air. It is due to a fungus which eventually reduces the wood to powder.

DRYADES (or Dryads), in classical myth., nymphs associated with woods and trees.

DRYANDER, JONAS (1748–1810), Swed. botanist; one of the founders of Linnæan Society.

DRYBURGH ABBEY, Præmonstratensian abbey, on Tweed, near Melrose, Berwickshire, Scotland; founded (probably) 1150; burnt by Edward II., 1322; restored but finally destroyed, 1545; burial-place of Sir Walter Scott.

DRYDEN, JOHN (1631–1700), Eng. poet and dramatist; b. Aldwinkle; s. of a Northamptonshire rector; ed. Westminster, and Trinity Coll., Cambridge; m. dau. of Earl of Berkshire; Poet Laureate and Historiographer Royal (1670). D. was a voluminous dramatist during the greater part of his life, but much of his dramatic work is characterised by the gross immortality of his age; he wrote Heroic plays in rhyme, and later adopted blank verse, as in his best-known play, *All for Love*. D. began his career as poet with *Heroic Stanzas on the Death of Oliver Cromwell* (1658), followed by *Astræa Redux* (1660), in celebration of the Restoration. One of his strongest poems, *Annus Mirabilis* (commemorating the Fire of London and Dutch War), appeared in 1667; *Absalom and Achitophel* (political satire), in 1681; *The Medal*, in 1682; *MacFlecknoe* (satire on the poet Shadwell), in the same year; *Religio Laici* (religion of a layman), in 1683; and *The Hind and the Panther* (defence of Church of Rome), in 1687. The strong, vigorous English of these poems, their keen invective, and satirical quality, give D. very high rank amongst Eng. poets. His poems, like his earlier plays, popularised 'heroic verse' (rhymed decasyllabic couplets) as opposed to 'blank verse.' The lyrical poems, *Ode for St. Cecilia's Day*, and *Alexander's Feast*, written in his later years, served but to increase his fame. Nor must his *Essay on Dramatic Poetry* (1668) be forgotten; it is valuable for its critical qualities and as a masterly piece of prose. D. rescued poetry from the bombast of Elizabethan decadent poets, prose from the prolixity and ornateness of writers like Milton and Clarendon; he was one of the great pioneers of Eng. criticism. Saintsbury, *Life*.

DRYING-MACHINE, apparatus for drying fabrics. A common type used in laundries is a perforated cylinder revolving within a metal cylinder at a great rate; by centrifugal force the water flies from inside to outside cylinder. Cotton may be dried by passing over rollers heated internally by steam, but linen is marred by this process.

DRYOPHIS, WHIP-SNAKE, genus of tree-dwelling snakes; not venomous; native of India, Africa, America.

DRY-POINT, see ETCHING.

DUBARRY, COMTESSE, see BARRY, COMTESSE DU.

DU BARTAS, GUILLAUME DE SALUSTE, see BARTAS.

DU BELLAY, GUILLAUME, see BELLAY, GUILLAUME DU.

DU BELLAY, JEAN, see under BELLAY, GUILLAUME DU.

DU BELLAY, JOACHIM, see BELLAY, JOACHIM DU.

DU BOIS-REYMOND, EMIL (1818–96), Ger. physiologist; prof. of Physiology at Berlin (1858); made many important researches in physiology, particularly on animal electricity.

DU CANGE, CHARLES DUFRESNE (1610–88), Fr. historian and scholar; wrote valuable *Glossarium ad Scriptores mediæ et infimæ latinitatis* (1678) and *Glossarium ad Scriptores mediæ et infimæ græcitatis* (1688).

DU CHAILLU, PAUL BELLONI, see CHAILLU, PAUL BELLONI DU.

DU CHÂTELET-LOMONT, MARQUISE, see VOLTAIRE.

DU CHESNE, ANDRÉ (1584–1640), Fr. historian and geographer.

DU GUESCLIN, BERTRAND (*c.* 1320–80), constable of France; served in many campaigns, 1341 onwards; at first for Charles of Blois, then for Fr. king; fought against English in France from 1356; constable, 1370; recovered from English Poitou, Auvergne, and Guienne; d. in laying siege to Château-neuf-Randon.

DU MARSAIS, CÉSAR CHESNEAU (1676–1756), Fr. philologist.

DU MAURIER, GEORGE LOUIS (1834–96), Eng. artist and novelist; was an analytical chemist in early life, but later adopted the profession of art, achieving fame as a *Punch* artist and book-illustrator. He wrote three novels: *Peter Ibbetson*, *Trilby*, and *The Martian*—the second and most popular of which was successfully dramatised by Paul Potter. Sons are LIEUT.-COLONEL GUY LOUIS BUSSON DU M. (1865–), author of play *An Englishman's Home*, and GERALD DU M. (1873–), actor-manager.

DU PIN, LOUIS ELLIES (1657–1719), Fr. Catholic divine; wrote *Bibliothèque universelle de tous les auteurs ecclésiastiques*; projected scheme for union with Anglican and Gk. churches.

DU PONT DE NEMOURS, PIERRE SAMUEL (1739–1817), Fr. statesman; served under Turgot; pres. of Constituent Assembly, 1790; afterwards on king's side; narrowly escaped execution; went to U.S., 1799; returned to France, 1802; finally to America, 1815.

DU PRÉ, JULES (1812–89), Fr. landscape artist.

DU RYER, PIERRE (1606–58), Fr. playwright; his best-known works are *Alcionée* (1638) and *Scévole* (*c.* 1645).

DU VAIR, GUILLAUME (1555–1621), Fr. political

lawyer and writer; b. Paris; employed on mission to England, 1596; Keeper of the Seals, 1621; his writings, which influenced Fr. style, include *La Philosophie morale de Stoïques* and *De l'éloquence française*.

DU VERGIER DE HAURANNE, JEAN (1581–1643), Fr. ecclesiastic; pioneer of the Jansenist revival; author of *Petrus Aurelius*.

DUALISM, any theory, philosophical or theological, based on two opposite principles. In metaphysics it means co-eternity of mind and matter; in theol. that there are good and evil gods, specially developed in Zoroastrianism (*q.v.*) and Manichæism (*q.v.*), whence it influenced later Judaism and Christianity; difficulty of reconciling evil with omnipotence of a good God tends to dualism. D. is the opposite of Monism (*q.v.*).

DUALLA, negro people of Kamerun district, W. Africa; noted for fine physique.

DUBAWNT.—(1) Lake, Canada (63° N., 101° 30′ W.); discovered, 1770. (2) River, Canada, rising 60° 15′ N., 104° 20′ W., and flowing through D. Lake into Hudson Bay; length, 750 miles.

DUBBO (32° 21′ S., 148° 39′ E.), town, New South Wales, Australia; sawmills. Pop. 4000.

DUBITZA (45° 11′ N., 16° 41′ E.), town, Bosnia; fortified. Pop. c. 3000.

DUBLIN (53° 20′ N., 6° 15′ W.), maritime county, Ireland, in Leinster; smallest Irish county except Louth and Carlow; area, 342 sq. miles. Special features are: promontory of Howth; beautiful bays of Dublin and Killiney; islands of Dalkey, Lambay, Ireland's Eye, and many islets, including Inispatrick (supposed landing-place of St. Patrick). N. is mostly level and occasionally boggy; S. is mountainous, with magnificent ravines, moor, and marshland. Principal river is Liffey. Chief towns are Dublin (*q.v.*), Kingstown, important port, Pembroke, Balbriggan, and Blackrock. Industries outside D. city include salmon and other fisheries; agriculture, dairy-farming; quarrying; lead and copper mines. Pop. (1911) 476,909.

F. E. Ball, *History of the County of Dublin*; D'Alton, *History of Dublin County*.

DUBLIN (53° 21′ N., 6° 16′ W.), city, seaport, parliamentary borough, capital of Dublin county and of Ireland, beautifully situated at mouth of Liffey on D. Bay; well-laid-out city, built mostly on flat ground, with spacious streets, squares, and parks, and many handsome buildings. Principal business streets are in centre; Sackville Street, most important thoroughfare, contains some fine buildings, including Post Office, Nelson Pillar, and O'Connell's monument; finest squares are St. Stephen's Green, Merrion Sq., Fitzwilliam Sq., and Rutland Sq.; most notable buildings include Bank of Ireland (formerly Houses of Parliament), 'Four Courts,' Custom House, National Art Gallery, Museum of Natural History, Science and Arts Museums, National Library, Leinster House (once town house of Duke of Leinster, now seat of Royal Dublin Soc.), city hall, Rotunda, and many monuments and statues; D. Castle is unimposing structure; most interesting churches are Prot. cathedrals of Christ Church (XI. cent.) and St. Patrick (XII. cent.).

D. contains Dublin Univ. or Trinity Coll., founded 1591, by Elizabeth, and is seat of National Univ., founded 1909. Residential parts lie mostly in S.E.; Phœnix Park in W. contains viceregal residence, barracks, military school, racecourse, zoological gardens, and Wellington monument; principal suburbs are Kingstown, Pembroke, Rathmines, Clontarf, Dalkey, and Killiney; Howth, Sutton, Malahide, and Bray are popular watering-places in neighbourhood. River Liffey is crossed by 12 bridges within limits of 'Circular Road'; banks lined with quays; near mouth of river are extensive docks.

Christianity was introduced by St. Patrick, c. 450, but little known of history of D. till IX. cent. when captured by Danes; city more or less in hands of Danes till XII. century. D. is of little commercial importance; manufactures porter, whisky, and poplin; has foundries, water-works, shipbuilding yards, and considerable export trade in agricultural implements. Pop. (1911) 309,272; including suburbs, 403,030.

DÜBNER, JOHANN FRIEDRICH (1802–67), Ger. scholar.

DUBOIS (41° 7′ N., 78° 46′ W.), town, Pennsylvania, U.S.A.; coal and lumber centre; ironworks. Pop. (1910) 12,623.

DUBOIS, GUILLAUME (1656–1723), Fr. cardinal; tutor to Duc de Chartres, 1687; sec., 1701; minister to him as Regent, 1715; formed with England and Holland Triple Alliance against Spain; unprincipled as statesman.

DUBOIS, JEAN ANTOINE (1765–1848), Fr. Catholic missionary in India; possessed great insight and sympathy with Hindus; wrote valuable works on Ind. life and religion.

DUBOIS, PAUL (1829–1905), Fr. artist and sculptor; statue of *Joan of Arc*.

DUBOIS, PIERRE (fl. 1300), Fr. lawyer and publicist; supported Philip the Fair in ecclesiastical conflict with Boniface VIII.

DUBOIS, THÉODORE (1837–), Fr. composer; Director of Paris Conservatoire; operas, ballets, overtures, masses, etc.

DUBOIS DE CRANCÉ, EDMOND LOUIS ALEXIS (1747–1814), Fr. Revolutionist; deputy to states-general, 1789; pres. of Convention, 1793; minister of war, 1799; opposed to Empire.

DUBOS, JEAN-BAPTISTE (1670–1742), Fr. author; wrote *L'Histoire de la Ligue de Cambray*, etc.

DUBOWKA (49° 8′ N., 44° 48′ E.), town, Saratov, Russia. Pop. 16,370.

DUBUQUE (42° 31′ N., 90° 41′ W.), chief city of Dubuque County, Iowa, U.S.A., on Mississippi; seat of Catholic and Protestant Episcopal bp's; contains Catholic cathedral, Iowa institute; institute of science and arts; various theological seminaries; lead and zinc mines; extensive manufactures of machinery, etc. Pop. (1910) 38,494.

DUCAMP, MAXIME (1822–94), Fr. author and traveller; wrote history of the Commune.

DUCANGE, VICTOR HENRY JOSEPH (1783–1833), Fr. dramatist and novelist.

DUCAS, Byzantine family of eminence IX. to XII. cent's; one member, Constantine X. (1059), was Emperor of the East.

DUCAS, XV.-cent. Byzantine historian.

DUCASSE, PIERRE EMMANUEL ALBERT, BARON (1813–93), Fr. historian.

DUCAT, coin, of gold or silver, originally struck by Duke of Apulia, and current in Europe until XIX. cent.; Austria-Hungary retains the d. (9s. 4d.).

DUCHENNE, GUILLAUME BENJAMIN (1806–75), Fr. physician; celebrated for application of electricity in muscular and nervous diseases, and author of works on use of electricity.

DUCHESNE, LOUIS MARIE (1843–), Fr. ecclesiastic and scholar; author of famous works on early history of Christianity.

DUCIS, JEAN FRANÇOIS (1733–1816), Fr. dramatist; tragedies; also adapted Shakespeare.

DUCK FAMILY (*Anatidæ*), a family containing over 200 species of birds, comprising swans, geese, and ducks, and found in all parts of the world. They are typical swimming birds with webbed feet and short legs set far back on long bodies, so that they swim strongly, but walk on land with stilted, awkward gait. Their wings are strong and carry their heavy bodies with great speed through the air. The bill is characteristic: flattened, covered with soft, sensitive skin, and fringed by a series of fine, tooth-like plates, which interlock and form a sieve through which the mud wherein they seek their food is strained. They live upon worms, molluscs, and aquatic insects; and although they are found most frequently in flocks near rivers and lakes, in winter they betake themselves to the kindlier seashore. Many are migratory, so that of forty-two British species, only four are residents, while sixteen are

uncertain visitors and twenty-two are regular visitors, many of them staying to breed. Some of these and their relatives are mentioned below.

The **Swans** are familiar to all on account of the graceful so-called mute swan (*Cygnus olor*), distinguished by the black tubercle or 'berry' between its eyes. It is almost a domesticated bird, common on some rivers and lakes, but occasionally it reverts to a semi-wild state. Less graceful is the WILD SWAN or WHOOPER (*C. cygnus*), which carries its neck straight as it swims, a winter visitor to Britain. Almost as familiar as these, on account of its presence in ornamental parks, is the BLACK SWAN (*Chenopsis atrata*) of Australia.

Amongst the **Geese**, all of which are winter visitors to British shores, many be mentioned the GREY-LAG GOOSE (*Anser cinereus*), which still breeds in summer in the north of Scotland and the Hebrides, and is the probable ancestor of DOMESTICATED GEESE; the black-headed BRENT GOOSE (*Brenta brenta*); and the Greenland white-faced BERNICLE GOOSE (*Bernicla leucopsis*).

The true ducks, the male of which is known as a drake, are smaller, with shorter necks and more varied plumage than the swans and geese, and may be divided into sea- or diving-ducks and non-diving-ducks. The former, whose names indicate their habit, include many winter visitors, such as the POCHARD or DUNBIRD (*Fuligula ferina*), with dense black collar and breast, nearly related to the North American CANVAS-BACKED DUCK (*Aythya vallisneria*); the SCAUP (*Fuligula marila*); the GOLDEN EYE (*Clangula clangula*); the EIDER (*Somateria mollissima*), which breeds in north Scotland, as does the COMMON SCOTER (*Œdemia nigra*), while the MERGANSER (*Mergus merganser*) nests also in Ireland. Amongst the non-diving-ducks are British residents, such as the SHELD-DUCK (*Tadorna cornuta*), the TEAL (*Nettium crecca*), smallest of British ducks, and the 'WILD DUCK' or MALLARD (*Anas boscas*); best known as winter visitors are the GADWALL (*Chaulelasmus streperus*), the WIDGEON (*Mareca penclope*), and the SHOVELLER or 'SPOONBILL' (*Spatula clypeata*), and a solitary rare spring visitor is the GARGANEY (*Querquedula querquedula*).

DUCKBILL, DUCKMOLE, see ORNITHORHYNCHUS.

DUCKING STOOL, chair fixed on end of see-saw beam, projected over pond, in which scolding women, alleged witches, and others were 'ducked' by way of punishment; used in England XVII. to XIX. cent.

DUCK-WEED, minute perennial plant (*Lemna minor*) with long roots; floats on still water.

DUCKWORTH, SIR JOHN THOMAS (1748–1817), Brit. admiral; commanded naval brigade at *Minorca*, 1798; won *San Domingo*, 1804; criticised for treatment of Turks.

DUCLAUX, MARY F. (1856–), Eng. poet; *Collected Poems* (1902); literary and biographical studies; formerly wrote under maiden name, Robinson, and later as Madame Darmesteter.

DUCLOS, CHARLES PINOT (1704–72), Fr. historian; wrote *History of Louis XI.*, etc.

DUCOS, PIERRE ROGER (1754–1816), Fr. politician; member of Directory; gained high positions under Empire, but eventually turned against Napoleon.

DUCTILITY, power of extension, differing from elasticity in that latter implies extension and resumption of original position; most metals are ductile and can be drawn into wires.

DUCTLESS GLANDS, inclusive term applied to a number of glandular organs in the body, the secretions of which are not conveyed away by ducts or tubes, but by the blood or lymph vessels draining them. See SPLEEN, THYROID GLAND, THYMUS GLAND.

DUDERSTADT (51° 31′ N., 10° 15′ E.), town, Hanover, Germany; has number of interesting churches; cottons, woollens manufactured. Pop. 5795.

DUDEVANT, MADAME, see SAND, GEORGE.

DUDLEY (52° 31′ N., 2° 5′ W.), market town, Worcestershire and Staffordshire, England; in midst of 'Black country'; has remains of castle supposed to date from VIII. cent.; important seat of iron trade; extensive coal-fields; limestone quarries. Pop. (1911) 51,092.

DUDLEY, BARONY AND EARLDOM OF.—1st baron created (1342); the grand-dau. of 9th baron married into Ward family, and in 1763 John Ward became Viscount D. His grandson became Earl D. and the title died with him. A kinsman was made Earl D. in 1860, and the 2nd earl of this line, William Humble Ward (1867–), was Lord-Lieut. of Ireland (1902–6), and Gov.-Gen. of Australia (1908–11). DUD DUDLEY (1599–1684), who first used coal instead of wood in iron-making, was natural s. of 9th baron.

DUDLEY, EDMUND (*c.* 1462–1510), Speaker of House of Commons; principal minister of Henry VII.; notorious for extortions along with Empson (*q.v.*); executed.

DUDLEY, ROBERT, see LEICESTER, EARL OF.

DUDLEY, SIR ROBERT (1573–1649), titular Duke of Northumberland and Earl of Warwick; s. of Robert D., Earl of Leicester; deserted his wife and married abroad; died in Italy. Wrote *Arcano dell mare*, a book on naval matters.

DUDLEY, THOMAS (1576–1853), Amer. colonist, of same family as Earl of Leicester; became extreme Puritan; went to America, 1630; deputy gov. of Massachusetts several times; helped to found Harvard Coll.; sternly opposed religious toleration; father of JOSEPH DUDLEY (1647–1720), gov. of Massachusetts.

DUDO (fl. *c.* 1030), Norman historian.

DUDWEILER (49° 17′ N., 7° 2′ E.), town, Rhine Province, Prussia; coal mines and ironworks. Pop. 19,431.

DUELS.—The *duel* as it is in modern times did not exist in ancient Greece and Rome. In the Middle Ages trial by compurgation of oath was developed, and form that judicial combat. The modern d. differs from this latter in that it has no elaborate sanction of law or religion. Duelling seems to have developed first in France, and more widely there than in any other country. Frequent attempts were made by legislature to check it (*e.g.* by Richelieu), but without avail. In the years 1601–9, 2000 men of gentle family are said to have met their death in duelling. At the time of the Revolution it was hoped by some that this would disappear together with other ancient abuses, but though checked for a time it soon 'came in' again, and d's still take place in France.

There were few d's in England before the early XVII. cent. Several famous d's took place in England in the first half of the XIX. cent. in which, amongst others, the Duke of York, Lord Byron, and the Duke of Wellington took part. The latter said once in reference to a d. between two officers that 'the probability of the Hussars having a fight or two' was 'a matter of no consequence'; 172 d's (of which 91 proved fatal to one of the combatants) were fought during the reign of George III. In the 'duelling' amongst Ger. students precautions are taken to protect all vital parts of the body. But real duelling still sometimes takes place in the Ger. army.

Millingen, *History of Duelling* (1841); Thimm, *Bibliography of Fencing and Duelling* (1896).

DUFAURE, JULES ARMAND STANISLAS (1798–1881), Fr. statesman.

DUFF, ALEXANDER (1806–78), Scot. missionary; went out to India, 1829; won many converts, introducing Eng. Bible and Western civilisation; returned home at intervals, permanently, 1864, devoting himself to religious work; prof. of Evangelistic Theology in Free Church of Scotland, 1867.

DUFFERIN AND AVA, MARQUIS OF, FREDERICK TEMPLE HAMILTON TEMPLE BLACKWOOD (1826–1902), Brit. diplomatist; succ. his f. as Baron D., 1841; commissioner in Syria, 1860–61; Under-Sec. of State for India, 1864–66; chancellor of duchy of Lancaster, 1868–72; cr. Earl of D., 1871; gov.-gen. of Canada, 1872; ambassador to Russia, 1879; Turkey, 1881; commissioner in Egypt, 1882–83; Viceroy of India, 1884–88; cr.

Marquis of D. and A., 1888; ambassador to Rome, 1888; Paris, 1892–96; a gifted diplomat.

Life, by Sir Alfred Lyell (1905).

DUFF-GORDON, LADY LUCIE (1821–69), Eng. authoress; *Letters from the Cape*, etc., and numerous translations.

DUFFTOWN (57° 27′ N., 3° 8′ W.), town, health-resort, Banffshire, Scotland; lime-works and distilleries.

DUFFY, SIR CHARLES (1816–1903), Irish author and politician; member of 'Young Ireland' party; subsequently emigrated to Australia, and became Prime Minister of Victoria; edit. *Ballad Poetry of Ireland*, and wrote numerous original works.

DUFOUR, WILHELM HEINRICH (1787–1875), Swiss general; instructor of Louis Napoleon; completed trigonometrical survey of Switzerland; repressed revolt of Catholic cantons, 1847.

DUFRESNY, CHARLES (1648–1724), Fr. dramatist; wrote lively comedies; patronised by Louis XIV.

DUGAZON, JEAN HENRI (1746–1809), Fr. comedian.

DUGDALE, SIR WILLIAM (1605–86), Eng. antiquary; author of *Monasticon Anglicanum*.

DUGONG (*Halicore*), herbivorous mammal inhabiting Red Sea, Indian Ocean, and N. Australian waters; length, 5–15 ft.; d.-fishing practised on Queensland coast; blubber made into oil.

DUGUAY-TROUIN, RENÉ (1673–1736), Fr. admiral; harried coasts of England and Ireland; celebrated for amazing daring in attacks on Eng. and Dutch ships; captured Rio Janeiro (1711).

DUHAMEL, JEAN BAPTISTE (1624–1706), Fr. natural philosopher; author of scientific works.

DUHAMEL DU MONCEAU, HENRI LOUIS (1700–82), Fr. scientist; made discoveries in science, chiefly in bot.; made improvements in Fr. navy.

DÜHRING, EUGEN KARL (1833–1901), Ger. thinker; became totally blind; works on philosophy and economy; in many ways follower of Comte; patriotic and materialistic.

DUIGENAN, PATRICK (1735–1816), Irish politician and lawyer; opposed Grattan and Catholic emancipation.

DUIKER, term including various varieties of African antelopes; also used of small agile animal found in S. Africa.

DUILIUS, GAIUS (fl. 260 B.C.), Rom. consul; performed brilliant services against Carthagenians.

DUISBURG (51° 26′ N., 6° 45′ E.), manufacturing town and port, Rhine Province, Prussia; at confluence of Rhine and Ruhr: ironworks. Pop. (1910) 229,478.

DUKAS, PAUL (1865–), French musical composer of advanced school. Wrote *Ariani et Barbe Bleu* (1907), a symphony, etc.

DUKE (Lat. *dux*, leader), now highest title in Eng. peerage. Elsewhere than in England, d's were generally sovereign princes. Edward, the Black Prince, cr. D. of Cornwall, 1337, was first Eng. d. The premier Eng. dukedom is Norfolk. A d's coronet has eight strawberry leaves. D's are formally addressed as *His Grace the D. of*, etc.

DUKE OF EXETER'S DAUGHTER, colloquial name for instrument of torture similar to rack, dating from XV. century.

DUKER, CARL ANDREAS (1670–1752), Ger. scholar.

DUKERIES, district, N.W. Nottinghamshire, England; so called from number of ducal mansions in neighbourhood.

DUKES, LEOPOLD (1810–91), Hungarian Hebrew scholar.

DUKINFIELD (53° 30′ N., 2° 5′ W.), town, Cheshire, England; now included in parliamentary borough of Stalybridge; extensive collieries.

DULCIMER, musical instrument, derived from Jewish psaltery, consists of wooden frame, with strings stretched across, which are struck with hammer.

DULCIGNO (41° 54′ N., 19° 12′ E.), small seaport town, Montenegro, on Adriatic; fishing; boat-building. Pop. 5000.

DULKEN (51° 16′ N., 6° 21′ E.), town, Prussia, in Rhine province; iron foundries. Pop. 10,033.

DULONG, PIERRE LOUIS (1785–1838), Fr. scientist; made valuable researches in chem. and physics; prof. of Physics (1820) and director (1830) of the Polytechnic School, Paris.

DULUTH (46° 48′ N., 92° 15′ W.), city, capital of St. Louis County, Minnesota, U.S.A.; at W. end of Lake Superior, at head of navigation on Great Lakes; terminus of several railways; fine natural harbour; extensive dockyards; large trade in grain, iron-ores, lumber; outlet to important mineral area; iron and steel manufactures; seat of Prot. Episcopal and R.C. bp's. Pop. (1910) 78,466.

DULWICH (51° 27′ N., 0° 6′ W.), suburb of London, in borough of Camberwell; D. Coll. (founded 1619 by Edward Alleyn, and comprising two schools), contains celebrated collection of pictures. Pop. (1911) D. division of Camberwell, 101,737.

DUMA, see RUSSIA (*History*).

DUMAGUETE (9° 20′ N., 122° 30′ E.), town, Negros, Philippine Islands; on S.E. coast; district fertile and agricultural. Pop. 14,000.

DUMANJUG (10° 4′ N., 123° 26′ E.), town, port, at mouth of Dumanjug, Cebú, Philippine Islands; important coast trade. Pop. 30,000.

DUMAS, ALEXANDRE (1802–70), Fr. novelist and dramatist; b. Villers Cotterets (Aisne); s. of a general; grandson of a marquis and Haitian negress. His early years were spent in poverty, and he received little education. He came to Paris, received an appointment in the bureau of the Duke of Orleans, and took to playwriting. His first play, *Henry III. and his Court* (1829), started the Fr. Romantic Drama. It was followed by many more, notably *Anthony* and *The Tour de Nesle*. In 1836 he began writing Fr. history in a series of novels, of which the most famous are *The Three Musketeers* (1844), *Twenty Years After* (1845), and *Margaret of Valois* (1845); in all his many novels D. was helped by collaborators, with whom he afterwards quarrelled. Besides hist. novels, he wrote his masterpiece, *The Count of Monte Cristo*. After making and giving away several fortunes, he d. a poor man. His work is notable for its imagination, exuberant vitality, and chivalric spirit.

Life, by Fitzgerald (1873), Davidson (1902), Spurr (1902).

DUMAS, ALEXANDRE, *fils* (1824–95), Fr. novelist and dramatist; natural s. of Alexandre D. and a dressmaker. He achieved his first success with a novel, *La Dame aux Camélias* (1848), which he afterwards dramatised. Other famous works are *Le Demi-Monde* and *L'Affaire Clémenceau*. His work is didactic, treating mainly of the 'sex question.' As a dramatist he is great in dialogue and dramatic situation alike.

DUMAS, GUILLAUME MATHIEU, COUNT (1753–1837), Fr. general; fought in Turkey, Holland, Revolutionary campaigns, and under Napoleon and Louis XVIII.; wrote *Précis des événements militaires*.

DUMAS, JEAN BAPTISTE ANDRÉ (1800–84), Fr. chemist and politician; made many important researches and pub. several new theories in chem.; was Minister of Agriculture (1850–51) and a senator.

DUMBARTON (55° 57′ N., 4° 34′ W.), town, capital of Dumbartonshire, Scotland; parliamentary and royal burgh; rising seaport; old capital of Strathclyde; has historic castle on rock (250 ft. high) on banks of Clyde; one of four fortresses maintained in terms of Articles of Union; shipbuilding yards. Pop. (1911) 21,989.

DUMBARTONSHIRE (56° N., 4° 40′ W.), maritime county, on Firth of Clyde, W. Scotland; area, 267 sq. miles; chief towns, Dumbarton, Clydebank, Helensburgh. Northern district round Loch Lomond and Loch Long is mountainous, with grand scenery; central region less wild; southern

district, with Clyde seaboard, Vale of Leven, and main portion of county is rich and pleasantly varied; favourite summer resorts. Agriculture is improving; extensive sheep-farming; industries include cotton works, calico-printing, bleaching, dyeing, paper-making, ship-building, fisheries, coal-mining. D. (once part of Lennox) became united to Scot. kingdom, 843; scene of much warfare from Rom. invasion onwards. Pop. (1911) 139,831.

DUM-DUM, (22° 38′ N., 88° 28′ E.), town and cantonment, Paraganas district, Bengal, India; ammunition factory; gives name to *Dum-dum* or soft-nosed bullet, which expands on striking. Pop. 11,000.

DUMESNIL, MARIE FRANÇOISE (1713–1803), Fr. actress.

DUMFRIES (55° 4′ N., 3° 36′ W.), picturesque town, on Nith, S.W. border of Dumfriesshire, Scotland; capital of county; royal and parliamentary burgh; seaport of little importance since era of railways; cattle markets; manufactures tweeds and hosiery; assize town for S.W. counties, and practically the metropolis of a great part of southern Scotland; associated with Robert Burns (*q.v.*). Pop. (1911) 16,062.

DUMFRIESSHIRE (55° 10′ N., 3° 30′ W.), border county, Scotland, bounded on S. by Solway Firth; length, 21–46½ miles; breadth, 13–32 miles; area, 1103 sq. miles. Boundary line consists mainly of mountainous watersheds, summits of which include Hartfell (2651 ft.), Queensberry (2285), Blacklorg (2231). Northern region constitutes part of Southern Highlands of Scotland. Southern region is divided into three large basins, through which run the Nith, Annan, and Esk. D. is an agricultural and pastoral county. Commerce is mostly conducted through Dumfries (*q.v.*), the capital. Manufactures include hosiery (in Thornhill and Lochmaben) and tweeds; Langholm manufactures coarse linen; woollen fabrics are made at Sanquhar and Moffat. Pop. (1911) 72,824.

Maxwell, *History of Dumfriesshire* (1896).

DÜMICHEN, JOHANNES (1833–94), Ger. Egyptologist.

DÜMMLER, ERNST LUDWIG (1830–1902), Ger. historian; wrote chiefly on Middle Ages.

DUMONT, ANDRÉ HUBERT (1809–57), Belg. geologist and mineralogist; prof. of Geol. and rector of Liége Univ.; made a valuable geological map of Europe.

DUMONT, FRANÇOIS (1688–1726), Fr. sculptor.

DUMONT, FRANÇOIS (1751–1831), Fr. miniature artist; patronised by Louis XVI. and other kings.

DUMONT, JACQUES (1701–81), Fr. artist; bro. of above.

DUMONT, JEAN (d. 1726), Fr. author and publicist.

DUMONT, PIERRE ÉTIENNE LOUIS (1759–1829), Fr. author; admirer of Jeremy Bentham, whose works he edited.

DUMONT D'URVILLE, JULES SÉBASTIEN CÉSAR (1790–1842), Fr. navigator; went voyage in S. Atlantic, 1826–29; brought deposed Charles X. to England, 1830; voyage in S. Polar regions, 1837–40.

DUMOULIN, CHARLES (1500–66), Fr. jurist and legal writer.

DUMOURIEZ, CHARLES FRANÇOIS (1739–1823), Fr. general; fought in Seven Years War, and then in Revolution campaigns; Minister of Foreign Affairs, 1792; defeated Prussians at *Valmy* and Austrians at *Jemappes*, 1792; lived latterly in England.

DUNBAR (56° N., 2° 31′ W.), royal burgh and seaport on N.E. coast of Haddington, Scotland; a place of historic interest, with ancient ruined castle on rocks projecting into the sea, and before introduction of gunpowder considered impregnable. Near D. Cromwell defeated Scots, 1650. D. has a beautiful seashore, well cultivated land, and is a popular holiday resort. Pop. (1911) 3346.

DUNBAR, GEORGE (1774–1851), Scot. scholar; compiled noted Gk. lexicon.

DUNBAR, PAUL LAURENCE (1872–1906), Amer. negro poet and novelist.

DUNBAR, WILLIAM (*c.* 1465–1530), Scot. poet of Chaucerian school. His *Golden Target* and *The Thistle and the Rose* show the allegory-work of the time, but in *The Twa Maryit Wemen and the Wedo*, *The Dance of the Seven Deadly Sins*, and *Kind Kyttok* he is far ahead of the Chaucerians in imagination and realism. These qualities along with his whimsical humour and biting satire make him perhaps the greatest Scot. poet. Works edit. by Scot. Text Soc. (1893).

DUNBIRD, see under DUCK FAMILY.

DUNBLANE (56° 12′ N., 3° 57′ W.), market town, on Allan, Perthshire, Scotland; ancient cathedral, recently restored, serves as parish church; associated with the name of Robert Leighton, who was bp., 1661–70; mineral spring; large hydropathic; woollen mill. Pop. (1911) 2978.

DUNCAN I. (d. 1040), king of Scots; succ. Malcolm II. (1034); murdered by Macbeth.

DUNCAN II. (d. 1094), king of Scots; s. of Malcolm III., and grandson of above.

DUNCAN, ADAM, 1st Viscount (1731–1804), Brit. naval officer; b. Scotland; entered navy, 1746; commander-in-chief of North Sea fleet, 1795; won great victory of *Camperdown*, 1797, and cr. Viscount D. of Camperdown; his s. received earldom.

DUNCAN, PETER MARTIN (1824–91), Eng. physician and geologist; prof. of Geol. at King's Coll., London (1870); conducted researches on fossil corals.

DUNCAN, THOMAS (1807–45), Scot. artist; portraits and hist. subjects.

DUNCANSBY HEAD (58° 39′ N., 3° 1′ W.), in Caithness; most north-easterly point of Scotland.

DUNCE, synonym for blockhead, derived from Duns Scotus (*c.* 1300), whose followers were nicknamed 'Duns' by those opposed to his methods.

DUNCKER, MAXIMILIAN WOLFGANG (1811–86), Ger. politician and historian.

DUNCKLEY, HENRY (1823–96), Eng. journalist; edit. *Manchester Examiner*.

DUNCOMBE, SIR CHARLES (1648–1711), Eng. politician; Lord Mayor of London (1709).

DUNCOMBE, THOMAS SLINGSBY (1796–1861), Eng. politician.

DUNDALK (54° N., 6° 24′ W.), seaport, Ireland, capital of Louth, at mouth of Castleton, Dundalk Bay; grain, dairy produce, brewing and distilling; here Irish and English defeated Scots under Edward Bruce, 1318. Pop. (1911) 13,128.

DUNDAS.—(1) (43° 17′ N., 80° 4′ W.) Town, Ontario, Canada. Pop. *c.* 3700. (2) (55° 58′ N., 3° 25′ W.) Castle, Linlithgowshire, Scotland. (3) (76° 5′ N., 95° 2′ W.) Island, Brit. N. America.—**D. Strait** (11° 20′ S., 131° 45′ E.), strait, N. Australia. **D. Mountain** (31° 5′ S., 150° 42′ E.), mountain, New South Wales, Australia.

DUNDEE (56° 27′ N., 2° 59′ W.), third largest city in Scotland; royal burgh, great seat of manufacture, and extensive seaport, Forfarshire, on N. side of Firth of Tay, at end of Tay Bridge. D. is rich in hist. associations, but few buildings of antiquarian interest remain. Univ. Coll. is incorporated with St. Andrews Univ.; excellent schools and other institutions. The harbour is one of the finest, safest, and most convenient in U.K.; shipbuilding; naval base for submarines; headquarters of Scot. whalers; extensive fisheries. D. is great seat in Britain of jute, flax, hemp, and coarse linen industries; marmalade and confectionery manufactured; tanning; engineering and iron-founding. D. has been royal burgh since XIII. cent.; early and eagerly espoused Reformation; destroyed by Monk, 1651. Pop. (1911) 165,000.

Barrie, *City of Dundee* (1890).

DUNDEE (28° 10′ S., 30° 8′ E.), town, Natal, S. Africa; coal mining.

DUNDEE, JOHN GRAHAM OF CLAVERHOUSE, VISCOUNT (*c.* 1649–89), Scot. leader of Stewart cause; s. of Sir William Graham; served

under Montrose (1678) in suppression of Covenanters; defeated by Covenanters at *Drumclog* (1679); killed Richard Cameron at Aird's Moss after *Bothwell Brig*; in 1688 served in interest of James II., and was cr. Viscount D. His followers failed to support him in Stewart interest, and he was himself then denounced as traitor. On July 27, 1689, he was killed in the moment of victory at *Killiecrankie* (q.v.); a strong but ruthless man.

Life, by Terry (1905), Ian Maclaren (1908), Barrington (1911).

DUNDERLANDSDAL, valley, N. Norway, rich in iron ore; possesses underground streams and stalactite caves.

DUNDONALD, THOMAS COCHRANE, 10TH EARL OF (1775–1860), Brit. admiral; M.P. in 1806; attacked naval abuses; given order of Bath for engagement in Basque Roads; tried and condemned for alleged fraud on Stock Exchange, 1814; fought for Chile, Brazil, and Greece; held Amer. command and fought in Crimea.

DUNEDIN (45° 52′ S., 170° 31′ E.), town, New Zealand, capital of Otago province, on hilly site at end of Otago Harbour, S.E. coast of South Island; chief commercial centre of colony; founded and called after Edinburgh by Scot. settlers, 1848; has Otago univ. (affiliated to univ. of New Zealand), athenæum, and museum; seat of R.C. and Anglican bp's; in neighbourhood of gold-fields (discovered, 1861); wool, frozen meat. Pop. (1911) 41,529; with suburbs, 64,237.

DUNES, BATTLE OF THE, Dunkirk (June 4, 1658), when French and English defeated Spaniards under Don John of Austria, and secured capitulation of Dunkirk.

DUNFERMLINE (56° 4′ N., 3° 28′ W.), city, S.W. Fife, Scotland; royal and parliamentary burgh of great hist. interest; ruined royal palace (probably built *c.* 1300; birthplace of David II., James I. of Scotland, Charles I.); abbey (dating from 1072); tombs of Bruce and other royalties; Tower of Malcolm Canmore (*c.* 1060) crowns steep eminence rising from beautiful Pittencrieff Glen. Modern D. owes much to its native, Mr. Andrew Carnegie, who gave (1903) £500,000 for its benefit; burgh limits now include Rosyth; seat of damask linen trade; coal-fields. Pop. (1911) 28,103.

DUNFERMLINE, ALEXANDER SETON, 1ST EARL OF (*c.* 1555–1622), Scot. statesman; s. of George, 5th Lord Seton; lord of session, 1588; chancellor, 1604; promoted Anglo-Scot. union.

DUNFERMLINE, JAMES ABERCROMBY, 1ST BARON (1776–1858), Brit. politician.

DUNGANNON (54° 31′ N., 6° 47′ W.), town, Tyrone, Ireland; until 1607 chief seat of O'Neills, linens and muslins.

DUNGARPUR (*c.* 24° N., 74° E.), native state, Rajputana, India. Area, 1447 sq. miles. Pop. (1911) 159,192.

DUNGARVAN (52° 4′ N., 7° 37′ W.), seaport town, Waterford, Ireland; remains of ancient castle; woollen mills.

DUNGENESS (50° 57′ N., 1° 2′ E.), headland, with lighthouse, S. extremity of Kent, England.

DUNKELD (56° 34′ N., 3° 35′ W.), town, Perthshire, Scotland, on river Tay, opposite village of Birnam; seat of Culdees from VIII. to XII. cent's; choir of XIV.-cent. cathedral recently restored, serves as parish church; in vicinity is seat of Duke of Athole; angling resort.

DUNKIRK, Dunkerque.—(1) (51° 7′ N., 2° 39′ E.) fortified seaport town, Nord, France, on Strait of Dover; magnificent harbour; has fine church of St. Eloi (1560); chapel of Notre Dame des Dunes (1405); town hall; extensive and varied manufactures and exports, and important fisheries; burned by English, 1388, taken by them in 1658, but sold to Louis XIV. by Charles II., 1662. Pop. (1911) 38,891. (2) (42° 27′ N., 79° 20′ W.) city, port of entry, on Lake Erie, New York State, U.S.A.; has extensive lake trade; iron and lumber manufactures. Pop. (1910) 17,221.

DUNLOP, JOHN COLIN (1785–1842), Scot. author; wrote *History of Fiction* (1814).

DUNMORE (41° 25′ N., 75° 38′ W.), town, Pennsylvania, U.S.A.; anthracite coal-fields. Pop. (1910) 17,615.

DUNMOW, GREAT (51° 52′ N., 0° 22′ E.), market town, on Chelmer, Essex, England. **Dunmow, Little,** village, 2 miles E. of Gt. Dunmow; custom of *Dunmow Flitch*, awarded to married couples who for a year and a day after marriage have had no quarrel and have not repented of their union, dates from 1244.

DUNNE, FINLEY PETER (1867–), Amer. journalist; author of the 'Mr. Dooley' series of humorous Irish-Amer. sketches.

DUNNOTTAR CASTLE, historic stronghold near Stonehaven, Kincardineshire, Scotland; dating from 1392; dismantled, 1720.

DUNOIS, JEAN, COUNT OF (1403–68), Fr. general; natural s. of Duke of Orleans; commonly known as the 'Bastard of Orleans'; famous for military exploits.

DUNOON (55° 57′ N., 4° 56′ W.), watering-place, Argyllshire, Scotland; on W. shore Firth of Clyde; remains of ancient castle. Pop. (1911) 6859.

DUNRAVEN AND MOUNT-EARL, EARL OF, Windham Thomas Wyndham-Quin (1841–), Eng. politician; acted as war correspondent in Abyssinian and Franco-Prussian Wars; celebrated yachtsman; author of several books; famous as promulgator of devolution scheme for Ireland; pres., Irish Reform Association, 1905.

DUNROBIN CASTLE, near Golspie, Sutherlandshire, Scotland; seat of Duke of Sutherland.

DUNS (55° 46′ N., 2° 19′ W.), market town, Berwickshire, Scotland; woollen industry; reputed birthplace of Duns Scotus.

DUNS SCOTUS, JOHN (1265 or 1275–1308), mediæval schoolman, studied at Oxford and Paris; critical theologian, and antagonist of St. Thomas Aquinas over Immaculate Conception, reason, and revelation.

Life, by Werner (1880).

DUNSINANE (56° 28′ N., 3° 17′ W.), peak of Sidlaws, Perthshire, Scotland; remains of 'Macbeth's castle.'

DUNSTABLE (51° 52′ N., 0° 32′ W.), market town, near Chiltern Hills, Bedfordshire, England; was a Rom. station; remains of church of Augustinian Priory (founded, 1131) now included in parish church; straw-plaiting. Pop. (1911) 8062.

DUNSTAFFNAGE (56° 27′ N., 5° 26′ W.), ruined castle, on Loch Etive, Argyllshire, Scotland; 3 miles N.N.E. Oban.

DUNSTAN, ST. (924–988), abbot of Glastonbury, 945; bp. of Worcester, then of London; abp. of Canterbury, 959.

DUNSTER (51° 11′ N., 3° 27′ W.), market town, Somersetshire, England.

DUNTOCHER (55° 51′ N., 4° 27′ W.), town, Dumbartonshire, Scotland.

DUNTON, JOHN (1659–1733), Eng. bookseller and author; Whig pamphleteer; useful book of memoirs.

DÜNTZER, JOHANN HEINRICH (1813–1901), Ger. philologist and historian.

DUNWICH (52° 17′ N., 1° 38′ E.), watering-place, Suffolk, England; was E. Anglican capital and episcopal see, founded VII. cent.; now almost swept away by inroads of sea.

DUPANLOUP, FÉLIX ANTOINE PHILIBERT (1802–78), bp. of Orleans (1849); opposed papal infallibility, but later submitted.

DUPERRON, JACQUES DAVY (1556–1618), Fr. R.C. theologian; s. of Prot. minister; cardinal; abp. of Sens, 1606.

DUPIN, ANDRÉ MARIE JACQUES (1783–1865), Fr. statesman, advocate, and author.

DUPLEIX, JOSEPH FRANÇOIS (1697–1763), Fr. administrator; gov.-gen. of all Fr. establishments

in India, 1742; tried to establish Fr. supremacy in India, but Clive (*q.v.*) frustrated his plans. D. was recalled in 1754. See *Life* by Biddulph (1910).

DUPLICIDENTATA, a sub-order of Rodents (*q.v.*).

DUPONT, PIERRE (1821-70), Fr. song-writer; words and music of *Le Chant des Ouvriers*, and other popular songs.

DUPONT DE L'ÉTANG, PIERRE ANTOINE, COUNT (1765–1840), Fr. general; fought under Napoleon, distinguishing himself in Italy, but defeated in Peninsula; served under Louis XVIII.

DUPONT DE L'EURE, JACQUES CHARLES (1767–1855), Fr. statesman and lawyer.

DUPORT, ADRIEN (1759–98), Fr. politician.

DUPORT, JAMES (1606–79), Eng. scholar and ecclesiastic.

DUPPEL (54° 56′ N., 9° 44′ E.), village, Schleswig-Holstein, Germany; Germans defeated by Danes, 1848; stormed by Bavarians and Saxons, 1849; by Prussians, 1864.

DUPRÉ, JULES (1813–89), Fr. romantic landscape painter.

DUPUIS, CHARLES FRANÇOIS (1742–1809), Fr. scientist, politician, and author; prof. of Rhetoric at Lisieux (1766), and prof. of Humanity in Collège de France, Paris (1788); prominent part in politics of the Revolution; wrote on astron. and mythology.

DUPUY, CHARLES ALEXANDRE (1851–), Fr. statesman; premier and Minister of Interior, 1894; in office when Dreyfus was condemned; resigned, 1899.

DUPUY, PIERRE (1582–1651), Fr. scholar; prolific writer on hist. and antiquarian subjects.

DUPUY DE LÔME, STANISLAS CHARLES HENRI LAURENT (1816–85), Fr. engineer and inventor; invented method of converting sailing battleships into steamships; introduced building of iron ships into France, etc.

DUPUYTREN, GUILLAUME, BARON (1777–1835), Fr. surgeon; prof. of Clinical Surgery in Hôtel-Dieu, Paris (1815); a brilliant operator, lectured to great numbers of students, and had enormous surgical practice.

DUQUE DE ESTRADA, DIEGO (1589–c. 1640), Span. soldier and writer; b. Toledo; fled after having killed his affianced wife and her lover; captured and tortured; escaped and led life of adventure, taking part in many campaigns; wrote memoir entitled *Commentarios*.

DUQUESNE (40° 24′ N., 79° 50′ W.), town, Pennsylvania, U.S.A.; steel-works. Pop. 15,727.

DUQUESNE, ABRAHAM, MARQUIS (1610–88), Fr. naval officer; distinguished himself in wars with Spain; defeated combined Dutch and Span. fleets off Sicily, 1676; cr. marquis by Louis XIV.

DURÁN, AUGUSTIN (1789–1862), Span. scholar.

DURANCE (43° 46′ N., 5° 15′ E.), Fr. river; rises in Hautes-Alpes; falls into Rhône 3 miles S.W. Avignon; length, *c.* 220 m.; fierce current.

DURAND, ASHER BROWN (1796–1886), Amer. artist and engraver.

DURAND, GUILLAUME (*c.* 1230–96), Fr. canonist; lectured at Modena; in 1274 legate at Council of Lyons; wrote *Rationale Divinorum Officiorum*, *Speculum Juris*.

DURANDO, GIACOMO (1807–94), Ital. statesman and general.

DURANGO (24° N., 105° W.), state, N.W. Mexico; mountainous; climate dry and healthy; soil very fertile; few streams; chief minerals, gold and silver; wheat, tobacco, fruits. Area, 38,009 sq. miles. Pop. (1910) 436,147. The capital, DURANGO, has a cathedral; cotton and woollen factories. Pop. (1910) 34,085.

DURANI, Afghan tribe of the highest rank.

DURANTE, FRANCESCO (1684–1755), Ital. composer of church music.

DURÃO, JOSÉ DE SANTA RITA (1720–84), Brazilian epic poet.

DURAZZO (41° 18′ N., 19° 26′ E.), decayed seaport, on Adriatic, Albania; ancient *Epidamnus* or *Dyrrachium*; founded by Corcyreans, VII. cent. B.C.; scene of Pompey's successful resistance to Cæsar, 48 B.C.; taken by Turks, 1501.

DURBAN, PORT NATAL (29° 52′ S., 31° E.), chief seaport and largest town, Natal (*q.v.*); excellent harbour with projecting 'Bluff'; beautifully laid-out city, with fine town hall, parks, gardens, Victoria Embankment, and ocean beach; Berea, handsome suburb; much of Transvaal and Orange Free State imports and exports pass through Durban; shipping, coaling-port, preserves, whale and other fisheries; exports tea, sugar, coffee, maize, wool, hides, skins, angora hair, etc.; wireless station; fortified. Pop. (1911) 69,000 (32,000 white; many Indians).

D'URBAN, SIR BENJAMIN (1777–1849), Brit. soldier-administrator; entered army, 1777; fought in Peninsula, 1808; gov. of Antigua, 1824; gov. of Cape Colony, 1834–38; slavery abolished and Great Trek of Dutch farmers commenced, 1836; *Durban* in Natal named after him; held military command in Canada, 1847–49.

DURBAR, Indian state ceremonial; also name for native state council. D's were held at Delhi (*q.v.*) when Queen Victoria was proclaimed Empress (1877); King Edward, Emperor (1903); and King George V., Emperor (1912).

DÜREN (50° 47′ N., 6° 30′ E.), town, Rhine province, Prussia; woollen cloth. Pop. (1910) 32,511.

DÜRER, ALBRECHT (1471–1528), Ger. artist and engraver; b. Nuremberg; s. of a goldsmith, to whose craft he was apprenticed; eventually placed under Michael Wolgemut, a local artist who employed assistants in the production of cheap devotional pictures. His apprenticeship ended in 1490, and until 1494 D. travelled about Germany to improve himself in his art. He married Agnes Frey (1494), but had great difficulty in making a living, and, to improve his position, took up etching and wood-engraving. In later years he lived in Venice and the Netherlands, but the greater part of his working life was spent in Nuremberg. Amongst his most famous paintings are the *Feast of the Rosary*, *Adoration of the Magi*, *The Crucifixion*, *Madonna and Child*, *SS. John and Peter*, *SS. Paul and Mark*, and many portraits; his most famous copper-plates include *St. Jerome in his Study*; *Knight, Death, and the Devil*; *Adam and Eve*, *Death's Coat-of-Arms*, besides numerous sets of woodcuts. His writings include *The Art of Mensuration*, *Treatise on Fortification*, and other scientific works. He ranks as the greatest of Ger. artists, and though there is little positive beauty in his painting it is distinguished by mastery of composition, grasp of character, and forcible colouring. His work as an engraver on copper and wood is no less distinguished, and has undoubtedly exercised a greater influence on later art than his painting.

Dürer, by H. E. A. Furst (T. C. & E. C. Jack); *Life*, by W. B. Scott; also one by Mrs. Heaton.

DURESS, legal term for a plea of compulsion; means also illegal constraint or imprisonment.

D'URFEY, TOM (1653–1723), Eng. dramatist and song-writer; many songs set to music by Purcell, Blow, and Farmer.

DURFORT (44° 14′ N., 1° 7′ E.), village, Tarn-et-Garonne, France; was seat of ancient lordship.

DURGA, wife of Siva in Hindu mythology.

DURHAM.—(1) (54° 46′ N., 1° 34′ W.) city, Durhamshire; Parliamentary and municipal borough; beautifully situated round rocky hill, with cathedral and castle on summit, and almost surrounded by river Wear. Cathedral (founded XI. cent.) is one of finest in England; built on site of church which enshrined St. Cuthbert's bones; Norman architecture; high central and two highly decorated western towers. Castle, erected by William the Conqueror, once occupied by Bishops of D., is now property of D. Univ. (founded 1832). Manufactures include ironware, carpets, and mustard; coal mines in neighbourhood. Pop. (1911) 17,550. (2) (36° 2′ N.,

78° 56′ W.) city, capital of Durham County, N. Carolina, U.S.A.; seat of Trinity Coll.; tobacco factories. Pop. (1910) 18,241.

DURHAM (54° 46′ N., 1° 45′ W.), maritime county, N. England; area, 1014 sq. miles; bounded N. by Northumberland, W. by Westmoreland and Cumberland, S. by Yorkshire, E. by North Sea. In W. are branches of Pennine Range where chief rivers (Derwent, Tees, Wear) rise, and stretches of bare moorland rich in minerals; farther E. are fertile and well-wooded valleys where celebrated cattle are reared. D. coal mines are among most productive in England. D. also produces limestone, slate, black marble, lead, zinc, firestone, and ironstone. Chief industry is shipbuilding; extensive and important yards on Tyne. Manufactures include iron, glass, chemicals, salt and earthenware. Chief towns are Durham (county town), Sunderland, Stockton, S. Shields, E. and W. Hartlepools, Jarrow (important shipbuilding ports), Gateshead, and Darlington. D. has some interesting old churches, crosses, castles, and ruins of peel-towers; most noteworthy castle and cathedral being in Durham city. D. was at one time part of kingdom of Northumbria, and scene of many border raids from Scotland; one of Counties Palatine. Pop. (1911) 929,340.

Durham, Victoria County Histories.

DURHAM, JOHN GEORGE LAMBTON, 1ST EARL OF (1792–1840), Brit. statesman; became strong Radical; opposed Corn Tax and advocated parliamentary reform; cr. Baron D., 1828; intimate friend of the Duchess of Kent and Queen Victoria. In 1830 D. became Lord Privy Seal in the Grey ministry; played a considerable part in framing the great Reform Bill; went as ambassador to Russia in 1832, and again 1835–37; cr. Earl of D., 1837; Gov.-Gen. of Canada, 1838; provoked opposition in England, and returned home, Dec. 1838; wrote a valuable *Report on the Affairs of British North America*.

S. J. Reid, *Life and Letters of the First Earl of Durham*.

DURIS (fl. 300–275 B.C.), Gk. writer; b. Samos; athlete and for a time tyrant of Samos; wrote work on Gk. history from 371–281 B.C., and various treatises; an untrustworthy source of information.

DÜRKHEIM (49° 28′ N., 8° 10′ E.), town and health-resort, Rhenish Bavaria, Germany; salt baths. Pop. 6000.

DURLACH (48° 59′ N., 8° 29′ E.), town, grand-duchy of Baden, Germany; iron manufactures. Pop. 13,000.

DÜRNSTEIN (48° 24′ N., 15° 35′ E.), town, Austria; here Russians and Austrians defeated French, 1805.

DUROCHER, JOSEPH MARIE ELIZABETH (1817–58), Fr. geologist and mineralogist; prof. at Rennes (1844); propounded new geological theories.

DURSLEY (51° 41′ N., 2° 21′ W.), town, Gloucestershire, England. Pop. (1911) 7591.

DURUY, JEAN VICTOR (1811–94), Fr. historian and educationist; Minister of Education (1863–69); did much for educational reform, and wrote histories of Greece, Rome, and France.

DUSE, ELEANORA (1861–), Ital. actress; famed for realism.

DUSSEK, JOHANN LUDWIG (1761–1812), Bohemian composer and pianist.

DÜSSELDORF (51° 13′ N., 6° 45′ E.), town, Prussia, on Rhine; busy river port; has churches of St. Lambert and St. Andrew, famous art academy, beautiful public gardens (Hofgarten); manufactures iron, chemicals, pianos, cotton, paper, glass, etc.; attained height of prosperity under Elector John William (1690–1716); became Prussian possession (1815); birthplace of Heinrich Heine. Pop. (1910) 357,702.

DUSSERAH, Hindu moon festival, celebrated in October.

DUST, earth or other matter reduced to very fine dry particles. We can observe its presence in the atmosphere by seeing a beam of light reflected by suspended motes each acting as a minute planet. D. is carried into the air by evaporation and air currents, and is, no doubt, largely due to physical causes, such as volcanic action, and also to artificial causes, of which the chief is the combustion of coal for commercial purposes. Some is due to meteors, and in this connection it has been stated that a layer of meteoric d. 12 inches thick would accumulate on the earth's surface in 1,000,000 years. It is supposed that the blue colour of a cloudless sky is due to the reflection of light by particles of d., and that owing to its presence atmospheric vapour is able to condense and form clouds.

In 1880 Aitken invented a method of counting d. particles which were beyond the power of a microscope. He caused them to become centres of condensation, and so being increased in size they were visible by optical aid, a principle used for numbering units of electricity.

DUST-LICE, see BOOK-LICE.

DUTCH EAST INDIA COMPANY, THE, founded by charter (1602) to protect Dutch trade, and also as a weapon in struggle with Spain and Portugal; governed by directorate of 60 members; it dealt principally with China and Japan, also with Malay Archipelago; founded settlement at Cape of Good Hope as half-way house to India; declined in XVIII. cent.; dissolved, 1798.

DUTCH EAST INDIES, Sumatra, part of Borneo, Java, and other E. India islands (6° N. to 11° S., 95° to 141° E.); capital, Batavia, Java; pop. 42,000,000; area, 740,000 sq. miles; export tobacco and spices; formerly property of Dutch East India Company, but since end of XVIII. cent. administered by crown officials.

DUTCH GUIANA, see GUIANA.

DUTCH LANGUAGE AND LITERATURE, see HOLLAND.

DUTCH PAINTING, see PAINTING.

DUTCH WARS, see HOLLAND.

DUTCH WEST INDIA COMPANY, THE, founded (1621) for the purpose of colonisation in American and African continents, to secure the supply of slave labour from Africa, and to plunder Span. and Portug. shipping.

DUTENS, LOUIS (1730–1812), Fr. writer on religious and antiquarian subjects.

DUTROCHET, RENÉ JOACHIM HENRI (1776–1847), Fr. biologist and physiologist.

DUTT, MICHAEL MADHU, SUDAN (1824–73), Ind. poet; wrote several plays, but fame rests on great blank-verse epic, *Meghanad-Badha*.

DUTY, that which one ought, or is required by the moral law, to do. See ETHICS.

DUVAL, ALEXANDRE VINCENT PINEUX (1767–1842), Fr. actor and dramatist; elected to Academy (1812).

DUVAL, CLAUDE (1643–70), Eng. highwayman; famed for his gallantry; hanged at Tyburn.

DUVEYRIER, HENRI (1840–92), Fr. explorer and geographer; explored Sahara (1858–61).

DUX (50° 47′ N., 13° 44′ E.), town, Bohemia, Austria; lignite mines; glass-works. Pop. 12,000.

DUXBURY (42° 3′ N., 70° 40′ W.), town, summer resort, Massachusetts, U.S.A., on Massachusetts Bay.

DVINA, NORTHERN, DWINA (64° N., 41° E.), river, Russia; has origin in two head-streams in Vologda; flows N.W.; enters White Sea, near Archangel, by several mouths, which form a delta; length, 760 miles.

DVINA, WESTERN, DÜNA (57° N., 24° E.), river, Russia; rises in Tver; flows S.W., then N.W.; falls into Gulf of Riga; length, 640 miles; navigable nearly to source.

DVINSK, DÜNABURG (55° 53′ N., 26° 23′ E.), fortified town, on Dvina or Duna, W. Russia; formerly

capital of Polish Livonia; important military and commercial centre; sawmills, linen. Pop. 110,354.

DVOŘÁK, ANTONÍN (1841–1904), Bohemian composer; director of Prague Conservatoire; choral works include *Stabat Mater* and *The Spectre's Bride*; also symphonies and miscellaneous pieces of high melodic quality.

DWARF (or 'pygmy'), name given to small-statured adult human beings, still found in different parts of the world, notably in Central Africa. Amongst these may be named the African 'Bushmen,' and the Bambute tribes of Uganda, averaging about 4 ft. 7 in. in height. Famous dwarfs of history have been Jeffery Hudson (1619–82), and 'General Tom Thumb' (d. 1883).

DWARFED TREES, common ornament in China and Japan; growth curtailed by placing them in shallow flower pots and preventing free flow of sap.

DWARKA (22° 14′ N., 69° 5′ E.), town, Kathiawar, Brit. India. Its sacred temple of Krishna is visited annually by many pilgrims.

DWARS (c. 26° 30′ N., 90° E.), tract of country, N.E. India; consists of two divisions, E. Dwars and W. Dwars; formerly part of Bhutan; ceded to British, 1865.

DWIGHT, JOHN (d. 1703), Eng. potter; pioneer of the industry in England.

DWIGHT, JOHN SULLIVAN (1813-93), Amer. musical critic.

DWIGHT, THEODORE WILLIAM (1822–92), Amer. jurist, educationist, and reformer.

DWIGHT, TIMOTHY (1752–1817), Amer. educationist and author; was Congregational preacher; pres. of Yale Coll.; voluminous writer of verse and prose.

DYAKS, DAYAKS, wild native tribes of Borneo, notorious for head-hunting, though this custom is now said to be little practised; skin reddish-brown, but other physical characteristics similar to the darker Malays; weapons are sword and spear, and they are very skilful in use of the blow-pipe; practise spinning, weaving, and other crafts, and possess considerable intelligence.

DYCE, ALEXANDER (1798–1869), Eng. dramatic editor and critic; edit. Shakespeare and other Elizabethan dramatists, and later Eng. poets.

DYCE, WILLIAM (1806-64), Scot. artist and etcher; R.A. (1848); *Descent of Venus*, *Bacchus*, *Madonna and Child*, etc.; typical examples in House of Lords, Tate Gallery, and at Edinburgh.

DYCK, VAN, see VANDYCK.

DYEING is the art of colouring materials, so that the colours will not be readily removed by washing, rubbing, or light. Silk, wool, cotton, straw, leather, and textile materials are those most usually requiring to be dyed. The process causes a permanent union between the material to be dyed and the colouring matter applied. The union is probably a chemical one, though the physical characters of the material may help in the process. Wool dyes most readily, cotton least so. Silk is intermediate between the two, a fact probably due to its different chemical composition. D. is usually carried on at high temperature, and is effected by allowing an aqueous solution of the dye-stuff with or without additions (acids, alkalies, salts) to act on the material to be dyed. Uniform distribution of the dye is ensured by moving the material in the liquid, or circulating the liquid through the material. Before 1856, when the first aniline colour, mauve, was isolated by Perkin, dyes were manufactured from natural products obtained from plants and animals. Since then dyes have been manufactured from coal-tar, and their range, vividness, and permanency have so steadily increased that the natural dyes have been ousted.

Dyes are classified according to their chemical constitution into Nitro-, Azo-, and Hydrazone colours, or according to the method by which they work—Direct, Acid, Basic, Developed, Mordant. *Acid* dyes colour animal fibres (wool and silk) in an acid bath; they do not dye cotton. *Nitro*-compounds and some *azo* ones are included in this group. They give red, brown, orange, green, blue, violet, and black colours. The dyeing power of *basic* colours lies entirely in the basic part of the salts of the organic colour bases. In the free state they are colourless and insoluble. With acids, coloured soluble salts are formed which dye silk and wool in a neutral bath. They have little affinity for cotton, unless it is steeped in tannic acid, which forms insoluble colour compounds (lakes) with the bases of the basic colours. The tannic acid is fixed into the fibre with a metallic oxide. The cotton is then said to be *mordanted*. The earlier coal-tar colours belonged to this class, and were remarkable for brilliancy. They were fugitive to light. *Direct* colours dye cotton without mordanting. They are also called *substantive* cotton colours. The group includes Benzo-, Diamine-, and Congo colours. *Diazo* compounds dye almost every variety of colour. Wool and silk can be dyed with the addition of a little acetic acid to the bath. On cotton the colours are not very fast to light or washing, but boiling with copper sulphate afterwards improves this.

Sulphide colours are only suitable for dyeing vegetable fibres. If the cotton is worked in the colour dissolved in an alkaline-reducing agent subsequent oxidation with bichromate of soda in acetic acid develops the colour. These colours are constantly increasing in number, and are fast to light, alkalies, acids, and washing. *Developed* colours are *azo* dyes which produce colour upon the fabric itself during the successive application of the constituent elements. After impregnation with alkaline solution of phenol the dried material is passed into cold solution of diazo compound. Fast to soap, but rather fugitive to light. Paranitraniline red is the chief. *Developed direct* colours are produced on cotton by developing it after diazotising in phenol solutions, and thereby obtaining azo-dyes of various hues—blue, red, brown, grey, and black. They are not very fast to light, and too sensitive to acids. Benzo- and nitrol colours can be dyed on cotton, and then developed by passing into diazo solutions. A new deeper and faster colour is formed by the reaction.

Mordant colours act like weak acids forming insoluble lakes with metallic oxides. The most stable are combined with alumina and lime. The object is to precipitate the coloured lakes within and upon the fibre. All dyed fabrics must undergo finishing.

Knecht, Rawson, and Loewenstein, *Manual of Dyeing*.

DYER, SIR EDWARD (d. 1607), Eng. courtier and poet; friend of Raleigh and Sidney; famed for pastoral verse.

DYER, JOHN (1700–58), Brit. poet; b. Wales; author of *Grongar Hill*, *Ruins of Rome*, etc.

DYER, THOMAS HENRY (1804–88), Eng. historian and antiquary; histories of Modern Europe, Athens, Rome, etc.

DYKE.—(1) Wall raised to prevent inundation; used in Holland, the Fen-country in England, and in other low-lying lands. (2) (in Geology) A wall or slab of igneous rocks, common in N. of England and in Scotland; always found in neighbourhood of volcanic vent.

DYMOKE, name of Eng. family who have held office of King's Champion since reign of Richard II.

DYNAMICS is the science which treats of force and its action upon bodies, and since force may be regarded as acting in one or other of two distinct ways, there is, usually, a corresponding division of the science into two branches. To the first of these, which treats of the action of force in producing or changing motion, the term *Dynamics* is properly given. To the second, which treats of the action of force in maintaining rest or preventing change of motion, the term *Statics* is given. But a statical problem is only a particular case of some more general dynamical problem, and hence this division of the subject is somewhat artificial.

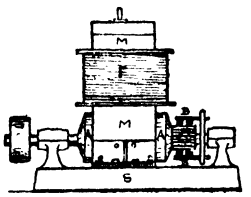
The study of dynamics involves, as a necessary preliminary, a study of the motions of points, lines, and surfaces, without reference either to the mass of any particular portion of matter which may move or to the particular force which may produce motion. This preliminary forms the science of *Kinematics*, and it is obviously concerned only with problems of space and time. Dealing next with dynamics proper, we have first to frame definitions of the principal terms used, such as mass, force, momentum, energy, work, etc., and to settle the *Units* (q.v.) in terms of which they may be quantitatively expressed. The next point is the consideration of the fundamental principles on which, or on deductions from which, dynamical science is built. These are Newton's Three Laws of Motion, viz.: (1) That every body continues in its state of rest or of uniform motion in a straight line except in so far as it is compelled by impressed forces to change that state; (2) that change of momentum is proportional to the impulse of the impressed force, and takes place in the direction of that force; and (3) that to every action there is an equal and contrary reaction. The best evidence for the truth of these laws is the fact that, using them as hypotheses to explain the motions of the solar system, we can predict the position of a planet or a satellite at any future time, and that such predictions are fulfilled with rigorous exactitude. The applications of these principles may for convenience be classified according to the nature of the problem dealt with—*e.g.* simple particles, systems of particles, and rigid bodies. (Their applications to elastic bodies and to fluids are dealt with under *Elasticity* (q.v.) and *Hydromechanics* (q.v.).) In each such application, the general method is to arrange the data of the problem so as to provide an *equation of motion*. On solution, this gives information regarding the position, or speed, or acceleration of the moving particle or body. Lastly, the principles of kinematics are employed so as to present the result in any particular form which may be desired. Taking the first of the divisions mentioned—the dynamics of a particle—we have to deal with problems which may be classified according to the species of curve described by the moving particle—*e.g.* rectilinear motion, parabolic motion, the motion of particles attracted towards a centre by a force which varies with the distance according to some prescribed law, motion of a particle which is constrained to move in a certain path, motion in a resisting medium, impact of a particle upon a fixed plane, etc.

In the second division—systems of particles—problems arise such as those of the impact of spheres, the motion of particles connected by strings, and the dynamics of flexible inextensible strings. In the third division we are introduced to several new conceptions, such as centre of mass, moment of a force, moment of inertia, moment of momentum, etc. In forming the equations of motion of a free rigid body, it is to be noted that any such body has six degrees of freedom, *i.e.* there are six independent ways in which it may be regarded as being free to move. For, regarded as a particle, it could move east or west, north or south, and vertically up or down. Again, regarded as an extended body it could rotate upon axes fixed in these three directions. It has, therefore, three degrees of freedom of translation and three of rotation. Consequently, we require six independent equations of motion, embodying the data provided, in order to determine the motion of a free rigid body.

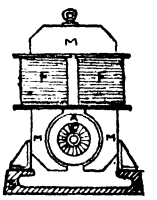
It will probably be readily seen that, in general, every dynamical problem has a statical aspect. For, on framing the equation of motion, if we insert the condition that equilibrium is maintained, the solution of the equation will give the condition contemplated in the statical treatment of the question. To take a very simple case, consider a particle which is placed upon a rough inclined plane. The forces involved are (1) the weight of the particle acting vertically downwards, (2) the force of friction acting opposite to the direction in which the particle moves or tends to move, and (3) the reaction of the plane acting perpendicularly to the plane. Treating the problem dynamically, these forces are *resolved* in the direction of the plane, *i.e.* their components in that direction are found, and the algebraic sum of these components is equated to the product of the mass of the particle and its acceleration. The solution of this equation would give the acceleration, and any other detail of the motion could be deduced by kinematical principles. Treating the problem statically, the condition of equilibrium is inserted into the equation by making the acceleration zero. The equation may then be solved so as to give the value of any of the quantities involved.

DYNAMITE, an explosive invented by Nobel; consists of a mixture of 25% Kieselguhr (mainly pure silica) with 75 % nitroglycerine. All modifications consist of nitroglycerine and a substance capable of absorbing it. See BLASTING.

DYNAMO.—A dynamo is a machine which turns mechanical into electrical energy, and depends on the principle that an electrical pressure, and consequent current, is created in a conducting circuit when the magnet field, passing through it, varies. This variation is produced by the motion of the circuits relative to the field or *vice versa*. When a rectangular coil, forming part of a circuit, is rotated in a magnetic field, the direction of the induced pressure changes each time the coil is at right angles to the magnetic lines and an 'alternating' current results. In a direct current d. the induced alternating current is made uniform and continuous in the outside circuit by the commutator. D's thus fall into two main classes: (1) CONTINUOUS CURRENT DYNAMOS; (2) ALTERNATORS. The parts of the former are: the *field-magnets* or *electromagnets* producing the magnetic field, the current used being derived from the machine itself; the armature, called *drum*, *ring*, or *disc* according to the construction, in which the circuits are grouped and the current generated. The first type which is most common is built up from thin iron stampings often



DYNAMO. Side View.



End View (bearing and brushes removed).

M, field-magnet; *F*, field-magnet coils; *S*, sole plate; *A*, armature; *C*, commutator; *B*, brushes.

separated by thin paper, threaded on to a three or four armed 'spider' keyed to the driving shaft. The resulting cylinder, hollow for ventilation, has slots on the surface parallel to the shaft, and into these insulated coils, previously wound on a frame or former, are slipped and fixed by wood strips and steel binding wire; the commutator, a small cylinder on the shaft and insulated from it, formed of copper and mica segments alternately, each of the former having the junction between two armature coils joined to it; the brushes, previously of copper gauze, now of hard carbon coppered where held in the brush-holder. These press upon the rotating commutator, the pressure being regulated by a spring, and deliver the current to the outside circuit.

Direct or continuous current d's are classed according to the method of exciting the field-magnets. *Series-wound machines* have the field-magnet coils, the armature coils, and the external resistance connected in series. The electrical pressure generated is thus equal to the sum of the pressures lost by the current in

passing through these three resistances. Originally used for lighting arc lamps in series, this type has been largely replaced by *shunt-wound machines* in which the field-magnet coils are joined to the brushes, *i.e.* are in parallel with the outside circuit. Only part of the current is shunted round the magnets; in large machines 2–3 % of the energy is thus consumed. Shunt machines are suited for charging accumulators, driving motors, and lighting. *Compound-wound machines* have a few series coils as well as shunt coils round the magnets, the number of turns being such that the pressure difference at the dynamo terminals is nearly constant with altering current. By increasing the series turns the pressure may be made to rise with increase of current. This is over-compounding. Compound-wound machines are sometimes constructed so that a switch can cut out the series coils, giving a shunt machine. A further distinction between machines lies in the number of *field-magnets* or *poles*. A two-pole machine has one north magnetic pole facing one south magnetic pole; a multipolar has an even number of poles spaced equally and alternately north and south. The latter, adopted in large installations, generate a high pressure with comparatively slow driving of the armature.

The capacities of any d. are represented graphically by its characteristic curves, introduced by Hopkinson, in which the pressure is plotted against the current for any particular speed. The external characteristic curve gives the relation between current in the external circuit and pressure difference at the d. terminals; the internal characteristic shows the pressure lost in the machine as the current varies; and the total characteristic gives the relation between the total pressure generated and the current. With increasing current these illustrate for a series machine increase of pressure to a maximum then decrease, for a shunt machine decrease; hence the combined effect in a compound-wound machine can produce level pressure and over-compounding an increasing pressure.

ALTERNATORS possess generally the same parts as direct current d's, omitting the commutator. The name *rotor* is applied to the rotating part whether armature or field-magnets; *stator*, to the fixed part, field-magnets or armature. Large alternators have invariably a fixed ring-shaped armature, laminated like that of a direct current d., inside which rotates a fly-wheel carrying radial magnetic poles alternately north and south at the circumference. A separate direct current for magnetisation is supplied from brushes through slip-rings on the shaft. In a single-phase machine the conductors in the armature are connected in series. In a two-phase alternator there are two independent sets of conductors, the portions of one set being placed half-way between those of the other, so that when the pressure in one set is a maximum, in the other it is zero. If a complete cycle, period, or wave of pressure be denoted by 360°, the pressure in one set is 90° (the phase difference) ahead of the other. In a three-phase machine the states of the pressures in the three windings are relatively at 0° in the first, 120° in the second, 240° in the third. While supplying power for local work, alternators are used specially along with *transformers* in long-distance economical transmission of energy derived from fuel and water-power. See ELECTRICITY (ELECTROSTATICS), TRANSFORMER.

DYNAMOMETER, an instrument for measuring force or power. Mechanical d's are of two kinds—*absorption* and *transmission* d's. In the former a known force in the form of a brake is applied to a wheel rotated by the engine whose power is to be measured. In the latter, the power, after being measured, is transmitted for use. In some machines the power is passed on from one shaft to another by means of a spring, the deformation of which measures the power so transmitted. Where a belt is used the difference in tension between the driving and slack sides gives the required measure, and this is obtained by passing the belt round a freely suspended pulley and measuring the force required to prevent the latter being displaced. The *electro-d.* measures strength of current, not force, the latter being easily calculated from the dimensions of the coils in the instrument.

DYSART (56° 8′ N., 3° 7′ W.), seaport town, Fife, on Firth of Forth, Scotland; contains Dysart House, seat of Earl of Rosslyn; ruins of ancient castle, Ravenscraig, in vicinity; flax factory. Pop. (1911) 4197.

DYSENTERY, an infectious disease, characterised by ulceration of the large intestine, with diarrhœa and the passage of blood and mucus, occurring in marshy and malarial districts. Somewhat different types are due to different organisms, the *amœba hystolytica*, and two differing *bacilli dysenteriæ*, and infection is supposed to be generally from drinking contaminated water. The onset of the disease is usually sudden, with griping pain, and frequent discharges from the bowel. An attack often lasts only a week, but it may become chronic. The treatment is to rest the affected part, giving only barley water and the very lightest nourishment; laudanum and ipecacuanha are useful drugs in attacks.

DYSPEPSIA, INDIGESTION, general term applied when the digestive organs, especially the stomach, are unable properly to perform their function of digesting the food, and thereby cause various disagreeable symptoms. D. may be due to derangement of the organs themselves, or to faults of the person affected. Under the former head may be classed weakness of the digestive organs after fevers, etc.; deficiency of the digestive juices of the stomach, of the pancreas, or of the liver; or, a frequent cause, bad teeth. Under the latter come intemperance in eating or drinking, or both; swallowing the food hurriedly without chewing it properly; drinking too much, or too often, tea, coffee, alcohol; insufficient exercise, or hard mental or physical work immediately after food; worry and mental strain; unclean, but not actually decayed, teeth.

The symptoms experienced usually include loss of appetite, headache, giddiness, a feeling of fulness or discomfort or dull pain in the chest after food, flatulence, nausea, and vomiting, but only one or two of these may be present.

The treatment is to correct any fault of the individual, to take plenty of fresh air and exercise, to keep to a carefully regulated diet, and to keep the bowels open and regular. Drugs should not be used if there is improvement without, and those employed depend of course on the actual condition present; but bismuth to soothe irritation, alkalies before meals to promote secretion, pepsin and hydrochloric acid to assist digestion, and tonics with strychnine and hydrochloric acid are all valuable in different cases.

DYSTELEOLOGY, denial of purpose in nature, as opposed to doctrine of design.

DYTISCIDÆ, see under CARABOIDEA.

DZUNGARIA, DSONGARIA (45° N., 85° E.), region, prov. Ili, N. China; was nucleus of a Mongolian kingdom which reached its zenith in XVII. cent.; subjugated by China about mid.-XVII. cent.

E, fifth letter of Eng. alphabet, having various long and short sounds; occasionally sounded as *ă* (clerk); final *e* is now usually mute, but was originally sounded.

EA, water-deity, associated, in the religion of Babylon, with the Persian Gulf. See BABYLONIA.

EADBALD, king of Kent; s. of Æthelberht; reigned, 616–40.

EADMER (c. 1064–1124), Eng. historian; Benedictine monk; sec. and biographer of St. Anselm.

EADS, JAMES BUCHANAN (1820–87), Amer. engineer; built steel arch bridge over Mississippi and famous jetties to deepen and clear river mouth.

EAGLE, a fierce and extremely powerful bird of , of strong flight and keen vision; the 'king of s.' Two species occur in Britain, though rarely, the golden e. (*Aquila chrysœtus*) nesting in the Scot. Highlands, and the sea e. (*Haliaëtus albicilla*). The rest, or *eyrie*, is generally built on precipitous crags, and consists of a large mass of sticks and heather lined with fur and wool. The e. feeds on game, lambs, and the like, but does not, however, refuse fresh carrion. Unless molested, it seldom attacks mankind. About half a dozen other varieties are found in Europe, including the imperial eagle.

The e. was an emblem of Jove, and so became the symbol of Roman sovereignty. The German imperial e. is one-headed, and its claws are outstretched; the Austrian is two-headed, and it grasps a sword and sceptre in the right claw, an orb in the other; the Russian, likewise two-headed, carries only the sceptre and orb. The United States have adopted a one-headed eagle holding arrows and an olive branch.

EAGLE ISLAND (54° 17′ N., 10° 5′ W.), island, Mayo, Ireland. EAGLE ISLANDS are dependencies of Mauritius; also called Trois Frères.

EAGLEHAWK (36° 50′ S., 144° 20′ E.), town, Victoria, Australia; gold mines. Pop. 8000.

EAGRE, tidal wave of unusual height, rushing up an estuary (*e.g.* Humber, Trent, Severn).

EAKINS, THOMAS (1844–), Amer. artist; portraits and genre pictures.

EAMES, EMMA (1867–), Amer. soprano; studied under Marchesi; Juliet (1889) in Gounod's opera a great success; sang in London, 1891, and m. Julian Story; New York (1891), and later at Madrid, Monte Carlo, etc.; m. Emilio de Gogorza, 1911.

EAR, the organ of hearing, is divided in man into external, middle, and internal ear. The EXTERNAL EAR consists of two parts, the *auricle*, or *pinna*, a fibro-cartilaginous framework covered with skin, the purpose of which is to catch the vibrations of the air, and the *auditory meatus*, a bony and in part cartilaginous canal passing into the temporal bone and ending at the *tympanic membrane*, which separates it from the middle ear. The auditory meatus is lined with skin, the glands of which secrete wax. The MIDDLE EAR, or cavity of the tympanum, is a small cavity situated in the petrous portion of the temporal bone, the purpose of which is to transmit to the internal ear the sounds which strike the tympanic membrane. It is filled with air (from back of nasal cavity through *Eustachian tube*), so as to preserve uniform temperature, to increase action of the sound conveyers, and to keep pressure equal on each side of the tympanic membrane.

Between the middle ear and the internal ear are two fine membranes covering little openings called the *fenestra rotunda* and the *fenestra ovalis*; and the vibrations caused by sounds are transmitted from the tympanic membrane to the membrane of the fenestra ovalis, and thus propagated to the internal ear, by a chain of little bones in the middle ear, called from their shapes the *malleus*, *incus*, and *stapes* (*i.e.* hammer, anvil, and stirrup).

The INTERNAL EAR is composed of a series of cavities in the petrous portion of the temporal bone, comprising the *vestibule*, the central cavity, into the superior part of which open three canals, named from their shape the *semicircular canals*, while the front part of the vestibule is prolonged into a spiral canal resembling the shell of a common snail, the *cochlea*. A spiral bony shelf divides the cochlea incompletely into two passages: an upper, or *scala vestibuli*, and a lower, or *scala tympani*. Within the bony cavities is contained a series of membranous canals which closely follow them in shape, but, being much smaller in calibre, are not in close contact with their walls. Between the walls of the two series of canals is a space filled with a special fluid, the *perilymph*, while the membranous canals are filled with another fluid, the *endolymph*.

In the vestibule the membranous labyrinth is divided into a small sac, the *saccule*, into which the membranous canal of the cochlea opens, the *utricle*, into which the membranous semicircular canals open, and a slender blind canal, the *endolymphatic duct*. The membranous semicircular canals are only about a quarter-width of the corresponding bony canals, and at one end of each is a large dilatation, or *ampulla*, into which the hairs of hair-cells project. The membranous cochlea, or *cochlear duct*, lies in the bony canal between the free edge of the bony shelf and the outer wall, and along its base extends a minute structure, the *organ of Corti*, the essential part of which consists of hair-cells projecting into the endolymph.

PHYSIOLOGY OF THE EAR.—When vibrations of a body set up air-waves (which cause the sensation called sound) they are reflected by the external ear and pass into the auditory meatus, and strike the tympanic membrane. The vibrations are transmitted by the chain of ossicles, and, the base of the stapes being attached to the membrane of the fenestra ovalis, are then transferred to the perilymph. The waves in the perilymph set up corresponding waves in the endolymph, and these affect the nerve endings to the different parts. The utricle and saccule can only perceive sounds as sounds, the analysis of tone is the function of the cochlea, its hair-cells being irritated by the waves of endolymph, and the sensation communicated to the brain by their fine nerve filaments. The function of the semicircular canals is concerned with the sense of equilibrium, the hair-cells of the ampullæ being irritated by the waves of endolymph caused by change of position.

DISEASES OF THE EAR may affect either the external, middle, or internal ear. The auditory meatus may be impacted with wax (the commonest cause of temporary deafness), the products of inflammation, etc., or the tympanic membrane may be thickened, have adhesions, be the subject of other diseases, or suffer from wounds caused by violence. Another common cause of deafness is the closure of the Eustachian tube at its opening into the upper part of the throat. A serious and common cause of pain in the ear is inflammation, suppurative or not, of the tympanic cavity (middle ear). This often has a discharge coming from it, and its seriousness is due to its proximity to the brain, to which inflammation may extend and cause death. As soon as possible the ear should be syringed out with a mild antiseptic solution, and the external meatus plugged with cotton wool to dry

up the moisture. A skilled ear specialist should always be consulted in regard to ear conditions, as their sequel may be very serious.

FOREIGN BODIES in the ear can usually be removed by syringing with warm water or by dropping in warm glycerin. See DEAF AND DUMB, SOUND.

EARL (Dan. *jarl*), Eng. title, corresponding to foreign count (note *countess* for an e.'s wife), one of five ranks of Eng. peerage. Anglo-Saxon earls were more like vassal kings, and in Norman times earldoms were powerful and extensive. Like other titles it became personal rather than territorial. The oldest existing earldom is Mar (Scot.—early XI. cent.). Some mediæval Eng. earldoms still survive.

EARL MARSHAL, position held by Duke of Norfolk, who as such is head of College of Arms, and has organisation of Coronations and State ceremonies.

EARLE, JOHN (d. 1665), Eng. bp.; famed for humorous *Microcosmographie.*

EARLE, RALPH (1751–1801), Amer. artist; portraits and hist. subjects.

EARLOM, RICHARD (1742–1822), Eng. mezzotint engraver.

EARLSTON (55° 39′ N., 2° 40′ W.), market town, Berwickshire, Scotland; traditional abode of Thomas the Rhymer (*Ercildoune*).

EARLY, JUBAL ANDERSON (1816–94), Amer. soldier; practised law; served in Mexican war; general in Confederate army in Civil War.

EARN (56° 23′ N., 4° 11′ W.), loch, Perthshire, Scotland; drained by river EARN, which, issuing from E. end, flows E. and enters Firth of Tay; course, 40 miles.

EAR-RING, pendent ornament to hang from the lobe of the ear, used both by savage and civilised races, and, in some countries, by both sexes. The use is of great antiquity, and there is reference to these ornaments in *Genesis.*

EARTH.—The earth is the third planet from the sun, round which it revolves in 365·26 days, and it also rotates about its own axis once in every 23 hrs. 56 min. 4·09 secs. It is a globe poised in space. Among the ancients the e. was thought to be a large disc surrounded by water, and various means of support were ascribed—by the Greeks, columns which in their turn were upheld by the god Atlas; by the Egyptians and Hindus, elephants, who stood on an enormous tortoise swimming in the sea.

Aristotle was the first to teach that the e. was spherical, and his arguments were similar to those used at the present time, viz. all heavenly bodies are round; the shadow of the e. on the moon during an eclipse is round; the appearance of the sky at night varies when viewed from different parts of the e.'s surface; the masts of ships appearing and disappearing on the horizon are first and last to be seen. It was not, however, until the world had been circumnavigated that its spherical form was firmly established.

The exact determination of the e.'s size and shape is one of the most brilliant achievements of applied mathematical science, and is of the utmost value in astron., where a number of measurements can only be expressed in terms of the e.'s radius. The e. is not a perfect sphere. It is slightly flattened at the poles, and bulges at the equator, the lengths of the equatorial and polar diameters being 7925·6 and 7899·14 miles respectively. In shape it is, therefore, an *oblate spheroid,* that is, the figure produced by the revolution of an ellipse about its shorter axis. But the deformation is so small that it is only revealed by careful measurements and observations such as the following: If the e. were truly spherical, the length of a degree of latitude would be the same wherever measured. This is, however, found to increase with distance from the equator, which could only be the case if the deviation from the spherical form was of the nature just mentioned. The actual measurement of a meridian is a very laborious and delicate process, and the final calculation is dependent on the measurement, correct to a couple of inches, of a 'base' line four or five miles long. In 1743 Clairault published a mathematical investigation on the figure of the e., and showed that its ellipticity could be obtained from a knowledge of the centrifugal force (due to the e.'s rotation) and the value of gravity at the equator, together with that of gravity at one or two places in different latitudes. The effect of the centrifugal force is slightly to counteract that of gravity, which is itself dependent on distance from the e.'s centre. If the e. were therefore a true sphere which did not rotate, the force of gravity would be the same at all places on its surface. Now the centrifugal force can be calculated, and gravity at any place can be determined from the length and time of swing of a simple pendulum. Biot, in 1808, was the first to make such observations, which have since been repeated by many others, notable among whom was an Englishman, Captain Henry Kater, who devised a special pendulum for the purpose. These observations prove that places at high latitudes are nearer the centre of the e. than those on the equator.

Further evidence of the e.'s ellipticity is supplied by careful measurements of the planets, which reveal a similar flattening at the poles—a result proved mathematically to be entirely due to rotation about an axis, and depending on the speed with which it is accomplished. The planet Jupiter serves as a beautiful illustration of this, the difference between the polar and equatorial diameters being immediately apparent without any refined measurements. The time of rotation of Jupiter is under 10 hours. The *precession* of the e.'s axis is also only explicable on the ground that the e. is elliptical. As the means of observation and measurement become more and more refined, greater precision in our knowledge of the e.'s figure and size is obtained. Thus, only recently it has been discovered that the equatorial circle is slightly elliptical. See TIDES, MAGNETISM (TERRESTRIAL).

Sir Robert Ball, *The Story of the Heavens.*

EARTH CURRENTS, see under TELEGRAPH.

EARTH-NUT, root-stock of *Conopodium denudatum,* an umbelliferous European plant; about size of chestnut; edible.

EARTHENWARE, see POTTERY.

EARTHQUAKE, see SEISMOLOGY.

EARTHWORM, small regularly segmented invertebrate, devoid of specialised sense organs, which feeds on the decaying vegetable matter in soils, this being effectively turned over and broken up in the process.

See Darwin, *Vegetable Mould and Earthworms.*

EARWIG (*Forficula auricularia*), a brownish insect, abundant in gardens, characterised by possession of a pair of pincer-like processes at posterior end of body; name derived from *supposed* habit of creeping into ears of sleeping persons.

EASDALE (56° 17′ N., 5° 39′ W.), island, near Oban, Scotland; has slate quarries.

EASEMENT, legal term meaning the use of, or benefit in, land or property, without proprietorship, which may arise in one of three ways: (1) by express or implied grant of the owner; (2) by virtue of the doctrine of lost grant; and (3) by virtue of the Prescription Act (1832). Thus it is provided by this Act that where a person has enjoyed a right to the free and uninterrupted flow of light over his neighbour's [illegible] years, unless he has obtained the written consent of the owner of the property for the use and enjoyment of the light, he obtains a perpetual right to enjoy that light, and he can obtain an injunction to restrain his neighbour from building on the land in such a way as to interrupt the flow of light. Similar claims apply to right of way.

EAST AFRICA, see BRITISH EAST AFRICA, GERMAN EAST AFRICA, PORTUGUESE EAST AFRICA.

EAST, SIR ALFRED (1849–), Eng. landscape artist and etcher; A.R.A. (1882); Pres. R.B.A. (1906).

EAST ANGLIA, kingdom of Anglo-Saxon England; probably founded early in VI. cent.; converted to Christianity VII. cent.; Sigeberht was a famous king;

under Mercian supremacy till 825, when Egbert of Wessex was acknowledged lord.

EAST CHICAGO (41° 38′ N., 87° 27′ W.), city, Indiana, U.S.A.; iron and steel manufactures. Pop. (1910) 19,098.

EAST DEREHAM (52° 41′ N., 0° 57′ E.), market town, Norfolk, England; has interesting cruciform church; iron foundries. Pop. (1911) 5729.

EAST GRINSTEAD (51° 7′ N., 0° 1′ W.), market town, Sussex, England. Pop. (1911) 7090.

EAST HAM (51° 32′ N., 0° 3′ E.), town, Essex, England. E. suburb of London. Pop. (1911) 133,504.

EAST INDIA COMPANY (popularly known as 'John Company') was founded in England in 1600. Its sphere included both what is now called India and the East Indies. For about fifty years it did not progress much, having to struggle against the Dutch. Its activities soon became confined to India, and the foundations of Brit. Imperial power were laid. Its power was consolidated and brought more under control of the Government in 1773. It became political rather than commercial, and was abolished when Ind. Government was taken over by Crown in 1858. See INDIA.

EAST INDIES, loose collective name formerly applied to India, Farther India, and Malay Archipelago; now restricted to last-mentioned.

EAST LIVERPOOL (40° 40′ N., 80° 31′ W.), city, on Ohio, Columbiana County, Ohio, U.S.A.; extensive potteries. Pop. (1910) 20,387.

EAST LONDON (32° 59′ S., 27° 52′ E.), important seaport town, Cape Province, S. Africa. Pop. (1911) 21,277 (including 12,552 whites).

EAST LOTHIAN, see HADDINGTONSHIRE.

EAST ORANGE (40° 44′ N., 74° 15′ W.), city, New Jersey, U.S.A.; residential suburb, 12 miles W. of New York; electrical machinery. Pop. (1910) 34,371.

EAST PROVIDENCE (41° 47′ N., 71° 27′ W.), town, Providence County, Rhode Island, U.S.A.; chemical works. Pop. (1910) 15,808.

EAST PRUSSIA (54° N., 21° E.), N.E. province, Prussia, Germany, on Baltic Sea; corresponds to ancient duchy of Prussia. Surface, generally low, contains numerous small lakes, while lagoons known as Frisches Haff and Kurisches Haff extend along Baltic coast; chief rivers, Memel and Pregel. Soil is mostly fertile; amber found; leading industry, agriculture; horse-breeding; capital, Königsberg. Area, 14,266 sq. miles. Pop. (1910) 2,064,175.

EASTBOURNE (50° 46′ N., 0° 17′ E.), watering-place, on Eng. Channel, Sussex, England. Pop. (1911) 52,544.

EASTER, annual festival commemorating Christ's resurrection; falls about the time of the vernal equinox, *i.e.* the next Sunday following the first full moon of the calendar on or after March 21; forms the opening of the ecclesiastical year. In England method of computing the date was fixed by a synod held at Whitby (664). Previous to this time E. had been kept according to an earlier method of computation, which was rejected by the Western and retained by the Eastern Church. In 664, however, Britain adopted the practice of the Western Church. The name is derived from a Saxon goddess (Eastre) whose festival occurred about the same time, synchronising with a festival kept in classical times. The eating of 'hot-cross' buns on Good Friday is a survival of an ancient custom of making special 'Easter cakes' for the festival. See CALENDAR.

EASTER ISLAND (26° S., 110° W.), in Pacific Ocean, belonging to Chile and about 2000 miles W. of coast; of volcanic origin, contains number of extinct craters; area, 45 sq. miles; fertile soil, little cultivated; natives, Polynesians; noted for gigantic prehistoric statues; discovered by Davis, 1686; visited by Roggeveen, 1722; by Cook, 1774.

EASTERN BENGAL AND ASSAM, former province, India; created in 1905 out of E. portions of Bengal, consisting of Dacca, Chittagong, Rajshahi, Malda, Hill Tipperah, and whole of Assam; capital, Dacca. Area, 106,130 sq. miles; abolished, 1912, part being reunited to Bengal (*q.v.*) and part reconstituted as Chief-Commissionership of Assam (*q.v.*). Pop. (1911) 34,018,527.

EASTERN QUESTION, name given to complicated political problem produced by gradual break-up of Turk. Empire. In XIX. cent. first Greece became independent, then Rumania, Servia, Montenegro, and Bulgaria (until 1908 under Turk. suzerainty). Mutual jealousies of European Powers lest any one of them should seize some advantage, and possibilities of further disruption produced recurring political anxieties. Internal reforms in Turkey (1908–9) seemed to promise renovation of the Ottoman Empire, but the Turco-Italian War (1911–12) in Tripoli (*q.v.*) continued the process of disintegration, and the victorious campaign (1912–13) of the Balkan Allies in the Turco-Balkan War (*q.v.*) may be regarded as the long-expected death-bed scene of the 'Sick Man of Europe.' See also MACEDONIA, BALKAN PENINSULA, TURKEY, ARMENIA, ALBANIA.

Macdonald, *Turkey and the Eastern Question* (Jack, 1913).

EASTERN RUMELIA, see BULGARIA.

EASTHAMPTON (40° 57′ N., 72° 12′ W.), town, Suffolk County, New York, U.S.A., at E. extremity of Long Island.

EASTHAMPTON (42° 16′ N., 72° 40′ W.), town, Hampshire County, Massachusetts, U.S.A.; seat of Williston Seminary; cotton and rubber goods. Pop. (1910) 8524.

EASTLAKE, SIR CHARLES LOCK (1793–1865), Eng. artist; Pres. R.A. (1850); Director of National Gallery; subjects various; wrote several books on art.

EASTON (40° 43′ N., 75° 17′ W.), city, Pennsylvania, U.S.A., at junction of Delaware and Lehigh; seat of Lafayette College; iron and wire works. Pop. (1910) 28,523.

EASTPORT (44° 53′ N., 67° 2′ W.), city, seaport, Maine, U.S.A., on Moose Island; trade in lumber; fishing centre; sardine-canning. Pop. 5000.

EASTWICK, EDWARD BACKHOUSE (1814–83), Eng. Orientalist.

EATING, see DIGESTION, DIETETICS.

EATON, DORMAN BRIDGMAN (1823–99), Amer. lawyer; wrote on legal subjects and Civil Service reform.

EATON, THEOPHILUS (d. 1658), Eng. colonist; one of founders, and first gov. of New Haven, Mass. (1638).

EATON, WILLIAM (1764–1811), Amer. soldier; consul to Tunis, 1790; led expedition in Tripoli in 1805; took Derna.

EATON, WYATT (1849–96), Amer. artist; chiefly portraits.

EAU CLAIRE (44° 40′ N., 91° W.), city, Wisconsin, U.S.A., at mouth of Eau Claire; lumber, sawmills. Pop. (1910) 18,310.

EAU-DE-COLOGNE, scent; first made by Farina, an Ital. perfumer, at Cologne, during XVIII. cent.

EAUX-BONNES (42° 59′ N., 0° 24′ W.), watering-place, Basses-Pyrénées, France; mineral springs.

EBBW VALE (52° 46′ N., 3° 11′ W.), urban district, Monmouthshire, England; coal, iron, steel. Pop. (1911) 30,559.

EBEL, HERMANN WILHELM (1820–75), Ger. philologist.

EBEL, JOHANN GOTTFRIED (1764–1830), Prussian writer; author of Swiss guide-book.

EBER, PAUL (1511–69), Ger. theologian.

EBERBACH (49° 28′ N., 9° 3′ E.), town, on Neckar, Baden, Germany. Pop. 6136.

EBERHARD I. (1445–96), first duke of Württemberg; made pilgrimage to Jerusalem; founded Tübingen Univ.; gave constitution to Württemberg; cr. duke, 1495.

EBERHARD, CHRISTIAN AUGUST (1769–1845), Ger. poet.

EBERHARD, JOHANN AUGUSTUS (1739–

1809), Ger. thinker, theologian, and writer; prof. at Halle, 1778; a broad-minded and learned man.

EBERLIN, JOHANN ERNST (1702–62), Ger. composer.

EBERS, GEORG MORITZ (1837–98), Ger. Egyptologist; wrote many novels which gave, in popular form, the results of his researches.

EBERSWALDE (52° 50′ N., 13° 48′ E.), town, Germany, Pruss. province of Brandenburg; iron-works, nail-making. Pop. (1910) 26,064.

EBERT, FRIEDRICH ADOLF (1791–1834), Ger. bibliographer.

EBINGEN (48° 12′ N., 9° 2′ E.), town, Württemberg, Germany; cotton and wool. Pop. (1910) 11,423.

EBIONITES (Hebrew *Ebhyon*, poor), name given to early sect of Jewish Christians believing in Christ as Messiah but not in Incarnation; observed Jewish law, some trying to force it on all Christians.

EBNER-ESCHENBACH, MARIE (1830–), Austrian novelist.

EBOLI (40° 37′ N., 15° 4′ E.), town, Campania, Italy; ancient *Eburum*. Pop. 9577.

EBONY, the hard, black heart-wood of certain species of *Diospyros*, notably *D. reticulata*, found in Mauritius, and *D. Ebenum*, found in Ceylon.

EBORACUM, Rom. name of York (*q.v.*).

EBRARD, JOHANNES HEINRICH AUGUST (1818–88), Prot. theologian; prof. at Erlangen; wrote several works.

EBRO (40° 43′ N., 0° 53′ E.), river, N.E. Spain; rises in Cantabrian mountains; flows with southerly course for 440 miles, and enters Mediterranean below Tortosa; navigable for *c.* 180 miles; ancient *Iberus*.

EÇA DE QUEIROZ, JOSÉ MARIA (1843–1900), Portug. novelist; famous as stylist; Eng. trans. of several stories, including *Sweet Miracle*.

ÉCARTÉ, card game played by two persons with thirty-two cards, the small cards, two to six (inclusive), being removed from pack. Five cards are given to each player, and the eleventh turned up for trumps. King ranks highest, and the others in order are queen, knave, ace. The scoring is for king and the greater number of tricks, the game being five up; consult Cavendish's *Laws of Écarté*.

ECBATANA (34° 46′ N., 48° 30′ E.), supposed ancient capital of Media, at foot of Mt. Orontes (now *Elvena*); summer residence of Persian and Parthian kings.

ECCARD, JOHANN (1553–1611), Ger. composer.

ECCELINO DA ROMANO, EZZELINO (1194–1259), Ghibelline leader; served under Frederick II.; excommunicated for great cruelties; figures in Dante's *Inferno*.

ECCENTRIC, a device to produce a reciprocating motion from a rotary one; is used also to actuate the valves of engines, etc. It is a small crank. In detail, a disc carries the crank-shaft at some distance from its centre. This disc or 'sheave' is made in two pieces to embrace the crank shaft, and the pieces are held together by a steel clip or strap. The centre of the disc moves round the shaft on a circular path.

ECCLES (53° 28′ N., 2° 21′ W.), extensive suburb, Manchester, England; cotton mills. Pop. (1911) 41,946.

ECCLESFIELD (53° 22′ N., 1° 28′ W.), town, W. Riding, Yorkshire, England; cutlery. Pop. (1911; Registration sub-district) 22,409.

ECCLESHALL (52° 52′ N., 2° 16′ W.), market town, Staffordshire, England; remains of former palace of bp's of Lichfield. Pop. 3700.

ECCLESIA (Gk. *ekklesia*=assembly), name given to the ancient Athenian assembly. It was given certain powers by Solon's legislation, but their exact nature is uncertain. Probably the *Thetes* were admitted to it, and it elected *Eupatrid*, magistrates. Its powers were increased later. Any Athenian over eighteen could be elected to it. From the IV. cent. onwards members received payment. All matters brought before the e. were first dealt with by the *boule* (council). Its decision was called a *psephisma*, and had the force of law. It also possessed certain administrative and judicial functions.

ECCLESIASTES, or the 'Preacher,' one of the books of the Wisdom lit. of the Old Testament. Its leading idea is expressed in the words, 'Vanity of vanities—all is vanity.' The only thing a man can do is to enjoy life while it lasts. The author is not an atheist, or even a materialist, but he is without the vivid faith of the prophets. To get pleasure, though not vicious pleasure, is the only thing to be done. There is no definite hope of immortality. The preacher regulates his life by wisdom; his whole attitude is that of not very cheerful moralising. It is questionable whether the work shares the influence of Gk. thought; some say there is nothing which cannot have been developed from earlier tendencies of Hebrew religion. The authorship is quite and the date somewhat uncertain, though undoubtedly late—probably B.C. 250–200. Some place it as late as Herod the Great. It cannot be earlier than the late Persian period. Its composite nature has been asserted by some critics—though on insufficient grounds. The style is unclassical, and words and constructions appear which are frequent in Aramaic and the Mishnah.

Driver, *Introduction to Lit. of Old Testament*; recent commentaries by Barton, Martin, M'Neile.

ECCLESIASTICAL.—The Gk. word *ekklesia* used to mean generally the assembly of freeborn citizens, and in the Septuagint the assembly of Israel was used by Christ to designate the visible society of His own foundation, whence the term 'ecclesiastical' has come to describe something which is connected with or bears upon the Church.

The **Ecclesiastical Commissioners**, or 'Ecclesiastical and Church Estate Commissioners for England,' is a body of sixty clerical and lay members, with various duties relating to Church property, particularly administering certain estates for a common fund to augment livings and help poor parishes.

Ecclesiastical Jurisdiction is the term applied to that authority exercised by the Church over its own members, whether in spiritual or temporal concerns, or over the laity. From the beginning, the Christian Church undoubtedly possessed certain disciplinary powers over those within it, and instances of this can be found in the New Testament. But they were generally confined to spiritual matters. Until the Edict of Milan the Church was an illegal institution, and hence could not really have any rights within the Rom. Empire. Nevertheless, from about 250 A.D. rights were sometimes recognised, for the deposition of Paul of Samosata by the Church of Antioch was recognised by the Imperial authorities. From the time of Constantine, when Christianity became the State religion, its power grew in judicial as in other matters. The authority of the Church is, now onwards, backed up by the State. Bp's were often tried not only for doctrinal but for moral offences, and the system of appeal was developed. In the V. cent. dioceses were grouping themselves into large units, and thus the great patriarchs come into being, Rome attaining pre-eminence—witness Gratian's rescript (378) entitling the Rom. bp. to judge bp's in consultation with others. Rome was now the centre of appeal from all the West, except the Celtic Churches. Constantinople held a similar position for the East. Meanwhile a practically double system of punishment was developing by which an offender might be punished spiritually by public penance or otherwise 'for the good of his soul,' and also in the ordinary civil courts. Under Theodosius secular power was first given to ecclesiastical tribunals.

Between the IV. and IX. cent's the Church punished chiefly by excommunication and exclusion from the sacraments; clerical offenders were suspended or deposed. Banishment and other punishments also came to be inflicted. In the later Middle Ages, however, an elaborate system of canon law came to be developed, and the Church Courts possessed great and far-reaching powers. Feudalism contributed its

share to this process, *e.g.* bp's, like other feudal lords, appointed officials to preside over their courts. Archdeacons also obtained authority, and by the Constitutions of Clarendon (1164) it was provided there was to be appeal from their courts to those of the bp. The Constitutions—one of the most important documents, be it noted, for the relation of Church and State in mediæval England—also allowed appeal from the bp. to the Metropolitan. Things became more complicated, and a number of special jurisdictions emerged. An endeavour was made to check appeals to Rome, and in several European countries there was provision made for appeal to a secular prince, and certain limits were set by the State to papal jurisdiction. The Constitutions of Clarendon had prohibited appeals to Rome, but the reaction which followed the murder of Becket made the provision of no effect. The termination in a way which displeased him of the divorce suit between Henry VIII. and Catherine of Aragon (which had been taken to Rome) was the cause of the king's anti-papal legislation. At first, appeals to Rome were restricted, no mention being made of the authority of the king, then they were abolished altogether, and were to go in future to the king in Chancery.

The *jurisdiction* of the Church Courts was wide, and included cases of matrimony and legitimacy, testamentary and succession cases, Church lands if held in *frankalmoigne*, i.e. by a spiritual tenure (from the XIII. cent. these were transferred to the King's Court), titles to benefices, administration of gifts to churches, questions arising from promises given on oath, etc. The jurisdiction of these courts over laymen included moral offences, also heresy, schism, and witchcraft; over the clergy, all these, and in addition offences of misconduct in their sacred office. The *punishments* inflicted were various, and might include fines, imprisonment, deprivation, suspension, deposition, and the more purely spiritual penalties of suspension, interdict, and excommunication. Death, usually by burning, could be inflicted as punishment for heresy. Many of these powers are still possessed by Ecclesiastical Courts in England to-day, at least theoretically, though many, too, have been taken over by the State. The Church Discipline Act of 1892 empowers the Courts to try clerks for immorality, with appeal to the Privy Council. At the present time the **Ecclesiastical Courts** have power over the discipline of the clergy, and of the laity (nominally) in morality, of lay office holders, claims to ecclesiastical offices, and church buildings. They have (not now in England the authority they had formerly; they are *Court of Arches*, with a 'Dean,' since 1874 app. by abp's to exercise jurisdiction in ecclesiastical cases; *Court of Faculties*, with a master (who as Judge of the Provincial Courts of Canterbury and York presides over the Ecclesiastical Courts as a whole), *Vicar-General's Office* and *Court of Peculiars*, also *Dean and Chapter of St. Paul's Court*. The *Church of Scotland* has a *Kirk-Session*, a *Presbytery*, *Synod*, and *General Assembly* (the supreme court). The Anglican Church in its colonial branches has no lay jurisdiction except in purely spiritual things. Since the Reformation, ecclesiastical jurisdiction in the Prot. Churches abroad has ceased, though it still flourishes in the Rom. and particularly in the Eastern Churches.

Pollock and Maitland, *History of English Law*; Maitland, *Roman Canon Law in the Church of England*.

Ecclesiastical Law, that body of law dealing with the Church in relation to the State, or in its internal government. The Canon Law (*q.v.*) of the Rom. Church is much more elaborate than that of Anglican or Prot. Churches, and can only be controlled by the State so far as is allowed by the Church itself. The Eng. Church is governed by Parliament, Convocation possessing little real power. The non-established churches only come under the law if they contravene it, or so far as they hold property.

ECCLESIASTICUS (Gk. versions, the *Wisdom of Jesus, S. of Sirach*) is in Old Testament Apocrypha (but accepted as canonical by the R.C. Church); consists of a number of religious and ethical sayings; tone is individualistic, moral rather than spiritual, and has no hope of immortality; exact date is uncertain, probably about 180 B.C.; was written originally in Hebrew, but for long only known in Gk. and other versions; Hebrew fragments have been recently discovered, but it has been doubted whether these are of the original or trans. of a version.

The Apocryphal Books, Andrews (Jack); *Apocrypha*, Wace and Salmon.

ECGBERT (*c.* 802–39), king of West Saxons.

ECGBERT, ECGBERHT (d. 766), abp. of York, 735; successor of Paulinus.

ECGFRITH (*c.* 671–85), king of Northumbria; killed in battle with Picts.

ECHEGARAY Y EIZAGUIRRE, JOSÉ (1833–), Span. mathematician, statesman, and dramatist; b. Madrid; prof. of Math's; Minister of Education and Finance (1868–74); on restoration of monarchy took to lit., winning celebrity with striking dramas (e.g. *El Gran Galeoto*), which rank him as Spain's foremost modern dramatist; again app. Minister of Finance, 1905.

ECHIDNA, PORCUPINE ANT-EATER, egg-laying mammal of order *Monotremata*; common e. (*Echidna aculeata*) is found in Australia, Tasmania, and in New Guinea, where the three-toed e. (*Proechidna*) is also found. They are spiny and roll into a ball when attacked; the tongue is long and sticky, and is thrust into ant-nests.

ECHINODERMATA (Gk. *echinos*, a hedgehog; *derma*, the skin), **PRICKLY-SKINNED ANIMALS**; the diverse marine animals, Starfishes, Brittle Stars, Sea Lilies, Sea Urchins, and Sea Cucumbers, are ranged together in this group or *phylum*. They possess a radially symmetrical body and a skeleton of limy plates or rods, evident in the vast majority as projecting prickles or spines. These characters are so distinct that Echinoderms are unlikely to be confounded with any other kind of animal. But they have other characters in common, of which three are very apparent. Their habit of life is sluggish, for the Sea Lilies are generally fixed to rocks or stones, and the other members lie at ease or creep slowly on the sea-floor. Their movement is accomplished by means of sucker- or tube-feet (an external expression of a peculiar and characteristic 'water-vascular' system), which may be modified, as in Brittle Stars and Sea Lilies, to act mainly as organs of sense, respiration, or food-catching. Lastly, most have an extraordinary power of regenerating lost parts—Starfishes and Brittle Stars can lose and re-grow arm after arm, Sea Cucumbers and Sea Lilies can, on occasion, eviscerate themselves and replace the lost by new organs.

A better idea of the characters of the E., however, will be obtained by a short discussion of the five groups into which they fall.

CLASS I., **Starfishes, Asteroidea** (Gk. *aster*, a star; *eidos*, shape), star-shaped, hard-skinned creatures with five or more arms not distinct from the body; common in rock pools and in the sea at all depths. The mouth is in the centre of the lower side, and from it grooves run along the arms (ambulacral grooves), from which the sensory and locomotor tube-feet project. Within the arms are prolongations of the food tract. Starfishes are carnivorous, feeding chiefly upon bivalve molluscs, the shells of which they tear open by main force.

CLASS II., **Brittle Stars, Ophiuroidea** (Gk. *ophiouros*, serpent-tailed; *eidos*, shape), Echinoderms with a circular disc-like body on the margin of which are inserted five long snake-like arms. These are covered by an armour of plates, the ambulacral groove is replaced by a closed canal, and they contain none of the food tract. From the readiness with which the arms break has arisen the name Brittle Star. The mouth is on the under surface, and on it the animals creep by horizontal wrigglings of their arms aided occasionally

by their tube-feet. Their digestive system is of a simple nature, for their food consists of small worms and crustacea or more often simply of mud from which they extract the organic content.

CLASS III., **Sea Urchins, Echinoidea** (Gk. *echinos*, hedgehog; *eidos*, shape), globular, heart-shaped, or disc-like animals (Regular, Heart, or Cake Urchins), whose common name indicates their spiky appearance. The shape of a Sea Urchin is due to a complete cuirass of large limy plates arranged in five series, corresponding to the five arms of a Starfish. On the plates are hinged movable spines, which, with the tube-feet, serve as locomotor organs. Sea Urchins live mainly on seaweed, which they chew with a peculiar five-toothed mill (*Aristotle's lantern*) situated in the mouth on the under side of the body. The ovaries of Sea Urchins are esteemed as food in many countries.

CLASS IV., **Sea Cucumbers, Holothuroidea** (Gk. *holothurion*, a Sea Cucumber), sausage-shaped, mostly soft-bodied animals in which the limy skeleton characteristic of Echinoderms is frequently reduced to small plates buried in the skin. A Sea Cucumber crawls, wormlike, by muscular contractions of its body, aided in some cases by tube-feet. Respiration, in most, is carried on by a pumping of water in and out of the hinder end of the food canal—the cloaca. A ring of tentacles or feelers surrounds the mouth, and these collect mud and sand from which the organic substance is extracted for food, or form a resting-place for minute animals, which are afterwards engulfed. Some Sea Cucumbers are considered great delicacies, the best known being the Pacific 'Trepang' or 'Bèche-de-Mer.'

CLASS V., **Sea Lilies and Feather Stars, Crinoidea** (Gk. *krinon*, a lily; *eidos*, shape), graceful animals, which, at least in early life, are attached by a stalk to the sea-bottom. The mouth is on the upper surface, and the tube-feet are of service only in wafting to it currents of water, laden with minute animals for food. Stalk, body, and the delicately branched arms seem to be formed almost altogether of limy joints and plates, and make up elegant plant-like forms, sometimes three feet high. Sea Lilies and Feather Stars live in the deep sea, but their modern representatives are few in comparison with the hosts of extinct 'Lily-encrinites,' which inhabited the oceans of Palæozoic times.

ECHINOIDEA, see ECHINODERMATA.

ECHINUS, sea-urchin; in arch. rounded moulding of capital in Doric column.

ECHIUROIDEA, a group of specialised marine worms, characterised by possession of a highly extensible proboscis, at the base of which the mouth is situated, and by the occurrence of two recurved chitinous hooks on the anterior ventral surface of the body. This latter is sausage-shaped and unsegmented, and terminates posteriorly in the anus. In *Bonellia viridis*, one of the best-known forms, the male is minute and degenerate, living parasitically in the *nephridium* (excretory organ) of the female. The *Echiuroidea* lie hidden in rock clefts, the proboscis, which is used for collecting food, alone being visible.

ECHMIADZIN, ITSMIADSIN, monastery in Russ. Transcaucasia, founded (traditionally) by Gregory the Illuminator, 302; has a valuable library of Armenian literature.

ECHO (classical myth.), mountain nymph, one of the Oreades, who pined for love of Narcissus, till only her voice was left. See also SOUND.

ECHTERNACH (49° 48′ N., 6° 23′ E.), town, on Sure, Luxemburg; annual religious dancing procession probably originated in an effort to charm away an epidemic of St. Vitus' dance. Pop. 4200.

ECHUCA (36° 7′ S., 144° 48′ E.), town, river port, on Murray, Victoria, Australia; has extensive wool-stores and sawmills. Pop. 4075.

ECIJA (37° 32′ N., 5 9′ W.), town, on Genil, Seville, Spain; ancient *Astigi*; textiles and shoes. Pop. 24,372.

ECK, JOHANN MAIER (1486–1543), Ger. theologian; b. at Eck; app. prof. at Ingolstad, 1510; a learned and clever controversialist; one of the ablest Catholic apologists; replied to Luther's theses in his *Obelisci*; disputed with Luther, 1519; *Enchiridion locorum communium* very popular; disputed also with Zwingli, and helped to draw up reply to Augsburg Confession, 1530.

ECKERMANN, JOHANN PETER (1792–1854), Ger. poet; friend of Goethe; wrote *Conversations with Goethe*.

ECKERNFÖRDE (54° 27′ N., 9° 50′ E.), seaport town, Schleswig-Holstein, Germany, on inlet of Baltic; fisheries. Pop. 7500.

ECKERSBERG, KRISTOFFER (1783–1853), Dan. artist; classical subjects and landscapes.

ECKHART, JOHANNES (*c.* 1260 to *c.* 1327), Ger. Dominican theologian and preacher; called a 'speculative mystic'; follower of Aristotle and speculative theologian; suspected of unorthodoxy; some writings survive.

ECKHEL, JOSEPH HILARIUS (1737–98), Austrian antiquary and numismatist.

ECKMÜHL, EGGMÜHL (48° 52′ N., 12° 11′ E.), village, Bavaria, Germany; Austrians defeated by French, 1809.

ECLAMESIA, a symptom of epilepsy (*q.v.*); a sudden attack of convulsions (*q.v.*) incidental to pregnancy, especially the first.

ECLECTICISM, term for any system in philosophy or theol. which is composed out of several others. Taking ideas from opposing schools may be sometimes advantageous, but owing to tendency to gloss over fundamental differences by confusion of thought, E. is sometimes spoken of contemptuously. Later Gk. philosophy specially was eclectic.

ECLIPSE.—When one heavenly body enters the shadow of another it is said to suffer an eclipse. With a large source of light like the sun, the shadow cast by a smaller body such as the earth or the moon consists of a long, conical shadow (*umbra*) where no light at all (apart from light refracted by the atmosphere) reaches, and a partial shadow (*penumbra*) surrounding the former. An e. of the moon can obviously only occur when the moon is in opposition, *i.e.* at the time of full moon. Similarly, an e. of the sun can only occur when the moon is in, or nearly in, conjunction, *i.e.* at the time of new moon. But since the moon's orbit is inclined to the ecliptic about 5°, an e. of the sun is impossible unless conjunction of the sun and moon takes place within about 16° of one of the nodes of the moon's orbit. The corresponding limit for a lunar e. is about 11°. E's of the sun may be *total*, *partial*, or *annular*. Total e's can only be seen at places within the umbra of the moon's shadow, but as this is only about 236,000 miles long, and the mean distance of the moon is about 238,000 miles, total e's, when such occur, can only be visible over a small portion of the earth's surface. When the umbra does not reach the earth, as when the moon is near apogee, an annular e. is visible at places in line with the point of the shadow. In a total lunar e. the whole of the moon enters the umbra of the earth's shadow, and may then frequently be seen shining with a reddish coppery light, due to light from the sun being refracted by the earth's atmosphere, only the longer red rays being transmitted. In a partial lunar e. only a portion of the moon enters the umbra. Successive e's occur at regular intervals. One of these (*Saros*), of 18 years 11 days, has been known from remote antiquity. Much of our knowledge of the sun has been obtained from observations only possible during total e's. Thus, a few seconds before totality, the red light of the chromosphere is seen; and during totality observations of the prominences, the 'reversing layer,' and the corona have yielded much information.

Total Eclipses, Todd (Sampson Low); *Astronomy for Everybody*, Newcomb (Isbister).

ECLIPTIC, great circle of the celestial sphere,

plane of which contains sun's yearly path. Eclipses occur near this circle—hence name. See ARIES.

ECLOGITE, green and red rocks, consisting of omphacite and garnet or of smaragdite and garnet.

ECLOGUE, see POETRY.

ECOLOGY, the study of the adjustment and response of plants and plant communities to various environmental factors, these being on the one hand climatic or geographical, and atmospheric, and on the other edaphic, that is, concerned with soil characters. Warming has recently classified the atmospheric (*a*) and edaphic factors (*b*) as follows: (*a*) light, temperature, atmospheric humidity and precipitations, movements of the air; (*b*) the nutrient substratum, its constitution, structure, air, water, temperature, dimensions and nutriment, the kinds of soil, the problem as to the chemical or physical action of soil. Under the influence of these and certain other factors plants fall into thirteen ecological classes, viz.: *Hydrophytes*, purely aquatic, including plankton and marine floras, and the submerged vegetation of lakes, etc.; *Helophytes*, marsh formations, including tropical swamps; *Oxylophytes*, on acid soils such as peat; *Psychrophytes*, on cold soils such as tundras; *Halophytes*, saline soil formations; *Lithophytes*, rock formations such as lichens; *Psammophytes*, formations of sand-dunes and the like; *Chersophytes*, waste land formations; *Eremophytes*, desert and steppe formations; *Psilophytes*, savannahs; *Sclerophyllous* formations, Mediterranean maqui, karroo; *Coniferous forests*; *Mesophytes*, meadow and forest of temperate climes living under average conditions without great extremes.

Warming, *Œcology of Plants*; Tansley, *Types of British Vegetation*.

ECONOMICS (Gk. *oikos*, house; *nomos*, law), originally the 'art of household management,' is now the science or study of wealth—that is, of the material and exchangeable possessions of the individual, the family, and the State. The term 'economy' has come to be thought of in relation to saving; as a matter of fact, economy is rather the art of a wise expenditure, an art best achieved by the person or State with some knowledge of the science of political economy. (Hence economics is sometimes called an art and sometimes a science. Both terms are accurate. In the collection and investigation of the facts of wealth production and distribution, and in our arrival at various laws which the facts demonstrate, we treat economics as a science. In the use we make of this scientific knowledge, personally or nationally, we prove that economy is an art.)

The real importance of economics is recognised today, for unless there is some knowledge of how nations are maintained, and of what expenditure is profitable and what useless or mischievous, and some grasp of the principles of finance, nations and individuals alike are brought to ruin and bankruptcy. The economics of housekeeping imply knowledge of market prices in the matter of food, clothes, and rent, and the ability to put that knowledge into operation. National economics imply similar knowledge for the whole people. The statesman-economist will be aware of the general standard of life, and will understand whether the industrial conditions are raising, depressing, or keeping stationary that standard in the community. As the domestic budget on examination reveals either good or false economy, so the annual budget of the Chancellor of the Exchequer makes it plain whether the revenue of the State is being wisely raised and profitably expended, or whether, in defiance of all economy, the methods of supply are oppressive and the expenditure wasteful and extravagant. The material prosperity of a nation depends so largely on the knowledge of economics in its Chancellor of the Exchequer and its legislators, and on the resolution to act upon knowledge, that whole communities languish in misery, devastated by disease and premature death, where this knowledge and resolution are lacking. The social questions of the day, relations of labour and capital, housing, land tenure, tariff reform, etc., are only to be solved satisfactorily by the growth of economic knowledge. (Of course scientific knowledge alone may not cure all social ills, there must be persons of good will to carryout the conclusions of economic science.)

Practically the science of economics is modern, not dating back earlier than the XVII. cent., though the scientific learning of the Middle Ages covered the social relations of man and his fellows. The discovery of America and the wide development of foreign trade made political economy inevitable, and Adam Smith was its greatest expounder in the XVIII. century. Many economic theories of Adam Smith and his followers have been discarded as knowledge has increased, and the data for establishing theories have changed (notably the theory of the 'economic man,' whose sole motive in life was the pursuit of riches, who bought cheap and sold dear, and who if he was a workman readily transplanted himself to the other end of the earth for the sake of a rise in wages).

Marshall, *Principle of Economics*; W. J. Ashley, *Economic History*; Cannan, *History of Theories of Production and Distribution*.

ECSTASY, a vividly emotional state, or, in its religious usage, the absorption of the mental faculties in religious contemplation to such an extent that the normal sense action is suspended. The fact of conscious mental activity differentiates e. from catalepsy, but it is not clear that the phenomena are incapable of a purely psychological explanation.

ECTOPROCTA, a class of Polyzoa (*q.v.*).

ECUADOR (1° 30′ N. to 4° 45′ S., 73° 30′ to 81° W.), republic, N.W. of S. America, on both sides of Equator (hence name).

E. is bounded N. by Colombia, E. by Brazil, S. by Peru, W. by Pacific Ocean (coast-line of *c.* 600 miles); area, 116,000 sq. miles. Surface consists of low-lying coastal region stretching inland to foot-hills of the Cordillera; hill country along Andes themselves, with plateaux 9000 ft. above sea-level; and woodland of Provincia del Oriente, on slope from Andes eastward by head-waters of Amazon; great part of this district is claimed by Peru (*q.v.*). Many of peaks of Andes in E. are active volcanoes; principal summits, Chimborazo (20,500 ft.), Cotopaxi (19,610 ft.). Ecuador is drained to E. of Andes by Napo, Cururay, and other streams of Amazon system; on W. are Daule, Vinces, Guayaquil, and other rivers flowing to Pacific. Lakes include Anatico, Supay, Aucacocha, in Provincia del Oriente, while in mountain districts are many tarns. Chief towns are Quito (capital), Guayaquil, Cuenca, and Riobamba. The Galapagos Islands, 730 miles off W. coast, belong to Ecuador. Climate is tropical in lowlands, mean temperature being over 82° Fahr.; in highlands there is an equable perpetual spring. In the E. there is heavy rain throughout year; in W. and mountain plateaux there is hot rainy season from Dec. till May. Ecuador is subject to earthquakes.

History.—For many cent's before the discovery of America, chief power in E. was held by the Shiris of Quito, last of whom was defeated by Husina Capac, Inca of Peru, towards end of XV. cent.; E. was thus annexed to Inca kingdom, with which it was conquered by Spain about 1532; became presidency of Span. Peru in 1548, and so remained (except for twelve years in early XVIII. cent.) until, like other Span. colonies, it attained independence in 1822; formed part of republic of Colombia until 1830, when it became a separate republic; since then its history has been one of constant insurrections and revolutions, while boundary disputes with Colombia and Peru have occurred.

Government is republican; executive is in hands of Pres. (chosen by popular vote for four years); there are two legislative houses, a senate of 32 members and a lower house of 48 deputies; these are both elected by popular vote. Pres. is assisted by vice-pres., 5

ministers, and a council of state, of which the vice-pres. and ministers are members. E. is divided into 16 provinces and one territory for purposes of local administration. Education is free and compulsory. State religion is R.C. There is a small army numbering some 8000. Military service is compulsory by Law of 1902. Most of the population is Indian, those of mixed blood forming one-third, and whites about one-twelfth. Pop. (1910) *c.* 1,500,000.

Resources.—For a S. American country E. is poor in minerals; gold is found, and was produced to the value of £25,000 at Zaruma in 1910; silver, platinum, petroleum, copper, and other minerals exist, but, owing to difficulties of transport, have not been greatly developed. Vegetation is everywhere luxuriant; cocoa is at present the staple produce, and sugar, coffee, and rubber are also cultivated; cereals, tropical fruits, tobacco, and cotton are produced, and in forests are valuable medicinal and other plants—sarsaparilla, balsams, cinchona, vegetable ivory, caoutchouc, etc. Industries are unimportant; straw hats and woollens are manufactured. Chief exports are cocoa, ivory-nuts, rubber, silver, straw hats, sugar, coffee, gold; chief imports, textiles, machinery, food-stuffs, oil, iron goods, wood. Railway mileage is about 400 miles.

Kean and Markham, *Central and South America*, vol. i. (1909).

ECUMENICAL, see ŒCUMENICAL.

ECZEMA, catarrhal inflammation of the skin; in the first stage the skin is swollen and reddened with little pimples and has vesicles, which burst easily, letting a fluid out; in the second stage the external layer of the skin is peeled off, leaving a swollen, red, encrusted surface; and if the disease goes on to a third stage and becomes chronic without treatment, the discharge disappears, and a scaly patch is left. Any part of the body may be the site of the disease, and there is a burning or intensely itching feeling.

The treatment differs with the different stages; in the early stage rest, soothing applications, *e.g.* zinc oxide, lead, or bismuth, as lotions or powders, and saline aperients, and antimony, or, for children, calomel, internally. In the later stages tar, carbolic acid, salicylic acid should be added as external stimulants. In chronic stages ointments of the above should be smeared on thickly, while tonics and a change of air are beneficial.

EDAM (52° 31′ N., 5° 3′ E.), town, Netherlands, province of N. Holland, with port on Zuider Zee; cheese. Pop. (1910) 6623.

EDDA, two Icelandic works dealing with Scandinavian myth. The 'Elder' E. consists of thirty-three mythological and legendary poems written during IX., X., and XI. cent's, the existence of which was discovered by Brynjulf Sveinsson in 1643. The 'Younger' or prose E., written by Snorri Sturluson, about 1230, only came to light in 1628. It contains the fullest information extant upon Norse myth.; also treatises on poetry and prosody. Eng. trans. of latter in Mallet's *Northern Antiquities* (Bohn's Series).

EDDIUS (VII. cent.), Anglo-Saxon author; wrote *Life of St. Wilfred.*

EDDY, MARY BAKER GLOVER (1821–1910), Amer. religious leader, founder of Christian Science (*q.v.*).

EDDYSTONE, see LIGHTHOUSE.

EDELINCK, GERARD (1649–1707), Flemish engraver; foremost of his time.

EDEN.—(1) (54° 57′ N., 3°5′ W.) river, Westmoreland, England. (2) (56° 22′ N., 2° 53′ W.) river, Fife, Scotland.

EDEN, GARDEN OF (*Genesis* 2[8]), may mean 'pleasure, delight,' but probably from Assyrian word for 'plain,' *i.e.* alluvial plain of Tigris and Euphrates; has been identified with various regions, *e.g.* Armenia, Palestine, Mongolia, by different writers.

EDEN, SIR ASHLEY (1831–87), Anglo-Ind. official; some time Lieut.-Gov. of Bengal.

EDEN HALL, LUCK OF, goblet of painted glass at Cumberland home of the Musgraves, upon which the family's safety and welfare is said to depend.

EDENBRIDGE (51° 12′ N., 0° 4′ E.), market town, on Eden, Kent, England.

EDENKOBEN (49° 18′ N., 8° 11′ E.), town, Bavarian Palatinate, Germany. Pop. 5144.

EDENTATES (order *Edentata*), an order of primitive Eutherian mammals found in America, Asia, and Africa. Their name, signifying 'Toothless Animals' is misleading, for while functional teeth are absent in some, in others a series of similar teeth, lacking enamel, develops. In all forms, however, front or incisor teeth are absent, in most there are no functional milk teeth, and Ant-Eaters have no teeth at all. The feet are furnished with long, strong, non-retractile, and curved claws, adapted for climbing or burrowing, but causing the animals to walk with awkward gait. They are vegetarian, or in the majority of cases insectivorous. Fossil forms have been found in Upper Cretaceous formations in S. America.

The Order EDENTATA falls into 2 distinct sub-orders, with few structural features to connect them:—

The New World forms are grouped in Sub-Order I., XENARTHRA, the members of which have accessory articulations on the lumbar and posterior dorsal vertebræ. They include the SLOTHS (*Bradypodidæ* or *Tardigrada*), arboreal mammals which move back downwards amongst the branches in South and Central American forests, clinging always with their curved claws. They are shy, nocturnal, dull creatures, and live on leaves, young shoots of trees and fruits. ANT-EATERS (*q.v.*) (*Myrmecophagidæ*) are confined to Central and S. America, but ARMADILLOS (*q.v.*) (*Dasypodidæ*) range northwards to Texas. Remains of many extinct forms have been found in the Tertiary formations of America; the gigantic GROUND SLOTHS (*Megatherium*, etc.), rivalling the elephant in bulk of body, and somewhat resembling sloths and ant-eaters; the scarcely less large MYLODON, with dermal bony plates; the herbivorous GLOSSOTHERIUM, probably domesticated by prehistoric Patagonians; and the armadillo-like GLYPTODON and its relatives, with body protected by a coat of bony plates.

The Old World Edentates form Sub-Order II., NOMARTHRA or EFFODIENTIA, without accessory articulating processes on the lumbar and dorsal vertebræ; only two distinct families: PANGOLINS (*Manidæ*), found in Africa, India, and S.E. Asia, burrowing creatures with strong, horny scales, which completely shield them when they roll into a ball, no teeth, but a long protrusible tongue for catching termites on which they mainly feed. The AARD-VARKS (*q.v.*) (*Orycteropodidæ*) are confined to Africa.

EDENTON (36° 3′ N., 76° 37′ W.), town, port, N. Carolina, U.S.A.; near mouth of Chowan River; fisheries. Pop. 3000.

EDESSA, ancient capital of Macedonia; modern Vodena.

EDESSA (37° 11′ N., 39° E.), ancient city, N. Mesopotamia, between Aleppo and Diarbekir; figures prominently in early Church history. In 137 B.C. E. became capital of an independent kingdom; Rom. military colony, 216 A.D.; near E. Caracalla was murdered, 217; became a seat of Christianity and Syrian learning, with many schools and monasteries; city held sacred by Moslems as home of Abraham; taken by Moslems, *c.* 640. A Christian principality founded here by Crusaders (*c.* 1100) was destroyed by Muslims, *c.* 1150; since 1637 E. forms part of Turkish Empire. E. has interesting archæological remains. Modern town, called URFA, is a flourishing centre for cotton industry and has large grain trade; inhabitants mostly Christian Armenians. Pop. 55,000.

EDFU (24° 59′ N., 32° 41′ E.), town, on Nile, Upper Egypt; ancient *Apollinopolis Magna*; has most perfect existing example of Egyptian temple (*c.* 200 B.C.). Pop. 14,267.

EDGAR, THE PEACEFUL (944–975), Eng. king; s. of Edmund I.; succ. his bro. Eadwig in 959; became

emperor of Britain; rowed on the Dee by six vassal kings.

EDGAR ATHELING (*c.* 1058–1125), Eng. prince; grandson of Edmund Ironside; after death of Edward the Confessor was next heir to Eng. throne, but his claim was never strongly advanced, and he subsequently lived on peaceful terms with the Norman kings.

EDGEHILL (52° 7′ N., 1° 30′ W.), ridge, Warwickshire, England; scene of first battle in Civil War, Oct. 23, 1642.

EDGECUMBE, EDGCOMBE, famous W. of England family, to which belonged Barons (now Earls) of Mount E.

EDGEWORTH DE FIRMONT, HENRY ESSEX (1745–1807), Fr. ecclesiastic; confessor to Louis XVI. at his execution; author of *Memoirs*.

EDGEWORTH, MARIA (1767–1849), Irish novelist; dau. of Richard Lovell E. (*q.v.*); her first novel, *Castle Rackrent* (1800), was followed by *The Absentee*, *Ormond*, and other stories. She excelled as a delineator of Irish character, and her works were otherwise distinguished by humour and originality. Her success inspired Scott to undertake the 'Waverley' novels.

Lawless, *Life* (English Men of Letters).

EDGEWORTH, RICHARD LOVELL (1744–1817), Eng. author; Irish landlord and M.P.; devoted to agriculture and mechanical science; invented several useful contrivances; friend of Thomas Day (*q.v.*), who wrote *Sandford and Merton* at his suggestion; works miscellaneous; *Memoir* by his dau., Maria E. (*q.v.*), upon whose character and writings he exercised great influence.

EDGREN-LEFFLER, ANNE CHARLOTTE, DUCHESS OF CAJANELLO (1849–92), Swed. authoress; stories and realistic sketches of Swed. life.

EDHEM PASHA (1815–90), Turk. grand vizier.

EDINBURGH (55° 59′ N., 3° 15′ W.), capital of Scotland, on Water of Leith, adjoining Leith (*q.v.*) and skirting Firth of Forth at Portobello and Granton (suburbs). E. is famed for its natural beauty, stirring history, literary and romantic associations, and educational institutions. Its situation—built on and amid hills (Castle Rock, Calton, Arthur's Seat, Blackford Hills, Braids, Corstorphine, etc.)—near the sea, its architecture, and its renown as a centre of learning have earned E. title of 'Modern Athens.' The Castle—containing St. Margaret's Chapel (XI. cent.), Queen Mary's Room, Scottish Regalia, etc.—overlooks both Old and New Town. Historic High Street runs down to ruined Holyrood Abbey (begun *c.* 1128 on site of earlier church: royal tombs) and Palace (dating from XV. cent.: Queen Mary's and Darnley's Apartments). Other notable features of Old Town are lofty houses and quaint 'closes,' streets, and squares, St. Giles' Church (XV. cent.), Parliament House (Law Courts), Tron Kirk (1637), Municipal Buildings, John Knox's House, Tolbooth, Moubray, Moray, and Huntly Houses, and Greyfriars' Church.

Princes Street in New Town ranks among finest streets in world; Scott Monument, Royal Institution, National Picture Galleries, Register House, and many handsome buildings; unfinished National Monument, Nelson's Monument, etc., on Calton Hill; beautiful gardens and view of Castle. Other notable features of E. are M'Ewan and Usher Halls, National and Antiquarian Museums, Royal Infirmary, Waverley Station (largest in U.K.), Public Library, Advocates' Library, National Portrait Gallery, Royal and City Observatories, Botanical Gardens, St. Bernard's Well, many fine parks (King's Park, Meadows, etc.), historic mansions, dignified streets, and pleasant suburbs.

Although a residential, professional city rather than manufacturing town, E., in printing, publishing, bookbinding, insurance, banking, and retail shop-keeping, claims to be second to London alone in U.K.; other industries include brewing, distilling, milling, baking, rubber-works, engineering, chemicals, scientific instruments, paper-making, fisheries. Education is called E.'s 'chief industry'; one of the greatest educational centres in world; Univ. (founded 1582; great medical school); many fine secondary schools, including Royal High School (XVI. cent.), George Heriot's School (1659), four Merchant Company Schools, Academy, Fettes College, Merchiston; Donaldson's Hospital and other charitable schools; Heriot-Watt College (technical and commercial), Royal College of Surgeons, Dental, Veterinary, Agricultural, Art, Training, and other Colleges.

Edwin of Northumbria founded E. (*Edwin's Burgh*) *c.* 620, on site of ancient Celtic stronghold; E. made a royal burgh by David I., early XII. cent.; took prominent part in Civil and Anglo-Scottish Wars; Leith port assigned to E. by Robert Bruce, 1329; charter granted by James III., 1482; thenceforward recognised capital of kingdom and hub of its history; James VI. removed Court to England, 1603; Union abolished Scot. Parliament and threatened E. with ruin, 1707; Prince Charlie entered E., 1745; New Town begun in later XVIII. cent.; great literary outburst under Scott (*q.v.*), *c.* 1800. Pop. (1911) 320,318.

Geddie, *Romantic Edinburgh* (1911); *Official Guide* (1912).

EDINBURGH REVIEW, founded 1802; famous journal edit. by Jeffrey (*q.v.*); in it Macaulay's *Essays* appeared.

EDINBURGHSHIRE, see MIDLOTHIAN.

EDISON, THOMAS ALVA (1847–), Amer. inventor of phonograph, megaphone, aerophone, cinematograph, incandescent light system, microtasimeter for estimating temperature changes, carbon telephone transmitter, multiplex telegraphic system, Gold and Stock printing telegraphs; has improved electric traction. *Life*, by Dyer and Martin (2 vols., 1910).

EDMONTON (51° 37′ N., 0° 3′ W.), town, Middlesex, England; burial-place of Charles Lamb. Pop. (1911) 64,820.

EDMONTON (53° 30′ N., 113° 5′ W.), town, Alberta, Canada, on Saskatchewan; lignite coal-mining centre; fur trade. Pop. (1911) 24,882, estimated (1913) 55,000.

EDMUND (fl. 855–70), king of East Anglia; defeated and slain by Danes; canonised as saint for religious constancy.

EDMUND I. (d. 946), king of the English; s. of Edward the Elder; succ. his half-bro., Athelstan, in 941; successful warrior.

EDMUND (1245–96), Earl of Lancaster and king of Sicily; Crusader.

EDMUND 'IRONSIDE' (989–1016), Eng. king; s. of Ethelred II.; renowned for valour.

EDMUND, ST. (d. 1240), Edmund Rich, a distinguished scholar of Paris and Oxford, became treasurer of Salisbury, then abp. of Canterbury on death of Stephen Langton; a zealous churchman and pious ascetic; wearied with ecclesiastical quarrels, he returned into monastic life.

EDMUNDS, GEORGE FRANKLIN (1828–), Amer. politician and lawyer; Senator (1866–91).

EDOM was the country S. of Palestine, where people were closely akin to the Jews. According to *Genesis* the Edomites were descendants of Esau; genealogy in *Genesis* 36 reflects the tradition of mixed descent from Canaanites, Ishmaelites, and Horites. Land of E. in Old Testament times is Mount Seir, now a desolate region. In 711 B.C. E. joined the league with Philistia, Judah, and Moab against Assyria; and then, like the rest, submitted. Later, however, Edomites were sternly denounced by the prophets; finally conquered by John Hyrcanus in 109 B.C. The Edomite language, of which only a few proper names are preserved, was closely akin to Hebrew.

Libbey and Horkins, *The Jordan Valley and Petra*.

EDRED (d. 955), Eng. king; friend of St. Dunstan.

EDRIC (fl. 1007–17), Mercian ealdorman; notorious for treachery.

EDUCATION, the science or art of training the

mind or body. The term e. is now most commonly applied to a system of mental training, but the ancient Greeks placed physical training in the forefront of their educational system, at least for males. This was particularly the case with the Spartans. Reading, writing, and simple arithmetic were included in training, but military dexterity was reckoned of the chief importance. The Athenians favoured a wider system of culture, in which music and singing held a place, but physical exercise received attention in various forms of gymnastics, running, leaping, and wrestling. Plato took the best from both systems when developing his educational methods in the *Republic*. Under the Romans boys remained in the care of their mothers up to the age of seven, afterwards attending school, where their elementary e. was continued up to the age of fourteen, when, if intended for a learned calling, they took up the study of poetry, philosophy, and other advanced subjects. Gk. tutors were largely employed, both privately and in the schools, and Gk. language and lit. constituted an important part of the educational system.

England.—The term Dark Ages reflects the almost complete extinction of learning from the time of the fall of the old Rom. Empire until the Renaissance (*q.v.*). In the middle of the XVI. cent. there were Eng. nobles who could not write, and, until Tudor times, a man who could read was entitled at law to 'Benefit of clergy' (*q.v.*). The first effort at resuscitation is seen in Charlemagne's schools under supervision of Alcuin of York (735–804). Towns like Bologna, Paris, and Oxford gradually became known as centres of learning, and developed (from XII. cent. onwards) UNIVERSITIES (*q.v.*) which have remained schools of higher e. throughout the Middle Ages and modern times. E. in the **Middle Ages** flourished in the monastery, trade guild, and noble household. The beginnings of Secondary e. are to be found in the pre-Reformation coll's and grammar-schools which were instituted for boys attached as choristers to chantries or collegiate churches; there were 16 at the commencement of the Tudor period, and numerous others were founded, although many of the 63 new schools of Edward VI. represent dissolved chantry schools refounded with smaller endowment. Among famous mediæval schools were Winchester (1387) and Eton (1440); others prominent among the numerous PUBLIC SCHOOLS of England are St. Paul's (1509), Shrewsbury (1551), Christ's Hospital (1552), Westminster (1560), Merchant Taylors' (1561), Rugby (1567), Harrow (1571), Charterhouse (1611), Marlborough (1843), Wellington (1856), and Clifton (1862). In St. Paul's school, founded by Colet (*q.v.*), an effort was made to humanise teaching methods. The humanist Erasmus expressed himself against the old convention of breaking children's spirits, but even Sir Thomas More, noted for indulgence, believed that they should stand and serve in the presence of their elders.

There are at present various kinds of **Secondary School** in England. The Secondary School has been defined by the Eng. Board of Education as 'any Day or Boarding School which offers to each of its scholars, up to and beyond the age of sixteen, a general education, physical, mental, and moral, given through a complete graded course of instruction of wider scope and more advanced degree than that given in Elementary Schools.' This definition includes higher elementary schools, private schools, high-schools for girls, and grammar-schools for boys. There is no technical difference between public and other secondary schools, but that name (Public) is usually assumed only by large, important schools, which are modelled on the old foundations mentioned above; small schools like that of Beverley, once a well-known mediæval school, retain the name GRAMMAR-SCHOOL. These schools are generally privately endowed and so distinguished from the Secondary School known by that name alone, subsidised by the Board of Education and County Council. A Public School is usually divided into senior and junior school, the former subdivided into classical side (in which preparation is made for the univ's, certain professions, and higher branches of the Civil Service) and modern side (in which preparation is made for army, navy, or commerce). There is a *Public Schools Year-Book*. Endowed secondary schools are subjected to the Charity Commissioners instead of the Endowed Schools Commission, 1874.

There was considerable provision of free e. for the poor before the XIX.-cent. movement of **elementary e.**, and it was an e. which left no social stigma, for the poor child, although taught gratuitously, received his e. in the same schools and on the same lines as the rich child. Rom. Catholics and Protestants at the close of the XVII. cent. began to erect CHARITY SCHOOLS; specially active was the Soc. for the Promotion of Christian Knowledge. Robert Raikes started Sunday Schools (1781), and in 1796 the Quaker Joseph Lancaster began his work; the Royal Lancasterian Institution, afterwards called the Brit. and Foreign School Soc., was formed (1805), and provided instruction for the poor. The National Soc. for Educating the Poor was founded (1811), and established Church of England Schools on Dr. Bell's lines. The Ragged School Union was formed in 1844, and the Charity Commission published reports on e., 1819–40, while in 1834 the Government commenced the system of annual grants. The schools now rapidly increasing in numbers were mostly sectarian (National, Wesleyan, Catholic, etc.), but in 1870 W. E. Forster's E. Act, hotly opposed by religious bodies, was passed, establishing School Boards to build BOARD SCHOOLS, supplementary to the *Voluntary Schools*, and supported partly by Government grants, partly by the rates; the Cowper-Temple Clause of the Act forbade denominational teaching in Board Schools, and a Conscience Clause (1863) allowed parents to withdraw children from religious instruction.

In 1876 e. was made compulsory (between five and thirteen), and in 1891 free between three and fifteen. COUNCIL SCHOOLS: The E. Act of 1902 (applied, with modifications, to London, 1903) substituted for the School Boards committees of the County, Borough, and Urban District Councils, and placed under their control secular education in both Voluntary and Board Schools (now called Non-Provided and Provided respectively), and gave both equal title to rate aid; alleged preference shown to Established Church led to 'passive resistance' of many Nonconformists—*i.e.* refusal to pay rates. The Act brought Elementary Schools into closer relation with the Secondary Schools already largely helped and controlled by the Councils through their Technical Instruction committees. The committee of the Privy Council on e. was established 1839, and became known as the E. Department in 1856. The BOARD OF EDUCATION was established by Act, 1899, amalgamating the Science and Art Department at S. Kensington with the E. Department at Whitehall; its function is to ensure the efficiency of all primary, technical, secondary, and higher schools in the country, while leaving their financial and particular administration to the local councils. The HIGHER ELEMENTARY SCHOOLS are for promising pupils leaving the elementary school; these pupils are trained for lower Civil Service examinations, scholarships, etc. Continuation Schools and various evening classes (provided for by Act of 1890) are run in connection with Council Schools.

Lancaster was largely enabled to do his work by his device of employing senior pupils to teach junior pupils; in the Board Schools the PUPIL-TEACHER system was much used, with evil result to both teacher and scholar. The evils of the system have, however, been removed by the E. Act of 1902, by which the minimum age of a pupil-teacher is sixteen, and facilities for e. in Secondary Schools are given to candidates; at the same time inducements are given to ordinary Secondary students to become elementary teachers, so that poor children may have the advantage of training from people in

higher social position. Denominational TRAINING COLLEGES for teachers in elementary schools obtained Government recognition in 1846.

The 'passive resisters,' who held large demonstrations in Hyde Park and made a great Free Church protest in an Albert Hall meeting (1903), and the opposition of Wales to the E. Act of 1902, led to the ill-fated E. Bill of the Liberal Government (1906). This Bill proposed to refuse recognition as public elementary schools to Voluntary Schools, to purchase the Voluntary Schools and re-found them as Council Schools, and to prevent any religious instruction by the school staff, except in urban areas (of over 5000 inhabitants) where parents of ¾ of the scholars wished for special instruction and there was school accommodation for the remaining ¼. The Bill met with much Conservative and Anglican opposition, passed the Commons, but after many amendments (not accepted in the Lower House), by the Lords, was dropped. Power was granted in 1908 to local e. authorities to provide meals for school children when necessary, and in this year a general system of medical inspection was established. The L.C.C. has since established open-air schools for delicate children at Bostal-Heath, Forest Hill, Kentish-Town, and Shooter's Hill.

The establishment of the GIRLS PUBLIC DAY SCHOOL Co. in England in 1874 marks the advance of the feminist movement. Women were elected members of the London School Board in 1873, and in 1874, besides the Public Day School Co., a medical school for women was opened and the Working Women's Coll.; the Women's E. Union followed (1871).

Scotland introduced elementary e. almost three cent's before England did. Led by John Knox, the Gen. Assembly decreed in 1560 that there should be a Latin school in every parish church, and later acts provided for their maintenance by the Church. David Stow established in 1816 a Sunday School, and in 1826 a Normal Seminary (for training elementary teachers) in Glasgow. The parochial schools received, like Eng. Voluntary Schools, Government grants (1839 onwards). Secularisation of the schools commenced in 1861, when the examination of teachers, previously conducted by the presbyteries, was given to the univ's; the teacher, however, had to be a Presbyterian. Lowe's Revised Code, establishing regular examinations and relation of grant to results, was extended with modifications to the whole kingdom (1862). Young's Scot. E. Act (1872) established School Boards with much the same powers as those created under the Eng. Act (1870). In 1885–89 the Scot. E. Department was separated from that of England. A Board of Commissioners was appointed for **Ireland** in 1831, and Board Schools constructed in which Rom. Catholicism is taught to R.C. children; Protestant scholars, safeguarded by conscience clauses, are nevertheless always sent to Protestant schools.

In CANADA elementary e. is free and nominally compulsory. Schools are unsectarian, but in Quebec, Ontario, Alberta, and Saskatchewan there are R.C. schools, controlled mainly by R.C. clergy. AUSTRALIA has a universal system of elementary e., controlled by the E. Ministers of each province. In THE UNION OF S. AFRICA higher, *i.e.* univ., e. is under control of The Union Minister of E. Until 1915 school e. (primary and secondary) remains under the Provincial Councils of Cape, Transvaal, Natal, and Orange Free State. For white children e. is compulsory, but not yet free throughout the Union. English and Dutch languages are used in instruction. Schools in INDIA are largely run by missionary enterprise, with help from the State; there is a strong current of modern feeling in favour of larger use of native teachers. The U.S.A. have no central Board of E., but there is a Federal Commissioner of Education and the laws require each State to make certain provision for e. All the States have excellent free primary schools for children up to ten years of age, and free grammar-schools for children from ten to fourteen; but in some States e. is not compulsory. Some of the States provide further e.

In FRANCE by Act of 1881 elementary e. became free, and by Act of 1882 compulsory between ages of six and thirteen in Fr. *écoles primaires*. Before the *école primaire* is the *école maternelle*; above the *écoles primaires* are the *écoles secondaires* and *supérieures*. The Secondary Schools are the *lycées*, which receive Government grants, and the *collèges*, which, like Eng. public schools, depend on their endowments and fees. In all schools which receive State aid the teachers (by the Act of 1886) must be laymen, but there is a large amount of conventual e. Fr. e. is controlled by the Ministry of Public Instruction, assisted by a *Conseil départmental de l'instruction publique*; the country is divided for e. administration into eighteen academies, each under a rector. In GERMANY e. is more highly organised than in any other country. The States of the empire differ in various particulars, but in all e. is compulsory and free between the ages of six and fourteen. Elementary e. is regulated by the Falk Acts of 1872, expanding the Pruss. Code of 1854. The *Gymnasien* and *Realgymnasien* correspond to Brit. grammar-schools and public schools; their *Realschulen* are for modern, not classical e. The *Höhere Töchterschulen* are girls' high-schools. In nearly every civilised country but RUSSIA free elementary e. is to be found. Russia has a Board of Instruction and gives some aid to secondary e., but on the whole definitely discourages e.

Infant Schools were established at New Lanark in Scotland in 1815, in London in 1818, but had already been established at Waldbach in Alsace. France, the parent of the *créche* and the *salle d'asile*, formed the *écoles maternelles* as Infant Schools under the Act of 1886. The Jesuits, who wrote a well-known book, the *Ratio Studiorum*, on e., made the important pronouncement that a human being's character is formed by the age of five, the point at which e. generally begins. The mother of the Wesleys began to train them immediately after birth, and Froebel recommends an early date. The old view as expressed by Locke (*Thoughts Concerning Education*, 1693) was that a child's mind should be left alone for the first few years; the new view recognises the immense receptivity of man in his earliest years, and also tends to recognise an inherent individuality which cannot be destroyed and must be trained to the height of its own particular type. Rousseau initiated this respect for individuality, and was followed by Pestalozzi (1746–1827), whose idea of the teacher's function was that of a gardener tending plants, and by Froebel (1782–1852), who fo the first KINDERGARTEN at Blankenburg in Germany, 1837, and the system was introduced into England (1858). In 1874 the Froebel Soc. was founded and a kindergarten training college established in connection with the Brit. schools. Various kindergarten societies formed the National Froebel Union (1887). The Board Schools at once adopted kindergarten in their infant departments. Froebel's system took the form of *Gifts* and *Occupations*. The Gifts are: (1) six balls of wool of primary and secondary colours; (2) wooden sphere, cube, and cylinder; (3) six wooden cubes divided in various ways. These Gifts are used to convey elementary knowledge. The Occupations continue these lessons and teach use of fingers in mat-plaiting, paper-flower-making, brush-work, clay-modelling, etc. Dr. Maria Montessori in XX. cent. established *Casa dei Bambini*, where she applied to children of 3–6 a new system of auto-education based partly on kindergarten methods, partly on methods she had devised for defective children. The Ger. philosophers, Fichte (1762–1814) and Herbart (1776–1841), have had great influence on modern educational theory.

Technical Education.—Trade apprenticeship has been largely supplemented in modern times by TECHNICAL SCHOOLS, which for moderate fees give a scientific

as well as practical knowledge of every industry, and have thus become important centres of secondary e. The inclusion of industries like wood-carving and sculpture in their curriculums has necessitated a good art side. A Polytechnic school was established in Darmstadt, 1830, and the example was speedily followed in other Ger. towns, some of the schools taking the form of working-men's guilds. Such establishments were also formed in England at this time. The Science and Art Department (formed 1853), at South Kensington, exercised an important influence on this movement by organising evening classes and granting certificates and prizes. London city companies took a great interest in the subject, and in 1878 was instituted the City and Guilds of London Institute for Advancement of Technical E., which resulted in 1881 in the Central Institution at S. Kensington. Technical Instruction Acts, passed 1889, 1891-92, the Local Taxation Act, 1890, and the E. Act, 1902, empowered local authorities to provide for these branches of e. which also receive government aid. By the E. Act of 1902 the Technical Instruction committees were absorbed in the general e. committees. There are now numerous Technical Institutes and Polytechnics, many of which are day schools where children as well as older students can commence industrial e. The Royal Polytechnic Institution, Regent St., London, opened 1839, bought by Quintin Hogg, 1882, and converted into the Polytechnic Young Men's Christian Institute, was the first of the London Polytechnics. Sir Joseph Whitworth (1803–87) charged a considerable estate with the provision of scholarships (given on results of Board of Education examinations), to encourage engineering and mechanics. In London and other large towns TRADE SCHOOLS have been established to train boys and girls leaving the elementary school in such a way as to fit them to be apprentices or improvers in skilled trades; the L.C.C. 'Central School of Arts and Crafts' is in Southampton Row, W.C.

Co-education is a system by which pupils of both sexes are taught the same subjects, in the same room, by the same teacher, and on equal competitive terms. C. was practised to some extent among the Greeks, the Academy being in certain subjects open to women. Luther took an important step towards establishing of co-education, as he advocated that girls should receive the same Biblical training as boys. Presbyterianism favoured it as being economical and improving to both sexes, and in Scotland it is the prevailing system. Another stronghold of C. is the U.S.A. In infant and kindergarten schools co-education is almost universal, but opinion is divided as to its desirability in secondary and higher-grade schools. Some hold that it is healthy and stimulating to both sexes; others hold that it has a deteriorating effect on the virtues of both girls and boys. In the universities co-education is widely adopted. Women are admitted as members to all the provincial universities of Britain, but in Oxford and Cambridge, though they may attend lectures and sit examinations, they are not recognised as members. See EXAMINATIONS.

Leach, *Eng. Schools at the Reformation*; Davidson, *History of Education* (1900); Browning's *History of Educational Theories* (1881); Compayré, *History of Pedagogy* (1888); Munroe, *Text-Book in the History of E.* (1905); Graham Balfour, *Educational Systems of Great Britain and Ireland* (2nd ed., 1903); Fletcher (edit.), *Sonnenschein's Cyclopædia of E.* (1906).

EDWARD I. (1239-1307), king of England; s. of Henry II. and Eleanor of Provence; succ. his f., 1272, being himself then a Crusader; had already fought in Civil War against Simon de Montfort. E.'s reign is one of the most important in Eng. history. Numerous measures were passed, the Statute of Westminster, Winchester, Mortmain, etc., and the Jews repelled. Wales was conquered, and an unsuccessful attempt made to subdue Scotland. Important also were wars with France. Eng. parliamentary life developed in his reign, and he can fairly be called the creator of the House of Lords and the House of Commons. He was a good man, and a strong king; m. (1) Eleanor of Castile and (2) Margaret of France.

Tout, *Edward I.*

EDWARD II., OF CARNARVON (1284–1327), king of England; succ. his f., Edward I., 1307; fell under power of his favourite, Piers Gaveston; total rout of *Bannockburn* destroyed Eng. supremacy in Scotland; government of England went from bad to worse. E.'s queen, Isabella of France, plotted against her husband. He was deposed and murdered in Berkeley Castle; a bad king and weak man.

EDWARD III., OF WINDSOR (1312–77), king of England; succ. on deposition of his f., Edward II., 1327. In 1337 broke out the Hundred Years War with France, in which were won the famous victories of *Crécy* (1346) and *Poitiers* (1356). England was ravaged by the Black Death in 1349. Peace with France was made at Bretigny in 1360, securing to England a considerable part of S.W. France. E. gave up claiming the throne of France, which he had made a pretext for war. In the later wars with France the English were not so successful. Lollardy broke out under the leadership of Wycliff. Towards the end of the reign the country was governed by favourites, and generally went down in prosperity. E. married Philippa of Hainault, and had seven s's and five dau's.

Mackinnon, *History of Edward III.* (1900).

EDWARD IV. (1442–83), king of England; s. of Richard, Duke of York, whose claim to throne caused Wars of Roses; succ. on deposition of Henry VI., 1461, and reigned till his death, except during Henry's short restoration, 1470–71; a firm ruler and good soldier, but not a noble man; m. Elizabeth Grey.

EDWARD V. (1470–83), king of England; s. of Edward IV.; murdered in Tower, by order of uncle, Richard III.

EDWARD VI. (1537–53), king of England and Ireland; s. of Henry VIII. and Jane Seymour; succ. his f. in 1547. His short reign is important for religious history; a precocious boy of strong character.

EDWARD VII. (1841–1910), 'By the Grace of God of the United Kingdom of Great Britain and Ireland and of the Brit. Dominions beyond the Seas, King, Defender of the Faith, Emperor of India'; Albert Edward, e. s. of Queen Victoria and Prince Albert; b. Buckingham Palace, Nov. 9. As Prince of Wales he travelled extensively, visiting Canada and U.S.A., 1860; India, 1875. In 1863 he married Alexandra, the king of Denmark's eldest dau.; their children being Albert Victor, Duke of Clarence, b. Jan. 8, 1864 (d. 1892); George (GEORGE V.), b. June 3, 1865; Louise (Princess Royal), b. Feb. 20, 1867; Victoria, b. July 6, 1868; Maud (Queen of Norway), b. Nov. 26, 1869. After a long apprenticeship for the royal *métier*, the Prince of Wales became king, Jan. 22, 1901, and until his death devoted himself unsparingly to his kingly duties; Coronation (postponed, owing to severe illness, from June 26), ug. 9, 1902. Notable events of his reign were end of South African War (1902) and formation of Union of South Africa (1909–10); House of Lords Crisis (1909–10); Anglo-Japanese Alliance (1902); cementing of *Triple Entente* with France and Russia (1904–10). King Edward died, May 6, 1910. During his brief reign he earned the title of 'Edward, the Peacemaker,' by his tact and diplomacy, and won the affection of 's own people and the respect of foreign nations; a good sportsman, a man highly endowed with common sense and *savoir-faire*, and a conscientious and successful ruler.

Life, in Dictionary of National Biography (by Sir Sidney Lee); *King Edward in his True Colours*, by Legge (1912); *Life and Times* (2 vols., 1910–11), edit. by Holmes.

EDWARD, PRINCE OF WALES (1330–1376), see BLACK PRINCE, THE.

EDWARD THE CONFESSOR (d. 1066), king of

England; s. of Ethelred II.; succ. on the death of Canute II. (1042); m. Edith, dau. of Earl Godwine; his reign peaceful, and himself a religious man; brought Norman influences into Eng. Church.

EDWARD THE ELDER (d. 924), king of the Angles and Saxons; s. of Alfred the Great, whom he succ. in 901; subdued the Welsh and became 'Emperor of Britain.'

EDWARD THE MARTYR (d. 978), Eng. king; murdered at Corfe Castle, Dorset.

EDWARDES, SIR HERBERT BENJAMIN (1819–68), Eng. soldier-statesman; fought in 1st Sikh war; C.B., 1849; commissioner on Peshawar frontier, 1853–57; at outbreak of Mutiny secured friendship of Afghanistan; returned to England owing to bad health, 1865.

EDWARDS, AMELIA BLANDFORD (1831–92), Eng. novelist and Egyptologist; founder of Egyptian Exploration Fund.

EDWARDS, BELA BATES (1802–52), Amer. journalist, educationist, and Hebrew scholar.

EDWARDS, BRYAN (1743–1800), Eng. politician and historian; opposed abolition of slave trade; wrote *History of the British Colonies in the W. Indies.*

EDWARDS, GEORGE (1693–1773), Eng. antiquarian; celebrated ornithologist.

EDWARDS, HENRY THOMAS (1837–84), Welsh Anglican divine; dean of Bangor.

EDWARDS, JONATHAN (1703–58), Amer. theologian, was proficient in Gk., Latin, and Hebrew at thirteen, when he entered Yale Coll.; grad. with high honours in 1720; became a preacher in 1722, tutor in Yale Coll. (1723); pastor of Congregational Church at Northampton (1727). He held that the Lord's Supper was for the converted only, and was dismissed his church; went as missionary to Indians; became Pres. of Princeton Coll. (1757); author of many books. He was a man of great learning and deep piety, a vigorous defender of the Calvinistic theol. A recent writer says that his career 'marks at once the tendency of Amer. theol. to depart from experience in its search for ideal truth, and the tendency of Amer. life to separate the things of this world from those of the next.'

Life, by Hickman, by Allen (1889).

EDWARDS, LEWIS (1809–87), Welsh Methodist preacher; moderator of Gen. Assembly of Welsh Calvinistic Methodists, 1866 and 1876.

EDWARDS, THOMAS CHARLES (1837–1900), Welsh Calvinistic Methodist preacher and scholar; principal of Univ. Coll. at Aberystwyth, then of Theological Coll., Bala.

EDWARDSVILLE.—(1) (41° 15′ N., 75° 53′ W.) town, Pennsylvania, U.S.A. Pop. (1910) 8407. (2) (38° 46′ N., 85° 59′ W.) town, Illinois, U.S.A. Pop. 4157.

EDWIN, Edwine (585–633), king of Northumbria; succ., 617; baptized, 627; founded Edinburgh; slain in battle with Penda, king of Mercia.

EDWIN, JOHN (1749–90), Eng. comic actor; also author of jest books. **Edwin, John** (1768–1805), s. of above, also a noted actor.

EDWY THE FAIR (959), Eng. king; s. of Edmund and Ælfgifu; succ. Eadred (955); his favour towards Wessex offended Mercia and Northumbria, and Edgar Ætheling supplanted him as ruler over these kingdoms.

EECKHOUT, GERBRAND VAN DEN (1621–74), Dutch painter of religious subjects.

EECLOO (51° 12′ N., 3° 33′ E.), town, E. Flanders, Belgium; woollens, cottons. Pop. 12,000.

EEL-POUT, see Burbot.

EELS (*Anguillidæ*, etc.), long snake-like bony fishes, without ventral or tail fins, and with small scales set in groups; found in all temperate and tropical seas down to 2500 fathoms, and many in fresh and brackish waters. E's appear to spawn only in the deep sea, and to reach suitable grounds adult females migrate from the rivers. The young return as transparent 'glass-eels,' and ascend streams and brooks in incredible numbers—'eel-fairs'—sometimes swarming through the grass on the banks. Brit. forms are the common e. (*Anguilla vulgaris*), the gigantic marine conger (*Conger vulgaris*), and the rare murry or moray (*Muræna helena*), a Muræoid e. (*Muræniдæ*) common in the Mediterranean. The last, like many of the e's, is much esteemed as food.

EFFENDI, respectful form of address used towards males in Turkey.

EFFIGIES, SEPULCHRAL, sculptured figures, or figures in relief, upon monumental tombs which, in England, date from the XII. cent. At first there was probably little attempt to produce a portrait of the person commemorated, but during the XV. cent., and later, very careful attention was given to portraiture and details of armour and costume. E's are now esteemed as invaluable in tracing the development and changes in the history of costume, arms, and armour. Worcester Cathedral contains the e. of King John; Westminster has many royal e's; and most of our cathedrals and older parish churches contain e's of hist. importance.

EFT, see Newts.

EGAN, PIERCE (1772–1849), Eng. humorist and ing writer; author of *Tom and Jerry's Life in* n, *Life of an Actor.*

EGAN, PIERCE (1814–80), Eng. novelist; s. of above.

EGBO, W. African native secret society devoted to worship of a jungle spirit; assists Brit. administrators in maintaining law and order.

EGEDE, HANS (1686–1758), missionary in Greenland; principal of Missionary coll., Copenhagen.

EGER.—(1) (50° 5′ N., 12° 22′ E.) town, Bohemia, Austria, where Wallenstein was assassinated (1634); has ruined citadel; manufactures machinery, textiles, beer. Pop. (1911) 27,949. (2) (47° 55′ N., 20° 23′ E.) town, Hungary; archiepiscopal see; produces wine; also called Erlau. Pop. (1910) 28,052.

EGER, AQIBA (1761–1837), Jewish rabbi and scholar.

EGERIA (classical myth.), female deity, one of the Camenæ, held in veneration by ancient Italians; said to have initiated Numa Pompilius in religious innovations.

EGG, AUGUSTUS LEOPOLD (1816–63), Eng. artist; famed for hist. pictures; associated with Dickens group of amateur actors.

EGGENBERG, HANS ULRICH VON, PRINCE (1568–1634), Austrian statesman; Chancellor to Emperor Ferdinand, whose policy he dominated during Thirty Years War.

EGGER, ÉMILE (1813–85), Fr. scholar.

EGGER MOTHS (*Lasiocampidæ*): Oak Egger (*Gastropacha quercus*), a yellowish moth, is common; the Lappet Moth (*Gastropacha quercifolia*), rare in Britain.

EGGLESTON, EDWARD (1837–1902), Amer. novelist and historian.

EGGMÜHL, see Eckmuhl.

EGHAM (51° 26′ N., 0° 33′ W.), town, Surrey, England; has Royal Holloway Women's Coll. Pop. (1911) 12,551.

EGIN (39° 16′ N., 38° 55′ E.), town, Asiatic Turkey; scene of Armenian massacre, 1896. Pop. *c.* 15,000.

EGINHARD, see Einhard.

EGLANTINE, poetic name for Sweet Briar (*Rosa rubiginosa*), a garden plant.

EGLINTON, EARLDOM OF, held by Scot. family of Montgomerie; 1st earl cr., 1508; Alexander, 6th earl (1588–1661), was a Covenanter and opposed Charles I., but later supported Charles II.; 13th earl (1812–61), Lord-Lieut. of Ireland (1852 and 1859), spent *c.* £40,000 on a tournament at E. Castle (1839), a forerunner of the XX.-cent. pageant (see Buchan's *Eglinton Tournament*); he was cr. Earl of Winton (1859). Present earl (1848–) is 15th Earl of E., 3rd Earl of Winton.

EGMONT, EARLDOM OF, first conferred (1733) on

John Perceval, one of the founders of Georgia (U.S.A.), and a noted genealogist; present holder, Charles John Perceval (1858–); succ., 1910.

EGMONT, LAMORAL, COUNT OF (1522–68), Flemish soldier; supported Prince of Orange in opposing attempt of Philip of Spain and helped Charles IX. of France to suppress Huguenots; seized by Duke of Alva, he was beheaded.

EGOISM.—(1) the theory that only selfish conduct is possible. (2) the theory that only selfish action is reasonable. (3) loosely, actual selfishness, or a self-centred disposition. See ETHICS.

EGORIEVSK (55° 27′ N., 39° E.), town, in Ryazan, Russia; grain and hides exported. Pop. 23,932.

EGREMONT (54° 28′ N., 3° 32′ W.), town, Cumberland, England; has ruined castle. Pop. (1911) 6305.

EGREMONT, EARLDOM OF, first conferred upon Algernon Seymour (1749), who was also Duke of Somerset; afterwards passed to the Wyndhams of Orchard Wyndham; became extinct on death of George Francis W. (4th earl) in 1845.

EGYPT is situated in N.E. Africa, and extends from the Mediterranean Sea southwards to 22° N., *i.e.* the Nile basin as far as Wadi Halfa where the Anglo-Egyptian Sudan begins, a distance of 680 miles. Tripoli forms the W. boundary. On the east Egypt extends to the Red Sea and includes the peninsula of Sinai, the boundary line running from the head of the Gulf of Akaba N. to Er Rafa on the Mediterranean. The total area is about 400,000 miles, of which the Nile delta and narrow valley and a few oases are the only inhabited parts.

Physical Features.—Primitive rocks appear in the mountain peaks; the general subsoils are sandstone, said to be Cretaceous, limestone and alluvium in the valley, the soils gravel, clay, desert sand. The delta was probably covered by the sea in prehistoric times, as no borings have reached bed-rock. Porphyry, diorite, verde antique, and alabaster have been quarried from ancient days; gold, silver, copper, and gems are found in small quantities. The hard red granite (syenite) of Aswan (Syene) was worked under the earliest Pharaohs. Salt is obtained in large quantities from Lake Mareotis. Herodotus named Egypt 'the gift of the river.' The Nile deposits, before reaching the delta, at the rate of 4 inches a century, a dark, fertile sediment. In Upper Egypt (that is, from Wadi Halfa to Cairo, about 600 miles) mountains approach closely to the stream; Lower Egypt (Bahari or the delta and surrounding lands) is a plain through which the Nile passes, dividing above Cairo and entering the sea by two mouths, that of Damietta to the east, Rosetta to the west, more than 100 miles apart.

Upper Egypt is an undulating plateau ranging on the west from 400 to 700 ft. in height, on the east from 1500 to 2000 ft., with higher peaks and ridges rising from 5000 to 6600 ft.; the highest mountains are Gebel Gharib, G. Attakah, G. Dukhan, and, in the Sinaitic peninsula, G. Serbal, G. Musa, and G. Catherine. The chief oases are the Siweh, Bahrier or Lesser, Farafreh, Dakhla, the Greater or Khargeh, and Selimeh, which stretch N. to S. within a few weeks' journey of each other, and have been used immemorially by caravans. In the oasis of Siweh are ruins of the temple of Jupiter Ammon, and in the Greater Oasis the ruined temple of Amen-Ra. The Nitrian valley in the Libyan desert contains 10 lakes, which yield salt and natron. Here was the anchorite settlement from which the Brit. Museum acquired priceless codices. To the S.W. is the 'river without water,' the Bahr Belama.

The Sinaitic peninsula of Arabia, which now belongs politically to Egypt, is bounded by the Gulf of Suez to the W., the Gulf of Akaba to the E. The Suez Canal (*q.v.*), commenced in 1859 by the Suez Canal Co., was finished in 1869, and connects the Mediterranean with the Red Sea. At its N. mouth is Port Said, at its S. mouth Port Suez. It requires constant labour to keep the mouth of the canal free from deposits. Twelve miles below Cairo the Nile divides, its two branches, flowing N.W. and N.E. respectively, forming the delta; at the two mouths are Rosetta and Damietta. In ancient days the river entered the sea by seven channels at this point, the Canopic, Bolbetine (the present western channel), Sebennytic, Phatnitic (the present eastern channel), Mendesian, Tanitic, and Pelusiac. The S. part of the DELTA is extremely fertile, the N. part sandy and marshy. The sea-water lakes near the coast (Mareotis, Edku, Burlus, and Menzala) have almost the nature of bays. On the N. bank of L. Mareotis stands Alexandria. The Canopic branch of the Nile issued, it is thought, in Aboukir Bay. The Sebennytic mouth was the issue of L. Burlus into the Mediterranean. Into L. Menzala, which has an area of 780 sq. miles, flow canals representing the Tanitic, Mendesian, and Pelusiac Nile.

The Suez Canal struck the final blow to the greatness of Alexandria (*q.v.*), which is the finest natural port on the Mediterranean. A large mole connects Alexandria with the island of Pharos, named from the lighthouse which was one of the wonders of the world. The mole protects the western harbour from the sand deposits, which form the greatest engineering problem of this coast, and it is still further secured by the modern breakwater, nearly two miles long, built westward from the island of Pharos. Mehemet Ali constructed the Mahmûdîyeh Canal in 1819 from Alexandria to Cairo, and this was soon followed by the railway. In 1904 a line was commenced westwards from Alexandria towards Morocco. The chief relic of antiquity here is Pompey's Pillar, a red granite monolith 67 ft. high, a prominent object to ships at sea. At Rosetta was found in 1799 the stone, now in the Brit. Museum, which first gave a clue to the hieroglyphic alphabet.

Other important towns of the Delta are Tanta, where the famous festivals of Ahmad el-Bedawy are held, Damanhûr, which has large cotton factories, Zagazig, a canal centre and the chief cotton town, Samanud, where pottery is manufactured, Mehalla el Kobra, with large silk and cotton factories, Shebin el-Kôm, a cotton town, Menuf, an agricultural centre, Mataria, fishing town.

HISTORY.

The history of E. before the Macedonian conquest (332 B.C.) was written for Ptolemy Philadelphus by Manetho, high-priest of Heliopolis. This work disappeared, but its substance is preserved in the writings of Julius Africanus (fl. 300 A.D.), Eusebius (d. c. 340), and Syncellus (fl. VIII. cent.), and has been confirmed, except in chronology, by archæological evidence. Other sources are the Table of Kings at Abydos, the fragmentary Turin papyrus compiled during the 19th dynasty, the Bible, and the accounts of Herodotus, Josephus, etc., but Manetho's account remains the most important. Its great lack is any standard of Chronology. Events were recorded as taking place in a certain year of the reign of a certain king, or as happening in the year of some notable event. The Egyptian 12-month year of 3 seasons or 365 days (each month containing 30 days, the 5 odd days belonging to no month) was an immemorial institution possibly dating back to the 5th millennium B.C. The year was in early times held to begin with the rising of the Nile, and as this took place at the same time as the rising of Sirius (Sothis), Egyptian chronology (still used by the Copts) has became known as the *Sothic* system. The Ptolemies introduced the Leap Year day to correct this chronology, and it was enforced by the Romans, whose system, the Alexandrian Era, commenced 24 B.C. The Era of Diocletian (known as the Era of the Martyrs) commenced when Egypt was made a Byzantine province at the reorganisation of the Rom. Empire, 284 A.D.

Manetho's history accounted for 31 dynasties

before the Macedonian conquest, and gave dates to the rulers; but these dates have been found inaccurate, when compared with monuments, etc. A great deal has been discovered from the astronomical data furnished by the Egyptians. The monuments cannot with certainty be dated before the dynastic period, but numerous excavations have discovered palæolithic (possibly eolithic) and neolithic remains in Middle and Upper E.; some of these precede, others coincide with, the first three dynasties. The men of these primitive times became in later legend dynasties of gods, who ruled for 13,900 years, and of demi-gods, who ruled for 4000 years. Two of the leading Egyptologists, Mariette and Brugsch, have respectively dated the commencement of the 1st dynasty as 5004 and 4400 B.C. History before that date is a problem of ethnology.

Old Kingdom.—The 1st dynasty is known as the THINITE, its members having their seat at Abydos (Lower Egypt was of no importance until the 21st dynasty), in the nome of which This was the capital. The first king, Menes, is said to have conquered Lower Egypt (probably racially distinct, and also under monarchical rule), founded Memphis, and built the temple of Ptah. His tomb was opened in 1897. Other tombs of the 8 kings of the 1st dynasty, and of the 9 kings of the 2nd, are at Abydos, and all show traces of the Egyptian habit of burying needments and luxuries for the dead. The early kings of the 3RD DYNASTY (4449 or 3966–4235 or 3733, established at Memphis) built tombs, and Zoser erected the pyramid of Sakkara. Senoferu conquered Sinai, and worked its copper, and built two pyramids. The most famous Egyptian works of art date back to the 4TH DYNASTY (4235 or 3733), when King Cheops (Khufu) built the great pyramid, Khafra the second pyramid, at Gizeh. The Sphinx was possibly modelled, and the Book of the Dead painted. Pyramids continued to be made by succeeding kings until the end of the OLD KINGDOM with the 8th dynasty (*c.* 3358).

The period from *c.* 3358 to *c.* 1703, in which dynasties 9–17 flourished, is known as the **Middle Kingdom.** Its founder came from Heracleopolis Magna in Middle Egypt, and overthrew the Memphite monarchy. His descendants were in their turn overthrown by Theban rulers; magnificent remains of this dynasty (the 12th) are found at Thebes, Beni Hasan, etc.; three dynasties (15–17) of Hyksos or SHEPHERD KINGS ruled in Lower Egypt, *c.* 2214–*c.* 1703. They were probably Asiatic conquerors, and the Hebrew Joseph of *Exodus* was possibly chief minister of Pharaoh at this period.

The Empire (dynasties 18–20) was founded by kings from Upper Egypt, who overthrew the Shepherd Kings, and lasted *c.* 1703–*c.* 1110. Thothmes I. turned Egypt into an empire. He and his daughter, Hatshepsut adorned the famous temple at Karnak, to which Thothmes III., the great conqueror, contributed the obelisks. Thothmes III. won the long-sung battle of Megiddo over the Syrians, whom he reduced year after year; all surrounding nations paid him tribute. Amenhotep III. built the great avenues at Karnak, the temple of Luxor, etc. He is depicted in the Colossi of Thebes. Amenhotep IV. temporarily overthrew the cult of Ammon (Amen-Ra) in favour of that of the sun-god, Aton, changing his own name to Akhenaton (follower of Aton). The new cult was speedily abandoned after his death.



The 19th and 20th dynasties were those of the renowned RAMESIDES, and almost equalled in architectural splendour the age of the Pyramids. Rameses I., Seti, and Rameses II. (the Sesostris of Asiatic legend) built the great hall at Karnak, the famous temple at Abydos, etc., and a colossus of Rameses II., greater than those at Thebes, was erected at Tanis, but is not now to be traced. Rameses II. captured Jerusalem and defeated many scriptural nations. Under the

last of the race, Rameses XII., Upper Egypt asserted its independence, and after his death the empire broke up.

Tanite, Bubasite, and Saite Dynasties (21–24) ruled (*c.* 1100–700) over Lower Egypt, with varying authority over Upper Egypt. Under the Ethiopian rulers of the 25th Dynasty, hateful to the Egyptians, Assyrian invasions (under Esarhaddon and Assur-bani-pal) commenced, and the brief Saite restoration, *c.* 666 (26th Dynasty), was followed by a succession of foreign conquests. Psammetichus I. (664–610), the founder of this dynasty, not only drove the Assyrians from E., but carried the war into the enemy's country; his son, Necho (610–594), won back the Egyptian empire in Syria, but was fatally defeated by Nebuchadnezzar (605). The Assyrians were, however, too busy combating the Persians to reduce Egypt again, and Egypt soon found herself face to face with the victorious Persians. Cambyses of Persia annexed Egypt in 525.

The Persian or 27th Dynasty was overthrown in 405, and three Saite Dynasties (28–30) followed, but the last native ruler was driven into exile by Artaxerxes III. of Persia in 340 B.C. After a brief unhappy period of Persian domination (31st Dynasty), Egypt became in 332 a Macedonian Province, with its capital at Alexandria, newly founded by Alexander the Great. The Macedonian empire broke up at Alexander's death (323), and Egypt, under its Gk. rulers, the Ptolemies (*q.v.*), became the centre of Mediterranean culture. It was absorbed in the Roman Empire, 30 B.C., but continued to keep alive Gk. learning, and, like N. Africa generally, was the home of Fathers of the Christian Church and of numerous sects and heresies. Gnosticism, Manichæism, Arianism, Neo-Platonism, etc., flourished here in the first 6 cent's A.D. Not only the Greeks, but the subject native races eagerly embraced Christianity, and Coptic versions of the Scriptures have survived. Greeks and Copts might have amalgamated under the continued influence of Christianity and the equal pressure of Rom. rule, but for the permanent Muhammadan conquest of the early VII. cent. Diocletian had made Egypt a member of the Eastern Empire at his reorganisation of the Rom. provinces in 284 A.D.; and Constantine confirmed this arrangement. A successful effort was made to retain Egypt (a source of considerable riches from its cornfields, etc.) when Italy, Spain, and N. Africa fell into the hands of the Goths, but it was impossible to protect it from the fierce onslaughts of the Arabs, especially as no assistance was given by the Egyptians, who peacefully submitted, 639–41. Constans II. made one ineffectual attempt to regain possession in 654, but otherwise the Muhammadans reigned in peace until the days of the Crusades.

Arab Rule (641–1517).—Egypt became a member of the eastern caliphate, and was the last possession retained by the Abbasid caliphs; Turk. encroachments on Arab possessions ended when Egypt also became a Turk. province in 1517. The Arabs were cruel and extortionate, and it was not for two cent's that Egyptian revolts ceased. The Arab governor of [illegible]t, Ahmad ibn Tûlûn, established a virtual independence of the caliphate in the IX. cent. His house, the Tûlunîs (868–905), was succeeded first by the Ikhshîdîs (935–69), and then by the famous line of the Fatimites. Jôhar, who conquered Egypt for the Fatimite caliph of Tunis in 969, founded the city of El-Kâhirah (the victorious), which became the modern Cairo, the previous Arab capital receiving in later times the name of Old Cairo. The rule of the Fatimites was noted for prosperity, art, and learning, but ended in decadence. The early Muhammadan conquerors had annexed Syria to Egypt, but the Crusaders and the Turks now conquered Syria, and Egypt, torn by internal strife, was besieged by the Franks in 1163, and a force of Kurds, under Saladin (s. of Ayyûb), who had made an agreement with the Franks, took possession of Alexandria. Saladin secured from the caliph his own appointment as vizier in 1169, and proclaimed the Fatimites' deposition in favour of the caliph in 1171. On the death of Nureddin, in 1174, Saladin assumed the rank of sultan, and, as leader of Islam, won back much of Syria from the Crusaders.

The hopes of the Crusaders revived after Saladin's death, 1193. They captured Damietta, 1219, but al-Kâmil, nephew of Saladin, forced them to purchase retreat by agreeing to leave Egypt alone. The Christians lost Jerusalem in 1244, and Egypt became a great object as an approach to Palestine; therefore, in 1249, St. Louis of France invaded Egypt, and again Damietta was captured, but was lost, after crushing defeat by the Muhammadans, in 1250. The Ayyubites were overthrown in 1250 by the Mamelukes, a body of Turk. troops introduced into the palace by the last Ayyubite.

The Mameluke rule was the great age of Saracen art. It was a dynasty of slave origin, but kept up a splendid court and retained foreign respect until its close. Moreover, the Abbasid caliphs had lost Bagdad through the Tartar invasion of 1258, and Egypt became the seat of the Commander of the Faithful, who exerted his authority under the Mameluke wing. At last, however, the Sonnite Muhammadans under the fanatical Selim I. of Turkey determined to crush the Shiite Muhammadans of Syria and Egypt. Selim conquered Syria in 1516, Egypt in 1517, sending the last Abbasid caliph, Motawakkel, to Constantinople and himself assuming the style of Commander of the Faithful, which henceforth belonged to the Sultan of Turkey. The Mamelukes, however, retained their importance for nearly three more cent's.

Turkish Rule.—Egypt became a Turk. pashadom unmolested by Christians until Napoleon appeared before Alexandria, June 30, 1798. He met with little resistance, owing to native resentment of Mameluke ill-rule, defeated the Mamelukes near the Pyramids, and was soon installed in Cairo. On Aug. 1, however, the great battle of Aboukir Bay totally destroyed the Fr. fleet, and in 1801 France was forced by Britain to evacuate Egypt, Turk. power being restored. This was the beginning of Britain's interference in Turk. affairs. Mehemet Ali (*q.v.*), being made pasha in 1805, took all their offices from the Mamelukes; a Brit. attempt to restore them only resulted in their wholesale slaughter, 1811. He restored the prosperity of Egypt, building the Mahmoud Canal from Alexandria to the Nile (1820), introducing European reforms, drilling a native army, and extending his territory southward. He soon endeavoured to cast off the rule of Turkey, but aided Turkey against Greece, his s. Ibrahim leading the Turk. forces. In 1831 he dispatched Ibrahim to conquer Syria, and the sultan's forces were defeated at Konieh, 1832. The pasha then occupied Constantinople with Russ. aid, and by the treaty of Kutayah, 1833, added Syria to his territories. As the sultan refused to grant him the pashalik in fee he again sent Ibrahim to Syria in 1839, when the Turks were defeated at Nezib. A coalition of Britain, Russia, Austria, and Prussia was now formed to subdue this rebellious vassal of Turkey, and after the loss of Acre (1840), Mehemet Ali agreed in 1841 to give up his claim to Syria for recognition as hereditary viceroy of Egypt. He became mentally deranged and Ibrahim became pasha in 1848, but died in the same year. Mehemet died in 1849. Turkey raised the tribute paid from the viceroyalty from £400,000 to £750,000 in 1861, but Egypt and Turkey remained on good terms.

In 1866 the viceroy assumed the title of khedive, and the sultan agreed to the succession being settled on the sons in the usual European way instead of descending, according to Turk. fashion, to the eldest male kinsman. In 1869 the khedive, Isma'il, agreed not to impose taxes or contract loans without consent of Turkey, but in 1873 received all sovereign rights except those of making treaties, increasing his armed force or coining money. Isma'il's buildings, railways, schools, and various reforms led to financial

ruin and to interference of the Powers, who also made the misrule of the slave-owners in the Sudan their concern. Brit. and Fr. Dual Control was established, 1876. Isma'il quarrelled with Nubar Pasha, the finance minister, approved by Britain and France, and in 1879 dismissed his cabinet. The Powers immediately demanded the appointment of European ministers and requested Turkey to depose the khedive. Isma'il was deposed and his s. Tewfik appointed (1879), and Baring (afterwards Earl Cromer) and Blignières became comptrollers-gen.

Ahmed Arabi Bey began in 1881 to voice national feeling against foreign interference; he became under-sec. of war in 1882, secured a large following, and overrode the khedive's government; he refused to submit to a sentence of exile, and the khedive obtained Fr. and Brit. aid; Europeans fled from the country, and when the allied fleets appeared at Alexandria, massacres took place. Arabi commenced to fortify Alexandria, whereupon it was occupied by Seymour, the Brit. admiral, after bombardment; in the meantime it had been burned by the Arabs, and all Europeans slain. The Khedive was imprisoned in the palace of Ras el-Tin, on the island of Pharos, while Arabi with a large force strove to stir up the country to a holy war. Several hot skirmishes took place before Wolseley landed in Aug. Wolseley quickly fought his way from Alexandria to Tel-el-Kebir, put Arabi to flight, and entered Cairo, Sept. 14, 1882.

British Occupation.—The Egyptians soon surrendered, and Britain, having borne the total burden of the war, assumed solo control at the close of 1882. A Brit. resident (Major Evelyn Baring) and army of occupation, and a constitution drawn up by Lord Dufferin, were agreed upon, 1883. The Sudan now became the great problem of Britain in Northern Africa. Gordon, appointed Gov.-Gen. in 1884, perished in Khartum before the relieving force could reach him. The Sudan was abandoned, but as a result of Lord Kitchener's operations, 1896–98, was again brought under Anglo-Egyptian control. Under Lord Cromer (Consul-General, 1884–1907) and his successors (Lord Eldon Gorst, 1907–11; Viscount Kitchener, 1911–) E. has progressed rapidly. The Anglo-French agreement of 1904 made financial reorganisation possible and set revenue free for development of the country. By the construction of the Assuan Dam (*q.v.*) and barrages at Esna, Assiut, and Zifta, perennial irrigation has been secured and over two million acres added to cultivation. The condition of the people has vastly improved; forced labour has been abolished. Education has advanced; in 1911 there were 45,173 boys and 5500 girls in the elementary schools. Provincial Councils were instituted, 1883, and reconstituted, 1910, as the elementary education authority and with restricted powers of local government. A feature of recent years has been the rise of a nationalist party antagonistic to the British occupation; cf. plot to murder Khedive, Kitchener, and the Premier (July 1912).

Archæological Remains:—Practically all Egyptian secular buildings have perished, and the reason for this appears in the only two towns which have been traced, Tell-el-Amarna and Kahun in the Fayum, where the hovel and the magnate's villa seem to have been alike made of sunburned brick. At Tell-el-Amarna a royal palace remains in stone, but the practically complete disappearance of such buildings points to their also having been constructed of clay. The rock-cut tombs at Gizeh perhaps perpetuate the style of the earliest Egyptian dwellings. The Sphinx at Gizeh, perhaps the oldest example of non-domestic arch. in the world, though usually ascribed to the 4th dynasty, the pyramids of this district, the temples and tombs of the Nile valley and delta (*vide supra*), and an important body of Gk. and Rom. remains constitute Egyptian antiquities. Probably all the rulers of the Memphitic dynasties erected pyramids (*q.v.*); that of Meydûm has been with certainty ascribed to Senoferu of the 3rd dynasty, the three greatest, at Gizeh, to Cheops, Chephren, and Mycerinus of the 4th dynasty. The step-pyramid at Sakkara belongs to the earliest dynasties. See ARCHITECTURE.

The centre of art shifted with the capital from Memphis to Thebes. In the 12th dynasty the famous tombs at Beni Hasan were built, and the column first entered on its architectural career. This period fell far behind that of the Pyramids; but a Renaissance commenced during the 12th dynasty; the great temple at Karnak, commenced at that period, was one of the glories of Egyptian arch., and many other temples, in which the utmost effect was obtained from the now highly evolved column, were constructed round Thebes. The Deltaic dynasties were poor in art, and the art of the Hellenistic and Rom. periods had little Egyptian character. Many ruined cities of this time remain; coins are seldom found before the Gk. period; statues, bas-reliefs in the tombs, hieroglyphics, are found from the times of the Pyramids. The famous *Book of the Dead* is ascribed to the 19th dynasty, and wall-paintings became excellent at this time. Beads appear in the earliest tombs, and jewellery became an important Egyptian art.

The art of coloured glass-making was known here from the beginning of history, and there are many remains of earthenware. For MSS. finds see PALÆOGRAPHY. Handbooks on hieroglyphics are: Birch, *Introduction to the Study of the Hieroglyphics* (1857); Budge, *First Steps in Egyptian* (1895).

Ancient Religion.—There is proof in the inscriptions of the Pyramids that the Egyptians of the age preceding the 1st dynasty believed in the resurrection of the dead, at least of dead royalties. From various inscriptions and papyri, chief of which are those that compose *The Book of the Dead*, and from the writings of Herodotus, Plutarch, and other Gk authors, some of the characteristics of Egyptian creeds have been discovered. In the earliest times every town and nome had its separate deity, and when provinces were joined, as was probably the case with Upper and Lower Egypt when the 1st dynasty was established, a deity was adopted to protect the whole area. A tendency to monotheism is seen in the religious strife of the 18th and 19th dynasties, and apart from this the gods of the ruling city tended to receive universal adoration. All appear to have originated in the tribal fetishes of the Stone Age, and continued to be represented by animals; thus the hawk represented Horus, the ibis represented Thoth, the cat Bast and Sekhet, the bull of Apis Ptah, the cow Hathor or Isis, the lotus blossom Nefertem. In the later dynasties animals of these sacred classes were mummified after death. The fetishes sometimes appear, even in the earliest representations, with human figures. The nature-myths also appear at an early date (Ra, the sun, and Hapi, the Nile, being prominent characters). Various inanimate objects were conceived as having organic life and will, and what we consider subjective emotions were regarded as external powers which possessed a man.

Much of the higher philosophy of Egypt is now merely matter of speculation, but it was probably already highly developed in this mystical race at the time of the construction of the Pyramids (5th to 4th millenniums B.C.). Those great artistic works presupposed high scientific attainments, and it is not to be supposed that the Egyptians of that date were childish savages in their religious views. Memphis became the capital in the 3rd dynasty, and, to the Greeks, Ptah (with his goddess Sekhet and their s. Imhotep), Ra, the sun-god, Osiris, Seth, Typhon and Horus, Memphite gods, then became the leading deities. In the Pyramid inscriptions, Ra and Osiris, who became national gods, were assigned the chief place, and Ptah remained a mere local deity. The recognised tradition at that time was that Ra (ancestor of the Pharaohs), born in a lotus blossom, was parent of Show and Tefnut, parents of Keb and Nut, parents

of Osiris, Isis, Seth, and Nephthys. Keb and Nut were afterwards interpreted as time and space. Osiris, slain by Seth, was carved into pieces, and although the pieces were collected and put together again by Isis, Osiris remained among the *manes* as king of the dead. Death occupied the thoughts of the Egyptians almost as much as life, and consequently Osiris divided their homage almost equally with Ra.

The Egyptians are believed to have discovered the relation of our planet to the universe, but in primitive times they thought that Ra, the sun, passed in the night in a boat through the kingdom of the dead, where Osiris reigned, and ascended from those under-regions for his day's course. In the under-world Osiris judged the dead and decided on their future destiny. Both the soul (*ba*) and the astral body (*ka*) of a mortal were dependent on the preservation of the body with which they had previously been associated. The *ba* was perhaps forced to leave the happy land and suffer reincarnation when the body perished. The sycamore tree seems to have been an astral plane translated out of the fourth dimension. When it fell the souls which had taken refuge in it perished. The body was preserved by embalming, of which the process is known, accompanied by religious rites. Symbols of all the accessories of life were, and still are, placed in the tombs; the papyrus rolls and inscriptions on the walls often contain directions by which the soul is to find its way to the realm of Osiris. This way is nearly related to that of the Greeks by Charon's ferry. The soul's boat is often elaborately depicted on the walls of the tombs. Osiris remained, but the worship of Ra gave place to that of Ammon. The Greeks said that the Theban gods who replaced the Memphitic in the 12th dynasty were Amen (Ammon), Mentu, Atmu, Shu, etc. The original character of Amen is not known, but he usurped the traits of Ra and took the name Amen-Ra, while some of the Pharaohs assumed the name Amenophis. Neit became the chief divinity in the Saite period.

Prof. Flinders Petrie (in *Religion in Ancient Egypt*) has analysed Egyptian religion into four elements corresponding to racial differences established by foreign invasions in pre-dynastic days. These elements are—(1) negro animistic deities, probably including the sycamore tree and *ka* and *ba*; (2) Libyan gods, *i.e.* the Osirian triad (Osiris, Isis, and Horus), and other anthropological figures like Amen and Neit; (3) Mesopotamian gods, Ra, Aten, and other aspects of the sun, whose predominance was due to the priests of Heliopolis; (4) deified ideas, such as Ptah, the creator, Maat, 'abstract truth and law,' Imhotep, son of Ptah, the 'peace and learning which follows law and order,' obtained from Phœnician invaders, who also introduced the cow-goddess Hathor, henceforth associated with Isis. Foreign gods introduced in the dynastic period were the Syrian Baal, Ashtaroth, Kedesh, and Bes (possibly Arabian and identical with the Egyptian lioness-god Bast). Serapis (the Hellenised Apis), Isis, and, above all, Horus, were worshipped in the Gk. and Rom. periods. Magic, much practised in primitive times, revived in the period of Egyptian decline, and there is much lit. for study of the subject.

Government.—Egypt is governed by an hereditary khedive nominally subject to the sultan of Turkey, to whom he pays a tribute of £720,000, but with very large independent rights, including those of concluding commercial treaties with foreign powers and of maintaining armed forces. Since 1883 the country has been under Brit. influence; the Brit. Agent and Consul-General exercises complete financial and extensive political powers, while the Sirdar, or commander-in-chief, and all the higher officers belong (since 1882) to the Brit. army, and there is a Brit. army of occupation of some 6000 men. The Legislative Council is partly nominated by the khedive, partly representative, and there are representative General Assembly and Provincial Councils. No new loan can be raised or new tax imposed without the Assembly's consent, but it has no direct legislative functions. Besides the pres. of the Council, who holds the ministry of the Interior, there are ministers of Education, Finance, Foreign Affairs, Justice, Public Works, War, and Marine.

Egypt is divided for local government into 5 governorships (*mohafzas*), with seats in 5 towns, and 14 provinces (*mudirias*), subdivided into *markaz*, collections of townships. There are several systems of justice. Under the Capitulations (*q.v.*) foreigners are tried in special courts. Mixed tribunals were established in 1876 for trial of matters between natives and foreigners, with appeal to the Court of Appeal at Alexandria; cases between foreigners of different nationalities, or cases between foreigners on matters of local interest, are also tried in these courts, but cases between foreigners of the same nationality are usually tried in Consular courts. There are certain exemptions for natives who are not Muhammadans, but, as a rule, the natives are subject to the Mehkemmeh courts, presided over by Cadis, for matters touching personal law, and to the Native Tribunals (established in 1884–89) of various kinds, with appeal to the Court of Appeal at Cairo. Military service is theoretically obligatory, but only a small proportion of the population is called upon to serve.

Communications.—The Nile, navigable throughout Egypt, is still the great thoroughfare for trade and travel, but there are, exclusive of the Sudan line, over 2000 miles of railway rapidly extending; of the total, two-thirds are in the delta; the larger amount belongs to the government, which in 1909 acquired the Upper Egypt Auxiliary Railways and Western Oases Railway. Lines from Alexandria and Port Said unite at Cairo and proceed up the Nile valley, beside the stream as far as Shellal, whence steamers run to Wadi Halfa, whence the Sudan railways run to the Red Sea and southwards towards the heart of Africa (see CAPE TO CAIRO RAILWAY). Other lines run from Damietta to Cairo, from Cairo by Zagazig to Ismailia, from Port Said by Ismailia to Suez. Caravan routes run in all directions. There is good postal, telegraphic, and telephonic communication.

Climate.—The Delta is not very wholesome for Europeans, but the rainless, dry climate of Upper Egypt has made it a health-resort. In Upper Egypt the temperature sometimes rises to 110°–140° Fahr., in Lower Egypt it varies from 50°–60° Fahr. in winter (Dec. to March), when there are cold, damp, northerly winds, and from 85°–90° Fahr. in summer (especially May and June), when hot, sand-laden winds from the east and south prevail. Snow occasionally falls on the highest mountains. The true Egyptian seasons are, however, not those of the sun, but of the Nile, and were so reckoned in the immemorial Sothic system.

Resources.—The Nile rises regularly at the end of July owing to the melting of the snows on the Abyssinian hills and the spring rains of the tropics, commences to sink in the middle of October, and returns to its natural level in April. From April to July, therefore, nothing can be grown, rain being absent, except where irrigation is possible. Cotton, sugar, and rice are grown from March to Oct., dhurra and vegetables, July to Oct., wheat, barley, and other cereals, Nov. to May. The chief crops are cotton, sugar-cane, rice, maize, wheat, barley, millet, and dates; about £23,000,000 of cotton is exported yearly, over £18,000,000 being to Britain, which also imports from Egypt £2,000,000 worth of cotton seeds, besides onions, oil-seed cake, beans, eggs, and manufactured tobacco; to Britain and other countries Egypt also sends raw wool, hides, cane-sugar, oranges, dates, gum, rice, henna, lentils, and tomatoes. Egyptian cigarettes are chiefly manufactured at Cairo and Alexandria, attar of roses at Cairo and in the towns of the Fayum, where there are large rose gardens.

Population.—The prevailing religion is Muhammadanism, there being in 1907 about 10,400,000 Muhammadans, 700,000 Copts (native Christians), 175,000

Christians of various denominations, and 39,000 Jews. The Coptic religion is very similar to that of the Gk. Orthodox Church. Under the patriarch of Alexandria there are three Egyptian archbishoprics and twelve bp's. The famous univ. of El Azhar at Cairo was established in 972, and is still flourishing. Another large Muhammadan school is the mosque of El-Ahmadi at Tanta. Technical, secondary, and higher education are extremely well provided for, chiefly by private initiative; 34 Higher Primary Schools (for Europeans) and 146 Kuttab schools (for natives) are directly under the Egyptian Board of Education; 3279 Kuttabs have received government aid since 1897.

More than half the native population is engaged in agriculture; it is chiefly composed of an Arab element intruded in the VII. cent., a Turk. element introduced shortly afterwards, and the Coptic substratum. The origin of the Copts (*q.v.*) is not certainly known, but racial types are to be discerned in the inscriptions on the pyramids. The ruling race is believed to have landed from Asia on the Red Sea coast and taken up its abode at Koptos on the Nile. A second element is believed to be from Mesopotamian immigration in primitive times, the third and fourth the probable negro and Libyan substrata. The total population at 1907 Census was about 11,300,000, of whom 151,000 were foreigners (chiefly Gk., Ital., Brit., Fr., Austrian, Russian, German, and Persian).

Egypt, by Lane-Poole (1881), Budge (1902), Petrie (1903), Breasted (1906); Milner, *England in E.* (1892); Cromer, *Modern E.* (2 vols., 1908); Newberry and Garstang, *Short History of Ancient E.* (1912).

EHRENBREITSTEIN (50° 22′ N., 7° 38′ E.), town, on Rhine, Prussia; important fortress. Pop. (1910) 5055.

EIBAR, town, Guipuzcoa, Spain; manufactures weapons. **Eibar Work** is damascened arms. See DAMASCENING.

EIBENSTOCK (50° 29′ N., 12° 36′ E.), town, Saxony, Germany; cattle market; chemical and tobacco manufactories. Pop. (1910) 9522.

EICHENDORFF, JOSEPH, FREIHERR VON (1788–1857), Ger. romance-writer and lyrical poet.

EICHHORN, JOHANN GOTTFRIED (1752–1827), Ger. theologian; prof. at Jena and Gottingen; wrote works on Oriental subjects, Biblical criticism, and history.

EICHHORN, KARL FRIEDRICH (1781–1854), Ger. jurist; pub. important works on constitutional law.

EICHSTÄTT (48° 53′ N., 11° 12′ E.), town, Bavaria, Germany; has cathedral. Pop. (1910) 8031.

EIDER (54° 10′ N., 8° 40′ E.), river, Prussia, enters North Sea; connected with Baltic by Kaiser Wilhelm Canal.

EIDER DUCK, see under DUCK FAMILY.

EIFEL (50° 23′ N., 6° 50′ E.), hilly region, Germany, bounded by Rhine, Moselle, and Belgium; of volcanic origin; has many extinct volcanoes and small lakes.

EIFFEL TOWER, colossal iron structure, built 1887–89, by Alexandre Gustave Eiffel, on the Champs-de-Mars, Paris. It is 985 ft. high, consists chiefly of lattice-work, is of three storeys, and served by lifts. It cost *c.* £250,000, a sum paid up in admission fees.

EIGG, Egg (56° 55′ N., 6° 13′ W.), island, Hebrides, Scotland; columnar cliffs.

EIGHT, PIECE OF, PIASTRE, PESO, old Span. coin. See DOLLAR.

EIKON BASILIKE, *The Portraiture of His Sacred Majestie in his Solitudes and Sufferings*, book pub. just after Charles I.'s execution; claims to be work of Charles, but Dr. Gauden's claim to authorship is generally accepted. Milton attacked it in *Eikonoclastes* (1649).

EILDON HILLS (55° 36′ N., 2° 45′ W.), three hill peaks, in Roxburghshire, Scotland; highest, 1385 ft.

EILENBURG (51° 27′ N., 12° 37′ E.), town, Saxony, Germany. Pop. (1910) 17,398.

EILITHYIA, ancient Egyptian city, on Nile, 40 miles S. of Thebes; site of temples and royal tombs.

EIMEO, AIMEO (17° 28′ S., 149° 53′ E.), one of the Society Islands; area, 50 sq. miles; French possession; devastated by tidal wave, 1903; centre for London Missionary Society.

EINBECK, EIMBECK (51° 49′ N., 9° 51′ E.), town, Hanover, Germany; manufactures textiles. Pop. (1910) 9430.

EINDHOVEN (51° 26′ N., 5° 28′ E.), town, in Brabant, Holland; flourishing industrial centre. Pop. 4730.

EINHARD, EGINHARD (770–840), Ger. historiographer; associate and biographer of Charlemagne.

EINHORN, DAVID (1809–79), Amer. Jew, introduced various ritual reforms; strong opponent of slavery.

EINSIEDELN (47° 7′ N., 8° 45′ E.), town, Switzerland; has Benedictine monastery. Pop. (1910) 8420.

EISENACH (50° 59′ N., 10° 19′ E.), town, Saxe-Weimar, Germany; Luther translated Bible in the Wartburg here. Pop. (1910) 38,353.

EISENBERG (50° 58′ N., 11° 54′ E.), town, Saxe-Altenburg, Germany. Pop. (1910) 10,750.

EISENERZ (47° 33′ N., 14° 53′ E.), town, Austria; rich ore quarried in district; iron and steel foundries. Pop. (1910) 7557.

EISLEBEN (51° 33′ N., 11° 33′ E.), town, Saxony, Germany; Luther's birthplace; centre of mining district. Pop. (1910) 24,627.

EISTEDDFOD (pl. *Eisteddfodau*), Welsh bardic congress, of very ancient origin; earliest description of one, held at Conway, dates from VI. cent. The modern annual celebration began in 1819. The purpose of the ceremony is the cultivation and encouragement of Welsh poetry, music, and tradition. See *History of Eisteddfod*, by Roberts (1909).

EJECTMENT, Eng. legal action for recovery of land by writ of summons demanding immediate possession. In Scotland the process is by summary ejection.

EKASILICON, see GERMANIUM.

EKATERINBURG (56° 52′ N., 60° 42′ E.), town, Perm, Russia, in centre of mining district. Pop. (1910) 51,740.

EKATERINODAR (45° 3′ N., 38° 53′ E.), town, on Kuban R., Caucasia, Russia. Pop. (1910) 93,800.

EKATERINOSLAV (48° 15′ N., 36° E.), government, S. Russia; area, 24,477 sq. miles; surface undulating; produces coal, iron, wheat, fruits; cereals exported in large quantities. Pop. (1910) 3,061,300. **Ekaterinoslav** (48° 28′ N., 35° 7′ E.), capital, on river Dnieper. Pop. (1910) 148,870.

EKHOF, KONRAD (1720–78), Ger. actor; highly esteemed by Goethe.

EKRON (31° 51′ N., 34° 51′ E.), ancient town, Palestine; modern AKIR.

EL BASSAN, town, in vilayet of Monastir, European Turkey; iron and copper manufactures; seat of Gk. bishop. Pop. 15,000.

EL DORADO, name given by Spaniards to undiscovered 'land of gold' in S. America; many expeditions searched vainly for it from 1531 to 1595, when Raleigh (*q.v.*) was liberated by the avaricious James I. to endeavour to find the 'city of Manoa in El Dorado'; term now used metaphorically for land where acquirement of wealth is easy.

EL OBEID (13° 16′ N., 29° 48′ E.), chief town, Kordofan, Sudan; extension of Cairo to Khartum railway was opened to El O., 1912; Hicks Pasha with Egyptian army defeated here by Mahdi, 1883; important trade centre for gum, ivory, cattle. Pop. *c.* 10,000.

EL PASO (31° 45′ N., 106° 25′ W.), town, Texas, U.S.A., on Rio Grande; important trading and railway centre; lead smelting carried on; railway carriages manufactured. Pop. (1910) 39,279.

EL RENO (35° 32′ N., 97° 59′ W.), town, Oklahoma, U.S.A. Pop. (1910) 7872.

EL TEB (*c.* 18° N., 37° 30′ E.), place near coast of Red Sea, Sudan.

EL WAD (33° 20′ N., 6° 56′ E.), town, Sahara, Algeria, Africa. Pop. 7586.

ELABUGA (55° 45′ N., 52° E.), town, Nyatka, Russia; exports corn. Pop. 9776.

ELÆOCARPUS, family of plants of order *Liliaceæ*; found in E. Indies and Australia.

ELAGABALUS, see HELIOGABALUS.

ELAM (*c.* 31° 20′ N., 49° 20′ E.), Bible name for Persian province Susiana. Capital is Susa or Shushan. Exact extent uncertain; excavations at Susa shed light on early history. E. figured in Babylonian myth.

ELAND (*Oreas canna*), a fawn-coloured African antelope; males and females with strongly ridged horns; male with large dewlap; height, 6 ft.—the largest of antelopes.

ELANDSLAAGTE, small town, Natal; battle between British and Boers fought here, Oct. 21, 1899.

ELASMOSAURUS, see REPTILES.

ELASTICITY.—This term denotes that property of matter in virtue of which it tends to recover from any change of shape or volume which has been produced by an applied force. A body can be given such a change in a variety of ways, for it can be compressed, elongated, twisted, bent, or sheared. In each case the force applied is termed a *stress*, and is measured by the number of units of force acting per unit area. The resulting change or deformation is termed a *strain*, and is generally measured by the amount of change in each unit which undergoes the change. But as different materials yield by different amounts to the same stress, it is necessary to have for each material a quantity which will specify or measure the behaviour of the material under a stress of each particular kind. Such quantities are termed *elastic moduli*, and they are generally defined for any particular kind of stress as the ratio of the stress applied to the strain produced. The first is known as *Young's modulus*, which is applied to cases of linear extension. Suppose a heavy mass is attached to the lower end of a vertical wire whose upper end is fixed. The stress is the weight of the mass divided by the area of cross section of the wire. The strain is the amount by which the wire stretches, divided by the length of the wire. The ratio of stress to strain is known as Young's modulus.

The second is known as *Poisson's ratio*, and it arises in the following way: if a wire elongates under tensile stress (as in the example given), its diameter must contract. The ratio of the transverse (or diametral) strain to the longitudinal or extensional strain is Poisson's ratio.

The third modulus is the *rigidity*, a simple conception of which may be obtained as follows. Let a large number of square sheets of paper, equal in size, be laid exactly one above another on a horizontal surface, so as to form a cube. Keeping the lowest sheet at rest, slide each sheet over that below it so that a vertical face of the cube becomes a plane inclined to the vertical. The deformation thus produced is termed a *shear*. In the case of a solid cube, it could be produced by equal forces acting tangentially in opposite directions on two opposite faces of the cube. The shearing stress is measured by the force thus acting on unit surface, and the shearing strain is measured by the angle (supposed small) through which one face of the cube rotates from its unstrained position. The ratio of the stress to the strain is the rigidity.

Lastly, we have the modulus of volume elasticity, or *bulk modulus*. Suppose a cube, whose edges are unit length, is subjected to an equal pressure on all its faces. Owing to compression, each edge will diminish in length. If this diminution be l, the volume of the cube will be decreased by $3l$ (approximately). If the applied pressure per unit area be P, the modulus of volume elasticity will be $\frac{P}{3l}$. Frequently, the reciprocal $\frac{3l}{P}$ of this modulus is used, and is known as the compressibility. Between these four ratios or moduli, two relations are known. Consequently, if any two of the four are determined experimentally, the remaining two can readily be calculated.

In all cases of deformation of a solid body, *Hooke's law* applies. This is to the effect that, so long as the deformation is small, the strain produced is proportional to the stress applied. Thus, so long as Hooke's law applies, the action is said to be within the limits of perfect elasticity. When the stress and strain are large, the body passes the *yield point* beyond which the law is no longer applicable, and a *permanent set* is produced.

The values of the elastic constants for a substance vary with temperature, with the mechanical or thermal treatment it has received, and with its freedom from impurity.

ELATERIUM, drug, prepared from a deposit of the juice of the fruit of the 'squirting cucumber' plant (*Ecballium elaterium*), in the form of slightly curved, greyish cakes of bitter taste. It is a violent purgative, producing watery evacuations, the active principle in it being a neutral body, *elaterin*. E. is used in ascites and Bright's disease, to assist in removing the surplus fluid from the body.

ELBA (42° 46′ N., 10° 15′ E.), island, Mediterranean, off Tuscan coast, Italy; surface mountainous; produces iron, granite, manganese, wine, fish; Napoleon lived here, 1814–15. Pop. 25,043.

ELBE (53° 53′ N., 9° 10′ E.), large river, Germany; rises on Bohemian side of Riesengebirge; flows S., W., and N.W., in Bohemia; N.W. and W., passing through magnificent scenery of Saxon Switzerland; through Prussia N.W., sometimes N.E.; 8 miles above Hamburg divides into several streams (which reunite at Blankenese), and enters Ger. Ocean at Cuxhaven; chief tributaries, Tser, Moldau, Eger, Schwarze-Elster, Elder, Mulde, Saale, Havel; principal towns, Dresden, Hamburg, Magdeburg, Wittenberge, Torgau. E. is navigable as far as Melnik (junction of Moldau, Bohemia); total length, 725 miles, of which over 500 are navigable; connected with Baltic, Trave, Havel, and Oder by canals. E. often figures in history, especially during Austro-Pruss. Wars.

ELBERFELD (51° 15′ N., 7° 9′ E.), town, Prussia, situated on river Wupper; great cotton centre; manufactures textiles, carpets, machinery, hardware, paper, and has large export trade; has some fine public buildings; many churches, schools, and charitable institutions. Pop. (1910) 170,118.

ELBEUF (49° 17′ N., 1° 7′ E.), town, Seine-Inférieure, France. Pop. 17,800.

ELBING (54° 10′ N., 19° 25′ E.), port, Prussia; shipbuilding, machinery. Pop. (1910) 58,515.

ELBOW, see SKELETON.

ELBURZ, ALBURZ (*c.* 36° 40′ N., 50′ E.), mountains, N. Persia to S. of Caspian Sea; length of range, *c.* 600 miles; highest peak, Demavend (19,400 ft.); slopes facing Caspian covered with woodland, and watered by many streams; an important pass is Kharzan.

ELCHE (38° 15′ N., 0° 41′ W.), town, Alicante, Spain. Pop. 27,308.

ELCHINGEN (48° 47′ N., 10° 16′ E.), village, Bavaria, Germany; Fr. defeated Austrians, 1805.

ELCHO, DAVID, see WEMYSS.

ELDAD BEN MAHLI (IX. cent.), Jewish traveller; supposed author of work relating to Lost Tribes.

ELDER, genus *Sambucus*, natural order *Caprifoliaceæ*, deciduous shrubs and trees; common elder, with black berries (*S. nigra*), is used medicinally and for turned articles, *e.g.* pegs and combs.

ELDER, a title existing in the ancient Jewish Church; thence in Christianity. The exact relation between the primitive e., or presbyter, and bp. is open to dispute; e's exist now in Presbyterianism.

ELDON, JOHN SCOTT, 1ST EARL OF (1751–1838), Eng. lawyer; Attorney-Gen. (1793); Lord Chief-

Justice of Common Pleas (1799); Lord Chancellor (1801); violently Conservative, he opposed abolition of capital punishment for minor offences.

ELEAN-ERETRIAN SCHOOL, a Gk. philosophical school, of which little is known, founded in Elis, his native city, by Phædo, who as a youth had been a disciple of Socrates, and subsequently removed to Eretria.

ELEANOR OF AQUITAINE (*c.* 1122–1204), dau. of William V., Duke of A.; m. Louis VII. of France; divorced, she m. Henry II. of England—a union which led to Anglo-French Wars.

ELEATIC SCHOOL, a Gk. school of philosophy founded by PARMENIDES OF ELEA (fl. V. cent. B.C.). Parmenides expounded his philosophy in a poem consisting of two parts, the *Way of Truth* and the *Way of Opinion*. The *Way of Truth* argues that only what is can be thought, and it must be one, without past or future, indestructible, indivisible, immovable, finite (because complete), and equal in every direction like a sphere. But, since the distinction of material and immaterial had not yet arisen, 'what is' (or Being) meant, for Parmenides, Body, and 'what is not' meant empty space. The *Way of Opinion* seeks to show that a belief in change, motion, etc., leads to difficulties even greater than the denial of them.

This attempt was carried further by his pupil, ZENO, also of Elea, who in a series of puzzles, of which that of Achilles and the Tortoise is the best known, argued the unintelligibility of multiplicity and of space and motion.

The E. view was in extreme opposition to that of Heraclitus (*q.v.*), and may be called a materialistic monism. The problem occupied Anaxagoras and Empedocles (*qq.v.*); but the growth of the distinction between mind and matter gave a new turn to the controversy in the next century.

ELECAMPANE (*Inula Helenium*), perennial European plant of order *Compositæ*; height, 2 to 5 ft.; yellow flowers; contains helenin (C_6H_8O) and inulin ($C_{12}H_{20}O_{10}$).

ELECTION, parliamentary and municipal, is under certain regulations. In U.K. any male with certain qualifications can be elected to Parliament; infants, women, aliens, lunatics, clergy, criminals, and holders of certain offices are ineligible. Electors must possess either Household, Occupation, Lodger, or Service Franchise or certain others, with slight variations in Scotland and Ireland; members are also elected by the Univ's of Oxford, Cambridge, London, Dublin, and the Scot. Univ's. Voting is now by ballot, a cross being marked against the name of the candidate for whom the vote is given. The votes are counted by the returning officer. E. expenses are regulated by Act of Parliament; bribery, corruption, treating, etc., can be heavily punished; a guilty candidate if elected can be unseated.

In *Municipal* e's the burgesses elect to town councils. Women can elect, but are not eligible. There are certain property qualifications. In England the council elects aldermen and mayor on November 9. In Scottish burghs the parliamentary electors vote, with the addition of qualified women.

Vote (Lat. *votum*, a vow), the deliberate expression of a wish or preference by one or other of various methods—*e.g.* acclamation, shouting ('ayes' and 'noes'), show of hands, rising to feet, 'dividing' (into separate lobbies), or by secret ballot (*q.v.*). Univ. electors may vote by post; shareholders and others often vote by proxy. Voting machines are used to record and count votes in some countries (*e.g.* America), the Bardwell votometer and Standard machine being the most successful. Qualifications for a parliamentary or municipal v. differ in various countries, the commonest being those of age, sex, education, property, residence, sanity. 'One man, one vote' is advocated by opponents of plural voting; 'one vote, one value' goes further and requires constituencies equal in number of electors, so that each man's vote is the same in value. Under Proportional Representation the elector has a single 'transferable' vote, so that if, among several candidates, his favourite is not elected, his vote may not be lost, but help to return the candidate he considers second-best.

In UNITED STATES elections are *national* (for Congress, or electoral college to choose president), *state* (for officials of state—governor, etc.), and *municipal* (town, city or county). Although most states accept in theory principle of universal manhood suffrage (and several extend vote to women), Cal. Conn. and Mass. insist on minimum of education; and several Southern states do likewise or impose taxes, to exclude indigent and ignorant negroes. In La. disqualified persons may vote if they were entitled on Jan. 1, 1867, or are sons or grandsons of people then voters

ELECTION, in Calvinism, PREDESTINATION (*q.v.*).

ELECTORAL COMMISSION, created to settle U.S.A. presidential election dispute (1876); candidates were Tilden (Democrat) and Hayes (Republican); verdict in Hayes' favour was partisan. An Act of 1887 provides for settling disputes conclusively.

ELECTORS, the Ger. princes (Kurfürsten), originally seven, who elected Ger. kings and Holy Rom. emperors—royal titles almost invariably held by one and the same man. The Ger. kingship, like that of other countries, was partly elective, partly official, though for several reasons the elective element came to predominate, partly because the Rom. Imperial tradition was maintained, and the old Empire had always been elective. By the XII. cent. the usual e's were the three Rhenish abp's (Köln, Mainz, and Trier) and the great dukes. The Golden Bull of Charles IV. (1356) recognised as lay e's the Palatine of the Rhine, Duke of Saxony, Margrave of Brandenburg, and King of Bohemia; two other votes were cr. for Bavaria (1623) and Hanover (1708). See EMPIRE, HOLY ROMAN, GERMAN EMPIRE, *History*.

ELECTRA (classical myth.).—(1) One of the Pleiades. (2) Dau. of Agamemnon and Clytæmnestra, and sister of Orestes. Subject of tragedies by Æschylus, Sophocles, and Euripides, and opera by Strauss.

ELECTRIC EEL (*Gymnotus electricus*), most formidable of electric fishes, capable, by electric shock, of overturning horses; found in rivers of Brazil and Guiana, 6 to 8 ft. long; not related to true eels.

ELECTRICITY. *Current e.* treats of e. in motion, while *electrostatics* treats of e. at rest. It is seen that e. flows between two points at different pressures when joined by a conductor. If the flow is to continue, the pressure difference or difference in potential must be sustained. This is achieved by *batteries* and *dynamos*. The existence of the current appears from the properties acquired by the conductor; it becomes heated, a magnetic field is created round it, and if it is severed and the ends connected to plates of certain substances placed apart in certain liquids these are decomposed.

The practical unit of current is the *ampère*, the unit difference of pressure, the *volt*. As shown by the heating effect, any conductor resists the passage of a current, and the unit of resistance is the *ohm*. The relation between current C, pressure loss E in, and resistance R of, a conductor is given by OHM'S LAW, viz. $E=RC$. If any two of these are known the third is fixed. So if a cable carries 300 ampères and the pressure difference between the ends is 6 volts, the resistance is $6 \div 300 = \cdot 02$ ohms; or if the resistance is known ·02 ohms and the current is 300 ampères, the drop in volts will be 6; or if the drop is to be 6 volts and the current 300 ampères, a cable of resistance 0·2 ohms must be chosen.

When conductors are joined on end or in series, their joint resistance equals the sum of the separate resistances. When they branch out from one point and join together at another or are in parallel, a current divides between them, the smallest resistance passing the greatest current. This is comparable to water in a pipe-line dividing between two pipes of different diameter. With resistances a, b, current C, a passes $\frac{b}{a+b}$. C, b passes $\frac{a}{a+b}$. C. Any number of resistances

in parallel are equivalent to one resistance = product of the single resistances ÷ their sum. In the special case of n equal resistances, each R, the equivalent is $\frac{R}{n}$.

The heat developed in a resistance, which will produce light with a suitable resistance, is expressed by JOULE'S LAW: Calories = $\cdot 24EC t = \cdot 24C^2Rt$, t being the time in seconds. The total energy of radiation corresponds to the loss in pressure E. Arago discovered that iron filings in the neighbourhood of a conductor carrying a current set themselves in definite positions, and Oersted found that a magnetic needle set itself at right angles to the conducting wire. A cylindrical coil, in fact, when carrying a current behaves as a magnet with north and south ends. The magnetism is concentrated by inserting a core of soft iron, which becomes a temporary electro-magnet.

Electrostatics.—It was known to the Greeks that amber (ēlektron) when rubbed became capable of attracting light bodies. This property, imparted by friction, is shown in different degrees by all substances when suitably rubbed, and the body is said to be electrified or possess electrification. It appears by experiment that there are two kinds of electrification produced in equal quantities at the same time. Glass, rubbed with silk, is said to be positively electrified; vulcanite, rubbed with fur, negatively electrified. Also similarly electrified bodies repel, dissimilarly electrified bodies attract each other. Now some bodies such as metals do not exhibit these properties when held and rubbed, but do so if given a glass handle. Such bodies are called *conductors*: glass, vulcanite, and such-like are *insulators*. A positively charged or electrified body is at a higher electrical pressure than the earth, and if it is connected to earth by a conductor, electricity flows from it till the pressures become equal. A negatively charged body is at a lower pressure or potential than the earth, and when connected receives electricity. The earth's potential is assumed zero for convenience. There can be no flow of electricity without difference of potential, which corresponds to difference of temperature or difference of head with water.

A positively charged body, such as a sphere in the centre of a room, tends to discharge itself and therefore the air round it is strained. An electric field is thus created and an insulated conductor placed in it is electrified negatively on the side next the sphere, positively on the side distant from the sphere. This is electrostatic induction. The transmitting medium (air) is a *dielectric*. If a sheet of glass or mica be now interposed, the inductive effect is increased. These and similar substances are said to have a higher specific inductive capacity (S.I.C.) than air, the specific inductive capacity of which is taken as 1.

Electrostatic measurement starts from the law that the force between two charges is proportional to their product divided by the square of their distance apart. The unit charge is such that it repels an equal charge 1 centimetre distant in air with a force of 1 dyne. The *potential* again at any point is the work done in moving a unit positive charge against the force to that point from an infinite distance: and the potential is 1 if the work done is 1 erg. For a sphere, the potential = charge ÷ radius. Lastly, the *capacity* is the charge when the potential = 1. The fundamental equation, charge = capacity × potential connects the three. An arrangement of conductors separated by a thin dielectric has high capacity and is termed a *condenser*.

ELECTROSTATIC MACHINES, appliances for producing positive and negative electricity separately, in large quantities. The earlier forms of machine depended on Friction, but these have given way to machines depending on Induction, by which is meant that a positive charge on a conductor will 'induce' (*i.e.* produce) an equal negative charge on another conductor placed near it, and conversely for a negative charge. The simplest of this type of machine is the *Electrophorus* (q.v.). All electrical machines consist essentially of two parts, one for producing and one for collecting the electricity. The *Wimshurst Influence Machine* is typical of others. It consists of two circular glass plates, placed close together and arranged to rotate in opposite directions. To the outer surface of each are attached an even number of metal strips. A small charge (positive or negative) is given to one of the strips, and as the plates rotate the others become charged by induction, the charges increasing with rotation. The charges are collected by wire combs touching the plates, and stored in metal knobs. More correctly, the combs neutralise the charges and induce similar charges in the knobs. Other induction machines are: Holtz Electrical Machine, Kelvin's Water-dropping Apparatus, Kelvin's Mouse Mill, Toepler's Influence Machine.

Modern Views of Electricity, Lodge (Macmillan); *The Principles of Electricity*, Campbell (Jack).

Electric Waves.—If a condenser, such as a Leyden jar, be discharged through a good conductor, electric oscillations are set up in the conductor, the charge surging to and fro as if it had overshot the mark each time, just as is the case in the swinging of a pendulum. The same occurs if there is a short air gap in the conductor, the first part of the discharge making the gap a good conducting path. The time of a complete oscillation is $2\pi\sqrt{LC}$, where C is the capacity of the circuit and L the self-induction. Direct evidence of the oscillatory nature of a spark discharge may be obtained by a photograph or by revolving mirrors.

If the oscillations are very rapid, electric (more correctly, electro-magnetic) waves are set up in the surrounding air. These waves travel away from the apparatus with the velocity of light, and consist of electric and magnetic disturbances taking place at right angles to each other and to the direction in which the waves are travelling. Hertz (*q.v.*), who investigated the subject in 1888, detected the waves by means of a 'resonator,' consisting of a thick copper wire bent into a circle and ending in two knobs, the distance between which was adjustable. When the resonator was 'in tune' a spark passed between the knobs. He proved that electric waves are capable of reflection, refraction, polarisation, and interference according to the same laws which govern waves of light, and that they travel with the same velocity. It is now believed that light waves are simply electric waves of very short wave length and high frequency.

In the application of electric waves to Wireless Telegraphy the oscillations take place along the aerial and the detector is a 'coherer' (see TELEGRAPH).

Electro-kinetics treats of the properties of the electric current. These may be generalised under four heads: (1) *The production of a magnetic field* (ELECTRO-MAGNETISM).—Owing to this the mechanical action of one current on another is such that parallel circuits will attract each other if the current flow in the same direction in both, and repel if the current flow in opposite directions. This has found practical application in Weber's Electro-dynamometer and Kelvin's Ampère Balance. (2) *The production of heat.*—Even the best conductors oppose a resistance to the passage of a current, which therefore has to perform work in overcoming this resistance; this work results in the production of heat. The quantity of heat produced in a second by a current C against a resistance R is C^2R. Also the thinner the conductor, the greater the resistance; hence in a thin filament like that of an electric lamp the heat is sufficient to cause it to glow brightly given a sufficient strength of current. (3) *Chemical effects* (ELECTROLYSIS).—This forms the basis of the present legal definition of the practical unit of current (the AMPÈRE), viz. 'That current which deposits ·001118 grammes of silver per second.' Properties (2) and (3) have been put to great commercial use in metallurgical processes (ELECTRO-

METALLURGY). (4) *Induction*, discovered by Faraday in 1831. He found that currents can neither be created nor destroyed instantaneously. This is similar to the property of 'inertia' in material bodies. Transformers, in use at all generating stations, and induction coils depend on this principle. Faraday further discovered that if a conductor is moved so as to cut the lines of force of a magnetic field a current is 'induced,' *i.e.* generated, in it, the strength of the induced current being proportional to the rate of motion of the conductor. This discovery has made possible the commercial production and use of the electric current. The dynamo works on this principle, a number of coils revolving in a magnetic field produced by electro-magnets. The current so generated, however, changes its direction twice in each revolution (alternating current), but by means of a commutator this is changed into a current which always flows in the same direction.

J. J. Thomson, *Elements of the Mathematical Theory of Electricity and Magnetism*; Poynting and Thomson, *Magnetism and Electricity*.

Supply.—Electric current is produced by one or more dynamos (*q.v.*), driven by a steam or gas engine or water-power, and is conducted, either overhead or underground, by copper cables. In the interior of buildings the conductor is a rubber-covered copper wire laid in a wood or fireproof casing. The current generated by a dynamo is alternating, *i.e.* it changes in direction twice in each revolution of the dynamo coils, but this can be changed by means of a commutator into a continuous current, always flowing in one direction. The supply will be either a continuous or an alternating current system, according to the purpose for which it is required; thus, for traction, a continuous current of between 500 and 600 volts is needed, while for lighting either one or the other will do.

The continuous-current system is either a low or high pressure system (low or high voltage). The first is suitable for supplying an immediate neighbourhood, the current being produced at between 450 and 500 volts, and by means of a three-wire system supplied to users at half this voltage. At such stations, it is usual, for economic reasons, to utilise storage batteries, which make a small plant, worked all the time, a possibility—when a sudden extra demand is made on the supply, the batteries discharge together with the dynamo, and on the demand falling, the excess produced by the dynamo charges the battery.

The high-pressure system is used where current has to be supplied to some distance from the generating station. In the ordinary way, there would be a great loss of power owing to the heating by the current of a long conductor. This could be avoided either by using a very thick cable, and thus reducing its resistance, or by generating a high voltage. The first would involve a heavy outlay on copper, and the second grave risks on the part of consumers in case of accidental contact. To prevent loss of power, therefore, the current is either (*a*) produced at low pressure, changed at the station into a high-pressure current by a *step-up* transformer (*q.v.*), transmitted at this high pressure to subcentres, where it is changed back to a low-pressure current by *step-down* transformers, and *then* supplied to users from these centres; or (*b*) produced at high pressure straightway, and changed to low pressure at the subcentres.

The alternating-current system is either single phase or polyphase, and the above remarks with regard to high and low pressure currents apply. The single-phase system cannot be used with storage batteries, and consequently the polyphase system is now commonly employed.

In small towns where the station supplies power for both traction and lighting, double current dynamos are used, giving a continuous current for the former and an alternating current for the latter purpose.

For private plants, a dynamo is usually employed. It is advisable to have storage batteries in connection with it, not only as a safeguard in case of stoppage, but also because the dynamo and driving engine require constant skilled attendance. See LIGHTING.

A. Gay and C. Y. Yeaman, *Central Station Electricity*; C. H. Wordingham, *Central Electrical Stations*; L. Andrews, *Electricity Control*; W. Perren Maycock, *Electricity Wiring, Fitting, Switches, and Lamps*.

Electrolysis.—If the platinum wires from the terminals of a battery are dipped into either (1) pure water, or (2) pure hydrochloric acid, no change takes place, but if a small amount of (2) is added to the water, on the passage of a current, certain chemical changes ensue. Therefore the solution of hydrochloric acid in water is a conductor of electricity, which pure water and pure hydrochloric acid are not. The term *electrolyte* is applied to substances which in aqueous solution conduct electricity; salts, acids, and basics are electrolytes. The same substances dissolved in chloroform do not conduct electricity; therefore they are present in some special condition in water. This condition is called dissociation, and it is supposed that when an electrolyte, sodium chloride, is dissolved in water, it splits into metallic radicles, or *cations*, carrying positive and negative radicles, or *anions*, carrying negative electricity.

In the case of an aqueous solution of sodium chloride there are sodium ions and chlorine ions. These, it must be observed, do not show the properties of the elements chlorine and sodium, because they are modified by the charge of electricity they carry. The dissociation varies in different electrolytes, and increases with the dilution till a maximum is reached. This splitting into ions, neither of which interferes with the action of the other, explains why two series of reactions, one belonging to the metal radicle, the other to the salt radicle, are obtained from a solution of a salt.

When a current from a battery is passed through a solution of sodium chloride, the electric forces direct the anions or chlorine ions to the positive pole or *anode*, and the cations or sodium ions to the negative pole or *cathode*. This movement of the ions is termed 'migration of ions.' At the anode the negative charge of the chlorine ion and at the cathode the positive charge of the sodium ion are neutralised, and these become ordinary atoms; the chlorine molecule is liberated, bubbling up from the anode, which the sodium attacks, the water yielding hydrogen, which is liberated, and sodium hydroxide, which alkalinises the water round the cathode. If the sodium had no action on water, it would simply fall to the bottom of the tank. This decomposition, which results from passing an electric current through an electrolyte, is termed *electrolysis*. It forms the basis of many industrial processes for the isolation and refining of metals. It can also be used as a laboratory method of analysis. See also ELECTRO-THERAPEUTICS.

Electroplating is one of the adaptations; the article to be plated is attached to the negative pole of a battery, and immersed in a bath of suitable solution of some salt of the metal to be deposited. If the substance to be coated is non-conducting, it is coated with graphite to render it conducting. The anode is made of the metal of which a coating is desired, and as it dissolves it maintains the strength of the bath approximately constant. The same amount of electricity deposits the same amount of metal. Copper, silver, nickel, and gold can be deposited. An adherent and regular deposit is obtained by regulating the concentration of the bath and the strength of the current.

Electrotyping is the electroplating of a plaster, wax, or gutta-percha mould from an engraved wooden block. The moulds are coated with plumbago.

Thermoelectricity.—If the ends A, B, of a copper wire are soldered to the ends X, Y respectively of an iron wire, and if one of the junctions, *e.g.* AX, is heated, a current of electricity will flow round the circuit so as to pass from the copper to the iron across the heated junction. The same effect will be produced if the junction BY is cooled to a temperature below that of the AX junction. Such currents are termed

thermoelectric currents, and they are said to be due to a thermoelectromotive force set up by the difference in temperature between the two thermoelectric junctions. They can be produced in any pair of metals and even by samples of the same metal which have received different mechanical treatment. Again, if the junction BY be kept in melting ice, while the junction AX is gradually raised in temperature, the current increases in strength at first, reaches a maximum when AB is at a temperature of about 270° C., then decreases until it is zero, at about 540° C., and for higher temperatures flows in the reverse direction. The temperature at which the current reaches a maximum is termed the *neutral point*, and it lies midway between the temperatures of the two junctions when the current reverses its direction. If the circuit is made up of a number of metals, the total thermoelectromotive force in the circuit is the sum of the thermoelectromotive forces due to the separate junctions. Hence the thermoelectric effect of including any additional metal in the circuit is zero if its ends are at the same temperature.

The above phenomena have their converse shown when a current from some separate source is sent round the circuit. In the example taken above, if this separate current flows from the copper to the iron across the junction which was heated, it is found that heat is absorbed at this and evolved at the other junction. This, named after its discoverer, is known as the *Peltier effect*. Thermoelectric circuits are largely used in scientific work for the measurement of temperature. The principle is also applied in the thermopile, which is used for the detection of radiant energy.

Tait, *Heat*; Stewart, *Magnetism and Electricity*.

ELECTRO-CHEMISTRY is based on electrolysis, and comprises the isolation and purification of metals. The electric current is used in industrial chemistry to obtain sodium and potassium from their fused hydroxides, and lithium and magnesium from their fused chlorides; the essentials are a containing vessel, cathode and anode unaffected by temperature and metal, and a device for preserving the metal pure. Copper obtained by smelting ore is very impure, but by using a cathode of refined copper, an anode of the impure metal, and a cupric salt as electrolyte, pure copper is deposited on the cathode on passage of a current.

ELECTROCUTION, term used for the execution of a criminal by electricity, a method employed in America, first in the State of New York in 1890. The criminal is seated in a special chair, his body, arms, and legs secured by straps; one electrode is fastened to his head, and another to one leg, and a current of electricity passed through the body several times for a few seconds at a time, at varying strengths. The first application, at 1600–1800 volts, destroys consciousness and stops the circulation and respirations at once, and the subsequent applications prevent any possibility of the recovery of these functions. Death is painless, and the process less revolting than hanging or beheading by the guillotine.

ELECTRO-MAGNETISM, the science dealing with the relation between magnetism and electricity, was first fully investigated by Ampère (*q.v.*). An electric current produces a magnetic field in its neighbourhood, and hence will deflect a magnetic needle—a fact utilised in the construction of all forms of *galvanometers* (instruments designed to measure the strength of currents). If the electric circuit is in the form of a circle of radius r, the strength of the magnetic field at the centre due to a current C is $\frac{2\pi C}{r}$. From this the definition of the electro-magnetic or C.G.S. unit of current is obtained, viz.: 'That current which, passed through a wire 1 centimetre long, bent into an arc of a circle of 1 centimetre radius, will exert a force of 1 *dyne* on unit magnetic pole placed at the centre of the circle.' The practical unit (the *ampère*) is $\frac{1}{10}$ of the electro-magnetic unit. Ampère introduced the notion of treating a circular coil through which a current is passing, as a magnetic shell, for one face of such a circuit possesses north-seeking polarity, and the other south-seeking polarity. If a large number of such coils be placed parallel and closely together (and this can be done by winding a wire round a cylinder), a *solenoid* is obtained, having a strong magnetic field in the central space if a current is passed, and the solenoid will behave as a bar magnet. If such a winding be made about a piece of iron in the form of a horseshoe, the iron will become a strong magnet on passing a current. Such a magnet is called an *electro-magnet*, and is usually made of soft iron, as this has the property of quickly losing its magnetism when the current is stopped. The electro-magnet is a very useful factor in many electrical devices; its invention made the electric telegraph, and later the dynamo, a possibility.

J. J. Thomson, *Elements of the Mathematical Theory of Electricity and Magnetism*; Poynting and Thomson, *Magnetism and Electricity*.

ELECTRO-METALLURGY, metallurgical processes in which an electric current is used. They are of three kinds: (1) *Electrothermal process*, in which the current is used to produce a high temperature in order to permit certain chemical reactions to take place—a process used in the manufacture of calcium carbide, graphite, phosphorus, carborundum; (2) *Electrolytic process*, where the current is used to act chemically on a solution of a metal salt in order to deposit the metal—as in electroplating, electrotyping, the production of pure copper from impure copper salts; (3) A process combining (1) and (2). In this, the current first acts as a heating agent, fusing a salt into a liquid, and then electrolytically on the liquid. It was in this manner that Davy first produced sodium and potassium. Magnesium and aluminium are also manufactured by this process.

ELECTROMETER, an electrical instrument for measuring differences of electrical potential. The usual form is the 'quadrant electrometer.' A light flat paper needle, dumb-bell in shape, is thinly coated on one side with metal, and symmetrically suspended by a quartz fibre in a flat metal cylindrical box, which is insulated and cut into equal quadrants, slightly separated from each other. Opposite quadrants are connected by wires, and the needle to one pair of quadrants. If the quadrant pairs are now charged to different potentials, the needle is attracted by one pair and repelled by the other pair, and thus twisted by an amount proportional to the square of the potential difference. This method (*idiostatic* method) is used for measuring large differences of potentials or rapidly alternating potentials. For measuring small potential differences the needle is disconnected and independently charged to a high potential (*heterostatic* method).

ELECTRON, see MATTER.

ELECTROPHORUS, the simplest form of electrical induction machine; invented by Volta; consists of circular cake of resin or ebonite and a metal disc of same diameter having an insulating handle.

ELECTROSCOPE, an instrument for detecting small charges of electricity. It consists of a stout wire with two gold leaves attached to one end, enclosed in a case from which it is insulated. When a charge is brought near the instrument, both leaves become charged with the same kind of electricity and repel each other. The electroscope can also be used to determine whether the charge is positive or negative. In some instruments only one leaf is used, the wire itself taking the place of the other leaf. The electroscope has recently been largely used in the study of radio-activity.

ELECTRO-THERAPEUTICS, term applied to the use of electricity for the cure of disease. In diagnosing various conditions, especially of the nasal passages, larynx, and the urinary bladder, small electric lamps attached to instruments suitable for the exploration

of such parts of the body have proved of great value, while in the location of foreign bodies and of urinary calculi, in the diagnosis of fractures and diseases of bones and of other conditions, the X-rays discovered by Röntgen have created a revolution, and examination with them is becoming more and more a routine in surgical diagnosis. In the treatment of lupus and other skin diseases the best method is by making use of the action of the X-rays or of other rays discovered by Finsen, special electric lamps being employed, while the X-rays have also proved of benefit in certain cases of cancer and other new growths, retarding their progress and diminishing their size, in leucocythæmia by diminishing the size of the spleen, and in several other obscure diseases. Electrolysis is the best method of removing superfluous hair and moles, and it is also used to promote the coagulation of blood in the sacs of aneurisms, for the treatment of inflammation of the internal lining of the uterus, for rodent ulcer, for ankylosis (*q.v.*) or adhesions of joints, and for adhesions in the pleura and elsewhere, while the sphere of its application is being gradually extended.

In the diagnosis of conditions due to nervous degenerations two forms of electricity are employed: the galvanic or continuous current, and the faradic or interrupted current, the former stimulating the muscles directly, and the latter the nerves directly and the muscles only through their nerve supply, the diagnosis depending on the excitability of the muscles. Both forms are used in the treatment of nervous affections, infantile paralysis, neurasthenia, sciatica, chorea, etc., in wasting conditions after anæmia or any prolonged illness, for lumbago, rheumatism, and other painful conditions, very often in combination with massage. The so-called 'electric' belts, rings, etc., depend, however, for their therapeutic powers, not on electricity, but on the faith of the individual who wears them.

Guilleminot, *Electricity in Medicine*; Dawson Turner, *Practical Medical Electricity* (4th ed., 1904).

ELEGIT, WRIT OF, in Eng. law, writ issued by sheriff to judgment creditor who, as 'tenant in elegit,' holds debtor's lands until the full amount of debt has been discharged out of rents.

ELEGY, stately poetic monody. Amongst the ancients the e. was not always funereal, often being patriotic or amatory. The classical form was an alternation of hexameter and pentameter verses, and famous early writers of the e. were Callimachus, Euphorion, Theocritus, Bion, Propertius, Tibullus, and Ovid. The form has long been a favourite with Eng. poets—Spenser, Milton, Donne, Gray, Shelley, Tennyson, Arnold, William Watson, Bridges, and others. See Bailey's *Eng. Elegies* (1900).

ELEIA, see ELIS.

ELEMENT is the term applied to such substances as cannot be broken up into other substances with different properties, and which, either combined with other substances, or, more rarely, uncombined, form all matter. Many substances thought to be elements are in reality compound substances, and possibly substances now included among the elements will yet prove to be compound substances. The number of known elements is being augmented, *e.g.* by the discovery of the *argon* group of elements, and by the discovery of *radium*. The fact that the element *radium* can change itself into the element *helium*, and also induce changes in other elements, may cause modification of the law of conservation of elements.

Elements are built up of *atoms*, which are the smallest possible particles of matter that can take part in a chemical change, and which, since an atom cannot be broken up, are identical. Assuming the weight of an atom of the lightest known element, *hydrogen*, as unity, by various methods, *e.g.* chemical methods, methods based upon volumetric relations, the ratios of the weights of the atoms of the different elements to the weight of an atom of hydrogen may be found, these being termed *atomic weights*. The elements at present known, eighty-one in number, are the following, the symbol of each being given immediately after it: Aluminium, Al; Antimony, Sb; Argon, A; Arsenic, As; Barium, Ba; Bismuth, Bi; Boron, B; Bromine, Br; Cadmium, Cd; Cæsium, Cs; Calcium, Ca; Carbon, C; Cerium, Ce; Chlorine, Cl; Chromium, Cr; Cobalt, Co; Columbium or Niobium, Cb or Nb; Copper, Cu; Dysprosium, Dy; Erbium, Er; Europium, Eu; Fluorine, F; Gadolinium, Gd; Gallium, Ga; Germanium, Ge; Glucinum or Beryllium, Gl or Be; Gold, Au; Helium, He; Hydrogen, H; Indium, In; Iodine, I; Iridium, Ir; Iron, Fe; Krypton, Kr; Lanthanum, La; Lead, Pb; Lithium, Li; Lutecium, Lu; Magnesium, Mg; Manganese, Mn; Mercury, Hg; Molybdenum, Mo; Neodymium, Nd; Neon, Ne; Nickel, Ni; Nitrogen, N; Osmium, Os; Oxygen, O; Palladium, Pd; Phosphorus, P; Platinum, Pt; Potassium, K; Praseodymium, Pr; Radium, Ra; Rhodium, Rh; Rhubidium, Rb; Ruthenium, Ru; Samarium, Sa; Scandium, Sc; Selenium, Se; Silicon, Si; Silver, Ag; Sodium, Na; Strontium, Sr; Sulphur, S; Tantalum, Ta; Tellurium, Te; Terbium, Tb; Thalium, Tl; Thorium, Th; Thulium, Tm; Tin, Sn; Titanium, Ti; Tungsten, W; Uranium, U; Vanadium, V; Xenon, X; Ytterbium, Yb; Yttrium, Y; Zinc, Zn.; Zirconium, Zr.

When the elements are arranged in order of their atomic weights, those which correspond in order in each series of eight have similar chemical and physical properties (Mendeléeff's law)—a law now modified by the inclusion of the argon group of elements (inert gases), and there are many gaps in the series representing elements which have not yet been discovered. This law is applied in grouping the elements,—the

PERIODIC SYSTEM OF ELEMENTS.

	Group 0 (Inert Gases).	Group I.	Group II.	Group III.	Group IV.	Group V.	Group VI.	Group VII.	Group VIII.
1	—	H	—	—	—	—	—	—	—
2	He	Li	Be	B	C	N	O	F	—
3	Ne	Na	Mg	Al	Si	P	S	Cl	—
4	A	K	Ca	Sc	Ti	V	Cr	Mn	Fe, Co, Ni
5	—	Cu	Zn	Ga	Ge	As	Se	Br	—
6	Kr	Rb	Sr	Y	Zr	Nb	Mo	—	Ru, Rh, Pd
7	—	Ag	Cd	In	Sn	Sb	Te	I	—
8	X	Cs	Ba	La	Ce	Nd	—	Sa	—
9	—	—	—	Gd, Tm	—	—	—	—	—
10	—	—	—	Yb	—	Ta	W	—	Os, Ir, Pt
11	—	Au	Hg	Tl	Pb	Bi	—	—	—
12	—	—	—	Th	—	—	U	—	—
13	—	—	Ra	—	—	—	—	—	—

periodic system. The properties of the elements *Dysprosium*, *Erbium*, *Europium*, *Lutecium*, *Praseodymium*, and *Terbium* are not sufficiently known to place them in their proper group, while the discovery of the radio-active elements may disturb Mendeléeff's grouping.

In the preceding diagram the elements are arranged in lines from left to right in order of their atomic weights, while the vertical lines cut them off into groups in which the elements resemble one another chemically and physically, each group being again arranged in two vertical columns of those elements which, in each group, most resemble one another. There are certain exceptions to this rule, *e.g.* argon should come after potassium in the order of atomic weights, but it must be put before to bring it within its proper group; these exceptions are due to some unknown disturbing factor which cannot yet be explained.

ELEMI, resin used in varnishes, exported from Philippine Islands.

ELEPHANT.—The two modern species of elephants and their extinct relatives are grouped in a sub-order of Ungulates, PROBOSCIDEA, but they are far removed from the Even- and Odd-Toed groups of that order. They present strange contrasts, for, although their skull, trunk, and teeth are peculiar and highly specialised, their limbs and vascular system are of an elementary character.

Modern elephants are large, clumsily built animals, with enormous heads and ears. Their skin is thick and hard, furnished with few bristly hairs; their limbs thick, with low knee-joint in the hind leg, and terminating in broad circular five-toed feet. Most peculiar is the extension of the nose into a long, mobile, sensitive proboscis or trunk, which bears the nostrils at its end, and is produced into two lips capable of grasping the foliage and shoots upon which the animals feed. The teeth also are peculiar, for the upper incisors are prolonged into huge tusks of solid ivory, while the back teeth or molars are very large; their grinding surfaces present many transverse ridges, and, although six or seven occur on each side, only one or portions of two are in use at once, these, as they become worn, being ejected and replaced by another of the series. The only living species are the frequently domesticated INDIAN ELEPHANT (*Elephas maximus*), found in India, Ceylon, Burma, Siam, Malay, Sumatra, and Borneo, and the AFRICAN ELEPHANT (*E. africanus*), occurring in Africa in the Sudan and southwards to the Zambesi. The former has moderate ears, parallel ridges on the teeth, the upper lip of the proboscis long and finger-like, and four or five hoofs on the hind feet; the latter has very large ears, lozenge-shaped ridges, no finger-like process, and only three hoofs on the hind feet.

The gigantic extinct MAMMOTH (*E. primigenus*), of Pleistocene times, had enormously long, curved tusks and a long, hairy coat. It roamed in the prehistoric forests of Britain. The MASTODON, whose remains are found in Tertiary formations in Europe, India, and America, had almost straight tusks; while in the European and Asiatic *Dinotherium* the tusks, pointing vertically downwards, were set in lower jaw.

ELEPHANT SEAL, see under CARNIVORA.

ELEPHANT SHREW, JUMPING SHREW (*Macroscelides*), African insectivorous mammal with long snout; long hind legs facilitate jumping gait.

ELEPHANTA ISLE (18° 56′ N., 72° 54′ E.), island, off Bombay, India; has rock temples containing Hindu religious statues; named after stone elephant which formerly stood near landing-place.

ELEPHANTIASIS, BARBADOS LEG, tropical disease, due to the obstruction of the lymphatics by parasites, filaria, and their embryos, affecting mainly the leg and scrotum. The treatment is the excision of the parasites or removal of as much as possible of the affected part by surgical operation.

ELEPHANT'S FOOT, TORTOISE PLANT, HOTTENTOT BREAD (*Testudinaria elephantipes*) S. African twining plant (*Dioscoreaceæ* order); bark resembles elephant's hide.

ELETS (52° 45′ N., 38° 30′ E.), town, Orel, Russia; cattle and grain. Pop. 51,708.

ELEUSIS (38° 2′ N., 23° 32′ E.), ancient Gk. city, in Attica, about 14 miles N.W. of Athens; of great antiquity and famed mostly for its mysteries. Excavations have revealed many ancient buildings, possibly destroyed by Goths (396 A.D.); now small village.

ELEUSINIAN MYSTERIES, see MYSTERIES.

ELEUTHEROBLASTEA, see under HYDROMEDUSÆ.

ELEUTHEROPOLIS (31° 36′ N., 34° 56′ E.), former town, Palestine, near Jerusalem.

ELEVATORS, mechanical contrivances for raising or lowering material or people from one level to another. An e. consists of a cage, guide rails, a counterpoised weight, and steam, hydraulic, or electric motive power. The lighter lifts for passing food from hotel kitchens to serving-rooms are operated by hand. In Amer. 'sky-scrapers' the e's travel 6000 feet per minute. Safety devices are—(1) air-cushions at bottom of shaft, (2) catches under floor of cage, which, if cable breaks, bite the framework and hold the cage *in situ*. See also GRAIN ELEVATORS.

ELF, mischievous supernatural dwarf, the cause of many ills and much tangling of human affairs.

ELGAR, SIR EDWARD (1857–), Eng. composer; b. Worcester; knighted, 1904; works, *The Dream of Gerontius* (1900), *The Apostles* (1903), oratorios, symphonies, violin concerto, Coronation March (1911).

ELGIN.—(1) (57° 39′ N., 3° 19′ W.) city and royal burgh, in Elginshire, Scotland; has ruins of a fine cathedral (founded 1224); scenery in neighbourhood, the 'Garden of Scotland,' is very beautiful. Pop. (1911) 8656. (2) (42° 2′ N., 88° 18′ W.) town, Illinois, U.S.A.; manufactures watches. Pop. (1910) 25,976.

ELGIN AND KINCARDINE, EARLDOM OF.—Earldom of Elgin (cr. 1633) became united in 1747 with Earldom of Kincardine (cr. 1647). Most important earls: THOMAS (1766–1841), 7th E. of Elgin and 11th of Kincardine, diplomatist; brought the famous Elgin marbles from Greece (now in Brit. Museum). JAMES (1811–63), 8th earl, s., special commissioner and plenipotentiary to China, Postmaster-General, and Gov.-Gen. of India (1862). VICTOR ALEXANDER (1849–), 9th and present earl, Viceroy of India (1894–99), Sec. of State for Colonies (1905–8).

ELGINSHIRE, or MORAY (57° 39′ N., 3° 19′ W.), county on S. shore of Moray Firth, Scotland, forming central division of old Province of Moray. Capital, Elgin. Total area, 485 sq. miles. Climate is very mild, and the hardier kinds of fruit—apples, pears, plums—grow abundantly, and apricots, nectarines, and peaches are grown outside. Rather more than half E. is drained by the river Spey and tributaries; the Lossie drains the centre and the Findhorn the W. part. Principal lochs are Lochindorb and Loch of Spynie; the mountainous parts are woody; the lower lands are rich, and cattle-breeding flourishes. Pop. (1911) 43,427.

ELGON, LIGONYI, MASAWA (1° N., 34° 40′ E.), extinct volcano, Uganda, Africa; slopes produce bamboos, bananas, and are inhabited by various negroid peoples.

ELI, high priest and judge of Israel; suffered because of evil courses of his sons Hophni and Phinehas; on hearing of capture of the Ark of the Lord E. fell from his seat and broke his neck (*1 Samuel* 4[18]).

ELIAS (1180–1253), follower of St. Francis of Assisi; general of the order, but deposed, 1232, then excommunicated, but reconciled.

ELIAS, JOHN (1774–1841), Welsh Calvinist Methodist divine.

ELIAS LEVITA (1469–1549), Jewish grammarian; famed for criticism of the *Massora*, and inquiry into scriptural punctuation.

ELIE (56° 12′ N., 2° 50′ W.), town, Fife, Scotland; watering-place. Pop. (1911) 1147.

ÉLIE DE BEAUMONT, JEAN BAPTISTE ARMANDE LOUIS (1798–1874), Fr. geologist; was prof. of Geol. at *École des Mines et Collège de France*; member of Academy (1835); perpetual sec. of same (1856). Along with Dufrénoy prepared a great geological map of France.

ELIJAH, Old Testament prophet, appears suddenly in *1 Kings* 17; fed by ravens and received by widow of Zarephath. The greatest scene in his life is that with the prophets of Baal on Mount Carmel; not less wonderful is the scene on Mount Horeb when the Lord was in the 'still small voice.' E. is commanded to anoint Jehu as king; later he denounces Ahab; calls down fire from heaven to destroy soldiers of Ahaziah; at length is translated to heaven.

Robertson Smith, *Prophets of Israel.*

ELIJAH WILNA (1720–97), celebrated Talmudist.

ELIOT, CHARLES WILLIAM (1834–), Amer. educationist, chemist, mathematician; pres., Harvard Univ. (1869–1909); author of remarkable education reforms and reports.

ELIOT, GEORGE (1819–80), Eng. novelist and poetess; pseudonym of MARY ANN EVANS. She early began to abandon orthodox views on religion and morals. In 1846 she produced a trans. of Strauss's *Life of Jesus.* She undertook a continental tour in 1849; and in 1851 became associated with the *Westminster Review.* Amongst her friends of this period were Herbert Spencer, Carlyle, and George Henry Lewes (*qq.v.*), and with the last-named she formed an irregular connection which lasted until his death in 1878. Lewes undoubtedly inspired most of her best work. She married J. W. Cross in 1880, but died soon after. Her first effort in fiction was *Amos Barton*, which appeared in *Blackwood's* in 1857, and was followed by the two other stories which make up *Scenes of Clerical Life* (1858). *Adam Bede* came out in 1859, met with instant success, and is generally considered to be her finest work. Succeeding this came *The Mill on the Floss* (1860), *Silas Marner* (1861), and other novels. Besides these, she wrote a volume of essays, *Theophrastus Such* (1876); *The Spanish Gypsy* (1868), a drama; and *The Legend of Jubal and other Poems* (1874). Her place is amongst the greatest writers of Eng. fiction. She excelled as a painter of middle-class life and character, and her work is marked by much pathos and humour.

Lives by J. W. Cross, Sir Leslie Stephen, Mathilde Blind, Oscar Browning; Gardner, *Inner Life of George Eliot* (1912).

ELIOT, JOHN (1604–90), 'The Apostle of the Indians'; ed. at Cambridge and emigrated to New England, where he devoted his life to preaching to the Indians; translated the Bible into their tongue; man of deep piety and splendid character.

ELIOT, SIR JOHN (1592–1632), Eng. statesman, knighted, 1618; in 1626 became leader of the House of Commons and helped to secure Buckingham's impeachment; imprisoned in the Tower several times; finally, 1630, for his continued opposition to the king's absolutism; d. in prison refusing to submit; a great orator but not a great statesman. *Life*, by Forster.

ELIS (37° 53′ N., 21° 22′ E.), ancient city, Elis, Greece; traditional founder, the Ætolian, Oxylus; had various temples and gymnasia.

ELIS, or **ELEIA** (37° 50′ N., 21° 30′ E.), district, S. Greece, coast of Peloponnesus; was divided into three portions: N., Elis, capital, Elis; centre, Pisatis, capital, Pisa; S., Triphylia, capital, Pylos; country held sacred and inhabitants privileged, owing to Olmypic festival which took place near Pisa every four years; prosperity ended by Peloponnesian War.

ELISABETHVILLE, town, Katanga, Belg. Congo; copper mines; connected by rail with Cape Town.

ELIS, PHILOSOPHICAL SCHOOL OF, see ELEAN-ERETRIAN SCHOOL.

ELISAVETGRAD (48° 32′ N., 32° 18′ E.), town, Kherson, Russia; important trade centre. Pop. 68,710.

ELISAVETPOL (40° 30′ N., 46° 30′ E.), province, Transcaucasia, Russia; area, 16,991 sq. miles; includes parts of Kur valley, Armenian plateau, Caucasus. Pop. (1910) 1,007,800. Chief town, **Elisavetpol** (40° 42′ N., 46° 17′ E.). Pop. 46,334.

ELISHA, Old Testament prophet, successor of Elijah (*q.v.*), with whom he is closely associated. His life is a loose collection of incidents, with many miracles wrought by him. He appears a gentler and kindlier figure than his master. The healing of Naaman the Syrian of leprosy (*2 Kings* 5) suggests the healing miracles of Christ.

ELIZABETH (40° 39′ N., 74° 17′ W.), town, New Jersey, U.S.A.; important coal-shipping dépôt; manufactures sewing-machines, iron ware; occupied by English, 1776 and 1780. Pop. (1910) 73,409.

ELIZABETH CITY (36° 13′ N., 76° 19′ W.), town, N. Carolina, U.S.A. Pop. (1910) 8412.

ELIZABETH (1533–1603), Queen of England and Ireland, dau. of Henry VIII. and Anne Boleyn; b. London; placed after Edward and Mary in list of succession, was imprisoned for two months in the Tower for suspected complicity in Wyat's rebellion (1554). The Protestant party welcomed her accession (1558) after Mary's persecutions; she at once endeavoured to impose uniformity in religion. Her foreign policy was always diplomatic, her finance economical, but diplomacy and economy developed into vacillation and parsimony. She was intensely jealous of Mary Stuart, and indeed of all women, but, largely for political reasons, was unable to marry and had to console herself with flirtations; her affection for Essex was certainly genuine. E.'s work terminated with the destruction of the Armada; she had carefully husbanded England's resources in case of war, and when England's position was made secure she had achieved her end. She grew old and peevish, embittered by the fact that she was the last of her line. As her successor she favoured James VI. of Scotland. For her public life, see ENGLAND (HISTORY).

Creighton, *Queen Elizabeth* (1896); Beesly, *Life of E.* (1892).

ELIZABETH (1596–1662), e. dau. of James I. of England; m., 1613, Frederick V., Elector Palatine and king of Bohemia; was mother of Sophia, wife of Ernest, Elector of Hanover, mother of George I., on whose descendants the Brit. Crown is settled by Act of Parliament.

ELIZABETH, EMPRESS OF AUSTRIA, AMÉLIE EUGÉNIE (1837–98), dau. of Duke Maximilian in Bavaria; m. Emperor Francis Joseph II. of Austria; murdered at Geneva.

ELIZABETH MARIE HÉLÈNE (1764–94), Fr. princess; usually called 'Madame Elizabeth'; sister of Louis XVI., to whose cause she was devoted, and for which she was guillotined.

ELIZABETH PETROVNA (1709–62), Empress of Russia; dau. of Peter the Great and Catherine I.; during the reign of the Empress Anne, E. lived chiefly in retirement; in 1741, however, by a bold and swift plot she seized the throne; she made peace with Sweden; during the Seven Years War she did her utmost for Russia and to counteract Prussia. With serious faults, she was a capable ruler.

ELIZABETH, QUEEN OF RUMANIA, PAULINE ELIZABETH OTTILIE LOUISE (1843–), dau. of Hermann, Prince of Wied; m., 1889, Prince Charles, now king of Rumania; a gifted writer under pseudonym, *Carmen Sylva.*

ELIZABETH, ST. (1207–31), of Hungary; m. Lewis IV., landgrave of Thuringia; woman of deep piety; subject of Kingsley's *Saint's Tragedy.*

ELIZABETH STEWART (1635–50), Eng. princess; 2nd dau. of Charles I.; celebrated for her gentle and affectionate disposition; d. of fever at Carisbrooke, and buried at Newport (I. of W.).

ELK, see under DEER FAMILY.

ELKHART (41° 38′ N., 85° 54′ W.), town, Indiana, U.S.A.; iron and brass foundries. Pop. (1910) 19,283.

ELL, 'arm-length,' measure used chiefly for cloth; Eng. e. was 45 inches, Scot. 37, old Dutch, 27.

ELLA, or ÆLLA (d. 588), 1st king of the Deirans after their separation from the Bernicians (559). The latter recovered Deira (*q.v.*) after his death. E. was also the name of a S. Saxon king (fl. 477–515); and of a Northumbrian king (d. 867), famed for his exploits against the Danes.

ELLAND (53° 41′ N., 1° 50′ W.), town, Yorkshire, England. Pop. (1911) 10,678.

ELLENBOROUGH, EDWARD LAW, 1ST BARON (1750–1818), Eng. lawyer; Attorney-Gen., 1801; cr. baron, 1802; Lord Chief Justice of King's Bench, 1802–18; Chancellor of Exchequer, 1806.

ELLENBOROUGH, EDWARD LAW, EARL OF (1790–1871), Brit. statesman; ed. Eton and Cambridge; M.P. for St. Michael's, Cornwall; succ., 1818; Lord Privy Seal, 1828; app. Gov.-Gen. of India, 1841. He was severely criticised for his conduct of the Sind campaign and general Ind. policy; cr. earl on his return to England, and resumed his part in political life.

ELLESMERE (52° 55′ N., 2° 55′ W.), town, Shropshire, England; has fine old church. E. Canal joins Severn, Dee, and Mersey.

ELLESMERE, FRANCIS EGERTON, 1ST EARL OF (1800–57), Eng. statesman and poet; Irish Sec. (1828–30); subsequently Sec. for War; trans. Goethe and other Ger. poets, and wrote some original poetry; art patron.

ELLICE ISLANDS, Lagoon Islands (5° 30′ to 11° 20′ S., 176° to 180° E.), Brit. islands, Pacific Ocean, N. of Fiji. Pop. 2400.

ELLICHPUR, Illichpur (21° 16′ N., 77° 30′ E.), town, Berar, India; has trade in cotton and forest produce. Pop. 26,082.

ELLIOTT, EBENEZER (1781–1849), Eng. poet; 'Corn Law Rhymer'; pub. *Corn Law Rhymes* (1831) and other volumes dealing with working-class life.

ELLIPSE is defined as the locus of a point the sum of whose distances from two fixed points is constant. It is also an equation of the secondary degree, the highest terms of which represent two imaginary lines. The orbit of a particle, moving under the influence of a central force, which varies inversely as the square of the distance of the particle is an ellipse. Certain sections of cones and cylinders are e's. See Conic Section.

ELLIS, ALEXANDER JOHN (1814–90), Eng. philologist and miscellaneous writer.

ELLIS, GEORGE (1753–1815), Eng. man-of-letters; friend of Sir W. Scott; chiefly known by *Specimens of Early English Poets* (1790) and *Early English Metrical Romances* (1805).

ELLIS, SIR HENRY (1777–1869), Eng. librarian and antiquary; Chief Librarian, Brit. Museum (1827–56).

ELLIS, ROBINSON (1834–), Eng. classical scholar.

ELLIS, WILLIAM (1794–1872), Congregationalist missionary in South Sea Islands and Madagascar; wrote *Polynesian Researches* (1829).

ELLISTON, ROBERT WILLIAM (1774–1831), Eng. actor; excelled in Shakespearean plays.

ELLORA (20° 2′ N., 75° 11′ E.), village, Hyderabad, India; its rock temples and caves are among finest in India.

ELLORE (16° 41′ N., 81° 8′ E.), town, Madras, India. Pop. 33,521.

ELLSWORTH (44° 31′ N., 68° 31′ W.), town, Maine, U.S.A. Pop. (1910) 3549.

ELLSWORTH, OLIVER (1745–1807), Amer. statesman; Chief Justice, Supreme Court, U.S.A., 1796; helped to arrange treaty with France, 1800.

ELLWANGEN (48° 58′ N., 10° 10′ E.), town, Württemburg, Germany; had Benedictine monastery. Pop. 5000.

ELLWOOD, THOMAS (1639–1713), Eng. Quaker author; wrote several polemical works, religious poems, and autobiography; intimate friend of Milton.

ELM, genus *Ulmus*, natural order *Ulmaceæ*, trees and shrubs. Common elm (*U. campestris*) grows throughout Europe; has rugged bark, doubly serrate ovate leaves, numerous spreading, often pendulous, branches, and membranous green one-seeded seed-vessels.

ELM BEETLES, see under Rhynchophorous Beetles.

ELMALI (39° 39′ N., 40° 5′ E.), town, Asia Minor. Pop. c. 4000.

ELMES, HARVEY LONSDALE (1813–47), Eng. architect; s. of James E. (*q.v.*).

ELMES, JAMES (1782–1862), Eng. architect and civil engineer; author of several books on arch. and allied arts.

ELMHAM, THOMAS (c. 1415), Eng. chronicler and ecclesiastic; chaplain to Henry V., whose life he wrote.

ELMINA (5° 8′ N., 1° 28′ W.), town, Gold Coast, Brit. West Africa; well fortified. Pop. 5079.

ELMIRA (42° 8′ N., 76° 55′ W.), city, New York, U.S.A.; railway centre; manufactures rails, railway plant, leather, woollens; has reformatory. Pop. (1910) 37,176.

ELMSHORN (53° 45′ N., 9° 38′ E.), town, Schleswig-Holstein, Germany. Pop. (1910) 14,789.

ELMSLEY, PETER (1773–1825), Eng. classical scholar.

ELNE (43° 37′ N., 3° E.), town, Pyrénées Orientales, S.W. France. Pop. 3026.

ELOI, ST., Eligius (588–659), bp. of Noyon; first a goldsmith, then ordained and won converts in Netherlands.

ELPHINSTONE, family name of Lords Balmerino (*q.v.*).

ELPHINSTONE, MOUNTSTUART (1779–1859), Ind. statesman; went to India, 1796; served under Wellesley, showing great military capacity; Resident at Poona, 1811; distinguished in war of 1817; the real founder of system of education of natives.

ELPHINSTONE, WILLIAM (1431–1514), Scot. statesman; a lawyer, afterwards bp. of Aberdeen, and lord high chancellor; helped to found univ. of Aberdeen, 1498.

ELSASS, see Alsace.

ELSINORE (56° 2′ N., 12° 36′ E.), port, Denmark, on island of Zealand; shipbuilding and repairing; chief export, agricultural produce. Pop. (1911) 13,783.

ELSSLER, FANNY (1810–84), Viennese dancer; rival of Taglioni.

ELSTER (50° 18′ N., 12° 13′ E.), town, Saxony, Germany; mineral springs.

ELSTER, Schwarze (51° 46′ N., 13° 5′ E.), river, Germany, enters Elbe above Wittenberg.

ELSTER, Weisse (51° 7′ N., 12° 12′ E.), river, Germany, enters Saale.

ELSWICK (54° 58′ N., 1° 37′ W.), township, Newcastle-on-Tyne, England. Pop. (Registration sub-district, 1911) 58,359. Elswick Works, founded by Armstrong (1847) for manufacture of hydraulic machinery; later introduced gun manufacture; now great dépôt for warship building, artillery and ammunition manufacture, owned by Messrs. Armstrong, Whitworth, & Co. Ltd.

ELTON, CHARLES ISAAC (1839–1900), Eng. lawyer and antiquary; pub. *Tenures of Kent, Law of Copyholds, Custom and Tenant Right, Origins of English History.*

ELTVILLE, Elfeld (50° 1′ N., 8° 6′ E.), town, Hesse-Nassau, Germany. Pop. 3700.

ELTZ (50° 13′ N., 7° 20′ E.), river, Germany; joins Mosel at Moselkern.

ELVAS (38° 48′ N., 7° 7′ W.), town, Portugal. Pop. 13,881.

ELVIRA, SYNOD OF, held near Granada, Spain, in 305 or 306, attended by nineteen bp's; legislated on ecclesiastical discipline, morals, and ritual.

ELWOOD (40° 16′ N., 85° 50′ W.), town, Indiana, U.S.A. Pop. (1910) 11,028.

ELY (52° 23′ N., 0° 15′ E.), city, Cambridgeshire, England, in Isle of Ely, on Ouse; famous for beautiful cathedral (founded XI. cent.; combines Saxon, Norman, and Gothic styles; western and central octagonal towers especially fine). Formerly there existed a convent (VII. cent.), burned by Danes; and monastery (IX. cent.), taken by William the Conqueror; bishop's palace and other old buildings survive; manufactures — oil and earthenware. Pop. (1911) 7917.

ELY, RICHARD THEODORE (1854–), Amer. economist; prof. of Political Economy (Wisconsin); pub. *Outlines of Economics, Monopolies, and Trusts, Socialism and Social Reform*, etc.

ELYOT, SIR THOMAS (*c.* 1490–1546), Eng. diplomatist and scholar; clerk of assize, 1511–28; wrote *The Governour* (1531); ambassador of Henry VIII. to Charles V.; friend of Thomas More; M.P. for Cambridge, 1542; much renowned as a scholar; pub. earliest large Latin dictionary (1538), also *The Castell of Health*, etc.

ELYRIA (41° 23′ N., 82° 9′ W.), town, Ohio, U.S.A. Pop. (1910) 14,825.

ELYSIUM (classical myth.), also called 'Elysian Fields,' the abode of the blessed after death; variously placed in the lower world, the Western confines of the earth, and the Isles of the Blest.

ELZE, KARL (1821–89), Ger. scholar and critic; student of Eng. lit.

ELZEVIR, name of a family of famous Dutch printers who issued beautiful editions of the classics, etc., 1592–1681. Genuine examples of their work are now rare and valuable.

EMANCIPATION (1) of slaves, see SLAVERY; (2) of Catholics, see ROM. CATHOLICISM; (3) of women, see WOMEN.

EMANUEL I. (1469–1521), king of Portugal; succ. John II. (1495); noted for religious enthusiasm, promotion of foreign trade, and zeal for exploration through Vasco da Gama and other discoverers.

EMBALMING, method of preserving dead bodies from corruption by means of aromatic and antiseptic preparations. The art was carried to a high state of perfection by the ancient Egyptians, and some of the bodies which have been thus preserved date back to 3600 B.C. The intestines were removed by means of an incision in the left side, the cavity filled with myrrh and cassia; the body afterwards being steeped for about seventy days in a preservative liquid, and subsequently swathed in gummed cloth.

Myers, *Text-book of Embalming* (1900).

EMBARGO, the detention by a State of vessels within its ports, or the prohibition of trade between certain ports.

EMBASSY.—(1) mission headed by ambassador (*q.v.*). (2) residence of an ambassador. E's in London are: *French*, Albert-Gate House, Hyde Park, W.; *Russian*, Chesham House, S.W.; *German*, 9 Carlton House Terrace, S.W.; *Italian*, 20 Grosvenor Square; *Austro-Hungarian*, 18 Belgrave Square, S.W.; *U.S.A.*, 5 Carlton House Terrace, S.W. Among Brit. e's are: Berlin, W., 70 Wilhelmstrasse; Paris, N.W., 5 Pariser Platz; Vienna, 3 Moltkestrasse; St. Petersburg, 4 Quai de la Cour. See DIPLOMACY.

EMBER DAYS, four periods set apart for fasting and prayer in the Christian Church, viz. Wednesday, Friday, and Saturday after the 1st Sunday in Lent; after Whitsunday; after Sep. 14; and after Dec. 13.

EMBERIZIDÆ, BUNTINGS, small, stumpy-billed, seed-eating birds which differ from finches in that the two halves of the bill do not fit closely; mainly inhabitants of northern portions of Old World, though some occur in Asia. The Arctic SNOW-BUNTING (*Plectrophenax*) breeds in Britain only in the Grampians; Brit. REED, COMMON, and YELLOW BUNTINGS (the last known as YELLOW-HAMMER), and European ORTOLAN belong to genus *Emberiza*.

EMBEZZLEMENT, crime by clerk or other employee who converts his master's money to his own use. It must be shown that the person charged was regularly employed in an official capacity. The maximum punishment is fourteen years' penal servitude.

EMBLEMENTS, in law, the cereal or vegetable products of the earth, which are the property of a tenant.

EMBOSSING, process of stamping under a press, or of beating out a relief pattern upon metal, leather, or other substance. It is distinguished from *stamping*, in which the lamina is pressed by a form into a mould, whereas the under surface in e. is a plane face of felt or other yielding material. *Repoussé* work is the e. of thin metal by beating upon the reverse side.

EMBRACERY, legal term for the act of any person who intimidates or otherwise attempts to influence a court or jury.

EMBRASURE, door or window; also opening for cannon in battlements; a crenelle.

EMBROIDERY is the working of a needlework pattern upon a fabric with threads of silk, wool, metal, or other material. It is a method of ornamentation subsequent to the process of weaving, and is thus distinguishable from tapestry, where the weaving involves the creation of the pattern. It may be machine-worked, or a kind of art needlework done by hand. Examples of Egyptian e. date back to the XVI. cent. B.C. The art was introduced to Europe from Byzantium, where magnificent work was produced, and it is amongst Eastern peoples that it is still most generally practised. In Europe the art flourished chiefly during the Middle Ages, when it was first employed in the working of heraldic devices, but subsequently it came into domestic use. Since the period of the Oxford movement there has been an increased use of e. for the decoration of ecclesiastical vestments, altar-cloths, etc.

Kendrick's *English Embroidery*; Higgins's *Handbook of Embroidery*; Townsend's *Embroidery*, etc.

The Gold and Silver Thread used in e. and other forms of decoration has been manufactured from very early times. It is still very largely used in the ornamentation of military, naval, masonic, and other articles of dress. Gold thread ornaments are usually made of fine silver wire gilded and worked over a yellow cone of silk or cotton. In the making of silver decorations this cone is white. The cheaper kinds of gold and silver threads are made from alloys.

EMBRUN (44° 34′ N., 6° 29′ E.), town, Hautes-Alpes, France; has fine church, formerly cathedral. Pop. 3752.

EMBRYOLOGY is the study of the beginning of a living thing, of its history during the period after it has commenced to germinate, and before it is born or has assumed the definite character of its kind. The study may deal simply with the structures of the young creature (*morphological e.*), with the processes and conditions of embryonic growth (*physiological e.*), embryonic development as it occurs naturally, or it may tamper with natural development in order to observe its ways and means (*experimental e.*).

It was impossible until late in the development of science to observe the early stages of embryonic growth, for the egg or ovum (*q.v.*) is in most cases almost too minute to be seen, but there was abundance of speculation. Aristotle asserted, with marvellous insight, that 'all living creatures . . . whether they come into the world with the form of an animal or of an egg, are engendered in the same way.' But Aristotle stood alone for many centuries. Harvey, in the beginning of the XVII. cent., was an early vitalist, holding that out of a simple homogeneous egg the living soul created a perfectly formed animal; towards the end of the cent. Bonnet propounded the mechanist theory that the final product was in reality contained in miniature in the egg: that there was no generation or creation in development, which was simply an *evolutio* or unfolding of parts already existing. So false a speculation could be refuted only by close and accurate observation, and it was soon shown that in the chick at least the parts were not evolutions, but apparently actual creations.

It was not, however, until the XIX. cent. that the minute researches on which the foundations of modern embryology are laid commenced with Prévost and Dumas' description of the earliest stages in germination, and von Baer's significant comparisons of different types of embryos. The resemblance between the very early stages of creatures so different as reptiles, birds, and mammals was emphasised, and was accounted for by the theory that the embryo traced in its own development the history of the race, that in the history of a single individual from the egg the story of the evolution of its kind from earliest times was summarised. The theory holds good only in a very general way, but it emphasised the importance of the study of early stages in unravelling the relationships of animals, and thus aided indirectly in the tracing of the genealogical tree of the animal kingdom.

Later, the minuter aspects of embryonic life were investigated: the human ovum was discovered by von Baer in 1828; towards the middle of the century the function of spermatozoa and the fact that both sexual products were simple cells became gradually realised; and towards its close the fine dividing and counter-dividing of the nuclear mass, previous to fertilisation and before cell-division, were made clear. To some thinkers it has seemed that the arranging and rearranging which takes place in cell-division indicated a possible sifting of character into the resulting cells—a qualitative process which selected the potentialities of each developing unit—such is the '*mosaic*' theory of Roux and Weismann. To others cell-division is simply division and nothing more, a mere dividing up of quantities of protoplasm the subsequent qualities of which depend upon their relationships to each other and to the organism as a whole.

As distinct are the two schools of mechanists and vitalists, the former holding that, did we but know all, we should be able to explain development wholly in terms of mere physics and chemistry; the latter arguing that there would still remain an unexplained residue which can be accounted for only by assuming that the 'principle of life,' '*entelechy*,' or some such vital force guides and controls the growth of things.

E. has revealed several important general truths. It has discovered that every organism, no matter what its final size, began as a single cell (*q.v.*), which divided and redivided; that the divisions and redivisions of the primary cell or egg often follow the same plan, and result in a thimble-shaped mass of cells, two layers thick—the *gastrula*; and this simple structure was held in Haeckel's 'gastræa theory' to represent a supposed first-evolved many-celled animal, a gastræa—the ancestor of all animals other than Protozoa. The development of the two layers of the gastrula has been followed, and it has been found that in general each gives rise to a constant set of organs, so that even diverse-looking organs in different animals may have the same origin; and that the individual organs themselves are foreshadowed from an early stage. Lastly, as we have already mentioned, the early developments of animals have shed much light on the relationships of adult forms and of the animal kingdom as a whole, and experimental e. has emphasised the fact that in nature a compensatory process, no matter what difficulties lie in its way, aims at the formation of a well-balanced, perfectly formed animal. See also REPRODUCTION.

EMDEN (53° 22′ N., 7° 12′ E.), town, Hanover, Germany; connected with Ems R. by canal; herring-fishing, shipbuilding, paper manufacture; has fine town hall. Pop. (1910) 24,034.

EMERALD, precious stone and rare mineral, of same family and composition as beryl, but differing in colour; harder than quartz, but one of softest precious stones; of beautiful green colour; found principally in Colombia, S. America; value depends upon deepness and beauty of colour. E's were highly prized by the ancients, and many engraved e's have been found amongst ruins of ancient temples.

ÉMERIC-DAVID, TOUSSAINT-BERNARD (1755–1839), Fr. archæologist.

EMERITUS (adjective), retired; cf. Emeritus Prof. of Greek.

EMERSON, RALPH WALDO (1803–82), Amer. essayist, poet, and transcendental philosopher; s. of Rev. William E., Unitarian minister; b. Boston, Mass.; ed. Harvard; tried teaching for three years, then entered Unitarian ministry; received a call to his native city, which he held (1827–32). His theological views having changed, he gave up the ministry, and thenceforward devoted himself to writing and lecturing. He twice visited England, and formed friendships with Carlyle, Wordsworth, and other authors. His philosophic creed was broad, sincere, and helpful, but was suggestive rather than systematic. In prose, his style was brilliant and epigrammatic. Amongst his chief publications were: *Essays* (1841); *Essays, 2nd Series* (1844); *Representative Men, English Traits, The Conduct of Life, Society and Solitude*, etc. His verse never appealed to a wide public, for though it is full of the essence of poetry, the form is rugged and unmusical.

Life, by Woodberry (1907); *Bibliography*, by Cooke (1908).

EMERY, mineral, impure variety of corundum; colour, greyish black; dull and opaque; found in Asia Minor and Europe; best is obtained from Levant; being very hard, used for grinding glass and lenses; e. wheels used in engineering for grinding.

EMESA, ancient name for HOMS (*q.v.*).

EMETICS, substances given to produce vomiting, either by acting directly upon the stomach, or indirectly upon the brain centre in the medulla oblongata, which controls the act of vomiting. *Warm water, mustard, common salt, copper* or *zinc sulphate* act in the former manner, *apomorphine* in the latter, *tartar emetic* and *ipecacuanha* partly in one and partly in the other.

EMEU, EMU, see RUNNING BIRDS.

EMIGRATION, see IMMIGRATION.

ÉMIGRÉS, French citizens who left their country during Revolution; many settled in England; some joined foreign armies against France.

EMILIA (44° 35′ N., 11° E.), division of Central Italy, extending nearly across peninsula; has Lombardy on W., Adriatic on E., Marches and Tuscany on S., Piedmont and Liguria on W.; includes provinces of Bologna, Ferrara, Modena, Piacenza, Ravenna, Reggio nell' Emilia, Forli, Parma; area, *c.* 7900 sq. miles. E. is named after great Rom. highway, *Via Æmilia* (beginning of II. cent. B.C.), from Placentia to Ariminum. Pop. (1911) 2,667,510.

EMIN PASHA, EDUARD SCHNITZER (1840–92), Ger. traveller; ed. at Ger. Univ's; medical officer at Antivari; went to Khartum, 1875, and served in missions under General Gordon; became gov. of Equatorial Province; promised to work with Stanley, but after all returned to Ger. service, 1890; murdered by Arabs in Congo Free State during unsuccessful expedition; *Life*, by Schweitzer (1898).

EMINENCE, honorary designation now only given to cardinals of the R.C. Church.

EMINENT DOMAIN, or 'compulsory purchase,' the State right to acquire private property for public use.

EMINESCU, MICHAIL (1849–89), Rumanian poet; great lyrist.

EMIR, see AMIR.

EMLYN, THOMAS (1663–1741), Eng. Unitarian theologian; imprisoned for writing *An Humble Inquiry into the Scripture Account of Jesus Christ.*

EMMANUEL ('God is with us'), name often applied to Jesus Christ.

EMMANUEL PHILIBERT (1528–80), duke of Savoy; succ. his f., Charles III., 1552; m. Margaret, dau. of Francis I. of France; thoroughly reformed and reorganised his duchy, becoming absolute. A strong Catholic, he tried to suppress his Prot. subjects, the Waldenses, but allowed them some liberty (1561).

EMMAUS, Biblical town near Jerusalem, site unknown.

EMMAUS-NICOPOLIS (31° 31′ N., 35° 1′ E.), town, Palestine (modern Amwas).

EMMENDINGEN (48° 6′ N., 7° 51′ E.), town, Baden, Germany. Pop. (1910) 8378.

EMMERICH (51° 51′ N., 6° 15′ E.), town, Rhine province, Germany; has large shipping trade. Pop. (1910) 13,428.

EMMET, ROBERT (1778–1803), Irish rebel; ed. Trinity Coll., Dublin; joined United Irishmen, and plotted with them on Continent; went to Dublin, 1802; planned Irish rebellion in July 1803; rebels being quite undisciplined, the only result was a riot; E. escaped, but later was arrested, tried, and hanged, Sept. 20; a noble, but unpractical character.

EMMET, THOMAS ADDIS (1764–1827), Irish lawyer and politician; bro. of Robert E.; joined United Irishmen; imprisoned, 1802; joined American bar; attorney-general of New York.

EMMITSBURG (39° 40′ N., 77° 27′ W.), town, Maryland, U.S.A. Pop. (1910) 1054.

EMMIUS, UBBO (1547–1625), Dutch geographer and historian; pub. *Rerum Frisicarum historiæ decades* (1616), *Opus Chronologicum* (1619), *Historia temporis nostri*, etc.

EMMONS, NATHANIEL (1745–1849), Amer. divine; constructed a theological system sometimes called *Emmonsism*, somewhat differing from the Calvinism of his day.

EMOTIONS, see PSYCHOLOGY.

EMPEDOCLES OF AGRIGENTUM (probably *c.* 490–30 B.C.), democrat, philosopher, physician, and magician; exiled, he wandered through Gk. cities, preaching the ascetic life. He is said to have claimed divinity, and also (falsely) to have jumped into the crater of Etna to prove the claim. He regarded all things as composed of earth, air, fire, and water, which are in alternate stages of the world's history mingled by Love, and separated out again by Strife. His biological teaching contains some curious, but accidental, anticipations of the notion of Evolution.

EMPEROR BUTTERFLY (*Apatura iris*), large Brit. butterfly, purple coloured, with white markings; lives on decaying organic matter.

EMPEROR MOTH (*Saturnia carpini*), large Brit. moth closely allied to *Bombycina*; male is orange-brown, female grey; wings marked with rings.

EMPHYSEMA, a condition of the lungs in which (*a*) the air-cells are over-distended, *vesicular* e., or (*b*) the air has infiltrated into the connective tissue between the air-cells and the pleura or membrane covering the lung, *interstitial* e. A portion of the lung may be expanded to take the place of a portion collapsed, *e.g.* in catarrhal pneumonia; the walls of the air-cells may atrophy through lack of nutrition in old age; or there may be both distention of the cells and atrophy of the walls, usually caused by blowing on wind instruments, continuous coughing, *e.g.* in chronic bronchitis, or by certain occupations, *e.g.* glass-blowing, coal-mining, the chest becoming barrel-shaped.

EMPIRE, BRITISH, see BRITISH EMPIRE.

EMPIRE DAY, anniversary of Queen Victoria's birthday, May 24, originally called VICTORIA DAY; inaugurated, 1902, to encourage imperialism.

EMPIRE, THE HOLY ROMAN, came into being when on Christmas Day, 800, Pope Leo III. crowned Charlemagne (*q.v.*) emperor of the Romans in the Basilica of St. Peter's. Since 476 there had been no emperor in the West, which owed nominal allegiance to the Byzantine emperor at Constantinople. Charles the Frank, who had crossed the Alps to protect the Pope against the Lombards, was a fitting recipient of the Imperial title, for the memory of empire had never quite died away. The splendour and dignity of a Rom. emperor were now granted to a barbarian king, and the union of the two positions in one man was to have important results throughout the Middle Ages. After Charles's death (814) his vast dominions were subdivided, and the line of the Karlings came to an end with Charles the Fat in 888. During IX. cent. government had become anarchic and civilisation had deteriorated. Meanwhile the nationalities we call French and German were beginning to emerge, and an Empire like that of Charles the Great was now impossible. In Germany Henry the Fowler had consolidated a national kingship, and his s., Otto, was crowned emperor by the Pope in Rome in 962.

The Empire of Otto I. was more Ger. and less Rom. than that of Charles, and henceforward the Ger. kingship and the Imperial title (Holy Roman Emperor of the German People) were united. Otto's was a strong Empire. Otto II. (973–83) was a mystical enthusiast; but his imitation of Byzantine splendour and his noble dreams were out of touch with the turbulence of his time. Otto III. died young and disappointed in 1002. In 1024 with Conrad II. began the strong dynasty of Franconian emperors, under whom the mediæval Empire increased in power. But the Papacy, which had done so much to create the Holy Empire, came into conflict with it, and the end of the XI. cent. saw the humiliation of Henry IV. by Gregory VII. (Hildebrand). The climax of the struggle (which began with the Investiture contest) was reached under the Hohenstaufen dynasty, of which Frederick I., called Barbarossa (1152–89), was the most brilliant monarch. After the short reign of Henry VI. the strife continued under Frederick II., 1212–50.

The greatest days of the Empire were over, and in 1273 Rudolf I., the first of the House of Hapsburg, was elected. Germany became more and more split up among a mass of princes, great and small, and henceforth the monarch's real strength lay in his personal territories rather than in the Ger. kingship itself, which was now weaker than the national monarchies of France or England. The feudal nobles and princes of Germany now became practically supreme in their own dominions. The constitution of the Empire was defined by the *Golden Bull* of Charles IV. in 1356. 'He legalised anarchy and called it a constitution,' is Mr. Bryce's much disputed epigram. By degrees seven, a sacred number, came to be recognised as the number of the electoral college; the members were defined by the Golden Bull as the Abp's of Köln, Mainz, and Trier, the King of Bohemia, the Count Palatine, the Duke of Saxony, and the Margrave of Brandenburg (two others were added later). The practical independence of the Ger. princes was now legally recognised.

By the end of the Middle Ages the Empire had not only ceased to be more than Germany practically, but it no longer had a hold over men's minds. The Renaissance destroyed its mediæval glamour; at the Reformation it was naturally committed to the Catholic side, and could claim less than ever to be universal. After the religious strife which culminated in the Thirty Years War had been ended by the peace of Westphalia, Prot. lawyers openly asserted the Empire was merely a Ger. monarchy. The Empire, however, dragged on a nominal existence for another cent. and a half; convulsions of the Fr. Revolution were the beginning of the end; in Napoleonic Europe it had no place; on Aug. 6, 1806, Francis Joseph (Francis II.) resigned the title of Elect Emperor of the Romans. Germany, Austria, and Russia may each be said in a sense to carry on the Imperial tradition as their monarchs bear the once solitary title, Emperor.

The Empire was a noble ideal, inspiring the statesmanship of Charles the Great and the genius of Dante. 'The Holy Roman Empire was none other than the ghost of the old Roman Empire sitting crowned on the tomb thereof.'

Bryce, *The Holy Roman Empire*; Fisher, *The Mediæval Empire*; Dante, *De Monarchia*; Cambridge, *Mediæval* and *Modern Histories* (*passim*).

EMPIRICISM, doctrine that all truth is derived from immediate sense experience.

EMPLOYERS' LIABILITY ACTS.—The law

relating to Employers' Liability and Workmen's Compensation in the U.K. has to be sought under three heads: (1) COMMON LAW; (2) EMPLOYERS' LIABILITY ACT OF 1880, modifying this; (3) WORKMEN'S COMPENSATION ACTS OF 1897, 1900, 1906. By (1), unless there be special agreement, the master is not liable for injuries caused by servants' own negligence. It came to be established as a principle that the master was not responsible for injury caused to one servant by negligence of another. Generally, therefore, the master was not liable at all. To remedy injustices to servants was passed (2) the *Employers' Liability Act*. By this the servant had the same rights against his master as a stranger would have; masters become liable for injuries in certain cases, if, *e.g.*, the injury is caused by a servant acting under his orders. The Act applies to all engaged in manual work—labourers, railway servants, etc., but not to seamen or domestic servants. (3) *The Workmen's Compensation Act* of 1897 much widened the scope of compensation, making it applicable to all injuries, whether caused by negligence or not. By Act of 1900 agricultural labourers also became entitled to compensation. The Act of 1906 goes further, and includes domestic servants and practically all employees whose incomes are under £250, except soldiers, sailors, policemen, or those of the family of their employer. Compensation is only given for injury, disablement, or death, caused in employment, or by disease resulting from employment. In cases of death compensation is given to dependants. The amount of compensation may be three years' wages, or a sum not exceeding £300. During partial disablement 50 % of wages can be given. The employer's liability is not changed by the Insurance Act (1912), but the compensation recovered will be taken into account in apportioning sickness or disablement benefit under the Insurance Act; so that if the maximum benefit allowed by the Act is being received as compensation nothing may be claimed for the Insurance Commissioners. Most European countries now have insurance schemes on similar lines. Germany has perhaps led the way.

EMPOLI (43° 43′ N., 10° 57′ E.), town, Tuscany, Italy. Pop. 20,301.

EMPORIA (38° 24′ N., 96° 10′ W.), town, Kansas, U.S.A. Pop. (1910) 9058.

EMPSON, SIR RICHARD (d. 1510), Eng. statesman; associated with Edmund Dudley in a vigorous system of taxation under Henry VII.; charged with constructive treason by Henry VIII., and beheaded.

EMPYEMA, collection of purulent fluid in the space between the outer and inner layer of the lining of the lung, or pleura, caused by infection by various organisms, usually after pleurisy, pneumonia, by the bursting of an abscess or a tuberculous cavity. The temperature goes up, there are rigors and profuse night sweats, the individual does not improve as in ordinary *Pleurisy* (q.v.). The treatment is to effect drainage by a slight surgical operation.

EMS (53° 23′ N., 6° 57′ E.), navigable river, Germany; enters North Sea by two mouths; connected with Rhine, Dortmund, and Emden by canals.

EMS (50° 20′ N., 7° 42′ E.), town, Hesse-Nassau, Germany; health-resort; thermal springs. Pop. (1910) 6777.

EMSER, JEROME, or HIERONYMUS (1477–1527), Ger. Catholic theologian; engaged in violent controversy with Luther and Zwingli; wrote *Annotationes* to Luther's Ger. New Testament, and himself made a trans. from Vulgate.

EMU, see RUNNING BIRDS.

ENAMEL is a vitreous substance or glass, coloured if necessary by the admixture of earths or metallic oxides before fusion, used as a surface for porcelain or metal, for decorative or useful purposes. *Cloisonné* e. is applied to a surface divided into a pattern of compartments by fine partitions, each compartment containing a distinct colour; *champlevé* e. is placed upon a hollowed ground, and is largely used in jewellery; *surface* e. forms a uniform coating like the white e. face of a clock. E's for art work may be had in sticks. These are powdered and applied to the surface and then baked until the powder fuses and adheres.

Cunynghame, *Art of Enamelling on Metals* (1906).

ENCÆNIA, church dedication festival; also the proper name for Oxford 'Commemoration week,' held yearly in June.

ENCAUSTIC.—(1) Name given to a method of painting in wax frequently employed by ancient Egyptians, Greeks, and Romans, but little used by moderns. (2) Name given to tiles of very close texture much used in mosaic pavements. The fine texture is secured by means of very heavy pressure before the tiles are dried and fired.

ENCEINTE (Fr.), term used in fortification for innermost line of defences; of a woman, pregnant.

ENCINA, JUAN DEL (1469–1533), Span. poet and dramatist; generally called father of Span. drama.

ENCLAVE, detached tract of one country or State enclosed by the territory of another; the detached portion is an *exclave* from the point of view of the country to which it belongs, an *enclave* from that of the surrounding country.

ENCRINITES, see under ECHINODERMATA.

ENCYCLICAL, papal letter issued to public.

ENCYCLOPÆDIA, CYCLOPÆDIA, a work covering the entire circle of the arts and sciences; a comprehensive survey of human knowledge, or any particular branch of it, and usually arranged in alphabetical order. The earliest extant work of an encyclopædic character is the *Natural History* of the 'elder' Pliny (23–79 A.D.), in which he treats of a great variety of subjects, including geography, med., astron., bot., fine arts, mineralogy, etc. Two famous e's of the Middle Ages were the *Bibliotheca Mundi* of Vincent of Beauvais (1190–1264), and the comprehensive *Livres dou Tresor* of Brunetto Latini (1230–94), a Florentine, well known for his association with Dante. The *De Proprietatibus rerum*, written in Latin by Bartholomeus de Glanville, an Eng. Franciscan, was trans. by John Trevisa (1398), and met with much success. The name *cyclopædia* was first used in connection with a work pub. by Ringelberg, at Basel, in 1541, and thereafter that, or *encyclopædia*, became the general name for such works. Other famous early e's were the compilations of Antonio Zara (1615); Johann Heinrich Alstead (1630); Louis Moréri's *Le Grande Dictionnaire Historique* (1674); Johann Jacob Hofmann's *Lexicon Universale* (1677); Étienne Chauvin's *Lexicon rationale* (1692); Pierre Bayle's *Dictionnaire Historique et Critique* (1697); and the *Bibliotica Universale*, by Vincenzio Maria Coronelli, an Ital. Franciscan (1650–1718), of which only seven out of forty vol's projected were pub. before his death.

The earliest Eng. e. of importance was the *Lexicon Technicum* (1704) compiled by the Rev. John Harris, Sec. to the Royal Society. This was followed by Ephraim Chambers' *Cyclopædia, or Universal Dictionary of the Arts and Sciences* (1728), which met with immense success, succeeding editions being revised and enlarged by Abraham Rees and others. This work also served as the basis upon which Diderot and his associates built their famous *Encyclopédie* (thirty-three vol's, 1751–80).

The most famous of later publications of this kind is the *Encyclopædia Britannica*, originally pub. by A. Bell and Colin Macfarquhar, of Edinburgh, with William Smellie as editor. It was first issued in sixpenny parts, the earliest appearing in Dec. 1768, and finally completed in three vol's in 1771. A second edit.—the first including hist. and biographical articles—was issued in ten vol's in 1784, a third edit., in eighteen vol's, appearing in 1797; also numerous edit's since, through various firms. The *Edinburgh Encyclopædia*, edit. by Sir David Brewster, in eighteen vol's, was issued 1810–30; the *Penny Encyclopædia*, edit. by Charles Knight, twenty-nine vol's, 1833–46; the *English Encyclopædia*, twenty-three vol's, 1853–61; *Chambers's*

Encyclopædia, ten vol's, 1860–68 (several revised edit's since); the *Harmsworth Encyclopædia*, ten vol's, 1906, which reappeared as *Nelson's Encyclopædia* in 25 smaller vol's in 1911. Besides the works named there are innumerable Eng. publications of an encyclopædic character upon a great variety of subjects.

Amongst foreign e's may be named, in French, Larousse's *Le Grand Dictionnaire Universal* (fifteen vol's), *La Grande Encyclopédie* (thirty-one vol's), and *Petit Larousse Illustré* (one vol.); in Ger., Brockhaus's *Konversations-Lexikon*, Meyer's *Konversations-Lexikon*, and Gruber's *Allgemeine Encyklopädie*. Important Amer. works are *The New International Encyclopædia*, and Johnson's *Universal Cyclopædia*.

ENDECOTT, JOHN (*c.* 1588–1665), gov. of Massachusetts Bay Colony, 1629–30; deputy-gov. and gov. at intervals from 1644; a zealous puritan.

ENDEMIC, see EPIDEMIC.

ENDERBY LAND (67° 21′ S., 49° 40′ E.), district, in Antarctic, discovered by Captain John Briscoe, 1831; he named it after his master, Samuel Enderby, grandfather of General Gordon.

ENDIVE (*Cichorium Endivia*), plant of order Compositæ; cultivated as vegetable; resembles Chicory (*q.v.*).

ENDOCARDITIS, see HEART.

ENDOGAMY, marriage only within a particular clan or community; found in primitive races; obtains in parts of Central America, Africa, India; some races in India are compelled to marry in the tribe but the wife must not belong to the husband's clan; a Hottentot generally marries in his own kraal. (Cf. intermarriage current in Scot. fishing villages, where numbers bear the same name.) For *Exogamy*, see FAMILY.

ENDOGENS, name given by Lindley to monocotyledons on incorrect assumption that growth of stem came from within (Gk. *endo*, within).

ENDOMORPH, a mineral enclosed within another —the *Perimorph*.

ENDOPROCTA, a class of Polyzoa (*q.v.*).

ENDOR (32° 38′ N., 35° 25′ E.), ancient town, Palestine, where Saul visited witch on eve of battle of Gilboa.

ENDOSPERM, see FLOWER.

ENDOSPOREA, see SPOROZOA.

ENDOTHERMIC, see CHEMISTRY.

ENDYMION (classical myth.), beautiful shepherd youth who dwelt on Mount Latmus, and was beloved by Selene (Luna), queen of the night. He received from Zeus the gift of perpetual youth and the power of sleeping at will; subject of poem by Keats.

ENEMA, injection of fluid into rectum through the anus. E. may be (1) *Purgative*,—cold or lukewarm water containing soap, olive oil, castor oil, or salts; should be used seldom, as it distends the intestine; (2) *Nutrient*,—peptonised beef-tea, eggs, milk, etc.; given in case of stomach's inability to retain food, *e.g.* after surgical operation; (3) *Astringent*,—cold water containing zinc or copper sulphate, tannic acid; used for checking diarrhœa or internal hæmorrhage; (4) *Healing*,—salt and water, laudanum, starch, silver nitrate; for hæmorrhage of lower bowel; (5) *E. for worms*,—strong solution of common salt and water.

ENERGICI, ENERGUMENS, the diseased or insane in the early Church, believed to be afflicted with evil spirits.

ENERGY is the capacity of a body or system to do work. For the purpose of measuring the quantity of work the system is capable of performing, the unit used is either a *foot-pound* (the work done in moving a pound weight through a vertical distance of one foot) or an *erg* (a gramme moved through a centimetre). The energy of a body may be due either (1) to its position, as in the case of a raised weight or a deformed spring, or (2) to the momentum it possesses when in motion. In the first case the e. is *Potential*; in the second, *Kinetic*.

Energy may take different forms, and any one form may change into another. For example, the *radiant* e. from the sun stored in coal is changed into *chemical* e. in burning, which in turn is transformed into *heat* e.; this can be converted into *mechanical* e. from which may be obtained *electrical* e., and so on. During all these changes, however, no energy is destroyed although a great deal is wasted. *Energy, like matter, is indestructible.* This principle is known as the Conservation of E. All the e. in the world is originally obtained from the sun. Another law: 'Whenever mechanical e. is converted into heat or *vice versa*, the ratio of the mechanical e. to the heat is constant.' This ratio was first investigated by Joule, and is called Joule's Mechanical Equivalent of Heat. It is equal to 42,000,000 ergs.

Clerk Maxwell, *Matter and Motion*; and text-books on General Physics.

Energetics.—Quite early in the XIX. cent. experimental investigation pointed to a direct connection between heat and mechanical energy. This resulted in the rejection of the caloric theory of heat, the formulation of the first law of thermodynamics (*q.v.*), and the development of the study of energetics, the principles of which have helped to co-ordinate and explain phenomena and causes previously considered far removed from each other.

Energy cannot be destroyed; it may undergo many changes, but the total energy in the universe must always remain the same. This summarises the principles of Conservation and Transformation of Energy, applications of which, by mathematicians, to statical and dynamical problems have yielded many important results.

In 1824, Carnot conceived the notion of a theoretically perfect heat engine in which a gas undergoes a reversible cycle of operations. A reversible cycle is one in which a substance after undergoing a series of operations is brought back to its initial state as regards volume and temperature, and is such that if the operations were reversed the results would be reversed. (Where friction enters as a factor in any operation, the cycle cannot be a reversible one.) Carnot's cycle consists of four operations: 1. Work is done *on* the substance, and its temperature thus raised (substance undergoes an *adiabatic* compression). 2. Work is done *by* the substance, but its temperature is not permitted to alter (*isothermal* expansion), heat being supplied by some source at the temperature to which the substance has been raised in the first operation. 3. Work is done *by* the substance, accompanied by a fall of temperature (*adiabatic* expansion). 4. Work is done *on* the substance until it regains its initial state, but its temperature is not permitted to alter (*isothermal* compression), heat being given out to some *sink*, called a condenser.

If the heat absorbed at the higher temperature during operation 2 is greater than that given out at the lower temperature during operation 4, the excess can be utilised to do external work. Consideration of Carnot's cycle, and deductions therefrom, form the basis of energetics and thermodynamics, and have resulted in the evolution of the modern heat engine.

Kelvin's Principle of Dissipation of Energy.—Although energy cannot be destroyed, yet in every transformation a certain quantity appears as heat which is diffused and becomes unavailable for use. All natural phenomena are of such a kind as to tend towards this degradation of energy, and permanent equilibrium of any system will only be attained when the limit of minimum available energy has been reached. This principle has been very usefully applied to the problems of solution, fusion, solidification, osmosis, etc.; it provides an explanation of the phenomenon of chemical combination in definite proportions,—combination only taking place if, as a result, the available energy is diminished,—and it is the basis of the prediction that ultimately no energy will be available and the universe become a uniformly hot, inert mass. See HEAT and THERMODYNAMICS.

ENFANTIN, BARTHÉLEMY PROSPER (1796–

1864), Fr. social reformer; became follower of Saint-Simon; advocated communism, 'woman suffrage,' and other innovations; with others sent to prison for a year (1832) for offence against 'morality'; became railway director (1845); also a journalist and author.

ENFIDAVILLE (*c.* 36° N., 10° 20′ E.), town, Tunisia, N. Africa; produces cereals.

ENFIELD (51° 40′ N., 0° 6′ W.), town, Middlesex, England; small-arms factory. Pop. (1911) 56,344.

ENFIELD (41° 58′ N., 72° 35′ W.), town, Connecticut, U.S.A. Pop. (1910) 9719.

ENFILADE, military term meaning to rake with shot the full length of a line; in general, a raking fire.

ENGADINE (Upper, 46° 33′ N., 9° 55′ E.; Lower, 46° 48′ N., 10° 17′ E.), upper valley of Inn, in Grisons Canton, Switzerland, amidst Alps (Rhætian group, etc.); divided into *Upper* E., towards S.W., with Lakes Sils, Silvaplana, and St. Moritz, and *Lower* E., towards N.W., with mineral springs at Schuls; length about 65 miles; elevation, 4000–6000 ft.; chief town, St. Moritz, 6070 ft.; Austrian possession, 1622–24; Swiss, 1652. Pop. (1910) Upper, 8652; Lower, 7852.

ENGEL, ERNST (1821–96), Ger. statistician and economist; prolific writer in *Preuss. Statistik*, etc.

ENGEL, JOHANN JAKOB (1741–1802), Ger. dramatist and writer on æsthetics.

ENGELBERG (46° 49′ N., 8° 24′ E.), village, Switzerland; famous Benedictine monastery.

ENGELBRECHTSDATTER, DORTHE (1634–1716), Norweg. poetess and hymnologist.

ENGELHARDT, JOHANN GEORG VEIT (1791–1855), Ger. theologist; prof. of Theol. at Erlangen.

ENGHIEN (50° 42′ N., 4° 2′ E.), town, Hainault, Belgium; lace and linen industries. Pop. 4541.

ENGHIEN, LOUIS ANTOINE HENRI DE BOURBON CONDÉ, DUC D' (1772–1804), only s. of last Prince of Condé; left France at Revolution, and later served against France; seized in foreign territory by Napoleon's order, court-martialled on trumped-up charge and shot at Vincennes.

ENGINE, a term now used loosely for a locomotive, in its strictest sense is a machine making use of power to perform work. In this sense a crowbar used to raise a weight is an e. More generally term is applied to prime movers, machines of some complexity producing mechanical effects by means of some motive power, chemical (such as explosion, as in gas e's), or physical (such as expansion, *e.g.* steam e's). E's may be differentiated by their motion, which is either *reciprocating* or *rotatory*. The latter describes e's in which the motion is directly rotatory, the piston being so made that it moves round without a crank; reciprocating e's are those which induce a backwards-and-forwards motion to the piston, whether this is a simple to-and-fro motion or is converted by a crank into rotatory motion, and whether the reciprocation is induced by admitting the motive power alternately to both sides of the piston (as in *double-acting* e's) or the return motion is induced by condensation when the atmospheric pressure on the reverse side drives it back (as in *single-acting* e's). Where the motive power is produced in the cylinder (as by explosion, in *gas* e's), the e. is an *internal combustion* e.; when outside, an *external combustion* e. Steam, oil, and gas e's are all *heat* e's. The only other prime movers are *electric* e's.

Air Engine, a reciprocating engine (which may be connected with machinery) in which the piston is driven by the expansion and contraction of air, produced by applying and withdrawing heat. As the heat is generated outside the cylinder, it may be termed an external combustion engine. They are now mainly used for low-power purposes, as for high power the waste of heat and their comparative bulk have caused them to be superseded by the more economical and effective gas or internal combustion engines.

Gas Engine, a form of heat engine using combustible gas as fuel; an internal combustion engine. In most engines the combustion of the fuel takes place outside the container of the working substance, as, for instance, in the steam engine, where coal is the fuel burnt in the furnace outside the boiler. In gas e's, however, the working substance is also the fuel, and is mixed with air so as to be rendered explosive. By this method it is possible to turn more heat into power than with the former (see THERMODYNAMICS), and in addition less attendance on the engine is necessary. Once started, the gas e. may run for hours without attention; a regular supply of fuel being arranged, together with automatic lubrication. On the other hand, with the steam engine constant attention to the plant and furnaces is required.

In 1823 Samuel Brown invented and patented an internal combustion engine which, it is said, successfully drove a boat on the Thames, a carriage on the road, and worked a pump. In 1833 L. W. Wright improved upon it, and used a water-jacket for cooling; explosions in his engine took place at both sides of the piston. Until 1860, however, the gas e. was entirely in an experimental state, but in that year E. Lenoir invented the first gas e. of practical commercial value, and 400 of this type were manufactured and sold in 1865. It was found, however, that their consumption of gas was very heavy, for they used about 100 cubic feet per indicated H.P. per hour. In 1867 Dr. N. A. Otto and Mr. Langen brought out an improved gas e. with double-acting pistons, in which the consumption of gas was only 40 cubic feet per brake H.P. per hour, and some thousands of this type of machine were turned out.

Rochas, a Frenchman, invented a cycle—the 'Otto'—of operations which was discovered independently by Dr. Otto in 1876. In 1876 Otto applied it to his engine and it surpassed all previous machines. It had four operations, viz. induction, compression, explosion, and exhaust. The gas e's of to-day use this cycle, and are practically of the same design as the earlier models, except that many improvements have been added, electrical ignition almost universally adopted, water cooling, and a far higher compression ratio is used than formerly. This not only gives greater power, but is more economical.

Oil Engine, an internal combustion engine similar in its action to a gas engine, except that the explosions for motor power are obtained from oil. Petrol engines come under this heading.

The principle of the oil engine was first proposed by Street (1794). A practical petroleum engine was first made in 1870, but the advantages of high compression and larger expansion recognised by Beau de Rochas led the way for Otto to produce (1876) his successful engine, the main features of which are still essential in modern designs. This was followed by an engine using gasolene as fuel. Daimler (in 1883) conceived a light engine to run at high speeds—800 to 1000 revolutions per minute. The successful application of this engine to a motor-cycle in 1886, and in 1887 to a carriage, brings us by definite steps to the present perfection of motor vehicles, with which are connected the names of the great manufacturing firms, Panhard-Levasseur, Peugeot, de Dion, Napier, Benz, Renault, Lanchester, Rolls-Royce, Austin, etc.

Engines using heavy oils are, with the exception of the apparatus for vaporising the oil, similar to gas engines. The oil, converted into spray with a current of air in a spraying nozzle, enters a vaporiser, a vessel heated externally either by a lamp, or a steam jacket through which the exhaust passes. During the suction stroke the air supply enters vaporiser and the charge is drawn into cylinder, where it is compressed and ignited by electric spark or ignition tube, doing work as it expands.

Diesel Engine.—An engine which in its modern form has attained a very high efficiency was invented by Diesel. It differs in its cycle of operations from the Otto engine. Air is highly compressed (to about 35 atmospheres per sq. inch) in the engine cylinder before oil is admitted at all. At the end of the piston stroke oil is injected by a separate pump and air reservoir into the cylinder, and immediately burns away,

owing to the high temperature of the compressed air. *No explosion occurs*, but the oil *burns* while it is pumped in during a part of the next forward stroke of the piston. The supply of oil is cut off, and a prolonged expansion follows until release at end of stroke. From the thermodynamic point of view the combustion of the working substance while comparatively cold is regarded as a serious defect. The Diesel engine overcomes this drawback by an attempt to attain the temperature of combustion before combustion commences by compressing the air in cylinder to a very high degree before fuel is admitted. In 1912 the first ocean-going vessel driven by oil engines (the *Selandia*, 7400 tons) completed a journey of 20,000 miles at an average speed of 10 knots an hour. Each of the twin screws were driven by an eight-cylinder motor giving 1250 I.H.P.

Steam Engine.—The first steam engine was described by Hero of Alexandria, 120 B.C.—essentially a turbine working by reaction of steam jets discharged from orifices formed in a wheel, free to rotate, by impinging on vanes set on its rim; a similar machine was used by Branca (1629). No serious efforts were made before XVII. cent. to apply steam to any useful purpose. In 1698 Captain Savery invented a machine to pump water from mines. The essence of his invention was a boiler; this was fitted to two vessels; steam was pumped into one vessel and condensed by cooling action of a jet sprayed on outside; condensation of steam resulting in a vacuum, water was forced up by atmospheric pressure. The vessels acted alternately, emptying and filling. Denis Papin (1690) introduced piston and cylinder into same machine, the pressure of steam on piston forcing water out at either end.

Newcomen, Savery, and Cawley (1705) produced a similar machine, but with a rocking beam. This was connected at one end by a chain to a piston, at the other end was suspended the pump rod and a weight or counterpoise to bring piston to top of stroke on admission of steam from boiler. Steam being cut off, a jet of cold water was sprayed on outside of cylinder, forming a vacuum within. Atmospheric pressure forced down piston and lifted pump rod at other end of beam.

The present perfection of the steam engine is due to the inventions, patented between 1763–69, of James Watt of Glasgow. His inventions were based upon the following main principles: (1) that the cylinder be kept as warm as possible; (2) to obtain the above the steam should be condensed in a separate vessel or condenser; (3) that steam be used expansively to press on the piston; (4) the use of oil, animal fats, etc., to render the piston and other engine parts water- and air-tight. Watt did not use high pressures, and to Trevithick is due the high-pressure engine. His production—the Cornish engine—was provided with a single cylinder and condenser, steam being used expansively.

In 1782 Hornblower patented the first compound engine. Two cylinders were used; the steam after doing work in one cylinder passed into the other to continue its action. Through the use of a condenser infringing Watt's patents the invention fell through, to be revived later by Woolf in 1800 and MacNaught in 1845 for marine purposes. Symington ran the first steamboat—the *Charlotte Dundas*, with one paddle-wheel at the stern—on the Forth and Clyde Canal (1802). Fulton (1807) in America ran the *Clermont* with engines by Boulton and Watt. The *Comet*, constructed on the Clyde in 1812 by Henry Bell, was also successful. The invention of the screw by Ericsson came later.

In 1802 Trevithick and Vivian patented the first steam carriage to run successfully, and in 1829 the Stephensons, by the trials of the 'Rocket,' ensured the adoption of locomotive traction.

THERMODYNAMICS.—In nearly every form of heat engine mechanical work is obtained by means of the expansive force of an elastic fluid acting usually on a piston travelling in a cylinder. It is essential that there should be (1) a working fluid; (2) a source of heat; (3) a receptacle for unexpended heat. In operation there must be a reception of heat by the working fluid, a conversion of heat into work, and a discharge of heat at a lower temperature than it was received. Steam starts as cold water in the boiler, is converted into steam, and, after use in the cylinder, is condensed back to water again. Heat is supplied to cause expansion; of this, part is lost by conduction from the cylinder walls, part escapes to the air or condenser at end of stroke, and part disappears. This third part is the exact equivalent of the work done by the elastic fluid in driving the piston. The ratio of this third part, converted into actual work, to the heat originally supplied determines the efficiency of the engine. One must guard against the idea that the mechanism has more serious connection with the waste of energy in any engine other than the unavoidable frictional resistances. Condensation of steam in the cylinder is the most important cause of waste in engines. The use of jacketing by Watt to prevent this has been superseded latterly by superheated steam at a high temperature and pressure. Steam in contact with the water from which it has been formed is said to be 'saturated.' Addition of heat at constant pressure, provided that no water is present, produces a rise of temperature. The steam is then said to be superheated.

Important Definitions.—Work is said to be done when a force acts through a distance overcoming resistance. The unit of work is the foot-pound, being the energy expended when a force of one pound acts through a distance of one foot. Power is the rate of doing work. The unit of power is the Horse-Power, and is the rate of doing work so that 33,000 foot-pounds are performed in one minute. Heat is a form of energy; it requires for its production and produces by its disappearance 774 ft. lb. (Joule's equivalent) of energy for each thermal unit lost or produced, the latter being defined as the amount of heat necessary to raise one pound of water through one degree Fahrenheit. Indicated Horse-Power is the power which the engine should deliver by reason of the pressure of steam on the piston, but a considerable part of this is not available for driving machinery. From 5 % to 20 % is used in overcoming frictional resistances. To obtain an estimate of the power an engine can deliver, the energy may be absorbed by a brake mounted on the fly-wheel. By calculation an estimate is arrived at, called the Brake Horse-Power. The ratio of Brake Horse-Power to Indicated Horse-Power is called the mechanical efficiency.

ENGINE DETAILS.—Fig. 1 shows the direct acting engine in its simplest form; B is the cast-iron

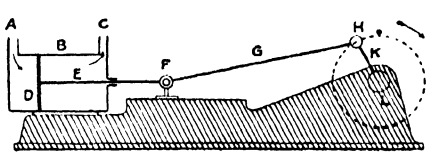


FIG. 1.

cylinder, D the piston sliding within it; E and G are respectively a piston-rod and connecting-rod to couple the piston to the crank K mounted on the crank-shaft L. The sliding motion of the piston induces rotation of the crank-shaft. By ports or openings A and C steam is admitted to each side of the piston alternately, the other side of the piston in each case being in communication with the exhaust part, by which steam is exhausted into the atmosphere (*non-condensing engine*) or into the condenser (*condensing engine*) after the piston has completed its stroke.

The distribution of steam is effected by a slide driven by an eccentric (*q.v.*) from the crank-shaft. There are many varieties. The usual device is shown in Fig. 2 for movement of piston to the right; Fig. 3

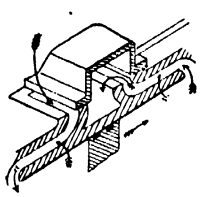


FIG. 2.

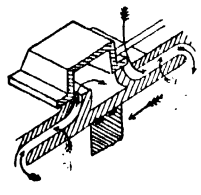


FIG. 3.

the position for the return stroke. Steadiness of rotation is ensured by two means: (1) a heavy fly-wheel mounted on the crank-shaft; (2) a governor of some sort driven by the engine to adjust the supply of steam to meet the demand. Steam is raised in a vessel called a boiler, built of cylindrical plates riveted together, and fitted with a furnace at one end and a chimney at the other. The furnace gases are led through a number of tubes, fitted between the end of the boiler and the furnace, giving up their heat to the surrounding water. This is called a fire-tube boiler. In a water-tube boiler the water occupies the pipes while the gases circulate round them.

Compound Engines.—The use of steam at high initial pressures with a large ratio of expansion increases the efficiency of the steam engine, but is impossible with a single-cylinder engine. It is customary to admit steam to one cylinder and then to exhaust it into the next one to continue the expansion. Triple expansion engines possess three cylinders. Quadruple expansion engines with four cylinders are also in use.

STATIONARY ENGINES.—These are used in commercial concerns, for driving machinery in mills, workshops, electric light and power stations. They vary in size and type according to the work for which they are required.

LOCOMOTIVES.—Locomotives are of two kinds—for rail and road work. Railway locomotives consist in general of an engine with two cylinders, carried forward, whose cranks drive two axles. There may be four, six, or even ten driving-wheels mounted on axles in pairs, one axle being driven direct, the others being connected by coupling-rods and cranks placed at right angles. The locomotives are said to be four-, six-, or eight-coupled according to the number of driving-wheels; the engines are mounted on a frame carried on springs.

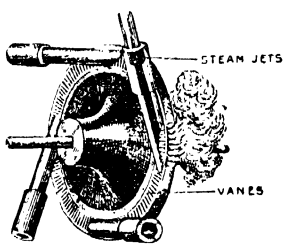
The great scope for railways in America has its natural sequence in locomotives of enormous size, weight, and speed, overshadowing British productions which are designed to suit the conditions of the country. Compound engines have been tried with some success by the North-Western, the North-Eastern, and Great Eastern Railways. Cylinders are placed both inside and outside the frame; the latter, an American practice, is being generally adopted. To give ease in rounding curves, engines of great wheel-base have the front carried on a bogie or truck on four wheels. Locomotives fitted for the consumption of oil fuel have been tried with success by the Great Eastern Railway.

There are many varieties of locomotives in use on ordinary roads for traction purposes, using oil or coal for fuel. The road locomotive capable of fair speeds dates from the removal of legal restrictions in 1898. In the type generally the engine is placed over the boiler and geared to the wheels.

MARINE ENGINES.—Since 1885 the use of triple expansion engines has become common practice. Quadruple expansion engines are confined to the mercantile marine, where economy of space is not essential. Conditions of service in warships render it desirable to have special means of forcing boilers when full speed is required. The introduction of forced draught has accomplished this, and has reduced the weight of machinery. The important feature of the last decade is the great increase in propelling power. Competition has resulted in high speeds. In 1845 the *Terrible*, the finest warship of the day, was driven by 2000-horse-power engines. The engines of the battleships and transatlantic liners of the day are of 75,000 to 80,000 horse-power, capable of speeds of 28 knots per hour, while in the case of smaller craft, destroyers, etc., a speed of 36 knots per hour has been obtained. It will be understood that but for the advent of the Parsons turbine this immense power could not conveniently have been generated. The latest battleships are fitted for the consumption of oil fuel as well as coal. The shipbuilding world is passing through a crisis in mechanical propulsion. Whether the future lies with the steam turbine or the oil engine is difficult to foresee. The former is in a position of proved efficiency, while the latter is merely an experimental success.

TURBINES.—A turbine is a non-reciprocating engine. The working fluid gives up its energy to rotating wheels in flowing past blades or buckets fixed to rim, being conducted by fixed blades so as to come into contact with the moving blades with the minimum of shock.

There are two types: (1) *Impulse turbines*, in which the energy of the fluid is used in its kinetic form; (2)



SKETCH SHOWING PRINCIPLE OF TURBINE ACTION.

Pressure turbines, where the energy of the fluid is of the pressure form.

De Laval turbines are of the first type. Steam is blown through nozzles, so constructed as to permit steam to be completely expanded, against the vanes of a revolving wheel. The pressure of the steam being low, the velocity and weight are high. The nozzle being short, there is little waste, the conversion of the energy is almost perfect. The velocity of the steam being high, the speed of the wheel is consequently high, being between 500 to 1400 feet per second, or 30,000 to 10,000 revolutions per minute. This speed, too high for direct use, is reduced by gearing in transmission. The speed of the wheel is kept uniform by a governor.

The Curtis turbine is a compound turbine of the same type, the steam acting on several wheels to reduce the velocity gradually.

The *Parsons turbine*, made under patents by the Hon. Charles Parsons, C.B., is a parallel-flow turbine, the steam passing through parallel to the axis of rotation. The turbine consists of a rotating shaft carrying a large number of bladed rings gradually increasing in diameter, corresponding bladed rings being attached to the casing to come between the rotating rings. Steam enters at the smaller end, and flowing among the blades to the larger end expands, falling in pressure in doing so. Each pair of fixed and rotating blades is called a stage, and at each stage the steam falls slightly in pressure and grows in volume, while a part is taken up by the rotating rings and so transmitted to the shaft.

The Westinghouse turbine is a combination of the Curtis and Parsons turbines.

MOTOR-CAR ENGINES.—Steam has been applied with success to pleasure vehicles. Fuel, either oil or paraffin, is burnt outside the cylinder, and imparts heat to water in a boiler, the steam raised there being used as a motive agent. Several firms, such as the White Steam Car Co. and Stanley's, have cars on the market.

The effect of a *tax* on engines of high power has been the production of an efficient car of medium power (15·9 H.P.) at a moderate price. Improvements have been mainly in the quality of the metals used, in coach work and body-building, and in silence of running.

Sleeve Valve.—To effect silence of running in motor-car engines, a new device, the 'Sleeve' valve, has been fitted by several of the leading makers, and varieties patented by the firms of Daimler, Argyll, etc. Briefly, a sliding sleeve or sleeves are fitted between the piston and the cylinders wall to shut and close the parts for the admission and exhaust of the charge.

AEROPLANE ENGINES.—These are petrol motors of two kinds, stationary and rotary. The prototype of the latter was the famous 'Gnome' engine. In the *Gnome* engine several cylinders are arranged star fashion round a crank-shaft of special shape. To ensure uniform rotation the explosions must succeed one another at regular intervals, so that the cylinders are always odd in number with a minimum of five. This arrangement is economical, since the rotating cylinders serve as a fly-wheel, which is dispensed with. These engines are invariably fitted in light machines. Stationary engines with several cylinders are used for heavy machines. The important problems with regard to aerial engines are lubrication and carburation. The horse-power of these engines varies from 25 H.P. to 200 H.P.

ENGINEERING, a term originally applied to the construction and management of military machines and defences, later to the construction of canals, roads, and other public works, hence the term '*civil*' *engineer*. In its modern sense it is the art or skill to use natural sources of power for the use and convenience of man. With the multiplication of modern inventions the science divided itself into special branches. First came mechanical engineering, then in natural sequence mining engineering, naval architecture (marine engineering), sanitary engineering, electrical engineering, and aerial engineering.

Engineers, Military, first corps founded 1772; styled 'Royal Engineers' since 1787; consists of about 10,000 officers and men (officers trained at Woolwich). On service a field company of R.E. is attached to every infantry division; undertakes field-engineering, fortifications, bridge-building, railway work, and demolition.

Engineers, Naval, are first examined by Civil Service Commission; curriculum includes five years' training at Devonport.

ENGIS (50° 34′ N., 5° 24′ E.), cave, on banks of Meuse, near Liége, Belgium.

ENGLAND, with the addition of Wales (*q.v.*) is the S. part of GREAT BRITAIN (*q.v.*). The area of England is 50,890 sq. miles; the greatest length (from Berwick to Lizard Point) is 420 miles, the greatest breadth (Lowestoft Ness to Land's End), 360 miles. No point is more than 60 miles from the coast. It is separated from Scotland by natural boundaries, the river Liddel, the Cheviot Hills (highest point, 2422 ft.), and the Tweed, although until the XVI. cent. there was a strip of 'Debateable Land' between the Esk and the Sark. The Severn used to form part of boundary of Wales, but this has long been constituted by the Eng. counties of Cheshire, Shropshire, Herefordshire, and Monmouthshire.

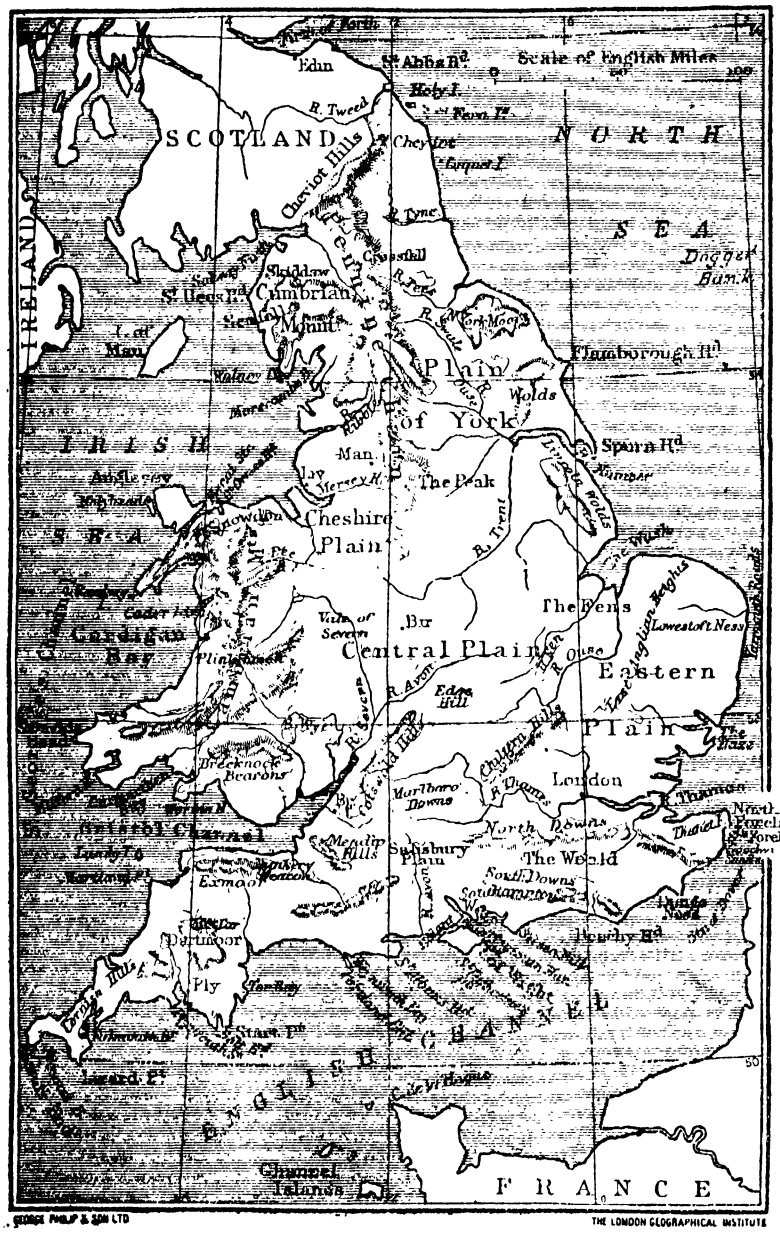
Physical Features.—Deep bays on E. and W. coasts, with good harbours, cut into the country at nearly opposite points, making horizontal divisions, sometimes almost peninsulas; thus Tynemouth faces Solway Firth, the wide mouth of the Tees Morecambe Bay, the Humber the mouth of the Mersey, which descends from same watershed as tributaries of the eastern stream; the Wash corresponds to Cardigan Bay, the Thames to the Bristol Channel, close to which it rises. The chief headlands on these coasts are: E. Flamborough Head and Spurn Head (Yorks), the slight projection of Lowestoft Ness (most E. point), Suffolk, the Naze (Essex), North Foreland and South Foreland (Kent); W., St. Bees Head (Cumberland), Birkenhead (Cheshire), Hartland Point (Devonshire), Land's End (Cornwall). The S. coast runs with tilt to N.E. in series of gentle bays of which chief are Mount's Bay, Falmouth Harbour, Cornwall, Plymouth Sound, Lyme Bay (with Tor Bay), Weymouth Harbour, Poole Bay, and, between Hampshire and the I. of Wight, the Solent and Spithead, with Southampton Water and Portsmouth Harbour (headquarters of Brit. fleet) running up into the land.

Islands are Holy Island and Farne Islands (off Northumberland), the Channel Islands, the Isle of Wight (Hampshire), the Scilly Isles (Cornwall), Lundy Isle (Devon), Walney (Lancs), and Man (midway between England and Ireland; the Channel Islands (*q.v.*) and Isle of Man (*q.v.*) do not form part of England.

England is divided as to physical characteristics into two clearly distinct parts, by a line of hills known to geologists as the Oolitic Escarpment, running from the lower Tees S.W. to the Exe mouth; the N.W. portion thus formed is of older geological character than rest of country, and contains its mountain systems, of Palæozoic rocks with coal measures in the Carboniferous strata. The Old Rock systems may be divided into (1) the mountains of northern England, composed of (*a*) the Pennine Chain, the chief geological feature of the north, stretching S. from the N. boundary, the Cheviots. It attains chief height in Cross Fell (2892 ft.), at the meeting-place of the five northernmost counties; other heights in the chain are Whernside, Ingleborough, and Penygant, and its southern culmination, the Peak, Derbyshire; (*b*) the Cumbrian mountains of the Lake District, where Scaw Fell (3210 ft.), Skiddaw, and Helvellyn are highest summits. They extend into N. Lancs (Pendle Hill, 1831 ft.). The chief lakes are Windermere, Ulleswater, Derwentwater, Buttermere, Coniston, and Thirlmere. (2) The Welsh mountains. (3) The S.W. mountains, comprising (*a*) the high tablelands of Exmoor and Dartmoor in Somerset, Devon, and Cornwall, with chief heights at Dunkery Beacon (1770 ft.), Yes Tor (2050 ft.), and Brown Willy (1370 ft.); (*b*) the Mendip Hills, Somerset; (*c*) the Malvern Hills, Worcestershire, rising to 1395 ft. at Worcester Beacon; (*d*) the Clee Hills and Wrekin, Shropshire. The newer S.E. portion of England may be divided into the Chalk Ridge and the Roe-Stone Ridge. The Roe-Stone Ridge commences south of the Oolitic Escarpment, in the moors of Cleveland, Yorks, forms the Lincoln Heights, Edge Hill (Warwickshire), the Cotswolds (Gloucestershire), the Western Downs (Dorset), and the Blackdown Hills (Devon). The Chalk Ridge runs S. from the bold chalk cliffs of Flamborough as the Wolds of the East Riding of Yorks and of Lincs, the E. Anglian Heights, the Chiltern Hills, the Marlborough Downs, and ends with the tableland of Salisbury Plains, from which the North and South Downs extend E. to Dover Cliffs and Beachy Head respectively, and form district known as the Weald. The highest point of this S.E. moiety of England, which belongs geologically to the Great Plain of Europe, is 1489 ft., in N.E. Yorks.

A system of plains unites all parts of E., and has enabled roads, railways, and canals to be readily constructed. The chief plains are the Midland Plain, which divides the older from the newer rocks, the Plain of Lancs and Cheshire, the Vale of York, and the Eastern Plain. The Fens are a marshy district round the Wash; many of its towns, like Ely, were islands in Saxon times. Above the chalk there

stretches from Thames along E. coast to N. of Norfolk a tract of clay known as the London Basin, and round Portsmouth another tract known as the Hampshire Basin. From the Pennine Range the Tyne, Wear, Tees, Ouse, most of its tributaries, Trent and Witham, flow from E. slopes of Pennines into N. Sea; the Lune, Ribble, and Mersey from W. slopes into Irish Sea. The two longest rivers of England are the Severn (200 miles), which receives the Teme, Avon, and Wye, and flows into the Bristol Channel, and the Thames (210 miles), which rises in the Cotswolds and flows E. to the N. Sea, receiving (left) the Cherwell, Thame, Colne, Lea, and Roding, and (right) the Kennet, Wey, Mole, and Medway. The streams which enter the Eng. Channel from the S. coast are all short.



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Counties.—The forty old counties of England are: 1. (N.) Northumberland, Cumberland, Westmorland, Durham, Yorkshire, Lancashire; 2. (Midland) Derbyshire, Northamptonshire, Nottinghamshire, Staffordshire, Leicestershire, Rutlandshire, Warwickshire, Worcestershire, Oxfordshire, Buckinghamshire, Bedfordshire, Hertfordshire, Middlesex; 3. (W.) Cheshire, Shropshire, Herefordshire, Monmouthshire, Gloucestershire; 4. (E.) Lincolnshire, Norfolk, Cambridgeshire, Huntingdonshire, Suffolk, Essex; 5. (S.E.) Kent, Sussex, Surrey, Berkshire, Hampshire; 6. (S.W.) Dorsetshire, Devonshire, Cornwall, Wiltshire, Somersetshire; under the Local Government Act of 1888, the number of 'Administrative Counties' was raised to 50.

Communications.—The total mileage of RAILWAYS in England and Wales exceeds 16,000 miles. The chief lines are the London and North-Western, the Midland, and the Great Northern, which run from London to Scotland; other lines include the Great Eastern, Great Western, London, Brighton, and South Coast, South-Eastern, Chatham, and Dover. London has an elaborate system of underground railways. There are, approximately, 2000 miles of CANALS, which with canalised and navigable rivers make a total of about 4100 miles of waterways open for traffic. There are about 151,000 miles of principal ROADS in England and Wales, kept in repair and improved partly by profit on motor-spirit duties, carriage licences, etc. Increased motor traffic has led to the laying down of many miles of roadway covered with a bituminous preparation calculated better to withstand wear and tear.

Resources and Industries.—England owes its pre-eminence in Europe, only dating from middle of XVIII. cent., to COAL, which has enormously facilitated the working of its other mineral treasures (chiefly iron and stone), and its manufactures. The coal-fields, except for two small outbreaks in the Midland Plain, belong to the geological system of the N. and W. That of Northumberland and Durham, at the mouth of the Tyne, which has made Newcastle, Gateshead, Sunderland, Hartlepool, etc., busy commercial centres, was already worked in the XIII. cent.; in this district, iron, steel, chemicals, machinery, and ships are manufactured. The Cumberland Field, between Maryport and Whitehaven, exports coal and limestone, produces iron and steel, and carries on shipbuilding at Barrow-in-Furness. The moorland villages of West Riding of Yorks Field have become thickly populated manufacturing towns; weaving always flourished in this grazing district, and now the Lancs and Yorks Railway brings further wool,

linen, and cotton material from Liverpool. The chief towns are Leeds, which possesses university, and cloth, iron, and machinery manufactures, the clothing towns of Bradford, Halifax, Huddersfield, Keighley, etc., and Sheffield with its cutlery industry.

The S. Lancs coal-field has turned Manchester in a cent. from a large but agreeable manufacturing town, to the growing commercial centre of the most densely populated district in the world. Owing to its damp climate, it was an early centre of the cotton manufacture, moisture being advantageous, particularly to the original hand-looms. In its immediate neighbourhood, Arkwright of Preston invented the first mechanical spinning-frame, 1768; the cotton industry is still to some extent carried on, but chief importance of Manchester now is as commercial centre and seaport at terminus of Ship Canal from Liverpool. The other manufacturing towns are the contiguous Salford, and Blackburn, Bolton, Oldham, Preston, Rochdale, Warrington, Wigan, headquarters of the coal-mines, Macclesfield, where silks are made up, Runcorn, Widnes, St. Helens, all noted for soap and chemicals, and Norwich, Middlewich, and Nantwich, where there are salt works. Other seaports are Liverpool, which imports raw cotton, wool, grain, provisions, and tobacco from Australia, New Zealand, South Africa, Egypt, India, the Argentine, Brazil, etc., and exports cotton goods and machinery, and Birkenhead, which carries on shipbuilding. N.W. is the Whitehaven coal-field, of which seaports are Whitehaven and Barrow, whose principal trade is with Isle of Man and Ireland. The manufacturing towns are Barrow (iron and shipbuilding), Workington, Millom, and Carnforth (iron).

The coal-fields of N. and S. Staffordshire lie respectively in the Potteries and the Black Country. The Potteries import china-clay from Cornwall and flint from Kent and Sussex, and their 'Five Towns,' Burslem, Hanley, Langton, Newcastle-under-Lyme, and Stoke, are chief seat of Eng. earthenware industry. The Black Country, in the heart of the Midlands, has both coal and iron ore. Its chief towns are Birmingham, which manufactures hardware of all kinds for all parts of the world, Wednesbury (hardware), Wolverhampton (locks), Dudley (nails), Redditch (needles), Coventry (bicycles and motor-cars). The coal-fields of the Forest of Dean, Gloucestershire, and of Bristol have decayed in importance since working of richest Brit. field, that of S. Wales; and the ancient port of Bristol has been superseded to a large extent by Newport and Cardiff on opposite bank of Severn. Bristol still, however, imports provisions, fruit, and tobacco from Ireland, the West Indies, and S. America, and is now in the line of traffic between the S. Wales coal-field and London, and southern ports generally, through the Severn Tunnel (4½ miles long; completed 1886).

After coal, IRON is the most important mineral product; it is often found near the coal, but besides N. Lancs and N. Staffordshire it is largely obtained in the Cleveland district of Yorks, and in Lincs, Northants, and Leicestershire. Middlesbrough, since the discovery of the peculiarly valuable iron ore of Cleveland (*c.* 1840), has developed from a fishing village into a town of over 100,000 inhabitants nearly all maintained by industries connected with the great iron and steel works which crowd the district with furnaces. Lincs, Northants, and Leicestershire are less important for iron; [illegible] principal industry, Northampton boots and shoes. [illegible]incs, besides its cathedral city, once a Roman town, on the Wytham, possesses Boston, on the Wash, formerly an important port, but now silted up, and the large fishing centre of Grimsby on the Humber. Other important minerals are tin (Cornwall), lead (Durham, Yorks, Cumberland, Westmorland, Derby, Shropshire), copper (Cornwall and Devon), gypsum (Cumberland, Notts, Staffordshire, Sussex, and Derby), stone (worked in most parts of the country).

Local architecture generally indicates nature of subsoil; brick is everywhere to be found in the London and Hampshire basins; slate roofs are common in West Riding of Yorks, tiles on E. coast of same county. The excellent building stone of E. coast of Yorks was used for present Houses of Parliament, London Bridge, etc., and alum and jet workings were once thriving industries there. Whitby still manufactures jet as it did in days of ancient Britons, but the material is now imported from Spain. Slate is obtained from Cornwall, Devon, Lancs, Yorks, Westmorland, Cumberland; chalk from Kent (chiefly), Essex, Hants, Sussex, Surrey. Fireclays are got in Durham, Yorks, Lancs, and Staffordshire coal-fields; china-clay (taken to the Potteries, Worcester, etc., for manufacture), in Cornwall and Devon; salt, besides being obtained from valley of the Weaver, Cheshire, in Worcestershire and N. Lancs. Barnsley is noted for linens; Derbyshire and N. Staffordshire manufacture silk; Nottingham, lace; Bedford, Luton, and Dunstable, straw hats; Kent, paper.

Besides the hilly grazing grounds of the country there remain considerable tracts for agriculture. Lincoln, Leicester, and the N. and S. Downs are famous for sheep, Yorks and E. counties for horses; wheat is chiefly grown in S.E. counties, barley in E. and Midlands, oats in N., N. Midlands, W., and S.W., rye in inferior ground everywhere. Hops grow in S., especially Kent, and also in Herefordshire. Fruit, grown widely, abounds in Kent, Herefordshire (both called the 'garden of England'), and S.W. generally; cider is made in Somerset, Devon, etc.

The old towns of the E. coast, Tynemouth, Hartlepool, Middlesbrough, Whitby, Scarborough, Bridlington, Hull, Grimsby, Boston, Yarmouth, Lowestoft, and Harwich all prospered either on wool trade with Netherlands or on the fisheries; herring and other fish used to visit this coast in far greater shoals than at present, and the fisher folk cruise out along the Dogger Bank (36 miles from Flamborough Head) in the summer for the cod fishery. Mackerel and pilchards are caught on S. and W. coasts. Fishing employs about 40,000 men and boys. London (*q.v.*) has from prehistoric times enjoyed international trade, and is commercial centre of the world.

Haughton, *A Descriptive, Physical, Industrial, and Historical Geography of England and Wales* (1893); Escott, *Social Transformations of the Victorian Age* (1897); Avebury, *The Scenery of England and the Causes to which it is due* (1902); Meredith, *Outlines of the Economic History of England*; Ashby, *British Industries* (1903); Shadwell, *Industrial Efficiency* (1909); Innes, *England's Industrial Development* (1912).

Finance.—The financial system of England in the Middle Ages was very different from that of to-day. A clear line between Crown and State did not exist; still, so far as his own household was concerned, the king was supposed to live 'of his own,' *i.e.* on the proceeds of the royal *demesne*. Besides this, revenue was drawn from various feudal rights, and from judicial administration; revenues of vacant benefices were appropriated, and wretched Jews were harried and tormented by kings and nobles to give up their stores of gold; this source of wealth, however, owing to continual squeezing, tended after a time to run dry. In the XII. cent. the notable fiscal change is the gradual commutation for money of payments in kind. The Jews were ejected in 1290; *tenths* and *fifteenths* were granted, though these came to be mere names for fixed sums. A *poll-tax* was instituted in 1377; the value of the various feudal dues was now less than formerly. *Benevolences*, *i.e.* grants to the king, nominally voluntary, but practically compulsory, were begun in the reign of Edward IV. In Tudor times certain revenues were granted to the sovereign for life; despite their despotism the Tudors were treated generously by Parliament. Much of the money raised, however, was wasted in the collecting—probably about a sixth of the total. With the beginning of the

XVII. cent. came the increased exactions which helped to bring on the Civil War. Elizabeth had introduced *monopolies*, but gave way when complaints were made. Parliament now insisted on the legality of methods of taxation employed, and of the use of the money procured. The chief grievance was the raising of funds, *e.g.* by *ship money*, without consent of Parliament; all these were declared illegal.

The Commonwealth forms a dividing line in English constitutional history, and there were permanent changes at the Restoration, which were carried further in the Revolution of 1688; there was definite appropriation of funds, and the *National Debt* began. The *Civil List* was begun under William III. Walpole and Pitt were great finance ministers. More and more articles were taxed as time went on; the process reached a climax in the Napoleonic wars, when England's financial resources were strained to breaking point. The lower classes had more than their fair share of the burden. In the XIX. cent. some important changes of financial policy took place. The *Income Tax* (begun previously and dropped) has existed since 1842; its highest rate during the Crimean War was 1s. 4d.; in 1894, only 8d.; now never less than 1s. in the £. A *super-tax* was imposed in 1909. The system of estate duties, too, has been extended. Direct taxation is now a much larger proportion of the whole. The institution of Free Trade and the present Fiscal controversy are likewise of fundamental importance.

Cunningham, *Growth of English Industry and Commerce*; Meredith, *Economic History of England*.

Local Government.—The township was the unit of civil life until 1782, when civil parishes were established; these may or may not coincide with the township or ecclesiastical parish, and where, as in Yorks, they coincide with the township it is generally found that several of them are located in the ecclesiastical parish. The civil parishes were formed into Poor Law (*q.v.*) Unions under Poor Law Amendment Act, 1834, and in 1871 the central Local Government Board was established. Corresponding to the civil parish, administrative counties were set up, 1888. See also Macmorran and Dill, *The Local Government Act*, 1888; *The Local Government Act*, 1894; S. and B. Webb, *Eng. Local Government*.

Local Government is administered by County Councils, Parish Councils, Municipal Corporations, etc., consisting of members elected by ratepayers. These fix local rates and taxes and deal with minor matters, and are controlled in matters of Public Health, Poor Law, etc., by the Local Government Board. The London County Council is an amalgamation of various lesser bodies, and has jurisdiction over London and its environs.

Odgers, *Local Government*; Shaw, *Municipal Government*.

Education is compulsory, and provided free of charge for poor children; it is locally administered by County Councils, etc., and supervised by the Board of Education. In 1910 there were 6,071,000 pupils in elementary government schools, while more than 12,500 religious schools have about 3,100,000 scholars in their care. See EDUCATION, UNIVERSITIES.

Religion.—The State religion is Prot. Episcopalian (see ENGLAND, CHURCH OF); the country is divided into the two ecclesiastical provinces of—(1) Canterbury and (2) York, each under an abp.; under the abp's are 76 bp's (of whom 33 are suffragan, 8 assistant); the Convocation of bp's and representatives of inferior clergy in each province is held whenever Parliament is assembled. Anglican communicants in 1910 numbered 2,231,375, those of the Free Churches, taken together, 2,082,047. The chief Free or Nonconformist persuasions are Methodists (Wesleyan, Primitive, Calvinistic, Independent, and United), who number over 1,000,000, Baptists, Congregationalists, Presbytorians, Quakers, Free Church of ——, Reformed Episcopal, Moravians, Countess of Huntingdon's Connexion. There are about 1,700,000 Roman Catholics, with a cardinal abp. of Westminster, abp. of Birmingham, and abp. of Liverpool, 16 bp's, and nearly 4000 priests. Jews number *c.* 200,000.

Population.—In 1911 the population of England was 34,043,076; previous censuses—30,807,310 (1901); 24,614,001 (1881); 16,921,972 (1851); 11,281,957 (1821). By the 1911 census it was shown that in England and Wales there were 1068 females for every 1000 males.

HISTORY.

Archæology.—From remains discovered in gravel-pits and caves it has been found that England was inhabited by man at the same time as it was tenanted by the mammoth and reindeer. This was the paleolithic or 'Old Stone' period, when chipped flint implements were used. Important paleolithic discoveries have been made in the S. of England, 1912–13, and a skull unearthed which is claimed to be the oldest in existence.

Many specimens of neolithic ('New Stone') art have been discovered; polished stone implements characterise this epoch. The dead were buried in stone chambers covered with earth ('long barrows'); cremation sometimes preceded burial. Stonehenge and other ruins of solar temples belong to this age. The tide of immigration from the East (1800 B.C.) brought the use of metal. Axes and other implements of bronze are to be found in abundance in England. Burial took place in 'round barrows'; cremation was common.

The Iron Age in England preceded the Christian by about 700 years. There was commerce between the early Britons and their kinsmen in western France, while the Phœnicians made frequent voyages to Cornwall for the purpose of obtaining tin. The island was visited (*c.* 300 B.C.) by the geographer Pytheas (*q.v.*) of Massilia (Marseilles).

Roman Occupation.—The recorded history of England begins with a visit paid to it by JULIUS CÆSAR in 55 B.C. Cæsar found it occupied by Celtic tribes, akin to the peoples of Gaul, still primitive in civilisation and with a somewhat mystical religion associated with the priesthood called *Druids*, a religion which practised human sacrifices. Cæsar made no attempt to conquer Britain, a business which was undertaken a hundred years later (41 A.D.) under the Emperor Claudius. By the end of the I. cent. A.D. the Roman legions occupied the country up to the Tyne; in what was afterwards called Scotland they never seem to have held more than mere garrisons. In what is now England a regular Roman government was established. The Britons lost their originally warlike character. Rome withdrew her legions in 406, having to guard her continental frontiers against Teutonic and Mongolian invaders. The Britons were fiercely attacked by the Picts and Scots from the N., and to repel these onslaughts tradition says they called in to their assistance the Teutonic pirates of the North Sea. This opened the floodgates of the English invasion.

English Conquest.—Between the middle of the V. (449) and the middle of the VI. cent's Jutes, Saxons, and Angles swarmed into the country, pushing their conquests inland until the Britons were driven into the moorlands and highlands of the W.; and their prospects of recovery were finally destroyed when Saxons and Angles drove wedges up to the sea on the N. and also on the S. of Wales about the beginning of the VII. cent. It was about the same date, 596, that Augustine's mission from Rome introduced Christianity among the English, though the Celtic Church of Ireland had already begun missionary work in the N.

The Eng. conquest extended as far north as the river Forth, and the conquerors gradually organised themselves into several kingdoms, of which there were at one time seven, whence the period is commonly known as the *Heptarchy* (q.v.). As a rule, whichever of these kingdoms was strongest compelled the rest to recognise its general overlordship. The supremacy lay

first for a short time with *Kent*, then with *Northumbria*, then with the Midland kingdom of *Mercia*, and finally passed at the beginning of the IX. cent. to the southern kingdom of *Wessex*.

Danish Invasions.—But now began incursions of a fresh group of Teutonic invaders, the Northmen, or Danes, and Norsemen. They threatened a conquest of the island, but were checked by ALFRED THE GREAT (871–901), king of Wessex. Alfred's son and grandsons brought all England under their dominion, but in the miserable reign of Ethelred the Redeless the Danes conquered the country at the beginning of the XI. cent. (1013). Knut or Canute ruled wisely for eighteen years, but seven years after his death the English recalled Edward the Confessor (1042), s. of Ethelred, from Normandy.

Norman Conquest.—On Edward's death, WILLIAM, DUKE OF NORMANDY, claimed the crown, which was bestowed by election upon the great Earl Harold. William invaded England, overthrew and slew Harold at the battle of *Senlac* or *Hastings* (1066), and procured his own election to the throne.

Under the Saxon system the king ruled by advice and consent of a council of magnates, lay and clerical, called the *Witan*, which bears traces of having been at one time, at least for certain purposes, a survival of a General Council which might be attended by all freemen or landholders. It was already an established custom at the time of the Norman Conquest that the majority of the small occupiers of the soil held their land from some overlord on condition of service. They remained, however, freemen, with the right of attending the local assemblies which generally conducted local affairs and administered justice. Theoretically the Norman Conquest maintained the old system; but actually nearly all the 'manors' of the landowners were forfeited and bestowed upon Normans, with the result that the small occupiers really became the serfs of the new overlords. Moreover the new overlords received their estates in *feudal* tenure from the king, that is on conditions of military service. The peculiar feature of the Norman feudalism was that no one of the tenants-in-chief, or barons, who held their land direct from the king, not from some intermediate overlord, combined contiguous estates extensive enough to make him dangerously powerful.

The Conqueror was followed by two sons in succession. The first, William Rufus (1087), was an evil and tyrannical ruler, but an able soldier who held the greater barons in check. The second, HENRY I. (1100), not only proved himself the master of his barons, but did much towards organising the administration of justice throughout the kingdom, so that the king's courts could counteract and repress maladministration and high-handed overriding of the law by local magnates, who were now practically all Normans. But he left no son, and although the throne was claimed on behalf of his dau., Maud, widow of the Emperor Henry V. and wife of the Count of Anjou, the Great Council which of old had been the Witan gave it to her cousin, Stephen (1135). There followed a period of appalling anarchy, since neither Stephen nor Maud exercised any effective control, and every one of the great barons did that which was right in his own eyes and foul wrong in the eyes of everybody else. But when Maud's young son, Henry, Count of Anjou, reached man's estate he wedded Eleanor, Duchess of Aquitaine, thus becoming lord of the western half of France, including Normandy from the English Channel to the Pyrenees, although he was nominally vassal to the king of France. An agreement was arrived at between Henry and Stephen that Stephen should reign for the rest of his life and should then be succeeded by Henry, who became king of England in 1154.

The Plantagenets.—HENRY II. was the first king of the Angevin or Plantagenet dynasty, and every king of England for three hundred and thirty years was a Plantagenet. Although the male descent was then broken, each successive dynasty has been of Plantagenet blood, having come into the line of succession through the marriage of a princess of the blood royal. Moreover, since Henry I. married a Scot. princess whose mother and bro's were representatives of the House of Wessex, all the monarchs of England and of Scotland since that time have been descendants of Alfred the Great. Henry himself was a great continental potentate, but his business in England was to organise a powerful Central Government under the king's control, and to establish order. The country was sick of anarchy, and the greater barons generally co-operated with Henry; those who attempted to resist were promptly quelled. In his reign there was the great contest in which the king endeavoured to assert the control of the State over the Church, for which Thomas Becket, abp. of Canterbury, claimed independent jurisdiction. The murder of the abp. (1170) practically gave the victory to the Church. But Henry's great work was the reorganisation of the administration of justice on the foundations laid by his grandfather; and with that, the assertion of the royal authority and [illegible] ght them to be the supporters instead of the enemies of law.

Magna Carta.—Henry's successor, the famous Crusader, Richard *Cœur de Lion* (1189), spent only a few weeks of his ten years' reign in England. His brother John (1199), who followed him, exercised the royal power with gross tyranny. Philip Augustus, king of France, used his opportunity to deprive the detested king of England of Normandy and of the greater part of the Angevin inheritance (1204), with the beneficial result for England that the barons of England, parted from their continental estates, became definitely English. But John's tyranny had the further effect of driving the barons to combine and to take their stand against the king in the name of the law. Under the wise influence of the abp. of Canterbury, Stephen Langton, they extorted from the king the GREAT CHARTER (*Magna Carta*), 1215, which laid down the fundamental principles of Eng. liberty: that taxation may not be imposed without the assent of the National Council, that no man may be imprisoned without fair trial, and that generally there is no power in the land which may override the law. John attempted to repudiate the Charter, and died while at war with a faction of the barons who, in desperation, intended to depose him and make the Fr. Dauphin king of England.

Within a few months of John's death (1216) this unpatriotic plan was dropped, and John's young son Henry was accepted as king. During his minority the country was well governed, first by William Marshal and then by Hubert de Burgh. But when Henry came of age (1227) he took the reigns of government into his own hands, and placed himself in the hands of foreign favourites. One group was expelled only to have its place taken by another, until the barons combined in effect to demand that the administration of the country should be placed in their hands.

Barons' War.—But their great leader, Simon de Montfort, was equally determined that the rights of the humbler classes should not be ignored by the barons. The king was compelled by the Great Council to accept a provisional constitution known as the *Provisions of Oxford* (1258). This he sought to repudiate, but was defeated in the first Barons' War, which virtually made Montfort Dictator. It was at this time (1265) that Montfort called a Great Council, to which for the first time were summoned representatives of the boroughs as well as of the landowners or knights of the shire. Divisions among the barons brought about the overthrow and death of Montfort in the same year, but under the influence of Prince Edward the misrule ceased.

National Progress.—EDWARD I. came to the throne in 1272, when he was actually absent on crusade. On his return to England he established for all time his claim to be the first really national king of England. The organisation and consolidation of his kingdom

was his first aim. Included in this was his conception of bringing the entire island, together with IRELAND, under one sceptre. Ireland had been annexed in the reign of Henry II. (1169), and a Norman colony planted there, but nothing effective had been done to establish a well-ordered government. Edward's desire was excellent, but his method was fatal. He succeeded in conquering WALES; but when his first plan for uniting the crowns of England and Scotland by marriage failed owing to the death of the young queen of Scotland (1290), he attempted to assert the Eng. supremacy over that country at the sword's point (1295), claiming that the kings of England had always been overlords of the kings of Scotland. The later years of his reign were marked by repeated conquests of Scotland followed by repeated insurrections. He was actually on his way to crush the insurrection headed by Robert Bruce when he died, and his whole scheme was brought to nought in the reign of his son. But the great work of Edward was in his legislation, which was not so much the making of new laws as the establishment of uniform and definite laws in the place of varying and indefinite customs. Finally he created the *Model Parliament* (1295), based on that of Simon de Montfort, which was attended by a group of hereditary peers, by the higher clergy, and also by two representative knights from each shire and two representative citizens from each borough, as well as by representatives of the lower clergy. Later the lower clergy ceased to attend, and the higher clergy sat with the lay peers in one Chamber, while the representative members sat together in what then became known as the *House of Commons*. The principle was laid down again that the assent of Parliament was necessary to taxation, and that what touches all should be deliberated upon by all.

Scottish Independence.—Edward I. was followed by his incompetent and foolish son, Edward II. (1307). The government fell into complete disorder, since the king was ruled by favourites, and the barons, lacking any leader of statesmanship, sought little but their own selfish interest. Robert Bruce in Scotland by degrees expelled one after another of the Eng. garrisons, till at last, when Stirling alone was left, Edward marched into Scotland with a great host to recover what had been lost. At the battle of *Bannockburn* (1314) the great host was utterly shattered, and the independence of Scotland was decisively secured. In England baronial combinations were formed, the most notable being that of the *Lords Ordainers* (1310), which endeavoured to secure for themselves the control of the administration, while periodically the king and his favourites temporarily recovered the upper hand. Finally, however, Edward was overthrown, deposed, and then murdered by his wife and her accomplice, Roger Mortimer, who seized the regency while the boy EDWARD III. was proclaimed king (1327). Misrule continued unabated until a party of the nobles joined with the young king in a *coup d'état* (1330). Mortimer was put to death, and the queen dowager Isabella was obliged to retire into privacy.

During the brief regency the independence of Scotland had been formally recognised by a treaty (1328), but Robert Bruce was now dead, his son David was a child, and Edward III. endeavoured to place another claimant on the throne as his own vassal. Edward, however, gave up the useless attempt when he found a field more attractive to his ambitions in France.

War with France.—The Plantagenets had kept their hold on the duchy of Aquitaine, while Fr. kings had continued to try to filch it from them piecemeal. Edward wished to put an end to these troubles by getting rid of the Fr. king's overlordship. Also he wanted to ensure the very valuable trade in wool and woollens between England and Flanders against interference on the part of the Count of Flanders and the king of France. A pretext was found for picking a quarrel with France when Edward put forward a claim to the Fr. crown through his mother, the sister of the three last kings, whose cousin, Philip of Valois, had been set on the Fr. throne on the principle that the crown descended only through males. Edward's claim to the crown, however, was not the real motive, but really a pretext for beginning (1338) what is called the HUNDRED YEARS WAR. With intervals of truce, during which some excuse was habitually found for keeping up the fighting between English and French, the war went on through the rest of the reign of Edward III. Its first stage was marked by the great naval victory of *Sluys* (1340), the complete overthrow of the French chivalry by the Eng. archers at *Crécy* (1346), and the capture of *Calais* (1347). Nine years after Calais a brilliant victory was won by the Black Prince, Edward, Prince of Wales, at *Poitiers* (1356); and this was followed in 1360 by the *Peace of Bretigny*, which gave Edward a quarter of France as an independent principality. The war, however, broke out again, and before the end of the reign (1377) nothing remained in Edward's possession except Calais and a part of Guienne. The reign was further marked by constitutional struggles between the king and Parliament, which ended in the complete recognition of the exclusive right of Parliament to vote supplies, and finally the Parliament asserted its rights to a voice in the administration of the country by impeaching (1376) some of the king's ministers.

Labour Revolution.—Just after the capture of Calais, England was visited (1348) by the tremendous scourge called the *Black Death*, which killed off at least one-third of the population. Agricultural labour was thereby completely disorganised, the demand for labour was greater than the supply, and the Government tried to enforce 'fair' wages and 'fair' prices by the *Statute of Labourers* (1351). A bitter hostility was engendered between the landlords and the *villeins*—that is to say, roughly, the labouring class and the class which occupied land under conditions of serfdom. These troubles came to a head in the great Peasant Revolt (1381), called *Wat Tyler's*, very soon after the accession (1377) of Edward's young grandson, Richard II. The insurgents were persuaded to disperse by promises that their demands should be met; but the promises were broken, and the insurgents themselves punished with a heavy hand. Still the conditions of serfdom practically vanished during the next fifty years. They had already been disappearing when the Black Death for the time being changed the economic conditions, which were leading to the substitution of rent and wages for forced services. With a return to normal conditions, the old forces came into play again and serfdom disappeared.

Struggles between the king and some of the great nobles for the control of administration culminated when the king succeeded in crushing or banishing the most dangerous of the nobles and procuring from a subservient Parliament a completely despotic authority for himself (1398). Yet this only led to the return to England of his cousin, Henry of Lancaster, his own overthrow and deposition, and the elevation of Henry IV. (1399) to the throne.

France Won and Lost.—The reign of Henry of Lancaster was troubled by a series of insurrections; but his son HENRY V. (1413), who succeeded to the throne, resolved to revive the Eng. claim to the Fr. crown. France being torn between two rival factions of the nobility, while the crazy Charles VI. was king. Henry invaded Normandy, captured Harfleur, and, marching from Harfleur to Calais, won at *Agincourt* (1415) the most astonishing of all the Eng. victories in France. Two years later he returned, set about a systematic conquest of N. France, and by the *Treaty of Troyes* (1420) procured his own recognition as heir to the Fr. throne. But his death (1422) left the baby Henry VI. on the throne of England, and the further progress of the Eng. arms was checked by the sudden appearance of JOAN OF ARC (1429), and, although she was captured and burnt for heresy and witchcraft,

the tide of success turned steadily in the favour of the French. The war was conducted without energy or skill, and in 1450, thirty years after the treaty of Troyes, all Normandy was lost. Three years later, Calais was the only portion of Fr. soil still held by the English.

Wars of the Roses.—Meanwhile faction and misgovernment ruled in England under the pious but imbecile Henry VI. At last his cousin, Richard of York, who, so far as descent was concerned, had a better claim to the throne than the king, insisted on taking a share in the government. This led to the outbreak of hostilities between his faction and that of the queen, and then Richard put forward his own claim to the Crown. The struggle which began in 1455 is called the *Wars of the Roses*, the Red and White Roses being the badges respectively of the houses of LANCASTER and YORK. Richard was killed, but the victory of *Towton* (1461) made his son, EDWARD IV., king of England—a position which he owed mainly to his cousin Richard, Earl of Warwick, called the *Kingmaker*. The luckless Henry was still alive; Edward quarrelled with Warwick, and did not finally secure the throne until Warwick, Henry, and Henry's son were all killed at or after the battles of *Barnet* and *Tewkesbury* (1471). Then for twelve years Edward reigned undisturbed, practically as an absolute monarch. On his death his bro., Richard III. (1483) of Gloucester, seized the Crown, and murdered the young Edward V., whom he had robbed of it. The usurper tried to secure himself by a merciless tyranny, but was overthrown and killed by Henry Tudor, Earl of Richmond, whom the Lancastrians had chosen as their representative.

The Tudors.—HENRY VII. (1485) established the Tudor dynasty, and to some extent reconciled the factions of Lancaster and York by marrying (1486) the dau. of Edward IV. The reconciliation, however, was not completed till the accession of their son, Henry VIII., whose title to the throne neither Yorkist nor Lancastrian could reasonably dispute. The old nobility had been almost wiped out during the Wars of the Roses, and Henry VII. was careful to repress what remained of it, and to keep down the new nobles, who had been brought into existence by the same wars, not by execution, but by great confiscations. He began the intervention of England in continental politics by means not of the sword, but of diplomacy; and he made it his business to strengthen the Crown by ingenious devices for filling the treasury, so that when he died he was probably the richest prince in Europe, and his son began his reign free from any necessity of relying upon Parliament for supplies. For many years of HENRY VIII.'s reign (1509–47) public affairs were managed mainly by his great minister, CARDINAL WOLSEY, a diplomatist of very great ability, whose main object was to hold the balance between France and Charles V., who was at once Holy Rom. emperor, Lord of the Netherlands, and king of Spain. But during Wolsey's ascendancy, Luther fired the revolt which divided Western Christendom into *Protestants* and *Papists* (1517). Henry had no sort of desire to be a Protestant, but he developed a private quarrel with the Papacy, because he wished to get rid of his wife, Katharine of Aragon, and to marry Anne Boleyn. Since Wolsey failed to obtain the papal sanction for this course, the cardinal was disgraced (1529), and Henry set the papal authority at defiance. He procured his recognition as 'Supreme Head' of the Church of England (*Act of Supremacy*, 1534), put to death numbers of prominent men, lay and clerical, who refused to acknowledge his title, appropriated the clerical taxes which had hitherto gone to Rome, and turned upon the estates of the Church, dissolved the monasteries, and seized their property (1536–39). In other respects, however, he refused to admit the Reformed doctrines into England, though he authorised the translation of the Bible into the Eng. tongue. His second great minister, Thomas Cromwell, had used Parliament to provide a popular sanction for these proceedings, and finally to confer absolute powers upon the monarch, so that, when Henry died, he was the most unqualified despot in Europe.

Protestantism and Catholicism.—Henry was succeeded in turn by the son and two dau's of three different wives. During the reign of the boy EDWARD VI. (1547) the government was in the hands of a Council controlled first by the Protector Somerset and then (1549) by the Earl of Warwick, who became Duke of Northumberland. The spoliation of the Church was continued, and two new prayer books (1549, 1552) in succession transformed the Church of England first into a comprehensive Body which still admitted without enjoining Romanist doctrines, and then into a Church definitely Protestant in the ordinary acceptance of the term, though it retained its 'Catholicism' in the theological sense by preserving the Apostolic Succession through Ordination. The country had long been suffering from agricultural depression, chiefly due to the diminution of rural labour by the systematic conversion of arable land into pasture. The religious changes and agricultural depression, independently or in combination, brought about popular insurrections which were sternly repressed. See ENGLAND, CHURCH OF.

After the fall of Somerset, Northumberland tried to perpetuate his own power by securing the succession of LADY JANE GREY, his dau.-in-law, who in England stood next in succession to the throne after Henry VIII.'s two dau's. But the attempt failed ignominiously and the Romanist queen, MARY, ascended the throne on Edward's death (1553). There followed a violent Romanist reaction, intensified by the marriage of the queen to Philip, the Crown Prince of Spain, and the persecution of the Protestants was set on foot (1555). The finances, the army, and the navy had all been falling into decay for the past decade, England was dragged into a Fr. war by her connection with Spain, and Calais was lost (1558).

Elizabethan Age.—Mary's death placed on the throne QUEEN ELIZABETH (1558), the dau. of Henry VIII. and Anne Boleyn. The circumstances of her mother's marriage made her legitimacy questionable, while from the Romanist point of view there was no doubt at all that the legitimate heir to the throne was MARY, QUEEN OF SCOTS, the granddaughter of the elder sister of Henry VIII. Elizabeth and her ministers settled the ecclesiastical question by giving the Church of England the form which has remained practically unchanged ever since. Conformity was secured by often overlooked severity. The queen of necessity relied on her Prot. subjects, and could ignore the dictation of Philip of Spain because, in his own interest, he was bound to keep her on the throne in preference to Mary Stuart because of that queen's close connection with France. Eng. Protestantism and Eng. maritime expansion together made it practically certain that sooner or later there would be a struggle for supremacy between England and Spain. Both Philip and Elizabeth wished to defer the struggle as long as possible, and in the meantime to do each other as much harm as possible. The flight of Queen Mary from Scotland (1568) and her detention in England made her the figure-head of a series of conspiracies for the overthrow of Elizabeth. At last, when the struggle between England and Spain could no longer be deferred, Mary, Queen of Scots, was executed (1587), and Philip of Spain sent his GREAT ARMADA for the conquest of England. The Armada was harried by the Eng. fleet as it sailed up the Channel, and was then thoroughly beaten in a fight off Gravelines (1588) before it fled up the North Sea and round Scotland for the tempests to complete the work of the Eng. seamen. The great victory at once set England in the forefront of the maritime nations. The destruction of the Armada marks almost the precise moment when English lit. also suddenly sprang into the front rank of the literatures of the world with its list of great names headed by SHAKESPEARE and SPENSER.

The Stewarts.—Since each of Henry's children had died childless, his elder sister's great-grandson, JAMES VI. of Scotland, now (1603) came to the throne as JAMES I. and inaugurated the Stewart dynasty, of which four generations numbering six monarchs occupied the throne. James believed himself, and taught his son, Charles I., to believe, in the *divine right* of kings. The doctrine was new in England, and the king's prerogatives as James conceived them were soon in collision with the rights of Parliament as Parliament conceived them. The king's claims to certain powers of taxation were disputed by Parliament but supported by the Law Courts, and the Parliament's right to freedom of discussion was asserted by it and disputed by the king. The royal claims to control the forms of State religion began to be questioned, though on none of these points did a really serious breach occur during the reign of King James, for the king tried as much as possible to manage without Parliament at all. But at the close of his reign England was drawn into a very ill-directed participation in the *Thirty Years War* (1618-48) then raging in Europe. This involved application to Parliament (1621) for supplies.

King and Parliament.—The mismanagement was mainly due to the king's favourite, the Duke of Buckingham, who continued to be paramount with his son, CHARLES I. (1625). Hence Charles called Parliaments together (1625, 1626, 1628) in the hope of extracting supplies from them, while they responded by formulating grievances and attacking Buckingham. In the intervals, after dissolving his Parliaments, Charles experimented in forms of taxation of dubious legality, while the steadily increasing *Puritan* spirit was generally irritated by the ascendancy in the Church of the high *Anglican* school represented by Laud, who afterwards became abp. The climax was reached in 1628 when Parliament presented the *Petition of Right*, reasserting the principles of taxation through Parliament only, and of the right of persons who are arrested to trial. Buckingham was assassinated. There was a hot disagreement between king and Parliament on the interpretation of the Petition of Right and on the respective rights of Crown and Parliament to control the Church. Parliament was dissolved (1629), and for eleven years the king made shift to govern without calling a new one, again resorting to every means of raising money which the judges could be induced to sanction as legal.

But in his other kingdom of Scotland Charles's attempt to enforce Anglican forms upon a nation which preferred the *Presbyterian* model caused almost the whole Scot. people to rise in arms. That he might obtain an army in order to bring them into subjection Charles again had to summon a Parliament (1640). But the new Parliament proved his master. It compelled the king to accept an *Act of Attainder* against his great minister Strafford, who was beheaded (1641), abolished the arbitrary courts on which the king had relied for the punishment of offenders, and all those rights of taxation which the king had been asserting. Charles did not dare to refuse assent; but when the Puritan element attacked the Anglican system of Church government, Parliament ceased to be unanimous and a new Royalist party was formed.

The result was the outbreak of the CIVIL WAR (*q.v.*) in 1642. The balance of success at first lay with the king, but the tide turned when the Parliament's victory at *Marston Moor* (1644) brought OLIVER CROMWELL into the front rank. Under his supervision the parliamentary army was reorganised and the Royalists were crushed at *Naseby* (1645). The grand desire of Cromwell's army was for the toleration of all forms of Protestant religion. The Parliament wished to enforce Presbyterianism. The king intrigued in the hope of recovering his own authority through the dissensions of his opponents. The discovery of these intrigues made Cromwell turn republican, with the result that all but a few members were excluded from the House of Commons, which assumed authority as the sovereign body of the realm and instituted a court for the trial of King Charles, who was beheaded (Jan. 1649).

The Commonwealth.—The Commonwealth was proclaimed. Government was carried on by the *Rump Parliament* and a Council of State, while Cromwell suppressed insurrection in Ireland and overcame the Scots who had acknowledged Charles II. as their king. The Rump then tried to make itself a permanent oligarchy; Cromwell ejected it (1653), and for five years ruled England as *Protector*, making sundry vain attempts to procure a Parliament which would work in harmony with him. Under what was practically a military dictatorship England forced the European Powers to recognise her military and naval strength, the latter having already been displayed before the Protectorate in a stubborn naval war with the Dutch (1653), at that time the greatest maritime power. But Cromwell's personality alone made such military rule tolerable, and twenty months after his death (1658) Charles I.'s son was recalled to the Eng. throne.

The Restoration.—CHARLES II. (1660) was determined not to 'go on his travels again,' and to let nothing interfere with his own amusement. These conditions being laid down, he proposed to make himself absolute and to reinstate Roman Catholicism. He dropped the second object when events taught him that the nation at large, including the Anglicans, had a terror of popery. In the former object he succeeded, by becoming a pensioner of the king of France—which finally relieved him of all dependence on Parliament for supplies (1681). But while this object was ultimately achieved for a short time, throughout the greater part of the reign the theoretical supremacy of Parliament was hardly challenged. The king usually got his way, but it was usually by skilfully blinding Parliament to the real course of events. Twice England fought in Dutch wars, not suspecting that her policy was being manipulated in the interests of France. It was the Parliament with its now dominant element of *Cavaliers* which passed severe restrictive measures upon Nonconformity (1661-65) of every kind (the *Act of Uniformity*, 1662, as in reigns of Elizabeth and Edward VI., imposing use of Book of Common Prayer on all ministers, and enjoining uniform Episcopal religious observance), and in consequence of the monstrous scare of the *Popish plot* (1678) stiffened the penal laws against Romanism.

What Charles won by sheer cleverness combined with a total absence of principle his bro., JAMES II. 1685), lost mainly through sheer stupidity and an obstinate adherence to principle. He strained the royal prerogatives violently in order to reinstate Romanism. The result was that the leaders of both political parties, now known as *Whigs* and *Tories*, combined to bring into England his Prot. son-in-law and nephew, WILLIAM OF ORANGE.

The Revolution.—James fled. William and his wife, MARY, were made king and queen (1689) on their acceptance of the Declaration of Right, which once more defined the limitations of the royal prerogative. It was William's principle to rule with as little regard as possible to parties, to act with justice all round, to establish toleration (by *Toleration Act*, 1689, Protestant Nonconformists were granted freedom of worship), and generally to give effect to the wishes of the nation. In the last resort he could impose his own will by the threat of going back to Holland. William, however, learnt that the best way of avoiding deadlocks and working harmoniously with Parliament was to select his ministers from the party predominant in the House of Commons; thus his reign saw the beginning of *Party* and *Cabinet Government*. The great business of his life was the formation of European coalitions including England to hold in check the aggression of Louis XIV. of France. The French bid for naval supremacy was shattered at the great battle of *La Hogue* (1692); while Holland dropped gradually but decisively to a position second to that of England.

By the *Act of Settlement* (1701) the succession to the Eng. throne was fixed upon the second dau. of the exiled King James, and failing heirs of her body upon the nearest Prot. representative of the royal house, the electress of Hanover, granddau. of James I. England was finally brought decisively into the coalition against France when Louis promised the dying James to recognise his son as the lawful king of England. Hence on QUEEN ANNE'S accession (1702) England plunged into Marlborough's war, the *War of the Spanish Succession.*

Great Britain.—Marlborough's brilliant campaigns almost ruined France. But when the war was brought to an end by a Tory Administration (1713) France obtained the establishment of the Bourbon family on the Span. throne, the prevention of which had been the theoretical object of the coalition against her. England, however, secured commercial advantages, together with the cession of the Rock of Gibraltar and of Nova Scotia. The greatest event of the reign, however, was the Legislative Union of England and Scotland as the single State of Great Britain (*Act of Union*, 1707). Henceforth it is not England but Great Britain which plays an international part and builds up the British Empire.

House of Hanover.—Intrigues to restore the exiled Stewarts on the death of Queen Anne were frustrated by the Whig leaders. The House of Hanover succeeded (1714) to the throne of Great Britain. The two first GEORGES were Germans; they reigned on sufferance, not because there was any sentiment of loyalty to them, but because while they were kept on the throne the Stewarts were kept out. The practical result was that one party, the Tories, were virtually identified with *Jacobitism* and the Whigs remained in power for fifty years. The supremacy of Parliament became fully established because the Hanoverian kings would at once have been turned out if they had attempted to challenge it. From 1721–39 Brit. policy was controlled by SIR ROBERT WALPOLE, who had before him three great objects: keeping the mass of the nation contented with the Government, increasing its material wealth by the development of commerce, and avoiding war while most of the European nations were exhausting themselves. His control broke down in 1739. Britain plunged into a war with Spain, and was soon involved in the general European conflagration called the *War of the Austrian Succession* (1740–48). In the course of that war the Brit. dynastic question was finally got rid of by the destruction of Jacobitism at the battle of *Culloden* in 1746.

Colonial Expansion.—Not less momentous was the opening of the struggle (1746) in INDIA between the Fr. and Eng. Trading Companies for an ascendant influence in the native states. The struggle ended with the complete overthrow of the French (1760), but incidentally it led to a quarrel between the British and the Nawab of Bengal, the issue of which was that Bengal itself passed under Brit. control (1757), and the Brit. East India Company became one of the territorial powers in India. Before this result was achieved another great European conflagration, the *Seven Years War* (1756–63), had broken out. In this great struggle the genius of WILLIAM PITT THE ELDER, afterwards Earl of Chatham, directed the energies of the nation to the development of an overwhelming naval supremacy and the demolition of Fr. rivalry in America as well as in India. The Fr. fleets were annihilated and the great prize of CANADA, the Fr. colony in North America, was won for the Brit. Empire by Wolfe on the *Heights of Abraham* (1759).

American Independence.—The young king, GEORGE III. (1760), was already on the throne before the Seven Years War was brought to an end. The third of the Hanoverian kings was not like his predecessors an alien stopgap for the exclusion of a Romanist Stewart. He was a Brit. king of the Brit. nation, and his great object was to recover the royal ascendancy, which had been in practical abeyance for more than half a century. His method was to break up the ascendancy of the great Whig families, which now practically formed a dominant oligarchy. The Tories having emerged from their long period of depression to transfer their loyalty from the Stewarts to a Brit. king, George succeeded in creating in both Houses of Parliament a predominant party of his own. But while this was going on the causes of disagreement between the Mother Country and the AMERICAN COLONIES came to a head, nominally over the right of the Parliament at Westminster to impose taxation (1765) on the unrepresented Colonies. Colonial grievances had been held in abeyance hitherto because the Colonies had been dependent on the support of the mother country to enable them to resist the aggressive rivalry of France on the North American continent. The last chance of reconciliation disappeared with the establishment of the king's complete ascendancy in Parliament (1770). The Americans took up arms to maintain their liberties, and the war which broke out (1775) developed into one for their complete independence. France threw her sword into the scale on their side. American independence was won (1783), but the naval ascendancy of Britain, which at one stage of the war seemed almost to have been lost, was in the long run successfully asserted (1782); while in India, Warren Hastings (1770–84) established the territorial dominion which had been won by Robert Clive.

Industrial Revolution.—The war was hardly over when the control of British policy passed into the hands of the younger WILLIAM PITT (1784), who enjoyed the entire confidence of the king. Now began the Industrial Revolution in England, the great development of manufacturing machinery driven by steam, which, owing to the vast wealth of Great Britain in coal and iron, and to the command of raw materials secured by her maritime supremacy, rapidly converted her into the 'workshop of the world,' and made her an industrial instead of an agricultural nation.

War with France.—But another revolution was arising in France. France became an aggressive republic, and Britain became the protagonist of Europe in the resistance to Fr. aggression. In the first period (1793–1802) of the great war the British took directly only an insignificant part in land operations, but dominated the seas, and the domination was converted into a decisive supremacy by the *Battle of the Nile* (1798). But this did not prevent France from immensely extending her power on the Continent, the work in great part of Napoleon Bonaparte. In the second stage (1803–15), when the Fr. Republic had disappeared and NAPOLEON was Emperor, France was finally paralysed for all maritime purposes by NELSON'S victory at *Trafalgar* (1805), and then Britain took up the rôle of a military power by sending her armies to the Peninsula under WELLINGTON (1808), who proved himself more than a match for each of Napoleon's greatest marshals in turn. Napoleon was overthrown by the combined forces of Europe, and was sent to Elba (1814). The Powers met in congress to reconstruct the European system; then Napoleon made his last throw, and Wellington held him at bay at *Waterloo* (1815) until the arrival of the Prussians under Blücher made that great battle an overwhelming rout. Napoleon became a prisoner on St. Helena.

The British Empire.—Since 1815 Britain has fought with no European Power save with Russia in the *Crimea* (1854–56). The last hundred years have witnessed the new expansion of the Brit. transoceanic empire, the development of democracy, and the development of great commercial and industrial questions and problems of social reform. The XVIII. cent. gave her a firm hold upon INDIA, and by 1820 the British were the paramount power over the whole Peninsula and the direct rulers of a third of it. That third was increased to a half during the Governor-Generalship of Dalhousie (1848–56). In the next

year broke out the *Indian Mutiny*, the great revolt of the sepoys or native army. Its suppression established the Brit. dominion more firmly, and the government was transferred from the East India Company to the direct control of the Crown (1858). There have been no more wars in India, though fears of Russ. aggression have compelled the maintenance of a huge army, and caused a great war in Afghanistan (1879), while the restlessness of frontier tribes has necessitated perpetual expeditions and 'little wars.'

The XVIII. cent. lost Britain the United States, but gave her CANADA. Also almost accidentally AUSTRALIA was annexed (1788) to provide a dumping-ground for convicts; while the Napoleonic war gave Britain the Dutch CAPE COLONY, which was primarily seized (1795) to prevent it from being used by the French. Out of the convict settlements grew the Australasian colonies, which in the middle of the cent. were given self-government. The self-governing colonies developed into states, and at the close of the XIX. cent. the Australian group formed themselves into a Federation (*the Commonwealth*). In this they had been anticipated by the colonies in North America which now form the Canadian *Dominion*. Canada itself was the first of the colonies to receive self-government (1840), which was soon granted to the rest; and they were empowered in 1867 to form a federation which Newfoundland alone has refused to join. New Zealand similarly declined to join the Australian Commonwealth, and remains a separate dominion. In South Africa numbers of the Dutch, discontented with Brit. Government, trekked into the interior (1836), where the Transvaal and Orange Free State Republics were set up (1856). Differences between the Republics and the British as paramount power in South Africa led to the great South African War (1899–1902), followed by the incorporation of the Republics in the British Empire, the grant of self-government, and their incorporation with the Cape and Natal in the *Union of South Africa* (1910).

Home Reform.—The Fr. Revolution caused a strong reaction of sentiment in the governing classes against all tendencies to alter the distribution of political power. The reaction continued predominant for many years after Waterloo; but in 1832 the demand of the middle classes for a revised system of representation brought about the great REFORM BILL, which abolished rotten boroughs and enfranchised the whole middle class. After another thirty-five years the demand of the labouring classes for enfranchisement produced Disraeli's Reform Bill (1867), which transferred the balance of political power from the middle classes to the working-men. The agricultural labourer, however, was still excluded, and it was not till 1885 that he received a vote and the House of Commons became a completely democratic assembly. Manhood suffrage and adult suffrage did not become questions of practical politics till 1912. Outstanding social measures of recent years introduced *Old Age Pensions* (1908) and *National Insurance* (1911).

The Legislative Union of IRELAND to Great Britain was carried through the Parliaments of Great Britain and Ireland in 1800. But the king's refusal to allow the *Act of Union* to be accompanied by *Catholic Emancipation* still left Ireland with an angry sense of grievance. Though the special grievance was removed in 1829 the mass of the Irish people still retained the sense that they were governed in accordance with Eng. ideas for the satisfaction of the Prot. minority, who had hitherto held an unqualified ascendancy. The demand for repeal of the Union was accompanied by the formation of secret societies and by periodical explosions of violence and outrage. The arrival of the democratic Parliament (1885), in which four-fifths of the Irish members were supporters of what was now called the *Home Rule* movement, set Home Rule in the forefront of the programme of the Liberal party, which, with one short interval (1893–95), was excluded from power for twenty years (1885–1905). A Home Rule Bill to re-establish an Irish Parliament was passed by the House of Commons, 1913, and, the veto-power of the House of Lords having been broken by the *Parliament Act* (1911), may become law if the Liberals can retain power for other two years.

Finally, reference may be made to the most striking feature of British commercial policy in the XIX. cent., the gradual development of *Free Trade* from the reforms of Huskisson (1823) to Peel's abolition of the Corn Law (1845), and the complete disappearance of Protection under the financial guidance of Mr. Gladstone. It remained for the XX. cent. to challenge the verdict of the XIX. and to set *Tariff Reform* in the front of the programme of the political party which has hitherto had no opportunity of carrying out that programme.

Innes, *A History of the British Nation* (1912); Green, *Short History of the English People* (1874); Ransome, *An Advanced History of England* (1899); Oman, *A History of England* (1895); Gardiner, *Student's History of England* (1893).

ENGLISH LANGUAGE.

English belongs to the Teutonic group of the Aryan or Indo-European languages, which comprise most of the literary languages of Europe. Teutonic is further subdivided into Scandinavian and Germanic, to which latter group English belongs. Originally it was a Low or N. German dialect or collection of dialects spoken by the Angles, Jutes, Saxons, and Frisians dwelling on the N.W. coast of Germany and in modern Schleswig-Holstein, and the languages which it resembles most to-day are Dutch and Frisian. Even before they left the Continent the English had borrowed a few foreign words, one or two from Celtic, but many more from Latin, chiefly of military significance (e.g. *camp, wall, mile*), or commercial (e.g. *mint, pound, inch, wine, cheese, butter, pepper*), and a few referring to Christianity, such as *church* and *minster*.

On coming to Britain (449–547 A.D.) they found the island occupied by a Celtic race, just freed from Roman government, speaking in the towns a Latin dialect and in the country at large a Cymric or Britannic form of Celtic from which Modern Welsh is descended. From these two languages the English learnt practically nothing; the names of their oldest cities are Latin (cf. *Chester* from *castra*=camp); most of the rivers (cf. *Avon, Esk, Ouse*) and hills (*Pennine* Chain) are Celtic; otherwise the only words, probably of Celtic origin, that English owes to the Early Britons are *down* (a hill), *combe, bin* (orig.=a manger), *dun* (the colour), *crock* (a pitcher), and one or two others. Between 597 and 630 England was taught Christianity, in the S. by the Roman Augustine, in the N. by the Irishman Aidan, and through this new teaching English first became a literary language. The history of the language as seen in this literature has been divided into three periods—Old English (630–1150 A.D.), Middle English (1150–1550 A.D.), and Modern English (1550 A.D. onwards).

The **Old English** Period has been called the Period of Full Endings, because it retains the inflectional endings of its words with their full vowel values (cf. O.E. *drincan*, Mid. E. *drinken*, Mod. E. *drink*). Old English was a highly inflected language, containing four cases, nominative, accusative, genitive, and dative; three grammatical genders, masculine, feminine, and neuter; two noun declensions, strong (with plural in *-as*, or *-a* when feminine) and weak (with plural in *-an*); two adjective declensions, definite and indefinite; two verb conjugations (as to-day), strong (with change of vowel-stem in the past tense) and weak (with addition of a suffix to the stem in the past); and two tenses, present and past. To-day English has entirely lost grammatical gender and adjective declension, and of noun declension keeps only the forms of the nominative singular and plural and the genitive singular; in *whilom*, however, is found a remnant of the dative plural (O.E. *hwilum*), and in *witena-gemot* (meeting

of the wise) of the genitive plural. Old English spelling was, as far as possible, phonetic; the vowels had the sounds of Modern French or German rather than Modern English (*i.e.* *a* as in *father*, *é* as in *they*, *í* as in *élite*, etc.), and *h* in the middle and end of words had the guttural sound of *ch* in Modern German (cf. *ich*). In general sound the language more closely resembled German than Modern English, and many Old English words are much longer than their modern descendants (cf. *fortnight* from O.E. *fēowertinĕniht*). Another peculiarity of Old E., shared with German, but partially lost in Modern English, was the power of forming compound words (*e.g.* O.E. *dæg* (day) gives a compound *dægred* (red day), meaning dawn, which in its turn gives *dægredsang*, meaning dawn-song, *i.e.* morning service). With the coming of Christianity many more Latin words came into English, some ecclesiastical (e.g. *priest, monk, nun, bishop, school, anthem*), some domestic (e.g. *cook, kitchen, dish, fork, cup, kettle*), some names of plants (*lily, rose*), and a few miscellaneous (*turn, offer*). In one point Old English differs from Modern, in that it attempted more to translate foreign terms rather than adopt them whole (e.g. *Exodus* = *Utgang*, the Out-going; *evangelium* = *godspell*, our *gospel* or good news).

In the IX. and X. cent's England was exposed to the attacks of the Scandinavians, who overran the North and Midlands and finally settled down among the English. Their influence upon the language was very great. Firstly, they enriched the Northern and Midland dialects with many Scandinavian words, many of which have crept into standard English; such words are usually (in origin) of legal significance (e.g. *law, outlaw, fellow, crave, hustings, riding, wapentake, husband, thrall*), nautical terms (e.g. *boatswain, steersman*), or forcible, often colloquial, expressions (*ugly, clumsy, smack, bawl, crazy, dumps, egg on, dowdy*). Secondly, they had great influence on the grammatical structure of the Northern dialects. As the English and Scandinavians both spoke cognate languages in which the stems of the simplest words were often alike, to make themselves understood to one another, they would often enunciate the stem of a word without heed to its inflectional endings, and hence the gradual weakening of endings which spread to all dialects after the Conquest. They also simplified the noun declension by practically abolishing the weak declension (except in such forms as *oxen, kine* (from *cow*), *children, brethren*) and making the strong masculine declension the chief declension (cf. O.E. *nama*, gen. sing. *naman*, nom. plur. *naman*, gen. plur. *namena* with Mod. E. *name*, gen. sing. *name's*, nom. plur. *names*, gen. plur. *names'*). One other change in grammar that dates from the Old English Period is the formation of new tenses (future, perfect, pluperfect), with the help of the auxiliaries *sceal* (shall), *will*, and *habban* (have).

In 1066 England fell into the hands of the Normans, and English became a medley of peasant dialects with little or no literature, while French became the language of culture. There were then four main dialects in English: *Northumbrian* or *Northern*, *Mercian* or *Midland*, *West Saxon* or *Southern*, and *Jutish* or *Kentish*. Before the Conquest, West Saxon had been the literary dialect, but in the confusion after 1066 it lost its pre-eminence, and finally, in Chaucer's days, it was the East Midland dialect round London that prevailed and became the ancestor of modern standard English. We still have, however, a few words from other dialects in Modern English: *vixen* (fem. of *fox*) is a southern form of *fixen*, and *left* (hand) and *kernel* are Kentish forms.

In XII. cent. English recovered its literary power, and the **Middle English** Period began. This period is called the Period of Weak Endings, as nearly all inflexional endings were weakened to *e* (cf. O.E. *drincan* = Mid. E. *drinken*). In the XV. cent. this inflexional *e*, when alone, became mute, and hence the modern final mute *e* in such words as *alive, bone*, etc. One great influence that French had was in the introduction of prepositional phrases in place of the cases (e.g. *the son of the king* for *the king's son*), and this, coupled with the gradual loss of inflexions, caused the disappearance of the complicated Old E. noun and adjective declension. After 1200 the language was re-spelt after French methods (*e.g.* O.E. *mūs* became *mouse*, and *mȳs, mice*), and the old phonetic spelling was largely lost. From 1066 onwards the language was flooded with French words, and even French suffixes for word-formation (cf. drunk*ard*, knav*ery*). The words introduced by the Normans refer chiefly to War and Feudalism (e.g. *war, captain, aid, armour, mail, baron, fealty, homage, tenant, vassal*), to Law (*arrest, assize, case, fee, estate, sue, plea*), and the Chase (*chase, brace, forest, covert, sport, venison*). Every English writer of culture, such as Chaucer or Gower, borrowed more words still, such as *courage, comfort, adventure, chamber, folly*, and often the French word would oust its Old Eng. synonym.

About 1550 the **Modern English** Period began. This has been called the Period of Lost Endings, as most of the inflexional endings disappeared during it (cf. Mid. E. *drinken* = Mod. E. *drink*). But the most important change of this period was in the sound of the accented vowels (chiefly when long), which altered from the sounds they still have on the Continent to their present sounds in English (*e.g.* in *mate, hide, but*). The guttural *ch* sound has also disappeared, although represented in spelling (cf. *light*), which, for the language as a whole, has scarcely altered since 1600. The great influence upon English in the XVI. cent. was the Renaissance, or revival of classical learning. This led to many more words being borrowed from Latin and Greek, not through French, but directly. Often it happened that words were thus borrowed which already existed in the language in another form (cf. *balm—balsam*; *challenge—calumny*; *dainty—dignity*). Words also were borrowed, usually through French, from Italian, chiefly terms of war (*attack, cannon, colonel*) or of art (*arcade, balustrade, balcony*), and directly from Dutch, chiefly sea-terms (e.g. *sloop, yacht, reef, rover, deck, hull*) or military terms (e.g. *leaguer, waggon*). One result of the revival of classical learning was the so-called Etymological spelling of some of our Latin words; for instance, because Mid. E. *dout* was derived from Latinian *dubitare* it was spelt *doubt*. During the Elizabethan period English attained a curious verbal flexibility which distinguishes it to-day from other European languages; a word, originally one single part of speech, may be used as any other part of speech (e.g. *clean*, originally an adjective, is an adverb in *clean gone*, a verb in *to clean*, and a noun in *to have a clean*). Many writers after 1600 have enriched English with words of their own coinage: Shakespeare gives us *bare-faced, beguile, dwindle, hint, hurry, lonely*, and phrases like *yeoman's service* and *towering passion*; the Authorised Version of the Bible gives *Babel, helpmate, prodigal* (son), *scapegoat, howling wilderness, eleventh hour*; Milton gives *gloom, pandemonium, impassive, irresponsible*; and Sir Thomas Browne, *hallucination*. In the XVIII. cent. more words were borrowed from French (e.g. *anachronism, anecdote, decadence, suicide*) and from Ital., chiefly musical (*opera, soprano, piano, tenor*). In the XIX. cent. and after, the growth of science and philosophy led to many more words being formed from Latin and Greek, such as *telephone, locomotive, aeroplane, psychology, dogma*.

The chief characteristic of Modern English is not elegance, but terseness and vigour, which renders it the best language for business purposes. The practical side of the English race is shown in the simplicity of its grammatical forms and the logical order of its sentences. It is also seen in the power of converting whole phrases into nouns or adjectives (cf. *It's the man who wrote it's fault*, and *The Adulteration of Food and Drugs Act*). An unpractical side is shown in the archaic and unphonetic spelling, dating from the XVI. cent. Another characteristic of English

which renders it capable of high poetic expression is its wealth of synonyms, arising out of the two languages, Teutonic and Latin, that build up its vocabulary. By means of these synonyms, English more than any other language can differentiate between the emotional and the intellectual idea (contrast the ideas conveyed by *fatherly—paternal*; *motherhood—maternity*; *friendly—amicable*; *holy—sacred*).

Bradley, *The Making of English* (1904); Emerson, *Brief History of Eng. Language* (1896); Jespersen, *Growth and Structure of the Eng. Language* (2nd edit., 1912); Toller, *Outlines of the History of the Eng. Language* (1900); also O.E. dictionaries, readers, etc., by Skeat, Morris, Sweet; and *Oxford Eng. Dictionary*, edit. by Sir James Murray.

ENGLISH LITERATURE.

English literature in its beginnings is associated with the introduction of Christianity. The first known native writer was CÆDMON, a monk of Whitby Abbey (d. 680), but only a fragment of his verse rendering of the Book of *Genesis* remains. It is, however, believed that a considerable oral lit. existed before his days, consisting of heroic legends brought over at the time of the Conquest of Britain by the Angles and Saxons. Some of these were probably reduced to writing in the VII. cent., examples surviving in the epic fragment known as *Widsith*, and the fine poem, *Beowulf*, in which are told the adventures of that hero with the monster, Grendel. The writers of these poems are unknown, and while *Widsith* probably belongs to a period before Cædmon, *Beowulf* is believed to have been written about 700. Bede's *Ecclesiastical History* belongs to the VIII. cent., but was written in Latin. The next considerable writer after Cædmon and the unknown author of *Beowulf*, is Cynewulf (VIII. cent.), who wrote the poems *Christ*, *Elene*, *Fates of the Apostles*, and *Juliana*. These native poets all used an alliterative measure, and wrote in an O.E. northern dialect. The O.E. 'Elegies,' *Deor*, *The Wanderer*, *The Seafarer*, and others, mark a further advance, and though their date of composition is uncertain, it is believed to be not later than the X. cent. To this latter period also belong the two excellent poems, *The Battle of Brunanburh* and *The Battle of Maldon*.

Eng. prose began with the trans. by King ÆLFRED (d. 901) of Latin originals, and the same great king is credited with having commenced the *Saxon Chronicle*. Other later prose writers were Ælfric and Wulfstan. With the exception of these and the *Chronicles* of Peterborough and Worcester, there was little native lit. of merit from the death of Ælfred to about the middle of the XIII. cent., thanks to the troublous times (Danish invasions, Norman Conquest, etc.) through which the country passed. There was indeed the valuable chronicle of Geoffrey of Monmouth (d. 1154), but it was written in Latin. Another writer, however, who claims notice was Layamon (fl. 1200), whose poem *Brut* was derived from Geoffrey's chronicle, and the Anglo-Norman poet Wace. This poem introduced the Arthurian story into Eng. lit.

The Norman Conquest introduced a new language and a new lit., the influence of which was long felt; but though many of the legends and traditions then introduced became incorporated in Eng. lit., there were many others, such as *Havelok the Dane*, *King Horn*, *Guy of Warwick*, which were of native origin, and, though first written in Norman-French, had assumed a vernacular form by the middle of the XIII. cent. From this period to the age of Chaucer (1340-1400) and his contemporaries, though there was a growing lit., there was nothing of outstanding merit, save the exquisite lyric, *Sumer is icumen in* (*c.* 1250), and, perhaps, another lyric, *Alison* (*c.* 1300).

Age of Chaucer.—Fr. influence was still strong in England when CHAUCER produced his *Canterbury Tales* and other poems, but though his subjects were often derived from Fr. sources, his genius transformed all that he touched and gave it distinction and native character. Chaucer was the first of the great Eng. poets, and the most notable literary figure of his age. Several of his contemporaries, however, demand consideration, amongst the most notable being John Gower, who wrote *Confessio Amantis*, William Langland, author of the *Vision of Piers Plowman*, and Laurence Minot, who wrote, in a northern dialect, stirring poems in celebration of the victories of Edward III. To these succeeded three poets of a distinctly Chaucerian type—Lydgate, Occleve, and Stephen Hawes. Eng. prose is represented by the writings of John Wycliffe (1320-84), Sir John Mandeville, and Sir Thomas Malory's *Morte d'Arthur* (1470).

A school of SCOTS poetry came into existence during this period, which was not without its influence on later Eng. lit., the authors including Barbour, Henryson, DUNBAR, and Gavin Douglas. The trans. of *Froissart*, by Lord Berners, commenced to appear in 1523, between which date and the earlier publication of the *Morte d'Arthur*, CAXTON had translated and printed numerous prose romances and other works. Amongst other contributors to the wealth of Eng. prose must be mentioned Sir Thomas More (1478-1535), author of the *History of Richard III.*, and the theological writers and translators, Tyndale, Latimer, Coverdale, and Cranmer.

Elizabethan Age.—Eng. poetry, which had somewhat declined since Chaucer's death, was revived and developed by two young men of noble birth, Sir Thomas Wyatt (1503-42) and the Earl of Surrey (1517-47). They experimented in new measures, and introduced Ital. forms of verse, and so provided the vehicles of expression for later and greater poets. Wyatt introduced the Petrarchian sonnet into Eng. verse; and Surrey, in his trans. of the *Æneid*, appears to have been the first Eng. writer to employ regular blank verse (blank verse lines had appeared in Chaucer's prose 'Tale of Melibee'). Minor poets belonging to this period are Churchyard, Gascoigne, Tusser, and Sackville. The brave and courtly Sir Philip Sidney (1554-86) achieved something approaching greatness in his *Astrophel and Stella* sonnets, and *Arcadia*; and the second great Eng. poet was discovered in his friend, EDMUND SPENSER (1552-99), whose *Faërie Queene* and other poems are amongst the masterpieces of Eng. poetry. Amongst notable prose works belonging to this period may be mentioned Roger Ascham's *Toxophilus* and *The Schoolmaster*, Richard Hooker's *Ecclesiastical Polity*, John Lyly's *Euphues*, Richard Hakluyt's *Principal Navigations*, and the numerous writings of Francis Bacon.

The most dominant feature of Eng. lit. in the age of Elizabeth was the DRAMA (*q.v.*), which began at an earlier period with the Miracle, Mystery, and Morality plays, and which reached its highest development in the hands of SHAKESPEARE. But it may be noted that many of the dramatists of this period also achieved more or less distinction as narrative or lyric poets. Thus Marlowe would be notable if only for his narrative poem, *Hero and Leander*; Ben Jonson, besides being a great dramatist, was the author of *Underwoods* and some of the most exquisite lyrics in the language; George Chapman translated the *Iliad* and *The Odyssey*; and if Shakespeare had never written a single play he would still be a great poet by reason of his incomparable *Sonnets*, his *Venus and Adonis*, and *The Rape of Lucrece*. There was also a considerable body of Elizabethan and early JACOBEAN writers, other than dramatists, who were distinguished as poets, and amongst these may be named Michael Drayton, author of *Poly-Olbion*, *Nymphidia*, etc.; Samuel Daniel, famed for his epistles and sonnets; William Browne, who wrote *Britannia's Pastorals*; the lyric poets, Thomas Campion and Thomas Carew; William Drummond of Hawthornden, the sonneteer and friend of Jonson; and that quaint and crabbed poet, Dr. John Donne, the first of the 'Metaphysical School' (*q.v.*). Several of these poets, as has been

noted, overlap into the Stewart period, but in style and manner they belong properly to the age of Elizabeth.

Age of Milton.—The latter part of the XVII. cent. may be classed as the age of MILTON. Amongst the courtly poets of this time were Wither, Suckling, Waller, and Cowley, and all Milton's own early poetry was written before the outbreak of the Civil War and the overthrow of the monarchy. But the severe rule of the Puritans, who closed the theatres and discouraged all forms of worldly pleasure, made itself felt in the lit. of the period. Milton's poetic masterpiece, *Paradise Lost*, was written in his later years, and not published until 1667, but there were a number of other poets contemporary with him whose seriousness and religious fervour dominated all they wrote. Prominent amongst these were Richard Crashaw, George Herbert, Henry Vaughan 'the Silurist,' and Francis Quarles. Robert Herrick (1591–1674) was, however, a bard of another type. Born in the reign of Elizabeth, he died in the same year as Milton, and his most characteristic work is distinguished by its wit, paganism, and lyric charm.

The note of high seriousness and the spirit of contemplation which distinguished the poetry of the Miltonic period is to be found no less in the prose. Milton himself, besides being one of the greatest of Eng. poets, was a distinguished prose-writer. To this time also belong Izaak Walton's *Lives* and *The Compleat Angler*, Burton's *Anatomy of Melancholy*, Sir Thomas Browne's *Religio Medici*, and the masterly productions of Hobbes, Jeremy Taylor, Clarendon, and numerous others.

Age of Dryden and Pope.—The licentiousness of Eng. society in the period succeeding the Restoration introduced a decadent spirit into lit., yet it is worthy of remark that England's greatest epic, *Paradise Lost*, was published seven years after the Restoration. The most dominant figure in the country's literature of this period was DRYDEN, who was forty-three years of age when Milton died, and whose first considerable poem was his *Stanzas on the Death of Oliver Cromwell* (1658). Had Dryden lived in any other period than that in which he did, he would doubtless have left the world his debtor by a much larger body of fine poetry; for the exigencies of his life compelled him to pander to the depraved taste of his age, and his work for the stage constitutes the larger part of his output. This, notwithstanding his contribution to England's poetical lit., was very considerable, and the masculine vigour of his lines has secured for him an honoured niche in the Temple of letters. Other poets of this time who cannot be overlooked were Prior, Marvell, and Samuel Butler, the author of *Hudibras*. But though the output of poetry was somewhat meagre, the harvest of prose was singularly rich, and includes the works of such various writers as Sir William Temple, John Locke, Gilbert Burnet, Jeremy Collier, Isaac Barrow, Richard Baxter, George FOX, John Bunyan, and the diarists, John Evelyn and Samuel Pepys.

POPE (1688–1744) was destined to be the natural successor of 'glorious John,' as the elder poet has been called. The heroic couplet, however, in the hands of Pope, lost the vigour which had distinguished it when employed by Dryden, but what it lost by effeminacy it perhaps gained in wit and polish. In other words, the satire of Dryden might be compared to the stroke of a broadsword; that of Pope to the thrust of a rapier. Other poets contemporary with Pope were James Thomson (1700–48), author of *The Seasons*; Thomas Gray (1716–71), of 'Elegy' fame; and William Collins (1721–59), whose odes are amongst the best in the Eng. classic style. Like the age of Dryden, that of Pope witnessed the production of many prose masterpieces. These include the satirical writings of SWIFT; the essays of Steele and Addison; the theological and critical works of Bentley and Joseph Butler; the philosophical writings of Berkeley; and the voluminous output of Defoe, the father of the Eng. novel.

Age of Johnson.—The next period of importance includes, besides the various writings of the great lexicographer, SAMUEL JOHNSON, the works of Edmund Burke and Oliver Goldsmith, and the novels of Fielding, Smollett, Richardson, and Sterne. Two poets of eminence, William Cowper (1731–1800) and George Crabbe (1754–1832), form a connecting-link between the XVIII. and XIX. cent's. The poetry of the former is distinguished by a gentle domesticity; that of the latter by a stern and rugged realism.

Daniel Defoe has been referred to as 'the father of the ENG. NOVEL.' It is true there had been fantastic 'romances' pub. in England long before the days of Defoe, but they were chiefly adaptations from foreign sources, and were not by any means 'novels,' as we now understand the word. Defoe was a journalist and pamphleteer by profession, and not until he was nearly sixty did he first turn his attention to fiction, and write his masterpiece, the picaresque yet moral story, *Robinson Crusoe* (1719–20). It was followed by his other autobiographical stories, *Captain Singleton*, *Moll Flanders*, and *Colonel Jacque*. Samuel Richardson (1689–1761) was over fifty years of age when his first novel, *Pamela*, appeared; this, together with its two successors, met with much appreciation. Richardson understood female character, but his men were not drawn with so firm a hand. FIELDING (1707–54) began his *Joseph Andrews* as a burlesque of *Pamela*, but he was a writer of too original genius to remain content with parody, and the completed work failed in its earlier intention. In *Tom Jones* he produced a far greater work, which is generally considered his masterpiece. He was a more vigorous writer than Richardson, and drew both men and women equally well. Smollett (1721–71) was a novelist of coarser fibre. He gave the flesh-and-blood sailor to Eng. fiction; he drew largely on the adventurous element; but he is often unpleasantly coarse. Lawrence Sterne (1713–68), by virtue of his *Tristram Shandy* and *Sentimental Journey*, has secured a place among the great novelists. After these came several writers of fiction who can be but named—Horace Walpole, Clara Reeve, Mrs. Radcliffe, 'Monk' Lewis, Henry Mackenzie, Robert Bage, and Fanny Burney. Maria Edgeworth's first novel appeared in 1800; Jane Austen's in 1811; Sir Walter Scott's in 1814; and Susan Ferrier's in 1818. See NOVEL.

XIX. Century.—In poetry a period of transition from the artificial style of the XVIII. cent. was reached in the works of Cowper and Crabbe. The next dominating influence was that of Robert Burns. Like Shakespeare, BURNS borrowed not a little from his predecessors. He owed much to Robert Fergusson and Allan Ramsay. But what he borrowed he subsequently made his own. His sturdy individuality and close kinship with nature paved the way for WORDSWORTH, who became the high-priest of Nature in all her moods. Of Southey little need be said. The great body of his verse is forgotten, but he lives deservedly by his fine prose and a handful of lyrics. Thomas Campbell (1777–1844) gave to Eng. lit. a few poems which will not readily be forgotten; and the same may be said of Chatterton and Blake. The XX.-cent. desire for realism has led to Blake's being hailed as 'The English Nietzsche.' *The Ancient Mariner*, *Christabel*, and a few other poems by COLERIDGE are amongst the greatest treasures of Eng. poetic lit. SCOTT'S romantic poems marked an epoch in Eng. literary history, but his fame will rest almost entirely on the *Waverley Novels*. The arrogant and tempestuous genius of Lord Byron drove Scott from the field of poetry, and though Byron's influence in lit. and society lasted long after his death, it was subsequently effaced in England, though there have been gleams of a revival of appreciation. SHELLEY and KEATS belong to the highest order of lyrical poets, and conquer by sheer beauty of form and expression. It is extremely unlikely that the exquisite quality of their work can ever lack admirers. TENNYSON, who succeeded Wordsworth as poet-laureate, began as an

imitator of Byron and Keats, but he quickly assumed a strong and unassailable position in poetry. His refined lyrical accomplishment, and his close interest in the affairs of his time, secured for him an extensive popularity. The sad and thoughtful note of Matthew Arnold's poetry made a deep appeal, and the excellence of his craftsmanship has been generally admitted. ROBERT BROWNING had to wait long for popular recognition. But, notwithstanding the depth and sincerity of his work, the grotesqueness and cragginess of his style must ever militate against his success with the general reader. The poetry of his wife, Elizabeth Barrett B., though of a more generally intelligible type, is often disfigured by careless workmanship and outrageous rhymes. The gentle piety which distinguishes the poetry of Christina Rossetti supplied a want of the time, and met with its due meed of appreciation. The work of Dante Gabriel Rossetti, William Morris, and SWINBURNE may be classed together. Though the general high quality of their writings is indisputable, the remoteness in choice of subject is such as can appeal only to the cultured reader.

The modern essay has been finely cultivated by Leigh Hunt, Lamb, Hazlitt, and De Quincey; history by Gibbon, Macaulay, Hallam, Milman, Freeman, Kinglake, Gardiner, Froude, and Green; art, criticism, philosophy, economics, and sociology by Hume, Carlyle, Ruskin, Arnold, Pater, and many others.

Sir Walter Scott, who was the founder of the Eng. historical novel, issued his last story in 1831. He had found a sedulous, though somewhat dull, imitator in G. P. R. James, who was already in the field, and met with considerable success. Lytton and Beaconsfield both published their first novels in 1827; and Captain Marryat the earliest of his sea-stories in 1829. After Scott, the next writers to give distinction to Eng. fiction were DICKENS, whose *Pickwick Papers* appeared in 1837; and THACKERAY, who, though only one year the junior of Dickens, did not achieve much success until the publication of *Vanity Fair* in 1847. After these came a group of women novelists of eminence—the Brontës, George Eliot, and Mrs. Gaskell. It is impossible even to mention by name in this place the many writers who were once highly popular, but it may be observed that Anthony Trollope, Charles Reade, Charles Kingsley, and, perhaps, Wilkie Collins have still their admirers. Robert Louis Stevenson combined fine style and imagination. George Meredith and Thomas Hardy have created new schools of fiction, and there is at present no evidence to suggest the possibility that their best work will be surpassed, or even equalled, in the immediate future.

XX.-cent. English lit. shows the contest between romance and realism in poetry, fiction, and drama, witness, *e.g.* Rudyard Kipling. The cult of realism has led to the identification of lit. pure with sociology and politics. This is seen in the works of Hardy (to some extent), H. G. Wells, G. B. Shaw, and Arnold Bennett. See also SCOTLAND: *Literature*; UNITED STATES: *Literature*.

Saintsbury's *Short History of English Literature*; Craik's *Manual of English Literature*; also other histories by Taine, Gosse, Stopford Brooke, and Andrew Lang (1912); *Cambridge History of English Literature*, edit. by Ward and Waller (1907, *sqq.*); brief *History of English Literature*, by Compton-Rickett (People's Books, 1912; with Bibliography); Chambers's *Cyclopædia of English Literature*.

ENGLISH LAW.

The roots of England's present legal system lie far in the past. Anglo-Saxon laws are closely akin to those of the Continent. Though Scandinavian, and with the Norman Conquest, Frankish elements entered in, yet Celtic influence both in England and in Scotland was very slight, so that Eng. law can be considered as a distinctly native as well as Teutonic thing. William I. determined that if possible England should not become over-feudalised and decentralised—hence that famous compilation known as *Domesday Book*. The so-called *Leges Henrici Primi* are a compilation from earlier sources; in the XII. cent. the book of Ranulf Glanvill is important; this developed the system by which legal action might be taken through one of a number of formulæ. The study of Rom. law underwent a great revival in Europe. Rom. and Canon Law were studied at Oxford; the latter became the Church law for England, and in conflict with secular Eng. law gave rise to quarrel of Henry II. and Becket. Two other documents of this age are important: *The Dialogue of the Exchequer* and Bracton's note-book. Although *Magna Carta* was, in form, a 'grant' by the king, its place in Eng. legal history is prominent, not only for what it directly accomplished, but for its significance in later controversies.

The reign of Edward I. is of fundamental importance for Eng. law and constitution. The foundation was laid on which later cent's were to build. Edward's legislation, though sometimes 'harking back' to earlier times, anticipates much later legislation. Few important developments took place between XIII. cent. and the Tudor age. Though it occurred to some then to remodel Eng. law on a Rom. basis, there was nevertheless a revival of Eng. mediæval law. During the Stewart period Edward Coke, John Selden, and William Prynne defended ancient Eng. privileges against royal encroachments. During XVIII. cent. a large amount of legislation was passed; much now done by the executive was then attempted by direct legislation. The *Commentaries* of William Blackstone, pub. 1765, are another of the important series of famous Eng. law works; the radical Bentham was destructive in spirit, but he inspired the reform legislation of Romilly and Brougham. The XIX. cent. has seen much important legislation, and, among legal changes, the union of old courts with the new Supreme Court of Judicature.

Judicature.—Minor cases are tried by petty sessional courts, consisting of at least two justices of the peace; more important cases are reserved for the assizes, held quarterly in provincial towns, and the Central Criminal Court, which, besides judges, have a jury consisting of residents in district where case is tried, from 12 to 23 in number. The Court of Criminal Appeal (1907) may reconsider appealed cases but does not retry them. The Royal Prerogative, exercised through the Home Secretary, may secure a reprieve for a condemned criminal. Separate courts are established for the City of London. The Court of Chancery deals with certain civil cases beyond the power of circuit courts.

Pollock and Maitland, *History of English Law*; and other works by Maitland.

ENGLAND, CHURCH OF, a term meaning not simply Eng. Christianity but the **Anglican Church**, which is peculiar in England and to England. Its story cannot be separated from Eng. history. The beginnings of Eng. Christianity are obscure, but it is probable that Rom. missionaries came in with the Rom. soldiery in the II. cent. A native CELTIC CHURCH arose, which was swept away by the Anglo-Saxon invaders in the V. cent., except in Celtic parts of Britain. (For Celtic Christianity, see PATRICK, ST.; COLUMBA, ST.; etc.) Christianity was reintroduced into Britain by St. Augustine in 597, but the progress of the faith was gradual. The newly founded Church had also to reckon with the remnants of the ancient Celtic Churches, but Celtic tradition gradually gave in to the Roman in the observances of Easter and other matters. The pre-Norman Church was a glorious one, and produced saints and scholars—the greatest the Venerable Bede.

At the Norman Conquest the Eng. Church entered more into the main stream of Western Christianity, and was very similar to the rest of the Churches under the sway of the Roman See. Continual strife between Church and State took place over the Church Courts.

A climax was reached in the quarrel between Henry II. and St. Thomas Becket. The XIV. cent. saw the beginning of LOLLARDY, led by John Wycliffe—a heretical movement which became mixed with schemes of social reform. A strong anti-clerical feeling had grown up as a result of the ecclesiastical abuses of the day, and anti-papal legislation was passed. Lollardy was suppressed, but it smouldered, and with the advent of the New Learning and the outbreak of the Continental REFORMATION a new era dawned.

The changes which took place in England under Henry VIII., the throwing off the papal power and nationalising of the Church, the thoroughgoing Protestantism of Edward VI., the reaction under Mary, and the Elizabethan *via media*, show the intimate relation of Church and State in England. The exact importance of the change which took place at the Reformation has been the object of fierce controversy, but it cannot be denied (1) that the amount of change was considerable, many, though not all, of the characteristics of the mediæval Church were modified; (2) that since then the ANGLICAN CHURCH has been isolated in Christendom, holding a position which to some seems Catholic, to others Protestant.

In the XVII. cent. came the PURITAN movement, which entered the political sphere in the Civil War and Commonwealth; the Restoration, followed by the permanent separation of NONCONFORMISTS, began the modern condition of religious life and parties in England.

The XVIII. cent. was a time of comparative though not of absolute stagnation, until the METHODIST REVIVAL at its close; though this started within the bounds of the Church it soon passed outside it. In the XIX. cent. came the OXFORD MOVEMENT, which, carrying the revival of religious life into other channels than Evangelicalism, revived Catholic faith and tradition, reintroducing many practices that had been obsolete since the Reformation. This has produced the modern *Anglo-Catholicism*, in which sometimes the doctrinal side, sometimes the ritual, is stressed. Thus a type of Christianity has been produced which has no parallel elsewhere, save in the daughter churches in English-speaking countries.

The doctrinal standard of the **Church of England** is the *Book of Common Prayer*, as last revised in 1662, and any changes have to be sanctioned by Parliament. The Church is represented in the House of Lords by the archbishops of Canterbury and York, and most of the bishops of England and Wales. The Church of Ireland was disestablished in 1871. A Bill to disestablish the Church of Wales passed the House of Commons, 1913, but was rejected by the Lords. It is important to remember that the Church of England is the mother-Church of a large Anglican communion existing throughout the Brit. Empire. Convocation, which had not met for more than a century, was re-established in 1852, and has done much for the Church.

Gee and Hardy, *Documents illustrative of Eng. Church History*; Wakeman, *History of the Church of England*; Canon Masterman, *Church of England* (1912: People's Books).

ENGLEFIELD, SIR FRANCIS (*c.* 1520–96), R.C. adherent of Queen Mary; supported persecution; went abroad, 1539; plotted against Elizabeth; attainted and estates forfeited, 1585; lived in Rome, Netherlands, and Spain.

ENGLEHEART, GEORGE (1752–1829), Eng. miniature artist; rival of Cosway.

ENGLEWOOD (40° 53′ N., 73° 58′ W.), town, New Jersey, U.S.A. Pop. (1910) 9924.

ENGLISH CHANNEL, narrow sea, between England and France; joins North Sea at Strait of Dover—its narrowest part (*c.* 21 miles), and, owing to chalk ridge, also its shallowest (12–13 fathoms); stretching W., joins Atlantic between Scilly Isles and Cape Ushant. Area is *c.* 23,900 sq. miles; length, *c.* 350 miles; average breadth, over 70 miles; highest tide, 42 ft. at St. Germain. Cliffs and lowlands alternate on both coasts; Eng. coast extends from Strait of Dover to Land's End. Only important river it receives is Seine, from France. In E. C. are Isle of Wight and Channel Islands (*q.v.*). Chief seaports are (in England) Falmouth, Plymouth, Southampton, Portsmouth, Brighton, Newhaven, Hastings, Folkestone, Dover; (in France) Cherbourg, Le Havre, Dieppe, Boulogne, Calais. E. C. is called in French *La Manche* (the sleeve), owing to its shape. A proposal to construct a *Channel Tunnel* was made in France in 1856, and several other schemes to avoid the sea-passage have been mooted since. Captain Webb swam the E. C. in 1875; Burgess in 1911. Blériot was the first to fly the E. C., July 1909.

ENGLISHRY, LAW OF, legal term used under the Norman kings referring to proof of Eng. birth. If a man was slain, unless he was proved to be Eng., the *hundred* was compelled to pay a fine or produce the murderer.

ENGRAVING.—(1) The art of designing or cutting inscriptions on stone, wood, or other hard substance. (2) A method of reproducing designs and pictures by printing from metal plates or wood blocks upon which the design has been cut, or, as is now general in the case of the former, mechanically produced by photography and corrosion with acid. The design appears on the plate or block either in incised or in raised lines; and for printing, in the former case the plate is wiped clean after being inked, leaving the ink only in the cut lines, while in the latter the raised parts of the plate only are inked.

Singer, *Etching and Engraving* (1897); Herkomer, *Etching and Mezzotint Engraving* (1892).

ENGROSS, to buy up goods so as to make a 'corner' in the market; criminal offence in Britain until 1844.

ENGYON, former town, Sicily; site unidentified.

ENID (36° 23′ N., 97° 53′ W.), city, Oklahoma, U.S.A. Pop. (1910) 13,799.

ENKHUIZEN (52° 42′ N., 5° 17′ E.), port, Holland, on Zuider Zee; has interesting churches. Pop. (1910) 7748.

ENNIS (52° 51′ N., 8° 59′ W.), town, County Clare, Ireland. Pop. 5093.

ENNISCORTHY (52° 31′ N., 6° 33′ W.), town, County Wexford, Ireland. Pop. 5458.

ENNISKILLEN, INNISKILLING (54° 21′ N., 7° 38′ W.), town, County Fermanagh, Ireland; successfully resisted James II.'s forces, 1689; famous Dragoon regiment was originally enlisted here. Pop. 5412.

ENNIUS, QUINTUS (239–170 B.C.), one of earliest Latin poets; celebrated as author of the *Annales*, a narrative poem on Rom. history; and a number of tragedies, of which only fragments have been preserved; the father of Rom. epic poetry.

ENNODIUS, MAGNUS FELIX (474–521), bp. of Pavia; wrote an apology for Pope Symmachus and other theological works, being the first to call the Rom. bp. 'papa'; theologically he was *semi-Pelagian*.

ENNS (48° 13′ N., 14° 29′ E.), town, Upper Austria. Pop. (1910) 4436.

ENOCH, in *Genesis*, son of Cain, and also descendant of Seth. There are two Books of Enoch (*q.v.*).

ENOCH, BOOKS OF.—There are two pseudepigraphic works with this name: the more important is the *Ethiopic Book of Enoch*; it is quoted in *Jude* 5^{14}, etc., and may be the source of eschatological colouring of *Matthew* 19^{28}. Its influence on early Christian and late Jewish lit. was considerable. It gradually was forgotten, and lost till the Ethiopic version was discovered in 1773. Its original language was either Hebrew or Aramaic, but which uncertain. It is certainly composite, and the division of it by R. H. Charles probably as near the mark as any. Chapters 72–82 he assigns to before 130 B.C., 83–90 before 161 B.C., 91–104 to 134–95 B.C., 1–36, a very composite part, earlier than 166 B.C., 37–71 (wherein occurs a remarkable passage in which the Messiah is pre-existent Son of Man) before 64 B.C. *The Book of the Secrets of Enoch*

(written partly in Gk., possibly some in Hebrew) exists only in Slavonic trans., written by a Hellenistic Jew in Egypt, 30 B.C. to 70 A.D.

Charles, *The Book of Enoch, The Book of the Secrets of Enoch.*

ENOS (40° 42′ N., 26° 5′ E.), town, Adrianople, European Turkey. Pop. *c.* 7500.

ENRIQUEZ GOMEZ, ANTONIO (d. 1661), Span. poet, dramatist, and novelist.

ENSCHEDE (52° 13′ N., 6° 53′ E.), town, Overysel, Holland. Pop. (1910) 34,201.

ENSENADA, CENON DE SOMODEVILLA, MARQUES DE LA (1702–81), chief minister in Spain, 1743; carried out various reforms; exiled, 1766.

ENSIGN, national, military, or naval flag or banner; also, until 1871, the officer of a regiment who bore the colours (*q.v.*). The word is now chiefly applied to a naval flag. See FLAG.

ENSILAGE, preservation of cattle fodder, such as hay, in an airtight and watertight chamber (*silo*), in which it undergoes partial fermentation.

ENSTATITE, green mineral of pyroxene group; a silicate of magnesium containing iron oxide and alumina.

ENTABLATURE, term in arch. which includes the architrave, frieze, and cornice.

ENTAIL (Fr. *tailler,* to cut), an estate settled according to the rule of descent, *i.e.* limited to a person and the heirs of his body, general or special, male or female. It is a freehold of inheritance. See FEE.

ENTEBBE, see BRIT. E. AFRICA (UGANDA).

ENTENTE CORDIALE, term used to denote friendly relations between France and Britain; mainly due to Edward VII. and Loubet, Fr. pres.; Anglo-Fr. agreement, signed April 1904, solved many differences; has since been extended to Russia; acts as offset to Triple Alliance (Germany, Austria, Italy).

ENTERIC, see TYPHOID FEVER.

ENTERITIS, inflammation of intestines.

ENTHYMEME, syllogism (*q.v.*) in which either a premise or the conclusion is omitted; the commonest form of syllogistic arguments in daily life. See LOGIC.

ENTOMOLOGY (Gr. *entomon,* an insect; *logos,* subject), the science which comprises all the branches of knowledge connected with Insects. The richness of the insect world, with its 250,000 species, renders e. one of the most important of the many branches into which Zoology is divided; and its importance is further increased on account of the harmful activities of many kinds of insects. The study of insect pests is generally termed Economic Entomology.

ENTOMOPHILY, see POLLINATION.

ENTOMOSTRACA, a comprehensive name, under which are generally grouped the more elementary orders of Crustacea (*q.v.*), minute creatures living in fresh water or in the sea, and distinguished by the simplicity of their structure. These lowly Crustaceans follow four types:—

(1) THE PHYLLOPODA (Gk. *phullon,* a leaf; *pous,* a foot), including Brine-shrimps, Shield-shrimps, and Water-fleas, with body protected by a shield-like shell, and with swimming feet bearing leaf-like respiratory plates. Mostly inhabitants of fresh water.

(2) THE OSTRACODA (Gr. *ostrakodes,* shell-like), small forms, mostly microscopic, common in fresh water and the sea. They are completely enclosed in a double-valved shell.

(3) THE COPEPODA (Gr. *kope,* an oar; *pous,* a foot), mostly minute Crustaceans occurring in fresh water and in the sea. The shell-less body is usually in distinct segments, except in many degenerate forms; parasitic on the skin or gills of fishes, such as the Fish-lice.

(4) CIRRIPEDIA or THYROSTRACA (Lat. *cirrus,* a tuft of hair; *pes,* a foot) include the Barnacles and the Acorn-shells. They are, when adult, sessile Crustacea with body protected by strong limy plates.

ENTRAGUES, CATHERINE HENRIETTE DE BALZAC D', MARQUISE DE VERNEUIL (1579–1633), was mistress of Henry IV. of France; notorious for her complicity in political intrigues.

ENTRE MINHO E DOURO (41° 30′ N., 8° 20′ W.), old province, Portugal, bordering on Atlantic; area, 2790 sq. miles. Cereals, fruits, wine; stock raised. Pop. 1,170,361.

ENTRE RIOS (*c.* 30° 20′ S., 59′ W.), province, Argentina, S. America; area, 28,784 sq. miles; rivers, Uruguay, Parana; produces cereals; stock raised. Pop. (1910) *c.* 416,000.

ENTRECASTEAUX, JOSEPH-ANTOINE BRUNI D' (1739–93), Fr. navigator; famed for his surveys of New Caledonia, Tasmania, and other coasts.

ENVIRONMENT, see EVOLUTION, EUGENICS.

ENVOY, diplomatic minister inferior to ambassador (*q.v.*); full title is *e. extraordinary and minister plenipotentiary.* See DIPLOMACY.

ENZELI, seaport of Resht (*q.v.*).

ENZIO (d. 1272), king of Sardinia; hero of many brilliant military exploits in Italy; captured by the Bolognese (1249), in whose hands he remained prisoner until his death.

ENZYME, see FERMENTATION.

EOBANUS, HESSUS HELIUS (1488–1540), Latinised name of Ger. humanist of Hesse-Cassel; his Lat. letters and poems were much esteemed.

EOCENE (Gr. *eos,* dawn; *kainos,* recent), name given by Sir C. Lyell to lowest and oldest members of rocks of Tertiary period; contain what Lyell considered first traces of testaceous fauna. He classified the Tertian formations according to proportion of fossil remains that each contained. E. rocks are divided into Lower, and Upper or *Oligocene*; composed of clays, loams, marls, and calcareous sandstones, whilst here and there are interspersed layers of a thick and widespread series of limestones and lignite; and found chiefly in the Isle of Wight, S.E. England, on both sides of the Mediterranean, Central Europe, Spain, West Africa, and along the Atlantic coast of N. America. Their characteristic feature is the great size coupled with the wide distribution of *Nummulites*—a forminifera organism which apparently flourished in the Eocene seas in vast numbers.

During the E. period there grew in England such plants as laurel, fern, and cactus, and trees such as palm, fig, pine, cypress. Otodus lamna, carchardon, and other sharks were numerous, whilst traces remain of such mollusca as conus, voluta, oliva, and nautilus. Reptiles include crocodiles, lizards, and a few large snakes and turtles. There were several early forms of present-day birds, including the eagle, flamingo, gull, heron, owl, pelican, plover, quail, and vulture. Animals were represented by such orders as Dinocerata and Tillodonts. See GEOLOGY.

EON DE BEAUMONT, CHARLES GENEVIÈVE LOUIS AUGUST ANDRÉ TIMOTHÉ D' (1728–1810), Fr. adventurer; for many years wore woman's dress; diplomatic agent to Russia; in exile, 1765–77; after Revolution lived in England.

EOS, see AURORA.

EÖTVÖS, JOZSEF, BARON (1813–71), Hungarian writer and politician; composed plays to aid reform movement; Minister of Public Instruction, 1848; wrote *The Influence of the Predominant Ideas of the Nineteenth Century upon the State*; advocated popular education and religious freedom; wrote memoirs.

EPACT, see CALENDAR.

EPAMINONDAS (*c.* 418–362 B.C.), Theban general; expelled Spartan garrison, 379 B.C.; defeated Spartans at Leuctra, 371, and Mantinea, 362; did much for Thebes politically, and developed military strategy.

EPAULETTE, distinctive shoulder ornament on military and naval uniform coats; still worn by certain officers in Brit. navy, but discarded in Brit. army since 1855.

ÉPÉE, CHARLES-MICHEL, ABBÉ DE L' (1712–89), Fr. ecclesiastic; famed for work as a deaf and dumb educationist.

EPEIRA, see under SPIDERS.

EPERJES (49° N., 21° 17′ E.), town, Hungary; has Gothic cathedral. Pop. 13,098.

ÉPERNAY (49° 3′ N., 3° 57′ E.), town, Marne, France; champagne centre. Pop. 20,291.

ÉPERNON (48° 37′ N., 1° 39′ E.), town, Eure-et-Loir, France.

EPHEBEUM, hall for the exercise of youths in ancient gymnasiums.

EPHEBI, class of young men in ancient Athens who formed a sort of univ.; they were aged 18 to 20 and under state supervision; institution lasted till III. cent. A.D.

EPHEMERIDÆ, see MAY-FLIES.

EPHESIANS, EPISTLE TO THE, is usually grouped with Epistles to *Colossians*, *Philippians*, and *Philemon*, as the Epistles of the Imprisonment. Its tone is somewhat different from the earlier Pauline Epistles; its eschatology is more spiritual, emphasis is laid on Church and family life; the interpretation of the person of Christ and the writer's conception of faith, love, and knowledge are allied to St. John. Some have thought it to be by another hand than St. Paul's, but now the trend of criticism is favourable to genuineness. If genuine it must have been written at either Cæsarea or Rome, probably Rome. The words, 'in Ephesus,' in chap. 1[1] are doubtful, so it may be a circular letter. In any case St. Paul's style and theology are here more developed; external evidence for it (Marcion and Muratorian Canon) is fairly good.

J. Armitage Robinson, *The Epistle to the Ephesians.*

EPHESUS (*c.* 37° 57′ N., 27° 20′ E.), ancient Ionian city, in Lydia; chief of twelve on coast of Asia Minor; traditionally founded by Carians and Leleges, and taken by Androclus at time of Ionian migration; on N. side of city there was formerly a lake (now a marsh) constituting an inner harbour, outer harbour being formed by mouth of Cayster (the deposits from which were E.'s ultimate ruin).

A little S. of E., on a plain bounded by two hills, stood famous *Temple of Diana* of the Ephesians, built by Chersiphron (a Greek) in VI. cent. B.C. and burnt ('tis said) by Herostratus (to perpetuate his own name) on night of Alexander the Great's birth (Oct. 356 B.C.); restored later, but destroyed by Goths, and only traces of foundations now remain (excavated since 1863); once one of the world's seven wonders, and probably largest Gk. temple ever built. Other buildings of which a few ruins are left are the Agora theatre, odeum, stadium, gymnasium, temples of Zeus Olympius and Julius Cæsar. E. was conquered in turn by Crœsus, Persians, Macedonians, and Greeks; flourished when other Ionian cities were decaying; capital of province of Asia under Romans, and by far the greatest city in Asia Minor; conspicuous also in early Christian history (witness St. Paul's Epistle and Council of E.). E. is now a magnificent village.

Hogarth, *Excavations at Ephesus* (1908).

Third Œcumenical Council of E., opened (431 A.D.) under presidency of Cyril of Alexandria, with 160 bp's present; condemned the Nestorian heresy, that Christ had two persons besides two natures; Nestorius himself was excommunicated.

EPHOD (Hebrew word, meaning *unknown*), in the 'Priestly Code' is part of the high-priest's official costume; it covered the front, possibly too, the back of the body. It was probably an ancient relic of the cult of Jahweh; may have been originally a loin cloth, and used in divination. The prophets objected to it.

EPHOR, name of five magistrates of ancient Sparta who became important in VII. cent. B.C.; in some ways they could override the kings; e's were abolished by Cleomenes III. *c.* 230 B.C.

EPHORUS OF CYME (*c.* 400–330 B.C.), Gk. historian; wrote universal history (29 books) and other works; style very rhetorical.

EPHRAEM SYRUS, ST. (b. *c.* 300), the most famous father of the Syrian Church of IV. cent.; at Council of Nicæa; went to Edessa, then centre of Syriac culture. An ascetic, he devoted himself to writing and teaching. His works, consisting of hymns, homilies, sermons, and commentaries, were written in Syriac. Many are thus preserved, others only in Gk., Lat., Armenian, and Slavonic translations.

Burkett, *Early Eastern Christianity.*

EPHRAIM, Israelitish tribe (named after the younger s. of Joseph), dwelling in the central portion of Canaan. Within its territory were Shechem, Samaria, and Shiloh.

EPIC, THE, EPOS, the highest and most dignified form of narrative poetry, usually dealing with great events of past times (hence also called *Heroic*). The *Iliad* and *Odyssey*, attributed to Homer (VIII. cent. B.C.), are usually regarded as the first epics, but epic stories were undoubtedly repeated orally long before being reduced to writing. Amongst later Gk. epic writers were Parmenides and Empedocles. The earliest Latin epics were written by Nævius and Ennius. These were followed by the greatest of Rom. epics, the *Æneid* of Vergil (70–19 B.C.). Later epic poets of eminence were Lucan and Statius. Other famous epics are *Beowulf* (Old Eng.), the *Chanson de Roland* (mediæval Fr.), *Nibelungenlied* (Teutonic), the *Mahâbhârata* (Ind.), Tasso's *Jerusalem Delivered*, Ariosto's *Orlando Furioso*, Dante's *Divina Commedia*, Camoen's *Lusiads*, Milton's *Paradise Lost*, Spenser's *Faerie Queene.* Among mock-epics may be instanced Butler's *Hudibras.* See also BURLESQUE.

Ker, *Epic and Romance* (1897); MacNeile Dixon, *English Epic and Heroic Poetry* (1912).

EPICHARMUS (d. 450 B.C.), Gk. comic dramatist; b. Cos; celebrated writer of the Dorian school, many of whose subjects were drawn from the Sicilian life of his day; survives only in fragments; highly esteemed by Plato.

EPICTETUS, Stoic philosopher of the I. cent. A.D.; a slave in Rome, afterwards freed. When Domitian expelled the philosophers from Rome he settled and taught in Epirus. His philosophy was predominantly ethical and religious, its main tenets being the care of God for man, the indifference of all social distinctions, and the dependence of man's happiness upon his will.

EPICURUS AND EPICUREANISM.—EPICURUS (341–270 B.C.), though an Athenian, was probably b. in Samos. In 307 he settled in Athens, and there formed a society of friends, whose central meeting-place was a garden in the town. The decay of the free city-state naturally led to concentration of thought upon the interests of the individual and to separation of ethical from political theory. The ethical doctrine of E. was hedonistic: welfare consists in pleasure and in pleasure alone. But, unlike the Cyrenaics (*q.v.*), he urged his friends to have regard, not only to the pleasant moment, but to the pleasure of life as a whole; to estimate, therefore, the pleasures of the mind and of friendship above those of the body; and to prefer calm to violent excitement. Far from being 'epicures,' the members of the society (at any rate in its earlier days) led a frugal and abstemious life. In physics E. maintained a crude form of atomism; in metaphysics a crude materialism, with which he inconsistently combined a belief in freedom of the will.

Lucretius, *De Rerum Natura* (trans. by H. A. J. Munro); R. D. Hicks, *Stoic and Epicurean*; W. Wallace, *Epicureanism*; Zeller, *Stoics, Epicureans, and Sceptics.*

EPICYCLE, see ASTRONOMY.

EPICYCLOID, curve generated by a point on the circumference of a circle rolling externally on a fixed circle, both circles being in the same plane. Curve has n cusps if radius of fixed circle is n times that of rolling one.

EPIDAURUS, name of two ancient Gk. cities.—(1) EPIDAURUS THE HOLY, city on E. coast of Argolis, with natural harbour in N. and open bay in S.; possessed fertile territory surrounded by sea and hills;

origin ascribed to Carian colony; later occupied by Ionians, then by Dorians. Objects of interest include: image of Athena in Acropolis; shrine of Aphrodite; temples of Dionysus, Artemis, and Hera. The *Hieron* (Sanctuary) of Asclepius, 8 miles inland, an ancient place of pilgrimage for the sick, has been excavated, and precincts (with magnificent theatre, stadium, baths, gymnasium, and hospital) have been cleared; sacred road from E. lined with tombs. (2) EPIDAURUS THE HUNGRY, city of Peloponnesus, E. coast of Laconia; founded by (1), and abandoned in Middle Ages; now in ruins.

EPIDEMIC, any disease affecting for a time numbers in one locality, *e.g.* measles, smallpox, diphtheria, scarlet fever, whooping-cough, influenza. **Endemic Disease** is one continually present in a district, *e.g.* cholera in parts of India.

EPIDERMIS, see SKIN.

EPIDOTE, mineral of same group as garnets, composed of silica and alumina; partially transparent and of foliated or granular structure; colour: green, grey, or yellow, usually, but some varieties red or black; found in Scotland and many other localities associated with gneiss.

EPIGASTRIUM, a division of abdomen (*q.v.*); the pit of the stomach.

EPIGONI (classical myth.), descendants of the Seven against Thebes who, ten years after the death of their fathers, marched against Thebes and destroyed the city.

EPIGRAM, the terse and happy expression, in prose or verse, of a single thought or subject; usually accentuated in verse by a striking conclusion. The Greeks and Latins (especially Catullus and Martial) were famous epigrammatists; and in modern times the French, Germans, and English and other nations have cultivated the art. Pope, in particular, was celebrated for his epigrams in verse.

Dodd, *The Epigrammatists.*

EPIGRAPHY, the classification and elucidation of inscriptions.

EPILEPSY, term applied to a nervous affection, characterised by sudden spasmodic attacks of unconsciousness usually accompanied by convulsions, there being three varieties, *grand mal*, *petit mal*, and *Jacksonian epilepsy*. About a quarter of the cases begin before the age of 10 years, and about three-quarters between the ages of 10 and 20. Children in whose families there are histories of nervous disorders, insanity, alcoholism, etc., are especially liable to be affected, and the exciting causes include practically any cause of undue nervous irritation. In *grand mal* there are two stages, the first termed the *aura*, a peculiar feeling, taking different forms, experienced by the individual previous to an attack, and warning him that it is coming on, while at the second stage a piercing and characteristic cry is uttered and the person falls down suddenly unconscious. The head is turned to one side, the face first pale and then livid, the pupils dilated. Later, about half a minute afterwards, convulsions come on, the tongue may be bitten, the face is purple, with the eyes protruding, and the breathing difficult. The convulsions usually pass off after a few minutes, the person becomes comatose and then falls asleep naturally.

In *petit mal* there is usually sudden unconsciousness, but there may be only slight giddiness, and there are no convulsions. After an attack, however, the mind may be somewhat affected for a time, and the person may perform actions—even criminal actions have been known—of which he is afterwards unconscious.

E. must be distinguished from hysteria, from convulsions in uræmia, and from unconsciousness due to apoplexy, drunkenness, etc.

E. requires careful medical treatment: attention is given to the preservation of the general health, the patient is advised to live an open-air life, and an attempt is made to remove the cause of the nervous irritation, while bromides are given internally. When a person is in a fit his collar or other restricting clothing is unfastened, a cork is put between the teeth to prevent biting the tongue, and care is taken that he does not injure himself in the convulsions.

Jacksonian epilepsy is due to a brain lesion, and usually occurs in adults. There are convulsions, twitchings, and perhaps paralysis of muscles, but no unconsciousness. The cause of the brain lesion, *e.g.* syphilis or hæmorrhage, must be treated by a medical man, and a surgical operation may be necessary, *e.g.* to remove bone pressing on the brain.

Turner, *Epilepsy.*

EPILOBIUM, see ONAGRACEÆ.

EPILOGUE, address in prose or verse at end of play by way of explanation, or to crave indulgence. It was employed by Shakespeare and his contemporaries, but was most used in age of Dryden and his immediate successors.

EPIMENIDES (VI. cent. B.C.), famous Cretan poet and prophet.

ÉPINAL (48° 10′ N., 6° 26′ E.), town, Vosges, France, on Moselle; manufactures cotton, paper, embroidery; has fine library and old church; strongly fortified. Pop. (1911) 30,042.

ÉPINAY, LOUISE FLORENCE D'ESCLAVELLES D' (1726–83), Fr. authoress; noted for intimacy with Rousseau and Baron von Grimm. She wrote *Conversations d'Émilie* and *Mémoires.*

EPIPHANIUS, ST. (315–402), bp. of Constantia (Salamis) in Cyprus; a vigorous and narrow Father; wrote *Ancoratus* (Anchor of Faith) and *Panarion* (Drug Chest); learned and honest, but untrustworthy authority.

EPIPHANY, FEAST OF (Gk. *epiphania* from *epiphainein*, to show forth), kept Jan. 6, twelve days after Christmas (whence *Twelfth Day*), commemorates the showing of Jesus to the Magi; is first alluded to by Clement of Alexandria as observed by the Basilidians of Egypt, *c.* 194 A.D. It was probably 'taken over' by the Church from the Egyptian festival of the blessing of the Nile on the same date. It came to be the festival of the Baptism of Christ; as this idea had an Adoptionist and Ebionite colouring E. was observed rather as Christ's birthday, which only later was put on Dec. 25. Epiphanius at first believed Jan. 6 was the day of Christ's 'Birth after the flesh,' though he afterwards adopted the view that Dec. 25 was really His birthday. In 385 Jan. 6 was observed as Christ's birthday in Bethlehem—witness the old Jerusalem lectionary. In the Oriental churches E. still retains its early connection with baptism and the blessing of the waters, *e.g.* in the Armenian Church children are generally baptized then, but in the West its original meaning has been overlaid.

Duchesne, *Origines du culte chrétien.*

EPIPHYTES, plants whose roots attach to other plants; may have aerial roots also, *e.g.* aroids and orchids. See PARASITISM.

EPIRUS, EPEIRUS (40° N., 20° 30′ E.), mountainous region in N.W. of ancient Greece; bounded by Illyria, Macedonia, Thessaly, Arcadia, Ambracian Gulf, and Ionian Sea; principal mts., Acrocerannii and Pindus; chief rivers, Celydnus, Acheron, Thyamis. E.'s best known ruler was Pyrrhus (*q.v.*); Republic established *c.* 200 B.C., but overwhelmed by Romans, 167; peopled mostly by Albanians since 1400; Turkish since 1468, except S.E. strip (Arta) assigned to Greece, 1881; invaded by Greeks in Turco-Balkan War (*q.v.*), 1912.

EPISCOPACY.—The origin of E. in the Christian Church is a much vexed question over which Catholic and Prot. divines have disputed. It seems possible that the bishops and presbyters of New Testament times were identical; the threefold ministry of the Church was probably not there at first, though when a clear system is developed it is that which is found. By the time of St. Ignatius we reach monarchical E. The essential nature of E. is asserted by Catholic theologians, Rom., Gk., or Anglican. The Amer. Methodist,

Protestant Episcopal, the Swed. Lutheran, the Moravian, and Hungarian Unitarian Church possess forms of E.

Gore, *Orders and Unity*.

EPISCOPIUS, SIMON (1583–1643), Dutch theologian; prof. at Leyden; follower of Arminius; banished at Synod of Dort, 1618, but returned, 1626.

EPISODE, part of a Gk. tragedy coming between choric songs; in modern use, means an interesting story or incident introduced into a longer narrative.

EPISTAXIS, bleeding from the nose, due either to local or general causes, may be stopped by grasping firmly the sides of the nose between the finger and thumb, or by applying ice externally, or cotton soaked in alum or turpentine internally up the nostrils, or by plugging the nostrils.

EPISTEMOLOGY, theory of process of knowing.

EPISTLE, a formal kind of letter; compositions addressed by the Apostles to the Romans, Corinthians, Galatians, and others; portion of Scripture appointed to be read in churches. The literary e. was largely cultivated by the ancients. Verse e's were popularised in France by Marot, Boileau, Voltaire, and others. The form was also frequently used by Eng. poets, from XVI. to XIX. cent's.

EPISTYLE, Gk. name for the architrave in architecture.

EPITAPHS, inscriptions on, or for, a tomb. The earliest which have survived have been found on the coffins and tombs of the ancient Egyptians. The Greeks and Romans also made considerable use of the e. In England it has been popular from very early times. For a long period Latin was the language most commonly used. The e's written by Pope, Goldsmith, William Browne, and other poets have considerable literary merit. Shakespeare's e. runs:

> 'Good frend, for Jesus sake forbeare,
> To digg the Dust enclosed heare:
> Bleste be the Man that spares thes stones,
> And curst be he that moves my bones.'

On Jonson's tomb is inscribed:

> 'O, Rare Ben Jonson.'

On that of Keats:

> 'Here lies one whose name was written in water.'

Amongst famous mock-epitaphs may be quoted that by Garrick on Goldsmith:

> 'Here lies Nolly Goldsmith, for shortness called Noll,
> Who wrote like an angel, but talked like poor Poll.'

That written by the Earl of Rochester on Charles II. is well known:

> 'Here lies our Sovereign lord the King
> Whose word no man relies on;
> Who never said a foolish thing
> And never did a wise one.'

Pettigrew, *Collection of Epitaphs*.

EPITHALAMIUM, bridal-song, of which the finest examples are by Theocritus, Catullus, and Statius; some of the Fr. and Ital. poets; Spenser and other Eng. poets.

EPITHELIUM, cell-tissue, forming the cuticle on the skin, and lining the intestines, bladder, etc. See CANCER.

EPIZOA, parasitic crustaceans of order *Copepoda*; fish-lice.

EPIZOÖTICS, the study of parasites living on human beings. See PARASITISM, PARASITIC DISEASES.

EPODE, a lyric poem; in early Gk. poetry it followed the strophe and antistrophe.

EPONA (classical myth.), Rom. protectress of horses.

EPONYM, mythical founder of a race, *e.g.* Romulus of Rome, Tros of Troy.

EPPING (51° 42′ N., 0° 7′ E.), town, Essex, England; famous forest (open to public since 1882). Pop. (1911) 4253.

EPPS, JAMES (1821–1907), Eng. homœopathic chemist; founder of famous firm of chocolate and cocoa manufacturers.

ÉPRÉMESNIL, JEAN JACQUES DUVAL D' (1745–94), Fr. politician; deputy of the nobility to Constituent Assembly; at first held republican views, but later supported the monarchy; guillotined.

EPSOM (51° 20′ N., 0° 16′ W.), town, Surrey, England; has medicinal springs. Epsom Downs have famous racecourse (where the 'Derby' and 'Oaks' are run). Pop. (1911) 19,156.

EPSOM SALTS, MAGNESIUM SULPHATE ($MgSO_4.7H_2O$), is obtained from dolomite or magnesite by the action of sulphuric acid, or by purifying the native sulphate; also occurring dissolved in mineral waters, *e.g.* at Epsom and Seidlitz. A valuable saline purgative, especially for children, in constipation associated with liver disorders, or in dropsy.

EQUATION.—An equation is simply a statement of equality between two algebraic expressions. E's are of two kinds—(i.) *identities*, and (ii.) e's of *condition* (see ALGEBRA), of which only the second will be dealt with here.

I. SIMPLE EQUATIONS, in which only first degree terms occur.

(*a*) *One unknown quantity.*

e.g. $3x-5=5x-13$.

Solution of such e's is effected by transposition of terms. Thus we get

$5x-3x=13-5$, whence $2x=8$ and $x=4$.

(*b*) *Several unknown quantities.*

e.g. $6x+2y-5z=13$ . . (1)
$3x+3y-2z=13$ . . (2)
$7x+5y-3z=26$ . . (3)

The general method of solution may be stated thus: Eliminate one unknown quantity by combining the e's in pairs, thus obtaining one less e. involving one less unknown; continue this process until left with a simple e. After finding the value of the unknown occurring in this e., the values of the others can be obtained successively by substitution.

In the example taken, multiplying (1) by 3 and (2) by 2 and combining we get

$12x-11z=13$ . . . (4)

From e's (1) and (3) we similarly obtain

$16x-19z=13$ . . . (5)

Combining (4) and (5) after multiplication by 4 and 3 respectively, we have $13z=13$. Hence $z=1$. Substituting this in either (4) or (5) we get $x=2$, and putting both these values in (1), (2), or (3), we find $y=3$.

II. QUADRATIC EQUATIONS, which involve powers of the unknowns not higher than the second.

(*a*) *One unknown quantity.*

e.g. $3x^2+7x-6=0$.

The left-hand side may be written $(3x-2)(x+3)$, and if *either* of the factors is zero the e. will be true. Hence $x=\frac{2}{3}$ or $x=-3$. Both values are admissible, and any quadratic e. similarly has two solutions.

Consider the e. $a\{ax^2+2bx+c\}=0$. This can be written $\{ax+b+\sqrt{b^2-ac}\}\{ax+b-\sqrt{b^2-ac}\}=0$.

Hence $x=\dfrac{-b-\sqrt{b^2-ac}}{a}$ or $\dfrac{-b+\sqrt{b^2-ac}}{a}$, and the roots of the e. will be (i.) real and different, (ii.) real and equal, (iii.) imaginary, according as (i.) b^2 is $>ac$, (ii.) $b^2=ac$, (iii.) b^2 is $<ac$.

(*b*) *Several unknown quantities.*

The principle of the method of solution is in general the same as for simple e's of similar type, but usually is more difficult, owing to greater difficulty in elimination.

III. CUBIC AND QUARTIC (OR BIQUADRATIC) EQUATIONS.—A cubic e. involves powers of the unknown not higher than the third, a quartic not higher than the fourth, and so on. It can be shown that an e. of the nth degree must have n roots, real or imaginary, and no more.

A general algebraical solution of e's of higher degree

ERNESTI, JOHANN CHRISTIAN GOTTLIEB (1756–1802), Ger. classical scholar.

ERNESTINE LINE, see WETTIN.

ERODE (11° 20′ N., 77° 40′ E.), town, Madras, India. Pop. 15,529.

EROS (classical myth.), Gk. god of love; represented as a beautiful boy; associated with the love of Psyche; called Cupid by the Romans. E. is also name of a minor planet.

EROSION, term applied to the eating away of coast-line by sea; common on S.E. coast of England; combated by concrete-work, sea-walls, etc.

ERPENIUS, THOMAS, THOMAS VAN ERPEN (1584–1624), Dutch Orientalist.

ERRATICS, stones which occur in places where existing geological formation does not correspond to their structure; due largely to glaciers.

ERROLL, FRANCIS HAY, 9TH EARL OF (d. 1631), Scot. noble; joined Span. cause; defeated Scot. army, 1594; app. commissioner to arrange union of Scot. and Eng. Crowns, 1604.

ERSCH, JOHANN SAMUEL (1766–1828), Ger. bibliographer.

ERSKINE, EBENEZER (1680–1754), Scot. theologian; led Secession from Church of Scotland, *c.* 1733; his followers incorporated into United Presbyterian Church, 1847. *Life*, by M'Ewen.

ERSKINE, HENRY (1746–1817), Scot. lord advocate; famed for his brilliant oratory and wit; also a poet of some distinction.

ERSKINE, JOHN, OF DUN (1509–91), Scot. Reformation leader; tried to mediate between contending factions.

ERSKINE, JOHN (1695–1768), Scot. jurist; pub. *Principles of the Law of Scotland* (1754), and *Institutes of the Law of Scotland* appeared posthumously.

ERSKINE, RALPH (1685–1752), Scot. ecclesiastic; bro. of Ebenezer E.; seceded from Established Church, 1737.

ERSKINE, THOMAS, 1ST BARON (1750–1823), Brit. lawyer; b. Edinburgh; s. of 10th Earl of Buchan; called to Bar, 1778; noted for several famous defences, including Captain Baillie, Admiral Keppel, and Lord George Gordon; M.P. for Portsmouth, 1785; Chancellor to Prince of Wales; Lord Chancellor, 1806–7; great reputation as an orator.

Campbell, *Lives of the Chancellors*.

ERSKINE, THOMAS, OF LINLATHEN (1788–1870), Scot. theologian; an advocate, but never practised, devoting himself to religious work with extreme evangelical party; wrote several works.

ERYSIPELAS, acute infectious disease, characterised by a spreading inflammation of the skin, caused by a *streptococcus*, a form of bacterium, usually invading a slight surface wound of the face. The onset is sudden with rise of temperature, and a red patch soon appears on the skin, spreading in all directions, blisters and pustules forming. The face is swollen and painful, but in a few days the temperature goes down and the skin comes off. The treatment is isolation of the person and careful nursing to keep up the strength; a vaccine has proved efficacious. Local antiseptics, *e.g.* hot carbolic fomentations, are applied to the affected surface.

ERYTHEMA, skin-rash due to exposure, irritation, or use of drugs; also found as accompanying symptom in several fevers; treatment consists of cooling ointments, and sometimes antipyretics (drugs which reduce fever).

ERYTHRÆ (38° 20′ N., 26° 30′ E.), ruined ancient city, Asia Minor; modern Litri.

ERYTHRÆA, see ERITREA.

ERZERUM, ARZRUM (39° 57′ N., 41° 19′ E.), town and vilayet, Armenia, Asiatic Turkey; at junction of trade routes to Trebizond, Transcaucasia, Persia, etc.; great distributing centre; important fortress; Armenians massacred here, 1895. Pop. *c.* 80,000. Vilayet: area, 19,300 sq. miles. Pop. *c.* 650,000.

ERZGEBIRGE (50° 40′ N., 13° 40′ E.), mts., between Saxony and Bohemia; highest peaks, Keilberg (4072 ft.), Fichtelberg (3980 ft.); produce lignite, silver, lead, etc.

ERZINGAN, ERZINJAN (39° 40′ N., 39° 50′ E.), town, Erzerum, Turkey in Asia; has copper, cotton, and silk manufactures; thermal springs. Pop. *c.* 20,000.

ESAR-HADDON, king of Assyria, reigned 681–668 B.C.; succ. Sennacherib; overthrow of Tyre accomplished by him and his successor Asshur-bani-pal.

ESAU, in *Genesis*, son of Isaac and bro. of Jacob, by whom E. was robbed of his birthright.

ESBJERG (55° 28′ N., 8° 25′ E.), port, W. coast of Jutland, Denmark. Pop. (1911) 18,208.

ESCANABA (45° 44′ N., 87° 14′ W.), town, Michigan, U.S.A. Pop. (1910) 13,194.

ESCARP, see FORTIFICATION.

ESCAUT, see SCHELDT.

ESCHATOLOGY, the doctrine of the last things; has gone through important changes in Jewish and Christian theology. The roots of the Christian doctrine lie in the Old Testament. At first there is very little that is eschatological; by degrees the idea is developed of the 'day of the Lord,' especially in *Amos* and *Isaiah*. Thus the conceptions of the 'coming of God,' judgment, and future bliss and an eternal kingdom, appear. Of personal immortality there is at first, too, very little; nothing more than the dim existence in Sheol for good and bad alike. In the two cent's before Christ this tendency, together with the moral difficulty of imagining this life to be the best of all, and the growing Messianic expectation, led to the growth of a large apocryphal and apocalyptic lit. Zoroastrian and possibly other influences, besides, had mingled with the purely Jewish aspirations during the Persian period. Hence it was into a world already teeming with eschatological ideas that Christianity came. The first generation of Christians lived in the immediate expectation of the coming of their Lord. This hope was disappointed, and Christian ideas of heaven and hell developed gradually. They are always prominent in popular theol., and the importance of e. in Christian origins has only recently been realised.

Schweitzer, *Quest of the Historical Jesus*; Alger, *Doctrine of a Future Life*; Oesterley, *Doctrine of the Last Things*.

ESCHEAT, the reversion of an estate to the Crown or lord of the manor, upon the tenant's dying intestate without heirs, or upon forfeiture for treason or felony.

ESCHENBACH, WOLFRAM, see MINNESINGERS.

ESCHENBURG, JOHANN JOACHIM (1743–1820), Ger. man of letters; trans. Shakespeare.

ESCHSCHOLTZ, JOHANN FRIEDRICH (1793–1831), German traveller, physician, and naturalist.

ESCHWEGE (51° 11′ N., 10° 3′ E.), town, Hesse-Nassau, Germany. Pop. (1910) 12,546.

ESCHWEILER (50° 49′ N., 6° 19′ E.), town, Prussia, Germany. Pop. (1910) 24,740.

ESCOBAR Y MENDOZA, ANTONIO (1589–1669), Spanish ecclesiastic; famous preacher and prolific writer.

ESCOIQUIZ, JUAN (1762–1820), Span. politician; entered Church; tutor to Ferdinand VII.; imprisoned for conspiracy, 1807; later in confidence of Ferdinand; exiled, 1815; wrote several works.

ESCORIAL, or ESCURIAL, palace of kings of Spain, 31 miles from Madrid; it contains a church, convent, and seminary; built, 1563–93; whole range of buildings is square in shape, with church in centre; total area, 396,782 sq. ft.; royal burying-ground; the library, damaged by fire (1671), contains many early MSS.; the church, according to some, is one of finest European buildings of its kind; palace contains many valuable paintings of Velazquez and others.

Calvert, *The Escorial* (1910).

ESCOVEDO, JUAN DE (d. 1578), Span. official; was sec. to Don John of Austria; associated with

various political intrigues; assassinated at instance of Philip II.

ESCUINTLA (14° 20′ N., 90° 39′ W.), town, Guatemala, Central America. Pop. *c.* 12,000.

ESCUTCHEON, term used in heraldry for shield displaying armorial bearings.

ESDRAS, see APOCRYPHAL LITERATURE.

ESERINE, or Physostigmine, see CALABAR BEAN.

ESHER (51° 22′ N., 0° 22′ W.), town, Surrey, England.

ESHER, WILLIAM BALIOL BRETT, 1ST VISCOUNT (1817–99), Eng. judge of Common Pleas, 1868; Master of the Robes, 1883; Solicitor-Gen., 1868; cr. Viscount, 1897.

ESK, four rivers, Scotland: (1) NORTH E. (56° 45′ N., 2° 26′ W.), Kincardine, Forfar, flows into N. Sea; length, 30 miles; (2) SOUTH E. (56° 47′ N., 3° 3′ W.), Forfar, flows into N. Sea; length, 50 miles; (3) confluence of NORTH E. (55° 53′ N., 3° 5′ W.) and SOUTH E. (55° 51′ N., 3° 5′ W.), flows into Firth of Forth; length of each stream is under 20 miles; (4) confluence of BLACK and WHITE E. (55° 19′ N., 3° 14′ W.), flows into Solway Firth; length, 37 miles.

ESKILSTUNA (59° 21′ N., 16° 28′ E.), town, on Hjelmar R., Sweden; chief seat of iron and steel industries. Pop. (1910) 28,371.

ESKIMOS, or ESQUIMAUX, aboriginal inhabitants of N. America, chiefly found in Greenland and Alaska. Their numbers have been computed at 40,000, and the area they inhabit is upwards of 15,000 sq. miles. They are very conservative in habit, and show little desire to adopt civilised manners of life. They are short of stature (average height about 5 ft. 4 in.); have broad, fat faces, black eyes, and coarse black hair. They live by hunting and fishing. For the latter purpose they use the 'kayak,' a light skin canoe, 18 ft. by 2 ft., with an opening in the top, in which the occupant seats himself, wrapped in waterproof skins. In this canoe they capture seals, which they take with the harpoon, to which is attached a line with floats. Hunting is done by means of dogs and sledges. In summer they live in tents near open water. Their winter huts are made of turf and snow, and heated by oil lamps. They usually congregate in settlements of twenty or thirty families. In 1912 the Stefansson Expedition discovered on the Arctic shores of N. America, near Coronation Gulf, some 2000 white Eskimos whose red hair, blue eyes, implements, and other characteristics led to the theory that they are descended from Old Norse vikings who visited N. America from *c.* 1000 onwards.

Nansen, *Eskimo Life* (1893).

Eskimo Dogs, see under DOG FAMILY.

ESKI-SHEHR (39° 44′ N., 30° 18′ E.), town, Asia Minor. Pop. *c.* 35,000.

ESMARCH, JOHANNES FRIEDRICH AUGUST VON (1823–1908), Ger. army surgeon; prof. of Surgery at Kiel (1857); surgeon-gen. in Franco-Prussian war (1870–71); great authority on military surgery, invented many surgical appliances, particularly the bandage called after him, and wrote several medical works, especially on 'first aid.'

ESMERALDAS (1° N., 79° 28′ W.), department, Ecuador, S. America; area, 7439 sq. miles. Pop. *c.* 15,000; capital of dep. is ESMERALDAS, at mouth of river E.

ESNA, ESNEH (25° 14′ N., 32° 33′ E.), town, Upper Egypt, on W. bank Nile; barrage. Pop. 19,103.

ESOCIDÆ, see PIKES.

ESOTERIC, something of a secret or mysterious character; that which is revealed to few; applied to religion, *e.g.* e. Buddhism.

ESPAGNOL SUR MER, LES, naval battle (described in Froissart's Chronicles) fought between Edward III. and Span. fleet off Winchelsea; after hard-fought battle Edward won.

ESPALIER, frame of trelliswork upon which fruit trees are trained for better exposure to sun and air; also the trees so trained.

ESPARTERO, BALDOMERO (1792–1879), Span. statesman; of humble birth; enlisted, 1807; fought in America, 1815–23; vigorous defender of Isabella in Civil War of 1832; of strong liberal and democratic sympathies; finally crushed Carlists, 1840; became regent, 1841–43; retired from political life, 1856.

ESPARTO, or SPANISH GRASS (*Stipa tenacissima*), a N. African grass, possessing extremely tough leaves, largely used in paper manufacture.

ESPERANCE (33° 50′ S., 122° E.), seaport and bay, south coast of W. Australia.

ESPERANTO, an international language invented by Dr. L. Zamenhof, of Warsaw, in 1887; introduced into England in 1902. The system is very simple, as there are no exceptions to rules, and no irregularities. The pronunciation is phonetic. It is claimed that the grammar, which is embodied in seventeen terminations, and thirty prefixes and affixes, may be learnt in an hour.

ESPINAL (4° 11′ N., 74° 59′ W.), town, Colombia; tobacco and earthenware. Pop. 10,500.

ESPINEL, VINCENTE MARTINEZ (1551–1634), Span. novelist and poet; freely drawn upon by Le Sage (*Gil Blas*).

ESPIRITO SANTO (20° S., 40° 30′ W.), state, Brazil, S. America; area, 17,312 sq. miles; surface mountainous in W. and S.; drained by Doce and other rivers; produces coffee, cotton, rice, sugar, tobacco. Pop. *c.* 300,000.

ESPRONCEDA, JOSÉ IGNACIO ENCARNACION DE (1808–42), Span. poet.

ESQUIMAULT, naval station and naval yard on Vancouver Is., Canada; imperial garrison replaced by Dominion troops, 1906.

ESQUIMAUX, see ESKIMOS.

ESQUIRE.—In Middle Ages an e. was a young man who attended a knight; now the term is legally applicable to any gentleman, *i.e.* according to some, one who bears coat armour, or to gentlemen by position or education; but the exact use of the term is open to question.

ESQUIROL, JEAN ÉTIENNE DOMINIQUE (1772–1840), Fr. physician; succeeded in amending the conditions in lunatic asylums, new asylums being constructed according to his ideas; chief physician at Charenton asylum (1826); author of several medical works.

ESQUIROS, HENRI FRANÇOIS ALPHONSE (1812–76), Fr. man-of-letters.

ESS, JOHANN HEINRICH VAN (1772–1847), Catholic divine, prof. at Marburg, and Biblical student.

ESSAY, used as a verb, means to try, or attempt; more generally used as noun to describe a short prose composition, complete in itself. The name and the form was invented by Montaigne (*q.v.*), and his first collection of *Essais* was pub. in 1580. They met with immediate popularity; were trans. into Eng. in 1603 by John Florio (*q.v.*), and are believed to have influenced Shakespeare. They certainly made a favourable impression on Francis Bacon (*q.v.*), whose own first vol. of *Essays* appeared in 1597. The next Eng. essayist of importance, in point of date, is Abraham Cowley (1618–67). The Golden Age of the Eng. e. was the XVIII. cent., when Steele and Addison were contributing to the *Tatler*, *Spectator*, and *Guardian*. Charles Lamb and De Quincey are amongst the greatest of our later essayists. Notable Fr. essayists have been Sainte-Beuve, Théophile Gautier, Jules Lemaître, and Faguet. Emerson's *Essays* occupy a high place in Amer. lit.

ESSEG, ESSEGG, or ESZEK (45° 33′ N., 18° 43′ E.), town, Croatio-Slavonia, Hungary. Pop. (1910) 31,383.

ESSEN (51° 28′ N., 7° 1′ E.), town, Pruss. Rhineland province, Germany; railway centre; coal, iron, steel; has Krupp's steel works; formerly site of Benedictine nunnery. Pop. (1910) 294,629.

ESSENES, Jewish sect (II. cent. B.C.), who have been the object of much hist. inquiry, because of their possible influence on religious life during Christ's lifetime. They strictly observed the Levitical law;

were famed for priestly sanctity; and abstained from worldly affairs.

ESSENTUKI (44° N., 42° 40′ E.), spa, Terek, Transcaucasia, S. Russia. Pop. *c.* 10,000.

ESSEQUIBO (7° N., 59° W.), district and river, Brit. Guiana, S. America.

ESSEX (51° 44′ N., 0° 30′ E.), county, E. England, having on N. Cambridgeshire and Suffolk, on E. North Sea, on S. Thames, on W. Hertfordshire and Middlesex; area, 1657 sq. miles; long, flat coast-line with shallow bays, occasionally fringed with marshland; inland, surface undulating, wooded, and well covered with meadows; owing to low-lying ground, land sometimes inundated. Chief rivers, Thames, Stour, Colne, Chelmer, Lea, Crouch, Roding, and Stort; great grain-producing county; important oyster-fishing. Principal towns are Chelmsford (county town), Colchester, Stratford, Barking, Braintree, and Brentwood; watering-places, Southend-on-Sea, Clacton-on-Sea, and Walton-on-the-Naze; Essex, being near London, is thickly populated. Industries include: Gt. Eastern Railway works, powder and water works, and breweries; important docks at Tilbury and Plaistow; manufactures agricultural implements and silk. Essex churches are famous for timber porches and towers, brasses and stained glass. There are some fine monastic remains; castles include Hedingham, Audley End, and two towers at Hadleigh. Pop. (1911) 1,351,102. **Essex, Kingdom of**, former Anglo-Saxon kingdom; included county of Essex, and at times the adjoining counties of Hertford and Middlesex; records are chiefly of VII. cent.; conquered by Danes, *c.* 870.

J. C. Cox, *Essex* (1910).

ESSEX, EARLDOM OF, created during XII. cent., and first held by the Mandeville family; subsequently by the Bohuns and Bourchiers, and by Thomas Cromwell. The title passed to the family of Devereux in 1572, and was held by them for three generations, after which it was conferred upon the family of Capel.—**Walter Devereux**, 1st earl (1541–76), succ. as Viscount Hereford (1558); cr. Earl of E. (1572); earl marshal of Ireland (1576).—**Robert Devereux**, 2nd earl (1566–1601), Eng. statesman; favourite with Queen Elizabeth; lord-deputy of Ireland (1599); disobeyed queen, and was executed.—**Robert Devereux**, 3rd earl (1591–1646), served in attack on Cadiz (1625); lieut.-general of army sent against Scot. Covenanters (1639); became commander of Parliamentary army on outbreak of Civil War; twice m., but d. without issue, and line became extinct.—**Arthur Capel** (1632–83), Eng. statesman; cr. 1st earl of Capel line (1661); ambassador to Denmark (1669); lord-lieut. of Ireland (1672–77); arrested after Rye House Plot; found dead.

ESSLINGEN (48° 44′ N., 9° 19′ E.), town, Württemberg, Germany. Pop. (1910) 32,216.

ESSONNES (48° 35′ N., 2° 26′ E.), town, Seine-et-Oise, France; paper and machinery. Pop. 10,000.

ESTABLISHMENT, CHURCH.—Before the conversion of the Rom. Empire as a whole to Christianity the Church was illegal, though persecution was intermittent. Afterwards the Church tended to encroach on the State and high claims of temporal power were made by mediæval churchmen. In England the Church was a unity before the State, and as only one religion existed to which all belonged, the separation of Church and State would have been unthinkable, though great delimitation of their respective spheres continually led to difficulty. In England the Anglican Church stands in a special relation to the State, and its prelates sit in the House of Lords. The (Presbyterian) Church of Scotland is likewise established, though its clergy are not represented in Parliament, hence it is very difficult to define wherein e. consists. Its existence is quite compatible with the toleration of other churches; it only means privilege, sometimes hardly more than prestige. The quarrels about possible *Disestablishment* really rage more round *Disendowment*. See DISESTABLISHMENT.

ESTAING, CHARLES HECTOR, COMTE D' (1729–94), Fr. admiral, captured at siege of Madras, 1759; assisted Americans against British, 1778; executed in Fr. Revolution as loyalist.

ESTANCIA, S. American cattle-run; equivalent to U.S.A. 'ranch' and Australian 'station.'

ESTATE, landed property; rank or condition; also collective name given to a governing body, as 'The Three E's'—the lords, clergy, and commons. Burke described journalism as 'the fourth e.'

ESTATE DUTY.—By Finance Act (1894) all property passing at death is liable to duty at from 1 to 15%; e. d's increased by Finance Acts, 1907 and 1909–10. See DEATH DUTY.

ESTCOURT, RICHARD (1668–1712), Eng. comedian and dramatist.

ESTE (45° 13′ N., 11° 39′ E.), town, Venetia, Italy. Pop. 10,779.

ESTE, noble family, originally from N. Italy, which divided into two branches in XI. cent. From one which went to Germany descended the Dukes of Brunswick; subdivided in turn into Brunswick-Lüneburg and Brunswick-Wolfenbüttel. The former became electors and kings of Hanover, and sat on Brit. throne, 1714–1901; they are sometimes called Guelphs. The other branch remained in Italy, and were lords of Ferrara, Modena, and Reggio; famous and cultured princes in Renaissance and Reformation times. Members of this house married into the greatest families, *e.g.* one m. a dau. of Louis XII.; another, Mary, was 2nd wife of James II. of England.

Gardner, *Princes and Poets of Ferrara*.

ESTEBANEZ CALDERÓN, SERAFIN (1799–1867), Span. poet and man of letters; wrote under name of 'El Solitario.'

ESTELLA (42° 35′ N., 2° 7′ W.), town, Navarre, Spain. Pop. 5736.

ESTEPA (37° 17′ N., 4° 56′ W.), town, Seville, Spain, formerly in hands of Moors; olive oil. Pop. 9000.

ESTEPONA (36° 25′ N., 5° 10′ W.), port, Malaga, Spain; wine, fruit, and fish. Pop. 10,000.

ESTERHAZY OF GALANTHA, aristocratic Magyar house, dating perhaps from XIII. cent., famous since XVI. cent.; Forencz Zerhazy (1563–94) became lord of Gálantha; his s. Miklos, or Nicholas, obtained Frakno, a large estate, since held by his descendants. He and his s. supported Hapsburg dynasty, latter being cr. prince (1687). Prince Nicholas Joseph (1714–90) built magnificent Schloss Esterhazy and patronised art and music. His s., Grand-Prince Paul Anthony (1786–1866), was ambassador in London (1815).

ESTERS, organic compounds whose preparation from acid and alcohol is a reversible reaction, and hence complete conversion never takes place unless some other agent such as strong sulphuric or hydrochloric acid is present. Pleasant fruity-smelling liquids used as flavourings.

ESTHER, BOOK OF.—E., a Jewess of Susa, becomes wife of King Ahasuerus (Xerxes); aided by her cousin Mordecai, delivers the Jews from a massacre ordered by the king; in celebration of their deliverance the feast of the Purim is founded; the aim of the book is undoubtedly to explain the feast; has a hist. nucleus, but the story has probably been freely treated; its tone is far less religious than Old Testament as a whole; date, IV. or III. cent. B.C. According to some, its origin is mythological, E. and Mordecai being really names of deities.

ESTHONIA (59° 10′ N., 26° E.), farthest N. Baltic province of Russia; bounded N.W. by Baltic and S. by Livonia; chief town, Reval; area, *c.* 7600 sq. miles; shores rocky; interior flat, mostly forest lands; also moors, small lakes, and sluggish rivers; soil not fertile; most important product, Indian corn; cattle reared; fishing industry important. Original people, Esths (Finnish); aristocracy Germans. Pop. (1910) 467,400.

ESTIENNE, family of celebrated Fr. painters and scholars. The most noted members were ROBERT E. (1503–59), and his s., HENRI E. (1531–98), famed as a Gk. scholar and lexicographer. His best-known works are *Thesaurus linguæ Græcæ*, a monumental work, and *Précellence du langage francois.*

ESTON (54° 33′ N., 1° 8′ W.), town, Yorkshire, England. Pop. (1911) 12,026.

ESTOPPEL, in law, a bar by which a person is prevented from alleging or denying a previous statement or action.

ESTOUTEVILLE, GUILLAUME D' (1403–83), French prelate, abp. of Rouen.

ESTOVERS, legal term for a tenant's right to make use of timber on land tenanted by him.

ESTRADA, LA (42° 40′ N., 8° 30′ W.), town, Pontevedra, N.W. Spain; mineral springs. Pop. (1910) 24,168.

ESTRADES, GODEFROI COMTE D' (1607–86), Fr. marshal and diplomatist; served in Italy, Catalonia, and Holland (1648–72); was entrusted with missions to Holland and England; secured restitution of Dunkirk.

ESTREAT, legal term for a duplicate of, or extract from, an original document.

ESTRÉES, GABRIELLE D' (1573–99), Fr. peeress; mistress of Henry IV., over whom she exercised great influence.

ESTREMADURA, EXTREMADURA (39° N., 8° 40′ W.), ancient division of central and W. Portugal and W. Spain; length, *c.* 160 miles; capital, Lisbon; Portug. part S. of Tagus—great navigable waterway—low, flat, marshy; N., mountain-chain (Torres Vedras over 2200 ft.); Span. part mostly tableland bisected by mountains; extensive sheep-farming.

ESTREMOZ (38° 51′ N., 7° 32′ W.), town, Portugal. Pop. *c.* 7900.

ESZEK, see ESSEG.

ESZTERGOM, GRAN (47° 47′ N., 18° 43′ E.), town, Hungary; archiepiscopal see. Pop. 16,948.

ETAH (27° 40′ N., 78° 40′ E.), town and district, United Provinces, India. Pop. 8000. District: area, 1737 sq. miles. Pop. 863,948.

ÉTAMPES (48° 27′ N., 2° 9′ E.), town, Seine-et-Oise, France; has several interesting old churches; market-gardening, quarrying; damaged during Fronde War. Pop. 9000.

ÉTAMPES, ANNE DE PISSELEU D'HEILLY, DUCHESSE D' (fl. 1526–47), mistress of Francis I.; after his death was driven from court by Diane de Poitiers, and came to an obscure end.

ÉTANG DE BERRE, see BOUCHES-DU-RHÔNE.

ÉTAPLES (50° 32′ N., 1° 38′ E.), town, Pas-de-Calais, France. Pop. 5136.

ETAWAH (26° 45′ N., 79° 2′ E.), town and district, United Provinces, India; has many fine Hindu temples, finest now used as mosque. Area, 1691 sq. miles. Pop. of town, 42,570; of district, 863,948.

ETCHING, the art of producing pictures by printing from metal plates upon which a drawing has been scratched by a needle. The plate, usually of copper, less frequently of zinc, is uniformly covered with a thin coating of a resinous substance impervious to acid, known as 'e. ground,' and then smoked black. The artist now draws the picture with a sharp etching-needle upon the resinous ground, so that lines of the bare metal appear. The plate is then placed in a bath of dilute nitric acid, which 'bites in' the lines exposed, and does not affect the parts still covered by the 'ground.' If it is desired to have certain lines finer than the others, the fine lines are covered over with Brunswick-black varnish, and the plate again placed in the acid bath, so that the other lines are further bitten in, a process which may be repeated as often as desired. When complete, the plate is removed from the acid, the ground cleaned off with turpentine, and the plate, upon which the design appears scratched upon the metal, is inked, its surface wiped clean so that the ink is left only in the bitten-in lines, and printed. In *dry point e.* the drawing is scratched with the etching-needle directly upon the metal plate, which is then inked and printed. See Hamerton, *Etcher's Handbook*; Rhead, *Etching.*

ETEOCLES (classical myth.), s. of Œdipus, king of Thebes; he and his bro., Polynices, agreed to reign alternately for a year at a time; differences subsequently arising brought about the Theban War. The bro. kings met in single combat and both were killed.

ÉTEX, ANTOINE (1808–88), Fr. artist, sculptor, and architect; designed Napoleon's tomb in Invalides.

ETHANE (C_2H_6), hydrocarbon; constituent of coal gas; faintly luminous; an additive compound of ethylene (see OLEFINES).

ETHELBERT, ÆTHELBERT (552–616), king of Kent; converted to Christianity by St. Augustine; first to write Saxon laws—*dooms.*

ETHELDREDA, ST., ÆTHELDREDA (630–79), abbess of Ely; name corrupted into St. Audrey. 'Tawdry' comes from St. Audrey's Fair.

ETHELRED, see ÆTHELRED.

ETHER ($C_2H_5.O.C_2H_5$) a colourless liquid with characteristic taste and smell, prepared by distilling definite proportions of sulphuric acid and alcohol; B.P. 35°; anæsthetic and solvent for carbon compounds.

ETHEREDGE, SIR GEORGE (1635–91), Eng. dramatist; was a courtier and man of wealth and fashion. In his three plays, *Love in a Tub, She Would if She Could,* and *The Man of Mode,* he inaugurated the comedy of intrigue. His work is distinguished by sprightliness and wit.

ETHERIDGE, JOHN WESLEY (1804–66), Eng. Wesleyan minister; Oriental and Biblical scholar.

ETHERS, organic compounds which contain two hydrocarbon groups united to one oxygen atom. All, except the gas-methyl ether, are inflammable liquids.

ETHICS, or MORAL PHILOSOPHY, is often defined as the systematic study, or the science, of conduct or of character. But we can study conduct and character in several ways. We may ask what takes place 'in a man's mind,' as we say, when he acts or wills to act, when he succumbs to or resists temptation, when he forms habits, and so on. We may trace the development of individual conduct from the imitative stage of infancy to the relatively rational life of an adult. To these psychological researches we may add the anthropological, and trace the development of moral conduct and social order in the race from the wild life of savagery to the comparatively reasonable morality of civilised peoples. But these positive studies, though they occupy a great part of treatises on ethics, are really but introductory to the ethical problems proper. When we have ascertained the psychological conditions of conduct and have noted what kinds of conduct have in history been regarded as good and bad, there remain questions such as, How far are actual moral judgments justifiable? What ought we to regard as morally good or bad, right or wrong? What is the moral ideal? What is true welfare? Thus ethics is concerned, not so much with character and conduct directly, as with moral judgments upon them, which it seeks to understand and test and clarify.

Upon what do we pronounce moral judgments? Some moralists have maintained that the goodness or badness of conduct depends wholly on the motive which prompts it. By *motive* may be meant the emotion which inclines a man to certain actions, or the end which he hopes to achieve by these actions. In the latter sense 'motive' is narrower than 'intention,' for a man intends not only the end that he wants, but also the means that he knows to be necessary to its attainment and the consequences that he knows will follow from its realisation; thus a man's motive may be to see a friend, but the journeys he undertakes in order to do so and the expenditure he incurs are, though not part of his motive, also intentional. Others (*e.g.* Mill) have argued that the morality of an act depends only on its consequences and not at all on its motive. Both parties to this controversy make an

artificial separation of agent from act. An act may be beneficial or injurious, but can have no moral value except as an indication of an agent's intention and character. But, again, the agent's motive should not be judged without any reference to the consequences of his conduct. Motive in the sense of the prompting emotion is comparatively unimportant, for moral judgments are certainly not mainly directed on states of feeling. Motive in the sense of the end desired is also too narrow, for the well-meaning fool, whose ends taken abstractly are good, but who neglects to consider the consequences of his actions, does not deserve unqualified approbation. The true object of moral judgment is either the general character of the agent or his acts as revelations of character, and such acts we judge as wholes, considering both the agent's motive and his actual intention, and also such consequences as he ought reasonably to have foreseen.

The first movement of reflection upon established maxims of conduct is usually simple revolt. Traditional principles are termed unreasonable, conventional, finally fictitious and false. All men, it is argued, are really selfish, and the high-sounding maxims under which they veil their selfishness represent nothing but the prudence of thieves afraid to attack one another. This doctrine of selfishness (*Egoism*) is often expressed —*e.g.* by the Cyrenaics (*q.v.*) and Epicureans (*q.v.*), and in modern times by Hobbes (*q.v.*)— in the form of Psychological Hedonism, that a man *can* have no other motive than his own pleasure. Were this true, it would be senseless to adjure men to aim at anything else; moral choice would be impossible. It is now generally admitted, however, that the doctrine is psychologically false: we do not often aim at pleasure as such, and usually should miss it if we did. But, even so, it remains conceivable that only selfish action is reasonable.

The ordinary honest man replies to the selfish doctrine that he knows perfectly well what is right and wrong without any argumentation. This reply formulated as a theory is known as *Intuitionism*. Thus (1) Shaftesbury (*q.v.*) and Hutcheson argued against Hobbes that we have in 'Moral Sense' a faculty which disinterestedly approves or disapproves conduct as right or wrong in itself, just as the Æsthetic Sense approves beauty and disapproves ugliness. But this theory tends to reduce the distinction of right and wrong to that of good and bad 'form,' or decorous and nasty, and to neglect the notion of obligation which distinguishes moral from æsthetic consciousness. (2) Butler therefore speaks rather of *Conscience*, a principle which in the system of human nature 'plainly bears upon it the marks of authority over all the rest,' so that conscientious, not selfish, conduct is truly following the law of our nature. More recently Martineau also developed a theory of conscience, which he regards as unerringly deciding between rival motives. (3) Earlier writers, such as Cudworth and Clarke, also insisted on the immediate and disinterested character of moral intentions, but regarded them as due, not to a special moral faculty, but to the activity of *Reason*, which apprehends moral truths in the same way as mathematical truths. (4) Kant (*q.v.*) also relates the moral law to reason — viz. to 'practical reason' or rational will, and argues that since the law must hold alike for all rational beings, our purposes ought to be such that we can will them, not for ourselves only, but as universal maxims for all men.

Appealing to the internal law, Intuitionism is an advance upon dogmatic reference to external commands or customs. But as a final theory it is defective. The verdicts of conscience, though now rapidly and unreflectively pronounced, usually represent the moral standards of our society, and issue from past reflection of ourselves or others. They are not above criticism, unless criticism means an attempt to bias conscience. Their asserted infallibility conflicts with actual variations in moral ideas. Moreover, when laws or duties seem to conflict, decision on the right course to pursue is not immediate, but often involves laborious reflection. Lastly, if we can give no account of our moral valuations, we cannot convince one who dissents; all equally conscientious conduct will be equally laudable, however foolish or barbarous it may be.

If we are to show that our duties are constituents of an *intelligible* idea, we must start, as the Greeks started, from a consideration of the question: What is the true welfare of a rational human being? An apparently simple answer to this question is, Pleasure. A thoroughgoing egoistic hedonism, such as the Cyrenaic, bids us cull the pleasures of the moment, whencesoever they arise. But, since such extravagant pleasure-seeking defeats its own end, the more practical, though less consistent, hedonism of the Epicureans looks beyond the moment and chooses among pleasures, preferring calm to violent intensity. Social hedonism (or *Utilitarianism*), on the other hand, whilst agreeing that welfare or happiness consists in pleasures, finds the end of action in the happiness of the greatest number, and not of the agent alone. Bentham, the founder of Utilitarianism, was more interested in legislative reform than in ethics, and scarcely attempted to reconcile this doctrine with his belief in the natural selfishness of mankind. He merely pointed out that fear of the punishments or 'sanctions' imposed by God, nature, public opinion, and law acts as a restraining force upon self-indulgence. But on this showing the most praiseworthy man would be he who combines successful selfishness with skilful evasion of the penalties. J. S. Mill added to the list of *sanctions* the internal or moral sanction of conscience, but this cannot furnish a bridge from natural selfishness to altruism, because unless we already approved unselfish action, we should not feel remorse for selfishness, nor do we gain the pleasures of a satisfied conscience if our aim is nothing higher than simply to gain them. Mill further suggested that, just as a miser may come to love money for its own sake, so naturally selfish man, finding beneficence pleasant, may come to love disinterested virtue by unreflective association. But were our approval of virtue thus irrational, reflection would soon convince us of our folly. The fact is that a consistent hedonism must be selfish; Utilitarianism as an ethical theory is inconsequent, though well-meaning. Mill was practically abandoning hedonism when he maintained that pleasures differ qualitatively in value. Bentham had held that any pleasure is as good as another if it is as intense, as fruitful of further pleasures, as free from consequent pains, and the like; and this must be so; if welfare consists merely in feeling pleased. Mill rightly recognised that this doctrine is subversive of morality: it is better to be Socrates dissatisfied than a pig satisfied. But if some pleasures are higher than others, their greater value must depend, not on their character as feelings, but on the activities and purposes from which they result; and we can no longer attempt to find man's welfare simply in the satisfaction of his nature as a sensitive being. Herbert Spencer's attempt to re-establish hedonism upon the doctrine of evolution really succeeded, not in its purpose, but in showing that function is more important than feeling.

Whilst consistent hedonism regards all pleasures as good alike, those schools of thought which may be roughly classed together as *ascetic* tend to regard pleasure as not a good at all, or even as positively an evil. Virtue, they say, is the only good, but they represent virtue as consisting essentially in the suppression of desire. They exaggerate the truth that self-restraint is necessary to all good living for men into the doctrine that the excision of passion and desire is the ideal of conduct. But regulation is a very different thing from excision. The orderly family life, for instance, which largely is (and ought still more to be) the basis of our social organisation, involves restraint of sensual passion, but would be impossible were passion abolished. Asceticism sunders reason from feeling and desire, and so leaves reason nothing to busy itself about. The reasonable man is not really one who lacks desires, but simply one whose desires

are reasonably ordered and directed. The examples of the *Cynics* (q.v.) and of the early anchorites of Eastern Christianity (on whom *vide* Lecky, *History of European Morals*, ii. 101 f.) show how intimately the highest exercises of human nature are inbound with its most primitive impulses; for in attempting to cut out desire and passion they had to abandon society and civilisation and human love for a life of isolation too often genuinely sordid, but not often genuinely humble. The attitude of the *Stoics* (q.v.) was more dignified, and in its way even heroic; but theirs too is the negative morality of 'natures over-proud,' who regard the ordinary joys and sorrows of our life as at best 'indifferent,' and think that if one likes to do a thing, doing it is very likely wrong, and is certainly morally worthless.

In Kant also is to be found a similar opposition of duty to inclination. In a purely reasonable being, indeed, such as God, reason and will would coincide; we cannot conceive of a moral struggle in God. But we have also a sensuous nature and like to do much which we ought not to do; therefore, the moral law appears to us in the form of an imperative of duty, which claims obedience, not as a means to happiness or anything else, but absolutely or, as Kant says, categorically. But Kant makes this rift in human nature radical; the only moral motive is reverence for the moral law; conduct has moral value only when it springs from sense of duty, none when it springs from inclination; and instead of pointing to a higher stage when desire and duty shall be reconciled, Kant rather argues that the fiercer the struggle, the greater is the merit of right action. So far Kant leaves the moral law empty and formal, nor does he help matters much by the doctrine already mentioned, that we can test the rightness of proposed conduct by asking whether we could wish every one to act in the same way. This is a useful warning against making exceptions in our own case, but pressed further is hardly true. His subsequent doctrines—that we should treat humanity always as an end, aiming at the happiness of others and our own perfection, and that we should keep before us the ideal of a 'kingdom of ends' or society of free unselfish moral agents—whilst an advance towards a more substantial morality, are scarcely consistent with his premises.

In Plato and Aristotle, and again in modern *idealism*, is found a broader conception of welfare as the systematic, harmonious, and comprehensive realisation of capacity, or, in more simple language, as 'making the most of oneself.' Welfare cannot indeed be described in detail, just because it is an ideal never completely attained, and even to mention its main constituents separately obscures their vital interconnection in actual experience. But it does not, as asceticism holds, exclude pleasures, or even sensual pleasures. The sensual man's error lies, not in thinking bodily pleasures good, but in neglecting the more specifically human goods, such as the acquirement and advancement of knowledge, the appreciation and production of beauty, the reception and reciprocation of friendship and love, the worship of God and enjoyment of divine peace. Moral virtue aims at the attainment of these goods for oneself and others. Not for oneself only, for the good of man as a social being must be a social good. Making the most of oneself does not mean hurting one's neighbour, and it is an error to oppose self and others as if the unselfish really lost through seeking the good of others and the selfish attained real good at the cost of others. Selfishness, even when not sensual, is always narrow, and its last stage, as Plato shows in his sketch of the Tyrant, is desolation. Even when he thinks that he has got all that he wanted from life, he has lost the love of others and the feeling for their good, and thereby has lost the power of genuinely appreciating all that is greatest and most beautiful in thought and art. Plato says that the unjust man, whilst always in truth miserable, is most miserable if he goes undetected and unpunished; and similarly it may be said of the selfish man that he loses most if he never recognises his loss.

References: R. A. P. Rogers's *Short History of Ethics* and H. Sidgwick's *Outlines of the History of Ethics* are convenient historical surveys of the subject. Of numerous text-books there may be specially mentioned J. S. Mackenzie's *Manual of Ethics* and J. H. Muirhead's *Elements of Ethics*. Both give numerous references to the literature of the subject, and the latter has also a useful bibliography of the chief English works. Selby-Bigge's *British Moralists* contains selections from writers of the XVII. and XVIII. cent's, with introduction and an excellent index.

ETHIOPIA ('land of the swarthy-faced'), name given by the ancients to an extensive tract of country on both sides of the Upper Nile. It was bounded on the N. by Egypt, on the E. by the Red Sea, and is covered by the modern Nubia and Abyssinia. It was also the Hebrew 'Cush' referred to in the Bible. The capital was Meroë, which became one of the principal trade centres of the ancient world. It was conquered by Cambyses, king of Persia, about 530 B.C.; and again, in later times, by Augustus. In the days of Nero Meroë was in ruins. Traces of its ancient glory, however, are still to be found.

ETHNOLOGY, science treating of relations of races to each other; distinguished from ANTHROPOLOGY, the study of man in relationship to other mammals. See RACES OF MANKIND.

ETHYL (C_2H_5), hypothetical alkyl radical, base of *Ethyl Series* of organic compounds; nearest affinity is $(C_2H_5)_2$, inflammable gas soluble in alcohol; compounds include ALCOHOL (C_2H_5OH) (*q.v.*), ETHYLAMINE, formed by replacing one to three atoms of hydrogen in ammonia by ethyl; $C_2H_5NH_2$ (mono-ethylamine) is a volatile inflammable liquid with strong basic properties. ETHYL CHLORIDE (C_2H_5Cl) is formed by union of alcohol and hydrochloric acid; volatile liquid used as local anæsthetic; ETHER (*q.v.*) is ethyl oxide $(C_2H_5)_2O$.

ETHYL ALCOHOLS, see ALCOHOLS.

ETHYLENE, see OLEFINES.

ÉTIENNE, CHARLES GUILLAUME (1778–1845), Fr. dramatist.

ETNA (37° 44′ N., 15° E.), volcano, Sicily; height, *c.* 10,760 ft.; summit generally under snow; central districts wooded; soil at base fertile, producing fruits and vegetables; observatory situated about 1000 ft. below summit; last eruption, 1910. See SICILY.

ETNA (40° 29′ N., 80° 1′ W.), town, Pennsylvania, U.S.A. Pop. (1910) 5830.

ETON (51° 29′ N., 0° 37′ W.), town, Buckinghamshire, on N. bank of Thames opposite Windsor; famous for Coll. founded by Henry VI. (1440) and completed next century; beautiful old buildings including quadrangles and chapel; many additions since; new buildings (opened by Edward VII.) have library and classical museum. Among famous Etonians were: Chatham, Fox, Canning, Gladstone, Shelley, the Walpoles, and Wellington. Pop. (1911) 3192.

ÉTRETAT (49° 43′ N., 0° 13′ E.), seaside resort, Seine-Inférieure, France.

ETRURIA (*c.* 43° 14′ N., 11° 25′ E.), a district of ancient Italy, probably including in early times N. Italy, between Alps and Tibor, but later reduced to district bounded by the Arno, Apennines, and the Tiber. Formerly inhabited by Etruscans—a powerful people of whose history little reliable is known, and whose origin is much disputed. Etruscans' own account was that they came from Lybia and formed a mixed race with the *Rasena*, who emigrated from N. Italy; modern critics incline to the view that a Pelasgic race subdued the Umbrians and were conquered by Rhætian people, called Rasena. Etruria was divided into three great nations occupying Circumpadane Etruria in N.; Etruria Proper in centre; and Campania in S.

Time when Etruscan civilisation began is calculated from objects found in tombs, at about 1000 B.C. Little

is known of history, but before VI. cent. E. probably held sway over Mantua, Felsina, Melpum, and perhaps Latium and Campania; last three kings of Rome were Etruscans. After expulsion of Tarquins, E. strove in vain to get foothold in Rome under Lars Porsena of Clusium; was subjected to Rome in 283, and ultimately defeated by Q. Fabius Maximus at battle of Vademonian Lake (*c.* 310); after this E. gradually lost independence and was absorbed in the Roman State. A former treaty with Carthage, by which E.—who held power over shipping in Tyrrhenian Sea—got Corsica and Carthage Sardinia, proves their one-time proud position.

E. was once thickly populated with well-distributed towns, of which the chief were: Veii, Tarquinii, Falerii, Cære, Volci, Clusium, Cortona, Perusia, Volsinii, Arretium, Fæsulæ, and Populonium. The people were great warriors, and the country drew much wealth from its agriculture and forestry, for which the land was exceedingly well adapted, with rich soil for crops and cattle; fine tracts of forests; and the three rivers, Arnus, Umbro, and Tibor. E. also amassed great wealth by her commerce, and became an important centre for foreign traders.

At first the government lay with the kings, who were elected for life, but these were greatly dependent upon State leaders and aristocracy; later, the office of kingship was abolished and magistrates appointed. A league of twelve cities met at Temple of Voltumna. The people were divided into three classes: aristocracy, the curiæ, and slaves; their habits and customs are mostly to be deduced from pictures and carvings found in excavated tombs; these indicate a manner of living similar to Romans; large houses, rich garments and armour (spears, swords, daggers, shields, greaves, and helmet) in bronze and iron and of Roman type, athletics, games, gladiators, dancing, and music. Religion incurred much human sacrifice to gods (many of Gk. and Rom. origin). Etruscans were not brilliant in art, but pictures and statuary are of good standard; best paintings and fine gold and silver ornaments found at Tarquinii, Chiusi, Volci, Cære, and Veii. The Etruscan language disappeared after the III. cent. B.C.

E. was restored by Napoleon (1801), and united to Fr. Empire (1807); for later history, see TUSCANY.

Dennis, *Cities and Cemeteries of Etruria* (2nd ed., 1878).

ETTENHEIM (48° 15′ N., 7° 48′ E.), town, Baden, Germany. Pop. 3106.

ETTLINGEN (48° 57′ N., 8° 25′ E.), town, Baden, Germany. Pop. 8668.

ETTMÜLLER, ERNST MORITZ LUDWIG (1802–77), Ger. philologist.

ETTMÜLLER, MICHAEL (1644–83), Ger. physician, prof. of Bot. (1676), and also prof. of Surgery and Anatomy, at Leipsig; author of many medical works. ETTMÜLLER, MICHAEL ERNST (1673–1732), s. of above; prof. of Medicine (1702), and afterwards, at different times, of Anatomy, Surgery, Physiology, and Pathology at Leipzig.

ETTRICK (55° 29′ N., 3° 3′ W.), river, Selkirkshire, Scotland; joins Tweed; near source is village and parish of E. (55° 26′ N., 3° 12′ W.). The *Ettrick Shepherd* was James Hogg (*q.v.*).

ETTY, WILLIAM, R.A. (1787–1849), Eng. artist; painter of hist. subjects; great colourist; untiring student of anatomy. His landscapes and drapery always harmonise admirably with his figures.

ETYMOLOGY, science treating of the origin and history of words.

EU (50° 2′ N., 1° 25′ E.), town, Seine-Inférieure, France; has XVI.-cent. castle, damaged by fire, 1902; fine Gothic church; Jesuit chapel; manufactures flour. Pop. 5400.

EUBŒA (38° N., 24° E.), largest island, Grecian Archipelago; separated from mainland on S.W. by channel, N.W. part of which was anciently called Eubœan Sea and narrowest part Euripidus (*c.* 120 ft.), and spanned by bridge; area, 1505 sq. miles. Chief town, Carystos. E. coast is steep and rocky, W. sloping gradually; interior wooded, fertile, mountainous; hot springs in N.; iron, coal, and marble in S. Principal products—corn, oil, wine; minerals—lignite and chrome ores. People mostly Greeks and Albanians. E. was subjugated by Athenians, Philip of Macedon, Romans, Venetians, and Turks. Part of Greece since 1830. Pop. 116,903.

EUBULUS (fl. *c.* 350 B.C.), Athenian statesman; famed for his financial abilities and love of peace, in which latter policy he had a strong opponent in Demosthenes.

EUBULUS (fl. 370 B.C.), Gk. comic dramatist.

EUCALYPTUS, genus of trees of natural order *Myrtaceæ*, including about 150 species, growing chiefly in Australia and Tasmania, often to the height of 150–200 ft., and sometimes to 450–500 ft. Many species are called gum-trees, from their resinous exudations, and their leaves are leathery, containing numerous oil-glands. They are believed to assist in the prevention of malaria in marshy districts, probably rather by the drainage of the large roots than from the antiseptic action of the smell. From the *E. rostrata* a red gum is obtained, used medicinally as a powerful astringent, while the oil distilled from the *E. globulus* is used as an antiseptic for wounds, etc., and internally as a spray in diphtheria or foul bronchitis, also as a stomachic, or for lowering the temperature, etc., in the same way as quinine, to which, however, for this purpose it is inferior.

EUCHARIST.—The beginning of the E. is to be found in the Last Supper instituted by Christ. According to the Synoptic Gospels it was a Paschal meal, according to St. John it was not. Probably the latter is right. The ideas underlying it of sacrifice and communion are to be found among the Jews and other ancient peoples (see Robertson Smith, *Religion of the Semites*). The earliest New Testament account is in *1 Corinthians* 11, where the words, 'I have received of the Lord,' refer to a special divine revelation to Paul. The account in *St. Mark* comes next, where the words, 'I will not henceforth drink of the fruit of the vine,' have, it has been said, an antique ring about them. The Lucan and Matthean narratives add the words, 'This is my blood, etc.,' but are probably due to the influence of the Pauline passage. St. Luke puts the delivery of the cup before the bread. St. John is very different, with no commemorative rite. Some have denied on quite insufficient grounds the historicity of the Markan narrative. In the *Acts* we read that the Christian Church was continual in the 'breaking of bread and in prayers.' Catholic theologians have believed this justifies communion 'in one kind.' Of extra canonical accounts of Eucharistic observance one of the most important is that in the *Didaché*, in which occur the words, 'As this broken bread was scattered upon the mountains and being gathered together became one, so may Thy Church be gathered together from the ends of the earth into Thy kingdom.'

Much dispute has arisen over the possible identification of the primitive E. with the *Agape* or love feast. Probably they were at first united, then separated, and the Agape gradually died out. From the beginning the E. was commemorative of the death of Christ, and symbolic language, the precise theological implication of which it is very difficult to determine, was used. Gradually the conception of the Eucharist as a sacrifice became more definite, the perpetuation of the sacrifice on Calvary. This was the predominant one in Mediæval Theol and is the distinguishing characteristic of the Catholic Mass. The doctrine of *Transubstantiation*, the actual identification of the sacramentally consecrated elements with the body and blood of Christ, was defined by the Lateran Council of 1215, confirmed and elaborated by the Council of Trent of 1565, and is the official doctrine of the Rom. Church. At the Reformation the Prot. churches all departed more or less from the Catholic doctrine. The Lutheran view was not *transubstantia-*

tion, but *consubstantiation*, the body and blood of Christ were present, not in, but with, the elements. Protestants now generally view the rite as entirely symbolical. In the Anglican Church various views are prevalent, the Anglo-Catholic party asserting belief in a *real* though not a corporeal presence. In most Non-conformist churches the E. is observed, though in some it is dropped. Quakers have never observed it. It has not generally the importance in religious life among Protestants which it has with Catholics. The forms of celebration differ widely, the Anglican is like the primitive, the Rom. very ancient in parts, the Gk. considerably different.

Harnack, *History of Doctrine*; P. Gardner, *The Origin of the Lord's Supper*.

EUCHRE, card game, very popular in U.S. and Australia. It is played by two or more persons with thirty-two cards, all cards below seven being withdrawn from the pack.

EUCKEN, RUDOLF CHRISTOPH (1846–), Ger. philosopher; prof. of Philosophy, Univ. of Jena (1874–); earlier writings historical, later, constructive; philosophy not merely intellectualistic, but religious inspiration applied to practical problems; awarded Nobel prize for Lit. (1908); originator of ACTIVISM.

He maintains that by Action comes Truth, that Action is the safest cure for all evils that beset humanity, that while Contemplation is apt to warp the intelligence, Action strengthens and develops the mind. Like pragmatism, activism sees in truth a matter of life rather than of reason.

E.: a philosophy of Life, by A. J. Jones (1912).

EUCLID, Gk. mathematician of III. cent. B.C.; nothing known of life except that he taught math's at Alexandria; immortalised by works, *Elements of Geometry* and *Data*; object of latter is to show that, given certain data, other facts can be determined from them; in famous *Elements* (13 books) hardly any important geometrical truth is omitted, and the demonstrations are so remarkably clear, concise, and exact, that for the last 2000 years the work has everywhere been used as an introduction to the study of geometry; also attributed to E.: *Porisms* (3 books), *Conic Sections* (4 books), *Fallacies*.

Thomas Smith, *E.: his Life and System* (1902).

EUCRATIDES (*c.* 175–129 B.C.), king of Bactria; opponent of Demetrius, whose dynasty he dethroned; kingdom extended to W. India; murdered by his s.

EUDÆMONISM, any ethical theory may properly be called eudæmonistic which holds that the moral end, by reference to which the moral value of action should be determined, consists in Welfare and Happiness (*eudaimonia*); but generally the term is applied only to hedonistic theories that identify Happiness with Pleasure.

EUDOCIA AUGUSTA (401–460), wife of Theodosius II., Byzantine emperor; celebrated for her literary gifts; wrote poems, and paraphases of scriptural works.

EUDOXIA LOPUKHINA (1669–1731), Russ. Empress; m. Peter the Great (1689), but the union proved unhappy. Famed for her beauty and asceticism, she was soon neglected by her husband, and subsequently took the veil.

EUGANEAN HILLS (45° 18′ N., 11° 40′ E.), volcanic mountain range, N. Italy; highest peak, Monte Venda, 1750 ft.

EUGENE (44° 3′ N., 122° 51′ W.), town, Oregon, U.S.A. Pop. (1910) 9009.

EUGENE OF SAVOY, PRINCE (1663–1736), s. of Prince E. Maurice; owing to dislike of Louis XIV., entered service of Emperor Leopold I.; served on Rhine; defeated Turks at Zenta (1697); fought in War of Spanish Succession (1699); with Marlborough at Blenheim (1704); fought against Fr. at Cassano (1705), and wounded (1706); gov. of Milan (1707); fought in Flanders, at Oudenarde (1708), and Malplaquet (1709); continued war against France when Britain had withdrawn from alliance; returned to Vienna (1714); commander against Turks (1717), and defeated them with great slaughter in battle of Belgrade (1717); peace was concluded (1718); made vicar-gen. of Italy (1724); again went on campaign against France (1734), but returned after peace of 1736. He was a daring commander, reckless of his soldiers' lives.

Malleson, *Prince Eugene*.

EUGENICS (Gk. *eu*, well, and *genos*, race), the science which treats of the physical well-being of a race and of the influences which tend towards improvement or degeneration. From early times efforts have been made by various nations to produce a physically sound race; the Spartans, for instance, exposed newborn children on hilltops to weed out weaklings, thus producing the finest men, if the most uncultured and unintellectual, in the whole of Greece. It was left, however, to Sir Francis Galton (*q.v.*) to crystallise the idea into a science. Besides writing and research, Galton founded a chair of Eugenics in the University of London, now held by Pearson, who has directed much valuable statistical research, which has not been impugned. Eugenists hold that nature is much more important than nurture (their relations being expressed by 6 to 1). Goring confirmed the earlier work of Heron, proving, from statistics taken from criminals (assumed to represent for this purpose a chance selection of the general population), that consumption is almost if not wholly due to heredity. Drunkenness is also stated to be much less due to surroundings than to inherited tendencies. Other work of the Eugenists claims to prove that the professional classes are much less fertile in production than the wastrels of the community, and to check one factor in the consequent increase of the less fit, the Mental Deficiency Bill was introduced in 1912, but was almost immediately dropped.

Though the movement has the usual number of camp-followers, who bring e. into disrepute by their fantastic theorising, it is a most valuable science, and one which, if properly put into practice, will certainly raise the physical standard of mankind. There is in Britain a E. Society, a monthly review, and an International Congress was held in 1912. Most of the periodicals are published in Germany, where the movement has spread with marvellous rapidity.

Pearson, *The Scope and Importance of National Eugenics* (Dulau & Co.); Elderton, *The Relative Strength of Nurture and Nature* (Dulau); Pearson, *Tuberculosis, Heredity, and Environment* (Dulau).

EUGÉNIE, EX-EMPRESS, MARIE-EUGÉNIE-IGNACE-AUGUSTINE DE MONTIJO (1826–), b. Granada; of Span., Ital., and Scot. descent; m. Louis Napoleon, afterwards Napoleon III. (1853); retired to Chislehurst, Kent, with deposed emperor and s., the Prince Imperial (1871).

EUGENIUS, name of four popes, of whom the most important were: E. III. (1145–53), pupil of St. Bernard. During his reign Arnold of Brescia was for a time supreme in Rome, and Second Crusade took place. E. IV. (1431–47) engaged in strife with the Colonna family; deposed by the Council of Basel, but restored (1443).

EUGUBINE TABLES, see IGUVIUM.

EUHEMERUS (fl. 300 B.C.), Gk. writer on mythology.

EULABES, a bird. See GRACKLE.

EULACHON, see under SALMON FAMILY.

EULENSPIEGEL, TILL, hero of a XVI.-cent. Ger. chap-book, full of coarse rustic jests and broad satire.

EULER, LEONHARD (1707–83), eminent Swiss mathematician; b. Basel; Bernouilli's pupil; prof. at St. Petersburg (1730); at Berlin at invitation of Frederick the Great (1741–66); returned to St. Petersburg, where he died; awarded Academy Prize ten times; totally blind during last years of life. E. chiefly worked at problems left by Newton. Wrote *Théorie de la Construction et de la Manœuvre des Vaisseaux*;

Institutions of the Differential and Integral Calculus; *Theory of Planetary Motion*. *Life* by Rudio (1884).

EUMALACOSTRACA, see under MALACOSTRACA.

EUMENES (d. c. 316 B.C.), famous Macedonian gen. who, after serving under Philip II. and Alexander, became ruler over Cappadocia.

EUMENES I., king of Pergamum (263–241 B.C.). **EUMENES II.**, king, 197–159 B.C.; formed alliance with Rome; Pergamum flourished in his reign.

EUMENIDÆ, see WASPS.

EUMENIDES, THE, see ERINYES.

EUMENIUS (*c.* 260–311 A.D.), Rom. panegyrist.

EUMOLPUS (classical myth.), reputed founder of the Eleusinian mysteries.

EUNOMIUS (d. *c.* 394), bp. of Cyzicus; was leader of extreme Arian party; his heresy condemned by Council of Constantinople.

EUNUCHS, emasculated male persons; commonly employed as servants in Oriental harems.

EUPALINUS, Gk. architect who constructed an aqueduct for Polycrates of Samos (d. 522 B.C.), which still exists.

EUPATORIA (45° 11′ N., 33° 22′ E.), port, Russia, on W. coast of Crimea. Pop. 17,915.

EUPATORIUM, family of composite plants common in America, and found in parts of Europe; various species used medicinally, and others in dyeing and tanning.

EUPATRIDÆ, nobility of Attica; probably they alone possessed political power, and not the *Geomori* (country folk) or *Demiurgi* (artisans); only a Eupatrid could be *polemarch* or *archon*.

EUPEN (50° 37′ N., 6° 3′ E.), town, Rhine province, Prussia. Pop. (1910) 13,540.

EUPHAUSIACEA, see under MALACOSTRACA.

EUPHEMISM, soft or pleasant turn given to the expression of a rude or unpleasant fact.

EUPHONIUM, brass wind instrument of saxhorn family, with four and sometimes five valves; usual pitch, C or B flat.

EUPHORBIA, oil obtained from seeds of *E. lathyris*; similar to croton oil; EUPHORBIUM is resin obtained from various African species of e.; used in liniments, etc.; both preparations are strong and pungent.

EUPHORBIACEÆ, dicotyledons characterised by the extreme variety of their vegetative organs, being mostly fleshy leaved herbs in Britain, shrubby or tree-like in the tropics, many possessing a cylindrical succulent stem with the leaves reduced to spines. The tissues contain *latex*, that of Hevea and Manihot when dried forming commercial rubber. The flowers are unisexual, and in Euphorbia are much reduced. They are massed together in a specialised inflorescence termed a *Cyathium*. Each cyathium consists of a single centrally-placed female flower surrounded by five groups of male flowers represented by one stamen.

EUPHORION (fl. 220 B.C.), Gk. poet and grammarian; valued elegies.

EUPHRANOR (IV. cent. B.C.), Gk. artist and sculptor.

EUPHRASIA, see EYEBRIGHT.

EUPHRATES (31° N., 47° 22 E.), largest river in W. Asia. Total length, *c.* 1800 miles; breadth varies greatly, above estuary ½ mile. Source, in Armenia, consists of two arms, Kara Su (rising N.E. of Erzerum) and Murad Su (rising near Lake Van, and joining near Keban Maadin); flows through mountainous region of Taurus; lower down separates Mesopotamia from Syria and Syrian Arabia; joined by Tigris at Kurna; united rivers called Shat-el-Arab, and flows into Persian Gulf by many branches. Upper course is wild and mountainous; country levels near Hit, and river in middle and lower courses flows through plains, deserts, and swamps, sparsely cultivated and inhabited by lawless Bedouin Arabs. Between Ana and Hit river is studded with islands. In ancient times rich cultivated plain well watered by canals; several mouths of smaller canals still kept open. Near Basra quantities of dates and rice are grown. Banks of river teem with ancient remains representing all periods; site of Babylon. Principal tributaries: Sajur, Balik-Su, Khabúr, and Kharúm. Present chief towns: Samsat, Bir, Ana, Hit, Hilla, and Basra. Formerly used as means of transportation, even of armies, now, owing to rapids, currents, falls, rocks, and ruins of dams, river is rendered unnavigable in middle and upper courses. Chesney's expeditions (*c.* 1830–35) discovered navigation impossible above Bir, except for native rafts. Great floods take place, due to melting snows on mountains of upper course.

Chesney, *Euphrates Expedition* (1850); Geere, *By Nile and Euphrates* (1904).

EUPHUISM, name for a stilted style of writing invented by John Lyly (*q.v.*) in fantastic romance *Euphues* (1579–80). It was intended for the reading of the upper classes; naturalness was carefully avoided, the style being distinguished by far-fetched metaphors, similes, and alliteration. Queen Elizabeth succumbed to it; Shakespeare mocked at it in *Love's Labour's Lost*. Greene and others imitated it; but its vogue was exhausted early in James I.'s reign.

EUPLECTELLA, see under SPONGES.

EUPOLIS (fl. 446–411 B.C.), Gk. comic poet; rival of Cratinus and Aristophanes.

EUPOMPUS (IV. cent.), Gk. artist.

EURAFRICAN, offspring of European and native African.

EURASIAN, term used to designate half-castes sprung from Europeans and Asiatics; principally in India. *Eurasia* in geography is Europe and Asia taken together.

EURE (49° 5′ N., 1′ E.), department, N.W. France; area, 2330 sq. miles; drained by Eure and Seine; produces cereals, timber, flax, fruit. Pop. (1911) 323,651.

EURE-ET-LOIR (48° 25′ N., 1° 30′ E.), department, N.W. France; area, *c.* 2291 sq. miles; drained by Eure, Loir, and Seine; produces wheat, silk, cider; woollens. Pop. (1911) 272,255.

EUREKA (40° 52′ N., 123° 58′ W.), port, California, U.S.A. Pop. (1910) 11,845.

EUREKA SPRINGS (36° 24′ N., 93° 45′ W.), town and health resort, Arkansas, U.S.A.; has famous medicinal springs. Pop. 3572.

EURIPIDES (480–406 B.C.), Gk. tragic dramatist; b. Salamis; s. of Mnesarchus, a wealthy trader; was intended for an athlete, but adopted painting, subsequently turned to dramatic work, and brought out his first play, the *Peliades*, at the age of twenty-five. E. is said to have written about ninety plays; gained the first prize at the age of thirty-five, and four times subsequently. Unlike his great contemporaries, Æschylus and Sophocles, he appears to have taken no part in public affairs. On the contrary, he is known to have been a student and recluse; his domestic life is said to have been unhappy, and he doubtless suffered from the attacks of his great contemporary, Aristophanes (*q.v.*). In later life he forsook Athens and made his home at the court of Archelaus, king of Macedon, and tradition attributes his death to violence at the instance of jealous enemies. His extant works include: *Alcestis*, *Medea*, *Hippolytus*, *Hecuba*, *Andromache*, *Suppliants*, *Ion*, *Heraclidæ*, *Troades*, *Helena*, *Phœnissæ*, *Orestes*, *Bacchæ*, *Iphigenia in Aulis*, *Hercules Furens*, *Iphigenia in Tauris*, *Electra*, and *The Cyclops*. As has been explained elsewhere (DRAMA), E. ranks below Æschylus and Sophocles, but his plays served as the model for later writers.

Donne, *Euripides*; A. D. Thomson, *Euripides and the Attic Orators*; Decharme, *Euripides and the Spirit of his Dramas* (Eng. trans.); Verrall, *Euripides, the Rationalist*.

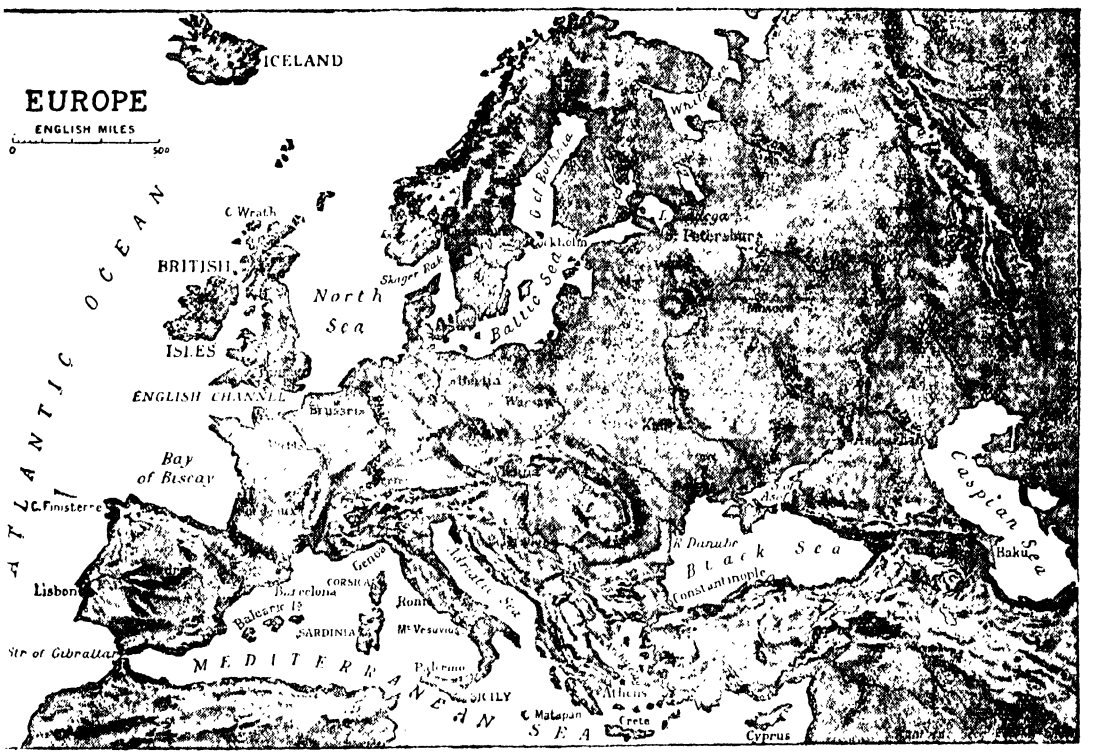
EUROPA (classical myth.), dau. of Agenor, king of Phœnicia; carried away to Crete by Zeus, under form of white bull, and became mother of Minos, Sarpedon, and Rhadamanthus.

EUROPE, the most westerly and smallest continent of the Old World, has an area of 3,750,000 sq.

miles; its mainland lies between 36° and 71° 6′ N., and between 66° 20′ E. and 9° 30′ W. The extreme length (from Nordkyn on the N. to the S. of Greece) is about 2400 miles, the extreme width from E. to W. about 3000 miles. Europe is bounded N. by the Arctic Ocean, on the E. (from Asia) by the Ural Mountains, Ural River, and the Caspian Sea, S. and S.E. by the Caucasus, Black Sea, Bosphorus, Sea of Marmora, Dardanelles, and Ægean Sea, S. by the Mediterranean as far as the Strait of Gibraltar, where Europe is 8½ miles distant from N.W. Africa, W. by the Atlantic Ocean.

Physical Features.—The Brit. Isles are separated from the mainland by the Eng. Channel and North Sea, Iceland by the North Sea, Novaya Zemlya, Spitzbergen, etc., by the Arctic Ocean. The coast-line, about 48,000 miles in extent, is very much broken. It throws out the great south-pointing peninsulas of Norway and Sweden goes westward by the Carpathians, the hills of the Crimea, and the Caucasus to the Caspian Sea; there are N. offshoots in the Vosges and mountains of Bohemia and S. Germany, and S. offshoots in the Apennines, the Dinaric Alps, and Pindus range, and the Transylvanian Alps and Balkans.

About two-thirds of the surface is a great plain, of which the greater part is under 600 ft. above sea-level. It begins in S. of England and extends through N. and E. of France (which was united to England in a recent geological period), N.E. to the tundras along the Arctic Ocean, and E. and S.E. to the Caspian and Black Seas; low lands extend along the coast and lower courses of rivers of Portugal, Spain, S. France, Italy, Turkey, and Greece; and along the Danube, encircled by the Alps, Carpathians, and Balkans, are the plains of Hungary and Walachia. A considerable area around the N. end of the Caspian Sea is below



(Scandinavia) on the north, Spain and Portugal (Iberian Peninsula), Italy, and that of Turkey, Greece, and the Crimea on the south, and the north-pointing peninsula of Denmark. All along it are islands, sheltered roadsteads, and situations for harbours. The many land-locked seas and considerable inlets and the navigable rivers bring a large area within convenient reach of the sea. Except in Russia no place is more than 300 miles from the sea, and the great plain of Hungary is the only large region from which access to the sea is difficult. In the N. traffic is interrupted in winter by the freezing of seas and waterways.

The mountainous regions are three: the chain along the west of Scandinavia, the Urals, and a series of chains running E. and W. across the centre and south. This third line begins at the Atlantic in the ridges of the Span. plateau, continues along the Cantabrian Mountains and the Pyrenees, passes through France by the mountains of Auvergne and the Cevennes to the Jura and the Alps, and thence sea-level. There are two great lake areas, one in the low-lying district round the Baltic, the other in the mountainous region of the Alps, both districts which have been subjected to intense ice action.

The Alps and the Valdai Hills are the principal watersheds; from the former flow the Rhine (to the North Sea), Rhône, Po, and Adige (to the Mediterranean), and the Danube (to the Black Sea); from the latter descend the N. Dvina (to the White Sea), the Volga (to the Caspian), the Don and Dneiper (to the Black Sea), the W. Dvina and Niemen (to the Baltic). The countries of Europe are, in order of size, Russia, Austria-Hungary, Germany, France, Spain, Sweden, Norway, Britain, Italy, Rumania, Bulgaria, Greece, Servia, Portugal, Turkey, Switzerland, Denmark, the Netherlands, Belgium, Albania, Montenegro, Luxemburg, Andorra, Lichtenstein, San Marino, and Monaco.

GEOLOGY.—Archæan and Palæozoic rocks appear in the N. (the Outer Hebrides, Norway, N. Russia, etc.),

and in the great mountain ranges above mentioned. S. of the northern band Cambrian, Silurian, Devonian, and Carboniferous strata were deposited, stretching from Cumberland and Wales eastward. Then followed the Permian, Palæozoic, and Mesozoic periods, during which the sea covered much of S. and central Europe, the Cretaceous period, in which there was a great upheaval, continued in the Eocene, Miocene, and Pliocene periods, the last-named being the age of volcanoes. The Glacial period practically completed the conformation of the continent. The precious metals are not found in abundance, but there are rich veins of coal (chiefly in Britain, Belgium, France, Germany), iron (the same, Sweden, and Spain), copper (Sweden and Spain), lead (Spain), zinc (Germany), mercury (Spain and Austria), sulphur (Sicily), and salt (Austria).

Owing to the position of the continent in the N. temperature zone, the influence of the Gulf Stream along the N.W., the large amount of inland water, and the slope and exposure of the great plain, Europe has more temperate yet more varied CLIMATE than any other continent. The extreme N. is arctic, the sheltered Mediterranean district sub-tropical. The S.W. winds, blowing over the warm Gulf Stream, bring abundant moisture and heat which are arrested by no western mountains; nowhere is agriculture impossible owing to drought except in S.E. of Russia and in interior of Spain. As a rule, rainfall decreases and temperature increases from W. to E.

FLORA and FAUNA vary in accordance with climate; *i.e.* from sub-arctic to sub-tropical. Indigenous animals include bear, wolf, elk, chamois, many species of deer, foxes, hares, and rabbits. A few bison are left in Central Europe. The North Sea provides a valuable fishing-ground for herring, cod, mackerel, etc., while tunny-fishing is an important Mediterranean industry. Of native trees, fir, oak, apple, pear, and cherry are the most common; while many varieties, *e.g.* myrtle and fig, imported centuries ago from Asia; are found to thrive excellently.

Every cultivated product can be grown farther N. than in other continents. The central regions produce timber, fibres, cereals, and hardier fruits, the S. sub-tropical fruits, the N. the hardier cereals; abundance of pasture and excellent fisheries.

Races.—The languages spoken may be classified as Indo-European, Semitic, and Slav, the races roughly described as Caucasian. The question of races is by no means settled, but ethnologists, now entirely disregarding the test of language, tend to divide European races into the three chief classes of 'Teutonic' (tall, dolichocephalic, with blue eyes and fair hair), 'Mediterranean' (of middle height, dolichocephalic, with dark hair and eyes), and 'Alpine' (stocky and brachiocephalic, with medium colouring), possibly all modifications of one original European race. The identity of the Iberians, who preceded the Celts in Britain and are to be traced in Spain and elsewhere, is still disputed, while the Celts, it is thought, were midway between the Teutonic and Mediterranean types. The ethnological problems of the Gk. and Ital. peninsulas are still unsolved.

The total population is estimated (1913) at 450,000,000.

HISTORY.

The earliest civilisation of E. was in the Troad, the east coast of Greece (*q.v.*), and the islands of the Ægean Sea. This Pelasgian, Mycenæan, or Minoan period lasted from *c.* 2000–1000 B.C.; the Minoan towns are supposed to have acquired their arts from Egypt through Phœnician traders. The Hellenic period followed, and by the VII. cent. B.C. the highly organised and cultivated city-states of Greece were flourishing, while the rest of Europe was occupied largely by Celtic and Teutonic races, who for many cent's preserved their tribal organisation. One aspect of the history of E. is the fall of the city-state and the tribe before the Empire, and the subsequent overthrow of the Empire by the modern nation. There were signs of unity in Greece in the alternate Athenian and Spartan supremacy, but never any true pan-Hellenic feeling; it was no great disgrace to Medize, and the alliance against Philip of Macedon was too late to save Greece from the decisive defeat at Chæronea (338 B.C.).

The vast Empire of Alexander the Great, the next salient feature of history, broke up after his death in 323 B.C., and was succeeded by the world-power of the **Romans**. The Rom. Empire existed in some form until 1806. Rome ceased to be its centre in 330 A.D. when Constantine the Great established his capital at Byzantium, henceforth Constantinople; it was divided into East (Byzantine) and West in 395, with Rome as the capital of the Western division; it was restored to nominal unity by the deposition of Augustulus, last Rom. emperor of the West, by the Goths in 476, but this event really meant the final division of East and West. The disputes about images in the churches caused the pope and Romans to repudiate the rule of the Byzantine emperor at the close of the VIII. cent., and in 800 Charlemagne, king of the Franks, was crowned emperor by the pope. See ROME; BYZANTINE EMPIRE.

The Empire was attached to Germany from 962 (when Otto I. was crowned, receiving the title of Holy Rom. emperor of the Ger. people) to 1806, although the dignity was elective, and, as in the great contest of 1519, the sovereigns of other lands sometimes became candidates for election. The Byzantine Empire kept alive Gk. civilisation, and protected Europe from the hordes of Asia until 1453, when it fell before the Turks. The Byzantine Empire, however, was a mediæval and Oriental rather than a Rom. State, and the fall of the Western Empire in 476 is always taken to be the end of the ancient and beginning of the modern history of Europe.

Christianity became the religion of the Rom. Empire in 312; it was preached to the Goths by Ulfilas (*q.v.*) in 376; the Irish and Franks were converted in the V. cent., the English, VII. cent., the rest of N. Europe, VIII.–XIII. cent., and Hungary, X. cent. Christianity and the tradition of Empire gave rise to some of the chief characteristics of mediæval Europe; the conception of a theocratic world-power, of which the spiritual side was the papacy, the temporal aspect the emperor, has been ascribed to the Middle Ages. The struggle of papacy and Empire for supremacy in this theocratic government was the chief political fact. The crusades, Gothic arch., and the production of epic and romantic lit. are other salient features. See EMPIRE, HOLY ROMAN.

The XV. cent. saw **The Renaissance**, which largely modified Christian by classical civilisation, and in Spain, France, and England the establishment of strong modern monarchies. The XVI. cent. swept away the notion of the world-power of papacy and Empire, the Reformation being largely an index of the movement to establish independent nations with national churches. The result of the wars of religion, which raged until the Treaty of Westphalia in 1648, was that the principle was established *Cujus regio ejus religio*.

The XVII. cent. was marked by the decline of **Spain**, the leader of Europe since the union of its provinces at the close of the XV. cent. by Ferdinand and Isabella. Their grandson, Charles V., ruled over Spain, the Netherlands, and the Empire, besides monopolising the trade with the New World discovered in 1498 through Span. encouragement. Spain was also the chief Catholic power, and so religious, national, and commercial rivalry united Europe against her.

After the abdication of Charles V. (1555) the Empire was settled on his younger son, and so separated from Spain, but for a cent. the Span. and Austrian Hapsburgs continued to trouble the Balance of Power (*q.v.*), a doctrine which now succeeded the mediæval ideal of a world-empire. Holland successfully secured its independence of Spain, after a fight which exhausted the latter, at the close of the XVI. cent.; Elizabethan sailors inflicted great damage on Span. commerce and

destroyed her fleets, and the last great war of religion, the Thirty Years War (1618–48), left the petty Ger. States practically independent of the emperor. Finally France, the natural enemy of Spain, as situated between Spain and the Span. Netherlands, obtained the aid of Cromwell's Ironsides, brought Spain, which had not accepted the Treaty of Westphalia, to sue for peace, and by the Treaty of the Pyrenees, 1659, tied the hands of Austria and Spain.

The following period, 'the age of Louis XIV.', is that of the ascendancy of **France**. This was one of the most glorious periods of Fr. history, but France was fatally weakened by the wars in which Condé, Turenne, Villars, and others conquered Span. and Ger. territory, and at the close of Louis' reign the successes of Marlborough in the War of the Span. Succession (1702–13) ended with the Treaty of Utrecht, whereby Britain obtained important concessions from both Spain and France, and began to come forward as a great power. At the same time Russia under Peter the Great (1682–1725) had become the chief northern power. The War of the Austrian Succession (1740–48) brought important accessions to Brit. territory overseas at the expense of France. By the accession of Louis XIV.'s grandson, Philip of Anjou, to the throne of Spain in 1700, France and Spain had been drawn together, and Bourbon 'family compacts' were a feature of European politics of this time. The revolt of Britain's Amer. colonies (1775) was assisted by both France and Spain, and Brit. ill-feeling against France lasted after the Treaty of Versailles (1783), by which the independence of U.S.A. was recognised. Britain, Holland, and the king of Prussia made a Triple Alliance in 1788 to guarantee Holland against Fr. aggression.

The **Fr. Revolution** in 1789 dwarfed every other European event; the first modern democracy was temporarily established; **Napoleon** abolished the shadowy Holy Rom. Empire (the emperor retaining that title for his Austrian dominions), became dictator on the Continent, and was a perpetual menace to Britain. At last Britain, which had restrained Napoleon by sea and in Spain, succeeded in forming the great European coalition, which brought his empire to an end in 1814. By the treaties of 1815 the Bourbons were reinstated, Lombardy and Venice were made into an Austrian kingdom, and the Austrian Netherlands were annexed to Holland. In nearly every country of Europe monarchs now carried out repressive measures against the beginnings of democratic agitation, Russia, Austria, and Prussia forming a Holy Alliance for the purpose in 1815. Risings in Spain and Portugal started in 1820, and the Carbonari movement commenced in Italy. The Holy Alliance successfully put down the Ital. rebels, but, with the defection of Russia to the Gk. side and aid of Britain, the Gk. revolt against the Turks resulted in the establishment of Gk. independence (1827). This war, in which Britain was compelled to play into the hands of **Russia**, was the beginning of the XIX.-cent. crusade of Russia against Turkey. The Crimean War (1854–56) showed the dread of the powers of Russian extension in Europe. The July Revolution of 1830 in France established the limited Orleanist monarchy overthrown in the year of revolutions, 1848. Italy, Hungary, and Vienna itself rose against Austria, Italy becoming an independent kingdom (1861), and Hungary winning self-government under the dual system (1867) of the present Austria-Hungary.

Britain this year had to deal with its chartist movements. The pre-eminence of Prussia in **Germany** was shortly afterwards recognised. Prussia had been slowly growing into a strong state since the early XVII. cent., and had defeated Austria in her War of Succession. She now joined in the Liberal outcry against Austria; a *casus belli* was found in the Schleswig-Holstein question (*q.v.*), and in 1866 Prussia inflicted on **Austria** the crushing defeat of *Königgrätz*. From this time **Austria** becomes more and more an Eastern power. The final step in Prussia's rise to the position of a great power was in her defeat of France and capture of Paris in 1870–71. France had established the Second Empire under Napoleon III. in 1852, but with the defeat of *Sedan* (1870), where Napoleon himself was captured, the Empire fell, and the Third Republic was established. In 1871 the king of Prussia was raised to the position of German emperor. An important event of 1870 was the conquest of Rome from the pope by the nationalists. Germany, through the skill of Bismarck, managed to conciliate her fallen foe Austria, and to allay the jealousy of Russia, and in 1872 these three powers made the famous *Dreikaiserbund*; but Russia soon became restless under Germany's control, and began to draw nearer to France. Austria and Russia joined in aiding the Christians of the Balkan States against Turkey, 1877–78, which led (despite the first remonstrances of Britain) to the further dismemberment of Turkey; Montenegro, Rumania, and Servia becoming independent, and Greece receiving Thessaly. Austria-Hungary was allowed to occupy Bosnia and Herzegovina in 1881, and in defiance of the protests of Britain, France, and Russia annexed the same in 1908. Turkey was also forced in 1878 to promise better treatment of Christians in Armenia and other reforms—never carried out.

Opposition to Fr. and Russ. interests in Africa and the Mediterranean led Italy to join her old mistress Austria in the Triple Alliance with Germany of 1882; this has endured for three decades. Russia was led, by bribe of support against Turkey, to accept Bismarck's proposition of a new alliance in 1884, and Russia, Germany, and Austria made a second league. Neither of the allies, however, aided Russia during the Bulgarian revolution of 1885–86, and the result was a long interval of friendship between France (which had never unbent towards Germany) and Russia.

Britain, although interfering in the East to protect the Turk, or restrain his atrocities, maintained on the whole a policy of 'splendid isolation' in the second half of the XIX. cent., but in 1904 made with France the *entente cordiale*, which covered France's annexation of Morocco, and, by inclusion of France's ally, Russia, led to the *Triple Entente* which now counterbalances the *Triple Alliance* (renewed 1913) in Europe. In the XX. cent. among the most momentous events in European history have been the defeat of Russia by an Asiatic power, Japan (1904–5), the Alliance of the Balkan States to drive the Turk out of Europe (see TURCO-BALKAN WAR, 1912–13), and Germany's rise as a Great Naval Power, challenging Brit. supremacy of the seas (see NAVIES).

Cambridge Modern History (1903, etc.); Lavisse et Rambaud, *Histoire Générale*; *Periods of European History* (8 vols., 1893); Hassall, *Handbook of European History* (1902); Freeman, *Historical Geography of Europe*; Stanford's Compendium, *Europe*; Latham, *Nationalities of E.*; Geikie, *Prehistoric E.* (1880).

EURYDICE (classical myth.), dau. of Nereus, and wife of Orpheus (*q.v.*).

EURYMEDON (d. 414 B.C.), celebrated Athenian general who performed distinguished service in Peloponnesian War; killed off Syracuse.

EURYPTERINA, see ARACHNIDA.

EUSDEN, LAURENCE (1688–1730), Eng. poet and clergyman; made poet laureate (1718); referred to in Pope's *Dunciad*.

EUSEBIUS (Gk. *eusebes*=pious), in the first four cent's A.D. a common name of churchmen, many of whom have been canonised.

EUSEBIUS OF CÆSAREA (264–340), ecclesiastical historian; bp. of Cæsarea, and one of the greatest Christian scholars and most prolific writers of his age. His *Ecclesiastical History*, which traces the history of the Christian Church from the beginning to the triumph of Constantine, was written *c.* 326. His *Life of Constantine* carries on the story several years later. Amongst his other surviving works are his *Preparation of the Gospel* and *Demonstration of the Gospel*, defences against paganism and Judaism. His *Ecclesiastical*

History incorporates many valuable fragments from earlier writers now lost, and his *Onomasticon* deals with the topography of Palestine. Some works survive only in fragments, or in Latin, Syriac, and Armenian versions. E.'s theology had Arian tendencies, in reaction, perhaps, from the *Sabellianism* of his day.

Eng. trans. in *Nicene and Post-Nicene Fathers.*

EUSEBIUS OF EMESA, Gk. theologian, pupil of Eusebius of Cæsarea; very learned and a student of astronomy.

EUSEBIUS OF LAODICEA (fl. 250), b. Alexandria; bp. of Laodicea; noted for orthodoxy and saintliness.

EUSEBIUS OF NICOMEDIA (d. 341), Gk. bp. and theologian, powerful under Constantine and Constantius; of Arian sympathies; eventually signed Creed of Nicæa.

EUSEBIUS OF ROME, pope, 309, but deposed.

EUSEBIUS OF SAMOSATA (d. 381), strongly anti-Arian bp.; martyred.

EUSKIRCHEN (50° 39′ N., 6° 48′ E.), town, Rhine prov., Germany. Pop. (1910) 12,420.

EUSPONGIA, see under SPONGES.

EUSTACHIAN TUBE, see EAR.

EUSTATHIUS, Gk. ecclesiastic, abp. of Thessalonica, 1175; student of Homer and Pindar; denounced abuses of his time; author of various works.

EUSTATHIUS (XII. cent. A.D.), Gk. romance writer.

EUTAW SPRINGS (33° 20′ N., 80° 18′ W.), village, S. Carolina, U.S.A.; here Americans defeated British, 1781.

EUTERPE, family of Central and S. American palms; includes cabbage-palm, *E. oleracea.*

EUTHANASIA, from a Gk. word signifying easy death, is a term used for shortening life in hopeless cases, or dulling the sensibilities of the dying by means of drugs. The first is absolutely forbidden.

EUTHYDEMUS (fl. *c.* 230 B.C.), king of Bactria; famed for his three years' successful resistance of the attacks of Antiochus the Great.

EUTIN (54° 8′ N., 10° 36′ E.), town, Schleswig-Holstein, Germany. Pop. 5399.

EUTROPIUS (fl. *c.* 350–78), Rom. historian; his *Breviarium Historicæ Romanæ* covers history of city from its foundation to time of Emperor Valens. The work is noted for simplicity and purity of style.

EUTYCHES (*c.* 380–456), presbyter and archimandrite at Constantinople; opposed Nestorius, but himself excommunicated for saying Christ was of two natures before the incarnation and one afterwards.

EUTYCHIDES (IV. cent. B.C.), Gk. sculptor; famous for statue of Fortune.

EUXINE, see BLACK SEA.

EUYUK, EYUK (40° 13′ N., 34° 40′ E.), village, Asia Minor; has interesting ruins of structure belonging to period earlier than that of Gk. civilisation.

EVAGORUS (fl. *c.* 410–374 B.C.), king of Salamis (Cyprus); was associated with Conon, the Athenian, in his defeat of the Spartans at Cnidus (394).

EVAGRIUS, surnamed 'Scholasticus' (*c.* 536–600), Church historian; b. in Syria; his *Ecclesiastical History* covers the years 431–593, and continues the work of Eusebius and others; Eng. trans. in Bohn's *Ecclesiastical Library.*

EVANDER (classical myth.), s. of Hermes and an Arcadian nymph; is said to have led an Arcadian colony into Italy, some sixty years before Trojan War. Upon the arrival of Æneas at Latium, E. became his ally against the Latins.

EVANGELICAL ALLIANCE (founded 1846), an association of Brit. denominations, to further religious liberty and evangelical principles; has annual conferences and international meetings.

EVANGELICAL ASSOCIATION, Amer. denomination founded in 1800 by Jacob Albright.

EVANGELICAL CHURCH CONFERENCE, an assembly of representatives of German Prot. churches, begun in 1848.

EVANGELICAL UNION, religious sect which separated from the Secession Church of Scotland in 1843; amalgamated with Congregational Union, 1896.

EVANS, SIR ARTHUR JOHN (1851–), Brit. archæologist; important discoveries in Crete; excavated palace at Cnossos.

EVANS, AUGUSTA JANE (Mrs. Wilson) (1835–1909), Amer. novelist; author of *St. Elmo* (1866).

EVANS, SIR GEORGE DE LACY (1787–1870), Brit. soldier; served in Peninsular, Carlist, and Crimean Wars; present at Waterloo, Alma, Inkerman.

EVANS, SIR JOHN (1823–1908), Eng. archæologist and geologist; s. of headmaster of Market Bosworth Grammar School; pres., Soc. of Antiquaries, 1885–92; pres., Geological Soc., 1874–76; treasurer of Royal Soc.; K.C.B., 1892.

EVANS, OLIVER (1755–1819), Amer. engineer who made valuable experiments in steam locomotion.

EVANS, ROBLEY DUNGLISON (1846–1912), Amer. naval commander-in-chief, known as 'Fighting Bob E.'

EVANSON, EDWARD (1731–1805), Eng. cleric; rector of Tewkesbury, 1769; afterwards became Unitarian minister; wrote on theology and Bible criticism.

EVANSTON (42° 5′ N., 87° 42′ W.), city, Illinois, U.S.A., on Lake Michigan; seat of North-Western (Methodist) Univ. Pop. (1910) 24,978.

EVANSVILLE (38° N., 87° 30′ W.), city, Indiana, U.S.A., on Ohio; lumber; flour and cotton mills. Pop. (1910) 69,647.

EVARTS, WILLIAM MAXWELL (1818–1901), Amer. politician and lawyer.

EVE, in Bible, wife of first man and mother of human race; name in Hebrew is *khavvah,* interpreted by *Genesis* as 'life.' Probably original writer of *Genesis* (q.v.) idealised some popular tradition in such manner as to embody certain truths concerning human nature suggested by his own experience. Thus Eve's formation from Adam's rib expresses dependence of weak on strong, while serpent's choice of her indicates her more sensuous nature. Story has been made starting-point of many speculations; Augustine originated discussion as to whether Eve's soul was immediately breathed into her by God, or was taken from Adam; and Milton, in *Paradise Lost,* develops theory that Adam's fall was due to his love for Eve, owing to which he preferred to share her fate rather than be separated from her.

EVELETH (47° 27′ N., 92° 33′ W.), city, Minnesota, U.S.A.; iron-ore mines. Pop. (1910) 7036.

EVELYN, JOHN (1620–1706), Eng. diarist and author; Surrey gentleman, of Royalist sympathies. His famous *Diary,* covering the period 1640–1706, remained in MS. until 1818. He was also the author of *Sylvia,* a work on gardening. E. was one of the founders, and some time sec. of the Royal Soc., and was noted for the purity of his life in a dissolute age.

EVERDINGEN, ALLART VAN (*c.* 1621–75), Dutch landscape artist and engraver.

EVEREST, MOUNT (27° 59′ N., 86° 58′ E.), peak of Himalayas, in Nepal, India; highest mountain in world (29,002 ft.); named after SIR GEORGE EVEREST (1790–1866), Brit. soldier and engineer who conducted trigonometrical survey of Himalayas (*q.v.*).

EVERETT.—(1) (42° 22′ N., 71° 3′ W.) city, Massachusetts, U.S.A.; steel and iron manufactures. Pop. (1910) 33,484. (2) (47° 58′ N., 122° 12′ W.) city, Washington, U.S.A.; sawmills; iron smelters. Pop. (1910) 24,814.

EVERETT, ALEXANDER HILL (1790–1847), Amer. diplomatist and author.

EVERETT, CHARLES CARROLL (1829–1900), Amer. Unitarian minister; prof. at Harvard University.

EVERETT, EDWARD (1794–1865), Amer. politician and orator; Gk. prof. at Harvard, 1815; sat in Congress, 1825–35; gov. of Massachusetts, 1835–39; ambassador to Britain, 1841; pres. of Harvard, 1846; Sec. of State, 1852; Senator, 1853–54; supported Union by patriotic speeches during Civil War.

EVERETT, JOSEPH DAVID (1831–1904), Eng. scientist, author of handbooks on physics.

EVERGLADES (26° 20′ N., 80° 30′ W.), a large shallow lake, occupying part of peninsula of Florida, U.S.A.; encloses thousands of islands, covered with dense thickets; inhabited in part by Seminole Indians.

EVERLASTINGS, or **IMMORTELLES,** popular name of plants, belonging generally to the *Compositæ*, whose flowers retain their form and colour when dried. The *Helichrysum grandiflorum*, which grows wild at the Cape, and the *Ammobium alatum*, found in New South Wales, are well-known examples. Much used for 'memorial' wreaths, especially in France.

EVERSLEY, CHARLES SHAW LEFEVRE, VISCOUNT (1794–1888), Eng. barrister and politician; M.P. from 1830; Speaker of House of Commons, 1839–57; Viscount, 1857.

EVESHAM (52° 5′ N., 1° 57′ W.), market town, on Avon, Worcestershire, England; has remains of Benedictine abbey, founded VIII. cent.; town hall and grammar school are of XVI. cent.; scene of defeat of Simon de Montfort by forces of Prince Edward, Aug. 1265; market-gardening. Pop. (1911) 8341.

EVIDENCE, that which makes manifest; any form of proof. In law, e. is usually either *direct* or *circumstantial*.

(1) In a court of law the 'best' e. only is admissible, and therefore a copy of a letter will not be admitted in e., if the original can be obtained. Similarly a witness must tell what he himself knows, and not what some one else has told him, except in certain cases when *hearsay* e. is accepted. As a general rule, only such matters will be admitted in e. as are relevant to the issue in dispute, *i.e.* which tend to prove or disprove the main fact in dispute (which is called the *fact in issue*). Anything that a party to a lawsuit or a prosecution said or wrote is admissible in e., if it is *against* the interests of that party, and if it throws light on the matter in dispute, but it will not usually be admitted if it is in his *favour*. Again, anything which a party has done in the matter which is in dispute, or anything which explains the matter in dispute, will be admitted in e. both *for* and *against* that party. Moreover, when it is important to know the state of a man's mind when he did an act, anything he said or did while accomplishing the act, or anything which he did or said in other transactions, is admissible in e. This is often done when it is sought to prove that a man was insane when he committed a murder.

(2) As opposed to direct e., *circumstantial* e. merely proves surrounding circumstances from which the fact in issue may be inferred. In murder trials this is frequently the only e. available.

(3) Sometimes first-hand e. is not forthcoming, *e.g.* the statements made by the victim of a murder. In that case the dying declaration of the victim will be allowed in e. If the original of a document is lost or destroyed, e. of its contents may be given, as, for example, a *copy* of the document can be put in, or a person may state from memory what the contents of the document were.

(4) Persons guilty of crime may make *confessions*, and such confessions are admissible as e. against them, but not against their accomplices. But such confessions will not be admissible unless they are voluntary, and they will not be deemed voluntary if they are made in consequence of any threat or inducement held out by a person in authority. The prosecutor is deemed a person in authority for such a purpose; so, too, are judges, magistrates, constables, and other officers of justice. It lies with the prosecution to show that a confession is voluntary; but a confession does not become involuntary by the fact that it was made whilst the accused was drunk, though this fact would diminish its value; nor is it involuntary when made under promise of secrecy.

(5) Not every kind of person can be called as a witness, and those called on to give e. cannot be compelled to answer every question put to them. No person can be compelled to give an answer to a question which would render him liable to criminal proceedings. The law will not allow the powers of courts of justice to be employed as a means of extorting confessions of crime. The law, too, regards communications which pass between married couples as privileged. No wife or husband can be compelled to disclose any such communication. Of similar nature are the communications which pass between a person and his legal advisers. No barrister or solicitor can, without his client's consent, be called upon to disclose any communication that his client may have made to him in his professional capacity; but such communication must not have been made in the furtherance of some criminal object, or the privilege lapses.

(6) Medical men can be compelled to reveal confidential communications. With regard to priests, authorities are somewhat conflicting. The priest may disclose such a communication, but judges would not countenance compulsion.

Pitt Taylor, *Law of Evidence* (9th edit., 1895).

Evidence, King's, testimony of accomplice to a crime, purchased by pardon; accomplice is usually acquitted before evidence is taken; the corresponding procedure in Scots Law is taking evidence from a *socius criminis*.

EVIL EYE is the name given to the belief that the human eye is capable of malignant influence. Such belief was common amongst ancient nations, and is still very widespread, not only amongst savage races, but many civilised peoples. Envy is supposed to be at the root of the mischief, and extravagant praise was and is regarded as an unmistakable sign of its presence.

Elworthy, *The Evil Eye* (1895).

EVOLUTION.—So familiar are we with the word 'evolution' that we ignore its assumption that there has been a true *evolutio* or unfolding of pre-existing characters in the descent of living things. But the general idea of the theory of evolution, or, more accurately, the THEORY OF DESCENT, is admitted by all: that the earth is peopled with animals and plants which have not indeed sprung up into sudden disconnected existence, but are connected with each other in a long line, or lines, of descent; that no matter how different they appear, all living things are blood relations, descended from simpler and still simpler ancestors. This great theory, although it received new life from the researches of Darwin and Wallace and Lamarck, is no new doctrine, for almost since scientific understanding began a hazy notion of connection between living things has prevailed. Gradually the idea gained in definiteness: in the V. cent. B.C., Empedocles, 'the father of the evolution idea,' held that the four elements played upon by love and hate yielded plants and animals, of which some were successful and survived; in the IV. cent. B.C., Aristotle, with wonderful insight, considered that nature was a unified development, living things forming a continuous line of descent which in the beginning had sprung from inanimate matter; and so with few additions of importance the subject stood, the fact of continuous descent recognised, its means unknown—until the present-day theories loomed on the horizon. Buffon and Erasmus Darwin are but two of the many XVIII.-cent. naturalists who, seeking in the action of environment, the struggle for existence, natural selection, and isolation, vague keys to the causes of variation, foreshadowed the truths which Lamarck, Darwin, and their successors were to place on a firm basis.

The theory that life is a long heritage receives support mainly from two sources: the direct evidence of Palæontology (*q.v.*), which has actually traced in a few cases the steps and stages by which one kind of organism has gradually developed into a rather different kind of organism; and the indirect evidence of the geographical distribution of animals, that creatures of a given kind have often an area of greatest abundance,—a geographical headquarters,—and that, as one

recedes from the headquarters, animals are found still showing the headquarters characters, but less and less predominantly, until these characters are all but swamped in newer developments. Such a series can be satisfactorily explained only on the assumption that all the creatures concerned had a common origination, probably located in the headquarters area, from which they have gradually diverged. The theory of common ancestry gains further strength from the fact that it makes clear many otherwise unaccountable similarities in the embryological developments of different creatures.

Evolution depends on two working causes: the organism itself, and its environment. The first provides the constant variations which are apparent even in the children of the same parents; the second directs, or prunes, or selects these variations. Various theories lay stress upon different aspects of the development of variations and of their interactions with environment. Thus Darwinism holds that exceedingly minute variations occur in all directions round a given mean, and that in the struggle for food and mates those animals with variations which hamper their efficiency are driven out of existence—in other words, that a natural selection is at work which prefers the most efficient variants, that the fittest survive. Such exceeding minute and gradual changes in character as Darwin postulated are known as 'continuous variations'; but there also occur 'discontinuous variations,' 'mutations,' or 'sports,' in which a new character suddenly leaps into existence, to persist or be eliminated as selection may decide. But 'variations' arise from other sources than the inherent tendency of the organism to vary, and on those in particular Lamarckism lays stress. The surroundings of an organism may change and induce some compensating change in the animal or plant; or an animal may find a habit, say that of burrowing, useful in some way, and the exercising of the habit may encourage a particular development of (say) short strong limbs, and hard scoop-shaped claws suitable for burrowing. Certainly the unwonted use of an organ leads to its better development (functional modification), just as disuse leads to degeneration. As certainly the individual is thereby benefited, and if such 'acquired characters' are transmissible (a doubtful point) so also is its progeny likely to persist, thus strengthened for the battle with circumstances. (See HEREDITY, MENDELISM, MIMICRY, PROTECTIVE COLORATION.)

EVORA (38° 34′ N., 7° 46′ W.), city, the ancient *Ebora*, Portugal; has cathedral, abp.'s see; seat of univ., 1550–1769; cotton cloth, wine. Pop. 16,152.

ÉVREUX (49° N., 1° 9′ E.), town, Eure, France, with XI.-cent. cathedral; textiles. Pop. 18,300.

EWALD, GEORG HEINRICH AUGUST (1803–75), Ger. theologian and Oriental scholar; b. Göttingen; first book, on *Genesis*, published 1823; prof. of Philology, Göttingen, 1827–37; prof. of Philology, Tübingen, 1838, of Theology, 1841; recalled to Göttingen, 1848. His *History of People of Israel*, finished in 1859, is work of great erudition.

EWALD, JOHANNES (1743–81), Dan. lyrical poet; most famous work the lyrical drama, *The Fishers*, which contains the Dan. national song; and other notable writings are his dramatic poem, *Adam and Eve*, and a tragedy, *Rolf Krage*.

EWART, JAMES COSSAR (1851–), Scot. zoologist noted for treatises on echinoderms and hybrids.

EWART, WILLIAM (1798–1869), Eng. Liberal politician; advocate of criminal law reform, and promoter of free libraries and the metric system.

EWE, negro tribe of Slave Coast, W. Africa.

EWELL, RICHARD STODDERT (1817–72), Amer. Confederate general.

EWING, ALEXANDER (1814–73), Scot. Episcopalian bp. of Argyll and the Isles (1873).

EWING, JULIANA HORATIA ORR (1841–85), Eng. writer of numerous popular children's stories.

EWING, THOMAS (1789–1871), Amer. lawyer and politician; Sec. of Treasury, 1841; of Interior, 1850; delegate, Peace Conference, 1861.

EXAMINATIONS, educational tests applied to pupils in schools, undergraduates in univ's, and competitors for posts, prizes, and distinctions. Organised competition for posts is old as civilisation (the Chin. public service was recruited by e. over 3000 years ago), and the degree system, which is coeval with univ's, was based on e's. Mediæval e's, partly oral, laid chief importance on theses prepared and publicly delivered by examinees, and neglected mnemonic tests, which are chief features of modern e's. The modern system of e. papers is not found until the early XVIII. cent. The thesis gradually became disused except for highest degree of a faculty, the Doctorate. A very high standard was prescribed for candidates for Oxford M.A. and B.A. degrees during reign of Charles I.; the e. for M.A. (which cannot be conferred till lapse of three years after taking of B.A.) was replaced by simple payment of fee in 1807, and the same thing has happened at Cambridge. In the new univ's, Manchester, etc., the M.A. degree is conferred on Honours graduates of three years' standing, and on pass students who undergo further 'M.A.' e's. In Scottish univ's the B.A. (though not the B.Sc.) has been dropped, and the candidate's first degree is M.A. In Amer. univ's A.B. S.B., and Ph.B., are the ordinary degrees, and the highest honour Ph.D. (requiring 2–4 years study from graduation). The system of allowing students to specialise in one subject and receive an 'honours' degree after e. in that alone was initiated (1830) at Oxford, where the preliminary e. is called Responsions ('Smalls'), the intermediate, Moderations ('Greats'). Cambridge has only two e's, the Previous ('Little Go') and Tripos. The older univ's were primarily teaching bodies, but London Univ. established in 1858 an independent examining body and confers its degrees on *external* examinees, as also does Dublin. The *Examining Univ.*, which does no teaching itself, spread to India and the Brit. Colonies (see UNIVERSITIES). Honorary degrees are conferred by all univ's, but Dublin also confers its degrees, after payment of fees, on women who have qualified for Oxford or Cambridge degrees. London Univ. admitted women to its e's, 1878, Cambridge, 1881, Oxford, 1884; but last two do not grant them degrees.

The Fr. *baccalauréat* is equivalent to Eng. matriculation, Scot. Univ. *preliminary* e.; or Ger. school-leaving (*Abiturienten*) e.; the Fr. academic degree is that of *licencié* in any of the faculties, the German that of Doctor. The Fr. *Agrégation* is a State competitive e. for posts in secondary schools. E's for medical degrees are State e's in Germany. Public e's, for which pupils in Eng. secondary schools often train, are held locally by a board of Oxford and Cambridge examiners and by the College of Preceptors. In Scotland school *leaving-certificate* e's take place annually under the Scotch Education Department. Grammar schools, high schools, and other secondary schools (the equivalents of the Ger. *Gymnasia* and Fr. *lycées*) may under certain conditions obtain Government inspection, which is given yearly to all State schools, primary or secondary. Owing to shortage of officers it has been proposed lately to abolish Army Entrance E's. School inspection is a branch of the Civil Service, the lower branches of which were thrown open to public competition on basis of e. in 1870. In U.S.A. entrance e's are dispensed with in many universities (not Harvard, Yale, Princeton, and Columbia) when pupil of certain recognised schools receives approval of his principal. The e. system has been much criticised and its imperfections allowed even by its supporters, and the State is the only employer of labour to grant offices as e. prizes; it eliminates, however, the element of jobbery.

EXARCH.—(1) Title of viceroy of Byzantine emperor, *e.g.* of Ravenna. (2) Head of an ecclesiastical province or chief see; in Gk. Church the deputy of a legate, generally a bp. (3) Head of Bulgarian Church.

EXCELLENCY, title held by Brit. colonial ad-

ministrators, ambassadors, viceroy of India, lord-lieut. of Ireland; by pres. of France; and by gov's of N. Amer. States.

EXCHANGE, to give one thing for another; to barter; the public building where business transactions are made; to give one person for another, as the e. of prisoners of war; the e. of regiments between officers, etc.

The term is applied in particular to the London **Royal Exchange**, which is the central bourse of metropolitan commerce. The first building, erected by Sir Thomas Gresham, was opened in 1571 by Queen Elizabeth. It perished in the Great Fire (1666), and its successor met with the same fate in 1838. The present building was opened by Queen Victoria in 1844. The principal 'market' days are Tuesdays and Fridays, and the busiest time from 3 p.m. to 4 p.m. Besides the Royal Exchange, there are numerous other trade e's, such as the Corn, Coal, and Stock Exchanges, and similar buildings for like purposes are to be found in all the larger provincial cities and towns.

The **Stock Exchange** is the market for stocks and shares in public companies, such as railway, mining, and the great industrial undertakings, debentures, consols, and all the securities for the repayment of loans issued by governments, municipal corporations, and trading companies. The dealers in these securities confine their operations to a small section of these securities, and do not deal in any others. Each section constitutes a 'market,' and it is to the market for any particular class of securities that a broker resorts on behalf of a client who either wishes to purchase or sell stocks or shares. Amongst the principal markets on the London Exchange may be mentioned the Consol Market, for the sale of government securities, the Amer. Railroad Market, the Foreign Market, which concerns itself with foreign securities, the 'Kaffir Circus,' for the transaction of business relating to S. African mines, the 'Jungle,' the market for W. African securities, and the Industrial Market for the sale of stocks and shares in industrial undertakings.

EXCHEQUER, department of Government which deals with public moneys. Name (Low Latin, *scaccarium*, Fr. *échiquier*) is derived from checked cloth on which money was counted. In early times Eng. E. department was called 'the tallies' from old method of keeping accounts by means of notched sticks. Chief authority for early procedure is Richard Fitz Neal, whose *Dialogus de Scaccario* was written about 1180.

Court of Exchequer, originally a revenue court, later became ordinary court of law, its judges being known as barons. In 1834 old offices were abolished by Act of Parliament, and new E. under comptroller-gen. came into existence; this however, proved unsatisfactory, and in 1866 the E. as a separate department was entirely done away with, the existing e. and audit department being founded in its place. E. at present day is official style of state revenue; monies due to Government are paid into Bank of England or of Ireland to account of E., and are supervised by auditor-gen., who grants payments on receipt of orders proceeding from Treasury.

Chancellor of Exchequer is now first finance minister of Crown; he was originally an Under Treasurer appointed to keep counter-roll to that of Lord High Treasurer, and was judge in E. court. Chancellor sat as judge for last time in 1735.

H. Hall, *Antiquities of the Exchequer* (1891) and *Court Life under the Plantagenets* (1901). Publications of Pipe Roll Society.

EXCISE, Inland Revenue tax upon dutiable goods; license charges for permission to deal in, or retail, wines, spirits, tobacco, etc.; the department which superintends this taxation.

EXCLUSION BILL, bill brought before parliament, 1679, to exclude the R.C. Duke of York from the throne; most important political subject of last years of Charles II.

EXCOMMUNICATION, term used for the deprivation of a Christian of the right to communicate, or for entire cutting off from Christian Church. It has parallels both in the Old Testament and elsewhere, and is referred to several times in the New Testament. In the Middle Ages the penalty was frequently inflicted, even kings being excommunicated. Heresy, immorality, or refusal to recognise in any way the Church's authority render men liable to e. It has seldom been resorted to in Prot. countries, but can still be pronounced in England by ecclesiastical courts. It is still inflicted by the R.C. Church on her disobedient children, and in the mission field native converts are excommunicated for immorality. The Scot. Presbyterian Church can exercise the power of e.

EXCRETION, waste product of a plant or animal; differing from a secretion in not being produced for a useful purpose.

EXE.—(1) (50° 37′ N., 3° 26′ W.) river, England; flows through Somerset and Devon and enters Eng. Channel. (2) (37° 47′ S., 144° 36′ E.) river, Victoria, Australia.

EXECUTION.—(1) Act of carrying out the death penalty. See CAPITAL PUNISHMENT. (2) In law, the making of a legal instrument valid, *e.g.* the e. of a will or a deed; process of carrying out a judgment of a court; writ by which an officer carries out a judgment.

EXECUTIVE, see ADMINISTRATION.

EXECUTOR, person whom a testator appoints to wind up his estate and distribute the assets in accordance with the terms of the will. When the deceased has left no will there can be no executors and no probate. The property, if *realty*, will go to his heir-at-law, and if *personalty* to his next of kin. But as it is desirable to wind up the estate the Court will appoint an *administrator*, who will be in practically the same position as an e. In general, any person may be appointed as e., but infants, lunatics, and bankrupts. A person desiring to be made an administrator applies to the Court, which will appoint the husband or wife of the deceased in preference to others; failing either of these, the next of kin. Executors and administrators are not entitled to any remuneration unless the will specially provides for it, but they are entitled to reasonable out-of-pocket expenses incurred in the course of their duties. Having buried the testator, proved the will, paid the testator's debts, and called in the money owing to the estate, the executor's next duty is to distribute the assets among the beneficiaries. An e. is, however, bound to pay the just debts of the testator before he distributes the property. An e. is not generally responsible for the defaults of his co-executor, unless he has contributed to them in some way; but, if he sees his co-executor commit a breach of trust, he must stop it at once, or he would be held personally responsible.

EXEDRA, in classical arch., an out-of-doors semi-circular seat, generally vaulted over; an alcove.

EXEGESIS, word used by Christian theologians for explanation of the Bible with regard to matters of faith and morality; used of literal and allegorical expositions; demands knowledge of original text, and therefore touches textual criticism.

Cave, *Introduction to Theology* (1896).

EXELMANS, RENÉ JOSEPH ISIDORE, COUNT (1775–1852), Fr. marshal; served under Murat in Austria and Spain; accompanied Napoleon to Russia.

EXEQUATUR, official document of authority issued by a foreign sovereign to his consuls.

EXETER (50° 43′ N., 3° 31′ W.), city, county town of Devonshire, England, on Exe. Ancient and historic city, believed to have been occupied by Romans. Cathedral founded XII. cent., finished XIV. cent., of Norman and Geometrical Decorated styles; fine organ, beautiful roof and screens, and minstrels' gallery. Other places of interest are: Rougemont Castle (XI. cent.), Guildhall (XV. to XVI. cent.), Albert Memorial Museum, Technical Coll. Manufactures include agricultural implements; chief market for 'Honiton' lace. Pop. (1911) 48,660.

E. A. Freeman, *Exeter* (1887); Addleshaw, *Exeter Cathedral* (1898).

EXETER (42° 58′ N., 70° 57′ W.), town, New Hampshire, U.S.A., on Exeter river; machinery, boots and shoes. Pop. 5000.

EXETER BOOK, a collection of XI.-cent. O.E. poetry, etc., preserved at Exeter Cathedral, and containing such poems as *Christ, Juliana, Guthlac*; pub. by Early Eng. Text Society.

EXETER, EARLDOM, MARQUISATE, AND DUKEDOM OF, titles held by different Eng. families at different dates. John Holland, Earl of Huntingdon, was cr. duke (d. 1400); executed for conspiracy against Henry IV. Earldom held by Cecil family from 1605–1801, when raised to marquisate.

EXETER HALL, building in the Strand, London; erected 1831; became property of Young Men's Christian Association, 1880, and was the scene of many important Free Church, philanthropic, and Liberal meetings; Strand Palace Hotel erected on its site, 1909.

EXHIBITION, a public display, particularly of arts, crafts, etc.; an allowance made to students in a univ. The public e. is an institution of comparatively modern date. E's were held in England in the latter part of the XVIII. cent., and also in France; and these were followed by others in the early years of the XIX. cent. The exhibits, however, were the productions of the countries in which they were held. The title 'The Great Exhibition' is still attached to the first international e. held in London (1851), although in magnitude it has been greatly surpassed by many others, notably those held in Paris, Chicago, and St. Louis. If the idea of a great international e. did not actually originate with the Prince Consort, he certainly took the leading part in giving effect to it. A building, constructed of iron and glass, was designed by Sir Joseph Paxton, and erected in Hyde Park. It was opened by Queen Victoria (May 1, 1851), and during the 144 days it remained open was visited by upwards of 6,000,000 people. At the close of the e., the building, under the name of 'The Crystal Palace,' was removed to Sydenham, Kent. Within the last quarter of a cent. many notable e's have been held in Manchester, Glasgow, and other large provincial centres.

EXHUMATION, the act of removing a corpse from a burial-place, the authority for which lies in the hands of a coroner, but in England directions are usually given by the Home Secretary.

EXILARCH, hereditary office, held by leader of Babylonian Jews, who were called 'the people of the Exile.'

EXILE, see BANISHMENT.

EXMOOR FOREST (51° 10′ N., 3° 45′ W.), elevated moorland, on S.W. borders Somersetshire and N.E. Devonshire, England; ancient forest.

EXMOUTH (50° 37′ N., 3° 24′ W.), watering-place, at mouth of river Exe, Devonshire, England. Pop. (1911) 11,963.

EXMOUTH, EDWARD PELLEW, 1ST VISCOUNT (1757–1833), Brit. sailor; commanded in E. Indies, 1804; North Sea, 1810; Mediterranean, 1811; bombarded Algiers, 1816; vice-admiral, 1832.

EXODUS, BOOK OF, second book of Old Testament; name of Gk. derivation, meaning 'departure.' Naturally divided into three parts; first part (chaps. 1 to 18) is historical, describes enslavement of Children of Israel in Egypt, birth and upbringing of Moses, his mission as deliverer of his race, the ten plagues, institution of Passover, and the departure from Egypt; second part (chaps. 19 to 24) is legislative, narrates the giving of the law on Sinai, and confirmation of Mosaic Covenant; third part (chaps. 25 to 40) is chiefly constructive, narrates orders respecting Tabernacle, consecration of Aaron's family as priests, making of Golden Calf and resulting punishment, and finally the building of the Tabernacle. E. shows many traces of Egyptian influence; numbers of Egyptian words occur, and regulations of Mosaic law show influence of Egyptian life. E. is a compilation by various writers from documents of different date, its sources, according to Driver and other authorities, being same as those of *Genesis* (q.v.). The sources, P, or the Priests' Code, J, and E, are generally easily recognisable; the last two are not always easily distinguishable in the legislative sections. First eighteen chapters have their source mainly in J and E, with extracts from P in various chapters; chaps. 19 to 24 and 31 (v. 18) to 34 (v. 28) are from J and E, except for three verses in chap. 24 ascribed to P, to whom also chaps 25 to 31 (v. 18) and 34 (v. 29) to 40 are due.

Exodus, W. H. Bennett (Century Bible); S. R. Driver, *Introduction to Literature of Old Testament.*

EXODUS, THE, the departure from Egypt and journey to Palestine of the Children of Israel, described in *Exodus, Leviticus, Numbers, Deuteronomy,* and *Joshua* (qq.v.). These books are now known to be of composite character, and to have been written long after the events they describe; this accounts for the non-continuity of the story and for the incompatibility of some of the statements. The facts are not easily separable from tradition, especially as no mention of the Israelites has been discovered among Egyptian inscriptions, and there is thus no external evidence with which to compare the Israelite records.

Exodus, W. H. Bennett (Century Bible, Jack).

EXOGAMY, see FAMILY.

EXORCISM, ceremony of casting out evil spirits. Important in early Christian Church. R.C. Church has form of service for exorcising demons, and a minor order, 'Exorcists.'

EXOTHERMIC, see CHEMISTRY (THERMO-C.).

EXOTIC, something of a foreign character; particularly applied to rare foreign plants.

EXPATRIATION, act of compulsory or voluntary exile. See BANISHMENT.

EXPERT, legal term for specialist whose services are employed in courts of law.

EXPLOSIVES.—The essentials of an explosive are that it shall be as powerful as possible, smokeless, and sufficiently stable to withstand ordinary conditions of manufacture, storage, and carriage. Explosives are usually mechanical mixtures of substances which may not be explosive in themselves, but which unite with the production of large volumes of gases. The union is brought about by the application of heat or by percussion. Gunpowder is a mixture of charcoal, sulphur and nitre. Chlorates and permanganates are used sometimes instead of nitre. Chlorates mixed with aromatic compounds make powerful blasting preparations.

Propellants (which on explosion throw neighbouring substances some distance) consist of nitrogen compounds. Nitro-glycerin and gun-cotton may be regarded as nitric acid in which the hydrogen has been replaced by a carbon group. High explosives for shells are made from picric acid and its compounds, since these are easily detonated by percussion and heat. Mercury fulminate forms the chief constituent in fuses, detonators, and caps. Smokeless propellants are mostly modifications of gelatinised gun-cotton with nitro-glycerin.

Guttmann, *Manufacture of Explosives* (1895).

EXPROPRIATION, act of depriving of proprietary rights. The term is especially applied to a Government action in appropriating, or modifying, personal rights in property.

EXTENSITY, the perception of space is supposed by many psychologists to develop (mainly through motor activity) out of a vague experience of voluminousness or 'extensity.' Some regard this experience as confined to visual and tactual perception; others think it discernible in all sensation.

EXTENUATING CIRCUMSTANCES, extreme provocation, previous good character, etc., urged in defence of a criminal.

EXTERRITORIALITY, in international law, exemptions from law of any state which in special circumstances are enjoyed by members of a foreign

state within its dominions. These privileges accrue to sovereigns, ambassadors, armies, and public ships. Sovereigns, unless incognito, are immune from jurisdiction of foreign country.

EXTORTION, oppressive or illegal exaction by a public official or private person.

EXTRACT, in pharmacy, a concentrated preparation made either by evaporating the juice obtained from a plant, or by solution of soluble dried substances.

EXTRADITION, the act of delivering up to the government of a foreign country a person accused of committing crime within that country. All civilised countries have e. treaties, and there is generally little hesitation in transferring criminals. A foreign criminal would be extradited from the United Kingdom only on the request of the diplomatic agent of the Power made to the Home Sec., who would refer the matter to a magistrate. After allowing the accused fifteen days for appeal against the magistrate's decision, the e. would become effective. Political offences do not, in England, come within the scope of e. treaties.

EXTRAVASATION, passing of fluids through wounds or perforations in vessels of body, *e.g.* escape of fæces from ruptured intestine into abdominal cavity, or of blood from split blood vessels as the result of a blow.

EXTREME UNCTION, R.C. sacrament, in which sick persons at the point of death are anointed with oil (Epistle of *St. James* 5^{14}), blessed by bp.

EYBESCHUTZ, JONATHAN (1690–1764), Ger. rabbi and scholar.

EYCK, HUBERT VAN (c. 1370–1426), and **JAN VAN E.** (c. 1389–1440), Flem. artists; founders of the early Flem. school. They were court painters of Philip, Duke of Burgundy. Their subjects are chiefly scriptural, and, apart from the general excellence of their work, the bro's are credited with the invention of oil-painting, colours having been previously mixed with gums. Examples of their works are to be seen in the London Nat. Gallery, and at Bruges, Ghent, Antwerp, Paris, and other continental cities. Their sister, Margaret, was also a painter of eminence. See PAINTING.

Weale, *Van Eyck* (Masterpieces of Colour).

EYE, the organ of sight, the essential part being a globular mass, the *eyeball*, contained in a bony cavity of the skull called the *orbit*, communicating with the brain by the *optic nerve*, and moved in the cavity by a set of small muscles, while it has three refractive media through which the rays of light pass, the *aqueous humour* in front, the *crystalline lens* in the middle, and the *vitreous humour* behind.

The EYEBALL is an almost perfect sphere, *c.* 1 inch in diameter, the front part bulging slightly forwards. It has 3 coats, the outer protective fibrous covering, or *sclerotic*, being white and opaque, except in the more prominent front part, where it is transparent and forms the *cornea*, a fine canal, the canal of Schlemm, running round the eyeball at the junction of opaque and transparent parts. The sclerotic is continued behind on to the optic nerve, which pierces it. The middle coat consists of the *choroid membrane*, the *ciliary processes*, and the *iris*, the first extending not quite so far forwards as the canal of Schlemm, being deeply coloured with pigment cells, and containing many fine blood-vessels; the ciliary processes extend radially round the eyeball at the junction of the sclerotic and cornea, containing the radiating fibres of the ciliary muscle, whose function is to regulate the lens in accommodating the eye to near objects; while the iris is a thin, coloured curtain hanging in front of the lens of the eye, perforated in the middle with a circular hole, the *pupil*, for the transmission of light.

The inner coat is a delicate structure, the *retina*, which becomes thinner towards the front, the nervous part ending behind the commencement of the ciliary processes, while the pigmented part is continued on to the back of the iris. The retina has two small round marks upon it, one in the middle, called the *yellow spot*, the centre of which is thinned out and is the point of keenest vision, and the other below and to the inner aspect of this, with raised edges and depressed in the middle, called the *blind spot*, which is the point of entrance of the optic nerve. The retina is formed of 8 layers of elements: (*a*) the pigmented layer, composed of pigmented hexagonal flat cells; (*b*) the layer of rods and cones, minute nervous structures which receive the impressions of light, the rods being more numerous except at the yellow spot, which has only cones; (*c*) outer granular layer of oval cells; (*d*) outer molecular layer of interlacing cell branches; (*e*) inner granular layer of oval cells; (*f*) inner molecular layer of interlacing cell branches; (*g*) layer of large nerve cells; (*h*) layer of nerve fibres, which go to the optic nerve.

The *aqueous humour*, between the cornea and the lens, is composed of water with a very slight solution of albumen and salt, believed to be secreted by the choroid membrane.

The *crystalline lens*, held in position by ligaments from the ciliary processes, is situated behind the pupil, in contact with the iris, making a depression into the vitreous humour behind. Convex on both sides, it is composed of many thin layers of transparent ribbon-like fibres, whose effect is to increase the lens' refractive power. The *vitreous humour* occupies the interior of the eyeball behind the lens, and is a transparent jelly of practically the same composition as the aqueous humour contained within a fine hyaloid membrane.

The muscles which move the eyeball in the orbit consist of the four *rectus muscles*, one above, one below, and one on each side; the *superior oblique* pulls the eyeball downwards and outwards by a pulley; the *inferior oblique* pulls it upwards and inwards. The eyelids protect the eye in front, and are composed of skin, with some fibres of the *orbicularis palpebrarum* muscle, the *sphincter muscle* of the orbit, plates of fibro-cartilage, called the *tarsal plates*, glands which lubricate the edges of the lids, large modified sweat glands (the latter, when inflamed, cause a 'stye'), and a layer of mucous membrane covering the back of the eyelids and the front of the eyeball, called the *conjunctiva*.

The *lachrymal gland* secretes the tears, which bathe and prevent irritation of the cornea and conjunctiva, and lies in the upper and outer part of the orbit, several ducts from it opening upon the upper part of the conjunctiva. The tears are conveyed away by two small canals from the inner angle of the eye communicating with the nose.

Sight.—The rays from a luminous object strike the cornea, and converge from it to pass through the aqueous humour. Those which fall on the farthest out parts of the cornea are shut off by the iris, but the central rays pass through the pupil to the lens, which, having a high refractive index, greatly converges them. The rays then pass through the vitreous humour, and are brought to a focus on the sensitive retina, forming upon it an inverted, but otherwise exact, image of an object. Probably by some chemical change the nervous elements in the retina are stimulated, and this impression is transmitted by the optic nerve to the brain.

The eye, in a position of rest, normally sees distinctly objects about 20 ft. or more away, and it requires to be specially accommodated to very near objects. This is brought about by a change in the lens, the anterior surface becoming more convex, and the posterior surface very slightly more concave, through contraction of the ciliary muscle, which drags upon the suspensory ligament of the lens. See VISION.

Diseases and Defects.—For BLINDNESS; see separate article under that heading.

ASTIGMATISM results from irregularity in the lens or the cornea, causing indistinctness of some parts of the image on the retina, and is cured by the use of suitable glasses; PRESBYOPIA is a failure of accommodation due to the deficiency in power of the ciliary

muscle and hardening of the lens in old age. MYOPIA (*i.e.* near- or short-sightedness) and HYPERMETROPIA (far-sightedness) are due to abnormal shape of the eye, usually hereditary, the globe being lengthened and the rays brought to a focus in *front* of the retina in the former, and *behind* the retina in the latter. See SPECTACLES.

A STYE is due to inflammation of one of the large sweat glands in the eyelid, and is treated by frequent hot-water fomentations; while BLEPHARITIS is inflammation and ulceration at the edges of the lids, with yellow crusts sticking the eyelashes together, for the cure of which yellow oxide of mercury ointment is applied daily. In both, tonics are given and the general health looked after, as they do not usually occur in healthy people.

The conjunctiva is affected by various types of inflammation. CATARRHAL CONJUNCTIVITIS, a common and simple form, is characterised by reddening of the white of the eye, and by a gummy exudation. It is treated by a mild astringent solution, *e.g.* boracic acid, or silver nitrate, used as a lotion thrice a day. PURULENT CONJUNCTIVITIS is much more dangerous, and in the form of *Ophthalmia neonatorum*, which attacks newly born children through irritating discharges from the mother, it is the cause of over a third of the blindness in European children. Washing the eyes with solutions of silver nitrate, e.g. *argyrol*, immediately after birth prevents its occurrence. PHLYCTENULAR CONJUNCTIVITIS is a form in which little pustules occur, especially on the margin of the cornea, and should be treated with mild astringent solutions, and by attending to the general health; while in TRACHOMA or GRANULAR CONJUNCTIVITIS reddish granules form, generally on the conjunctival surface of the upper lid, and this type requires treatment, perhaps operative, by a medical man, under whose care, indeed, all eye diseases should at once be put.

KERATITIS, inflammation of the cornea, often associated with ulceration, is treated by bathing with boracic acid or silver nitrate solutions and shading the eye from the light; one form of it, *interstitial*, is generally characteristic of congenital syphilis.

IRITIS, or inflammation of the iris, arises from many causes, *e.g.* tuberculosis, rheumatism, and is treated by dilating the pupil with atropine; but it may require operative treatment.

CATARACT is opacity in the lens, which may be present at birth, or caused by diabetes, by changes in the lens in old age, extension from eye disease elsewhere, or by wounding of the lens; and it can only be cured by an operation.

The retina may be affected by inflammation, bleeding, by the blocking of the arteries supplying it, or inflammation of the optic nerve.

GLAUCOMA, due to increased tension in the eyeball, affects the retina and causes the person affected to see coloured rings or 'halos' round lights. It is treated by surgical operation.

Swanzy and Werner, *A Handbook of the Diseases of the Eye and their Treatment* (10th ed., 1912).

EYE (52° 18′ N., 1° 8′ E.), market town, Suffolk, England.

EYEBRIGHT (*Euphrasia*), root-parasitic found in Britain, as *E. officinalis*; astringent properties; member of Scrophulariaceæ.

EYEMOUTH (55° 52′ N., 2° 5′ W.), seaport village, at mouth of Eye, Berwickshire, Scotland; important fisheries.

EYLAU (54° 22′ N., 20° 40′ E.), town, East Prussia, Germany, near Königsberg; foundries and sawmills; great battle (1807), in which Napoleon defeated Russians and Prussians. Pop. (1910) 3274.

EYRA, see under CAT FAMILY.

EYRE, EDWARD JOHN (1815-1901), Brit. administrator and explorer; successively gov. of St. Vincent and Jamaica.

EYRE, SIR JAMES (1734-99), Eng. judge.

EYRE, SIR VINCENT (1811-81), Brit. general distinguished in Afghan War and Ind. Mutiny.

EYRIE, or EYRY, nesting-place of eagle or hawk; also the brood reared there.

EZEKIEL, Hebrew prophet, whose name signifies 'God strengthens me,' or 'God is strong,' was the son of Buzi, and of priestly descent; he was carried off to captivity in Babylonia with Jehoiachim by Nebuchadnezzar in 597 or 599 B.C., and apparently spent the rest of his life in a Jewish colony on banks of the Chebar, about 200 miles N. of Babylon. He began to prophesy about five years after the Captivity, and continued to do so for about twenty-two years. Book may be divided into three parts, of which the first (chaps. 1-24) contains denunciations of the sins of the age and prophecies concerning impending fall of Jerusalem. Second part (chaps. 25-32) consists of prophecies concerning heathen nations of Ammon, Moab, Edom, Philistia, Tyre, Sidon, Egypt. Third part (chaps. 33-48) is full of consolation and promises future restoration, ending with a vision of the Temple. The authenticity of the book has never been seriously impugned.

Ezekiel, W. F. Lofthouse (Century Bible); Driver, *Introduction to Literature of Old Testament*.

EZRA, Old Testament character at time of Jews' return from Exile; his work is described in Books of *Ezra* and *Nehemiah*.

EZRA, THIRD BOOK OF.—This apocryphal book is called *First Esdras* in the Septuagint and Syriac versions, *Third Esdras* in the Vulgate. It has been compiled chiefly from Book of *Ezra*, with interpolations from *2 Chronicles* and *Nehemiah*; of original additions, story of Darius and three wise men is most remarkable. This book was used by Josephus, and detracts from merit of his history; it is quoted by Athanasius and other early writers. Rejected by Council of Trent.

Wright, *Introduction to Old Testament*.

EZRA, FOURTH BOOK OF.—This book is called *Second Esdras* in English Apocrypha, and is also variously known as *Apocalypse of Ezra*, *1 Ezra*, *3 Ezra*, and *5 Ezra*. Original text is not extant, but according to Syriac, Arabic, Armenian, and other versions, book was written in I. cent. A.D. It has no connection with the canonical book, but contains a series of visions dealing with racial and religious questions.

EZRA AND NEHEMIAH, BOOKS OF.—These books, which are the sequel to *Chronicles*, were originally regarded as one book in the Hebrew Canon; they are named respectively *First* and *Second Esdras* in the Vulgate, *Second Esdras* and *Nehemiah* in the LXX. Each may be divided into two parts. First part of *Ezra* (chaps. 1-6) relates return from exile under Zerubbabel, *c.* 536 B.C., and rebuilding of temple, *c.* 516 B.C.; second part (chaps. 7-10) deals with second return under Ezra, *c.* 457 B.C. First part of *Nehemiah* (chaps. 1-7) gives Nehemiah's journey from Shushan, *c.* 144 B.C., and reconstruction of walls of Jerusalem; second part (chaps. 7 (v. 73*b*) to end) treats of restoration of Jewish religion and reform of various abuses. Written chiefly in Hebrew, with portions in Aramaic, books are a compilation; those parts written in first person may be ascribed to personal memoirs of Ezra and Nehemiah respectively, while those in third person are by a later writer whom many authorities believe to have been the author of *Chronicles*.

Ezra, Nehemiah, and *Esther*, T. W. Davies (Century Bible); Driver, *Introduction to Literature of Old Testament*.

EZZOLIED, XI.-cent. Ger. poem on Christ's life.

F, 6th letter of Eng. and Latin alphabet, deriving its form from the Greek *digamma* (q.v.).

FABBRONI, ANGELO (1732–1803), Ital. author.

FABER, FREDERICK WILLIAM (1814–63), Eng. theologian and hymn writer; became R.C., 1845; wrote many ascetical and devotional works.

FABER, JACOBUS, FABRI (*c.* 1455–1536), French Prot. reformer; trans. New Testament (1523) and subsequently whole Bible into Fr.

FABER, JOHANN (1478–1541), Ger. R.C. theologian, but partly sympathetic with Reformation leaders.

FABER, JOHN (*c.* 1690–1756), Eng. engraver whose mezzotints of portraits are well known. His f., JOHN (*c.* 1660–1721), was also a well-known engraver.

FABER, KASPAR (fl. 1775), founder of firm of Ger. pencil makers.

FABERT, ABRAHAM DE (1599–1660), Fr. marshal; famed for heroism and devotion.

FABIAN, ST., pope, 236–50; martyred in Decian persecution.

FABIAN SOCIETY, see SOCIALISM.

FABIUS, Rom. patrician *gens*; distinguished members are: QUINTUS FABIUS MAXIMUS RULLIANUS, six times consul; won victory at *Sentinum*, 295 B.C. QUINTUS FABIUS MAXIMUS VERRUCOSUS, dictator (221 B.C.); wore out Hannibal and saved the State by masterly tactics, drawing on the Carthaginians and refusing to fight; hence called the *Cunctator* (delayer). QUINTUS FABIUS PICTOR (fl. 220 B.C.), earliest Rom. annalist; fought in Gallic War; wrote, in Gk., hist. of Rome from the earliest period to his own day. QUINTUS FABIUS ALLOBROGICUS, defeated Allobrogi, 121 B.C.

FABLE, sometimes called 'apologue,' is a fictitious narrative intended to enforce some moral or useful precept, and the characters are generally animals. This form of lit. is of very ancient origin, and many of the earliest f's that have come down to us from the Greeks are supposed to be derived from earlier Buddhist moral stories called *jātakas*. Æsop (*q.v.*) is generally regarded as the first fabulist, but very little is known about him, save that he is believed to have lived in the VI. cent. B.C. At a later period Babrius, a Gk. writer, made himself responsible for the first collection of Æsop. Amongst Lat. writers, the f's of Phædrus (*q.v.*), a freedman of Augustus, are noteworthy. The greatest of modern fabulists was Jean de La Fontaine (*q.v.*); Florian (*q.v.*) ranks next to him among Fr. fabulists. Noted Ger. fabulists were Christian Gellert (1715–69) and Gotthold Lessing (1729–81). Eng. verse fables have been written by Dryden, Prior, and Gay. Rostand's *Chanticleer* and Maeterlinck's *The Blue Bird* are f's in dramatic form.

FABLIAUX, short moral or satirical metrical tales in old Fr. lit. From one to two hundred still survive, mostly written during the XII. and XIII. cent's. Boccaccio, Chaucer, La Fontaine, and later story-tellers made free use of the mediæval f.

FABRE, FERDINAND (1827–98), Fr. novelist; deals chiefly with mountain-village life.

FABRE D'ÉGLANTINE, PHILIPPE FRANÇOIS (1750–94), Fr. dramatist, poet, and revolutionist; guillotined.

FABRETTI, RAPHAEL (1618–1700), Ital. archæologist.

FABRIANI, SEVERINO (1792–1849), Ital. educationist.

FABRIANO (43° 21′ N., 12° 53′ E.), town, Ancona, Italy; paper-mills. Pop. 9417.

FABRICIUS, GAIUS LUSCINUS (fl. 285–78 B.C.), Roman consul and popular hero; famed for his victories over the Lucanians, Samnites, and Tarentines; censor (275), and distinguished by his promotion of social reforms.

FABRICIUS, GEORG (1516–71), Ger. poet and scholar.

FABRICIUS (ACQUAPEDENTE), HIERONYMUS (1537–1619), Ital. anatomist; prof. of Anatomy at Padua after Fallopius (*q.v.*); author of several works on anatomy, specially embryology.

FABRICIUS, JOHANN ALBERT (1668–1736), Ger. scholar and bibliographer.

FABRICIUS, JOHANN CHRISTIAN (1745–1808), Dan. naturalist; then prof. of Nat. History and Political Economy at Kiel (1775); made important researches and wrote several works on entomology.

FABRIZI, NICOLA (1804–85), Ital. patriot.

FABYAN, ROBERT (d. 1513), Eng. merchant and chronicler; his *New Chronicles of England and France*, first pub. 1516.

FAÇADE, front, or face, of a building, generally architecturally embellished.

FACCIOLATI, JACOPO (1682–1769), Ital. philologist.

FACTOR.—(1) A constituent element which helps to bring about a particular result. (2) An agent entrusted with the possession of goods for the purpose of selling them on commission. He has, under the Factors Act (1889), an implied authority to dispose of them in the ordinary course of his business, and can bind his principal on a *bona fide* sale, even where he has no express authority to sell. (3) In Scotland, the steward of an estate.

FACTORY ACTS, the Factory and Workshop Act (1901), and other legislative measures, regulate the employment of women and young persons in mills and workshops, fixing the hours, meal-times, holidays. See LABOUR.

FACULTY.—(1) Term signifying the powers of the mind, such as memory, imagination. (2) Order granted by a bp. allowing an act otherwise illegal; thus any important internal arrangement of church furniture, organ, etc., would necessitate a f. The Court of Faculties, an Abp.'s Court, founded by Henry VIII., now confines its attention chiefly to granting licences of marriages without publication of banns. (3) The term is also used to designate the collective members of a learned profession, or university, such as the f's of law, science, medicine, arts, etc.

FAED, THOMAS (1826–1900), Scot. artist; *genre* pictures.

FAENZA (44° 17′ N., 11° 53′ E.), walled city, Ravenna, Italy; formerly famous for Majolica ware, known from name of town as 'faience'; cathedral; silk manufactures. Pop. 13,966.

FAEROE, FAROE (62° 10′ N., 7° W.), islands in N. Sea, between Iceland and Shetland. Capital, Thorshavn, in Strömö. Seventeen out of twenty-two inhabited; coast-line steep, inland flat-topped mts.; currents dangerous, and storms frequent, so that even harbours are insecure, but always free from ice. Produce peat and coal. Industries: sheep-farming, fishing, wild-fowling. Area, 539 sq. miles. Pop. (1911) 18,000.

FÆSULÆ (43° 50′ N., 11° 18′ E.), ancient name of Fiesole (*q.v.*).

FAFNIR (Norse myth.), guardian of the Nibelung hoard; slain by Sigurd the Volsung.

FAGGING, system in Eng. public schools by which

juniors are compelled to perform certain duties for the senior boys. The system dates back several cent's.

FAGGOT, bundle of sticks; name once given to a non-existent soldier whose name appeared on muster-roll; 'faggot-votes' were created, till 1884, by sub-dividing property amongst nominal owners, or by such sale of property under mortgage or otherwise as would entitle these owners to a vote.

FAGUET, ÉMILE (1847–), Fr. literary critic; prof. of Fr. Lit., Sorbonne; member of Académie française.

FAHRENHEIT, GABRIEL DANIEL (1686–1736), Ger. scientist who introduced use of quicksilver and new scale for thermometers. See THERMOMETERS.

FAIDHERBE, LOUIS LÉON CÉSAR (1818-89), Fr. soldier, writer, colonial administrator. Increased Fr. W. African possessions; gov., Senegal, 1854; commanded army of north in Franco-Prussian War.

FAIENCE (Fr.), name given to a kind of fine glazed earthenware, originally made at Faenza (*q.v.*).

FAILLY, PIERRE LOUIS CHARLES DE (1810–92), Fr. general; won battle of *Mentana* in Italy against Garibaldi (1867); defeated at *Beaumont* (1870) in Franco-Prussian War.

FAIN, AGATHON JEAN FRANÇOIS, BARON (1778–1837), Fr. historian; Napoleon I.'s sec.

FAINT or **FAINTING,** loss of consciousness due to weakness of heart's action. See SHOCK.

FAIR, a public market held on an extensive scale on a fixed date and in a particular place. Formerly the f. was largely mixed up with the showman's business, but this has to a great extent been eliminated. In various parts of England f's are known as the 'Wakes.' F's are now held for a specific purpose, as the sale of horses, cattle, poultry, dairy produce, etc. Thus Horse F's are held at Horncastle, Woodbridge, Barnet; Nottingham has its Goose F.; Gloucester, a Cheese F. F's date from the Roman occupation, but they first become of importance after the Norman Conquest. St. Bartholomew's F. was instituted in 1133 and was not suppressed until 1855.

FAIR HEAD, BENMORE (55° 13′ N., 6° 9′ W.), promontory, Antrim, Ireland; *c.* 640 feet high.

FAIR ISLE (59° 33′ N., 1° 38′ W.), island between Orkney and Shetland; 480 feet high in one part; area, 3 sq. miles. Pop. (1911) 139.

FAIR OAKS, SEVEN PINES, railway station, 7 miles E. of Richmond, Virginia, U.S.A., on Chickahominy; scene of victory of Federals over Confederates, June 1, 1862.

FAIRBAIRN, ANDREW MARTIN (1838–1912), Scot. Congregationalist theologian; principal of Mansfield College, Oxford, till 1909; wrote numerous works, especially on religion, philosophy, and dogmatics.

FAIRBAIRN, SIR WILLIAM (1789–1874), Scot. engineer; along with Lillie built up a famous business in Manchester, and improved mill-works and water-wheels; established shipbuilding yard at Millwall, London; first to build an iron ship; erected Conway and Menai Straits tubular bridges, 1845 (with Robert Stephenson); made steam-boiler improvements; Pres., Brit. Assoc., 1861; Bart., 1869. *Life,* by Pole (1877).

FAIRBANKS (65° N., 147° 50′ W.), town, Alaska; largest gold camp in interior of Alaska. Pop. (1910) 3541.

FAIRFAX, EDWARD (*c.* 1580–1635), Eng. author; trans. (in verse) Tasso's *Jerusalem Delivered* (1600), and wrote a treatise on witchcraft.

FAIRFAX OF CAMERON, FERDINANDO FAIRFAX (1584–1648), Scot. baron; Roundhead general in Civil War; routed, Marston Moor; gov. of Hull, 1643, York, 1644.

FAIRFAX OF CAMERON, THOMAS FAIRFAX, BARON (1612–71), s. of above, Eng. soldier; served under Charles I. before outbreak of Civil War, after which became lieut.-general under his f., Lord Fairfax, on Parliamentary side; distinguished in long contest in Yorkshire; became commander-in-chief of Parliamentary forces in 1645; routed Royalists at Langport, 1645; during second Civil War he reduced Kent and forced Royalists to surrender Colchester (1648); opposed execution of king, and refused to act as judge at his trial; put down insurrection at Burford (1649), and soon afterwards retired from active service; Member of Restoration Commission, 1660.

FAIRFIELD (41° 8′ N., 73° 15′ W.), town, Connecticut, U.S.A.; rubber manufactures. Pop. (1910) 6134.

FAIRFIELD (41° N., 92° W.), city, Iowa, U.S.A.; seat of Parsons Coll.; wagons, farm implements. Pop. (1910) 4970.

FAIRHAVEN (41° 38′ N., 70° 58′ W.), town, Massachusetts, U.S.A., at mouth of Acushnet; iron goods; yacht-building. Pop. (1910) 5122.

FAIRHOLT, FREDERICK WILLIAM (1814–66), Eng. antiquary and wood-engraver; his best-known work is *Costume in England* (1846).

FAIRIES, supernatural beings, both of good and evil influence; also known by the names of 'brownies,' 'elves,' and various other terms. In Devon and Cornwall they are called 'pixies'; in Ireland, 'gentle people.' In popular belief 'good' f's can be helpful in many ways, and their interest is to be encouraged; but 'wicked' f's spirit away children, leaving changelings in their places, and commit various other kinds of mischief. These malignant spirits sometimes assumed the appearance of beautiful women who lured people to destruction or madness. The belief in f's has been common to all lands and to all periods.

Hartland, *Science of Fairy Tales* (1891).

FAIRLIE, ROBERT FRANCIS (1831–85), Scot. engineer; invented double-bogie engine (1864).

FAIRMONT (39° 28′ N., 80° 9′ W.), city, W. Virginia, U.S.A., on Monongahela; coal mines. Pop. (1910) 9711.

FAIRY RINGS, circular spaces of rich dark grass, nourished by decayed fungi, supposed by the superstitious to be the places where fairies hold their revels.

FAITH may be defined as the assent of the intellect to truths on evidence extrinsic to them; thus we believe in the existence of Mt. Erebus because of our belief in the explorers who have seen it. From this it is clear how large a part f. plays in daily life. *Supernatural* or *religious* f. merely adds to the definition, that the extrinsic evidence is supernatural or religious, *e.g.* the authority of God who has revealed the truth. Faith has also the sense of a body of beliefs; and, still further, it is often loosely used to describe confidence, trust which indeed presupposes, but is not itself faith. See RELIGION.

The doctrine that bodily diseases can be healed without any specific treatment by the faith of the suffering,—**Faith-healing,**—is now widely held, not only by followers of Christian Science (*q.v.*), but also, among others, by the sect called the Peculiar People, founded by John Banyard (1838). Healings at Lourdes and other places of pilgrimage are also by some attributed to faith-healing, and it is not disputed that nervous diseases may benefit in this way.

FAITHFULL, EMILY (1835–95), Eng. philanthropist and lecturer on women's emancipation.

FAITHORNE, WILLIAM (1627–91), Eng. artist and engraver; produced crayon portraits and engravings of many eminent persons from Charles I. downwards.

FAIZABAD (37° 8′ N., 70° 39′ E.), fortified town, on river Kokcha; capital, Badakshan, Afghanistan; military post.

FAJARDO (18° 20′ N., 65° 40′ W.), town, Porto Rico, on E. coast; commercial centre; sugar. Pop. 3000.

FAKHR UD-DIN RAZI (1149–1209), Arab. theologian and historian.

FAKIR, name given to Indian ascetics corresponding to Muhammadan dervishes (*q.v.*); some live in monasteries, others are mendicant.

FALAISE (48° 53′ N., 0° 11′ W.), town, Calvados, France; birthplace of William the Conqueror. Pop. 6740.

FALASHAS, Hamitic tribe in Abyssinia; claim to

represent ten lost tribes of Israel, and practise Jewish religion. Hold Abraham's day, day of Covenant, Passover, harvest festival, and Feast of Tabernacles.

FALCÃO, CHRISTOVÃO DE SOUSA (*c.* 1512–57), Portug. poet.

FALCK, ANTON REINHARD (1777–1843), Dutch statesman.

FALCON (*c.* 10° N., 72° W.), maritime state, Venezuela; extends along coast on Caribbean Sea; capital, Coro. Area, 9573 sq. miles. Pop. 139,110.

FALCONE, ANIELLO (1600–65), Ital. artist; battle-scenes.

FALCONER, HUGH (1808–65), Scot. botanist; advised tea-planting and growing cinchona bark in Ind. Empire; saved teak forests from reckless felling; described Ind. fossil fauna.

FALCONER, WILLIAM (1732–69), Brit. poet and sailor; b. Edinburgh; drowned at sea; author of *The Shipwreck* (1673) and the *Universal Marine Dictionary* (1769).

FALCONET, ÉTIENNE MAURICE (1716–91), Fr. sculptor.

FALCONIDÆ, see HAWK FAMILY.

FALCONRY, a field sport popular among upper classes during Middle Ages, and, though severely checked by civil wars of Charles I., still in existence. F. consists in hunting birds and small animals by means of falcons or hawks. These are either taken from the nest and trained (called *eyesses*), or captured when full-grown and tamed (called *passage-hawks*). When hunting-bird is sufficiently trained, it is taken out hooded to the place where it is to be 'entered at the quarry,' when the hood is removed. Falcons are entered at winged game, hawks at winged and ground game. The females are more frequently used than the male, owing to their superior strength. When a falcon sights its quarry it rises to a height above it and 'stoops' upon it, while a hawk does not rise but flies in a straight line. After killing, the bird is called back by the 'lure,' hooded, and taken back.

Cox and Lascelles, *Coursing and Falconry* (1892); Mitchell, *Art and Practice of Hawking* (1900).

FALCONS, see HAWK FAMILY.

FALDSTOOL, reading-desk in Anglican or R.C. churches; folding stool used by R.C. bishops.

FALERII (42° 20′ N., 12° 25′ E.), one of twelve chief cities of Etruria; W. of Tiber, N. of Mount Soracte; destroyed by Rome, 241 B.C.; modern Castellana.

FALERIO (43° 7′ N., 13° 25′ E.), ancient town, Picenum, Italy; modern Fallerone.

FALGUIÈRE, JEAN ALEXANDRE JOSEPH (1831–1900), Fr. artist and sculptor.

FALIERO, MARINO (1279–1355), doge of Venice; executed for plotting to murder nobles and declare himself prince.

FALK, JOHANN DANIEL (1768–1826), Ger. philanthropist and author.

FALK, PAUL LUDWIG ADALBERT (1827–1900), Ger. politician; Prussian Minister of Public Worship and Education; retired, 1879.

FALKE, JOHANN FRIEDRICH GOTTLIEB (1823–76), Ger. historian.

FALKIRK (56° N., 3° 48′ W.), town (parliamentary burgh), Stirlingshire, Scotland, including suburbs of Stenhousemuir, Grahamston, Bainsford, and Camelon; centre of fertile agricultural and extensive coal-mining district; important iron manufactures, dating from XVII. cent.; breweries, explosives; formerly noted for cattle markets, called 'Trysts'; scene of defeat of Wallace by Edward I. (1298), and victory of Prince Charlie's army (1746). Pop. (1911) 33,569.

FALKLAND (56° 16′ N., 3° 13′ W.), royal burgh, Fifeshire, Scotland, at foot of E. Lomond Hill. Ancient palace (*c.* 1450–1540) was favourite residence of Stewart sovereigns; James V. d. here (1542); restored by Marquis of Bute (1888).

FALKLAND ISLANDS, ILES MALOUINES (East: 51° 41′ S., 57° 51′ W.; West: 51° 35′ S., 60° W.), Brit. Crown Colony in S. Atlantic (300 miles E. of Magellan Straits), consisting of East Falkland (3000 sq. miles), West Falkland (2300 sq. miles), and dependencies of South Georgia (*c.* 1000 sq. miles) and other dependencies (South Orkneys, South Shetlands, Graham's Land, Sandwich group); includes over 100 small islands; capital, Stanley (East Falkland). Coast is irregular, with many excellent harbours; highest point, Mt. Adam (over 2300 ft.); many small rivers and lakes; no forests, and no coal, peat being burnt; climate healthy. Chief industry is sheep-rearing; whaling stations; wool, hides, tallow, whale-oil exported. F. I. were sighted by Davis (1592); called after Lord F. by Captain Strong (1689); permanently occupied by Britain (1832), and used as penal colony for some years; administered by gov. Pop. (1911) 2300.

FALKLAND, LUCIUS CARY, 2ND VISCOUNT (*c.* 1610–43), Eng. soldier and politician; fought against Scots (1639); member of Short and Long Parliaments; at first supported Parliamentary party; Sec. of State (1642); espoused Royal cause, and killed at Newbury (1643); wrote *Discourse on Infallibility*; in philosophy was a rationalist; friend of Clarendon. *Life and Times*, by Marriott (1907).

FALL RIVER (41° 40′ N., 71° 10′ W.), city, Massachusetts, U.S.A., at mouth of Taunton; has many handsome buildings; extensive cotton manufactures; ironworks. Pop. (1910) 119,295.

FALL, THE, see ADAM, EVE, SIN.

FALLACY, breach of logical rule, though loosely applied to any false statement. Fallacies may be used as (1) Logical, in the mere form of statement, without regard to the meaning of the terms; (2) Material, concerned with the subject-matter of the argument. See LOGIC.

FALLIÈRES, CLÉMENT ARMAND (1841–), Fr. statesman; from country lawyer rose to be Prime Minister, Pres. of Senate (eight times), and Pres. of Republic (1907–13).

FALLMERAYER, JAKOB PHILIPPI (1790–1861), Ger. traveller and historian; travelled in East; best known for his views on Slavonic origin of modern Greeks; wrote history of Morea during Middle Ages and other works.

FALLOPIUS, GABRIELLO, FALLOPIO (1523–62), Ital. anatomist; prof. of Anat. in Ferrara, in Pisa, and afterwards in Padua; made several anatomical discoveries, and author of an early and valuable work on anat. **Fallopian Tubes**, see REPRODUCTIVE SYSTEM, GYNECOLOGY.

FALLOUX, FRÉDÉRIC ALFRED PIERRE, COMTE DE (1811–86), Fr. hist. writer and politician; Minister of Public Instruction; Member of Académie française.

FALLOW, land left untilled, or unsown for a year or more, for the purpose of giving rest to the soil. This system is now to a great extent rendered unnecessary by the use of manures, and by the alternating of turnip and other root crops with cereals.

FALMOUTH (50° 7′ N., 5° 3′ W.), seaport, Cornwall, England, on S. side of estuary of Fal; has excellent harbour, defended by castles—Pendennis on W., St. Mawes' on E.; headquarters of Royal Cornwall Yacht Club; fisheries; shipbuilding; engineering. Pop. (1911) 13,136.

FALSE POINT (20° 20′ N., 86° 46′ E.), cape, port, and lighthouse, Cuttack district, Bihar and Orissa, India.

FALSE PRETENCES, the obtaining of goods by this method means that they were obtained by false representation made either verbally, by writing, or by conduct which is calculated to deceive. The maximum punishment is five years' penal servitude.

FALSTER (54° 50′ N., 12° E.), Dan. island in Baltic Sea; *c.* 27 miles long; area, 183 sq. miles; agricultural. Pop. *c.* 35,000.

FALTICENI (47° 28′ N., 26° 16′ E.), town, Suceava, Rumania; large annual horse and cattle fair. Pop. 9643.

FALUN (60° 33′ N., 15° 35′ E.), town, Sweden; famous copper mine. Pop. (1910) 11,582.

FAMA (classical myth.), the goddess of rumour.

FAMAGUSTA (35° 7′ N., 33° 57′ E.), seaport town, E. coast of Cyprus; near ruins of Salamis; important in Middle Ages; taken by Richard Cœur de Lion, 1191; by Turks, 1571. Pop. 3400.

FAMILIAR, spirit or demon supposed to be in attendance on a necromancer; attendant attached to household of the pope or R.C. bp's; an official of the 'Holy Office' (Inquisition).

FAMILISTS ('Family of Love'), Dutch sect, founded by Joris and Niclaes in XVI. cent.; held that love was essential character of religion.

FAMILY, as the word is now understood, means the father, mother, their children, and other kindred. This modern conception of the term is derived from the ancient patriarchal form of f., in which the eldest male was essentially the 'father of the family,' and exercised supreme powers over his wife, or wives, their children, and the husbands and wives of the children, during the entire length of his days. It has been assumed by some writers that the patriarchal form was preceded by a promiscuous state, when sexual relations existed between persons of near kin. As opposed to this theory there is plenty of evidence regarding *exogamy*, associated with totemism, which prohibited marriage between members of the same tribe (i.e. *endogamy*). Arising out of the prohibition demanded by the custom of exogamy there came into existence the *beenah* form of marriage, of which there are numerous examples in the Bible. By this method a woman of one tribe received a lover, or lovers, from another tribe, and all children born of the connection became the property of the mother's tribe. Often, however, the father forsook his own tribe and was formally received into that of the mother of his offspring. Marriage by capture, or by purchase, was also contemporaneous with the *beenah* form of marriage. The term *family* is also used by botanists and zoologists to describe trees, plants, or animals belonging to a particular genus.

Lubbock's *Origin of Civilisation*; H. S. Morgan's *Ancient Society*; and works by Sir H. S. Maine, Westermarck, and McLennan; Bosanquet, *The Family* (1906).

FAMILY OF LOVE, see FAMILISTS.

FAMINE, distress and starvation caused by dearth of food; may be caused by failure of harvest owing to insect pests, drought, or other unfavourable weather conditions, or by war, excessive taxation, insufficient means of transport, or other difficulties in distributing food supplies. India's liability to f., which has occurred at intervals throughout Christian era (*e.g.* 1022, 1344, 1770, 1790, 1876, 1900), is chiefly due to intensely tropical climate; preventive measures include promotion of irrigation and railway systems, and agricultural improvements. Great f's occurred at Rome, 436 B.C.; in Egypt, 1064–72; in England, 1005, 1069; Ireland, 1822, 1846–47; China, 1877–88, 1888–89; Russia, 1891–92, 1905; universal f's, 879, 1162.

FAN, an implement used for producing coolness in the atmosphere, and upon the skin. Feather f's upon long handles were used by the ancients, and were regarded as symbols of royalty. In the Middle Ages f's were used in churches to keep flies from the consecrated elements. Small feather f's began to be used in England during Elizabeth's reign. The modern folding f. is of Jap. origin. From the XVII. cent. onwards France has been the chief seat of the f. industry.

Rhead, *History of the Fan* (1909).

FAN VAULT, in arch., decorative kind of vaulting resembling an open fan.

FANCY, passive imagination, in which the sequence of images and thoughts is casual and not the development of a plan.

FANG, FAN, cannibal race of the Fr. Congo; warriors, hunters, and workers in metal.

FANNERS, apparatus for winnowing grain; current of wind blows away chaff; first machine f. built in 1737; see also BLOWING-MACHINES.

FANO (43° 50′ N., 13° 2′ E.), town, Italy, on Adriatic Sea; cathedral; remains of triumphal arch of Augustus; ancient *Fanum Fortunæ*. Pop. 10,638.

FANSHAWE, SIR RICHARD (1608–66), Eng. diplomat and poet; Royalist in Civil War; after Restoration was ambassador to Portug. and Span. courts; trans. Camoens's *Lusiads* and other poems. His wife, LADY FANSHAWE, wrote remarkable *Memoirs*.

FANTASIA, musical composition of free or original design; term loosely applied to medley of popular tunes, a favourite type of music with mediocre pianists.

FANTI, native race of African Gold Coast; polygamous; marriage is by barter, but women are held in much regard; skilled artificers; fetish worshippers.

FANTI, MANFREDO (1806–65), Ital. soldier; commanded division in war between Austria and Piedmont, 1859; War Minister, 1860; commanded army in Papal States and subdued Umbria, 1860.

FANTIN-LATOUR, IGNACE HENRI (1836–1904), Fr. artist.

FANUM FORTUNÆ (43° 50′ N., 13° 2′ E.), ancient town, Umbria, Italy; celebrated temple of Fortuna, whence the town's name; modern Fano.

FARABI (870–950), Arab. scholar; student of Aristotle; Latin and Ger. trans. of some of his works.

FARAD, practical unit of electrical capacity; capacity of condenser giving difference of potential of 1 volt when charged with 1 coulomb.

FARADAY, MICHAEL (1791–1867), Eng. physicist; originally a bookbinder's apprentice, F. was app. assistant in the Royal Institution Laboratory on Davy's recommendation; worked there for fifty-four years; after 1833 as Fullerian Prof. of Chem.; experimented on the diffusion and liquefaction of gases and on the alloys of steel, and introduced the ideas of *polymerism* and *isomerism*. He discovered the induction of electric currents, the identity of electrification produced by different methods, and the different capacities of substances for participation in electrical induction. He was the first to recognise the chemical decomposition set up by an electric current, and to detect the rotation of the plane of polarised light in a magnetic field. He discovered the continuous rotation of magnets and wires conducting an electric current round each other. See ELECTRICITY.

Thompson, *Michael Faraday: His Life and Work*.

FARAH (32° 30′ N., 62° 10′ E.), town, Afghanistan, on river Farah; ancient *Phra*; river flows into Lake Hamun.

FARAZDAQ (*c.* 641–728), Arab. poet.

FARCE, humorous dramatic work, broadly comic in design, and depending upon ridiculous, sometimes clownish, situations for its effects, in which it differs from 'comedy,' a more witty and refined class of play.

FARCY, see GLANDERS.

FAREHAM (50° 52′ N., 1° 10′ W.), market town and watering-place, Hampshire, England, on Portsmouth Harbour; earthenware. Pop. (1911) 9674.

FAREL, GUILLAUME (1489–1565), Fr. reformer; preached Reformed doctrines in Switzerland; led Reformation party in Geneva, 1534, but was expelled with Calvin, 1538; d. Neuchâtel.

FAREWELL, CAPE (59° 44′ N., 43° 54′ W.), most southerly point in Greenland.

FARGO (46° 48′ N., 96° 45′ W.), city, N. Dakota, U.S.A., on Red River; R.C. and Prot. Epis. see; seat of State Agricultural and Fargo Colleges; centre of wheat trade; ironworks. Pop. (1910) 14,331.

FARGO, WILLIAM GEORGE (1818–81), Amer. express carrier and railway magnate.

FARIA Y SOUSA, MANUEL DE (1590–1649), Portug. poet and historian.

FARIBAULT (44° 20′ N., 93° 4′ W.), city, Minnesota, U.S.A., on Cannon; educational centre; furniture, woollens. Pop. (1910) 9001.

FARÍD UD-DÍN 'ATTÁR (1119–1229), Pers. poet, mystic, and traveller; prolific writer of verse.

FARIDKOT (30° 40′ N., 74° 46′ E.), native Sikh state, Punjab, India; chief town, FARIDKOT. Area, 642 sq. miles. Pop. (1911) 130,374.

FARIDPUR (23° 36′ N., 89° 53′ E.), town and district, Dacca division, Bengal, India; chief product, rice. District: area, 2281 sq. miles; pop. 1,937,646. Town: pop. 10,774.

FARINA, SALVATORE (1846–), Ital. novelist.

FARINATO, PAOLO (1522–1606), Ital. artist and architect.

FARINELLI, CARLO BROSCHI (1705–82), celebrated Ital. singer; enjoyed highest favour at Span. court under Philip V. and Ferdinand VI.

FARINGDON, GREAT (51° 30′ N., 1° 36′ W.), market town, Berkshire, England.

FARINI, LUIGI CARLO (1812–66), Ital. politician and writer; carried out negotiations with Napoleon III.; helped to unite Central Italy with Piedmont; premier, 1862–63.

FARMER, RICHARD (1735–97), Eng. ecclesiastic and Shakespearean commentator.

FARMERS' ALLIANCE.—Amer. political movement; began 1867, when it was called the *Grange*, aiming at improving the conditions of farming class socially and economically; had practically ceased by 1876. *Alliance* movement began 1889, principally in S.; advocated secret ballot, etc., and aimed also at doing away with national bank. *Populist* movement, beginning in Kansas, 1890, aimed at establishing eight hours' day, State control of telegraphs, telephones, and railways, and other reforms; united with Democratic party in 1896 and 1900.

FARMERS-GENERAL, Fr. association which farmed public taxes; system led to much abuse, and was abolished by Revolutionaries, 1789.

FARMING, see AGRICULTURE.

FARNABY, THOMAS (*c.* 1575–1647), Eng. grammarian.

FARNBOROUGH (51° 18′ N., 0° 45′ W.), town, Hampshire, England. St. Michael's Church contains tombs of Napoleon III. and Prince Imperial. Pop. (1911) 14,202.

FARNBOROUGH, THOMAS ERSKINE MAY, BARON (1815–86), Eng. historian.

FARNE ISLANDS, FEARNE (55° 38′ N., 1° 37′ W.), group of islets off N.E. coast of Northumberland, England.

FARNESE, Ital. family, who governed Parma 200 years. Alexander F. became Pope Paul III. in 1534; gave large properties to his natural children, of whom best known is Pierluigi, afterwards Duke of Parma, whose s., Ottavio, was father of famous general, Alexander F. (*q.v.*). Line became extinct, 1731. FARNESE PALACE in Rome is a beautiful Renaissance building.

FARNESE, ALEXANDER (1545–92), Duke of Parma; brilliant soldier and statesman; succ. Don John of Austria as gov. of Netherlands, 1578; reduced southern provinces, which became Span. Netherlands; wished to reconquer northern provinces, but was prevented by Philip II.'s schemes elsewhere, which twice compelled him to leave Netherlands at critical moment and lead army to France.

FARNESE, ELIZABETH (1692–1766), queen of Spain; wife of Philip V.; noted administrator.

FARNHAM (51° 13′ N., 0° 48′ W.), market town, on Wey, Surrey, England; has ancient castle, residence of Bp. of Winchester; hop plantations. Pop. (1911) 7365.

FARNWORTH (53° 33′ N., 2° 24′ W.), town, Lancashire, England; cotton-mills; collieries. Pop. (1911) 28,142.

FARO (37° N., 7° 52′ W.), town, Algarve, Portugal; fruit, cork, fish. Pop. 12,000.

FAROE ISLANDS, see FAEROE.

FARQUHAR, GEORGE (1678–1707), Eng. dramatist; was for some time an actor; first play was *Love and a Bottle* (1698), followed by *The Constant Couple, Sir Harry Wildair, The Inconstant, The Recruiting Officer,* and *The Beaux' Stratagem,* his most successful play; dramas well constructed, humorous and sprightly: *Best Plays* in Mermaid Series.

FARR, WILLIAM (1807–83), Eng. medical statistician.

FARRAGUT, DAVID GLASGOW (1801–70), Amer. admiral; entered navy, 1821; served several years in Mediterranean; remained faithful to Union in Civil War; commanded Western Gulf Squadron, 1861; took New Orleans, 1862, Mobile, 1864; admiral, 1866. *Life,* by Mahan (1893).

FARRAR, FREDERICK WILLIAM (1831–1903), Eng. cleric; headmaster of Marlborough, 1871; rector of St. Margaret's, 1876; dean of Canterbury, 1895; wrote religious works and school stories. *Life,* by his son (1904).

FARRAR, GERALDINE (1882–), Amer. soprano; début as Marguerite at Royal Opera House, Berlin, 1901.

FARREN, ELIZABETH (*c.* 1759–1829), Eng. actress; m. 12th Earl of Derby (1797).

FARREN, WILLIAM (1786–1861), Eng. actor.

FARRER, THOMAS HENRY, BARON F. OF ABINGER (1819–99), Eng. statistician.

FARRIER, shoer of horses, or veterinary surgeon.

FARS (30° N., 52° E.), province, on Persian Gulf, Persia; capital, Shiraz; Bushire is principal port; area, *c.* 53,500 sq. miles; interior is mountainous, with long fertile valleys; many salt lakes. Produces corn, rice, fruits, tobacco, opium, hemp, and wines; cattle and sheep reared; manufactures woollen, cotton, and silk goods. Pop. *c.* 1,000,000.

FARTHING, smallest Eng. copper coin; originally of silver; copper f's date from Stewart times.

FARTHINGALE, female hooped petticoat, first worn in England in Elizabeth's reign.

FARUKHABAD, FARRUKHABAD (27° 23′ N., 79° 37′ N.), city and district, Agra division, United Provinces, India. City is joint municipality with Fategarh; Mahrattas defeated here by Lake, 1804; held by native troops, 1857–58. Pop. 67,338. District forms part of Doab; capital, Fategarh; chief crop, rice. Area, 1685 sq. miles. Pop. 925,812.

FASANO (40° 50′ N., 17° 20′ E.), town, Bari, Italy; olive oil.

FASCES, bundles of birch or elm rods, from which an axe-head projected, carried by *lictors* before Roman magistrates.

FASCIA, in arch., a flat band, portion of the architrave.

FASCINATION, term applied in botany to peculiar growth, which sometimes appears in plants, characterised by flattening of growing point and consequent irregularity of structure.

FASCINE, long cylindrical bundle of sticks, closely bound together, used in fortification and military engineering.

FASHION, see COSTUME.

FASHODA (9° 55′ N., 32° 10′ E.), town, on White Nile, Egyptian Sudan; occupied by Fr., July 1898; surrendered to Kitchener, Nov. 1898; modern Kodok.

FASTI, in ancient Rome, days on which it was permissible to transact business (as opposed to *nefasti*); lists of these days being published in Forum, word came to mean 'calendar,' which included sacred and historical Fasti.

FASTING.—Fasting from religious motive is found in practically all religions, and is often regarded as the invariable and inseparable accompaniment of piety. It has been suggested that it originated as a preparation for the eating of sacrificial food; or it may have been considered as in itself an act of worship, or as a means of subjecting the physical to the spiritual faculties. F. at stated times was practised by Hindus, Parsees, Greeks, Romans; in Egypt there seem to have been no obligatory general fasts, but those about to be initiated into the religious mysteries of Isis and

Osiris were obliged to practise rigorous abstinence beforehand. Among the Jews f. was important, and on the 10th day of the 7th month was compulsory for whole nation, disobedience being punishable by death. Other compulsory fasts were afterwards ordained to commemorate certain national disasters, and seem to have been generally observed.

In the time of our Lord a great number of fasts were held; and although Christ Himself neither required nor forbade His disciples to fast, the Church has ordained many f. seasons for its members. Church of England does not insist on the observance (though the Book of Common Prayer includes a 'Table of the Vigils, Fasts, and Days of Abstinence to be observed in the year'), and in Scotland it is practically unknown among members of Presbyterian churches. The Gk. Church has a great number of fasts, which are strictly observed; and the R.C. Church has, besides the vigils of certain Feasts, the great fast in Lent, weekly abstinence from meat on Fridays, and four annual fasts, called the Quatembers, of three days in one week each. Among Muhammadans f. is compulsory in the month of Ramadan.

In Scotland *Fast days* are held in the week preceding Communion, but much of their religious character has gone.

Dr. Tanner and Succi went forty days without food; Jacques in 1891 fasted for fifty days, but in all cases water was taken daily.

Nelson, *Fasts and Festivals of Church of England* (1810).

FASTOLF, SIR JOHN (d. 1459), Eng. soldier, distinguished in Fr. wars; gov. of Bastille, 1420; regent of France, 1422; won victory at *Rouvray*, 1429; in some respects original of Shakespeare's Falstaff.

FAT, natural oils in plants and animals; most important are olein, stearin, palmitin.

FATA MORGANA, phenomenon seen in Strait of Messina; similar to mirage (*q.v.*).

FATALISM, doctrine of inevitable predetermination.

FATEHGARH, cantonment, 3 miles E. of Farukhabad; has Government gun-carriage factory; European population massacred, 1857. Pop. *c.* 13,000.

FATEHPUR (25° 55′ N., 80° 53′ E.), town and district, Allahabad, United Provinces, India. Town contains two fine mosques; agricultural trade. Pop. 19,281. District forms part of Doab. Area, 1618 sq. miles. Pop. 686,391.

FATEHPUR SIKRI (27° 5′ N., 77° 42′ E.), town, Agra district, United Provinces, India; former capital of Mogul Empire, founded by Akbar, 1569; remains of magnificent mosque and other ruins.

FATES, in classical mythology were represented by three women: Clotho, who spun the thread of life; Lachesis, who assigned to man his lot in life; Atropos, who cut the thread.

FATHER, male parent; one who begets, also one who originates; name applied to God, to the Pope, to priests of R.C. Church; to the Early Christian writers, known as 'the apostolic fathers,' who were contemporary with, or immediately followed, the apostles; senior member of a society, parliamentary body, etc. The term, 'f. of comedy,' has been applied to Aristophanes; 'f. of tragedy,' to Æschylus; 'f. of Eng. poetry,' to Chaucer; 'f. of Eng. prose,' to Roger Ascham. See FAMILY.

FATHERLASHER, see BULLHEADS.

FATHERS OF THE CHURCH, Early Christian teachers and writers renowned for saintliness and orthodoxy. The *patristic* period is by some writers continued to XIII. cent. in Latin Church, and to Council of Florence (1441) in Gk. Church, but is more generally considered to mean period from time of Apostolic Fathers (II. cent.) till rise of schoolmen in Middle Ages, ending for Gk. Church with John of Damascus (*c.* 756) and for Latin Church with Gregory the Great (d. 604); it is usually subdivided into periods before and after Council of Nicæa, 325 A.D. *Ante-Nicene* fathers include: Greek—Justin Martyr, Irenæus, Athenagoras, Clement of Alexandria, Hippolytus; Latin—Tertullian, Minutius Felix, Cyprian. *Post-Nicene* fathers include: Greek — Eusebius, Athanasius, Basil, Cyril of Jerusalem, Gregory Nazianzen, John Chrysostom, Cyril of Alexandria, John of Damascus; Latin—Ambrose, Jerome, Augustine, Gregory the Great. Farrar, *Lives of the Fathers* (1889); Series of *Fathers for Eng. Readers* (S.P.C.K.).

FATHOM, nautical measure (6 ft.) of depth.

FATIMITES, FATIMIDES, dynasty descended from Ali and Fatima, dau. of prophet Muhammad, of which chief members were: AL-MAHDI 'OBAIDALLAH (909–33), caliph of Tunis; conquered N. Africa. AL-QA'IM MUHAMMAD (933–45) gained Sicily. MOIZZ ABŪ TANĪM MA'ADD (969–75) conquered Egypt; founded Cairo. AZIZ ABU MANSŪR NIZĀR (975–96) extended N. African possessions. HAKIM (996–1020) persecuted Christians; gave impetus to Crusades. ZAHIR (1020–35) lost and regained Syria. MOSTANSIR (1035–94) lost Cairo to Turks; afterwards recovered. MOSTA'LI (1094–1101); possessions in Palestine lost to Franks. AMIR (1101–30) lost Tyre to Franks; assassinated. ZĀFIR (1149–54) lost Ascalon; murdered. 'ADID (1160–71), last F. caliph, deposed and died, 1171, when new dynasty was founded by vizier Saladin. See EGYPT.

FAUBOURG, Fr. equivalent for suburb; applied to various parts of Paris absorbed by that city.

FAUCES, the passage between the mouth and the pharynx, the soft palate being above and the root of the tongue below, while at the sides are the pillars of the f., with the tonsils between them.

FAUCHER, LÉONARD JOSEPH (1803–54), Fr. journalist and politician; minister of public works under Louis Napoleon; subsequently minister for interior; wrote on economics.

FAUCHET, CLAUDE (1529–1601), Fr. antiquary and historian.

FAUCHET, CLAUDE (1744–93), Fr. ecclesiastic, at court of Louis XVI., but sympathised with Revolution; protested against king's execution, and himself guillotined.

FAUCIT, HELENA SAVILLE (1817–98), Eng. actress and author; famous for Shakespearean impersonations; m. Sir Theodore Martin; wrote *Shakespeare's Heroines*, etc.

FAUJAS DE SAINT-FOND, BARTHÉLEMY (1741–1819), Fr. geologist; took up study of law, but abandoned profession; investigated rocks of the Alps; as assistant commissioner of mines travelled through Europe studying nature of rocks.

FAULT, geological term denoting a fracture in the strata which has also a displacement of deposits on either side of the fracture. F's, which are found in rocks of all kinds and ages, may be of a simple or compound nature, *i.e.* there may be the one single f., or the single original f. may be accompanied by minor f's branching off the main one like branches of a tree. The cause of f's is at present unknown, although there have been many suggestions. A sudden yield of strata along a f. line causes an earthquake, with which phenomena f's are therefore directly connected. Numerous f. lines are shown on geological maps.

FAUNA, animals of any region.

FAUNTLEROY, HENRY (1785–1824), Eng. banker; hanged for forgery.

FAUNUS (classical myth.), the Rom. god of agriculture and of shepherds; later identified with the Gk. Pan (*q.v.*).

FAURE, FRANÇOIS FÉLIX (1841–99), Pres., Fr. Republic; shipowner at Le Havre; entered Parliament and became Colonial Minister; Pres., 1895–99.

FAURÉ GABRIEL (1845–) Fr. musical composer of great originality; cantata *The Birth of Venus* produced at Leeds Festival, 1898.

FAURIEL, CLAUDE CHARLES (1772–1844), Fr. littérateur; private sec. to Fouché, 1799; resigned post to devote himself to letters; principal work,

Histoire de la Gaule Méridionale sous la Domination des Conquérants Germains.

FAUST, Faustus, a character around whom much legend has crystallised. Dr. John Faustus is said to have been b. at Knittlingen, in Württemberg, and to have d. about 1540. By most accounts he was a wandering necromancer, who lived by his wits, and there are a number of references to him by contemporaries. The earliest pub. account of the F. story was that of Johann Spies, issued at Frankfurt, in 1587. The story runs that F., the learned doctor, sold his soul to the devil (Mephistopheles), who restored his lost youth and permitted him to enjoy all kinds of worldly pleasures for twenty-four years, at the end of which time he was carried to Hell. An Eng. version appeared some time after 1588, and upon this Christopher Marlowe founded his great tragedy (first played in 1594; pub. 1604). Goethe's masterpiece, conceived upon somewhat more ambitious lines, was pub., pt. i., 1808; pt. ii., 1831. Musical works on F. story have been composed by Gounod, Berlioz, and Boito.

FAUSTINA (d. 141), wife of Emperor Antoninus Pius. Her dau., Faustina (d. 175 A.D.), was wife of Emperor Marcus Aurelius, who was devoted to her.

FAVARA (37° 15′ N., 13° 37′ E.), town, Girgenti, Sicily; sulphur mines. Pop. 20,398.

FAVART, CHARLES SIMON (1710-92), Fr. dramatist; wrote vaudevilles and comic operas: *Le Coq du village, Annette et Lubin, Les Trois Sultanes,* and *Ninette à la Cour.* Madame F. was a noted actress.

FAVERSHAM (51° 19′ N., 0° 52′ E.), market town, river port, Kent, England; remains of abbey founded by King Stephen; important oyster fisheries; gunpowder mills. Pop. (1911) 10,619.

FAVRAS, THOMAS DE MAHY, MARQUIS DE (1744–90), Fr. soldier; on Royalist side at Revolution; tried to aid Louis XVI.; arrested, 1789; hanged, 1790.

FAVRE, JULES CLAUDE GABRIEL (1809–80), Fr. politician; actively participated in revolutions of 1830 and 1848; leader of Republican party, 1863; Foreign Minister on dissolution of Empire, but resigned.

FAVUS, skin disease, occurring on the scalp and sometimes on other parts of the body, forming yellow, irregular, cup-shaped crusts, with a mousy smell, caused by the growth of a fungus, and usually continuing for several years. The treatment is to remove the crusts with a starch poultice, clean the part thoroughly, and apply formaldehyde, dilute carbolic acid, or similar parasiticides.

FAWCETT, HENRY (1833–84), Eng. political economist; b. Salisbury; ed. King's Coll. School, London, and Cambridge; lost eyesight, 1858; prof. of Political Economy, Cambridge, 1863; M.P. for Brighton, 1865; took leading part in movements for abolition of religious tests at the univ's, advocacy of compulsory education, preservations of commons and open spaces, and amelioration of condition of natives of India. His enthusiasm for India gained for him title of 'member for Hindustan'; F. worked for representation of women in political affairs; Postmaster-General in Gladstone's administration, 1880; initiated parcels post, sixpenny telegrams, savings bank, and postal orders. His wife, **Millicent Garrett F.** (1847–), wrote *Political Economy for Beginners* (1870), *Life of Queen Victoria* (1895), etc.; ardent advocate of votes for women.

Leslie Stephens, *Life of Henry Fawcett* (1885).

FAWCETT, JOHN (1768–1837), Eng. actor.

FAWKES, FRANCIS (1720–77), Eng. clergyman, poet, and translator.

FAWKES, GUY (1570–1606), Eng. conspirator; became zealous Catholic, acting as agent of Span. party in England; fought for Spain in Netherlands; returned to England at Catesby's invitation to assist in Gunpowder Plot, 1604; arrested in cellar beneath Parliament House, Nov. 4, 1605; tortured until revealed conspirators' names; and hanged.

FÁY ANDRÁS (1786–1864), Hungarian poet and novelist.

FAYAL (38° 23′ N., 28° 48′ W.), one of Azores Islands; chief town, Horta; exports fruit. Pop. 22,385.

FAYETTEVILLE (36° 4′ N., 94° 4′ W.), city, summer resort, Arkansas, U.S.A.; contains state Industrial Univ.; flour-mills, lumber manufactures. Pop. (1910) 4471.

FAYETTEVILLE (35° N., 78° 45′ W.), city, N. Carolina, U.S.A., on Cape Fear River; cotton and silk factories. Pop. (1910) 7045.

FAYRER, SIR JOSEPH, Bart. (1824–1907), Eng. physician; surgeon in Lucknow Residency during the Mutiny (1857); prof. of Surgery in Calcutta Medical Coll. (1859); pres. of the India Office Medical Board (1874); author of works on Ind. medical subjects.

FAYUM (29° 22′ N., 30° 55′ E.), province, Upper Egypt; area, *c.* 500 sq. miles; well watered and fertile, a portion in N. being occupied by Lake Kirket-el-Kerun (ancient Mœris); inhabitants chiefly agriculturists; principal products, fruit, cereals, rice, cotton. Pop. 441,583. Chief town, **Fayum,** pop. 37,320.

FAZOGLI, Fazokl (11° 15′ N., 34° 50′ E.), district, Anglo-Egyptian Sudan, on both banks of Blue Nile; exports gold, tobacco. Pop. *c.* 500,000.

FEAR, CAPE (33° 48′ N., 77° 59′ W.), southerly point, N. Carolina, U.S.A.

FEARNE, CHARLES (1742–94), Eng. jurist.

FEASTS, Festivals, are occasions periodically set apart for mourning or rejoicing, or in celebration of some deity, saint, hero, or special event. Such f's are common to all peoples and all countries. The ancient Egyptians had their f's of the Dead, and others in honour of Isis, Osiris, etc. The Greeks followed with their two early f's—the harvest and the vintage—but these were soon increased by the addition of f's in celebration of innumerable deities, out of which arose the Olympic, Nemean, Pythian, and Isthmian games. The Romans, imitating the Greeks, had their Lupercalia, in honour of Pan; Saturnalia, in honour of Saturn, and numerous other f's.

The Hindus observe many f's, among the more important being Pongal, Holi, Dasahara, and Dipavali; these had their origin in the changes of the seasons, but became identified with certain gods and goddesses. Of the Muhammadan f's may be mentioned Muharram, commemorating the martyrdoms of Ali and his sons, Hasan and Husain; and Ramazan, sacred as the month in which Muhammad returned from his meditation. Amongst the Jewish celebrations may be mentioned the Passover and the F. of Tabernacles. Christian peoples honour Christmas, or the Nativity, Easter, Whitsuntide, Trinity Sunday, besides numerous days devoted to the memory of saints and martyrs. There are besides several f's to which a more secular and local interest attaches, *e.g.* St. David's Day (March 1); St. Patrick's Day (March 17); St. George's Day (April 23); St. Andrew's Day (Nov. 30); Empire Day, May 24; in Canada, Dominion Day (July 1); in Australia, Anniversary Day (Jan. 22 or 26); in S. Africa, Union Day, May 31; in France, the *Fête nationale* (July 14); in America, Independence Day (July 4).

FEATHER.—Feathers are elaborate structures possessed only by one group of animals, namely, birds, and each is derived primarily from a small, hollow, epidermal *papilla,* whose centre is occupied by a core of more internal tissue. The epidermis produces the f. itself, whilst the pulp, which nourishes the developing f., and remains as a shrunken mass in the mature quill, is derived from the central portion. A mature f., like the large f's from the wing of a goose, consists of two main parts, the quill or *rachis,* and the closely packed lateral branches or *barbs.* The quill is grooved on the under surface, and contains two apertures, one basal, through which the f. derived nourishment when immature, the other situated on the under surface in the neighbourhood of the lowest barbs. Each barb produces smaller barbs or *barbules* on either side, and

these again terminate in minute hooks or *barbicels*. Apart from the lowest barbs, which are imperfect, the barbules, by means of their hooklet systems, produce a strong and elastic structure, impervious to air, and capable owing to its concave under-surface of resisting great pressure from below. Most f's bear, near the base, a small additional structure termed the *after-shaft*. Where the system of hooklets is imperfect, a softer, more downlike f. is produced, as in the ostrich, the *down* which covers the duckling and chicken, and also constitutes an important part of the mature plumage of many birds, being somewhat similar in character, though it may consist merely of a small apical tuft of fluffy matter. Minute hair-like structures, termed *filoplumes*, are often found surrounding the bases of the larger f's, as in the goose, and these either branch very little, or not at all. The f's of the heron are peculiar in that they shed a dry, greasy substance termed *powder-down*. F's are believed to have evolved from the reptilian scale, and are essentially similar in development.

F's form an important article of commerce, the value of imports into the U.K. exceeding two millions sterling. Many f's are made into boas, whilst ostrich f's and the plumage of tropical birds are much used in trimming hats. The inordinate use of birds' plumage for personal adornment led to a strong humanitarian reaction against the wholesale destruction of birds this involved, and the wearing of ospreys was forbidden at Court. An attempt to obtain parliamentary legislation (1908) restricting the importation of plumage was unsuccessful. The smaller f's of poultry and game birds are used to stuff cushions and beds, quilts being stuffed with the delicate down of the eider-duck. The quills are used for pens, toothpicks, and paint-brushes.

FEATHER GRASS (*Stipa pennata*), Brit. garden plant having feathery awns; Esparto is of the genus.

FEATHER STARS, see ECHINODERMATA.

FEATHERSTONE (53° 42′ N., 1° 20′ W.), town, W. Riding, Yorkshire, England; coal mines. Pop. (1911) 14,377.

FEATLEY, DAVID, FAIRCLOUGH (1582–1645), Anglican Divine, in Westminster Assembly.

FEBRONIANISM, Ger. R.C. movement which aimed at establishing independence of national churches, and opposed pontifical claims. System was first proclaimed in 1763 by Johann Nikolaus von Hontheim in his *De Statu Ecclesiæ et legitima potestate Romani pontificis*, pub. under pseudonym, 'Justinus Febronius,' whence name.

FEBRUARY (Lat. *Februarius*), 2nd and shortest month of the modern year; contains 28 days, and in leap years 29; amongst the Romans it was the feast of expiation and purification, and the month in which the Lupercalia were held. Candlemas Day (2nd) and St. Valentine's Day (14th) occur during this month.

FÉCAMP (49° 46′ N., 0° 22′ E.), seaport, watering-place, Seine-Inférieure, France; has XIII.-cent. Benedictine abbey church; 'Benedictine' liqueur distillery; deep-sea fisheries; various manufactures. Pop. 15,400.

FECHNER, GUSTAV THEODOR (1801–87), Ger. philosopher and psychologist; based metaphysics on natural science, and proceeded by methods of induction and analogy; founded psycho-physics, and discovered psycho-physical law of relation between stimulus and sensation.

FECHTER, CHARLES ALBERT (1824–79), Anglo-Fr. actor; famed in England and America for Shakespearean impersonations.

FECKENHAM, JOHN (d. 1585), Eng. cleric; became Abbot of Westminster, 1556; sent to Tower in 1560 for refusing to take Oath of Supremacy; most of remaining life spent in captivity.

FEDERALISTS, Amer. political party which, under leadership of Alexander Hamilton and John Adams, controlled national affairs and carried out various reforms between 1789 and 1801, after which it lost power, partly owing to hostility between leaders. By 1820 it had practically ceased to exist. See UNITED STATES: *History*.

FEDERATION, CONFEDERATION, the union of several states under one government so that they stand before the world as one united body, although the several states reserve certain departments of administration for their own control. A recent instance is the Commonwealth of Australia, in which everything not specifically reserved for the Federal Government is under jurisdiction of the several States; while in the Dominion of Canada everything is under jurisdiction of the Federal Government except what is specifically reserved for the several governments of the Provinces forming the Dominion. Other examples are the United States of America, the German Empire, the Swiss Republic, Argentine Republic, Brazil, Mexico, Venezuela, and Federated Malay States. Ancient federations were the Ætolian and Achæan Leagues in Greece; and the Lycian League in Roman times. A closer form of Union than Federation is *Unification* (*e.g.* the Union of 1707 between England and Scotland and the Union of South Africa, 1910), which involves complete legislative union, there being only one central Government and one supreme Parliament, sovereignty and legislative rights being abandoned by the individual States or kingdoms which are merged in such a union.

Hamilton, *The Federalist*; Oliver, *Life of Alexander Hamilton*.

FEDERICI, CAMILLO (1749–1802), Ital. playwright; prolific writer of popular comedies.

FEE, the charges of a professional man; the educational charges at a univ. or coll.; land held in 'fee simple' (*i.e.* freehold), by which the holder is the absolute owner, and may do with it as he pleases. The opposite of this is land which is 'entailed,' *i.e.* inalienable land which descends to the heirs of his body and their heirs.

FEHMARN, FERMERN (54° 28′ N., 11° 10′ E.), island in Baltic, belonging to Prussian province of Holstein; separated from mainland by F. Sound. Pop. *c.* 10,000.

FEHMIC COURTS, mediæval Ger. courts, which became an important institution in XII. cent.; attained greatest degree of power in Westphalia, where they continued to exist (after being abolished elsewhere in XVI. cent.) till 1811, when Jerome Bonaparte put an end to them. Pres. of court was app. by overlord of juridical centre.

FEHRBELLIN (52° 50′ N., 12° 46′ E.), town, Brandenburg, Prussia, Germany; scene of defeat of Swedes by Frederick, Great Elector, 1675.

FEITH, RHIJNVIS (1753–1824), Dutch poet and novelist; wrote didactic and lyrical poems; *Ferdinand and Constantia*, and other popular novels.

FELANITX, FELANICHE (39° 29′ N., 3° 12′ E.), town, island of Majorca, Spain; earthenware; wine.

FELDKIRCH (47° 13′ N., 9° 36′ E.), town, Vorarlberg, Austria-Hungary; occupies strong strategic position. Pop. (1910) 5057.

FÉLIBRIGE, Fr. association (founded, 1854) for reviving Provençal speech and lit. See PROVENCE.

FELIDÆ, see CAT FAMILY.

FELIS, see under CAT FAMILY.

FELIX, name of 5 popes: FELIX II. raised to papal chair during exile of Liberius, 356–57, on whose return F. retired.—FELIX III. (483–92) repudiated deed of union pub. to end quarrel between Church and Monophysites.

FELIX (VIII. cent.), bp. of Urgela in Spain.

FELIX, ANTONIUS (fl. 55 A.D.), Procurator of Judæa, before whom St. Paul preached.

FELIX OF VALOIS (1127–1212), founder of order of Redemptionists or Trinitarians.

FELIXSTOWE (51° 58′ N., 1° 22′ E.), seaside resort, at mouth of Orwell, S.E. coast, Suffolk, England. Pop. (1911), with Walton, 8667.

FELL, JOHN (1625–86), dean of Christ Church,

Oxford, and bp. of Oxford (1676); Royalist in Civil War; maintained Church services during Commonwealth; after Restoration became canon and subsequently dean of Christ Church, D.D., and royal chaplain (1660); vice-chancellor (1666–69); strict disciplinarian; restored many of the college buildings; did much to promote learning; name associated with Tom Brown's rhyme beginning 'I do not like thee, Dr. Fell.'

FELLÁH (Arabic 'tiller'), Egyptian labourer, descended from, and much resembling, ancient Egyptians; formerly oppressed by Turks.

FELLENBERG, PHILIPP EMANUEL VON (1771–1844), Swiss educationist.

FELLING (54° 57′ N., 1° 34′ W.), town, Durham, England; collieries. Pop. (1911) 25,020.

FELLOW, graduate of a univ., holding a fellowship; member of a learned society; at the older Brit. univ's a f. shares in the government of his coll. and receives an annual payment from its revenues. In other univ's a f. usually receives a fixed sum for a limited period for the purpose of research, etc.

FELLOWS, SIR CHARLES (1799–1860), Brit. archæologist, noted for his discoveries in Lycia.

FELO DE SE, SUICIDE (*q.v.*).

FELONIES, see CRIMINAL LAW.

FELSITE, fine-grained igneous rocks of acid composition, often mixture of quartz and orthoclase, but generally recognised as only a variety of quartz porphyry.

FELSPAR, FELDSPAR (Ger. *feldspat*, field spar), mineral of foliated structure found in nearly all parts of world; hard silicate, constituent of granite, gneiss, and greenstone; in colour, white or pink with pearly lustre; much used in manufacture of porcelain.

FELSTEAD (51° 52′ N., 0° 26′ E.), village, Essex, England; has important public school, founded 1564.

FELT, a matted woollen substance, produced, not by weaving, but by placing numerous layers of hair together and applying pressure by means of heated steam rollers.

FELTON, CORNELIUS CONWAY (1807–62), Amer. scholar; pres. of Harvard; wrote *Greece, Ancient and Modern.*

FELTON, JOHN (d. 1628), Eng. soldier; assassin of Duke of Buckingham; hanged.

FELTRE (46° 1′ N., 11° 54′ E.), town (ancient *Feltria*), Venetia, Italy; bp.'s see; cathedral. Pop. 5314.

FELTRE, MORTO DA (d. 1519), Venetian artist.

FELUCCA, swift, three-masted, lateen-rigged vessel, used in Mediterranean.

FEMERN (54° 28′ N., 11° 10′ E.), island, Baltic Sea, belonging to Germany. Pop. *c.* 10,000.

FENCE, slang term for receiver of stolen property.

FENCING, the art of single combat with swords or other steel hand weapons, in which skill and not sheer force is employed, and in which the importance of time, measure, and guard must be recognised. The principle of keeping time includes reducing all movements to minimum in extent and number; measure means remaining out of easy reach when defending, and attacking only when within easy striking distance; keeping guard is to be so placed that all regular attacks and parries can be made with least expenditure of energy. During the Middle Ages the use of complete suits of mail caused f. to be neglected, but on the subsequent disuse of armour the art was revived.

Scientific swordcraft would seem to have originated in Germany, where there were gilds of f. masters in the XV. cent.; in the following cent. the state of society in Italy was such that skill in single combat was essential, and in that country the rapier style was first introduced; the art was further developed by the Spaniards, whose improvements the Italians afterwards adopted. The Ital. style, with long rapiers, was great practised in Elizabethan England; but in the XV cent. a new school was founded in France, in which the long rapier was superseded by a shorter weapon. The use of this caused the disappearance of the dagger, which up to this time had been considered necessary as an additional weapon. The new style quickly came into favour, and the Ital. method fell into disrepute. Most of the f. terms used in England are derived from Fr. words. Such are the *tierce*, a position in parrying which protects the upper part of the body on the right; *carte*, which protects the left upper part; and the *seconde*, which protects the lower part. A *riposte* is a quick return thrust after a parry, and a *remise*, the second of two thrusts given on the same lunge. A beat with the right foot is called an *appel*, and a beat of the blade against that of the opponent is known as a *battement*; while a *flanconnade* is a thrust made at the opponent's side under his arm.

The weight of the *sabre* (or sword) is against its use for thrusting in fencing, and leaves it with few of the powers of the rapier for attack or defence. Nevertheless its point makes it a valuable weapon for a thrust on occasions. The cut, the guard, and the point are the three actions both in sabre-fencing and in sabre against lance or bayonet. In one-third of the blade from the point the greatest force of the blow is concentrated (and the sabre is expressly fashioned for cutting by a sharp and heavy blow); this is called the *centre of percussion*, and is relied upon for attack. In about a third of the blade from the hilt, the *forte*, lies the strength for defence.

Carl Thimm, *Bibliography of Fencing and Duelling*; Chapman, *Foil Practice.*

FÉNELON, BERTRAND DE SALIGNAC (1523–89), Fr. diplomatist; ambassador to England at period of St. Bartholomew massacre.

FÉNELON, FRANÇOIS DE SALIGNAC DE LA MOTHE (1651–1715), Fr. ecclesiastic and author; s. of the Comte de F.; became tutor to the Duke of Burgundy, and subsequently abp. of Cambrai; his sympathy with, and defence of, Madame Guyon, the Quietist, involved him in prolonged theological controversy, and his didactic novel, *Télémaque*, gave offence to Louis XIV. His other works include a treatise on the *Education of Girls*, *Dialogues of the Dead*, *Maxims of the Saints.* He was notable for the dignified austerity of his life, his gracious manners, and for his benevolence and charity; his style is rich, eloquent, and full of classical allusions. *Life*, by Viscount St. Cyres (1903).

FENESTELLA, Rom. historian of the age of Tiberius.

FENESTRATION, term in arch., relating to the arrangement of window spaces.

FENG-TIEN, SHENG-KING (*q.v.*).

FENIANS, brotherhood of Irishmen, formed in New York by John O'Mahony in 1857, to secure independence of Ireland; spread rapidly among Irishmen all over world; not only made various unsuccessful attempts to raise insurrection in Ireland, but also essayed invasion of Canada in 1866 and 1870; became a secret society in 1872. In 1882 the Phœnix Park Murders, and in 1883–85 the existence of a society advocating use of dynamite, showed a development of Fenian spirit.

The Fenian Movement (Irish Library).

FENNEL (*Fœniculum*), plant with yellow aromatic flowers; used in sauces as carminative and condiment; a genus of L. Umbelliferæ.

FENNER, DUDLEY (1558–87), Eng. theologian, an able expounder of Puritan theology.

FENNY STRATFORD (52° N., 0° 45′ W.), market-town, Buckinghamshire, England. Pop. (1911) 5171.

FENRIR (Norse myth.), monster wolf; offspring of Loki (*q.v.*).

FENS, district, E. of England, embracing parts of Lincolnshire, Northamptonshire, Huntingdonshire, Cambridgeshire, and Norfolkshire; flat, marshy tract of land round Wash, intersected by rivers and channels. Principal rivers which flow through F. into Wash are Gt. Ouse, Witham, Welland, Nen, and Cam. Preservation of F. depends on preservation of river-

banks, hence earthen embankments to protect it from sea and rivers. Water is drained into rivers by steam-pumps; Romans said to have been first to undertake drainage and preservation of F., and under them land became fertile; later, owing to neglect and incursions of sea, F. converted into morass; most successful attempt at drainage was Earl of Bedford's (XVII. cent.), in district called Bedford Level. On islands of firmer ground are monastic buildings. In Lincolnshire F. are some fine parish churches. Cathedrals of Ely and Peterborough and church of King's Lynn most noteworthy ecclesiastical buildings. Hereward the Wake had his camp of refuge on F.; now converted into a healthy grazing and agricultural district; has considerable barge traffic.

Wheeler, *History of Fens of S. Lincoln* (2nd ed., 1897).

FENTON (52° 49′ N., 2° 12′ W.), town, Staffordshire, England; china and earthenware; incorporated in county borough of Stoke-on-Trent, 1910.

FENTON, EDWARD (fl. 1577–1603), Eng. navigator; served under Frobisher, and commanded *Mary Rose* against Armada.

FENTON, ELIJAH (1683–1730), Eng. poet and translator; associated with Pope in trans. of *Odyssey*.

FENTON, SIR GEOFFREY (1539–1608), Eng. politician and author.

FENTON, LAVINIA (1708–60), Eng. actress; m. 3rd Duke of Bolton.

FENWICK, SIR JOHN (d. 1697), Eng. general; implicated in Jacobite plots against William III.; beheaded.

FEOFFMENT, O.E. conveyance of land by 'livery of seisin,' in which one of the acts of the feoffor was to deliver a clod of earth, or some such trifle, to the feoffee. Before the date of the Statute of Frauds (1678) a deed was unnecessary.

FERDINAND I. (1793–1875), Austrian emperor; intermittently insane; abdicated in 1848, when his nephew Francis Joseph became emperor.

FERDINAND I.-III., Holy Roman emperors.

FERDINAND I. (1503–64), Emperor of Holy Rom. Empire; b. Spain; m. Anna, sister of Louis of Bohemia and Hungary, at whose death he claimed both crowns; king of Bohemia, 1526; opposed in Hungary by John Zapolya, who was aided by Turks; succ. his bro., Charles V., as emperor, 1558; tried to reconcile his R.C. and Prot. subjects.

FERDINAND II. (1578–1637), Emperor of Holy Rom. Empire; gov. of Styria, Carinthia, and Carniola in 1596; king of Bohemia, 1617; of Hungary, 1618; emperor, 1619. His quarrel with Frederick V., Elector Palatine, in whose favour he was deposed in Bohemia in 1618, was opening of Thirty Years War. F. banished Protestants in 1627; restored Church lands by Edict of Restitution, 1629; made Treaty of Prague, 1635.

FERDINAND III. (1608–57), Emperor of Holy Rom. Empire; king of Romans, 1636; emperor, 1637; continued Thirty Years War till 1648; arranged Polish Alliance to combat Sweden.

FERDINAND I.-IV., kings of Naples; F. IV. of Naples became F. I. of the Two Sicilies (*q.v.*).

FERDINAND I. (1423–94), king of Naples; defeated John of Anjou; warred against Turks, 1480–81; excommunicated in 1489 by Pope Innocent VIII.

FERDINAND II. (1469–96), king of Naples (1495).

FERDINAND IV. (1751–1825), king of Naples; succ. on his f's accession to throne of Spain, 1759. Influenced by his wife, Maria Carolina, he waged war against France, 1796, but was defeated; formed alliance with Austria against France, 1805. After *Austerlitz*, Napoleon conquered Naples and gave it to Joseph Bonaparte. F. again fled to Sicily, but returned after Napoleon's downfall; rest of life passed in career of despotism and merciless persecution.

FERDINAND I. and II., kings of Leon; Leon was united with Castile by Frederic the Great and finally joined in 1230, so that the kings of Leon were also kings of Castile (*q.v.*).

FERDINAND I., THE GREAT (d. 1065), king of Castile; famed for military triumphs and for individual piety. His death was followed by civil conflict between his three sons, amongst whom he divided his possessions.

FERDINAND II. (d. 1188), king of Leon; noted for soldierly qualities.

FERDINAND I.-IV., kings of Castile; F. V. of Castile became F. V. of Spain (*q.v.*).

FERDINAND III., THE SAINT (1199–1252), king of Castile; famed for wars with the Moors.

FERDINAND IV. (d. 1312), king of Castile; weak and insignificant ruler.

FERDINAND V.-VII., kings of Spain; descended from kings of Castile (*q.v.*).

FERDINAND V., THE CATHOLIC (1452–1516), king of Spain; m. Isabella (*q.v.*) of Castile, his cousin, 1469; with her succ. to throne of Castile, 1474 (as Ferdinand V.); as Ferdinand II., succ. his f., John I., as king of Aragon, 1479; defeated Moors; annexed their last stronghold, Granada, 1492; Navarre, 1515; united whole of Spain under his sway, and forwarded voyages of Columbus. See SPAIN: *History*.

Prescott, *History of Reign of Ferdinand and Isabella*.

FERDINAND VI. (1713–59), king of Spain (1746); of a pacific, shy, and melancholy temperament.

FERDINAND VII. (1784–1833), king of Spain; proclaimed king in 1808 on abdication of f., Charles IV.; soon afterwards forced by Napoleon to abandon claim to Span. throne; restored to throne, 1814; ruled despotically; re-established Inquisition; declared incapable of governing, 1823; in character false and vicious.

FERDINAND I. and II., kings of the Two Sicilies; F. I. of the Two Sicilies was F. IV. of Naples.

FERDINAND II. (1810–59), king of the Two Sicilies; despotic ruler; popular discontent evinced by attempted risings in 1837, 1841, 1844, 1847; general rising in Sicily, 1848, was suppressed by bombardments; hence his nickname—*Bomba*.

FERDINAND I. (1373–1416), king of Aragon.

FERDINAND III. (1769–1824), Grand Duke of Tuscany; Elector of Salzburg, 1802; of Wurzburg, 1805; finally restored to Tuscany, 1815.

FERDINAND I. (1345–83), king of Portugal.

FERDINAND (1577–1650), elector-abp. of Cologne.

FERDINAND, DUKE OF BRUNSWICK (1721–92), Prussian soldier; served in Seven Years War; distinguished at *Prague*; defeated French at *Crefeld* and *Minden* (1758, 1759); field-marshal, 1758.

FERDINAND, MAXIMILIAN KARL (1861–), tsar of Bulgaria, s. of Prince August of Saxe-Coburg and Gotha; succ. Prince Alexander of Battenburg, who abdicated (1887); assumed title of king (1911); m. Marie Louise (d. 1899), dau. of Duke of Parma; m. Princess Eleonore of Reuss-Köstritz (1908); heir, Prince Boris (b. 1894). F. was commander-in-chief of forces of Balkan Allies in Turco-Balkan War (*q.v.*). See BULGARIA.

FERENTINO (41° 41′ N., 13° 16′ E.), town (ancient *Ferentinum*), Rome, Italy; bp.'s see. Pop. 8072.

FERENTINUM (c. 42° 40′ N., 12° 7′ E.), ancient town, Etruria, Italy; birthplace of Emperor Otho (32 A.D.).

FERETORY, in arch., a shrine or memorial chapel.

FERGHANA (40° N., 71° E.), province, Russ. Turkestan, in valley of Syr-Daria; formed in 1876 from khanate of Khokand; fertile, well-watered plain, enclosed by mountains; produces large crops of grain, cotton, fruit; coal, iron, lead, and silver found; inhabitants, chiefly agriculturists, consist mainly of Sarts, Uzbegs, and Kara-Kirghiz; principal towns, Marghelan, Khokand, Namangan, and Andjan. Area, 35,446 sq. miles. Pop. (1910) 2,034,200.

FERGUS FALLS (46° 18′ N., 96° 5′ W.), city, on Red River, Minnesota, U.S.A.; flour-mills; woollen factories. Pop. (1910) 6887.

FERGUSON, ADAM (1723–1816), Scot. philosopher and historian; prof. of Natural Philosophy,

Edinburgh, 1759; Moral Phil., 1764; wrote *History* ... philosophical works.

FERGUSON, JAMES (1710–76), Scot. astronomer; b. Keith; studied Edinburgh; went to London (1743), and there lectured on experimental philosophy; principal work, *Astronomy explained upon Newton's Principles.*

FERGUSON, ROBERT, THE 'PLOTTER' (*c.* 1637–1714), anti-Catholic agitator under Charles II., and author of *History of the Revolution* (1706).

FERGUSON, SIR SAMUEL (1810–86), Irish poet and antiquary.

FERGUSSON, JAMES (1808–86), Scot. author; wrote a *History of Architecture,* and works on kindred subjects.

FERGUSSON, SIR JAMES (1832–1907), Brit. statesman; Postmaster-General (1891–92); gov. of S. Australia (1868), New Zealand (1873–75), Bombay (1880–85).

FERGUSSON, ROBERT (1750–74), Scot. poet; b. Edinburgh; ed. St. Andrews; d. in Edinburgh madhouse. His Scots poems exercised a marked influence on Burns, who borrowed from him the measure since known as the 'Burns stanza.' F.'s Eng. verses have little merit.

FERGUSSON, SIR WILLIAM, Bart. (1808–77), Scot. surgeon; surgeon in Edinburgh Royal Infirmary (1836); prof. of Surgery in King's College, London (1840); invented several useful surgical instruments, and devised new methods of operative procedure, especially excision of joint as substitute for amputation of a limb.

FERIÆ, Rom. 'free' or festival days, holidays; f. were either special (*imperativæ*), ordered for special occasions; or legal (*publicæ*), and these were periodically recurrent, like the *Saturnalia* (in mid-December), or held when the priests decided, *e.g.* the *Compitalia* (see FEASTS). The term f. is applied ecclesiastically to days of the week except Sunday and Saturday, Monday being f. *secunda.*

FERISHTA, MUHAMMAD KASIM (d. 1611), Persian historian.

FERMANAGH (54° 20′ N., 7° 30′ W.), inland county, Ulster, Ireland; almost divided into two parts by Upper and Lower Loughs Erne; surface generally hilly and undulating, mountainous in W., culminating in Cuilcagh, 2188 ft.; well-wooded, several fertile vales; large tracts uncultivable; limestone, coal, iron, and marble found; principal industry agriculture; pottery works (Belleek); manufactures of coarse linen; chief town, Enniskillen. Area, 715 sq. miles. Pop. (1911) 61,811.

FERMENTATION, a change brought about in various substances, especially organic liquids, by agents called ferments, which are of two kinds: *organised* ferments, or living organisms, bacteria, yeasts, moulds; and *unorganised* ferments or enzymes, or soluble chemical substances. In order to bring about f. by organised ferments the organisms must be alive and growing, and certain conditions are necessary for their growth. Suitable nourishment and sufficient moisture must be present, the temperature must be within a certain limited range, about blood-heat, some of the organisms require the presence of oxygen, while various poisonous substances, *e.g.* acids or alcohols in too great quantity, or antiseptics, will kill them and thus prevent f.

These organisms are either unicellular masses of protoplasm, *bacteria,* which multiply by fission of the cells (see BACTERIOLOGY); or more highly developed cells which multiply by budding, *yeasts*; or still more highly developed organisms, which branch freely and multiply by the formation of special organs, *moulds.* They live on nutritive substances in the liquid and give out products, allied to the unorganised enzymes, which break down the more complicated organic substances in the liquid, *e.g.* sugars, into simpler substances, *e.g.* alcohols and carbon dioxide, this process receiving the name of f. Alcoholic f. is the most important economically, and, *e.g.* in the making of *beer,* it is caused by a yeast (*Saccharomyces cerevisiæ*) acting on solutions of sugars, glucose, or dextrin, extracted from malt, and changing them into alcohol, carbonic acid gas, and small quantities of other substances which give the liquid its special flavour.

The most important unorganised ferment is *diastase,* which is contained in malt, and changes starch into glucose, while others are ptyalin in the saliva, and pepsin in gastric juice, which have much the same properties.

J. R. Green, *The Soluble Ferments and Fermentation* (2nd ed., 1901).

FERMO (43° 11′ N., 13° 43′ E.), town (ancient *Firum*), Italy, 4 miles from Adriatic; cathedral; archbishop's see; trade in grain, silk, and wool; was Rom. colony founded 264 B.C.; remains of Rom. walls. Pop. 16,914.

FERMOY (52° 8′ N., 8° 16′ W.), market town, on river Blackwater, County Cork, Ireland; has R.C. coll.; military barracks; salmon-fishing. Pop. 6126.

FERNANDEZ, ALVARO (fl. 1450), Portug. voyager to W. Africa.

FERNANDEZ, DIEGO (fl. 1545–71), Span. soldier; wrote on Peruvian history.

FERNANDEZ, JOHN (fl. *c.* 1445), Portug. West African explorer.

FERNANDEZ, JUAN (XVI. cent.), Span. navigator; discovered the islands (1563) which bear his name—islands associated with the castaway, A. Selkirk.

FERNANDEZ, LUCAS (XV. cent.), Span. dramatist.

FERNANDINA (30° 40′ N., 81° 36′ W.), city, port entry, Florida, U.S.A.; popular summer and winter resort; cotton and lumber manufactures; large export trade. Pop. (1910) 3482.

FERNANDO DE NORONHA (3° 50′ S., 32° 30′ W.), island in S. Atlantic, off coast of Brazil; penal settlement.

FERNANDO PO (3° 30′ N., 8° 47′ E.), island, W. coast of Africa, in Bight of Biafra; capital is Santa Isabel; coast steep, inland mountainous; principal peak, Mt. Clarence (*Span.* Pico Santa Isabel). Vegetation luxuriant; cocoa, coffee, sugar, tobacco, and vanilla plantations; inhabitants European, Bantus, negroes. Discovered XV. cent. by Portug. navigator Fernão do Po; now under Span. gov.-gen. Area, 780 sq. miles. Pop. *c.* 25,000.

FERNEL, JEAN FRANÇOIS (1497–1558), Fr. natural philosopher and physician, author of several scientific works.

FERNEY (46° 15′ N., 6° 6′ E.), town, Ain, France; associations with Voltaire. Pop. *c.* 2000.

FERNIE (49° 25′ N., 115° 5′ W.), city, Brit. Columbia, Canada, on Canadian Pacific Railway; extensive coal mines.

FERNOW, KARL LUDWIG (1763–1808), Ger. critic and archæologist.

FERNS, see PTERIDOPHYTA.

FEROZEPUR, FIROZPUR (30° 56′ N., 74° 48′ E.), town and district, Punjab, Brit. India, near the Sutlej; contains important arsenal; commercial centre. Pop. 49,341. District: area, 4302 sq. miles; pop. 958,072.

FEROZESHAH (30° 53′ N., 74° 49′ E.), village, Punjab, Brit. India; scene of Brit. victory over Sikhs, Dec. 21, 1845.

FERRAND, ANTOINE FRANÇOIS CLAUDE, COMTE (1751–1825), Fr. statesman and author.

FERRAR, NICHOLAS (1592–1637), Anglican theologian; lived a life of study and devotion.

FERRAR, ROBERT (d. 1555), Eng. martyr and bp; app. to see of St. David's, 1548; accused of heresy under Mary; burnt at Carmarthen.

FERRARA (44° 50′ N., 11° 39′ E.), capital of F. ...vince, N. Italy, 3½ miles S. of Po; cathedral ... XII. cent.) and other fine churches; Castello, ... de Diamanti (XV. cent., containing picture gallery), univ., and library; long flourished under

illustrious house of Este (*q.v.*); celebrated school of painting, XV.–XVI. cent.; birthplace of Tasso and Guarini. Pop. (1911) 95,196. Province: area, 1012 sq. miles; pop. (1911) 300,877.

Noyes, *Ferrara* (Mediæval Town Series).

FERRARA, ANDREA (fl. late XVI. cent.), Ital. sword-maker.

FERRARI, GAUDENZIO (1484–1549), Ital. artist and sculptor; pupil of Leonardo da Vinci; religious subjects.

FERRARI, PAOLO (1822–89), Ital. comic dramatist of the Goldoni school.

FERREIRA, ANTONIO (1528–69), Portug. poet; wrote *Castro*, a tragedy; also elegies, sonnets, etc.

FERRERS, Norman Eng. family, which held large fiefs after Conquest; held earldom of Derby, 1138–1266; barony, 1299–1450, when it passed to Devereux family, afterwards to Shirley, who have been Earls Ferrers since 1711.

FERRERS, LAURENCE SHIRLEY, 4TH EARL (1720–60), hanged at Tyburn for murder of his steward.

FERRET, see WEASEL FAMILY.

FERRI, CIRO (1634–89), Rom. painter; follower of Pietro da Cortona; painter of frescoes, etcher, architect.

FERRI, ENRICO (1856–), distinguished Ital. socialist and criminologist.

FERRIC AND FERROUS SALTS, see IRON.

FERRICYANOGEN, radical, non-existent in free state, forming ferricyanides, *e.g.* potassium ferricyanide ($Fe_2(CN)_{12}K_6$), formed by union of potassium ferrocyanide and chlorine, and used in manufacture of blue dyes (Turnbull's blue).

FERRIER, ARNAUD DU (d. 1585), Fr. diplomatist.

FERRIER, JAMES FREDERICK (1808–64), Scot. philosopher; b. Edinburgh; prof. at Edinburgh and St. Andrews. F. rejected common-sense systems as absorbing philosophy into psychology; began with consciousness involving the ego conscious of itself as present in all its products; held the ego a necessary constituent of the conception of matter.

FERRIER, SUSAN EDMONSTONE (1782–1854), Scot. novelist; pub. anonymously *Marriage* (1818), *The Inheritance* (1824), and *Destiny* (1831). Her books are full of humour and lively descriptions of Scot. life and character. She was a friend of Scott, who thought highly of her work.

FERRO, HIERRO (27° 43′ N., 18° W.), one of the Canary Islands; famous as first meridian chosen by Fr. scientists, 1630.

FERROCYANOGEN, radical, non-existent in free state, forming ferrocyanides, *e.g.* potassium ferrocyanide, formed by union of potassium cyanide and water in iron vessels, and used in manufacture of blue dyes (Prussian blue).

FERROL (43° 29′ N., 8° 13′ W.), fortified seaport; prov. Corunna, Spain; chief Span. naval arsenal; excellent harbour; extensive dockyards; contains naval school; textiles, naval stores, sardine-fishing. Pop. (1910) 26,252.

FERRUCCIO, FRANCESCO (1489–1530), Florentine soldier; took Volterra, 1530; captured at *Gavinana*, and killed by Maramaldo.

FERRY, public passage across a water-space; also the boat used for such purpose. Before bridges became common, the f. was an important means of transit. A famous ferry across the Forth gave its name to the places on either side (N. and S. Queensferry).

FERRY, JULES FRANÇOIS CAMILLE (1832–93), Fr. premier; attacked Jesuits in education bills; responsible for acquisition of Tunisia and general policy of expansion.

FERSEN, FREDERIK AXEL, COUNT VON (1719–94), Swed. soldier and politician; served with distinction in Seven Years War; leader of Hat Party in Sweden from about 1755 onwards; opposed policy of Gustavus III.

FERSEN, HANS AXEL, COUNT VON (1755–1810), Swed. soldier and statesman; served in Finland, 1788; aided Fr. royal family at Revolution; took no part in Swed. Revolution in 1809; killed by mob at funeral of Crown Prince of Sweden.

FERTILISATION, see POLLINATION, REPRODUCTION.

FESA, FASA (28° 53′ N., 53° 43′ E.), town, Fars, Persia; silk manufactures; dates and tobacco. Pop. *c.* 4000.

FESCENNIA (*c.* 42° 20′ N., 12° 30′ E.), ancient city, Etruria; said to give name to ancient Rom. songs. **Fescennine Verses,** early kind of Lat. poetry, employed at harvest festivals. The verses were often of coarse and obscene character.

FESCH, JOSEPH (1763–1839), ecclesiastic, born in Corsica, intimate with Bonaparte family; abp. of Lyons, 1802; cardinal, 1803; Fr. ambassador at Rome, 1804; after fall of Napoleon he lived in Rome; had a fine art collection.

FESCUE (*Festuca*), genus of grasses (*q.v.*); Meadow F., Sheep's F., Tall F., and Hard F. are important pastural grasses.

FESSE, see under HERALDRY.

FESSENDEN, WILLIAM PITT (1806–69), Amer. financier and politician; supported abolition of slavery; member of Peace Congress, 1861; twice chairman of finance committee; sec. of Treasury, 1864–65.

FESSLER, IGNAZ AURELIUS (1756–1839), Hungarian scholar and ecclesiastic; a monk, he later left R.C. Church and became a Lutheran, then a Moravian; in trouble with secular and ecclesiastical authorities for liberal views; wrote several works.

FESTINIOG (52° 58′ N., 3° 56′ W.), town, Merionethshire, Wales; slate quarries. Pop. (1911) 9682.

FESTIVAL, see FEASTS.

FESTOON, garland of flowers, fruit, or leaves, arranged in a curve, for decorative purposes; used also for anything arranged in such manner. In sculpture and arch., an ornamental relief to imitate a real garland.

FESTUS, PORCIUS, Rom. procurator of Judæa, before whom St. Paul was tried 62 A.D. (*Acts* 25).

FESTUS, SEXTUS POMPEIUS (fl. II. cent. A.D.), Lat. scholar; his abstract of Flaccus's *De Verborum Significatione* was edit. by K. O. Müller (1839).

FÉTIS, FRANÇOIS JOSEPH (1784–1871), Belg. musician; prof., Paris Conservatoire; wrote much on music and musicians.

FETISHISM, a word used with varying meaning to signify the cult of inanimate objects, particularly when supposed to be inhabited by some deity or spirit. Fetish is often used for the figure or idol wherein the god resides, also for a charm possessed with the potency of the deity. The W. Africa *ju-ju* is a type of fetish.

Nassau, *F. in W. Africa* (1904).

FETTERCAIRN (56° 51′ N., 2° 35′ W.), village, Kincardineshire, Scotland.

FEU, Scot. legal term denoting the sale of land by means of a perpetual rent, in place of the payment of a capital sum. Since the passing of the *Quia Emptores* statute (1290) such an arrangement has not been possible in England.

FEUCHÈRES, SOPHIE DAWE, BARONNE DE (1795–1840), Eng. adventuress; once a servant, became mistress of the Prince de Condé.

FEUCHTERSLEBEN, ERNST, FREIHERR VON (1806–49), Austrian physician and poet; dean of faculty of medicine, Univ. of Vienna (1844); Under-Sec. of State for Education (1848); author of many medical, philosophical, and poetical works.

FEUDALISM, system of social organisation which arose among the nations of Europe on the disruption of the Rom. Empire. It is primarily an association for purposes of safety, the weaker folk placing themselves under the care of an *overlord*, and surrendering to him their lands, which they subsequently received again on feudal tenure. In return for the protection extended to them by the overlord they did *homage* and swore *fealty* to him, and undertook to serve him

on field of battle; they thus became his followers, living on land allotted to them and looking to him for justice and safety. With the growth of nationalities, local feudal lords became a menace to royal power; but the centrifugal tendencies of the continental systems were modified in England by the statesmanship of William the Conqueror. The system he introduced may be said to represent both the purely feudal European system and that of the former kings of England, although in many respects it differed from both. As the successor of Edward the Confessor, William retained the older administrative and judicial organisation of the country; as the conqueror, he established a system of military organisation, in order to secure the possession of his conquests; and by distributing widely the lands of the more powerful barons, and constituting himself the direct overlord of every freeman in England, compelling each to swear allegiance to him before all intermediaries, he established a more centralised form of government than was possible in France and Germany, where each great feudal lord had a large number of *vassals* who were bound to support him even against the king should occasion arise. Various forms of feudal service due from vassal to overlord included military and court service; *aids* and *reliefs* also had to be paid, and the overlord had rights of *wardship* of heir during minority, and of marriage of heiress. See FRANCE, p. 625 B.

Abdy, *Feudalism* (1890); Round, *Feudal England*; Maitland, *Domesday Book and Beyond*; and standard histories of England, France, Germany, etc.

FEUERBACH, ANSELM (1829–80), Ger. artist; famed for his interpretation of classical subjects.

FEUERBACH, LUDWIG ANDREAS (1804–72), Ger. philosopher; reduced Hegelianism to naturalism; denied immortality. Combining Spinoza's substance and Fichte's Ego, F. held that the only absolute is the sense-endowed man; that only the sensible is real, and that truth is perceived by the educated senses. According to F., pleasure is man's highest good, and is attainable only in society.

FEUERBACH, PAUL JOHANN ANSELM VON (1775–1833), Ger. criminal jurist; by his writings he did much to promote the emendation of criminal law.

FEUILLANTS, Fr. political club founded in Revolutionary times by various members of Jacobin Club; ceased to exist soon after Aug. 10, 1792.

FEUILLET, OCTAVE (1821–90), Fr. novelist and dramatist; his French is notable for its purity, and his writings enjoyed marked popularity.

FEUILLETON, portion of a newspaper devoted to literary and scientific articles, and especially to novels in serial form and light lit.

FEUQUIÈRES, ISAAC MANASSÈS DE PAS, MARQUIS DE (1590–1640), Fr. general and diplomat. His grandson, **Antoine, Marquis de F.** (1648–1711), wrote *Mémoires sur la Guerre*.

FÉVAL, PAUL (1817–87), Fr. novelist; wrote criminal and hist. stories.

FEVER, general term applied to elevation of the normal temperature of the body, due either to disturbance of the nervous system, to disturbance of the heat-losing apparatus of the body (*i.e.* the skin, respiratory system, etc.), or, most usually, to the action in the body of various bacterial or other poisons, which cause increased breaking down of protoplasm, diminish the loss of heat from the body, and interfere in various ways with the functions of the organs of the body. A temperature higher than 106° F. in the human body is very dangerous.

FEVERFEW, composite plants; best known is Wild F. (*Matricaria parthenium*), a strong-smelling evergreen. Gold-leaved F. is common in gardens.

FEVERWORT, HORSE GENTIAN (*Triosteum*), plant of order *Caprifoliaceæ*; berries of Amer. variety (*Tinkar's Root*) used as substitute for coffee.

FEYDEAU, ERNEST-AIMÉ (1821–73), Fr. novelist, dramatist, and miscellaneous writer.

FEZ (34° 6′ N., 4° 53′ W.), largest city, Morocco, to which it was annexed, 1548; now one of its capitals; formerly capital of a Moorish kingdom; celebrated for centuries as a holy city, and once famous as a seat of learning; is surrounded by walls; has many fine mosques, univ., and the Sultan's palace; commercial centre; active caravan trade; manufactures woollen, morocco leather goods, gold and silver ware; was besieged by Berbers and other tribes supporting Mulai Zin, the bro. of Mulai Hafid, in his claim to sultanship (1910), and was relieved by Fr. troops; inhabitants chiefly Moors, Arabs, Berbers, Jews. Pop. *c.* 140,000.

FEZZAN (26° 30′ N., 16° E.), region of Sahara; Italian province to S.E. of Tripoli; capital, Murzug; shut in N., S., and E. by Sahara and hills; barren plateaux; shallow valleys with fertile oases (the only cultivated spots) where a little grain, some vegetables, and the principal food, dates, are grown; gentle slope to E.; climate very dry, but healthy, except for malaria; soda obtained from salt lakes in N.W., only export trade. Pop. *c.* 43,000.

FIACRE, ST., a VII.-cent. monk of Irish birth, settled at Breuil in France.

FIARS, in Scots law are the standard prices fixed by sheriffs for different kinds of grain, relative to the payment of clerical stipends, etc.

FIBER, musk rat or Musquash; see under MOUSE FAMILY.

FIBRIN, a protein which appears in the blood when it escapes from the body, due to the action of the fibro-ferment, which comes probably from the white corpuscles or blood-platelets, on the fibrinogen contained normally in the blood, the presence of which gives rise to coagulation.

FIBULA, see SKELETON.

FICHTE, IMMANUEL HERMANN VON (1797–1879), Ger. philosopher; ed. Berlin; defended his f.'s philosophy against Hegel. See FICHTE, JOHANN GOTTLIEB.

FICHTE, JOHANN GOTTLIEB (1762–1814), Ger. philosopher; founder of Subjective Idealism; b. Lusatia; studied theology at Jena and Leipzig; prof. at Jena, 1794–99, dismissed on charge of atheism, and finally Rector of new Berlin Univ.; converted from Spinozistic determination by Kantian doctrine that the category of causality applies only to phenomena. F. proceeded to deny the thing-in-itself. Knowledge is not due to the action of things-in-themselves on the percipient subject; both 'matter and form' of knowledge are the product of the active Ego. The manifold of experience and the *à priori* forms of cognition are alike due to a creative faculty in us. In every intellectual act in general the Ego posits first itself and then the Non-ego in distinction from itself, and finally recognises itself as one with the Non-ego. This creative Ego is pure Ego in general, not the individual, but the absolute, Ego. From this, however, Fichte attempts to deduce the former, since the distinction of individuals is required by morality. The Ego is essentially an activity, striving after independence and freedom, which are reached proportionately to successful resistance of our rational being to our lower tendencies. Freedom is the highest expression of the moral law. To be virtuous, one must continually 'fulfil his vocation,' and act for sake of duty only.

Adamson, *Fichte*.

FICHTELGEBIRGE (50° 2′ N., 12° E.), mountain p, Bavaria, N.E. of Baireuth; highest peak, chneeberg, 3450 ft.

FICINO, MARSILIO (1433–99), Ital. philosopher; b. Arno valley; s. of eminent physician; translator, editor, commentator of Plato and Alexandrians; erudite scholar and saint, founded school of mystics, to which belonged Agrippa of Nettesheim, Ramus, Telesio. Forerunner of Renaissance; profoundly influenced Platonic studies in Italy. Philosophy and religion are identical, for both study wisdom and truth, and God is wisdom and truth: religion is

common to all men; its purest form is known through Christ, whose teaching suffices in all circumstances of life; reason is necessary to faith. Platonism makes possible acceptance of Christ by speculative minds.

FICK, AUGUST (1833–), Ger. comparative philologist.

FICKSBURG (29° S., 27° 48′ E.), town, Orange Free State, S. Africa.

FICTION, see NOVEL, and also under literature of different countries.

FICUS, see FIG.

FIDDES, RICHARD (1671–1725), Anglican scholar and theologian; wrote *Life of Cardinal Wolsey* and bther works.

FIDDLE (Lat. *fidula*), old term for any stringed instrument, generally violin; now popular or derogatory name for violin (*q.v.*).

FIDEICOMMISSA, in Rom. law, trusts formed to carry out will of one deceased; clumsy law often nullified wills, and f. remedied abuses by allowing a dying person to bequeath property to one who should hand it on to another.

FIDENÆ, modern CASTEL GUIBILEO (*c.* 42° N., 12° 30′ E.), ancient city, on Tiber, Italy.

FIDUCIARY, legal term for something held in trust.

FIEF, land held in fee of a superior.

FIELD, CYRUS WEST (1819–92), Amer. capitalist; b. Stockbridge, Massachusetts; planned first Atlantic cable, succeeding in laying one in 1866, after several failures.

FIELD, DAVID DUDLEY (1805–94), Amer. jurist; chairman of two commissions appointed to codify law and procedure in New York State.

FIELD, EUGENE (1850–95), Amer. poet; pub. several volumes of poems of childhood.

FIELD, FREDERICK (1801–85), Anglican theologian and scholar, particularly of patristics.

FIELD, HENRY MARTYN (1822–1907), Amer. preacher and author; wrote travel and hist. books.

FIELD, KATE (1838–96), Amer. journalist, lecturer, and actress.

FIELD, NAT (1587–1633), Eng. dramatist and actor; wrote two comedies, *A Woman is a Weathercock*, and *Amends for Ladies*; collaborated with Massinger and Fletcher.

FIELD OF THE CLOTH OF GOLD, meeting between Henry VIII. of England and Francis I. of France, near Calais (June 1529); so called because of the splendour displayed on both sides.

FIELD, STEPHEN JOHNSON (1816–99), Amer. lawyer; judge of Supreme Court of California, 1851; judge of Supreme Court of U.S., 1863.

FIELD, WILLIAM VENTRIS, BARON (1813–1907), Eng. judge.

FIELDFARE, see under THRUSH FAMILY.

FIELDING, ANTHONY COPLEY (1787–1855), Eng. artist; chiefly celebrated for his water-colours (land- and sea-scapes).

FIELDING, HENRY (1707–54), Eng. novelist; b. Glastonbury; s. of an army officer; ed. Eton and Leyden; thrown upon his own resources, he turned his attention to the London stage, and between 1730 and 1736 produced a number of plays long since forgotten. He married Miss Cradock, a small heiress, in 1734, and after having dissipated her fortune again turned playwright and theatre-manager, but with little success. He subsequently studied law; was called to the Bar, and joined the Western Circuit, eventually becoming a magistrate and the recipient of a pension. F. discovered the true bent of his genius when, after the publication of Richardson's *Pamela*, he commenced to write *Joseph Andrews* as an avowed parody. As, however, the work grew in his hands, the original idea was lost sight of. F.'s first novel was pub. in 1742, and met with some success. It was followed by other notable productions, including his powerful satire, *Jonathan Wild the Great*, *Tom Jones* (1749), *Amelia* (1751), and numerous other works. F. ranks amongst the greatest of Eng. novelists. He held up a merciless mirror to the people and the manners of his day. His characters are always drawn with a masterly hand, and his style is bracing and vigorous.

Life, by Austin Dobson (English Men-of-Letters Series).

FIELDING, WILLIAM STEVENS (1848–), Canadian statesman.

FIELD-MARSHAL, a Brit. military honour which, since 1736, has been the highest in the army; selection rests with the king.

FIELD MOUSE, see MOUSE FAMILY.

FIELDS, JAMES THOMAS (1817–81), Amer. publisher and author.

FIENNES, NATHANIEL (*c.* 1608–69), Eng politician and soldier; Roundhead in Civil War; distinguished at *Worcester* and *Edgehill*; sentenced to death for surrendering Bristol to Royalists in 1643, but pardoned.

FIERI FACIAS, in Eng. law a writ addressed to sheriff empowering execution in an action for debt, etc.

FIESCHI, GIUSEPPE MARCO (1790–1836), Corsican criminal; attempted assassin of Louis Philippe; guillotined.

FIESCO, GIOVANNI LUIGI (*c.* 1523–47), Count of Lavagna, Genoese noble; planned conspiracy to destroy Doria family and overthrow government; succeeded in neither object; accidentally drowned.

FIESOLE (43° 50′ N., 11° 18′ E.), town, ancient Fæsulæ, on hill above Arno, near Florence, Italy; one of ancient Etruscan confederation; contains Etruscan and Rom. antiquities; bp.'s see; XI.-cent. cathedral; native place of painter, Fra Angelico; straw-plaiting. Pop. 5163.

FIFE (56° 15′ N., 3° 10′ W.), maritime county in E. of Scotland; bounded on N. by Firth of Tay, on E. by Ger. Ocean, on S. by Firth of Forth, on W. by Perth, Clackmannan, and Kinross shires; county town, Cupar; maximum length and breadth, 41½ and 21 miles respectively. Area is 492 sq. miles. Eden (29½ miles) and Leven (16½ miles) are only rivers of consequence. Climate is mild, and rainfall varies. Many golf-courses and watering-places (including St. Andrews). Fife has valuable coal-fields and busy coaling ports. Large percentage of land is cultivated, and agriculture extensively carried on. Damask is manufactured at Dunfermline (*q.v.*); linoleum and other manufactures at Kirkcaldy (*q.v.*); large number of small seaports; chief port, Burntisland. Pop. (1911) 267,734.

FIFE, a flute-like instrument, generally in B flat or F; chiefly used in military music along with drums; old form 'cross' flute; modern form 'conical.'

FIFE, ALEXANDER WILLIAM GEORGE DUFF, DUKE OF (1849–1912), Scot. nobleman; husband of Princess Louise Victoria Alexandra Dagmar, eldest dau. of Edward VII. (b. 1867, m. 1889, cr. Princess Royal, 1905); two dau's, Princess Alexandra (1891) and Princess Maud (1893).

FIFTH MONARCHY MEN, extreme Puritan sect. who looked for the second coming of Christ upon earth to found the V. monarchy foreshadowed in *Daniel*, the successor to the Assyrian, Persian, Macedonian, and Roman empires. The sect was radical in politics; it was dispersed by Cromwell in 1653, and the leaders imprisoned.

FIG (*Ficus carica*), a native of the Mediterranean region, where it has been cultivated since very early times. The leaves are palmate, veined, and stipulate, the stipules acting as bud-protecting structures. The receptacle consists of a hollow, pear-shaped structure, the so-called 'fruit,' with a small opening at the apex. The flowers, which are unisexual, are packed inside this, the staminate ones being nearest the top, with the female flowers, of which there are two kinds, long and short styled, below. The long-styled form alone sets seed, the other type, termed gall flowers, being utilised by a wasp, Blastophaga, for the deposition of its ova, one of which is laid in each flower. In so

doing the insect pollinates the fertile flowers by transferring pollen from the male part of the inflorescence.

FIG, INDIAN, see CACTUS.

FIGARO, comic barber; hero of Beaumarchais's comedies, *Le Barbier de Seville* and *Le Mariage de Figaro*; also of operas by Mozart and Rossini. He is represented as lively and cunning, and his roguery outwits every one. The name was subsequently adopted as the title of a Fr. journal.

FIGEAC (44° 36′ N., 2° 3′ E.), town, on Célé, Lot, France; cloth manufactures. Pop. 4324.

FIGUEIRA DA FOZ (40° 40′ N., 7° 25′ W.), watering-place, at mouth of Mondego, Beira, Portugal; grain, wine, and fruit. Pop. 7890.

FIGUERAS (42° 15′ N., 2° 54′ E.), town, fortress, Gerona, Spain; various manufactures; taken by French, 1794, 1808, 1811, and 1823. Pop. 10,714.

FIGWORT (*Scrophularia*), wild flowers; *S. nodosa*, knotted f., and *S. aquatica*, purple flowers, are common in Britain.

FIJI, archipelago in Pacific; about 250 islands, of which some 80 are inhabited, forming a British Crown colony. Area, *c.* 7430 sq. miles. Capital, Suva, on S.E. coast of Viti Levu. Principal islands, Viti Levu, Vanua Levu, and Taviuni; others are Kandavu, Koro, Ngau, Ovalau, and numerous islets, enclosing Koro Sea; larger islands of volcanic formation, and smaller low coral. The surface is rugged and covered with luxuriant vegetation and beautiful hills (3000–4000 ft.). Larger islands contain open, dry, undulating country, except certain rich tracts along coast of the two largest; many large rivers afford waterways to rich lands on their banks — fertilised by frequent floodings; good climate and tropical vegetation—fruits abounding; chief food, yam; sugar-cane, cotton, and turmeric cultivated; chief exports include bêche-de-mer, mother-of-pearl, and cocoa-nut oil. Vanua Batevu is a trading centre. Inhabitants, of Melanesian-Polynesian stock, formerly cannibalistic and savage, are now mostly all christianised by Wesleyans. The Fijis were discovered by Tasman in 1643; little known till XIX. cent., and ceded by chiefs and people to Britain in 1874. The Gov. is also High Commissioner and Consul General for Western Pacific; Legislative Council is partly elected. Pop. (1911) 139,540 (including some 3700 Europeans and over 40,000 Indians).

Guppy, *Fiji* (1904); Thomson, *The Fijians* (1910).

FILANGIERI, CARLO (1784–1867), Neapolitan soldier and politician; Prince of Satriano. F. fought in Netherlands, Spain, Sicily; reduced Sicily to submission (1849); viceroy of Sicily till 1855; War Minister, 1859.

FILANGIERI, GAETANO (1752–88), Ital. reformer; advocate of free trade; wrote *La Scienza della legislazione.*

FILARIA, see under NEMATODA.

FILARIASIS, disease occurring in the tropics, caused by a parasite, *Filaria sanguinis hominis*, which probably enters the body in infected water; the embryos are found in the general circulation during the day, in the lung capillaries at night, and the adult filaria inhabit the lymphatics, causing elephantiasis or swelling of the tissues through blocking the lymphatics, milky urine, etc.

FILDES, SIR LUKE (1844–), Eng. artist and book illustrator; amongst his best-known works are *The Doctor* (Tate Gallery), *The Casual Ward*, State portraits of King Edward VII. and Queen Alexandra; R.A. (1887).

FILE, instrument used for smoothing or cutting metal; consists of steel bar with roughened surface which is broken up into points or ridges; in roughness they vary from 'dead-smooth' to rasps, which are used for coarse working on horn and timber as well as on metal.

The term is also applied to a pointed wire on which letters are affixed for purposes of reference.

FILE FISHES (*Monachanthidæ*), laterally flattened bony fishes, so called on account of their hard, prickly skins; sometimes destructive to pearl fisheries; tropical and subtropical seas.

FILELFO, FRANCESCO (1398–1481), Ital. scholar.

FILEY (54° 13′ N., 20° W.), watering-place, Yorkshire, England, on North Sea. Pop. (1911) 3228.

FILIBRANCHIA, see LAMELLIBRANCHIATA.

FILIBUSTER (Fr. *flibustier*), pirate or buccaneer; especially applied to U.S. adventurers, who led attacks upon parts of Span. America.

FILICAJA, VINCENZO DA (1642–1707), Ital. poet; wrote patriotic odes and sonnets.

FILICALES, see PTERIDOPHYTA, PALÆOBOTANY.

FILIGREE, metal-work, usually composed of fine gold, silver, or copper wire, arranged in delicate patterns, used in decorating jewellery, to which it is soldered. F. has been worked from very early times in Egypt, Greece, India, and other countries.

FILLAN, ST., FAELAN, name of two saints, whose lives are legendary, supposed to have come to Scotland from Ireland; commemorated on Jan. 9 and June 20. The St. F. whose feast is kept on Jan. 9 is supposed to have evangelised Scotland in VIII. cent.

FILLMORE, MILLARD (1800–74), Amer. statesman; entered Congress, 1832; advocated abolition of slavery; became 13th Pres. of U.S.A., 1850; became unpopular with Whig party by signing Fugitive Slave Law.

FILMER, SIR ROBERT (d. 1653), Eng. political writer; Royalist in Civil War; suffered greatly under Commonwealth; wrote the *Patriarcha*, defending Divine Right.

FILON, PIERRE MARIE AUGUSTIN (1841–), Fr. author; has written on Eng. life and lit.

FILOSA, a group of Amœboid Rhizopods, minute Protozoa without a clear external coat of protoplasm, and with the body processes (*pseudopodia*) branched, *e.g.* EUGLYPHA, a freshwater form protected by hexagonal plates.

FILTER, a cone of unsized paper, felt, etc., mesh of which permits fluid to pass, while retaining solid particles. A hollow cylinder of porcelain retains bacteria when water is pumped through under pressure. Charcoal filters are inefficient because bacteria feed on them, and pass through the enlarged pores.

FINANCE, the money dealings between man and man, and the business of public revenue and expenditure. It is an item of political economy. F. in personal matters is mainly concerned with the disposal of capital or income in investments, and with the adjustment of expenditure to income: the safety of investments, the proportion of income to be set aside for investment, the raising of additional income, are all questions of personal f. The main question of national f. is the raising of revenue. In earlier ages, conquest was followed by tribute, and a very important contribution to the coffers of the State. In later times the land owner, holding his land from the Crown, was the chief contributor (under varying degrees of compulsion) to the royal treasury, in return for his lands. To-day in civilised states the payment of taxes, either direct on income, or indirect through the Customs and Excise, is the main element in national revenue, and legislative sanction is required for the levying of such taxes. Hence f. is subject to the will of Parliament. Local finance is concerned with the expenditure of rates, and is strictly defined and limited.

Bastable, *Public Finance*; E. Carroll, *Principles and Practice of Finance*; Plehn, *Public Finance.*

FINCH, see NOTTINGHAM, EARLDOM OF.

FINCH FAMILY (*Fringillidæ*), a large family of perching birds, with 700 species, found throughout the whole world with the exception of Madagascar, Australia, and New Zealand and the neighbouring islands. They are seed-eating birds of small size, characterised by their short, thick, conical beak, with smooth biting edges. There is much variation and much beauty in the colouring of their plumage. Some finches have exceedingly stout, clumsy bills, the lower half being deep and strong; such are the rare Brit.

HAWFINCH (*Coccothraustes vulgaris*) and common GREENFINCH (*Ligurius chloris*), and the N. American RED CARDINAL (*Cardinalis virginianus*) and GROSBEAKS (*Hedymeles*). Others have less clumsy and deep beaks, *e.g.* the familiar CHAFFINCH (*Fringilla cælebs*), the highly emigratory BRAMBLING (*F. montifringilla*), the BULLFINCH (*Pyrrhula rubicilla*), the CANARY (*Serinus canarius*), so called because of its abundance in the Canary Islands, the SPARROWS (*Passer*, etc), the REDPOLLS and LINNETS (*Linaria*), the SISKINS (*Chrysomitris*), the ROSE FINCH or SCARLET GROSBEAK (*Carpodacus*) of N. Europe, and the curic CROSSBILLS (*Loxia*), easily recognised by the seeming misfit of the two halves of the bill, which cross near the tip. The BUNTINGS belong also to this family; see EMBERIZIDÆ.

FINCH OF FORDWICH, JOHN FINCH, BARON (1584–1660), Eng. judge.

FINCHLEY (51° 36′ N., 0° 9′ W.), town, forming N. suburb, London, 7½ miles N.W. of St. Paul's. Pop. (1911) 39,425.

FINCK, FRIEDRICH AUGUST VON (1718–66), Pruss. general; subsequently in Dan. service.

FINDEN, WILLIAM (1787–1852), Eng. engraver.

FINDLATER, ANDREW (1810–85), Scot. editor; chiefly known as editor of *Chambers's Encyclopædia*, and other works pub. by the same firm.

FINDLAY (41° 1′ N., 83° 38′ W.), city, Ohio, U.S.A.; natural oil and gas fields; flour-mills, glass-works. Pop. (1910) 14,858.

FINDLAY, SIR GEORGE (1829-93), Eng. railway manager; general manager for L. & N.W. Ry.

FINDLAY, JOHN RITCHIE (1824–98), Scot. journalist and philanthropist; one of proprietors of *The Scotsman*; founder of Scot. Nat. Portrait Gallery.

FINE, deprivation of money as punishment for misdemeanour; in England and Scotland seldom exceeds £25; never inflicted for felony or high treason.

The term is also used for various charges in connection with property.

FINGAL'S CAVE, see STAFFA.

FINGER-AND-TOE, a plant disease caused by a fungus which attacks plants of the order *Cruciferæ*, *e.g.* turnips, cabbages. The fungus develops in the cells of the root, which increase greatly in size, and nodules are formed on the exterior which break down and give rise to an unpleasant smell. Quicklime mixed with the soil is a preventive, and plants attacked are burned. See MYCETOZOA.

FINGER-PRINTS, the system of identification by this means has been used from very early times. Its employment for criminal identification was introduced into India by Sir William Herschel, and it subsequently superseded the Bertillon measurement system in England. As the skin-markings of the fingers remain the same from childhood to old age, the system has been found extremely valuable. Impressions are taken by placing the bulb of the finger on an inked slab, and afterwards pressing it on a white paper slip. The slips are classified under various headings, of which the principal are 'loops,' 'arches,' 'whorls,' and 'composites.' There are books dealing more fully with the subject by Sir Francis Galton, Sir E. R. Henry, and Fauld. The taking of finger-prints for identification purposes gave rise to Indian Passive Resistance movement in Transvaal. See ASIATIC QUESTION.

FINGO, S. African tribe, offshoot from Zulus, much improved by W. influence.

FINIAL, in Gothic arch., usually a foliage ornament forming the termination of gables, spires, etc.

FINIGUERRA, MASO (1426–64), Ital. craftsman; noted as a draughtsman and metal-worker; famous early engraver.

FINISHING, in textile industry, is a purely mechanical process which gives a characteristic appearance to the surface of the material and also affects its 'handle' or feel. Cotton fibres which shrink during bleaching, etc., are stretched on stentering frames while damp, and as they travel over the frame hot air is blown on to them, so that when they reach the end of the frame they are dry and stretched. They can be previously impregnated with starch to stiffen them or with china clay to weight them. By sending stretched cloth over a combination of rollers with or without heat it may be given an ordinary finish, a high gloss, a watered or embossed effect, according to the nature of the rollers. This is *calendering*. *Beetling* gives a linen-like appearance to cotton by making each thread prominent. Woollen goods are finished by *milling*, which subjects the fabric to mechanical friction to bring about felting or matting by the close interlocking of the hairs in the threads. The surface is subjected to *raising*, *i.e.* passing over bent spikes which pull up any hairs which have sunk below the surface. By shearing or cropping with an instrument like a lawn-mower the hairs are made of equal length *Crabbing* prevents the unequal shrinkage of worsted. *Lustreing* of silk is effected by stretching it beyond its original length. *Scrooping* gives the silk feel.

FINISTÈRE (*c.* 48° 20′ N., 4° W.), department, W. France; area, 2729 sq. miles; produces flax, cereals, linen; capital, Quimper. Pop. (1911) 809,771.

FINISTERRE (42° 53′ N., 9° 16′ W.), cape, N.W. Spain; off which British twice defeated French in 1747.

FINITE DIFFERENCES, CALCULUS OF (*Mathematics*).—Deals with the changes in value which arise in functions as a result of *finite* changes in the value of the variables on which the functions depend. It is thus different from the Differential Calculus, which is concerned with the *limits* of the ratios of the increments of mutually dependent quantities as these increments become indefinitely small. If u_x denotes a function of x, Δx a given *constant* increment of x, then Δu_x, the corresponding increment in u_x is given by $\Delta u_x = u_{x+\Delta x} - u_x$, and we have $\frac{\Delta u_x}{\Delta x} = \frac{u_{x+\Delta x} - u_x}{\Delta x}$. $\frac{\Delta}{\Delta x}$ is the fundamental operative symbol of the calculus of finite differences, as $\frac{d}{dx}$ is in the differential calculus. It should be noted that $\frac{\Delta u_x}{\Delta x}$ is a true fraction, both numerator and denominator having definite magnitude. The theorems of finite differences are utilised in interpolation, as, *e.g.*, the altitude of a star at different times being observed, required the meridian altitude; and they have important applications in actuarial calculations. See Boole, *Finite Differences*.

FINLAND (65° N., 27° E.), country in N.W. of Russian Empire; bounded on N. by Norway; W. by Sweden and Gulf of Bothnia; S. by Gulf of F.; length, *c.* 700 miles; breadth, 112–370 miles; area, *c.* 144,000 sq. miles; includes large part of Russ. Lapland; capital, Helsingfors; coast much indented, and many small islands; interior eaten up with large and small lakes—connected naturally or artificially; Lake Saima—composed of over 100 large and numberless small lakes—with natural outlet over Imatra Falls (finest in Europe); connected by canal (36 miles) with Gulf of F.; Lakes Enare, Uleå, Kemi, Payanne; highest mts. (in Lapland), Haldefjall (4126 ft.); principal rivers, Kemi, Ulea, Kymmene (used for driving mills and floating logs from inland forests, which cover great expanses belonging largely to State); great extent of swamps. Climate is healthy; severely cold in winter, snow lying from Nov. to April; polar in Lapland; summer hot and dry; bears, wolves, and seals are found; soil fertile, but mostly pasture-land; wood utilised for pulp for paper-mills; granite of excellent quality is quarried. Principal towns are Helsingfors, Abo, Tammerfors, Uleåborg. People are Finns, Swedes, Russians, Germans, Laps. Important industries comprise iron and mechanical works, textiles, wood industries, paper, leather, chemicals. F. was annexed by Russia (1809), deprived of privileges but given nominal autonomy; governed by Russ. Grand-

Duke. Diet—elected by universal suffrage and summoned or dissolved by Grand-Duke—may decide anything except fundamental laws and land and naval defence organisations. Pop. (1910) 3,120,000.

History.—Finns came from Volga region; conquered by Swedes in XII. and XIII. cent's. Gradual encroachments by Russia led to cession of F. to Russia, 1809; Swedish constitution was allowed to remain, but in XIX. cent. was often violated; Russ. language was made official, 1899, and Russ. military system enforced, 1901. Constitution was reformed, 1906, and concessions made.

Language and Literature.—Finnish or Suomi belongs to Ugro-Finnic branch of Uralo-Altaic family; agglutinative, has no articles and prepositions, and in verb no tenses except present and past; many dialects. Lit. began with religious subjects, although folk poetry handed down orally is old, *e.g.* the epic *Kalevala*, compiled by Lönnrot. There are Finnish newspapers and translations of Shakespeare, etc. Runeberg, poet and dramatist, F.'s greatest artist.

Dobson, *Finnish Revolution in Preparation* (St. Petersburg, 1911); Renwick, *Finland To-day* (1911).

FINLAND, GULF OF (60° N., 27° E.), shallow arm of Baltic Sea; Lakes Ladoga and Onega drain into it, hence water is but slightly salt.

FINLAY, GEORGE (1799–1875), Brit. historian; entered into Gk. struggle for independence; his history of Greece, first pub. in instalments, is the standard authority.

FINMARK (70° N., 24′ E.), province on N. coast of Norway, including several islands; capital, Hammerfest. Area, 17,918 sq. miles. Pop. (1910) 38,065, chiefly fishers and herdsmen.

FINN MAC COOL, FINGAL, Celtic legendary hero, leader of the *fiann* in Ireland; his name occurs in Macpherson's *Poems of Ossian* and in Gaelic ballads.

FINSBURY, district of London, N. of the Thames.

FINSEN, NIELS RYBERG (1860–1904), Dan. physician; discovered curative use of violet and ultra-violet rays in skin diseases. See ELECTRO-THERAPEUTICS, LUPUS.

FINSTERSWALDE (51° 37′ N., 13° 40′ E.), town, Prussia, Germany; cloth factories, iron foundries. Pop. (1910) 13,114.

FIORENZO DI LORENZO (*c.* 1440–1522), Ital. artist; lived at Perugia, where most of his best works are to be seen. These include a *Nativity*, *Adoration of the Shepherds*, and other religious subjects; one of most distinguished painters of the Umbrian school.

FIORENZUOLA (44° 56′ N., 9° 56′ E.), small town, Piacenza, Italy. Pop. 3658.

FIORILLO, JOHANN DOMINICUS (1748–1821), Ger. artist and writer on art.

FIR, a collective term which comprises two coniferous genera of evergreens, viz. Abies (e.g. *Abies pectinata*, the silver f.), and Picea (e.g. *Picea excelsa*, the Norway spruce or spruce f.). Both genera include valuable timber trees; whilst resins, balsams, and turpentines are also produced, one species, *Abies balsamea*, yielding Canada balsam, an indispensable reagent for optical and microscopic work. Of the two, Picea is the more hardy, extending throughout Siberia, and found abundantly on the slopes of the Alps, Urals, Rocky Mountains, and other high ranges. The leaves, which are borne spirally on the main axis, are usually tetragonal, but in some species (*P. ajanensis*) they are flattened. The cones, which mature in one year, are shed intact. In Abies the leaf is usually flattened, often with a median groove on the upper surface, and possesses two well-marked resin passages, one in each half of the leaf. The cones are large, and shed their scales, leaving the bare axis on the tree for a time. The Scots f. is a *Pine* (*q.v.*).

FIRBOLGS, legendary Irish race supposed to be Briton invaders.

FIRDAUSI, FERDUSI (940–1020 A.D.), Pers. poet; sometimes called 'the Homer of Persia,' and undoubtedly the greatest poet of his country. His real name was ABÚ-'L KÁSIM MANSÚR, and he was b. at Shadab (Khurásán). After spending upwards of thirty years in the writing of his great epic, *Shah Náma*, founded on the history of the Pers. kings, he presented his work to the Sultan Mahmud, but being disappointed by the reward given, incurred the Sultan's displeasure, and spent many of his remaining years in exile at Bagdad, where he composed another famous poem, *Yusuf and Zuleikha*, dealing with the loves of Joseph and Potiphar's wife. See PERSIA.

FIRE (O.E. *fyr*), flame or conflagration. According to classical myth., f. was given to mankind by the god Prometheus, who contrived to steal some sparks from the chariot of the sun, which he conveyed to earth hidden in a hollow tube. The raising of f. by means of a concave mirror, or burning-glass, was employed by the Greeks, and is referred to by Aristophanes; and Plutarch speaks of the sacred altar f's being kindled in this manner. Probably the earliest means of raising f was by rubbing two sticks together, and this method is still found in use amongst primitive races. Another common way of f.-making is that described by Mr. E. B. Tylor—known as the 'stick and groove' method—by which 'a blunt-pointed stick is run along a groove of its own making in a piece of wood lying on the ground.' Such is the method employed in New Zealand and the South Sea Islands. Other simple processes are making a stick rotate rapidly, with the palms of the hands, in a round hole in a block of wood; striking together two pieces of quartz smeared with sulphur, or else friction between a piece of quartz and one of iron pyrites. F.-raising by means of flint, steel, and tinder-box is also of very early origin, and was the general method in England and other countries down to the invention of lucifer matches.

F., apart from its usefulness to man, has from very early times been associated with many religious and heathen ceremonies. **Fire-walking** is a religious ceremony, widespread in all ages and still practised in Tahiti; priests and other devotees walk barefoot over hot stones, charcoal, or cinders.

E. B. Tylor's *Researches into the Early History of Mankind.*

FIREBALL.—(1) Explosive ball used for illumination or incendiarism; (2) ball lightning.

FIRE-BRAT, *Thermobia furnorum*, a representative of the primitive wingless insects, Thysanura, so called because of its occurrence in the warm parts of some Brit. bakehouses.

FIREBRICKS, bricks made from certain *fireclays*, which will withstand high temperature without fusion, used for lining flues and furnaces. Many varieties of fireclays exist, nearly all being shales obtained from the Coal Measures, and containing only small quantities of lime, potash, or soda.

FIRECLAYS, see FIREBRICKS.

FIRE-DAMP, see MARSH-GAS.

FIRE-FLIES, see POLYMORPHA.

FIRENZE, Ital. name for Florence (*q.v.*).

FIRENZUOLA, AGNOLO (*c.* 1493–1544), Ital. poet and man of letters; works distinguished by satirical qualities, licentiousness, and elegant style.

FIRES.—The great wastage caused by fire (estimated at £50,000,000 per annum) and loss of life have led to the adoption of elaborate measures for fire prevention and extinction. In order that a building be protected as far as possible against f., it must be constructed so that a f. in one room cannot easily spread to another, the lighting and heating arrangements must be carefully planned and executed, and appliances for extinguishing a f., or for checking its progress to some extent until the arrival of the fire-brigade, must be readily available. The floors should be stoutly built and well supported, the doors well fitting and preferably lined with sheet iron or asbestos cloth, and the ceilings carried on wire netting or metal instead of the ordinary laths.

A further great protection is afforded by the use of

one of the patent fire-resisting materials for floors, partitions, etc. Lift wells and shaft holes are a source of danger, and they should be protected by doors or shutters, special fire-resisting glass being used for skylights. Defective flues, stoves standing on floor boards, lamps, and gas jets in unsafe positions are common sources of f's. Electric light is much safer than gas, and f's due to it are almost invariably caused by careless or improper wiring. Too much confidence should not be placed in fire-resisting materials, for they are not really fireproof, and they can only hold the f. in check for a limited time. Local f. appliances usually consist of rows of buckets kept full of water, hand chemical extinguishers, and automatic sprinklers, which at a certain temperature discharge water from the ceilings of rooms, and in some cases from a central tower. In these sprinklers the water is carried under pressure to the desired points, and prevented from issuing only by a thin covering of some fusible metal. At a temperature of about 160° F. this metal softens and collapses, thus releasing the water, which is discharged in a shower.

Large buildings always should be provided with fire-*escapes*, the most efficient form being an external staircase of iron extending from top to bottom, and accessible from the windows of each floor by balconies. Canvas tubes or chutes are also used, but under most conditions they are less efficient than a staircase, which has the great advantage of being always in readiness. In the event of a f. in a large factory or warehouse the safety of the workpeople depends upon their being got out quickly, and in order to facilitate this some firms have a regular system of f.-*drill*. The danger is still greater in the case of theatres, music-halls, and other places of entertainment, and the exits are carefully planned so as to empty the building in the shortest possible time. The real danger in a theatre f. is not so much from the f. itself as from panic amongst the audience, resulting in doorways and corridors becoming jammed with struggling people, and in this way a false alarm of f. may be attended with fatal consequences. If some modified form of f.-drill could be instituted for all threatres many lives undoubtedly would be saved, but the problem is a difficult one.

When a building is discovered to be on f. it is of the utmost importance that the f.-*brigade* should be summoned immediately, and the telephone is largely used for this purpose. There are also various types of public automatic street *alarms*, a common form consisting of a metal box with a glass door, the alarm being given by breaking the glass and pulling a handle which telegraphs the number of the box to the district f.-station. The equipment of a modern f.-brigade is elaborate and costly, the most important appliance being the f.-engine for pumping water on to a burning building. Until quite recently the pumps were all worked by steam, the *engines* being drawn by horses, but petrol motor engines are now rapidly asserting their superiority. They are very much faster, and may be made of greater power than is possible in a horse-drawn vehicle, where weight has to be carefully considered.

An ordinary motor engine has a pumping capacity of about 400 or 500 gallons per minute, but they may be made of sufficient power to deliver over 1000 gallons per minute. F's in docks or in warehouses along the water side are frequently inaccessible from the land side, and in such cases steam-driven f.-boats are used. The water is conveyed from f.-engines in hose-pipes made of leather or of rubber protected with canvas or cotton, and issues through nozzles of various designs, giving either a jet or a spray, the spray being useful for clearing away smoke. The hose is sometimes raised to a considerable height by attaching it to a telescopic ladder. Another form of f.-engine is the chemical engine, which delivers water charged with some gas that will not support combustion, generally carbon dioxide, and the hand chemical extinguishers work on a simi'ar principle. Other accessary appliances are telescopic f.-escapes, hook ladders, and jumping-sheets. The *firemen* are provided with ropes, and axes for breaking through doors and other obstructions. The efficiency of a f.-brigade depends not only upon its promptness in responding to calls and its ability in f. fighting, but also upon its capacity for extinguishing f's with the least possible damage from water and the firemen's axes.

FIRESHIP, vessel filled with combustibles or explosives, fired and set adrift against hostile fleet; used by Drake against Span. Armada.

FIREWORKS, products of the art of *pyrotechny*, *i.e.* the making of scenic effects by fire and chemical compounds. Pyrotechny is of very ancient origin, f's of a kind being known in China for many ages, while displays were given in Rom. circuses from an early date. Gunpowder, however, practically revolutionised the art and researches of chemists, and scientists have rendered the making of modern f's a fine art. The burning of certain minerals, mixed in definite proportions, gives different coloured effects, and upon this fact the variations in f's may be said to lie. The minerals generally used, and the colour effects they produce are as follows: barium — green; calcium — red; copper — green or blue; lithium carbonate — purple-red; salts of strontium—crimson; sodium—yellow; sulphide of antimony—white; sulphide of arsenic—white.

Charcoal and sulphur are greatly used, too, and mixed with a proportion of nitre form gunpowder. After the compounds have been mixed they are packed in cylindrical cases, generally made of pasteboard, and the cases are made with mathematical precision, for much depends on their size and shape.

Amongst simple f's are crackers, squibs, Roman candles, stars, sparks, maroons, Bengal lights, jack-in-the-boxes, coloured fire, etc., whilst the more complicated are rockets, bombs, rotating or Catherine wheels, and set pieces (battles or portraits).

The chief pyrotechnists in England are Messrs. Brock and Messrs. Pain, and the Crystal Palace has become famous for the displays held there. Such displays are expensive, and may amount to £20,000 or more.

FIRKIN, old measure of capacity, equal to 9¼ imperial gallons; small cask.

FIRMÂN, Turk. passport; also name given to edicts issued by Sultan or his officials.

FIRMICUS, MATERNUS JULIUS (IV. cent.), Rom. writer on religion and astron.

FIRMINY (45° 23′ N., 4° 20′ E.), town, Loire, France; coal mines; steel and glass works. Pop. 17,000.

FIROZABAD (28° 45′ N., 52° 35′ E.), town, Fars, Persia; grain and rice.

FIROZPUR (30° 57′ N., 74° 38′ E.), district, Punjab, India; area, 4300 sq. miles. Pop. 1,000,000; its capital, FIROZPUR, pop. 50,000, contains arsenal.

FIRST-FOOT, prevalent superstition in Scotland and N. of England regarding the first person who crosses the threshold after midnight on New Year's Eve. Such person must not come empty-handed. A woman brings ill-luck; dark-complexioned males bring most luck.

FIRST OF JUNE, BATTLE OF THE (1794), naval engagement, fought to W. of Cape Ushant, between Brit. fleet under Lord Howe and Fr. fleet under Villaret-Joyeuse, in which British captured six ships and won glorious victory, yet failed in their object of intercepting a Fr. convoy of grain from America.

FIRTH, CHARLES HARDING (1857–), Eng. historian; prof. of Modern History (Oxford).

FIRTH, MARK (1819–80), Eng. steel manufacturer and philanthropist.

FIRUZKUH (35° N., 52° 48′ E.), small province, Persia.

FISCHART, JOHANN (*c.* 1545–91), Ger. satirical writer and Doctor of Laws; satirised all contemporary

follies; over fifty authentic works, including *Das glückhafft Schiff von Zürich.*

FISCHER, EMIL (1852–), Ger. chemist; prof. of Chem. in Berlin; won Nobel prize for Chem., 1902; has prepared ozazones, rosanilin dye-stuffs, and compounds of uric acid, but his greatest work is the synthesis of the simplest proteins from amido-acids. While synthesising carbohydrates he investigated many of their properties and the action of ferments.

FISCHER, ERNST KUNO BERTHOLD (1824–1907), Ger. philosopher of Hegelian school; prof. at Jena.

FISH, HAMILTON (1808–93), Amer. politician; Sec. of State, 1869–77; had considerable share in settling Alabama dispute.

FISHER, RT. HON. ANDREW (1862–), Australian politician; b. Kilmarnock; leader of Federal Labour Party, 1907; Prime Minister of Commonwealth (1908–9) and (1910–).

FISHER, GEORGE PARK (1827–1909), Amer. writer on theol. and history.

FISHER, JOHN (*c.* 1469–1535), Eng. Churchman; bp. of Rochester; advocated reasonable reform in Eng. Church, but opposed Lutheranism; opposed Henry VIII.'s divorce, and was executed for his denial of king's ecclesiastical supremacy; canonised in 1886.

FISHER, JOHN ARBUTHNOT FISHER, 1ST BARON (1841–), Brit. Admiral of the Fleet; commanded *Inflexible* at *Alexandria*; helped to draw up Army Reform Scheme; first Sea Lord, 1904–10; instituted the 'Dreadnought' policy; received O.M., 1905; peerage, 1909.

FISHES, class—*Pisces*, form a great class near the base of the vertebrate stock. They are most closely related to the Amphibians, with which they are associated in the group *Ichthyopsida*, but from these, as from other vertebrates, they can be easily distinguished, owing mainly to characters impressed upon them by their aquatic life. The study of fishes, from whatever point of view, is known as *Ichthyology* (Gk. *ichthus*, a fish).

The majority of fishes are spindle-shaped, with head, trunk, and tail graduated into each other, so that the minimum of resistance is offered to their passage through water; but there are also 'flat'-fishes, 'globe'-fishes, 'ribbon'-fishes (*qq.v.*), and others, the habits of which have led them to depart from the typical form. For swimming purposes their bodies are very muscular, the muscles lying in flakes—segments or myotomes—and actuating the swimming organs, or fins, the paired sets of which probably represent the limbs of other vertebrates. The exterior of the body is generally protected by scales of various forms and types.

Their SENSES are similar to those of higher animals. Hearing and taste are feebly developed, but smell, associated with the nostrils and even, it has recently been discovered, with the dorsal vibratile fin in the Rockling, is acute. Tactile organs, barbels, elongated fin-rays, and perhaps the lateral line are highly developed, especially in abyssal fishes, where they compensate for the reduction or absence of eyes. But in most there are efficient eyes, sometimes stalked, rarely, as in Anableps, with both an upward and a downward-looking segment.

Their FOOD consists of many shore forms of seaweed, or of organic matter abstracted from mud, but most pelagic fishes are carnivorous, feeding on minute crustacea, jelly-fishes, worms, molluscs, etc., or on fishes smaller than themselves. According to their habit they are furnished with flat crushing, or sharp biting teeth.

All fishes breathe the air dissolved in the water which washes their gills. Here foul BLOOD, driven by the two-chambered heart, is purified and returns to the head and body. An accessory to respiration is the air-bladder, which in the Dipnoi has lung-like functions and drives pure blood to the incipiently three-chambered heart, where it mixes with the impure body blood.

Some fishes, a few Bony Fishes and Sharks, bring forth living young, but, as a rule, the **Eggs** are fertilised and hatch externally. Sometimes they are laid in sand or gravel, the male afterwards depositing spermatozoa, or 'milt,' upon them, or are attached to water-weeds; but the great majority of marine fishes lay enormous numbers of floating eggs. It has been calculated, for example, that in a single season a female cod will produce on an average 4,398,700 eggs. The ovary of a female fish is eaten under the name of *roe*; and from the salted roes of sturgeon *caviare* is made. Amongst Elasmobranchs the large eggs are protected in a horny capsule—the 'mermaid's purse.' The eggs once laid and fertilised, most fishes leave their further development to chance, but the males of several species (notably the Sticklebacks) build nests for their protection and guard them faithfully, or, as in the Pipe-Fishes, retain them temporarily in an external pouch. *Spawning* habits afford many points of interest.

Familiarity has robbed of their strangeness the **annual migrations** of salmon, shad, sturgeon, and others, from their feeding-grounds in the sea to their spawning-beds in fresh water, but one is still lost in wonder at the marvellous journeys of the common eel, which, after years spent in its river, at the call of nature sets its face steadfastly for the ocean, and there seeks the great depths far from land in which to deposit its eggs, whence the young eels (*Leptocephali*), totally unlike their parents, make their way back unguided to the rivers again.

The **colours** of fishes deserve special mention, and although it is impossible to be dogmatic about these, it will be found, as a rule, that the brightest and most varied colours occur amongst shore fishes and especially amongst such as frequent the brilliant coral reefs of tropical seas. Oceanic fishes which are surface-feeders have often blues and greens on the upper portions of their bodies, while the fishes of the dark ocean depths are sombre in colour—often dark purples or black. Change of colour is a phenomenon more or less marked amongst shallow-water fishes, most striking perhaps in some Bermudas sea-perches, but noticeable even in the plaice of Brit. seas.

Fishes are found in seas and fresh waters all the world over. Some are confined to deep water, some hug the shore, while others spend their whole lives in their native streamlets or lakes; but there are wandering forms which seek now fresh now salt water, there are others which can leave the watery element to make journeys overland or to bask on high roots. The specialised Dipnoi are exceptional in being able, on account of their lung-like air-bladder, to withstand a continued drought, coiled up in a mud-burrow.

Owing to their hard scales many fishes have been preserved as **fossils**, even from Upper Silurian times, when Elasmobranchs first made their appearance, through the Carboniferous and succeeding periods, when these simpler fishes predominated in the seas. And from the rocks one can trace how they were gradually ousted from supremacy in numbers by the advent of Bony Fishes in the Jurassic period and their rapid increase in later Cretaceous and Tertiary times.

Fish as food brings sometimes less than a blessing, for the enormous prevalance of the giant tapeworm (*Bothriocephalus latus*) in the inhabitants of E. Europe is due to the fact that the larva of the tapeworm, harboured in pike, trout, turbot, perch, and such-like, is passed on to man when these fishes are consumed in a semi-cooked state.

According to their structures and affinities living fishes are divided into three main groups, which again are split into smaller divisions:—

Fishes, class PISCES, aquatic vertebrates which breathe all their life long by means of gills, and possess fins.

Sub-Class I., ELASMOBRANCHII or CARTILAGINOUS FISHES, fishes with cartilaginous skeleton, skin covered with minute enamelled bony warts (placoid scales), a varying number of gill-slits and no air-bladder or lung Divided into two orders—

ORDER 1, *Selachii*, *Plagiostomi*, or *Selachians* (q.v.), transverse mouth on under surface, preceded by a projecting rostrum, tail asymmetrical (heterocercal), usually five gill-slits not covered by a protecting plate (operculum). Examples—Sharks, Dogfishes, Skates, Rays.

ORDER 2, *Holocephali*, bones developed only as slender rings in notochordal sheath, skin naked, four gill-slits covered by an operculum. Examples—Chimæra, Callorhynchus.

Sub-Class II., TELEOSTOMI, fishes with a more or less bony skeleton, skin covered with soft, circular scales (cycloid); the gill-slits are always covered with a well-developed operculum, and there is present an air-bladder, which, when it has a vascular function, returns purified blood into the veins. Divided into four orders—

ORDER 1, *Crossopterygii*, with lobed pectoral and pelvic fins, fringed with fin-rays, scales, and dermal skull bones often enamelled, air-bladder bilobed. Examples—Polypterus and Calamoichthys.

ORDER 2, *Chondrostei*, body covered with large bony plates in definite rows, internal skeleton cartilaginous, spiral valve in intestine, tail asymmetrical (heterocercal). Example—Sturgeons (*Acipenser*).

ORDER 3, *Holostei*, skeleton bony, air-bladder lung-like in structure, and aiding in respiration, spiral valve in intestine, tail heterocercal. Examples—Amia and Lepidosteus.

ORDER 4, *Teleostei* (Gk. *teleos*, true; *osteon*, a bone), BONY FISHES (*q.v.*), skeleton ossified, no spiral valve in intestine, tail pseudo-symmetrical (homocercal). Includes by far the greatest number of living fishes. Examples—Carps, Eels, Salmon Family, Herrings, Cod Family, Flat-Fishes, Perches, and Globe-Fishes.

Sub-Class III., DIPNOI, MUD-FISHES or LUNG-FISHES, skeleton partly bony, partly persisting as cartilage; skin covered with soft circular scales (cycloid); gill-slits covered by an operculum; an air-bladder present which resembles and acts as a lung, sending purified blood to the heart, which is incipiently three-chambered; tail primitively symmetrical (diphycercal). Examples—Ceratodus, Protopterus, and Lepidosiren.

Jordan, *Guide to the Study of Fishes*; Günther, *An Introduction to the Study of Fishes* (1880); Sir Herbert Maxwell, *Brit. Freshwater Fishes* (1912); and FISHES, vol. 7, in *Cambridge Natural History*, and Part IX. of Lankester's *Treatise on Zoology*.

Fisheries.—The term includes the ordinary fisheries of the sea, which concern not only fishes themselves, but crabs, lobsters, shrimps, prawns, and shell-fish, and such diverse industries as sponge, coral, pearl, and whale 'fisheries.'

The importance of fisheries proper as a means of food supply may be estimated from the fact that Grimsby alone sends out 600 trawlers, which garner over three million pounds worth of fishes annually, and that the fishermen of the Brit. Isles land in a year 958,000 tons of sea-produce worth more than £10,120,000. These vast numbers are distributed in the main amongst a comparatively small number of fishes, such as herring, cod, haddock, and various types of flat fishes, such as plaice, dabs, and flounders.

In pursuit of these species, fisheries are prosecuted in inshore and in offshore districts, where fishes are plentiful. The latter are generally shallow sea areas characterised by abundance of fish food, and by the presence of suitable spawning-grounds. Most frequented are the North Sea, the Dogger Bank, and the Newfoundland Banks with their cod fisheries, but the Atlantic Plateau, the Banks of Iceland and of Morocco are also much exploited. Inshore fisheries are pursued mainly by the use of wind-driven boats, furnished with long lines bearing many baited hooks, and, in the case of salmon, by coastal stake-nets; in addition to this, outshore fisheries employ steam-propelled line boats furnished with a beam or otter trawl—a large, heavy weighted net which is dragged over the bottom. Further, migratory types of fish, such as herrings, pilchards, and mackerel, are captured by 'drift-nets'—walls of netting hanging perpendicularly in sea, into meshes of which fishes strike as they swim.

Fisheries Law.—Fishery legislation is both local and international, and has two aims—that of protecting the fishermen and that of protecting the fish. The preservation of trout and salmon in rivers is enforced by regulations dealing with property rights, with restrictions as to the means by which the fishes may be caught—for example, by exclusion of weirs and nets, and by institution of periods (close terms) during which fishing for a particular species is illegal.

In the sea, fisheries are protected by international law. **Territorial Waters** are the littoral sea, or inland gulfs, which can be occupied by the sovereign of the land. There are international treaties concerning the control of the Eng. Channel, North Sea, etc. etc. Three miles from the shore and six miles from the entrance to bays or gulfs is the minimum territorial limit. Within this area the use of trawl-nets is prohibited, and many fish nurseries are thus safeguarded. Further efforts are made to preserve immature individuals of edible fishes by regulating the size of meshes of nets and by prohibiting the sale of fishes under a given size. See ANGLING.

FISHGUARD (51° 59′ N., 4° 58′ W.), seaport town, Pembrokeshire, Wales; Irish Channel service; good harbour; fisheries.

FISHKILL-ON-HUDSON, FISHKILL LANDING (41° 31′ N., 73° 57′ W.), village, New York State, U.S.A.; iron and rubber manufactures. Pop. 4000.

FISH-LICE, see ENTOMOSTRACA.

FISK, JAMES (1834–72), Amer. financier; assassinated.

FISK, WILBUR (1792–1839), Amer. educationist.

FISKE, JOHN (1842–1901), Amer. historian and philosopher; graduated Harvard; his hist. writings form a complete colonial history of the U.S.A.

FISKE, MINNIE MADDERN (1865–), Amer. actress and theatrical manager; most famous rôle, 'Becky Sharp'; has played 'Nora' and 'Tess.'

FISSIPEDIA, a sub-order of Carnivora (*q.v.*).

FISTULA, (*a*) abnormal opening from the surface of the body into a normal canal or organ; or (*b*) an abnormal opening from one normal canal or cavity in the body to another, *e.g.* (*a*) anal fistula, (*b*) recto-vesical fistula, between rectum and urinary bladder.

FITCH, JOHN (1743–98), Amer. engineer; pioneer of Amer. steam navigation.

FITCH, SIR JOSHUA GIRLING (1824–1903), Eng. educationist.

FITCH, RALPH (fl. 1583–1606), Eng. merchant and Eastern traveller.

FITCH, WILLIAM CLYDE (1865–1909), Amer. author and playwright.

FITCHBURG (42° 32′ N., 71° 52′ W.), city, Massachusetts, U.S.A., on Nashua; tools, machinery, textiles. Pop. (1910) 37,826.

FITTON, MARY (fl. 1600), dau. of Sir Ed. Fitton, of Gawsworth, Cheshire; Queen Elizabeth's maid of honour; Earl of Pembroke's mistress; the supposed 'dark lady' of Shakespeare's sonnets.

FITZ GERALD, EDWARD (1809–83), Eng. man-of-letters; trans. some dramas of Calderon; wrote several miscellaneous works; was a delightful letter-writer, and secured world-wide fame by his paraphrase of *Omar Khayyám* (first pub. 1859); *Life*, by A. C. Benson, John Clyde, T. Wright.

FITZ NEAL, RICHARD, FITZ NIGEL (d. 1198), Eng. bp. and treasurer; wrote *Dialogus de Scaccario*, describing exchequer procedure; bp. of London, 1189.

FITZ OSBERT, WILLIAM (d. 1196), Eng. crusader and social reformer; executed.

FITZ PETER, GEOFFREY, EARL OF ESSEX (*c.* 1190–1213), Eng. chief justiciar.

FITZ STEPHEN, ROBERT (fl. 1160–82), Eng. military leader.

FITZ STEPHEN, WILLIAM (fl. 1160–90), Eng. judge; wrote life of Becket.

FITZ THEDMAR, ARNOLD (1201–74), Eng. chronicler.

FITZ WALTER, ROBERT (fl. c. 1210–35), Eng. baron; principal figure in baronial opposition to King John.

FITZBALL, EDWARD (1792–1873), Eng. dramatist and librettist.

FITZGERALD, family name of Dukes of Leinster, and of former Earls of Desmond, latter title being extinct since 1601, when the last earl (restored, 1600, seventeen years after his f.'s attainder and execution for rebellion) died unmarried. Both families trace descent from Dominus Otho, a Florentine noble, who came to England before Norman Conquest and whose s., Walter, was castellan of Windsor in Domesday times. John F. was cr. Earl of Kildare in 1316, title descending in family until James, 20th earl, was Duke of Leinster in 1766.

FITZGERALD, LORD EDWARD (1763–98), Irish soldier, politician, and conspirator; fought in America, 1781–82; travelled in Canada, 1789, where he was made chief of Bear Indians; on return became M.P. for Kildare; joined United Irishmen, 1796; had share in organising conspiracy in Dublin, 1797, after discovery of which he was arrested, dying a fortnight later from wound received during struggle preceding his arrest. His wife, Pamela, was said to be dau. of Duke of Orleans.

FITZGERALD, RAYMOND (d. 1182), constable of Leinster.

FITZGERALD, THOMAS, 10TH EARL OF KILDARE (1513–37), Irish rebel, 1534; ultimately surrendered, was executed and attainted, 1537.

FITZHERBERT, SIR ANTHONY (1470–1538), Eng. jurist.

FITZHERBERT, MARIA ANNE, MARIA ANNE SMYTHE (1757–1837), secretly married after death of second husband to George IV. when Prince of Wales in 1785; marriage invalidated by previous Royal Marriages Act. The Prince and Fox denied the marriage, which, on the break with Princess Caroline, was resumed by special papal permission, but finally ended in 1803.

FITZHERBERT, THOMAS (1552–1640), Eng. Jesuit; active plotter against Elizabeth.

FITZ-OSBERN, ROGER (c. 1071), Earl of Hereford; rebelled against William I., and was banished.

FITZ-OSBERN, WILLIAM (d. 1071), Earl of Hereford; favourite of William I.

FITZROY (37° 49′ S., 144° 59′ E.), manufacturing town, N.E. suburb of Melbourne, Victoria, Australia. Pop. 32,000.

FITZROY, ROBERT (1805–65), Brit. admiral and meteorologist; surveyed coasts of Patagonia and Tierra del Fuego, and commanded surveying expeditions of the *Adventure* and *Beagle*, being accompanied by Darwin on latter; gov. of New Zealand, 1843–45; meteorologist to Board of Trade, 1854; pub. *Weather Book*, 1863. Newspaper weather forecasts are based on his system of storm warnings.

FITZWILLIAM, SIR WILLIAM (1526–99), Eng. administrator.

FITZWILLIAM, WILLIAM WENTWORTH FITZWILLIAM, EARL (1748–1833), Brit. politician and administrator.

FIUME (45° 19′ N., 14° 27′ E.), chief seaport, kingdom of Hungary, on Adriatic, at mouth of Fiumara, in Gulf of Quarnero; has several harbours; large shipping trade and varied manufactures, including torpedoes and tobacco. Principal buildings are: cathedral, governor's and emperor's residences, naval academy. F. was annexed to Hapsburg dominions, 1471; passed to Hungary, 1779; came under direct Hungarian rule, 1870. Pop. (1910) 49,806.

FIVE MEMBERS, the five M.P.'s whom Charles I. tried to arrest in 1642, this forming the chief exciting cause of the Civil War. They were John Pym, John Hampden, Sir A. Haselrig, William Strode, and Denzil Holles.

FIVE-MILE ACT, Eng. law passed in 1665 forbidding nonconforming divines to minister as clergymen, tutors, or teachers within 5 miles of a town or of any place where they had once officiated, unless they took the oath of non-resistance.

FIVES, Eng. game played at public schools and most universities; played by two or four players in rectangular court, which sometimes has buttress on left side and step; server flings ball on to front wall so that it bounds on to right-hand wall; striker returns it *vice versa*; play is then open, but ball must always touch front wall above a certain height; only the server can score; when he loses a stroke he becomes striker. Fifteen points constitute game; balls are made of twine and cork covered with kid; padded gloves are worn. BAT F., played with wooden racquet, is similar game.

FIX, THÉODORE (1800–46), Swiss economist and journalist.

FIXTURES, may be defined under two heads—landlord's f's and tenant's f's. The first-named must remain when a person gives up a tenancy; the second are, in law, such f's as the tenant is duly entitled to remove. It may be noted that an agriculturist may remove fencing, etc., which has been provided by himself, at the expiry of his tenancy; and a market-gardener may remove shrubs, plants, etc.; but an ordinary householder cannot remove trees, bushes, plants, etc., although planted by himself.

FJORD, FIORD, Anglicised form of the Norweg. name for long, narrow, and frequently deep and precipitous inlets of the sea so common in Norway.

FLACCUS, Rom. family; famous members are Quintus Fulvius, distinguished in war against Carthage; Marcus Fulvius supported the Gracchi; Caius Valerius, Rom. poet (I. cent. A.D.), wrote *Argonautica*.

FLACCUS, QUINTUS HORATIUS, see HORACE.

FLACH, GEOFROI JACQUES (1846–), Fr. writer on history and law; b. and ed., Strassburg, Alsace; prof. of Comparative Legislation at Collège de France, 1879; wrote *Les Origines de l'ancienne France* and other works on Old Fr. law.

FLACIUS, MATTHIAS (1520–75), Lutheran reformer and writer; father of critical study of ecclesiastical history; wrote *Catalogus Testium Veritatis*.

FLACOURT, ÉTIENNE DE (1607–60), Fr. colonial administrator; wrote *History of Madagascar*.

FLAG, any light cloth flown in the air and bearing device to convey definite meaning or signal; usually attached to a halyard or staff, the end so attached being called the *hoist*, while the length from the staff to the free end is called the *fly*. Military use of f's in England dates back to Norman Conquest, if we may accept as proof the pennons and f's occurring in representations of the Conqueror's troops on the Bayeux tapestry. Of mediæval f's the *pennon* was a mark of knightly rank; it was small and triangular in shape, and showed the heraldic bearings of the owner; the *banner*, rectangular in shape and varying in size according to rank of owner, was carried by all above the degree of a knight simple, including the king; and the *standard* was of much greater size, and was a tapering f., generally richly embroidered and slit slightly at the narrow end; it was borne by peers or knights of importance in the Middle Ages. Less-important mediæval f's were the *pennoncel*, borne by esquires, the *banderoll*, the *guydon*, and the *gonfanon*.

Regimental f's, called the *colours*, are of silk, with gold and crimson cords and tassels; old disused colours are placed in parish church or minster at headquarters of the regiment, and the presentation of new colours is a religious ceremony of much dignity and solemnity. *White flag* is a sign of truce; *red-cross flag* is sign of ambulance, hospitals, etc.

The *Royal Standard* (the personal f. of the Brit. sovereign) is a banner in shape, with the arms of England on the first and fourth quarters, the Scot. arms on the second, and those of Ireland on the third.

In its Scot. form the Royal Standard has Scot. arms on first and fourth quarters, Eng. arms on second. The *Union Jack*, the Brit. national flag, is formed by combination of crosses of St. George, St. Andrew, and St. Patrick; the first two were united in 1603, when James VI. of Scotland became James I. of England, the union being effected by keeping the blue field and white St. Andrew's cross of the old Scot f., and representing the Eng. white field by a narrow border or fimbriation round the red St. George's cross; in 1801 Ireland joined the Union, and St. Patrick's cross was incorporated with the other two. The *ensign* is a naval f., and is of three colours, red, white, and blue, according to a now obsolete threefold division of the fleet. The *red ensign*, a red f. with the Union Jack in the first quarter, is now used by merchant vessels; the *white ensign*, a white f. with the red cross of St. George and the Union Jack in the upper canton, is now only flown by the Royal Navy and Royal Yacht Squadron; and the *blue ensign*, a blue f. with the Union Jack in the first quarter, is now carried by the Naval Reserve and certain yacht clubs.

National f's of other countries include: U.S.A.—*Stars and Stripes*—thirteen stripes (representing thirteen original states) of alternate red and white, with forty-eight white stars on blue ground in first quarter, to represent existing number of states; French—*Tricolour*—blue, white, and red vertical stripes, blue being next halyard or staff; Dutch—red, white, and blue horizontal stripes; Belgian—black, yellow, and red vertical stripes; Swiss—a white cross on red field; Spanish—three horizontal stripes, yellow between two reds, crown-surmounted escutcheon on middle stripe. The f. of Ger. Imperial Navy is white field divided into quarters by white-edged black cross, with black Prussian eagle on white ground in centre, and in first quarter black, white, and red bars surcharged with iron cross. Ger. mercantile marine f. has black, white, and red horizontal stripes. Ital. mercantile marine f. has green, white, and red vertical stripes, with arms of Savoy in centre. The f. of the Austrian navy is like that of the merchant service (red, white, and red horizontal stripes), with shield and imperial crown in centre. The Russian navy has for f. a blue St. Andrew's cross on white field; the merchant service, white, blue, and red horizontal stripes. The Dan. navy has a white St. George's cross on red field; Swed. navy, yellow St. George's cross on blue field; Turk. navy, white star and the crescent moon on red field; Gk. navy's f. has nine horizontal stripes, blue and white alternately, with white cross and crown in top left-hand corner; Jap. naval f. has red rising sun, with white background.

Pirate f. is black, quarantine yellow, mutiny red. F. at half-mast signifies mourning.

Macgeorge, *Flags*; Hulme, *Flags of the World* (1897).

FLAGELLANTS, religious confratornities of Middle Ages, members of which marched in bands, scourging themselves in public in reparation for sin; they became extravagant during plague periods of the XIV. cent.; but, subjected to papal persecution, soon disappeared. A temporary revival occurred in 1414.

FLAGELLATA, MASTIGOPHORA, class containing many often exceedingly minute Protozoa; simplest forms, known as *Monads*, are scarcely distinguishable from Rhizopods, but all are furnished with one or more whip-like filaments or *flagella*, by which they move and capture food. Some live independently in fresh or salt water, and feed upon bacteria and minute organisms; others contain colour-bearing grains (chromoplasts or chromatophores) which enable them to live like plants. Many live in and on decaying vegetable or animal substances, and still more occur as external or internal parasites. The latter live in the digestive tract of many animals, especially Insects and Vertebrates, frequently causing disease and death.

Sub-Class I.—EUFLAGELLATA: minute animals with one or more flagella; widely distributed in fresh water (e.g. *Euglena*), decaying vegetation, or parasitic in bodies of animals; latter group includes HÆMOFLAGELLATES, parasitic in blood of vertebrates, e.g. *Trypanosomes* (q.v.). Sub-Class II.—DINOFLAGELLATA or PERIDINIALES: mostly marine forms (some parasitic), with ventral groove, two flagella, and body protected by rigid cellulose covering, e.g. *Peridinium*. Sub-Class III.—CYSTOFLAGELLATA or RHYNCHOFLAGELLATA: floating marine forms, with inflated gelatinous body, *e.g.* the phosphorescent *Noctiluca*.

FLAGEOLET, simple musical instrument, consisting of straight tube with mouthpiece and finger-holes. See FLUTE.

FLAGSHIP, the ship which in a squadron serves as headquarters of the senior officer commanding; is distinguished by a flag corresponding to his rank. **Flag-Captain**, officer in command of admiral's ship.

FLAHAUT DE LA BILLARDERIE, AUGUSTE CHARLES JOSEPH, COMTE DE (1785–1870), Fr. soldier; ambassador at Berlin, 1831; Vienna, 1841–48; England, 1860–62.

FLAIL, a club-headed whip used for threshing corn by hand. Also a favourite weapon in mediæval warfare.

FLAMBARD, RANULF (d. 1128), Eng. bp.; formed church benefices for William Rufus, at whose death he fled to France; returned, reinstated, 1106.

FLAMBOROUGH HEAD (54° 7′ N., 0° 4′ W.), promontory, on Yorkshire coast, England; lighthouse.

FLAMBOYANT, in arch., the last development in Gothic tracery, which prevailed in France during XV. and part of XVI. cent's. The tracery flows upwards in wavy divisions like flames of fire. See ARCHITECTURE.

FLAME.—When a gas, or mixture of gases, is heated to a certain temperature it burns with production of light and heat. The amount and colour of light varies with the gas burnt. Coal gas burns with a yellowish, hydrogen with an almost colourless f. The luminosity of the f. depends (1) on the temperature—the higher it is, the greater the luminosity; (2) on the density of the gases of the f.—the more compressed the gases are, the greater the luminosity; (3) on the amount of solid matter in the f. Powdered charcoal in a hydrogen f. will make it luminous. The incandescent mantle, a film of alkaline earths, increases the luminosity of the ordinary gas jet, and a block of lime placed in the oxyhydrogen f. produces an intense white light. The chief constituents of the ordinary f. is ethylene, which when burned produces carbon dioxide and water.

Four regions can be distinguished in a f.: (1) the inner cone of unburnt gas, (2) a non-luminous blue region, (3) a luminous f. with (4) a faintly luminous mantle. In the blue region carbon monoxide and water are formed, with traces of carbon dioxide and hydrogen. The carbon monoxide and hydrogen are oxidised into carbon dioxide and water in the outer cone. In the faintly luminous mantle, carbon monoxide, hydrogen, and small quantities of hydrocarbons which have escaped combustion in the luminous parts of the f. are burnt. The non-luminous character of this area is due to the cooling effect of the air, which is drawn into the f. The gases as they reach the luminous area are surrounded by burning material which raises them to the temperature at which marsh gas and ethylene are decomposed into acetylene and hydrogen.

FLAMEL, NICHOLAS (d. 1418), Fr. alchemist.

FLAMEN, in ancient Rome, priest in service of some special god; three chief f's were those of Jupiter, Mars, and Quirinus.

FLAMINGO, a long-legged wading bird, intermediate between goose and stork; characterised by long neck and peculiar beak, bent sharply downwards medianly, and exceptional in upper jaw moving on lower; plumage bright pink to scarlet; gregarious, inhabiting sub-tropical swamps, and breeding in colonies.

FLAMINIA, VIA (43° 15′ N., 12° 45′ E.), one of most ancient highways, Italy; extended from Rome to Ariminum; built by censor G. Flaminius, 220 B.C.

FLAMININUS, TITUS QUINCTIUS (c. 228–174 B.C.), Rom. soldier and politician; subdued Macedonia; became consul, 198; won decisive

victory at *Cynoscephalæ* in Thessaly, 197; represented Rome in Greece, 192.

FLAMINIUS, GAIUS, Rom. plebeian soldier and statesman; twice consul; defeated Gauls, 223 B.C.; defeated by Hannibal and killed at *Trasimene Lake*, 217; built Circus Flaminius on Campus Martius, and the Flaminian Way. See FLAMINIA, VIA.

FLAMSTEED, JOHN (1646–1719), first astronomer-royal of England; grad. Cambridge, 1674; app. by Charles II. astronomical observator to king; formed the first trustworthy catalogue of fixed stars, and supplied lunar observations by means of which Newton verified his lunar theory; principal work, *Historia Cœlestis* (1723).

FLANDERS (51° N., 3° E.), the land of the Flemings, comprising modern Belg. provinces of E. and W. Flanders, part of Zeeland (Holland), and of northern France; stretched along North Sea from Somme to Scheldt; famed in Middle Ages for powerful Counts and sturdy burghers; centre of woollen manufactures, hence intimately connected with England, which supplied wool; had many industrial towns like Bruges and Ghent. F. was conquered by Julius Cæsar, 51 B.C.; came under Frankish kings, IX. cent.; Counts of F. subject to France for five cent's; William the Conqueror's wife, Matilda, was Count of F.'s dau.; popular rising under Arteveldes (*q.v.*), XIV. cent.; F. passed to Burgundy, 1384; crushed under Austrian and Spanish rule, 1477–1794 (see NETHERLANDS), not securing independence like United Provinces of North in XVI. cent.; France secured part, 1659, 1679, and whole, 1794–1814; incorporated in Netherlands, 1815; since 1831 part of Belgium (*q.v.*). E. F. area, 1158 sq. miles; pop. (1910) 1,123,755. W. F., area, 1249 sq. miles; pop. (1910) 881,033. For **Flemish Literature**, see HOLLAND (LANGUAGE AND LIT.). For **Flemish Art**, see PAINTING.

FLANDRIN, JEAN HIPPOLYTE (1809–64), Fr. artist; pupil of Ingres; religious frescoes.

FLANNEL, soft woollen cloth, the best of which is made in Wales, the original home of the industry. The fleecy softness of 'raised' f. is secured by carding; but firmer f. wears better and shrinks less.

FLANNELETTE, fleecy cotton cloth, used as a substitute for flannel. As it is highly inflammable its use for children's clothing is dangerous.

FLAT, a self-contained apartment approached through a stair or a hall, with its own entrance door. In English law, occupiers are ordinary tenants, not lodgers; each flat is separately rateable and has right of support on the flats below. Scots law recognises absolute right of proprietorship of a flat independently of ownership of the rest.

FLAT WORMS, see PLATYHELMINTHES.

FLATBUSH, former town, Long Island, New York, U.S.A.; now included in Brooklyn, N.Y.

FLAT-FISHES (*Pleuronectidæ*), laterally compressed fishes, which lie on one side, hidden under the surface of sand at the bottom of shallow seas. They include some of the most valuable of food fishes; found in all seas. The most important Brit. forms are halibut and turbot (*qq.v.*), the brill, a turbot-like fish, but without tubercles, the plaice, with orange spots, the dark-brown flounder or fluke, often found in rivers, the dabs, and the almost black elongated soles.

FLATHEADS, small tribe of N. Amer. Indians, now living in Montana.

FLAUBERT, GUSTAVE (1821–80), Fr. novelist; b. Rouen. His works, most of which have been trans. into Eng., are either realistic novels or hist. romances, and include *Madame Bovary, Bouvard et Pécuchet, Salammbô, L'Éducation sentimentale, Trois Contes*, etc. He was a slow and careful writer, and one of the greatest stylists France has produced. See Merejkowski's *Lifework of F.*

FLAVEL, JOHN (*c.* 1630–91), Eng. Presbyterian preacher and author; voluminous writer on theol.

FLAVIAN (fl. *c.* 450), bp. of Constantinople and martyr.

FLAVIGNY (47° 30′ N., 4° 32′ E.), small town, Côte d'Or, France; textiles; 'Flavigny anise.'

FLAX (*Linum usitatissimum*), an annual plant belonging to the family Linaceæ. It possesses a tall, slender, upright stem, clothed with small leaves. The flower is large and brilliant blue, and persists only one day. Many flowers are borne at the apex of the stem. The fruit is a capsule, and contains when ripe ten flat seeds—*linseed*. The original home of the f. is Western Persia, but for many thousand years it has been cultivated all over the north-temperate and subtropical zones in such stations as are suited to it. It demands for its best development a cool and moist climate. In Ireland, Eastern Russia, Belgium, and Holland it reaches its finest quality. F. is cultivated for the sake of its seeds and of its fibre. Linseed yields, on pressing, an oil which is valuable in the manufacture of paint and of printer's ink. The compressed refuse is used as *oil-cake* for feeding cattle, and the ground seed constitutes *linseed meal*.

The *bast* of the stem (that part of the fibre which surrounds the wood) is the raw material of linen. To obtain it the f. stems, from which the seed pods have been removed, are rotted for 10 to 15 days in hard water; they are then beaten to break up the wood, and subjected to various combing processes, by means of which the long bast fibres are separated from shorter fibres, and from the wood—these forming the *tow*. From the fibre thus obtained thread is manufactured by spinning, and cloth by weaving the thread.

Sharp, *F., Tow, and Jute Spinning*.

FLAXMAN, JOHN, R.A. (1755–1826), Eng. sculptor; as a boy had feeble health, but imbibed a love of art from his f., who was a moulder of figures. He became an Academy student, and found scope for his abilities as a designer for Wedgwood. In 1782 he began to devote himself to statuary and monumental sculpture, and thus established his fame as the greatest of Eng. classical sculptors, his designs in illustration of Homer, Æschylus, and Dante being especially famous.

Sidney Colvin, *Drawings of F.* (with biography).

FLEABANE, general term for asteraceous plants popularly supposed to keep off fleas; best known European species, *Pulicaria dysenterica*.

FLEAS, from the order *Siphonaptera* or *Aphaniptera*, are wingless, compressed insects, with piercing mouth parts, and are external parasites of almost all animals and birds. They are responsible for the spread of several diseases, *e.g.* plague in India. Well-known examples are the human flea (*Pulex irritans*) and the jigger (*Sarcopsylla penetrans*), a terrible American pest.

FLÉCHIER, VALENTIN ESPRIT (1632–1710), Fr. writer and cleric; bp. of Lavaur, 1685; of Nîmes, 1687; noted for eloquent sermons and funeral orations.

FLECKEISEN, CARL FRIEDRICH WILHELM ALFRED (1820–99), Ger. critic and philologist.

FLECKNOE, RICHARD (d. *c.* 1678), Eng. poet and dramatist; satirised by Dryden.

FLEET, the entire body of a nation's war-vessels, or a division of the same located in some particular waters; applied also to fishing-boats.

FLEET PRISON, famous gaol which stood in Farringdon St., London; existed in Norman times; destroyed by Great Fire in 1666 and again during Gordon Riots in 1780; used for Star Chamber and Chancery prisoners, debtors, and bankrupts.

Fleet Marriages.—Clandestine marriages performed by disreputable or pseudo-parsons in or near Fleet Prison; suppressed in 1754.

FLEET STREET, famous London street, with many newspaper offices; identified with journalism. See *Fleet St. in Seven Centuries*, by W. G. Bell (1912).

FLEETWOOD (53° 56′ N., 3° 1′ W.), seaport, watering-place, Lancashire, England; fisheries. Pop. (1911) 15,876.

FLEETWOOD, CHARLES (d. 1629), Eng. politician and soldier; Roundhead in Civil War;

present at *Dunbar* and *Worcester*; commander-in-chief, Ireland, 1652–55; commander-in-chief, 1659.

FLEETWOOD, WILLIAM (1656–1723), Eng. ecclesiastic; held sees of St. Asaph and Ely.

FLEGEL, EDUARD (1855–86), Ger. West African traveller and author.

FLEISCHER, HEINRICH LEBERECHT (1801–88), Ger. Oriental scholar.

FLEMING, PAUL (1609–40), Ger. poet; lyrics, sonnets, hymns.

FLEMING, RICHARD (fl. 1406–31), Eng. ecclesiastic; founder of Lincoln Coll., Oxford.

FLEMING, SIR SANDFORD (1827–), Canadian engineer and author.

FLEMISH LITERATURE, see HOLLAND (LANGUAGE AND LITERATURE).

FLEMISH SCHOOL, see PAINTING.

FLENSBURG (54° 46′ N., 9° 26′ E.), seaport, Germany; breweries, distilleries. Pop. (1910) 60,931.

FLERS (48° 44′ N., 0° 35′ W.), town, Orne, France; linen and cotton manufactures. Pop. 14,000.

FLESH-FLY, general term for flies whose larvæ feed on flesh; the common European species is *S. carnaria*; the American, *S. sarracenia.*

FLETCHER, ANDREW, OF SALTOUN (1655–1716), Scots politician; took part in Monmouth's rising of 1685; afterwards travelled; returned to Scotland, 1689; was prominent politician from 1703 till 1707, opposing Anglo-Scot. Union.

FLETCHER, GILES (1548–1611), Eng. author and State official; wrote *The Russe Commonwealth.*

FLETCHER, GILES (1584–1623), Eng. poet; s. of above; author of *Christ's Victory* (1610).

FLETCHER, HORACE (1849–), Amer. dietician; founder of system (*Fletcherism*) for thorough mastication of food.

FLETCHER, JOHN (1579–1625), collaborated with Francis Beaumont (*q.v.*).

FLETCHER, JOHN WILLIAM (1729–85), Eng. clergyman; intimate friend of Wesley.

FLETCHER, PHINEAS (1582–1650), Eng. poet, bro. of Giles F. (jun.); author of *The Purple Island.*

FLEURANGES, ROBERT (III.) DE LA MARCK (1491–1537), Fr. marshal and historian; distinguished at *Marignano*, 1515; captured Cremona; imprisoned in Flanders, where he wrote his history.

FLEUR-DE-LIS, the lily-flower heraldic device borne as the royal arms of France from very early times down to the extinction of the monarchy. The triple heads are said to typify the Trinity.

FLEURUS (50° 30′ N., 4° 33′ E.), village, Belgium; scene of four battles in Span. and Fr. wars. Pop. 6231.

FLEURY, ABRAHAM JOSEPH (1750–1822), Fr. actor.

FLEURY, ANDRÉ HERCULE DE (1653–1743), Fr. politician and ecclesiastic; cardinal, 1726; governed France, 1726–43; tried to maintain peace, improved commerce; sent force against Austrians, 1733.

FLEURY, CLAUDE (1640–1723), Fr. Church historian; educated several Fr. princes; wrote *Histoire Ecclésiastique,* work of great learning in twenty vol's.

FLEXNER, SIMON (1863–), Amer. pathologist; discovered (with Jobling) serum treatment for cerebro-spinal meningitis.

FLIEDNER, THEODOR (1800–64), Ger. Lutheran pastor; founder of Prot. order of Deaconesses; pastor of Kaiserswerth, 1822; founded there deaconesses' home and seminary for infant-school teachers.

FLIES, see DIPTERA.

FLIGHT is the passage of an animal through the air by means of wings, which are limbs specially adapted for the purpose. Flying animals,—which include insects, birds, and bats, but not so-called flying squirrels, flying opossums, or flying fish,—whatever their species and however different the appearance of their wings, all fly according to the same principles. It has been supposed that the air-sacs and cavities in the bones of birds when filled with heated air supported the birds after the manner of a balloon, but this has been disproved, the purpose of the sacs being to assist in regulating the temperature and in aerating the lungs more completely, the f. of birds being due to the weight of the animal and the power of the wings inducing a resistance in the air sufficient to propel it upwards and onwards. Weight is as necessary as power for the purpose of f., as, without sufficient weight to overcome air currents simply by inertia, the animal would be unable to direct its movements and would be at the mercy of every wind that blew. This fact is greatly in favour of the idea that a flying machine should not be a light, balloon structure, having a very large surface exposed, but should be comparatively heavy and compact, depending for its ability to fly solely on the power of its flying mechanism.

Pettigrew (1867) has shown that the wings of all flying animals are built as screws, and when they vibrate they twist in opposite directions during the up and the down strokes, striking upwards and forwards for the up strokes, and downwards and forwards during the down strokes, passing through the air obliquely as a boy's kite when pulled on, or as an oar in the water in rowing. Professor Marey, a few years afterwards, elaborated the theories of Pettigrew by means of the sphygmograph (an instrument in which movements are recorded by a pointer on a revolving drum) and by photography, showing the movements of the different feathers of a wing. The wings of birds and other animals are made to vibrate at very high rates of speed, and in the course of a vibration they cover over a large space so rapidly that it forms, as it were, a solid support for the animal; and by vibrating at a high speed light wings of small size perform the work of heavy wings of large size vibrating slowly, while the resistance of the air is also greater to a swiftly moving object than to one moving slowly, so that the propulsion of the animal is much assisted. This may also be brought about by the velocity of the wind being high, so that one sees birds flying easily in a breeze with but little movement of their wings. Since the parts of the wing nearest to the body of the animal pass through a very much shorter space than those farthest away in exactly the same time, the wing is necessarily an elastic body so as to avoid violent vibration of its parts.

Aviation.—The possibility of human beings flying is a subject which has engaged the attention of man since early times, as one may learn from the myths of Pegasus, the flying horse, and of Dædalus, who constructed wings of feathers and wax. At a somewhat later period various persons are said to have flown from St. Mark's, Venice, in Spain, and in Nuremberg, while near the beginning of the XVI. cent. an Ital. alchemist attempted to fly from Stirling Castle to France, but soon fell, breaking a leg; Leonardo da Vinci also wrote at some length on the subject of f., designing wings which could be fitted to the body for the purpose. Borelli in 1670 investigated the mechanism of flying in birds and designed artificial wings, his theories being followed by many authorities as late as the XIX. cent. In 1768 Paucton designed a flying-machine fitted with screws, while somewhat later Cayley constructed a model which flew on the same principles, other experimenters following with more or less success. In 1868 d'Amécourt exhibited a model driven by steam and propelled by screws, and Pénaud, a few years after, had some success with models fitted with elastic in place of rigid screws.

The flying-machine built by Henson in 1843 was the first attempt on a large scale to combine propelling screws with supporting planes, and Stringfellow, who had been associated with him, invented a much improved model with a light engine. At the end of the XIX. cent. Langley and Hiram Maxim each constructed models driven by steam which flew short distances—that of Langley, in 1896, flying half a mile on the Potomac River in America. Experiments were also carried out by gliding aeroplanes carrying passengers, by Lilienthal in Germany, Pilcher in England, and Chanute in America, each of whom made several

hundred flights, the two former, however, being killed.

At the same time investigations were being carried out by Wilbur and Orville Wright in Ohio, U.S.A., at first merely with gliders, but afterwards with aeroplanes fitted with a petrol motor, and in 1903 they accomplished a flight of fifty-nine seconds' duration with one of the latter machines, while in 1905 they covered 22¼ miles in a flight. Meanwhile Santos Dumont had been experimenting in France with dirigible balloons, in 1901 winning the Deutsch prize for encircling the Eiffel Tower in Paris; but in 1906 he constructed an aeroplane on the box-kite design, fitted with a petrol motor, and succeeded in flying 220 metres. Also in France, Farman designed an aeroplane of the biplane type, and in 1908 won the Deutsch-Archdeacon prize of £2000 for a circular flight of one kilometre. The brothers Wright, however, were even more successful, and coming over to France in 1908 Wilbur Wright broke all previous records by remaining in the air for 2 hrs. 20 mins. 23 secs. on a biplane of his and his bro's design. The next year saw great developments in the science of aeronautics, especially as regards the *monoplane* as opposed to the *biplane*, the former being lighter, swifter, and more easily started than the latter, which, however, is more stable; and in this year (1909) the Eng. Channel was first crossed by an aeroplane, Blériot accomplishing this feat in a monoplane of his own design, while Paulhan won the *Daily Mail* prize of £10,000, flying from London to Manchester within twenty-four hours, with only one stop for fuel. Aeroplane meetings have since been held all over Europe and N. America, while flights have been made so far away as China and S. America. In 1910 the Alps were crossed by an aeroplane by way of the Simplon Pass, Chavez, the aviator, being, however, fatally injured in landing; and in 1911 the circuit of Great Britain was accomplished by Lieut. Conneau (Beaumont) of the Fr. Navy (who won the prize of £10,000 offered by the *Daily Mail*), and by Vedrines. In the summer of the same year the first aerial post was established, messages being carried from London to Windsor, 21 miles away, the first voyage taking only ten minutes. Airships of the dirigible balloon type are treated under BALLOON (*q.v.*). All the great European countries now have Flying Corps attached to their military forces for scouting and other purposes. *Hydroplanes*, which can mount from, alight, and travel on smooth water surfaces, as well as fly in the air, are also attracting growing attention. Brit. Aerial Navigation Act (1913) prescribes certain areas forbidden to airmen; chief aim is to protect against foreign spies, and foreign airmen are required to obey strict rules as to landing, etc.

Walker, *Aviation* (1912: T. C. & E. C. Jack).

FLINCK, GOVERT (1615–60), Dutch artist; portraits, Scripture pieces, and *genre* pictures.

FLINDERS, MATTHEW (1774–1814), Eng. explorer; entered navy, 1790; fought in *Bellerophon*, 1794; surveyed great part of Australian coast, 1795–96, discovering Bass Strait; led expedition to explore Australian coast, 1801; on return wrecked, and imprisoned at Mauritius for six years; returned to England, 1810; pub. *A Voyage to Terra Australis*, 1814.

FLINSBERG (50° 54′ N., 15° 21′ E.), village, watering-place, Silesia, Germany; mineral springs.

FLINT (43° 1′ N., 83° 41′ W.), city, Michigan, U.S.A.; carriages; woollen goods. Pop. (1910) 38,550.

FLINT (53° 15′ N., 3° 9′ W.), seaport, county town, Flintshire, Wales; smelting and chemical works. Pop. (1911) 5474.

FLINT, variety of quartz; colour, brown, red, yellow, or grey; clouded, marbled, spotted, or veined; found embedded in chalk in round lumps or nodules; readily strikes spark with steel; easily split into sharp fragments, whence much used by ancients for knives, axes, and arrow-heads; now used in manufacture of earthenware and glass.—**Flint Implements**, remains of the Palæolithic period found in caves, river-beds, and ancient burial-places. See ARCHÆOLOGY.

FLINT, AUSTIN (1812–86), Amer. physician; prof. of Med. in Buffalo Coll. (1847), Louisville (1852), and Bellevue Coll., New York (1861); author of numerous works on medical subjects.

FLINT, AUSTIN (b. 1836), s. of above; Amer. physiologist; prof. of Physiology in Buffalo Coll. (1858) and elsewhere; author of many works on physiology.

FLINTSHIRE (53° 15′ N., 3° 8′ W.), county, N. Wales; bounded N. by Irish Sea, N.E. by Dee, E. by Cheshire, S.W. by Denbighshire; detached portion Maelor lies a few miles S.E.; area, 255 sq. miles. F. produces coal, limestone, zinc, lead, iron; good pasturage; main rivers, Dee and Clwyd; chief towns, Mold, Flint (county town), St. Asaph; ruins of F. Castle; Hawarden (Gladstone's home). Pop. (1911) 92,720.

FLOATING BATTERY, device for coast defence or attack against coast fortifications; a floating gun-platform, heavily armed, with small navigating power.

FLOATING DOCK, see DOCK.

FLOATING ISLAND, common in Chinese rivers and lakes; an artificial island of earth and vegetation on a floating platform of wood.

FLODDEN (55° 36′ N., 2° 7′ W.), hill, near village of Branxton, Northumberland, England; scene of battle, Sept. 9, 1513, in which Scots were defeated by English, and James IV., king of Scots, and many of his nobles slain.

FLODOARD, a Fr. priest (894–966) whose chronicles of Reims Cathedral are of much value to the historian.

FLOOD, THE, see DELUGE.

FLOOD, HENRY (1732–91), Irish orator and politician; elected to Irish Parliament, 1759; became leader of national party; vice-treasurer of Ireland, 1775, holding office till 1781; was in favour of Lord North's colonial policy; had share in organising Irish volunteers in 1778; resigned office in 1781, and returned to his former party, where, however, he found himself superseded by Grattan, with whom he afterwards quarrelled on the Irish Bill of Right introduced by the latter. F. entered Brit. Parliament in 1783; o[illegible] repeal of Catholic disabilities; introduced Reform Bills in 1784 and 1790; retired from public life, 1790; *Life and Correspondence* (edit. by W. Flood, 1838).

FLOOD PLAIN, term in physical geography relating to sediment accumulated in a valley by river, which, when river is full, causes the valley to be flooded by acting as a barricade to the waters.

FLOORCLOTH, usually oilcloth or linoleum. The former has a canvas ground, which is treated with size, and successive coats of paint, laid on with a kind of trowel. The pattern is printed from wooden blocks. Linoleum is also based on a canvas ground, the coating consisting of powdered cork, mixed with oxidised linseed oil and resin, which is crushed into the canvas by means of heated steam rollers.

FLOQUET, CHARLES THOMAS (1828–96), Fr. politician; Pres. of Chamber, 1885, 1886–87, 1889–92; concerned in Panama case, 1892.

FLOR, ROGER DI (d. 1306), soldier and adventurer; fought in Sicily and East; besieged Magnesia; assassinated by Michael Palæologus.

FLORA (classical myth.), Rom. goddess of the spring-time, and of flowers.

FLORE AND BLANCHEFLEUR, XIII.-cent. romance; several times trans. into English.

FLORENCE (34° 49′ N., 87° 47′ W.), city, Alabama, U.S.A., on Tennessee; coal mines; iron manufactures. Pop. (1910) 6689.

FLORENCE, FIRENZE (43° 46′ N., 11° 15′ E.). Tuscan city, Italy, on Arno, in fertile valley among Apennines; capital of F. province; world-famous for its art treasures, glorious history, and natural beauty. F. abounds in wonderful mediæval and Renaissance buildings, rich picture-galleries, fine statuary, gardens, etc. Among most notable churches are the Duomo (magnificent cathedral; begun 1294), with Campanile of Giotto (1334 onwards), Baptistery (XII. cent.: famous bronze doorways), and Museum

(containing Della Robbia's reliefs); San Lorenzo (with Laurentian Library, Brunelleschi's Old Sacristy, Michael Angelo's New Sacristy, and Medici Tombs), Santissima Annunziata (founded 1250; Del Sarto frescoes), La Badia (rebuilt 1285, 1625), Santa Croce (begun 1294; beautiful cloisters; tombs of Michael Angelo and Alfieri), San Marco Monastery (XV. cent.), Santa Maria Novella (begun 1278; Spanish Chapel and 'Green Cloisters'), San Miniato (XI. cent.; Tuscan Romanesque), Or San Michele (Gothic; XIV. cent.; tabernacle by Orcagna), Santo Spirito (1487), Santa Maria del Carmine (dating from 1422; celebrated frescoes). Famous Palaces include Palazzo Vecchio (1300–1600; now town hall), Uffizi (Picture and Sculpture Galleries: many masterpieces, including *Venus de Medici*), connected (by long corridor crossing Arno on famous XIV.-cent. Ponte Vecchio) with Pitti Palace (begun 1440; more masterpieces; lovely Boboli Gardens), Palazzo Medici or Riccardi (*c.* 1430), Palazzo Strozzi (1489–1550). Other leading features are Loggia dei Lanzi (XIV.-cent. arcade with celebrated sculptures), Il Bargello (National Museum: art treasures), Accademia di Belli Arti (art collection), Archæological Museum, Il Bigallo (Gothic loggia; 1352–58), Michael Angelo's house, city walls (XIII. cent.), and gates, Cascine (park), Prot. cemetery (graves of Mrs. Browning, Savage Landor, Clough, etc.), Lung' Arno (riverside promenade).

History.—Ancient Florentia was an unimportant Rom. city; undistinguished till XII. cent., when Republic started (1115) on Countess Matilda of Tuscany's death; fierce feuds arose between Papal and Imperial parties, afterwards Guelphs (*q.v.*) and Ghibellines; aristocratic Ghibellines triumphant with Emperor Frederick II.'s help, 1249–50; democratic Guelphs predominant, 1250–60, when defeated at *Montaperto*; Ghibellines in power, 1260–66, Manfred (*q.v.*) being overlord; Dante (*q.v.*) born at F., 1265; Ghibellines crushed at *Benevento*, 1266, Manfred killed, Charles of Anjou chosen protector. Government of restored Republic (*Secondo Popolo*) was entrusted by ruling merchant-guilds (money-changers, wool-merchants, silk-weavers, furriers, etc.) to a *Signoria* selected from their Presidents (*Priori*) and a *Gonfaloniere* ('banner-bearer,' pres. of Priori) supported by civic militia, *buonuomini* (magistrates), and various councils. This 'Republic of merchants' defeated combined forces of Pisa, Arezzo, and Ghibellines at *Campaldino*, 1289. Guelphs split into two factions—*Neri* (Blacks) and *Bianchi* (Whites); latter (including Dante) were expelled, 1301. Walter of Brienne, Duke of Athens, abolished Constitution, 1342, but fled, 1343. Notwithstanding famine (1346), plague (1348; described in Boccaccio's *Decameron*), and repeated popular risings (against oligarchical government of Albizzi, Strozzi, etc.), F. now flourished exceedingly; many fine buildings erected and dominions extended by conquest of Pisa (1406), Cortona (1414), and acquisition of Leghorn (1421).

Medicis (*q.v.*) assumed supreme power, but retained republican institutions, 1434; made F. rich and powerful, the chief centre of Renaissance and Humanists, home of a famous School of Painting, and cradle of modern Ital. language, lit., and learning. The word 'florin' testifies F.'s former pre-eminence in banking. The populace stirred by Savonarola (*q.v.*) expelled Medicis, 1494; Savonarola burned at stake, 1498. Machiavelli (*q.v.*) served as Sec. of State to Gonfaloniere, 1498–1512, when Spaniards restored Medicis. Medicis were rebanished, 1527; F. besieged by Charles V., Oct. 1529, gallantly defended by Michael Angelo and others, capitulated, Aug. 1530. Medicis now overthrew Republic and ruled as Dukes of F.; extended rule over all Tuscany (*q.v.*), becoming Grand-Dukes, 1569, F. being capital. House of Medici became extinct, 1743, and F. passed to Austria; taken by France, 1799; under Austrian Grand-Dukes again, 1814 till 1859, when united to Italy; capital of Italy, 1865–70, when Rome was selected.

A provincial town, F. now lives on former glories; favourite tourist centre and residential resort for foreigners. Industries include woollens and silks, straw-plaiting, jewellery, porcelain, glass, mosaics, works of art, etc. Pop. (1911) 232,260.

Ruskin, *Mornings in Florence*; Vaughan, *Florence and her Treasures* (1911); Lucas, *A Wanderer in Florence* (1912).

FLORENCE, COUNCIL OF (from 1438), a council which met with object of uniting Gk. and Rom. Churches; first formal meeting at Ferrara, 1438; first session, Florence, Feb. 1439. Subjects discussed were the *filioque*, pontifical supremacy, Eucharist, and purgatory. Union was decreed and signed by Pope and Byzantine emperor, July 1439; Union of Armenians, Jacobites, Syrians, subsequently decreed at various dates; Union finally refused by Constantinople Synod, 1472.

FLORENCE OF WORCESTER (d. 1118), Eng. chronicler and monk.

FLORES.—(1) (39° 20′ N., 31° 18′ W.) westernmost of the Azores Islands. (2) (8° 30′ S., 121° E.) island, Dutch E. Indies, S. of Celebes.

FLOREZ, ENRIQUE (1701–73), Span. historian.

FLORIAN, JEAN PIERRE CLARIS DE (1755–94), Fr. poet, dramatist, and fabulist.

FLORIAN, ST. (*c.* 190-230), martyr, whose relics were treasured in Poland.

FLORIANOPOLIS (27° 36′ S., 48° 27′ W.), city, on W. coast of island Santa Catherina, Brazil; exports dairy and agricultural produce. Pop. 33,000.

FLORIDA (25° to 31° N., 80° to 87° W.), most south-easterly State of U.S.A., situated on a peninsula between Atlantic and Gulf of Mexico; bounded on N. by Georgia and Alabama and S. by Florida Channel. Area, 58,666 sq. miles. Capital, Tallahassee. Coast (*c.* 1200 miles) has many islands, bays, and keys, the latter being sometimes rocky, sometimes overgrown, and with fertile soil. Interior is low and flat (highest point *c.* 350 ft.); numerous lakes—the largest being Okeechobee in S. (*c.* 1000 sq. miles and shallow); many marshes and swamps of which the largest are, the Everglades in S. connected with Lake Okeechobee, the Kissimmee, Cypress, and part of the Okefenokee swamps; there are abundant springs—many mineral. Large number of rivers, of which the most important and navigable are: St. John's, Ocklawaha, Hillsboro, Calooshatchie, Apalachicola, and St. Mary's. The climate is tropical, but cooled by sea breezes; healthy, although malaria is not unknown. The soil although sandy is various and fertilised by heavy rains (the annual fall being *c.* 54 inches); great expanses of swamp, drained, have become fertile land; fruit grows abundantly, and market-gardening is carried on extensively; low hummocks, dry enough for cultivation, produce large crops of cotton, sugar-cane, and grain; cocoa-nuts grow, and natural products include Ind. corn, coffee, rice, and tobacco. Animals include black bears, cougars, wild-cats, wolves, alligators, and small game. Industries comprise tobacco manufacture, lumber trade, turpentine, tar, rosen, and pitch works, sugar-making, salt-evaporation, coral and sponge fishing; valuable fisheries. Chief towns: Key West, Jacksonville, Pensacola, Tampa, Gainesville with state univ. F. was discovered (1512) by Juan Ponce de Leon; explored by De Soto (1539); Span. till 1763; British till 1781; Span. again till 1819, when ceded to U.S.A.; admitted into Union as State (1845); war with aborigines, 1834–42; State taking Confederate side, not readmitted to Union till 1868.

F. is governed by a Senate of 32 and a House of Representatives of 68 members; Senators are elected for 4 years, Representatives for 2; Democrats in power, 1911–13. Pop. (1910) 752,619.

Davidson, *The Florida of To-day* (1889); Norton, *A Handbook of Florida* (1892).

FLORIDA (34° 7′ S., 56° 11′ W.), town, capital of department, Uruguay. Pop. *c.* 2500. Department has area 4763 sq. miles. Pop. (1909) 47,699.

FLORIDA CHANNEL (26° N., 79° 40′ W.),

strait separating Florida state from Bahamas and Cuba.

FLORIDABLANCA, DON JOSE MOÑINO, COUNT (1728–1808), Span. statesman.

FLORIDOR (fl. *c.* 1640–71), Fr. actor; leading player of his day.

FLORIN, originally a Florentine gold coin; Eng. gold f's were struck by Edward III.; the silver f. (value 2*s.*) dates from 1849.

FLORIO, JOHN (*c.* 1553–1625), Eng. scholar and translator; pub. an Ital.-Eng. dictionary and other works; famous as the translator of Montaigne's Essays (1603). He was an intimate of Jonson, and, presumably, of Shakespeare.

FLORIS, FRANS (1520–70), Flem. artist.

FLORUS (II. cent. A.D.), Rom. historian.

FLORUS, JULIUS, Rom. jurist and poet; fl. during the reign of Augustus.

FLORUS, PUBLIUS ANNIUS (II. cent. A.D.), Rom. poet and rhetorician.

FLOTSAM, JETSAM, AND LAGAN (or *Ligan*), goods cast away at sea. The first is the name given to goods that float on the surface of the water; the second to goods that have sunk; the third to sunken goods attached to a buoy, or other sea-mark. Goods under all three headings become crown property, failing the original owner's claiming them.

FLOUNDER, see FLAT-FISHES.

FLOUR, the powdered and refined grain of wheat, rye, and other cereals, but particularly of wheat. The ground oat-berry is called *meal*. The grinding of wheat by means of stones (pestle and mortar) dates back to a very early period, and is known to have been the system employed several cent's B.C. Later, stone rollers were employed, to be followed by iron ones, but present-day milling is done with chilled steel rollers. In modern f.-milling the grain is carefully cleansed before it is ground, and in the process of milling the outer husks and all the constituent parts of the wheat-berry are carefully separated. It was claimed by the supporters of the 'Standard Bread' movement (1910–11) that this excessive refining process removed from the f. highly necessary nutritive properties, but public opinion will probably remain divided as to the use of highly refined white bread and whole-meal bread, in the latter of which the husk is ground up along with the kernel of the berry. Whole-meal bread, it is claimed, is more nourishing than white bread, but, on the other hand, it is often found to disagree with delicate digestions, and in that case reliance upon white bread becomes a necessity. Oats are more nourishing than wheat, because they contain a larger quantity of saline and fatty matter. See BREAD.

FLOURENS, GUSTAVE (1838–71), Fr. revolutionary author; one of Commune leaders.

FLOURENS, MARIE JEAN PIERRE (1794–1867), Fr. physiologist, pupil of Cuvier; prof. of Comparative Anatomy in Museum of Jardin du Roi (1832); prof. of Natural History in Collège de France (1855); author of numerous works on physiology and natural history.

FLOWER, a specialised shoot of limited growth bearing the essential organs of reproduction, the stamens and carpels, apically. The portion of the shoot which bears the stamens and carpels is termed the receptacle, and as a rule also carries two other sets of leaves—the sepals, protective in character and collectively forming the *calyx*, and the petals, often brightly coloured and insect-attracting, termed the *corolla*. Where, as in the Liliaceæ (*q.v.*), the calyx and corolla do not differ in appearance, they are grouped together as the *perianth*. In the more primitive flowers (*e.g.* Magnoliaceæ, Ranunculaceæ, Nymphæaceæ) the whole or part of the floral organs exhibit a spiral arrangement on the axis, but in the majority the floral parts are given off in whorls, the sepals outermost and then the petals, stamens, and carpels successively. The *receptacle* in the earlier types (*e.g.* Magnoliaceæ) has a pronouncedly conical character, with the result that the *carpels* project above the rest of the floral leaves and are said to be *superior*, the remaining structures being said to be *hypogynous*. In other cases the receptacle becomes flattened, forming a disc, which either shows very clearly above the calyx, as in the sycamore and orange, or may bear the sepals at its margin, as in many Rosaceæ. From this disc-like form the next step is produced by the development of a central depression or cavity, owing to the more rapid growth of the margins, as in the rose. The result is that the outer whorls appear to arise at the same level or even above the carpels, and are then said to be *perigynous*. Finally, the hollowing may become so pronounced that fusion of the carpels and receptacle has resulted, as in the apple and narcissus, the calyx, corolla, and stamens then seeming to be borne actually upon the ovary, and being termed *epigynous*, whilst the ovary is said to be *inferior*.

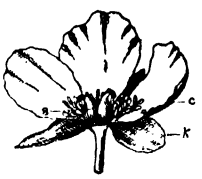
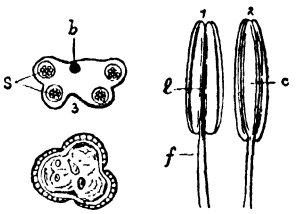


DIAGRAM OF A FLOWER IN LONGITUDINAL SECTION. *k*, one of the sepals which compose the calyx; *c*, one of the petals which similarly make up the corolla; *a*, the stamens; *g*, one of the carpels making up the pistil. (*After Strasburger.*)

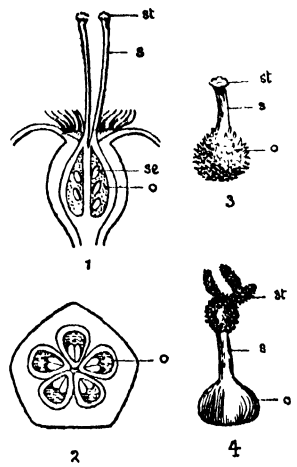
The *calyx* is primarily protective, and so is often tough and may be covered with hairs. In some cases its functions cease with the opening of the flower, as in the poppy, in which the petals are shed as the bud unfolds; in most other cases its functions extend throughout the life of the flower, whilst in a few (*e.g.* Rosaceæ, Leguminosæ) it is persistent and protects the developing fruit. Certain of the Ranunculaceæ, such as delphinium and aconitum, have developed petaloid brightly-coloured calices, owing to the reduction and modification of the petals as nectaries, whilst the catkin-bearing flowers are devoid of calyx, their place being taken by overlapping scales.



DIAGRAMS ILLUSTRATING THE STRUCTURE AND PARTS OF THE STAMEN. 1, ventral, and 2, dorsal view of an entire stamen; *f*, filament; *l*, one of the two anther lobes; *c*, connective. 3, cross section of the anther to show the four pollen-sacs (*s*); *b*, the fibro-vascular bundle of the connective. 4, a single pollen grain of the wallflower, highly magnified (about 450 times), showing the wall of the grain, with the three thin places at any one of which the pollen tube may grow out, also the three nuclei.

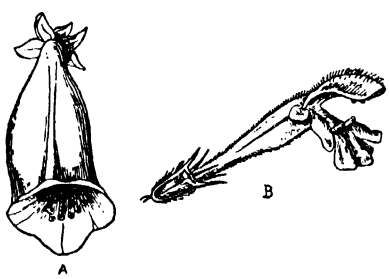
Stamens and Petals.—The *sepals* in the higher groups are coherent or gamosepalous, this usually being accompanied by a similar fusion of the *petals*, termed gamopetaly. Whilst most flowers are radially symmetrical or actinomorphic, there is in nearly all groups a tendency to bilateral symmetry or zygomorphy, owing to the development of nectariferous spurs or other honey-protecting devices. Thus we have the larkspur and monkshood in the Ranunculaceæ, the Papilionatæ, such as the sweet pea, the Labiatæ, Scrophulariaceæ, and many others, exhibiting this character, which tends to prevent all but those insects efficient as pollen-bearers from obtaining the secreted honey. The *stamens* are numerous in many groups (Rosaceæ, Ranunculaceæ) and are arranged spirally, but there is a general tendency to reduction in most groups correllated with the greater specialisation of the remaining floral members. In the Malvaceæ the stamen head or anther is extensively subdivided, thus compensating for numerical reduction, whilst in the Compositæ the individual stamens are united by their

anthers. Each stamen consists of two portions, the stalk or filament, and the anther, which is composed of four pollen sacs bearing the pollen grains. The latter are often delicately sculptured and ornamented, and, when transferred to the receptive surface of the carpellary structures, produce a fertilising tube down which the male elements are borne. The carpels in the simplest cases are separate or *apocarpous* (*e.g.* strawberry, buttercup), but in the majority fusion has occurred, the coherent structures forming a *syncarpous* ovary.



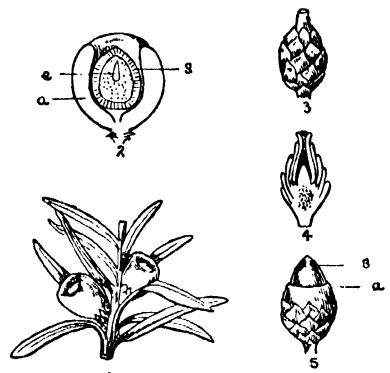
DIAGRAMS ILLUSTRATING THE STRUCTURE OF THE PISTIL. 1, longitudinal section of the pistil of the apple, showing two of the divisions of the ovary (*o*) containing ovules (*se*), also two of the free styles (*s*) and stigmas (*st*). 2, transverse section of same, showing that five carpels (*o*) are present in all, making up a five-celled ovary; round the whole is the receptacle wall which thickens to form the edible part of the fruit. 3, the pistil of a lime flower (*Tilia*), showing the stigmas (*st*), the united styles (*s*), and the ovary (*o*). 4, pistil of the woodrush (*Luzula*), showing the three free stigmas, the united styles, the ovary of three united parts.

Pollination.—The carpels bear one or more ovules and at the apex possess a specialised receptive portion for the pollen grains, which is termed the *stigma*, and is often of either a sticky or a brush-like character. Each ovule when mature contains a central embryo-sac in which there are three nuclear groups: (1) the egg-cell, forming the embryo on fertilisation, and two synergidæ; (2) the polar nuclei, which, on fusion with the second male nucleus, form the *endosperm* or embryonic food reserve; (3) the antipodals, which are abortive. The double nuclear fusion of two male nuclei from the pollen grain, one with the ovum and the other with the polar nuclei, is a characteristic and constant feature, and has no parallel in any other plant group. Many devices are adopted to secure cross-pollination, such as the maturation of one set of organs before the other (protandry, protogyny), by the development of unisexual flowers bearing carpels or stamens only, as in catkinate flowers, and by the protection of the stigmatic surface from the pollen of the same flower, as in orchis and iris; whilst a further means to this end is seen in the elaborate devices of many plants for the attraction of insect visitors by bright coloration, scent, and honey. See POLLINATION.



TWO ZYGOMORPHIC FLOWERS. *A*, foxglove; *B*, hempnettle. In both cases the flower is symmetrical about a median line only.

With regard to the arrangement of the individual flowers on the axis, it will be seen that although in some plants, such as the tulip, the blooms are borne singly, in the majority the formation of an inflorescence is resorted to. All inflorescences fall into two classes: the *cymose* or definite, in which the main axis is terminated by a flower and the further growth is due to the development of secondary axes; and the *racemose* or indefinite, in which the main axis, though it may branch, is of unlimited growth and bears a series of flowers from the base upwards. The chief modifications of the cyme are the dichasium, formed by the development of secondary, tertiary, and subsequent axes in pairs, and the helicoid and scorpioid cymes, which result from unilateral branching. The raceme



DIAGRAMS OF THE NAKED OVULE AND SEED OF THE YEW, A GYMNOSPERM. 1, part of a yew branch, showing the ripe seeds, partially enveloped in the pinkish pulp (*arillus*); 2, longitudinal section of same; *s*, the naked seed, *a*, the arillus, *e*, the embryo, surrounded by its food material (*endosperm*). 3, young ovule of the yew, projecting above its scale leaves. 4, section of the same, showing that the ovule has no surrounding ovary. 5, the young seed, after fertilisation, with the arillus (*a*) beginning to grow up round the naked seed (*s*).

which develops sessile flowers is termed a spike (*e.g.* barley), whilst if the main axis is foreshortened so that all the florets appear to spring from one level, like the ribs of an umbrella, a racemose umbel results (Umbelliferæ). Finally, by the development of sessile flowers on the foreshortened and apically flattened main axis, a dense head of florets termed a capitulum is produced, such as occurs in the dandelion, daisy, and other Compositæ. Kerner's *Natural History of Plants*.

FLOWER, SIR WILLIAM HENRY (1831–99), Eng. zoologist.

FLOWERING RUSH (*Butomus umbellatus*), European plant with rose-coloured umbel; of order *Alismaceæ*.

FLOWERS, ARTIFICIAL, are used chiefly in millinery and for decorative purposes. France, Belgium, Britain, and Holland are the chief centres of production; chief materials used are taffetas, muslins, satins; cotton wool, wire, and paper; thin metal sheets and blown glass; occasionally stone and china ware.

FLOWERS OF TAN, see MYCETOZOA.

FLOYD, JOHN (1572–1649), Eng. Jesuit author.

FLOYD, JOHN BUCHANAN (1807–63), Amer. politician.

FLOYER, SIR JOHN (1649–1734), Eng. physician; author of many medical (particularly on baths) and other works.

FLUDD, ROBERT (1574–1637), Eng. physician and philosopher; believed to be the inventor of the barometer; one of the founders of modern freemasonry in England.

FLÜGEL, GUSTAV LEBERECHT (1802–70), Ger. Oriental scholar.

FLÜGEL, JOHANN GOTTFRIED (1788–1855), Ger. lexicographer.

FLUID, a term describing states of matter which

flow, i.e. the liquid and gaseous; for the physics of f's, see HYDROMECHANICS.

FLUKES, a kind of TREMATODE WORMS (*q.v.*).

FLUME, see AQUEDUCT.

FLUMINI MAGGIORE (39° 24′ N., 8° 32′ E.), small town, Sardinia; centre of lead and zinc mining district. Pop. 4000.

FLUORESCEIN, or RESORCIN-PHTHALEIN ($C_{20}H_{12}O_5$), alkaline solution; shows magnificent yellow-green fluorescence which is imparted to wool and silk; colour is faint and fades, but mixed with other dyes it imparts fluorescence.

FLUORESCENCE, discovered by Brewster in 1833, is a self-luminosity exhibited by certain bodies, such as fluor-spar. It differs from phosphorescence in the time it lasts after the light is cut off, disappearing instantaneously in liquids, not quite so abruptly in solids. If a beam of sunlight is allowed to fall on a solution of chlorophyll, which is green, it becomes in the fluid a bright blood-red colour. Some bodies exhibit fluorescence only in the liquid state, others in the solid state only. Solutions of sulphate of quinine in sulphuric acid have a blue fluorescence. Fluorescence is probably produced by some molecular change in the body.

FLUORINE (F = 18·9), an irritating gas and the most energetic halogen; combines with all elements except nitrogen and oxygen. It is liberated on passing an electric current through hydrofluoric acid in platinum vessels. It decomposes cold water, and has bleaching and antiseptic properties. HYDROFLUORIC ACID (H.F.), obtained by decomposing fluor-spar with strong sulphuric acid, is a colourless volatile (the vapour being a deadly poison) liquid; M.P. 19° C. It is chemically very active, attacking glass (whence its use for glass etching), and its salts are called fluorides.

FLUOR-SPAR, DERBYSHIRE SPAR, FLUORITE, transparent mineral, common in Cornwall and Derbyshire; composition, fluoride of calcium. Generally colourless, but sometimes of yellowish or greenish hue, also found bluish and reddish. Often found in tin or lead mines, but also in granites, slates, and limestones; made into vases and ornaments.

FLUSHING, VLISSINGEN.—(1) (51′ 26′ N., 3° 34′ E.) Fortified seaport town, Zeeland, Holland, on island Walcheren; active shipping trade. Pop. (1910) 21,363. (2) (40° 48′ N., 73° 53′ W.) Former town, Long Island, New York, U.S.A.; now part of borough of Queens, N.Y. City. Pop. c. 16,500.

FLUSTRA, see under POLYZOA.

FLUTE (Ital. *flauto*; Fr. *flûte*), a wood-wind instrument which produces sound by the player partly covering the 'embouchure' or mouth-hole with the lower lip, and blowing against the opposite side of the mouth-hole. The f., which is a very ancient instrument, consisted of one piece in its original form, and until comparatively recent times had only finger-holes and no keys. The old *Flûte-à-bec* was played straight to the mouth. The 'transverse' f. was not known until a few cent's ago, and the modern instrument of this type has been carried to a high pitch of perfection by a succession of improvements, due among others to Quantz, Boehm, Siccama, Clinton, and Carte. First one key then others were introduced, until the present eight-keyed f. was evolved. By this means the player was enabled to give the complete chromatic scale with a fair amount of accuracy. But the f. was still an unsatisfactory instrument until the middle of the XIX. cent. when an immense improvement in tone was effected. Boehm replaced the 'cone' f. (with conical body and cylindrical head) by the 'cylindrical' f. (with cylindrical body and conical head). This change, together with the substitution of open for closed keys, gave the f. a much more perfect quality of tone and intonation. The f. is generally made of wood or ebonite, and consists of three parts—head, body, and foot; modern f. has a compass of three octaves with chromatic semitone; it is a non-transposing instrument, and in orchestra is assigned the leading part among wood-winds. Many instruments, simple and complex, belong to the f. family, *e.g.* concert f., piccolo or octave f. (which is pitched one octave higher than concert f.), fife (*q.v.*), old-fashioned *Flûte d'Amour* made in A, and straight or 'fipple' f.'s, such as recorder, *Flûte-à-bec*, flageolet, and whistle.

FLUX, see BLACK FLUX.

FLUXION, a name given by Newton to the rate of flow or change of a variable quantity, called a *fluent*. F's was the name of what is now commonly known as the Infinitesimal Calculus (*q.v.*), and the *method of f's* differed from the method of infinitesimal calculus in referring the rate of change of y not to the independent variable x, but to time (t), to which the change of x was also referred. In Newton's notation the fluxions of $x \times y$ were represented as $\dot{x} \times \dot{y}$.

FLY, see DIPTERA and HOUSE-FLY.

FLY (8° S., 143° E.), river, New Guinea; enters Gulf of Papua.

FLY-CATCHER, or 'BEAM-BIRD' (*Muscicapa grisola*), a late spring migrant, arriving in Britain in May, and leaving for India, Arabia, and Africa in Sep.; plumage, similar in both sexes, brownish above, with darker streaks—under parts pale with brown markings; food chiefly small insects, occasionally berries.

FLY-FISHING, see ANGLING.

FLYGARE-CARLÉN, EMILE (1807–92), Swed. novelist.

FLYING BUTTRESS, in arch., an open buttress for supporting the thrust of a vault.

FLYING COLUMN, military light detachment, usually composed of all arms, for quick movements.

FLYING DRAGON, see LIZARDS.

FLYING DUTCHMAN, the phantom ship of Vanderdecken, doomed to beat around the Cape of Good Hope; its appearance was said to presage evil; opera of Wagner's.

FLYING FISH, so named from its habit of leaping from water to escape foes, by means of powerful tail-stroke; pectoral fins extremely elongate and wing-like, acting as sustaining gliding-planes.

FLYING FOXES, FOX-BATS, FRUIT-BATS (*Pteropodidæ*), family of Bats (*q.v.*), containing 136 species, distinguished by enormous size (up to 5 feet from tip to tip of wings); many have fox-like heads; feed on fruits, flowers, and the juices of trees; occur in warmer regions of Old World.

FLYING LEMUR, see GALEOPITHECUS.

FLYING MACHINES, see FLIGHT.

FLYING SQUIRREL, a general term including certain rodents of squirrel family, characterised by possession of a tough membrane stretching from body wall to toes, which assists in parachute-like flight from tree to tree. See MARSUPIALS.

FLY-WHEEL, see under ENGINE.

FOCA, town, Bosnia; chief industry, silver filigree and inlaid work; formerly Turkish capital of Herzegovina vilayet. Pop. c. 5000.

FOCHABERS (57° 37′ N., 3° 5′ W.), village, Elginshire, Scotland, near mouth of Spey; near it is Gordon Castle.

FOCSANI (45° 47′ N., 27° 15′ E.), town, Putna, Rumania; grain, wine; fortification works. Pop. (1911) 25,032.

FOCUS, see LENS.

FODDER, food of herbivorous domestic animals; term generally used for dried grass—hay and straw—and Leguminosæ—beans, peas, clover, tares, etc.

FŒTUS, see OVUM, EMBRYOLOGY.

FOG, water dust suspended in the atmosphere close to the earth, depends on the solid matter in the air. If the air is free from dust the temperature may be below dew-point, but no drops of water will form, for as soon as water is present it will evaporate. But if particles of dust are present the water condenses on them as a thin film, from which re-evaporation does not take place readily. The water is probably produced in favourable sites by the movement of masses of moist air at different temperatures. In the country, f. is

usually white, and consists of minute water-globules which disperse the sunlight by repeated reflection, but it is fairly translucent. In the town, soot and smoke blacken it, so that light may be quite obscured. The presence of f. in the air decreases the velocity of sound.

Fog-Signals, audible warnings used at sea and on railways. International law decrees that ships in fog must give warning of their approach by siren (steamship), by fog-horn (sailing ship). Ships at anchor give warning by bell. On railways detonators are laid, and explode on contact with the engine wheels.

FOGARAS (45° 47′ N., 24° 54′ E.), capital, F., Hungary. Pop. *c.* 5000. The province has area of 725 sq. miles. Pop. *c.* 88,000.

FOGAZZARO, ANTONIO (1842–1911), Ital. poet and novelist; author of *The Saint*.

FOGELBERG, BENEDICT ERLAND (1786–1854), Swed. sculptor.

FOGGIA (41° 27′ N., 15° 31′ E.), town (ancient *Arpi*) and episcopal see, Foggia, Italy; agricultural produce. Pop. (1911) 76,534.

FÖHN, warm and dry wind of the Alpine valleys.

FÖHR (54° 43′ N., 8° 30′ E.), Ger. island, N. Sea, off W. coast of Pruss. province of Schleswig-Holstein.

FOIL, a plate of metal between leaf and sheet metal in thickness, used in metal decoration and for wrapping articles.

FOIL, see FENCING.

FOIX (42° 57′ N., 1° 36′ E.), formerly capital of Foix County, now capital of Ariège, on river Ariège. Near it is an old castle belonging to Counts of Foix. F. has iron and steel works. Pop. 7000.

FOIX, Fr. family which took title of count from F. district; RAIMOND ROGER (d. *c.* 1223), famous as Crusader and in Albigensian movement. GASTON IV. (d. 1472), m. heiress of Navarre, and was named successor by her father, John II. GASTON (1489–1512), 'The Thunderbolt of Italy,' was slain at Ravenna, and Navarre was divided by France and Spain.

FOIX, PAUL DE (1528–84), Fr. abp. and diplomatist.

FOLARD, JEAN CHARLES (1669–1752), Fr. soldier and writer; served in Italy, 1702–5; at Malplaquet, 1709; in Malta, 1714; Spain, 1719; gov. of Bourbourg, 1711; wrote *Essays on War*.

FOLD, in geology, a bend or curvature in the stratified rocks composing the earth's crust. F's are often best seen where strata is exposed, such as in cliffs on the seashore or in quarries. F's are due to upheavals, caused by earthquakes, or to pressure, whereby the earth's crust is so moved as to fold over. They are of two kinds, simple and complex. In the latter case a simple fold may be further folded. Fine examples are found in the Alps.

FOLENGO, TEOFILO (1491–1544), Ital. poet.

FOLEY, JOHN HENRY (1818–74), Irish sculptor.

FOLEY, SIR THOMAS (1757–1833), Brit. admiral; served under Nelson at Copenhagen.

FOLIATION, in geol., parallel layers of different minerals; found in schists and gneisses.

FOLIGNO (42° 57′ N., 12° 43′ E.), town (ancient *Fulginia*) and episcopal see, Perugia, Italy; silks, woollens. Pop. 9511.

FOLIO, page in a ledger; printer's term for sheet folded once; book containing such sheets; the number of a book; in legal documents in Gt. Britain and Ireland, 72 words, in United States 100 words.

FOLKES, MARTIN (1690–1754), Eng. archæologist.

FOLKESTONE (51° 5′ N., 1° 11′ E.), seaport, watering-place on English Channel, Kent, England; has fine harbour, esplanade; fisheries; terminus of steam-packet route to Boulogne. Pop. (1911) 33,495.

FOLKLAND, A.-S. term for land held by custom, or without documentary title.

FOLKLORE, the science devoted to the study and elucidation of traditions and folk-tales. Eng. F. Society was founded 1878. Similar societies also exist in America, France, and other countries. See Andrew Lang's *Custom and Myth*, and *Myth, Ritual, and Religion*.

FOLKMOOT, FOLKMOTE, O.E. national assembly, originally attended by all freemen of a shire; later by magnates only.

FOLLEN, AUGUST LUDWIG (1794–1855), Ger. poet and translator.

FOLLETT, SIR WILLIAM WEBB (1798–1845), Eng. politician and lawyer.

FOLLICLE, see SKIN.

FOMENTATION, application of warm fluid to part of body so as to relieve pain; generally of flannel soaked in boiling water, and covered with waterproof.

FONBLANQUE, ALBANY WILLIAM (1793–1872), Eng. journalist; wrote for *The Times* and other journals; subsequently edit. *The Examiner*.

FOND DU LAC (43° 46′ N., 88° 21′ W.), city, Wisconsin, U.S.A.; machinery; lumber manufactures. Pop. (1910) 18,797.

FONDI (41° 21′ N., 13° 27′ E.), town, ancient *Fundi*, Caserta, Italy; cathedral; monastery in which Thomas Aquinas taught; taken by Turks, XVI. cent. Pop. 9930.

FONNI (40° 6′ N., 9° 20′ E.), town, island of Sardinia. Pop. 4500.

FONSAGRADA (43° 7′ N., 7° 6′ W.), town, Galicia, Spain; flour-mills. Pop. 17,302.

FONSECA, BAY OF (13° 10′ N., 87° 45′ W.), inlet of Pacific, bordering Honduras, Salvador, and Nicaragua, Central America.

FONSECA, MANOEL DEODORO DE (1827–92), Brazilian soldier and statesman; led successful insurrection in Brazil and proclaimed republic (1889), and became first pres. (1891).

FONT, receptacle for holding water used in baptismal rite; generally made of stone, though some bronze and leaden examples have been found; took place of earlier baptisteries (*q.v.*), few of which were built after IX. cent.; early mediæval f's were generally circular in form; at later date octagonal shape became more frequent, while some square examples also occur. Eng. f's include some beautiful examples of Norman, Early English, Decorated, and Perpendicular styles.

FONTAINE, JEAN DE LA, see LA FONTAINE.

FONTAINE, PIERRE FRANÇOIS LÉONARD (1762–1853), Fr. architect.

FONTAINEBLEAU (48° 24′ N., 2° 42′ E.), town, Seine-et-Marne, France; surrounded by picturesque forest; favourite resort of Fr. landscape painters; magnificent palace, from Middle Ages to abdication of Napoleon in 1814 one of chief residences of kings of France; revocation of Edict of Nantes signed here, 1685; sandstone quarries; porcelain. Pop. 14,200.

FONTANA, DOMENICO (1543–1607), Ital. architect; builder of the Vatican Library and Quirinal.

FONTANA, LAVINIA (1552–1614), Ital. artist; like her f., Prospero, among the imitators of Raphael; has left some very fine portraits.

FONTANA, PROSPERO (1512–97), Ital. artist.

FONTANE, THEODOR (1819–98), Ger. novelist and poet.

FONTANES, LOUIS, MARQUIS DE (1757–1821), Fr. poet and statesman; grand master of Paris univ. under empire; wrote *Éloge* on Washington.

FONTARABIA, see FUENTERRABIA.

FONTENAY-LE-COMTE (46° 28′ N., 0° 48′ W.), town, Vendée, France; suffered in Huguenot and Vendean wars; textiles. Pop. 8000.

FONTENELLE, BERNARD LE BOVIER DE (1657–1757), Fr. man of letters; a voluminous writer, best known works being *Entretiens sur la Pluralité des Mondes* and *Histoire des Oracles*; sec. of Académie française, where he pronounced famous *Éloges*.

FONTENOY (50° 34′ N., 3° 30′ E.), village, Belgium, near Tournai, province of Hainault; site of fierce battle (1745) during War of Austrian Succession, between French commanded by Marshal Saxe and British, Austrians, Dutch, and Hanoverians under Duke of Cumberland, George II.'s s. Object of allies was to

relieve fortress of Tournai held by French. Success of British at beginning due to celebrated attack by Cumberland; finally allies were forced to retreat.

FONTEVRAULT (47° 11′ N., 0° 3′ E.), town, Maine-et-Loire, France; has celebrated XI.-cent. abbey, destroyed during first revolution, now a convict prison.

FONTINALIS, genus of mosses. Greater Water-Moss (*F. antipyretica*), being incombustible, is used for lining woodwork near chimneys.

FOO-CHOW, see FU-CHAU.

FOOD, the material taken into the body in order to preserve life, and for the purpose of the growth and repair of the tissues. F. ought to contain proteins, carbohydrates or starches, fats, certain acids, inorganic salts, and water, and these substances are obtained from various sources. Meat has about 20 % of proteins, a small percentage of fats, the greater part, over 70 %, being water. Grains, wheat, barley, etc., contain starch, and also a small amount of proteins, and when made into bread contain about 70 % of starch, whole-meal bread containing a higher percentage of proteins than white bread, and therefore being more nutritious. Oats, maize, and rye contain more fats than other grains, while rice has very little fats or proteins. Beans, peas, and lentils have a large percentage of proteins, and form a very nutritious f. Potatoes contain much starch, but very little proteins or fats, and should be combined with foods containing these substances. Vegetables and fruits are chiefly valuable for the salts and acids they contain. Milk is the most nutritious beverage, containing all the necessary food substances, and infants obtain absolutely all the nutrition required from human milk. Tea, coffee, and cocoa are stimulants only, and have no nutritive value, while alcohol, especially in the form of beer and porter, is slightly nutritive as well as stimulating, but, in large quantities, has a depressant action. See DIETETICS and DIGESTION.

Preservation.—Food preservation has been practised by man in different forms since a primitive stage of civilisation, drying and salting the flesh of animals, preserving fruit juices by fermenting them into wines, and drying and pressing milk into cheese being well-known methods in very early times. It is only within recent times, however, that the reasons for, and the principles in, food preservation have been really understood, for it is only since the middle of the XIX. cent. that it has been known that the decomposition of foodstuffs is not due to any property of the actual substances themselves, but to the action upon them of invading organisms. Modern methods are, therefore, directed towards preventing the presence or the life of such organisms, a variety of different systems being employed.

The most general method is that invented by François Appert, which consists in packing the food to be preserved in *cans*, usually made of sheet steel, with a thin layer of tin upon it, immersing them in a calcium chloride solution, and then sterilising them by exposure to steam at a high temperature, the lid and any hole which has been made to allow of the escape of the heated air being closed with solder. Meats of different kinds and fruits in syrup are preserved in this way. Fruit may also be preserved by boiling in syrup and then drying (*candied* fruits), or by boiling with an equal weight of sugar until it breaks down slightly, both methods depending on the fact that sugar in solution has a bactericidal action; or the fruit may be heated in water of a sufficient temperature to effect sterilisation in vessels, which are then carefully closed so as to shut out air. Fruits, *e.g.* grapes, plums, apples, and also vegetables are excellently preserved by *drying*.

Salt is a fairly good preservative for meats, etc., but its taste is always very evident; while boracic acid, salicylic acid, and other chemical antiseptics are also becoming much used, but, while efficient preservatives, their effect on the consumer is injurious. The drying of meats is a method hardly practised at all now, except a few instances abroad, *e.g.* biltong, a species of sun-dried meat in S. Africa. Fish is sometimes dried, and sardines and other fish are preserved by packing them in oil; eggs, by submersing them in water-glass or lime water; and milk, either by heating to such a temperature as will kill organisms in it, or by evaporating it down to a viscid consistency either with or without the addition of sugar, and packing in tins, or by drying to a powder.

Refrigeration is a valuable method widely used to-day in preserving food, as organisms are unable to grow at a temperature below the freezing-point of water, and enormous quantities of meat, beef, mutton, etc., fish, eggs, and fruit are imported frozen from Australia, New Zealand, the West Indies, and other colonies into Britain, and kept in this state till required.

FOOL, professional or court jester, or buffoon. Such jesters were employed amongst the ancient Greeks, and they were to be found at most European and Eastern courts during the Middle Ages and down to comparatively modern times. The f.'s dress was parti-coloured; he wore a close-fitting hood decorated with a cockscomb upon his shaven head, and carried a 'bauble' in his hand.—**The Feast of Fools** was a mock-religious observance in the Middle Ages, probably derived from Rom. *Saturnalia*. It reached its greatest development in the XI. and XII. cent's, when the choir-boys used to elect one of their number as bp., go to church, and hold a mock service; these customs lasted till the XVI. cent. (later in France).

FOOL'S PARSLEY (*Æthusa Cynapium*), annual umbelliferous plant; poisonous.

FOOLSCAP.—(1) A conical dunce's cap; (2) a size of writing-paper, about 13 × 17 in., of which the original water-mark was a jester's or fool's cap or hood.

FOOT, the end portion of the leg, upon which animals rest when standing or walking; in man, more particularly, that part of the lower limb beyond the ankle. There are certain superficial landmarks which may be noted. At the inner side of the ankle the internal *malleolus*, part of the tibia, may be easily felt, while at the outer side, slightly farther back and lower, is the external malleolus, part of the fibula. Behind the malleoli on either side tendons are seen passing from the muscles on the leg above to the foot, the most noticeable being the *tendon Achillis* passing to the back of the heel. On the front of the foot a nerve may be made out, the *musculo-cutaneous* nerve, beneath the skin, which goes to the toes, and a venous arch also passes across the front, conveying the blood from the foot to the superficial blood-vessels of the leg.

The ankle joint is formed by the tibia and fibula of the leg and the *tarsal bones* of the foot. The tarsal bones are seven in number, roughly of a cubical form, the uppermost, or *astragalus*, articulating with the leg bones, below it being the *os calcis* or heel bone, and in front the *scaphoid*. In front of the scaphoid are three wedge-shaped bones, the three *cuneiforms*, and to their outer side, in front of the os calcis, is the *cuboid*.

In front of the last four, which are in a more or less regular row, are five long *metatarsal* bones, and each metatarsal has in front of it three *phalanges* (in the great toe, two only) or bones of the toes. Between each of the bones are surfaces covered with cartilage, forming slightly movable joints, and the bones are strongly bound to one another by ligaments, whole tendons from the muscles of the leg come round the bones to be attached at different points, and also serve to assist in holding them in place.

The movements of the foot are brought about by the muscles of the leg, the tendons of which act upon the different bones of the foot to which they are attached. The muscles of the calf are attached to the os calcis by the strong tendon Achillis, while from other muscles on the back of the leg come one tendon attached to the scaphoid, and another which is attached below [illegible] wards, those tendons passing on the internal side of the leg. On the external

side there is a tendon which goes to be attached to the outer metatarsal bone, and another which runs across the sole of the foot to be attached to the metatarsal bone of the great toe. On the front of the foot there are five tendon slips coming to the different toes from a muscle on the front of the leg, the action of which is to make them turn downwards, while there are also four slips from a little muscle which springs from the os calcis, which assist in the same movement. It is by the combination of the actions of these tendons controlled by the muscles of the leg that the harmonious movements of the foot are brought about.

FOOT-AND-MOUTH DISEASE, a contagious disease of animals, attacking cattle, sheep, pigs, and goats; characterised by the appearance of little blisters on the mouth, lips, and tongue, the heels, coronets, and interdigital spaces of the feet, and on the udder, with some fever, running a course of eight or ten days. Soft, easily digested food, salines, or other laxatives are given, and mild antiseptics and astringents, *e.g.* alum, zinc oxide, applied to the affected parts. The animals attacked are isolated or destroyed.

FOOTBALL has been played since Roman times; it was penalised by several rulers from Edward II. to Elizabeth. Since that time the number of players on each side has been greatly reduced, and rules now make the game a science instead of a mere mêlée.

F. falls into three main divisions—Association, Rugby, and miscellaneous forms played by certain schools and clubs.

Association is played on a ground the maximum measurements of which are 130 × 100 yards, the minimum 100 × 50 yards; goals are 8 yards wide, 8 ft. high; the ball is round, and from 27·28 inches in circumference. The field is divided by a half-way line, with 'penalty lines' 18 yards in front of goal, and is bounded by touch lines. Eleven players constitute a side—goalkeeper, two backs, three half-backs, and five forwards. The object of the game is to kick the ball between the goal-posts of the opposing team. Handling the ball, except by the goalkeeper, is forbidden, though a player may use his head. The goalkeeper and full backs defend, the forwards carry on the main attack, while the halves 'feed' the forwards. When the ball is kicked beyond the touch line it is thrown in by one of the opposing team, generally one of the halves. Penalty kicks for various offences are taken from a point 12 yards in front of offenders' goal. A 'corner kick' is taken when the ball is kicked over the line by one of the players whose line it is; the ball is kicked from a corner of the back line so as to swerve in front of the goal. If the ball is kicked over by one of the opposite side it is kicked back from a point in front of the goal. The rules are enforced by a referee and two linesmen.

Professionalism has spoiled Association in Britain, and the number of amateur clubs and schools which play it is steadily decreasing in consequence.

Rugby Union differs from Association by the fact that the ball may be carried. The usual dimensions of the field are 110 × 75 yards, divided by a half-way line and two 'twenty-fives' drawn 25 yards in front of each goal; the ball is oval, 11–11¼ inches long. On each side there are eight forwards, two halves, four three-quarters, and a full back. The rules are rather complicated and cannot here be fully enumerated. The main things forbidden are fouling, forward passing, 'feet up' in the scrum, and 'off-side,' picking up ball in the scrum, or not releasing it when tackled. Points may be scored in the following ways: a *try* (3 points), when player carries ball over opponents' line, which may be converted into a *goal* (5 points) by a place-kick taken from a place opposite the scoring point; penalty goal (3 points), kick taken from point where opponents were penalised; free-kick from a 'mark' or a 'dropped goal' each counting 4 points. The 'scrum' takes place after such things as a forward pass or a crooked throw-in from touch. The opposing forwards form up against each other and one of the halves puts in the ball, which is either heeled or rushed along to suit circumstances.

In U.S.A. Yale Univ. adopted Rugby Union rules, 1876. Changes have been made and the game is rougher than Brit. f. Amer. rules are: field, 110 by 53⅓ yards; players number eleven; scrum resolves itself into series of single contests; *touch-down* (Brit. 'try') counts 5, and the goal resulting from it 6 points; goal from *drop-kick* counts 4, and a *safety* (Brit. 'touch-down') 2 points; passing forward is permitted on occasion.

The most famous Rugby team was the 'All Blacks' of New Zealand, who toured Britain in 1905, undefeated except by Wales. Their tactics, which developed three-quarter play to an enormous extent, were taken up by several clubs and schools, notably by Glenalmond, which in three school matches scored 181 points to 3 (1910). Eton, Harrow, and other schools play f. games of their own, while the 'Australian game' is a development of Rugby. The Northern Union game, a variety of Rugby, is much faster; clubs seceded from the Rugby Union (1895–96) owing to a dispute about professionalism.

Notable events in football:—

ASSOCIATION.—English Cup instituted, 1871; Scottish Cup, 1873; first international match played, 1872; professionalism legalised, 1885; Football League started, 1889.

RUGBY.—First international match played, 1870; new regulations regarding referee, 1884; dispute resulting in suspension of international matches, 1887–89; penalty goal introduced, 1889. Secession of Northern Union, 1895; visit of New Zealand team, 1905; new rules regarding 'touch' introduced, 1910–11.

Sewell, *The Book of Football* (1911); Vassall and Budd, *Football, The Rugby Game* (1909).

FOOTE, ANDREW HULL (1806–63), Amer. naval commander.

FOOTE, SAMUEL (1720–77), Eng. actor and dramatist; b. Truro; ed. Oxford; after squandering two fortunes, went on stage; first essayed tragedy, than genteel comedy; eventually achieved success by marvellous powers of mimicry; wrote a considerable number of plays very popular in their day, such as *The Liar*, *The Mayor of Garratt*, *The Devil on Two Sticks*, *The Nabob*, and *The Capuchin*; appears to have been devoted to Garrick, although his rival, and was famed for wit, repartee, and kindliness of disposition.

FOOT-POUND, see ENGINE.

FOOTSCRAY (37° 4′ S., 144° 56′ E.), city, Victoria, Australia; 4 miles W. of, and suburban to, Melbourne; stone quarries. Pop. 18,000.

FORAIN, JEAN LOUIS (1852–), Fr. artist and caricaturist; contributes satirical sketches of Fr. life to Parisian illustrated journals.

FORAMINIFERA, a group of unicellular animals, the vast majority of which are marine, characterised by the possession of a simple or elaborate test or shell, which may be of a calcareous, or arenaceous, but never of a siliceous nature, penetrated or enveloped by delicate protoplasmic processes, which branch and anastomose freely (cf. *Heliozoa*). The shells, which are extremely variable in character, are always primarily single-chambered, and from this starting-point, a closely coiled spiral, a globular mass, a chain-like series, and many other forms may be evolved. The initial chamber may be large, when the individual is said to be *megalospheric*, or minute, when it is termed *microspheric*. The microspheric form produces the megalospheric, and this may produce a number of similar individuals, but eventually free-swimming sexual cells result, which on conjugation reproduce the microspheric form. Many species are littoral, occurring attached to the fronds of seaweeds, but others are planktonic and are often modified for a surface life, the test being produced into long spiny processes, and the outer protoplasm being highly vacuolate. One of the best known of these is *Globigerina*, the shells of which accumulate on the ocean floor, forming the well-known

fine mud termed *Globigerina* ooze. This ooze may, by subsequent pressure, ultimately solidify, forming the so-called 'grey chalk.' In addition to this, however, the tests of various species form a very considerable proportion of other calcareous rocks, as instanced by such terms as *Nummulitic* and *Succamina* limestones (from the preponderance of *Nummulites* and *Saccamina* respectively), whilst chalk (*q.v.*) itself consists very largely of *Textularia* and allied genera. The F. have a geological range commencing with the Upper Cambrian, but first become important from a rock-forming standpoint in the Carboniferous period.

FORBACH (49° 11′ N., 6° 53′ E.), town, Alsace-Lorraine, Germany; pottery; coal mines. Pop. (1910) 10,107.

FORBES (33° 25′ S., 148° 3′ E.), town, N.S.Wales, Australia; commercial centre; several mills. Pop. 4500.

FORBES, ALEXANDER PENROSE (1817–75), Scot. Anglican ecclesiastic; associated with the Puseyites.

FORBES, ARCHIBALD (1838–1900), Brit. journalist; noted war correspondent in Franco-Ger. War, 1870–71; Carlist War, 1873; Russo-Turkish War, 1877; Zulu campaign, 1879.

FORBES, DUNCAN, OF CULLODEN (1685–1747), Scot. judge and politician; prominent anti-Jacobite; supported Government in 1715 and 1745; Lord Advocate, 1725; pres., Court of Session, 1737.

FORBES, EDWARD (1815–54), Brit. botanist; prof. of Bot., King's Coll., London (1842); Palæontologist to Geological Survey of Great Britain (1844); pres., London Geological Soc. (1853); Natural History prof., Edinburgh Univ. (1854); investigated the bot., geol., and zool. of the Mediterranean area, especially the effect of climate on distribution; and published works on molluscs and starfish.

FORBES, JAMES DAVID (1809–68), Scot. scientist; prof. of Natural Philosophy, Edinburgh Univ., 1833; principal of St. Andrews University; investigated heat, glaciers, temperature of earth at different depths, and thermal conductivity of iron.

FORBES, SIR JOHN (1787–1861), Scot. physician; practised medicine in different parts of England; physician to the royal household (1841); author of numerous medical and other popular works.

FORBES-ROBERTSON, SIR JOHNSTON (1853–), Brit. actor; one of the most gifted and artistic of modern Shakespearean and romantic actors.

FORBIDDEN FRUIT, ADAM'S APPLE, fruit of citrus. *Citrus Medica* has 'tooth-marks' in its rind.

FORBIN, CLAUDE DE (1656–1733), Fr. naval commander.

FORCE, see DYNAMICS and ENERGY.

FORCE PUMP, see PUMP.

FORCELLINI, EGIDIO (1688–1768), Ital. philologist.

FORCEPS, scissor-like instrument with flattened or expanded ends, used in surgery, dentistry, etc., or for any delicate work where objects are too small or inconvenient to handle.

FORCHHAMMER, PETER WILHELM (1801–94), Ger. archæologist.

FORCHHEIM (49° 44′ N., 11° 5′ E.), town, Bavaria, Germany; formerly fortified; seat of diets in Middle Ages. Pop. (1910) 9150.

FORCING, process by which plants, etc., are artificially matured; consists in growing them in hot-houses either for whole or part of growth; fruits forced in Britain include grapes, peaches, and apricots.

FORD, EDWARD ONSLOW (1852–1902), Eng. sculptor.

FORD, JOHN (1586–*c.* 1640), Eng. dramatist; b. Ilsington (Devon); ed. Oxford; studied law, but eventually devoted himself solely to dramatic authorship. In his choice of subjects F. was sometimes abnormal, and there is much that is repulsive in his plays, but they are distinguished by great intensity of passion and literary quality of a very high order. His plays include *'Tis Pity She's a Whore, The Lover's Melancholy,* and *Perkin Warbeck*; author, with Dekker and Rowley, of *The Witch of Edmonton.*

FORD, PAUL LEICESTER (1865–1902), Amer. novelist and historian; wrote *The True George Washington,* etc.

FORD, RICHARD (1796–1858), Eng. traveller and author; wrote Murray's *Handbook to Spain.*

FORDE, FRANCIS (fl. 1746–70), brilliant Eng. leader, under Clive, in India.

FORDHAM, formerly village, New York, U.S.A.; now part N.Y. city; seat of St. John's (R.C.) Coll.

FORDUN, JOHN OF (XIV. cent.), Scot. chronicler; his *Scotichronicon* covers Scot. history till 1153; left materials for further volumes, which Walter Bower of Inchcolm brought down to 1437; chief authority on early Scot. history.

FORECLOSURE, in Eng. law, action by which a mortgagor is prevented from redeeming a mortgaged estate or property. See MORTGAGE.

FOREIGN ENLISTMENT ACT, 1870, enacted that any Brit. subject enlisting in service of a foreign state at war with a state friendly to Britain, was guilty of misdemeanour.

FOREIGN LEGION, LÉGION ÉTRANGÈRE, French army corps of various nationalities; raised in 1831 for service in Africa; fought well in Crimean and Franco-German Wars; consists of 8000 troops in all.

FOREIGN OFFICE, Brit. administrative department which manages national relations with foreign countries; presided over by Sec. of State for Foreign Affairs; separate office established, 1782.

FORELAND, NORTH AND SOUTH (N.—51° 22′ N., 1° 26′ E.; S.—51° 10′ N., 1° 24′ E.), two headlands on coast of Kent, England, having Downs and Goodwin Sands between them; lighthouse on each.

FORENSIC MEDICINE, see MEDICINE (MEDICAL JURISPRUDENCE).

FORESHORE, the stretch of coast comprised between high and low water mark at ordinary tides. The proprietary rights are vested in the Crown unless modified by local custom or by royal grant to a subject.

FOREST FLY, HORSE FLY (*Hippobosca equina*), very small insect, parasitic on horses, cattle, etc.; plentiful in New Forest, Hampshire.

FORESTRY.—The term *forestry* is used at the present day to denote the whole process of economic management of woodlands—that is, the cultivation of trees in such manner as to secure the maximum return of forest products, and at the same time to retain the forest in a state of permanent and unimpaired productivity. F. in this sense has been known, however, for less than a cent.; before that period it usually meant the provision of suitable sporting- and pleasure-grounds for the rich. The reason for the comparative youth of rational f. (as compared with the ancient art of agriculture) is to be sought for in the fact that so long as the demands of small populations and modest industries could be readily supplied by the cutting of natural wood, there was no pressing reason for the artificial regeneration of the forests as they fell beneath the axe. To-day, however, with the world's population steadily increasing, and with new industries demanding an ever larger supply of wood, it is no longer possible to be blind to the fact that even the vast reserves of countries like Canada and Siberia cannot meet, permanently and unaided, the world's requirements.

Economically, f. is distinguished from agriculture by the fact that the capital involved is represented partly by standing wood, on which it is very easy to encroach by untimely cutting; since untimely cutting is usually the result of financial strain, it generally follows that replanting is not undertaken, and that a part of the forest is thus destroyed. It is also the case that a newly planted forest does not give any return for a large number of years. The second of these two considerations makes it quite improbable that any large amount of afforestation will take place without financial aid from the State;

the first requires, that should this aid be given, the forests must either be acquired, or at least adequately controlled, by the State. This is the case in all those countries where f. is in a satisfactory condition. In India nearly 25 % of the country is under State-controlled forest; in Germany 66 % of the forests are either State-owned or State-controlled: in most other European countries the forests are privately owned, but are controlled to some extent by the State.

In U.S.A. there are numerous national (besides several state) forest reserves, embracing some 263,000 sq. miles, controlled by the Forest Service. New forest areas are added by presidential proclamation. Tracts denuded by fire are reforested from some thirty forest nursery stations.

In Great Britain f. is in an extremely unsatisfactory condition. The woodlands are largely privately owned, and are quite free from all State supervision. Left thus to the caprice or necessity of the owner, they have in too many cases ceased to exist, with the result that large areas of the country eminently suited to the growing of trees are to be classed as waste land, grouse moor, or deer forest. It is instructive to compare the areas under forest in this and other countries: we find that whereas Austria has 33 % of the total area under forest, Germany 26 %, and France 16 %, Great Britain has only 4 %. And to this we must add that mountain and heathland occupy 20 %.

The uses which a forest serves are various, and may be classed under two heads: (1) *Direct uses*: here we include the production of fuel and, much more important, of *timber*. By timber we understand wood which is to be used for building or similar purposes, and that which is to be employed in the manufacture of toys, ornaments, matches, etc., and the exceedingly important *wood-pulp*. Besides wood a forest supplies an enormous variety of minor products—bark, turpentine, fodder, seeds, and so on.

(2) *Indirect uses*: it has been demonstrated that by the presence of a forest in a countryside the climate is rendered somewhat cooler; the soil is kept considerably moister; springs have a more regular supply; erosion and denudation of the soil are prevented; rapid passage of heavy rains into watercourses is prevented, and consequent flooding is diminished.

The formation of a new forest or the placing of a forest under proper management is preceded by the preparation of a *forest working plan*. This takes account of all questions relating to the finance of the forest, the provision of labour, the selection of trees to be grown, the programme of planting and cutting, and the construction of roads and rides in the forest. The actual management of the forest may be divided into (1) SILVICULTURE, treats of the raising of seedlings, the planting of young trees, the subsequent thinnings, and the general tending of the forest until it is ripe for cutting. (2) FOREST UTILISATION includes the process of felling, and conversion of the timber into the form in which it serves as raw material for the industry requiring it. Of great importance are the construction and maintenance of suitable means of transport—whether by road, water, or rail. (3) FOREST PROTECTION deals with the suppression of animal pests—rabbits, squirrels, some birds, and many insects; with the means of averting the attacks, and of preventing the spreading, of parasitic fungi; with the various devices used for minimising the danger of fire, storms, and snow; and with the damage which may be done by man. Protection in this case is attained by suitable *forest laws*. These may make it penal to light fires, or to smoke in the forest; or they may prohibit entrance into young plantations, where great damage may be done by trampling on young trees.

Schlich, *Manual of F.*; *Practical F.*, by Curtis, Fuller, Gifford.

FOREY, ÉLIE FRÉDÉRIC (1804–72), Fr. marshal; commanded Mexican Expedition, 1862–63, and took Puebla.

FORFAR (56° 39′ N., 2° 53′ W.), county town, Forfarshire, Scotland; ancient royal residence; royal burgh; linen and jute manufactures. Pop. (1911) 10,849.

FORFARSHIRE (56° 45′ N., 2° 55′ W.), large maritime and agricultural county in E. Scotland, and corresponding to district of Angus; county town, Forfar; bounded by Kincardineshire, Aberdeenshire, and Perthshire, and having for seaboard Firth of Tay and German Ocean; area, 890 sq. miles. Arable land has lately shown substantial increase. Cattle are bred, and coarse fabrics from flax, jute, etc., are manufactured; also leather, gloves, soap; principal towns, Dundee, Arbroath, Montrose. Pop. (1911) 281,419.

FORFEITURE, originally the term applied to the passing into king's hands of the goods and real property of a treasonable or felonious person. This law was abolished in 1870. The term now means a penalty or fine.

FORGERY, making a false document with intent to defraud. This may be done by alteration of its contents, by adding to its contents, or by signing it in the name of any other person with the intention to defraud. The punishment varies according to the nature of the offence, the maximum being penal servitude for life.

FORGET-ME-NOT, see BORAGINACEÆ.

FORGING, the working of iron or steel when it is at white heat and thus in a malleable state. It is chiefly a moulding process. The steps are: (1) 'swagging,' or reducing to necessary size, or the converse, 'upsetting,' or enlarging; (2) 'bending' to necessary angle; (3) 'welding,' or joining different pieces; (4) 'holing,' or boring; (5) 'severing,' or lopping off. Forging is now increasingly done by machinery, and is then known as 'die forging,' which reduces the amount of skilled labour required very considerably.

FORK, see CUTLERY.

FORLI (44° 13′ N., 12° 2′ E.), town (ancient *Forum Livii*) and episcopal see, Forli, Italy; cathedral; old castle; picture-gallery. Pop. 15,802.

FORLIMPOPOLI (44° 12′ N., 12° 7′ E.), town (ancient *Forum Popilii*), Forli, Italy.

FORLORN HOPE (from Dutch, *verloren hoop*, 'a lost troop'), military troop told off for any dangerous employment, such as leading a charge at a critical moment, storming a breach, etc.

FORM, in metaphysics, the developed actuality, that which gives reality to matter (Aristotle); according to Kant, the element of an object due to mind, as distinguished from 'matter,' the manifold of sense.

FORMALDEHYDE, see FORMALIN.

FORMALIN(E) (Formaldehyde) (CH_2O), prepared by condensation after passing the vapour of methyl alcohol mixed with air over heated copper. It has a pungent smell, and is at ordinary temperatures a gas, commercial formalin being a solution of it in water or alcohol, which is used as an antiseptic, deodorant, and preservative.

FORMAN, ANDREW (d. 1521), abp. of St. Andrews; sometime one of the Vice-Regents of Scotland.

FORMAN, SIMON (1552–1611), Eng. physician and astrologer, practising in London; author of several works on astrology.

FORMEY, JOHANN HEINRICH SAMUEL (1711–97), Franco-Ger. philosophical writer.

FORMIA, formerly MOLA DI GAETA (41° 15′ N., 13° 38′ E.), town, on Gulf of Gaeta, Caserta, Italy. Pop. 8108.

FORMIC ACID (H.COOH), fatty acid prepared by heating oxalic acid and glycerine or passing carbon monoxide over soda-lime. Liquid (B.P. 101°), pungent irritating odour, blisters skin, has acid reaction and reducing properties.

FORMOSA (c. 25° S., 60° W.), territory, N.E. part Argentine Republic, S. America; occupies forest-covered plain between rivers Paraguay, Pilcomayo,

and Bermejo; capital, Formosa. Area, 41,402 sq. miles. Pop. 15,000.

FORMOSA, Taiwan (23° 30′ N., 121° E.), Jap. island in W. Pacific, off coast of China. Area, 13,840 sq. miles. Chief town, Taipe. Mountainous—chief summits being Mt. Morrison (c. 14,270 ft.) and Mt. Sylvia (12,480 ft.). Volcanoes in N. Plain stretching to W., with short mt. range presenting sheer cliff to Pacific. Two rivers—both called Tamsui Kai; hot springs numerous; mountains thickly wooded; country fertile, well-cultivated, with tropical vegetation. Climate damp and hot; malaria prevalent in N. Typhoons common. Peopled by aboriginals,—uncivilised and fierce,—Chinese traders, and Japanese. Agricultural products include rice, tea, sugar, camphor, jute, etc. Active fisheries. Industries comprise flour-milling, sugar and tobacco, oil, spirits, and iron-works. Minerals: gold, silver, sulphur, petroleum. Live stock: buffaloes, oxen, swine, goats, poultry. Trade mostly with Japan. Chief ports are Taipe and Anping. Ruled by Dutch (XVII. cent.); ceded by China to Japan (1895), under whose rule much progress is being made. Pop. (1908) 2,984,590.

Formosa, by Davidson (1903), Clark (1896).

FORMOSUS, Pope during turbulent period (891–96).

FORMULA, prescribed or established rule; a formal confession of faith; a general rule in mathematics; symbolic description of a substance in chemistry, etc.

FORNER, JUAN BAUTISTA PABLO (1756–99), Span. satirist.

FORRES (57° 37′ N., 3° 37′ W.), market town and royal burgh, on the Findhorn, Elginshire, Scotland; among public buildings are town hall, Falconer Museum, and Anderson's Institution; Nelson Tower on Cluny Hill; health-resort; has ruined castle, once a royal residence, and a remarkable sculptured monolith called Sweyno's Stone, said to commemorate a victory over Danes; chemicals and artificial manure; boots and shoes. Pop. (1911) 4421.

FORREST, EDWIN (1806–72), Amer. actor; famous in Shakespearean tragedy.

FORREST, RT. HON. SIR JOHN (1847–), Australian statesman and explorer; commanded expedition in search of Dr. Leichhardt (1869); first Premier and Treas. of W. Australia (1890–1901); Minister of Defence under Commonwealth (1901–3); Minister of Home Affairs (1903–4); Prime Minister (March–June, 1907); pub. *Explorations in Australia, Notes on Western Australia.*

FORREST, NATHAN BEDFORD (1821–77), Amer. soldier; raised regiment for Confederates in Civil War, 1861; became cavalry gen. After many brilliant exploits, surrendered, May 1865. F. was uneducated, but had great natural abilities.

FORSSELL, HANS LUDVIG (1843–1901), Swed. political and hist. writer.

FORST (51° 44′ N., 14° 40′ E.), town, on Neisse, Brandenburg, Prussia; woollen cloth. Pop. (1910) 33,828.

FORSTER, FRANÇOIS (1790–1872), Fr. engraver.

FÖRSTER, FRIEDRICH CHRISTOPH (1791–1868), Ger. poet and historian.

FORSTER, GEORGE EULAS (1847–), Canadian statesman; Minister of Finance (1888–96).

FORSTER, JOHANN GEORG ADAM (1754–94), Ger. author and traveller.

FORSTER, JOHN (1812–76), Eng. historian, biographer, and editor; several hist. works, biographies of Goldsmith and Landor, and standard *Life of Charles Dickens* (1872–74).

FORSTER, JOHN COOPER (1823–86), Eng. surgeon; surgeon to Guy's Hospital (1870); pres. of Royal Coll. of Surgeons (1884); introduced new surgical measures; author of *Surgical Diseases of Children* and other surgical works.

FORSTER, WILLIAM EDWARD (1818–86), Brit. politician; was distinguished member of Mr. Gladstone's Cabinets from 1870 onwards; introduced and carried Education Bill of 1870, by which school boards were established; Chief Sec. for Ireland, 1880; forced to take strong line of action against Land League, which he proclaimed illegal; opposed separation of Brit. and Irish Parliaments; a Quaker of high character. *Life,* by Reid (1888).

FORSYTH, PETER TAYLOR (1848–), Eng. Congregational preacher and author.

FORT AUGUSTUS (57° 8′ N., 4° 43′ W.), village, at S. extremity Loch Ness, Inverness-shire, Scotland; old fort now converted into Benedictine abbey and coll.

FORT DE FRANCE (c. 14° 55′ N., 61° W.), town, Martinique, Fr. W. Indies; has naval arsenal. Pop. 27,069.

FORT DODGE (42° 30′ N., 94° 30′ W.), city, on Des Moines River, Iowa, U.S.A.; seat of Tobin Coll.; centre of extensive coal mines, limestone and gypsum quarries; railway workshops. Pop. (1910) 15,543.

FORT EDWARD (43° 17′ N., 73° 34′ W.), village and township, on Hudson River, New York, U.S.A.; seat of Fort Edward Collegiate Instituto; paper-mills, potteries. Pop. 4000.

FORT GEORGE (57° 35′ N., 4° 4′ W.), fortress, on Moray Firth, Inverness-shire, Scotland; built, 1748.

FORT LEE (40° 52′ N., 73° 58′ W.), town, on Hudson River, New Jersey, U.S.A. Pop. 3500.

FORT MADISON (40° 38′ N., 91° 25′ W.), city, Iowa, U.S.A., on Mississippi; railway workshops; lumber mills. Pop. (1910) 8900.

FORT SCOTT (37° 48′ N., 94° 43′ W.), city, Kansas, U.S.A., on Marmiton; railway centre; extensive trade in bituminous coal; foundries, potteries. Pop. (1910) 10,463.

FORT SMITH (35° 24′ N., 94° 25′ W.), city, Arkansas, U.S.A.; cotton mills; furniture. Pop. (1910) 23,975.

FORT WAYNE (41° 2′ N., 85° 4′ W.), city, Indiana, U.S.A., at head of Maumee; important railway centre; contains numerous public and educational institutions; railway workshops, foundries, flour and woollen mills; fort built, 1794, by General Wayne. Pop. (1910) 63,933.

FORT WILLIAM (48° 12′ N., 89° 25′ W.), town, Ontario, Canada; large trade in grain; sawmills. Pop. 10,000.

FORT WILLIAM (56° 48′ N., 5° 5′ W.), town, tourist resort, at foot of Ben Nevis, Inverness-shire, Scotland; fortress unsuccessfully besieged by Jacobites, 1746.

FORT WORTH (32° 45′ N., 97° 20′ W.), city, Texas, U.S.A., on Trinity; seat of Fort Worth Univ.; Polytechnic Coll.; Medical Coll.; manufactures flour; foundries. Pop. (1910) 73,312.

FORTALEZA (3° 43′ S., 38° 24′ W.), city and port, Ceará, Brazil, near mouth of Ceará; rubber, sugar, cotton. Pop. 33,000.

FORTESCUE, SIR JOHN (c. 1394–1476), Lord Chief Justice of England under Henry VI.; wrote Latin legal works and *Governance of England.*

FORTESCUE, SIR JOHN (c. 1531–1607), Eng. politician; Chancellor of Exchequer and Privy Councillor, 1589; knighted, 1592; Chancellor of Duchy of Lancaster, 1601.

FORTEVIOT (56° 21′ N., 3° 32′ W.), village, Perthshire, Scotland; ancient capital of the Picts.

FORTH (56° 7′ N., 4° 14′ W.), river and firth, E. of Scotland; river rises on N.E. side of Ben Lomond, flows eastward with many windings (links of Forth), and expands into Firth of Forth; chief tributaries. Teith, Allan, and Devon. Firth of Forth, an inlet of North Sea, extending from Alloa eastward about 50 miles; navigable for largest vessels to Queensferry, smaller vessels to Alloa; river steamers to Stirling; contains islands Inchcolm, Cramond, and fortified Inchkeith; many good harbours; coaling ports; to W. of Forth Bridge on Fife coast is bay of St. Margaret's Hope, with naval base of Rosyth; important fisheries. See Bridges.

FORTIFICATION, the art of strengthening military positions in such a way that they may be defended by force inferior in number to that which attacks them. Its objects are to give protection to defenders of position and to place obstacles in enemy's way. F. may be subdivided into *field* and *permanent* f's.

Field Fortifications are works hastily constructed for temporary purposes, to shelter troops on the battlefield, or to protect isolated posts. Their construction is as old as the existence of armies. They now generally consist of lines of detached redoubts, which check the enemy's onslaught by their fire and allow the defenders to rush upon the attackers at favourable opportunity. They are also used to defend bridges, and to prevent access to important passes. The *redoubt*, which is the most important closed field-work, is a quadrangle enclosed by a ditch and parapet; other works of this kind are the redan and lunettes; *redan* is simplest form employed, and consists of two parapets of earth raised to form a salient angle with the apex towards the enemy; there is a ditch in front, and it is unprotected in the rear. *Lunettes* are redans with short flanks, intended chiefly for protection of avenues, bridges, and curtains of field-works. Parapets are made 3 ft. thick to be proof against rifle bullets, or 7½ against artillery. Cover is also sometimes provided by digging trenches over which men can fire. Other important characteristics of field f. are the clearance of the foreground in order to expose the enemy in his advance, and the creation of obstacles to hinder that advance. Among obstacles used wire entanglements stretched between posts are important; *abattis* are branches of trees pegged down to the ground; and military pits may be dug.

Permanent Fortifications.—Early forms were extremely simple, consisting merely of banks or mounds of earth or fence of palisade, which gave considerable advantage to defenders when at close quarters with enemy. They were on commanding positions, and were usually employed against nomadic tribes of about equal strength. Later, when centres of population increased, stone and brick walls were built, high enough to prevent escalade, and broad enough to enable defenders to convey men and ammunition from one part to another. To get necessary breadth two walls were built, with earth filling up the space between. A flooded moat was subsequently added as additional defence. Next improvement was building of towers at intervals along walls to protect entrance gates and cover offensive sorties. This constitutes practically whole art of f. as known to ancients.

Great modifications were caused by introduction of artillery, first change being an increased thickness of walls, and greater diameter of towers, which were called *roundels* (round towers offering best resistance to rams), and were large enough to hold several cannon. Banks of earth were then thrown up behind, which strengthened the wall and gave width to enable besieged to work cannon there. Albrecht Dürer may be mentioned here as link between old and new styles, counter-arched revetments being ascribed to him. It was found, however, that round towers left undefended small angles close to the walls; to improve matters, shape was changed to an irregular pentagon, with one side facing inward and four outward; this was called *bastion*, in use by 1500. Most European nations had system of bastionary f. First, chronologically, was Ital. school, which, except concerning the flanking fire, made little alteration in essential characteristics of f. They had no glacis, no tenaille, no ravelin, no covered way; their main wall (*enceinte*) was of stone or brick, their bastions were small, and there were long spaces (*curtains*) between them. As the system developed there were many improvements. Bastions became larger, curtains shorter; ditches were widened and deepened, and covered way was invented; this was to allow troops to be drawn up unseen by enemy, and enable besieged to keep up closer fire on besiegers. To cover the gates which were in middle of curtains, *demilunes* were placed before them in ditch; this, a crescent-shaped work, was afterwards changed into triangular one, called *ravelin*.

Daniel Speckle of Strassburg made great improvements, laying foundation of system afterwards perfected by Vauban. He built fortresses at Ingolstadt, Ulm, Strassburg, and other places. Further developments were brought about by Fr. and Ital. engineers in XVII. and XVIII. cent's, Vauban making the Fr. school the most important in Europe. His methods were marked by great perfection of detail and adaptation to local needs; and his system of attack was such that he himself was unable to construct a rampart to withstand it. He constructed thirty-three new fortresses, improved over one hundred, and conducted in person over forty sieges. Among his followers may be mentioned Cormontaigne and Carnot, whose works generally consisted of a continuous polygon surrounding the position, with a bastion front, covered by outworks, on each side. Vauban in his second and third systems had made use of old walls, making hollow bastions by placing counter-guards in front of existing corner-towers, and thus avoiding necessity of entire rebuilding. Cormontaigne widened the gorge of the ravelin, and reintroduced the step formation of the covered way. Montalembert used chiefly the *tenaille* or star trace, but later inclined to polygonal system.

Dutch methods were of great repute from middle of XVI. cent. onwards; chief characteristics of system were low ramparts, wide, shallow ditches with many outworks, and flooding of country beyond the glacis; brought to great perfection by Coehoorn, contemporary and rival of Vauban. He was director-general of fortresses of United Provinces; invented 'Coehoorn mortar'; system applied to numerous places in Holland, notably Bergen-op-Zoom.

Ger. school of f's identified itself chiefly with the tenaille system. *Tenaille* consists of succession of lines forming salient and re-entering angles alternately, with the addition of ravelins and other outworks. Polygonal system, which was developed from tenaille system, is also associated with Germany, and is characterised by bomb-proof casements, and a simple trace. An important Ger. engineer was Rimpler (d. 1683), who wrote a book advocating the polygonal trace.

Modern methods of defending large fortresses are largely due to Montalembert, already mentioned as advocate of tenaille and polygonal systems. He constructed field f's at Anklam and Stralsund, and founded arsenal at Ruelle. His fortress has been described as 'an immense battery.' Instead of an intricate trace arrangement he adopted a tenaille so arranged that the besieged could direct overwhelming fire against besiegers. He also foresaw that in future detached forts would be necessary, and designed for these his caponier flanking. His system of surrounding position with single or double line of detached forts or high situations which could support each other by fire and give facilities for sorties, has been adopted in many places, one of most important being Paris, where there are an enceinte with bastions and two lines of detached forts. Detached forts began in early XIX. cent. to be more important than enceinte. Range of artillery had greatly increased, and henceforth girdles of forts were built at some distance in front of enceinte in order to keep besiegers as far away as possible. Cologne and Coblenz, Belfort, Grenoble, Besançon, and Verona are among fortresses constructed in this way. The introduction of the rifled gun caused further developments about middle of XIX. cent., the general trend of which has been to reduce large detached forts to small infantry redoubts. About 1885 the long shell made its appearance, necessitating further modifications such as the improvement of cover by bomb-proof concrete roofs 6 to 10 ft. thick,

and greater strength in the revetments. The introduction of smokeless powder in 1890 made concealment an essential in the designs of all f's.

In Europe military authorities generally are agreed as to the necessity for fortifying important places and as to the best means whereby this end is to be attained. Places which are in themselves worth fortifying are strategical positions, places where stores may be kept, places commanding important passes or bridges over large rivers, and great railway centres. The details of modern f's may be briefly described as follows: the place to be defended is surrounded by a girdle of small detached forts or redoubts at a distance of from 4 to 6 miles from the place, and from 1 to 2½ from each other. These are garrisoned by forces varying from half a company to half a battalion. Between these redoubts and concealed behind natural features are the howitzers; while a few fortress guns and magazines are artificially hidden. A trench railway round the batteries to carry ammunition is of fundamental importance. An enceinte is generally considered a desirable adjunct; but those constructed within last forty years have for the most part been simple 10 or 12 ft. walls with loopholes at intervals, which are of no practical use against modern artillery fire. A few modern details may be given; thus, concrete has replaced brick and stone works, because it offers greatest resistance to heavy shells, 5 ft. of concrete being enough to stop one large shell. It is used for parapets, casements, and revetments. The *escarp* or inner wall of the ditch is now of less importance, but a very solid counterscarp, the opposite wall of the ditch, is generally used. Electric searchlights are placed in disappearing domes; and iron and steel casements are used to give additional strength. See also COAST DEFENCE.

Royal Military Academy, *Text-Book of Fortification* (1893); Sir G. S. Clarke, *Fortification* (1907); Viollet-Le-Duc, *Military Architecture* (1907); works of Speckle, Dürer, Vauban, Montalembert, etc.

FORTROSE (57° 35′ N., 4° 8′ W.), royal burgh and watering-place, on Moray Firth, Black Isle, Rossshire, Scotland; ruined cathedral.

FORTS, see FORTIFICATION.

FORTUNA, FORTUNE (classical myth.), Latin goddess to whom shrines were erected in several places. She was believed to have the power of granting prosperity to whom she would.

FORTUNATUS, character in mediæval stories, who received from Fortune an inexhaustible purse, and stole from the Sultan a cap that would transport its wearer wherever he would go.

FORTUNATUS, VENANTIUS HONORIUS CLEMENTIANUS (530–609), Frankish ecclesiastic; bp. of Poitiers and hymnologist.

FORTUNE-TELLING, see PALMISTRY.

FORTUNY, MARIANO JOSE MARIA BERNARDO (1838–74), Span. artist; notable as colourist.

FORUM, an open space for the transaction of public business. The Roman f. was a rectangular building, surrounded by basilicas, etc. It was also the name given to a tract of open country in the neighbourhood of the Capitoline hills.

FORUM APPII (*c.* 41° 30′ N., 13° E.), ancient town, on Via Appia, Latium, Italy. Christians from Rome here met Apostle Paul.

FORUM CLODII (*c.* 42° 10′ N., 12° 10′ E.), ancient town, on Via Clodia, S. Etruria, Italy.

FORUM TRAJANI (40° N., 8° 50′ E.), ancient town, Sardinia, on river Thyrsus.

FOSBROKE, THOMAS DUDLEY (1770–1842), Eng. clergyman and antiquary.

FOSCARI, FRANCESCO (1373–1457), Doge of Venice; elected, 1423; supported Florentine campaign against Milan; increased Venetian dominions. His s., JACOPO, accused of receiving bribes and of treason, was imprisoned and exiled.

FOSCOLO, UGO (1778–1827), Ital. poet and patriot; author of several tragedies of high merit, including *Tieste*, *Ajax*, and *Ricciarda*; and a political work, *Letters of Jacopo Ortis*. At first an admirer of Napoleon, he became disgusted with Bonaparte's despotic aims, and, quitting the Fr. military service, devoted himself to lit.; finally retired to England.

FOSS, EDWARD (1787–1870), Eng. lawyer and biographical writer.

FOSSA, a carnivore; see under CIVET FAMILY.

FOSSA NOVA, Cistercian abbey, Rome province, Italy; deathplace of Thomas Aquinas, 1274.

FOSSANO (44° 33′ N., 7° 42′ E.), town, episcopal see, Cuneo, Italy; silk. Pop. 7682.

FOSSICK, word of Australian origin, applied to a miner who potters about in abandoned workings; hence a casual or trifling workman.

FOSSIL, remains of plants and animals embedded in minerals; term includes foot-marks of animals. Formerly called *petrifactions*, owing to organic parts being replaced by petrifying solution; thus the gradual decay of organic matter allowed each cell to be replaced, and corals, leaves, etc., showing complete structure, are found. Fossil forests have been found in coal, *e.g.* Parkfield Colliery, Wolverhampton. Fossil ferns show the development of the plant from Devonian Period.

FOSSOMBRONE (43° 42′ N., 12° 48′ E.), town, Pesaro, Italy; silk manufactures; ancient *Forum Sempronii*. Pop. 7240.

FOSSOMBRONI, VITTORIO, COUNT (1754–1844), Ital. statesman and mathematician.

FOSSORIAL WASPS, see WASPS.

FOSSWAY, one of the ancient Rom. roads of Britain, running from neighbourhood of Lincoln to Exeter; remains still exist.

FOSTER, JOHN (1770–1843), Eng. Baptist minister and essayist.

FOSTER, SIR MICHAEL (1836–1907), Eng. physiologist: prof. of Physiology at Univ. Coll., London (1869); prælector (1870) and prof. (1883) of Physiology at Cambridge; pres. of Brit. Association (1899); author of *Textbook of Physiology* and other works; elected M.P. for London Univ. (1900). He had a great influence on the study of biology in England.

FOSTER, MYLES BIRKET (1825–99), Eng. water-colour artist and book-illustrator.

FOSTERAGE, custom common in mediæval Europe, and especially in Ireland, where children of good family were brought up by foster-parents, who received a fosterage fee and support in old age.

FOSTORIA (41° 10′ N., 83° 26′ W.), city, Ohio, U.S.A.; glass and flour manufactures. Pop. (1910) 9597.

FOTHERGILL, JOHN (1712–80), Eng. physician; practised med. with great success in London; author of one of the first descriptions of diphtheria in English, under title of *Sore Throat attended by Ulcers*.

FOTHERING(H)AY (52° 32′ N., 0° 27′ W.), village, Northamptonshire, England. Ancient ruined castle was scene of imprisonment and execution of Mary, Queen of Scots, 1587.

FOUCAULT, JEAN BERNARD LÉON (1819–68), Fr. scientist; Copley medallist, Royal Soc., 1855; invented gyroscope and polariser, determined the absolute velocity of light, and demonstrated diurnal motion of the earth.

FOUCHÉ, JOSEPH, DUKE OF OTRANTO (1763–1820), Fr. politician; entered enthusiastically into Revolution; prominent in Jacobin movement; suppressed revolt at Lyons with utmost severity; on return quarrelled with Robespierre, who had him expelled from Jacobin Club; imprisoned for short time in 1795; ambassador to Cisalpine Republic, 1797; Chief of Police, 1799, continuing in office under Napoleon, who cr. him Duke of Otranto, 1808; deprived of office, 1810, and sent to Rome as titular gov. After Napoleon's fall, F. became Minister of Police under Louis XVIII.; retired from public life, 1816, and d. in exile.

L. Madelin, *Fouché* (Paris, 1901).

FOUCQUET, JEAN (*c.* 1415–85), Fr. artist; celebrated for miniatures.

FOUGÈRES (48° 20′ N., 1° 12′ W.), town, Ille-et-Vilaine, France; formerly one of strongest places in Brittany, frequently besieged; boots and shoes manufactured. Pop. 21,000.

FOULA (60° 8′ N., 2° 5′ W.), island, Shetlands, Scotland; area, 5 sq. miles; fish.

FOULAHS, see FULAHS.

FOULD, ACHILLE (1800–67), Fr. politician and financier.

FOULIS, ANDREW (1712–75) and **ROBERT** (1707–76), Scot. publishers; famed for beautiful and scholarly editions of Gk., Lat., and other classics.

FOULLON, JOSEPH FRANÇOIS (1717–89), Fr. administrator and financier; hanged by populace after fall of Bastille.

FOUNDATIONS are the natural earth-bed, rock, or other substance upon which the walls of a building rest. In selecting the site for a structure it is first of all necessary to examine the nature of the ground, and if a substantial natural f. cannot be reached at a moderate depth it must be provided by artificial means (*e.g.* by piles or concrete). Rock is the best natural f.; certain kinds of clay also serve the purpose; and sand and gravel likewise possess good weight-bearing qualities, but these latter are subject to the action of 'scour,' *i.e.* disintegration by water. Then, sometimes, the ground itself is of an artificial character, which means that at some period a hollow has been filled in with waste material, and where this is encountered it is always necessary to go deeper until a substantial natural f. is reached. A bed of concrete is now the method usually employed to provide a f. where the ground is found insufficient to support a building; and the alternative to this is the use of piles, which are driven deep into the soil, and upon the heads of which a timber platform is laid; piles are used in canal-cities like Venice and Amsterdam. Stone footings to the walls are also sometimes used.

FOUNDER, popular name for LAMINITIS, disease of horses and cattle in which laminæ of foot are inflamed; treatment consists in bleeding, poulticing, and purges, because f. is frequently caused by indigestion or constipation.

FOUNDING, or MOULDING, is a method of casting metals by preparing a mould in green or dry sand or in loam. A pattern, usually of wood, but sometimes of metal, is used; the sand is firmly beaten about it and damped; the pattern is withdrawn, and molten metal poured in. In order to withdraw the pattern it is necessary that the mould should be made in two parts, which fit upon one another.

FOUNDLING HOSPITALS are institutions established for the care and education of abandoned children, and, either State-supported or otherwise endowed, are to be found in France, Italy, Russia, America, and other civilised countries. The London F. H. was founded by Captain Thomas Coram in 1739, for the reception of 'deserted children,' who were placed in a basket at the entrance. It is now a home for illegitimate children whose mothers are known. The institution now maintains upwards of 500 girls and boys, who are afterwards put out to service or trade. They are well trained in music, a feature begun under the influence of Handel.

Folks, *Care of Destitute, Neglected, and Delinquent Children* (1902).

FOUNTAIN may be either a natural flow of water from a rock, or from the soil, or a stream diverted into an artificial and ornamental basin. The early Greeks were especially fond of constructing ornamental f's, and they were usually dedicated to deities or heroes. The Romans also built some celebrated f's. Excellent modern examples are to be found in Paris and at Versailles, also at the Crystal Palace (Sydenham) and various other places in England.

FOUNTAINS ABBEY, Cistercian monastery, near Ripon, Yorkshire, England; founded XII. cent. by Thurston, abp. of York; one of largest and best preserved of Eng. ecclesiastical ruins.

FOUQUÉ, FRIEDRICH HEINRICH KARL DE LA MOTTE (1777–1843), Ger. soldier and romanticist; wrote *Undine* and many novels, plays, and romances.

FOUQUET, NICOLAS, FOUCQUET (1615–80), Fr. statesman; Viscount of Melun and Vaux, Marquis of Belle-Isle; through influence of Mazarin became Procureur-Général, 1650; Finance Minister, 1653; lavish patron of art and science; of great wealth and extravagance; becoming too powerful, was arrested, 1661, and after long trial imprisoned for life at Pignerol.

FOUQUIER-TINVILLE, ANTOINE QUENTIN (1746–95), Fr. revolutionist; public prosecutor under the Terror; guillotined.

FOURCHAMBAULT (47° 2′ N., 3° 5′ E.), town, on Loire, Nièvre, France; large ironworks.

FOUR-EYED FISH, see KILLIFISHES.

FOURIER, FRANÇOIS CHARLES MARIE (1772–1837), Fr. social philosopher; developed theory of social reorganisation based on principle of co-operation. His scheme was to divide society into autonomous sections (*phalanges*) of about 1700 persons living in common building (*phalanstère*) with fixed amount of arable land attached; members to choose their own employment and receive minimum wage; surplus money to be divided between labour, capital, and talent. F. wrote *Théorie des Quatre Mouvements et des Destinées Générales,* etc.

FOURIER, JEAN BAPTISTE JOSEPH (1768–1830), Fr. mathematician; served in Egypt under Bonaparte; chief works: *Analyse des Équations déterminées* and *Théorie Analytique de la Chaleur,* in the latter of which he suggested what are now known as **Fourier's Series.** These are series of the form

$$a_1 \sin x + a_2 \sin 2x + \ldots + b_0 + b_1 \cos x + b_2 \cos 2x + \ldots$$

It is often important to be able to express a given function of x in terms of sines or cosines of multiples of x. Fourier first solved the general problem.

Any function of x which is single-valued, finite, and continuous between $x=0$ and $x=\pi$, or, if discontinuous, has only finite discontinuities each of which is preceded and succeeded by continuous portions, can probably be developed into a series of the form

$$f(x)=a_1 \sin x + a_2 \sin 2x + a_3 \sin 3x + \ldots$$

where $a_m=\frac{2}{\pi}\int_0^{\pi} f(x) \sin mx \, dx=\frac{2}{\pi}\int_0^{\pi} f(a) \sin ma \, da$;

and the series and the function will be identical for all values of x between 0 and π (not inclusive, unless $f(x)=0$ when $x=0$ and $x=\pi$).

e.g., $x=2(\sin x - \frac{1}{2}\sin 2x + \frac{1}{3}\sin 3x - \frac{1}{4}\sin 4x + \ldots)$

Similarly, for the same conditions,

$$f(x)=\tfrac{1}{2}b_0 + b_1 \cos x + b_2 \cos 2x + b_3 \cos 3x + \ldots$$

where $b_m=\frac{2}{\pi}\int_0^{\pi} f(x) \cos mx \, dx=\frac{2}{\pi}\int_0^{\pi} f(a) \cos ma \, da$;

$$e.g., x=\frac{\pi}{2}-\frac{4}{\pi}\left(\cos x+\frac{1}{3^2}\cos 3x+\frac{1}{5^2}\cos 5x+\frac{1}{7^2}\cos 7x+\ldots\right)$$

which is true from $x=0$ to $x=\pi$, both inclusive.

If $f(x)=-f(-x)$, $f(x)$ is an *odd* function, and the expansion in a series of sines is valid for values of x between $-\pi$ and $+\pi$, except possibly for $x=0$. If $f(x)=f(-x)$, $f(x)$ is an *even* function, and the cosine series for $f(x)$ is valid from $-\pi$ to $+\pi$, including the value 0. Hence any function can be developed into a series holding for *all* values between $-\pi$ and π, for

$$f(x)=\frac{f(x)+f(-x)}{2}+\frac{f(x)-f(-x)}{2}$$

and is thus expressed as the sum of an even and an odd function.

By putting $x=\frac{cz}{\pi}$ we can extend the limits, and we obtain

$$f(x)=\tfrac{1}{2}b_0+b_1\cos\frac{\pi x}{c}+b_2\cos\frac{2\pi x}{c}+b_3\cos\frac{3\pi x}{c}+\ldots$$
$$+a_1\sin\frac{\pi x}{c}+a_2\sin\frac{2\pi x}{c}+a_3\sin\frac{3\pi x}{c}+\ldots$$

where $b_m=\frac{1}{c}\int_{-c}^{c}f(x)\cos\frac{m\pi x}{c}\,dx$

and $a_m=\frac{1}{c}\int_{-c}^{c}f(x)\sin\frac{m\pi x}{c}\,dx$; this expansion is valid between the limits $x=-c$ and $x=+c$.

Fourier's series can be integrated term by term, the resulting series being the integral of the corresponding function, but only in certain cases can such series be differentiated with valid results.

Byerly, *Fourier's Series and Spherical Harmonics*; Fourier, *Théorie de la Chaleur*; De Morgan, *Differential and Integral Calculus*.

FOURMIES (50° 1′ N., 4° 1′ E.), town, Nord, France; wool-combing and spinning; glass works. Pop. 14,000.

FOURMONT, ÉTIENNE (1683–1745), Fr. Orientalist.

FOURNIER L'HÉRITIER, CLAUDE (1745–1825), Fr. revolutionist.

FOURNIER, PIERRE SIMON (1712–68), Fr. engraver; chiefly notable for improvements in type-founding.

FOURTOU, MARIE FRANÇOIS OSCAR BARDY DE (1836–97), Fr. politician.

FOUSSA, Foosa, see under CIVET FAMILY.

FOWEY (50° 21′ N., 4° 38′ W.), market town, seaport, Cornwall, England; important XIII. and XIV. cent's; good harbour; pilchards, china clay.

FOWL, a domestic bird of Asiatic and Amer. origin; body stout and flight feeble; cock polygamous and often brightly coloured; hen usually shows more subdued plumage; both characterised by possession of wattles and comb, these being larger in male than female; young, produced from eggs, covered with down at birth. POULTRY-FARMING.

FOWLER, CHARLES (1792–1867), Eng. architect.

FOWLER, EDWARD (1632–1714), Eng. ecclesiastic and theological writer.

FOWLER, SIR HENRY HARTLEY, see WOLVERHAMPTON, VISCOUNT.

FOWLER, SIR JOHN (1817–98), Eng. civil engineer; built Manchester, Sheffield, Lincolnshire Ry., and London Metropolitan Ry.; adviser to Khedive of Egypt; co-operated with Sir Benjamin Baker in designing Forth Bridge.

FOWLER, WILLIAM (d. *c.* 1614), Scot. poet; uncle of Drummond of Hawthornden.

FOX (*Canis vulpes*), an animal allied to the wolf, dog, and jackal, and included with them in group *Canidæ*; characterised by long, bushy tail, or *brush*, by upright and somewhat large ears, short legs, and comparatively slender build; extremely intelligent and cunning, and feeds upon various small mammals and birds, and also fruit; preserved for hunting in Britain; his astuteness has made him a favourite character in fable, the classic being Reynard the Fox (*q.v.*).

FOX, CHARLES JAMES (1749–1806), Brit. (Whig) statesman; 3rd s. of Henry Fox, Lord Holland; b. Westminster; ed. Eton and Oxford; early addicted to gambling; M.P., 1768; spoke against Wilkes; became junior lord of Admiralty, 1770; resigned, 1772; opposed Royal Marriage Act, thus incurring dislike of George III.; junior lord of Treasury, 1773; quarrelled with Lord North and joined Opposition, 1774; influenced by Burke; became great leader of Whigs; opposed Lord North's Amer. policy, and sided with colonists; Foreign Sec. under Rockingham, 1782, but retired soon after latter's death, and later formed ministry with Lord North known as the *Coalition*, which was unpopular both with king and country, and ended, 1783.

Whigs were utterly defeated in election of 1784, and for twenty-two years F. remained out of office; during most of this period he was rival and opponent of Pitt, the Prime Minister; opposed free trade with Ireland, 1785, and commercial treaty with France, 1787; prominent in impeachment of Warren Hastings; advocated removal of religious disabilities and abolition of slave trade; opposed Pitt's policy during Fr. Revolution, which he upheld; carried Libel Bill, 1792; opposed Anglo-Fr. war, 1793. After Pitt's death in 1806 F. became Foreign Sec., but died a few months afterwards and was buried in Westminster Abbey. A brilliant orator and possessed of great personal charm, his powerlessness as a statesman is attributable partly to the reputation gained by his early excesses, partly to the continued disfavour of George III.

Lord John Russell, *Life and Times of Charles James Fox* (1859–66).

FOX, EDWARD (*c.* 1496–1538), Eng. bp.; sent on missions concerning Henry VIII.'s divorce; had share in drawing up Ten Articles, 1536.

FOX, GEORGE (1624–91), Eng. Quaker; founder of Society of Friends; b. Drayton; early gave himself up to religion; began to preach in 1647, and soon afterwards began missionary travels, which continued throughout his life; many times imprisoned; travelled in Scotland, Ireland, W. Indies, America, Holland; advocated doctrine of 'Light within,' and discontinuance of sacraments and tithes; d. in London. See FREE CHURCHES (SOCIETY OF FRIENDS).

FOX, HENRY RICHARD VASSALL, see HOLLAND, BARON.

FOX, RICHARD (*c.* 1448–1528), Eng. bp.; chief sec. to Henry VII.; bp. of Exeter and Lord Privy Seal, 1487; bp. of Bath and Wells, 1492; of Durham, 1494; arranged commercial treaty with Netherlands, and marriage of James IV. of Scotland and Margaret, dau. of Henry VII.; Chancellor of Cambridge, 1500; bp. of Winchester, 1501; founded Corpus Christi Coll., Oxford, 1515–16.

FOX, SIR STEPHEN (1627–1716), Eng. politician; fled to France with Charles II., at whose Restoration he received many lucrative appointments.

FOX, SIR WILLIAM (1812–93), New Zealand politician; went to New Zealand, 1842; prominent in demanding autonomy for colony; four times premier of New Zealand, 1856, 1861–62, 1869–72, 1873.

FOX BATS. see FLYING FOXES.

FOXE, JOHN (1516–87), Eng. author and ecclesiastic; chiefly remembered by his *Acts and Monuments* (1563), better known as 'Foxe's *Book of Martyrs*.'

FOXGLOVE, natural order *Scrophulariaceæ*, biennial and perennial plants; common purple foxglove (*Digitalis purpurea*) contains a poison, digitalis, used medicinally.

FOXHOUNDS, dogs capable of great speed and endurance, used in fox-hunting; chief characteristics of good f. are: short back, large head with long ears, straight fore-legs, round feet with well-arched toes; colour is generally white, with black and tan markings; height, 20–24 inches.

FOX-HUNTING.—The fox has been hunted in England since Anglo-Saxon times, but till the middle of the XVII. cent. more for the purpose of extermination than for sport. The modern form of f.-h. may be said to date from the reign of Charles II., when it became exceedingly popular with wealthy landowners, and packs of hounds were kept in all parts of England.

The hunting-season lasts from November till about March. In the early morning the earths are stopped to prevent the fox from taking to ground. Hounds are 'thrown off' about 10 a.m., pick up the scent and pursue, followed by the huntsman (who manages the pack), the whipper-in (his subordinate), and the members of the hunt. At the 'kill' the head and brush are kept as trophies.

There are in England about 170 packs, while the sport is popular in the E. of Ireland and in parts of Scotland, and it has been introduced into all parts of the English-speaking world. The most famous Eng. packs are the Quorn, Meynell, Belvoir, and Lord

Middleton's; the Peshawur Vale pack is celebrated in India.

Scarth Dixon, *The Sport of Kings* (1900); Underhill, *The Master of Foxhounds* (1904).

FOX-SHARK (*Alopecias vulpes*), found in Atlantic and Pacific Oceans; upper lobe of tail is tremendously lengthened; total length, 5–12 feet; feeds on small fish, but does not attack man.

FOXTAIL GRASS, genus of grasses (*Alopecurus*) valued for pasturage and lawns.

FOX-TERRIER, see under DOG FAMILY.

FOY, MAXIMILIEN SÉBASTIEN (1775–1825), Fr. soldier and politician; served with distinction in Fr. Revolutionary wars; fought in Netherlands, Italy, Austria, Turkey, Peninsula; wounded at *Waterloo*.

FOYERS, FALLS OF (57° 12′ N., 4° 34′ W.), two cascades, 40 and 165 ft. in height, on river Foyers, Inverness, Scotland; power utilised for generating electricity for aluminium works.

FOYLE, LOUGH (55° 7′ N., 7° 5′ W.), gulf on N. coast, Ireland; receives river F., on which Londonderry (*q.v.*) is built; navigable for moderately sized craft; length, 15 miles; breadth, 1–10 miles.

FRA DIAVOLO, soubriquet of Michele Pezza (*c.* 1760–1806), Ital. brigand and soldier; considerable source of annoyance to French troops in Italy, 1799–1806; captured and executed; F. D. is name of opera by Auber.

FRACASTORO, GIROLAMO (1483–1553), Ital. physician; prof. of Philosophy at Padua (1502), afterwards practising med. at Verona; renowned for versatility, being poet, philosopher, physician, scientist, and artist; author of a once famous rhyming medical work, *Syphilidis, sive Morbi Gallici*, and of many other works and poems.

FRACTION, see ARITHMETIC.

FRACTURES, see BONE.

FRAGA (41° 30′ N., 0° 15′ E.), town, Huesca, Spain; formerly in hands of Moors, well fortified till Peninsular War. Pop. 7000.

FRAGONARD, JEAN-HONORÉ (1732–1806), Fr. artist; his voluptuous style was highly popular in his day, and, after a period of neglect, his work is now again valued.

MacFall, *Fragonard*.

FRAHN, CHRISTIAN MARTIN (1782–1851), Ger. archæologist and numismatist.

FRAMING, the craft of embellishing pictures and mirrors with carved or gilded frames, began in England in Tudor times. Composition moulding, in place of carved wood, is now largely used.

FRAMINGHAM (42° 14′ N., 71° 33′ W.), town, on Sudbury, Massachusetts, U.S.A.; boots and shoes. Pop. (1910) 12,948.

FRAMLINGHAM (52° 13′ N., 1° 21′ E.), market town, Suffolk, England; ruined castle, ancient residence of Dukes of Norfolk.

FRANC, Fr. silver coin, and monetary unit; worth about 9½d. (19 cents); also used in Belgium and Switzerland.

FRANÇAIS, ANTOINE, COUNT DE NANTES (1765–1836), Fr. author and politician.

FRANÇAIS, FRANÇOIS LOUIS (1814–97), Fr. artist; landscapes.

FRANCAVILLA (40° 33′ N., 17° 35′ E.), town, Apulia, Italy; textiles. Pop. 20,422.

FRANCE (42° 20′ to 51° 6′ N., 4° 42′ W. to 7° 39′ E.), republic, S.W. Europe; bounded N.E. by Belgium, Germany; E. by Germany, Switzerland, Italy; S. by Mediterranean, Spain; W. by Atlantic; N.W. by Eng. Channel; greatest length, *c.* 600 miles; breadth, 550 miles; area, 207,054 sq. miles.

N. and W. are flat, almost nowhere over 600 ft. above sea-level, but with small hilly parts in Brittany and Normandy and to S.E. of Nantes. In S. centre is great plateau of Auvergne, with average elevation of 3000 ft., and with number of extinct volcanic cones (Puy de Dôme, Mont Doré, etc.) rising above it to heights of 5000–6000 ft. In S.E. are the Cévennes, which are continued northward by mts. of Charollais, Côte d'Or, and Plateau of Langres, from which Monts Faucilles are sent off across Upper Moselle to meet Vosges. Along E. of this line of mt. ranges is valley of lower Rhône and Saône, extending over 300 miles from N. to S.; E. of this and N. of Doubs are Vosges Mts.; between Doubs and upper Rhône are Jura Mts., and between upper Rhône and Mediterranean are spurs of Graian, Cottian, and Maritime Alps, reaching heights of 13,000 to 15,000 ft. (Mont Blanc, 15,780). In S.W. the Pyrenees stretch along frontier between F. and Spain, and the great plain of Landes extends along W. coast between rivers Adour and Garonne. Coasts are well adapted for maritime relations with other countries; on N. Dieppe, Calais, and Boulogne share passenger traffic from England; at mouth of Seine stands the large port of Le Havre; farther W. the rocky peninsula of Cotentin juts into Eng. Channel, terminating in Cape de la Hogue, near Cherbourg. Most westerly point is Cape Ushant, off rocky coast of Brittany. W. coast borders on Bay of Biscay, chief ports being Brest, Lorient, Nantes, Rochefort, and Bordeaux; on S. coast is Gulf of the Lion, to E. of which are Marseilles, the chief southern port, and Toulon, headquarters of Mediterranean Fleet of France; and still farther E. are Nice, Cannes, Mentone, chief towns of Fr. Riviera. Principal rivers flowing into Eng. Channel are Somme, Seine, Orne; to Atlantic, Vilaine, Loire, Charente, Dordogne, Garonne, Adour; to Mediterranean, Rhône.

Climate is temperate, but varies according to districts, the winter of the Mediterranean region being very mild, that of the Vosges, for example, very severe; mean winter temperature, *c.* 42° Fahr., summer 68° Fahr.; rainfall over lower regions ranges from 20 to 30 inches, increasing in higher districts.

Geology.—The central plateau consists chiefly of Archæan rocks, which occur also in Finisterre and great part of Brittany; secondary formations occur to N.E. of Auvergne plateau, and in Jura, where great masses of limestone appear; and the Paris basin and Aquitaine are of tertiary formation.

FRENCH HISTORY.

F. was first peopled by *Palæolithic* tribes (remains like those of Stonehenge, but on a much larger scale, being found at Carnac and elsewhere), then by *Iberians*, whose racial identity is not yet agreed upon, and afterwards by Celtic races called in F. *Gauls*.

Roman Gaul.—Gaul (*q.v.*) was bounded by the Rhine, Jura Mts., Mediterranean, Pyrenees, and Atlantic. In Cæsar's days it was inhabited by Belgians in N., Celts N. of the Loire, Aquitanians in S.W., Ligurians and Greeks of Marseilles in S.E. The Romans founded Aix and Marseilles (122–18 B.C.) and appropriated the land afterwards called Provence. In 58–50 B.C. JULIUS CÆSAR conquered all Gaul, in eight different raids or campaigns. In the seventh, Vercingetorix, after a desperate resistance, had to surrender on the fall of Alesia. Gaul was subject to the Romans for five hundred years, and became part of the Western Empire with Great Britain, Spain, and Italy. It had a Rom. government, and spoke a Romance language; towns and roads were built; the Christian religion was introduced by St. Denis in Paris, St. Martin in Tours, etc.

Merovingians and Carolingians.—In the V. cent. over 600,000 Germans, who had been long threatening and kept back with difficulty, crossed the Rhine and went through Gaul to Africa. The Franks, successively led by their chiefs, Pharamond (420), Clodion (428), Mérovée (448), penetrated as far as the Somme. They founded the dynasty of the MEROVINGIANS (420–752). In 451 the Huns from Asia invaded Europe under their chief, Attila; Paris was saved by St. Geneviève and Orléans by its bishop, St. Aignan; they were met and defeated in the *Plain of Champagne* (451) by the united forces of Mérovée, Ætius, Rom. general, and Alaric I., king

of the Visigoths. The Frank, CLOVIS, took possession of the whole of Gaul after defeating the Romans at *Soissons* (486), the Germans at *Tolbiac* (496), the Burgundians at *Dijon* (500), and the Visigoths at *Vouillé* (507). He divided his kingdom between his four sons, a custom carried on in the next dynasty. The Frankish kings finally became *rois fainéants*; and were ruled by the *Maires du palais*, one of whom, CHARLES MARTEL, repulsed the Arabs under Abderahman at *Poitiers* (732), thus saving Europe. His s., PÉPIN LE BREF, shut up the last Merovingian king, CHILDERIC III., in a cloister, took the crown (752), and was ancestor of the CAROLINGIANS (752–987), so named from Charles the Great. He left two sons, CARLOMAN, who did not live long, and Charlemagne (768–814). Aquitaine submitted to CHARLEMAGNE, who became sole master of F. He crossed the Alps, conquered Didier, king of the Lombards, and confirmed to the Pope the church lands given by Pépin le Bref.

On Christmas Day, 800, Leo III. crowned Charlemagne Emperor of the West (see EMPIRE, HOLY ROMAN), an empire extending on the south to the Ebro in Spain and the Garigliano in Italy, the Bosna and the Theiss on the east, and to the Elbe on the north. Charlemagne was one of the founders of European civilisation. He created dukes, counts, etc., to keep order in the provinces, had his laws (*Capitulaires*) written, founded Aix-la-Chapelle, his capital, held there his '*Académie Palatine*' of learned men, amongst whom were the Eng. monk Alcuin and Eginhart, his historian, and established schools in his palace. His s., LOUIS LE DÉBONNAIRE (814–40), was not the man to carry on his work. His sons revolted against him, and after his death, by the Treaty of Verdun (843), divided the empire into Germany, Italy, and France, with CHARLES LE CHAUVE (843–77) as king of the last named. In 877, by the Edict of Kiersy-sur-Oise, Charles allowed his vassals' land and offices to become hereditary, thus establishing FEUDALISM (*q.v.*). Eventually the town of Laon alone remained to the crown. The smaller landowner sought protection of the greater, declaring himself his vassal, and by the end of the X. cent. F. was divided into about a hundred fiefs or *arrière-fiefs*, the chief of which were the counties of Vermandois, Champagne, Toulouse, Flanders, and the duchies of France with Artois, Burgundy, Normandy, and Aquitaine. The Church, with her large landed property, abbeys, and monasteries, was powerful, the only repository of learning, and a rival to the purely feudal forces as well as to the monarchy which after cent's of struggle triumphed over the feudal system.

The later Carolingian kings were too weak to repel the NORTHMEN, who had already appeared at the end of Charlemagne's reign and had sailed up the rivers, plundering and burning. The lords called to the throne CHARLES LE GROS (884), king of Germany, thinking he would have more power than the lawful heir, but under his reign the Northmen came as far as Paris, where Count Eudes and Bp. Gozlin made a brave defence. Charles bribed the Northmen to retreat, and was dethroned for his cowardice. CHARLES LE SIMPLE (896–923), the restored Carolingian king, gave by the Treaty of St. Clair-sur-Epte (911) the province since called Normandy (*q.v.*) to the Northmen, whose chief, Rollo, married his dau., Gisèle.

Capetians.—The barons, who had brought the Carolingians to the throne, had taken their provinces one by one, administered them, and usurped most of the royal functions. HUGH CAPET, who possessed the Ile de France and Orléanais, imprisoned the Carolingian heir, Charles of Lorraine, and seized the throne. He began the third dynasty, that of the CAPETIANS (987–1792).

The first Capetians, Hugh Capet (987–96) and Robert, his s. (996–1031), set themselves to strengthen their hold upon the throne. Under Henry I. (1031–60) the Normans (*q.v.*) became the first race of



Europe; they conquered the south of Italy, and under PHILIP I. (1060–1108) conquered England (1066). F., 'the eldest child of the Church,' took the lead in the Crusades (*q.v.*), and Henry, Duke of Burgundy, founded the kingdom of Portugal; but the king of F. took no part in these events.

LOUIS VI. (1108–37), one of the strongest kings of the line, helped the *Communes* to win their franchise, established order in his demesne, and encouraged local forces to fight in his army. He was beaten by Henry I. of England at *Brenneville*, but repulsed an invasion of the Emperor Henry V. The reign of Louis VII. (1137–80) was unfortunate. He went on the second crusade (1147) with Conrad, emperor of Germany, against the advice of his minister and biographer, Suger, after whose death he repudiated his wife, Eleanor of Aquitaine. Eleanor married (1152) Henry II., future king of England, who thus became possessor of about half of F.

By PHILIP AUGUSTUS (1180–1223) the throne of France was much strengthened. He went on the third crusade with Frederick Barbarossa and Richard

Cœur de Lion, whom he encouraged in revolt against his f., Henry II. They took St. Jean d'Acre together, but disagreed afterwards, and Philip went back to F., and plotted with King John of England to take Normandy. After the death of Richard I., Philip Augustus confiscated Normandy, Anjou, and Poitou (1204) as suzerain of Arthur of Brittany, who had been murdered. He won the battle of *Bouvines* (1214) over Otto IV., emperor of Germany, and Ferrand, Count of Flanders. In the S. the religious war of the Albigenses ended in Simon de Montfort's taking Toulouse from its count, Amaury. Philip Augustus instituted the *Cour des Pairs* (Chamber of Peers), which lasted until 1789, and established the *Quarantaine le Roi*, a period of forty days between challenge and combat. During that time quarrelsome nobles might come to terms and even appeal to the king. He also sent *baillis, prévôts, sénéchaux* to judge lawsuits, etc., with appeal to himself. Paris grew, the Cathedral of Notre Dame was in process of completion, the Hôtel-Dieu (hospital), the Louvre (palace), and the Halles (market) were built. The Univ. was founded and called 'the eldest daughter of the king.' After the death of LOUIS VIII. (1223–26) his widow, Blanche of Castille, was regent until 1236, and, with the aid of the poet, Count Thibaut of Champagne, repressed the nobles; she prepared for the union of several provinces to the crown, and carefully educated her s., LOUIS IX. (1226–70), one of the finest figures of Fr. history. 'St. Louis' disapproved of the confiscations of his grandfather, Philip Augustus, and by the Treaty of Abbeville recognised the king of England as Duke of Guyenne (1259), on condition that he should give up any claim on Normandy or any border provinces. He led the two last crusades (1248, 1270), and died of the plague at Tunis. In his time were built the hospital of *Quinze-Vingt*, the *Sainte Chapelle*, and the *Sorbonne*. The chronicler Joinville records the good government and prosperity of F.

PHILIP III. *le Hardi* (1270–85) added Poitou and Toulouse to the crown; his s., PHILIP IV. *le Bel* (1285–1314), added Navarre and Champagne. After a war with England he married his dau. Isabelle to the s. of Edward I. of England, a marriage which led later to the Hundred Years War. Increased expenses of administration led him to raise new taxes on salt (the *gabelle*), Jews, Lombards, the clergy, etc., and he forbade the pope's taxes to be paid. To facilitate assessment of taxes and obtain general support for his great attack on the papacy, he called together for the first time the *États Généraux* (1302). He then joined the Conciliar movement, sent to Pope Boniface VIII. messengers who insulted him and caused his death, and secured the appointment of the Abp. of Bordeaux as Pope Clement V., whose residence he fixed at Avignon. He brought about the dissolution of the Templars, the Temple in Paris and their wide lands in F. coming to the crown. The three sons of Philip *le Bel*, LOUIS X., PHILIP V., and CHARLES IV., reigned in turn. They had no son, and as it was decreed by the old Frankish *Loi Salique* that women must not inherit the throne, after the death of Charles IV. *le Bel* (1322–28), Edward III. of England vainly claimed the throne as nearest heir by his grandmother Isabelle. The *loi salique* was enforced for the third time, and PHILIP OF VALOIS (1328–50), cousin of the last three kings, succeeded.

House of Valois (1328–1589).—The rivalry between the kings of England and F. had long been felt; F. was jealous of England's power, and the Eng. kings resented the allegiance they had to pay to F. for their continental possessions. Besides, the Flemings revolted against F., sought help from England, with whom their commercial interests were bound up. Hostilities began at *Cassel*, 1328, after which England openly took the part of Flanders; war was declared (1336); F. was defeated on sea at *Sluys* (1340), crushed on land at *Crécy* (1346), and in 1347 the English took Calais, which they kept until 1558. The plague forced suspension of hostilities for a few years. JOHN II. *le Bon* (1350–64) was the first to bear the name of *Dauphin* (q.v.), from the province of Dauphiné now acquired by the crown. In 1355 the war began again. John was badly beaten at *Poitiers* (1356); his s., Charles, taken prisoner to England, fled back to F., but John himself was captured. He signed the Treaty of London, which the dauphin would not accept, and war continued, until the Treaty of Bretigny (1360). F. was also torn by the strife between the *bourgeoisie*, headed by Étienne Marcel, and *la Jacquerie*, of peasants.

CHARLES V. (1364–80), with the help of the Breton Du Guesclin, beat the army of Navarre at *Cocherel*. In Brittany Du Guesclin was taken prisoner by Chandos, but by the Treaty of Guérande Brittany acknowledged the suzerainty of the king of F. Du Guesclin took the *Grandes Compagnies* of mercenaries to Spain, was again taken prisoner by Chandos at *Navarette*, but set free by the Black Prince on promise of a heavy ransom. In 1375 at the Truce of Bruges the English only possessed Calais, Bayonne, and Bordeaux. CHARLES V., *the Wise*, a good administrator, first instituted a permanent professional army. When he died, his s., CHARLES VI. (1380–1422), being only twelve, his uncles, the Dukes of Anjou, Berry, Bourgogne, and Bourbon, squandered the riches of the kingdom. The people (*Maillotins* in Paris, *Harelles* in Rouen, etc.) revolted against the heavy taxation. The king, declared of age at twenty, called back his f.'s ministers and at first showed some firmness, but two accidents affected his brain, whereupon the uncles threw the ministers, whom they scornfully called *Marmousets*, into the Bastille. The king's mother, Isabeau de Bavière, and his bro., the Duke of Orléans, also took part in affairs; and in 1407 Jean *sans Peur*, Duke of Burgundy, killed the Duke of Orléans. Bernard d'Armagnac, father-in-law of the new duke, took his part and began the civil war of the *Armagnacs* and the *Bourgnignons*, who both wanted governorship of the king and realm (1411). The Armagnacs were defeated by the English at *Agincourt* (1415); Jean *sans Peur* was murdered, and the queen made the king sign the Treaty of Troyes (1420), by which he left his throne to Henry V. of England. Both kings died in the same year.

By this time the English ruled the whole country north of the Loire. CHARLES VII. (1422–61), called derisively 'the little king of Bourges,' abandoned by his mother and without means, was thinking of retiring abroad, when the English, after the victories of *Cravant* and *Verneuil* came to besiege Orléans. The town was exhausted and F. nearly lost, when JEANNE D'ARC appeared, took Orléans, and went with the king to Reims, where he was anointed. At her death patriotic feeling was restored; Paris (1436), Rouen (1449), Bordeaux (1453) recovered their independence. Charles VII. behaved in a kingly way: he made peace with Burgundy by the Treaty of Arras (1435), reorganised his army, and by the victories of *Formigny* (1450) and *Castillon* (1453) ended the Hundred Years War. He governed his kingdom wisely, but is accused of ingratitude to his servants.

Charles died of hunger for fear of being poisoned by his s., LOUIS XI. (1461–83), a clever and cunning prince, who contributed more than any king towards F.'s greatness and royal authority, though his means were not always straight and he was feared rather than loved. He began his reign by putting down the so-called League of the Public Welfare, in which he had against him the clergy and the lords, especially Charles the Bold, Duke of Burgundy. He met them at *Montlhéry*, where the battle was indecisive. Unfulfilled promises of the king brought a new league. He went to Péronne to appease Charles the Bold, and accompanied him to Liége to put down a revolt which he had himself raised against the duke (1468). He signed the Treaty of Péronne to which he adhered no more than to others. The duke then invaded several towns of the Somme, and besieged Beauvais, but a woman,

Jeanne Hachette, headed the inhabitants and drove him away. Charles the Bold was killed before Nancy (1477); whereupon the king added Burgundy, Maine, Anjou, Provence, Guyenne, etc., to the crown and ruled them with an iron hand. Louis' s., CHARLES VIII. (1483–98), was thirteen when he ascended the throne. His eldest sister, Anne de Beaujeu, for eight years directed affairs. She put down the *Guerre Folle* (Mad War) waged by the lords and Maximilian of Austria. In 1498 the king married Anne of Brittany, heiress of that province. By the Treaty of Étaples he bought off invasion by Henry VIII. of England. With Aragon and Austria he made the Treaties of Narbonne and Senlis, by which F. lost several provinces. Finally he made an epoch in history by setting off to the conquest of Naples, which he claimed as heir of the House of Anjou. This was the beginning of the Italian wars (1494–1544). On his return Naples shook off Fr. domination.

Charles left no children; his cousin, the Duke of Orleans of the *Valois-Orléans* branch, who had taken a prominent part in the *Guerre Folle*, became king, as LOUIS XII. (1498–1515). After divorce he married the queen, Anne de Bretagne, in order to secure that province to the crown. The new 'father of his people' enforced the *Ordonnance de Blois*, by which the *baillis*, *prévôts*, and *sénéchaux* had to have a degree in law, instituted *Parlements* in Provence and Normandy, diminished the taxes, and yet increased the finances. The peasant's property was protected; agriculture and commerce prospered. Unfortunately, the king resumed the Ital. wars, and besides Naples claimed the *Milanais* through his grandmother, Valentine Visconti. Milan was conquered twice, and La Trémouille left to govern it. Naples was subjugated with help of Ferdinand of Aragon, but French and Spanish disagreed, France was defeated at *Seminara* and at *Cerignola* (1503), and Naples was lost again. Louis XII. foolishly joined the League of Cambrai against the Venetians. The battle of *Agnadello* was won (1509), but the Allies, Pope Julius II., the Swiss, Ferdinand of Aragon, Henry VIII., and Maximilian formed the Holy League (1511), against him. Louis XII. was victorious at *Ravenna* (1512), but was again forced to make great concessions to his neighbours. The kingdom was at last at peace when he died without sons.

His cousin and son-in-law, of the branch of *Valois-Angoulême*, became king under the name of FRANCIS I. (1515–47). The Holy League had formed again, and the king commenced his reign by the victory of *Marignano* (1515). He received knighthood there at the hands of Bayard (*q.v.*). The coronation of Charles V. of Austria as emperor, a dignity which Francis I. also coveted, was the signal of a long European war, the field of battle being again Italy. Both sought the alliance of Henry VIII., who met the king of France at the Field of the Cloth of Gold (1520), but by Cardinal Wolsey's advice supported Charles V. War was declared in 1521; the chief battles were *La Bicoque*, *Biagrasso*, *Rebecco*, *Romagnano*. Finally the king himself was beaten and taken prisoner at *Pavia* (1525) by Charles V. Meanwhile the queen regent, Louise of Savoy, mother of Francis I., kept order, and on his return after signing the humiliating Treaty of Madrid (1526) the king found his kingdom peaceful. The Treaty of Cambrai (1529), negotiated between Louise of Savoy and Margaret of Austria, gave Europe a few years' peace during which Francis I. gave his mind to art and the organisation of his kingdom. When war began again, for the fourth time, he made alliance with Soliman, emperor of the Turks (1541), and with the Protestants of Germany. He raised five armies, which were successful at *Cérisoles* in Italy and in different parts of F. Peace was made with Charles V. at Crespy-en-Laonnais (1544) and with Henry VIII. at Ardres (1546), but in 1551 war began again under Henry II. (1547–59), who also became the ally of the Turks and the Ger. Prot. princes. Francis of Guise conquered the three bishoprics of Metz, Toul, and Verdun, and won the battle of *Renty* over Charles V. After that emperor's abdication his s., Philip II., defeated the French at *St. Quentin* (1557), but Guise arrived in haste, took Calais (1558), and finally the Peace of Cateau-Cambrésis (1559) ended the first period of war with the house of Austria. Philip II. married Fleury II.'s dau. During the festivities the king was mortally wounded in a tournament. His s., FRANCIS II. (1559–60), who had married Mary Stewart, reigned only one year.

The Ital. wars helped greatly to extend the Renaissance (*q.v.*) from Italy to F. Francis I., surnamed 'the Father of Arts,' entrusted the artistic direction of his castle of Fontainebleau to Rosso (1496–1541); Chambord was raised by Primatice (1490–1570); the king bought works of Leonardo da Vinci (1452–1519) and others. F. itself produced artists, Jean Cousin (1501–90), Jean Goujon (1520–72), Pierre Lescot (1510–71), etc., as well as poets, writers, printers. The *Collège de France* was founded then. Francis I. also reformed the army and the navy. He sent out Jacques Cartier and Jean de la Roque, who established Fr. settlements at the mouth of the St. Lawrence.

Francis I. and Henry II. had been the allies of the Ger. Prot. princes against the emperor, but would not tolerate heresy at home. The Protestants, however, were getting numerous in France. At their head were Antoine de Bourbon, king of Navarre, his wife, Jeanne d'Albret, his bro., the Prince of Condé, and Admiral Coligny. At the head of the extreme Catholics were the Guises, the Marshal of St. André, the old Constable of Montmorency. Between these parties were the *Politiques*, among whom was the noble and wise Michel de l'Hôpital and Catherine de' Medici (widow of Henry II., mother of the three kings, Francis II., Charles IX., and Henry III.), who aided now one, now the other, as her interest lay. Under the young king, Francis II., the Guises governed. Condé, by the Conjuration d'Amboise, tried to kidnap the king, but the plot was discovered, and Condé had been condemned to be executed when the king died.

Catherine de' Medici, regent for her s., CHARLES IX. (1560–74), seemed in her ambition and cunning to favour all parties alike. She sent Mary Stewart back to Scotland and assembled the useless *Colloque de Poissy* in which Catholic and Prot. doctors were to discuss the different points of faith. It did not prevent eight sanguinary RELIGIOUS WARS (1562–94). The signal was the Massacre of Vassy (1562). In the first war Antoine de Bourbon died, leaving the kingdom of Navarre to his young s., Henry of Béarn (later Henry IV.); the Marshal of St. André died also at *Dreux*, and Francis of Guise was murdered. In the second, the Protestants tried, again in vain, to kidnap Charles IX. After the third, Condé having been treacherously killed at *Jarnac*, the young king of Navarre, his mother, Jeanne d'Albret, and Coligny were left chiefs of the Protestants. Catherine de' Medici had arranged Henry of Navarre's marriage with her dau., Marguerite, and when all the Protestants were in Paris for the marriage feast, the MASSACRE OF ST. BARTHOLOMEW (Aug. 23–24, 1572) took place; Coligny and many others were killed. Jeanne d'Albret had died before, probably poisoned. The massacres went on in the provinces, and the Protestants who had escaped began the fourth war. HENRY III. (1574–89) was little able to face the situation. Henry of Guise, bro. of Francis, defeated the Protestants headed by Henry of Navarre and the Duke of Alençon, the king's bro., at the battle of *Dormans*. The queen, nevertheless, signed the Treaty of Loches in favour of the Protestants. The Catholics, greatly incensed, formed *La Ligue*. After the sixth and seventh wars, ended by the Treaties of Bergerac (1577) and Pleix (1580), the Duke of Alençon died. Henry III. had no s., and the *Ligueurs* wished Henry of Guise to succeed. Henry III., disliking Guise as a rival, favoured Henry of Navarre, and the eighth war, named *Guerre des Trois Henris*, began. Henry of Navarre won at *Coutras*, Guise at

Vimory and *Auneau*, and besieged Paris; after the day of Barricades (1588) the king called the States-General at Blois. As they also were in favour of Guise, Henry III. caused him to be murdered. This act increased Henry's unpopularity; Paris and other towns shut their gates against him. He and Henry of Navarre had their camp at St. Cloud, and were besieging Paris when Henry III. was murdered.

The House of Bourbon (1589–1792).—Henry of Navarre, who became HENRY IV. (1589–1610), was abandoned by the royal army, and went to Dieppe to meet reinforcements sent by Queen Elizabeth of England. He won the battles of *Arques* (1589) against Mayenne, bro. of Henry of Guise, *Ivry* (1590) against the *Ligueurs*, and *Aumale* against the Spanish, who helped the *Ligueurs*. The people were utterly weary of civil war; the States-General were called and made apparent the self-seeking of adherents of the remaining Guises. A satiric pamphlet, the *Satire Ménippée*, did great service to Henry, who clinched matters by solemn acceptance of Rom. Catholicism in the basilica of St. Denis (1593). The *Ligue* was dissolved and the great Wars of Religion finished. The king signed the EDICT OF NANTES (1598) with the Protestants and the Peace of Vervins (1598) with the Spanish after his victory of *Fontaine-Française* over them and Mayenne. The territorial unity of F. was restored and absolute monarchy came to its climax. In 1600 the king obtained the annulment of the marriage he had been trapped into by Catherine de' Medici, and married the pope's niece, Marie de' Medici. The wounds of the country after forty years of civil war were healed. Sully, Henry IV.'s friend and chief minister, improved agriculture and finances, constructed canals and roads, protected labourers against tax collectors and nobles. After paying 235 million francs debt, Sully left 40 millions in the Bastille. The Gobelin factories were reorganised and others established for silk, glass, artistic earthenware, and other home industries. Henry was full of great schemes when he was murdered by François Ravaillac.

LOUIS XIII. (1610–43) was only nine years old. His mother, Marie de' Medici, regent, entrusted affairs to an Italian, Concini, whose wife, Eleonora Galigai, had great influence over him. Concini was killed by the king's orders, and Albert de Luynes did not fare better. The States-General of 1614 did little good except to bring under the queen's notice the young bp. of Luçon (later Cardinal RICHELIEU), whom she made chief minister. That eminent statesman had a threefold plan for putting down (1) the nobles, (2) the Protestants, (3) the house of Austria. (1) The religious wars had revived the centrifugal tendencies of feudalism and introduced an anti-national spirit. Richelieu ordered the Count of Chalais, the Maréchal de Marillac, the Duke of Montmorency, and other magnates to be beheaded because they had called in the Spanish. Marie de' Medici, who had joined in a conspiracy of the lords against her son and Richelieu, was exiled to Compiègne, where she died. The last to fall were Cinq Mars and his friend, De Thou, executed for not betraying the plot. (2) Richelieu took La Rochelle, the Prot. stronghold, by building a huge dyke round it and reducing the inhabitants to famine. The Peace of Alais, however, granted religious freedom. (3) The house of Austria was reigning over Spain, Italy, and Germany. Richelieu took Valtelina in 1624, and in 1629 secured the succession of the duchy of Mantua. He helped the Catholics diplomatically with money during the early periods of the Thirty Years War (1618–48), and in 1635 made France join openly in the 'French' or fourth period. He and Louis XIII. drove the Spanish from Picardy (1636) and took Arras, Artois, Alsace (minus Strassburg), the islands of St. Margaret and St. Honorat, St. Jean de Luz and Roussillon (1641–42). In 1643 Condé, Duke of Enghien (*le Grand Condé*), won the battle of *Rocroi* against the Spanish; he and Turenne were successful at *Freiburg* and *Nordlingen*, Condé again at *Lens*. Austria had to sign the Treaty of Westphalia (1648), which marked the first decline of the Span. empire. F. occupied Lorraine; her frontiers touched the Rhine. Richelieu, who, after Louis XI., contributed most to Fr. unity, did not enjoy the fruit of his work. He died in 1642, Louis XIII. next year. Louis had the great merit of bearing for eighteen years with a capable minister whom he disliked.

His s., LOUIS XIV. (1643–1715), succ. at the age of five. His mother, Anne of Austria, obtained the regency from the *Parlement* as Marie de' Medici had done. MAZARIN, who had succ. Richelieu, was unpopular as an Italian, and nobles and *Parlement* repressed by Richelieu, joined in the civil war of the *Fronde*. The queen had the leaders of the *Parlement* arrested, but the people rose and made barricades in Paris, and the queen was forced to fly to St. Germain with the young king (1649). Condé quelled Paris, but disagreed with Mazarin and joined the Spanish. Turenne besieged Paris in his turn, but 'The Great Mademoiselle,' dau. of Gaston d'Orléans, the king's uncle, compelled him to retire. However, the people of Paris begging for peace, the king proclaimed an amnesty (1653). The Frondeurs either flocked to the court and Mazarin or were exiled. During the Civil War Spain had again attacked the north and east of F. Turenne won the battle of the *Dunes*, and the Treaty of the Pyrenees was made (1659). Condé recovered his possessions and honours. Louis XIV. married the Infanta Maria Theresa, dau. of Philip IV. of Spain. After Mazarin's death (1661) he showed great activity, common sense, and dignity, and was fortunate in ministers and councillors. Colbert reorganised the finances and exposed the *sur-intendant* Fouquet. Louvois was minister of war. Condé, Turenne, Luxembourg, Catinat, Villars, etc., generals; D'Estrées, Duquesne, Tourville, Jean Bart, Duguay-Trouin, admirals, in Louis's four great wars. After the peace of the Pyrenees F. enjoyed six years' peace.

There followed (1) the War of DEVOLUTION (1667). At the death of Philip IV. of Spain, Louis XIV., according to the right of 'devolution,' claimed the Span. Netherlands for his wife, Maria Theresa. He was at first victorious, with the help of Condé, but the Dutch called England and Sweden into the Alliance of The Hague, and Louis XIV. was obliged to sign the Treaty of Aix-la-Chapelle (1668), which only left him Fr. Flanders. (2) War with Holland (1672–78). These constant wars by which F. became famous left her exhausted at the close of the 'grand monarque's' reign, and this exhaustion was one of the causes of the Fr. Revolution. The valiant resistance of William of Orange saved the Dutch Netherlands, and when the Peace of Nimeguen (1678) was signed, Spain paid for all. She conceded to F. towns in the east and north—Valenciennes, Cambrai, Maubeuge, etc., which Vauban fortified strongly as frontier fortresses. Ten years of peace followed for F.; arts and lit. flourished. Louis XIV. had reached the climax of his power and abused it. He assembled the *Chambres de Réunion*, tribunals which pronounced his all the towns and places attached to the territories he had gained by the last treaties. In 1685 he revoked the Edict of Nantes signed by his grandfather, Henry IV.; 100,000 Protestants went abroad with their money and industry. Others under Jean Cavalier (1701) went to the Cévennes and took arms. These *Camisards* were reduced by the *Dragonnades* and by Villars who was sent against them. This act strengthened Louis's enemies. William of Orange formed the League of Augsburg between Holland, Spain, the emperor, some Ger. princes, and, after the Revolution, England. (3) WAR OF THE LEAGUE OF AUGSBURG OR GRAND ALLIANCE (1688–97). James II. of England, whose cause Louis espoused, was beaten at *the Boyne*, and Tourville was defeated at *La Hogue*, but inland Luxembourg won the battles of *Fleurus* (1690), *Steinkerque* (1692), and *Neerwinden* (1693), taking so many flags from the enemy that he was surnamed 'the upholsterer of Notre-Dame.' The Palatinate was taken

by Louvois as belonging by right to the Princess Palatine, second wife of the Duke of Orléans, and burned and devastated. In Italy Catinat defeated Victor Amadeus of Savoy at *Staffarde* (1690) and *La Marsaille* (1693). When both sides were exhausted peace was signed at Ryswick (1697). Louis XIV. recognised William III. as king of England, allowed the Dutch to put garrisons in some towns of Flanders, and the Duke of Savoy received Fr. possessions beyond the Alps. (4) War of the SPANISH SUCCESSION (*q.v.*) (1700–13), in which Marlborough and Prince Eugene inflicted great defeats on the French. Nevertheless, by the Treaty of Utrecht (1713) the Bourbon candidate kept Spain on condition of renouncing the crown of F. F. kept her limits and colonies, except Nova Scotia, abandoned to Britain, who also received Gibraltar and Minorca. The country, however, was in a pitiful state. Louis XIV. died, preceded by the grand dauphin, the Dukes of Burgundy, Brittany, and Berry. His heir was his great-grandson, the Duke of Anjou, aged five. Louis had secretly married Madame de Maintenon (*q.v.*) in 1684. The 'Age of Louis XIV.' was a period rich in lit. and art.

During the minority of LOUIS XV. (1715–41) his uncle, Philip of Orléans, the notorious regent, governed and inaugurated a court reaction after Madame de Maintenon's severity. Licence and luxury prevailed. F. wanted money at all costs, and it was then that the Scot. banker, Law, proposed his system of paper money. The Royal Bank was established and its shares rose from 5000 to 25,000 francs. A new Indian Co., including that founded by Colbert, was created to capitalise the treasures of Louisiana and the Mississippi valley, and led to wild speculation. Bankruptcy followed, besides a war in which the regent, Britain, Holland, and Austria, now suddenly become allies, joined against Spain. The war was caused by Alberoni, Philip V.'s minister, who had utilised Span. discontent with the Treaty of Utrecht for his private purposes, and Spain was subdued. After the Regent's death, the Duke of Bourbon governed long enough to arrange the king's marriage with Maria, dau. of Stanislas Leczinski, king of Poland. In 1733 the aged Cardinal Fleury, the new minister, took the part of the king's father-in-law in the War of the Polish Succession, ended by the Treaty of Vienna (1738).

After a short peace, the War of the AUSTRIAN SUCCESSION (1741–48) broke out. F. took no active part until its later stages, but it cost her 1200 million francs. Louis XV. had quitted himself well on the battlefield, and become popular, but his education had been deplorable; he retired to Versailles and led an indolent life, ruled by Mme de Pompadour, Mme du Barry, and other mistresses whom he allowed to meddle in State affairs. His invaluable minister, Choiseul, tried to prevent the disasters of the SEVEN YEARS WAR (*q.v.*) (1756–63), but fell before a court intrigue. Choiseul worked the *pacte de famille* (1761) between the Bourbons of France, Spain, and the two Sicilies, but Louis XV. had to accept the disastrous Treaty of Paris (1763). F. recovered some of the West Indies and places in India, but gave up Louisiana to Spain (who ceded Florida to Britain), Canada (*q.v.*) to Britain, and promised to pull down the port of Dunkirk. Under the administration of Choiseul, Lorraine and Corsica were joined to F. (1768–69). His successors, engaged in struggles with the *Parlements*, did not interfere in the division of Poland between Austria, Prussia, and Russia. The *Jansenist* heresy was causing trouble also; the *Parlement* of Paris took part against the pope, who had issued the bull *Unigenitus*.

At his death Louis XV. left to his grandson, LOUIS XVI. (1774–92), a kingdom lowered in the eyes of Europe, with court intrigues, religious quarrels, increasing taxes, and parlements ready to oppose royalty. The philosophers were writing against institutions and abuses, and disturbing the people's minds. The new king was honest and patriotic, but had not strength for this crisis. There was no social equality in the division of land, taxes, trades, etc. The ministers, Turgot, Malesherbes, Necker, tried to improve matters, beginning with finances, but the nobles resented economic measures which touched themselves; the ministers were dismissed one after the other. In 1775 Louis XVI. very unwillingly was drawn into the Amer. War of Independence (1775–83) by the enthusiasm of his nobles. La Fayette and Rochambeau went to fight under Washington. The Fr. fleet won victories, and by Treaty of Versailles (1783) F. recovered her colonies of Senegal, West Indies, and India, and the freedom of others, and was allowed to rebuild Dunkirk's fortifications, while Britain lost Minorca; finances were in a worse state than before. Calonne, then Brienne, tried to raise new taxes, *Parlement* resisting. Queen MARIE-ANTOINETTE of Austria, dau. of Maria-Theresa, who was of Brienne's party, was publicly insulted. Louis XVI. recalled Necker, who assembled the States-General (1789), in which the people had double the number of representatives of the nobles or the clergy. In a preparatory meeting, the 'Principles of 1789' were drawn up, *i.e.* a new constitution for F.; the Fr. Revolution (*q.v.*) had come.

The **First Republic** (1792–1804) was proclaimed Sep. 22, 1792. Louis XVI. was guillotined in Jan. 1793, Marie Antoinette in Oct. The dauphin, LOUIS XVII., died June 8, 1795. At the news of Louis XVI.'s execution, nearly the whole of Europe had made the *First Coalition*, and marched to the Fr. frontiers. Carnot 'organised victory.' Hoche conquered on the Rhine (1793), Houchard was victorious against the British at *Hondschoote* and Dutch at *Menin*, Jourdan at *Wattignies* and *Fleurus* (1794), and Pichegru in Holland. On Jan. 20, 1795, the four N. armies entered Amsterdam, though in rags, without shoes, in the snow. In the south, Dumerbion, Masséna, and Bonaparte had taken the camp of Sorgio (1794); Dumouriez had entered Catalonia; Moncey and La Tour d'Auvergne occupied the Basque provinces. Spain, Prussia, and Holland drew out of the Coalition, and signed the Peace of Basel (1795), which gave F. the left bank of the Rhine. The Civil War of *Vendée* had been sustained after the king's death, but Hoche subdued the last signs of revolt at *Quiberon* (1795). The people of Paris rose for the last time against the Convention (Oct. 5, 1795), and were subdued by Barras and Bonaparte. The next government was the DIRECTORY (*Conseil des Anciens*, '*des Cinq-Cents*'), the five 'directors' being Barras, Rowbell, La Réveillière-Lépeaux, Le Tourneur, and Carnot (1795–99). It had to free F. from invasions. Bonaparte, with Masséna, Augereau, Sérurier, and Berthier, crossed the Alps, and won the victories of *Montenotte*, *Mondovi*, *Lodi*, *Castiglione*, *Arcole*, *Rivoli*, etc. Hoche, Moreau, and Desaix fought on the Danube. Bonaparte signed with Austria the Treaty of Campo-Formio (1797). Britain still remaining hostile, Bonaparte attacked her in Egypt. He went from Toulon (1798) to Alexandria, was victorious at the *Pyramids* and entered Cairo; but Nelson defeated Admiral Villeneuve. Bonaparte, inland, won at *Mont Thabor* and *Aboukir*. All the European Powers, except Spain, had now formed the *Second Coalition*. Bonaparte was recalled to Paris, and the *coup d'état* of '18 Brumaire' followed.

The Consulate (1799–1804) was formed, with Bonaparte as First Consul for ten years, and Cambacérès and Lebrun as colleagues. In less than two years Napoleon (*q.v.*) reformed the services, created the Bank of F., negotiated with Rome the *Concordat* (1801), which fixed the standing of the Church, began the *Code Napoléon*, and instituted the *Légion d'Honneur* (1802). To face the Second Coalition he crossed the Great St. Bernard and won the battle of *Marengo* (1800). An attempt in Paris to take his life, made by the Royalists through Georges Cadoudal, increased his popularity. Peace was signed with Austria at Luneville (1801), and with Britain (1802). **The First Empire.** After being elected consul for life (1802), and escaping a second attempt on his life by

the same conspirators, Bonaparte accepted the Senate and people's suffrage, and became Emperor. Pope Pius VII. came to Paris and crowned him and his wife, the Empress Josephine (May 18, 1804). Royalists came back in numbers and resumed their titles. The emperor adopted Josephine's children by a first marriage, Prince Eugène de Beauharnais and Hortense, who m. Louis Bonaparte, Napoleon I.'s bro., and was the mother of Napoleon III. Napoleon I. was deposed (April 1814), and Louis XVIII., Count of Provence, bro. of Louis XVI., was called to the throne. Napoleon abdicated in favour of his son (April 20). **The First Restoration** (1815) was maintained, the new king signing the 'Charter of 1814,' maintaining the institution of the Revolution. The Treaty of Paris, signed with the seven Powers who had been leagued against Napoleon, put back the limits of F. to what they were in 1790; foreign troops evacuated the country. The new king was not popular, and Napoleon, *au fait* with what was going on in F., escaped from Elba, and entered the Tuileries (March 20, 1815) as Louis XVIII. was leaving for Ghent. He reigned over F. for a Hundred Days (*Les Cent Jours*). The armies of the Allies returned; Napoleon faced them, but was defeated at *Waterloo* (June 18, 1815), and secluded at St. Helena, where he died, May 5, 1821. Louis XVIII. (1815–24) came back—**Second Restoration** (1815–30). By the Treaties of Vienna and Paris, F. lost some places in the north and east, and a new division of Europe was made. Louis XVIII. treated the Bonapartists with great severity, and the Royalists allowed massacres in F., called the *White Terror* (because of the Bourbons' white flag), in which Marshal Ney perished (Dec. 7, 1815). The king governed with ministers (Richelieu, Descazes, Villèle) and two Assemblies, the *Chambre des pairs* and the *Chambre des députés*; an electoral law and a conscription act were passed. An army was sent to Spain to put down a revolt and to restore Ferdinand VII. In 1820 Louvel, an enemy of the Bourbons, killed the Duke of Berry, second son of Louis XVIII.'s bro., the Count d'Artois (afterwards Charles X.); but the Duchess of Berry seven months after the assassination gave birth to a son, the Duke of Bordeaux (later Count of Chambord, d. 1883). Charles X. (1824–30) became very unpopular by granting an enormous indemnity to the *émigrés*. With his ministers, Martignac, Polignac, Bourdonnaie, and Bourmont, he made enactments doing away with the freedom of the press, and introducing a new mode of election. Paris revolted (July 27–29, 1830). The king abdicated in favour of his grandson, the Duke of Bordeaux, whom the people refused. Under Charles X., Britain, F., and Russia won the battle of *Navarino* (1827) over the Turks, and established the independence of Greece.

The Chamber of Deputies elected Louis-Philippe (1830–48), Duke of Orleans, who had fought for the Revolution at *Valmy* and *Jemmapes*. He took the name of 'King of the French,' accepted the Charter of 1814, and the three-coloured flag. The minister Casimir Périer kept the Austrians in check at *Ancona* and repressed the riots in Lyons, but unfortunately died of cholera (1832). Marshal Soult, Guizot, Thiers, and Broglie succeeded to power, and put down the *Vendée*, raised by the Duchess of Berry, who wanted to enthrone her s., the Duke of Bordeaux. Antwerp was taken by a Fr. army, establishing Belgian independence of Holland, Algeria was conquered (1834–47), Constantine was taken (1837), the battle of *Mazagran* won (1840); Marshal Bugeaud was victorious at *L'Isly* (1844); Abd-el-Kader surrendered to General Lamoricière (1847). Louis-Philippe escaped death several times, notably in 1835 in Fieschi's plot. In 1842 his eldest s., the Duke of Orleans, who was very popular, died. The king and Guizot having refused electoral reform, revolution broke out (Feb. 24). Louis-Philippe resigned in favour of his grandson, a child, the Count of Paris.

But the **Second Republic** (1848–52) was proclaimed. In 1833 primary schools had been organised. The Second Republic established universal male suffrage. Capital punishment for political offences was abolished. Louis Bonaparte, nephew of Napoleon I., was elected Pres. He sent an army to Rome to restore the Pope, and made the law of 1850 giving the direction of education to the clergy and congregations. On Dec. 2, 1851, he made a *coup d'état* and formed a new constitution which made him Pres. for ten years.

The Second Empire.—On Dec. 2, 1852, he was made Emperor as Napoleon III. (1852–70). He married (1855) Eugénie de Montijo, the Empress Eugénie, and had a s., the Prince Imperial, killed in Zululand (1879). Napoleon III. undertook several wars, beginning with the Crimean (*q.v.*) (1854–56), in alliance with Britain. Peace was signed at Paris, 1856. In 1859 Britain and F. made a campaign in China; Generals Grant and Cousin-Montauban took the forts of Pei-ho (Aug. 1860), and won the battles of *Tehang-Kia* and *Palikao*. In Italy (1859–60) the Count of Cavour, Victor Emmanuel's minister, induced Napoleon III., after the conspiracy of Orsini and Pietri, to help Italy against Austria. After the victories of *Montebello*, *Palestro*, *Magenta*, *Solferino*, the Treaty of Zürich was signed. Austria gave Lombardy to the emperor, who renounced Piedmont in exchange for Savoy and the county of Nice (1860). Later Napoleon III. helped Italy to get Venetia.

An Austrian prince was, with Napoleon's approval, made emperor of Mexico; the Mexicans revolted; F. had to call back her troops and Maximilian was killed at *Queretaro* (1867). Faidherbe also extended Fr. dominion in Senegal over Cayor, Bondo, and Bambouk. In 1853–57 Randon subdued Kabylie (Algeria). In Annam (Indo-China), after the war (1861–62), the Emperor Tu-Duc had to allow religious freedom and give up to France the provinces of Saigon, Bien-Hoa, and Mytho. Three more provinces were added in 1867.

The Franco-German War (see separate article under that heading) took place 1870–71. After the disaster of Sedan, the ministers, Jules Favre, Gambetta, and Trochu, proclaimed the **Third Republic** (Sep. 4, 1870). The Prussians besieged Paris (Sep. 19), which surrendered through famine (Jan. 28, 1871). By the Treaty of Frankfort (May 10, 1871) F. lost Alsace and half Lorraine, but kept Belfort. She had, besides, to pay 5 billion francs (£200,000,000) to Germany. In Paris the Royalist party under Thiers did not welcome the Republic; this incensed the people, who rose (March 18, 1871) and instituted the Commune, by which each local unit was to govern itself freely. The Assembly retired to Versailles, besieged and took Paris (May 28), and deported or killed the revolutionaries. But the factions were not satisfied. Thiers had to resign (May 24, 1873), after having, in two years, paid the heavy war indemnity, and sent the Germans out of the country. Marshal MacMahon was elected for seven years (1873–79). The Royalists would have triumphed had the Count of Chambord not insisted on bringing back the white flag of royalty (Aug. 27, 1873). The National Assembly retired (1875). The Senate and Chamber of Deputies governed under a Pres., elected for seven years at a congress of the two Chambers. MacMahon, too much inclined to the Royalists, resigned; Jules Grévy was elected Pres. (Jan. 30, 1879). After him came Sadi Carnot (Dec. 1887), murdered at Lyons by an Ital. anarchist (June 1894), Casimir-Périer (1894), Félix Faure (1895), Émile Loubet (1899), Armand Fallières (1906), Raymond Poincaré (Jan. 1913).

Carnot's presidency saw the Boulanger (*q.v.*) incident, Panama Canal (*q.v.*) scandals (see also Lesseps). Dreyfus case (see Anti-Semitism) occurred, 1898–99, and Fashoda incident, 1898. In 1904 F. recognised Britain's influence in Egypt, and Britain agreed to F.'s predominance in Morocco (*q.v.*). By Separation Law, 1905, official religion was abolished, and no

State salaries are paid to clerics, while religious instruction was to be gradually superseded. Socialism flourishes in F., strikes are common, and Syndicalism (*q.v.*) grows.

Under the Third Republic many railways, canals, and ports have been constructed. The Fr. colonies have been extended. In 1879 Savorgnan de Brazza established the Fr. Congo; a Fr. Protectorate was declared over Tunis (1881); a new expedition went to Tonkin and succeeded in taking of Son-Tay (Dec. 17, 1883), Bac-Ninh (March 12, 1884); Fr. Protectorate proclaimed over Annam; Treaty of Tien-Tsin (May 12, 1884) recognised Fr. establishment in Tonkin. In Sudan victories were won over Ahmadon (1890) and Samory, prisoner of F. (1899). In 1893 Bonnier took Timbuktu. In Dahomey General Dodds captured King Behanzin (1894) and established a Fr. Protectorate. Conquest of Madagascar: General Duchesne took Tananarivo (1895). On the Red Sea, establishment in Djibouti (1900). In 1900 F. took possession of In-Salah and In Bahr in the oases of Touat in S. Algeria. An alliance was made between F. and Russia (1897) to balance the Triple Alliance (Germany, Austria, and Italy) and maintain peace in Europe. An Anglo-Fr. *Entente* (1904) facilitated consolidation of Fr. power in Morocco. Fr. ministries follow each other in quick succession, but the Third Republic remains firmly established.

FRENCH LANGUAGE.

At the time of the Roman Conquest (58–50 B.C.) Gaul was inhabited by Iberian and Celtic peoples. They spoke Gallic, a language which was not written; the Druids maintained oral scholarship, and the language disappeared with them about three cent's after the Conquest (except in Brittany, which stood apart). The Gauls, less civilised than the Romans, adopted their language, the popular Latin, which became the Romance language (Autun, Bordeaux, and Lyons possessed celebrated schools where learned Latin was professed). The Franks conquered Gaul, IV.–V. cent.; they adopted the Romance language, but about 900 Germanic words, mostly of war, law, and titles, were introduced.

The oldest written documents in Romance language are the *Gloses de Reichenau* (748), a sort of glossary of the Bible; the *Serment de Strasbourg* (842), an agreement between the two grandsons of Charlemagne, which shows that the Romance tongue was sufficiently established to necessitate a copy in both Romance and German. The *Cantilene of St. Eulalia* (IX.–X. cent.) and a poem on *The Life of St. Léger of Autun* (X. cent.) are the oldest pieces of Fr. poetry known. By the XI. cent. the Fr. language was formed, Fr. lit. flourished and its influence was felt all over Europe, but there was no unity as yet in the tongue. Different dialects existed, due to differences of race—*Langue d'Oil* in the north and *Langue d'Oc* in the south, from *oil* (Lat. *hoc illud*) and *oc* (Lat. *hoc*) meaning 'yes' in the respective dialects. A line drawn from La Rochelle to Grenoble would make a fair division of the country as regards languages. For the Langue d'Oc, see PROVENCE.

The *Langue d'Oil* was subdivided into *Normand, Picard, Bourguignon, Lorrain*, and the dialect of Ile-de-France called *Français*. The official acts and literary works of each province were at first written in its own dialect. Roger Bacon, in his *Opus Majus* (*c.* 1286), mentions those dialects. The dialect of Ile-de-France prevailed for political reasons; in 987 Hugh Capet, Duke of France, usurped the throne and made Paris his capital; until the middle of the XIII. cent. the Capetians had little influence in the country, but thereafter the Fr. dialect extended with their rule, and in less than three cent's the other three dialects became *patois* which can still be found in provincial literary works of the Middle Ages. French was first used in the provinces for official acts, then in literary works; finally it was adopted by all educated people. The process was accomplished in XIV. and XV. cent's. The strong influence exercised by Ital. Renaissance led to ingress of Ital. words. Joachim du Bellay, in his *Défense et Illustration de la Langue française* (1548), and Ronsard (1524–85) and the other members of the *Pléiade* introduced Latin words. Malherbe (1555–1628), the *Hotel de Rambouillet*, and the *Dictionnaire de l'Académie* (1694) worked a purist reform which left the language poorer, but it developed again under the great writers of XVII., XVIII., and XIX. cent's; late additions (20,000 words and more) are due to struggle of the *Classiques* and *Romantiques*, progress of journalism, science, industry, and better knowledge of foreign lit.

As to construction, the *Langue d'Oil* had two cases (instead of six as in Latin); later French drops them all, but becomes analytic, *i.e.* employs different forms and prepositions to mark cases, and takes the article. Agreement of adjectives was retained but not always observed in old French. A new form of conjugation (the infinitive with an auxiliary) was used. About 800 doublets are to be found in French; they are words of learned Latin in which tonic accent has been misplaced, introduced again into the language, cf. *porte, portique*; *fraile, fragile*.

FRENCH LITERATURE.

French literature begins when the *Langue d'Oil* and the *Langue d'Oc* (see FR. LANGUAGE) are definitely shaped; latter was employed by *troubadours* in Provence (*q.v.*), former by northern *trouvères* in Fr. lit. proper. Political, legal, and religious documents are found in early times in prose in vernacular, but pure lit. commences and for long time continues in verse only.

Poetry in Middle Ages.—The earliest form, *cantilena* (*chant*), parent of the later *chanson*, is supposed to have existed in VII. cent., but first that remains is song of *Ste. Eulalie* (IX.–X. cent.); metrical lives of the saints followed, and led way to XI.-cent. lives of the heroes, or CHANSONS DE GESTE (*i.e.* of deed), which form a cycle of stories about Fr. heroes, chief of whom was Charlemagne; the glory of early Fr. lit., the *Chanson de Roland*, was first discovered at Oxford, 1837. ROMANCES followed as epic poems; romances of Arthurian cycle, which came into being in Brittany in XII. cent., were turned into prose at close of cent. by Chrestien de Troyes. The Cycle of Antiquity is name given to those of the *genre* of same period which took classic themes; Benoît de Ste.-More, who wrote the *Roman de Troie*, is supposed to have been also author of *romans* of Æneas and Thebes; *Alexandre*, by Lambert le Tors and Alexandre de Bernay, and *Julius Cæsar* are famous examples. Early chronicles also took form of poems; Wace wrote *Brut* (*Estoire des Bretons*) before 1155, and *Rou* (*Geste des Normans*), 1164–70; Jordan Fantosme's chronicle of war between Henry II. and his son was written 1173–74, the valuable *Thomas à Beckett* of Garnier de Pont Sainte-Maxence, 1177.

The FABLIAUX were a characteristic form of XII. and XIII. cent's; translations or imitations of Æsop's fables, they were the vehicle of worldly wisdom and humour of the time, and so parent of important forms of later literature; example, *Le Vair Palfroi*. Eastern stories were versified as in *Sept Sages*. The FOX CYCLE (*Roman de renart*) of XIII. cent. is an important body of poems of amusing and didactic nature; love of allegory, satire, and a frank naturalness are shown in great poem of early XIII. cent., the *Roman de la rose*, by Guillaume de Lorris, completed by Jean de Meung (1250–*c.* 1305); pre-Renaissance pagan spirit in *Aucassin et Nicolette* (XIII. cent., author unknown). Verse was to the Middle Ages the most obvious way of conveying instruction; *castoiements* (chastisements, principles) were drawn up for guidance of youth, while Robert de Blois penned *Le Chastiement des dames*. *Bestiaires, lapidaires*, and *volucraires* gave technical matters in form easy to

remember, and correspond to the weather folk-lore and other rhymes still handed down in England. Most important class of all is LYRIC POETRY, in its varieties of *sirventes, jeux-partis, motets, lais, virelais,* and *pastourelles*; Audefroi le Bastard and Marie de France (XII. cent.), Thibaut de Champagne, Rutebœuf, and Adam de la Halle (XIII. cent.) are chief early lyric poets. Guillaume de Machault (*c.* 1300–80) is one of earliest experimenters in metre; his pupil, Eustache Deschamps (*c.* 1340–*c.* 1410), evolved entire *art poëtique*; XIV. and XV. cent's saw rise of *rondeau, rondolet, ballade,* etc. Alain Chartier (1392–*c.* 1440) and Christine de Pisan (1363–1430) enjoyed great reputation at time, but names which have remained are those of Charles d'Orléans (1391–1465), and, supreme in Fr. mediæval lit., Villon (*q.v.*).

DRAMA.—*Miracle* plays commenced XII. cent.; poem of Adam de la Halle, *Robin et Marion,* pastourelle in dialogue, led later to genuine secular drama. The Miracles of Notre Dame (XIV. cent.) form forty-three plays; from 1450 the Miracles were called *Mystères,* and may be divided into three cycles: *Old Testament, New Testament* (arranged in three parts by Arnoul and Simon Greban about 1450), and *Saints.* In XV. cent. appeared the *Moralités, farces,* and *soties*; a masterpiece is farce of the *Avocat Patelin* (author unknown). The Miracles were acted in XV. cent. by the *Confrérie de la Passion,* and the secular plays by the *Clercs de la Basoche.* From 1548 the two societies joined.

Prose in Middle Ages.—Prose, used in earliest times for legal purposes, first commenced to be employed for *belles-lettres* in chronicles, usually written in verse or Lat. prose; Geoffrey de Villehardouin (1160–1213) wrote first Fr. history in vernacular in description of Fourth Crusade. Joinville (1224–1317) left a *History of St. Louis*; first manuscript was lost, but a learned editor, Natalis de Wailly, reconstituted it from his notes. *Les Grandes Chroniques de St. Denis,* begun in XIII. cent., under Mathieu de Vendôme, abbot of St. Denis, and continued by laymen, are annals of kings of France to crowning of Louis XI.—called later *Grandes Chroniques de France.* Froissart (1337–1410), the greatest historian of Middle Ages, dealt with period 1352–1410; Philippe de Comines (1445–1511) left admirable *Mémoires* of Louis XI.'s reign and Charles VIII.'s expeditions beyond the Alps. *Aucassin et Nicolette* is partly in verse, partly in prose; *Le Petit Jehan de Saintré,* by Antoine de la Salle (1398–1461), is an early prose novel. La Salle is the accredited compiler of the famous *Cent Nouvelles Nouvelles* and *Les Quinze Joies de Mariage,* first masterpieces of Fr. prose; sermons and translations of Bible and Latin authors loom large.

Renaissance.—One of greatest periods of Fr. lit. is that of the Renaissance (*q.v.*), which affected France long before England; Fr. period, indeed, came to an end soon after Eng. period, the age of Shakespeare, began; France at this time was literary leader of Europe.

POETRY.—The poetical movement was carried out by the *Pléiade,* seven literary stars—Ronsard (1524–85), Joachim du Bellay (1525–60), Jean Daurat (1508–88), tutor of Ronsard, Étienne Jodelle (1532–73), Rémy Belleau (1528–77), Jean Antoine de Baïf (1532–89), and Pontus de Tyard (d. 1605), who formulated a new poetical creed, and, while adopting much from the classics, tried every poetical experiment and obtained wonderful grace and ease of form. One of last of mediæval school was Pierre Gringoire (1475-1544), who continued to produce moralities and allegorical poems in the old forms; Clément Marot (1497–1544), who preceded the Ronsardists, introduced the sonnet and founded a school which prepared the humanistic outbreak, although at once pushed into the background when the classical movement began. The *Pléiade's* aims are set forth in Du Bellay's *Défense et illustration de la langue française* (1549); a vast classical importation of words and fancies constituted a permanent contribution to Fr. culture, although much of their coining was subsequently repudiated.

DRAMA.—Jodelle had the task of renovating drama; *Cléopâtre* (1552) and *Didon,* though of little value, had great influence on future tragedy through choice of subject, fewness of characters, and observation of three classical Unities. Jacques Grévin (*c.* 1540–70), Robert Garnier (1545–1601), Antoine de Montchrestien, and Pierre Larivey developed tragedy and comedy on classical lines.

PROSE.—The aims of the *Pléiade* were not accepted by the first great prose-writer of France (excepting La Salle), Rabelais (end of XV. cent.–1533), whose *Gargantua* (1535) and *Pantagruel* (1535–52) rank among the great comic masterpieces of lit., and burlesqued human society in general and that of XVI. cent. in particular. His mockery of the *latinisants* Ronsard never forgave, and retaliated by a farcical epitaph on Rabelais, which fixed his reputation for generations and was only corrected quite recently. Marguerite de Navarre (1492–1549) used her ascendancy over her bro., Francis I., to encourage the classical school; her *Heptaméron* imitated Boccaccio's *Decameron*; written with much freedom of language, it is one of chief productions of Fr. Renaissance. Memoirs and biographies figure prominently in XVI. cent. Marguerite de Valois, '*la Reine Margot*,' dau. of Henri II., wrote *Mémoires*; Brantôme (1527–1614) recounted the scandals of the most licentious court in history, and, with equal skill, lives of illustrious soldiers of his age; an unknown writer, signing himself '*Le Loyal Serviteur*,' wrote *Histoire du gentil seigneur de Bayart.* Blaise de Montluc (1501–77) dictated his *Commentaires* from memory, without notes, in conversational style, not always grammatical, but vigorous and graphic. John Calvin (1509–64) has often been called the father of Fr. prose; he set example of clearness, lightness, great result obtained with least means, and absolute absence of the forced note—qualities which have remained distinctions of his tongue; his *Institution of Christian Religion* (1536), then unparalleled in style, was less representative of the cent. than works of that great Fr. writer of its close, Montaigne (1533–92), the parent of much in Shakespeare, and still a mine for literary men and philosophers; his *Essais,* begun in 1572, treat of everything—God, religion, politics, poetry, manners, virtues, vices, dress, trade, his own life and travels, and especially his friendship with La Boëtie, with little arrangement or order. Saint François de Sales (1567–1622), bp. of Geneva, founded in Annecy, Savoy, the *Académie florimontane,* whose emblem, an orange tree in bloom, is applicable to his style, exquisitely flowery and graceful. Never since the *Imitation* had a devotional book become so popular as his *Introduction à la Vie dévote* (1608) and *Traité de l'Amour de Dieu* (1614). Translations of Amyot (1513–93), bp. of Auxerre (among them Plutarch's *Lives*), were and are considered models of style. Of great political importance in its time was the *Satire Ménippée* (1594), which ridiculed the Ligue and did much to secure the throne for Henry of Navarre. It is a pamphlet composed by six very grave and learned *bourgeois* of Paris: Jacques Gillot, Nicolas Rapin, Jean Passerat, Florent Chrestien, Pierre Pithou, and Gilles Durant; conceived and drafted by Pierre le Roy, canon of Rouen. Jean Bodin (1530–96) was a noted political theorist.

First half of the XVII. century.—The happy classical and romantic blend of XVI. cent. gave place to severer classicism under what is now felt to have been the evil influence of Malherbe (1555–1628), a reformer, who thought to reform Fr. language and versification vitiated by Ronsard. As a matter of fact, he merely made a choice amongst the forms left by Ronsard, omitting some excellent ones which have been taken up with success by modern poets, but he arrested poetical movement. Products of the early XVII. cent. are the drama, which commences its great

age, miscellaneous prose, beginnings of academy and *salon* movement.

The *Hôtel de Rambouillet*, the first Fr. salon, was for forty years the place where the art of conversation, language, wit, and manners were brought to perfection. The Marquise de Rambouillet (1588–1665) and her dau., Julie d'Angennes (afterwards Duchess of Montausier), welcomed all literary and high-born men. Voiture (1598–1648), for instance, the son of a wine merchant, and author of witty letters, epigrams, and quatrains, was there on equal footing with aristocrats. Other salons were opened in imitation; affectations which resulted from the institution deserved the severe censure of Molière in his *Précieuses ridicules*. The Académie française (1635), under the patronage of Richelieu, had for its object to fix the language; Conrart (1603–75) was its originator; the first edition of the *Dictionnaire de l'Académie* came out, 1694, the seventh, 1878; a grammar was written by Régnier Desmarais (1705). Vaugelas (1585–1650), the chief grammarian of the classical period, with Malherbe, the *Hôtel de Rambouillet*, the *Académie française*, and J. G. Balzac (1597–1654) did most towards forming the Fr. language of XVII. cent.; J. G. Balzac created *prose oratoire*, endowing the Academy with a prize for the subject.

Drama.—Pierre Corneille (1606–84) is father of Fr. tragedy; chief works, *Le Cid* (1636), *Horace* (1640), *Cinna* (1640), *Polyeucte* (1643), which met with great success, thanks to the good taste of the public; he and Rotrou (1609–50), his friend, inspired Racine, Molière, Quinault, Regnard, and others.

Prose.—Prose like the drama flourished as poetry decayed. Descartes (1596–1650) and Pascal (1623–62) were both masters of style and of metaphysics; Descartes' *Discourse on the method of using the Reason* (1637) introduced philosophy in the vernacular; it met with instant recognition; chief thinkers of time were the Cartesians; the *Académie des Sciences* (1666), Cartesian at its foundation, later became Newtonian. Pascal is intimately connected with *Port-Royal*, an abbey of Bernardines, near Paris, founded 1204 and reformed 1602 by the Abbess Angélique Arnauld, sister of Antoine Arnauld (1507–1619), *le grand Arnauld*. The religious house was removed to Paris (1626), and the original abbey, *Port-Royal-des-Champs*, became residence of learned men, mostly friends and relatives of Arnauld, all Jansenists; they formed a remarkable school. Pascal published his *Lettres provinciales* to defend the Port-Royal Jansenists against the Jesuits in French so that everybody might follow the debate; his *Pensées* is also a masterpiece of Fr. prose. Mézeray (1610–83), Mme de Soudéry (1607–1701), Cyrano de Bergerac (1620–55), and Sully (1560–1641) left much of interest in history, novels, and memoirs.

The Age of Louis XIV.—The period 1660–1715 is called *Le Siècle de Louis* XIV., because that king exercised an influence marked, though indirect, on contemporary writers; masterpieces crowded in during his reign.

Poetry and Drama.—Boileau (1636–1711), in his *Art Poétique* (1669–74), Satires, etc., laid down, in admirable style, laws of verse. Very different from his expressive classicism was the work of La Fontaine (1621–95), whose *Fables*, an 'ample comedy with a hundred different acts,' develop one of the best mediæval kinds of verse. Another comic spirit, of wider range, but tied in classical bonds, is Molière (1622–73), one of France's greatest names. His excellence is in width of view, tolerance of judgment, a great comic spirit, and pure sense of fun. It has been objected that *Les Précieuses ridicules* (1659), *Les Femmes savantes* (1672), *Le Bourgeois Gentilhomme* (1670), *Le Malade imaginaire* (1673), amusing as they are, are types, not people; but *Le Misanthrope* (1666), *Tartufe* (1667), and *L'Avare* (1668) are immortal portraits with no undue exaggeration. Racine (1639–99), the great tragic poet, introduced innovation of simple plot, in which the hearer's attention is kept only by interest of characters and beauty of verse, and enriched literary language by using common words. Among lesser dramatists is Thomas Corneille (1625–1709).

Prose.—Theologians and preachers held a prominent place in Louis XIV.'s time; of them Bossuet (1627–1704) was the greatest orator and most productive genius. His *Sermons* are monuments of eloquence, but he made a special art of the *Oraison funèbre*; his *Discours sur l'Histoire Universelle* (1681) and *Grandeur et Décadence des Romains* are in the grand style. Bourdaloue (1632–1704) made great use of images and symbols in his *Sermons*, an innovation followed by Massillon (1663–1742), and the XVIII. cent. Fénelon (1651–1715) is another great name in this kind, and made important contributions to criticism in *Lettre à M. Dacier sur les Occupations de l'Académie française*; his *Télémaque* is still used as a model of style. Among the many aphorists of the salons who aimed at brilliance, La Rochefoucauld (1613–80), with his *Maximes* (from 1665), was strikingly successful; La Bruyère (1645–96) left his *Caractères* (1688), miniatures which are, with the *Lettres* of Madame de Sévigné (1626–96), faithful pictures of the late XVII. cent. Two other women here deserve mention—Mme de la Fayette (1633–96) for her novel, *La Princesse de Clèves*, important as the beginning of modern writing, and Mme de Maintenon (1635–1719) whose *Correspondance* Napoleon I. preferred to that of Mme de Sévigné. *Mémoires* are represented by Cardinal de Retz (1614–89), and by Saint-Simon (1687–1755) whose *Mémoires*, only revealed at the time of the Revolution, are a vivid account of the court of Louis XIV., and provide the moralist with excellently expressed reflections. Charles Perrault (1628–1703) started the *Querelle des Anciens et des Modernes* (1670–1720) in a poem, *Le Siècle de Louis le Grand*, read before the Academy. He wrote exquisite *Contes* (1697), which include old fairy stories—Puss in Boots, Cinderella, etc.

XVIII. century.—The XVIII. cent. may be divided into four periods: (1) till the end of Louis XIV.'s reign; (2) 1715 to 1750; (3) 1750 to the Revolution; (4) the Revolution.

(1) The poetic output of XVIII. cent. is negligible, but the first years are a time of transition. Regnard (1655–1709), Fontenelle (1657–1757), Jean-Baptiste Rousseau (1670–1741), and others still write good poetry compared with that of their followers; Regnard's style may claim some of Molière's qualities; Fontenelle, a *moderne*, had the merit of making the Academy and its works known to the public in *Histoire de l'Académie des Sciences* (from 1697) and *Éloges des Académiciens* (1708), and inculcating necessity of good style in works of science. Le Sage (1668–1747) by *Gil Blas* (1715–35) attained very high rank amongst painters of character, observers, and analysts of manners and passions. Memoirs continued to be excellent throughout the cent.; among early ones are Souvenirs of Mme de Caylus (1673–1720), niece of Mme de Maintenon, and *Mémoires* of Mme de Staël-Delaunay.

(2) Time of strong reaction against the XVII. cent., though it respects its masterpieces. Voltaire (1694–1778) fills the whole of century, and was chief of the *Philosophes*. He attempted with success all kinds of prose and poetry; Diderot said that he only came second in each; his philosophy is out of date and he was a one-sided historian, but his qualities of elegance and wit retain their value; later generations have been more appreciative. He contributed several articles to the great *Encyclopédie* edited by Jean d'Alembert and Diderot; in this book the faith and style of the cent. may be best studied. Montesquieu (1689–1755) and Jean-Jacques Rousseau (1712–78) are the only two writers not put in the shade by Voltaire; Montesquieu after *Lettres Persanes* (1721), a satire on Fr. society during the regency, turned his mind towards history, and published (1734) eloquent and pithy *Considérations sur les Causes de la grandeur et de la décadence des Romains*, and in 1748 the more

famous *Esprit des Lois*, the work of twenty years; its epigrams and generalisations are among best literary contributions of the century; in eighteen months the *Esprit des Lois* went through twenty-two editions. Vauvenargues (1715–47) wrote *Réflexions et Maximes* (1746) as a counter-blast to La Rochefoucauld; his *Caractères* and *Dialogues* had merit and some vogue. Louis Racine (1693–1763) wrote poems which belong in kind to earlier period, and more valuable Memoirs of his famous father, Jean Racine. Some writers of comedies kept the XVII.-cent. manner; Marivaux (1688–1763) in amusing style called *Marivaudage*, produced original plays, e.g. *Feu de l'Amour et du Hasard* (1730), besides his delightful novels; Grosset (1709–77) wrote *Le Méchant* (1749) and *Ver-Vert* (1734), with some observation of character, but weak plots.

(3) The flourishing time of the *Philosophes* and *Encyclopédistes*, who attacked all preconceived notions of physics, metaphysics, politics, and religion, in spirit of what we should now call Nihilism, but they usually clung to creed they called Deism (*q.v.*). Jean-Jacques Rousseau (1712–78) contributed perhaps as much as Voltaire to overthrowing the old monarchy and bringing about the Revolution, and his doctrine of 'return to Nature,' one of main themes of Romantic movement, had great influence on subsequent lit.; his theories on education are expressed in *Émile* (1762), on politics in the *Contrat Social*. Diderot (1713–84), who founded the *Encyclopédie* (1751–80), and D'Alembert (1717–83), who aided in the production, exercised great influence on science, but the latter soon retired in fear of the authorities. Diderot's idea was to include all knowledge in his *Encyclopédie*, which pronounced authoritative modern free-thinking view on all subjects; most of the great Fr. contemporary writers collaborated, but there were gaps in the syllabus, unevenness in the articles, contradictions in the doctrines. Diderot was far from a mere *doctrinaire*, as later ages have opprobriously dubbed the *philosophes* who sought to remodel society on abstract plan; he tried to make the drama more natural in a way that was followed in the XIX. cent., and is the parent of art criticism. D'Alembert was above all a mathematician, inspired by Bacon. An example of the combined scientist and stylist is Buffon (1707–88), author of the saying, 'Style is the man'; he composed an encyclopædic *Natural History* (1749–1804); his *Discours sur le Style*, on being admitted to the Academy (1753), is both precept and example. Gilbert (1751–80), one of the few poets, wrote *Le Dix-huitième Siècle* (1775) and *Adieux à la Vie*, more poetical than anything his age had yet produced. Marmontel (1723–99) and La Harpe (1739–1803), inspired by Molière, show the faults of nearly all his followers. The *Salons* flourished under Mme de Lambert (1647–1733), Mme de Tencin (1681–1749), Mme du Deffand (1697–1780), Mme de Lespinasse (1731–76), Mme Geoffrin (1699–1777), and Mme Necker (1739–94).

(4) A great change came with the Revolution; poor in poetry, the XVIII. cent. had been a great period for prose, but now came time of silence, scarcely broken even by munificent State encouragement under the First Empire. There has always been a curious reflex action of Fr. and Eng. lit. The Eng. Renaissance owed an immense debt to Fr. Renaissance of XVI. cent.; Eng. philosophers of XVII. and XVIII. cent's were the parents of Fr. *philosophes* who did much to bring about Fr. Revolution; then France produced Rousseau, who was chief cause of Romantic movement, which gave to Germany and England some of their greatest literary masterpieces, but France herself gained nothing from the Romantic movement for generations; a Gothic and mediæval revival began in England, but Fr. Empire styles refined more and more on the classical forms; the Republic and Empire sought precedents not from Middle Ages but Imperial Rome; when the Fr. Romantic movement finally commenced it was under influence of England; there was, however, a feeble attempt at emancipation from the classics in the earlier period. Beaumarchais (1732–99) wrote *Mariage de Figaro* (1784), acted in spite of Louis XVI., and *Le Barbier de Seville* (acted 1775), which met with little success at the time.

Bernardin de St. Pierre (1737–1814), friend and follower of Rousseau, published the idyllic if now somewhat dull *Paul et Virginie* (1787). André Chénier (1762–94) wrote lyrics: *L'Aveugle*, *Le Mendicant*, *La Jeune*, *Tarentine*, *Élégies*, *Odes*, and *Iambes*, quite different from productions of Voltaire's school. Marie-Joseph Chénier (1764–1811), his less-talented brother, wrote *Epistles*, but the Revolution for a time killed poetry. The Empire, with its classical ideals, proved nearly as fatal, although Napoleon's restoration of religion acted to some extent as a classical antidote; first signs of coming Romantic movement are to be found in religious revival.

XIX. century. — Mme de Staël (1766–1817) applied the term ROMANTIC MOVEMENT to the anti-classical revolt which now ensued. Chateaubriand (1768–1848), pupil of Rousseau, in *Le Génie du Christianisme* (1802) attacked doctrines of the last hundred years, upheld Christianity as source of art and poetry, and did justice to the Middle Ages for first time since the Renaissance. *Atala* and *René* episodes in the book contain fine descriptions of the New World. *L'Itinéraire de Paris à Jérusalem* (1811) is first thing of its kind; *Les Martyrs* (1809) continued the *Génie du Christianisme*. Mme de Staël, author of the once famous *Corinne* (1807), clung to the old school but coquetted with the new; her *De l'Allemagne* (1810) helped the movement by describing Germany, and started modern hist. and literary criticism. Joseph de Maistre (1754–1821) was a mediævalist even more ardent than Chateaubriand, as he showed in *Considérations sur la France* (1796) and *Essai sur le Principe Générateur des Constitutions politiques* (1810). Joubert (1754–1824), Chateaubriand's friend and literary adviser, wrote polished *Maximes*, *Essais*, *Lettres*. The Abbé de Lamennais (1783–54), a leader in this religious revival, wrote fiery, eloquent *Essai sur l'indifférence en matière de religion* (1817); his opinions were censured by Rome (1832), and after leaving the Church he penned *Paroles d'un croyant* (1834). The Dominican, Lacordaire (1802–61), one of the greatest orators of the cent., left admirable *Conférences* (1835–50).

Poetry.—Lamartine (1790–1869), also deeply pious, was one of the first poets of Romanticism; in pure lyric gift he was far surpassed by Béranger (1780–1857) but neither of them really represent the new movement, of which Victor Hugo (1802–85) is the first great exponent; production of his play *Hernani* (1830) marked crisis of movement. Hugo (*q.v.*) is first of series of poets who restored Fr. poetic repute; since days of mediæval *Chansonnier* France had produced little pure poetry, though she had led the world in prose; now comes another great poetic epoch. The motto of the *Cénacle*, presided over by Hugo, was freedom of form for lit. Casimir Delavigne (1793–1843), a noteworthy poet and dramatist, inclines towards the old school. Alfred de Vigny (1797–1863), one of the leaders of the new school, has only recently received justice. Alfred de Musset (1810–57), the most classical poet in the early movement, was the poetical personality of his age. Auguste Barbier (1805–82) wrote *Iambes* which recall those of André Chénier. Brizeux (1806–58) and Victor de Laprade (1812–84) were minor members of the school. A younger school of romanticists, now growing up, was colder and subtler. Théophile Gautier (1811–72), the poet of the perfect ear, was a romantic and classicist blended, and his *L'Art* is a model of writing as well as much-quoted expression of poetic creed; same masterly style in stories, *Italie* (1852), *Voyage en Russie* (1866). Gautier, Banville, Leconte de Lisle, and Baudelaire (1821–67) (the moon

of the movement) were the elder members of the *Parnassiens*, one of first societies to branch off, under auspices of Ricard and Catulle Mendès (1841–1909), from the Romanticists; chief among the *Parnassiens* are Sully Prudhomme (1839–1907), Villiers de l'Isle-Adam (1840–89), François Coppée (1842–1908), Mallarmé (1842–98), Paul Verlaine (1844–96); later *Symbolists* include several of above names, that of the boy Rimbaud (1854–91), who started movement with *Le Bateau ivre* (1871), Hérédia (1842–1905), graceful poet, Léon Dierx (b. 1838), Paul Fort (b. 1872), etc.; although Jean Richepin (b. 1849) and others still keep poetry alive, signs now appear that the poetic outburst is over, and that France has once more entered on a great prose period.

Drama.—Victor Hugo laid down rules for Romantic drama in preface to *Cromwell* (1827), but did not observe them; his plays were not so well received as the *Othello* (1829) and *Chatterton* (1835) of Alfred de Vigny, or as hist. plays of Dumas *père* (1803–70), whose *Tour de Nesle* is a little masterpiece of horror of the kind dear to the school. On the whole, the Romantic hist. drama was a failure. Eugène Scribe (1791–1861) obtained success with light, amusing comedies cleverly staged. Among many dramatists may be mentioned Augier (1820–89), author of amusing comedies, Dumas *fils* (1824–95), writer of popular moralising dramas, Sardou (1831–1909), whose problem plays tend to sink by their own weight, Pailleron (1834–99), author of *Le Monde où l'on s'ennuie*, and Rostand (b. 1868), whose poetical dramas owe so much to the Coquelins; the hypercritical find Rostand rhetorical, and Paris was both bewildered and angered by *Chantecler*. See also DRAMA.

FICTION steadily developed throughout the cent. and has now become principal Fr. arm. Hugo, who led the way, Dumas, who has interest rather of plot than style, and George Sand, also a distinguished pioneer, have not the characteristics which are the chief ornaments of Fr. prose style; the best of them are poets writing in prose; nor has Balzac (1799–1850), though in some ways the greatest literary figure of the cent., those qualities, which appear, however, at that early date in Gautier and Prosper Mérimée (1803–70), who chained their imaginations to the rule of *chercher le mot*, as Maupassant and Anatole France have done later; authors of the next generation are Octave Feuillet (1827–90), who followed George Sand, Gustave Flaubert (1821–80), Edmond de Goncourt (1822–96), Jules de Goncourt (1830–70), all three 'precious' writers, Daudet (1840–97), who to real wit and pathos united emotionalism, Edmond About (1828–85), whose best works, such as *Le Roi des Montagnes*, are classics of comedy, the mighty figure of Zola (1840–1903), who threw needful ballast into the ship of fiction, his disciple Huysmans (b. 1848), a decadent realist, 'Pierre Loti' (b. 1850), who, again, sins on the emotional side, the Catholic and conservative Paul Bourget, whose *Le Disciple* is a triumph of the psychological novel, the witty, malicious Maupassant (1850–93), who reached the high-water mark of style, and his successor, Anatole 'France' (Thibault, b. 1844), the greatest living Fr. man-of-letters.

OTHER PROSE WRITERS.—The Restoration of 1815, which restored freedom of tribune, produced distinguished orators; under Louis Philippe, Guizot and Montalembert shone. Victor Cousin (1792–1867) represents philosophy, little treated, as such, during the cent., by his *Du vrai, du beau et du bien* (1853) and other works. History is strong, both in the old form of treatment as a branch of *belles-lettres* and in the new scientific method; important names are Guizot (1787–1874), eloquent in writing as in speech, his disciple, Tocqueville (1805–59), Thiers (1797–1856), the statesman, Mignet (1786–1884), Augustin Thierry (1775–1856), Michelet (1798–1874) who wrote one of best histories of the Revolution, and Henri Martin (1810–84), important member of the new school. Fustel de Coulanges (1830–89) won fame with *La Cité antique*; Renan (1823–92) employed an excellent style in the service of the Higher Criticism with strong anti-theological bias; Taine (1828–93) did brilliant work in study of history of institutions; followed by Lavisse (b. 1842), Broglie (1821–1901), Thureau-Dangin (b. 1837), Houssaye (b. 1848), Hanotaux (b. 1853); Gaston Boissier (1823–1908), holds prominent place as writer of Roman lives. Prominent among literary critics is Sainte-Beuve (1804–69), whose *Causeries du Lundi* are valuable.

Chief later literary critics are Ferdinand Brunetière (1849–1911), Emile Faguet (b. 1847), Jules Lemaître (b. 1853), and Francisque Sarcey (1828–99), themselves masters of style.

Most Belgian writers have used French since c. 1880; two schools: Parnassians—Arenberg, Giraud, etc., follow Fr. classical vogue; the mystics—Maeterlinck, Lemonnier, Rodenbach, Verhaeren, Eeckhout, etc.

Saintsbury, *Short History of F. L.*; Dowden, *History of F. L.*; Brunetière, *Manual of History of F. L.* (1898); Faguet, *Literary History of France* (1907); Lanson, *Histoire de la Littérature Française*; see also separate articles on various writers mentioned.

Education, Science, and Art.—The minister of Public Instruction is at the head of univ. and school education. For educational administration purposes F. is divided into 17 circumscriptions called *Académies* (one in Algeria), each under a rector, assisted by several inspectors. The Sorbonne in Paris is the seat of the Faculties of Literature and Sciences of the Univ. of Paris. It was founded under St. Louis by Robert de Sorbon (1211–74), and first intended for theol. The Collège de France, close to the Sorbonne, is independent of the Univ.; it was founded by Francis I., and is a public institution.

Primary education is compulsory between ages 6–13, free, secular.

Government and Administration.—CENTRAL.—The Third Republic dates from Sep. 4, 1870. The Legislature is bicameral. The Chamber of Deputies (597 paid members, elected by universal suffrage for 4 years) sits at the Palais-Bourbon, Paris; the Senate (300 paid members, over 40 years of age, elected for 9 years by Electoral Colleges, representing each *département* and Colonies), meets at the Palais du Luxembourg. The two Chambers, sitting together at Versailles, elect the Pres. of the Republic, the head of the Executive, every 7 years. He is assisted by responsible Ministers; there are 11 ministries (Interior, Foreign Affairs, Finance, War, Marine, Colonies, Justice, Public Instruction, Agriculture, Public Works, Commerce). The Prime Minister is the *Président du Conseil*; he is nominated by the Pres. and chooses his colleagues after consultation with the Pres. A *Conseil d'Etat* prepares Government Bills, decrees, etc., decides administrative difficulties, etc.

LOCAL.—F. was formerly divided into provinces, among which were Anjou, Auvergne, Brittany, Burgundy, Dauphiné, Gascony, Languedoc, Normandy, Provence, Touraine. Alsace belonged to F. until 1871, when most of it and part of Lorraine (in all 5604 sq. miles) were ceded to Germany. Since 1790 F. has been divided, for local administrative purposes, into 86 *départements*, viz.: Ain, Aisne, Allier, Alpes-Maritimes, Ardèche, Ardennes, Ariège, Aube, Aude, Aveyron, Basses-Alpes, Basses-Pyrénées, Bouches-du-Rhône, Calvados, Cantal, Charente, Charente-Inférieure, Cher, Corrèze, Corse (Corsica), Côte-d'Or, Côtes-du-Nord, Creuse, Dordogne, Doubs, Drôme, Eure, Eure-et-Loir, Finistère, Gard, Gers, Gironde, Haute-Garonne, Haute-Loire, Haute-Marne, Hautes-Alpes, Hautes-Pyrénées, Haute-Saône, Haute-Savoie, Haute-Vienne, Hérault, Ille-et-Vilaine, Indre, Indre-et-Loire, Isère, Jura, Landes, Loir-et-Cher, Loire, Loire-Inférieure, Loiret, Lot, Lot-et-Garonne, Lozère, Maine-et-Loire, Manche, Marne, Mayenne, Meurthe-et-Moselle, Meuse, Morbihan, Nièvre, Nord, Oise, Orne, Pas-de-Calais, Puy-de-Dôme, Pyrénées-Orientales, Rhône, Saône-et-Loire, Sarthe, Savoie, Seine, Seine-

Inférieure, Seine-et-Marne, Seine-et-Oise, Sèvres, Somme, Tarn, Tarn-et-Garonne, Var, Vaucluse, Vendée, Vienne, Vosges, Yonne; and there is also the territory of Belfort (*q.v.*). The largest towns are Paris, the capital, Marseilles, Lyons, and Bordeaux. Each department is under a *Préfet*, assisted by a *Conseil de Préfecture* and a *Conseil Général* (dealing with roads, public buildings, instruction, etc.). Each département has several *arrondissements* (each under a Sous-Préfet, app. by Central Government and assisted by a *Conseil d'Arrondissement*); each *arrondissement* has several *cantons* (with a justice of the peace), and each *Canton* several *Communes* (under a Mayor and elective *Conseil Municipal*).

Institutions. — LAW AND JUSTICE. — Legislative bodies are the Senate, Chamber of Deputies, and the *Conseil d'Etat*; laws have to be voted by the two chambers and (after two readings and two votes, unless there is 'urgence') pub. by the Pres. of the Republic, and executed. The *Conseil d'Etat* prepares laws, gives advice on contentious matters, and decides points of administration, justice, foreign affairs, etc. etc. Its pres. is the *Minister of Justice*, who cannot preside in administrative affairs by the Law of 1910; the real head is the vice-pres.; under him are 5 sectional presidents, 35 *Conseillers d'Etat*, 21 for extraordinary cases (directors of ministries having to do with the matter discussed), 37 *Maîtres des requêtes*, who prepare the deeds, and 50 *Auditeurs* of first and second class. The Senate acts as High Court of Justice. In case of high treason by the Pres. of the Republic or a Minister a commission is elected among the senators. The Pres. and Ministers may call the High Court, if the surety of the State is endangered.

In each canton there is a justice of the peace (cr. by the *Assemblée Constituante*, 1790), who has cognizance of suits under value of £8. In each important town there is a *tribunal de première instance* with at least three judges, one of whom is pres. The judges are app. by the State and cannot be removed. These tribunals have cognizance of cases of marriage, divorce, affiliation, contract, mortgages, etc. The debates must be public, except in exceptional cases when the verdict must be given publicly. Matters involving less than £60 are judged without appeal. Appeal may be made within two months of the first verdict. The *Cour d'appel* is constituted by a *quorum* of pres. and 4 councillors. There are 26 in F., with separate divisions for civil and criminal cases. Cases involving more than five years' imprisonment are judged at the *Cour d'Assises* by a jury of 12 citizens and 3 councillors chosen by a commission. In Paris the Assizes meet every fortnight; in the provinces there are 4 sittings a year. The jury gives the verdict in urgent questions only; usually the magistrates give the verdict. The cause may then be brought before the Supreme Court, the *Cour de Cassation* (cr. 1790). It sits in the *Palais de Justice*, Paris, and decides (1) if the procedure has been correct, (2) if the law has been correctly administered. If not, writs are issued for a second trial. If that again is unsatisfactory the three chambers of the *Cour de Cassation* formed into the *Conseil Supérieur de la Magistrature* judge the case, hearing the witnesses, etc. It is this council that judges magistrates for professional faults. In the chief departmental town there is also, if needed, a *Conseil de prud'hommes* (since 1907) to judge differences arising between employers and employees in matters not exceeding £12. It is elected for five years by employers and workpeople. Women may vote and may be elected since the Law of 1908. Cases above £12 are referred to a *Tribunal de Commerce* elected by tradesmen, employers, etc., elected for two years. Women may vote (since 1878), but not be elected. A jury *d'Expropriation* fixes indemnities paid to people dispossessed by the building of roads, railways, etc. The administrative tribunals judge questions of justice and administration. The *Conseils de Préfecture* assess local taxes. The *Cour des Comptes* (since law of 1807) controls the money matters of the State. It only judges as to facts, punishments being referred to criminal courts. Military cases are judged in the army by a Council of War of officers of a grade above that of the accused. Since 1906 appeal may be made to the *Cour de Cassation*, but a reform on that point has been proposed. The prisons are under the Ministry of the Interior. There are 24 *Maisons Centrales* for prisoners serving long terms. Political prisoners go to Maisons de Détention at Doullens and Belle-Île. Convicts are transported to Cayenne and New Caledonia.

Among the many specialising institutions are the National School of Beaux-Arts (founded, 1643), whose students compete for the *Grand Prix de Rome*; the *École des Chartes*, a school of hist. study; Schools of Agriculture at Grignon, Paris, Versailles, etc., Forestry School at Nancy. The *Conservatoire de Musique*, instituted in Paris, 1795, is a famous operatic school, free, for pupils from 9 to 22 who pass a preliminary examination. The Opéra, also called 'National Academy of Singing and Dancing,' Opéra Comique, Théâtre Français, and Odéon are theatres subsidised by the State; the *Institut Océanographique* and the *Institut Pasteur* are well-known establishments for acquisition of new knowledge. Among philanthropic institutions is the *Ecole Braille* for the blind; the Jardin des Plantes in Paris is one of the most complete botanical collections in the world. See EDUCATION, ACADEMY, UNIVERSITIES, and other separate articles.

ORDERS, CHARITIES, ETC.—The Order of the Legion of Honour is a knighthood instituted by Napoleon I. in 1802 to reward military and civil services. The *Hôtel des Invalides* was founded by Louis XIV. for old soldiers of all grades. HOSPITALS are under a commission of 6, nominated by the Prefect and the *Conseil Municipal*. There are in Paris 30 general, and 17 special, hospitals, besides hospices for the aged, lunatic asylums, *crêches*, all under the *Assistance publique*. *Bureaux de Bienfaisance* for the poor were instituted into the communes in 1796. The funds are provided by charities, legacies, taxes on theatre tickets, allowances from the communes, etc.

Savings Banks pay 3 %. Post Office Savings Banks were instituted on the same lines in 1881. A *Caisse de Retraite pour la Vieillesse* was founded, 1850. A law was passed in 1910 introducing a contributory system of Old Age Pensions.

Finance.—Revenue of Central Administration is derived from direct taxes or *contributions* (on lands, houses, doors, windows, patents, professions, trades, etc.); indirect, such as Customs duties (protective tariff), registration, stamp, and other duties; government monopolies (tobacco, matches, post-office, etc.); forests, and other sources. The National Debt is enormous—over £1,300,000,000 in 1911. The Local Authorities usually obtain supplies for local purposes by voting additions to State taxes, by *octroi* duties and certain special taxes. *Percepteurs* collect the taxes; each arrondissement has a *receveur particulier*, each department a *trésorier payeur général*; accounts are supervised by Inspectors-General and the *Cour des Comptes*. The Bank of France (founded 1799; definitely instituted, 1806) is under a gov. and two deputy gov's app. by Pres. of Republic.

Defence.—ARMY.—The Fr. Army comprises: (1) the 26 legions of *Gendarmerie* (police); (2) the *Armée Active* (Army proper), composed of infantry, cavalry, artillery, engineers; and divided into twenty corps, commanded by generals of brigade and generals of division. The Minister of War is assisted by two generals, a *chef d'état major*, a historiographer; above them is the Superior Council of War (the Pres. of the Republic, and *Président du Conseil*, or premier; Ministers of War and Navy and Army inspectors); (3) the territorial Army. Military service is compulsory. From 20 to 45, a Frenchman, except in case of ill-health, is under military authority. At

20 he is examined in his *commune* by the Council of Revision. Since 1905 the period of service is 2 years in the *Armée Active*. For the following 11 years he is in the reserve of the *Armée Active*, and serves twice (23 and 17 days); after that, 6 years in the territorial army or *territoriaux* (serving 9 days); finally 6 years in the reserve of the territorial army, only summoned in time of war. In consequence of Germany's increase of army (1913), France proposed to reintroduce 3 years' service, and to abolish all exemptions. Proposal was opposed by Socialists. The principal military schools are the *École Polytechnique* (engineers, etc.), St. Cyr (cavalry and infantry), Saint-Maixent (infantry), Saumur (cavalry), and Versailles. The soldiers of the Colonial Army are volunteers 21 years of age or more, and have served at least 6 months in F. This army includes the Artillerie de Marine, and is under the Ministry of War. See also ARMY.

NAVY.—The Fr. Navy, once second to that of Britain alone, has in recent years been outstripped by the fleets of Germany, U.S.A., and Japan. The coasts are divided into five *Arrondissements Maritimes* with the chief towns, military ports of Cherbourg, Brest, Lorient, Rochefort, and Toulon, under the supervision of a *préfet maritime*. The men are partly volunteers, partly *inscrits maritimes*, sailors engaged in mercantile marine, fishing, etc., being liable to serve in the Navy. The officers come from the Naval Schools or are promoted. According to the strategic requirements the Fr. fleet is sometimes concentrated in the Mediterranean (with Toulon as base), sometimes divided into two squadrons, one in Mediterranean, one on Atlantic seaboard (headquarters, Brest).

Religion.—A law of Dec. 9, 1905, annulled the Concordat (concluded between Napoleon I. and Pope Pius VII., July 15, 1801) and separated Church and State. There are 17 R.C. archbishoprics and 67 bishoprics in F. Protestants (in 1906) numbered about 650,000; Jews, *c.* 100,000; very many are free-thinkers; Roman Catholicism is still very strong in Brittany and certain other districts.

Colonies and Dependencies include: In AFRICA: Algeria, Tunis, Sahara, Fr. West Africa, Fr. Equatorial Africa, Mayotte and Comoro Islands, Madagascar, Réunion, Fr. Somali Coast, and virtual protectorate over Morocco. In ASIA: Fr. India, Fr. Indo-China. In OCEANIA: New Caledonia, with dependencies (Loyalty Is., etc.), New Hebrides (under joint Franco-Brit. administration), Society Is., Tahiti, and other Pacific islands. In AMERICA: S.—Fr. Guiana; N.—Guadeloupe, Martinique, Saint-Pierre and Miquelon. See separate articles.

Resources.—About 16 per cent. of whole area is under forest; about 70 per cent. under crops and grass, F. being pre-eminently an agricultural country, with many small farms and peasant proprietors; cereals include wheat, oats, rye, maize; excellent cider is made in Normandy, etc.; fruits and vegetables, and especially potatoes and beetroot, extensively grown; nursery and market-gardening are carried on; live stock raised; dairy-farming is an important industry. Wines are largely produced and world-famous; best-known wine districts are the S.W. for red Bordeaux wines (known in Britain as clarets); Côte d'Or and country to S. of it for red and white Burgundy; N.E., particularly Marne, for champagne; light red wines are produced along lower Loire.

There are a number of coal-fields, largest being the group in Pas-de-Calais and Nord, while others are round and across the central plateau. Iron ore is found in N.E. along Moselle, at E. end of Pyrenees, and along Rhône and Saône valleys; rock salt in N.E.; marble in Pyrenees, plaster in Paris district, building stone in Burgundy and elsewhere. Iron- and steel-founding are carried on chiefly in the N.E., Le Creusot in Meurthe-et-Moselle being the principal centre.

Textiles are manufactured chiefly in the coal districts; cottons and woollens in the N., where the weaving of linen, jute, and hemp is also carried on; silks in the Rhône valley, Lyons being the centre of silk trade; china and earthenware are made at Limoges, glass in N., paper at Angoulême and in the Isère valley at Grenoble; watches along the Swiss border. Aubusson and Gobelins are noted for carpets, Sèvres for china, and Baccarat for crystal. Fishing industry is of considerable importance.

Commerce is very active. Principal exports are silk, cotton, and woollen textiles, raw silk and wool, millinery, wine, leather, linens, metal goods, dairy produce, skins, furs, timber, sugar, pottery, glass, fruit. Largest import and export trade is with U.K.

Chief railways of F. (some State-owned) are the Chemins de Fer du Nord; de l'Est; Paris-Lyons-Méditerranée (P.L.M.); Paris-Orléans; l'État; du Midi, and de l'Ouest (which passed under State control, 1909); railway mileage in 1911 was 30,709. F. is well provided with canals and navigable rivers and good roads.

The Population is almost stationary, having increased from 38,961,945 in 1901 to only 39,252,267 in 1906, and 39,601,509 in 1911. About 2·8 per cent. of population are foreigners—Italians, Belgians, Germans, Spaniards, Swiss, British, Russians, Austrians, etc.

Betham-Edwards, *Home Life in F.* (1905), *Unfrequented F.* (1910); Dawbarn, *F. and the French* (1911); Hassall, *The French People* (1910); George, *F. in the XX. Cent.* (1908); Kitchin, *History of F.* (1903).

FRANCE, ABRAHAM, FRAUNCE (*c.* 1560–1633), Eng. poet; friend of Spenser and Sidney.

FRANCE, ANATOLE (1844–), pseudonym of ANATOLE THIBAULT; Fr. novelist, poet, and man of letters; member of Académie française; noted stylist; a master of irony and gifted story-teller, amongst his works are *Le Crime de Sylvestre Bonnard, Île des Pingouins, Thaïs, Le Livre de Mon Ami*, etc.

FRANCE, ÎLE DE, see ÎLE-DE-FRANCE.

FRANCESCHI, PIERO DE' (fl. 1439–92), Ital. artist; frescoes in church at Arezzo.

FRANCESCHINI, BALDASSARE (1611–89), Ital. artist; famed for frescoes.

FRANCHE-COMTÉ (47° N., 6° 20′ E.), old Fr. province in Rhône basin on Swiss frontier; ancient capital, Besançon; now comprised in departments of Doubs, Haute-Saône, and Jura; conquered by Cæsar; later part of Burgundy; split into four countships in Middle Ages; annexed to France, 1678.

FRANCHISE, a right or privilege; the right to exercise a parliamentary vote. See ELECTION.

FRANCIA, FRANCESCO DI MARCO DI GIACOMO RAIBOLINI (1450–1517), Ital. artist; his *Pieta* (in the National Gallery) one of the noblest in all the Italian achievement.

FRANCIA, JOSÉ GASPAR RODRIGUEZ (*c.* 1757–1840), Paraguayan statesman; became dictator of Paraguay, 1814, holding office till death.

FRANCIABIGIO (*c.* 1482–1525), Ital. artist; famed for frescoes.

FRANCIS I. (1708–65), Grand Duke of Tuscany and emperor of Holy Rom. Empire.

FRANCIS II. (1768–1835), last emperor of Holy Rom. Empire, first emperor of Austria (FRANCIS I. of Austria); in wars against Napoleon lost Netherlands, Lombardy, Venetia, and other provinces; became Austrian emperor, 1804; renounced Holy Rom. Empire, 1806; after battle of *Leipzig* regained Lombardy, Galicia, and Venetia, by Treaty of Vienna, 1815.

FRANCIS I. (1494–1547), king of France; conquered Milan by defeat of Swiss mercenaries at *Marignano*, 1515; unsuccessfully contested imperial crown; henceforth bitter rival of successful candidate, Charles V.; failed to gain England's support at Field of Cloth of Gold, 1520; defeated and taken prisoner at *Pavia*, 1525; resigned Ital. possessions by Treaty of Madrid, 1526; allied himself with Turks, 1534; finally made peace with Charles, 1544; promoted Renaissance, founded Collège de France. See FRANCE: *History*.

Pardoe, *Court and Reign of Francis I.*

FRANCIS II. (1544–60), king of France; m.

Mary Stewart, afterwards Queen of Scots; d. after reigning seventeen months.

FRANCIS I. (1777–1830), king of the Two Sicilies.

FRANCIS II. (1836–94), king of Naples and Sicily; defeated by Garibaldi in 1860–61, after which Naples was united to Italy.

FRANCIS IV. (1779–1846), Duke of Modena; reign marked by despotism and persecution of Liberals. Rebellion broke out in 1831, but was suppressed by F. with aid of Austrian arms.

FRANCIS V. (1819–75), Duke of Modena; dethroned.

FRANCIS, SIR PHILIP (1740–1818), Brit. politician and writer; first clerk in War Office, 1762; member of Council of Bengal, 1773; fought duel with Warren Hastings, 1780; M.P., 1784–1807; prominent in proceedings against Warren Hastings; supposed to have written *Letters of Junius*.

FRANCIS OF ASSISI, ST., FRANCIS BERNARDONE (*c.* 1181–1226), founder of Franciscan Order; b. Assisi; in youth was prominent among young men of fashion; was taken captive and imprisoned in war with Perugia, 1201; his spiritual experiences during a subsequent illness resulted in complete change of life; henceforth devoted himself to religion, and became beggar, taking 'Lady Poverty' as his spouse; joined by disciples, whom he formed into new order, 1210; went as pilgrim to Holy Land, 1219–20. His mysticism, poetry, simplicity, gaiety, and love of nature have won something of the same sympathy from the present generation that they won from his own. All things created are his 'brothers' or 'sisters,' and he exhorted them to praise God with him. In prayer on Mount Alverno (Sept. 14, 1224) he received in his own body the *Stigmata* (marks of the nails, etc.) of the crucified Christ. P. Sabatier, the Fr. Protestant critic, maintains the objectivity of this phenomenon. See FRANCISCANS.

Life, by Mrs. Oliphant (1871), Canon Knox Little (1877), Paul Sabatier (1894), Father Cuthbert (1912).

FRANCIS OF PAULA, ST. (1416–1507), Franciscan friar; founded *Order of Minims* (still existing), remarkable for its specially severe rule.

FRANCIS OF SALES, ST. (1567–1622), s. of a Savoyard noble, studied at Jesuit College at Paris; studied law at Padua, 1588; ordained, 1592, as provost of chapter of Geneva; preached in Chablais, 1589, converting Protestants; bp. of Geneva, 1602; most devoted in his duties; in Paris, 1618–19; d. much revered, and was 'beatified,' 1661, and canonised, 1665; wrote several religious works.

FRANCIS JOSEPH I. (1830–), emperor of Austria, king of Bohemia, king of Hungary. On accession, 1848, war broke out in Hungary, which he put down by aid of Russ. troops; present at *Solferino*, 1859, after which had to give up Lombardy; quarrelled with Prussia, 1864, which after *Sadowa* replaced Austria as leading Ger. power; ceded Venetia to Italy, 1866; crowned king of Hungary, 1867, taking oath to observe constitution; policy has been preservation of peace by alliance with Italy and Germany; annexed Bosnia and Herzegovina, 1908. Empress Elizabeth was assassinated, 1898; s., Rudolph, committed suicide, 1889; accordingly heir is nephew, Archduke Francis Ferdinand. See AUSTRIA-HUNGARY.

Mahaffy, *Francis Joseph I.*

FRANCISCANS, R.C. religious order, variously known as Grey Friars, Lesser Brethren, Friars Minor, Minorites, Seraphic Order. Divided into three bodies —First Order, including *Observantists* (the strictest, holding to the original poverty), *Conventuals* (who are allowed to hold property), and *Capuchins*; Second Order, or nuns, also known as *Poor Clares*; Third Order, or Tertiaries. Order was originally founded by St. Francis of Assisi (*q.v.*), about 1210, and was formally constituted by Pope Honorius III. in 1223. Leading idea, poverty—aim being to possess only irreducible minimum necessary to maintain life. The strictness and unworldliness of their lives did much to revive the fervour of the Church, and gained them great influence, especially among the common folk, whom their missionary zeal peculiarly embraced. After death of founder, various modifications occurred, resulting in many subdivisions, which were ultimately reduced by Leo XIII. into the three branches of First Order already mentioned.

Wadding, *Annales*; Little, *Grey Friars in Oxford* (Oxford Hist. Soc., 1892).

FRANCK, CÉSAR (1822–90), Fr. composer; b. Liége; studied at Paris; prof. of Organ, Paris Conservatoire, 1872; church, symphonic, and chamber music.

FRANCK, SEBASTIAN, FRANK, or FRANCUS (*c.* 1499–1543), Ger. writer; became priest, subsequently joined Reformed Church, finally becoming a freethinker; wrote *Chronica, Zeitbuch und Geschichtsbibel*, treating various aspects of Reformation, and other works.

FRANCKE, AUGUST HERMANN (1633–1727), Ger. pastor; b. Lübeck; lectured on Bible subjects at Leipzic from 1689; prof. of Gk., Halle, 1691, and later of Theology; pastor at Glaucha, 1691–1727; established free school, orphanage, and other institutions; wrote *Lectiones paræneticæ*.

FRANCKEN, JEROME (fl. *c.* 1574–1603), Flem. artist; employed by Henri III. of France; several other members of same family were distinguished artists.

FRANCO-GERMAN WAR (1870–71), between Fr. Empire and Prussia. France's alarm at growth of Hohenzollern power had been increased by disclosure of Prussia's military power in campaigns of 1866, and by formation of North Ger. Confederation. Question of cession of Luxemburg almost precipitated outbreak. Finally, a pretext was found in Hohenzollern candidature for Span. throne. Spaniards offered their throne to Prince Leopold of Hohenzollern-Sigmaringen, a distant relative of Prussian royal family. Napoleon III. resented affair as a Bismarckian intrigue to extend Pruss. power. Bismarck's manipulation of 'Ems incident' made war popular. France declared war (July 19, 1870). Confederation placed all its forces at disposal of Prussia and voted 120 million thalers for war expenses. A large army was placed in field, nominally commanded by king, but practically by Von Moltke. Crown Prince, Prince Frederick Charles, and Steinmetz commanded divisions.

War itself was short and sharp. Napoleon assumed command of Fr. army, aided by Marshals Bazaine, MacMahon, Canrobert, and Lebœuf. After action of Saarbrücken (Aug. 3), first of war, events moved rapidly. French fought courageously, but were badly organised and outnumbered; their delay allowed Germans to enter Alsace and continue war on Fr. soil. MacMahon was defeated at Weissenburg (Aug. 4) by Crown Prince, and more seriously at Wörth (Aug. 6), and retreated on Châlons. General Frossard was driven from heights of Spicheren (Aug. 6) by Prince Frederick Charles and Steinmetz. Main Fr. force was now concentrated near Metz, under Bazaine. Germans won decisive victory at Gravelotte (Aug. 18). Early on 19th, Bazaine's army in Metz was invested by Frederick Charles. Rest of Ger. army, under Crown Prince, advanced on Paris. MacMahon attempted relief of Metz, but was caught on way and completely defeated at Sedan (Sep. 1). Next day whole army capitulated. Napoleon himself became a prisoner and was sent to Wilhelmshöhe, near Cassel.

First phase of war (exactly a month in duration) was over. News of these great disasters overthrew Fr. Empire and a Republic was proclaimed (Sep. 4). Germans continued to advance. Paris was besieged by Crown Prince (Sep. 20). Strasburg surrendered (Sep. 28), and on Oct. 28, Bazaine capitulated at Metz, and 150,000 Fr. troops and immense army stores were delivered into enemies' hands. Gambetta had organised three new armies beyond Loire, which carried on desperate but hopeless resistance. Germans defeated army of Loire (Oct. 9), and occupied Orleans.

in provinces Germans repelled all attacks, and gradually closed in on Paris. Only place besides capital which held out was fortress of Belfort, in Alsace (surrendered, Feb. 16). Paris capitulated (Jan. 28). Preliminaries of Peace were arranged (Feb. 26), and ratified at Frankfort (May 10).

France ceded to Germany whole of Alsace (except Belfort) and E. Lorraine, including fortresses of Metz and Strasburg, and agreed to pay indemnity of five milliards of francs (£200,000,000) within three years. Ger. army of occupation was to be withdrawn gradually as each instalment of indemnity was paid. Results of war were far reaching. Second Empire was destroyed and Third Republic established in France. In Germany war completed Ger. unity under King William of Prussia, who accepted imperial crown at Versailles (Jan. 18, 1871). Italian unity was secured at same time, for, on Napoleon's fall, Rome was made capital of Victor Emmanuel's kingdom. Russia also took advantage of European situation to contravene Treaty of Paris of 1856, and thus reopened Eastern Question.

Von Moltke, *The F.-Ger. War of 1870–71* (Eng. trans., 1893).

FRANÇOIS DE NEUFCHÂTEAU, NICOLAS LOUIS, COUNT (1750–1828), Fr. statesman and poet; b. Lorraine; Minister of Interior (1797); pres. of Senate (1804–6); wrote many works on diverse subjects.

FRANCOLIN, genus of Oriental birds (*Francolinus*) of family Tetraonidæ; akin to partridge family.

FRANCONIA, Ger. FRANKEN (*c.* 49° 50′ N., 11° E.), ancient duchy of Germany; chiefly in valley of Main; afterwards one of the circles into which Germany was divided by Maximilian I., in 1501; now denotes the three N. divisions of Bavaria—Upper, Middle, and Lower F.

FRANCS-ARCHERS, regular Fr. foot-soldiers of XV. and XVI. cent's.

FRANCS-TIREURS, irregular Fr. infantry, chiefly peasants, who took part in Franco-German War (1870–71).

FRANEKER (53° 12′ N., 5° 32′ E.), town, Friesland, Holland; from 1585–1811 seat of univ.; silk and woollen goods. Pop. (1910) 7642.

FRANK, JAKOB (1726–91), Jewish divine; leader of mystic sect which merged in Christianity.

FRANK-ALMOIGN, system of land tenure held by a religious body in perpetuity.

FRANKEL, ZECHARIAS (1801–75), Jewish scholar and pioneer of hist. criticism.

FRANKENBERG (50° 53′ N., 13° 1′ E.), town, Saxony, Germany; textiles. Pop. (1910) 13,576.

FRANKENHAUSEN (51° 23′ N., 11° 5′ E.), town, Schwarzburg-Rudolstadt, Germany; brine-springs. Pop. (1910) 6566.

FRANKENSTEIN (50° 37′ N., 15° 50′ E.), town, Silesia, Germany; straw hat factories. Pop. (1910) 8737.

FRANKENTHAL (49° 32′ N., 8° 21′ E.), town, Bavarian Palatinate, Germany; ironworks. Pop. (1910) 18,779.

FRANKENWALD (50° 25′ N., 11° 30′ E.), mountainous region, Germany, connecting Fichtelgebirge with Thuringian Forest.

FRANKFORT (40° 17′ N., 86° 26′ W.), town, Indiana, U.S.A.; agricultural implements. Pop. (1910) 8634.

FRANKFORT (38° 9′ N., 84° 52′ W.), city, Kentucky, U.S.A.; contains State House, State Library, Penitentiary, and other institutions; sawmills, furniture factories. Pop. (1910) 10,465.

FRANKFORT-ON-MAIN (50° 6′ N., 8° 40′ E.), city, Hesse-Nassau, Prussia; wealthy and important commercially; great banking centre and leading Ger. railway junction; terminus of Rhine River traffic. F. has handsome modern streets (*e.g.* Zeil, Kaiserstrasse), squares, and suburbs with striking buildings and monuments. The cathedral (St. Bartholomew) was founded in IX. cent. by Lewis the German, rebuilt and extended, 1235 onwards; here, in terms of Golden Bull (1356) of Charles IV., Ger. emperors were elected; after 1562 coronation of emperors also took place in F. Other notable features are: Leonardskirche (begun, 1219), Nikolaikirche (XIII. cent.), Römer, and New Rathaus (the old and modern municipal offices), historical museum, Bethmann's Museum (with Dannecker's famous *Ariadne*), Städel Art Institute and other galleries, magnificent Schauspielhaus (theatre), library, Goethe House (where poet was born, 1749), Opera House, Central Railway station, Old Bridge (*c.* XIII. cent.), Eschenheimer Tor (1400–28) and other mediæval gateways, Palm garden, and Zoological garden. F. has long been the home of a large Jewish community, but the old house of the Rothschild family alone survives of the Judengasse. Industries are less prominent than trade, but include jewellery, soap, perfumery, chemicals, machinery, tapestry, waxcloth, carpets, tobacco, photographic and electrical apparatus. *Franconofurd* (ford of the Franks) first appears in hist. records, 793; became capital of E. Frankish Empire; many important diets and councils held here in Middle Ages; city attained autonomy under Empire and became 'free imperial town'; free city of Ger. confederation, 1815–66; annexed by Prussia, 1866; Peace of F. ended Franco-Prussian War, 1871. Pop. (1910) 414,600.

FRANKFORT-ON-ODER (52° 21′ N., 14° 32′ E.), town, Brandenburg, Prussia; important commercial centre; formerly seat of univ. now at Breslau; manufactures machinery, firearms, chemicals; taken by Gustavus Adolphus, 1631, by Russians, 1759. Pop. (1910) 68,230.

FRANKINCENSE, an aromatic gum resin, is obtained by incising the bark of certain trees (*Conifers*). The fluid hardens into irregular lumps covered with white dust. It has a yellow or yellowish-brown colour, a bitter aromatic taste, and a balsam-like odour. It is insoluble in water and burns with a white flame. As a drug it was widely used in all kinds of inflammatory diseases, but is little used now except for external application. It has been employed from the earliest times in incense.

FRANKING, right to send postal packets and letters without payment. Practice introduced (1660); greatly abused; abolished (1840).

FRANKL, LUDWIG AUGUST (1810–94), Austrian lyric and epic poet.

FRANKLAND, SIR EDWARD (1825–99), Eng. chemist; investigated organic metallic bodies, and introduced idea of valency and bonds from observation of saturation capacity of metallic bodies. He introduced the modern form of Bunsen's gas-analysis apparatus, making it less cumbersome and slow, and with others investigated contamination of water-supplies.

FRANKLIN (72° N., 95° W.), Arctic district of Canada, including Banks, Prince Albert, Victoria, Wollaston, King Edward and Baffin Lands, Melville, Bathurst, Prince of Wales, and Cockburn Islands, Baffin Land alone extending S. of Arctic Circle.

FRANKLIN.—(1) (43° 26′ N., 71° 39′ W.) city, Merrimack County, New Hampshire, U.S.A., at head Merrimack River; needles, woollen goods; birthplace of Daniel Webster. Pop. (1910) 6132. (2) (41° 22′ N., 79° 55′ W.) city, Pennsylvania, U.S.A., on Alleghany; oil region; oil refineries; machine-shops. Pop. (1910) 9767. (3) (35° 53′ N., 86° 55′ W.) town, Tennessee, U.S.A., on river Harpeth; flourmills; scene of defeat of Confederates by Federals, 1864. Pop. (1910) 2924. (4) (42° 5′ N., 71° 24′ W.) town, Massachusetts, U.S.A.; straw goods. Pop. (1910) 5641.

FRANKLIN, O.E. name for a small freeholder.

FRANKLIN, BENJAMIN (1706–90), Amer. statesman and scientist; one of the heroes of Amer. War of Independence; b. Boston, Massachusetts, of poor parents. F. began life as a working printer, setting up in business for himself at age of twenty-three; almost entirely self-taught; established in Philadelphia one

of earliest circulating libraries in America (1731); served as clerk of the Gen. Assembly (1736–51); appointed postmaster at Philadelphia (1737) and about same time organised first police force and fire company in the colonies. In 1749, in conjunction with other citizens of Philadelphia, he formed an association for purpose of establishing an academy which was opened (1751), chartered (1753), and eventually became Univ. of Pennsylvania. He also shared in several other projects for advancement of well-being and prosperity of Philadelphia; served as a member of Gen. Assembly of Pennsylvania for thirteen years. From 1753–74 he was in joint charge of post service of the colonies. His famous experiment proving the identity of lightning and electricity was made in June 1752.

Besides achieving a great reputation as a man of science, he did much for establishment of Amer. independence. He resided in England as agent for colonies of Pennsylvania, Massachusetts, Maryland, and Georgia from 1757–62, and from 1764–75, protested against claim of Britain to tax her colonies. In March 1775 he returned to Philadelphia and became a prominent member of insurrectionary government in America. He was immediately appointed a delegate by assembly of Pennsylvania to Continental Congress in Philadelphia. In 1776 he was sent on a mission to France, and in 1778 managed to induce the Fr. government to form an alliance with the revolted colonies. But before he left Paris in July 1785 he had made commercial treaties with Sweden (1783) and Prussia (1785). Returning to America, he was immediately elected a member of municipal council of Philadelphia, and pres. of Supreme Executive Council of Pennsylvania, and re-elected, 1786–87. His last public act was to address a petition to Congress for abolition of slavery (Feb. 12, 1790). During his lifetime he received many literary distinctions, and published several political pamphlets and writings on economics. His many-sided genius was eminently practical, and in science and politics he was an altruist.

Life, by himself (1883), Parton (1864), Morse (1889).

FRANKLIN, SIR JOHN (1786–1847), Eng. explorer; first discoverer of N.W. passage to Pacific; b. Spilsby, Lincolnshire; early resolved to be a sailor; served as midshipman in battle of Copenhagen, 1801; spent some time under training of Captain Flinders in exploration and mapping of Australian coasts; at Trafalgar was on board *Bellerophon*; became lieut., 1808; took part in blockade of Flushing, and distinguished himself in expedition against New Orleans, 1814. F. commanded overland expedition from Hudson Bay to Arctic Sea, 1819; became commander, 1821, and obtained post rank of captain, 1822; headed another overland expedition, 1826, and traced N. Amer. coast as far as 149° 37′ W. long.; knighted, 1829, and received other honours; was lieut.-gov. of Van Diemen's Land (Tasmania), 1836–43, fostering social and political advancement of colony; d. (June 1847) during ill-fated expedition for discovery of N.W. passage to Pacific. See POLAR REGIONS.

Life, by Traill (1896), Markham (1891).

FRANKLIN, WILLIAM BUEL (1823–1903), Amer. general; graduate, West Point, 1843; major-gen., 1862; for a time director of Panama Railway.

FRANK-MARRIAGE, obsolete O.E. law by which a landowner bestowed property on his dau. at marriage, and her husband and their heirs.

FRANK-PLEDGE (*Frithborh*), institution possibly introduced about Norman Conquest; association of ten men in common responsibility, having a headman, *borhs-ealdor* or *frithborge-head*; sometimes confused with local tithing, a territorial subdivision, with which it became connected.

FRANKS, SIR AUGUSTUS WOLLASTON (1826–97), Eng. antiquary; pres. Soc. of Antiquaries.

FRANKS, THE, a Germanic people who settled to the N. of the Western Goths, in the N. of France during the early part of the V. cent. A.D. Clovis, the first king of the Franks, drove the Goths out of France (481), the country taking its name from the conquerors, just as S. Britain (England) took its name from the invading Angles. Clovis became a Christian; was baptized at Reims (496); and was buried with his wife, Clotilda, in the Church of St. Geneviève, Paris, which she had built. This people was subsequently divided into the Austrasian and Neustrian Franks, betwixt whom there arose considerable hostility.

Sergeant, *The Franks* (1898).

FRANZ JOSEF LAND (82° 5′ N., 50° 70′ E.), archipelago in Arctic Ocean, consisting of Wilczek Land (E.), Zichy Land (W.), and many ice-covered islands with flat-topped hills. Arctic animals found, and water only open in summer. Discovered and partly explored in 1873–74 by Payer and Weyprecht; explored by Jackson-Harmsworth Expedition, 1894–97.

FRANZÉN, FRANS MIKAEL (1772–1847), Finnish (Swed.) poet.

FRANZENSBAD (50° 8′ N., 12° 20′ E.), watering-place, Bohemia, Austria; mineral springs.

FRANZOS, KARL EMIL (1848–1904), Russo-Ger. novelist.

FRASCATI (41° 48′ N., 12° 40′ E.), town, summer resort, prov. Rome, Italy; celebrated villas. Pop. 9915.

FRASER (50° N., 122° 30′ W.), river, British Colombia, Canada, formed by two branches uniting near Fort George; enters Gulf of Georgia; gold deposits; salmon-canning.

FRASER, ALEXANDER CAMPBELL (1819–), Scot. logician, metaphysician, and writer; b. Ardchattan, Argyllshire; ed. Edin. Univ.; editor, *North British Review*, 1850–57; prof. of Logic and Metaphysics at Edin. Univ., 1856–91; honoured by many universities; author of several books; authority on Berkleian philosophy.

FRASER, JAMES (1818–85), Anglican divine; ordained, 1846; bp. of Manchester, 1870; authority on education.

FRASER, JAMES BAILLIE (1783–1856), Scot. writer; travelled extensively in India and Asia Minor.

FRASER, SIR WILLIAM AUGUSTUS, Bart. (1826–98), Eng. politician; noted anecdotist, and author of interesting works on Wellington, Disraeli, and others.

FRASERBURGH (57° 41′ N., 2° W.,) seaport, Aberdeenshire, Scotland; herring fisheries. Pop. (1911) 10,574.

FRASERVILLE (47° 52′ N., 69° 35′ W.), watering-place, on St. Lawrence, Quebec, Canada.

FRATERNITIES, COLLEGE, see UNIVERSITIES.

FRATERY, the common eating-room of a friary.

FRATICELLI, name attached to certain rigorous groups of Franciscan order, who fl. XIII.–XV. cent's, and although condemned by John XXII. in 1318, founded ascetic colony in Sicily, exerting considerable influence there and in Italy; formed separate church, electing own popes; relentlessly persecuted in XV. cent., before end of which they finally disappeared.

FRATTAMAGGIORE (40° 55′ N., 14° 17′ E.), town, Naples, Italy; silkworms bred. Pop. *c.* 13,000.

FRAUD, act of imposture or deceit; defined by the jurist Pothier as 'Any kind of artifice by which one deceives another.'

FRAUENBURG (54° 21′ N., 19° 40′ E.), town, E. Prussia, Germany; has cathedral, and is seat of Catholic bp. of Ermeland.

FRAUENFELD (47° 33′ N., 8° 54′ E.), town, on Murg, Thurgau, Switzerland; machinery, textiles. Pop. (1910) 8377.

FRAUENLOB (XIII. cent.), pseudonym of Heinrich von Meissen, Ger. poet.

FRAUNHOFER, JOSEPH VON (1787–1826), Ger. optician; invented and improved many optical instruments, especially in regard to telescopic prisms and lenses; discovered the dark lines (which are called after him) in the spectrum of the sun.

FRAUSTADT (51° 47′ N., 16° 19′ E.), town, Posen, Germany; woollens, cottons. Pop. (1910) 7556.

FRÉCHETTE, LOUIS HONORÉ (1839–1908), Fr. Canadian poet and prose writer.

FRECKLES, small brown skin spots on exposed parts of the body; specially marked in summer; due to defective pigmentation.

FREDEGOND (d. 597), Frankish queen; an adventuress who became the wife of Chilperic I. By violent methods she removed all who stood in the way of her schemes, and eventually secured the throne for her s., Clotaire II.

FREDERIC, HAROLD (1856–98), Amer. novelist; author of *Illumination* and other stories.

FREDERICIA (55° 34′ N., 9° 45′ E.), seaport town, S.E. Jutland, Denmark, on Little Belt; formerly fortified; scene of defeat of Schleswig-Holsteiners by Danes, July 1849. Pop. 13,451.

FREDERICK (39° 23′ N., 77° 25′ W.), city, Maryland, U.S.A.; contains F. Coll.; flour-mills; canneries. Pop. (1910) 10,411.

FREDERICK I.-III., Holy Roman emperors.

FREDERICK I. (OF HOHENSTAUFEN), BARBAROSSA (*c.* 1123–90), emperor of Holy Rom. Empire (1152); endeavoured to appease territorial feuds in Germany; settled disputed succession to Denmark; undertook first Ital. expedition, 1154; received Lombard crown at Pavia; crowned emperor, 1155, by Adrian IV.; established Duchy of Austria, 1156; m. Beatrice of Burgundy, 1156; forced Boleslav IV. of Poland to recognise his overlordship. Diet at Besançon, 1157, saw rupture of momentary alliance between pope and emperor. During F.'s second Italian expedition, 1158–62, Milan was destroyed. After Adrian's death, 1159, F. set up anti-pope; Lombard League revived; F. captured Rome, but was defeated at Legnano, 1176; F. submitted to pope, 1177, and granted practical autonomy to Lombard cities, 1183; crushed Henry the Lion, 1180; secured union of Empire and Sicily by Treaty of Augsburg, 1184; drowned in Cilicia, 1190, while on Crusade. A brilliant statesman and brave general, F. was truly an 'imperialist Hildebrand.'

Testa, *History of War of Frederick I. against the Communes of Lombardy*; Prutz, *Kaiser Friedrich I.* (Danzig, 1871–74); Bryce, *Holy Roman Empire* (1907), chap. xi.

FREDERICK II. (1194–1250), emperor of Holy Rom. Empire; s. of Emperor Henry VI. by Constance of Sicily. After Henry's death, 1197, Sicilian and Ger. crowns were separated; Constance and Pope Innocent III. secured F.'s succession in Naples and Sicily; elected emperor, 1212, in opposition to Otto IV.; strove to make himself despotic in Sicily; founded Naples Univ., 1224. F. had promised Innocent III. to separate Sicily from Empire by investing his s. with it as a papal fief, and had also undertaken to go on a Crusade; delayed fulfilling these obligations, hence quarrel with Papacy; excommunicated, 1227; went on Crusade, 1228–29, and secured Jerusalem; made peace with pope at San Germano, 1230. F. made Sicily a centralised bureaucracy dependent upon himself, but left Germany to feudal anarchy; defeated revived Lombard League at Cortenuova, 1237; renewed breach with pope, 1239; Council of Lyons, 1245, deposed F., and hence war broke out; between 1245–50 F. strove to achieve ecclesiastical reform and establish a lay papacy. Brilliant, versatile, a shrewd, crafty statesman, but no warrior, F. was 'first of great modern kings.'

Huillard-Bréholle, *Historia Diplomatica Frederici Secundi* (Paris, 1852–61); T. L. Kington, *History of Frederick II.*

FREDERICK III. (1415–93), Duke of Styria and Carinthia; elected Emperor of Holy Rom. Empire, 1440; acquired Austria, 1463; driven from Vienna, 1485, by Hungarians; he was an inefficient ruler, and a cautious, timid diplomatist.

FREDERICK I.-VIII., kings of Denmark. F. I. reigned from 1523–33.

FREDERICK II. (1534–88), king of Denmark and Norway; b. Hadersleben; succ. to throne, 1536; m. Sophia of Mecklenburg, 1572; pursued policy of imperialism; ambitious, popular, able ruler.

FREDERICK III. (1609–70), king of Denmark; b. Hadersleben; m. Sophia Amelia of Brunswick-Lüneburg, 1643; succ. to Dan. throne, 1648; defeated by Charles X. of Sweden, 1658; by monarchical revolution, 1661, abolished privileges of nobles, made himself absolute and crown hereditary, and secured throne by professional army.

FREDERICK VIII. (1843–1912), king of Denmark; s. of Christian IX.; succ. 1906.

FREDERICK I.-III., kings of Prussia; F. III. became Ger. emperor.

FREDERICK I. (1657–1713), king of Prussia; became Elector F. III. of Brandenburg, 1688; founded Halle Univ., 1694; received title of king from Emperor Leopold, 1700; m. Sophia Charlotte of Hanover.

FREDERICK II., THE GREAT (1712–86), king of Prussia; s. of Fred. Wm. I., who conceived intense dislike for him and treated him harshly; betrothed to Elizabeth of Brunswick-Bevern, 1732; served in Polish Succession War; devoted himself largely to lit., 1735–40; succ. 1740; inherited a well-administered, skilfully organised despotism, a well-drilled army, and full treasury. F. developed his f.'s work; made Prussia a leading European power; from first showed spirit of liberalism. His two Silesian wars filled years 1740–4; Prussians invaded Silesia, 1740; F.'s aggression unjustifiable, but successful; Prussian infantry won Mollwitz, 1741; by Treaty of Berlin Austria yielded to Prussia Upper and Lower Silesia, and city and county of Glatz; in second war F. secured Silesia by Treaty of Dresden, 1745; by Convention of Westminster, 1756, F. became Britain's ally. F. overran Saxony, 1756, thus anticipating attack of his enemies, Austria and Russia, and beginning Seven Years War. F. fought tenaciously, despite great odds, and Peace of Hubertsburg, 1763, established Prussia's claim as a great power. In 1772 F. obtained Polish Prussia (except Danzig and Thorn) and part of Great Poland, which were rapidly assimilated with rest of monarchy. In Bavarian Succession War 1777–79, F. successfully contested Hapsburg claims; formed League of Princes, 1785. An opportunist, a philosopher despot, a great administrator, cynical, selfish, industrious, tolerant, F. left his country the first of Ger. States. But he had concentrated all government powers in himself, and thus hastened temporary decline of Prussia after his death.

Carlyle, *History of Frederick the Great* (1872); Reddaway, *F. the Great and Rise of Prussia* (1904).

FREDERICK III. (1831–88), king of Prussia and Ger. emperor; b. Potsdam; m. Princess Victoria of Great Britain, 1858; a strong Liberal; distinguished himself in war with Denmark and in wars of 1866 and 1870–71. F. acted as regent, 1878; succ. his f., March 1888, but, already smitten with a mortal disease, reigned only three months.

FREDERICK III. (1272–1337), king of Sicily; became regent, 1291; crowned king on renunciation of Sicily to the Church and Angevins by James of Aragon, 1296; fought against pope and Angevins throughout reign; courageous, capable administrator.

FREDERICK I. (d. 1440), Elector of Brandenburg; noted military leader and administrator.

FREDERICK I.-V., Electors Palatine of the Rhine.

FREDERICK I. (1425–76), Elector Palatine of the Rhine; famed for warlike qualities.

FREDERICK II. (1482–1556), Elector Palatine of the Rhine; patron of learning.

FREDERICK III., THE PIOUS (1515–76), succ. as Elector Palatine of Rhine, 1559; m. Maria of Bayreuth, 1537; championed cause of Protestantism.

FREDERICK IV. (1574–1610), Elector Palatine of the Rhine; noted for his encouragement of Protestantism.

FREDERICK V. (1596–1632), Elector Palatine of Rhine; m. Elizabeth, dau. of James I. of England; elected king of Bohemia, 1619; driven from Bohemia

and Palatinate, 1620; f. of Sophia, who m. Elector of Hanover and became mother of George I. of Britain. Cavalier leader, Prince Rupert, was his son.

FREDERICK I.-III., Electors of Saxony.

FREDERICK I., THE WARLIKE (1369–1428), Elector and Duke of Saxony; m. Catherine of Brunswick, 1402; founded Leipzig Univ., 1409; secured Duchy of Saxe-Wittenberg, 1423.

FREDERICK II. (1411–64), Elector and Duke of Saxony; known as 'the Mild'; succ. 1428; became, with his bro. William, joint-heir to kingdom of Thuringia, receiving Altenburg as his share; attempt made by Kaufungen, 1455, to abduct his two sons (*Prinzenraub*).

FREDERICK III., THE WISE (1463–1525), Elector of Saxony; founded Univ. of Wittenberg (1502), and was the patron and protector of Luther.

FREDERICK, THE HANDSOME, of Hapsburg (*c.* 1286–1330), Duke of Austria, 1306; defeated and captured by Louis the Bavarian at Mühldorf, 1322; claimed election as emperor of Holy Rom. Empire.

FREDERICK AUGUSTUS I. and II., kings of Saxony.

FREDERICK AUGUSTUS I. (1750–1827), Elector, afterwards (1806) king of Saxony; enlightened ruler; took part with Prussians in Jena campaign; subsequently faithful ally of Napoleon, who made him king and Grand Duke of Warsaw.

FREDERICK AUGUSTUS II. (1797–1854), became king of Saxony, 1836; m. (1) Caroline of Austria, 1819; (2) Maria of Bavaria, 1833; enlightened, liberal.

FREDERICK CHARLES, PRINCE (1828–85), Prussian soldier; grandson of Frederick William III.; present at battle of Schleswig, 1848; wounded at Wiesenthal; commander of 3rd army corps, 1860–70; won battle of Sadowa, 1866; displayed great tactical skill, though more often careless strategy, in Franco-Ger. War; reorganised Ger. cavalry.

FREDERICK HENRY (1584–1647), Prince of Orange; stadtholder; famous for soldierly and statesmanlike qualities.

FREDERICK, PRINCE OF WALES (1707–51), s. of George II.; m. Augusta of Saxe-Gotha, 1736; led opposition to government; pretentious, insincere.

FREDERICK WILLIAM I.-IV., kings of Prussia.

FREDERICK WILLIAM I. (1688–1740), king of Prussia; succ. 1713; gave Prussia a compact political organisation, efficient civil service, well-filled treasury, and well-drilled army; m. Sophia Dorothea of Hanover, 1706; obtained greater part of Gelderland, 1713, part of Pomerania, 1720, and struggled hard, though unsuccessfully, to secure Prussian succession to Berg and seigniory of Ravenstein; assisted Russia in Polish Succession War, 1734–35; encouraged colonisation. A keen politician, a conscientious, thrifty administrator, strong-willed, and passionate, F. W. founded Prussian greatness.

FREDERICK WILLIAM II. (1744–97), king of Prussia; succ. 1786; policy at first inspired chiefly by Wöllner, a Rosicrucian, who pursued obscurantist policy. F. W.'s foreign policy was not successful; intrigued with Turks against Austria; encouraged Belgian patriots, 1789; subsequently signed with Leopold the Declaration of Pillnitz, 1791, and took part in campaigns, 1792–93, but signed Treaty of Basel with Fr. Republic, 1795. Of feeble intellect and undecided nature, sensual, pleasure-loving; left State bankrupt and army decayed.

FREDERICK WILLIAM III. (1770–1840), king of Prussia; succ. 1797; m. Louise of Mecklenburg-Strelitz, 1793; defeated by Napoleon at Jena; had to surrender great part of his dominions by Treaty of Tilsit. 1807; compelled to join Napoleon in war against Russia; subsequently faithful ally of Emperor Alexander; weak, pious, good-hearted.

FREDERICK WILLIAM IV. (1795–1861), Prussian king; m. Elizabeth of Bavaria, 1823; succ. to throne, 1840; centralised government and pursued policy of religious toleration; behaved irresolutely in Berlin Revolution, 1848; refused to accept leadership of Federal Diet; his refusal of imperial crown, April 1849, postponed union of Germany. F. W. established Northern Confederacy; agreed to Olmütz Convention, 1850; attacked by paralysis, 1857, from which time his bro. was regent; romantic, idealistic, filled with notions of divine right.

FREDERICK WILLIAM, THE GREAT ELECTOR (1620–88); b. Berlin; succ. as Elector of Brandenburg, 1640; m. Louise Henriette of Orange, 1646; established personal government throughout his incongruous dominions; reorganised army and finances; definitely annexed Eastern Pomerania, 1653, and was acknowledged sovereign over Prussia by Treatics of Wehlau and Oliva, 1657, 1660; won battle of Fehrbellin, 1675, over Swedes. Brutal, unscrupulous, a skilful diplomatist and administrator, F. W. was real founder of Prussian State.

FREDERICKSBURG (38° 14′ N., 77° 33′ W.), city, Virginia, U.S.A.; contains Fredericksburg Coll. (1893); leather and woollen manufactures; scene of defeat of Federal forces by Confederates under Lee, 1862. Pop. (1910) 5874.

FREDERICTON (45° 58′ N., 66° 39′ N.), capital and port of New Brunswick, Canada, on St. John River; seat of Provincial Univ.; commercial centre; large lumber trade. Pop. (1911) 7208.

FREDERIKSHAVN (57° 26′ N., 10° 31′ E.), port, on Kattegat, Denmark; fish and dairy produce. Pop. 7000.

FREDONIA (42° 26′ N., 79° 20′ W.), village, New York, U.S.A.; wines, canned goods. Pop. (1910) 5285.

FREDRIKSHALD, FREDERIKSHALD (59° 8′ N., 11° 26′ E.), fortified seaport, Christiania, Norway, on Idde Fjord; near fortress Frederickstcen, at siege of which Charles XII. of Sweden was killed, 1718; timber, granite. Pop. (1910) 11,992.

FREDRIKSTAD, FREDERIKSTAD (59° 12′ N., 11° 15′ E.), seaport town, at mouth of river Glommen, Norway; timber; sawmills. Pop. (1910) 15,597.

FREE BAPTISTS, Amer. sect, founded *c.* 1779, under leadership of Benjamin Randall. Beliefs resemble those of Eng. Gen. Baptists.

FREE CHURCH FEDERATION, association of Nonconformist Churches in Britain, founded 1892; includes Methodists, Congregationalists, Presbyterians, Baptists, Friends, Free Episcopal Church of England. Objects: religious, social, and civil co-operation; advocacy of special interpretation of New Testament doctrine.

FREE CHURCH OF ENGLAND, founded 1844, with Prot. purpose; has two bp's.

FREE CHURCH OF SCOTLAND, became a separate religious body in 1843, when by DISRUPTION 396 ministers and prof's withdrew from Established Church of Scotland, number afterwards increasing to 474. Ultimate cause of secession was intrusion of State in ecclesiastical matters, especially in appointment of ministers, patronage having been revived in 1712, while right of rejection was in 1838 refused by Court of Session and House of Lords; civil courts had also power to reverse judgments and censures of ecclesiastical courts, to interfere with, or prevent, services, and generally to coerce them in many ways. Immediate cause was refusal of Commons to redress any grievances of Scot. Church in 1843. At following Assembly, protesting party retired, and marching to Tanfield Hall, Edinburgh, held there the first Assembly of F. C., under Dr. Chalmers as moderator. On May 23, Act of Separation was signed, by which all benefices were surrendered. Within four years F. C. had 700 churches and many schools. Sustentation fund was formed on system whereby each congregation helped in supporting whole body. Doctrines and constitution of Established Church were retained, except regarding State control, spiritual independence being asserted. A union was effected between United Presbyterians and majority of F. C. in 1900; henceforward known as

UNITED FREE CHURCH. Minority, who did not join union, retained name of Free Church; church property after legal proceedings, in which the House of Lords reversed the judgment given in favour of the U.F. Church by the Courts of Session, was allocated between the two bodies. The little Church retained old Presbyterian doctrines in original form, and has some 200 congregations, chiefly in Highlands.

Sydow, *The Scottish Church Question* (1845); Logan, *The United Free Church* (1681–1906); Innes, *Free Church Union Case*.

FREE CHURCHES, as historic societies, are offshoots of the Reformation. Under the title are grouped to-day all the Reformed Churches which are free from State establishment; they have arisen at different times, and represent the expression given in corporate action to spiritual movements, more especially among the English-speaking peoples. The 'Separatists' in the Elizabethan age, the Friends in the Commonwealth, the Methodists in the XVIII. cent., varying as they did in their doctrine and in the circumstances of their origin, are grouped together under this name. For long there was no effective co-operation between them, but their deepening fellowship is significant. They are alike in their freedom from State control, and in their denial of sacerdotalism they claim to reassert the original ideals of the Apostolic Church, and in their positive witness to preserve the spiritual principle from the bondage to machinery.

There are three main varieties—Episcopal, Presbyterian, Congregational. Of these **Presbyterianism** stands for 'the rule of an official aristocracy exercising collective control through an ascending series of ecclesiastical courts.' This form of government may be shared by Churches of different creeds; some Unitarian Churches, for example, are named Presbyterian, and Methodism in its ecclesiastical aspect comes under the same grouping. But the name is claimed for their distinctive title by a large number of Churches with a common confession as well as a common method of government. Such Churches are found in many countries. In 1899 at a conference held by the Reformed Churches holding the Presbyterian system sixty-four Churches were represented and sixteen others were known, not formally in the alliance. Of the Presbyterian Churches among the English-speaking peoples, all but the ESTABLISHED CHURCH OF SCOTLAND would be classified as 'Free.' Since 1899 rapid movements towards union among these Presbyterian Churches have taken place, and now it is claimed that in every country within the Brit. Empire, except in Scotland, there is a united Presbyterianism.

Before the Act of Uniformity (1662) the Presbyterians in England were not opposed to Establishment, but to Prelacy; during the Long Parliament, indeed, an attempt was made, though never completed, to establish Presbytery as the national system. The rigour of the Clarendon Code drove many known as Presbyterians, some of whom had been in favour of a moderate Episcopacy, into the ranks of Nonconformity, and the word became somewhat vague in its connotation. Of the Presbyterian Churches formed in the years following the eviction of the clergy in 1662 the greater part became Arian; and there are few Churches of the Presbyterian order in England to-day which date from that period. During the XIX. cent. many congregations were gathered throughout England into Churches, which in 1876 were united under the title of the PRESBYTERIAN CHURCH OF ENGLAND. They were composed at first chiefly of Scots resident in England, but they have grown rapidly in their influence upon Eng. thought and life.

Presbyterianism found a congenial soil in Scotland, where it has remained the chosen order of Church government since the Reformation. Presbyterian Nonconformity in Scotland was of comparatively late and slow growth. In the XVIII. cent. various movements of this nature are chronicled, as, for example, the Glasites and the Secession Church, divided into the Burgher and Anti-Burgher sections, afterwards reunited to form the United Secession Church. Side by side grew the Relief Church, and the two united in 1847 to form the UNITED PRESBYTERIAN CHURCH. In 1843 the FREE CHURCH OF SCOTLAND came into being, when 470 ministers, led by Dr. Chalmers, left the National Kirk in protest against its patronage system, and in defence of the voluntary principle. In 1900 the Free and the United Presbyterian Churches united to form the UNITED FREE CHURCH; a small body of dissentients retained the title Free Church. The ecclesiastical situation in Scotland has always had a character of its own. Latterly (1912) overtures have been made which give promise of an improved relationship between the Established and the United Free Churches.

In Wales the CALVINISTIC METHODIST CHURCH is Presbyterian, and is represented at the General Councils of the Churches of this order. In U.S.A. and the Dominions Presbyterianism has been a 'reproduction and further development' of Presbyterianism in Europe.

Presbytery as a method of government stands midway between Episcopacy and Congregationalism. It corresponds in things ecclesiastical to the republican order in things political. It has been defined as 'government by presbyters under Calvinistic and Puritan ideas, and for national ends.' 'Every congregation sends its ministers and one or two elders to the local presbytery. In the larger churches several presbyteries send representatives to a synod, and then there is a General Assembly.' This highest court, Synod or Assembly, decides finally all appeals, but it must keep in touch with the elders of the congregations and they with the members.

The doctrine of Presbyterianism is in line with the Calvinist tradition. The Westminster Confession of Faith is accepted still by the Presbyterian Church as its standard. The Confession is strictly Calvinistic in its doctrine of election and in its entire range of doctrine, but everywhere freedom to restate the intellectual content of the Faith is claimed, and not denied.

Congregationalism.—For their principle Congregationalists claim to return to the earliest days of the Church, and to find a sanction in the promise of Christ that He would be where two or three were gathered in His name. On the analogy of political institutions, Congregationalism corresponds to the pure democracy enjoyed by some Gk. cities.

As a modern hist. movement it dates back to the Elizabethan age, though there were isolated churches before that time. There were in England three strains of Puritans. One section was in favour of 'reformation without tarrying for any.' These were named *Separatists*, and their greatest preacher was Browne, after whom they were called *Brownists*. They were suppressed by Whitgift with great cruelty. Many took refuge in Holland, whence in James I.'s reign some returned to England, and others, the Pilgrim Fathers, sailed from Leiden for New England. Those who returned to England came to great power, though never numerous, during the Civil War; Cromwell and his army were 'Independent' in their sympathies, and during the Commonwealth the Congregationalists grew in influence and in numbers. But it is from 1662 that these Churches date their chief advance. By force of circumstances many, ejected through their refusal to accept the Act of Uniformity, were driven into Congregationalism. Since that time the Congregational Churches have had an acknowledged place in the national life, and have been pioneers in the struggle for religious equality. Till recently there has not been a close federation of these Churches, but now through the county unions and the CONGREGATIONAL UNION provision is made for a greater co-operation, and Congregationalism has also become conscious of its world-wide mission; and international Councils are held from time to time.

In Scotland the Congregational Churches owed much

to the preaching of the Haldanes, the fervent preachers, who were Free Church 'in practice rather than in theory' (Selbie); but it was Robert Haldane who, with his followers, founded the SCOT. CONGREGATIONAL UNION. This in 1897 united forces with the Evangelical Union.

It is impossible to overestimate the influence of Congregationalism in the history of U.S.A. through the refugees who carried the doctrine; in their zeal for education and their high standard for their age of toleration and their democratic creed they affected greatly the constitution and temper of the States. Throughout the world there are, roughly speaking, a million and a half communicants in these churches, but their influence has always gone much beyond their own borders; since they are the least denominational of all the Churches.

Each Congregational church is an autonomous and completely equipped Church. The decisive authority rests with the meeting of the church members, who elect the minister, and their executive, usually known as deacons or elders. They have no creeds binding upon the members, though many confessions of faith have been compiled to set forth the things held in common. It is not easy, therefore, to describe the theological position of Congregationalists. Historically their churches are in the Calvinist line; but they claim a wide latitude of opinion, and their general position is a broad evangelicalism.

Baptists are the Congregationalists who believe in the baptism of adult believers, and claim that in this they are loyal to the practice of the Apostolic Church. In their history as a community they are to be divided from the *Anabaptists*, the Reformers of the Reformation, from whom they were distinct both in origin and doctrine. There is evidence for the existence in England of those holding Baptist views in early XVI. cent. But the General Baptist Church begins with Thomas Helwys, who, returning from Amsterdam, formed a Church in Newgate Street in 1611 or 1612. The Baptists named 'Particular' trace their origin back to 1638. These two communions existed side by side till 1891, when the General Baptist Association resolved to amalgamate with the other Baptists. The GENERAL BAPTISTS were Arminian, the PARTICULAR BAPTISTS, who became the greater body, Calvinistic. There are to-day (1913) more than 7,000,000 adult members of Baptist churches; in 1905, the Baptist World Alliance was formed for mutual help and comfort. Among the Baptists in union with the Alliance are churches in many of the countries of Europe.

In America there are about 6,000,000 members, who trace their witness back to original emigrants. Of these one of the great figures was Roger Williams, founder of the colony of Rhode Island, 'the first government in Christendom to grant absolute religious equality to all its citizens.'

The emphasis laid upon adult baptism is not for the Baptists a little matter; it indicates their belief in the 'centrality of conversion.' 'The Baptist doctrine has always been not to exalt baptism, but to exalt conversion.' Among the honourable traditions of the Baptists are their early understanding of toleration and liberty of conscience, and their part in the foreign missionary enterprise. William Carey, the pioneer of modern missions in India, was a Baptist, and the inspiration of his work was felt in every Protestant Church.

There have been two streams of doctrine in the Baptist communion—the one Arminian, the other Calvinist. Many of the Arminian Baptists during the XVIII. cent. became Unitarians; and it is clear that the main stream has been Calvinistic. In their general position they occupy a more conservative position than the other wing of Congregationalism.

It is claimed by Baptist scholars that it is possible in the present day to see in various parts of Europe exactly those conditions and processes at work which we know at various periods obtained in this country. And an increasing sympathy is felt by other Baptists for their brethren in Russia and Austria and other countries.

Like the Congregationalists, the Baptist Churches have drawn nearer together in their Church order. And many also cherish the hope that a union may be possible between the two communions which are so near to each other.

The Society of Friends.—During the Commonwealth GEORGE FOX bore his witness to the truths in which he himself had found peace. It was a time when traditionalism prevailed in many of the churches, and FOX, in his own religious experience, had found none to speak to his condition, but was led to believe in the 'inner light,' and the presence of the Spirit of God. He was a great mystic, coming in a time when many were waiting for one to lead them into a spiritual faith. Wherever he preached, hearers were convinced. These were gathered after a time into societies, and were known as 'Friends.' The depth and the tenacity of their faith were proved by their endurance under persecution during the Commonwealth, and still more in the reign of Charles II.; Fox himself and Margaret Fell were themselves heroic sufferers.

In harmony with their cardinal belief they were led to dispense with the outward ordinances of the churches, such as the official ministry and the sacraments. In worship they met in simple dependence upon the Spirit. They also acted in literal obedience to the teaching of the Gospels, as they read it; they would not take oaths, and refused to enter military service. In their personal lives they practised a scrupulous speech and a simplicity of dress. They have been foremost from the first in all humanitarian movements.

The Society has not abandoned in any important way the ideal of George Fox. Its organisation is akin to that of the family rather than to any system of State government. It has never been a large body, but its intensive influence has been great both in England and in America.

The Society has been the pioneer in the Adult School movement. To many other educational movements it gives invaluable help, and in an age of unsettlement in religious thought the witness of the Friends to the inward work of the Spirit is most helpful, and their advocacy of international peace has power far beyond their borders.

Methodism.—In the early years of the XVIII. cent. religion was at a low ebb in England; materialism and rationalism were strong, both in the Establishment and among the Dissenters. The neglect of religion was found in every rank of society. In England a great revival was the result of the preaching of Wesley and Whitefield. WESLEY began his apostolic labours in 1738, after he had passed through many experiences, culminating in the meeting in which 'assurance was given him that Christ had taken away his sins.' From that time the evangelistic labours began which have led not only to Methodism, by which the direct results are called, but to a new warmth in all the Churches. Wesley and Whitefield were supremely practical; they preached to all men scriptural holiness and an experimental religion; they went to those who were forgotten and almost heathen, and found a ready response. Wesley was a Churchman, and never contemplated a separate Church, but rather the direction of the Church of England to her evangelistic mission. Methodism, both in its origin and its history, stands rather for an evangelistic passion than for any distinctive Church system, or even doctrine. WHITEFIELD, also in the days of the Revival, preached with amazing power both in England and America. These preachers were often bitterly opposed by the vicious section of the community and many of the clergy. But they helped to revive in England a living faith; they prepared the way for new movements in philanthropy, as well as for the foreign missionary work. They gave, moreover, a practical answer to many of the attacks made upon Christianity.

To-day there are nearly 9,000,000 Methodists; the

divisions among them are not important, and they are becoming fewer in number through the frequent union of Churches.

Wesleyan Methodists.—In 1743 Wesley drew up rules for the Societies gathered together as the result of the Great Revival. In 1784 he gave legal form to the constitution of the new society. The 'Legal Hundred' was formed, in which authority in discipline and administration was vested. But so long as Wesley lived there was no Methodist Church separated from the Established Church. After his death, slowly and reluctantly the Societies were driven to permit the sacrament to be administered in their buildings, and this meant their establishment as a Church. The Wesleyan Methodists have kept with close fidelity to the organisation prescribed by their founder; they still have their itinerant preachers, annual Conference, and class-meeting; and their standards are still Wesley's sermons and notes on the New Testament.

Calvinistic Methodists.—When Wesley and Whitefield were preaching in England, Howel Harris and others evangelised Wales. They were, like Wesley, members of the Established Church, but, failing to find an opening for their work, they formed the Methodist Association Meeting in 1743. In the Revival there was a sharp distinction between the Arminians, such as the Wesleys, and Calvinists, such as Whitefield. To distinguish the Meeting when the Wesleyan Methodists began their work in Wales, the title 'Calvinistic' was adopted. Not till 1811 were preachers ordained and the Church fully organised. Its stronghold is still among the Welsh. Its government is Presbyterian.

Primitive Methodists.—In 1807 two Methodist laymen, Bourne and Clowes, filled with evangelistic zeal, organised 'a camp-meeting' for open-air preaching. The Methodist Conference pronounced against this innovation; the two evangelists refused to give way, and were expelled from the Society. In 1811 the first meeting of the seceders was held, and the Primitive Methodists came into being. The movement grew rapidly, through the amazing devotion of its poor members. Its claim was not to depart from Methodism, whose standards it held, but to represent the true evangelistic spirit of Methodism. In its Conference the lay element out-numbers the ministerial by 2 to 1. Its work has been remarkable, especially in the rural and mining districts.

Unitarianism is a convenient name used to cover certain departures from the general view of the Church upon the Person of Jesus Christ. Though in its original use it defined the attitude of those who denied the Doctrine of the Trinity, to-day it is used more widely. Unitarians to-day hold for the most part a humanitarian view of Christ, but refuse to bind themselves, as the older Unitarians did, to dogmatic statements of belief; and membership in their churches does not involve the acceptance of any dogma, either Trinitarian or Antitrinitarian. There are many Unitarians in doctrine outside the Church of that name. It has been found necessary to organise Churches for this witness, chiefly in Poland, Transylvania, England, and U.S.A.

Modern Unitarianism is a development from Socinianism and Arianism. It was found in England long before the earliest Unitarian Church was formed by LINDSEY, in London, 1773; many of the Presbyterians, Independents, and General Baptists had adopted Arian views before that date, but Priestley and Lindsey were pioneers of the Church which took the name. In 1825 the Brit. and Foreign Unitarian Association was formed. In New England the Unitarians have a great tradition; and in the U.S.A., as a whole, their power is strong and recognised. Apart from their religious tenets they have taken a considerable part both in England and America in the struggle for civil and religious liberty.

Clark, *History of Eng. Nonconformity* (1911); Silvester Horne, *A Popular History of the Free Churches* (1903); Carlile, *Story of Eng. Baptists* (1905); Dale, *History of Eng. Congregationalism* (1907); Townsend and Workman, *A New History of Methodism*; Macphail, *The Presbyterian Church* (1908); Turner, *The Quakers* (1912).

FREE IMPERIAL CITIES, see IMPERIAL CITIES.

FREE PORTS.—(1) Ports where no custom duties are charged; (2) ports with a 'zone' within which commerce is conducted without exaction of import or export duties; (3) in China, ports open to foreign trade, but not 'open' in fiscal sense. F. p's arose owing to desirability of having central markets on trade routes, and refuges from pirates; greatly diminished by unification of customs and raising of tariff walls in European countries. F. p. zones exist at Hamburg and Copenhagen among other places; among colonial f. p's are Hong Kong and Singapore.

FREE REED VIBRATOR, in musical instruments, a thin strip of metal fitting into a narrow slit, fixed at one end, and able to vibrate freely when driven by a current of air, thus producing musical sounds; used in harmonium, organ, concertina, accordion, etc.

FREE TRADE.—Name given to an economic principle, chief exponent of which is Great Britain. The term has passed through various meanings in economic history, at one time being identified with smuggling; but since the teaching of the Manchester school of economists (Cobden as chief) it has come to mean the opposite of Protection (*q.v.*), and is generally understood to be the policy which favours the abolition of any restrictions on international trade. The economic doctrine on which Free Trade is based is a root one of exchange. In exchange one person for the time being places more value on the article he seeks after than on the article he offers in exchange. Applied to its fullest in international trade, it is supposed that the greatest amount of wealth will only accrue to everybody concerned when there is the greatest possible freedom of trade. This position, it is claimed, applies with especial force to the economic position of Great Britain, chiefly dependent as she is for her corn-supply from trans-oceanic sources. Against Free Trade it is urged that the doctrines of the Manchester school have become obsolete, in view of the growth of foreign textile trades, and that only by protecting herself by tariffs against foreign competition will Brit. predominant trade supremacy be maintained. Federations like U.S.A., German Empire, Australia, etc., have Free Trade within the Federation, but have protective tariffs against the outside world.

FREEDMEN'S BUREAU, established by Act of U.S. Congress (1865–72) to deal with negro problem; by it North tried to educate and help blacks; management necessitated discontinuance of bureau.

FREEHOLD (40° 20′ N., 74° 28′ W.), town, New Jersey, U.S.A.; manufactures carriages; canneries; scene of indecisive battle between Washington and British, June 28, 1778. Pop. 3300.

FREEHOLD, system of land tenure by which the holder has the sole right of disposal, and which, if he dies intestate, descends to the heir-at-law.

FREELAND (41° 2′ N., 75° 55′ W.), town, Pennsylvania, U.S.A.; coal-fields. Pop. (1910) 6197.

FREEMAN, one who holds special privileges in a borough or livery company; one who is not a slave.

FREEMAN, EDWARD AUGUSTUS (1823–92), Eng. historian; b. Harborne, Staffordshire; elected Fellow of Trinity Coll., Oxford (1845); devoted his life to literary work; served on royal commission on ecclesiastical courts, app. 1881; regius prof. of Modern History, Oxford, 1884; spent much time abroad after 1886, owing to ill-health; d. of smallpox at Alicante. An indefatigable writer and great investigator, besides many other works he wrote *History of the Norman Conquest* (1867–76); *Historical Essays* (1872–79); *William Rufus* (1882); *History of Sicily* (unfinished; 1891–94).

FREEMASONRY, in its present form, is of English origin, and dates from the beginning of the XVIII. cent. All the stories and traditions of an

ancient f. have been investigated, and prove to be without evidence to justify belief. The old claim, that f. dates from the building of the Temple at Jerusalem, and that King Solomon was its first grand master, has been dismissed as being entirely without proof. The assemblies or lodges of masons included in the XVI. cent. members who were not operative, but speculative or theoretical, and the earlier records of masons' guilds are still extant. But f. proper, as it is known to-day throughout the world, dates from the inauguration of the mother Grand Lodge on June 24, 1717, in London. On that day, four old lodges of speculative, not operative, masons set up the Grand Lodge, which was to be the governing authority over all masonic bodies. Henceforth there was no shadow of connection between operative masons and f., and no masonic lodge was admitted to be in the fraternity which did not acknowledge the authority of the Grand Lodge. A Grand Lodge was set up in Ireland in 1725, and in Edinburgh in 1736, and from these three Grand Lodges all the lodges throughout the world are derived. The first 'regular' lodge in U.S.A. was that at Boston, Mass., in 1733; meetings had been held at Philadelphia earlier, but without a Grand Lodge authorisation. Nowhere outside Britain has f. thrown out such wide roots; there are now nearly 1½ million members in fifty Grand Lodges.

F. is secret, and its operations are largely of a friendly, benevolent nature. The promotion of social intercourse amongst its members, 'the practice of moral and social virtue,' and the exercise of charity are amongst the objects of f. By a peculiar grip of the hand and the exchange of certain passwords, members are enabled to recognise one another, and the existence of masonic lodges in every civilised land enables a travelling freemason to find social intercourse, and, possibly, assistance in all sorts of places. Three degrees of masonry — apprentice, craftsman, master-mason—are the rule of the English Rite, but the ancient Scottish Rite has thirty-three degrees, and the English Rite has been enlarged to thirteen degrees in America. As f. requires secrecy of its members, it is banned by the R.C. Church, and while the Grand Orient Lodge of France has struck out belief in God from the tests of membership, and has been the active centre of anti-clerical and anti-Christian propaganda on the Continent, British freemasons are strictly non-political and unsectarian, confining their energies to social intercourse and the exchange of friendly and benevolent services, and subscribing large sums of money to the various masonic charities. Women are not admitted to Masonic Lodges, but an Order of the Eastern Star, which includes men and women, and is akin to f. in its objects and its ritual, has been in existence since the middle of the XVIII. cent.

Baxter, *Text-Book of F.* (6th ed., 1910), *F., its History, Principles, and Objects* (4th ed., 1909).

FREEPORT (42° 17′ N., 89° 33′ W.), city, Illinois, U.S.A.; carriages, hardware. Pop. (1910) 17,567.

FREESOIL PARTY, political party, U.S.A., founded (1847) to oppose extension of slavery into the Territories; merged in new Republican Party (1856).

FREESTONE, composed of sand or grit, used in arch. for mouldings, etc., and so called because it can be easily worked.

FREETOWN (8° 29′ N., 13° 14′ W.), capital, Sierra Leone, Africa, on Sierra Leone R.; good harbour; Brit. coaling-station; contains governor's residence, barracks, and cathedral; exports palm-oil, rubber; unhealthy climate. Pop. 34,463.

FREGELLÆ (41° 40′ N., 13° 30′ E.), ancient town, Italy, on Liris, near Via Latina.

FREIBERG, FREYBERG (50° 55′ N., 13° 20′ E.), town, Saxony, Germany, near Mulde; centre of silver- and lead-mining district; seat of famous mining academy; has fine old cathedral, museum, antiquities; gold and silver work; chemicals; scene of victory of Prussians over Austrians, Oct. 1762. Pop. (1910) 36,237.

FREIBURG (50° 52′ N., 16° 20′ E.), town, on Polsnitz, Silesia, Germany; watch-making. Pop. (1900) 9759.

FREIBURG (Switzerland), see FRIBOURG.

FREIBURG IM BREISGAU (47° 59′ N., 7° 51′ E.), chief city of Baden, Germany; beautifully situated on Dreisam, 11 miles from Rhine, on western side of Black Forest. Notable features are magnificent Gothic cathedral (XII. cent.; with paintings by Holbein and Hans Baldung, fine stained-glass windows, and tower, 386 ft.); Rathaus (XVI. cent.); famous univ. (1457); Kaufhaus (Merchant's Hall); library, museums, theatre; grand-ducal and archiepiscopal palaces, and ruined castle of Zähringen in vicinity; chief industries—sewing-silk, cotton-thread, buttons, beads, bell-founding, machinery, paper; founded by Duke of Zähringen, 1091; passed to Austria, 1368; repeatedly taken by French; annexed to Baden, 1806. Pop. (1910) 83,324.

FREIDANK (XIII. cent.), Ger. didactic poet and strolling singer.

FREIENWALDE (52° 48′ N., 14° E.), watering-place, on Oder, Brandenburg, Prussia; mineral springs. Pop. (1910) 8635.

FREIGHT, see AFFREIGHTMENT.

FREILIGRATH, FERDINAND (1810–76), Ger. poet; a voluminous writer of political verse; also translated Eng. poetry.

FREIND, JOHN (1675–1728), Eng. physician; served in the army in Spain and Flanders, and afterwards practised medicine with much success in London; entered Parliament, but was imprisoned for a short time in the Tower for his supposed Stewart sympathies; author of works of travel and history of medicine.

FREINSHEIM, JOHANN (1608–60), Ger. scholar and critic.

FREISCHÜTZ (Freeshooter), legendary hunter who obtained from Devil magic bullets, six unerring, but the seventh guided by the Devil; opera by Weber.

FREISING (48° 25′ N., 11° 44′ E.), town, on Isar, Bavaria, Germany; XII.-cent. cathedral; with Munich gives title to R.C. abp.; breweries. Pop. (1910) 14,948.

FRÉJUS (43° 26′ N., 6° 45′ E.), town, ancient *Forum Julii*, Var, France; bp.'s see; founded by Julius Cæsar, 44 B.C. Pop. 4156.

FRELINGHUYSEN, FREDERICK THEODORE (1817–85), Amer. statesman; b. Millstone, New Jersey; grad. (1836) and studied law; Senator (1866); Sec. of State (1881).

FREMANTLE (32° 3′ S., 115° 45′ E.), seaport, at mouth Swan River, W. Australia; port of call for mail steamers; iron foundries; sawmills. Pop. (1911), including suburbs, 20,847.

FRÉMIET, EMMANUEL (1824–1910), Fr. sculptor.

FREMONT.—(1) (41° 28′ N., 96° 33′ W.) city, Nebraska, U.S.A., on Platte; grain. Pop. (1910) 8717. (2) (41° 21′ N., 83° 8′ W.) city, Ohio, U.S.A.; on Sandusky River; natural oil and gas fields; agricultural implements; canneries. Pop. (1910) 9939.

FRÉMONT, JOHN CHARLES (1813–90), Amer. explorer; b. Georgia; of Fr. and good Virginian descent; entered Charleston Coll. (1828), but expelled; July 1838 saw him assisting Nicollet, Fr. explorer, in survey of upper Mississippi and Missouri lands; surveyed lower Des Moines River, 1841; m. Senator's dau. and secured government influence; next work on frontier beyond Missouri, and later Pacific coast; served in U.S. Senate, 1849; governed Arizona, 1878–81.

FREMSTAD, OLIVE (c. 1870–), Swed.-Amer. soprano.

FRENCH, NICHOLAS (1604–78), bp. of Ferns, Ireland; owing to political troubles, in exile from 1651.

FRENCH CONGO, see FRENCH EQUATORIAL AFRICA.

FRENCH EQUATORIAL AFRICA, FR. CONGO, Fr. territory in W. Central Africa; enclosed by Gulf of Guinea, Ger. Kamerun, Sahara, Anglo-

Egyptian Sudan, Belgian Congo, and Portug. Kabinda; it consists of Gabun Colony, Middle Congo, and Ubangi-Shari-Chad Colony, including Wadai and Kanem; total area, 500,000 sq. miles; coast region swampy; climate unhealthy; immense forests with valuable wood; chief rivers — Gabun estuary, Ogowe, Ubangi, Congo, Mbomu, Shari, Kuilu; principal towns—Brazzaville (Middle Congo cap.), Libreville (Gabun cap.), Fort-de-Possel (Ubangi-Shari-Chad cap.), Loango (seaport), Franceville, Abeshr, Mão; communication mainly by rivers; principal products and exports—ivory, timber, palm oil, rubber, coffee, cocoa, vanilla, tobacco, gum, copal; gold, copper, and iron are found; administered by gov.-gen. and lieut.-gov's.

Gabun district discovered by Portuguese, 1470; first Fr. settlement, 1843; Libreville founded, 1849; Cape Lopez ceded to France, 1862; Fr. possessions gradually extended on coast and inland, especially after the explorations of Savorgnan de Brazza (*q.v.*), 1875–78, 1879–80; the name Fr. Congo was changed into Fr. Equatorial Africa, and in 1911, in return for practical admission of Fr. protectorate over Morocco, France ceded to Germany some 100,000 sq. miles of her Congo territory. Pop. *c.* 9,000,000.

Rouget, *L'expansion Coloniale au Congo français* (1906).

FRENCH GUIANA, see GUIANA.

FRENCH GUINEA (10° N., 15° W.), territory, West African coast, between Portuguese Guinea and Sierra Leone, including the inland territories of Dinguiray, Siguri, Kouroussa, Kankan, Kissidugo, and Beyla; area, 95,000 sq. miles; coast flat with unhealthy climate; Konakry capital and principal port; chief products and exports—india-rubber, palm oil, nuts, cattle; railway between Konakry and the Niger; regularly visited by Fr., Ger., and Brit. steamers; formerly the old colony of the Southern Rivers (Rivièrs du Sud); Futa Jallon with chief town, Timbo, annexed, 1891. Pop. (1911) 1,700,000.

Machat, *La Guinée française* (1905).

FRENCH INDIA, INDES FRANÇAISES, the remnant of Fr. possessions in India, consisting of five scattered *établissements* or provinces, viz. Pondicherry, Karikal, Mahé, Yanaon, and Chandernagore. F. I. sends 1 deputy and 1 senator to Paris; governor is stationed at Pondicherry. Area, *c.* 200 sq. miles. Pop. (1911) 282,000.

Malleson, *History of the French in India* (1893).

FRENCH INDO-CHINA, INDO-CHINE, embraces the five states — Annam, Cambodia, Cochin-China, Tongking, and Laos (*qq.v.*); gov.-gen. resides at Hanoi (*q.v.*). Kwang-Chau-Wan has been leased from China by France. Area, *c.* 310,000 sq. miles. Pop. (1911) 17,000,000.

Russier and Brenier, *L'Indo-Chine française* (1910).

FRENCH LANGUAGE and **LITERATURE**, see FRANCE.

FRENCH POLISH, a liquid polish for wood, made of shellac dissolved in methylated spirit; for red polish, Bismarck brown is added.

FRENCH REVOLUTION, THE, was an integral part of a process begun long before. Its origin may be traced back to Louis XIV.'s policy of centralisation. The nobility enjoyed privileges divorced from responsibility; the clergy also existed as a wealthy order, exempt from taxation, monopolising all high offices. But the privileged classes had grievances in their exclusion from government, local and central; politically, they were non-existent. The king and his officials governed. People were oppressed by unjust taxation; their misery was aggravated by recurrence of famine and bad manipulation of corn trade. But economic distress was not the sole cause of revolution. The Fr. peasant, though wretched, was less so than any other peasant of Europe, but he was intelligent and independent enough to resent traditional restrictions. The cleavage between classes was serious by the time of Louis XVI.'s accession (1774). The Fr. middle class, composed of educated people, smarted under the privileges of a nobility that did nothing to justify these privileges. The spirit of discontent found expression in materialistic and sceptical philosophy; Voltaire and Montesquieu gave forcible expression to the vague feelings of the people. The *Encyclopédistes* (Diderot, D'Alembert, etc.), popularised doctrines of scepticism and materialism, and Rousseau became the prophet of the proletariat. Contempt and hatred for established institutions of Church and State grew rapidly.

Fr. political economists taught similar doctrines. Blanqui declares that the F. R. was only the theory of physiocrats carried into action. A further cause of revolution was the establishment of the Amer. Republic, but political reasons played a prominent part. France in 1789 was very weak internally. Fr. people had outgrown the system of government; there was a chronic national deficit, and finances were hopelessly disordered. Louis XVI. (*q.v.*) was not the man for the hour, though he attempted some reforms. Turgot became Director of Finances, but his reforms, including of necessity retrenchment on part of court and taxation of privileged classes, roused opposition, and he was dismissed (1776). Necker, a Genevese banker, followed Turgot's method and had to resign (1781). A reaction followed and speedily led to revolution. The extravagance and interference in State affairs of Marie Antoinette (*q.v.*) accentuated government's difficulties, and the king stupidly embarked on Amer. War. Fr. finance became for a time irremediable. The privileged classes opposed all reform; in turn Fleury, D'Ormesson, Calonne retired discomfited; Assembly of Notables (summoned 1787) did nothing. The king had to recall Necker, who restored partial confidence in the government.

Assembly of States General (which had never met since 1614) met at Versailles, May 5, 1789, but, being mainly composed of amateurs, theorists, and radical innovators, failed in reconstruction. *Résultat du Conseil* (Dec. 1788) had allowed *Tiers État* double representation. The question of *vote par ordre* or *vote par tête* was ended by decision of Commons to constitute themselves the *National Assembly*. Oath of Tennis Court (June 20), by which NationalAssembly swore to frame a new constitution for France, began the F. R. The king attempted to assert himself by a *Séance Royale*, but found his authority defied, and, yielding to persuasion, he collected troops round Paris, dismissed Necker, and made Marshal de Broglie commander-in-chief. This drove Paris to insurrection. Riots occurred and National Guards were formed. The Bastille (*q.v.*) fell (July 14), and the king had to recall Necker and visit Paris. Although the aristocracy surrendered feudal privileges (Aug. 4), mistrust of Parisians deepened. A mob of women and National Guards marched to Versailles (Oct. 6), and, bringing royal family to Paris, practically imprisoned them in Tuileries.

Power had passed into hands of people, and many nobles emigrated. The National Assembly set to work to frame a new Constitution. France was divided into departments, property of Church nationalised, 'Civil Constitution of Clergy' established, and a paper currency issued. Central Authority became disorganised. Mirabeau, the greatest statesman of revolutionary crisis, tried to keep France from international complications, but he died (April 1791). Royal family fled from Paris (June 21), but was arrested at Varennes, and remained with suspended authority till Assembly resigned (Sept.). *Girondist* (q.v.) ministry declared war on Austria (April 1792). Loopold had issued Manifesto of Padua (July 6, 1791), the sequel to which was Declaration of Pilnitz (Aug. 27). Fr. attack on Belgium failed, and invasion of Tuileries (June 20, 1792) marked the final breach between king and people. *Jacobins* (q.v.), exasperated by Brunswick's threatening manifesto, and by the ill-success of the war, rebelled, Aug. 10, 1792. Power fell into the

hands of Jacobins and a revolutionary *commune*. Massacres of royalist prisoners (Sep.) followed on Prussian advance on Paris. On day of Cannonade of *Valmy* (Sep. 20) a National Democratic Convention superseded the Legislative Assembly. Its first act was to declare France a republic. Convention conducted the war successfully; Dumouriez defeated Austrians at *Jemmapes* (Nov.) and occupied Belgium. The war now went hand in hand with revolutionary propaganda. Louis XVI. was guillotined at Paris (Jan. 1793), and a great coalition of European countries declared war on the French, who were driven from Belgium. Results of these reverses were the formation of the first Committee of Public Safety and the insurrection of Vendée (*q.v.*). Revolutionary Tribunal of Paris was established (March 1793), Girondins were overthrown, and civil war raged. Republican constitution was promulgated, and, July 1793, Great Committee of Public Safety came into power.

Its rule was period of *Reign of Terror*. Marie Antoinette was guillotined (Oct. 1793). Robespierre's fall (July 1794) ended Reign of Terror, and the *Thermidorians* came into power. Insurrections of 12th *Germinal* (April 1, 1795), raised by Jacobins, and 1st *Prairial* (May 20) were followed by Constitution of the Year III. Treaties of Basel (1795) restored France to a recognised position amongst European nations. Insurrection of 13th *Vendémiaire* failed to dislodge an unpopular Convention, which, however, dissolved itself in Oct. The Directory and two Legislative Councils assumed power. Bonaparte became practically supreme by revolution of 18th *Brumaire* (1799), and he was proclaimed emperor (1804). Results of Revolution were recognition of equality, of liberty, maintenance of doctrine of popular sovereignty, and growth of spirit of nationality.

Carlyle, *The French Revolution* (1837); Michelet, *Histoire de la Révolution Française* (Paris, 1847–62); Morse Stephens, *History of the French Revolution* (1886, 1892); Sorel, *L'Europe et la Révolution Française* (Paris, 1885–1904); Johnston, *French Revolution* (1909).

FRENCH REVOLUTIONARY WARS, see PENINSULAR WAR, NAPOLEON, FRANCE, *History*.

FRENCH WEST AFRICA, AFRIQUE OCCIDENTALE FRANÇAISE, name given since 1895 to a general government uniting the Fr. possessions in N.W. Africa; includes Senegal, Mauretania Protectorate, territories of Senegambia and of the Niger, Fr. Guinea, Ivory Coast, and Dahomey; area, *c.* 1,500,000 sq. miles; pop. (1911) 11,500,000; capital, Dakar, seat of gov.-gen. Fr. Congo, formerly part of Fr. W. Africa, is now included in Fr. Equatorial Africa.

FREPPEL, CHARLES EMILE, Fr. R.C. prelate; bp. of Angers, 1870; prominent in Chamber of Deputies from 1880.

FRERE, SIR HENRY BARTLE EDWARD (1815–1884), Brit. administrator; joined Bombay Civil Service, 1834; private sec. to Gov. of Bombay, 1842; political resident at court of rajah of Satara, 1844; administrator, 1848; chief commissioner of Sind, 1850; won distinction during Mutiny; Gov. of Bombay, 1862. After work in Zanzibar over slave trade and a tour with Prince of Wales, 1875, F., now a baronet and G.C.B., went to S. Africa as High Commissioner; made premature attempt to unite S. Africa; failure culminated in Zulu War; recalled, 1880.

FRERE, JOHN HOOKHAM (1769–1846), Brit. diplomatist and author; b. London; ed. Eton and Caius Coll., Cambridge; Under-Sec. of State (1799); envoy at Lisbon (1800) and Madrid (1802); P.C. (1805); incurred censure over Moore's retreat to Corunna; best literary works verse translations of Aristophanes.

FRÈRE, PIERRE ÉDOUARD (1819–86), Fr. artist; *genre* subjects.

FRÈRE-ORBAN, HUBERT JOSEPH WALTHER (1812–96), Belgian statesman and writer; b. Liège; joined Liberals; finance minister (1848–52); pres. of council and foreign minister (1878).

FRÉRET, NICOLAS (1688–1749), Fr. scholar and critic.

FRÉRON, ÉLIE CATHERINE (1719–76), Fr. literary controversialist; satirised by Voltaire.

FRÉRON, LOUIS MARIE STANISLAS (1754–1802), Fr. revolutionist; s. of Elie F. (*q.v.*).

FRESCO, painting upon plaster walls, with such colours as resist the effects of lime. True f. is worked upon fresh-laid damp plaster, upon which the figure of the cartoon is traced and coloured.

FRESHWATER (50° 39′ N., 1° 30′ W.), watering-place, W. of Isle of Wight, England.

FRESHWATER SHRIMP, see under MALACOSTRACA.

FRESNEL, AUGUSTIN JEAN (1788–1827), Fr. scientist; introduced compound lenses as substitutes for mirrors in lighthouse work. He studied laws of aberration of light and polarised rays.

FRESNILLO (23° 10′ N., 102° 42′ W.), town, Zacatecas, Mexico, Central America; silver and copper mines. Pop. 6309.

FRESNO (36° 40′ N., 119° 50′ W.), city, California, U.S.A.; raisins, grain, and wine; chief industries, lumbering and mining. Pop. (1910) 24,892.

FRESNOY, CHARLES ALPHONSE DU (1611–65), Fr. artist and art writer.

FRET, heraldic term to denote a design formed of two crossed bars dexter and sinister with interlaced square or mascle.

FREUDENSTADT (48° 27′ N., 8° 25′ E.), town, summer resort, Württemberg, Germany; cloth manufacturers. Pop. (1910) 8462.

FREUND, WILHELM (1806–94), Ger. philologist.

FREWEN, ACCEPTED (1588–1664), Eng. cleric; bp. of Lichfield and Coventry, 1644; abp. of York, 1660.

FREY, FREYA (Norse myth.), goddess of love; dau. of Njorth and sister of Freyr; sometimes confused with Frigga.

FREYBURG (51° 13′ N., 11° 46′ E.), town, Prussian Saxony, Germany; vineyards. Pop. 3341.

FREYCINET, CHARLES LOUIS DE SAULCES DE (1828–), Fr. statesman and engineer; entered Senate, 1876; held ministerial rank (with short breaks), 1877–99; Premier, 1886; member of Fr. Academy since 1890.

FREYCINET, LOUIS CLAUDE DE (1779–1842), Fr. navigator; explored S.W. coast Australia; also neighbourhood of S. Pacific.

FREYJA, brother of Freyr; Norse goddess of love and spring.

FREYR, FREY (Norse myth.), god of love, peace, and fertility.

FREYTAG, GEORG WILHELM FRIEDRICH (1788–1861), Ger. philologist.

FREYTAG, GUSTAV (1816–95), Ger. novelist and dramatist; hist. studies and modern realistic stories.

FRIAR, member of a mendicant order such as the Dominicans, Franciscans, Austin Friars, and Carmelites, as distinct from the older monastic orders.

FRIAR'S BALSAM, see BENZOIN.

FRIBOURG, FREIBURG (46° 48′ N., 7° 9′ E.), canton, Switzerland; admitted into the confederation, 1481; surface hilly, traversed by river Saane; chief pursuit agriculture; prevailing religion, R.C.; language mostly Fr.; dairy-farming, watch-making, straw-plaiting. Area, 646 sq. miles. Pop. 139,654.

FRIBOURG (46° 48′ N., 7° 9′ E.), town, Switzerland, capital of canton F., on Saane; with narrow streets, numerous old houses and monasteries; St. Nicholas church (XIII.-cent.: famous organ), Rathaus, univ. (1889), and fine suspension bridge, 807 ft. long; chief industries—sewing-machines, agricultural implements; founded by Duke of Zähringen, 1178, as German city; passed to Austria, 1277, to Savoy, 1452; admitted to Swiss Confederation, 1481; became independent, 1477. Pop. (1910) 20,300.

FRICTION is the force called into play when the surface of one solid moves or tends to move

relatively to that of another solid when both are in contact. Suppose that a brick-shaped body is placed on a rough horizontal table and that a force is applied to it horizontally so that it tends to move as a whole in a certain direction; if the force is less than a certain amount, the body will not move owing to the f. between it and the table. Friction acts in a direction opposite to that in which motion tends, and up to a certain amount is sufficient to prevent one body's sliding over another; this amount is known as the *limiting f.* If now the force applied to the body be increased, motion ensues, but the f. called into play does not increase beyond the limiting f.

It has been proved (1) that the amount of f. in any case bears a certain proportion to the pressure exerted between the surfaces in contact, and that this proportion, termed the COEFFICIENT OF F., is constant for the same pair of surfaces; (2) that the amount of f. is independent of the extent of the surfaces in contact; and (3) that it is nearly independent of their relative speed. F. is less when the speed is greater, and this is ascribed to an increase in the thickness of the layer of air between the two surfaces. Consequently, the f. should be quite independent of the relative speed when the rubbing surfaces are in a vacuum, and experiment shows that this is the case. The reduction of f. in moving machinery is a matter of great practical importance. Generally speaking, it is effected by polishing and lubricating the surfaces. F. is also experienced by bodies moving through gases and liquids. See HYDROMECHANICS.

FRIDAY (Lat. *Dies Veneris*) derives its name from Scandinavian divinity, Frigga (*q.v.*); a day of abstinence from flesh meat (in R.C. Church), and (according to superstition) of ill-luck; day of Crucifixion; supposed day of Adam's Creation; Muhammadan Sunday.

FRIEDBERG.—(1) (48° 22′ N., 11° E.) town, Bavaria, Germany; scene of defeat of Austrians by Fr., Aug. 1796. Pop. 3150. (2) (50° 19′ N., 8° 43′ E.) town, Hesse-Darmstadt, Germany. Pop. (1910) 9520.

FRIEDEL, CHARLES (1832–99), Fr. chemist; synthesised benzene homologues, ketones, and aldehydes. He formed minerals artificially by damp and pressure, and wrote on crystallography.

FRIEDLAND.—(1) (50° 56′ N., 15° 3′ E.) walled town, Bohemia, Austria; ancient castle; textiles. Pop. (1910) 6892. (2) (53° 40′ N., 13° 33′ E.) town, grand-duchy Mecklenburg-Strelitz, Germany; cloth manufactures. Pop. (1910) 7872. (3) (54° 28′ N., 21° E.) town, E. Prussia, where Napoleon defeated Russians and Prussians, 1807. Pop. (1910) 3027.

FRIEDMANN, MEIR (1831–1908), Hungarian Rabbinical scholar.

FRIEDRICH, JOHANN (1836–), Ger. Catholic theologian; prof. at Munich; strongly opposed papal infallibility with much hist. and theol. learning; excommunicated, 1871.

FRIEDRICHRODA (50° 50′ N., 10° 33′ E.), town, summer resort, Saxe-Coburg-Gotha, Germany. Pop. (1910) 4714.

FRIEDRICHSDORF (50° 15′ N., 8° 38′ E.), town, Hesse-Nassau, Germany; tanneries; Huguenot settlement (1687).

FRIEDRICHSHAFEN (47° 39′ N., 9° 29′ E.), town, on Lake of Constance, Württemberg, Germany; summer residence of royal family. Pop. (1910) 7041.

FRIEDRICHSRUH (53° 32′ N., 10° 22′ E.), village, Holstein, Prussia; residence of Prince Bismarck.

FRIENDLY ISLANDS, see TONGA ISLANDS.

FRIENDLY SOCIETIES.—Societies existing for purpose of relieving sickness and its consequent distresses, providing proper burial, and insurance against accidents, death, etc. In the United Kingdom they are regulated by F. S. Act (1896), which limited their powers and scope. They exist chiefly for benefit of poorer classes, and probably originated in the burial club. In some cases they have become merged in trade unions, and their purely benevolent purposes are subservient to political propaganda. Historically in United Kingdom F. S. cannot be traced back to mediæval gilds, but that they originated as some form of reaction to the suppression of religious gilds and to Elizabethan Poor Law can hardly be doubted. Movement received fresh impetus from societies of foreign refugees (1703 and 1708). Example of thrift thus offered was recognised by Rose's Act (1793), and many societies date from that period. In 1819 an Act ensured greater financial stability than before. In 1829 another Act was passed, John Pratt (1797–1870), a barrister, was app. to regulate the F. S. He eliminated the unsound and did much to promote the genuine societies. Further Acts (1834, 1846, and 1850) were passed regulating and supervising, and again in 1855 legislation attempted to deal with problem of proper supervision combined with due latitude. By Acts of 1875 and 1896 societies are now under efficient registrars, who have powers of inspection, right of refusing registration, and power to call a general meeting of inquiry. Under these regulations F. S. have flourished. Societies were divided by Royal Commission into thirteen classes, ranging from a large premier society like Manchester Unity of Oddfellows down to local cattle insurance societies. Total membership of registered societies in U.K. is fourteen millions, with funds amounting to over £50,000,000. By the Insurance Act of 1912 'approved societies' were allowed to administer the benefits under the Act.

F. S. are also met with in many colonies, and are there under similar legislation. In European countries societies have developed on different lines. They have lost much of their original independence, and have in many cases become mere insurance societies under government security. In U.S.A. they are numerous, and are modelled closely on those of England.

G. F. Hardy, *Essay on Friendly Societies*; Gordon-Smith, *Progress and Position of Friendly Societies.*

FRIENDS, SOCIETY OF, see FREE CHURCHES.

FRIES, ELIAS MAGNUS (1794–1878), Swedish botanist, especially interested in cryptogamia.

FRIES, JAKOB FRIEDRICH (1773–1843), Ger. philosopher; prof., Heidelberg, Jena; connects Kantian and Scot. schools; world of sense the object of knowledge; supra-sensible, of rational faith; the manifestation of the supra-sensible in the sensible, of presentiment.

FRIES, JOHN (d. 1825), Amer. agitator; leader of the 'Fries Rebellion' (1798) against heavy taxation.

FRIESLAND, VRIESLAND, ancient *Frisia* (53° 5′ N., 5° 50′ E.), province, Netherlands, on N.E. side Zuider Zee; surface flat, part below level of sea; coasts protected by dikes; exports horses, cattle, dairy produce; capital, Leeuwarden. Area, 1278 sq. miles. Pop. 364,415. See FRISIANS.

FRIEZE.—(1) An Irish woollen cloth, with nap on outer side; (2) in arch., central portion of the entablature of a column.

FRIGATE, originally a swift Mediterranean craft, using sail and oar; name afterwards applied to swift full-rigged ships in Brit. navy carrying all guns on one deck.

FRIGATE BIRDS (*Fregata*, or *Tachypetes*), marine fowls which obtain most of their food by stealing the prey of other birds; strong, hooked beak, bifurcated wings, and slender body; *Fregatus aquila* found in northern temperate waters sometimes reaches 4 feet in length; *F. minor* inhabits the Indian and Pacific Oceans.

FRIGGA (Norse myth.), wife of Odin; goddess of sky, domesticity, and lower world; gave name to 'Friday'; sometimes confounded with Frey (*q.v.*).

FRIGIDARIUM, cooling apartment in ancient Roman baths.

FRIIS, JOHANN (1494–1570), Dan. statesman and patron of learning.

FRIMLEY (51° 18′ N., 0° 45′ W.), village, on Blackwater, Surrey, England; near Bisley.

FRIMONT, JOHANN MARIA PHILIPP, COUNT OF PALOTA (1759–1831), Austrian general.

FRISCHES HAFF (54° 25′ N., 19° 35′ E.), lagoon, E. and W. Prussia, Germany; separated by tongue of land from Baltic, but joined by channel.

FRISCHLIN, PHILIPP NIKODEMUS (1547–90), Ger. poet, dramatist, and scholar.

FRISI, PAOLO (1728–84), Ital. scientist; wrote treatise on figure of earth; held many professorships; introduced lightning conductors into Italy.

FRISIAN ISLANDS, a chain in North Sea off Dutch and Ger. coasts, between Zuider Zee and Jutland. *W. Frisian Islands* (Tessel, Vlieland, Terschelling, etc.), belonging to Holland; *E. Frisian Islands* (Borkum, Norderney, Juist, etc.), and *N. Frisian Islands* (Sylt, Heligoland, etc.), mostly Pruss.; gradually being submerged; dangerous to navigation.

FRISIANS, a Teutonic people akin to Angles and Saxons, dwelling on lowlands now covered by the Zuider Zee; joined in Anglo-Saxon invasion of Britain, and occupied district known as Mercia, between Humber and Thames. Of all Teutonic languages Frisian has always been most closely akin to English.

FRITH, or **FRYTH, JOHN** (*c.* 1503–33), English Prot. reformer; lived in Germany, but returned to England, 1532; arrested and burnt, 1533.

FRITH, WILLIAM POWELL, R.A. (1819–1909), Eng. artist; hist. and genre subjects and portraits; painter of 'The Derby Day'; wrote *Autobiography*.

FRITZLAR (51° 8′ N., 9° 17′ E.), town, on Eder, Hesse-Cassel, Germany; cathedral; first seat in Hesse of Christianity introduced by St. Boniface, 732.

FRIULI (46° 18′ N., 12° 45′ E.), district, ancient *Forum Julii*, N. Italy; formerly independent duchy, now included in modern Udine and part of Austrian districts Görz, Gradisca, and Idria.

FROBEN, JOANNES (d. 1527), Ger. scholar and printer.

FROBISHER, SIR MARTIN (*c.* 1535–94), Eng. admiral and explorer; conceived project of discovering a North-West passage to Cathay at early age; sailed in command of small expedition, 1576; reached Labrador; following years commanded larger expeditions under queen's patronage, but occupied himself with securing supposed gold ore, rather than attempting N.W. passage; knighted for services in Armada, 1588; d. from wound received at Fort Crozon.

FROEBEL, FRIEDRICH WILHELM AUGUST (1782–1852), Ger. educationist. See EDUCATION.

FROGS (*Ranidæ*), tailless Amphibians, including about 450 species found the world over. There is a metamorphosis in development, through gilled and tailed tadpole stages, which resemble newts, the tail being absorbed, the breathing changing from gill breathing to lung breathing, the blood circulation from fish-like to that of the adult, the so-called mouth 'sucker' and horny jaws being replaced by a well-developed mouth, and the four limbs pushing their way into prominence. F's are aquatic, arboreal, or purely terrestrial. Amongst the first are the EDIBLE F. (*Rana esculenta*) of Europe, the Brit. GRASS F. (*R. temporaria*), and the large N. Amer. BULL F. (*R. catesbiana*), while the FLYING F's of Malay (*Rhacophorus*) parachute from tree-tops with large webbed feet. From true f's the OBSTETRIC F's (*Alytes*), with eggs attached to limbs of male, and the Tree F's (*Hyla*) differ in breastbone structure.

FROGMORE, palace in Windsor Park, purchased by Queen Charlotte (1800). Adjacent is the Royal Mausoleum of Prince Consort and Queen Victoria.

FROG-SPIT, see CUCKOO-SPIT.

FRÖHLICH, ABRAHAM EMANUEL (1796–1865), Swiss poet and fabulist.

FROHSCHAMMER, JAKOB (1821–93), Ger. philosopher and theologian; b. at Illkofen; prof. of Philosophy, Munich, 1855; founded *Athenäum* newspaper, maintaining independence of science from religion; excommunicated, 1871. F. wrote *Über die Freiheit der Wissenschaft*, 1861, and other works.

FROISSART, JEAN (1338–*c.* 1410), Fr. chronicler; b. Valenciennes; s. of a painter of armorial bearings; visited England, 1356; Avignon, 1360; and in 1361 returned to England to push his fortunes at court of Queen Philippa, bringing with him a book of verse chronicles, his first attempt at hist. composition. F. enjoyed queen's bounty several years, his verses and romances being much applauded. During this time he wandered freely in Scotland, Brittany, France, Italy, gathering information for his chronicles. He far excelled older generation of historians in picturesque detail and literary genius, but lacked precision and exactness; recorded brilliant tournaments, fêtes, and banquets of Edward's court, and the exploits of Eng. knights, in courtly language, viewing nations and individuals from point of view of chivalry and glorifying chivalric ideals. After death of Philippa he found a patron in French-loving Wenceslaus of Brabant, and became curé of Lestines. Subsequently he became chaplain to Gui, Count of Blois, and Canon of Chimay. That he visited Flanders is clear from lengthy account of Flemish troubles in his chronicle. He visited S. France, 1389, and was welcomed as a chronicler by Count of Foix. After his return to Valenciennes, Count Robert of Namur became his patron. He revisited England, *c.* 1406. He is said to have died in poverty at Chimay.

As a critical historian F. stands condemned, but as a painter of the life and manners of his age he is unsurpassed.

Madame Darmesteter-Robinson, *Froissart* (Eng. trans., 1895).

FROME (51° 14′ N., 2° 19′ W.), market town, on Frome, Somersetshire, England; art metal works; woollen cloth. Pop. (1911) 10,901.

FROMENTIN, EUGÈNE (1820–76), Fr. artist and writer; excelled in N. African subjects; partly autobiographical novel, *Dominique*.

FROMMEL, GASTON (1862–1906), Swiss religious philosopher; prof. of Theol., Geneva, 1894–1906. Insisted on man's moral dependence on God.

FRONDE, THE, outbreak of constitutional factiousness and personal ambition, causing civil war in France (1648–52), and having as sequel war with Spain (1653–59); hatred to Mazarin, chief factor of revolution. Paris Parlement refused to register an *octroi* duty (1648), and demanded constitutional reform. Mazarin arrested leader, but infuriated Parisians compelled court to release him and accept charter of reform. Nobility took leadership of movement from Parlement; intrigues prevailed, and civil war devastated France; but divisions arose amongst Frondeurs. Condé was defeated (1652), and joined enemies of France. Failure of F. proved that the only practical party in France was the monarchical one.

FRONTENAC, LOUIS DE BUADE, COMTE DE (1620–98), Fr. colonial administrator; entered army, becoming colonel, 1643, and field-marshal, 1646; app. gov. of Canada (Sept. 1672); recalled in 1682, owing to quarrels with Intendant and Church, but sent back to Canada and warmly welcomed by colonists, 1689; repulsed attack on Quebec, 1690; conducted campaign against Iroquois, 1695; a brave, energetic administrator, choleric, but very capable. See CANADA: *History*.

FRONTINUS, SEXTUS JULIUS (*c.* 40–103 A.D.), gov. of Britain (76–8); wrote on aqueducts and fortification.

FRONTO, MARCUS CORNELIUS (II. cent. A.D.), Rom. rhetorician and grammarian; consul (143); tutor of Marcus Aurelius; disciples formed school of Frontoniani.

FROSINONE (41° 38′ N., 13° 22′ E.), town, ancient *Frusino*, Rome, Italy. Pop. 10,000.

FROSSARD, CHARLES AUGUSTE (1807–75), Fr. general; defeated at *Forbach* (1870).

FROST is the visible frozen vapour found on exposed surfaces. It can only occur when surface temperature falls below 32° F., the freezing-point of water.—**Frostbite**, gangrene, or death of a portion of the tissues of the body, due to severe cold stopping the circulation in a part, especially of the extremities, or to

inflammation through sudden thawing of a frozen part. The frozen parts are thawed very gradually, or, if gangrene has already occurred, the dead portion is kept free from organisms by weak carbolic dressings, till it separates and healing takes place.

FROST, WILLIAM EDWARD, R.A. (1810–77), Eng. artist.

FROSTBURG (39° 39′ N., 78° 56′ W.), town, Maryland, U.S.A.; coal-fields. Pop. (1910) 6028.

FROTH-FLY, see CUCKOO-SPIT.

FROTHINGHAM, OCTAVIUS BROOKS (1822–95), Amer. divine and writer; advocated abolition of slavery; radical in views; wrote *Beliefs of Unbelievers.*

FROUDE, JAMES ANTHONY (1818–94), Eng. historian; b. Dartington, Devon; ed. Westminster and Oriel Coll., Oxford; elected Fellow of Exeter Coll., 1842; came under influence of Tractarian movement of which his bro., Richard Hurrell F., was a leader; hence associated with Newman; religious opinions became shaken, and after publication of *Nemesis of Faith* (1848) was forced to resign fellowship; thereafter contributed largely to *Westminster Review* and *Frazer's Magazine*; edit. Mrs. Carlyle's *Letters*, and wrote *Life of Carlyle*; finished *History of England* in 1870; prof. of Modern History, Oxford, 1892; hist. work characterised by brilliant style, attractive narrative, but by partiality and inaccuracy. *Life*, by Herbert Paul (1906).

FRUCTOSE, see SUGAR.

FRUGONI, CARLO INNOCENZIO MARIA (1692–1768), Ital. lyric poet.

FRUIT.—When the female organs of a flower are fertilised the most important result of the process is the production of a seed; but usually the ovule from which the seed develops is not the only part of the flower to be affected: the seed vessel or ovary is frequently stimulated to fresh growth and modification, and even the part of the stalk—*receptacle*—on which are inserted the organs of the flower, may be caused to take on a new appearance or structure. The total result of all three processes is a *fruit.* This conception of the f. causes us to include under the term objects like the tomato and marrow, more generally regarded as vegetables, or like the grain of corn, usually termed a seed.

F's are classified in the first place according as they open at maturity to liberate the contained seeds or not. Those which open are variously termed *capsule*, e.g. of the foxglove; *legume*, e.g. of the pea; *silique*, e.g. of the mustard—the two latter being included in the term *pod*; the distinctions rest on the number of seed vessels in the fruit and the manner in which the latter opens. F's which do not open may be either dry or juicy. The dry f's are termed *nuts*, different types being recognised. But certain dry f's, although they do not open to liberate their seed, break up into distinct parts; such are the f's of the carrot family and of the mallow. The juicy f's are of very various structure. In the *berry* the whole of the wall of the seed vessel is fleshy, *e.g.* gooseberry, orange, tomato. In the *drupe* the inner layer of the f. wall is stone-like, *e.g.* plum, cherry. In the apple and pear the fleshy part is really the receptacle enclosing the root of the f.; while in the strawberry the fleshy part is again the swollen receptacle, this time bearing numerous small fruitlets on its surface. The fig is an example of an *aggregate f.*, developing not from a single flower but from an inflorescence. It must be mentioned that in some cases a f. is formed subsequent to fertilisation but without seeds—sultana raisins, bananas; while in the fig and seedless apples no fertilisation takes place.

Of great interest are the adaptations shown by the f. for securing dispersal of the seeds. F's which open frequently do so with considerable violence and scatter the seed. Examples are the whin and broom, the pods of which may be heard exploding on a warm summer day. Frequently the f. is provided with wings, by means of which it is kept floating in the air and may drift to a considerable distance—the ash, elm, and maple are good examples; while in the dandelion family the f. is provided with a tuft of hair which serves the same purpose. The burrs have hooked hairs which hang on to passing animals. Finally, we have those f's classed as fleshy which form the food of birds and other animals; the seed passes unscathed through the animal, and is deposited at a spot distant from the parent.

Fruit-Growing.—From these fleshy f's have arisen our cultivated f's by a process of selection aided by careful culture which has produced the enormous number of varieties at our disposal to-day. F.-farming is practised on an enormous scale in America, where very large areas of suitable land are treated uniformly with one or few species. In Britain and in Europe generally more variety is displayed. Fruit-growing in Britain is very largely of the market-garden type. Besides this, however, there are considerable orchards which, while they cannot compete with the Amer. growers, still provide many fine sorts which are much sought after. In particular, the Eng. apple orchards are able to produce the apples best adopted for the preparation of cider.

FRUIT BATS, see FLYING FOXES.

FRUIT-PIGEONS (*Carpophaginæ*), large sub-family of pigeons, chiefly found from India to New Zealand; damage fruit-crops.

FRUMENTIUS (c. 300–60), Abyssinian Christian missionary; consecrated bp., 326.

FRUNDSBERG, GEORG VON (1473–1528), Ger. soldier and imperialist leader; organised Landsknechte in Netherlands. Pavia (1525) was largely his victory.

FRUSTULE, see DIATOMACEÆ.

FRUYTIERS, PHILIP (1627–66), Flem. artist and engraver.

FRY, SIR EDWARD, G.C.B. (1827–), Eng. judge; s. of Joseph F.; judge of High Court (Chancery Division), 1877–83; Lord Justice of Appeal (1883–92); arbitrator in S. Wales colliery dispute (1898), Grimsby fishery dispute (1901), L. & N. W. Ry. employees' deadlock (1908); Ambassador Extraordinary to Hague Peace Conference (1907); has pub. *Treatise on Contracts, British Mosses, Studies by the Way.*

FRY, ELIZABETH (1780–1845), Eng. social reformer; promoted prison reform throughout Europe, and secured great improvements in Brit. hospital system and treatment of insane.

FRY, JOSEPH (1728–87), Eng. Quaker doctor; founder of the Bristol cocoa firm, J. S. Fry & Sons.

FRYING, see COOKERY.

FRYXELL, ANDERS (1795–1881), Swed. historian.

FUAD PASHA (1814–69), Turk. soldier and statesman.

FU-CHAU, FUCHOW, FOOCHOW (26° 7′ N., 119° 20′ E.), city, Fu-kien, China, on Min; was made free port in 1842; large transit trade with interior; exports tea, timber, textiles; contains arsenal; important mission station. Pop. *c.* 650,000.

FUCHS, LEONHARD (1501–66), Ger. physician; prof. of Medicine at Ingolstadt (1526), and afterwards at Tübingen (1535); author of several medical works and an important illustrated work on botany.

FUCHSIA, natural order *Onagraceæ*; native to Central and South Africa, was first grown in Kew Gardens in 1788. Forest plants with brightly coloured pendant and funnel-shaped flowers, they are called after Leonhard Fuchs (*q.v.*). The fruit is a berry. Many forms, cultivated by selection and hybridisation, exist. Most are dwarf shrubs, but some reach 12 ft. in height.

FUCHSINE, or **MAGENTA,** oxidation product of anilin oil; crystals with intense green metallic lustre, which dye wool and silk directly, and cotton after mordanting, a brilliant magenta.

FUCINO, LAGO DI, ancient *Lacus Fucinus* (42° N., 13° 35′ E.), former lake, Aquila, Italy; drained by Prince Torlonia (1862), and now under cultivation.

FUCUS, see ALGÆ.

FUEGO, see TIERRA DEL FUEGO.

FUEL, carbonaceous matter which, when burnt, gives off heat; may be gaseous, liquid, or solid.

Gaseous Fuel.—The most important, coal gas, gives a blue, smokeless flame if mixed with air just below the point of combustion. Gas fires are made by filling an ordinary grate with asbestos and placing the gas flames at the bottom, the asbestos soon becoming red-hot. Water gas, obtained by decomposing water, is sometimes used for industrial purposes.

Liquid Fuels are mainly animal, vegetable, or mineral oils. Of the mineral oils petroleum, shale oil, and creosote are most commonly used. Attempts have been made to heat steam boilers with liquid f., especially those in connection with naval vessels. Some systems use sprayed oil, others vitalise it by superheated steam. Petroleum is the most common oil used and gives a much greater heat than coal, bulk for bulk; but apart from this, liquid f. has many other advantages. In storing it occupies less space than coal; it is smokeless when burnt; it abolishes stoking. The troublesome labour of coaling would also be dispensed with, as the liquid fuel would simply be pumped into the vessel's reservoirs from barges alongside the ship. Liquid f. would also allow of a warship being equipped even though the sea were rough, a state of things which is impossible as long as coal is used.

Solid Fuels.—Peat, compressed masses of decayed vegetable matter, is largely used by peasants, but it does not give much heat. Sometimes it is compressed and soaked in tar or oil and used in the form of bricks. Wood is little used in Britain, but in France and Germany its use is more common. Wood of compact texture, *e.g.* oak, beech, or elm, burns slowly, while soft, light woods, as lime, pine, chestnut, or deal, burn quickly and give more heat. Wood charcoal is extensively used in metallurgy and in chemistry; it kindles rapidly, emits no vapours, and leaves only a few light ashes.

Coal is the most important of all f's, and is of vegetable origin (see COAL). A variety known as lignite, or brown coal, presents a woody appearance to the eye; it is neither peat nor coal, occurring in the later geological deposits. Coke is used for domestic purposes and for producing intense heats for melting metals. Anthracite coal is a smokeless variety and has 90 % carbon; it is very compact and brittle.

Artificial Fuels, such as 'briquettes,' are manufactured from coal dust and clay, lime or coal tar. Sometimes sawdust is used. The bricks are compressed into pieces about 6 in. square and used for domestic purposes. This form of fuel was manufactured by the Chinese ages ago from coal dust, clay, and bitumen. See ENGINE.

FUENTE OVEJUNA (38° 14′ N., 5° 31′ W.), walled town, Cordova, Spain; honey and fruit. Pop. 11,777.

FUENTERRABIA (43° 21′ N., 1° 45′ W.), town, Guipúzcoa, Spain, at mouth of Bidasso; formerly important frontier fortress; frequently besieged. Pop. 4345.

FUERO, word used in Spain in sense of right, privilege, or charter; derived from *fora*, by which established common law of occupied district was recognised by Romans. In X. cent. word *forum* emerges in sense of privilege. Earliest *fuero* extant is one granted to Leon by Alphonso V. (1020). Only *fueros* of Navarre and of the Basque survive till modern times.

FUERTEVENTURA (28° 25′ N., 14° W.), one of the Canary Islands, Atlantic Ocean. Area, 665 sq. miles. Pop. 11,669.

FUGGER, famous German family of merchants and bankers. Founded by John Fugger, a weaver of Graben, near Augsburg, whose son (d. 1408), became by marriage a citizen of Augsburg, and began a linen trade there. Business increased enormously during next generation of F's. They rendered great services to Hapsburgs; made large loans to Maximilian I., who pledged to them county of Kirchberg and lordship of Weissenhorn. Under Emperor Charles V. family reached zenith of its power and wealth.

FUGITIVE SLAVE LAWS, the laws passed by U.S. Congress between 1793 and 1850 to deal with escapes of slaves, especially with regard to their passage into non-slaving States. The owner could at first reclaim the fugitive, the decision in case of contested status of the slave being in the hands of any Federal or State magistrate. In 1824 Indiana passed a law giving right of jury trial to fugitive slaves, and this example was widely followed. The most drastic of these laws was the 1850 Compromise Measure, which led to much confusion and friction, and powerfully contributed to the outbreak of the Civil War.

FUGLEMAN, a guide; particularly a military drill guide, or file-leader.

FUGUE (Lat. *fuga*, flight), a musical composition of at least two voices in which 'subject' (principal melody) and 'answer' keep recurring, harmonised by laws of counterpoint. Greatest f. writers: Bach (instrumental), Handel (vocal). See Prout's *Fugue* (1891) and *Fugal Analysis* (1892).

FÜHRICH, JOSEPH VON (1800–76), Austrian artist.

FUJI-SAN, FUJI YAMA (35° 21′ N., 138° 43′ E.), loftiest mountain, Japan (12,400 ft.); dormant volcano; place of pilgrimage.

FU-KIEN, FO-KIEN (26° 30′ N., 118° E.), S.E. maritime province, China, bordering Che-Kiang, Kwang-tung, and Kiang-si; surface generally mountainous; chief river, the Min; principal products—tea, fruit, grain, sugar; ports, Fu-chau, Amoy, Funing. Area, 43,500 sq. miles. Pop. c. 22,000,000.

FUKUI (36° 10′ N., 136° 15′ E.), town, Nippon, Japan, paper. Pop. 50,396.

FUKUOKA (33° 36′ N., 130° 20′ E.), town, N.W. coast Kuishui, Japan; silk fabrics. Pop. 82,106.

FULAHS, native race inhabiting Nigeria, numbering several millions.

FULCHER OF CHARTRES (fl. *c.* 1090–1130), Fr. chronicler.

FULDA (50° 32′ N., 9° 40′ E.), town and episcopal see, on Fulda, Hesse-Nassau, Germany; has episcopal palace, several churches, seminaries; famous Benedictine abbey founded by St. Boniface, VIII. cent.; abbot in 968 made primate of all Teutonic abbeys; most ancient seat of ecclesiastical learning in Germany; seat of univ., 1734–1804; textiles. Pop. (1910) 22,488.

FULGENTIUS, FABIUS PLANCIADES (VI. cent. A.D.), Lat. grammarian.

FULGURITES, deposits of vitrified rock found on mountain-tops; films and tubes of glass found in sandhills; probably produced by lightning.

FULHAM, suburb, London, on Thames; palace and burying-place of bp's of London. Pop. (1911) 153,325.

FULIGO, see under MYCETOZOA.

FULIGULA, see DUCK FAMILY.

FULK (d. 900), abp. of Reims, 883; supported Charles the Simple; murdered at instigation of Baldwin, Count of Flanders.

FULK (1092–1142), s. of Fulk IV.; Count of Anjou, 1109–42; m. a dau. of Baldwin II. of Jerusalem in 1129; succ. to throne of Jerusalem, 1131.

FULK NERRA (fl. 987–1040), Count of Anjou; famous builder of castles and abbeys.

FULKE, WILLIAM (1538–89), Eng. Puritan theologian; lecturer at St. John's College, Cambridge; wrote controversial works.

FULLER, ANDREW (1754–1815), Eng. Baptist minister; opposed Calvinism and Deism; an able leader; sec. of Baptist Missionary Soc.

FULLER, GEORGE (1822–84), Amer. artist; painted chiefly portraits and nature fantasies.

FULLER, MARGARET, MARCHIONESS OSSOLI (1810–50), Amer. authoress; was associated with Emerson and the Transcendentalists, and edit. *The*

Dial; later with Mazzini and the cause of Ital. independence; wrote an *Autobiography* and other works; drowned at sea.

FULLER, MELVILLE WESTON (1833–1910), Amer. lawyer; Chief Justice U.S. Supreme Court, 1888.

FULLER, THOMAS (1608–61), Eng. cleric, wit, and historian; became rector of Broadwinsor, Dorset, 1634; pub. *History of the Holy War*, 1639; attained fame in London by lectures at the Savoy; during Civil War supported king, acting as chaplain to Sir Ralph Hopton's regiment; afterwards lived at Exeter, and in 1646 compounded with government for his presence among king's troops; perpetual curate of Waltham Abbey, 1648; app. royal chaplain at Restoration. F. wrote *Good Thoughts in Bad Times*, *Pisgah-Sight of Palestine*, *Worthies of England*, *Church History of Britain*. His style is full of wit and humour.

J. E. Bailey, *Life of Thomas Fuller* (1874).

FULLER, WILLIAM (d. *c.* 1718), Eng. impostor; frequently whipped, fined, and imprisoned for false accusations and writings relating to public characters.

FULLER'S EARTH, a greenish unctuous powder, usually consisting of hydrous aluminous silicate with some magnesia, iron oxide, and soda. S.G., 1·7–2·4; employed in filtering mineral and decolorising vegetable oils, and in dry cleaning as an absorbent of grease; found in Somersetshire and Surrey, England.

FULLERTON, LADY GEORGINA (1812–85), Eng. novelist and philanthropist; dau. of Earl Granville; joined R.C. Church, and gave much time to religious work.

FULMAR, see Shearwater Family.

FULMINIC ACID (HCNO) has same structure as cyanic and cyanuric acids; very explosive, with poisonous vapour. Its salts, especially fulminating mercury, are extremely explosive, and are used with potassium nitrate for filling percussion caps. **Fulminates**, explosive compounds such as mercury fulminate derived from f. a.; used in detonators.

FULTON.—(1) (38° 50′ N., 92° W.) City, Missouri, U.S.A.; fireclay manufactures. Pop. (1910) 5228. (2) (43° 20′ N., 76° 24′ W.) City, on Oswego, New York, U.S.A.; flour and paper mills. Pop. (1910) 10,480.

FULTON, ROBERT (1765–1815), Amer. engineer; began life as miniature portrait and landscape painter; came to England, 1787; took up steam navigation in Paris, 1797, and in 1807 invented and launched a steamship at New York—an epoch-marking event in steam navigation; improved dredging and flax-spinning machines, invented submarines, and constructed canals. See Mrs. Sutcliffe's *Fulton and the Clermont* (1909).

FUMARIACEÆ, genus of herbaceous dicotyledons, the commonest of which is *Fumaria officinalis*, which produces potash and is used in dyeing.

FUMARIC AND MALEIC ACIDS (COOH.CH:CH.COOH), unsaturated compounds of identical structure, with dissimilar actions explained by the relative positions of the atoms in space.

FUNCHAL (32° 37′ N., 16° 54′ W.), seaport town, capital of Madeira Islands, on S. coast Madeira; bp.'s see; residence of governor; commercial centre; port of call for steamers. Pop. 20,844.

FUNCTION.—Whenever two quantities are so related that any change made in one produces a corresponding change in the other, then the latter is said to be a *function* of the former. This relation is usually represented by the letters F, *f*, ϕ, ψ, etc. Thus $y=F(x)$, $u=f(x)$, $v=\phi(x)$, denote that y, u, v are functions of x, and their values are determined for any particular value of x when the form of the function in question is given. x is in this case the *independent variable*; y, u, v are *dependent variables*. By taking corresponding values of (say) x and y for co-ordinates, curves may be obtained representing graphically the function concerned.

Complex Quantities of the form $x=a+ib$, where $i=\sqrt{-1}$, may be represented graphically by measuring a horizontally from the origin and b vertically from the a-axis. The polar co-ordinates of the resulting point being r, θ, we have $a=r\cos\theta$, $b=r\sin\theta$, and hence $x=r(\cos\theta+i\sin\theta)$, which may be written $r\,\mathrm{cis}\,\theta$. The positive length r is called the absolute value of x, and $(\theta+2n\pi)$ the amplitude of x. By this graphic method complex quantities may be added and subtracted by the ordinary vector laws.

Real Functions of a Real Variable.—When one and only one real value y corresponds to each value of a real variable x, y is said to be a one-valued function of x. When two or more real values of y correspond to each x, y is said to be a many-valued function of x. The latter will not be considered here.

Continuity.—The function $f(x)$ is said to be continuous at $x=a$, when there exists an interval of the axis of x,—say the interval from $a-\delta$ to $a+\delta$, where δ is real,—such that at every point x of this interval, we have $|f(x)-f(a)|<\epsilon$, where ϵ is an arbitrarily small positive number chosen in advance. $|x|$ is the absolute value of x, and in the above it is assumed that $f(x)$ is defined for $x=a$.

Rational Algebraic Functions.—Rational integral function of complex variable x is

$$y=a_0+a_1x+a_2x^2+\ \ldots\ +a_nx^n.$$

This is evidently *one-valued*, since x^n is one-valued.

The definition of continuity requires modification and becomes: A function $f(x)$ of a complex variable x is said to be continuous at the point $x=a$, when there exists a circular region ($|x-a|\leq\delta$) such that at every point x of this region $|f(x)-f(a)|<\epsilon$ where ϵ is an arbitrarily small positive number chosen in advance. Again it is assumed that $f(x)$ is defined when $x=a$.

Limit.—Suppose $f(x)$ is a one-valued function of x, and ϵ as above, then if for every ϵ there is a corresponding positive number δ such that, when $|x-a|<\delta$ and $\neq 0$, $|f(x)-b|<\epsilon$, b is called the limit of $f(x)$ when x approaches a.

If for every ϵ there is a corresponding δ such that, when $|x|>\delta$, $|f(x)-b|<\epsilon$, then b is said to be the limit of $f(x)$ when x approaches infinity.

If when $|x-a|<\delta$ and $\neq 0$, $|f(x)|>1/\epsilon$, the limit of $f(x)$ is infinity when x approaches a.

If when $|x|>\delta$, $|f(x)|>1/\epsilon$, the limit of $f(x)$ is infinity as x approaches infinity. Hence for continuity of $f(x)$ at $x=a$, there must be one and only one limit as x approaches a, there must be a definite value $f(a)$ at $x=a$, and this value must equal the limit.

Derived Functions.—If $f(x)$ has a definite value $f(a)$ at $x=a$, then the limit, if existent, of $\{f(x)-f(a)\}/(x-a)$ for $x=a$ is called the first derived function of $f(x)$ at $x=a$. Putting h for $(x-a)$ this ratio becomes $\{f(a+h)-f(a)\}/h$, and the derived function is the limit of this as h approaches zero. It is often denoted by $f'(x)$ or by $\frac{df(x)}{dx}$.

In particular, if $f(x)=x^n$, then $f'(x)$ is the limit of $\{(a+h)^n-a^n\}/h$, which by use of the Binomial Theorem becomes

$$na^{n-1}+\frac{n(n-1)}{1.2}a^{n-2}h+\frac{n(n-1)(n-2)}{1.2.3}h^2+\ \ldots\ +h^n.$$

The difference between this and na^{n-1} can be made as small as we please by confining $h(\neq 0)$ to a suitably chosen small circle about the point where $h=0$.

$$\text{Hence}\ \operatorname*{Limit}_{x=a}\frac{x^n-a^n}{x-a}=na^{n-1}.$$

But a may be anywhere in the x-plane, and hence the first derived function, or *derivate*, of x^n at the point x is nx^{n-1}.

The method may obviously be applied to other functions.

Transcendental Functions are such as do not admit of being represented as ordinary algebraic expressions in a finite number of terms. Examples are exp x, sin x, log x, sinh x, etc. The simplest

is the *exponential*, defined by $y=\exp x=\sum_{n=0}^{n=\infty} x^n/n\,/$ where $\sum_{n=0}^{n=\infty} x^n/n\,/$ denotes the sum of all the terms like $x^n/n\,/$ obtained by giving n in succession all integral values from 0 to ∞. Investigation shows the series to be convergent (see SERIES). The *addition theorem* $\exp x_1 . \exp x_2=\exp(x_1+x_2)$ is obtained by direct multiplication, and can evidently be extended for any number n of arguments. If all these are equal to x we get $(\exp x)^n=\exp nx$.

The *Logarithm* of a complex quantity x cannot be defined simply as in the case of the logs of numbers used in calculation. If $x=\rho \operatorname{cis}\theta$, we have

$$dx=d\rho . \operatorname{cis}\theta+\rho . d\operatorname{cis}\theta=(d\rho+i\rho d\theta)\operatorname{cis}\theta.$$

Hence, if initially $x=1$, $\rho=1$, $\theta=0$, we obtain

$$\int_1^{x_1} dx/x=\int_1^{\rho_1} d\rho/\rho+i\int_0^{\theta_1} d\theta$$

i.e. $\log x_1=\log\rho_1+i\theta_1=\log|x_1|+i\operatorname{am}x_1$

where $\operatorname{am}x_1$ denotes the *amplitude* of x_1. The first term of this is the natural log of ρ_1, a real number, and depends only on the distance of the final x from the origin. The second term, $i\theta_1$, depends on the path of integration. So $\log x$ is many-valued just as its amplitude, and the general value of $\log x_1$ is found by adding $2n\pi i$ to any particular value. We define that value of $\log x$ for which $-\pi<\theta\leqq\pi$, as the *chief value* of the log, and denote it by $\log x$, so we have

$$\log x=\log\rho+i\operatorname{am}x$$

where $\operatorname{am}x$ is the chief amplitude of x.

If y is the log of x, $x=\exp y$ (by definition), and $y=\xi'+i\eta'=\log\rho+i\theta$; so x is determined from $\xi'=\log\rho$, or $\rho=\exp\xi$, and $\theta=\eta'$. Thus for a given y, x is single-valued, but one value of x will correspond both to y and to $y+2n\pi i$, and hence $\exp y$ is periodic, with the imaginary period $2\pi i$.

CIRCULAR FUNCTIONS.—When y is purely imaginary, *i.e.* $\xi'=0$, we have $\rho=1$ and $x=\operatorname{cis}\theta$, while $y=i\eta'$ or $i\theta$. Hence $\operatorname{cis}\theta$ is the same as $\exp i\theta$, or $\exp\theta=\cos\theta+i\sin\theta$, and we have $\cos\theta+i\sin\theta=1+i\theta+(i\theta)^2/2\,/+(i\theta)^3/3\,/+\ldots$

Equating real and imaginary parts of each side, we get the analytical expressions for $\cos\theta$ and $\sin\theta$:—

$$\cos\theta=1-\frac{\theta^2}{2\,/}+\frac{\theta^4}{4\,/}-\frac{\theta^6}{6\,/}+\ldots$$

$$\sin\theta=\theta-\frac{\theta^3}{3\,/}+\frac{\theta^5}{5\,/}-\frac{\theta^7}{7\,/}+\ldots$$

Thus $\cos x$ and $\sin x$ are transcendental integral functions. We have

$$\left.\begin{aligned}2\cos x&=\exp ix+\exp(-ix)\\ \text{and } 2i\sin x&=\exp ix-\exp(-ix)\end{aligned}\right\} \quad . \quad . \quad \text{(i.)}$$

and $\sin x$ will be zero when $e^{ix}=e^{-ix}$, *i.e.* $x=n\pi$ or 0; so the zeros are distributed along the real axis at intervals of π starting from the origin. In the same way the zeros of $\cos x$ are distributed at intervals of π, starting from $\pi/2$. The addition theorems

$$\cos(x_1+x_2)=\cos x_1\cos x_2-\sin x_1\sin x_2$$
$$\sin(x_1+x_2)=\sin x_1\cos x_2+\cos x_1\sin x_2$$

and others following from (i.) above, are true equally for complex arguments as for real angles (see TRIGONOMETRY). The other circular functions, which are transcendental fractional functions of x, are defined as the ratios $1/\cos x=\sec x$, $1/\sin x=\operatorname{cosec}x$, $\sin x/\cos x=\tan x$, $\cos x/\sin x=\cot x$. They have first order infinities for zeros of their denominators.

The *Hyperbolic Functions* for real arguments are defined by

$$\cos ix=\cosh x=\frac{1}{2}(e^x+e^{-x})$$

$$\sin ix=i\sinh x=\frac{i}{2}(e^x-e^{-x}).$$

From these we get a special case of the addition theorems:—

$$\sin(\xi+i\eta)=\sin\xi\cosh\eta+i\cos\xi\sinh\eta$$
$$\text{and } \cos(\xi+i\eta)=\cos\xi\cosh\eta-i\sin\xi\sinh\eta.$$

INTEGRALS.—The definite integral $\int_a^b f(\xi)d\xi$, where ξ is real, may be regarded in two ways, treating integration as (i.) the inverse of differentiation, (ii.) as a summation (see *Infinitesimal Calculus*). Both views may be generalised to apply to analytic functions of x, and lead to the same results.

EULERIAN INTEGRALS.—The definite integral $\int_0^1 x^{l-1}(1-x)^{m-1}dx$ is called the *first Eulerian integral*, or the *Beta* function, and is denoted by $\mathrm{B}(l, m)$. The integral $\int_0^\infty e^{-x}x^{n-1}dx$ is the *second Eulerian integral*, or the *Gamma* function, and is denoted by $\Gamma(n)$.

In the first integral put $x=1-z$ and it is found that $\mathrm{B}(l, m)=\mathrm{B}(m, l)$.

Integrating by parts $\int e^{-x}x^n dx$ we get

$$\int e^{-x}x^n dx=-e^{-x}x^n+n\int e^{-x}x^{n-1}dx.$$

But $e^{-x}x^n$ vanishes when $x=0$ and when $x=\infty$, and hence

$$\Gamma(n+1)=n\Gamma(n).$$

It is easy to see that $\Gamma(1)=1$, and so if n is an integer $\Gamma(n+1)=n\,/$.

Again, integrating first with respect to x we have

$$\int_0^\infty\int_0^\infty x^{l+m-1}y^{m-1}e^{-(1+y)x}dy\,dx=$$
$$\Gamma(l+m)\int_0^\infty \frac{y^{m-1}dy}{(1+y)^{l+m}}$$

Integrating first with respect to y we get for the same double integral:—

$$\Gamma(m)\int_0^\infty e^{-x}x^{l-1}dx, \text{ which is } \Gamma(m)\Gamma(l)$$

$$\text{Hence } \int_0^\infty \frac{y^{m-1}dy}{(1+y)^{l+m}}=\frac{\Gamma(l)\Gamma(m)}{\Gamma(l+m)} \quad . \quad . \quad . \quad \text{(A)}$$

By putting $x=\dfrac{1}{1+y}$ in $\mathrm{B}(l, m)$ it may be shown that $\mathrm{B}(l, m)$ is equal to the integral on the left of (A).

Thus $$\mathrm{B}(l, m)=\frac{\Gamma(l)\Gamma(m)}{\Gamma(l+m)}$$

If now $l+m=1$, m being less than unity, we get

$$\int_0^\infty \frac{y^{m-1}dy}{1+y}=\Gamma(m)\Gamma(1-m), \text{ since } \Gamma(1)=1.$$

This integral has the value $\pi/\sin m\pi$, and hence putting $m=1/2$ we get $\Gamma\left(\frac{1}{2}\right)\Gamma\left(\frac{1}{2}\right)=\pi$

$$\text{and } \therefore \Gamma\left(\frac{1}{2}\right)=\sqrt{\pi}.$$

Many definite integrals may be expressed in terms of the Gamma function.

e.g. $\int_0 e^{-a^2x^2}dx$ becomes, putting y for a^2x^2, $\int_0^\infty \frac{e^{-y}dy}{2a\sqrt{y}}$

i.e. $\frac{1}{2a}\Gamma\left(\frac{1}{2}\right)=\frac{\sqrt{\pi}}{2a}$.

ELLIPTIC INTEGRALS.—The integrals $\int_0^\theta \frac{d\theta}{\sqrt{1-c^2\sin^2\theta}}$

$\int_0^\theta \sqrt{1-c^2\sin^2\theta}\,d\theta$, and $\int_0^\theta \frac{d\theta}{(1+a\sin^2\theta)\sqrt{1-c^2\sin^2\theta}}$

are known as elliptic functions or integrals of the first, second, and third order respectively. They are denoted by the symbols $\mathrm{F}(c, \theta)$, $\mathrm{E}(c, \theta)$, and $\Pi(c, a, \theta)$.

θ is the *amplitude*; c, the *modulus*, is a constant less than unity; a is the *parameter* of the third function. Taken between the limits 0 and $\pi/2$ the functions

are called *complete* functions, so that the amplitude of a complete function is $\pi/2$. $E(c, \theta)$ is the length of a portion of the arc of an ellipse measured from an end of the minor axis, c being the eccentricity of the ellipse. From this fact and the connection between the integrals, the name elliptic integrals was given to them.

Functions of great importance in the higher developments of mathematical physics are the *Potential Function*, and the following, obtained as solutions of certain differential equations: *Legendre's Coefficients*, or *Zonal Harmonics*; *Laplace's Coefficients*, or *Spherical Harmonics*; *Bessel's Functions*, or *Cylindrical Harmonics*; *Lamé's Functions*, or *Ellipsoidal Harmonics*.

See Forsyth, *Theory of Functions*; Harkness and Morley, *Theory of Functions*; Appell and Lacour, *Elliptic Functions*; Todhunter, *Functions of Laplace, Lamé, and Bessel*; Byerly, *Fourier's Series and Spherical Harmonics*.

FUNDY, BAY OF (45° N., 66° W.), inlet, N. Atlantic Ocean, separating Nova Scotia from New Brunswick; remarkable for high tides.

FÜNEN, FYEN (55° 20′ N., 10° 20′ E.), Danish island in Baltic Sea, between Zealand and Jutland. Area, 1100 sq. miles. Pop. 280,000.

FUNERAL, see BURIAL.

FÜNFKIRCHEN, PÉCS (46° 6′ N., 18° 13′ E.), town, Baránya, Hungary; capital of province; leather, cloth, and earthenware. Pop. 45,000.

FUNG-HWANG, FENG-HWANG, a kind of phœnix of Chin. myth., and one of the supposed guardians of China.

FUNGI are flowerless plants devoid of chlorophyll, and therefore of necessity leading either a parasitic or a saprophytic (living upon dead plants) mode of life. They are usually divided into four main groups, the Schizomycetes or 'Fission F.,' the Myxomycetes or 'Slime F.,' the Phycomycetes or 'Alga-like F.,' and the Eumycetes or higher f., each of which is in turn again subdivided. The *Schizomycetes* include the various bacilli and bacteria, and play an important part in determining the balance of terrestrial life. They are minute unicellular or filamentous forms, often rodlike, and in many cases possess one or more cilia. Many are the cause of disease, as in cholera and phthysis, whilst others give rise to fermentation (*e.g.* the vinegar and lactic acid bacilli) and to the putrefaction and decay of animal and vegetable substances. They occur throughout the atmosphere and in water, and are usually only killed by rigid sterilisation. They multiply rapidly by binary fission under favourable conditions and by hard-walled resting-spores in adverse circumstances.

The *Slime F.* usually occur on rotten wood, dead leaves, and similar substrata as slimy naked protoplasmic masses termed 'plasmodia.' When threatened with drought or shortage of food material they form resistant fructifications containing highly protected spores. These liberate minute flagellate swarmers, which become amœboid and coalesce, forming plasmodia as before. One form, *Plasmodiophora brassicæ*, gives rise to the malformation of turnips and other root-crops known as 'Fingers and Toes.' The *Phycomycetes* contain two important orders—the Oomycetes and Zygomycetes respectively. Both consist of small filamentous forms, with a freely branched and usually non-septate, multinucleate mycelium. In the Oomycetes the sexual organs consist of globular oogonia and club-shaped antheridia, the sperms of the latter being non-motile and transferred to the ova passively by a fertilising tube. Each ovum on fertilisation gives rise to a thick-walled resting-spore. Asexual reproduction in the aerial species is by means of numerous conidia borne on branching upright hyphæ, and in the aquatic forms by motile zoospores. Among the economically important forms the following are perhaps the best known: *Saprolegnia ferox*, causing the salmon disease; *Pythium*, causing the 'damping off' of cress and other seedlings; *Phytophthora infestans*, giving rise to the potato disease; and *Plasmopara riticola*, producing the destructive 'false mildew' of the vine. In the Zygomycetes, of which the 'Black Mould' of bread (*Mucor*) is typical, the gametes are similar and produce a thick-walled zygospore, whilst the asexual spores are borne in globular sporangia. Generally speaking, asexual reproduction is in both groups utilised for rapid propagation under favourable conditions, whilst sexual reproduction only occurs in times of stress.

The *Eumycetes*, which are the dominant class, are divided into four main groups—the Ascomycetes, the Uredineæ, the Ustilagineæ, and the Basidiomycetes. The first group is characterised by the production of club-shaped reproductive structures termed asci, each usually containing eight spores. It includes a vast and very diverse assemblage of forms, among which the mildews attacking the hop, vine, gooseberry, etc., *Claviceps*, causing 'ergot' of rye and other cereals, and *Nectria ditissima*, causing apple canker, are some of the more important. In addition the cup fungi, the truffles, and morels belong to this group, whilst the blue and green moulds on bread and fruit are also included. The Uredineæ are parasitic on gramineous and other hosts causing 'rust.' Many are heteræcious, notably *Puccinia graminis*, the 'wheat rust,' which passes part of its life on the wheat plant, whilst the remainder is passed on the barberry, in the absence of which the full life cycle cannot be accomplished. Both the rusts, and to a larger extent the Ustilagineæ, which cause 'smut' and 'bunt' in wheat, oats, and similar crops, may be combated by suitable preliminary treatment of the seed. The Basidiomycetes include all mushrooms (*q.v.*) and toadstools as well as bracket fungi and puff balls. The spores are borne on gills or lamellæ, or in closed pear-shaped or globular fructifications. Whilst the majority are saprophytes, feeding on dead organic matter, others, notably the bracket fungi (Pdyporaceæ) and *Armillaria mellea*, cause immense damage to timber by attacking trees injured by wounding and causing their death. (For details with regard to treatment of various fungal plant diseases, see the leaflets of the Board of Agriculture and Fisheries.)

Cooke, *F., their Nature, Influence, and Usage* (1883); Swanton, *F., and how to know them* (1909).

FUNGUS-GNATS, or MIDGES (*Mycetophilidæ*), minute flies, the larvæ of which burrow in fungi or in decaying vegetation.

FUNJ, negroid people inhabiting parts of the eastern Sudan.

FUNKIÆ, PLANTAIN-LILIES, liliaceous plants common in gardens; noted for their flowers.

FUR, on animals, is a protection against cold, or as with the mole, against irritation by earth particles. Most f's come from N. America and Siberia; animals are killed when in winter coat. Most expensive f's are: Sea Otter, £20–£500; Silver Fox, £10–£500; Russ. Sable, £6–£44; Black Bear, 10s.–£12; Wolf, 5s.–£5; Seal, £2–£10. Cheaper f's are Skunk, Squirrel, Marten, Mink, Red Fox, Grey Fox, Beaver, Lamb, Hare, Rabbit, Opossum, Musk-Rat, Wild-Cat, Chinchilla (sometimes expensive), Ermine.

Manufacture is a trade secret. F's are first cleaned with soap, salt, and alum; sawdust and butter are used in 'dressing'; dyeing is a secret process. See, further, under HAIR.

FURETIÈRE, ANTOINE (1619–88), Fr. author; wrote *Roman Bourgeois* and compiled dictionary.

FURFOOZ (50° 13′ N., 4° 58′ E.), village, Belgium; notable for discovery of caves containing remains of prehistoric man (1872).

FURFURANE or **FURANE** (C_4H_4O), colourless liquid, B.P. 32°, with characteristic smell, found in distillation products of pine-wood. It does not react with sodium or phenylhydrazin, but forms dye-stuffs with isatin and phenanthene-quinone.

FURIES, THE, see ERINYES.

FURNACE.—A place where a fire is maintained so as to give out great heat.

Each type is made so as (1) to give out the greatest possible amount of heat, with a minimum expenditure of fuel, (2) to prevent the loss of heat thus given, (3) to concentrate the heat as desired, (4) to give the operator full control over the regulation of the heat. A f. must be constructed with due regard to the law of combustion; a certain proportion of air should be allowed to combine with the gases of the fire. Should the design of the furnace allow too much air to enter, the gases are chilled and diluted, while too little air causes them to escape unconsumed.

AIR FURNACES are those where only a natural draught is used. BLAST FURNACES, i.e. f's with forced draught made by fans, etc., are generally used in the melting of metal, and very high temperatures are obtained. REVERBERATING FURNACES are those in which the direction of the flames is changed by an arched roof. ELECTRIC FURNACES, capable of giving the highest known temperatures, are used mainly for laboratory experiments in chemistry, metallurgy, and mineralogy. See IRON.

FURNEAUX, TOBIAS (1735–81), Eng. navigator; commanded *Adventure* in Cook's 2nd voyage; charted Tasmania. F. Islands, between Tasmania and Victoria, Australia, are named after him.

FURNES (51° 4′ N., 2° 38′ E.), town, W. Flanders, Belgium; tanneries and linen works. Pop. 6200.

FURNESS (54° 15′ N., 3° 6′ W.), district, N.W. Lancashire, England, forming peninsula between Morecambe Bay and Irish Sea; rich in hematite iron-ore; chief town, Barrow-in-Furness; near Dalton are ruins of Furness Abbey, founded 1127.

FURNESS, HORACE HOWARD, Ph.D., LL.D. (1833–1912), Amer. Shakespearean scholar.

FURNISS, HARRY (1854–), Brit. caricaturist and book illustrator; on staff of *Punch* (1884–94).

FURNITURE, general name for tables, chairs, cabinets, beds, and other domestic objects of a like kind. Examples of Egyptian f., dating back to about fifteen cent's B.C., are still in existence. The ancients used very little f.—beds and couches, chiefly, and few chairs. Yet f. they did use was often very ornate. The Egyptians used wooden f., carved in fantastic animal shapes, and gilded. Other nations used cedar and ebony, and their f. was often inlaid with ivory and precious metals. Greek f. was simple; Roman ornate, but both nations used little. Eng. f., until after the Conquest, was of the rudest description, but a rapid change took place with the advent of the Normans. Yet throughout the feudal period such f. as was used was substantial rather than ornamental. Massiveness, too, was characteristic of most of the f. produced from the time of the Early Tudors to that of Queen Anne. The golden age of f.-making in Europe was the XVIII. cent., and in England work of the most elaborate and beautiful description was produced by such artists as Chippendale, Sheraton, Heppelwhite, Adams, and others. The Victorian period in f. was generally one of heaviness and ugliness; but since then there has been a marked revival of more tasteful designs and lightness of form.

Foley, *Decorative Furniture*, 2 vols. (Jack); Macquoid, *History of Eng. F.: the Age of Walnut* (1905); Morse, *F. of the Olden Time* (1903); Robinson, *Eng. F.* (1906); also works by Bumpus, Chippendale, Ince, Mayhew, Sheraton.

FURNIVALL, FREDERICK JAMES (1825–1910), Eng. scholar and philologist; founded the Early Eng. Text, Chaucer, Browning, and numerous other Societies.

FURSE, CHARLES WELLINGTON (1868–1904), Eng. artist; achieved eminence by his portraits and outdoor studies.

FÜRST, JULIUS (1805–73), Ger. Orientalist.

FÜRSTENBERG.—(1) Noble house in Swabia, dating back to XII. cent.; family played important part in Ger. political, military, and ecclesiastical history; Franz Egon (1625–82) and bro., Wilhelm Egon (1629–1704), both Counts of F. and Bp's of Strassburg, served Louis XIV.'s interests. (2) Family in Westphalian Rhine district, dating from XIII. cent., to which belonged Franz Friedrich Wilhelm (1728–1810), who promoted agriculture and education.

FURSTENWALDE (52° 23′ N., 14° 2′ E.), town, on Spree, Brandenburg, Prussia; machinery. Pop. (1910) 22,604.

FÜRTH (49° 29′ N., 10° 59′ E.), manufacturing town, Bavaria, Germany; population mainly Jews; mirrors, toys. Pop. (1910) 66,555.

FURZE, GORSE, or **WHIN** (*Ulex europæus*), a xerophytic shrub which grows abundantly on heaths and similar places; characterised by needle-shaped leaves and modification of branches to form spines.

FUSAN (35° 24′ N., 129° 26′ E.), port, Korea Bay, Korea; opened to foreigners, 1876; exports silk, rice, vegetables, and hides; terminus of Seoul-Fusan line. Pop. 60,000.

FUSARO, LAGO, (40° 50′ N., 14° 2′ E.), ancient *Acherusia*, small lake, Campania, Italy; oysters.

FUSELI, HENRY (1742–1825), Anglo-Swiss artist and art critic; b. Zurich; after studying in Italy he settled in England; elected R.A. (1790), and prof. of Painting at the Academy (1799). His paintings, including *The Nightmare* and numerous illustrations of Shakespeare and Milton, are distinguished by a weird and fantastic beauty; wrote extensively on art subjects, and his *Lectures on Painters* are of great critical value.

FUSEL-OIL, strong-smelling liquid formed in fermentation; contains large quantity of amylic alcohol ($C_5H_{12}O$); used in oils, varnishes, etc.; present in inferior spirits. See also SPIRITS.

FUSILIER, foot-soldier, formerly armed with *fusil*, a kind of musket.

FUSION, the melting of a substance. Most substances exist both as liquids and solids. When the solid passes into the liquid state it either does so abruptly at one definite temperature, called the *Melting or Fusion Point*, or it does so gradually, in which case there is no definite melting-point. Substances with a definite melting-point are said to be examples of crystalline fusion. They require a certain definite amount of heat to transform them into liquid (*latent heat of fusion*), and the process is accompanied by a change of volume. Thus water, bismuth, and iron expand on solidification, while paraffin contracts. With these substances there is a certain temperature and pressure at which both the liquid and solid exist side by side. Substances which do not change their state at a definite temperature, do not give evidence of any latent heat, show no change in volume, and cannot exist as liquid and solid at the same time. This is *amorphous* fusion.

But if two substances capable of existing as solid and liquid side by side are mixed together in the liquid state they may solidify in varying proportions at varying temperatures, so that a mechanical mixture of them in the solid state is obtained. For a given temperature and pressure the composition of the mixture is always the same. Such mixtures when composed of metals are termed alloys, and differ in properties from their constituents.

FÜSSEN (47° 34′ N., 10° 44′ E.), town, on Lech, Bavaria, Germany; rope-making.

FUST, JOHANN (d. *c.* 1466), Ger. printer of eminence; was sometime associated with Gutenberg. There has been considerable controversy as to which of the two was the actual inventor of printing. The facts seem to be that F. advanced capital to G. to develop his business, and, litigation ensuing, F. commenced a rival concern in partnership with another.

FUSTEL DE COULANGES, NUMA DENIS (1830–89), Fr. historian; b. Paris; grad. as doctor, 1858; prof. of History, Strassburg, 1860–70; lecturer at École Normale Supérieure, 1870; prof. at Paris, 1875; prof. of Mediæval History at Sorbonne, 1878;

director of École Normale, 1880; pub. several hist. works, including *La Cité Antique*, 1864. A systematic, conscientious historian.

FUSTIAN, kind of cotton cloth of heavy weaving, coarse in texture, mainly for labourers' wear.

FUTURES, DEALING IN, term used in produce and cotton-market speculations relating to future deliveries of goods not yet in the market. When persons deal in f's they are gambling on future fluctuations in prices, and to bring about the desired rise or fall to their own advantage they seek to influence the market in that direction. Thus the producer and consumer suffer, and the entire gain falls to the speculator.

FUZE, apparatus for igniting explosives; quick-burning f's consist of yarn and uncompressed gunpowder, or of fulminated cotton; slow-burning f's are made of yarn and compressed gunpowder; electrical f's have largely displaced other varieties.

FYNE, LOCH (56° N., 5° 20′ W.), inlet of sea, Argyllshire, Scotland; herring-fisheries.

FYRD, the army on a militia basis of the Anglo-Saxon kings in England; service when required was compulsory on all landholders.

FYT, JOHANNES (1609–61), Belg. artist; celebrated for his animal studies.

FYZABAD, FAIZABAD (26° 46′ N., 82° 11′ E.), city, district, and division in United Provinces, India. District: area, 1740 sq. miles; pop. 1,225,374. Division: area, 12,113 sq. miles; pop. 6,856,000. FYZABAD (town), on Gogra, near site of ancient Ajodhya; rice, cotton, sugar. Pop. 74,076.

G, seventh letter of Rom. alphabet; in Lat. always hard, so in Eng., except in Romance words, *e.g.* gentle. In O.E. *g* was soft in words *geong* (young), *sælig* (blessed).

GABBRO, important group of plutonic rocks of crystalline and coarse-grained structure, containing felspar and diallage; occasionally found in thick layers, brown or dark green in colour, and widely distributed in Scotland, Wales, Cornwall, Hartz Mountains, and the Black Forest.

GABELENTZ, HANS CONON VON DER (1807–74), Ger. ethnologist and linguist; distinguished for his extensive knowledge of ancient and modern languages and dialects; author of numerous text-books and grammars.

GABELLE, oppressive Fr. salt-tax; abolished latter part of XVIII. cent.

GABERDINE, loose, outer garment, once much worn by the Jews.

GABES (33° 53′ N., 10° 4′ E.), seaport town, on Gulf of Gabes, Tunis, Africa; dates. Pop. 12,000.

GABII, ancient hist. town, near Rome, Italy; according to legend was early home of Romulus.

GABINIUS, AULUS (d. 48 or 47 B.C.), Rom. general; enacted Gabinian Law, 67 B.C.; consul, 58 B.C.; Syrian proconsul, 57–4 B.C.; exiled for extortion; recalled, 49 B.C.

GABION, basket-shaped frame, with open ends, which is placed on end, and filled with earth; used in fortification.

GABLE, in arch. triangular part of the upper wall of a building enclosed by the slopes of the roof. The g. was a distinctive feature, and used with much decorative effect in half-timbered architecture. In parts of Germany, the Netherlands, and Scotland 'corbie-step' gables have been very popular. A small g., often decorated with a finial or other ornament, is known as a GABLET.

GABLER, JOHANN PHILIPP (1753–1826), Prot. theologian; prof. at Altdorf and Jena.

GABLONZ (50° 43′ N., 15° 6′ E.), town, on river Neisse, Bohemia, Austria; glass manufactures. Pop. (1910) 29,605.

GABOON, GABUN (*q.v.*).

GABORIAU, ÉMILE (1835–73), Fr. novelist; noted for his sensational detective and criminal stories —*Monsieur Lecoq* (1869), etc.

GABRIEL, in *Book of Enoch* and Christian Church one of four archangels, the others being Raphael, Michael, Uriel.

GABUN (0° 15′ N., 9° 20′ E.), district and river of Fr. Equatorial Africa (*q.v.*); G. estuary receives several rivers; on N. bank is settlement of Libreville; unhealthy climate. G. in 1886 was annexed to the Fr. Congo, now Fr. Equatorial Africa.

GACHARD, LOUIS PROSPER (1800–85), Belg. historian.

GAD.—(1) Jacob's seventh son, founder of Israelite tribe of G. (2) Seer, connected with David; occurs in *Samuel* and *Chronicles*.

GADAG, GARAG (15° 25′ N., 75° 40′ E.), town, Bombay, India; cotton and silk manufactures. Pop. 31,000.

GADARA, modern UM-KEIS (32° 37′ N., 35° 43′ E.), ancient town, Syria, in the Decapolis; famous hot springs; conquered by Antiochus the Great, 218 B.C.; besieged by Jannæus; rebuilt by Pompey.

GADDI, GADDO (*c.* 1239–1312), Ital. (Florentine) artist; famous as fresco painter and mosaicist. His s., TADDO G. (*c.* 1300–66), a pupil of Giotto, and his grandson, AGNOLO G. (*c.* 1350–96), were also greatly distinguished in the same kinds of art.

GAD-FLIES, BREEZE-FLIES, HORSE-FLIES, or CLEGGS (*Tabanidæ*), large flies, the females of which have piercing mouth-parts, and cause much irritation to man, horses, and cattle by blood-sucking.

GADSDEN, JAMES (1788–1858), Amer. soldier; app. minister to Mexico, where he negotiated 'G. Treaty,' 1853. His bro., CHRISTOPHER G. (1785–1852), was Prot. Episcopal bp. for S. Carolina, 1839–52.

GADWALL, see under DUCK FAMILY.

GAEKWAR, title of the Mahratta princes of Baroda, who, under Damaji I., secured supremacy in Gujarat during early part of XVIII. cent.

GAETA (41° 12′ N., 13° 35′ E.), fortified seaport, Caserta, Italy; ancient *Caieta*; cathedral; abp.'s see; resort of wealthy Romans in ancient times; frequently besieged; became refuge of Pius IX., 1848, of Francis II. of Naples, 1860; has active coasting trade. Pop. 5393.

GAETANI, CAETANI, noble Rom. family to which Pope Boniface VIII. (1294–1303) belonged; still holds distinguished place among Rom. nobility.

GÆTULIA (*c.* 33° N., 0°), ancient region, N. Africa, S. of Mauritania and Numidia, embracing N.W. part of Sahara; inhabited by warlike tribe called Gætuli, noted rearers of horses; conquered by Rome, 6 A.D.

GAGE, THOMAS (1721–87), Brit. general; served in Flanders, at Culloden, and under Braddock in America; became Gov. of Massachusetts.

GAGERN, HANS CHRISTOPHER ERNST, BARON VON (1766–1852), Ger. statesman and prime minister of Netherlands; b. near Worms; wrote on history and political science; also a valuable auto-biography.—**Gagern, Heinrich Wilhelm August, Freiherr von** (1799–1880), 3rd s.; b. Bayreuth; lawyer and soldier; first pres. of Ger. Parliament.—**Gagern, Maximilian, Freiherr von** (1810–89), youngest s.; b. Weilburg; Under-Sec. of State for Foreign Affairs in Ger. National Parliament.

GAIL, JEAN BAPTISTE (1755–1829), Fr. Gk. scholar; was a voluminous writer, and did much to promote the study of Gk. in France.

GAILLAC (43° 54′ N., 1° 54′ E.), town, Tarn, France; wines. Pop. 7700.

GAILLARD, GABRIEL HENRI (1726–1806), Fr. historian.

GAINESVILLE (29° 38′ N., 82° 20′ W.), city, Florida, U.S.A.; seat of State univ. Pop. (1910) 6183.

GAINESVILLE (33° 46′ N., 97° 23′ W.), city, Texas, U.S.A.; ironworks. Pop. (1910) 7624.

GAINSBOROUGH (53° 24′ N., 0° 45′ W.), town, on Trent, Lincolnshire, England; has an old Manor House, built by John of Gaunt; linseed cake and agricultural machinery manufactured. Pop. (1911) 20,589.

GAINSBOROUGH, THOMAS, R.A. (1727–88), Eng. artist; b. Sudbury (Suffolk); s. of a small tradesman; studied engraving, and afterwards set up as an artist, first at Ipswich, and afterwards at Bath and London. He was one of the greatest portrait-painters England has produced, and though his landscapes were not appreciated in his own day, they are now considered only less valuable than his portraits. The misadventures of his famous *Duchess of Devonshire* portrait are well known. The National Gallery contains his portrait of *Mrs. Siddons*, and some of his finest landscapes.

Gainsborough, by Sir W. Armstrong (1894), Gower (1903), Rothschild (Masterpieces in Colour).

GAIRDNER, JAMES, LL.D., C.B. (1828–1912),

Brit. historian; b. Edinburgh; wrote chiefly on Plantagenet and Tudor kings, and edited *The Paston Letters*.

GAIRDNER, SIR WILLIAM TENNENT (1824–1907), Scot. doctor; house physician, Edinburgh Royal Infirmary, fifteen years; prof. of Medicine, Glasgow Univ. (1862); honorary Physician in Ordinary for Scotland to Edward VII.; works: *The Physician as Naturalist, Clinical Medicine*.

GAIRLOCH (57° 43′ N., 5° 44′ W.), village and parish, at head of Gairloch, an inlet of sea, W. coast of Ross and Cromarty, Scotland.

GAISERIC, GENSERIC, first Vandal king of Africa (c. 390–477), conquered and ruled Africa (439–77); a crafty politician, noted general, and treacherous oppressive ruler.

GAISFORD, THOMAS (1779–1855), Eng. classical scholar.

GAIUS, Rom. jurist; author of the *Institutes*—a complete exposition of elements of Rom. law; a treatise on the Edicts of the Magistrates, and Commentaries on the Twelve Tables; written under influence of Traditionalists, between 130 and 180 A.D.

GAIUS CÆSAR, CALIGULA (A.D. 12–41), succ. Tiberius as Rom. emperor, 37 A.D.; a tyrannical, cruel, profligate ruler; assassinated.

GALABAT, GALLABAT (12° 58′ N., 36° 12′ E.), town, Anglo-Egyptian Sudan, on W. borders Abyssinia; trading centre.

GALACTODENDRON, see COW-TREE.

GALAGOS, AFRICAN LIONESS (*Galago*), a genus of Lemuroidea (*q.v.* under *Primates*), with large, hairless ears; the only long-tailed lemurs found widely distributed on the mainland of Africa.

GALAHAD, hero of Arthurian group of legends, s. of Lancelot; from secondary position in earlier legends became central figure as successor of Perceval (*q.v.*).

GALANGAL, drug prepared from the root of a plant, *Alpinia officinarum*, of natural order *Zingiberaceæ*, growing in southern China; still used in parts of Russia and China medicinally and as a flavouring agent, having a peppery taste, but is not now used except in the above places, although a favourite drug of mediæval physicians.

GALANTHUS, see SNOWDROP.

GALAPAGOS ISLANDS (c. 0° 30′ S., 90° 30′ W.), group of some thirteen islands, belonging to Ecuador, lying in Pacific Ocean. Total area, c. 2940 sq. miles. The largest island, Albemarle, is c. 60 miles long. Islands have dense vegetation in S. but covered with lava in N., resulting from numerous volcanoes—some still alive; chief crop, sugar. Pop. c. 400.

GALASHIELS (55° 37′ N., 2° 49′ W.), town, on Gala, Selkirkshire, Scotland; noted woollen manufactures; iron and brass foundries. Pop. (1911) 14,914.

GALATEA, personage in Gk. and Rom. mythology. (1) A nymph wooed by Cyclops Polyphemus, who crushed his rival Acis under a rock. (2) Shepherdess in third Eclogue of Vergil, typifies feminine coquetry. (3) Statue of ivory loved by Pygmalion, and endowed with life by Aphrodite.

GALATIA, an inland country of Asia Minor, chiefly remarkable as the home of a Christian colony to whom St. Paul addressed the *Epistle to the Galatians* (q.v.).

GALATIANS, EPISTLE TO THE.—This epistle of St. Paul, authenticity of which has scarcely been impugned, is the only one addressed by the apostle to a group of churches. Its exact date has not been established, though it was probably written in 57 or 58 A.D., between the writing of 2 *Corinthians* and *Romans*, and during Paul's third missionary journey, while he was at Ephesus or Corinth or on the way between the two. Its object was to counteract the Judaic teaching which for some time had been undermining Paul's work in the Galatian Church. May be divided into three parts, of which the first is a vindication of the author's independence as an apostle of Christ; second is doctrinal, showing that the Gospel dispensation is the fulfilment of the law; third is practical, showing that the believer's life should be the expression of his faith.

Dods, *Introduction to New Testament*; M'Clymont, *New Testament and its Writers*; Moffatt, *Introduction to Lit. of New Testament*.

GALATINA (40° 15′ N., 18° 10′ E.), town, Apulia, Italy. Pop. 12,912.

GALATZ, Rumanian GALÂȚI (45° 27′ N., 28° 3′ E.), city, port of entry, Rumania, on Danube; commercial centre; chief exports, grain and timber; iron and copper industries. Pop. 66,000.

GALAXY, in astron., the Milky Way, the belt of luminaries stretching across the heavens; hence, any splendid gathering.

GALBA, SERVIUS SULPICIUS (5 B.C.–69 A.D.), Rom. emperor; prætor (20); consul (33); gov. of Hispania Tarraconensis (61); emperor (June 68–Jan. 69 A.D.); assassinated by rebels.

GALBA, SERVIUS SULPICIUS (fl. 150), celebrated Rom. orator and general; consul (144).

GALBANUM, gum resin, yellowish brown, containing umbelliferone, derived from exotic plants (*ferulæ*); has bitter taste; used in medicine externally as irritant, internally as digestive; also to make varnish.

GALE, THEOPHILUS (1628–78), Eng. Nonconformist theologian; wrote *The Court of the Gentiles*.

GALE, THOMAS (d. 1702), Eng. antiquary and scholar.

GALEN, or CLAUDIUS GALENUS (130–c. 200 A.D.), physician; b. at Pergamos, Asia Minor; practised medicine with very great success, chiefly in Rome; author of many works on logic, ethics, and medicine, his writings on the latter being the guide for physicians for several cent's; one of the founders of science of anatomy (*q.v.*).

GALENA.—(1) (42° 23′ N., 90° 24′ W.) city, Illinois, U.S.A.; extensive lead and zinc mines. Pop. (1910) 4835. (2) (37° 5′ N., 94° 40′ W.) city, Kansas, U.S.A.; lead and zinc mines. Pop. (1910) 6096.

GALENA (PbS), sulphide of lead, possesses a light bluish white metallic lustre. Practically all the lead of commerce is made from this ore, which contains traces of silver.

GALEOPITHECUS, FLYING LEMUR, a vegetarian arboreal Insectivore, so peculiar that it is often placed in a separate order. Hind and fore limbs are connected by a fold of skin, so that the creature can parachute from one tree to another.

GALERITES, fossil sea urchin found widely in Cretaceous; shape conical; shell oval; base flat; mouth in middle of under surface.

GALERIUS, VALERIUS MAXIMIANUS (fl. 305–11), Rom. emperor; from common soldier rose to be Diocletian's son-in-law and successor.

GALESBURG (40° 54′ N., 90° 18′ W.), city, Illinois, U.S.A.; seat of Lombard Univ. and Knox Coll.; railway workshops; iron foundries. Pop. (1910) 22,089.

GALGACUS (I. cent. A.D.), famous Caledonian chieftain, routed by Agricola in Scotland at the battle of the *Grampians*.

GALIANI, FERDINANDO (1728–87), Ital. economist; b. Chieti; Neapolitan ambassador at Paris, 1759–69; his *Dialogues sur le commerce des blés* made his name in economic world; concerned mainly with question of freedom of corn trade.

GALICIA (42° 25′ N., 8° W.), ancient kingdom and province of Spain, now captaincy-general; divided into four provinces of Corunna, Lugo, Orense, and Pontevedra; surface generally mountainous and well watered; climate mild; coast-line much indented; has many good harbours, of which Ferrol is one of finest naval ports of Europe; principal river, Minho; minerals—lead, tin, copper, iron; inhabitants mostly agriculturists, but agriculture is backward; chief exports—timber, cattle, sardines;

capital, Corunna. Area, *c.* 11,250 sq. miles. Pop. *c.* 1,976,000. See SPAIN.

Meakin, *G., the Switzerland of Spain* (1909).

GALICIA, Austrian crown land; on N. slopes of Carpathians, comprising old kingdoms of Galicia and Lodomeria, duchies of Auschwitz and Zator, and grand-duchy of Cracow; area, *c.* 30,300 sq. miles; fine pasture, and arable land, and immense forests; chief rivers—Vistula, Dniester, Sereth, Pruth; Lemberg (capital). Rich in iron-ore, coal, salt, sulphur, lead, zinc, petroleum. East G. and Lodomeria taken from Poland (*q.v.*), 1772. Cracow (*q.v.*) finally annexed, 1846. Pop. (1910) 8,025,675.

GALIGNANI, GIOVANNI ANTONIO (1752–1821), Ital. publisher; founded an Eng. library and newspaper in Paris.

GALILEE, province of Palestine; bounded N. by Leontes, E. by Jordan, S. by Samaria and Carmel Mountains, W. by Phœnicia and Mediterranean. Greatest length, *c.* 60, breadth, 35 miles. Chief interest lies in its being cradle of Christianity, whose founder passed His youth and began ministry here, performing first miracle at Cana, raising the widow's son at Nain; while the Transfiguration occurred at Mt. Tabor in the N.E.

GALILEE, porch, or small outer chapel, for penitents, attached to churches and cathedrals; examples at Durham, Lincoln, and Ely.

GALILEE, SEA OF (32° 47′ N., 35° 38′ E.), SEA OF TIBERIAS, LAKE OF TABARIYEH or GENNESARET, lake in N. Palestine; length, *c.* 14 miles, and half as broad; lying almost 700 ft. below sea-level, and situated at bottom of volcanic basin. River Jordan enters from N.; W. side has good vegetation, but N. and E. sides are bare and rocky; figures largely in Bible as Sea of G.; formerly the ancient cities of Tiberias, Magdala, Capernaum, lay round it.

GALILEO GALILEI (1564–1642), Ital. astronomer; b. Pisa; his f., a nobleman of Florence, procured him an excellent education in lit. and the arts, and in 1581 he entered the Univ. of Pisa. When nineteen G. investigated the laws of the oscillation of the pendulum, which he subsequently applied in the measurement of time. In 1589 he was made prof. of Math's in the Univ. of Pisa, and three years later filled a similar office in Padua, where he continued eighteen years, his lectures gaining for him a European reputation. He invented the type of telescope known by his name, and with the aid of his later and much-improved instruments made many remarkable observations. He noted the irregularity of the moon's surface, and showed how the heights of the mountains could be determined from their shadows. From his resolution of certain nebulæ into individual stars he concluded that the *Milky Way* might be similarly resolved with a telescope of higher power. His most remarkable discovery was that of the four largest satellites of *Jupiter*. He detected sun-spots, and inferred from their motion the rotation of the sun and the inclination of its axis to the plane of the ecliptic.

In 1610 Cosimo II., Grand-Duke of Tuscany, app. him grand-ducal mathematician and philosopher. His increased leisure G. devoted to further investigations of natural phenomena and the publication of numerous treatises. He brought fresh evidence in support of the Copernican theory by the discovery of the varying phases of *Mercury*, *Venus*, and *Mars*. In his later years he became more and more involved in controversy. Twice he was compelled by the Church to renounce his views on the Copernican system and philosophy, and to abstain from defending or teaching it. Domestic troubles and disease marred the last years of his life. In 1637 he became quite blind, though just previously he had discovered the diurnal libration of the moon, and seems to have known something of the libration in longitude. He died the year Newton was born, and was buried in church of Santa Croce, Florence. Fahie, *Life* (1903).

GALION (40° 46′ N., 82° 46′ W.), city, Ohio, U.S.A.; machine shops. Pop. (1910) 7214.

GALIUM, genus of plants, order Rubiaceæ; common Brit. wild flowers are Lady's Bedstraw or Yellow Bedstraw (*G. verum*). Cleavers (*q.v.*) is of the genus.

GALL, a term for bile, which is stored up in the **gall-bladder** (see LIVER, DIGESTION); also a swelling on a horse, or a swelling formed on plants, *e.g.* oak trees, resulting from certain parasites. See GALLS.

GALL, FRANZ JOSEPH (1758–1828), Ger. physician; practised in Vienna; made researches in anatomy and physiology, and founded the science of phrenology, writing much and lecturing upon it throughout Germany and France, and also in London; author, in addition to phrenological works, of works on anatomy and physiology.

GALLA, a race, numbering several millions, occupying parts of Abyssinia and Brit. E. Africa. They are of a fine physical type, brown-skinned, and show little trace of negro blood.

GALLAIT, LOUIS (1810–87), Belg. artist.

GALLAND, ANTOINE (1646–1715), Fr. archæologist and Orientalist.

GALLARATE (45° 40′ N., 8° 48′ E.), town, Milan, Italy; textiles. Pop. 9647.

GALLAS, MATTHIAS, DUKE OF LUCERA (1584–1647), Austrian military commander; prominent in Thirty Years War.

GALLATIN, ALBERT (1761–1849), Amer. statesman; b. Geneva, of ancient and honourable family; ed. Geneva; graduated, 1779; went to Massachusetts (1780), made his way south, and entered politics. In view of 1787 Constitution, G. was one of founders of Anti-Federalist party (afterwards the Republican). Chosen a Senator (1793), but his election annulled (1794), partly because of unpopularity he incurred over Whisky Insurrection. Elected to House of Representatives (1795), and secured leadership of Republican party. After 1798 his career was a remarkable triumph. Became Sec. of Treasury (1801) under Jefferson's presidency. Became minister to France (1816). In 1826 he was in England over North-East boundary question. Retired, 1827. Wrote much and well. *Life*, by Stevens (1883), Lodge (1879).

GALLAUDET, THOMAS HOPKINS (1787–1851), Amer. deaf and dumb educationist; his sons, Thomas and Edward, were associated with similar work.

GALLE, POINT DE GALLE (6° N., 80° 15′ E.), fortified seaport town, S.W. coast Ceylon; formerly chief port of island; good harbour; exports tea, plumbago, and cocoa-nut oil. Pop. 37,316.

GALLENGA, ANTONIO CARLO NAPOLEONE (1810–95), Ital. patriot, author, and journalist; wrote in English.

GALLERY, kind of room or separate part of room, length largely exceeds breadth; underground passage, *e.g.* in mine; platform projecting from wall; place for exhibition pictures.

GALLEY, vessel of war and commerce, with oars (and also sails), rowed by slaves and condemned criminals; long swift rowing-boat; ship's kitchen.

GALL-FLIES (*Cynipidæ*), a widely distributed family of Hymenopterous insects, which pierce and lay eggs in plants, a gall afterwards forming at the place, *e.g.* the mossy bedeguar gall on wild rose-bushes, caused by *Rhodites rosæ*.

GALLIA CISALPINA (*c.* 45° N., 10° E.), ancient province, N. Italy; originally inhabited by Ligurian, Umbrian, Etruscan, and other races.

GALLIC ACID ($C_6H_2(OH)_3COOH$), produced by boiling tannin with dilute acid. Occurs in gall nuts, and with excess of ferric chloride forms dark green solution.

GALLICANISM, theory of comparative independence of Fr. Church and king towards pope; expressed in Bossuet's *Declaration of French Clergy*, 1682. See Galton's *Church and State in France* (1907).

GALLIENI, JOSEPH SIMON (1849–), Fr. colonial administrator; b. Saint-Béat, Haute-Garonne;

app. gov. of Upper Senegal, 1886; gov.-gen. of Madagascar, 1896–1905.

GALLIENUS, PUBLIUS LICINIUS EGNATIUS (fl. 260 A.D.), Rom. emperor; notorious for his debauchery and weak government; killed by his soldiers.

GALLIFFET, GASTON ALEXANDRE AUGUSTE, MARQUIS DE, Prince de Martignes (1830–1909); Fr. soldier; served in Crimea, 1855, Italy, 1859, Algeria, 1860, Mexico, 1863, and Franco-Ger. War; War Minister, 1899–1900; authority on cavalry questions.

GALLINACEOUS BIRDS, GALLINÆ, order of birds of ground habits; heavy and ill adapted for long flight, *e.g.* fowls, guineafowls, turkeys, pheasants, grouse, partridges.

GALLINAGO, SNIPE, see PLOVER FAMILY.

GALLIO, JUNIUS ANNÆUS (d. 65 A.D.), Rom. proconsul of Achæa; referred to in *Acts* 18.

GALLIPOLI.—(1) (40° 3′ N., 17° 58′ E.) seaport, ancient *Callipolis*, Apulia, Italy; on island in Gulf of Taranto; olive oil. Pop. 10,350. (2) (40° 25′ N., 26° 39′ E.) seaport, European Turkey, on Dardanelles; formerly important commercial centre; key of Dardanelles; seat of Gk. bishop; two harbours, good bazaars, some mosques, Rom. and Byzantine remains; taken by Turks, 1357; occupied by allied Fr. and Brit. armies, 1854; peninsula invaded in Turco-Balkan War (*q.v.*), 1912–13. Pop. 30,000.

GALLIPOLIS (38° 51′ N., 82° 14′ W.), city, Ohio, U.S.A., on Ohio; iron and lumber. Pop. (1910) 5560.

GALLITZEN, DEMETRIUS AUGUSTINE (1770–1840), Amer. priest; ordained 1795; founded R.C. settlement in Cambria county, Pennsylvania.

GALLIUM, grey metal of aluminium group, hardness 6, S.G. 5·9, M.P. 29·0 C., and remaining fluid below that; discovered by spectroscope, 1875.

GALLON, Eng. liquid and corn measure; comprises 4 quarts, or 277·274 cubic in.; instituted, 1824.

GALLOWAY (55° N., 4° 15′ W.), district, S.W. Scotland, comprising shires of Wigtown and Kirkcudbright.

GALLOWAY, JOSEPH (1731–1803), Amer. lawyer; pres. of Philadelphia Assembly, 1766–73; in Anglo-Amer. dispute advocated compromise, and wrote *Plan of a Proposed Union between Great Britain and the Colonies*, 1774; fought with Brit. army; retired to England, 1778, all his property being confiscated.

GALLOWAY, MULL OF, promontory in S.W. of Scotland, Wigtonshire.

GALLOWS, wooden erection for hanging criminals, now consisting of two uprights and a cross-bar, but formerly of a single upright and a cross-piece. The latter was often called 'gibbet.'

GALLS.—Certain insects deposit their eggs in the tissues of plants, injecting at the same time a drop of irritating fluid. This causes increased growth of the plant tissues, which cover the egg and provide shelter and sustenance for the larvæ, forming a gall. G's are found on oaks, willows, currants, and pears. Many are brightly coloured, but they vary in size, shape, and colour according to the insects and the part of the plant attached, leaf or bud. If one member alone of the plant is attacked, they are one-chambered, but if buds are attacked they have many chambers which simulate flower and leaf structure. G's usually contain in addition to the larvæ a certain number of insects which cause birds to prey on them. Hemipterous and homopterous insects form galls. Wasps are responsible for oak-apples, from certain kinds of which ink is manufactured. Many different galls, formed by Diptera, are found on willows. Mite-galls, consisting of little tufts of hair and hypertrophied cells, are found on the pear, plum, ash, and alder. They are caused by microscopic Acaridea.

GALL-STONES, lime concretions formed by bile in gall-bladder; brown to white, size from small gravel to goose egg; hot fomentations helpful; sometimes surgical operation necessary.

GALLUS, CORNELIUS (I. cent. B.C.), Rom. elegiac poet and politician; friend of Vergil.

GALSTON (55° 36′ N., 4° 23′ W.), town, Ayrshire, Scotland; coal mines, weaving. Pop. (1911) 5296.

GALT (43° 19′ N., 80° 25′ W.), town, Ontario, Canada, on Grand River; flour and iron manufactures. Pop. 7866.

GALT, SIR ALEXANDER TILLOCH (1817–93), Canadian statesman; s. of John Galt, the novelist; emigrated to Canada, 1835; reorganised Canadian finance and shared in federation of Brit. N. Amer. Provinces.

GALT, JOHN (1779–1839), Scot. novelist; b. Irvine; prolific writer of stories dealing with Scot. life and character, of which the best are *The Ayrshire Legatees*, *Annals of the Parish*, *The Entail*, and *Lawrie Todd*.

GALTON, SIR FRANCIS (1822–1911), Eng. scientist; grandson of Erasmus Darwin (*q.v.*); made explorations in S.W. Africa and other countries; investigated meteorological conditions, being the first to establish the theory of anti-cyclones; made important researches in anthropology and heredity, employing biometrical and statistical methods, and founded the science of Eugenics (*q.v.*), endowing a chair in London Univ.; inventor of many scientific methods and instruments, and author of many works on scientific subjects. See his *Memories of My Life* (1908).

GALVANI, LUIGI (1737–98), Ital. physiologist; lecturer on anatomy at Bologna (1762); made first investigations of action of electricity on muscles of animals.

GALVANOMETER, an instrument for detecting, or measuring the strength of, an electric current. There are various forms of instruments suitable for different purposes, the chief being the *sine*, *tangent*, *mirror*, *suspended coil*, and *ballistic* g's. The last is used for measuring the *quantity* of electricity that has passed in the case of a current of very short duration, while the mirror g. will detect and measure very weak currents. The construction of all g's depends on the observed fact that an electric current in a wire deflects a neighbouring magnetic needle in accordance with a known law. See ELECTRICITY (ELECTROKINETICS).

GALVESTON (29° 19′ N., 94° 48′ W.), prosperous seaport and city in Texas, U.S.A.; situated on G. Island, at corner of G. Bay and Gulf of Mexico; connected by railway and causeway with mainland; contains Catholic cathedral, a univ., and Texas medical coll.; has large foundries, mills, and machine shops; exports include cotton, grain, flour; visited by disastrous hurricane in 1900. Pop. (1910) 36,981.

GALWAY (53° 20′ N., 9° W.), second largest county in Ireland; in Connaught; coast-line broken; Area, *c.* 2370 sq. miles; includes Lough Corrib and part of Lough Mask; in W. lies famous district of Connemara—wild and mountainous; G. is flat and marshy in E. Chief rivers are Shannon (forming S.E. boundary), Black, and Suck. Slieve-Baughta Mts. in S.; Twelve Pins (*c.* 2400 ft.) in W. Valuable fisheries; has seven round towers and many monastic ruins. Pop. (1911) 181,686.

GALWAY (53° 17′ N., 9° 3′ W.), seaport, capital of County Galway, Ireland; seat of Catholic bp.; chief edifices, Episcopal church of St. Nicholas, St. Augustine's Catholic church, Univ. Coll.; has good harbour; salmon fishing; exports agricultural produce, wool, marble; surrendered to Ginkell in 1691. Pop. (1911) 13,249.

GAMA, DA, see DA GAMA.

GAMALIEL, a Pharisee mentioned in *Acts*; grandson of Hillel; rabbinical teacher, taught St. Paul; member of Sanhedrim. His grandson, GAMALIEL II., was prominent in war against Rome; helped to revive Judaism after fall of Temple; pres. of Sanhedrim, 90–110 A.D. GAMALIEL III. was patriarch, 193–220; completed his f.'s work of drawing up Mishna.

GAMBETTA, LÉON (1838–82), Fr. statesman; b. Cahors; educated Cahors and Paris. Made his name at the Bar over defence of Delescluze, 1868. Sat in Assembly (1869) as a republican. Supported Franco-Prussian War as a patriot, and after Sedan continued a wonderfully inspiring resistance. Chiefly responsible for securing constitution of Feb. 1875. Author of policy of opportunism, opponent of clericalism, and head of 'Le Grand Ministère' (Nov. 1881). Advocated co-operation with Britain in Egypt, but prevented from developing his views by his death.

P. B. Gheusi, *Life and Letters* (Eng. trans., 1910).

GAMBIA (*c.* 13° N., 14° W.), Brit. crown colony and protectorate, W. Africa; consists of a narrow strip of country on both banks of Gambia, from its mouth to Barroconda, about 220 miles inland; country flat and marshy; climate fairly healthy; river Gambia navigable to Barroconda; principal town, Bathurst; chief products and exports are ground nuts, india-rubber, bees-wax, hides, kernels, cotton (woven and dyed by natives). Cable communication from Bathurst to St. Vincent and Sierra Leone; no railways; total area of colony and protectorate about 3600 sq. miles; Eng. settlement dates from XVI. cent.; after being a dependency of Sierra Leone, and part of W. African settlements (1876), G. was made a separate colony (1888); administered by a governor, with executive and nominated legislative council. Pop. (1911) 138,401.

Archer, *Gambia Colony and Protectorate*, 1906 (official handbook); Reeve, *The Gambia* (1912).

GAMBIA (13° N., 15° W.), river, Senegambia, W. Africa; rises in Futa-Jallon, flows generally W. through Gambia, enters Atlantic at Bathurst, after course of *c.* 1000 miles; navigable to Barraconda rapids, *c.* 350 miles above mouth.

Reeve, *The Gambia* (1912).

GAMBIER (40° 24′ N., 82° 25′ W.), village, Ohio, U.S.A.; contains Kenyon Coll. (Prot. Episcopal) and Kenyon theological seminary. Pop. (1910) 537.

GAMBIER ISLANDS (23° 15′ S., 134° 55′ E.), small archipelago in Pacific, forming part Polynesia; three larger and seven small islands; Fr. colony. Area, 10 sq. miles. Pop. 500.

GAMBIER, JAMES GAMBIER, BARON (1756–1833), Brit. admiral; entered navy as midshipman, 1767; post-captain, 1778; rear-admiral and one of Admiralty Lords, 1795; commanded Channel Fleet, 1808–11; further services were diplomatic.

GAMBLING, see GAMING.

GAMBODGE, Indo-Chinese kingdom, under Fr. protectorate, on banks of Mè-Kong River; capital, Pnom Penh. Pop. 1,103,000.

GAME LAWS, a series of statutes relating to the killing and disposal of game. The term includes hares, rabbits, pheasants, partridges, grouse, heath or moor game, black game, bustards, snipe, woodcocks, and the eggs of pheasants, partridges, grouse, and black or moor game. The *close-time*, when game may not be killed or taken, is, for partridges, Feb. 1 to Sep. 1; pheasants, Feb. 1 to Oct. 1; black game, Dec. 10 to Aug. 20; grouse, Dec. 10 to Aug. 12; bustards, March 1 to Sep. 1. Christmas Day and all Sundays throughout the year are also close-days; penalty, £5. There is no close-time for hares except Sundays and Christmas Day; and rabbits may be killed all the year round. Hares, however, under the Hares Preservation Act (1892), may not be sold in March, April, May, June, or July. Rabbits and hares may not be killed on moorlands and unenclosed lands between March 31 and Dec. 11. This does not apply to arable lands.

Wild birds, other than game, are cared for under the Wild Birds Protection Acts. The unlawful killing of deer comes within the purview of the Larceny Act (1861); in Scotland such offences come under the heading of theft. Deer which have strayed on to a man's private lands may be killed by him. Night poaching is punishable by fine and imprisonment; the use of man-traps or spring-guns renders the person concerned liable to five years' penal servitude; and the laying of poison on any public ground or highway is punishable with a fine of £10. Inland Revenue licences must be taken out before game can be killed or sold. The taking of game-birds' eggs by unauthorised persons is subject to a fine of 5s. for each egg.

Oke, *Game Laws* (1897).

GAMES.—Athletic games were a marked feature of the lives of the Greeks from very early times, and are described in Homer. The principal g's were foot-racing, wrestling, boxing, and chariot-racing, and in their beginning were closely connected with religion. They were generally held near the shrine of some deity, to whom they were dedicated; but later they were celebrated because of some military victory, or in honour of some great person. The principal g's were the Olympic, the Pythian, the Nemean, and the Isthmian—held at different times and in different places, and dating from many cent's before Christ. Thus the Olympic g's were held at Olympia; the Pythian originally at Delphi; and the Isthmian in the Isthmus of Corinth. The earliest and most celebrated were the Olympic g's, which were abolished by the Christian Emperor, Theodosius (394 A.D.). They were revived in 1896, and are held every four years; thrown open to people of all nations; take place in Berlin, 1916. The Romans adopted the Gk. g's named, and also added others; but they were eventually supplanted by the gladiatorial and wild-beast combats of the later Cæsars.

For modern games, see ATHLETICS.

GAMING, the playing for stakes at games either of chance, or of mixed chance and skill. The keeper of a gaming-house may be fined up to £50 and costs, or in default may be sent to gaol for twelve months. It should be noted that gaming and wagering transactions are void in law, and no action can be brought to recover any money alleged to have been won in such transactions. See BETTING.

GAMMARUS, see under MALACOSTRACA.

GAMOPETALY, GAMOSEPALOUS, see FLOWER.

GAMUT (*gamma ut*), form of scale used in mediæval music; now applied to the scale or compass of wind instruments.

GAND, see GHENT.

GANDAK, GREAT (25° 45′ N., 85° 14′ E.), river, India; rises in Nepal, Himalayas; joins Ganges near Patna.

GANDAK, LITTLE (26° 4′ N., 84° 4′ E.), river, India; rises in Nepal hills; joins Gogra, a tributary of Ganges.

GANDAMAK (34° 18′ N., 70° 2′ E.), village, Afghanistan; scene of massacre of last survivors of Brit. force from Kabul, 1842.

GANDERSHEIM (51° 52′ N., 10° 1′ E.), town, Brunswick, Germany; seat of famous abbey, founded IX. cent.

GANDHARVA, deity in the Vedic myth.

GANDIA (39° N., 0° 10′ W.), town, Valencia, Spain; coasting trade. Pop. 10,026.

GANDO (11° N., 4° E.), state, W. Sudan, on Niger, N. of Borgu; chief town, Gando (pop. *c.* 12,000), on Sokoto; inhabited by Fulah and Hausa races. Area, *c.* 78,000 sq. miles. Pop. *c.* 5,000,000.

GANESA, Hindu god, patron of prudence; represented with elephant's head.

GANGES (23° N., 90° E.), the sacred river of India; rises in ranges of Himalayas under name of Bhagirathi, and at junction with Alaknanda takes name of Ganges; flows with generally S.E. course and enters Bay of Bengal by one of largest deltas in world; most important channels, Hugli on W., Meghua on E.; length of main stream, about 1500 miles, greater part of which is navigable; chief tributaries, Jumna, Son, Ramgunga, Gunti, Gogra, Gandak, Kusi, Jamuna, and Attri; on its banks are many great cities, including Calcutta, Monghyr, Patna, Benares, Allahabad, Cawnpore.

GANGI, town, Palermo province, Sicily; famous

as Enguium, temple of which Cicero accused Verres of having despoiled. Pop. 11,000.

GANGLION, nerve centre, oval swelling containing nerve cells. See NERVOUS SYSTEM.

GANGOTRI (31° N., 79° E.), celebrated place of Hindu pilgrimage, in Gharwal, N. India.

GANGPUR (22° 5′ N., 84° E.), native state, Bihar and Orissa, India. Area, 2518 sq. miles. Pop. 238,896.

GANGRENE, mortification (*q.v.*) of appreciable part of the body; due to devitalisation or disease (Bright's and diabetes); *dry* or *moist*, latter accompanied by putrefaction, high fever, and blood poisoning.

GANGUE, see MINERAL.

GAN-HWUY, see NGAN-HUI.

GANILH, CHARLES (1758–1836), Fr. politician and economist.

GANJAM (19° 22′ N., 85° 7′ E.), district, Madras Presidency, Brit. India, extending along Bay of Bengal; mountainous, interspersed with fertile plains and valleys; chief rivers, Rushikulya, Vamsadhara, and Languliya; produces grain and rice; capital, Berhampur. Area, 8372 sq. miles. Pop. 2,010,256.

GANKU (1749–1838), Jap. artist; founder of the Kishi school; famous as a painter of tigers.

GANNAT, town, Allier, France, on river Andelot; also district of same name, 66 parishes, pop. 60,000. Pop. (town) 5600.

GANNETS and BOOBIES (*Sulidæ*), a family of marine swimming and diving birds with four webbed toes; feed on fish, and nest on rocky cliffs; frequent all the great oceans; the SOLAN GOOSE (*Sula bassana*) is a Brit. species, found on the Bass Rock, and some western islands.

GANODONTA, order of mammals having bands of enamel on teeth; possibly related to Edentates (*q.v.*).

GANOIDS, term sometimes used for the orders Crossopterygii, Chondrostee, and Holostee. See FISHES.

GANS, EDUARD (1797–1839), Ger. jurist.

GANYMEDE (classical myth.), a beautiful Trojan boy who was taken to heaven by an eagle and made cupbearer to Zeus.

GAO, GARO, or GOGO (16° 10′ N., 0° 8′ E.), town, on Niger, Fr. W. Africa; ancient capital, Songhai Empire; military post.

GAP (44° 34′ N., 6° 4′ E.), town, ancient *Vapincum*, capital of Hautes-Alpes, France; has fine modern cathedral; silk and woollen manufactures. Pop. 11,000.

GAPAN (15° 24′ N., 120° 57′ E.), town, Luzon, Philippine Islands; rice, tobacco. Pop. 20,000.

GAR FISHES (*Belonidæ*), long-jawed, long, narrow-bodied, 'bony' fishes; exceedingly active and voracious; common in warm seas.

GARASHANIN, ILIYA (1812–74), Servian soldier and politician; commander of army (1836); minister of home and foreign affairs (1853–67).

GARAT, DOMINIQUE JOSEPH (1749–1833), Fr. politician, lawyer, and writer; made a senator and count by Napoleon; member of Institute of France, 1803–16.

GARAY, JÁNOS (1812–53), Hungarian poet and dramatist.

GARBLE, originally to sift; but now to mutilate a book or writing, for the purpose of distorting the author's meaning.

GARÇÃO, PEDRO ANTONIO (1724–72), Portug. poet.

GARCIA GUTIÉRREZ, ANTONIO (1812–84), Span. dramatist.

GARCIA MANOEL, DEL POPOLO VINCENTO (1775–1832), famous Span. teacher and composer; celebrated pupils, daughters, Marie (Mme Malibran) and Pauline, and s., MANOEL G. (1805–1906), who invented laryngoscope, wrote works on singing and human voice; prof., Royal Academy of Music, 1848–95.

GARCÍA DE LA HUERTA, VICENTE ANTONIO (1734–87), Span. dramatist.

GARCÍA DE PAREDES, DIEGO (1466–1534), Span. soldier of fortune; notorious for reckless bravery.

GARCILASO DE LA VEGA, see VEGA.

GARD (44° N., 4° 10′ E.), department, S. France, on Mediterranean; formed of part of ancient Languedoc; surface slopes towards Rhône and Mediterranean with numerous lakes and marshes on coast; chief rivers, Cèze, Gard, Vidroule, and Hérault; rich in coal, iron, lead; large quantities of salt manufactured; olives and chestnuts extensively grown; important vineyards; silkworm rearing; capital, Nîmes. Area, 2270 sq. miles. Pop. (1911) 413,458.

GARDA, LAKE OF (45° 40′ N., 10° 40′ E.), lake, N. Italy, between Lombardy and Venetia; receives Sarca at N. end; drained by Mincio at S.E. end into Po; surrounded by beautiful scenery; favourite health-resort.

GARDAIA, GHARDEIA, town, S.E. Algeria, occupied by Fr., 1857; caravan centre; also district of same name, pop. 15,000, including 1600 Europeans. Pop. (town) 52,000.

GARDANE, CLAUDE MATTHIEU, COUNT (1766–1818), Fr. general; rose rapidly in army, distinguishing himself at Barsiguana, 1799; A.D.C. to Napoleon, 1805; occupied in diplomatic negotiations; attached to army of Masséna in Portugal, 1810; blundered and fell into disfavour.

GARDELEGEN (52° 31′ N., 11° 23′ E.), town, on Muldo, Pruss. Saxony, Germany; agricultural implements manufactured. Pop. (1910) 8499.

GARDEN.—The Scripture story of man begins in G. of Eden, and the g. dates back to beginning of secular history; there were famous hanging g's at Babylon (*q.v.*) and irrigated g's in Egypt; Greeks sang of g. of the Hesperides (*q.v.*), and Horace rejoices over kitchen g. of his Sabine farm; potherbs and simples have, perhaps, been continuously cultivated, but history of mediæval flower-g. is obscure. By XIV. cent. it had become great feature of S. manor-houses, and, in XVI. cent., of Eng. towns, where flowers as well as rushes were strewn on floors, so that when trampled upon sweet odour would arise. The g. at Golder's Green, and other public g's containing every plant mentioned by Shakespeare, illustrate importance of flowers in his time. In XVI. cent., under influence of Renaissance (*q.v.*), the formal, classical ITAL. GARDEN began to be formed; fine examples at Versailles. In England terraces with balustrades and urns, symmetrical walks, statuary, sundials, clipped yews, and carefully shaped flower-beds superseded careless profusion of Old Eng. g's until, in XVIII. and early XIX. cent., the Romantic Movement resulted in a 'return to nature'; England and France vied with each other in LANDSCAPE GARDENING of which effects were, woodland streams dashing through grounds over rocky beds, waterfalls, grottos, hermitages concealed at point where fine view is obtained. Modern times have seen renaissance of all modes. Dutch have shown great enterprise in scientific gardening, and their bulbs are highly prized. The vegetable market of London is known as COVENT G.; Kent and the Riviera are called respectively the G. OF ENGLAND and the G. OF EUROPE; G. in philosophy means Epicurean sect, opposed to Stoics, called the Porch, named from respective meeting-places. See also BOTANY: *Botanic Gardens*.

Garden Planning.—It is impossible to lay down exact rules for planning a garden, because the plan should be made to follow the natural shape and lie of the ground. This is especially the case where there is the advantage of an uneven surface. If the ground is absolutely level it will usually be found necessary to undertake the raising of at least one corner or side, to give relief and to afford place to rock-plants. The house should be used as the base from which to start. It should be used to support such climbing plants as can be secured—*e.g.* rambler roses, tea roses, clematis, ampelopsis, tropæolum, and jasmine. Should the house possess a porch or verandah, then the effects which can be obtained may be greatly enhanced.

The bed in which these plants are rooted may well be extended to a distance of several feet from the wall, and used for herbaceous plants or small shrubs. These should be grown as far as possible in masses, and not singly or in regular rows. By this means we obtain a contour that is never to be found in a formal bed, and at the same time a massing and blending of colour effects to which the strips and spots of carefully selected colour cannot compare. Thus at one corner of the house might be planted a group of hollyhocks or larkspurs, followed by a mass of woodruff, then scattered clumps of campion, or poppies, spiræa, marguerites, or evening primrose, while the spaces might be filled in by a mass of small-flowered blue pansies, or rose-coloured maiden-pink. The edge of this border, and of borders in general, may be finished off in various ways. Something may be said for the old-fashioned low clipped box, which, despite its primness, has an undeniable charm. But it is often very difficult to grow, and only succeeds on light, warm, well-drained soils. Much easier and at the same time more generally beautiful is a simple row of low rough stones, over and between which such spreading plants as saxifrage, stonecrop, or the maiden-pinks and pansies already mentioned, may be grown.

Between this bed and the lawn may be placed a gravel walk, which will at the same time be continued from the house door to the garden gate; if possible, this approach should run down the side and not down the centre of the garden. In the former case, the wall along which it runs can be utilised for growing a variety of climbing plants—ivy is the best; a narrow bed along the foot would give room for roses and herbaceous plants; an unpointed wall is in all cases preferable, and may be greatly beautified by filling the interstices with stonecrops.

Between the approach walk and the lawn should be placed the principal flower bed, and in arranging it the same rules should be applied as to the bed in front of the house. Mass effects should be aimed at, and in general the highest plants kept to the back. In this bed roses may be grown, and it may be stated that it is far better to grow freely blooming kinds in a bed like this, intermingled with other flowers, than to aim at few and large blooms of showing sorts, which must often be grown by themselves and which present a very bare appearance in the garden.

A *rockery* should be a main feature in every garden, and should occupy by preference the shady side, and if possible the highest part of the ground. It should be made as 'knobby' as possible, and the stones used should be large and rough. Here, again, plants should be massed: Arenaria montana forms beautiful white cushions; periwinkle gives smooth sheets of dark green studded with blue flowers; saxifrages, stonecrops, gentians, pinks, veronicas, low-growing shrubs like the rock-roses (*cistus*), petty-whin, and heaths are only a few of the innumerable plants which may be obtained even for a small expenditure; and ferns can always be planted with great effect.

The *pergola* is another very beautiful device, and is best made of rough larch arches; iron and wire trellises are not to be recommended. The chief pergola plant should be the rambler rose, of which many beautiful varieties exist. The pergola can best be introduced if the approach walk cuts the garden in two, and can be made to cover it for most or all of its distance.

The proper plants to grow can only be found by trial in each particular locality. An attempt should be made to plant in the various parts of a garden a series of flowers which will come into bloom in succession, so that at no period of the flowering season will the garden be destitute of blossom; and a further point to be observed is, that in selecting plants none which, flowering together, will give a colour discord should be chosen. Thus crimson peonies and scarlet Oriental poppies should not be grown together. In *spring* the flowering plants will be largely bulbs—snowdrops and crocus, daffodils, winter aconite, etc.; closely following on these will come the primroses; then will come the great mass of *summer* plants, violas, stocks, phlox, forget-me-not, campions, campanulas, larkspurs, monkshood, columbines, corn-flowers, petunias, pentstemons, salvias, and innumerable others; while in *autumn* the garden may still be gay with chrysanthemums, Michaelmas daisies, anemones, colchicums, cyclamen, heaths, fuchsia, hollyhock, lavender, tuberose, and many others.

The **Vegetable Garden** is separated from the flower garden, and most conveniently by a hedge or fence on which climbers may be grown. A row of sweet peas is perhaps as good as anything; or the sweet peas may be grown in front of a hedge of hawthorn—the latter flowering early and the sweet peas later on. The vegetable garden is generally planned more with a view to utility than to beauty, but even in it the general appearance may be very greatly improved by edging the beds with culinary or aromatic herbs—parsley, balm, sweet basil, lavender. Salad vegetables should be given a prominent place, especially in small gardens, and a series of plantings of lettuce giving young plants all through the season should be attempted. The other vegetables grown must depend largely on the taste of the owner, but spinach, cauliflowers, and brussels sprouts are worth attention; cabbages, carrots, and potatoes may be left to the market gardener unless there is more ample space available. Here, too, the various fruits have their place—strawberries in a bed; while even a single row of gooseberries and currants will provide a good supply of fruit. Apples and pears may also be grown, more especially if a wall with a good—southern or western—exposure is available.

Digging and Tending.—If a new garden is being laid out on ground formerly used for agriculture, much attention must be paid to getting the soil into good condition. This is done by *trenching*: that is to say, the ground is dug over with a spade, the effect being to break up the soil into smaller particles to a considerable depth (about 9 in.), and thus to render it porous and light in texture. The trenching also affords opportunity for several other important operations, the removal of large stones, the removal of the roots of weeds, and the improvement of the soil by the addition of manures. If the soil be *stiff*—*i.e.* if it contain much clay—then sand should be dug into it; and it will always be necessary to add considerable quantities of leaf-mould and of farm dung. To give good results these should both be well rotted. If they are dug in in autumn then a further trenching in spring will secure efficient mixing of all the soil constituents. Beds, and especially those of the vegetable garden, must be periodically trenched or dug over, and supplied with dung and leaf-mould. It must not be imagined that the soil if once brought into good condition will remain so; on the contrary, constant attention is required to keep it porous and friable: for this purpose the *rake* and the *hoe* should be freely employed. The former tool also serves to remove rubbish and to give an even appearance to the surface; the latter may be used to loosen weeds and to keep the lower parts of plants well supplied with soil. Should the surface of the soil become caked and hard, not only is the water supply seriously affected, but also the aeration of the roots is endangered. The main object of a good gardener should be to keep the soil in condition and free of weeds; the latter object can only be accomplished by constant use of the hoe (or Dutch hoe) and by laborious hand-weeding.

Sowing and Planting.—The actual furnishing of the garden with plants is a very varied process. The lawn may be turfed with turf obtained from the seaside, but this is very expensive; it may also be sown with suitable mixtures of grass seed, which may be obtained from all seedsmen; sowing should be done in spring and the seed should be well rolled in; a lawn, no less than any other part of a garden, needs constant

weeding; and it must also be frequently rolled and mowed.

Flowers and vegetables may be obtained very often as rooted plants, or they may be raised from seed. In the former case they are simply planted in holes made with a *trowel* or *dibble* in the positions which they are to occupy. In planting care should be taken to place sufficiently deep in the ground, and to pack the roots thoroughly, but not too hard, with soil.

In the great majority of cases, however, the plants must be raised from seed, and the exact method of doing this varies with different plants; directions are commonly supplied by the seedsman. Seeds may be sown in the place which the plant is to occupy and allowed to develop where they come up. But in most cases the seed is sown in a special bed and the young plants when sufficiently large are *pricked off* and dibbled into their permanent positions. This has the effect of strengthening the roots and inducing a more vigorous growth. Sometimes it is necessary to transplant more than once. Or the seed may be sown in the permanent position and the crop improved by drastic thinning out.

Those plants which are termed *half-hardy* must be sown under glass, either in a hothouse or in a glass frame, when they are protected from the frost. Only when the season is somewhat advanced are they planted out in the open. Very frequently too it is advantageous to sow hardy plants under a glass frame, as they may thus be brought on much earlier and protected during the most susceptible period of their growth.

The spring will naturally be occupied by such operations as sowing and transplanting and getting the garden into good trim. Summer will provide occupation in keeping the ground clear of weeds, in watering, and in a thousand minor tidying and tending operations. In autumn annual plants are removed as they die off, pruning of roses and fruit trees is undertaken, cuttings are taken from such plants as can be propagated by this means, and as winter approaches digging operations may be commenced and bulbs and roses planted. Only a very short time, if any, will elapse between the last of the autumn work and the first of the spring. The garden provides perpetual employment, and it is only if it is continually attended to that really satisfactory results can be obtained.

* *Present-Day Gardening* (series, Jack); *Beautiful Flowers, and How to Grow Them* (2 vols., Jack). Amherst, *History of Gardening in England* (1896).

GARDEN CITY, name given to new suburbs, industrial villages planned on hygienic lines, *e.g.* Bournville, Port Sunlight, Letchworth, Rosyth naval base settlement. See Sennett's *Garden Cities in Theory and Practice* (1905).

GARDENIA, group of rubiaceous plants and trees; white or yellow funnelled flowers, 6 to 7 stamens; small berry, yields a yellow dye.

GARDIE, MAGNUS GABRIEL, COUNT DE LA (1622–86), Swed. statesman; supreme in court of Christina, and principal member of ill-famed regency of minority of Charles XI.

GARDINER (44° 11′ N., 69° 51′ W.), city, Maine, U.S.A.; machine shops. Pop. (1910) 5311.

GARDINER, JAMES (1688–1745), Scot. military adventurer; killed at *Prestonpans*.

GARDINER, SAMUEL RAWSON (1829–1902), Eng. historian; ed. Winchester and Christ Church, Oxford; Fellow of All Souls, 1884, and Merton, 1892; subsequently prof. of Modern History, King's Coll., London; declined regius professorship of Modern History, Oxford, 1894. Chiefly remembered as historian of Puritan Revolution.

GARDINER, STEPHEN (*c.* 1493–1555), lord chancellor and bp. of Winchester; b. at Bury St. Edmunds; became sec. to Cardinal Wolsey, whose embassy to France he accompanied in 1527. In 1528 was sent on diplomatic errand to Pope Clement VII. in connection with question of royal divorce, and obtained from him a decretal commission; app. sec. to king, 1529; bp. of Winchester, 1531; supported king's divorce, 1533; renounced allegiance to Rome, 1534, writing a famous treatise, *De Vera Obedientia*; was sent on various diplomatic missions to France and Germany; helped in translation of New Testament, 1535; chancellor of Cambridge, 1540. On accession of Edward VI., G. was deprived of bishopric and imprisoned in Fleet; was set free by Queen Mary, whom he crowned, and whose lord chancellor he became.

GARDNER (42° 33′ N., 72° W.), town, Massachusetts, U.S.A.; chairs and toys manufactured. Pop. (1910) 14,699.

GARDNER, PERCY (1846–), Eng. archæologist.

GARE-FOWL, see AUKS, GUILLEMOT AND AUK FAMILY.

GARFIELD, JAMES ABRAM (1831–81), 20th Pres., U.S.A.; b. Orange, Ohio; obtained employment on lake schooner, 1848; illness sent him home and he turned to study; grad. 1856; app. prof. at Hiram Institute, within a year pres.; elected to Ohio Senate, 1859. When Cotton States seceded, G. advocated coercion; in war he became colonel of 42nd Ohio Volunteers; major-general, 1863; Member of Congress, 1862; Republican candidate for speakership, 1877; Pres., 1881; shot by a disappointed office-seeker, July 1881; d. Sept. *Life*, by Ridpath (1881).

GARGANEY, see under DUCK FAMILY.

GARGANO (41° 49′ N., 16° 10′ E.), mountainous peninsula (ancient *Garganus*), Apulia, S. Italy; culminates in Monte Calvo, 3470 ft.

GARGANTUA, see RABELAIS.

GARGOYLE, in mediæval arch., fantastic carvings of heads and other objects for conveying rain-water from roofs.

GARHWAL, or TEHRI (31° N., 78° E.), native state, adjoining district of G., United Province, Brit. India, in Himalayas; capital, Tehri. Area, 4180 sq. miles. Pop. (1911) 299,853.

GARHWAL, or GURWAL (31° N., 79° E.), district, United Prov., Brit. India, on S. slope of Himalayas; whole surface mountainous; chief rivers, Alaknanda and other headstreams of Ganges; capital, Serinagaur. Area, 5629 sq. miles. Pop. 429,900.

GARIBALDI, GIUSEPPE (1807–82), Ital. patriot b. Nice; after many vicissitudes as a youth on the sea, he entered on his life-work by offering his services to Pius IX., whom he believed to be furthering the cause of national liberty; fought against Fr. (1848–49), in which campaign occurred the wonderful retreat through central Italy, pursued by the armies of four countries. He himself escaped to America; served in war of 1859. With Brit. support in 1860 he pursued scheme for liberating Naples and seizing Rome; accompanied Victor Emmanuel on his entry into Naples (1860); soon re-entered political life, quarrelled with Cavour, and attempted to seize Rome; fought against Austrians and papal troops (1866). After 1875, G. accepted a pension and worked loyally with the Parliament.

Autobiography (Eng. trans., 1889); Trevelyan, *G.'s Defence of Rom. Republic*, and *G. and the Thousand*.

GARLAND, HAMLIN (1860–) Amer. novelist.

GARLAND, JOHN (XIII. cent.), Anglo-Fr. Lat. poet and grammarian.

GARLIC, natural order *Liliaceæ*, bulbous perennial plant with long narrow green leaves and an umbel of whitish flowers. Bulb is eaten, especially in Southern Europe, and has strong acrid taste and odour.

GARNET, precious stone, found in mica slate, hornblende, gneiss, and granite; colour—red, brown, green, yellow, or black; varieties—pyrope, almandine, and common garnet. Pegu, in Syria, is the chief centre of the g. markets. G's were used as beads in ancient Egypt, and by the Greeks and Romans as engraved gems.

GARNET, or **GARNETT, HENRY** (1555–1606), Eng. Jesuit; b. Heanor, Derbyshire, and became Jesuit while in Italy, 1575; in 1586 was sent on Eng. mission, which he successfully promoted for eighteen

years, making many converts; came to know of Gunpowder Plot conspiracy under seal of confession, according to his own account, and apparently did not attempt to prevent it; suspicion falling on him, he was tried for complicity in the plot, and ultimately confessed his knowledge of it; found guilty of misprision of treason, and executed.

GARNETT, RICHARD (1789–1850), Eng. philologist; one of founders of Philological Soc.; keeper of printed books at Brit. Museum.

GARNETT, RICHARD (1835–1906), Eng. scholar; s. of Richard G. (*q.v.*); keeper of printed books, Brit. Museum, 1890–99; wrote numerous vol's of literary criticism and poetry.

GARNIER, CLÉMENT JOSEPH (1813–81), Fr. economist of Free Trade school.

GARNIER, GERMAIN, MARQUIS (1754–1821), Fr. politician; Minister of State under Restoration.

GARNIER, JEAN LOUIS CHARLES (1825–98), Fr. architect; designed Paris Opera-House and Monte Carlo Casino.

GARNIER, MARIE JOSEPH FRANÇOIS (1839–73), Fr. explorer; b. St. Étienne; travelled and killed in Indo-China.

GARNIER, ROBERT (fl. 1565–83), Fr. tragic dramatist.

GARNIER-PAGÈS, ÉTIENNE JOSEPH LOUIS (1801–41), Fr. politician; leader of Republican party under Louis Philippe.

GARNISHEE, see ATTACHMENT.

GARO HILLS (26° N., 90° E.), mountainous district, Assam, India.

GARONNE, ancient *Garumna* (44° 41′ N., 0° 20′ W.), river, S.W. France; rises in Pyrenees, flows N.N.W., enters Bay of Biscay; length, *c.* 350 miles; navigable to Toulouse; chief affluents, Tarn, Lot, Dordogne, Save, Gers, Baïse.

GAR-PIKES, BONY PIKES (*Lepidosteidæ*), long, slender, ganoid fishes with enamelled scales, armoured head, and skeleton well ossified. There are four or five species found only in the fresh waters of south-eastern N. America, Central America, and Cuba. They are extremely voracious and exceedingly destructive to young fishes, and hence are detested by fishermen. The best known is the long-nosed Gar Pike (*Lepidosteus osseus*). There are many fossil representatives of the family.

GARRETT, JOÃO BAPTISTA DA SILVA LEITÃO DE ALMEIDA (1799–1854), Portug. poet; wrote hist. and poetic dramas and lyrics of high merit; did much political and administrative work.

GARRICK, DAVID (1717–79), Eng. actor and dramatist; b. Hereford; s. of an army captain; ed. at Lichfield, where he met Samuel Johnson; accompanied the latter to London; set up in business as wine merchant, but to no purpose; turned actor, and achieved immediate success as Richard III., 1741. He later played at Covent Garden and Drury Lane Theatres, becoming, with Lacy, joint-proprietor of the latter house in 1747. He disposed of his share in the theatre for £35,000 in 1766, and retired from the stage. He died three years later and was buried in Westminster Abbey. G., who was below middle height, had a face of great mobility, and possessed wonderful powers of mimicry. He was probably the most versatile actor ever seen on the Eng. stage, and his range included all the leading Shakespearean parts, both tragic and comic, besides numerous character studies in his own plays and many of the older dramatists. His lasting vogue was due to the naturalness of his acting; and his vivacious style, in place of the stilted, declamatory manner of his predecessors, gave new life to Shakespeare as a stage dramatist.

Life, by Percy Fitzgerald (1868), Knight (1894).

GARRISON, WILLIAM LLOYD (1805–79), Amer. anti-slavery journalist; took up championship of emancipation and devoted life to this object, writing, lecturing, and agitating; uncompromising advocate of immediate liberation; imprisoned and pursued with incessant threats by slave-owners; with Knott he founded and edit. the *Liberator*, 1831, which ran for thirty-five years till abolition of slavery; pres. of Amer. Anti-Slavery Soc.; visited England several times on behalf of cause.

Life, by sons, W. P. and F. J. Garrison.

GARROTTE, Span. method of strangling criminals by means of a metal collar, fixed to an upright post, and a screw which enters the spinal column.—GAROTTING, system of partial strangulation, used by highway robbers in England, who seized their victims from behind.

GARRUCHA (37° 10′ N., 1° 52′ W.), seaport, on Mediterranean, Almeria, Spain; exports silver, copper, iron, fruit. Pop. 4661.

GARRULUS, a jay. See under CROW FAMILY.

GARSTON (53° 22′ N., 2° 54′ W.), town and port, on Mersey, Lancashire, England. Pop. 17,000.

GARTER, ORDER OF THE, see KNIGHTHOOD.

GARTH, SIR SAMUEL (1661–1719), Eng. physician, author of satirical and moral poems and of several translations.

GARTOK (31° 44′ N., 80° 23′ E.), town, W. Tibet; trading centre.

GARY (41° 36′ N., 87° 20′ W.), city, Indiana, U.S.A., on Lake Michigan. Pop. (1910) 16,802.

GAS is a state of matter which differs from a liquid and solid in that there is no cohesion or attractive force between its molecules at ordinary temperatures and pressures. The most characteristic property of a g. is its power of diffusion. If the concentration of the g. is greater at one point than at another, then the g. moves from the region of higher to the region of lower concentration until by this diffusion the concentration is everywhere the same. Diffusion is independent of the presence of another g., although the rate of diffusion is less rapid the greater the concentration of the other g. Both g's, however, distribute themselves equally over the whole space at their disposal. G's can be liquefied if they are cooled to a certain temperature (*critical temperature*). Above this temperature pressure will only compress the g., not liquefy it. The *critical pressure* is the minimum pressure which will condense the g. to a liquid at the critical temperature. Every known g. has now been obtained as a liquid simply by cooling it. The molecules of a g. exert a pressure on the walls of the vessel which contains it.

Very simple laws regulate the behaviour of g's. BOYLE'S LAW states that at any given temperature the volume of a g. varies inversely as the pressure upon it. GAY-LUSSAC'S LAW is that for any given pressure the vol. of a g. varies directly as the absolute temperature. From these two laws it is deduced that if the vol. of a g. remains constant the pressure of any given vol. varies directly as the absolute temperature. The amount of work done upon or by a g. when it changes its vol. under external pressure is equal to the product of the pressure into the change of vol. AVOGADRO'S HYPOTHESIS states that equal vol's of different g's under the same conditions of temperature and pressure contain the same number of molecules.

This hypothesis and the three laws mentioned above are supposed to be explained by the Kinetic theory of g's enunciated by Clausius and Maxwell. The molecules of a g. are supposed by it to be independent of one another and to move briskly in all directions in straight lines. The particles may hit each other and the walls of the vessel containing them; but as both they and the walls behave like perfectly elastic bodies there is no loss of their energy of motion in such collisions, their directions and relative velocities only being changed by the impact. This explains the slowing of the diffusion rate when two g's are mixed.

The g. laws do not apply without correction to vapours near the point of condensation or to g's under very great pressure. The explanation of this is that the g. molecules themselves occupy a considerable amount of space when the g. is confined in a small space,

and that therefore their range of movement is limited. The gram molecular weight of a g. is the weight of it which will occupy the same vol. as 2 grammes of hydrogen measured under the same conditions of temperature and pressure. The vol. which the gram molecular weight occupies is called the gram molecular volume. It is practically the same for all g's, and at 0° and 76 cm. pressure equals 22·38 litres.

G., the illuminating agent (*coal g.*), was discovered in 1792 and manufactured in 1802. It is manufactured by the destructive distillation of coal in special retorts under special temperature conditions. The g's evolved during this process belong to the saturated and unsaturated hydrocarbons. The chief constituent of coal g. is ethylene (C_2H_4), which burns with a very luminous flame, forming carbon dioxide and water. When burned with an insufficient supply of air for complete combustion *acetylene* (C_2H_2), a g. with an unpleasant odour, is formed. This is experienced in the 'back-burning' of Bunsen burners. G. contains variable quantities of hydrogen, oxides of nitrogen, and carbon dioxide mechanically mixed with it, and, owing to the carbon monoxide in it, is very poisonous. See LIGHTING.

Traver, *Study of Gases* (1901); Maxwell, *Heat*; Meyer, *Kinetic Theory of Gases*; Watson, *Kinetic Theory of Gases*; Butterfield, *Gas Manufacture*.

GAS ENGINE, see ENGINE.

GASCOIGNE, GEORGE (c. 1535–77), Eng. poet; s. of Sir John G.; disinherited because of youthful follies; m. a wealthy widow; served as soldier of fortune in Low Countries, and taken prisoner; associated with Leicester in entertainment of Elizabeth at Kenilworth; original works include *A Hundred Sundry Flowers* (1572), *The Glasse of Government* (1575), *The Steele Glass* (1576)—one of the earliest Eng. satires,—*Instructions Concerning the Making of Verse or Rhyme in England*, etc. His poetry is marked by considerable originality, and he was an apt experimentalist in prosody. *Life*, by Schiller (1893).

GASCOIGNE, SIR WILLIAM (d. 1419), Eng. chief justice; reputed to have committed Henry V. (when Prince of Wales) to prison.

GASCONY, old province of S.W. France; called after ancient Span. tribe Vascones; under counts of Aquitaine, XI. cent.; joined to France, 1137; passed to England, 1154–1451, through marriage of Duke William X.'s daughter to Henry of Anjou, afterwards Henry II. of England; inhabitants notorious for boastfulness.

GASKELL, MRS. ELIZABETH CLEGHORN, *née* STEVENSON (1810–65), Eng. novelist; spent her early life at Knutsford, Cheshire, and her married life at Manchester, as the wife of the Rev. William G., a Unitarian minister. Her first long story, *Mary Barton*—dealing with the operative life of Manchester—was pub. anonymously in 1848, and met with instant success. It was followed at intervals by her other stories, *Lizzie Leigh*, *Cranford*, *Ruth*, *North and South*, *Sylvia's Lovers*, *Wives and Daughters*, etc. The perennial charm of Mrs. G.'s stories has given her a place amongst the classic writers of Eng. fiction; and her *Life of Charlotte Brontë* (1857) is recognised as one of the great biographies in the language.

GASOLENE, inflammable liquid distilled from crude petroleum; used for gas-engines. See PARAFFIN.

GASSENDI, or **GASSEND, PIERRE** (1592–1655), Fr. philosopher; b. Champtercier, Provence; prof. of Math's, Univ. of Paris; G. was in the front rank of the scientists of his time, and anticipated various modern doctrines, *e.g.* the fall of bodies due to gravity. He revolted against the scholastic philosophy then predominant, and applying Descartes' mathematical methods and Bacon's empiricism, revived the atomism of Epicurus and Lucretius. He held that the primal elements are atoms, generated and set in motion by God; from them everything else is formed by generation and destruction.

GASSNER, JEAN JOSEPH (1727–79), Swiss priest and thaumaturgist.

GASTEIN (47° 8′ N., 13° 8′ E.), Alpine valley, duchy Salzburg, Austria; picturesque scenery; contains several villages; Wildbad-Gastein has hot mineral springs; favourite resort of Emperor William I. of Prussia; Hof-Gastein is the capital; salt mines.

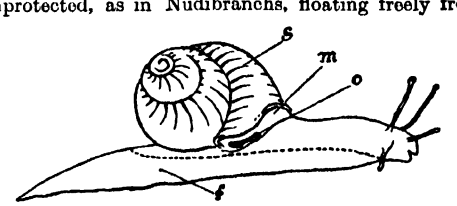
GASTEROPODA, UNIVALVE MOLLUSCS, a great class of Mollusca or Shell-Fish, with more than 17,000 species, found in all seas and on almost all lands. They include the mollusca best known on account of their abundance and the beauty of their shells, as well as on account of their destructive propensities in vegetable gardens.

G. are easily distinguished from other Mollusca on account of the univalve shell which the vast majority bear, but slugs and some marine forms have no apparent shell, and one group (*Isopleura*) has a series of shell-plates. Apart from this, they have distinct heads with radula or rasp, and tentacles, at the base or tip or middle of which simple eyes are placed. The muscular foot is well-developed, with a flat under-surface on which the creature creeps, its path being lubricated by slime secreted by glands in the foot, but its progress is proverbially slow. In most the viscera, which are packed away in the shell, have twisted on their axis in an extraordinary way, so that the body has become unsymmetrical.

The nervous system and senses of g. are wonderfully varied: they feel by means of their tentacles and by occasional outgrowths from other parts of the body; see moderately by eyes placed on their heads or tentacles, or on their backs; smell by sensitive projections or areas on their tentacles (*rhinophores*) and by one or two small organs (*osphradia*) placed within the mantle cavity near the gill; balance and perhaps hear by sac-shaped otocysts sunk in the foot. These senses are not present in all to the same degree, for eyes may be simple or complex or even absent in some deep-sea and burrowing forms.

The shells of g. are often of great beauty and are exceedingly varied in shape. Some are flattened and conical, as that of the Limpet, or flattened and whorled, as the finely iridescent Ear-Shell, or with a short close spire, as in PLANORBIS or the Whelk, or long close spire, as in Turreted or Tower Shells, or an open series of spiral curves, as in *Siliquaria* or *Cylindrella*. In Slugs and several other forms the shell is invisible, concealed under the mantle, but it is entirely absent in the Nudibranchs, the Aplacophora (see below), and a few others.

The habits of 'Univalves' exhibit much diversity. The majority are marine, and crawl leisurely upon the sea bottom in shallow water, but *Strombus* and others progress by jerks or jumps, and some are light, transparent-bodied creatures, such as the HETEROPODS and SEA BUTTERFLIES or PTEROPODS, and float or swim actively in the open sea. The marine forms breathe by means of gills usually contained in the mantle over the back, but sometimes the gills are placed in a furrow between mouth and foot, or they may be quite unprotected, as in Nudibranchs, floating freely from



SIDE VIEW OF A LIVING SNAIL AS AN EXAMPLE OF A GASTEROPOD. *f*, foot—the dotted line shows upper limit of the muscular portion; *m*, mantle; *o*, opening between mantle and body; *s*, shell.

the creature's back in the open water. Many species live in ponds or slow-running streams, and these too are gill-breathers. The aquatic forms are carnivorous

or vegetarian. The former, distinguished by a notch in the shell through which a breathing-tube or siphon projects, feed on such animals as worms, bivalve molluscs, often overcoming great difficulties in their search for a meal. Some, like the whelk, rasp through the shells of brother molluscs to obtain the soft flesh within, while others secrete acid substances which destroy the limy armour of their Echinoderm prey. The marine vegetarian feeders, such as the Periwinkles, confine their attacks to seaweeds.

Over 6000 species of g. slugs and snails live on land, and although some feed on worms and decaying matter, the majority are vegetable feeders, and, occurring sometimes in millions, as the gigantic *Achatina* in Ceylon in 1910, do considerable damage to plant life. These land forms differ from their aquatic relatives in breathing, not by gills, but by a long chamber to which the air enters by a hole on the side of the head, and also in their development. For while the young of land forms are born as miniatures of the adult, the marine forms lay eggs, in clumps or in protecting cases, and these develop into embryos, which, before the adult shape is assumed, pass through stages—trochosphere and veliger—very unlike the parent, the veliger stage being absent in most land forms. Most land g. hibernate during winter or cold weather, sealing the mouths of their shells with hardened mucus—an epiphragm—which prevents evaporation.

The place of g. in the life of the world is not of great interest. The open sea forms, especially the Pteropods, form the main food supply of many fishes and of whalebone whales; many land snails, *Helix*, *Achatina*, etc., and marine forms, such as Whelks, Periwinkles, etc., are common articles of food; and several are used as bait for fishing. From the juices of *Murex* and the Dog Whelk (*Purpura*) Tyrian purple dye was manufactured. The shells of Cowries are used as money, larger shells are made into utensils or carved into ornaments, and from the Helmet-Shells of *Cassis* shell-cameos are made. On the other hand, the vegetarian land forms cause considerable damage, especially in vegetable gardens.

The class GASTEROPODA falls into the following groups: Sub-Class I., ISOPLEURA or POLYPLACOPHORA, bilaterally symmetrical g., with shell composed of eight latitudinal plates, and numerous gills; example, *Chiton*, frequent on rocky coasts of British Isles, etc.

Sub-Class II., ANISOPLEURA, asymmetrical g. with shell of one piece and not more than two gills. There are four orders distributed in two sections (according to one of the many systems of classification).

Section A., *Streptoneura*, with visceral nerve loop twisted into 8-shape, and sexes separate, including: Order 1, *Zygobranchiata* or *Diotocardia*, with two gills or ctenidia, such as the EAR SHELL (*Haliotis*), the KEYHOLE LIMPET (*Fisurella*). The COMMON LIMPET (*Patella*) has plate-like structures instead of true ctenidia. Order 2, *Azygobranchiata* or *Monocardia*, with only one ctenidium retained—the left; examples: PERIWINKLE (*Littorina*), TOP-SHELL (*Turbo*), DOG WHELK (*Purpura*), COWRIES (*Cyprœa*), HELMET SHELLS (*Cassis*), *Cassidaria*, *Calyptrœa*, *Cancellaria*; and the pelagic HETEROPODS, e.g. *Carinaria*, with minute shell.

Section B., *Enthyneura*, with visceral nerve loop not twisted, individuals hermaphrodite, includes: Order 3, *Ophisthobranchiata*, with breathing organs behind the heart, and auricle of heart behind ventricle; examples: BULLA, SEA HARE (*Aplysia*), and the group of SEA BUTTERFLIES or WINGED SNAILS—the PTEROPODS—all of which have gills at least partially covered by mantle fold, and a more or less distinct shell. Whereas the NUDIBRANCHIATA or SEA SLUGS have no shell, and have, instead of true gills, branched processes or 'cerata' which float freely from the back in the water, others simply breathe through the skin. Common Brit. shore forms are *Doris* and *Eolis*.—Order 4, *Pulmonata*, include the land and fresh-water air-breathing g. furnished with a lung space, and generally with a shell. They include the terrestrial SNAILS (*Helix*), SLUGS (*Limax*, *Arion*, etc.), and gigantic ACHATINA; and the aquatic pond snails, as PLANORBIS and LIMNÆA.

GASTRÆA THEORY of animal ancestry, see under EMBRYOLOGY.

GASTRALGIA, pain or cramp in the stomach.

GASTRIC ULCER, disease occurring more often in women than men, especially in anæmic, under-fed, and overworked domestic servants, usually on the posterior surface of the stomach, due to the action of the digestive juices on a portion of the stomach wall, the nutrition of which is impaired, *e.g.* by a clot blocking the blood-vessel supplying the wall. The symptoms are often somewhat indefinite, resembling dyspepsia, and vary with the site of the ulcer; but there is usually severe pain, tenderness below the ribs, and vomiting soon after food is swallowed, which relieves the pain. Vomiting of blood is also common. The treatment consists in making the person affected lie down at once, and rest quietly, taking only milk and water until the symptoms improve, unless there has recently been vomiting of blood, when nothing at all must be taken. Medical care is necessary, as there may be serious complications. On improvement the diet is gradually advanced, beaten eggs, then nourishing broths, milk puddings, chicken, or white fish being given stage by stage, and under this treatment the ulcer usually heals. If perforation of the stomach wall takes place, there is sudden, very severe pain and collapse, the abdominal walls being rigid. This is a very serious condition, immediate surgical operation being necessary.

GASTRITIS, inflammation of the stomach, is usually due to irritation from food (*e.g.* tinned meats) which has begun to decompose, unripe fruit; or it may occur after diphtheria, typhoid, and other fevers. There is headache, sickness, severe pain, and tenderness over the abdomen, and often vomiting of blood-streaked food. An emetic (*q.v.*) or purgative is given to remove the irritation, ice to suck, and a hot fomentation over the stomach for the pain, and then bismuth, lime water, and other weak alkaline fluids, with a light milk diet. *Chronic G.* may arise from the acute, but is often caused by continual alcoholic excess. The diet, in this case, is carefully regulated, the stomach is washed out, and bismuth, or dilute hydrochloric acid in combination with other tonics, given.

GASTROPHILUS, see BOT FLIES.

GASTROTRICHA, group of small Infusorian-like animals found among weeds and débris in fresh water, moving by means of two ventral rows of cilia; related to Turbellarians, Nematodes, and Rotifers.

GASTRULA, see EMBRYOLOGY, REPRODUCTION.

GATAKER, THOMAS (1574–1654), Anglican theologian; wrote several works; opposed trial of Charles I.

GATCHINA (59° 32′ N., 30° 3′ E.), town, summer resort, Russia; contains one of imperial residences. Pop. 14,735.

GATE, Teutonic word meaning a passage or entrance (cf. Cowgate, Canongate, streets in Edinburgh). In fortifications it was surmounted by a crenellated gatehouse for the warden and flanked by towers, while a moat ran in front, only to be crossed by the drawbridge. It is an imposing architectural feature in Renaissance work, *e.g.* Wren's Middle Temple Gateway.

GATEHOUSE, building over the outer gate in mediæval and later castellated buildings and mansions. They were often of considerable size and strength. Town gates often had g's attached.

GATES, HORATIO (1728–1806), Amer. gen.; defeated Burgoyne at *Saratoga*.

GATESHEAD (54° 58′ N., 1° 36′ W.), town, Durham, England, on Tyne, opposite Newcastle, with which it is connected by several bridges; chief edifices, town hall, library, parish church, hospitals; locomotive dépôt; extensive ironworks; glass and chemical works; grindstone quarries. Pop. (1911) 116,928.

GATH (31° 41′ N., 34° 54′ E.), one of five chief cities of Philistines.

GATLING, RICHARD JORDAN (1818–1903), Amer. inventor of agricultural machinery and machine guns; though superseded by the Maxim and Hotchkiss and other makes in most leading armies, G. gun is still in use.

GATTY, MRS. ALFRED SCOTT (1809–73), Eng. writer for children; pub. *Parables from Nature*, *Aunt Judy* books.

GAU, JOHN (d. *c.* 1553), Scot. theol. and translator.

GAUDEN, JOHN (1605–62), Eng. bp. and author; vicar of Chippenham, 1630; rural dean of Bocking, 1641; bp. of Exeter, 1660; of Worcester, 1662; claimed to have written *Eikon Basilike*, originally pub. as work of Charles I.; authorship still doubtful.

GAUDICHAUD-BEAUPRÉ, CHARLES (1789–1854), French traveller and botanist.

GAUERMANN, FRIEDRICH (1807–62), Austrian artist; landscapes and animal studies.

GAUHATI (26° 11′ N., 91° 48′ E.), town, Assam, India, on Brahmaputra. Pop. 11,661.

GAUL, GALLIA, territory occupied by Gallic tribes (*Celti*, *Belgæ*, *Aquitani*, etc.); in ancient times consisted of—(1) GALLIA CISALPINA, *i.e.* N. Italy between Alps and Apennines; (2) GALLIA TRANSALPINA, modern France and Belgium, part of Germany and Switzerland. Cisalpine Gaul was conquered by Romans, *c.* 220 B.C., and afterwards joined to Italy. Transalpine Gaul was then invaded and ultimately subdued by Julius Cæsar in famous Gallic Wars, 58–50 B.C.; adopted Rom. civilisation and prospered (see PROVENCE); chief town, Lyons (*q.v.*); divided into provinces—*Narbonnensis*, *Aquitania*, *Lugdunensis*, *Belgica*; overrun by Franks, Vandals, Visigoths, and other barbarians, *c.* 400 A.D. See FRANCE.

GAULT, GOLT, GALT, marls and calcareous slates occurring between the lower and upper greensands of chalky formations, and belonging to the lower Cretaceous system; colour—light grey and dark blue; found at Folkestone and in Cambridgeshire. G. is also name for any kind of stiff blue clay.

GAULTHERIA PROCUMBENS, see WINTERGREEN.

GAUNTLET, a steel or leather glove; to 'run the gauntlet' was an old punishment by which persons were compelled to pass between a double line of their fellows, who struck at them with knotted ropes.

GAUR, see OX GROUP.

GAUR, LAKHNAUTI (24° 52′ N., 88° 10′ E.), ruined city, near Ganges, Bengal, India; said to have been founded XII. cent.; capital of Muhammadan viceroys and kings of Bengal from XIII. cent.; fell into decay after Mogul conquest, 157-.

GAUSS, KARL FRIEDRICH (1777–1855), Ger. mathematician and physicist; app. director Göttingen astronomical observatory, 1807, where with Weber he built a magnetic observatory, 1833; invented magnetometer, declination needle; made trigonometrical survey of Hanover.

GAUSSEN, FRANÇOIS SAMUEL ROBERT LOUIS (1790–1863), Swiss Prot. theologian; in trouble with ecclesiastical authorities at Geneva; formed *Société Evangélique*.

GAUTIER D'ARRAS, Fr. trouvère of XII. cent.

GAUTIER, ÉMILE THÉODORE LÉON (1832–97), Fr. scholar; edit. *Chanson de Roland*.

GAUTIER, THÉOPHILE (1811–72), Fr. poet and prose writer; disciple of Victor Hugo and Romantic school; began his career as poet with *Albertus* (1830), which was followed by the *Comédie de la Mort* (1832), but his best poetical work is contained in *Émaux et Camées* (1856). He achieved success with his realistic novel, *Mademoiselle de Maupin* (1835), and other works of fiction include *Le Capitaine Fracasse*, *La Belle Jenny*, *Militona*, etc. He was also a prolific writer of travel books, criticism and feuilletons, and was one of the greatest Fr. masters of the short story. All his writings are distinguished by a masterly sense of style.

See Du Camp's *Gautier* (Eng. trans., 1893).

GAVARNI, pseudonym of SULPICE CHEVALIER (1804–66), a noted Fr. caricaturist and book illustrator; took subjects from low life.

GAVAZZI, ALESSANDRO (1809–89), Ital. Prot.; preached in England; chaplain in Garibaldi's army.

GAVELKIND, general usage in England before the Conquest, by which if a man d. intestate his lands passed equally to all his sons, or, failing direct issue, to his bro's. The custom still survives in Kent.

GAVESTON, PIERS (d. 1312), Earl of Cornwall; favourite of Edward II.; executed by jealous barons.

GAWAIN, knight in Arthurian legend; s. of Loth, king of Orkney, and nephew to Arthur. Gawain was originally regarded as model of courtesy and gallantry. Malory and later writers make him base and immoral.

GAWLER (34° 35′ S., 138° 39′ E.), town, S. Australia; foundries, flour-mills. Pop. 11,000.

GAY, JOHN (1685–1732), Eng. poet, dramatist, and fabulist; his most successful works were his *Fables* (1727) and *The Beggar's Opera* (1728)—a Newgate pastoral. Other writings include *Rural Sports*, *Trivia*, *The Shepherd's Week*, also some plays and miscellaneous poems; lyrical gift shown in *Black-Eyed Susan* and other undying songs; helpless, lazy, easy-going nature; very popular in XVIII. cent.

GAY, MARIE FRANÇOISE SOPHIE (1776–1852), Fr. novelist (Directoire and Empire periods), playwright, song-writer, and musician; mother of Delphine G., Madame de Girardin (*q.v.*).

GAYA (24° 48′ N., 85° 3′ E.), district, Patna, Bihar and Orissa, India; consists of level and fertile plain; chief river, Son; abounds with holy places; capital, Gaya (pop. 71,000), where Buddha, under a pepal tree, is supposed to have attained all knowledge; centre of pilgrimage; silk and cotton manufactures. Area, 4712 sq. miles. Pop. 2,059,933.

GAYAL, see OX GROUP.

GAYARRÉ, CHARLES ÉTIENNE ARTHUR (1805–95), Amer. historian and novelist.

GAY-LUSSAC, JOSEPH LOUIS (1778–1850), Fr. physicist; prof. of Physics at the Sorbonne, and of Chem. at the Jardin des Plantes; was a rival of Davy, whose researches on iodine, chlorine, sodium, and potassium he tried to prove inaccurate. He investigated properties of gases, hygrometry, capillarity, and stated the law of volumes, and improved the processes for the manufacture of sulphuric and oxalic acids. Quantitative analysis and organic analysis were benefited by the accurate methods he introduced into such problems as the assay of silver.

GAZA (31° 30′ N., 34° 33′ E.), town, Palestine, on coast; commercial centre; seat of Gk. and Armenian bp's; was most southerly and important of five Philistine cities; taken by Alexander the Great, 332 B.C., and by Bonaparte, 1799. Pop. 40,000.

GAZA, THEODORUS (*c.* 1398–1478), Gk. scholar; one of the pioneers of the revival of Gk. learning; author of a Gk. grammar and other works.

GAZALAND (24° 30′ S., 34° 20′ E.), district, S.E. part of Portug. E. Africa.

GAZELLE (*Gazella*), antelope genus, of African, Arabian, and Indian deserts; distinguished by lyrate horns, sandy colour, with light and dark face markings. WALLER'S G. (*Lithocranius walleri*), or gerenuk, an E. African g., has hooked, massive horns in male and peculiar skull structure.

GAZETTE, a newspaper; the *London Gazette*, pub. twice weekly, is the Government organ for official announcements and appointments.

GEBER (X. cent.), reputed author of certain Lat. and Arabic writings on alchemy, etc. The works themselves are of considerable hist. value, but opinion differs regarding their authorship and date.

GEBHARD TRUCHSESS VON WALDBURG (1547–1601), abp. of Cologne; elector of Cologne, 1577; embraced reformed faith, 1582, and m.; deposed and excommunicated, 1583.

GEBWEILER (47° 55′ N., 7° 11′ E.), town, Alsace-Lorraine, Germany; textiles; wines. Pop. (1910) 12,900.

GECKOS, see under LIZARDS.

GED, WILLIAM (c. 1690–1749), Scot. inventor of stereotyping; first printed from casts in Edinburgh, 1725.

GEDDES, ALEXANDER (1737–1802), Scot. R.C. Bible critic; removed from Banffshire charge for sympathising with Protestants; trans. part of Old Testament.

GEDDES, ANDREW (1783–1844), Scot. artist; amongst his sitters was Sir Walter Scott.

GEDDES, JAMES LORRAINE (1827–87), Scot.-Amer. soldier and poet.

GEDDES, JENNY (XVII. cent.), Scot. historical character; caused riot by throwing stool at Bishop Lindsay's head in St. Giles', Edinburgh (July 23, 1637), on introduction of Laud's Prayer Book.

GEDDES, SIR WILLIAM DUGUID (1828–1900), Scot. educationist; his works include a *Greek Grammar* and a criticism of Homer.

GEDYMIN (fl. early XIV. cent.), grand-duke of Lithuania; s. of Lutuwer; ruler over large portion of Russia; warred against Teutonic and Livonian knights; was first to open up Russia to Western culture; founded dynasty and largely increased dominions; killed at siege of Wielowa (1342).

GEE, THOMAS (1815–98), Welsh Calvinist divine; devoted himself to itinerant preaching and religious journalism.

GEEL, JACOB (1789–1862), Dutch scholar.

GEELONG (38° 10′ S., 144° 21′ E.), seaport, Victoria, Australia; first woollen mill in colony established at G.; has extensive wool trade, flour-mills, and tanneries. Pop. (1910) 28,880.

GEESE, see under DUCK FAMILY.

GEESTEMÜNDE (53° 31′ N., 8° 34′ E.), fortified town, Hanover, Germany; principal port of Ger. deep-sea fisheries. Pop. (1910) 25,061.

GEFFCKEN, FRIEDRICH HEINRICH (1830–96), Ger. diplomatist and hist. and legal writer.

GEFFROY, MATHIEU AUGUSTE (1820–95), Fr. historian; b. Paris; pub. *Histoire des états scandinaves* (1851) and other hist. studies.

GEFLE (60° 38′ N., 17° 10′ E.), seaport, Sweden, on inlet of Gulf of Bothnia; manufactures textiles, machinery, and tobacco; timber, wood-pulp, iron, and steel exported. Pop. (1910) 35,203.

GEGENBAUR, CARL (1826–1903), Ger. anatomist; prof. of Anatomy at Jena (1855) and Heidelberg (1873); made important investigations in comparative anatomy; author of many scientific works.

GEHENNA (Heb. *Gē Hinnom*, valley of Hinnom), Heb. name for Hell. Hinnom, near Jerusalem, being the place where Israel sacrificed children to Moloch, came to be held in horror, and was used later for tipping refuse.

GEIBEL, EMANUEL (1815–84), Ger. lyric poet; prof. of Æsthetics, Munich (1852–68).

GEIGER, ABRAHAM (1810–74), Jewish scholar and theologian; rabbi at Wiesbaden, Breslau, Frankfort, Berlin; wrote *Urschrift und Übersetzungen der Bibel*, *Sadducäer und Pharisäer*, etc. His nephew, Lazarus G., wrote *Ursprung der Sprache*.

GEIJER, ERIK GUSTAF (1783–1847), Swed. historian and poet; grad. at Univ. of Upsala, 1806, becoming prof. of History there, 1817–46; pub. *History of the Swedes* (1832–36; Eng. trans., 1845), a masterpiece in history.

GEIKIE, SIR ARCHIBALD (1835–), Scot. geologist; b. Edinburgh; ed. Edinburgh Royal High School and Univ.; assistant of Geological Survey, 1855; director, Geological Survey for Scotland, 1867; prof. of Geology, Edinburgh Univ., 1871; director-gen. of Geological Survey of United Kingdom, 1881–1901. Author of many publications; made special study of microscopic petrography. His bro., JAMES (1839–), author of many works on geol., succ. him as prof. of Geol., Edinburgh Univ. (1882).

GEIKIE, WALTER (1795–1837), Scot. artist; noted for black-and-white illustrations of Scot. life.

GEILER VON KAISERSBERG, JOHANN (1445–1510), great Ger. pulpit orator; preached at Strassburg Cathedral, 1478–1510.

GEISHA, Jap. female singer and dancer.

GEISLINGEN (48° 37′ N., 9° 50′ E.), town, Württemberg, Germany; glass and iron works. Pop. (1910) 8671.

GELA (37° 10′ N., 14° 20′ E.), ancient city, Sicily; founded by Cretans and Rhodians, 688 B.C.

GELADA BABOON, see under CERCOPITHECIDÆ.

GELASIUS I., pope (492–96); banished Manichæans. GELASIUS II., pope (1118–19); expelled from Rome by Emperor Henry V., whom he afterwards excommunicated.

GELATI, monastery in Transcaucasia, founded by David, king of Georgia, 1109.

GELATIN, or **GELATINE**, nitrogenous substance obtained by digestion of bones, skin, and tendons with superheated steam. The cooled hot-water solution jellies, but after prolonged heating does not. With potassium bichromate it forms, when exposed to the light, an insoluble compound used in the carbon processes in photography. Bacteria are grown on gelatin cultures.

GELDERLAND (52° 5′ N., 6° E.), province, Netherlands, S.E. of Zuider Zee; surface more hilly than most of Dutch provinces; traversed by Waal, Rhine, Yssel, Maas; soil very fertile along river banks. Chief crops—cereals, flax, tobacco; cattle-rearing, brick-making, paper and cotton industries carried on; capital, Arnheim. Area, 1965 sq. miles. Pop. 639,602.

Old Countship of G. was raised to a DUCHY, 1338, under the Empire; thrived in commerce; seized by Maximilian of Austria, 1483; absorbed in Hapsburg Netherlands, 1543; north (present Dutch province) seceded, south adhered to Spain, 1579; divided between Holland and Prussia, 1814.

GELDERN (51° 31′ N., 6° 19′ E.), town, Germany, Pruss. Rhine province; formerly residence of Dukes of Gelderland. Pop. (1910) 6447.

GELLERT, faithful hound of the Welsh prince, Llewellyn, who slew him, thinking he had killed the child he had actually saved from a wolf.

GELLERT, CHRISTIAN FÜRCHTEGOTT (1715–69), Ger. religious poet, fabulist, and dramatist; prof. of Philosophy, Leipzig (1751).

GELLIUS, AULUS (II. cent. A.D.), Rom. grammarian, and author of *Noctes Atticæ*, a miscellany valuable for its extracts from ancient writings no longer extant.

GELLIVARA (67° 20′ N., 20° 50′ E.), town, Sweden; extensive iron-ore mines.

GELNHAUSEN (50° 13′ N., 9° 6′ E.), town, on Kinzig, Hesse-Nassau, Germany; rubber goods; wine. Pop. (1910) 4858.

GELSEMIUM, drug consisting of the dried root of a plant, *Gelsemium nitidum*, of natural order *Loganiaceæ*, growing chiefly in the south-eastern United States, its chief constituents being two alkaloids, *gelseminine* and *gelsemine*. Its action has been shown to be mainly on the anterior horns of the spinal cord grey matter, but owing to its uncertain action it is not much used now, except sometimes, in combination with other drugs, for neuralgia or migraine.

GELSENKIRCHEN (51° 32′ N., 7° 14′ E.), town, Westphalia, Prussia; collieries. Pop. (1910) 169,550.

GEM (Lat. *gemma*, 'precious stone'), term applied to certain rare minerals, valued for ornamental purposes, or to precious stones cut, polished, and engraved, which, when the engraving is sunk in the stone, are called *seals* or *signets*, and when engraving is raised, *cameos*.

The ancients had great belief in the medicinal powers of gems, and even at present day some people put faith in 'lucky stones.' The ancients, owing to the absence of chemical analysis, were only able to distinguish the different precious stones by colour

and density. The diamond, ruby, and sapphire were not much used, as their hardness prevented their being successfully engraved. Varieties of chalcedony quartz were more often employed, and the following were known: carnelian, sard, onyx and sardonyx, agate, plasma, jasper, garnet, hyacinth, emerald, beryl, chrysoberyl, topaz, chrysolite, opal, sapphire, tourmaline, amethyst, and turquoise.

The engravers of those times suited the colour of the stones to the subject of their engraving; *e.g.* beryl was used for marine pictures, green jasper for woodland scenes, etc. The range of subjects was wide, and included animals, battle scenes, portraits, fancy designs, mottoes, etc. Inscriptions varied—names of deities, the name of the engraver, a motto, a piece of poetry, or some words indicative of the virtue of the individual gem.

Artificial g., a precious stone formed by chemical means. The term should not be confused with 'artificial precious stones,' as an artificial gem is actually a real precious stone, which is chemically, physically, and optically identical with a natural gem, though produced by artificial means. Diamonds have been produced from carbon in molten iron under great pressures, and rubies and sapphires from fusion of barium fluoride with alumina and traces of potassium bichromate or cobalt.

The term a. gem may also be applied to cameos and intaglios, which are spurious imitations of some original and valued engraving.

The engraving of gems is of very ancient origin, and some of the early cameos are valued highly by collectors. This led to their being imitated and copied at the close of the XVIII. cent. by unscrupulous persons who found collectors only too willing to pay for imitations of valuable gems which they had not got in their collections. In modern times, too, a considerable trade is done in this line, and also in the manufacture of gems for ornamental purposes.

Paste copies of existing gems are obtained by making a mould from the original. This is covered with small pieces of glass and placed in a furnace, and the temperature raised to such a heat that the glass melts and fills the mould.

Streeter, *Precious Stones and Gems* (1898); Kirkpatrick, *Discrimination of Gems* (1895).

GEMBLOUX (50° 33′ N., 4° 42′ E.), town, Namur, Belgium; has extensive railway and engine works and is railway junction; scene of defeat of Dutch by John of Austria, 1578. Pop. 4664.

GEMINI, a zodiacal constellation.

GEMMI PASS (46° 25′ N., 7° 37′ E.), Alpine pass, connecting Swiss cantons Bern and Valais.

GEMSBOK, see Oryx.

GENAZZANO, small town, prov. of Rome, Italy; famous old castle of Colonnas and place of pilgrimage.

GENDARMERIE, name now given to the Fr. military police, but in mediæval times applied to select Fr. cavalry, organised by Charles VII.

GENEALOGY, a systematical account of origin, descent, and relations of families; a pedigree; founded on idea of a lineage or family. Ancient g's often supply information respecting tribal subdivision and interrelation. Study of g. is an aid to hist. science, but most old g's require interpretation and criticism of a close nature. Biblical g's, for instance, besides their complexity, often contain manifest improbabilities and inconsistencies. Similarly many g's of ancient Gk. and Rom. families are untrustworthy. Owing their origin often to a desire to trace divine descent, or to prove continuity of race, they are in some cases pure fabrication. Then again, the frequent resort to well-recognised practice of adoption amongst the ancients was an almost insuperable barrier to possibility of a correct g. Study of g. grew in importance in Middle Ages, when nobility was distinct from other classes and monopolised certain offices, eligibility for which depended largely on descent.

In modern times, importance of g. is largely due to laws of inheritance, and desire to assert privileges of a hereditary aristocracy. Private g's are a comparatively late development of the art of pedigree-making. Historically, g's came into prominence in England during time of Edward III.'s claim to Fr. crown, and during rivalry between Yorkists and Lancastrians. From XVI. cent. onwards g's are numerous. Work of genealogist is not always free from taint of inaccuracy and forgery, but is now largely in hands of antiquaries, whose researches are of enormous value to historian. Of late the study has made rapid strides, more material having been made available by publication of parish registers, marriage-licence allegations, monumental inscriptions, and publications of Public Record Office.

J. H. Round, *Peerage and Pedigree* (London, 1910); Stokvis's *Manuel d'histoire et de généalogie de tous les états du globe* (1888–93).

GENELLI, GIOVANNI BUONAVENTURA (1798–1868), Ger. artist; his work was much influenced by the older Ital. masters.

GENERAL, commander of an army, division, or brigade; chief of a religious order; added to official titles, term implies higher rank and authority (cf. Auditor-G.).

GENERATIONS, ALTERNATION OF, the occurrence of different kinds of individuals in successive generations, as in butterflies which have seasonal forms, or more usually the occurrence of different kinds of individuals differently produced, in a single life-history, *e.g.* where a sexual generation is succeeded by a vegetative generation which reproduces by budding, as in many Cœlenterates, Worms, and Tunicates.

GENERIC IMAGE, or **Recept**, an image of the common visible characters of a class, *e.g.* of cow or horse, but vague in details. Sometimes compared to a 'composite photograph.'

GENESIS, first book of Old Testament; name is of Gk. derivation, signifying the origin or generation of the world. G. forms introduction to history of Israel; naturally divided into two portions, of which the first (chaps. 1–11) gives account of early history of man, beginning with Creation and describing the Fall, the increase of sin, and the Deluge; the second (chaps. 12–50) gives history of the patriarchs, beginnings of the twelve tribes, the sojourn in Egypt, and death of Joseph. G. is said to be the oldest complete book in existence; it is now admitted to be a compilation from various sources; this is known from the double record of various events and from differences in style and language. According to Dr. Driver, the two earliest documents from which book was compiled are those known as J and E, from their respective use of the terms Jehovah and Elohim in speaking of the Creator; these two seem to have been combined by a third writer into a single story; they are not now easily distinguishable, and are generally referred to together as JE. The third principal source is generally known as P, or the Priests' Code; this in itself gives practically a complete story, and it is written with a certain precision which contrasts with the less studied style of the earlier sources; it is sometimes called the Elohistic narrative, from constant use of term Elohim. A later editor seems to have combined P with JE, using the former as a kind of groundwork into which he has introduced portions from the earlier documents.

W. H. Bennett, *Genesis* (Jack's Century Bible); S. R. Driver, *Introduction to Literature of Old Testament*; Robertson, *The Old Testament and its Contents*; Wright, *Introduction to Old Testament*.

GENET, a carnivore; see under Civet Family.

GENEVA (42° 52′ N., 77° 4′ W.), city, New York, U.S.A.; seat of state agricultural experiment station; extensive seed and plant nurseries; manufactures stoves, boilers. Pop. (1910) 12,446.

GENEVA (46° 11′ N., 6° 9′ E.), town, Switzerland, capital of G. canton, at S.W. end of Lake of G., overlooked by Jura and Alps. Rhône, issuing from lake, flows through city under handsome bridges. G. is a

great commercial, industrial, and educational centre and favourite resort of foreigners, and has striking modern buildings, broad quays, and fine boulevards. Among the few older buildings of interest are the Cathedral of St. Pierre (XII., XIII. cent's), Chapel of the Maccabees (XV. cent.), town hall (XV. cent.), arsenal containing historical museum; old tower (c. 1219) on the Île in Rhône. Notable modern features are Univ. (founded as Academy, 1559, by Calvin; became univ., 1873), Bâtiment Électoral, Conservatoire de Musique, Victoria Hall (concert hall), Theatre, Musée de Fol (fine collection of antiquities), Musée Rath (pictures, sculptures), Musée Ariana (art collection), Musée des Arts Décoratifs, statue to Duke of Brunswick (who left his fortune to G.), Rousseau Island, houses of Calvin and Rousseau, quai de Mont Blanc with splendid view of Mt. Blanc, grand quai du Lac, etc.; chief industries are watch-making, jewellery, diamond-cutting, musical-boxes, scientific instruments, cutlery. G. first appears in Cæsar's *Gallic War*; held by Burgundians and Franks, V. and VI. cent's; part of Ger. Empire, XI. cent.; Republic founded, 1512, allied to Swiss cantons, 1584; long resistance to house of Savoy ended successfully, 1603; annexed to France, 1798; admitted into Swiss Confederation, 1815. G. figured very prominently in the Reformation; Farel, famous Prot. preacher, settled there, 1533, Calvin in 1536. The same year G. finally espoused Prot. faith; Farel and Calvin were exiled, 1538; latter, recalled, 1541, was for the rest of his life the stern and severe ruler of G., even sending Gruet and Servetus to the stake, 1547, 1553. Pop. (1910) 125,500.

Lewis and Gribble, *Geneva* (1910).

Geneva Convention, an agreement relating to treatment of sick and wounded in war, was adopted at international conference, G., 1864, which originated in a book entitled *Un Souvenir de Solférino*, by Henri Dunant, a Genevese philanthropist. Sympathy following publication of this book was crystallised by M. Gustave Moynier. Convention was accepted by every civilised nation. There have since been supplementary conventions. The New G. C. (1906) was signed by thirty-five nations. The Hague Convention (1907) adopted terms of G. C. for maritime warfare.

GENEVA, LAKE OF, Lac Léman (46° 25′ N., 6° 30′ E.), largest lake, ancient *Lacus Lemannus*, Switzerland, bordering Haute-Savoie, France, and cantons Geneva, Vaud, and Valais; extends in crescent shape E. to W.; traversed by Rhône; length, 45 miles; greatest breadth, 9 miles; height above sea-level, 1230 ft.

GENEVIÈVE, a noble Brabantine lady who was falsely accused of wifely infidelity. The story is a common theme of mediæval romances.

GENEVIÈVE, ST. (c. 422–512), guardian saint of Paris, which she protected against Attila and Huns; what is now the Panthéon was erected as a church in her honour; her tomb was desecrated at the Revolution.

GENGHIZ KHAN, Jenghiz Khan (*q.v.*).

GENIUS, beneficent spirit who, in the belief of the ancient Romans, presided over the birth and career of every human being. The Greeks called such spirits *dæmones*.

GENLIS, STEPHANIE FÉLICITÉ, COUNTESS DE (1746–1830), Fr. authoress; works, *Mémoires*, romances, and comedies.

GENNADIUS II., Georgios Scholarios (d. c. 1468), patriarch of Constantinople; tried to unite Gk. and Lat. Christendom; a distinguished scholar.

GENNESARET, see Galilee, Sea of.

GENOA, Genova (44° 24′ N., 8° 53′ E.), strongly fortified seaport and chief commercial city of Italy, on Gulf of G. Its situation in midst of Riviera, its mediæval churches in black and white marble, XVI.-cent. palaces, steep irregular old lanes, and broad handsome modern streets justify G.'s title, *La Superba*. The magnificent harbour has been greatly extended. Among finest churches (XI., XII., and later cent's) are Santa Maria di Castello, San Lorenzo Cathedral, San Donato, Santo Stefano, San Giorgio, San Matteo, San Siro, Santa Maria di Carignano, L'Annunziata, and Sant' Ambrogio. Outstanding palaces (with art treasures) are Rosso, Bianco, Doria, Municipale, Balbi-Senárega, San Giorgio, Reale, Durazzo-Pallavicini, and Ducale (doges' residence); Univ. (founded, 1471), Art Academy (and Museo Chiossone), municipal library; Verdi Institute of Music; Teatro Carlo Felice; Porta Pilo, Lanterna, Romana (old gateways); Campo Santo (cemetery), beautiful parks, monuments. Chief industries are silk and velvet, cabinet-making, filigree work, marbles, damask, lace, embroidery, candied fruit, leather. In Middle Ages G.'s position made her the recognised leader in Liguria against Saracen and other invaders, and mistress of W. Mediterranean; Republic of G. crushed Pisa, XIII. cent., but was conquered by Venice, 1380. Family feuds continually disturbed G.; Dogos instated, XIV. cent.; embodied in Ligurian Republic, 1797; annexed to France, 1805, to Sardinia, 1815. Famous Genoese include Columbus, Admiral Andrea Doria, and Mazzini. Pop. (1911) 272,077.

GENOVESI, ANTONIO (1712–69), Ital. philosopher; first entered the Church, then took to law, finally to philosophy; prof. at Naples.

GENSERIC, Gaiseric (*q.v.*).

GENSHIN (942–1017), Jap. artist; known also as Yeshin Sodzu; his *Descending Buddha* and similar studies are amongst the greatest religious pictures of the world.

GENTIAN, natural order *Gentianaceæ*, herbaceous perennial plants (characterised by simple exstipulate leaves, the spiral [imbricate] arrangement of the petals in flower buds, and absence of latex in tissues), the majority of which have brilliant deep blue blossoms, and grow on hills. All possess an active bitter principle in the root, but medicinal g. is derived from *G. Lutea*. Its action is due to a glucoside which increases the tone of the alimentary canal.

GENTIANACEÆ, family of glabrous herbs, rich in bitter principles; chief genus, *Gentiana*, used in distilling liqueur Enzian.

GENTILES, Scriptural name for people other than Jews.

GENTILESCHI, ORAZIO DE' (d. 1646), and his dau., Artemisia G. (1590–1642), Ital. artists of eminence; both spent some time in England and were employed by Charles I.

GENTILI, ALBERICO (1552–1608), Ital. lawyer; prof. of Civil Law at Oxford Univ.; advocate of the king of Spain, 1605; works important in history of international law.

GENTLEMAN is a term which has undergone changes of meaning at different periods. Originally it was applied to a person of property, below the rank of a noble, who had received a coat-of-arms. Another distinction was the right to carry a sword. In the XVIII. cent. the term was additionally used for a g.'s footman or valet (called a 'gentleman's gentleman'). Of late years the term has three distinct applications: a man of good family; a man of independent means, who follows no regular occupation; and any man, whether well-born or otherwise, of refined manners and taste—one of 'Nature's gentlemen.'

GENTZ, FRIEDRICH VON (1764–1832), Ger. statesman; stirred up opposition to the Fr. Revolutionary government and sought to create a great European party against the Napoleonic empire. Prussia dared not countenance his attacks, but the good effect produced by his eloquence and wit secured him subsidies from Britain and the rank of imperial councillor; and after the fall of Napoleon he was the skilled adviser of the Holy Alliance and the draughter of most European treaties; denounced by Napoleon, with some justice, as a mercenary, but after the first ebullitions of youth worked consistently for conservation of institutions.

GEODESMUS, a Turbellarian worm (*q.v.*).

GEOFFREY (1158–86), Duke of Brittany; fourth

s. of Henry II. of England, and f. of the Prince Arthur of Shakespeare's *King John*.

GEOFFREY DE MONTBRAY (d. 1093), Eng. ecclesiastic; was bp. of Coutances; prominent military figure and administrator from Conquest onwards to death of William I.; took part in rising against William Rufus (1088).

GEOFFREY OF MONMOUTH (d. 1154), Welsh chronicler; bp. of St. Asaph, 1152; his *Historia Britonum*, a romance tracing descent of Britons from Brut, s. of Æneas, is source of Arthurian legends, prophecies of Merlin, and stories of Cymbeline and King Lear.

GEOFFREY PLANTAGENET (d. 1151), Count of Anjou, and (1144) Duke of Normandy; second husband of Matilda, dau. of Henry I., and f. of Henry II. of England.

GEOFFRIN, MARIE THÉRÈSE (1699–1777), Fr. authoress; associated with the Encyclopædists, and famed for brilliance of her literary and artistic gatherings.

GEOFFROY, ÉTIENNE FRANÇOIS (1672–1731), Fr. physician and chemist; prof. of Chemistry at Jardin du Roi, of Pharmacy and Medicine and dean of faculty of Medicine at Collège de France, Paris; author of works on chemistry. His bro., CLAUDE JOSEPH, chemist, made researches on essential oils in plants.

GEOFFROY SAINT-HILAIRE, ÉTIENNE (1772–1844), celebrated Fr. zoologist and comparative anatomist; famous for his contention of the homologies of parts in animals, and his general theories of anatomical relationships.

GEOFFROY SAINT-HILAIRE, ISIDORE (1805–61); Fr. zoologist; b. Paris; s. of above; doctor of med., 1829; assisted and finally succ. his f.; held various educational posts, including inspector-generalship of Paris Univ., 1844; founded Paris Acclimatisation Society, 1854; writings include *Histoire générale et particulière des anomalies de l'organization chez l'homme et les animaux* (1832–37).

GEOGRAPHY (Gk. *Ge*, the Earth; *graphein*, to describe) has been defined as 'the exact and organised knowledge of the distribution of phenomena on the surface of the Earth, culminating in the explanation of the interaction of Man with his terrestrial environment' (Dr. H. R. Mill). This most comprehensive science naturally divides itself into various branches, according to the different aspects of the earth's surface with which it is concerned. Thus *mathematical g.* deals with the earth as a planet—its figure, motions, and its place in the solar system (also known as *astronomical g.*); this branch also embraces the measurement of the earth and its representation on maps, charts, etc., *i.e.* geodesy, cartography, topography.

Mathematical g. is mainly the study of scientists and experts; *physical g.* is more familiar to the average man; it occupies itself with the earth's physical features — its soil and sea and air, its climate, and kindred subjects; it bears, therefore, on such sciences as geology, oceanography, meteorology (*qq.v.*). Still more familiar is *biography* or *biological g.*, which investigates the earth as a home of living things—*phytogeography* studies the distribution, etc., of plant-life, and is akin to botany; *zoogeography* studies in like manner the animal-life, and is related to zoology. Of still more human interest is *anthropogeography*, which treats of the distribution and conditions of mankind on the earth. This, again, may be subdivided into *political g.*, which considers states and their boundaries, races, governments, institutions, languages, and so forth; *economic* or *commercial g.*, which relates to products, industries, routes and means of transportation, and similar matters. Geography may also be *historical*, *applied*, or *practical*.

Exploration and Discovery.—From the earliest times four great factors have combined to advance g.—the scientific spirit, the missionary spirit, the commercial spirit, and the adventurous spirit. The scientist in the observatory or laboratory has, from the days of Anaximander, Aristotle, Strabo, and Ptolemy, worked out and handed down in the form of treatises and maps the great problems of mathematical g. and other branches of the science, securing an ever more and more correct and detailed knowledge of the earth as part of the Universe (see EARTH, MAP). The merchant seeking new markets and fresh sources of wealth has eagerly sought the remotest regions of the earth; and to aid him he has ever found bold mariners and intrepid explorers ready to traverse unknown seas and lands. To-day exploration is still a science, a mission, a speculation, or a sport, according to the character of the explorer.

Principal Dates.—A few of the more outstanding dates in the history of geography and exploration (radiating from the Mediterranean) may be given:—

	B.C.
Egyptian expedition to Punt (Somaliland)	*c.* 1600
Reputed Phœnician 'Periplus' or circumnavigation of Africa	600
Anaximander's invention of maps	580
Hecataeus writes *Tour of the World* (first Geography)	500
Hanno, the Phœnician, explores West African Coast	450
Pytheas of Marseilles reaches the British Isles	333
Alexander the Great enters India	327
Julius Cæsar traverses Europe	60–54
	A.D.
Strabo's Geography	18
Ptolemy's Geography and Maps	159
Missionary explorations of St. Patrick, St. Columba, and St. Brandan	V.–VI. cent.
Cosmas writes *Christian Topography*	VI. cent.
Norse vikings discover Iceland, 861; Greenland, 985; Newfoundland and N. America	1000
Othere explores the Baltic	890
Arabs visit China and East	IX. cent.
Marco Polo travels in East	1271–95
Portuguese mariners seek and find sea-route to India *via* Cape of Good Hope, XV. cent.; Diego Cam discovers Congo, 1484; Diaz rounds Cape, 1486; Da Gama reaches India	1497
Spanish mariners seek westward route to India, and Columbus discovers New World	1492
Cabot reaches Newfoundland	1497
Pacific Ocean sighted by Balboa	1513
First circumnavigation of World by Magellan's ship	1519–22
Spanish Conquistadores explore South America	XVI. cent.
French exploration of Canada (Cartier, 1534; Champlain, 1615)	XVI.–XVII. cent.
Search for North-East Passage begins (Willoughby finds Novaya Zemlya, 1553)	XVI. cent.
Search for North-West Passage begins (Frobisher discovers Frobisher Bay, 1576)	XVI. cent.
Drake sails round World	1577–80
Barents reaches Spitzbergen	1596
Davis Strait discovered, 1586; Hudson Bay, 1616; Baffin Bay	1616
Dutch discover Australia and colonise South Africa	XVII. cent.
Tasman discovers Tasmania	1642
Bering Strait discovered	1741
Cook discovers New Zealand	1769
Interior of Africa explored (Nile, by Bruce, 1770; Niger, by Park, 1796)	XVIII. cent.
N. America and Arctic regions explored by Mackenzie, Ross, Parry	1789–1829
North Magnetic Pole discovered	1830
Lake Tchad discovered, 1822; Timbuktu	1829
Landers finds Niger mouth	1830
Exploration of Australia by Bass, Flinders, Sturt	1797–1831

	A.D.
Livingstone, Burton, Speke, Grant, Baker, explore Central Africa and discover Great Lakes	1849–73
Burke and Wills cross Australia	1861
Stanley finds Congo mouth	1877
Nordenskiöld navigates North-East Passage	1879
Younghusband enters Lhasa, the Forbidden City	1904
North-West Passage first navigated by Amundsen	1906
Peary reaches North Pole, April 6	1909
Amundsen reaches South Pole, Dec. 14	1911
Scott reaches South Pole, Jan. 18	1912

(For other important names and dates in the history of exploration, see AFRICA, AMERICA, ASIA, ATLANTIC, AUSTRALIA, EUROPE, PACIFIC, POLAR REGIONS, and other articles on various countries of the world.)

Modern Geography.—Geography tends to become ever more and more a matter of science. Explorers are now scientists, and scientists are explorers, witness men like Humboldt and Darwin. During the XIX. cent. enormous progress was made, largely through the instrumentality of *Geographical Societies* (of Paris, founded 1821; Berlin, 1828; Royal Geographical Society, London, 1830; Royal Scot. Geographical Society, 1884), and of geographical writers, compilers, and publishers (like Reclus, Bartholomew, and Geographical Institute of Justus Perthes, at Gotha). The XX. cent. has seen Geography begin to take its proper place in Brit. Univ's, and more rational methods of teaching it applied in schools. Explorers have now solved most of the great problems which so long baffled man, but both in the Old and in the New World large fields still remain untouched. The days are long since gone when

> 'Geographers in Afric maps
> With savage pictures fill their gaps,
> And o'er unhabitable downs
> Place elephants for want of towns.'

But there is still unlimited work for the explorer and the geographer.

The International Geography, by Seventy Authors (1909); *A Book of Discovery: History of the World's Exploration*, by M. B. Synge (1912); *Physiography*, by Salisbury (1907); *Commercial Gazetteer*, by Melven (1905); *Guide to Geographical Books and Appliances*, edit. by H. R. Mill (1910).

GEOK-TEPE (38° 24′ N., 57° 48′ E.), fortified town, Transcaspia, Russia; taken by Skobeleff, 1881.

GEOLOGY (Gk. *ge*, 'the earth'; *logos*, 'doctrine'), the science dealing with the study of the structure of the earth in all its aspects, from its earliest existence down to the present time, but especially relating to the structure and composition of the earth's crust.

History.—In early times little, if any, attention was paid to g., as we know it at the present day, and therefore an account of the early history is of little interest, except in showing some of the incorrect and absurd beliefs of the ancients. In the early records of the Hindus, Chinese, and Egyptians, the more pronounced geological phenomena, such as earthquakes and volcanic eruptions, are recognised, but the first true treatise on g. is ascribed to Anaximander (610 B.C.); of this work there is now no trace. Strabo (b. 66 B.C.) and Pythagoras (580 B.C.) observed changes taking place on the earth's surface, and Strabo suggested that it was the land which changed its level and not the sea, but Pythagoras maintained that it was the sea which retired and left the land, and with this he coupled volcanic action to account for other changes.

Aristotle, Lucretius, and Anaximenes considered the relation of geological effects of the earth, while Seneca recorded particulars of the Naples earthquake of 63 A.D. To the X. cent. no real geological work was done, but at that time Avicenna, a physician, wrote a work on the 'Formation and Classification of Minerals.' Another blank occurred until the XVI. cent., when a revival of geological interest sprang up in Europe. Considerable discussion took place as to the nature and origin of fossils. One side contended they were terrestrial exhalations, or due to the influence of heavenly bodies; others held that they were animal remains. It was not until two cent's later that the latter (and correct) opinion was generally adopted.

Leibnitz (1680) seems to have been the first to suggest that the earth was originally in a molten state; that the primary rocks were formed by the cooling of the surface, and that sedimentary strata resulted from the subsiding of the waters. Hooke (1680) and Ray (1690) held the same views as Pythagoras, and were followed by a host of others. Werner (1780) drew attention to the importance of g. in connection with mining, and the practical value of the science gave it an impulse. Werner examined all the rocks he could in his own district (Freyberg, Saxony), and classified them according to their mineralogical character. Owing to his regarding all rocks as being deposited on the bed of a universal ocean originally, and holding that the ocean had since subsided, he gained for himself and his followers the name of *Neptunists*.

On the other hand, Desmarest and Dolomieu, two French geologists, in maintaining the volcanic origin of the rocks of S. Europe, were known as *Vulcanists*. In 1795 Hutton published his *Theory of the Earth*, which specially drew attention to the constant denudation of the earth's surface by running water and the deposition of débris on the floor of the ocean by this action. In 1797 Playfair published *Illustration of Hutton's Theory*, while the following year Sir James Hall proved that molten rock may form lava or basalt, according to the pressure it is subjected to in cooling. Wm. Smith, an English surveyor, established stratigraphical g., and in 1790 published his *Tabular View of British Strata*, and a geological map of England in 1815. He classified the strata of the Secondary or Mesozoic formations by their fossils, and Cuvier and Brongniart, two French naturalists, did the same with the Tertiary or Kainozoic formations.

The Geological Soc. of London was formed in 1807, and geological science became formally established from this time. During the XIX. cent. g. received a great impetus, and many famous scientists devoted their energies to it. Hugh Miller's *Old Red Sandstone* is world-famous, and Murchison's researches on the Silurian Rocks won for him everlasting fame. Students of g. are familiar with such names as Sedgwick, Elie de Beaumont, Lyell, and Geikie—all men who gave a great impetus to the science.

Practical.—The term g. is a wide one, embracing as it does not only study of the actual rocks constituting the earth's crust, but also the evolution of its surface features, the building up and destruction of continents, and the tracing of the changes in the evolution of plants, animals, and human races which have peopled the earth. This latter branch of g. can only be pursued by a study of the fossils found embedded in the various rocks and deposits. Since the introduction of life on the earth, each succeeding period in the earth's history is marked by some peculiar type of animal or vegetable life, and it is by the fossil remains of these characteristic types that geologists are able to determine to what particular period belong the rocks in which they are found.

G. calls to its aid almost all other branches of science: astronomy teaches something of the appearance and nature of the other planets, the telescope reveals nebulæ in various stages of condensation; and the spectroscope shows the exact composition of the heavenly bodies. Physics reveals data relating to the condition of matter and energy. The researches of the chemical laboratory simplify the complicated compositions of many rocks, while bot. and zool. enable fossil remains to be classified accurately. Much is, of course, to be learned from the actual arrangement of the rocks themselves, the oldest rocks being found at the greatest depth. In some cases, however, the arrangements are very complex, as, for instance, when the remains of an ancient marine bed are found covered

by a lake, overlying which again are proofs of another sea, on the floor of which lie volcanic ashes, thus indicating that the original sea, having receded, had its place taken by a lake, only in turn to give way to a return of the sea at some subsequent period, followed by volcanic activity, the whole series being again left high and dry embedded in rock and undisturbed for countless ages, until laid bare by the geologist who reads the riddle of their changes.

All rocks are either *sedimentary* or *igneous*—that is, arranged by mechanical or other processes, or due to the action of heat. Indeed, water and fire have played the principal parts in the earth's history. Water wears away existing rocks both chemically and mechanically, and in the form of rivers carries the débris long distances, finally depositing it on the floor of the ocean. Here these sediments form stratified deposits, which eventually solidify and become petrified by the pressure of the water above. Subsequent deposits form above, and thus a stratum is formed which is sometimes many thousands of feet thick. Disturbances in the earth's crust, due to earthquakes, shrinkage, etc., have caused strange changes among these strata, which are so contorted, tilted, dislocated, fractured, and changed that their original arrangements in most cases is entirely altered.

To fire and heat are due the formation of igneous rocks, which are an important factor in the formation of the earth's crust, though less numerous than sedimentary rocks. Volcanoes poured forth ashes and lavas, which formed beds of rock, while extreme pressure exerted on existing rocks would cause heat so intense as to render their matter molten, only to solidify again, perhaps, when they cooled. Some of these rocks, whilst in a molten state, would be forced, by enormous pressure, into existing and differently constituted rocks above, and thus we find intrusive masses, like the granites and gabbros, appearing among rocks of other kinds. The granites are regarded as the most important and widely distributed of all the igneous rocks, and are generally looked upon as rocks of fundamental importance in the construction of the earth's crust. (For a more detailed account of the structure, etc., of other rocks, see separate articles thereon.)

Classification of Rocks.—The different rocks are arranged in groups, commencing with the newest as being at the top, while the oldest are at the bottom of the table. Each group is subdivided into formations, and again into subdivisions, and in many cases minor subdivisions again. It is a peculiar fact that subdivisions, and even the minor subdivisions, are characterised and generally identified by their distinct fossil remains. The preceding table gives the chief groups of rocks recognised at the present time, together with their various divisions, the newest being at the top, the oldest at the bottom.

Period.	Groups.	Remarks.
Post-Tertiary or Quaternary.	Recent Post-Glacial or Human	Historic. Pre-historic. Neolithic. Palæolithic.
	Pleistocene or Glacial	Valley gravels. Boulder clays.
Kainozoic or Tertiary.	Pliocene	Newer. Older.
	Miocene	Subdivided into 5 groups: Pontian, Sarmatian, Tortonian, Helvetian, and Laughian.
	Oligocene	Subdivided into 3 groups: Aquitarian, Stampian, and Tongrian.
	Eocene	Barton sands and London clays.
Mesozoic or Secondary.	Cretaceous	Upper and Lower.
	Oolitic	Purbeck beds and Oxford clays.
	Liassic.	
	Triassic	Subdivided into 4 groups: Rhætic, Keuper, Muschelkalk, and Bunter.
Palæozoic or Primary.	Permian.	
	Carboniferous	Coal measures.
	Devonian	Upper, Middle, and Lower.
	Old Red Sandstone	Red sandstones and Caithness stones.
	Silurian	Upper and Lower.
	Cambrian	Upper, Middle, and Lower.
Archæan, Laurentian, or Eozoic	Pre-Cambrian. Oldest of all rocks, and consisting of fundamental gneiss.	

The origin of the earth is hidden in mystery, but the geologist commences his studies from the time of the nebula which, it is supposed, condensed down and ultimately formed the solar system. The oldest rocks have been observed by Logan in Canada, and to these he gave the name of the *Laurentians*. Similar strata to these were found existing in Scotland by Murchison and Geikie, but so altered have they been by heat and other forces that they are completely changed from their original state. Very few fossil remains indeed are found here, and this remark applies also to the *Cambrian Group*; what few there are are mostly crustaceans or zoophytes, while the rocks are mainly shales or slates. On the other hand, the next series in order of ascension (the *Silurian*) teems with fossils of marine deposits in some districts, but is quite barren in others. The *Old Red Sandstone* gives us numerous fish remains, and it is this series which points to the first dry land of the globe, by the fact that a few land plants and air-breathing animals are here found in the upper divisions.

The *Carboniferous strata* are the remains of land plants and trees, whilst a few fish remains of great size are also found. The *Permian strata* consist, for the most part, of sandstones, marls, and magnesian limestones, while their fossil remains are practically the same as those of the Carboniferous, though there are traces here of a few reptiles. With the Permians the group of rocks known as the *Primaries* terminate, and it is evident from a study of the structure of the rocks immediately following that a great disturbance took place between this and the following series; and not only so, but a change took place in the animal and vegetable life of the globe.

The oldest rocks of the *Secondary Epoch* are the *Triassic Group*, which in Britain consist chiefly of sandstones and marls, containing remains of marine organisms, plant life, and footprints, and remains of some reptiles. The *Lias* consists chiefly of clays, argillaceous limestones, and sandstones, containing fossils of insect life, plants and brachiopods and cephalopods. The *Oolites* are alternate beds of limestones and clays, and here appear mammalia fossil remains for the first time. The *Cretaceous* series are mainly immense thicknesses of chalk, as the name implies, and life was prolific, for the chalk itself is largely composed of shells of foraminifera and mollusca. Shells, fish, plants, and land and sea reptile remains are numerous.

The next series is the *Eocene*, belonging to the *Tertiary Group*, where again a striking change is found between the two periods. The fossils now begin to assume an appearance more resembling those of recent species. During, or about, the time of the *Oligocene* commenced the formation of the present-day continents, while no representatives of the *Miocene* period are to be found in Britain. Here are found molluscan remains, and also those of many mammalia. The *Pliocene Group* consists of marls, sands, and gravels, and contains a large number of present-day types of fossil remains. During the *Pleistocene Epoch* almost all the forms now alive are found, but as yet man had not made his appearance. The strata consist chiefly of sands and gravels of glacial origin. The *Recent strata* contain fossil remains of plants and animals of present-day types, and commences the Human period.

Geikie, *Text-Book of G.* (1903), *Class-Book of G.* (1907); Lyell, *The Students' Elements of G.* (1896); T. G. Bonney, *The Structure of the Earth* (Jack, 1912).

GEOMETRY is supposed to have had its origin in land-surveying. Some methods of surveying must have been practised in very early times, but ancient tradition said g. originated in Egypt, where, according to Herodotus, the periodical inundations of the Nile, by altering the course of the river and destroying landmarks in the valley, rendered a fairly accurate system of surveying necessary; hence the study of the subject by the priests. The Egyptians were familiar with the fact that a triangle with sides in the ratio 3 : 4 : 5 was right-angled, and used this in setting out an E. and W. line from a N. and S. line. Various mensuration formulæ were also known; the Rhind papyrus, from which most of our knowledge of Egyptian g. has come, gives, among other things, the formula $(d-\frac{1}{9}d)^2$ for the area of a circle of diameter d, which is equivalent to using the value 3·1604 for π.

Greek g. differed from the Egyptian g., of which we have knowledge, in that it was from the commencement a deductive science; the specimens of Egyptian g. only deal with particular numerical problems, not with general theorems. The foundations of the science were laid by the members of the Ionian and Pythagorean schools of philosophy, who discovered many well-known theorems subsequently included in Euclid's *Elements*. Thus Thales probably proved the angles at the base of an isosceles triangle are equal, that a triangle is determined by its base and base-angles, that the sides of similar triangles are proportionals, etc. Pythagoras proved the properties of right-angled triangles, different proofs of which are given in Euc. I. 47 and 48, besides numerous other theorems. The scholars of the Athenian school developed the science of g. very considerably. Hippocrates of Chios wrote the first elementary text-book of g., and on this Euclid's *Elements of G.* was probably founded. Most of the theorems in Book V. of Euclid were discovered by Eudoxus, a member of the Athenian school, and his proofs were much the same as those of Euclid. Euclid (*c.* 330–275 B.C.) is famous for his text-book of g., which has been the standard text-book for 2000 years, though parts of it are now superseded. Archimedes and Apollonius of Perga, two other members of the Alexandrian school, added considerably to the knowledge of g., especially of conic sections. From I. cent. B.C. to the Renaissance, g. made comparatively little progress, but the invention of analytical geometry by Descartes, in 1637, opened up vast new fields. The use of points and lines at infinity, which are not considered in Euclidean g., gave rise to modern projective g. In the last 300 years the science has developed on more and more specialised lines.

Geometry may be divided into several sections, not independent, but the division is convenient.

I. EUCLIDEAN G. deals with the metrical properties of space.

II. PROJECTIVE G. is similar to (1), but has wider scope, due to use of principle of geometrical continuity, *i.e.* points and lines at infinity are utilised.

III. ANALYTICAL G. applies the methods of analysis to the study of both plane and solid g.

IV. DESCRIPTIVE G. deals with the representation of solids by plane figures.

I. Euclidean g. starts with various definitions, postulates, and axioms, from which proofs of the theorems considered are developed in a systematic manner. All modern text-books are primarily based on Euclid's *Elements*. This was divided into 13 books. Of these, Books I. to IV. and Book VI. deal with plane g.; Book V. deals with proportion, and Books XI. and XII. with solid g.; Book XIII. contains theorems both on plane and solid g. The other books deal with the theory of numbers.

DEFINITIONS.—A *point* has position, but no magnitude; a *line* has length, but no breadth. A *surface* has length and breadth, but no thickness; and a *solid* has length, breadth, and thickness. From these ideas are derived the definitions of all other terms used. Euclid assumed the following POSTULATES: (1) That a straight line may be drawn between any two points; (2) that a finite line may be produced to any length; and (3) that a circle may be described with any point as centre and radius of any length. AXIOMS.—(1) Things equal to the same thing are equal to one another; (2, 3) if equals be {added to / taken from} equals the {wholes / remainders} are equal; (4, 5) if equals be {added to / taken from} unequals the {wholes / remainders} are unequal; (6, 7) things which are {double / halves} of the same thing or of equal things, are equal to one another; (9) the whole is greater than its part. The above are *general* axioms. The rest are purely *geometrical*. (8) Magnitudes which can be made to coincide with one another are equal; (10) two straight lines cannot enclose a space; (11) all right angles are equal; (12) if two straight lines are met by a third so as to make the interior angles on one side of it together less than two right angles, these two straight lines will meet, if produced, on the side of the third line where the angles are together less than two right angles.

It should be noted that the last 'axiom,' which is certainly neither simple nor self-evident, was placed by Euclid among the postulates. It does not admit of proof, though its converse can be proved easily. Many substitutes have been proposed. Probably the best of these is *Playfair's axiom*: Two intersecting straight lines cannot both be parallel to a third straight line.

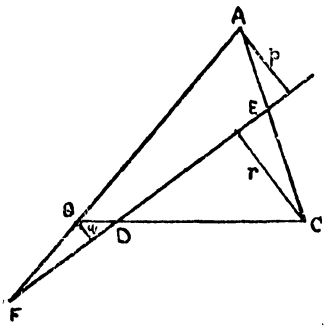
Important theorems of the first book are those relating to the equality of triangles (Props. 4, 8, 26). In these it is proved that if two triangles have (i) two sides and the included angle (ii) three sides, (iii) one side and two angles of the one equal to those of the other, then the triangles are equal in all respects. The first of these is proved by the 'method of superposition,' use being made of axiom 8. The second is also proved by the same method. The last is obtained by the method known as 'reductio ad absurdum.' A supposition is made, and arguing from the construction made on this supposition, a result is finally reached which is contrary to known facts. Hence the supposition must have been wrong, and in this way, by exhausting the possible assumptions which may be made, the truth of the original theorem may be deduced. In Props. 9, 10, 11, 12 constructions are given for bisecting an angle and a straight line, also for drawing a perpendicular to a given straight line from a point either in or outside the line. Important theorems relative to triangles are: The three angles of every triangle are together equal to two right angles (Prop. 32); and, in a right-angled triangle, the square described on the hypotenuse is equal to the sum of the squares on the other two sides. Props. 35 to 42 deal with the areas of parallelograms and triangles between the same two parallel lines. Book II. deals with the areas of rectangles and squares, and is more conveniently dealt with by analytical methods. Props. 12 and 13 are important and may be thus stated: If a, b, c are the lengths of the sides of a triangle ABC, having an obtuse angle at A, and d is the distance from A to the foot of the perpendicular from B on the side CA, then $a^2=b^2+c^2+2bd$ . . . (Prop. 12); also if the triangle is acute-angled at A, then $a^2=b^2+c^2-2bd$ . . . (Prop. 13).

Book III. deals with the properties of circles. The most important theorems are the following: *Prop. 20.* The angle at the centre of a circle is double of an angle at the circumference standing on the same arc. *Prop. 21.* Angles in the same segment of a circle are equal. *Prop. 31.* The angle in a semicircle is a right angle. *Prop. 32.* The angles made by a tangent to a circle with a chord drawn from the point of contact

are respectively equal to the angles in the alternate segments of the circle. *Prop. 35.* If two chords of a circle cut one another, the rectangle contained by the segments of one equals that contained by the segments of the other. *Prop. 37.* If from a point outside a circle a tangent and a secant be drawn, then the rectangle contained by the whole secant and the part of it outside the circle is equal to the square on the tangent. Book IV. consists entirely of problems dealing with triangles, squares, and polygons, and the circles through their angular points or touching their sides. Book VI. deals with proportion as applied to lines and areas of figures. Important theorems are: If the interior or exterior vertical angle of a triangle be bisected by a straight line which also cuts the base, the base is divided internally or externally into segments which have the same ratio as the sides of the triangle (Props. 3 and 3A). If two triangles are equiangular to one another, their corresponding sides are proportional (Prop. 4). Books XI. and XII. treat of solid geometry, and the 5 regular solids are discussed in the last 6 props. of Book XIII.

II. **Modern Plane Geometry.**—The convention of signs adopted in trigonometry and analytical geometry is also used here. Thus, if ABC are three points in a straight line (hereafter called simply a line), then, in whatever order the points occur in the line, we have $AB+BC=AC$ or $BC=AC-AB$. A number of collinear points are said to form a *range*.

(1) If ABCD be a range of four points, then $AB.CD+BC.AD+CA.BD=0$. For we have $AB(AD-AC)+(AC-AB)AD-AC.(AD-AB)=0$. As regards areas, these are to be reckoned positive or negative according as the figure is to the left or right as the contour is traversed. (2) *Menelaus' theorem.*—If D, E, F are points on the sides of a triangle ABC opposite to the vertices A, B, C respectively, then the necessary and sufficient condition that D, E, F should be collinear is $AF.BD.CE=AE.CD.BF$, these lines all having their appropriate signs, positive or negative according as the triangle is to the left or right as the line is traversed.



Let p, q, r be the perpendiculars from A, B, C on the line DEF, and let these be positive or negative according as they are on one or the other side of DEF.

Then $\frac{AF}{BF}=\frac{p}{q}$, $\frac{BD}{CD}=\frac{q}{r}$, $\frac{CE}{AE}=\frac{r}{p}$.

Hence $\frac{AF.BD.CE}{BF.CD.AE}=1$ and the theorem follows, since it is easy to show that if the above equation holds, then D, E, F are collinear.

(3) *Ceva's theorem*, that if AD, BE, CF are concurrent, then $AF.BD.CE=-AE.CD.BF$, is proved in a similar manner. For if the lines intersect in the point P, it is easy to show that $\frac{AF}{BF}=\frac{\Delta APC}{\Delta BPC}$, $\frac{BD}{CD}=\frac{\Delta BPA}{\Delta CPA}$, $\frac{CE}{AE}=\frac{\Delta CPB}{\Delta APB}$. Hence $\frac{AF.BD.CE}{AE.CD.BF}=\frac{\Delta APC}{\Delta CPA}\cdot\frac{\Delta BPA}{\Delta APB}\cdot\frac{\Delta CPB}{\Delta BPC}=(-1)(-1)(-1)=-1$, and the result follows.

(4) If D, E, F be three points on the sides of a triangle ABC opposite to A, B, C respectively, then $\frac{AF.BD.CE}{AE.CD.BF}=\frac{\sin ACF.\sin BAD.\sin CBE}{\sin ABE.\sin CAD.\sin BCF}$.

For $\frac{BD}{CD}=\frac{\Delta BAD}{\Delta CAD}=\frac{\frac{1}{2}AB.AD.\sin BAD}{\frac{1}{2}AC.AD.\sin CAD}=\frac{AB}{AC}\cdot\frac{\sin BAD}{\sin CAD}$,

with similar results for $\frac{AF}{BF}$ and $\frac{CE}{AE}$. The required result follows on multiplication. It follows at once from Ceva's theorem that if AD, BE, CF are concurrent in P, then $\frac{\sin ABP.\sin BCP.\sin CAP}{\sin BAP.\sin CBP.\sin ACP}=-1$.

(5) Two lines AD, AD′ through the vertex A of a triangle are called *isogonal conjugates* if $\angle BAD=\angle D'AC$. If AD, BE, CF be three concurrent lines through the vertices of a triangle ABC, then will also their isogonal conjugates AD′, BE′, CF′ be concurrent.

For $\frac{\sin BAD}{\sin CAD}=\frac{\sin CAD'}{\sin BAD'}$, $\frac{\sin CBE}{\sin ABE}=\frac{\sin ABE'}{\sin CBE'}$, $\frac{\sin ACF}{\sin BCF}=\frac{\sin BCF'}{\sin ACF'}$.

Hence, since the product of the three left-hand members of the above equations is equal to -1, that of the right-hand members is also, and AD′, BE′, CF′ are therefore concurrent.

PROJECTION.—If V be a fixed point and A any other point, and the line VA meet a given plane π in A′, A′ is called the projection of A on the plane π by means of the vertex V. The projection of a straight line on a plane π is necessarily another straight line, for it is simply the intersection of the plane containing V and the line with the plane π. If the plane through V and the line be parallel to the plane π, then the line will be projected to infinity on the π plane and is called the '*line at infinity*' in that plane. If we are projecting points and lines in a plane p from a vertex V on to the plane π, and if AB be the intersection of a plane through V parallel to π with the plane p, then obviously AB will project to infinity on the plane π, and is hence called the *vanishing line* on the plane p. Now, if E and F be two points in the vanishing line AB, it is easy to see that any angle EDF in the p plane will project into an angle of magnitude EVF in the π plane. Hence we may show that by a proper choice of vertex and of the plane of projection, any given line in the plane p may be projected to infinity, while at the same time any two given angles are projected into angles of given magnitude. Thus any triangle can be projected into an equilateral one, and any quadrilateral into a square.

Again, since a tangent to any curve is the line through two coincident points on the curve, such a line will project into the tangent to the curve which is the projection of the first curve. Any conic can be projected into a circle having the projection of any given point for centre. For, if O is the point whose projection is to be the centre of the projected curve, let P be any point on the polar of O, and let OQ be the polar of P, so that OP, OQ are conjugate lines. Take OP′, OQ′ another pair of conjugate lines. Then, if we project the polar of O to infinity and at the same time the angles POQ, P′OQ′ into right angles, we then have a conic whose centre is the projection of O, and since two pairs of conjugate diameters are at right angles, the conic is a circle.

CROSS-RATIOS.—If A, B, C, D be a range of four points, the ratio $\frac{AB.CD}{AD.BC}$ is called the *anharmonic* or *cross-ratio* of the four points, and is denoted symbolically by (ABCD). The range is said to be a *harmonic* one if $(ABCD)=-1$. A number of lines in a plane meeting in a point V form a *pencil*, each line being a *ray*. Any line in the plane of the pencil cutting the rays is called a *transversal*. The cross-ratio of the pencil is conveniently represented by V (ABCD), and can be shown to be the same as that of *any* transversal. Hence cross-ratios are unaltered by projection. Two ranges or pencils are said to be *homographic* when every four constituents of the one, and the four corresponding constituents of the other, have equal cross ratios, and any two homographic pencils are mutually projective.

The methods of projection are extremely useful in higher geometry, for, by suitable projection, pro-

perties of circles or conic sections which admit of easy proof may be made to give proofs of theorems relating to other conic sections.

The following are examples :—

(i) Given three concentric circles, any tangent to one is cut by the other two in four points whose cross-ratio is constant.	Given three conics all touching each other in the same two points, any tangent to one is cut by the other two in four points whose cross-ratio is constant.
(ii) The tangent to a circle is at right angles to the radius.	Any chord of a conic is cut harmonically by any tangent, and by the line joining the point of contact of that tangent to the pole of the given chord.

For the chord of the conic is the projection of the line at infinity in the plane of the circle; the points where the chord meets the conic are the projections of the imaginary points at infinity on the circle, and the pole of the chord is the projection of the centre of the circle.

(iii) If from any point on a conic two lines at right angles to each other be drawn, the chord joining their extremities passes through a fixed point.	If a harmonic pencil be drawn through any point on a conic, two legs of which are fixed, the chord joining the extremities of the other legs will pass through a fixed point.

(iv) *Pascal's theorem*, that the three intersections of the opposite sides of any hexagon ABCDEF inscribed in a conic section are in one straight line, only needs proving for the case of a circle, and may be made still simpler by supposing the line joining the intersection of AB, DE, to that of BC, EF, to pass to infinity, when we have only to show that if a hexagon inscribed in a circle has AB, DE parallel and also BC, EF parallel, then CD is parallel to AF.

RECIPROCATION.—If we have any figure consisting of any number of points and straight lines in a plane, and we take the *polars* of those points and the *poles* of the lines with respect to some fixed conic C, we obtain another figure called the *polar reciprocal* of the former with respect to the conic C. When a point in one figure and a line in the reciprocal figure are respectively pole and polar with respect to the conic C, they are said to *correspond* to one another.

It is easily seen that (i) the line joining two points in one figure corresponds to the point of intersection of the corresponding lines in the other figure. (ii) The tangent to any curve in one figure corresponds to a point on the corresponding curve in the other. (iii) If two curves touch, the reciprocal curves have two common tangents and must therefore also touch. (iv) The pole of any line through the centre of the auxiliary conic being at infinity, it follows that the points at infinity on the reciprocal curve correspond to the tangents to the original curve from the centre of the auxiliary conic. Hence the reciprocal of a conic is an hyperbola, parabola, or ellipse, according as the tangents to it from the centre of the auxiliary conic are real, coincident, or imaginary, *i.e.* as the centre of the auxiliary conic is outside, upon, or within the curve.

The following are examples of reciprocal theorems :—

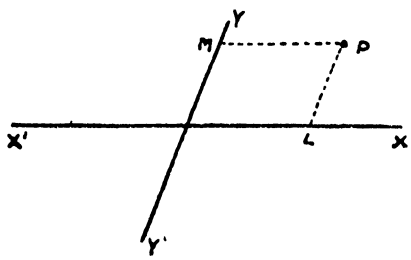
(i) The three intersections of opposite sides of a hexagon inscribed in a conic lie on a straight line (Pascal's theorem).	The three lines joining opposite angular points of a hexagon described about a conic meet in a point (Brianchon's theorem).
(ii) Given four points on a conic, the locus of the pole of a fixed straight line is a conic section.	Given four tangents to a conic, the envelope of the polar of a fixed point is a conic section.

It is usual to take for the auxiliary conic a circle, and then it is possible to reciprocate not only theorems of position, but also theorems involving the magnitude of lines and angles.

INVOLUTION.—If O be a point on a line on which pairs of points A, A′; B, B′; C, C′; etc., lie such that $OA \cdot OA' = OB \cdot OB' = OC \cdot OC' = \ldots = k$, the pairs of points are said to be in involution. Any two associated points P, P′ are called *conjugates*, and the point O is the *centre* of involution. A range of points in involution projects into another range in involution and reciprocates into an involution pencil. The following theorem is easily proved: Any transversal cuts the pairs of opposite sides of a quadrangle in pairs of points which are in involution. On reciprocation this gives: The lines joining any point to the pairs of opposite vertices of a complete quadrilateral form a pencil in involution. [*Note.*—A system of four points connected by six lines is a *quadrangle*; a system of four lines intersecting in six points, a *quadrilateral.*]

INVERSION.—If O is the centre of a circle, P and P′ are inverse points if they lie on the same radius and $OP \cdot OP' =$ the square of the radius. If P describes a curve, P′ describes the inverse curve. More generally, if P moves in space, P′ will move correspondingly, and we get inversion with respect to the sphere whose centre is at O. The inverse of a circle with respect to a point in its plane is a straight line if the point is on the circle, a circle otherwise. Various interesting theorems result from the use of the principles of inversion; *e.g.* it can be shown that the nine-points circle of a triangle touches the inscribed and the three escribed circles (Feuerbach's theorem).

III. **Analytical Geometry.**—If two intersecting *axes* in a plane be considered, the position of any point in the plane is determined when its distances from these axes along lines parallel to them are known.



The lengths MP, LP or OL, OM are called the *co-ordinates* of the point P. O is called the origin, and, as in trigonometry, distances measured parallel to OY′ and below X′OX, also parallel to OX′ and to the left of YOY′ are considered as negative. OL is the *abscissa* of P, OM the *ordinate*. Hence we develop a system in which lines are represented by equations, those of the first degree representing straight lines, those of the second some conic section, and those of higher degree curves of corresponding degree (See CURVE). Usually the axes OX, OY are at right angles, when we have rectangular co-ordinates, with equations usually simpler than for oblique axes. The analytical g. of solids is based on the fact that the position of a point in space is fixed by reference to three mutually intersecting planes. A brief discussion of the results of analytical g. is impossible, but it should be noted that by its means problems may be solved that otherwise could never be successfully dealt with.

In *Line Geometry* the line replaces the point as element.

IV. **Descriptive Geometry** utilises the methods of orthographic projection on two planes at right angles to each other—is much used in building, engineering, etc., to give graphical representations of proposed constructions.

V. For discussion of axioms on which g. is based, see *Principles of Mathematics*, Bertrand Russell.

Geometrical Continuity.—In Euclidean geometry all points, lines, etc., dealt with are real and finite.

In modern geometry we use the principle of geometrical continuity whereby we pass from real and finite to imaginary points and lines and to infinities. We assume theorems true when these ideas are introduced, and greatly extend their application.

TEXT-BOOKS: Elementary: *School Geometry*, Hall and Stevens; *A New Geometry*, Barnard and Child. Advanced: *Modern Plane Geometry*, Richardson & Ramsey; *Pure Geometry*, Askwith. *Geometrical Conics*, C. Smith. ANALYTICAL GEOMETRY: *Conic Sections* by Salmon, C. Smith, Loney; *Higher Plane Curves*, Salmon; *Analytical Geometry of Three Dimensions*, Salmon; *Solid Geometry*, C. Smith. LINE GEOMETRY: *Treatise on the Line Complex*, C. M. Jessop; *Geometrie der Berührungstransformationen*, Lie.

GEOMYS, see POCKET GOPHERS.

GEONEMERTES, see under NEMERTINE WORMS.

GEOPHILUS, a genus of Centipedes. See MYRIAPODA.

GEORGE I. (1660–1727), Elector of Hanover and king of Britain; succ. to Brit. throne, 1714, as grandson of Elizabeth, dau. of James I., on whom (and her heirs) the succession was fixed by *Act of Settlement*, 1701. With his accession began predominance of Parliament in Brit. constitution. Intensely Ger. in sentiment, he regarded England as a means for the aggrandisement of Hanover and a fruitful soil for his Hanoverian friends. His reign was marked by gross corruption and venality in public and private life; m. Sophia Dorothea of Brunswick-Celle (1682), but divorced her on charge of unfaithfulness (1694).

Morris's *Early Hanoverians* (London, 1899); Justin M'Carthy's *The Four Georges*; Carlyle's *Four Georges*.

GEORGE II. (1683–1760) succ. to Brit. throne, 1727; m. Caroline of Brandenburg-Anspach, who kept Walpole in power, despite G.'s aversion to him. Walpole ruled country till 1742, aiming rather at good administration than brilliant legislation; sluggish conduct of Span. War occasioned his downfall. War of Austrian Succession (1740–48) and Jacobite rebellion (1745–46) occurred in this reign, which also saw beginnings of Methodist movement. G. was thoroughly Ger. in habits, vain and consequential, but prudent and business-like.

Horace Walpole's *Memoirs . . . George II.*; Ward's *Great Britain and Hanover* (London, 1899); M'Carthy's and Carlisle's *Four Georges*.

GEORGE III. (1738–1820), king of Great Britain and Ireland; succ. 1760; m. Sophia Charlotte of Mecklenburg-Strelitz, 1761. His accession interrupted continuity of politics of time. His chief adviser was Earl of Bute, who was inexperienced in politics. From first G. resolved to destroy Whig oligarchy. By bribery and corruption he constructed a party for himself, 'King's Friends.' Bute and G. thwarted Pitt's war-policy. Pitt resigned (1761). Bute's unpopular ministry (1762–63) was followed by Grenville-Bedford ministry (1763–65), famous for Wilkes's prosecution and Stamp Act. Official Whigs succeeded under Rockingham and repealed Stamp Act, but were overthrown (1766) by 'King's Friends.' Pitt-Grafton ministry followed, but Pitt's ill-health prevented achievement of his cherished schemes, and Grafton controlled Cabinet. Struggle with America was renewed. From 1770–82 North was First Lord of Treasury, and during this time G. ruled according to his own ideas. He persisted obstinately in Amer. War of Independence (1775–82), despite great difficulties. Second Rockingham administration (1782) conceded legislative independence to Ireland. Shelburne signed Peace of Versailles (1783), but his ministry soon fell before hostility of opposition. Fox formed a coalition with North, and forced on king a ministry nominally headed by Portland (1783). G., however, unconstitutionally secured rejection of Fox's India Bill; coalition resigned, and Pitt became Prime Minister.

In Nov. 1788 the king went mad. After his recovery, he united closely with Pitt. Both struggled against Fr. Revolution. France declared war (1793), which lasted with two short breaks till 1815. G. again became insane, 1801, after Pitt's resignation. Addington ministry succeeded (1801–4). Pitt died, 1806, and 'Ministry of all the Talents' (1806–7) resigned on the Catholic question. Tories were in power from 1807–30. Failure of his armies and death of Princess Amelia, Nov. 1810, caused G.'s madness to return permanently. Regency Bill (1811) made Prince of Wales practically king. G. died Jan. 29, 1820, blind, deaf, mad, having outlived his triumphs.

Horace Walpole's *Memoirs of the Reign of G. III.* (latest edit., London, 1894); M'Carthy's and Carlyle's *Four Georges*; B. Willson's *George III.* (London, 1907).

GEORGE IV. (1762–1830), king of Great Britain and Ireland; became prince-regent, 1811, owing to George III.'s insanity; succ. as king, 1820. He kept Tories in office; m. Caroline of Brunswick-Wolfenbüttel, 1795, but soon separated from her; her trial, 1820, increased G.'s unpopularity. Soon afterwards he withdrew from public observation, becoming a peevish recluse. Ministers were unpopular between 1820–22, cf. Cato Street conspiracy (1820). Liberal Tories joined ministry, 1822. G. had to receive Canning as Foreign Sec. and Leader of House of Commons. Canning freed Britain from Holy Alliance; Peel, as Home Sec., reformed Criminal Law. Huskisson, Pres. of Board of Trade, effected reforms which prepared way for Free Trade. Canning's ministry (1827) was followed by Goderich's failure, and Wellington-Peel ministry (1828–30) was marked by question of Catholic Emancipation. G. was a selfish voluptuary, vacillating and unprincipled.

L. Melville's *First Gentleman of Europe* (London, 1906); and M'Carthy's and Carlyle's *Four Georges*.

GEORGE V. (1865–), by the Grace of God, of the United Kingdom of Great Britain and Ireland and of the Brit. Dominions beyond the Seas, King, Defender of the Faith, Emperor of India; George Frederick Ernest Albert, second son of Edward VII.; b. Marlborough House, June 3. On death of his elder bro. Duke of Clarence, he became heir-apparent, 1892; entered navy as cadet, 1877; served on *Britannia* training-ship 2 years; then went 3 years' trip round world on *Bacchante*; midshipman on *Canada*, 1883; lieutenant, 1885; commander of gunboat *Thrush*, 1890. As Duke of York he entered House of Lords, 1893, and on July 6, 1893, he married Princess Victoria Mary of Teck (now QUEEN MARY); their children are: (1) EDWARD ALBERT (now Prince of Wales), b. June 23, 1894; (2) ALBERT FREDERICK, b. Dec. 14, 1895; (3) VICTORIA ALEXANDRA ('Princess Mary'), b. April 25, 1897; (4) HENRY WILLIAM, b. March 31, 1900; (5) GEORGE EDWARD, b. Dec. 20, 1902; (6) JOHN CHARLES, b. July 12, 1905. In 1901 the Duke of York, now rear-admiral, became Duke of Cornwall (on his father's accession); set out (March 16) on the *Ophir* to make a colonial tour and open the first Commonwealth Parliament; created Prince of Wales (Nov. 9); in 1905–6 he visited India. On May 6, 1910, King George ascended the throne; Coronation, June 22, 1911. On Dec. 12, 1911, His Majesty was proclaimed Emperor of India in person at Delhi Durbar, during what constituted the first visit of a Brit. monarch to his overseas dominions.

Knight's *With the Royal Tour* (London, 1902); Abbott's *Through India with the Prince* (London, 1906).

GEORGE I. (1845–1913), king of Greece; s. of Christian IX. (Denmark); elected in succession to Otho I., 1863; m. Grand Duchess Olga; five sons, one dau.; assassinated, 1913. See GREECE.

GEORGE V. (1819–78), king of Hanover; became blind; succ. his f., 1851; deposed, 1866, when Prussia absorbed Hanover.

GEORGE (1832–1904), king of Saxony; s. of King John; succ. his bro., King Albert (1902); distinguished for military abilities.

GEORGE, HENRY (1839–97), Amer. political economist; b. Philadelphia, Pennsylvania, U.S.A.; pub. *Progress and Poverty* (1879), *Protection or Free*

Trade (1886), *Political Economy* (1898), etc.; advocate of the 'Single Tax' on land.

GEORGE JUNIOR REPUBLIC, an institution, founded (1895) at Freeville (New York), by W. R. George, for the reclaiming of youths and girls of the slums. Both sexes are compelled to work at useful employments.

GEORGE, LAKE (43° 40′ N., 73° 32′ W.), lake, E. part of New York State, U.S.A.; extends N.E. to S.W. for over 30 miles; discharges by narrow channel into Lake Champlain; enclosed by mountains, and contains hundreds of islands; favourite summer resort; scene of series of engagements in Fr. and Indian War, 1755–59.

GEORGE, ST., patron saint of England and Portugal; feast day, April 23. Historically, St. G. is a matter of some controversy; probably came from Asia Minor; lived in Nicodemia; arrested as a Christian under anti-Christian laws of Diocletian, confessed his faith, and was tortured, 303 A.D. The dragon usually associated with him is a later legendary embellishment. Canonised, 1222, and finally recognised as patron of England by Edward III. in 1349.

See Bulley's *St. George for Merry England* (London, 1908).

GEORGE, THE, see KNIGHTHOOD.

GEORGE THE CAPPADOCIAN (fl. 360 A.D.), abp. of Alexandria; notorious for tyranny; murdered by populace.

GEORGE THE SYNCELLUS (VIII. cent.), Byzantine historian; wrote a chroniole from early times to reign of Diocletian.

GEORGETOWN.—(1) (6° 46′ N., 58° 8′ W.) capital of Brit. Guiana, near mouth of Demerara, S. America; contains government buildings, Anglican and R.C. cathedrals, coll's, museum, botanical gardens; good harbour; several factories; exports sugar, coffee, timber. Pop. (1910) 53,000. (2) (38° 12′ N., 84° 32′ W.) city, Kentucky, U.S.A.; agricultural and stock-raising region; has large oil-refineries. Pop. 4533. (3) (33° 23′ N., 79° 16′ W.) seaport city, S. Carolina, U.S.A., on Winyah Bay; lumber manufactures. Pop. (1910) 5530. (4) (39° N., 77° 5′ W.) port of entry, forming part city of Washington, U.S.A., on Potomac; seat of G. Coll. (1842) and several other collegiate institutions; flour-mills. Pop. 15,000. (5) (30° 39′ N., 97° 40′ W.) town, Texas, U.S.A.; cotton manufactures. Pop. 3096.

GEORGIA (33° N., 83° W.), one of the most southerly of the United States; bounded by Tennessee and N. Carolina on N.; S. Carolina and Atlantic Ocean on E.; Florida on S.; and Alabama on W.; length, *c.* 320 miles; breadth, *c.* 250 miles; total area, *c.* 59,475 sq. miles, of which almost 500 are water. Capital is Atlanta, in N.W. interior. G. is divided, naturally, into five regions: the sea-islands—the home of the famous sea-island cotton—lying along the coast, with sand, marshes, and woods—oak, palmetto, magnolia, cedar, etc.; the mainland is low and level for some 60 miles inland—with a salt marsh, near the sea—rich in soil and semi-tropical vegetation; beyond are the pine-barrens, with great forests of pitch-pine, but with numerous swamps; then come the sand-hills and fertile tracts with forests and yielding fruit, cotton, Indian corn, oats, and other cereals; the country then becomes mountainous, with fertile valleys. In N. and W. lie the Appalachian Mts. (rising sometimes to *c.* 5000 ft.); principal rivers are the Chattahoochee (part of W. boundary), along with the Flint, constituting the Apalachicola (navigable *c.* 300 miles), which flows into the Gulf of Mexico; the Savannah and Altamaha (navigable *c.* 300 miles), flow into the Atlantic. Climate is mild and, except in lowlands and swamp regions in S., agreeable and healthy; mean temperature is 78° in summer and 47° in winter. Game is plentiful, and alligators are numerous in the rivers.

G., which is named after George II., was founded by James Oglethorpe (*c.* 1733) as a place of refuge for poor debtors and religious refugees, but failed in this object; it succeeded, however, in its aim of protecting N. and S. Carolina from the Spaniards and French. G. adopted the Constitution of U.S. in 1788. Before Civil War G. joined S. Confederacy; rejoined Union, 1868.

About 70 % of the country is farmland, largely worked by negroes. G. is the second largest producer of cotton in U.S.A.; it is also the greatest grower of sea-island cotton; cereals are cultivated in N. regions, the chief being corn and wheat; rice is grown near the coast; the cultivation of sugar-cane is increasing; tobacco is grown; much fruit—oranges, melons, grapes, pine-apples, peaches, and bananas—is grown, and, along with market vegetables, exported to the N.; large pine forests cover *c.* 42,000 sq. miles of land; and fisheries—belonging to the State—are of importance, especially oysters and shads. G. is rich in minerals, including gold, silver, coal, iron, and manganese ores; marble and other quarries are worked, and mineral springs occur.

Chief manufactures and industries are extensive cotton and woollen manufactures; iron and steel trades; lumber, timber-planing, flour and grist milling. Lumber and naval stores are shipped from Savannah, Darien, Brunswick, and St. Mary. Savannah (with a population of 65,064) is the chief port; other cities are Atlanta (154,839), Augusta (41,040), Macon (40,665), Columbus (20,554), Athens, and Brunswick. G. is divided into 146 counties; and is represented in Congress by two senators and eleven representatives. There are many schools and academies in G. and a Univ. of G. at Athens. In religion Baptists and Methodists predominate. The State Militia have their headquarters at Atlanta. Pop. (1910) 2,609,121.

Phillips, *Georgia* (Boston, 1907).

GEORGIA, large portion of Transcaucasia, with own language and literature; annexed Russia (1802). Pop. 400,000.

GEORGIAN BAY (45° 25′ N., 81° W.), N.E. portion of Lake Huron, separated from main body of lake by Manitoulin Island and Cabot's Head.

GEORGIOS MONACHOS, GEORGE THE MONK (IX. cent.). Byzantine writer; compiled a chronicle dating from the earliest times to his own period.

GEORGSWALDE (51° 1′ N., 14° 35′ E.), town, Bohemia, Austria; centre of linen industry. Pop. (1910) 8836.

GERA (50° 52′ N., 12° 5′ E.), town, Reuss (the Younger), Germany, on White Elster; textile industries. Pop. (1910) 49,283.

GERALDTON (28° 46′ S., 114° 36′ E.), seaport town, on Champion Bay, W. Australia; lead and copper mines.

GERANDO, MARIE JOSEPH DE, DEGÉRANDO (1772–1842), Fr. philosopher; b. Lyons; teacher at law school of Paris; opposed all doctrines of primary ideas; held that knowledge is the result of experience; reflection the source of our ideas of substance, unity, identity.

GERANIACEÆ, in bot., dicotyledonous natural order, mostly herbaceous, and hairy with entirely pentamerous flowers. The fruit is explosive, and often has a hygroscopic appendage. The commonest of the eleven genera are *Geranium*, *Erodium* (stork's-bill), and *Pelargonium*.

GERANIUM, largest genus of natural order *Geraniaceæ*, annual and perennial herbs found throughout the temperate regions. In Brit. Isles eleven species known as *crane's-bill* are found. The commonest is Herb Robert, *G. Robertianum* of the hedgerows. Leaves are palmately lobed, flowers regular, 5 sepals, 5 imbricating petals, 10 stamens, and a beaked ovary. Many handsome garden plants exist, but the commonest 'geraniums' are really pelargoniums.

GERARD (fl. XI. cent.), organiser of KNIGHTS OF ST. JOHN OF JERUSALEM. G. was the administrator of the Hospital of St. John at Jerusalem and was first Grand Master. See HOSPITALLERS.

GÉRARD, ÉTIENNE MAURICE, Count (1773–1852), distinguished Fr. soldier; Minister of War and a marshal of France after 1830.

GÉRARD, FRANÇOIS PASCAL, Baron (1770–1837), Fr. artist; famous for portraits and hist. subjects.

GÉRARD, JEAN ISIDORE (1803-47), Fr. caricaturist (pseudonym, *Grandville*); famous for political caricatures and book illustrations.

GERARD, JOHN (1545–1612), Eng. herbalist; keeper of the gardens of Lord Burghley in London, and at Theobalds (Herts); practised as barber-surgeon in London; author of well-known *Herball*, an early illustrated pharmacological work.

GÉRARDMER (48° 3′ N., 6° 53′ E.), town, summer resort, Vosges, France; textile weaving. Pop. 9000.

GERASA, modern Jerash (32° 17′ N., 35° 57′ E.), ancient city, Palestine; important place, II. and III. cent's.

GERBERT, see Silvester II.

GERBERT, MARTIN (1720-93), Ger. writer and theologian; prince-abbot of St. Blasien, 1764; wrote *Scriptores ecclesiastici de musica sacra.*

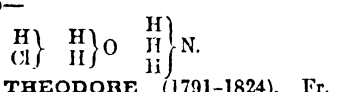
GERBILS, members of Mouse Family (*q.v.*).

GERENUK, see Gazelle.

GERGOVIA, modern Gergovie (*c.* 45° 40′ N., 3° 10′ E.), ancient town, Auvergne, France; besieged by Cæsar, 52 B.C.

GERHARD, JOHANN (1582–1637), Ger. Prot. theologian; prof. of Theology, Jena, 1616; wrote *Loci communes theologici, Meditationes sacræ.*

GERHARDT, CHARLES FRÉDÉRIC (1816–56), Fr. chemist; contributed to the molecular theory, and elucidated constitution of organic compounds by his 'types,' which were—



GÉRICAULT, THEODORE (1791–1824), Fr. artist; one of the early Romanticists, and famed for military and equine studies.

GERIZIM (31° 12′ N., 35° 16′ E.), hill, Samaria; alt., 2850 ft.; Joshua's Mountain of Blessing; Samarian chief temple.

GERMAN BRETHREN, German Baptist Brethren, an Amer. sect, found in Pennsylvania, Maryland, and other states; first established in Germany in 1708 by Andrew Mack and several of his disciples; owing to persecution, members fled to Netherlands, afterwards sailing to Pennsylvania; first Amer. congregation at Germantown, Penn., 1723. Sect has been much subdivided.

GERMAN CATHOLICS, religious denomination, seceded from Rome, 1844, led by Czerski and Ronge; subsequently banished from Austria, while they suffered from various restrictions in Saxony, Prussia, and Baden. About 1859 many united with 'Free Congregations,' others having already returned to Rome. G. C. are now found only in Saxony.

GERMAN EAST AFRICA (7° S., 35° E.), Ger. Protectorate bounded by Brit. East Africa and Victoria Nyanza on N., Belg. Congo, Lake Tanganyika, Rhodesia, Nyasaland, and Lake Nyasa on W., and Portug. East Africa on S.; coast-line about 600 miles; total area, 384,070 sq. miles; traversed by mountain ranges, many of which are densely forested; mount Kilimanjaro in N.E., 19,300 ft.; highest peak in S.W. about 9000 ft.; climate tropical; unhealthy on coast; healthier in highlands of interior; sleeping sickness prevalent in some districts owing to tsetse fly; many rivers, including Rovuma (southern boundary), Pangani, Ulanga, and Rufiji-Ruaha (all partly navigable); principal seaports, Dar-es-Salaam (capital), Bagamoyo, Tanga, Kilwa, Kisiwani, Mikindani, and Lindi; inland stations include Ujiji on Tanganyika, Bukoba on Victoria, and Kilimatindi; native tribes are mostly Bantu; Suahilis on the coast. Chief products—cattle, rice, cotton, agave, ground-nuts, rubber, coffee, maize, copra, sugar, tobacco, hemp, ivory; gold, coal, copper, garnets, salt also found; railways inland from Dar-es-Salaam and Tanga. E. African coast was taken by Portuguese, 1498; retaken by native tribes and Arabs, 1729; Deutsch-Ostafrikanische Gesellschaft (private company) acquired the country from native chiefs, 1884; boundaries settled by Anglo-Ger. agreement, 1890; native rebellion, 1905–6; colony administered by imperial governor. Pop. (1911) 10,000,000.

Brode, *Brit. and Ger. East Africa* (1911).

GERMAN EMPIRE, Germany, Deutsches Reich, Central European Federation comprising kingdoms of Prussia, Bavaria, Saxony, Württemberg; grand-duchies of Baden, Hesse, Mecklenburg-Schwerin, Oldenburg, Saxe-Weimar, Mecklenburg-Strelitz; duchies of Brunswick, Anhalt, Saxe-Meiningen, Saxe-Coburg-Gotha, Saxe-Altenburg; principalities of Reuss (younger line), Lippe, Schwarzburg-Rudolstadt, Schwartzburg-Sondershausen, Reuss (elder line), Waldeck, Schaumburg-Lippe; free Hansa towns of Hamburg, Bremen, Lübeck; and the 'Reichsland' (imperial territory) of Alsace-Lorraine; extreme length from N. to S., *c.* 600 miles; extreme breadth, E. to W., 750 miles; total area, 208,770 sq. miles (of which Prussia accounts for 134,629 sq. miles).

G. is bounded on N. by North Sea, Denmark, and, Baltic, W. by Holland, Belgium, France, S. by Switzerland, Austria, and E. by Russia. The coast-line, *c.* 1000 miles, is generally flat and has a few large indentations, viz. Gulf of Danzig, Pomeranian Bay, Lübeck Bay, Kiel Bay, Heligoland Bay, and the three vast lagoons, Stettiner Haff, Kurische Haff, Frische Haff. The largest islands in the Baltic are Rügen, Fehmarn, and Usedom; in North Sea are Frisian Islands (*q.v.*). The central and southern parts of Germany consist of large plateaus traversed by numerous Mountain Ranges; viz. Bavarian Alps (with Zugspitze, 9738 ft., highest peak in the Empire), in southern Bavaria; Bayrischer Wald (*c.* 4000 ft.), in east Bavaria, Fichtelgebirge in N.-eastern Bavaria, Schwarzwald (Black Forest, with Feldberg, 4898 ft.), in Baden; Vosges Mountains (with Sulzer Belchen, 4669 ft.), in Alsace-Lorraine; Thüringerwald (Thuringian Forest), over 3000 ft.; Riesengebirge (with Schneekoppe, 5266 ft.), on the borders of Silesia and Bohemia; Hartz Mountains (with Brocken, 3747 ft.), in province of Saxony; Erzgebirge, in kingdom of Saxony; Vogelsberg, *c.* 2536 ft., in Hesse; Taunus, Westerwald, Hunsrück, in Rheinland, etc.

The northern region of the Empire consists of an immense level plain known as the Great North Ger. Plain, with large stretches of moorland (Lüneburger Heide, Geest), and fertile tracts in Holstein, and northern parts of Oldenburg, Hanover, and East Frisia.

Principal Rivers are Vistula, Oder, Pregel, Memel, flowing into Baltic; Elbe, Weser, Ems, Rhine, flowing into North Sea; Danube, flowing into Black Sea; their chief tributaries are Main, Neckar, Lahn, Mosel, Lippe, Elster, Mulde, Saale, Warthe, Bartsch, Neisse, Isar, Inn, Iller, Lech, Regen, and Altmühl, many of which are navigable.

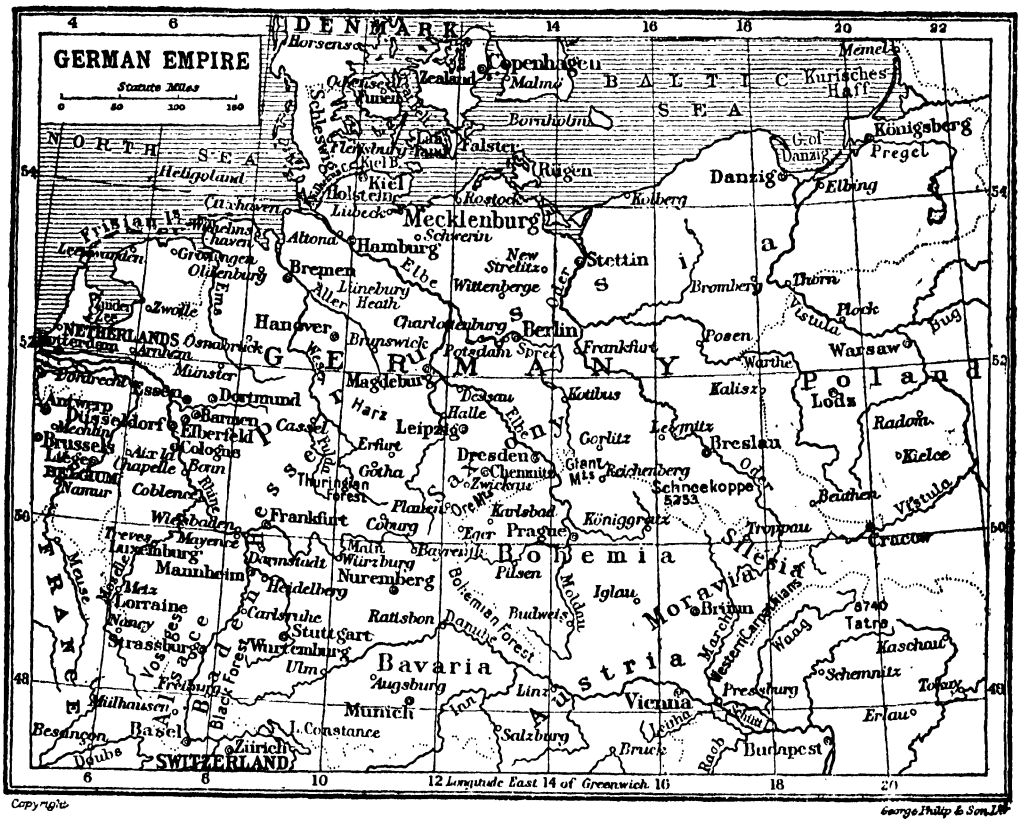
Lakes are found mainly in N. and S.; viz. Lake of Constance, Königsee, Starnbergersee, Ammersee, Tegernsee, Chiemsee, in S.; generally surrounded by mountains, and all famed for fine scenery. In the N. are Spirding and Mauersee (East Prussia), Plönersee (Holstein), Schwerinersee, Müritzsee, Plauensee (Mecklenburg). Germany has many important Canals, viz. Kaiser Wilhelm Canal (connecting North Sea and Baltic), Elbe-Trave Canal, Dortmund-Ems Canal, Ludwig's Canal (between Danube and Main), Finow and Müllros (connecting Oder and Havel-Elbe), Teltower Canal, etc.

Geology.—Almost all geological formations are represented in Germany. Rocks belonging to Archæan system (schist, gneiss, granite, etc.) occur in Silesia, Erzgebirge, Thüringerwald, Fichtelgebirge, Schwarzwald, Vosges, etc. Of the Palæozoic formations, Cambrian and Silurian occur in Vogtland, Fichtelgebirge, Thüringerwald, Eozgebirge, Silesia, etc.;

Devonian in Taunus, Hunsrück, Westerfeld, Eifel, Harz, Westphalia, etc.; Carboniferous regions are Aachen, Westphalia, Silesia, Nassau, etc. Jurassic rocks are found in central Germany, Lorraine, Alps, etc. Large area of Triassic beds in west and central Germany. Extensive Tertiary and Quaternary deposits, especially in N. Germany.

CLIMATE is generally healthy; warmest in northern Rhine districts and valleys of Main, Neckar, and Mosel; coldest on Baltic coast and in E.; average summer temperature is *c.* 60° to 62°; rain falls at all seasons; mean annual rainfall, *c.* 20 in.; greatest in west and Bavarian highlands.

FLORA includes over 2000 species of vascular plants; extensive forests (chiefly fir, pine, oak, beech, larch, chestnut); largest forest area in central and southern regions, *c.* 20 % is pasture land and 49 % under cultivation. FAUNA includes fox, boar, martin, weasel, otter, chamois, stag, elk, marmot, roe; few reptiles.


GERMAN EMPIRE
Statute Miles
DENMARK
NORTH SEA
BALTIC SEA
Copenhagen
Mecklenburg
Hamburg
Bremen
Hanover
Berlin
GERMANY
NETHERLANDS
Amsterdam
Rotterdam
Dortmund
Magdeburg
Leipzig
Dresden
Frankfurt
Cologne
Brussels
Antwerp
Liège
Coblenz
Mannheim
Nuremberg
Stuttgart
Munich
Augsburg
Bavaria
Lorraine
Strassburg
Metz
Nancy
Carlsruhe
Heidelberg
Würzburg
Ulm
Freiburg
Basel
Zürich
SWITZERLAND
Constance
Danube
Rhine
Bohemia
Prague
Pilsen
Budweis
Bohemian Forest
Austria
Vienna
Salzburg
Linz
Bruck
Budapest
Moravia
Silesia
Breslau
Poland
Warsaw
Lodz
Danzig
Königsberg
Memel
Stettin
Kolberg
Rügen
Kiel
Lübeck
Rostock
Schwerin
Hanover
Brunswick
Potsdam
Frankfurt
Posen
Bromberg
Thorn
Plock
Kalisz
Thuringian Forest
Harz
Elbe
Oder
Vistula
Weichsel
Cracow
Tatra
Kaschau
Pressburg
Schemnitz
Erlau
Trappau
Königgrätz
Giant Mts
Schneekoppe
5253
Riesengebirge
Carpathians
Western Carpathians
Black Forest
Vosges
Rhine
Danube
Main
Moldau
Inn
Drave
Raab
Waag
Neisse
Oder
Warthe
Netze
Vistula
Pregel
Elbing
Frisian Is.
Helgoland
Borkum
Juist
Norderney
Langeoog
Spiekeroog
Wangerooge
Sylt
Föhr
Amrum
Fehmarn
Rügen
Usedom
Zealand
Malmö
Bornholm
Gulf of Danzig
Kurisches Haff
Lüneburg Heath
Oldenburg
Osnabrück
Münster
Minden
Cassel
Erfurt
Gotha
Chemnitz
Zwickau
Görlitz
Leipzig
Halle
Dessau
Kothus
Lemberg
Radom
Kielce
Beuthen
Teschen
Olmütz
Iglau
Brünn
Znaim
Marchfeld
Eastern Carpathians
Lemberg
Jaroslau
Przemysl
Sanok
Tarnow
Krakau
Lublin
Chelm
Brest
Grodno
Suwalki
Tilsit
Insterburg
Allenstein
Marienwerder
Graudenz
Culm
Neustettin
Stargard
Pyritz
Angermünde
Frankfurt
Cottbus
Guben
Sorau
Glogau
Liegnitz
Jauer
Hirschberg
Glatz
Neisse
Ratisbon
Passau
Landshut
Munich
Augsburg
Ulm
Stuttgart
Würtemburg
Carlsruhe
Rastadt
Baden
Strassburg
Colmar
Mülhausen
Besançon
Basel
Zürich
Constance
Lake of Constance
Lake of Zürich
Lake of Wallenstadt
Lake of Lucerne
Lake of Thun
Lake of Brienz
Lake of Neuchâtel
Lake of Geneva
Lake of Zug
Lake of Lugano
Lake of Maggiore
Lake of Como
Lake of Garda
Lake of Iseo
Lake of Idro
Lake of Molveno
Lake of Caldonazzo
Lake of Levico
Lake of Toblino
Lake of Ledro
Lake of Tenno
Lake of Cavedine
Lake of Lavarone
Lake of Terlago
Lake of Santa Massenza
Lake of Ampola
Lake of Tovel
Lake of Nambino
Lake of Ragoli

crowned him Emperor of the Romans. Charlemagne died in 814 A.D., and was succeeded by Louis, his son. The great empire now began to totter. By the *Treaty of Verdun* in 843 A.D. France and Germany became separate kingdoms, ruled respectively by Charles and Louis, the sons of Louis le Debonnaire, the Rhine forming the rough line of division between the two political entities. The Norsemen swooped down upon the newly formed kingdom, and neither Louis nor his son Charles was strong enough to resist them effectually. For sixty-eight years after the Treaty of Verdun the Carlovingians continued to rule the territory east of the Rhine, but proved degenerate and effete. In 911, Conrad, Duke of Franconia, was elected ruler of the Germans, and in 918 the ruler, Henry the Fowler, was elected. Henry was a capable and powerful ruler. His great policy was to unite all the German-speaking tribes. He conquered the Dukes of Alemannia and Bavaria, and mastered Lorraine. But his most redoubtable foes were the Hungarians. In order to fortify his eastern frontiers against them he planted *burgs* along his marches—the germs of the famous German cities—and, to cope with the Magyars, whose strength lay in horsemanship, he founded a strong cavalry of nobles. Hence he is called 'the founder of knighthood.' In 936 Henry was succeeded by his son Otto. The grand-dukes rose in insurrection, but Otto quelled them, and similar disturbances were obviated by a powerful organisation of margraves.

But his great object was to regain the imperial crown, and so he turned his attention to Italy. His opportunity came when Adelaide, widow of Lothaire, king of Italy, implored his aid. He speedily subdued Lombardy and married Adelaide. In 961 he was crowned king of Lombardy, and in 962 Pope John XII. granted him the imperial crown of the Western Empire, a distinction previously conferred upon Charlemagne. Otto improved the whole constitution of Italy, and his domestic policy was equally salutary. Otto was thus one of the great builders of the German Empire, and he made it the foremost power in Europe. By making himself champion of the Holy Roman Empire he resuscitated its supremacy in Europe. But his great imperial policy did not maintain its tradition in the reigns of his later successors.

Empire and Papacy.—Germany's hold in Italy [illegible] iritual powers. The traditional elective system of German monarchy, too, fostered an independent spirit among the nobles, and favoured the subsequent disintegration of the empire into states, *i.e.* of the Saxons, Thuringians, Franconians, Suabians, and Bavarians. Otto II. (973–83) felt his position almost untenable. Otto III. (983–1002) came into conflict with the princes and the Church. Henry II. (1002–24) loosened his hold on Italy and concentrated his attention on his domestic affairs. Conrad II. (1024–39) was more successful than his immediate predecessors, and to a considerable extent consolidated anew the reaches of the empire. He successfully balanced the interest of his dominions in Germany and in Italy. He acquired the kingdom of Arles in 1032. His son, Henry III. (1039–56), succeeded him, and gained Bohemia, Hungary, and Poland as federal states. Under Henry Germany's imperial power was at the zenith.

He was succeeded by Henry IV., who came into direct collision with the pope on the subject of investiture. The event of the First Crusade towards the end of his reign aggravated the rupture. From the marshalling of the Christian army Henry held aloof, refusing to arm at the call of his acknowledged enemy. Henry V. (1106–25) ameliorated matters by his concessions at the *Concordat of Worms* (1122), but the imperial power of Germany was losing prestige, while the spiritual supremacy of Rome was becoming more widely acknowledged. Lothair II. (1125–37) did not find the difficulties of his position so insurmountable, and lived on amicable terms with Innocent II. His successor, Conrad III., felt the stress of his situation bitterly. St. Bernard enlisted his services for the Second Crusade. Combining with Louis VII. of France he marched to the Holy Land through Constantinople, but his supplies were cut off by Manuel, emperor of the East, and he was defeated by the Saracens in Cappadocia. Conrad retreated to Constantinople, but rejoined Louis on his victory over the Saracens. The two kings entered Jerusalem, but their attempt to take Damascus was an utter failure. Conrad's dominion in Italy was fatally weakened by the rapid growth of autonomous cities. Conrad was succeeded by Frederick Barbarossa (1152–90), who endeavoured to shatter the autonomy of the Lombard cities, but his schemes proved abortive.

The feud in Italy between the Ghibellines (or upholders of the emperors) and the Guelphs (or upholders of Italian freedom) became intense. Milan led the opposition to the German supremacy, but fell in 1162. Frederick then attempted to bolster up his position by stationing *Podestas* or governors in the cities, but this only incensed revolt. In 1167 the League of Lombardy was formed in order to assert the freedom of the federal cities. Frederick then tried to form a counter-league of Ghibelline cities. Protracted warfare ensued, until the decisive battle was fought at *Legnano*, near Milan. The turning-point of the battle was when the 'company of death'—900 exiles of Milan, sworn to die or gain the victory—saved the sacred standard of Milan from the German cavalry. Frederick barely escaped from the scene of defeat. In 1183 Frederick, by the *Peace of Constance*, agreed that the young Italian Republics should govern themselves, and levy their own defensive forces. The Peace of Constance brought the real dominion of Germany over Italy to an end, and reduced her transalpine claims to a purely nominal footing. Frederick had some measure of success against the encroachments in Bavaria and Saxony of Prince Henry the Lion. But when the tidings came of the capture of Jerusalem by Saladin, and Richard I. of England and Philip Augustus of France were mustering their forces for the Third Crusade, Frederick promptly advanced from Ratisbon, following the route *via* Adrianople to the Hellespont, and marched victoriously through Asia Minor. He conquered Iconium, but died while bathing in the river Selef, in Cilicia. Only a remnant of his army made its way to the camp of the Christians before Acre.

Henry VI. (1190–97), a man of unbounded ambitions, succeeded Frederick. He aimed at the conquest of the Byzantine Empire, and sought to realise his projects by planting his foot in Sicily and working under cover of a Fourth Crusade. He married Constance, the heiress of Sicily, with a view to securing his position. His forces he divided into three divisions: one division he himself commanded in Sicily, another he dispatched from Constantinople to Acre, and the remaining body he shipped to Palestine from the Baltic ports. Henry's forces united with the Syrian Christians, besieged and captured Berytus, and set free the Christians therein imprisoned. Henry had now secured his position in Sicily, and dispatched his remaining forces to the Holy Land. Hopes were entertained of taking Jerusalem. The German forces turned to the *Siege of Thoron*. Just as the ramparts were falling, tidings came of the advance of a Saracen relief force. The German army was scattered, and the early death of Henry brought the Fourth Crusade to an end. At Henry's death a rivalry arose between Otto, son of Prince Henry the Lion, and Frederick, son of Henry VI. Otto was crowned as Otto IV. in 1209, but was excommunicated by Innocent III., and Frederick II. was crowned in 1212. Otto was defeated at Bouvines in 1214 by Philip Augustus, and Frederick now had no rival to his title. Frederick was a man of high intellectual standing, but he lacked that keen and practical insight that was necessary in order to maintain a balance of the German powers, and he

is to a large extent responsible for the disintegration of the early German Empire. In order to devote his full attention to the opposition of the Papacy, he left the government of domestic affairs in the hands of the princes, and thus abolished the successful policy of the Hohenstaufen kings, who had striven to check the independence of the nobles. The towns, too, began to assert their autonomy, a fatal sign of disintegration. In the south, Ulm, Nuremberg, Augsburg, and Ratisbon were developing to an alarming degree. In the north, the Baltic towns were soon by the *Hanseatic League* to defy the central power.

Frederick II. was succeeded in 1250 by his son, Conrad IV. (1250–54), the last of the Hohenstaufens. From his death in 1254 to the election of Rudolf in 1273 was the period of the GREAT INTERREGNUM. When Rudolf of Hapsburg came to the throne the domestic situation had undergone a fundamental change—a change brought to pass by the two fatal forces of disintegration, viz. the opposition of the Papacy and the opposition of the nobles. Powerful principalities weakened the central power. The house of Ascania ruled Brandenburg and Saxony, the house of Welf ruled Brunswick, the house of the Wittelsbachs ruled Bavaria and the Palatinate, and the house of Wettin ruled Meissen and Thuringia. The power of the archbishops also, whose chief sees were in Mainz, Köln, and Trier, began to be asserted. Rudolf of Hapsburg was succeeded by Rudolf of Nassau (1292–98), but he was deposed and slain by the princes, thus proving that the combination of an elective monarchy and a system of powerful principalities was self-destructive. The fate of Adolf's successors confirms the truth of this statement. The reigns of Albert of Austria (1298–1308), the son of Rudolf, and Henry of Luxemburg (1308–13) were syncopated by a similar opposition. Ludwig IV. of Bavaria successfully combated the claims of Frederick, son of Albert, at Mühldorf in 1322, and occupied the throne till 1346. During his reign a decisive step was taken against papal interference. In 1338 the convention of the electors at Rhense declared the German sovereign independent of the pope. Ludwig was succeeded by Charles IV. (1346–78), son of John of Bohemia. The most important event of this reign was the issue of the *Golden Bull* (1356). By this edict the system of imperial election was defined. Seven electors were recognised, viz. the king of Bohemia, the Count Palatine of the Rhine, the Duke of Saxony, the Margrave of Brandenburg, and the archbishops of Mainz, Cologne, and Trier. The emperor was to be elected at Frankfort-on-Main and crowned at Aix-la-Chapelle. The new system continued to operate for four and a half centuries. Wenceslaus, the son and successor of Charles, was deposed in 1400. He was succeeded by Rupert, who ruled till 1410. Albert II. of Austria succeeded Rupert, and was himself succeeded by Frederick III., Duke of Styria (1440–93). He was succeeded by his son, Maximilian I. (1493–1519), who, by his marriage with Mary of Burgundy, acquired new territory.

The Reformation.—Maximilian recognised that the three chambers which composed the Diet were inadequately organised, but he failed to carry out his scheme of reform. In 1512 the empire was divided into ten departments for administrative purposes. Charles of Spain was elected emperor as Charles V. (1519–56), and widely extended the imperial supremacy, but his policy was frustrated by the great Reformation movement. Charles was the grandson of Maximilian. He succeeded Ferdinand as king of Spain in 1516. On the death of Maximilian he had a rival in his claims to the throne in Francis I. of France. The inroads of the Turks prompted the electors to choose Charles, whose dominions now extended over Austria, the Netherlands, Naples, Spain, and large tracts in America. The great struggle of the reign of Charles V. was against Francis of France. Italy was the theatre of the war. In 1525 the decisive battle of *Pavia* was fought, in which Francis was worsted and taken prisoner. After a year's imprisonment Francis was released, after signing a treaty by which he renounced his claims in Italy and ceded the duchy of Burgundy to Charles. Hostilities broke out afresh. Francis formed a league with the pope, but the army of Charles marched against Rome, sacked it, and took the pope prisoner (1527). A new treaty was struck (1529) by which Francis agreed to pay a heavy indemnity, ceded Flanders and Artois, and renounced his claims in Italy. Charles agreed to waive his claims on Burgundy.

The Reformation in Germany was now at a white heat. At the Diet of Worms in 1521 Charles had pronounced Luther a heretic. In 1530, at the *Diet of Augsburg* was read the Confession of the Protestant Faith. The Confession was condemned by the Diet, but the Protestants only gathered strength. The emperor was desirous of mustering all his forces against the inroads of the Turks, and could not afford to estrange so vast a portion of his people. He therefore annulled his decrees at the previous Diets, and Protestantism won the day. The great ambition of Charles was to turn the tide of Moslem supremacy which threatened Europe on the east, but his protracted wars with Francis spent his strength and rendered his attack on Algiers disastrous. In 1545 Protestantism met a redoubtable foe in the Jesuits, and was denounced by the Council of Trent. In 1546 Francis and Luther both died, and Charles resolved to trample out the hold of the Reformed Faith, but a temporary victory was followed in 1552 by the Peace of Religion—a treaty by which he secured the claims of the Protestants. Charles V. was succeeded by his brother Ferdinand, during whose reign the rupture between the Protestants and Romanists was keenly felt. The conflict grew keener in the reigns of the succeeding monarchs—Maximilian II. and Rudolph II.

In the reign of Matthias the crisis came, and the THIRTY YEARS WAR commenced. The war originated in a contest for the throne of Bohemia between the Protestant Frederick and the Catholic Ferdinand. The Protestants were at first worsted, and Christian IV. of Denmark, who championed the cause of Frederick, was no match for the military genius of the Bohemian General Wallenstein, who assisted Ferdinand. Richelieu's influence secured the recall of Wallenstein. But the advent of Gustavus Adolphus of Sweden, the great Protestant champion, turned the tide of battle. The battle of *Leipzig* in 1631 was a decisive victory for Protestantism. Ferdinand in desperation recalled Wallenstein. In 1632 the forces of Wallenstein and Gustavus Adolphus met at *Lutzen*. The battle ended with the victory of the Protestants, but a heavy price was paid by the death of the noble king of Sweden. The war ended with the *Peace of Westphalia* in 1648, by which France retained Metz, Toul, Verdun, and Alsace (except Strasburg), with the fortresses of Breisach and Philippsburg; Holland was made a free state; the Swiss Cantons were made free; Sweden was awarded a large indemnity and received important ports on the Baltic. Germany thus lost the absolute navigation of the Rhine, the greater part of her empire, and was confronted with the independence of the principalities. During the reign of Leopold (1658–1705) Germany recovered to some extent from her abject state. Louis XIV. of France aimed at the supremacy of Europe, and this drew Germany closer to England, and forced the German princes to stand by the central power. In 1714 the Peace of Baden settled the relations between Germany and France.

Rise of Prussia.—In the first year of the XVIII. century a momentous change was made among European powers by the creation of the Prussian kingdom, with Frederick the Great on the throne. The first decisive action of the new monarch was to seize from Maria Theresa the realm of Silesia. Peace was secured by the *Treaty of Dresden*, by which Frederick acknowledged the election of Francis I., husband of Maria Theresa, to the imperial throne. During the

eight subsequent years of peace, Frederick reconstructed the constitution of Prussia. Then followed the SEVEN YEARS WAR, involving untold bloodshed, and ending with the *Peace of Hubertsburg*. By this peace Frederick retained Silesia—the bone of contention. In 1772 Frederick seized on Polish Prussia. But the conquest of Napoleon made a temporary upheaval of the European countries. The fall of Napoleon again altered the face of things; the ferment was followed by clarification. One great lesson the Germanic states learned from the disasters of the French Revolution and the rise of Napoleon was the expediency of union. A step was taken in 1834 by the formation of a Customs Union (*Zollverein*), headed by Prussia. But it was left to Bismarck to decide between Austria and Prussia as the leading states of Germany. The war of spoliation against Denmark fanned the fire of jealousy between Austria and Prussia. The war of 1866 culminated in the defeat of Austria at *Sadowa*; Austria was humiliated, and Prussia became the dominant power.

Bismarck formed the NORTH GERMAN CONFEDERATION, of which he became Chancellor. In 1870 the *Franco-Prussian War* broke out, and on the surrender of Paris Bismarck decided the conditions of peace. During the war the states of South Germany had united with Prussia and the North German Confederation. This Confederation was changed into the German Confederation, and in 1871 William, king of Prussia, was crowned as **German Emperor** at Versailles. Bismarck took the title of Prince and now became Chancellor of the German Empire. Bismarck's policy was anti-democratic. He aimed at checking the power of France, pacifying Russia, and confirming an alliance between Germany, Austria, and Italy. His *Falk laws* were directed mercilessly against the Roman Catholics. His great ideas of colonial expansion have not been realised. Bismarck, nevertheless, was the founder of one of the greatest empires of the world.

On the accession of William II. in 1888 the authority of Bismarck waned. He was requested to resign his chancellorship, and an open feud arose between the young monarch and the old chancellor. The ill-feeling, however, abated during the last few years of Bismarck's life. William II. is a staunch believer in the divine right of kings, and his autocratic views have brought him into collision on several occasions with his councils. On the subject of the British occupation of South Africa the Kaiser was very bitter, and his somewhat rash speeches were the cause of deep-seated ill-feeling between the two countries, which has taken long to be eradicated. Russia was for long a thorn in the flesh of the German Empire, but fear of an invasion abated until the beginning of 1913, owing to the disastrous effects on Russia of the Russo-Japanese War. During the reign of William the progress in the country has been little short of miraculous. The commerce of the country has made vast strides, and the military organisation of the country has been put on a new basis. But perhaps the Kaiser's greatest work is the creation of a great Navy second only to that of Britain. But the stress of the upkeep of these great military forces and the rigorous protectionist system has aggravated social discontent in Germany, and the growth of the Social-Democratic party is a serious menace to the entire prevailing policy.

LANGUAGE.

German is spoken by some 60 millions (*c.* 92 % of inhabitants)—besides 10 millions in Austria and 2½ millions in Switzerland. French is spoken by *c.* 250,000 (chiefly Alsace-Lorraine). Masurian, Danish, Czech, Lithuanian, and other tongues are also spoken in different regions. German belongs to Teutonic branch of Indo-European languages. West Teutonic group included (1) OLD HIGH GERMAN (700–1100), which became MIDDLE HIGH GERMAN (1100–1500), and thereafter MODERN HIGH GERMAN—*Hoch-deutsch* or standard German of to-day. (2) Old Saxon (800–1100), from which sprang MIDDLE LOW GERMAN (1100–1600), and thereafter MODERN LOW GERMAN, or *Plat-deutsch* patois; (3) Low Franconian, ancestor of modern Dutch; (4) Old English or Anglo-Saxon; (5) Frisian. Low German was spoken in low-lying, High German in upland districts of S. Germany. Middle Low German had no lit. to speak of, but in recent times Plat-deutsch has been used by dialectal writers like Fritz Reuter. Old High German was marked by a second sound shifting (*c.* 600), which distinguished it not only from E. Teutonic, but from other West Teutonic speeches; thus *t* became *z*, *tz*, *s*, *ss*; *p* became *pf*, *f*, *ff*; *k* became *ch*; *d* became *t*. Old High German had various dialects of its own—still traceable. Upper German (*Oberdeutsch*) was spoken in Switzerland, Bavaria, etc.; Franconian in Rhineland, etc. Upper and Middle German (spoken in Middle Germany; comprising Franconian, Thüringian, etc.) are together called High German.

Absence of national union retarded the evolution of a uniform national speech. Luther and his Bible (1531) established High German as modern standard German; Old Prussian, akin to Lithuanian, was supplanted by German in XVII. cent. Adoption of German in place of Latin as academic tongue in univ's gave great impetus to native language; growth of national lit. and national feeling gave it definite form and ensured unity for written and cultured German. The purest German, it is said, is spoken in Hanover. Recent tendency is to expel foreign (especially French) words in favour of Teutonic; e.g. *trottoir* being replaced by *Burger-steig*, *billet* by *Fahrkarte*. German has retained power of compounding words largely lost by its cousin English.

Loewe, *German Philology* (trans. by Jones, 1913); Strong and Meyer, *History of Ger. Language* (1886).

Government.—The present constitution of the Ger. Empire (*Deutsches Reich*) dates from 1871. At the head of the State is the Ger. Emperor, 'Deutscher Kaiser' (there is no 'Emperor of Germany'), who must always be the ruling king of Prussia. The Kaiser has the power of declaring defensive war, of making peace, concluding alliances and treaties with

STATES OF THE EMPIRE.	Area.	Pop. (1910).	Bundesrat & Reichstag Representatives.
Prussia	134,616	40,165,219	17 : 236
Bavaria	29,292	6,887,291	6 : 48
Saxony	5,789	4,806,661	4 : 23
Württemberg	7,534	2,437,574	4 : 17
Baden	5,823	2,142,833	3 : 14
Hesse	2,966	1,282,051	3 : 9
Mecklenburg-Schwerin	5,068	639,958	2 : 6
Mecklenburg-Strelitz	1,131	106,442	1 : 1
Oldenburg	2,482	483,042	1 : 3
Saxe-Weimar	1,397	417,554	1 : 3
Brünswick	1,418	494,339	2 : 3
Anhalt	888	331,128	1 : 2
Saxe-Meiningen	953	278,357	1 : 2
Saxe-Coburg-Gotha	764	257,177	1 : 2
Saxe-Altenburg	511	216,128	1 : 1
Reuss (younger line)	319	152,752	1 : 1
Lippe	469	150,937	1 : 1
Schwarzburg-Rudolstadt	363	100,702	1 : 1
Schwarzburg-Sondershausen	333	80,917	1 : 1
Reuss (elder line)	122	72,769	1 : 1
Waldeck	433	61,707	1 : 1
Schaumburg-Lippe	131	46,652	1 : 1
Hamburg	160	1,014,664	1 : 3
Bremen	99	229,526	1 : 1
Lubeck	115	116,599	1 : 1
Alsace-Lorraine	5,604	1,874,014	3 : 15
Total	208,780	64,925,993	61 : 397

foreign States, and other matters relating to international law; also of convoking, closing, and adjourning the Reichstag. The Chancellor, the chief officer of state, is chosen by the Kaiser, and supervises 7 Secretaries (Foreign Affairs, Interior, Navy, Justice, Treasury, Post Office, Colonies), who do not form a collective Cabinet, and are not responsible to Parliament. There are two legislative bodies, the *Bundesrat* (Federal Council) and the *Reichstag* (Imperial Parliament). The Bundesrat has 58 members, representing the individual states of the Empire, app. each session by the governments thereof. The Reichstag consists of 397 members, elected by universal (male) suffrage for five years. The Bundesrat and Reichstag must meet annually; all laws must receive votes of an absolute majority of both houses. The Bundesrat is presided over by *Reichskanzler*, or Chancellor of the Empire, and the President of the Reichstag is elected by deputies. Bundesrat members may attend Reichstag sittings. Initiative in legislation lies mainly with Reichstag; legislation is restricted to matters within jurisdiction of the Empire, *e.g.* defence, finance, communication, commerce and customs, justice, etc. The constituent states of the Empire are sovereign, self-governing states as regards education, religion, and all save purely imperial affairs. A dozen parties are represented in Reichstag, chief being (1913) Conservatives (43), Free Conservatives (14), Clerical Centre (90), National Liberals (44), Progressive People's Party (42), Social Democrats (110).

GERMAN LITERATURE.

German literature began to take definite shape at the commencement of the X. cent., but had two distinct tendencies. There was a body of alliterative heroic songs and ballads in vernacular German, and also a body of Christian poetry composed in rhymed Latin verse. Both tendencies prevailed, and in the later literature met. The spirit and language of the old German heroic literature were an inexhaustible source of rejuvenescence which saved the verse of a maturer epoch from formalism, but the stanzaic and rhyming system of the Latin hymns were victorious over the alliterative system of the heathen poetry of German vernacular. This early literature is the product of the populace and the monasteries, and thus stands in contrast to a species of poetry that arose in the XII. and XIII. cent's, the offspring of court life and manners. This is the chivalric poetry of the *Minnesänger*, akin in spirit to the Troubadour verse of S. France, Spain, and Italy. The *Minnesänger* (poets of love) travelled from court to court and from country to country, and thus the sphere of their influence was wide. Their style tended to become stereotyped and artificial, but still it had a refining and ennobling influence on both the form and content of verse. Famous among *Minnesänger* were Hartmann von der Rue, author of *Der arme Heinrich*, Gottfried von Strassburg, author of *Tristan und Isolde*, and Wolfram von Eschenbach, author of *Parzival*. These poets were all of high rank. The *Nibelungenlied* and *Gudrun*, the great ballad epics, also belong to this period. Their Gothic grandeur, depth of feeling, and wealth of imagination make a vivid contrast to the limited appeal, forced sentimentality, and restricted vision of the court school.

But in the XIV. and XV. cent's the Minnesänger traditions became vulgarised, and there arose the famous guilds of the *Meistersänger*, recruited mainly from the artisan classes. Poetry then became a source of profit as well as of pleasure. The chief guild centres of the Meistersänger were in Nuremberg and Ulm. The verse of the Meistersänger lacked spontaneity and was shaped according to rule rather than by inspiration. The most original poet of the school was Hans Sach (1494–1576), the cobbler of Nuremberg. In the XIV. and XV. cent's literary prose also began to develop. The *Volksbücher* in particular reached a high degree of excellence. Notable among them are *Die Haimonskinder*, *Doktor Faust*, *Die Schildbürger*, and *Reineke Fuchs*. A new creative impulse was given to the literature with the classicism of Ulrich von Hutten (1488–1523). But the most influential figure in German letters is perhaps Luther—he is in fact the father of modern German literature. His translation of the Bible not only stirred new depths of feeling, but finally fixed the form of Ger. speech. The hymns of Luther are unsurpassed in sweetness and fervour.

But the poetic zeal of the country was quenched by the Thirty Years War, and the XVII. cent. proved to be the most sterile period of German literature. It does, indeed, embrace the two Silesian schools. The first was originated by Martin Ogritz (1597–1639), and was essentially didactic. The greatest follower of the second Silesian school was Paul Fleming (1597–1639). Philosophy, however, produced some brilliant thinkers, *e.g.* Leibniz, Wolf, and Thomasius. At the beginning of the XVIII. cent. a new school of poetry arose at Leipzig. This school was led by Gottsched (1700–66), a formalist and disciple of Boileau and Racine. About the same time arose the Swiss or Zürich school, led by Bodmer (1698–1783) and Breitinger (1701–76), and in spirit directly opposed to the Leipzig school. This school drew its inspiration from the rich and natural ballads and folk-songs of bygone ages, and paved the way for the revolution effected in letters by Klopstock, Lessing, Wieland, and Herder. Klopstock's great work is the *Messiah*, an epic modelled after Milton's masterpiece, and in genuine feeling and religious inspiration recalling the spirit of Luther and the Reformation. But Lessing's was the master spirit of the time, and his *Hamburgische Dramaturgie* and *Laokoon* were epoch-making works in the history of German criticism. His comedy, *Minna von Barnhelm*, and his drama, *Nathan der Weise*, revived dramatic art in Germany. Wieland succeeded best in the romance—witness *Agathon*, *Oberon*, *Musarion*, and *Aristipp*. He added a lightness of touch to the language, of which it had never before been capable, but beauty with him often degenerates into sensuousness and animalism.

The spirit of Rousseau and the French Revolution was perhaps assimilated by no other as sanely as by Herder. He drew his inspiration from the evergreen *Volkslieder*. But his theories and style were exaggerated and travestied by the writers of the *Sturm und Drang* (storm and passion) school, whose name is derived from a play of Klinger's. The early works of Goethe and Schiller show traces of this unlicensed and Rousseauesque exuberance, but both in the period of their poetic maturity tempered this emotional abandon with a Greek sense of moderation, restraint, and repose. Goethe's multifarious genius is exhibited in such works as *Iphigeneia*, *Egmont*, *Wilhelm Meister*, *Hermann und Dorothea*, and *Faust*. Schiller found most perfect expression in the ballad. His works encompass dramatic poems (*Wilhelm Tell*, *Wallenstein*, *Maria Stuart*), lyrics, and writings on æsthetics and history. Philosophy also produced a magnificent assemblage of great names—witness Kant, Fichte, Schelling, and Hegel. Other great names in German philosophy are Fries, Jacobi, Herbart, Schopenhauer, Zeller, von Hartmann, Lotze, Haeckel.

The names which rank next to Goethe and Schiller in the generation which followed are those of Heine, Gutzkow, and Fritz Reuter. Heine succeeds best in lyric verses, e.g. *Buch der Lieder*, *Nordseebilder*. Gutzkow (1811–78) was the great leader of the 'Young Germany school'—a school obsessed with social problems. Fritz Reuter (1810–74) was pre-eminently a humorist and writer of narratives. In the latter half of the XIX. cent. in few departments of German literature have there been any names of really outstanding genius. With the rise of the naturalistic drama are connected Sudermann (author of *Die Ehre*, *Heimat*, etc.) and Hauptmann (author of *Die Weber*, *Fuhrmann Henschel*, etc.), both writers of great merit.

In philosophy the writings of Nietzsche (1844–1900) have had a great influence on the writers and philosophers of modern Europe.

Bayard Taylor, *Studies in Ger. Lit.* (1879); *History of Ger. Lit.*, by Hosmer (1892), Priest (1910), Robertson (1902), Scherer (1886), Thomas (1909).

Colonies.—As a colonising power Germany was late in entering the field (1884); consequently her over-sea possessions are mostly tropical and unsuited for white settlers. Ger. colonies are administered by imperial governors. In Africa: Ger. E. Africa, Ger. S.W. Africa, Kamerun, Togoland. In Asia: Kiaochau. In Pacific: New Guinea and dependency islands; Samoan islands. Total area of colonies, *c.* 1,134,239 sq. miles.

Towns.—Berlin is the capital of the Ger. Empire. Other leading towns are Hamburg, Munich, Leipzig, Dresden, Cologne, Breslau, Frankfort-on-Main, Düsseldorf, Nürnberg, Hanover, Essen, Chemnitz, Stuttgart; principal ports are Hamburg, Bremen, Stettin, Königsberg, Danzig, Memel, Swinemünde, Emden, Geestemünde.

Religion.—Protestants form 62 % of entire population, Catholics 36 %, Jews 1 %. Catholics are chiefly centred in Bavaria (70 %), Alsace-Lorraine (76 %), Baden (59 %); in Prussia they form 36 % (predominating in Rhenish Prussia, Silesia, Posen, Westphalia, West Prussia, and Hohenzollern); in Württemberg, 30 %; Hesse, 31 %, Oldenburg, 22 %. In Saxony and the remaining states Protestants constitute over 90 %.

Education is compulsory and free from 6–14, and almost uniform throughout the Empire; and is of very high standard. Elementary schools (*Volksschulen*) are maintained by local taxation with State aid. Secondary schools include *Fortbildungsschulen* (evening continuation classes), *Bürger-* and *Höhere-Bürgerschulen* (intermediate schools), and various *Gymnasien* (preparing for univ. and learned professions). In *Realschulen* modern languages take the first place; there are 21 State univ's (see UNIVERSITIES); numerous special schools and colleges (some degree-granting); Polytechnica (notably at Charlottenburg, Karlsruhe, Munich, Hanover, Stuttgart, etc.); forestry schools (*Forstakademien*) at Eberswalde, Hohenheim, Münden, Tharandt, etc.; mining schools (*Bergakademien*), Berlin, Freiberg, Klausthal; schools of commerce (*Handelshochschulen*), Aachen, Leipzig, Frankfort, Berlin, etc. agricultural colleges (*Landwirtschaftliche Hochschulen*), Berlin, Göttingen, Halle, Jena, etc.; art schools (*Hunst-Akademien*), Berlin, München, Düsseldorf, Dresden, Weimar, Karlsruhe; music schools (*Konservatorien*), Berlin, Leipzig, Dresden, Munich, Cologne, etc.; also numerous learned societies, such as Academies (*Akademien der Wissenschaften*) of Berlin, Munich, etc. The largest libraries are at Berlin and Munich (over 1,000,000 vols., MSS., etc.); Strassburg, Hamburg, Heidelberg, Göttingen, etc., over 500,000.

Justice.—The Imperial Supreme Court is the *Reichsgericht* (sitting at Leipzig). There are 29 State appellate courts (*Oberlandesgericht*; an *Oberste Landesgericht* in Bavaria); courts of first instance are *Schwurgerichte* (periodical jury courts), *Landgerichte*, and subordinate *Amtsgerichte* (magistrates' courts). The system of law courts and *burgerliches Recht* (civil law) are uniform throughout the Empire. Imperial laws within limits of constitution override State laws.

Defence.—Military service is compulsory and universal; at 17 every German becomes liable for service, at 20 his service (*Heerpflicht*) begins. Recruits serve (1) 2 years in active army, followed by (2) 5 in the reserve (for cavalry and horse artillery, 3 years active, 4 years reserve); reservists are called out twice for several weeks' training, followed by (3) 12 years in *Landwehr* (5 years in first 'ban,' with 2 periods of training, and 7 years in second 'ban' without training). Till 45 all belong to the *Landsturm* (mobilised when necessary). Those attaining certain educational standards and paying own expenses need serve only one year in active army (*Einjährige Freiwillige*, or Volunteers). Total peace strength (1912), 531,000 men, 125,000 officers, non-com., etc. In 1915 there will be 560,000 men, or even more if Government proposals (1913) are adopted. The army (which includes automobile and aerostatic detachments) comprises 25 *corps d'armée*, of which Bavaria furnishes 3, Saxony 2, Württemberg 1, Prussia, etc., 19. The Kaiser is Federal Commander-in-Chief; but in peace-time kings of Bavaria, Saxony, and Württemberg are sovereign heads of their respective forces. Chief fortresses are Cologne, Metz, Coblenz, Strassburg, Ingolstadt, Ulm, Mainz, Spandau, Königsberg, Posen, Magdeburg.

NAVY.—The Ger. Imperial navy has increased enormously since 1900, and ranks second in power in the world (see SEA POWER). Successive navy laws (1900, 1906, 1912) automatically regulate its growth; by 1920 it will consist of 41 battleships, 20 large and 40 small cruisers, 144 torpedo boats, 72 submarines, and 101,500 men, at an estimated annual maintenance cost of £23,000,000; old and small ships are systematically replaced by large new ships. The navy is recruited by obligatory service of the maritime population at age of 20, and by volunteers, age 15 upwards. Important coast fortresses are Kiel, Danzig, Wilhelmshaven, Cuxhaven, Memel, Swinemünde, Pillau. G. has naval academy school at Kiel, military academies (*Kriegsakadamien*) at Berlin and Munich; besides several schools of navigation, military schools, and cadet institutions.

Resources and Industries.—There are (1913) some 39,000 miles of RAILWAY in Germany, of which 36,000 are State-owned. The *Zollverein* or Customs Union embraces almost all Germany, together with Luxemburg and Austrian communes of Jungholz and Mittelberg; outside the union are the free-port territories of Hamburg, Bremen, Geestemünde, part of Cuxhaven, several districts in Baden adjoining Switzerland, and Heligoland. Within the Zollverein there is complete free trade. Germany's tariff is protectionist. Within recent years G. has become an important industrial as well as agricultural country; about one-third of the population are engaged in agriculture, over one-third in manufacture and mining industries. Poverty and distress are provided against by a compulsory poor relief system, compulsory (contributory) insurance of work people against illness, and by old age pensions acts and other measures.

Principal products are wheat, rye, oats, hay, barley, hops, potatoes, tobacco, fruit (chiefly apples, pears, cherries, plums), vegetables, valuable timber and live stock. Important industries are iron and steel goods, textiles, wooden ware, chemicals, musical and scientific instruments, glass, porcelain, leather, india-rubber, sugar, beer, etc.; famous wines made in Rhine provinces. Chief mining centres are Rhenish Prussia, Westphalia, Silesia, Saxony, Hartz Mountains, where iron ore, coal, lignite, zinc, lead, copper, silver, antimony, bismuth, cobalt, and various salts, etc., are mined; total mineral produce (1910), 263,167,300 Eng. tons, valued at *c.* £100,400,000; iron ore, 29,399,000 tons.

G. has numerous medicinal and mineral springs, viz. Ems, Schlangenbad, Wiesbaden, Kissingen, Nauheim, Aachen, etc. There are extensive deep-sea and fresh-water fisheries. In 1911 imports (special trade) exceeded £490,500,000; exports totalled £411,000,000. Pop. (1871) 41,058,000, (1885) 46,855,000, (1900) 56,367,000, (1910) 64,925,993.

Barker, *Modern Germany* (1907); Dawson, *Germany and the Germans* (2 vols., 1894); *The Growth of Modern Germany* (1909); Eltzbacher, *Modern Germany* (1905); Howard, *Ger. Empire* (1906).

GERMAN EVANGELICAL SYNOD OF NORTH AMERICA, widespread combination of Ger. Prot. bodies, distinguished by broad religious views.

GERMAN SILVER, see ALLOY.

GERMAN SOUTH-WEST AFRICA (*c.* 25° S., 17° E.), Ger. Protectorate bounded by Portug. West Africa (on N.), Cape of Good Hope (S.), Bechuanaland

Protectorate (E.); belongs to western part of the Kalahari plateau. In N. is Ovampoland, in centre Damaraland, in S. Great Namaqualand; coast-line about 800 miles. Southern regions are traversed N. and S. by mountains; highest peaks between 6000 and 8000 ft.; large tracts of desert on coast and inland; total area, 322,450 sq. miles; climate very hot, but fairly healthy; annual rainfall less than ½ in.; few running rivers (Orange River forms southern boundary), but water generally found in sand of river-beds; many hot springs and extensive water-boring; chief native races, Hereros, Bantus, and Ovampos; also Hottentots, Bushmen, etc.; principal towns, Windhoek (capital), Swakopmund and Lüderitzbucht (harbours), Keetmannshoop, Warmbad, Omaruru, Otavi, Grootfontein; principal industries, pastoral and mining; chief exports, cattle, guano, copper-ore, ostrich feathers, diamonds, and hides; railways inland from Swakopmund and Lüderitzbucht.

Angra Pequena (Lüderitzbucht) discovered by Diaz, 1486; part of coast bought from natives by Lüderitz (firm in Bremen), 1883; became Ger. possession as Lüderitzland, 1884; dangerous Herero rising, 1903; rebels surrendered, 1906; important discovery of diamonds at Lüderitzbucht, 1909.

Administered by imperial governor. Walfisch Bay (in centre) and Guano Islands off S. coast are Brit. Pop. *c.* 100,000 (including *c.* 14,000 whites).

Dove, *Deutsch-Südwest Afrika*, 1903; Leutwein, *Elf Jahre Gouverneur in Deutsch-Südwest Afrika* (3rd ed., 1908).

GERMANDER, general name for menthaceous plant of *Teucrium* genus, order *Labiatæ*.

GERMANICUS CÆSAR (15 B.C.–19 A.D.), Rom. gen.; s. of Claudius Drusus Nero; adopted by, and served under, Tiberius; became consul, 12 A.D.; subsequently commanded eight legions on Rhine, distinguishing himself against Germans; rousing Tiberius' jealousy, was sent to E. to settle disputed succession in Parthia and Armenia; death probably due to poisoning.

GERMANIUM, rare metal, similar to the series carbon, lead, silicon, and tin; discovered (1886) by Winkler in argyrodite at Freyberg, Saxony. G. has been shown to be the hypothetical element *ekasilicon*.

GERMANTOWN (40° 6′ N., 75° 16′ W.), former borough of Pennsylvania, now N. suburb of Philadelphia, U.S.A.; founded by Germans, XVII. cent.; here (1690) was established first paper-mill in America, and in 1743 first Amer. edition of Bible (Ger.) was printed; scene of Brit. victory over Americans, Oct. 4, 1777; cotton and woollen manufactures.

GERMERSHEIM, ancient *Vicus Julius* (49° 14′ N., 8° 21′ E.), fortified town, on Rhine, Bavarian Palatinate, Germany; scene of defeat of Fr. by Austrians, 1793. Pop. 6000.

GERMISTON, town adjoining Johannesburg; railway junction. Pop. 54,327, of whom 15,589 are whites.

GEROLSTEIN (50° 14′ N., 6° 39′ E.), watering-place, Rhine province, Germany; mineral baths.

GÉRÔME, JEAN LÉON (1824–1904), Fr. artist and sculptor; highly successful as a painter of hist., classical, and Eastern subjects.

GERONA.—(1) (42° N., 2° 35′ E.) maritime province, N.E. Spain, forming part of Catalonia; generally mountainous; rich in minerals and timber; numerous mineral springs; extensive fisheries; textile industries. Area, 2264 sq. miles. Pop. (1910) 318,626. (2) (42° N., 2° 50′ E.) capital, prov. Gerona, Spain; remains of ancient walls and ruined fortifications; bp.'s see; XV.-cent. Gothic cathedral; paper and textile manufactures; besieged by Fr., 1809. Pop. 15,787.

GERONTIUS, COUNT (360–413), Byzantine general; dethroned Constantine III., and besieged Byzantium; his troops mutinied; committed suicide.

GERRESHEIM (51° 16′ N., 6° 59′ E.), town, Rhineland, Prussia; incorporated with Düsseldorf; glass and wire manufactures. Pop. 14,434.

GERRHA (26° N., 49° 40′ E.), ancient city, Arabia, on Persian Gulf.

GERRÛS (36° N., 48° E.), small province, Persia.

GERRY, ELBRIDGE (1744–1814), Amer. politician; b. Marblehead, Massachusetts; grad. Harvard (1762); member of Massachusetts gen. court (1772, 1773); of Continental Congress (1776–81, 1783–85); hostile to Britain; anti-Federalist in national House of Representatives (1789–93); Gov. of Massachusetts (1810–12); Vice-Pres., U.S.A. (1812).

GERRYMANDER, a device to gain political advantage by arranging electoral districts; word coined during Gerry's administration of Massachusetts.

GERS (43° 40′ N., 0° 30′ E.), department, S.W. France; formed part of ancient Gascony; surface hilly, partly covered wood and heath; soil moderately fertile; chief rivers, Gers, Save, Baïse, and Ardour; many sheep and poultry reared; extensive vineyards; brandy. Area, 2428 sq. miles. Pop. (1911) 221,994.

GERSON, JOHN (1363–1429), Fr. cleric and scholar; proper name, Jean Charlier de G.; b. G., France; chancellor of Paris Univ., 1395; endeavoured to reform Church, and to replace scholastic theology by simpler mode of thought; influential in ending papal schism, writing many pamphlets for guidance of Council of Pisa; on failure of which to restore unity, he used his influence in formation of Council of Constance, 1414; having incurred enmity of Duke of Burgundy, he spent several years in exile in Tyrol, where he wrote *De Consolatione Theologiæ*.

GERSONIDES, LEVI (1288–1344), Jewish scholar; wrote a work on the 'Wars of God,' part of which Pope Clement VI. ordered to be translated into Lat.

GERSOPPA, FALLS OF (14° 12′ N., 74° 40′ E.), a cataract on Sharavati River, N. Kanara district, Bombay, India.

GERSTÄCKER, FRIEDRICH (1816–72), Ger. novelist; also author of travel-books descriptive of journeys in N. and S. America, Tahiti, etc.

GERSTENBERG, HEINRICH WILHELM VON (1737–1823), Ger. poet; wrote *Ugolino*, and was a pioneer of the *Sturm und Drang* school.

GÉRUZEZ, EUGÈNE (1799–1865), Fr. critic; pub. *Histoire de l'éloquence politique et religieuse* (1837–38), *Histoire de la littérature française* (1852–59).

GERVASE OF CANTERBURY (*c.* 1140–1210), Eng. Benedictine monk; wrote two Eng. chronicles, one of which, the *Gesta Regum*, included his own period; also wrote a topographical description of England (*Mappa Mundi*).

GERVASE OF TILBURY (fl. 1220), Eng. hist. writer; author of *Otia Imperialia* (history and legend) and *Liber Facetiarum* (anecdotes).

GERVEX, HENRI (1852–), Fr. artist; his earlier works were classic studies, of which *Bacchantes and Satyr* (Luxembourg Gallery) is a notable example; his later pictures include *The Coronation of Nicholas II.*, *Communion at Trinity Church*, *Job*, *Return from the Ball*.

GERVINUS, GEORG GOTTFRIED (1805–71), Ger. historian and critic; b. Darmstadt; became Privatdozent at Heidelberg (1830), then prof. of History and Lit. at Göttingen; honorary prof. at Heidelberg (1844); pub. *Geschichte der poetischen Nationalliteratur der Deutschen* (1835–42) and a study of Shakespeare.

GERYON (classical myth.), a triple-bodied giant, s. of Chrysaor. He possessed a splendid herd of red cattle, which it was the tenth labour of Heracles to carry off. This he did, and the monster perished at his hands.

GERYONE, see under HYDROMEDUSÆ.

GESENIUS, HEINRICH FRIEDRICH WILHELM (1786–1842), Ger. scholar; a distinguished Biblical critic and writer on Oriental subjects.

GESNER, JOHANN MATTHIAS (1691–1761), Ger. classical scholar; prof. of Poetry at Göttingen; pub. *Novus Linguæ et Eruditionis Romanæ Thesaurus* (1749); also compiled classical anthologies; edit. works by Horace and Quintilian.

GESNER, KONRAD VON (1516–65), Swiss naturalist; prof. of Greek at Lausanne, 1537; of Natural History at Zürich, 1541; wrote *Bibliotheca Universalis*, *Historia Animalium*, and other works.

GESSNER, SALOMON (1730–88), Swiss poet engraver, and artist; originally Zürich bookseller; his poems were insipid, but won popularity; his pastoral canvases were undistinguished; but he achieved some eminence as engraver.

GESSO, a gypsum or 'plaster of Paris' preparation for painting upon or modelling in.

GESTA ROMANORUM ('Deeds of the Romans'), collection of stories in Lat., from various sources, probably compiled about the early part of the XIV. cent., and drawn upon by Chaucer and later poets.

GESTATION, see under OBSTETRICS.

GETA, PUBLIUS SEPTIMIUS (189–212 A.D.), Rom. emperor; 2nd s. of Septimius Severus; became joint ruler with his elder bro., Caracalla, by whom he was murdered.

GETÆ (called by Romans *Daci*), ancient Thracian tribe, noted for valour and culture; conquered by Trajan (106 A.D.).

GETHSEMANE, garden on the Mount of Olives, near Jerusalem, where Jesus spent the night previous to His crucifixion.

GETTYSBURG (39° 47′ N., 77° 18′ W.), borough, county seat of Adams County, Pennsylvania, U.S.A.; situated in valley amid beautiful surroundings; contains Pennsylvania Coll. (Lutheran) and Lutheran Theological Seminary; site of famous and decisive battle during Amer. Civil War, between Confederates under Lee and Federals under Meade; after heavy losses on both sides Confederates forced to retire from Pennsylvania and Maryland (1863). Battlefield is now laid out as public park with monuments, tablets, etc. Pop. (1910) 4000.

GEULINCX, ARNOLD (1624–69), Dutch philosopher; b. Antwerp; prof. of Philosophy, Leyden; held the doctrine of Occasionalism (*q.v.*). See DESCARTES.

GEUM, genus of rosaceous herbs; hardy perennial, over 40 species; flowers white, yellow, purple.

GEVELSBERG (51° 18′ N., 7° 23′ E.), town, Rhine province, Prussia; cutlery. Pop. (1910) 18,942.

GEX (46° 20′ N., 6° 3′ E.), town, Ain, France (gives name to old district Pays de Gex, included in department Ain).

GEYSER, GEISER, GEISIR, natural fountain of boiling water found especially in Iceland, but also N. America, New Zealand, Tibet, and the Azores; in Iceland they number *c.* 100, and are all in a plain some 30 miles N.W. of Mount Hecla. In the Yellowstone regions of Wyoming (U.S.A.) the jets rise to a height of 90–250 ft., while in Auckland (N.Z.) three kinds are known—the intermittent, steam, and hot-water cisterns. G's occur only in regions where recent volcanic activity has been in evidence, and are caused by the filtration of water on to some heated centre, probably a lava bed.

GEZER (*c.* 31° 55′ N., 35° 5′ E.), ancient Canaanite city, modern TEL JEZAR, on S.W. border Ephraim; important stronghold.

GFRÖRER, AUGUST FRIEDRICH (1803–61), Ger. historian; valuable works on Gustavus Adolphus, Church history, etc.

GHADAMES, GADAMES, or RHADAMES, ancient *Cydamus* (30° 5′ N., 9° 14′ E), town and oasis, trading centre, in Sahara, N. Africa; formerly important; many ancient ruins; inhabitants chiefly Berbers and Arabs; dependency of Tripoli. Pop. *c.* 7000.

GHAT, RHAT (25° N., 10° 15′ E.), town and oasis, Sahara, Tripoli; trading centre. Pop. 4000.

GHATS, EASTERN G. (18° N., 82° 40′ E.), WESTERN G. (16° N., 74° E.), two mountain ranges bordering E. and W. shores of India, uniting near Cape Comorin; E. G. extend N. to Balasore; average elevation, 1500 ft.; W. G., N. to valley of Tapti; average elevation, 3000 ft.; highest summit of the Nilgiris (W. G.) is Dodabetta, 8700 ft.

GHAZALI, MUHAMMAD IBN MUHAMMAD ABU HAMID, AL- (1058–1111), Muslim critical philosopher; wrote *The Overthrow of the Philosophers*.

GHAZI, Muhammadan title given to zealots who have taken prominent part in the destruction of unbelievers.

GHAZIABAD (28° 40′ N., 77° 28′ E.), town, Meerut, United Provinces, Brit. India; railway junction. Pop. 11,000.

GHAZIPUR (25° 35′ N., 83° 38′ E.), town and district, Benares, United Provinces, India; scent distilleries; opium. Pop. 39,186.

GHAZNI (33° 34′ N., 68° 17′ E.), famous city in Afghanistan, situated on high tableland on direct road between Kabul and Kandahar; town consists of dirty streets surrounded by fortified walls. Ancient city of G. probably occupied site some distance away, where there is large extent covered with ruins; only preserved remains, two towers, erected by Conqueror Mahmud and his son; under Ghaznevid dynasty G. became city of great wealth and importance, and capital of empire. At village of Ranzah, in vicinity, is Mahmud's tomb; many holy shrines around city where pilgrims come yearly. In 1839 G. was captured by British; taken by Afghans, 1842, but forced to surrender to Nott same year.

GHEE, highly refined butter, largely used by natives in India.

GHEEL, GEEL (51° 9′ N., 4° 59′ E.), town, Antwerp, Belgium; colony for the insane. Pop. 14,087.

GHENT, GAND (51° 2′ N., 3° 44′ E.), city, Belgium; at confluence of Lys and Scheldt; capital of East Flanders; important trading and manufacturing centre; intersected by canals forming numerous islands. Notable features are: Cathedral of St. Bavon (X. cent.), with fine paintings; Church of St. Michael; Gothic cloth-hall (1325); town hall (1518); Château des Comtes (1180); Palais de Justice, State univ.; Béguinage (nunnery) and quaint old houses; chief industries—cotton, linen, lace, leather, machinery, paper; as capital of Flanders (*q.v.*), G. flourished XIII.–XV. cent. (great weaving centre); passed to Burgundy, 1384; Pacification of G. (league against Span. tyranny), 1576. Pop. (1910) 165,000.

GHERARDESCA, UGOLINO DELLA, see UGOLINO DELLA GHERARDESCA.

GHETTO, Jewish quarter in a city; sometimes called the 'Jewry.'

GHIBELLINES, see GUELPHS AND GHIBELLINES.

GHIBERTI, LORENZO (*c.* 1378–1455), Ital. sculptor and metal-worker; his masterpiece consists of the bronze doors of the Baptistery, Florence.

GHIKA, GHYKA, GIICA, family important in Rumanian history; apparently of humble origin, coming from Albania; founder was George, Prince of Moldavia and Walachia (1659–64), from whom are derived various branches.

GHILAN, GILAN, or GUILAN (37° 30′ N., 49° E.), province, N. Persia, bordering Caspian Sea; vast forests; swampy and unhealthy on coast; soil fertile, well-watered, and cultivated; produces rice, wheat, and fruit; silk-culture an important industry; good fisheries; capital, Resht. Pop. *c.* 200,000.

GHILZAI, powerful Afghan tribe, noted for military qualities.

GHIRLANDAJO, DOMENICO DEL (1449–94), Ital. fresco painter; s. of Tomasso Bigardi; apprenticed to goldsmith, and from making *ghirlande* earned name, his best work being the scenes, which he painted with his bro. David, from the lives of St. John the Baptist and the Virgin Mary in Santa Maria Novella, Florence; had as pupil Michael Angelo; his portrait of Giovanna Tornabuon one of the supreme achievements in whole portraiture of Italian Renaissance. His bro. Benedetto was also a distinguished artist.

GHIRLANDAJO, RIDOLFO (1483–1560), Ital. artist; s. of Domenico G.

GHOR, GHUR (*c.* 33° 2′ N., 63° 12′ E.), ancient kingdom of Afghanistan, constituting mountainous

district E. of Herat; little known of history of G. except when interwoven with that of Ghazni; capital in XII. cent., Firoz Koh; extensive ruins found in Murghab valley, at Taiwara, and elsewhere. Besides other streams, the Hari-rud, Farah-rud, and Khash-rud originate in G.; valleys generally well cultivated.

GHOST, see APPARITION, SPIRITUALISM.

GHŪR, see GHOR.

GIACOMETTI, PAOLO (1816–82), Ital. dramatist.

GIANNONE, PIETRO (1676–1748), Neapolitan historian.

GIANNUTRI (42° 15′ N., 11° 5′ E.), small island (ancient *Dianium*) in Mediterranean, off S.W. coast Tuscany, Italy.

GIANT CRAB OF JAPAN, see under MALACOSTRACA.

GIANTS, the Titans and Cyclopes of classical myth., ogres of fairy tales, etc. 'Giantism' is abnormal development, and may be regarded as a disease. Modern g's are often delicate, in many ways defective, and usually die young. A Russ. g. of modern times was 9 ft. 3 in. in height, and there have been several g's upwards of 8 ft.

GIANT'S CAUSEWAY (55° 14′ N., 6° 13′ W.), group of columnar basaltic rocks on N. coast of Antrim, Ireland.

GIANTS' KETTLES, geological phenomena; also called *moulins*; pot-shaped holes in rock due to action of glacier streams.

GIAOUR, Turk. name for infidel, *i.e.* person not of their religion.

GIB, ADAM (1714–88), Scot. minister; opposed the Jacobite rising (1745); and became leader of Anti-Burgher party in the division of the Secession Church (1747).

GIBARA, JIBARA (21° 4′ N., 76° 20′ W.), city, Cuba, on N. coast; exports woods, tobacco, sugar. Pop. 6841.

GIBBON, EDWARD (1737–94), Eng. historian; b. Putney, Surrey, of good and rather wealthy family; suffered from weak health until 1752; went to school at Kingston-upon-Thames, 1746; returned home, 1747, on mother's death, and continued to develop a love of wide reading; went to Westminster School, 1749. In 1751 G. first started his interest in Rom. history by casually picking up a continuation of Echard's Rom. history; matriculated as gentleman commoner at Magdalen Coll., Oxford (April 1752); arrived at the univ. 'with a stock of information which might have puzzled a doctor, and a degree of ignorance of which a schoolboy might be ashamed.' At Oxford he was temporarily converted to the Church of Rome, but the system not suiting him, and his conversion offending his f., he left Oxford and was placed under the tutelage of M. Pavilliard, a Calvinist minister of Lausanne. Here he read systematically and wisely under shrewd guidance. In 1754 he returned to Protestantism. During his stay at Lausanne he fell in love, and, at his f.'s command, out of it, with Mlle Suzanne Curchod, the future Madame Necker. G. returned to England in 1758, writing French nearly as well as English.

In 1761 he published *Essai sur l'étude de la littérature*. He became a captain in the Hampshire Militia (June 1759), and from 1760 to 1762 was in 'Military Servitude.' During the years 1763–65 he toured the Continent; at Rome he first conceived his immortal work, the *Decline and Fall of the Roman Empire*, 1764. In 1767 he joined with a young Swiss friend in writing a literary journal entitled *Mémoires littéraires de la Grande-Bretagne*. In 1770 he wrote *Critical Observations*, an attack on a theory of Warburton's. The first vol. of the *Decline and Fall* appeared Feb. 1776. The famous chapters (15 and 16) produced a great clamour and a library of controversy. Gibbon wrote his *Vindication* (Feb. 1779). Meanwhile he had been elected M.P. for Liskeard (1774). For some services to the Government he received (1779–80) a seat at the Board of Trade and Plantations, with a sinecure salary of £800 a year. He lost his seat for Liskeard (1780), but was elected subsequently for Lymington. In April 1781 the second and third quartos of his history were issued. G.'s salary disappeared after abolition of Board of Trade by Burke's Bill in 1782. He retired to Lausanne (Sept. 1783), and the History progressed. Volume iv. was completed in June 1784. Volume v. took less than two years. Volume vi. (begun May 1786) was finished in thirteen months. G. returned to London (1787), and in 1788 last three volumes of the history were published. In July he went to Switzerland. His *Memoirs* came out in 1789. He returned to England in June 1793, and died at London after a painful illness. G.'s work has permanent value. His style is gorgeous and his prose stately and artificial. A great historian and man of letters, he possessed the faculty of hist. 'architectonic.' Almost his only drawback was his sceptical belittlement of all forms of enthusiastic religion, especially Christianity.

Morison, *Gibbon* (1887).

GIBBONS, see CERCOPITHECIDÆ, PRIMATES.

GIBBONS, GRINLING (1648–1721), Anglo-Dutch wood-carver and sculptor; executed the Whitehall statue of James II.; chiefly celebrated for extreme beauty and delicacy of his wood-carving.

GIBBONS, JAMES, CARDINAL (1834–), R.C. abp. of Baltimore, U.S.A., and religious writer.

GIBBONS, ORLANDO (1583–1625), Eng. musician and composer; organist, Chapel Royal; excellent chamber music and anthems.

GIBBS, JOSIAH WILLARD (1839–1903), distinguished Amer. physicist; b. New Haven; grad. and taught at Yale; honoured by London Royal Soc.

GIBEON, modern EL-JIB (31° 51′ N., 35° 12′ E.), ancient town, Palestine.

GIBEONITES, people of Gibeon, Hivite town, Palestine, c. 6 miles N.W. of Jerusalem; deceived Joshua, and were made helots.

GIBRALTAR (36° 6′ N., 5° 21′ W.), rocky peninsula and Brit. crown colony, at most southerly point of Andalusia, commanding the Mediterranean gateway; connected with Spain by a sandy isthmus (about 1¾ mile long and ¼ mile wide), the middle part being neutral ground between Span. and Brit. frontiers; c. 16 miles from African coast. G. rises almost precipitously 1400 ft., with exception of western side on Bay of G.; length, 3 miles from N. to S.; breadth, ¾ mile; area, 1¾ sq. mile. Town lies on west side, and consists of N. and S. town, with several churches, ruined Moorish castle (X. cent.), old Franciscan convent, governor's residence, extensive barracks, Alameda Gardens, cable-station; powerful light-house on Europa Point (southern extremity), and large harbour. G. is a naval base, strongly fortified, a good coaling-station, and a place of great strategic importance; climate hot, but not unhealthy; industries unimportant.

Many interesting large caverns (*e.g.* Hall of St. Michael) with stalactite pillars; G. is the only part of Europe where a species of monkey (Barbary apes) is found.

G. was known to Greeks as *Calpe*, one of the pillars of Hercules (*q.v.*); strongly fortified by Târik-ben-Zaid at Moorish invasion of Spain, 711 A.D., and called Jebel-al-Târik (hill of T.); name gradually degenerated into G.; finally taken from Moors by Spain, 1462; captured by Brit. fleet under Admiral George Rooke during war of Span. Succession, 1704; several attempts made by Spain and France to retake G., the last great siege being 1779–82, when G. was heroically defended by Sir George Eliott (afterwards Lord Heathfield). Since *Peace of Versailles*, 1783, Britain's claim to G. has been unchallenged. Administered by a governor. Pop. (1911) 19,120 civilians.

Lucas, *Historical Geography of Brit. Colonies* (2nd ed., 1906).

GIBSON, CHARLES DANA (1867–), Amer. black-and-white artist and book illustrator; creator of the feminine type known as the 'Gibson girl.'

GIBSON, EDMUND (1669–1748), Eng. ecclesiastical jurist; bp. of Lincoln, 1716; of London, 1720; wrote *Codex juris ecclesiastici Anglicani*.

GIBSON, JOHN (1790–1866), Brit. sculptor; s. of a Welsh market-gardener; befriended by Roscoe, the historian; went to Rome, where he studied under Canova. His classical studies are distinguished by great beauty of form; he sometimes used colour in his statuary, and 'The Tinted Venus' is one of his best-known works. He was very successful in modern statues of Queen Victoria and others.

Life, by Lady Eastlake (1870).

GIBSON, THOMAS MILNER (1806–84), Brit. statesman; supporter of Cobden, and advocate of free trade: Pres., Board of Trade (1859–66).

GIBSON, WILLIAM HAMILTON (1850–96), Amer. artist and author; illustrated natural history works.

GICHTEL, JOHANN GEORG (1638–1710), Ger. mystic; banished for his attack on doctrine of Justification by Faith (1665); founder, at Amsterdam, of the *Gichtelians*, or Angelic Brethren, who endeavoured to live by the divine inspiration, as 'angels' by chastity, and as expiators by vicarious suffering.

GIDDINGS, JOSHUA REED (1795–1864), Amer. politician; entered Congress, 1838; advocated abolition of slavery; consul-gen. in Canada, 1861–64; wrote *History of Rebellion*.

GIDEON, judge of Israel; destroyed Baal altar at Ophrah, and was called Jerubbaal; summoned by Jehovah to free Israelites from oppression of Midianites, whom he defeated with a small force.

GIEN (47° 41′ N., 2° 39′ E.), town, Loiret, France; porcelain. Pop. 8500.

GIERS, NICHOLAS KARLOVICH DE (1820–95), Russ. politician; minister plenipotentiary in Persia, 1863; foreign minister, 1882–94; cultivated friendship of Germany, Austria, Italy.

GIESEBRECHT, WILHELM VON (1814–89), Ger. hist. writer; wrote *Geschichte der deutschen Kaiserzeit* and other works.

GIESELER, JOHANN KARL LUDWIG (1793–1854), Ger. ecclesiastical historian; famed for monumental *Kirchengeschichte* (Church History).

GIESSEN (50° 34′ N., 8° 41′ E.), town, on Lahn, Hesse-Darmstadt, Germany; seat of univ., founded 1607; tobacco, cotton, and woollen manufactures. Pop. (1910) 31,047.

GIFFEN, SIR ROBERT (1837–1910), Brit. statistician; after experience as financial edit. of *The Times* and other journals, he entered the Board of Trade, becoming Controller-Gen. (1892); pub. *Essays on Finance*, *The Case against Bimetallism*, *The Growth of Capital*.

GIFFORD, ROBERT SWAIN (1840–1905), Amer. artist; painter of landscapes and etcher.

GIFFORD, WILLIAM (1756–1826), Eng. journalist; first edit. of *Quarterly Review* (1809–24); notorious for severe criticisms of Keats, Hazlitt, Shelley, Wordsworth, and other writers; edited Jonson and other Elizabethans.

GIFT, legal term; necessary elements, clear intention to give and actual transfer of subject to donee; written deed advisable.

GIFU (35° 12′ N., 136° 45′ E.), town, Central Nippon, Japan; silk and paper manufactures. Pop. 40,168.

GIGLIO, ancient *Igilium* (42° 22′ N., 10° 53′ E.), island, off S.W. coast of Italy.

GIJÓN (43° 35′ N., 5° 44′ W.), seaport, Oviedo, Spain, on Bay of Biscay; one of best roadsteads on Span. coast; has some fine buildings; manufactures tobacco, earthenware, glass; exports minerals and fruit; favourite sea-bathing resort. Pop. (1910) 52,226.

GIL BLAS, see LE SAGE.

GILBART, JAMES WILLIAM (1794–1863), Eng. author; wrote *Practical Treatise on Banking* (1827), *History and Principles of Banking* (1834).

GILBERT, ALFRED (1854–), Eng. sculptor and metal-worker; amongst his principal works are the Shaftesbury Memorial Fountain, London; Duke of Clarence Memorial, Windsor; the Queen Victoria Memorial, Winchester, and many busts.

GILBERT DE LA PORRÉE, GILBERTUS PORRETANUS (1070–1154), Fr. theologian and scholastic philosopher; famous dialectician; arraigned before the council by Bernard of Clairvaux and the pope.

GILBERT FOLIOT (d. 1187), Eng. bp.; supported Matilda against Stephen; rival to Becket; bp. of Hereford, 1148, of London, 1163.

GILBERT or **KINGSMILL ISLANDS** (0°, 175° E.), archipelago in Pacific; belongs to Britain.

GILBERT, MARIE DOLORES ELIZA ROSANNA, LOLA MONTEZ (1818–61), Irish adventuress; achieved fame as a 'Spanish' dancer; became mistress of Ludwig I. of Bavaria; banished; subsequently performed in America and Australia; devoted her last years to the care of female outcasts.

GILBERT OF SEMPRINGHAM, ST. (d. 1189), Eng. ecclesiastic; founder of the Gilbertine Order of canons regular and nuns.

GILBERT, SIR HUMPHREY (*c.* 1539–83), Eng. sailor; joined fruitless voyage of discovery, 1578; took Newfoundland, 1583; founded Eng. colony at St. John's, and was drowned on way home.

GILBERT, SIR JOHN (1817–97), Eng. painter of hist. pictures, including 'Joan of Arc,' 'Murder of Becket,' 'Agincourt,' etc., hence called 'the Scott of painting'; also celebrated for illustrations to Shakespeare.

GILBERT, SIR JOSEPH HENRY (1817–1901), Brit. chemist; valuable research in agricultural chemistry; instituted nitrogen treatment of soil.

GILBERT, SIR WILLIAM SCHWENCK (1836–1911), Eng. playwright and humorist; first achieved distinction with his *Bab Ballads* and such plays as *Pygmalion and Galatea*, *Sweethearts*, and *Dan'l Druce*; and subsequently, in conjunction with Sir Arthur Sullivan, as the librettist of the world-famous 'Savoy operas,' the first of which was produced in the early seventies; knighted, 1907.

GILBERT, or **GYLBERDE, WILLIAM** (1540–1603), physician to Queen Elizabeth, and a careful and accurate chemist. He studied terrestrial magnetism and wrote the earliest treatise on magnetism, a very valuable work.

GILBERTINES, see GILBERT OF SEMPRINGHAM, ST.

GILBEY, SIR WALTER, 1st Bart. (1831–), Eng. wine merchant; one of the founders of the firm of W. & A. G.; noted horse-breeder and agriculturist.

GILCHRIST, ALEXANDER (1828–61), Brit. biographer; wrote *Life of Etty*, *Life of Blake*.

GILDAS, GILDUS (*c.* 516–70), earliest Eng. historian; wrote *De excidio Britanniæ liber querulus*, history of Britain from Rom. invasion to VI. cent.

GILDER, RICHARD WATSON (1844–1909), sometime editor of *The Century Magazine*, and a voluminous writer of lyrical verse; *Collected Poems* (1908).

GILDERSLEEVE, BASIL LANNEAU (1831–), Amer. scholar; prof. of Gk., Johns Hopkins Univ., Baltimore; author of *Latin Grammar*, and *Syntax of Classical Greek*.

GILDING, the art of decorating objects with leaf or powdered gold, is of very early origin, and was practised by the Hebrews, Romans, and other ancient nations. The modern methods are of various kinds, but in the best gilt-work the surface is carefully prepared with adhesives and other substances, after which gold leaf is applied.

GILDS, see GUILDS.

GILEAD (*c.* 32° 25′ N., 35° 58′ E.), mountainous region, E. of Jordan, Palestine; general elevation, 2500 ft.; highest point, Ramoth-Gilead, 3597 ft.

GILES, ST., GIL or GILLES, abbot who founded hermitage of St. Gilles, France; lived about VII. cent.; festival, Sep. 1.

GILFILLAN, GEORGE (1813–78), Scot. author and lecturer; pub. *Gallery of Literary Portraits*; *Martyrs and Heroes of the Scottish Covenant.*

GILGAL, various places in Palestine. Most noted was sacred site near Jericho; another is in Sharon, a third near Bethel.

GILGAMESH, legendary regal hero of a Babylonian epic, who, stricken with disease, applies to Ut-napishtim, a survivor of the Deluge, for a cure. The latter refers him to a herb which gives immortality, but he is robbed of this by an evil spirit.

GILGIT (35° 54′ N., 74° 23′ E.), an outlying province in extreme N.W. of India, under sovereignty of Kashmir, and embracing part of basin of river Gilgit; mountainous country, intersected by narrow valleys and with numerous glaciers and ice-fields; separated from Chinese frontier by mountain range; station of Gilgit stands *c.* 4890 ft. above sea-level. G. forms a *wasarat* of Kashmir State; also headquarters of Brit. political agent, responsible to Ind. government for administration of outlying districts. People are a mixed race, speaking different languages, but generally classed under name of Dards. Pop. *c.* 17,000.

GILL, JOHN (1697–1771), Eng. Baptist preacher and author; noted Hebrew scholar and theologian.

GILLES DE ROYE (d. 1478), Flem. monk; author of valuable *Annales Belgici.*

GILLESPIE, GEORGE (1613–48), Scot. Presbyterian clergyman; protested against episcopal innovations in Scotland, and against king's interference in religious affairs; chosen Moderator of Gen. Assembly, 1648.

GILLESPIE, THOMAS (1708–74), Scot. preacher; deposed by Gen. Assembly, he founded the 'Relief Church' (1761), subsequently incorporated in the United Presbyterian Church.

GILLIE, Scot. Highlander, who serves as outdoor attendant.

GILLIES, JOHN (1747–1836), Scot. historian and scholar; trans. several of Aristotle's works; wrote *History of Ancient Greece* (1786).

GILLINGHAM.—(1) (51° 2′ N., 2° 17′ W.) market town, Dorsetshire, England. Pop. 3380. (2) (51° 18′ N., 0° 33′ E.) town, on Medway, Kent, England; brick and tile manufactures. Pop. (1911) 52,252.

GILLOTT, JOSEPH (1799–1873), Eng. manufacturer; founded (*c.* 1830) the famous steel-pen business which bears his name.

GILLRAY, JAMES (1757–1815), Eng. caricaturist; s. of a soldier; began life as engraver, and after hard struggles became noted as one of the greatest of Eng. comic artists. His works are remarkable for exquisite finish. The chief butts of his satire, apart from social follies, were George III. and Napoleon. He was intemperate in his habits, and d. insane.

GILLYFLOWER, originally meant the *clove, Dianthus caryophyllus,* used in spiced wine. *Stock* and many *Cruciferæ* are now called G's.

GILMAN, DANIEL COIT (1831–1908), Amer. scholar; first pres., Johns Hopkins Univ., Baltimore, U.S.A. (1875–1901), where the result of his labours was such as to exercise a marked influence on education; first pres., Carnegie Institution, Washington (1901–4).

GILPIN, BERNARD (1517–83), 'Apostle of the North,' was so called from his preaching excursions in the N. counties of England; rector of Houghton-le-Spring, Durham, where he founded and endowed grammar school; renowned for hospitality and benevolence; educated many poor children.

GIMBALS, two brass rings used to suspend a compass, so as to keep it horizontal.

GIMP, stiff embroidery in which cord, or metallic threads, are overlaid with silk, wool, or cotton.

GIN, see SPIRITS.

GINCKELL, see GINKEL, GODART VAN.

GINDELY, ANTON (1829–92), Ger. historian; notable for his writings on the Thirty Years War.

GINGER, the dried and scraped root of *Zingiber officinale,* natural order, *Scitamineæ,* comes from the E. and W. Indies in branched pieces 3 inches long, of pale buff, striated, fibrous appearance; has an agreeable aromatic odour and a strong pungent taste; is used as a *stomachic, carminative,* and flavouring agent.

GINGHAM, a variety of printed cotton cloth; colloquial name for umbrella.

GINGI, GINGEE (12° 16′ N., 79° 26′ E.), rock fortress, S. Arcot, Madras, India.

GINGUENÉ, PIERRE LOUIS (1748–1815), Fr. author; wrote an important *Histoire Littéraire d'Italie* (1811–24).

GINKEL, GODART VAN (1630–1703), 1st Earl of Athlone; Dutch soldier; came to England with William of Orange; reduced Ireland to submission, 1691; distinguished in wars of Grand Alliance and Span. Succession.

GINKGOALES, see GYMNOSPERMS.

GINSBURG, CHRISTIAN DAVID (1831–), Hebrew scholar; famed for critical studies on the Massorah.

GINSENG is the root of *Panax ginseng,* natural order, *Araliaceæ,* from Korea. Chinese believe it restores strength, but it has no pharmacological action.

GIOBERTI, VINCENZO (1801–1852), Ital. philosopher and statesman; accused of conspiracy, 1833, and exiled; returned, 1848; became pres. of Chamber of Deputies; Prime Minister, 1849. G. wrote *Introduzione allo Studio della Filosofia* and other philosophical works; may be called a neo-Platonist.

GIOJA, MELCHIORE (1767–1829), Ital. economist and philosopher; imprisoned on charge of political conspiracy; his work was largely statistical; wrote several books.

GIOJOSA (38° 18′ N., 16° 25′ E.), small town, Calabria, Italy; corn, wine, oil. Pop. 10,000.

GIOLITTI, GIOVANNI (1842–), Ital. politician; head of Treasury, 1889; Premier, 1892; compelled to resign because of bank scandals, 1893; again premier, 1903–5, 1906–9, 1911– .

GIORDANO, LUCA (1632–1705), Ital. artist; notorious for his rapidity with the brush; spent many years at the Span. court, where he acquired great wealth, which he afterwards distributed in charity.

GIORGIONE (*c.* 1477–1511), Ital. artist; b. Castelfranco; of obscure parentage; went to Venice in early youth, where he is said to have studied under Giovanni Bellini, and had Titian for a fellow-pupil; became one of the greatest masters of the Venetian school; besides devotional pictures, painted many others expressive of romantic feeling and the joy of life, and was celebrated for the splendour of his landscape backgrounds. Much of his work is in fresco, and many of his easel-pictures are in the galleries of Venice, Dresden, Berlin, and Paris. See PAINTING.

GIOTTO DI BONDONE (*c.* 1266–1337), Ital. artist and architect; b. Vespignano, near Florence; s. of a peasant; said to have been seen by Cimabue, drawing a sheep upon a stone whilst tending flocks, and taken to Florence to be trained in art. Under careful tuition his artistic genius rapidly developed, and he subsequently became one of the greatest of the early Ital. artists. His works are chiefly frescoes, and deal with allegorical subjects or incidents from the lives of the saints. Fine examples of his work are twenty-eight frescoes illustrating the life of St. Francis, at Assisi; and other famous works showing his later development are to be seen at Rome, Padua, and Florence. G. was also famous as an architect, and held an official appointment in Florence. He designed the world-famous Campanile there, which is associated with his name, but did not live to see it finished. It was completed, after his death, by Andrea Pisano and Francesco Talenti.

Giotto, by De Selincourt (1905), F. M. Perkins (1910).

GIOVINAZZO, town, Bari, Italy; harbour on Adriatic; trade, brandy and ropes. Pop. 12,000.

GIOZA DEL COLLE, town, Reggio di Calabria, Italy; trade, wine and oil. Pop. 11,0

GIPPSLAND, district, S.E. Victoria, Australia; area, *c.* 14,000 sq. miles; grazing and mining.

GIRAFFE FAMILY (*Giraffidæ*), group of ungulate, artiodactyle ruminants, comprising two African genera, giraffes (*Giraffa*) and okapi (*Ocapia*), which have three bony, skin-covered skull prominences, separated from the bony substratum, one in front and two behind; feet are two-hoofed; no upper canines or incisors. GIRAFFES have a long tongue, long legs and neck—tallest of mammals—and browse on tall trees. OKAPI have shorter necks and legs; male alone has horns, which at apex come through skin. *Palæotragus* (or *Samotherium*) and *Sivatherium* are extinct forms, found in Lower Pliocene deposits. See PECORA.

GIRALDI, GIGLIO GREGORIO (1479–1552), Ital. scholar; learned Gk. under Chalcondylas and wrote works on classical lit. and antiquities.

GIRALDI, GIOVANNI BATTISTA (1504–73), Ital. poet; author of *Ercole* (epic), *Orbecche* and other tragedies, and *Hecatommithi* (short stories), some of which served as the basis of plays by Shakespeare and others.

GIRALDUS CAMBRENSIS (*c.* 1146–1220), Welsh historian; his election to see of St. David's was never confirmed; wrote *Topographia Hibernica*, *Itinerarium Cambriæ*—works of considerable value, though marked partisanship.

GIRANDOLE, a table candelabrum with branching lights; usually of silver or other metal.

GIRARD, STEPHEN (1750–1831), Amer. philanthropist; b. Bordeaux, France; settled in Philadelphia, U.S.A., 1776; amassed fortune in commerce; founded a bank, 1812; lent government large sum, 1814; did great service during epidemics, 1793, 1797–98; left money to charities, founding orphan college.

GIRARDIN, DELPHINE DE (1804–55), Fr. poetess, novelist, and dramatist of some eminence. Her novels include *La Canne de Monsieur de Balzac*; and her plays, *Cléopâtre*, *Lady Tartufe*, and *Le Chapeau d'un horloger*.

GIRARDIN, ÉMILE DE (1802–81), Fr. journalist; wrote novel *Émile*, supporting cause of illegitimate children; founded popular periodicals; m. Delphine Gay, the authoress.

GIRARDON, FRANÇOIS (1628–1715), Fr. sculptor; decorated Versailles Palace; chief work is Richelieu's tomb in the Sorbonne, Paris.

GIRART DE ROUSSILLON (IX. cent.), Burgundian hero of a XII.-cent. romance; famed, like his wife, Bertha, for valour and piety.

GIRASOL, mineral; usually called fire-opal; dark red. See OPAL.

GIRGA, GIRGEH (28° 19′ N., 31° 59′ E.), town, on Nile, Upper Egypt; has very ancient R.C. monastery; pottery. Pop. 17,913.

GIRGENTI (37° 18′ N., 13° 23′ E.), town (ancient *Agrigentum*), Sicily; bp.'s see, cathedral; sulphur mines in vicinity. Pop. 25,024.

GIRISHK (31° 45′ N., 64° 22′ E.), village and fort, on river Helmund, Afghanistan.

GIRNAR (21° 30′ N., 74° 42′ E.), sacred hill, Kathiawar, W. India; numerous ruined Jain temples.

GIRODET DE ROUSSY, ANNE LOUIS (1767–1824), Fr. artist; pupil of David; pioneer of the romantic in Fr. art; amongst his best-known works are *Endymion*, *Danaë*, and *Atala au Tombeau*.

GIRONDE (44° 50′ N., 0° 30′ W.), maritime department, S.W. France, formed from part of old province Guyenne; chief rivers, Dordogne and Garonne; surface generally flat, W. portion along sea coast consisting of sandy dunes planted with pines, and interspersed with lagoons, from which large quantities of salt are obtained; extensive vineyards; some grain, vegetable, and fruit-growing; varied manufactures; chief product, wine; capital, Bordeaux. Area, 4140 sq. miles. Pop. (1911) 829,095.

GIRONDISTS, Fr. political party in Revolutionary times, so called because several leading members represented province of Gironde; guiding spirit was Madame Roland, wife of a deputy; among conspicuous members were Brissot, Vergniaud, Condorcet, Guadet, Isnard, Gensonné, Barbaroux. They formed ministry in 1792; consented to king's death, but had no part in Sep. massacres, and wished to establish orderly government. The invasion of France by Austrians and Prussians threw chief power into hands of extremists, and in Convention formed for government of nation no G. was a member; their moderation had excited suspicion, and they fell victims to fanaticism of Committee of Public Safety, over forty being guillotined.

Lamartine, *Histoire des Girondins* (Eng. trans.).

GIRTIN, THOMAS (1775–1802), Eng. artist; friend of Turner, and a pioneer of modern Eng. water-colour painting. His landscapes and etchings are valued by collectors.

GIRTON COLLEGE, college for women affiliated to Cambridge University; about 160 students; may attend University classes.

GIRVAN (55° 14′ N., 4° 51′ W.), market town, watering-place, Ayrshire, Scotland; herring fishing; weaving. Pop. (1911) 4467.

GIRY, ARTHUR (1848–99), Fr. writer; wrote *Manuel de diplomatique*, part of *Monumenta Germaniæ historica*; also produced new edit. of Theophilus's *Diversarum Artium Schedula*, and Carolingian chronicles.

GISBORNE (38° 45′ S., 178° 1′ E.), seaport, on Poverty Bay, New Zealand; landing-place of Captain Cook, 1769. Pop. 6000.

GISORS (49° 15′ N., 1° 53′ E.), town, France; cloth and leather manufactures. Pop. 4800.

GISSING, GEORGE ROBERT (1857–1903), Eng. novelist and critic; most of his novels deal with life's seamy side, but, in his later work, there was a brighter outlook. He also wrote a study of Dickens.

GITSCHIN (50° 27′ N., 15° 23′ E.), town, Bohemia, Austria; scene of defeat of Austrians by Prussians, 1866. Pop. (1911) 10,204.

GIUDICI, PAOLO EMILIANO (1812–72), Ital. author; wrote *History of Ital. Lit.*

GIUGLIANO, town, Naples, Italy. Pop. 15,000.

GIULIO ROMANO, GIULIO DI PIETRO FILIPPO DE' GIANNUZZI (*c.* 1492–1546), Ital. artist and architect; b. Rome; ed. under Raphael, and became, after his master, head of the Rom. school; assisted Raphael in many important works in the Vatican, and the 'Battle of Constantine' and 'The Apparition of the Cross' were entirely from his brush. Some of his greatest works were executed for the ducal palace at Mantua; he restored the Cathedral; and, being a prolific worker in several mediums, he lived in affluence.

GIUNTA PISANO (d. *c.* 1235), Ital. painter whose *Crucifix* (at Pisa) is treasure of archæology rather than art; lacked technique.

GIURGEVO, Rumanian GIURGIU (43° 53′ N., 25° 56′ E.), town, river port, on Danube, Rumania; exports timber, grain. Pop. 15,000.

GIUSTI, GIUSEPPE (1809–50), Ital. satirical poet; writer of remarkably original gifts; first won notoriety with *La Ghigliotteria* ('The Guillotine'). Other works include *Gingillino*, an attack upon the Treasury administration, and *Sant' Ambrogio*. Eng. trans. by W. D. Howells and Mrs. T. A. Trollope.

GIUSTINIANI, AGOSTINO (1470–1536), member of notable Ital. family; pub. polyglot edit. of Psalter; prof. of Arabic and Hebrew at Paris. BERNARDO G. (1408–89) wrote on Venetian history. LORENZO G. (1380–1465), patriarch in 1451. PAVLO G. (1444–1502) was famous preacher; wrote exegetical works. VINCENZO G. (XVII. cent.) formed art collection.

GIVET (50° 9′ N., 4° 49′ E.), town, on Meuse, Ardennes, France; formerly fortified; lead-pencils. Pop. 7000.

GIVORS (45° 35′ N., 4° 46′ E.), town, Rhône, S.E. France; iron and glass manufactures; coal mines.

GJALLAR (Scan. myth.), the horn which Heimdall blows to give notice to the gods of those arriving at the bridge, Bifröst.

GLACE BAY (46° 12′ N., 60° W.), city, port entry, Cape Breton Island, Nova Scotia, Canada; coal-fields. Pop. 7000.

GLACIAL PERIOD, Ice Age, sometimes called Pleistocene Period (*q.v.*), but this term is generally used only in connection with the flora and fauna of the period.

The G. P. refers to that epoch of the post-Tertiary system during which nearly all parts of the globe N. of lat. 50° were under ice. Traces of glacial action are found chiefly in the Highlands of Scotland, the Jura Mountains, Black Forest, Himalayas, and N. America. The most important member of the Glacial strata is the Boulder Clay (*q.v.*), an unstratified clay in which are embedded boulders marked by glacial action, which may also be seen on rock surfaces and Giants' Kettles (*q.v.*).

The Glacial Deposits are developed on a large scale in N. America where, as in Europe, the clays are separated by the interglacial deposits.

GLACIER is a large mass of snow which under pressure becomes granular and is finally transformed into dense clear ice, which still retains the granular crystalline structure. Snow collects above the snow-line, and when there is a certain weight moves downwards, reaching a point where the melting is not balanced by the *snow-fall*, *i.e.* below the *snow-line*. Here it is termed a g., its form depending on the shape of the ground over which it flows.—Valley Glaciers are long and narrow.—Piedmont Glacier is a lobulated mass made by the convergence of long, narrow processes.—Cliff Glacier is formed in a hollow on the edge of a snow-field. The g. is fed from the snow-field and ends when the waste of ice is greater than the supply. The material which the g. collects after it leaves the snow-field, *morainic material*, is distributed by the streams. It is this débris which polishes the rocks, and the fragments it grinds off are called *boulder-clay* or *tile*. A *V-shaped* valley cut out by streams is transformed into a *U-shaped* valley by ice action.—Ice-Tables consist of large stones which prevent the ice below melting and remain on the top of an ice pillar. Small stones absorb heat, melt the ice, and sink into the g. When a g. reaches the sea portions break off and form icebergs (*q.v.* under Ice).

Chamberlin, *Theory of Glacial Motion* (1910).

GLACIS, natural, or artificial, slope outside a fortification.

GLADBACH, or Bergisch-Gladbach (51° N., 7° 8′ E.), town, Rhenish Prussia, Germany; paper and metal industries. Pop. (1910) 15,213.

GLADBACH, or München-Gladbach (51° 33′ N., 6° 25′ E.), town, Rhenish Prussia, Germany; centre of cotton industry. Pop. (1910) 66,410.

GLADIATORS, professional combatants who fought in arena of Rom. theatres; practice began in 264 B.C. at Rome, and spread throughout Rom. Empire, until no town of any size was without its gladiatorial combats. G's were generally slaves, prisoners of war, or condemned criminals. When a g. was so wounded as to be unable to fight any longer, his antagonist stood over him with uplifted sword ready to slay him if the spectators willed his death, which they indicated by turning their thumbs inwards. Constantine issued a decree against the barbarous practice in 325, but it did not entirely cease until the time of the Emperor Theodoric, about 500 A.D.

GLADIOLUS, a genus of herbaceous monocotyledonous plants, natural order *Iridaceæ*, belonging to the mountains of the S. hemisphere. The *corm* is solid and fibrous, the leaves long and narrow, the flowers form a terminal *spike*, are funnel-shaped with the wide end upwards.

GLADSHEIM (Scandinavian myth.), the dwelling-place of Odin, which embraces also Valhalla.

GLADSTONE (23° 50′ S., 151° 15′ E.), seaport, Clinton Bay, Queensland, Australia; gold and manganese mines.

GLADSTONE, JOHN HALL (1827–1902), Eng. chemist; investigated various points in physical and electro-chem.; popularised the *spectroscope* and pub. researches on explosives, mass action, and phosphorus.

GLADSTONE, WILLIAM EWART (1809–98), Brit. statesman; b. Liverpool; ed. Eton and Oxford, where he was prominent debater at Union at time of Reform Bill. His strong churchmanship made him look to Tory party for safety from revolutionary measures, and in 1839 he was described by Macaulay as the 'rising hope of the stern unbending Tories.' He was M.P. for Newark, 1833; Junior Lord of Treasury under Peel, 1834; Under Colonial Sec., 1835. In Peel's second administration he became successively vice-pres. (1841) and pres. (1843) of Board of Trade; had considerable share in revising Customs tariff. Resigning office in 1845, G. was outside Parliament during great Corn Law movement, which, with Cobden's struggle for free trade, attracted his attention and probably initiated his gradual change from Toryism to Liberalism; M.P. for Oxford, 1847; first great speech delivered, 1852, in reply to scathing attack by Disraeli during debate on latter's Budget. Chancellor of Exchequer in 1853, he made first of his remarkable Budget speeches, and proved his financial genius; High Commissioner to Ionian Isles, 1859; again became Chancellor under Palmerston, 1859; abolished paper duty, 1861; became leader of Lower House, 1865; failed to carry Reform Bill. G. succeeded Lord Russell as Liberal leader in 1867; while in opposition carried bill for abolition of Church rates; became Prime Minister, 1868; disestablished Irish Church, 1869; passed Education and Irish Land Acts, 1870, and Ballot Act, 1872. In 1873 he failed to carry bill concerning Irish University Education, and in 1874 he dissolved Parliament and resigned Liberal leadership.

'Bulgarian Atrocities' in 1875 led him to attack Disraeli's foreign policy and defence of Turks. Again becoming Premier, 1880, he turned attention to Ireland, passed Coercion and Land Acts, 1881, Crimes Act, 1882. Khartum disaster of 1885 aroused hostility to government, on which votes of censure were moved by Opposition; defeated on Budget Bill, 1885, G.'s government resigned. He again became Premier, 1886; his introduction of Home Rule Bill caused split in Liberal party, and G. again resigned, and for six years remained in opposition, once more taking office as Premier in 1892; having failed to carry his Home Rule Bill in 1894, he retired to private life. One of the greatest of Parliamentary debaters, G. had great gift of eloquence, a genius for finance, a scholarly mind, and a deeply religious nature.

Morley, *Life of Gladstone* (1903).

GLAIR, glazing preparation, made with white of egg and other ingredients, used in bookbinding.

GLAISHER, JAMES (1809–1903), Brit. meteorologist; did balloon research on humidity of air; *Meteorology of England* (1860) and other works.

GLAMIS (56° 37′ N., 3° 1′ W.), village, Forfarshire, Scotland; castle associated with Shakespeare's *Macbeth*.

GLAMORGANSHIRE (51° 35′ N., 3° 30′ W.), most southerly county, Wales. Bounded N. by Brecknockshire, W. by Monmouth, S. by Bristol Channel, E. by Carmarthen. Area, 855 sq. miles. Most important county in Wales, owing to enormous mineral productions. N. is rugged mountainous region (highest point, Llangeinor) with rich coal-fields; in S. are fertile wooded valleys, finest being Vale of Glamorgan; beautiful waterfalls in valley of Neath, but much of beauty of county destroyed by industrial operations. Magnificent cliff scenery on coast; chief headlands, Nash and Lavernock Points, Worms and Mumble Heads, Whiteford Point; indentations, Swansea Bay, Burry estuary, mouths of Taff and Ogmore. Principal rivers, Rhymney, Taff, Tawe, Neath, flow into Bristol Channel. Chief towns include Cardiff, Swansea, Cowbridge, Merthyr-Tydvil, Neath, and Aberavon. Fertile soil, crops raised; sheep and ponies reared; dairy-farming, fishing.

Mining chief industry. Anthracite, coking-coal, ironstone, and limestone produced; tin, copper, and lead smelted; machines, chemicals, tools, paper, etc.; Manufactured iron and steel-works. Among many fine ruined castles are those of Caerphilly, Castell Coch, Coity, Llantrosant, Llanblethian, Newcastle, Swansea, and Pennard; castles of Cardiff, St. Donat's, St. Fagan's, Penrice, Dunraven, and Fonmon are restored; there are several interesting churches; large number of sculptured stones and some famous bone-caves in Gower. Pop. (1911) 1,130,818.

GLANDERS (FARCY), contagious disease occurring in horses, asses, and mules, and communicable by them to man, caused by a bacillus, the *Bacillus mallei*; in man it usually starts at the hands or face, swellings appear which break down and ulcerate, accompanied by fever and a feeling of general pain. The swellings and ulcerations may also occur later in internal organs, and blood-poisoning develops, usually leading to death. The treatment is to excise the affected part before the disease becomes generalised.

GLANVILL or **GLANVIL, JOSEPH** (1636–80), Eng. philosophic writer; wrote *The Vanity of Dogmatising, Philosophical Considerations concerning the Existence of Sorcerers and Sorcery.*

GLANVILL, RANULF DE (d. 1190), chief justiciary of England; author of the historically valuable legal work, *Tractatus de Legibus et Consuetudinibus Regni Angliæ*; Eng. trans by John Beames (1812).

GLAPTHORNE, HENRY (fl. 1635–47), Eng. poet and dramatist; author of *Whitehall* (1642) and other poems displaying Royalist sympathies, also some tragedies and comedies; *Plays and Poems* (1874).

GLARUS, GLARIS (47° 2′ N., 9° 4′ E.), canton, Switzerland, between Schwyz and St. Gall; surface almost entirely mountainous, rising in the Tödi to height of 11,887 ft.; traversed by Linth and affluents; severe climate; occupation chiefly pastoral; sheep and cattle-rearing, cheese-making; cotton manufactures; joined Swiss Confederation, 1352. Capital, GLARUS; textile manufactures. Pop. (1910), canton, 33,316; town, 5089.

GLAS, GEORGE (1725–65), Scot. merchant adventurer; founded Port Hillsborough, trading station on N.W. coast of Africa; murdered by mutinous sailors.

GLAS, JOHN (1695–1773), Scot. cleric; b. Auchtermuchty, Fife; ordained 1719; founded sect known as Glasites (*q.v.*); deposed from ministry for renouncing Presbyterian tenets in 1730; wrote *Testimony of King of Martyrs.*

GLASGOW (55° 51′ N., 4° 16′ W.), city, chief commercial and manufacturing centre of Scotland, situated on both sides of river Clyde, some 22 miles from estuary, in county of Lanark; second city in British Isles; incorporated Govan, Partick, Pollokshaws, and adjoining districts. G. is a well-built town, masonry solid and substantial; older parts squalid but newer districts pleasant; many streets are broad and open, the most important being Sauchiehall, Buchanan, Union, and Argyle Streets. Of the many squares, most important are: Glasgow Green (in S.E.), with Nelson's monument, People's Palace, museum, and art gallery; George Square, surrounded by handsome public and municipal buildings and statues; West End Park (crossed by Kelvin River), contains Stewart Memorial and magnificent Corporation Art Galleries; others are Queen's Park in S.W., and Alexandra Park. There are many handsome buildings, but the only one of any historical interest is the Cathedral, situated in N.E., built in Early Eng. Gothic style, and with beautiful crypt and stained-glass windows. G. University (now an imposing building on Gilmorehill) was founded *c.* 1451 by Bishop Turnbull. There are three terminal railway stations, and in every direction electric tramways extend long distances. G. has made rapid strides in municipal enterprise; the Town Council owns the tramways, electric light, gas, and water-supply (brought from Loch Katrine).

G. owes much of its prosperity and progress to its proximity to rich fields of coal and ironstone. The harbour extends from Glasgow Bridge to joining of Kelvin and Clyde, and there are six miles of quays. Both banks of the Clyde are lined for many miles with shipbuilding yards and engineering works. Shipbuilding is the great industry—vessels of every type being built, from liners and battleships downwards. Iron-founding is an industry of vast importance; manufactures of steam tubes—boilers, locomotives, machinery, etc.; muslin and other textiles; chemicals, paper, glass, and china works; spinning, dyeing, brewing, and many other industries.

Although only of much commercial importance since Union of Scotland and England, G. dates back to *c.* 560. Pop. (1911) 784,455; with extensions (1912), over 1,000,000.

Bell and Paton, *G., its Municipal Organisations*; Muir, *Glasgow in 1901*; Primrose, *Mediæval Glasgow.*

GLASGOW, ELLEN ANDERSON GHOLSON (1874–), Amer. novelist.

GLASITES, SANDEMANIANS, Prot. sect, originated (1725) in Scotland by John Glas (*q.v.*); aimed at independent church government and simple doctrine.

GLASS is a complex solution of many substances, chiefly *silicates* and *borates.* Solidification occurs without any change in structure, and g. is often spoken of as a 'congealed liquid.' G. is a typical vitreous body with an amorphous structure. Although a large number of bodies can be obtained in the vitreous state, very few are used in g., because with many the cooling of the molten solution cannot be carried out quickly enough to avoid a component crystallising out at its own freezing-point (*devitrification*). Cost, as well as the risk of *devitrification* and the temperature of the furnaces, also restricts the choice of the substances used in g. manufacture.

Industrially, therefore, g. is composed of mixed *silicates* of *bases*, those most in use being the *alkalies* (*Sodium* and *Potassium*), the *alkaline earths* (*Calcium, Magnesium, Strontium*, and *Barium*), and oxides of *Iron, Aluminium*, and *Lead.* The properties of the g. depend on the base chosen, as does also its behaviour during manufacture. *Lead* and *Barium* give weight and brilliancy, and increase the fusibility and softness during manufacture. *Magnesium* and *Aluminium* give a g. which stands red heat without softening. The *alkalies* increase the fusibility of g. and ensure its easy working, but reduce the chemical resistance of the finished article, which is hygroscopic and apt to decompose rapidly in a damp atmosphere. Even good g. —that is, g. containing less than 15 % alkali—is not stable. The prolonged action of water on the best g. extracts a small quantity of alkali, and steam actively corrodes it. Water and alkali remove silica. Water and acid tend to protect g., since it prevents the formation of *silicon hydrate*, which permits the water to dissolve out the alkali. *Phosphoric* and *Hydrofluoric Acids* both corrode g.; the latter is used to etch g. *Carbonic Acid* in the presence of water dissolves the surface of g., rendering it liable to decomposition by bacteria. G. is photo-sensitive. Light produces colour changes in it, bringing out a brown or purple tint in g. made with manganese. The *Tensile Strength* of g. is said to be about 2½ to 5 tons per sq. inch, and the *Crushing Strength* 3 to 8 tons per sq. inch. These two properties are both affected by rate of cooling. The hardness depends on the rate of cooling as well as on the constituents. G. is not a good conductor of heat, and the thicker it is, the more easily it is fractured, since the inner wall expands, while the outer wall, remaining stationary, suffers from this tension and fractures. This has to be overcome in the manufacture of boiler gauge glasses, glass and metal junctions, etc. The harder g. is, the better it acts as an electric insulator. Transparency is the most essential property of g., and it is estimated that over 90 % of it

is used for this. Even the best g. absorbs a certain amount of light.

The manufacture of g. is controlled by the above facts, and the constituents, melting, and rate of cooling are so chosen as to adapt the g. as nearly as possible to the required object. The quality of the g. decreases with the impurities in the raw material; therefore, the raw material should be pure and uniform. The *silica* is got from sand, which must be dry and of uniform grain. For the best g. it must contain less than ·05 % of *Iron* and not more than ·05 % of other impurities. Sandstone is difficult to grind to uniform grain, and therefore cannot be used. Felspar is too expensive. The *alkali* used in the best g. is obtained from the *Le Blanc* or *Ammonia Soda* process, while *salt-cake* is used in the manufacture of inferior g. The *calcium* used in *sheet-g.*, *pressed* and *blown g.* is obtained as the carbonate or as slaked lime. The *Lead* for *flint g.* is introduced as *red lead*. For the special scientific, optical, and technical glasses specially prepared salts of *Barium*, *Magnesium*, and *Zinc* are employed. *Aluminium* is added in the form of *felspar* or as *hydrate*. The *tanks* or *pots* used in the manufacture are made of *fireclay* if they have to resist heat and the solvent action of g., or of *silica brick* if they have only the latter to withstand.

The furnaces are fed by gas generated in gas producers. In the furnace the gas meets with hot air and the mixture burns rapidly, and if properly proportioned gives very high temperatures. The materials are mixed very carefully, and when the mixture is uniform in colour and material the heating commences. The *silica* is supposed to act as an acid; all the *carbon dioxide* is expelled, and *silicates* of *sodium* and *calcium* remain in combination and solution with one another, so that the contents of the furnace are a mass of transparent glass with many bubbles. The bubbles are disengaged by boiling, the g. then being '*fine*.' The surface is skimmed and the temperature reduced. The g. is now ready to be worked. If the g. is to be blown it is removed by *gathering*. A hot rod is dipped repeatedly into the mixture, and when some pounds have adhered the worker blows through the rod and a hollow sphere of g. is obtained. From this sphere articles are made by pressure, moulds or blocks with or without further blowing.

HAND-BLOWN G. has not the regularity of mould-made g., but contact deprives the latter of its brilliancy. PRESSED G. is made by pressing the g. into the mould by means of a metal plunger. The articles have to be made in pieces to allow of the extraction of the plunger. They lack brilliancy, and the joins can be detected. ROUGH PLATE G. is made by ladling the molten mass on to a table and rolling it with a roller, after which it is cooled by passing through a tunnel, the temperature of which decreases from one end to the other. POLISHED PLATE G. is cooled in special chambers very slowly, and the surface is then ground, smoothed, and polished. CROWN G. was gathered into a hollow sphere, which was flung on to a rotating plate. The disc thus obtained had a thick centre with wavy lines surrounding it, but lacked all surface marking, such as rolled g. has. It is now used only for microscope slides and cover-glasses, where its marked surface is valuable. OPTICAL G. is the only g. which is allowed to cool *in situ*. This secures perfect homogeneity. Transparency, absence of colour, chemical solubility, and special refractive index are other essential characters.

The usual method of colouring g. articles is to heat and apply small rods of coloured g. in the required quantity. *Copper* and *gold* in the reduced state colour g. ruby, that from gold being the lighter, more regular and uniform in tint. *Chromium* tints g. green; *uranium*, a fluorescent yellow; *manganese*, pinkish purple; *cobalt*, a deep blue. *Aluminium* imparts an opal effect. *Metallic lustres* are got by fusing a layer of particles of the metal on to the top of the g.

Shenstone, *Glass - Blowing Methods*; Rosenhain, *Glass Manufacture*.

Stained Glass is an art of N. Europe which arose in the XII. cent., and reached its turning-point in Tudor times. The development of mosaics and frescoes on the walls of Ital. churches rendered it an unnecessary art in that country, consequently the finest examples are to be found in the older cathedrals and churches of France and England. The best work is now done, as it was in the Middle Ages, by the method known as 'mosaic glass.' First a design is prepared representing the figures in the proposed picture; then the glazier works out the main portions in various kinds of coloured glass; after which the artist develops in pigment all the delicate shadings of draperies, the lines of the figures, etc., and when this is completed the colours are fixed by firing. 'Mosaic glass' may be distinguished by the characteristic way in which the leads, or *calms*, do not follow the outlines of the figures, but boldly intersect them, enclosing rich and variegated plots of colour. An inferior method, known as 'enamelled glass,' proceeds by painting entirely on white glass and fusing the pigments to fix them. The leads, in this case, follow the contours of the design, and are concealed; but transparency is lost and the effect is blurred.

L. F. Day, *A Book about Stained and Painted Glass* (1909); Eden, *Ancient Stained and Painted Glass* (1913).

GLASSBRENNER, ADOLF (1810–76), Ger. humorist; author of *Neuer Reineke Fuchs*, *Gedichte*, *Die verkehrte Welt*, etc.

GLASS-EELS, see EELS.

GLASSITES, see GLASITES.

GLASSIUS, SALOMO (1593–1656), Ger. Biblical commentator who took important part in religious organisation of Gotha.

GLASSWORT, genus of chenopodiaceous herbs, found on seashore; ash gives soda.

GLASTONBURY (51° 9′ N., 2° 33′ W.), municipal borough, Somersetshire, England. Tradition has it that Joseph of Arimathea brought here Holy Grail and founded first Christian Church in Britain. Abbey, erected VIII. cent., was destroyed by Danes and refounded by St. Dunstan (X. cent.); again destroyed (XII. cent.) and rebuilt. Other notable buildings are tower on Tor-Hill, Pilgrims' Inn (XV. cent.), Tribunal, and Abbots' Barn; quaint town, with many houses built of stones from cathedral. Manufactures include mats, gloves, pottery. Pop. (1911) 4251.

GLATIGNY, JOSEPH ALBERT ALEXANDRE (1839–73), Fr. poet; author of *Les Flèches d'or* and *Gilles et pasquins*.

GLATZ (50° 26′ N., 16° 39′ E.), fortified town, Silesia, Germany; machinery, textiles. Pop. (1910) 17,095.

GLAUBER'S SALTS, SODIUM SULPHATE (Na_2SO_4, $10H_2O$), a transparent, colourless, crystalline, prismatic substance, with a salt taste, obtained by the action of sulphuric acid on sodium chloride (common salt) and other sodium salts; first described by Johann Rudolf Glauber (1603–68); it occurs native in parts of Spain, western N. America, and the Russ. Caucasus, as well as in certain mineral waters (*e.g.* Frederickshall) and sea-water. It is used medicinally as a purgative, being safe and easily taken by children.

GLAUCHAU, town, Saxony, Germany; manufactures woollen materials, calicoes, and dyes. Pop. 25,194.

GLAUCOMA, see EYE.

GLAUCONITE, green crystalline mineral occurring in mud on floor of ocean and in greensands, in some Tertiary rocks and Eocene sands, and largely in Lower Cretaceous rocks; is hydrous silicate of iron and potassium; found generally in clusters of minute particles.

GLAUCUS (classical myth.).—(1) Son of Sisyphus, torn in pieces by his own horses; (2) Lycian prince, slain by Ajax in Trojan War; (3) s. of Minos, accidentally smothered in pot of honey, but miraculously restored

to life; (4) fisherman of Anthedon (Bœotia), afterwards changed into a sea-god.

GLAUX, genus of primulaceous plants, found on seashore; pink flower; common in Britain.

GLAZING, the craft of the skilled workman, known as a glazier, who fits panes of glass into window-sashes, doors, etc. Besides various measuring and other tools, including the diamond, for cutting purposes, putty-knife, etc., the chief materials used in fixing the glass are putty, or beading. Sometimes a bed of rubber or other material is used instead of putty.

GLAZUNOV, ALEXANDER CONSTANTINOVICH (1865–); Russ. musical composer; his symphonies include *The Kremlin*, *The Forest*, and *Stenka Razin*.

GLEBE, in England, land pertaining to an ecclesiastical benefice, from which the incumbent derives his income. In Scotland glebe is regulated by the Glebe Lands (Scotland) Act, 1866.

GLEE, an unaccompanied vocal composition for three or more voices; in vogue at the beginning of XVIII. cent.

GLEET, see GONORRHŒA.

GLEIG, GEORGE (1753–1840), Scot. episcopalian bp. of Brechin, 1808; primus of Scotland, 1816; a zealous and reforming prelate.

GLEIWITZ (50° 17′ N., 18° 40′ E.), town, Pruss. Silesia, Germany; iron foundries; glass-works. Pop. (1910) 66,910.

GLEN GREY (31° 30′ S., 27° E.), division of Cape province, S. Africa; native land settlement. Pop. (1911) 50,570 (whites, 773).

GLENALMOND (56° 27′ N., 3° 50′ W.), village, Perthshire, Scotland; seat of Trinity Coll. (Episcopal).

GLENCAIRN, EARLS OF.—William, 4th earl, supported Henry VIII.'s Scot. policy. Alexander, 5th earl, supported Reformation. William, 9th earl, aided Charles II.; Chancellor of Scotland, 1660. James, 14th earl, befriended Burns.

GLENCOE.—(1) (56° 38′ N., 4° 57′ W.) deep valley, N. Argyllshire, Scotland; scene of massacre of the MacDonalds, Feb. 1692. (2) town, Natal, S. Africa.

GLENDALOUGH (53° 1′ N., 6° 20′ W.), valley, Wicklow, Ireland; celebrated for picturesque scenery and ancient ecclesiastical ruins.

GLENDOWER, OWEN (*c.* 1359–1415), Welsh hero who opposed Henry IV., calling himself Prince of Wales; carried on harassing border warfare till 1403, when he joined the Percies, who were also in rebellion; defeated in 1405 by Prince Henry, whose capture of Harlech in 1409 ended war.

GLENELG (34° 59′ S., 138° 35′ E.), watering-place, on Holdfast Bay, Adelaide County, S. Australia. Pop. 4500.

GLENELG, CHARLES GRANT, LORD (1778–1866), Brit. statesman; as Sec. for War and the Colonies, 1835–39, he failed in treatment of Canadian difficulties; raised to peerage, 1835.

GLENFINNAN, Scot. valley, Inverness-shire; gathering-place of Prince Charlie's clans, 1745.

GLENGARIFF, or **GLENGARRIFF** (51° 44′ N., 9° 31′ W.), village, on Glengariff harbour, County Cork, Ireland; tourist resort.

GLENLIVET, Scot. valley, Banffshire; scene of Prot. victory (1574); famous manufacture, whisky.

GLENROY, Scot. valley, Inverness-shire; famous for three superimposed natural terraces, *parallel roads*, supposed shorelines of ancient lakes, different levels.

GLENS FALLS (43° 18′ N., 73° 38′ W.), village, New York, U.S.A., on Hudson River; lumber and paper manufactures. Pop. (1910) 15,243.

GLENTILT (56° 52′ N., 3° 46′ W.), Scot. valley, Perthshire; pass, Blair Athole to Braemar; geologically interesting evidence of denudation theory.

GLEYRE, MARC CHARLES GABRIEL (1806–74), Fr. artist; amongst his most notable canvases are *Evening*, *The Deluge*, *Ruth and Boaz*, *Minerva and the Nymphs*; a slow and careful painter, whose work is of high quality.

GLIDDON, GEORGE ROBINS (1809–57), Eng. antiquary; author of *Ancient Egypt* (1850) and other works.

GLINKA, FEDOR NIKOLAEVICH (1788–1849), Russ. author; famed for military songs, and his *Letters of a Russian Officer* (1815–16).

GLINKA, MICHAEL IVANOVICH (1803–57), Russ. composer; laid foundation of modern Russ. music; composed *A Life for the Tsar*, national opera.

GLOBE-FISHES, PUFFERS (*Tetraodontidæ*), prickly skinned, bony fishes which are capable of inflating their body to a globe shape; mostly inhabitants of tropical and temperate seas, though a few occur in large rivers.

GLOBIOCEPHALUS, see DOLPHIN FAMILY.

GLOGAU (51° 40′ N., 16° 3′ E.), fortified town, Germany, on Oder, Pruss. Silesia; centre of wool trade; various manufactures. Pop. 23,457.

GLOMERIS, a genus of Millipedes. See MYRIAPODA.

GLORIA, GLORY, first word of doxology, 'Glory be to the Father,' etc., *Gloria in excelsis* (Glory be to God on High).

GLORIOSA, genus of tropical, liliaceous, climbing plants; red or yellow flowers.

GLOSS (from Gk. *glōssa*, 'language').—The word 'gloss' means a comment or explanation of a word or passage, the writer of which is called a 'glossator'; '*glossary*' is a tabulated list of words requiring special explanation, and the maker is known as a 'glossarist.' During the Alexandrian period the glossing of the early Gk. poets became common, and amongst the notable writers engaged in the work were Philetus of Cos, Aristophanes of Byzantium, Apion, Suidas. Two famous glosses on the Lat. Vulgate are Walafrid Strabo's *Glossa Ordinaria* (IX. cent.) and the *Glossa Interlinearis* of Anselm of Laon (*c.* 1100). At a later period the glossing of works on civil and canon law was eagerly taken up by scholars, a notable example of the kind being *Corpus Juris Glossatum*, of a XIII.-cent. writer, Accursius. Subsequently the making of glosses upon a great variety of works became widespread amongst all cultured peoples. Tyrwhitt's *Glossary to Chaucer* (1775) may be referred to as an example of many modern works of the kind.

GLOSSINA, see under HOUSE-FLY.

GLOSSOP (53° 27′ N., 1° 58′ W.), market town, Derbyshire, England; cotton manufactures. Pop. (1911) 21,688.

GLOSSOTHERIUM, an extinct Edentate (*q.v.*).

GLOUCESTER.—(1) (51° 52′ N., 2° 15′ W.) city, capital of Gloucestershire, England; parliamentary and county borough and port, on Severn. Ancient historic town with beautiful cathedral, once Benedictine abbey; architecture chiefly Norman and Perpendicular; central tower, whispering gallery, and cloisters are particularly fine. Among other buildings are New Episcopal Palace, West Gate (XII. cent.), New Inn (*c.* 1450), and Guildhall. Connected with Sharpness by G. and Berkeley Canal. Shipbuilding, foundries, chemical works. Pop. (1911) 50,029. (2) (42° 34′ N., 70° 40′ W.) city and seaport, Massachusetts, U.S.A.; excellent harbour; chief seat of cod, mackerel, and halibut fisheries in U.S.; important granite quarries; settled by Eng. colonists, known as Dorchester adventurers, in 1623–25. Pop. (1910) 24,398. (3) (39° 52′ N., 75° 12′ W.) **G. City**, New Jersey, U.S.A., on Delaware, opposite Philadelphia; cotton and woollen manufactures. Pop. (1910) 9462.

GLOUCESTER, EARLDOM AND DUKEDOM OF, dukedom held by various royal princes; last duke d. 1834. Earldom was formerly held by Clares and Despensers.

GLOUCESTER, GILBERT DE CLARE, EARL OF (1243–95), Eng. soldier; prominent figure in the baronial wars of Henry III.'s time, and instrumental in securing the accession of Edward I. (1272).

GLOUCESTER, HUMPHREY, DUKE OF

(1391–1447), Eng. soldier; s. of Henry IV. and Mary de Bohun, present at Agincourt, 1415; acted as regent during Henry V.'s absence in France, 1421, 1422; Protector during Henry VI.'s minority, managing home affairs during Bedford's absence in France; patron of learning.

GLOUCESTER, RICHARD DE CLARE, EARL OF (1222–62), Eng. soldier; the most powerful peer of his day, and leader of the barons in their rising against Henry III.

GLOUCESTER, ROBERT, 1ST EARL OF (d. 1147), Eng. soldier; illegitimate s. of Henry I.; fought for Matilda against Stephen; won battle of Lincoln, 1141.

GLOUCESTER, THOMAS OF WOODSTOCK, 1ST DUKE OF (1355–97), Eng. statesman; s. of Edward III.; practically ruled England, 1386–89; arrested on charge of plotting against Richard II., 1397; soon afterwards died, or was killed, at Calais.

GLOUCESTERSHIRE (51° 45′ N., 2° 30′ W.), W. midland county, England, situated on estuary and lower course of Severn. Bounded N. by Herefordshire, Worcestershire, and Warwickshire, E. by Oxfordshire, S. by Berkshire, Wiltshire, Somerset, W. by estuary of Severn and Monmouthshire. Area, 1228 sq. miles. Chief towns: Gloucester (capital), Cheltenham, Tewkesbury, and part of Bristol. Surface is varied, with three distinct features: E., Cotswold Hills (highest, Cleeve Hill); centre, rich, fertile valleys of Severn and other rivers; W., Forest of Dean. Most important rivers include Avon, Lower Avon, Wye, and Thames. Sheep-farming is carried on in hills; in valleys pasture-land, orchards, woods, and dairy-farms where celebrated G. cheese is made. W. are coal-fields of Forest of Dean and Bristol. Other minerals include iron, ochre, building-stone, freestone, and quartz. Manufactures—woollens, cottons, silk, gloves, glass, hardware. Extensive canal system. Most noteworthy antiquities are: cath's of G. and Bristol; churches of Tewkesbury and Cirencester; many fine parish churches; remains of Hayles Abbey and castles of Berkeley, Thornbury, and Sudeley. Pop. (1911) 329,037.

Gloucestershire, in Victoria County Histories.

GLOVE, covering for the hand, usually made of fine dressed skins, silk, wool, or cotton. 'Kid' gloves, made from kid or sheep-skin, are largely made in Paris and other Fr. towns. The most delicate kinds are usually described as suède, in which the inner side of the skin is dressed; and glacé, the outer side. As regards the history of g's they appear to have been used from very early times, and are referred to in Homer's *Odyssey*. They probably reached their most decorative stage, in England, in the reign of Elizabeth, when they were often jewelled and otherwise ornamented. In mediæval times the throwing down of a glove was a symbol of defiance.

Beck, *Gloves, their Annals and Associations* (1883).

GLOVER, SIR JOHN HAWLEY (1829–85), Brit. administrator; was administrator of Lagos; served in the Ashanti War (1873); afterwards gov. of Newfoundland, and subsequently of Leeward Islands.

GLOVER, RICHARD (1712–85), Eng. poet; wrote two epics, *Leonidas* and *The Athenaid*; also two tragedies; best remembered by his ballad, *Hosier's Ghost*.

GLOVERSVILLE (43° 2′ N., 74° 20′ W.), city, New York, U.S.A.; large glove-making and leather-finishing factories. Pop. (1910) 20,642.

GLOW-WORMS, see under POLYMORPHA.

GLOXINIA, genus of tropical, gesneriaceous herbs; violet flowers; also greenhouse plant, genus *Sinningia*, especially *S. speciosa*.

GLUCINIUM, see BERYLLIUM.

GLUCK, CHRISTOPH WILLIBALD, or RITTER VON GLUCK (1714–87), Ger. composer; b. near Neumarkt; studied at Vienna and Milan, where first opera, *Artaserse*, was presented (1741), followed by *Demofoon*, *Artamene*, *Poro*, and others belonging to old school of Ital. opera; visited England, 1745; greatly impressed by Händel's works, and later in Paris by Rameau's operas; settled in Vienna, 1756. Between 1762 and 1769 G. produced first great operas of new type: *Orpheus and Euridice*, *Alceste* (with explanatory prefaces), and *Paris and Helena*; visited Paris, and successfully brought out a music drama, *Iphigénie en Aulide*, 1774, and *Armide*, 1777. His great work, *Iphigénie en Tauride*, 1779, secured him complete and permanent victory over Ital. rival, Piccini; returned to Vienna, 1780. Unlike vast majority of earlier composers G.'s works are still popular; like Wagner, one of the greatest opera reformers; style marked by simplicity, nobility, and naturalness; strove to abolish inferior libretto and subordination of composer to singer, thus giving proper proportion to opera as a whole.

Newman, *Gluck and the Opera* (1895); Tiersot, *Gluck* (1910).

GLÜCKSBURG (54° 49′ N., 9° 34′ E.), watering-place, Schleswig-Holstein, Germany.

GLÜCKSTADT (53° 47′ N., 9° 24′ E.), town, on Elbe, Schleswig-Holstein, Germany; fisheries, various manufactures. Pop. (1910) 6572.

GLUCOSIDES are substances yielding sugar, especially *glucose*, on fermentation or *hydrolysis*. For each group there is a special ferment. They are classified by the chemical constitution of the non-glucose part of the molecule into (1) *Ethylene Derivatives* (mustard oils), decomposed by ferment *myrosin*. (2) *Benzene Derivatives* (salicin), decomposed by *ptyalin* and *emulsin*. (3) *Styrolene* and *Anthracene Derivatives*.

Glucose, GRAPE-SUGAR, or DEXTROSE, $CH_2OH.(CH.OH)_4CHO$, is a carbohydrate regarded as an *aldehyde* of *sorbite*; glucose, M.P. 86° C.; very soluble in water, only slightly so in strong *alcohol*; reduces alkaline *copper* solutions, and is fermented by *yeast, lactic acid bacilli*. It causes specific rotation of the plane of polarised light 105° to right. Levo-rotatory (*fructose*) and inactive forms exist. Commercial glucose is a syrup containing a complex mixture of carbohydrates. See SUGAR.

GLUE is an impure gelatin with strong adhesive properties.—BONE GLUE is made by dissolving grease out of bones by *petroleum*. The *de-greased* bones are then steamed under pressure in cylinders with false bottoms. The glue-liquor collects below the false bottom, is clarified with alum, and concentrated *in vacuo* to 30 % dry glue. The liquor, bleached by *sulphur dioxide*, is allowed to cool to a jelly.—FISH GLUE has a disagreeable odour. Glue should be free from grit, and of uniform golden colour. Cold water should soften and swell it and hot water dissolve it.

Rideal, *Glue and Glue Testing* (1900).

GLUKHOV (51° 42′ N., 33° 54′ E.), town, Chernigov, S.W. Russia; kaolin mining. Pop. 15,000.

GLUTEN, adhesive substance derived from kneading wheat flour in water; composed of fibrin and gelatin; highly nutritious; best wheaten flour should contain 11 % gluten. Word also used generally of gum.

GLUTTON, see WEASEL FAMILY.

GLYCAS, MICHAEL (XII. cent.), Byzantine historian; author of a *Chronicle* from early times to his own period.

GLYCERIN, GLYCEROL, GLYCERINUM ($C_3H_5(OH)_3$), colourless, viscid liquid, with a sweetish taste; Sp. G., 1·265; when heated it decomposes, and it dissolves readily in water and alcohol. It is obtained from the action of alkalies or superheated steam on fats and fixed oils, and commercially it is mainly obtained from the spent lyes in soapmaking. It is used as a lubricating agent in the manufacture of nitro-glycerin; in the making of plasters, modelling clay, moist colours; as a preservative and slight antiseptic; as a solvent for colouring fluids and various drugs, *e.g.* iodine, tannic acid alkalies, alkaloids, and neutral salts; and medicinally as a purgative, either by the mouth or by the rectum.

GLYCEROL, see GLYCERIN.

GLYCOGEN ($C_6H_{10}O_5$), a carbohydrate, white, amorphous powder, found in liver; turns red with iodine.

GLYCOL, see ALCOHOLS.

GLYCONIC VERSE, metres used by Gk. lyric poet Glycon; logaœdic tripody or tetrapody, *i.e.* a spondee and two dactyls, three trochees and a dactyl, or dactyl and three trochees.

GLYPTODON, an extinct Edentate (*q.v.*).

GMÜND (48° 48′ N., 9° 48′ E.), town, Württemberg, Germany; gold and silver jewellery. Pop. (1910) 21,270.

GMUNDEN (47° 56′ N., 13° 48′ E.), town, summer resort on Lake Traun, Austria; centre of salt industry.

GNAWERS, see RODENTS.

GNEISENAU, AUGUST WILHELM ANTON, COUNT NEITHARDT VON (1760–1831), Prussian soldier; served in Amer. War of Independence, on Brit. side; present at Jena; defended Kolberg, 1807; became Blücher's chief of staff; distinguished in Waterloo campaign; gov. of Berlin, 1818; Field-Marshal, 1825.

GNEISS, mineral; name originally used by miners of the Hartz, but now used by geologists to describe certain metamorphic rocks composed generally of layers of quartz and felspar. Some g's are sedimentary, others igneous and differ from granite only by their foliated structure; contain no fossil remains; there are several varieties classed generally according to the distinct minerals they contain; they include muscovite-g., biotite-g., muscovite-biotite-g., mica-g., and syenitic-g. (containing hornblende).

GNEIST, HEINRICH RUDOLF HERMANN FRIEDRICH VON (1816–95), Ger. politician and jurist; prof. of Jurisprudence, Berlin, 1844; became a senior judge of Supreme Court of Prussia, 1875; wrote on constitutional and historical subjects, among his most important works being *History of English Constitution* and *Trial by Jury*.

GNESEN (52° 32′ N., 17° 33′ E.), town, Posen, Germany; old crowning-place of Polish kings. Pop. 25,340.

GNETALES, see GYMNOSPERMS.

GNOMES, legendary dwarfs, dwelling in the earth, and supposed to guard its treasures.

GNOMIC POEMS, versified maxims (*Gnomes*), much favoured by the ancient Gk. poets.

GNOSTICISM, the name given to a movement in early Christianity, especially in the II. cent. G. was not a definite creed, still less any one clearly defined organisation, though it gave rise to numerous sects. G. began outside Christianity and was a combination of Gk. speculation, Iranian dualism, and Babylonian mythology. Its root principle was not faith but knowledge, which was given to the initiated only. In its speculations it mixed up the Platonic theory of ideas (that everything has a spiritual archetype) with an Oriental dualism which made all matter evil. The supreme God was removed from the world and could only communicate with it by a number of æons, in which various principles and ideas were personified.

G. was antagonistic to Judaism, for it held the God of the Old Testament to be the *Demiurge*, a secondary and less good God. The opposition of spirit and matter is a Gk. idea, but into this is united the idea of a conflict in the present world between forces of good and evil, which is Zoroastrian. It is difficult to generalise about G., as most documents were destroyed by the orthodox, and quotations in the works of antagonists are what we have mostly to depend on, and also because the various sects differed from each other. Thus the Demiurge in the system of Valentinus is represented by seven World Powers (a Zoroastrian conception) elsewhere. The Great Mother of the Gods, worshipped in many Mediterranean lands, is taken over as Sophia (Wisdom), also the myth of the Primal Man appears—another close parallel with Zoroastrianism. Practically all the elements of G., therefore, were pre-Christian, and all that was done by some of the more Christian Gnostics (some were outside Christianity even in name) was to bring them into connection with the hist. figure of Christ by making Him an æon or emanation from God. Marcion, though a Gnostic, was different from others, and is important. G. was essentially mystical and also sacramental; many sacraments analogous to Christian rites were invented. Like other heretics, Gnostics were charged with immorality not without cause, as they tended to oscillate between asceticism and licentiousness. G. declined in the III. cent., giving place to Manichæism, but its ideas have considerably tended to reappear, and it is of profound significance in the history of thought and religion.

Mansel, *Gnostic Heretics*.

GOA (15° 20′ N., 74° E.), Portug. territory on W. coast of India, S. of Bombay; extends 60 miles along Ind. Ocean; area, *c.* 1400 sq. miles; immense forests and many rivers; chief exports—salt, spices, fruit, coco-nuts, copra, manganese, and iron. *Old G.* former flourishing capital, with remaining fine archiepiscopal cathedral and church of Bom Jesus. Numerous palaces and splendid churches in ruins. *Nova G.*, or *Panjim*, present capital, on Mandavi, with viceregal palace, barracks, technical school, harbour (1882), etc. Taken from Muhammadans by Albuquerque, 1510; Old G. was made capital and rose to great commercial prosperity under Portuguese. Administered by gov.-gen. Pop. 520,000.

GOALPARA (26° 11′ N., 90° 41′ E.), district, Assam, India; fertile, chief crop, rice; exports timber, cotton; subject to earthquakes; unhealthy climate. Area, 3961 sq. miles. Pop. 462,052. Capital, Goalpara, on Brahmaputra. Pop. 6000.

GOAT (*Capra*), an ungulate of the subfamily Caprinæ, which also includes the sheep and ibex. Both sexes are horned and bearded, but these structures are usually more prominent in the male than the female. The male is further distinguished by its strong odour. The genus is confined to the Old World and is mainly alpine and sub-alpine in distribution; Asia Minor is believed to be the home of the domesticated species. Many yield rich milk, and some (Angora and Cashmere goats) provide valuable hair. The goat is the *vacca pauperis* (the poor man's cow).

GOATSBEARD, popular name of cichoriaceous plant, genus *Tragepogon*, order *Compositæ*; also fungus of genus *Clavaria*.

GOATSRUE, popular name of two fabaceous plants; blue-flowering (*Galega officinalis*) and white (*G. alba*).

GOATSUCKER, or NIGHTJAR, is a bird of nocturnal habits, feeding on insects which it captures on the wing; beak short and broad, and mouth enormously wide, and fringed with highly modified, bristle-like feathers which prevent the escape of prey; plumage loose in texture, and dark, with exquisite mottling; eyes large, as in owls, to which nightjar is related; male produces a peculiar jarring or churring noise, hence the name *nightjar*; summer visitant to Britain, migrating from Africa. The belief expressed in the name g. is not authentic: the bird's object in flying at the udders of goats being simply to catch the flies found there.

GOBAT, SAMUEL (1799–1879), Prot. bp. of Jerusalem (1846–79); noted for his extensive missionary work in the Holy Land.

GOBELIN, a famous make of tapestries produced at a factory in Paris. The founder of the firm was Giles G., a XVI.-cent. wool-dyer.

GOBI (*c.* 43° N., 110° E.), Chin. name for extent of desert stretching from Pamirs to Great Kingan Mts. on borders of Manchuria, and from Altai, Sayan, and Yabloni Mts. on N. to most northerly ranges of Kuen-lun Mts. on S.; includes large portion of Mongolia; 450 to 600 miles from N. to S., and over 1000 miles from S.W. to N.E.; elevation between 3000 and 5000 ft. and sometimes higher; also called SHAMO (sandy desert), and HAN-HAI (dry sea). Almost whole surface is sandy or stony desert, without water or vegetation (except for oases) and with little animal life; in some parts are grassy steppes, masses of rocks and

crags, and salt lakes. Mountainous tracts, forests, good water, abundant vegetation, and more animal life are to be found in part known as Ordos. Climate has great extremes, with rapid changes. Shifting sands have buried large extents of once cultivated country and habitations, and many discoveries of buried towns and villages have been made; important explorations have been made by Przhevalsky, Sven Hedin, and others. Desert crossed by various caravan routes, some being thousands of years old; among principal routes are those leading from Kalgan (on Chinese frontier) to Urga, from Su-Chow to Hami, and from Hami to Peking.

GOBLET (Fr. *gobelet*), large drinking-cup, on stem, but without handles.

GOBLET, RENÉ (1828–1905), leader of Fr. Radical party; prime minister at close of 1886; unequal to facing Boulanger, and resigned, 1887.

GOCH (51° 40′ N., 6° 10′ E.), town, on Niers, Rhine province, Prussia; various small manufactures. Pop. (1910) 11,139.

GOD (O.E. *god*, Dutch *god*, Ger. *gott*), in heathen times an idol, or object of worship. Since the Teutonic acceptation of Christianity it is the name reserved to the Creator of the Universe.

GODALMING (51° 11′ N., 0° 37′ W.), market town, on Wey, Surrey, England; seat of Charterhouse School. Pop. (1911) 8847.

GODARD, BENJAMIN LOUIS PAUL (1849–95), Fr. composer; wrote the operas, *Dante*, *La Vivandière*, and *Jocelyn*; also numerous symphonies, songs, and other works.

GODAVARI (16° 30′ N., 82° 15′ E.), river, in Deccan, Brit. India; flows S.E.; discharges by seven mouths into Bay of Bengal; length, *c.* 900 miles; one of the twelve sacred rivers of India.

GODAVARI (17° N., 81° E.), district, Madras Presidency, Brit. India, in lower valley of Godavari; chief town, Cocanada. Area, 5634 sq. miles. Pop. 1,445,961.

GODEFROY, DENIS (1549–1622), member of notable Fr. family; prof. of Law at Geneva; was historiographer of France. JACQUES G. (1587–1652) pub. new edit. of *Codex Theodosianus*. THÉODORE G. (1580–1649) wrote *Le Cérémonial de France*.

GODESBERG (50° 41′ N., 7° 9′ E.), town, summer resort, Rhine province, Prussia; mineral springs. Pop. (1910) 15,820.

GODET, FRÉDÉRIC LOUIS (1812–90), Swiss Biblical commentator.

GODFREY OF BOUILLON (*c.* 1060–1100), Fr. crusader; led army in first crusade, 1096; took Antioch, 1097, Jerusalem, 1099; became ruler of Jerusalem, with title, 'Defender and Guardian of Holy Sepulchre'; great victory over Muslims at Ascalon, 1099, made him supreme in Palestine.

GODFREY OF VITERBO (fl. XII. cent.), author of *Memoria seculorum*, of which part entitled *Gesta Friderici* is important source for career of Emperor Frederick I.

GODFREY, SIR EDMUND BERRY (1621–78), London magistrate before whom Titus Oates made affidavit concerning Popish plot; subsequently murdered.

GODIN, JEAN BAPTISTE ANDRÉ (1817–88), Fr. socialist; author of *Solutions Sociales* (1871), *Mutualité Sociale*, and similar works.

GODIVA (XI. cent.), wife of Leofric, Earl of Mercia, who, at her husband's challenge, rode naked through the streets of Coventry, to secure the relief of the townspeople from the heavy taxation which the earl had imposed; subject of poem by Tennyson.

GODKIN, EDWIN LAWRENCE (1831–1902), Amer. publicist; founded *Nation*, New York weekly paper; advocated reform in currency and civil service.

GODMANCHESTER (52° 18′ N., 0° 12′ W.), town, on Ouse, Huntingdonshire, England.

GÖDÖLLÖ (47° 37′ N., 19° 21′ E.), market town, Hungary; scene of defeat of Austrians by Hungarians, April 6, 1848. Pop. 5893.

GODOLPHIN, SIDNEY, EARL OF G. (*c.* 1645–1712), Eng. politician; page in Charles II.'s household after Restoration; P.C. and Lord of Treasury, 1619; First Lord of Treasury under Charles II., James II., William III., and Anne; promoted Anglo-Scot. Union; dismissed from office, 1710.

GODOY, MANUEL DE (1767–1851), Duke of El Alcudia; Span. courtier and statesman; prime minister, 1792–98; negotiated Treaty of Basel; became Prince of the Peace, 1795; joined France against Britain; died in Paris.

GODRA, GODHRA (22° 46′ N., 73° 40′ E.), town, Bombay, India; trade in timber. Pop. 21,000.

GODWIN, FRANCIS (1562–1633), Eng. ecclesiastic; bp. of Hereford (1617); author of *Annales of England* (1630), and a fantastical story, *The Man in the Moone*, first pub. 1638.

GODWIN, MARY WOLLSTONECRAFT (1759–97), Eng. writer; was early employed in teaching and literary work, and, after a *liaison* with a Captain Imlay, she m. William Godwin (*q.v.*). Her works include *Vindication of the Rights of Women* and *Original Stories for Children*, the latter being illustrated by Blake.

GODWIN, WILLIAM (1756–1836), Eng. doctrinaire; b. at Wisbech; became Glasite minister, and held charges at Ware, Stowmarket, and Beaconsfield; subsequently settled in London, changing clerical for literary career; m. Mary Wollstonecraft; their dau., Mary Godwin, afterwards became wife of Shelley. G. was generally in money difficulties in spite of his success as a writer, and was bankrupt in 1822; he later obtained the post of yeoman usher of the Exchequer, which he held from 1833 till his death; wrote *Inquiry concerning Political Justice*, a philosophic work showing influence of Rousseau; *History of Commonwealth*; *Caleb Williams*, a novel; and other works.

GODWINE (d. 1053), Earl of Wessex; justiciar under Canute; assisted in restoration of Edward the Confessor, 1042; exiled, 1051; f. of last Saxon king, Harold.

GODWIT, a spring and autumn migrant, visiting marshy estuarine areas and accompanying sand-flats; long legs and beak, and reddish plumage, with barred tail; nests in Arctic regions.

GOEBEN, AUGUST KARL VON (1816–80), Prussian general; as lieut.-general won great victories over Austria in Seven Weeks War, 1866; commander of VIII. corps against France, 1870; head of First Army, which won St. Quentin, 1871.

GOES (51° 29′ N., 3° 53′ E.), chief town, island S. Beveland, Holland. Pop. (1910) 7620.

GOES, DAMIÃO DE (1502–74), Portug. historian; keeper of archives and royal chronicler, 1548; wrote history of reign of King Manuel, but owing to its truth work condemned and compulsorily revised; G. tried and imprisoned by Inquisition on slight charges; an able and honest historian.

GOES, HUGO VAN DER (*c.* 1420–82), Flem. artist; painter of a famous triptych now in the Uffizi Gallery, Florence.

GOETHE, JOHANN WOLFGANG VON (1749–1832), Ger. poet, dramatist, philosopher, and scientist; b. Frankfort-on-Main; at Leipzig G. studied law, 1765–68, and, inspired by Kätchen Schönkopf, wrote *Annette* (charming MS. volume of lyrics, pub. 1896), and play, *Die Laune des Verliebten*. Returning to Frankfort, 1768, an invalid, he wrote *Die Mitschuldigen* (comedy). G. graduated as Doctor of Law at Strasburg, 1771; also studied bot., anat., alchemy, etc. At Strassburg he was greatly influenced by his intimate friend, Herder. *Sesenheimer Lieder* (lyrics), inspired by Frederike Brion, were written, 1770. At Wetzler (1772) he became friends with Kestner, whose fiancée, Charlotte Buff, is immortalised in *Die Leiden des jungen Werthers* (1774), which made him world famous. In 1773 *Clavigo* and the hist. drama *Götz von Ber-*

lichingen (first really great work) appeared; also some dramatic satires (*Götter, Helden und Wieland, Pater Brey, Hanswursts Hochzeit*, etc.). At this time G. became engaged for a short while to Lili Schönemann.

In 1775 he wrote the *Faust* of the 'Sturm und Drang' period (pub. as a Fragment, 1790). From 1775 onwards G. lived in Weimar, holding several responsible government posts; formed intimate friendship with Frau von Stein; ennobled, 1782. To the Weimar period belong dramas, *Egmont* (pub. 1778), *Die Geschwister* (1776), *Iphigenie* (prose version, 1778), *Harzreise im Winter*, and *Briefe aus der Schweiz* (1779), etc. The spell of an Ital. visit (1786–88) is seen in *Die Italienische Reise* (pub. 1816–17). The dramas, *Iphigenie* (poetical version, 1787) and *Torquato Tasso* (1790), are by many reckoned his masterpieces.

G. accompanied the Duke of Weimar in Fr. campaign, 1792–93; formed deep and lasting friendship with Schiller, 1794; app. director of Weimar Court Theatre, 1791–1817; *Metamorphosen der Pflanzen* (1790), *Beiträge zur Optik* (1791, 1792), *Hermann und Dorothea* (narrative poem), and some of G.'s finest ballads appeared, 1789. In 1806 G. married his mistress, Christiane Vulpius. To his later years belong *Die natürliche Tochter* (drama, 1804), first part ('Erster Teil') of *Faust* (1808), the drama which established G.'s reputation as the greatest poet of his time. *Die Wahlverwandtschaften* (novel, 1809), autobiographical *Dichtung und Wahrheit* (1811), *Über Kunst und Alterthum* (1816–32), *Zur Morphologie* (1817–24), *Wilhelm Meister's Wanderjahre* (romance, 1821), and *Faust*, second part ('Zweiter Teil'), 1833.

Of handsome presence and amazing versatility G. ranks as the world's most universally gifted of writers. Distinguished in letters, philosophy, science, and politics, he summed up XVIII. cent., and launched XIX. cent.; dominated Romantic movement, then espoused classical principles; a profound thinker and a great lyric poet, he crowned Ger. lit.

Life, by Lewes (1875), Düntzer (Eng. trans., 1908); M'Cabe, *The Man and Character* (1912); Robertson, *Goethe in Twentieth Century* (1912).

GOETZ, HERMANN (1840–76), Ger. composer; works few but distinctive—opera, *Taming of the Shrew*, Symphony in F, chamber music, etc.

GOFFE, WILLIAM (1605–79), Eng. politician; one of judges of Charles I.; signed death warrant; excluded from Act of Indemnity; fled to America.

GOG AND MAGOG.—It is thought that Biblical characters bearing these names are symbolical for nations dwelling N. of Caucasus, and hostile to Jews.

GOGO, GOGHA (21° 39′ N., 72° 15′ E.), seaport, Bombay, Brit. India, on Gulf of Cambay. Pop. 9500.

GOGOL, NIKOLAI VASILIEVICH (1809–52), Russ. novelist, poet, and dramatist; famed for his Cossack tales and realistic novels exposing the abuses of officialdom. Amongst his principal works are the *Revizor*, a satirical comedy, and a powerful novel, *Mertvuiya Dushi* (Dead Souls).

GOGRA (25° 45′ N., 84° 30′ E.), sacred river, India, rises in Himalayas; flows S.E., joins Ganges at Chapra; length, 600 miles.

GÖHRDE (53° 7′ N., 10° 45′ E.), forest, Hanover, Prussia.

GOIL, LOCH, Scot. fjord, branching off Loch Long (Clyde), Argyllshire; length, 6 miles.

GOITO (45° 14′ N., 10° 42′ E.), village, Mantua, Italy; scene, in 1848, of defeat of Austrians by Piedmontese.

GOITRE, an endemic disease occurring in various districts, *e.g.* certain valleys of Switzerland and Derbyshire in England, characterised by enlargement of the thyroid gland in the neck, and believed to be caused by the drinking-water (containing lime and magnesium salts) of these districts. Distressful symptoms are due to pressure of the enlarged gland on the windpipe, certain nerves, and other structures in its neighbourhood. The treatment is a change of air, rest, and tonics; iron, iodine, or thyroid extract are administered, and if improvement does not take place an operation for removal of part of the gland is carried out. In *Exophthalmic G.*, palpitation of the heart, protrusion of the eyeballs, and anæmia accompany the enlargement of the gland; it is believed to be due either to nervous derangement or to excessive absorption of the secretion of the gland. The treatment is the same as that given above, but the disease, often accompanied by diarrhœa and much wasting, is more serious.

GOKAK (16° 10′ N., 74° 52′ E.), town, Bombay, India. Pop. 12,000.

GOKCHA, Armenian SEVANGA (40° 30′ N., 45° 10′ E.), lake, Russian Transcaucasia; outlet by Zanga into river Aras.

GOLCONDA (17° 22′ N., 78° 26′ E.), fortress and ruined city, Hyderabad, India; capital of a kingdom in XVI. and XVII. cent's; formerly centre of diamond cutting and polishing.

GOLD (Au=197·2), metallic element; known to and prized by the ancients and by the alchemists, who compared it with the sun, and strove to obtain it by the transmutation of base metals through the philosopher's stone. G. generally occurs native, though alloyed with silver, copper, etc., in quartz veins and alluvial deposits. Quartz may contain as much as 1 part of gold in 70,000; alluvium as little as 1 in 15 millions, though nuggets may occur. The chief gold-producing localities are Transvaal, Australia, Russia, and N. America from Mexico to Klondike. G. is widely diffused in minute quantities, and is profitably extracted from sea water.

G. is collected from alluvium by hand or hydraulic washing, mercury being sometimes used to amalgamate with and retain the g. To obtain g. from auriferous quartz the crushed ore is passed with water through a stamp-battery, where it is reduced to fine powder, which passes over amalgamated copper plates. Thus, much of the g. is obtained as amalgam, from which the mercury is distilled.

From 'tailings' from the above process, and poor ores, such as auriferous pyrites, the g. is extracted by (i.) chlorine, and (ii.) weak potassium cyanide solution (MacArthur-Forrest process).

From auric chloride g. is precipitated by ferrous sulphate, thus:

$$AuCl_3 + 3FeSO_4 = Au + FeCl_3 + Fe_2(SO_4)_3.$$

The cyanide reaction is

$$4Au + 8KCN + O_2 + 2H_2O = 4KAu(CN)_2 + 4KOH;$$

and from the aurocyanide g. is precipitated electrolytically (Siemens-Halske), or by zinc, thus:

$$2KAu(CN)_2 + Zn = K_2Zn(CN)_4 + 2Au.$$

G. is refined by heating in a graphite or clay crucible with borax or nitre, the oxidisable impurities being removed as dross; it is then 'parted' from silver by nitric acid, sulphuric acid, or chlorine.

PHYSICAL PROPERTIES.—Pure g. is bright yellow, and crystallises in the regular system; density, 19·4; M.P. 1064° C.; soft, very malleable, and ductile. One ounce of g. as leaf, $\frac{1}{282000}$th inch thick, will cover 189 sq. feet: one grain will gild 2 miles of silver wire; one grain will make 3240 metres of finest wire. G. leaf is green by transmitted light; finely divided g. colours glass ruby-red, and gives a purple tint to photographic prints (toning). Colloidal g. in water is blue, red, purple, or green.

G. is too soft for use, and is therefore alloyed with silver or copper; 24 carat is pure g. Eng. g. coinage is 22 carat—22 g. to 2 copper. Lower standards are 18, 15, 12, and 9 carat.

CHEMICAL PROPERTIES AND COMPOUNDS.—G. is the most electro-negative metal; it does not combine directly with oxygen, nor is it dissolved by any single acid. Chlorine dissolves g.; also *aqua regia* which contains free chlorine.

Aurous oxide, Au_2O, in which g. is monovalent, forms aurous salts, *e.g.* AuCl, Au_2S, $KAu(CN)_2$.

Auric oxide, Au_2O_3, in which g. is trivalent, and

chiefly acidic, forms auric compounds, *e.g.* $AuCl_3$, $KAuCl_4$, $KAuO_2+3H_2O$.

Fulminating g. is $Au\begin{matrix}NH\\ \diagup\diagdown\\ NH_2\end{matrix}$; purple of Cassius probably $[Au_2O+SuO_2]$.

Metallurgy of Gold, by Rose; by Eissler; *Cyanide Process for Extraction of Gold*, by Eissler (3rd ed., 1902).

Gold Beating.—Process of producing extremely thin leaves of gold. An ingot of gold, rolled into a thin strip about 1½ in. wide, is, after annealing, cut into squares. These are placed between pieces of tough paper, about 4 in. square, a square of vellum replacing the paper at intervals. The whole is then put in a bag of vellum and beaten with a heavy hammer till the squares of gold have the same area as the squares of paper. Each square of gold is then divided into four equal parts, and the beating is repeated, the paper and vellum being replaced by gold-beater's skin. The dividing and beating is again repeated, until the gold leaves have the thickness of about the $\frac{1}{282000}$th part of an inch.

Gold Thread, see EMBROIDERY.

Gold-Beater's Skin, the thin, tough, outer coat of the cæcum, part of the large intestine of the ox. This coat is cleansed and stretched, coated first with fish-glue and then with albumen. Often used as a plaster to stop bleeding of slight flesh wounds.

Output of g., 1908, was over 21,000,000 oz. (valued at *c.* £89,500,000), 60 % being produced in Brit. Empire. For g. as a standard, see MONEY.

GOLD COAST (5° N., 2° W.), Brit. crown colony and protectorate, including Ashanti and N. territories, on Gulf of Guinea, W. Africa; between Fr. Ivory Coast and Fr. Upper Senegal, and Niger on W. and N., and Ger. Togoland on E.; length of coast-line, 350 miles; area, *c.* 80,000 sq. miles. Climate is hot, damp, and unhealthy; country mostly flat and covered with immense forests and swamps; partly navigable rivers are Ankobra and Volta; principal towns are Accra (capital), Addah, Cape Coast Castle, Quittah, Salt-pond, Winneba, Axim, Akuse; chief products and exports are palm oil, kernels, timber, gold, india-rubber, cocoa, monkey skins; also ground-nuts, coffee, copra, ivory, etc.; output of gold, which gives its name to the colony, is rapidly increasing; was valued at £1,071,616 (1911); silver, copper, and iron also found; government railway from Sekondi on coast to Kumasi, 168 miles; lines between Accra and Mangoase (40 miles), and Tarkwa and Prestea (20 miles), under construction; cables to London and Cape Town; regular steamers from London, Southampton, Plymouth.

G. C. was discovered by Portug., Santander (1470); Diego d'Asambuja built the fort St. Gorge la Mina (present Elmina), 1481; Dutch obtained part of G. C., 1717; Royal African Co. established Dixcove, Winneba, and Accra, 1672; Britain obtained Christianbourg, Augustenbourg, and Fredensbourg from Danes, 1851; and bought Dutch part, 1871–72. Ashanti (*q.v.*), with chief town Kumasi, was placed under Brit. protection, 1896, and after a dangerous rising (1900) was definitely annexed (1901) with N. territories (which lie N. of 8° N.). G. C. is administered by gov.-gen., with executive and legislative council. Pop. (1911) 1,500,000.

Lucas, *West Africa* (2nd ed. vol. iii.); Macdonald, *G. C., Past and Present* (1898); Ellis, *History of G. C.* (1893).

GOLD LEAF, see GOLD.

GOLDBERG (51° 8′ N., 15° 56′ E.), town, on Katzbach, Silesia, Prussia; cloth manufactures. Pop. (1910) 6989.

GOLDEN (39° 46′ N., 105° 12′ W.), city, Colorado, U.S.A.; seat of Colorado School of Mines; potteries; rich mineral deposits.

GOLDEN BULL, an edict issued by Emperor Charles IV. in 1356, to regulate the proceedings at an imperial election; it provided that the election of Holy Rom. Emperor should take place at Frankfort, and the coronation at Aix-la-Chapelle; and that there should be seven electors, the result being decided by majority of votes; these regulations remained in force till close of Holy Rom. Empire in 1806. Name is applicable to any document with golden seal, but is usually confined to important political charters.

GOLDEN CALF, see AARON.

GOLDEN EYE, see under DUCK FAMILY.

GOLDEN FLEECE (classical myth.), the fleece of the winged ram on which Phryxus and his sister, Helle, the children of King Athamas of Thebes, escaped from the wrath of their stepmother, Ino. The recovery of the fleece was the object of the voyage of the Argonauts under Jason.

GOLDEN HORDE, name given to the Kipchaks, a Tartar race, which, about 1240, rose to power in E. Europe. Their leader was Bātū Khan, whose 'golden' pavilion was erected on the Volga bank.

GOLDEN LEGEND, collection of lives of saints (*c.* 1250) by Dominican Jacobus de Voragine; Caxton printed Eng. translation (1483).

GOLDEN NUMBER, see CALENDAR.

GOLDEN ROSE, ornament solemnly blessed by Pope on fourth Sunday in Lent, and sent annually to some prince or community he wishes specially to honour on account of services to Church.

GOLDEN RULE, name given to the precept of Christ in *Matthew* 8^{12}, *Luke* 6^{31}, 'Whatsoever ye would that men should do to you, do ye even so to them.'

GOLDEN-EYE FLIES, see LACEWING FLIES.

GOLDFIELD (37° 43′ N., 117° 15′ W.), town, Nevada, U.S.A.; goldfields. Pop. (1910) 4838.

GOLDFINCH (*Carduelis elegans*), Brit. cage bird. See FINCH FAMILY.

GOLDIE, SIR GEORGE DASHWOOD TAUBMAN (1846–), Eng. explorer and administrator; explored Niger district, Africa, 1877, and with object of uniting this region to Britain founded United African Company, afterwards called Royal Niger Company, of which he became gov., 1895; subdued Illorin and Nupé, 1897; pres., National Defence Association.

GOLDING, ARTHUR (*c.* 1536–1605), Eng. translator; noted for trans. of Cæsar's *Commentaries* (1565) and Ovid's *Metamorphoses* (1565–67); also theological works by Calvin and Beza.

GOLDINGEN, KULDIGA (56° 58′ N., 21° 57′ E.), town, Russia; needle and woollen factories. Pop. 9733.

GOLDMARK, KARL (1832–) Hungarian composer; wrote operas *Queen of Sheba, Merlin*; *Country Wedding* Symphony, etc.

GOLDONI, CARLO (1707–93), Ital. dramatist; founder of the modern school of Ital. comedy, which replaced earlier pantomimic buffoonery; plays deal with domesticity and contemporary manners; lively dialogue and humorous situations; wrote *Mémoires*.

GOLDSBORO (35° 42′ N., 77° 53′ W.), city, N. Carolina, U.S.A.; cotton goods; furniture. Pop. 6107.

GOLDSCHMIDT, see LIND, JENNY.

GOLDSMITH, OLIVER (1728–74), Brit. poet, dramatist, and man-of-letters; s. of an Irish clergyman; b. Pallas, Longford, Ireland; ed. at Trinity Coll., Dublin, and afterwards studied med. at Edinburgh and Leyden. Then he wandered on foot over Europe, and at length, having failed in everything he undertook, turned bookseller's hack in London. After severe struggles G. began to be known in literary society, and made the acquaintance of Johnson, Burke, Reynolds, Garrick, and others. He was plain looking, and marked with smallpox; generous to a fault; extremely foolish in most of his actions; lacking in the ability to make money systematically, or to take care of it when made; but he was beloved by everybody. His *Vicar of Wakefield* (1766) is one of the masterpieces of Eng. fiction, and his brilliant comedy, *She Stoops to Conquer* (1773), still maintains its popularity. His play, *The Good-Natured Man*, though little read now, was much esteemed during his lifetime. His poem, *The Deserted Village*, will not readily be

forgotten. G. wrote many other works—histories, biographies, essays, and poems. Johnson said of him that he 'left scarcely any style of writing untouched, and touched nothing that he did not adorn.'

Life, by Forster (1848), Black (1879), Dobson (1887).

GOLDSTÜCKER, THEODOR (1821–79), Ger. scholar; prof. of Sanskrit in Univ. Coll., London; author of *Sanskrit Dictionary* and other works.

GOLETTA (36° 48′ N., 10° 18′ E.), port, Tunisia, N. Africa; connected with Tunis (11 miles S.) by ship canal traversing shallow salt lake. Pop. 4000.

GOLF.—'The Royal and Ancient game' of golf is generally regarded as originally a Scot. pastime, but there is good reason for believing that it was first played in Holland. When it was introduced into Scotland is not known, but it was certainly highly popular there in the XV. cent. Clubs began to be established early in the XVIII. cent.; that at St. Andrews—the 'Mecca' of golfers—was founded in 1754. James I. instituted a club at Blackheath (1608); Charles I. was fond of the game, and is known to have played on the Links of Leith. The game did not find favour in England until the second half of the XIX. cent.

Golf is played under ideal conditions on the Scot. *links*, *i.e.* ground by the sea, with short, springy turf, diversified with sandholes called 'bunkers.' 'Inland' greens are hilly ground or flat meadows in which artificial 'bunkers' and 'hazards' have to be provided. A full-length course has eighteen 'holes,' placed at 150 to about 500 yards apart, according to the nature of the ground. Holes, about 4 in. in diameter, are placed in smooth 'putting' greens. The game is usually played by two persons, each provided with a small hard ball (of gutta and rubber), or by four persons, two players on each side, who strike the same ball alternately; the match is then called a 'four-some.' The object of each player is to get his ball from the 'teeing-ground' into the hole with the least number of strokes. The one who gains the greater number of holes in the fewest strokes wins the round. For the purpose of driving the ball from good or bad positions a variety of clubs are used. Some of these have wooden heads, others iron, the principal clubs being the driver, brassy, spoon (wood); the cleek, iron, mashie, niblick (iron); and the putter (iron, aluminium, or wood).

Works by Hutchinson, Braid, Taylor, Vardon.

GOLIAD (28° 40′ N., 97° 24′ W.), village, Texas, U.S.A., on San Antonio; cotton-gins, flour-mills.

GOLIARDS, riotous European students of the Middle Ages, whose songs were directed against the asceticism of the Church.

GOLIATH, famous giant of Gath, slain in single combat with David, who was armed only with a sling and stone (*1 Samuel* 17).

GOLITSUIN, VASILY VASILEVICH (1643–1715), Russ. statesman; was intimately associated with the fortunes of the Regent Sophia, and shared her fall.

GOLLNOW (53° 34′ N., 14° 50′ E.), town, Pruss. province of Pomerania, Germany. Pop. (1910) 10,280.

GOLOVIN, FEDOR ALEKSYEEVICH, COUNT (d. 1706), chief minister of Peter the Great of Russia.

GOLOVKIN, GAVRIIL IVANOVICH, COUNT (1660–1734), Russ. statesman; Grand-Chancellor under Peter the Great and Catherine I.; much esteemed by those rulers.

GOLOVNIN, VASILY MIKHAILOVICH (1776–1831), Russ. naval commander and navigator; sailed round the world (1817–19); wrote *My Captivity in Japan* (1811–13; Eng. trans., 1824).

GOLTZ, COLMAR, FREIHERR VON DER (1843–), Pruss. general and author; wrote *The Nation in Arms*, *Rossbach and Jena*, and other military works.

GOLTZIUS, HENDRIK (1558–1617), Dutch engraver; famed for portraits, and imitations of Michael Angelo.

GOLUCHOWSKI, AGENOR, COUNT (b. 1849), Austro-Hungarian statesman; app. Foreign Minister, 1895; possessed great influence with Russia, Germany, and Italy, and peacefully upheld Austrian rights; resigned because of unpopularity with Hungarians, 1906.

GOMAL, GUMAL (32° 10′ N., 69° 30′ E.), river and important pass, on borders of India and Afghanistan.

GOMARUS, FRANZ (1563–1641), Dutch Prot. minister; ed. Oxford, Cambridge, and Heidelberg; prof. at Leiden, Groningen, and Saumur; a good Hebrew scholar.

GOMBRUN, see BANDER ABBASI.

GOMEL, see HOMEL.

GOMERA (28° 8′ N., 17° 22′ W.), one of Canary Islands; chief town, San Sebastian. Area, 144 sq. miles. Pop. 15,385.

GOMEZ, DIOGO (DIEGO) (fl. 1460), Portug. sailor, explorer, and author; judge at Cintra, 1466; wrote chronicle in Latin on life of Prince Henry the Navigator.

GOMEZ DE AVELLANEDA, GERTRUDIS (1814–73), Span. dramatist and poet; her literary dramas include *Saul*, *Baltasar*, and *Alfonso Munio*.

GOMM, SIR WILLIAM MAYNARD (1784–1875), Brit. general; served with distinction in the Peninsula and at *Waterloo*; succ. Napier as commander-in-chief in India (1850).

GOMPERS, SAMUEL (1850–), Amer. politician and publicist; rose from humble position and first became known as prominent trade-unionist; for long pres. of Amer. Federation of Labour; editor of *American Federationist*.

GONCHAROV, IVAN ALEXANDROVICH (1812–91), Russ. novelist; author of *Oblomov*, and other novels valuable as pictures of Russ. society.

GONCOURT, EDMOND LOUIS ANTOINE HUOT DE (1822–96) and **JULES ALFRED HUOT DE** (1830–70), Fr. authors of early naturalist school; collaborated in writing histories and novels, including *Portraits intimes du XVIIIe siècle*, *L'Art du XVIIIe siècle*, *Sœur Philomène*, etc.

GONDA (27° 7′ N., 82° E.), town and district, Fyzabad division, United Provinces, India. District: area, 2813 sq. miles. Pop. 1,403,195. Town: pop. 17,000.

GONDAL (21° 55′ N., 70° 52′ E.), native state, in Kathiawar, Bombay, India.

GONDAR (12° 37′ N., 37° 29′ E.), town, Abyssinia, Africa; formerly capital; much decayed; numerous ruined castles, palaces, and churches; cotton, gold, silver, and fine leather manufactures; partly burned by Dervishes, 1889. Pop. 8000.

GONDIVES, town, W. Haiti; harbour; birthplace of Haitian independence, Jan. 1804. Pop. 13,000.

GONDOKORO (4° 54′ N., 31° 40′ E.), village, on Upper Nile, at frontier of Egyptian Sudan; trading centre.

GONDOLA, kind of boat; long, narrow, and flat-bottomed, high prow and bow, propelled by single oar; used on Venice canals.

GONDOMAR, DIEGO SARMIENTO DE ACUÑA, COUNT OF (1567–1626), Span. diplomat; ambassador to Eng. court, 1613–18 and 1619–22; prevented James I. from joining anti-Span. alliance.

GONDS, DRAVIDIANS (*q.v.*).

GONFALON, State banner of the Middle Ages, particularly that borne in procession by the magistrates (*gonfaloniers*) of the Ital. republics.

GONG (Malay *gong-gong*), instrument of call used by Malays, Chinese, etc.; made of alloy of bronze, tin, and copper, and emits when struck boom which was long a curiosity to Europeans.

GONGORA Y ARGOTE, LUIS DE (1561–1627), Span. poet; admired by Cervantes; affected style (cf. Euphuism) known as *estilo culto*, now called *gongorism*.

GONIOMETER in its simplest form, CONTACT *g.*, is a graduated semicircle of metal at the centre of which two rules are pivoted together. Between these the angles of large crystals with dull faces are

measured. The REFLECTING g., used for small bright crystals which reflect sharply defined images, measures the angle between the normals to two faces, *i.e.* the angle of rotation necessary to superpose the image reflected from the second face on that reflected from the first, while the crystal is rotated about an axis parallel to the edge between two faces. See CRYSTAL (CRYSTALLOGRAPHY).

GONORRHŒA, inflammatory condition of the mucous membrane of the urethra and other genito-urinary passages, caused by a specific organism, the *gonococcus*, and usually resulting from impure sexual intercourse. A purulent discharge commences from about two to eight days after infection, and under proper treatment recovery takes place in two or three weeks, although there is often considerable risk of infection, owing to the presence of gonococci in the urethra, long after that time. The treatment consists of the avoidance of all stimulating or irritating food, the patient drinking freely of barley-water and similar beverages to dilute the urine, while urotropin (10 gr. doses, three times a day) is taken internally as a urinary disinfectant. Copaiba and sandalwood-oil, which have a disinfectant and diuretic action, are used internally with benefit after irritation begins to disappear, and frequent injections should be made into the urethra of 1 % solution of argyrol or a weak solution of potassium permanganate. Chronic gonorrhœa, or *gleet*, and a gonorrhœal inflammation of joints which may result in permanent stiffness of the affected joint or joints, may follow the acute condition; and gonorrhœal discharges from the passages of the mother infecting the eyes of a newborn infant are the commonest cause of blindness (*q.v.*).

GONSALVO DI CORDOVA, see CORDOVA, GONZALO FERNANDEZ DE.

GONTAUT, MARIE JOSÉPHINE LOUISE, DUCHESSE DE (1773–1857), celebrated Frenchwoman, associated with court of Charles X.; her *Memoirs* give an interesting account of period (Eng. trans., 1894).

GONVILLE, EDMUND (d. 1351), Eng. ecclesiastic; part-founder of Gonville and Caius Coll., Cambridge.

GONZAGA, Ital. family, rulers of Mantua from 1328 to 1708; often at war with the Viscontis of Milan. Giovanni Francesco II. obtained marquisate for military services to Emperor Sigismund, 1432; and Federigo II. was cr. duke by Emperor Charles V. in 1530. Line became extinct, 1708.

GONZAGA, THOMAZ ANTONIO (1744–1809), Portug. poet; wrote a collection of love poems, entitled *Marilia*, which achieved great popularity.

GOOCH, SIR DANIEL, Bart. (1816–89), Eng. engineer; greatly advanced Great Western Ry. and laying of transatlantic cable ('Great Eastern').

GOOD FRIDAY, name given to the Friday before Easter, on which the Saviour was crucified. It is kept as a very solemn fast in the R.C. Church, increasingly so in the Anglican, not so much among Nonconformists.

GOOD, JOHN MASON (1764–1827), Eng. author; chiefly known for his *History of Medicine* (1795) and his trans. of Lucretius.

GOODENIACEÆ, genus of Australian herbs and plants, order *Campanulales*; favourite pot plants.

GOODRICH, SAMUEL GRISWOLD (1793–1860), Amer. writer; edit. *The Token* annual; as 'Peter Parley,' wrote chiefly for young people.

GOODRICH, THOMAS (d. 1554), bp. of Ely and Lord Chancellor of England (1551–52); assisted in compilation of the *Institution of a Christian Man*, and Cranmer's *Bible*, and *Book of Common Prayer*.

GOODSIR, JOHN (1814–67), Scot. anatomist; studied dentistry; became curator of museum of Royal Coll. of Surgeons at Edinburgh, and afterwards (1846) prof. of Anat. at Edinburgh Univ.; carried out valuable researches on minute structure of the tissues, being one of the first to recognise the importance of cell-life, and on various branches of anat. and zool.

GOODWIN SANDS (51° 19′ N., 1° 35′ E.), dangerous shoals, E. of Kent, England; separated from mainland by the Downs; shifting sands; scene of many wrecks; said to be submerged estate of Earl Godwin.

GOODWIN, THOMAS (1600–80), Eng. Puritan preacher; friend of Cromwell's; member of Westminster Assembly, 1643; pres. of Magdalen Coll., Oxford, 1650–60.

GOODWIN, WILLIAM WATSON (1831–), Amer. scholar; pub. noted *Greek Grammar*, *Syntax of Moods and Tenses of the Greek Verb*, etc.

GOODWOOD, seat of Duke of Richmond, near summit of S. Downs, 3½ miles from Chichester; noted racecourse.

GOODYEAR, CHARLES (1800–60), Amer. inventor; invented method of producing vulcanised rubber.

GOOGE, BARNABY (1540–94), Eng. pastoral poet; author of *Eglogs, Epytaphes, and Sonettes* (1563).

GOOLD-ADAMS, SIR HAMILTON JOHN (1858–), Brit. administrator; Lieut.-Gov. and Gov. of Orange River Colony, 1901–10; High Commissioner of Cyprus, 1911.

GOOLE (53° 42′ N., 0° 52′ W.), market town and port, West Riding, Yorkshire, England; extensive docks; iron foundries; manufactures sugar, agricultural implements. Pop. (1911) 20,334.

GOORKHAS, see GURKHAS.

GOOSE, a collective term for members of the *Anserinæ*. The group is largely Arctic in character, the only species breeding in Britain being the Grey Lag g. (*Anser cinereus*), although two other species, the *Brent* and the *Barnacle* g., are common winter visitors. The plumage is similar in both sexes; beak tapering and characterised by horny, knobbed tip. Geese are more terrestrial in character than either ducks or swans, and when on the wing travel in typical 'V'-shaped formation, termed by sportsmen a *skein*. The Grey Lag g. is believed to be the progenitor of the domestic species. G. liver has been considered a dainty from early times. In Holland and Germany enormous quantities of geese are reared for the market. Strassburg *pâté de foie gras* is obtained from geese confined in an apartment kept at a high temperature to produce morbid enlargement of liver.

GOOSEBERRY is the fruit of *Ribes grossularia*, natural order *Ribesaceæ*. The shrub has *spines* (modified leaf-bases) and alternate *crenated* three- or five-lobed leaves with dilated *petiole*. The flower has a *monosepalous* bell-shaped *calyx* with five divisions and a *corolla* of five free petals alternating with the divisions of the *calyx*. The five *perigynous* stamens are opposite the petals, and the inferior unilocular *ovary* has two short *styles*. The *ovules* are borne on two *placentas*. The fruit is a berry with a persistent *calyx* at the top, and contains sugar and malic acid. The best growth conditions are cool climate, rich loam, much manure.

GOOTY, GUTTI (15° 6′ N., 77° 33′ E.), town, hill fortress, Anantapur district, Madras, India.

GOPHERS, see POCKET GOPHERS.

GÖPPINGEN (48° 42′ N., 9° 40′ E.), town, on Fils, Württemberg, Germany; cotton and woollen goods. Pop. (1910) 22,362.

GORAKHPUR (26° 44′ N., 83° 23′ E.), district and division, United Provinces, India; district, flat, abounds in lakes and marshes; dense forests; chief rivers, Rapti, Gogra, Great and Little Gandak; products—timber and rice; area, 4535 sq. miles. Pop. 2,938,176. Chief town, GORAKHPUR, on Rapti; river trade, timber, grain. Pop. 64,000.

GORBERSDORF (50° 42′ N., 16° 15′ E.), village, health-resort, province Silesia, Germany.

GORBODUC, legendary Brit. king, subject of the earliest Eng. tragedy, *Gorboduc*, or *Ferrex and Porrex*, by Sackville and Norton, played before Queen Elizabeth (1561).

GORCHAKOV, ALEXANDER MIKHAILOVICH, GORTSCHAKOFF (1798–1883), most distinguished

member of Russ. princely family; ambassador to Württemburg and Austria; Foreign Minister, 1856; Chancellor, 1863; for some time most powerful minister in Europe. To same family belong ALEXANDER IVANOVICH (d. 1825), and ANDREAS IVANOVICH (1768–1855), who fought against Napoleon; MIKHAIL DMITRIEVICH (1795–1861), Russ. commander-in-chief at Crimea, who conducted defence of Sevastopol; and PETER DMITRIEVICH (1790–1868), who commanded division at *Alma* and *Inkermann*.

GORDIAN KNOT, inextricable knot fastened to wagon of Gordius; man who loosed it to rule world; Alexander the Great cut it with sword.

GORDIANUS, MARCUS ANTONIUS, Rom. emperor; devoted to study of letters and philosophy; emperor, 238, in 80th year, for a month, jointly with s., GORDIANUS (killed in battle, 238). His grandson, GORDIANUS, emperor, 238, inflicted great defeat on Persians; assassinated, 244.

GORDIUM (*c.* 40° N., 31° 35′ E.), ancient capital, Phrygia, on Sangarius; here Alexander the Great cut the Gordian knot.

GORDIUS, a Nematomorph worm (*q.v.*).

GORDON, Scot. family; lived in Berwickshire, XII. cent.; descended from Sir Adam G., lord of Huntly, Aberdeenshire, 1318; became Earls and Marquesses of Huntly and Dukes of G.; dukedom extinct, 1836; granted to Duke of Richmond, descendant in female line, 1876.

GORDON, ADAM LINDSAY (1833–70), Brit. poet; ed. Cheltenham and Oxford; afterwards went to Australia and pub. *Bush Ballads* and other vol's of lyrics; committed suicide.

GORDON, ALEXANDER (*c.* 1692–1754), Scot. antiquary; author of *Itinerarium Septentrionale*.

GORDON, CHARLES GEORGE (1833–85), Brit. general and administrator; b. Woolwich; served in Crimea, 1855–56; joined military expedition to China, 1860; present at capture of Peking. During Taiping rebellion he took command of some Chin. troops, trained by European and Amer. officers; relieved Chansu, 1863; reorganised his troops, rightly named 'Ever Victorious'; fought over thirty actions and seized several towns, including Suchow and Chanchufu; final suppression of rebellion largely due to his leadership; refused all pecuniary rewards from Chin. emperor. On returning home G. became Commanding Royal Engineer at Gravesend, and supervised construction of forts to defend Thames; devoted means and spare time to philanthropy; represented Britain in international commission concerning Danube navigation, 1871. Entering service of Khedive of Egypt in 1873, for nearly seven years (the last three as gov. of entire Sudan) he laboured indefatigably to establish law and order in Upper Nile district; resigned on failing to arrange peace between Egypt and Abyssinia, 1880; returned to Sudan at request of Brit. Government, 1884, to quell Mahdi's rebellion; shut up in Khartum by rebels; bravely defended city for a year, but was treacherously killed two days before the arrival of relief force under Wolseley. 'Chinese Gordon' lives as a national hero, thanks to his gallantry as soldier and explorer, his integrity as administrator, his piety as Christian, and his tragic fate.

Lord Cromer, *Modern Egypt* (1908); *Journals of Major-General Gordon at Khartoum* (1885); F. R. Wingate; *Mahdiism and the Egyptian Sudan* (1891); Boulger, *Life of Gordon* (1896).

GORDON, LORD GEORGE (1751–93), son of Duke of G., fanatical leader of GORDON RIOTS, 1780—a violent protest against removal of R.C. disabilities.

GORDON, PATRICK (1635–99), Russ. general; of Scot. birth, he entered the Russ. army, and rose to high rank under Peter the Great.

GORDON, SIR JOHN WATSON (1788–1864), Scot. artist; Pres., R.S.A.; famed for portraits of celebrities, including Scott, De Quincey, Lockhart, Prof. Wilson, Macaulay, and numerous others.

GORDON-CUMMING, ROUALEYN GEORGE (1820–66), Scot. traveller and hunter; wrote *The Lion Hunter of South Africa*.

GORE, CATHERINE GRACE FRANCES (1799–1861), Eng. novelist; author of *Cecil, or the Adventures of a Coxcomb*, *The Banker's Wife*.

GORE, CHARLES (1853–), Eng. theologian; Fellow of Trinity Coll., canon of Westminster, then bp. of Worcester, 1902–4, of Birmingham, 1905–11; since 1911, of Oxford; known particularly for his theological books and social work.

GORÉE (14° 39′ N., 17° 15′ W.), small island, Fr. Senegal, W. Africa, E. of Dakar; chief town, GORÉE; large harbour; formerly important commercial entrepôt.

GÖRGEI, ARTHUR (1818–), Hungarian patriot; fought for Hungarian revolution, 1848–49, winning great victory of *Ozora*, 1848, and numerous successes, 1849; minister of war of new Hungarian republic; became dictator on Kossuth's resignation, 1849; surrendered before combined Austrian and Prussian force at *Vilagos*, 1849.

GORGES, SIR FERDINANDO (*c.* 1566–1647), Eng. soldier and colonist; was prisoner in Spain; fought for Henry IV. of France; sometime gov. of Plymouth; later became founder and chartered proprietor of Maine, New England (1639).

GORGET, broad collar-piece, worn with suit-armour in England, XV.–XVII. cent's.

GORGIAS, see SOPHISTS.

GORGONS, THE (classical myth.), Medusa, Stheno, and Euryale, female monsters, dwelling beyond the Western ocean, who turned to stone any mortal who looked upon them. Medusa alone was mortal, and was slain by Perseus (*q.v.*).

GORGONZOLA (45° 32′ N., 9° 23′ E.), town, Milan, Italy; famous cheese. Pop. 4895.

GORHAM, GEORGE CORNELIUS (1787–1857), Eng. clergyman; central figure in ritual case about baptism, 1847; refused admission to benefice by bishop, but instituted by Privy Council.

GORI (42° N., 44° E.), town, on Kura, Tiflis, Russ. Transcaucasia; corn. Pop. 5100.

GORILLA, largest of anthropoid apes; confined to forest belt of western portion of African tropics. Though a vegetable feeder, it is of ferocious appearance and savage nature, possessing huge teeth; body covered with coarse brown hair, abdomen protruding, arms long, extending below knees, and used somewhat like crutches when walking.

GORINCHEM, GORKUM (51° 49′ N., 4° 59′ E.), fortified town, on Merwede, S. Holland, Netherlands; salmon fisheries; trade in grain, cattle. Pop. (1910) 12,200.

GORING, GEORGE, LORD GORING (1608–57), Eng. soldier; supported Charles I. in Civil War; defeated at *Langport*, 1645; spent rest of life abroad.

GORKI, MAXIM (1868–), pseudonym of Alexei Maximovich Pyeshkov; Russ. writer and revolutionary; in early life an ikon painter, pedlar, scullery boy, baker's apprentice, etc.; produces novels and plays of intense realism and of international repute; Eng. trans. have appeared of *The Orloff Couple and Malva*, *The Outcasts*, and other works; *The Lower Depths* was acted in London, 1903.

Dillon, *M. Gorki* (1902).

GORKUM, see GORINCHEM.

GORLITZ (51° 9′ N., 15° E.), town, Silesia, Prussia; important commercial centre; principal edifice, XV.-cent. Gothic church of St. Peter and St. Paul; cloth, machinery, and glass manufactures. Pop. (1910) 85,790.

GÖRRES, JOHANNES JOSEPH VON (1776–1848), Ger. author and publicist; prof. of Physics in Coblenz Univ. (1800–14); began to pub. his *Die teutschen Volksbücher* (1807), and became a leader of the Ultramontane party. His chief work was *Christliche Mystik* (1842).

GORSE, see FURZE.

GORST, SIR JOHN ELDON (1835–), Brit.

politician; Conserv. M.P., Cambridge (1866); Solicitor Gen. (1885); Under-Sec., India (1886), Treasury (1891), Education (1895); joined Liberal party, 1904.

GORST, SIR J. ELDON (1861–1911), succ. Lord Cromer as Agent and Consul-General in Egypt, 1907; e. s. of above.

GORTON (53° 28′ N., 2° 10′ W.), town, Lancashire, England, forming E. suburb of Manchester; iron works, cotton mills.

GORTSCHAKOFF, see GORCHAKOV.

GORTYNA (35° 10′ N., 25° E.), ancient city, Crete, on river Lathæus.

GORTZ, GEORG HEINRICH VON (1668–1719), Baron von Schlitz; Holstein politician; controlled Charles XII. of Sweden's foreign and financial affairs; executed after king's death.

GÖRZ, GORIZIA (45° 57′ N., 13° 58′ E.), town, Austria, on Isonzo; capital of Görz and Gradisca Crownland; seat of abp.; cathedral, ancient castle; favourite winter resort; silk mills. Pop. (1910) 30,995.

GÖRZ AND GRADISCA (45° 57′ N., 13° 38′ E.), county and crownland, Austria, between Carniola on E., Italy on W.; capital, Görz; surface very mountainous; principal river, Isonzo; extensive vineyards; exports wine and fruit; silk-culture an important industry; pop. mainly Slavic and Catholic; belongs to Austria since 1500. Area, 1127 sq. miles. Pop. (1910) 260,721.

GOSCHEN, GEORGE JOACHIM, VISCOUNT (1831–1907), Brit. statesman and financier; grandson of celebrated Leipzig bookseller (1752–1828) of same name; First Lord of Admiralty, 1871; ambassador to Constantinople, 1880; opposed Home Rule and joined Unionists; Chancellor of Exchequer, 1887–92; converted National Debt, 1888; again First Lord of Admiralty, 1895–1900; adhered to Free Trade.

GOSHAWK, a member of the HAWK FAMILY (*q.v.*).

GOSHEN (30° 18′ N., 32° E.), region, Lower Egypt; settled by Israelites before the Exodus.

GOSHUN, MATSUMURA (1752 – 1811), Jap. artist; founder of the Shijo school; work something akin to that of Okyo, but broader in general effect; used colour more sparingly, and built up his forms more simply. He was highly successful as a teacher, and his pupil, KEIBUN (1779–1843), carried the school to the height of its glory.

GOSLAR (51° 55′ N., 10° 25′ E.), town, Hanover, Prussia, on Gose; has numerous fine old churches and quaint buildings; imperial palace, recently restored, formerly favourite residence of Ger. emperors; silver, copper, lead, sulphur mines; passed from Hanover to Prussia, 1866. Pop. (1910) 18,909.

GOSNOLD, BARTHOLOMEW (d. 1607), Eng. navigator; intimately associated with the colonisation efforts of Sir Walter Raleigh and Capt. John Smith.

GOSPEL (literal meaning—good news) was originally applied to the proclamation by Christ of the kingdom of heaven. Canonical g's are first four books of New Testament, with which are associated names of Matthew, Mark, Luke, and John (*qq.v.*); these were probably written in second half of I. cent. A.D., when the spread of Christianity made written accounts of its origin necessary. First three are called the *Synoptic* g's because of their similarity of matter, method, and style; while St. John's account differs in all three respects. It is now generally believed that St. Mark's G. was written first, and was derived from, and practically identical with, an earlier document; and that Matthew and Luke wrote their accounts by combining this early document with another known as the *Logia*, a compilation of Christ's sayings.

Wright, *Composition of the Four Gospels* (1890).

GOSPORT (50° 48′ N., 1° 8′ W.), seaport, Hampshire, England, opposite Portsmouth, with which it is connected by floating bridge; contains Clarence victualling yard; yacht-building. Pop. (1911) 33,301.

GOSSAMER, fine threads, or webs, formed by spiders, generally attached to trees or plants; hence anything of a light, flimsy nature. See also SPIDERS.

GOSSE, EDMUND, C.B. (1849–), Eng. poet and critic; since 1904 librarian to the House of Lords; famed for his trans. and literary and biographical studies in English, Dutch, and Scandinavian lit.; also much graceful verse.

GOSSE, PHILIP HENRY (1810–88), Eng. naturalist; a careful observer of *marine fauna*; his *Actinologia Britannica* is a standard work on sea-anemones.

GOSSIP (Anglo-Saxon, *God* and *sib*), word meaning (1) sponsor or godparent, (2) friend, (3) idle tattler, (4) idle talk.

GOSSON, STEPHEN (1554–1624), Eng. satirist and ecclesiastic; originally an actor and dramatist, he subsequently took orders, and became Rector of St. Botolph's, London. His *School of Abuse* (1579) is a satire directed against poets, players, and others.

GOT, FRANÇOIS JULES EDMOND (1822–1901), Fr. actor; one of the principal figures of the modern Fr. stage.

GOTA (58° N., 12° 2′ E.), river, Sweden, flowing from Lake Vener into the Cattegat; length, 50 miles; navigable throughout. GOTA CANAL, connects Baltic and Cattegat by way of Lakes Vetter and Vener.

GOTAMA, see BUDDHA.

GOTHA (50° 57′ N., 10° 42′ E.), town, Germany; joint capital, with Coburg, of duchy of Saxe-Coburg-Gotha (*q.v.*); principal building—Friedenstein castle (1643), with library, cabinet of coins, museum of antiquities, and picture-gallery; contains famous geographical publishing house of Justus Perthes (who pub. well-known *Almanach de Gotha*); important industrial centre; manufactures sausages. Pop. (1910) 39,581.

GOTHAM, WISE MEN OF, old name given to the inhabitants of Gotham, a Nottinghamshire village, who were notorious for their stupidity.

GOTHENBURG (57° 39′ N., 11° 59′ E.), seaport, Sweden, on Göta-Elf; large commercial and industrial centre; traversed by numerous canals; consists of old and new town, with fine harbour (seldom blocked by ice); chief industries, shipbuilding, machinery, textiles, wood-pulp, sugar-refining, brewing; founded by Gustavus Adolphus, 1618; rose to commercial importance during continental blockade, 1806; gives name to famous licensing system. Pop. (1911) 167,813.

GOTHIC ARCHITECTURE, see ARCHITECTURE.

GOTHS, Teutonic race whose earliest-known home was the S. shores and islands of Baltic, where they are found in I. cent. A.D. They gradually migrated southwards through central Europe, and early in III. cent. settled in districts to N. of Danube and Black Sea. In this cent. they first came into contact with the Romans, whom they routed at *Abritta* in 251; thereafter for 20 years they ravaged Asia Minor and Balkan regions, and in 270 they obtained the concession of Dacia from Emperor Aurelian. By middle of IV. cent. they had become dominant race of non-Roman Europe, their kingdom stretching in broad band from Black Sea to Baltic. Principal subdivisions of nation are OSTROGOTHS, or East Goths, and VISIGOTHS, or West Goths. The Visigoths were driven across the Danube by invading Huns *c.* 375, and settled under Rom. rule; under Alaric (*q.v.*) they rose in rebellion, overran Greece and Italy, and captured Rome in 410; after Alaric's death they left Italy for Gaul, but were subsequently driven by Franks across Pyrenees, and established a kingdom in Spain which lasted until VIII. cent., when the country was subdued by Muslims. The Ostrogoths were conquered by Huns *c.* 376, when Ermanaric (*q.v.*), the most celebrated Gothic king, committed suicide; they remained in subjection until 451, when they regained independence; and under Theodoric they acquired most of Italy after the break up of Western Empire in 476. After wars with Romans they were eventually defeated by Justinian's general, Narses, and left Italy *c.* 552. Later history is unknown.

Bradley, *Goths* (1888); Hodgkin, *Italy and her Invaders* (1880–99).

GOTLAND (57° 30′ N., 18° 30′ E.), island, Baltic Sea, belonging to Sweden; forms *län* of G., together with several smaller islands. Chief town, Visby. Coast is steep; interior mostly level, with large extent of forest; cultivates barley, rye, wheat, oats, and beet-sugar; main industries are sheep- and cattle-raising, fishing, cement-making, and lime-burning; contains large number of ruined churches. Pop. (1910) 55,219.

GOTO, Goto Retto, Gotto (33° N., 129° E.), group of islands lying W. of Kiushiu, Japan.

GÖTTER, FRIEDRICH WILHELM (1746–97), Ger. poet and dramatist; friend of Goethe; his plays, in classical subjects, followed Fr. models; produced the first Ger. *Musenalmanach.*

GOTTFRIED VON STRASSBURG (XIII. cent.), Ger. epic poet; wrote *Tristan and Isolde,* which served as the foundation of Wagner's opera; Eng. trans. by Weston (1899).

GÖTTINGEN (51° 35′ N., 9° 56′ E.), town, Hanover, Prussia; seat of famous univ. (Georgia Augusta), founded by George II., 1734, with library of over 500,000 vol's; has also Royal academy of sciences, founded 1751; book trade; manufactures scientific and mathematical instruments. Pop. (1910) 37,531.

GÖTTLING, CARL WILHELM (1793–1869), Ger. scholar; edit. Hesiod, and Aristotle's *Politics* and *Economics*; Eng. trans. has appeared of his *Elements of Greek Accentuation* (1831).

GOTTSCHALK, Godescalus (808–67), Ger. thinker; author of several works viewed as heretical; a monk at Orbais, then in Italy; condemned at Council of Quierzy, finally excommunicated by Nicolas I.

GOTTSCHALK, LOUIS MOREAU (1829–69), Amer. pianist and composer.

GOTTSCHALL, RUDOLF VON (1823–1909), Ger. author; wrote epics, dramas, novels, and critical works; his plays include *Pitt and Fox, Amy Robsart, Mazeppa, Catherine Howard,* and others.

GOTTSCHED, JOHANN CHRISTOPH (1700–66), Ger. author; chiefly notable for his works of literary criticism and for his adaptations of Fr. plays.

GÖTZ VON BERLICHINGEN, see Berlichingen, Goetz.

GOUACHE, method of water-colour painting in which the colours are mixed with a preparation of gum.

GOUDA (52° 1′ N., 4° 42′ E.), town, on Yssel, S. Holland; Groote Kerch (1552) has fine stained glass; noted for cheese. Pop. (1910) 24,574.

GOUDIMEL, CLAUDE (1505–72), Fr. composer; set to music in four-part harmony Marot and Théodore de Bèze's trans. of Psalms.

GOUGH, HUGH, Viscount Gough (1779–1869), Brit. general; brought first Chinese War to successful conclusion, 1842; defeated Mahrattas, 1843; Sikhs, 1844, 1849. By final defeat of Sikhs at *Gujerat* added Punjab to Brit. Empire.

GOUGH, JOHN BARTHOLOMEW (1817–86), Anglo-Amer. temperance orator; reformed drunkard.

GOUGH, RICHARD (1735–1809), Eng. antiquary; wrote *Sepulchral Monuments of Great Britain,* etc.

GOUJON, JEAN (1515–66), Fr. sculptor and architect; founded Fr. neo-Greek school; designed *Fountain of the Innocents* and other Louvre decorations; though following antique models, his works are modern in sentiment.

GOULBURN (34° 36′ S., 149° 43′ E.), city, New S. Wales, Australia; seat of Catholic and Anglican bp's; tanneries, boots and shoes. Pop. 10,618.

GOULBURN, EDWARD MEYRICK (1818–97), Brit. clergyman; headmaster, Rugby, and dean, Norwich; theological works.

GOULD, BENJAMIN APTHORP (1824–96), Amer. meteorologist and astronomer; first to use photography in astronomy.

GOULD, JAY (1836–92), Amer. railway proprietor and speculator; built enormous Gould railway system. Son, George Jay (1864–), also railway proprietor and director. Dau., Helen Miller G. (1868–), has liberally endowed various public institutions; m. (1913) Finley Shepard.

GOULD, SIR FRANCIS CARRUTHERS (1844–), Eng. (Liberal) political cartoonist ('F. C. G.'); famous for his work in *Truth, Pall Mall Gazette,* and *Westminster Gazette.*

GOUNOD, CHARLES FRANÇOIS (1819–93), Fr. composer; b. Paris; won *Grand prix de Rome,* 1839; studied sacred music in Rome, especially Palestrina and Bach; first opera, *Sappho,* 1851; *Faust,* 1859, most popular work and long the standard type of Fr. opera; *Philémon et Baucis,* 1860; *La Reine de Saba,* 1862; *Mireille,* 1864; *Romeo and Juliet,* 1867. G. wrote sacred music during the latter part of his life, two oratorios, *The Redemption* and *Mors et Vita,* being among his best works; a master of orchestration; romantic in style, with great dramatic passion.

Tolhurst, *Gounod.*

GOURD, *monœcious* annual herbs, genus *Cucurbitæ,* natural order *Cucurbitacea,* which trail by tendrils; showy yellow flower and large juicy fruits. The *Melon, Cucumber,* and *Vegetable Marrow* are cultivated for table use, while the *Colocynth* yields a purgative. The seeds of all have a destructive action on intestinal parasites. The shell of g. fruits are used as bottles, dippers, etc.

GOURGAUD, GASPARD, BARON (1783–1852), Fr. general; distinguished for personal devotion to Napoleon in wars, and voluntarily shared exile at St. Helena till jealousy of fellow-attendants caused departure; wrote *Campagne de 1815, Journal inédit de Ste. Hélène,* etc.

GOURKO, JOSEPH VLADIMIROVICH, COUNT (1828–1901), Russ. gen.; served with distinction in Turk. War (1877).

GOUROCK (55° 57′ N., 4° 49′ W.), town, watering-place, Scotland, on Firth of Clyde. Pop. (1911) 7430.

GOURVILLE, JEAN HÉRAULT DE (1625–1703), Fr. speculator; condemned to death with Fouquet, but fled country; afterwards financial agent of Condé; wrote important *Mémoires.*

GOUT, constitutional disease characterised by inflammation of joints with deposition of biurate of soda and derangement of various internal organs, particularly the kidneys. The condition is due to excess of uric acid within the body, either through excessive consumption of nitrogenous matter or through deficient oxidation by the tissues and organs, accompanied by an obscure nervous disturbance. G. is hereditary and is influenced by over-indulgence in alcoholic beverages, particularly sweet wines and heavy malt liquors, or in rich foods, by sedentary occupations and overwork, by certain poisons, such as lead, or by a combination of insufficient nourishment and bad hygiene. An attack of g. usually commences with severe pain in the big toe, with perhaps some giddiness and mental depression a little before, the joint being at first red and tender, and later swollen and of a dark colour, an attack lasting about five to ten days, with intermissions of pain. There is constipation, the urine is diminished in quantity, and the appetite is poor. Chronic g. may develop, in which the joints of the toes and fingers are disfigured by so-called chalk-stones, composed of biurate of soda combined with calcium phosphate, under the skin, which may eventually ulcerate through, while there are important changes in the kidneys and other organs. The treatment of g. in the acute stage is rest; the affected limb is kept propped up, and hot fomentations are applied to it; a light milk diet is generally insisted upon, and a simple purgative at first; and then colchicum, which has a powerful effect in g., is administered along with potassium iodide. Massage of the joints is of benefit as the individual improves. In the chronic condition food and drink are carefully regulated, lithia water is of value, and regular exercise, baths, and massage are ordered.

W. Ewart, *Gout and Goutiness.*

GOUTHIÈRE, PIERRE (1740–1806), Fr. metal-worker; one of the greatest craftsmen of his day.

GOUVION SAINT-CYR, LAURENT, MARQUIS DE (1764–1830), Fr. soldier; distinguished in Napoleonic wars; War Minister, 1815, 1817.

GOVAN (55° 52′ N., 4° 19′ W.), town, Lanarkshire, Scotland, on Clyde; large shipbuilding yards; engineering works; locomotive manufactures; incorporated with Glasgow, 1912. Pop. (1911) 89,725.

GOVERNMENT, ruling authority in state; may also mean the person or persons to whom administration is entrusted, and whose duty it is to deal with public affairs at home and to control foreign policy of state. G. have been classified from ancient times as monarchic, aristocratic (or oligarchic), and democratic, according as power is held by one person, by the few, or by the many. In the modern world the principal forms of g. are constitutional monarchy, as in Great Britain, Spain, Austria, Prussia; the republic, as in the United States, France, Switzerland, Portugal; and the absolute monarchy, as in Russia. The last mentioned, however, may be said to be an autocracy only in name, the reality being that a system of officialdom prevails, most of the power being held by heads of various departments; but it is not impossible that a strong ruler might even now establish a despotism as great as that of Peter the Great.

The constitutional monarchies of Europe are of two different types; thus in Spain and Germany the sovereign may, within certain legally fixed limitations, act at his own discretion; and in the latter country at least it sometimes happens that the ruler acts or speaks in a manner condemned by the council of state, the press, and the nation as a whole. In Great Britain and other countries the constitutional monarchy approximates closely to the republican form of g., the sovereign acting only in accordance with the wishes, as expressed by Parliament, of the majority of his subjects. Most noticeable tendencies of Brit. g. are the increasing power of the Lower House as a whole, and the decreasing power of the private member. G. may also be classified, according to the solidification or dispersion of ruling power, as centralised, dual, federal, and confederate; in a centralised g., entire power is in hands of central administrative body; but in the other forms a considerable amount of authority is exercised by local governing bodies.

GOVERNOR, title of chief official of Brit. colony, generally also commander-in-chief; the g. represents Crown, and in colonies not possessing self-government has sole executive and sometimes sole legislative power. Canada, Australia, and South Africa have a governor-general; Australian states have gov's and lieut.-gov's; Canadian provinces have lieut.-gov's; S. African provinces have 'administrators.' In U.S.A. the g. is the chief magistrate of a State, and is elected.

GOW, NEIL (1727–1807), Scot. violinist and composer of dance music; did valuable work in preserving old Scot. melodies. Edited *Gow Collection.*

GOWER, GWYR (51° 36′ N., 4° 8′ W.), seignory and district in Glamorganshire, Wales; on peninsula in Bristol Channel. On coast are famous bone-caves where large deposits of animal remains and some traces of man are to be found. G. has many cairns and an important cromlech.

GOWER, JOHN (d. 1408), Eng. poet; was a person of means and influence; called by his friend, Chaucer, 'the moral Gower.' His Eng. poem, *Confessio Amantis,* consists of love stories and meditations. He also wrote in Latin, *Vox Clamantis,* dealing with the Peasants' revolt; and in Fr. *Speculum Meditantis,* a poem on married life. He was a liberal contributor to St. Saviour's Church, Southwark, where his tomb may be seen.

GOWN (O. Fr. *goun*), outer garment without division for legs; now, except for clerical and academic g., appropriated to use of women, and known as dress or frock.

GOWRIE, CARSE OF (56° 25′ N., 3° 15′ W.), fertile district, Perthshire, Scotland, between R. Tay and the Sidlaw Hills.

GOWRIE, JOHN RUTHVEN, 3RD EARL OF (1577–1600), Scot. noble; central figure of so-called **Gowrie Conspiracy,** a plot to seize and dethrone or assassinate James VI., who was lured to G.'s house in Perth on Aug. 5, 1600. G. and his younger bro., Alexander Ruthven, were seized by the king's followers and slain on the spot. Existence of plot has never been authoritatively established.

Lang, *James VI. and the Gowrie Conspiracy* (1902).

GOWRIE, WILLIAM, 4TH LORD RUTHVEN, EARL OF (c. 1545–84), Scot. noble; joined his f. in murder of Rizzio, 1566; cr. Earl of G., 1581; led party in 'Raid of Ruthven,' whereby king was seized, 1582; executed.

GOYA (29° 12′ S., 59° 14′ W.), town, on Parana, Corrientes, Argentine Republic, S. America; pastoral district; commercial centre. Pop. 7000.

GOYA Y LUCIENTES, FRANCISCO (1746–1828), Span. artist; famed for portraits, including several Span. kings; also distinguished for genre pictures and etchings.

GOYANA, GOYANNA (7° 25′ S., 34° 48′ W.), city, Pernambuco, Brazil, S. America; active trade in sugar, coffee, cotton. Pop. c. 16,000.

GOYAZ (13° S., 48° W.), town and state, Brazil, S. America; between Minas Geraes and Matto Grasso; mountainous; traversed N. to S. by river Tocantius, the Araguay forming W., and Paranahyba S., boundary; extensive forests; chief occupation, agriculture and stock-raising; some tobacco cultivated and gold mined. Area, 266,000 sq. miles. Pop. c. 290,000. Town: pop. 13,475.

GOYEN, JAN JOSEPHSZOON VAN (1596–1656), Dutch artist; a famous master of landscape, his favourite subjects being Dutch scenes and views of the Rhine.

GOZLAN, LÉON (1806–66), Fr. novelist and dramatist; his novels include *Aristide Froissart, Le Notaire de Chantilly,* etc.; plays, *La Pluie et le beau temps, Le Gâteau des reines,* and others.

GOZO (36° 3′ N., 14° 14′ E.), island, in Mediterranean, belonging to Britain; 4 m. N.W. of Malta; ancient *Gaulos.* Area, 20 sq. miles. Pop. 18,000.

GOZZI, CARLO, COUNT (1720–1806), Ital. dramatist; comedies and fairy plays, including *Turandot, Princess of China*; strongly opposed Goldoni's innovations.

GOZZI, GASPARO, COUNT (1713–86), Ital. essayist and poet; famed for his classic prose writings in Venetian journals; pub. *Il Mondo Morale,* etc.

GOZZOLI, BENOZZO (c. 1420–98), Ital. artist of vast industry; pupil of Fra Angelico; principal work consists of series of frescoes illustrating Old Testament history, in the Campo Santo (Pisa), which occupied him for sixteen years.

GRAAFF-REINET (32° 16′ S., 24° 53′ E.), town, Cape of Good Hope province, S. Africa; founded by Cape Dutch, 1786; vineyards and orchards. Pop. (1911) 8129 (including 3903 whites).

GRABBE, CHRISTIAN DIETRICH (1801–36), Ger. dramatist; his works include *Don Juan und Faust, Napoleon, Hannibal.*

GRACCHUS, plebeian Rom. family of *gens* Sempronia, of which most noted members were Tiberius Sempronius G. and Gaius Sempronius G., generally known as the *Gracchi,* sons of **TIBERIUS SEMPRONIUS GRACCHUS,** consul in 177 B.C., and his wife **CORNELIA** (*q.v.*). **TIBERIUS SEMPRONIUS** (163–133 B.C.) fought under Scipio against Carthaginians; became tribune, 133, when he passed agrarian law, allotting public lands to the poor; killed with number of followers, by patricians headed by Scipio Nasica. **GAIUS** (158–121 B.C.) became tribune, 123; introduced many reforms, passed corn law, and re-established agrarian law; while at Carthage, his reputation was undermined by enemies at home; on return, rejected

for tribunate; escaped from ensuing riots, but was found dead next day; like his bro., a lofty character, an ardent reformer, and a fine orator.

Holden, *Lives of the Gracchi.*

GRACE.—(1) The unmerited favour shown by God to man; (2) as means of salvation has become chief Christian symbol as opposed to works; (3) any favour or the disposition to favour; (4) permission; (5) a legal pardon; (6) attractiveness, virtue, charm; (7) musical: subsidiary embellishment, *e.g.* trills.

GRACE, WILLIAM GILBERT (1848–), Eng. cricketer; was for some forty years engaged in first-class cricket, and known as England's 'champion.' As a batsman and all-round cricketer 'W. G.' has never been equalled; a doctor by profession; recipient of a national testimonial (1896) of £10,000.

GRACES, THE (classical myth.), were Aglaia, Thalia, and Euphrosyne, dau's of Zeus. They personified grace, beauty, and mirth; represented as three beautiful maidens with hands and arms intertwined.

GRACIÁN Y MORALES, BALTASAR, Span. author; the style of his prose allegory, *El Criticon*, has been much admired; Eng. trans. of his *The Art of Worldly Wisdom*, by Jacobs (1892).

GRACKLE (*Eulabes*), a genus of starling-like birds, differing from true starlings in their arboreal habits, their spotted eggs, and rictal bristles; inhabitants of South-Eastern Asia.

GRADISCA (45° 53′ N., 13° 29′ E.), town, crown-land of Görz and Gradisca, Austria, on Isonzo; silk mills. Pop. 3881.

GRADO (43° 23′ N., 6° 8′ W.), town, Oviedo, Spain. Pop. 17,125.

GRADUAL, anthem or responsory chanted after Epistle at High Mass.

GRADUATE, one who has passed the examinations of a recognised university for the degree of doctor, bachelor, or master. Originally graduation was a licence to practise a profession. Term 'Graduation' at times applied to prize-giving day in schools and colleges. Graduation and payment of a fee admits to General Council or corresponding body.

GRADUATION is the division of circumferences, arcs, straight lines, cylinders, and cones into any required number of equal parts. Accurate g. is an essential in most scientific instruments. Geometrical methods of division are theoretically the most correct, but difficulties due to material, time, and labour arise in applying them. *Original* g. is the division of the actual article; if a straight line, it is graduated by continual bisection or by measuring off in a straight line lengths equal to the shortest lengths required, the latter method, *stepping*, makes the last divisions appreciably inaccurate. *Copying* g. consists in laying on the article a very accurately divided circle or straight line, called a *dividing plate.* A set square is placed against the pattern, and the required division is then made on the article by means of a knife held close to the square. *Machine* g. was introduced in 1740 to cut the teeth of clock wheels.

GRADUS AD PARNASSUM ('Steps to Parnassus'), dictionary of Latin prosody; an aid to Lat. verse-making.

GRAETZ, HEINRICH (1817–91), Jewish historian; wrote *Geschichte der Juden* (1853–75), best history of Jewish race; pioneer of higher criticism among Jews, but faithful to religion.

GRAEVIUS, JOHANN GEORG (1632–1703), Ger. scholar; Historiographer-Royal to William III. (of England); author of numerous works dealing with classical subjects.

GRAF, ARTURO (1848–), Ital. poet and scholar; prof. of Ital. Lit., Turin (1882); his works include *Poesie e Novelle, Medusa, Dopo il Tramonto*, and several critical writings.

GRAF, KARL HEINRICH (1815–69), Ger. scholar; a pioneer of Old Testament criticism, and wrote *Die geschichtlichen Bücher des Alten Testaments* (1866), etc.

GRÄFE, ALBRECHT VON (1828–70), Ger. oculist; prof. of Ophthalmology at Berlin (1858), and great authority on subject; introduced new treatments for cataract, glaucoma, etc.

GRÄFE, KARL FERDINAND VON (1787–1840), Ger. surgeon; prof. of Surgery at Berlin (1811), and head of military hospitals during Napoleonic wars; author of many surgical works, and made many advances in surgical treatment.

GRAFFITI, name given by archæologists to chalk writings and rough drawings made on ancient buildings at Pompeii and elsewhere.

GRÄFRATH (51° 13′ N., 7° 4′ E.), town, Rhineland, Prussia; steel and iron works. Pop. (1910) 10,062.

GRAFTING, inserting buds or cuts (scions) from one plant (stock) within bark of another so that they unite; used to propagate plants not easily reproducible by seed.

GRAFTON.—(1) (29° 39′ S., 152° 55′ E.) city, New South Wales, on Clarence; agricultural district; sugar-mills. Pop. 5150. (2) (42° 13′ N., 71° 36′ W.) town, Massachusetts, U.S.A.; boots and shoes. Pop. (1910) 5705. (3) (39° 20′ N., 80° W.) city, W. Virginia, U.S.A.; machinery shops; various mills. Pop. (1910) 7563.

GRAFTON, DUKEDOM OF, first conferred upon Henry Fitzroy (1663–90), s. of Charles II. and Barbara Villiers, Duchess of Cleveland.

GRAFTON, RICHARD (d. 1572), Brit. chronicler and printer; was king's printer; printed the 1549 Prayer Book; compiled *Abridgment of the Chronicles of England* (1562).

GRAGNANO, town, 20 miles S.E. Naples; trade in wine and macaroni. Pop. 10,000.

GRAHAM, JOHN, see DUNDEE, VISCOUNT.

GRAHAM, SIR GERALD (1831–99), Brit. gen.; distinguished himself in Crimean and China Wars (1860); commanded in Egyptian War at *Tel-el-Kebir*; wrote *Last Words with Gordon*, and other works.

GRAHAM, SIR JAMES ROBERT GEORGE, Bart. (1792–1861), Brit. statesman; an advanced Liberal, and supporter of the Reform Bill; Home Sec. under Sir Robert Peel (1841–46); First Lord of Admiralty under Aberdeen and Palmerston.

GRAHAM, SYLVESTER (1794–1851), Amer. food reformer; advocate of temperance reform and vegetarianism; introduced 'Graham bread,' made from unbolted flour, and drew up a dietarian and physiological regimen which had many supporters.

GRAHAM, THOMAS (1805–69), Brit. physicist and chemist; appointed Master of the Mint, 1855. His chief researches concerned molecular physics, the absorption of gases by liquids, and the diffusion of gases. He divided substances into crystalloids and colloids, and investigated their behaviour towards membranes. He discovered polybasic acids, and obtained three acids from phosphorous anhydride.

GRAHAME, JAMES (1765–1811), Scot. poet; author of two noteworthy poems—*The Sabbath* and *Mary, Queen of Scots.*

GRAHAM'S DYKE, Rom. fortification, crossing Scotland from Forth to Clyde, constructed in time of Antoninus Pius.

GRAHAM'S LAND, Antarctic district (56° to 57° W., 65° to 67° S.), discovered 1832.

GRAHAMSTOWN (33° 13′ S., 26° 32′ E.), city, Cape Province, S. Africa; educational centre; seat of Anglican and R.C. bp's; agricultural and pastoral district; wool industry. Pop. (1911) 13,803, including 7376 whites.

GRAIL, THE HOLY, a miraculous vessel, which formed subject of many mediæval romances; in most versions of the legend it was a cup sent from heaven, and used by Christ at Last Supper, afterwards coming to possession of Joseph of Arimathea, who collected the Lord's blood in it; on death of Joseph, the grail was taken back to heaven, to be kept there until a hero worthy of it should appear on earth. It enters into the legend of King Arthur and the knights of the Round

Table, many of whom, including Galahad, Perceval, and Gawain, set out in quest of it.

Nutt, *Legends of the Holy Grail* (1902).

GRAIN, see WEIGHTS AND MEASURES.

GRAIN AND GRANARIES.—Grain includes wheat, barley, oats, and various other cereal food-stuffs. Of these wheat is the most important, and its cultivation dates back to remote times. Oats, an important article of food for animals, are largely used in the form of oatmeal for human consumption; and barley, also a cattle-food, is extensively employed in manufactured products. Wheat is grown both in cold and hot climates: in Canada and Australia; in India and Russia. Excellent wheat crops are grown in the British Isles, but the country relies mainly upon imports from Russia, Australia, Canada, Argentina, India, and other countries.

Granaries are places for the storage of grain, which, in countries like Great Britain, depending largely on foreign supplies, are of prime importance. As grain depreciates in quality and condition under unfavourable atmospheric conditions, its proper storage is essential. In dry, equable climates the matter presents little difficulty, and even earth-pits have been used for storage purposes. In N. America, the provision for grain storage reaches its highest state of development; and the method which obtains there is also to a great extent followed in Great Britain and other countries. The Amer. *grain-elevators*, and their prototypes elsewhere, are vast buildings containing many chambers, called 'silos,' formed of wood, brick, iron, or other suitable material, where grain can be stored under the most favourable conditions. These warehouses, usually adjacent to some waterway, and connected with local railways, are fitted with the most improved appliances for clearing grain-ships at their wharves, and transferring stock to the railway trucks at the sidings.

It has been several times proposed that the Brit. State should hold a six or twelve months' supply of grain, in case of need during a great naval war. A Royal Commission considered this question (1903), but the result was unfavourable to the proposal.

Grain Elevators are used chiefly in U.S.A. for transferring grain from holds of ships to warehouses by means of a number of buckets or scoops arranged regularly on an endless chain or belt, which travels over drums and receives its power from an engine. The name grain elevator is also applied to buildings which store grain. The largest elevator buildings are found at Chicago and Buffalo.

GRAINS OF PARADISE, aromatic seeds of *Amomum melegueta* and *A. grana paradisi*; used as condiments and for embalming.

GRAM, or CHICK-PEA, an annual herb, natural order *Leguminosæ*, with bluish purple flowers, cultivated as a pulse-food in S. Europe, Egypt, and India.

GRAMMAR consists of a code of laws to which the usage of the best writers of an age and language conforms. G. is not a static thing. Speech varies in different areas and in different periods, and the only pattern or standard available is the usage of the best writers and speakers. One language may have very many dialects. Each *dialect* will have an independent g., but in such cases one dialect is usually preferred because it is employed at the court, or in the chief univ., or is represented by the finest body of lit. There is, however, a possibility and a probability that the usages of the other dialects may become standard, because it is from the so-called dialect sources that the approved speech is for the most part replenished and renewed. Such growth, therefore, implies various transition stages when alternative forms exist side by side, and time only (and not the grammarian) can choose between them.

Only by patient study of the evolution and development of forms can the seeming irregularities and anomalies of g. be understood. G. falls into two broad divisions—(1) MORPHOLOGY, which deals with the form, structure, and inflections of words; (2) SYNTAX, which deals with the arrangement of proper word-forms in groups and sentences. Morphology is concerned with the classification of stems and the classification of inflections. Inflections designate relations to other words in the group (*e.g.* case), or qualify and limit the meaning of the word (*e.g.* gender). Languages vary greatly in the number and kind of inflections. Inflections themselves belong to a more or less advanced stage in a language development. *Comparative* g. is necessary for the proper appreciation of the individual systems.

GRAMME, see WEIGHTS AND MEASURES.

GRAMMICHELE (37° 12′ N., 14° 39′ E.), town, Catania, Sicily. Pop. 15,075.

GRAMONT, ANTOINE AGÉNOR ALFRED, DUC DE (1818–80), Fr. statesman and diplomat; ambassador to Italy, 1857; Austria, 1861; Foreign Minister, 1870; had considerable share in causing outbreak of Franco-German War; wrote *La France et la Prusse avant la Guerre*.

GRAMONT, PHILIBERT, COMTE DE (1621–1707), Fr. courtier; famed for his handsome person, wit, and gallantries; served under Condé and Turenne; favourite of Louis XIV.; later exiled, he appeared at the court of Charles II. of England. His *Mémoires*, compiled by his bro.-in-law, Anthony Hamilton (*q.v.*), is a Fr. classic.

GRAMOPHONE, talking machine on similar principle to phonograph (*q.v.*), with flat disk instead of cylinder, with or without sound-trumpet; chief manufacturing centres, U.S.A. and England.

GRAMPIANS, THE (56° 50′ N., 4° W.), mountain range, Central Scotland, stretching N.E. to S.W. from counties of Banff and Aberdeen to Argyll and Dumbarton; highest summit, Ben Nevis, 4406 ft.

GRAMPOUND (50° 18′ N., 4° 54′ W.), small market town, on Fal, Cornwall, England.

GRAN, Ger. name of ESZTERGOM (*q.v.*).

GRAN CHACO, EL (25° S., 60° W.), extensive region, Argentine Republic, S. America, comprising Bolivia, Paraguay, Argentina, and Brazil; traversed by Pilcomayo, Bermejo, and other affluents of Paraguay; surface mostly flat, with sandy deserts and large tracts of forest; portions subject to periodical inundations; thinly populated by nomadic Indian tribes.

GRAN SASSO D'ITALIA, MONT CORNO (42° 27′ N., 13° 40′ E.), highest group of the Apennines; highest summit, 9585 ft.

GRANADA (12° N., 85° 56′ W.), city, Nicaragua, Cent. America, on Nicaragua Lake; manufactures gold-wire chains; exports indigo, hides, cocoa, coffee. Pop. 20,000.

GRANADA (37° 13′ N., 3° 41′ W.), town, Andalusia, Spain; capital of province G.; splendidly situated at base of Sierra Nevada on Darro and Genil. Outstanding features are the Alhambra (*q.v.*), Alcazabar (citadel), on strongly fortified eminence; Generalife (summer residence of Moorish kings); fine Gothic cathedral (1528), Segrario, with royal mausoleum; monastery of St. Jerome (1492), univ. (1531), and many old interesting houses. G. was founded VIII. cent.; capital of Moorish kingdom, and great trading and artistic centre in XIII. cent.; last Moorish stronghold in Spain; taken by Spaniards, 1492. Pop. (1910) 77,425.

GRANADA (37° 30′ N., 3° W.), maritime province, S. Spain, formed from part of ancient Moorish kingdom of Granada; generally mountainous, traversed by Sierra Nevada; fine fertile valleys and plains; rich in minerals; produces wheat, barley, wine, sugar, fruit; area, 4928 sq. miles. Pop. (1910) 503,898. Capital, Granada, has a univ. Pop. (1910) 77,425.

GRANADA, LUIS DE (1504–88), Span. theologian; provincial of Dominicans in Portugal; a mystical thinker, he was suspected by the Inquisition and his works put on the Index.

GRANBY, JOHN MANNERS, MARQUESS OF (1721–70), Eng. soldier; commanded Brit. troops in Germany, 1760–63; commander-in-chief, 1766.

GRAND ALLIANCE, WAR OF THE, see FRANCE.

GRAND CANYON (36° N., 114° W.), gorge in plateau region of Arizona, U.S.A., cut out by Colorado River, 200–300 miles long, 4½ to 12 miles wide, average depth 4000 ft., but in some parts even 6000 ft. Walls of gorge descend in series of shelves with detached pillars and masses of rock; magnificent rock-colouring and countless side gorges. Most important exploration by Powell (1869). Part of canyon now reached by branch of Atchison, Topeka, and Santa Fé railway from Williams Station (Arizona).

GRAND FORKS.—(1) (48° 50′ N., 117° 50′ W.) city and port, British Columbia. (2) (47° 59′ N., 97° 2′ W.) city, N. Dakota, U.S.A., on Red River; seat of univ. of N. Dakota; large lumber and flour mills; agricultural implements. Pop. (1910) 12,478.

GRAND HAVEN (43° 5′ N., 86° 15′ W.), city, port of entry, Michigan, U.S.A., on Lake Michigan, at mouth of Grand River; ships lumber, fruit, grain, celery; important fisheries; machinery shops; various manufactures. Pop. (1910) 5856.

GRAND ISLAND (40° 55′ N., 98° 20′ W.), city, Nebraska, U.S.A., on Platte; seat of Grand Island Coll. (1892); sugar industries. Pop. (1910) 10,326.

GRAND RAPIDS (42° 58′ N., 85° 41′ W.), city, Michigan, U.S.A., on Grand River; seat of Michigan Soldiers' Home and many other charitable institutions; R.C. and Prot. Epis. see; important commerce and manufactures; large lumber industry; furniture, wooden-ware, machinery, flour-mills; large gypsum quarries in vicinity. Pop. (1910) 112,571.

GRAND RAPIDS (44° 23′ N., 89° 41′ W.), town, Wisconsin, U.S.A., on Wisconsin River; large manufacturing centre. Pop. (1910) 6521.

GRAND-DUKE, title, dating from the XVI. cent., at present borne by several European rulers. It is also given to the nearest relatives and the children of the Tsar of Russia.

GRANDEE, title borne by Span. nobles of the highest rank. Formerly the title carried special privileges.

GRAND-JURY, see JURY.

GRANDMONTINES, order of hermits (living much like the Camaldolese, *q.v.*) founded by St. Stephen of Thiers (XI. cent.); named from Grandmont, near Muret, where large monastery was founded; order ceased XVIII. cent.

GRANDSON, GRANSON (46° 49′ N., 6° 38′ E.), town, Swiss canton Vaud, on Lake Neuchâtel; scene of defeat of Charles the Bold by Swiss, 1476.

GRANDVILLE, pseudonym of **GÉRARD, JEAN IGNACE ISIDORE** (*q.v.*).

GRANET, FRANÇOIS MARIUS (1777–1849), Fr. artist; famed for his painting of monastic scenes.

GRANGEMOUTH (56° 2′ N., 3° 45′ W.), seaport town, Stirlingshire, Scotland, on Firth of Forth; large docks; shipbuilding yards; exports coal, iron. Pop. (1911) 9480.

GRANGER, JAMES (1723–76), Eng. biographer; vicar of Shiplake (Oxon); wrote *Biographical History of England,* in which portraits were first introduced; hence 'to Grangerise' is to insert illustrations from other books.

GRANGERS or **GRANGES,** nickname of an agricultural association founded in America, 1867, for farmers' education and co-operation.

GRANIER DE CASSAGNAC, see CASSAGNAC.

GRANITE, unstratified rocks, composed of quartz, felspar, and mica, occurring in masses. G's are the most abundant of igneous rocks, and have been subjected to great pressure; they belong to various periods, ranging from the pre-Cambrian to Tertiary. They vary in hardness and colour according to their composition; Aberdeen g. is blue-grey, Peterhead g. is red, due to the felspar or orthoclase in its composition. G. containing hornblende is known as syenite. G's are much used for building and monumental purposes. Aberdeen is known as the *Granite City.*

GRANSON, see GRANDSON.

GRANT, legal term for transfer of property by deed; popularised by Real Property Act (1845).

GRANT, ANNE (1755–1838), Scot. authoress; wrote *Letters from the Mountains* and other works dealing with the Highlands.

GRANT, CHARLES (1778–1866), see GLENELG, LORD.

GRANT, GEORGE MUNRO (1835–1902), Canadian educationist; principal of Kingston Univ. (Ontario); author of *Ocean to Ocean, Our National Objects and Aims.*

GRANT, JAMES (1822–87), Scot. novelist; author of *The Romance of War* and other brisk hist. and military novels; also *British Battles on Sea and Land* and *Old and New Edinburgh.*

GRANT, JAMES AUGUSTUS (1827–92), Scot. soldier and explorer; served during Indian Mutiny; was associated with Speke in exploration of equatorial East Africa (1860–63).

GRANT, ROBERT (1814–92), Brit. astronomer; pub. *History of Physical Astronomy* (1852); *Glasgow Catalogue of 6415 Stars* (1883); *Glasgow Catalogue of 2156 Stars* (1892).

GRANT, ROBERT (1852–), Amer. lawyer and novelist; wrote *Face to Face* (1886), etc.

GRANT, SIR ALEXANDER, 8th Bart. (1826–84), Brit. educationist; principal of Edinburgh Univ. (1868–84); noted for warm advocacy of extended facilities for medical study.

GRANT, SIR FRANCIS (1803–78), Brit. artist; pres., R.A. (1866); chiefly notable for portraits of celebrities.

GRANT, SIR JAMES HOPE (1808–75), Brit. general; distinguished in Ind. Mutiny, 1857, and Chin. campaign, 1860; commander-in-chief of army of Madras, 1861; reorganised home army, 1865–70.

GRANT, SIR PATRICK (1804–95), Brit. general; performed useful service in India during Mutiny; gov. of Malta (1867–72); gov. of Chelsea Hospital (1874–95).

GRANT, ULYSSES SIMPSON (1822–85), Amer. soldier and statesman; pres. of U.S.; b. at Point Pleasant, Ohio; served in Mexican War, 1846–48. Soon after outbreak of Civil War, 1861, G. became brigadier-general; took Paducah, 1861; captured Fort Donelson, 1862, in which year he was victorious at Shiloh; successfully besieged Vicksburg and defeated Confederates at Chattanooga, 1863; app. commander-in-chief, 1864, and directed great number of severe actions in the Wilderness campaign and the long siege of Petersburg, 1864–5, which Federal army finally occupied as well as Richmond, April 1865. The surrender of Confederates at Appomattox ended the war. After Lincoln's assassination he became war secretary during Johnson's presidency; elected pres. in 1868, and re-elected in 1872. During his administration the national debt was reduced, and the *Alabama* dispute with Britain settled by *Treaty of Washington,* 1871; overtaken by financial misfortune in 1884, to remedy which he wrote his *Personal Memoirs*; d. of cancer.

Hamlin Garland, *Ulysses S. Grant* (New York, 1898); Grant's *Personal Memoirs* (New York, 1885–86).

GRANTH, sacred writings of Sikhs; name derived from Sanskrit word *grantha,* 'a fastening together'; originator of Sikh religious sect was Baba Nanak, a Hindu, whose writings are contained in the *Adi Granth Sahib,* a compilation made by Guru Arjan, and written in various dialects. A second collection made in 1734 is called the *G. of the 10th Guru,* but is not regarded with the same reverence.

GRANTHAM (52° 55′ N., 0° 39′ W.), market town, Lincolnshire, England, on Witham; fine XIII.-cent. church; in grammar school Newton was ed.; in vicinity, on May 13, 1643, Cromwell won his first victory over Royalists; iron manufactures. Pop. (1911) 20,074.

GRANTON, Scot. harbour, on Firth of Forth, near Edinburgh; fishing, coal, and timber trade.

GRANTOWN (57° 20′ N., 3° 36′ W.), market town, on Spey, Elginshire, Scotland; health-resort.

GRANULITE (Lat. *granulum*, a little grain), name of two classes of rocks of granite class and of same family as gneiss. Muscovite and biotite freely occur in g., but as a rule it is composed mostly of quartz felspar. G. often contains small garnets.

GRANVELLA, ANTOINE PERRENOT, CARDINAL DE (1517–86), ecclesiastic and politician: premier to regent in Netherlands, 1559; persecuted Protestants; abp. of Malines, 1560; cardinal, 1561; viceroy of Naples, 1570; abp. of Besançon, 1586.

GRANVILLE.—(1) (48° 51′ N., 1° 37′ W.) fortified seaport, seaside resort, Manche, France; deep-sea fisheries; shipbuilding; active trade; unsuccessfully besieged by the Vendeans in 1793; by British in 1803. Pop. 11,700. (2) (33° 50′ S., 151° 15′ E.) town, Cumberland County, N. S. Wales; flour-mills; tanneries. Pop. 5098. (3) (40° 5′ N., 82° 33′ W.) village, Ohio, U.S.A.; educational centre. Pop. (1910) 1394.

GRANVILLE, GEORGE LEVESON-GOWER, 2ND EARL (1815–91), Brit. politician; M.P. for Morpeth, 1836; Foreign Under-Sec., 1840; held office in all Liberal governments till 1886; promoted exhibition, 1851; Colonial Sec., 1868; Foreign Sec., 1870–74, 1880–85. Liberal leader in Upper House for many years.

GRANVILLE, JOHN CARTERET, EARL (1690–1763), Eng. politician; supported George I. against Jacobites; ambassador to Sweden, 1719; Sec. of State, 1721; Lord-Lieut. of Ireland, 1724–30; secured recall of patent for 'Wood's halfpence.' G. opposed Walpole's policy of peace with Spain; Sec. of State, 1742–44; formed ministry with Lord Bath, which lasted two days, 1746; Pres. of Council, 1751–63.

GRAO (39° 30′ N., 0° 19′ W.), town, Valencia, Spain. Pop. *c.* 6000.

GRAPE, see VINE.

GRAPE HYACINTH, popular name for various liliaceous plants of genus *Muscari*; most have small, blue flowers.

GRAPE-SUGAR, see SUGAR.

GRAPHITE, also called plumbago (Lat. *plumbum*, lead) and blacklead, a form of carbon and one of softest of minerals, occurring in older crystalline rocks such as gneiss and schist, and found in great purity in Burrowdale, Cumberland, also in Canada and Bohemia. Colour is iron grey. G. is used for pencils, giving a smooth surface to casting moulds and lubrication. See also CARBON.

GRAPHS, diagrams, generally drawn for convenience on squared paper, which are intended to illustrate or prove a calculation or an array of facts. For instance, if a table showing the average height of a number of men was required, the simplest form would be a g. with the number of men of similar height arranged in ascending order on the side line with a scale in inches marked along the base. G's of this kind take the form of a tall curve narrowing as it ascends and generally symmetrical; the normal variability curve is of this type. G's are also employed in marking contour lines, barometric conditions, and for temperature charts, while their service is widely employed in math's, especially in Algebra. See CURVE.

GRAPHICAL STATICS are employed in calculations of force-pressure, etc.; specially useful in building problems, *e.g.* in suspension bridges, roofs, etc.

Gibson, *An Elementary Treatise on Graphs* (1904).

GRAPTOLITES, an order of extinct *Hydromedusæ*, occurring in the Lower Palæozoic rocks; believed to be related to existing *Calyptoblasts*, though differing in important details. The harder parts alone remain to us, and these, when preserved in the original condition, are found to consist of *chitin*. Generally, however, they are replaced by iron pyrites, or have become carbonised. They consist of a series of small cup-shaped structures, termed *hydrothecæ*, arranged in close succession, in one or more series along a median rod or virgula. The hydrothecæ are connected by a common median canal, and each is believed to have contained a jelly-like polyp.

GRASLITZ (50° 21′ N., 12° 27′ E.), town, Bohemia, Austria; manufactures cottons and laces, upholstery. Pop. (1911) 13,825.

GRASMERE (54° 27′ N., 3° 1′ W.), lake, Westmoreland, England; 1 mile long; also village on lake, associated with Wordsworth, De Quincey, and Coleridge. Pop. (1911) 876.

GRASS.—The presence of grassland depends not so much on soil as on rainfall. Grasses have shallow roots and require frequent showers during their growing season. The earth is naturally divided into *woodland*, *desert*, and *grass-land*, but an increase of pasture at the expense of woodland may spoil the pastures of a locality. Nearly all pastures are sown with mixed grasses. Of these *Phleum pratense* (timothy grass) is cheap, and used for crops of more than one year's duration. *Lolium perenne* (perennial rye-grass) is cheap, and very popular. *Alopecurus pratensis* (meadow fox-tail) is expensive, and therefore often adulterated.

Grasses are herbaceous *monocotyledonous* plants with jointed stems, hollow except at the bases of the leaves. They belong to the natural order *Tramineæ*, which includes *cereals*, *grasses*, and *bamboos*. The *embryo* has one *cotyledon*, which remains behind in the seed-coat to absorb the *endosperm*. The primary root is soon replaced by other roots from the base of the stem. The long, narrow leaves are parallel-veined and have long membraneous sheaths, which enclose the stem, being split on the side opposite the leaf-blade. The leaves are arranged in two opposite series. In the buds the leaves may be rolled or folded. The flowers are arranged in *spikelets* (*i.e.* are borne on the axis without stalks). These may be grouped together in various ways. If the *spikelets* are borne on branches of the main axis the *inflorescence* is a *panicle*, which is loose as in the *oat*, or close and cylindrical as in the *fox-tail* grass. In the *wheat* the *spikelets* form a compound *spike*. The number and character of the flowers in a *spikelet* vary, and the sepals and petals are absent or scaly. The *spikelet* bears a number of scales in two rows; the two basal scales have no flowers, and are called *glumes*. The other scales represent *bracts* and carry flowers in their axils. They constitute the lower or outer *palæ* or *flowering glumes*. A long process, the *awn*, is sometimes carried by the lower *palæ*. Above the lower *palæ* is the flower, above which there is a scaly *bracteole* called the *upper* or *inner palæ*. The flower has three or two *stamens* inserted below the *pistil* and borne on long, slender filaments. The *anthers* are versatile. The *pistil* consists of one *carpel* bearing two feathery *stigmas*, and the *ovary* contains one *ovule*. The fruit is a *caryopsis*, *i.e.* has the seed-coats and fruit-wall fused together, while the seed is *albuminous*. Two little scales, *lodicules*, are found at the base of the ovary. The *stigma* ripens first and the wild grasses are cross-fertilised, but the cultivated *cereals* are self-pollinated. All are *wind-pollinated*. Perennial grass grows either by *rhizomes*, *runners*, or *suckers*, or by branching at the base form tufts.—CEREALS form a useful member of the series in the rotation of crops, for they absorb a large quantity of *silica* and take from the ground less than half as much nitrogen, lime, and potash as turnips or potatoes do. They are cultivated for their *seeds*, which contain large amounts of *carbohydrate* and fair amounts of *protein*. All contain more or less mineral matter, but a large quantity of the *silica* is stored in the leaves. Of the pasture grasses the *Poas* are much used in meadows. The *Fescues* are grown largely. *Dactylis glomerata* (cock's-foot) is too coarse for fields, and is usually restricted to waste places.

Percival, *Agricultural Botany* (1902); Marshall Ward, *Grasses* (1910).

GRASS OF PARNASSUS, name applied to various herbaceous plants of genus *Parnassia*, order *Saxifragaceæ*; particularly *P. palustris*.

GRASS PARRAKEET, see under PARROT TRIBE.

GRASSE (43° 39′ N., 6° 54′ E.), town, Alpes Maritimes, France; celebrated for manufacture of essences and perfumes. Pop. 16,000.

GRASSE, FRANÇOIS JOSEPH PAUL, COMTE DE (1722–88), Fr. naval leader; defeated and captured by Rodney (1782).

GRASSHOPPERS (*Locustidæ*) form a family of ORTHOPTERA (*q.v.*), differing from true locusts in possessing long, tapering antennæ and four-jointed terminal leg-segments. Many are green in colour, and all are herbivorous, and in the main nocturnal, when their chirping music is commonly heard. There are moderately few small species in temperate regions, but in the tropics there is great diversity in size, shape, and colour.

GRASS-TREE, popular name for Australian liliaceous plants of genus *Xanthorrhea*; yield resin.

GRATIAN, see CANON LAW.

GRATIANUS (375–80), Rom. emperor whose weakness led to revolts; rebellion of Maximus in Britain and Gaul ended in assassination of G.; ardent Christian.

GRATIANUS, FRANCISCUS (XI. cent.), Ital. monk; compiler of the *Decretum Gratiani*, first treatise on canon law (*q.v.*).

GRATIOLA, see HYSSOP.

GRATTAN, HENRY (1746–1820), Irish orator and statesman; b. Dublin; after studying law in London was called to Irish Bar; entered Irish Parliament, 1775; as leader of national party, advocated removal of authority exercised by Brit. Parliament over Irish Parliament, his attitude leading to enrolment of 80,000 Irish volunteers, ostensibly for defence of Ireland; Britain was compelled to yield to Irish demands, and Ireland obtained Home Rule; for this service G. received grant of £50,000. In 1800 he opposed bill for Union of Great Britain and Ireland, to which parliamentary corruption and the Irish rebellion of 1798 had led; but he afterwards sat in the United Parliament, and until his death worked incessantly for Catholic emancipation. As a statesman he was broad-minded, disinterested, and patriotic; as an orator, brilliant, witty, and eloquent.

Life, by his s., Henry G.; and by R. Dunlop.

GRATTIUS, FALISCUS, Rom. poet; author of *Cynegetica*, verse treatise on hunting, etc.; Eng. trans. by Wase (1654).

GRATZ, see GRAZ.

GRAUDENZ (53° 29′ N., 18° 43′ E.), fortified town, on Vistula, W. Prussia, Germany; has iron foundries and breweries; successfully defended against Fr. in 1807. Pop. (1910) 40,313.

GRAVEL, fragments of rock, worn round by the action of water. Shore g. is composed of small stones washed up by waves; river gravel, stones washed down by rivers to 'pockets'; includes stones varying in size from that of a pea to a hen's egg. Anything smaller than former is called 'sand'; larger, 'shingle.' G. may be composed of any kind of rock, and is used for covering walks or paths in gardens and parks.—**Gravel beds** occur in geological formations of all ages; mostly composed of quartz fragments.

GRAVEL (pathology), calculi or stones. See BLADDER.

GRAVELINES (51° N., 2° 6′ E.), fortified seaport, Nord, France, on Aa; fisheries, scene of victory of Spaniards over Fr., 1558. Pop. 6200.

GRAVELOTTE (49° 6′ N., 6° E.), village, Alsace-Lorraine, Germany; scene of Ger. victory over Fr., 1870.

GRAVES, ALFRED PERCEVAL (1846–), Irish writer; author of 'Father O'Flynn'; has edit. several collections of Irish songs.

GRAVES, CHARLES L. (1856–), bro. of above; author of *The Hawarden Horace* (parodies), etc.

GRAVESEND (51° 27′ N., 22° E.), market town and river port, Kent, England, on Thames; chief pilot station for river; favourite resort of Londoners; boat-building yards; iron foundries; extensive market gardens in vicinity. Pop. (1911) 28,117.

GRAVINA (40° 49′ N., 16° 24′ E.), town, on Gravina, Italy; bp.'s see; cathedral. Pop. 18,085.

GRAVING-DOCK, see DOCK.

GRAVITATION is the attraction which bodies have for one another due to their *mass*. Newton formulated the *Law of G.* thus: 'The force of the attraction which bodies have for one another is directly proportionate to their masses, and inversely proportionate to the square of their distances apart.' This is the most general property of matter, and no exceptions to Newton's Law are known. If a body is thrown up into the air, it falls to the earth after a longer or shorter time, depending upon the greatness of the force opposed to that of gravity. Such a body has a certain attraction for the earth, but since the mass of the earth must necessarily be larger than that of any body on it, the force with which the body attracts the earth must be negligible compared to that with which the earth attracts the body. When the force impelling the body to move upwards is expended, the pull of the earth on the body becomes evident. The value of gravity is 32·2 ft. per sec., and it is unaffected by the nature of the matter. The value of gravity is less at the equator than at the poles, but this does not affect ordinary calculations. By very exact experiment the force of attraction which a body exerts on the earth can be determined. Through the force of g. the sun and various other planets affect the earth, while the earth affects the moon, acting through a distance of 240,000 miles.

The mutual attraction between a body and the earth is represented by its *weight*. The presence of large masses, such as mountains, does not alter the weight of any substance for practical purposes. Weight always acts downwards through the *centre of gravity*, i.e. the point through which the *resultant* of all the forces due to gravity must pass. When a body is lifted a certain resistance is felt. This resistance is the force with which the body is attracted to the earth. Water flowing from a horizontal hose gradually curves towards the earth as the force by which it is expelled horizontally becomes exhausted, and gravity becomes noticeable. A drop of water as it falls towards the ground soon loses its spherical shape and becomes pointed, due to the attraction of the earth on the surface nearest it.

GRAY (47° 26′ N., 5° 35′ E.), town and port, Haute-Saône, France; large flour-mills; iron manufactures. Pop. 6700.

GRAY, ASA (1810–88), Amer. botanist; author of many popular works on bot.; wrote *Structural Bot.* and *Manual of Bot. of the Northern United States*. In the latter he described and systematised the flora of the region. He collected and arranged the Harvard Univ. herbarium.

GRAY, DAVID (1838–61), Scot. poet; author of *The Luggie* and some sonnets; accompanied Robert Buchanan (*q.v.*) to London; was befriended by Lord Houghton; d. of consumption.

GRAY, ELISHA (1835–1901), Amer. inventor and electrician; invented telautograph, and filed patent for telephone a few hours after Bell.

GRAY, JOHN DE (fl. 1200), Eng. bp. (of Norwich) and Irish justiciary; much favoured by King John.

GRAY, JOHN EDWARD (1800–75), Eng. geologist; made the Brit. Museum zoological collection the largest and most complete in the world. He wrote on zoophytes, shells, mollusca, and bot.

GRAY, PATRICK, 6TH BARON G. (d. 1612), Scot. statesman; intrigued against Mary, Queen of Scots; ambassador to England, 1584, 1587; imprisoned by James VI. for plotting, 1587; banished till 1589.

GRAY, ROBERT (1809–72), Eng. colonial bp. (first bp. of Cape Town), and a promoter of Church interests in South Africa.

GRAY, SIR THOMAS (d. c. 1369), Eng. chronicler; his *Scalacronica* deals with the period of the first three Edwards.

GRAY, THOMAS (1716–71), Eng. poet; b.

London; ed. Eton and Peterhouse, Cambridge; spent two years abroad, in company with Horace Walpole; and afterwards returned to Cambridge, where he spent the rest of his life. He declined the laureateship, on the death of Cibber; but in 1768 was app. prof. of Modern History at Cambridge. His poems include *Ode on a Distant Prospect of Eton College* (1747), which was followed by *Pindaric Odes, The Fatal Sisters, The Descent of Odin*, and in 1750 he completed, and sent to Walpole, the MS. of the *Elegy in a Country Churchyard*. He was a famous letter-writer, a sound scholar, and a slow and careful writer. Probably no Eng. poem has found wider acceptance than the *Elegy*, or has provided more quotable passages.

Life, by Mitford; by Gosse.

GRAYLING, general name for various trout-like Salmonidæ fish: genus *Thymallus*. See SALMON.

GRAY'S INN, see INNS OF COURT.

GRAYS THURROCK (51° 29′ N., 0° 23′ E.), town, on Thames, Essex, England; trade in lime, cement, bricks. Pop. (1911) 16,003.

GRAZ, GRATZ (47° 4′ N., 15° 26′ E.), cap. Styria, Austria-Hungary, on Mur; has interesting XV.-cent. cathedral; seat of univ. founded 1586; other features of interest are the Landhaus, Stadt-Park, ancient fortress of Schlossberg (destroyed by the Fr. in 1809), the Joanneum Museum, and the picture-gallery; bishop's see; active industrial centre; manufactures machinery, iron-ware, leather-ware, wine. Pop. (1911) 151,688.

GRAZZINI, ANTONIO FRANCESCO (1503–83), Ital. author; his *Le Cene* (1756), a volume of stories, is distinguished by elegance of style.

GREAT AUK, see AUKS, GUILLEMOT.

GREAT AWAKENING, religious revival which began in New England in 1740 under leadership of George Whitefield and subsequently spread over America.

GREAT BARRIER REEF, coral reefs off E. coast Queensland, Australia; length, 1300 miles; distance from coast, 15 to 155 miles; supposed form of old Australian coast-line; area, about 100,000 sq. miles; broken by several natural navigation channels.

GREAT BARRINGTON (42° 7′ N., 73° 25′ W.), town, summer resort, Massachusetts, U.S.A.; cotton and woollen goods; stone quarries. Pop. (1910) 5926.

GREAT BASIN (*c.* 32° to 45° N., 112° to 122° W.), area in W. Cordilleran region of U.S.A.; *c.* 200,000 sq. miles in extent; surface is varied, and includes mountain chain known as Basin Range, which has smooth valleys with shallow salt lakes; the largest is Great Salt Lake.

GREAT BEAR LAKE (66° N., 120° W.), lake, N.W. Canada; discharges through Great Bear River into the Mackenzie River.

GREAT BRITAIN (49° 57′ to 58° 40′ N., 1° 46′ E. to 6° 13′ W.), large island off W. coast of Europe, consisting of England, Scotland, and Wales. Name *Britannia* was first applied in Rom. times. Rom. Britain in time of Claudius consisted of country S. of Tyne and Solway, which formed a single province of Rom. Empire; Hadrian's famous wall between Tyne and Solway was built *c.* 122 A.D., and in following reign the conquerors extended their dominions to include S. of Scotland, the Wall of Antoninus between Forth and Clyde representing limit of Rom. control from *c.* 142 till *c.* 185, when the N. portion was lost to them. In the III. cent. Severus fixed the limit of his Brit. dominions at Hadrian's Wall, and divided country S. of this into the two provinces of *Britannia Superior* and *Britannia Inferior*. The name G. B. was first applied in 1603, on succession of James VI. of Scotland as James I. of England and Wales. The island has an extreme length of *c.* 605 miles; breadth, *c.* 320 miles; total area, *c.* 88,321 sq. miles; the most northerly point is Dunnet Head, in Caithness; most easterly, Lowestoft Ness, Suffolk; most southerly, Lizard Pt., Cornwall; most westerly, Ardnamurchan Pt., Argyll. Total pop. (1911) 40,935,610. See also UNITED KINGDOM, ENGLAND, SCOTLAND, WALES.

GREAT CIRCLE, any circle of longitude, or the meridian circle at the equator.

GREAT EASTERN, see SHIPS.

GREAT FALLS (47° 30′ N., 111° 20′ W.), city, Montana, U.S.A., on Missouri; rich mining region; large smelting works; flour-mills; ships wool, grain. Pop. (1910) 13,948.

GREAT GRIMSBY, see GRIMSBY.

GREAT HARWOOD (53° 46′ N., 2° 24 'W.), town, Lancashire, England; collieries; cotton mills. Pop. (1911: urban district) 13,817.

GREAT KANAWHA, KANAWHA, see OHIO RIVER.

GREAT LAKES OF NORTH AMERICA, THE.—Collective name for five freshwater lakes—Superior, Michigan, Huron, Erie, and Ontario—situated between Canada on N. and U.S.A. on S., and forming upper waters of St. Lawrence River. Superior, largest lake, is connected with Huron by St. Mary River; Michigan (lying wholly in U.S.A.) joins Huron at Straits of Mackinac; Huron empties itself into Erie by St. Clair River, and lakes, and Detroit River; between Erie and Ontario are Niagara River and Falls. Lakes opened up to navigation, and differences of levels overcome by system of canals with numerous locks. During winter months lakes never completely frozen, but canals and connecting waters closed to traffic. Some of largest and most important towns in N. America situated on shores of lakes. Chicago, on Michigan, and Buffalo, on Erie, share greater part of lake-traffic. Around lakes are extensive coal-fields, iron mines, and grain-growing regions.

GREAT MOTHER OF THE GODS, Phrygian deity in classical times, but the Phrygians may have taken over her worship from earlier peoples, as the worship of a native deity is found throughout Asia Minor. Her worship influenced the Greeks through more than one channel. The Romans identified her with *Ceres* and other goddesses. Under the Empire her worship, like that of Isis and Mithras, became very popular, and was sometimes attended by orgiastic rites. It rivalled Christianity, but in some way its rites prepared the way for it.

GREAT REBELLION, wars in Great Britain, 1642–52, between Royalists and Parliament. Beginning of Parliamentary independence was shown in resisting of monopolies in Elizabeth's reign; James I. showed a certain wisdom in giving way, but Charles I. made an attempt to revive despotism of Tudors; and in his reign the opposition to the Arminianism of the king and Laud by the strong Puritanical party in Parliament culminated in a war which is often called the Puritan Revolution. The king's rejection of the nineteen propositions addressed to him by Parliament in 1642 was immediately followed by raising of royal standard at Nottingham, Aug. 22; in September an encounter took place in which Prince Rupert defeated Essex, the Parliamentary general; battle of *Edgehill*, which followed, Oct. 23, was indecisive, although advantage rested with Charles, whose way to London was left open by Essex's withdrawal to Warwick. Prince Rupert's capture of Brentford, Nov. 12, was followed by meeting between the opposing armies at *Turnham Green*, when Charles, outnumbered, retreated and established his winter quarters at Oxford, which he proceeded to fortify. During winter months some successes were gained by Royalists in Yorkshire, by Roundheads in Midlands.

In April 1643 Roundheads were victorious at *Sourton Down*, captured Hereford, and successfully besieged Reading. In May a small force of Cornish Royalists under Greenvil gained a brilliant victory at *Stratton*, forced Roundheads under Stamford to retire to Exeter, and invaded Devonshire; other Royalist successes were at *Chalgrove Field*, June 18, when John Hampden was mortally wounded, and at *Adwalton Moor*, June 30, when Fairfax suffered severe defeat. The Cornish Royalists were again victorious

at *Lansdowne* in July, after which they were unsuccessfully besieged at Devizes by Roundheads under Waller, whom they repulsed and cut to pieces at *Roundway Down*, July 13; Royalists then seized Bristol, July 26, which made Charles master of the west.

The Eastern Association, of which Cromwell was a leading spirit, now began to attain prominence; Cromwell himself raised a cavalry troop, known from their severe discipline as *Ironsides*, whose quality was shown in defeat of Royalists at *Gainsborough*, July 25. Royalist siege of Gloucester, begun in Aug., was raised, Sept. 5, by Essex, whose subsequent return to London Charles vainly tried to prevent by intercepting him at *Newbury*, where an indecisive battle took place, Sept. 20. Charles then retired to Oxford to winter; and on Sept. 25 the *Solemn League and Covenant* was made between Parliament and Scots, whereby former pledged themselves to establish Presbyterian religion in return for Scot. aid. Siege of Hull by Newcastle, who was defeated by Roundheads at *Winceby*, was raised, Oct. 11; and Lincoln and Gainsborough were retaken by Parliamentary forces. In Dec. Royalists were defeated at *Alton*.

In Jan. 1644 Arundel was seized by Waller, and Roundheads were again victorious at *Nantwich*; while in Yorkshire rebellion broke out afresh and Roundheads laid siege to Newark, which was relieved by Prince Rupert in March. In same month, Royalists were defeated at *Cheriton*, and in April Roundheads laid siege to York. In June, Royalists gained victory at *Copredy Bridge*; but after Rupert's relief of York, were utterly defeated at *Marston Moor*, July 2, which gave mastery of the north to Parliament. In Sept. Charles defeated Essex at *Lostwithiel*; and in same month Royalists in Scotland under Montrose gained victories at *Tippermuir* and *How Burn*, seized Perth, and pillaged Aberdeen. An indecisive battle was fought at *Newbury*, Oct. 27, after which Charles withdrew to Oxford. During winter the Scots Royalists overran the West Highlands, and in Feb. 1645 they gained great victory at *Inverlochy*.

In April 1645, *Self-Denying Ordinance* was passed, and Parliamentary army, which since *Marston Moor* had been broken up by quarrels and mutinies, was reorganised, Fairfax becoming commander-in-chief, with Cromwell as lieut.-gen. *New Model Army* soon changed aspect of war. Defeats were inflicted by Cromwell on Royalist cavalry at *Islip* and *Bampton-in-the-Bush* in April, resulting in its utter disorganisation. Charles then concentrated his forces near Oxford, but subsequently, owing to fact that Committee of Both Kingdoms dispatched Fairfax to relieve Taunton, leaving only Cromwell's force to keep king in check, was able to leave the city and march towards north.

In Scotland, Montrose took Dundee in April, but was immediately compelled to retire; and on May 9 he won a brilliant victory at *Auldearn*. Towards end of May Charles marched to Derbyshire; Rupert captured and pillaged Leicester; and on June 14 battle of *Naseby* resulted in utter rout of Royalists by Roundheads under Fairfax. After this defeat Royalists never completely rallied, their arms meeting with a series of disasters; defeat at *Langport* was followed by fall of Bridgwater in July; in Aug., Bristol was surrendered by Rupert; and on Sept. 13, Montrose, who had previously won battles at *Alford* and *Kilsyth*, was vanquished at *Philiphaugh*. Royalists were also defeated at *Rowton Heath* and *Sherburn* in Oct.; Fairfax subdued Devon, Cromwell Hampshire; Hereford fell towards end of 1645, and king's last army capitulated at Stow-in-the-Wold in March 1646. Newark, Oxford, Raglan, and Harlech Castles fell in turn, and in May 1747 Charles surrendered to Scots at Southwell.

The Scots handed the king over to Parliament in Jan. 1647, and six months later he was seized by the army, from whom he escaped to Isle of Wight, where he publicly made treaty with Parliament and privately with Scots, to whom he promised establishment of Presbyterianism in return for restoration.

Second war broke out in April 1648; Fairfax defeated Royalists in Kent, and starved them into submission at Colchester. Cromwell put down insurrection in Wales, and cut the Scots to pieces in Lancashire, the Royalist cause being finally lost by the brilliant campaign of *Preston*. The king, seized at Carisbrooke, was tried, and beheaded, Jan. 30, 1649.

War was continued until 1652 by Charles II., who on execution of Montrose, May 1650, took the Covenant. Cromwell, on returning from reduction of Ireland, crossed Tweed, July 22; actions took place near Edinburgh in same month, and on Sept. 3 Cromwell annihilated Scots army at *Dunbar*. Finally, disastrous defeat of Charles at *Worcester*, Sept. 3, 1651, closed war, and surrender of Dunottar Castle in 1652 ended the Great Rebellion.

Clarendon, *History of Rebellion* (ed. Macray, 1888); *Fairfax Correspondence* (ed. Bell, 1849); Gardiner, *History of the Great Civil War* (1886–91).

GREAT SALT LAKE (41° N., 112° 30′ W.), shallow inland sea of concentrated brine in Utah, U.S.A., at base of Wasatch Mts. in N.E. portion of Great Basin; size varies greatly; has several islands, largest being Antelope Island; receives waters of Bear, Ogden, Jordan, and Weber; has no outlet but evaporation; contains insects and brine-shrimps, but no fish. Garfield Beach is a bathing-resort on S. coast. First explored by Fremont, 1843. Area, *c.* 1750 sq. miles.

GREAT SLAVE LAKE (62° N., 115° W.), lake, N.W. Canada; discharges by Mackenzie River into Arctic Ocean; *c.* 300 miles long; average breadth, 50 miles.

GREAT SOUTHERN OCEAN, narrow expanse of water encircling the globe almost completely, between parallels of 40° and 66½°.

GREBES (*Podicipedidæ*), a cosmopolitan family of swimming birds, with short, close plumage, brown on upper and white and very glossy on under surface.

GRECO, EL, Dominico Theotocopuli (d. 1614), Cretan artist; pupil of Titian; spent many years in Spain, under the patronage of Philip II.; was an artist of striking and original genius.

GRECO-TURKISH WAR, 1897, see Greece: *History*.

GREECE, a small kingdom of S. Europe, consisting of mainland at extremity of Balkan Peninsula, and numerous islands—Eubœa and Northern Sporades on N.E., Cyclades on S.E., Cerigo on S., Ionian Islands on W. G. is bounded N. by Servia and Bulgaria, E. by Ægean Sea, S. by Mediterranean, W. by Ionian Sea and Albania; area, *c.* 37,000 sq. miles. The mainland is almost bisected by Gulf of Ægina (entering on E.) and Gulfs of Corinth and Patras (entering on W.); the severance is completed by canal across the narrow Isthmus of Corinth. Southern portion is the Morea or Peloponnesus. Coasts are high, rocky, and much indented. Principal inlets (besides afore-mentioned) are Gulfs of Volo, Salonika, and Lamia on N.E.; of Nauplia or Argos, S.E. of Morea; of Laconia and Messenia, S. of Morea; of Arcadia, W. of Morea; of Arta in N.W. Cape Matapan, in S., is most southerly point on mainland of Europe.

Surface generally is mountainous, except for plains of Zituni and Bœotia in E., and that of Thessaly in N. The W. is occupied by Dinaric Mountains, of limestone formation, which continue in Ionian Islands and Morea, where they culminate in Mt. Taygetos (7890 ft.). Pindus Range runs across mainland from Turk. border to Gulf of Corinth, its continuation in Ætolia reaching height of 8236 ft. in Mt. Kiona (highest peak in G.). In N.E. are Mts. of Thessaly, of crystalline formation, which include, just beyond modern Gk. boundary, famous Mt. Olympus (9750 ft.). E. Central G. is crossed by various limestone chains, and includes celebrated Mt. Parnassus (8050 ft.) and Mt. Helicon; this formation also occurs in N.E. Morea and Eubœa, while mountains of crystalline structure appear in Cyclades. Chief rivers are Varna and Peneus, in N.E.; Archelous

or Aspro, in N.W.; Sperchius, entering Gulf of Lamia; Vasilo, S. of Morea; Rhouphia, W. of Morea; Morno, entering Gulf of Patras. Famed in history are Athenian rivers Cephissus and Ilissus, and in myth., Alpheus and Styx.

The cotton plant and madder grow wild; the currant-grape is extensively cultivated along the shores of the Gulf of Corinth and in the Ionian Islands. The vine, olive, citron, fig, orange, lemon, tobacco, and mulberry abound. Wolves and jackals are found, with several kinds of deer, bears in the higher ground, the lynx and badger. Vultures are included among the birds. Climate is subject to extremes of heat and cold; mean temperature, 60° Fahr.; in summer months there is almost no rain, but cool winds temper the otherwise excessive heat and render climate healthy.

GREEK HISTORY.

Prehistoric Times.—The term *Ægean Civilisation* is used to denote the culture of G. and the Ægean islands, with outposts both E. and W., before the coming of the historic Greeks. It is a civilisation whose discovery has only been made within the last generation by the unearthing of various archæological remains. It has no literary records except inscriptions, which are still undeciphered. It seems certain now that in primitive times these lands were inhabited by a long-skulled dark-skinned people to which the name Mediterranean race has been given. The Stone Age came to an end about 3000 B.C., and from that time civilisation greatly improved and a state of culture was reached unsurpassed till classical times. The centre of this was Crete, especially the capital, Knossos; recent excavations show the various stages of culture, sometimes called *Minoan* (from King Minos); and Dr. A. J. Evans divides it into Minoan I., II., and III., each in three subdivisions, coming to an end about 1000 B.C. The art is quite distinct from that of neighbouring races, though it shows affinities with Egypt and Phœnicia. The occurrence of Ægean objects in the tombs of Egyptian kings has enabled us approximately to date the civilisation to which they belong. Minoan civilisation reached a high pitch about 2000 B.C., then after a temporary decline its highest point about 1600, when the city was burnt. It revived somewhat, but was finally destroyed about 1000, when this civilisation in Crete came to an end, though it may have lingered a little in Cyprus and elsewhere. The destroyers were probably still uncivilised Greeks from the north. On the mainland the chief centres were Mycenæ (where it is sometimes called *Mycenæan*) and Tiryns. Ancient Ægean costume, curiously, resembled modern dress more than classical. Its religion was a form of nature worship. A goddess, who appears possibly in the Gk. Artemis and Aphrodite, and her divine son and partner were the chief deities. It is uncertain whether an Indo-European tongue was spoken or not.

Sergi, *The Mediterranean Race*; Evans, *Scripta Minoa*; Burrows, *Discoveries in Crete*.

Ancient History.—The Greek people are a branch of the great Aryan or Indo-European family. They came down from the mountain district that stretches from the Alps to the Himalayas, and dispossessed a people of advanced civilisation that held the lands round the Ægean Sea.


TURKEY
Gulf of Salonika
Janina
THESSALY
Larissa
Mt. Pelion
Arta
Othrys Mts.
Gulf of Arta
Zeituna
Lepanto
Parnassus
Livadia
Chalcis
Euripus
EUBŒA
Thebes
Marathon
ATTICA
Athens
Corinth
Argos
Nauplia
MOREA
Tripolitza
Arkadia
Kalamata
Sparta
C. Malea
CYCLADES
Melos
Siphnos
Seriphos
Andros
Tenos
Mykonos
Delos
Rhenea
Naxos
Paros
Amorgos
Icaria
Samos
Patmos
Leros
Kalymnos
Cos
Rhodes
Lemnos
Imbros
Mytilene
Chios
Smyrna
Gulf of Adramyti
Adramyti
Gulf of Smyrna
Ephesus
Scala Nova
Gulf of Kos
Gulf of Makri
Gulf of Kos
Gulf of Kos
Gulf of Kos

selves in some cities at various times between 700 and 500 B.C. Periander of Corinth, Cleisthenes of Sicyon, Thrasybulus of Miletus are the chief; their influence was largely for good, but no tyranny could long overcome the Gk. love of freedom.

ATHENS comes into prominence in the VI. cent.; her great lawgiver, Solon, set a high ideal, which the tryanny of Peisistratus did little to destroy. After the expulsion of the tyrants (510), the constitution was organised by Cleisthenes on a more democratic basis.

Persian Wars.—The Gk. cities of Asia Minor had first been attacked by Lydia, and all subdued except Miletus; in 546 Cyrus of Persia overthrew Crœsus of Lydia; all Ionia was reduced thereafter, except Miletus, which made a separate treaty. Darius (521–485) determined to extend his empire into Europe, but first had to deal with the Ionic Revolt, led by Miletus and Chios; the Athenians helped to burn Sardis, but the Revolt failed for lack of unity, and their defeat at *Lade* (494) destroyed the Ionians.

Thereafter Darius's general, Mardonius, secured Thrace and Macedonia (493), but failed to reach Greece. A second expedition under Datis and Artaphernes sailed across the Ægean, took Eretria, and landed at *Marathon* (490), but was defeated by the Athenians under Miltiades. The third expedition (480) was led by Darius's successor, Xerxes; Themistocles had organised the Athenian fleet in the interval, and Athens, Corinth, and Ægina were the protagonists in the decisive victory of *Salamis*, after Leonidas and the 300 Spartans had nobly died in defence of *Thermopylæ*; Xerxes fled, leaving Mardonius in Bœotia. A simultaneous attack on Sicily by Carthage was defeated by Gelo, tyrant of Syracuse, at *Himera*. Next year the Greeks under the Spartan Pausanias defeated Mardonius at *Platæa*; a victory by sea and land at *Mycale* finished the war, which determined the fate of Europe. The subject cities were gradually freed by the CONFEDERACY OF DELOS, a maritime league led by Athens.

This Confederacy developed into an Athenian Empire, and its members gradually became subjects. Cimon and Pericles successively developed Athenian strength, the former winning great victories at the *Eurymedon* (467) and in Cyprus (against Persia) in the east, while Pericles, the organiser of Athenian democracy, aimed at land-empire. Athens crushed Ægina, defeated Corinth, and established a short-lived supremacy in central Greece, ended by a defeat at *Coronea* (447) by Thebes.

Sparta had had trouble in the Peloponnese after the Persian Wars, but had recovered, and crushed a rising of the Helots (serfs); gradually the antipathy between the Empire and the League rose, fostered by Corinth, Athens' great trade rival, until it culminated in the *Peloponnesian War* (431–404): Athens *v.* Sparta, Ionian *v.* Dorian, democracy *v.* oligarchy. Athens met with success at *Sphacteria* (425), but was defeated by Thebes at *Delium* (424), and Brasidas the Spartan made havoc of their Thracian possessions. From 421 to 413 the Peace of Nicias closed open hostilities; Sparta defeated her old rival Argos at *Mantinea* (418), while Athens ambitiously tried to gain Sicily and attacked Syracuse (415), but the great SICILIAN EXPEDITION met with a memorable disaster. This led Sparta to renew the war; her capable admiral, Lysander, aided by Persian money, eventually defeated Athens at *Ægospotami* (405) and starved the city into surrender. During this time Athens' one capable man, Alcibiades, proved untrustworthy, and internal dissensions aided her fall; the conquerors granted easy terms.

Sparta now took over the Athenian Empire, but mismanaged it; her allies turned against her, and she began to fail, partly for lack of men, as shown by an attempt by Agesilaus to attack Persia. Athens revived somewhat; Thebes developed strength under Epaminondas, who defeated the Spartans at *Leuctra* (371), and organised Arcadia and Messenia against them; a further victory at *Mantinea* (362) ended Spartan power, but Epaminondas was killed—his work had been entirely destructive.

Macedonian Empire.—Worn out by their struggles,



the Greeks of central and southern Greece fell a prey to the semi-alien power of Macedon under Philip; the resistance of Thebes and Athens, led by the orator Demosthenes, ended at the battle of *Chæronea* (368). His son Alexander had larger schemes: in the name of Greece he attacked Persia; in the three great battles of the *Granicus* (334), *Issus* (333), and *Arbela* (331) he defeated the Persians by the famous Macedonian phalanx, and extended his sway to the Hindu-Kush and the Indus. He tried to hellenise the East, but his premature death (323) left his work half done. His generals divided his Empire: the western part of Asia Minor remained Greek for centuries, but beyond the Euphrates the Oriental element eventually triumphed.

In Greece proper Macedon resumed the position of a semi-alien but dominant state, and the chief feature is the rise of Federations, of which the chief were the ÆTOLIAN and ACHÆAN LEAGUES. In 198 Rome began to look eastwards, first to protect the Greeks

from Macedon, then, in their own interests, to govern them; eventually it became necessary to subdue them, and the destruction of Corinth (146) marked the end of Gk. independence.

The Greeks in Sicily, after the Athenian Expedition, found a strong enemy in Carthage, who took in succession Himera, Selinus, and Acragas, and threatened Syracuse, which was saved by the tyrant Dionysius; the struggle continued intermittently with varying fortunes till Rome intervened to help the Greeks, and the First Punic War (264–241) gave Sicily to Rome.

Greece came under Roman control in 146 B.C., when Mummius, the Rom. general sent to support Sparta, captured and ruined Corinth and defeated the Achæan League. Macedonia then became a province of Rome, and with Achæa was governed by a prætor. Many Gk. institutions were left unaltered, but the cities were deprived of all political importance. Country enjoyed considerable prosperity, which was interrupted by national rising led by Mithridates in I. cent. B.C.; this was suppressed by Rome with great severity by 84 B.C., after which country was in evil case for some time. It revived under the Empire, and was recognised as supreme in field of culture. Christianity was introduced in III. cent., and from this time old paganism gradually declined.

C. W. Oman, *History of Greece* (Longmans, 1901); J. P. Mahaffy, *Greek Life and Thought* (Macmillan, 1896).

Mediæval and Modern History.—G. suffered from invasions of Western Goths in III. cent., Vandals and Eastern Goths in V. cent., Slavs from VI. cent. onwards. After break-up of Rom. Empire, G. formed part of Byzantine dominions till 1204, when it was seized by Latins. During XIII. cent. it was subdivided into fiefs; greater part of country conquered by Turks by 1460; Venetians for some time retained several of the islands, and warred against Turks from time to time, but by 1718 whole country was under domination of Porte. Greeks, who remained in subjection till 1821, were allowed by their Turk. masters to acquire considerable wealth, and the increase of education and culture, which followed, resulted, early in XIX. cent., in a revival of national feeling. In 1821 open rebellion broke out, and the WAR OF GK. INDEPENDENCE began with a rising in Moldavia. The Turks vainly tried to suppress revolt by terrible cruelties and massacres, but within the year they were expelled, G. regained her freedom, and a national constitution was framed. Turkey, however, obtained reinforcements, under Ibrahim Pasha, from Egypt, and reconquered country in 1825. Gk. cause was then taken up by Britain, Russia, and France, whose combined forces destroyed the Turk. and Egyptian fleets at *Navarino*, 1827; further Russ. victories on land completed Turk. discomfiture, and in 1830 the independence of G. was declared by the London protocol.

In 1832 a monarchy under Otho of Bavaria was established; but his despotic rule proved so unpopular that a revolution occurred and he had to leave the country in 1862. Prince George of Denmark became king in 1863, with consent of Britain, France, and Russia. Under him the country enjoyed a fair degree of prosperity until the outbreak of war with Turkey, the king's unwillingness to engage in which made him somewhat unpopular. Dissatisfaction in Greece concerning possession of Crete and Greco-Turk. boundary resulted in GRECO-TURKISH WAR in spring, 1897. In Thessaly Greeks suffered series of defeats, Larissa, Pharsala, and Velestino being taken by Turks, who were also victorious in Epirus at *Homopulos* and at mouth of river *Luro*. Tsar intervened; armistice arranged which resulted in agreement whereby Greece paid large indemnity but lost little territory. Since then the principal events have been the outbreak of a military revolutionary movement in 1909–10; the rivalry with Rumania on the Macedonian question, which in 1905, 1906, and 1910 resulted in the breaking off of diplomatic relations between the countries; constant difficulties with European Powers on account of Crete (*q.v.*); declaration of war against Turkey by G., Oct. 18, 1912 (see TURCO-BALKAN WAR); assassination of king, March 18, 1913.

Finlay, *History of Greece* (Oxford, 1877); Grote, *History of Greece* (1888); Papparigopoulos, *History of Hellenic Nation* (Greek, 1886); Gobineau, *Deux Études sur la Grèce Moderne* (Paris, 1905).

The **Greek Religion** was an important aspect of Gk. civilisation. Recent research into anthropology, comparative religion, and mythology has made it possible to view it in relation to other systems of belief. Though Gk. religion possessed no doctrinal system there are certain definite characteristics which marked it off from that of neighbouring peoples. It has been defined as 'anthropomorphic polytheism.' Some elements of it were brought in by the Greeks; others were taken over from the older non-Aryan peoples of the Mediterranean, of whose importance we have only lately come to know. One authority distinguishes two types: the *Olympic*, the joyous worship of the gods, and the *Chthonic*, the propitiation of malevolent deities. Certainly the Greeks conceived the gods to be like 'big men' with human passions, while to the Romans they were more shadowy. Gk. religion was profoundly influenced by the introduction of the cult of Dionysus, and by Orphism. These superimposed a mystery religion upon older cults. In the cent's immediately preceding the Christian era G. was more than ever influenced by Oriental worship and modes of thought, and thus the way was prepared for Christianity. See GREEK CHURCH.

J. E. Harrison, *Prolegomena to the Study of Gk. Religion*; R. Farnell, *Cults of the Gk. States.*

GREEK LANGUAGE.

The Greek language belongs to the Indo-European group. Little is known of the pre-Hellenic population of Greece, and surviving elements of the language (chiefly in place-names) show no kinship with the Gk. tongue. But this evidence is not conclusive, and the eventual deciphering of Cretan records may prove an unexpected and uncontestable argument in favour of a close relationship. As it is, Prof. Ridgeway holds that the Achæans adopted the language of the Pelasgians they conquered.

The physical features of Greece and the adjacent islands fostered a diversity of DIALECTS. The country is broken and irregular, and mountain barriers separate state from state. Gk. dialects are usually classified into *Æolic*, *Doric*, *Ionic*, and *Attic*. It was not till the unification of Greece under Macedonian rule that the dialects broke down and a common dialect was established (*koinè dialektos*). Of this one of the best-known examples is the Gk. of the New Testament.

The Gk. alphabet differs from the Roman: Uncials—Α Β Γ Δ Ε Ζ Η Θ Ι Κ Λ Μ Ν Ξ Ο Π Ρ Σ Τ Υ Φ Χ Ψ Ω. Script—*α β γ δ ε ζ η θ ι κ λ μ ν ξ ο π ρ σ τ υ φ χ ψ ω*. Variants, ϑ for *θ*, *φ* for *φ*; obsolete letters, *F*, digamma (*q.v.*), and *ϕ*, koppa, which only survived in numerical calculations. The language is synthetic and inflectional. In Greek we find reduplication verbs. In nouns only five cases survive out of the original eight—nominative, vocative, accusative, genitive, and dative. Greek, like Sanskrit, has three numbers—singular, dual, and plural. The conjugation of the verb is extraordinarily fine and subtle, and is unparalleled in its power of expressing delicate shades of meaning. A fully conjugated verb has three voices and 507 forms.

The vowel-music of the Gk. language is extremely rich. Especially beautiful are the diphthongs, viz. *ai*, *au*, *ei*, *eu*, *oi*, *ou*, *ēi*, *ōi*, *ēu*, *ōu*, and *ui*. Gk. words terminate either in a vowel or in the consonants *n*, *r*, *s*, and *x* (the preposition *ek* alone excepted). This gives the language great flexibility, beauty, and grace. The vocabulary is very copious, and yet it retained perfect purity.

The ATTIC dialect, through the supremacy of Athens, became the dialect of refinement and culture, but the

others were adopted as literary dialects in various branches of poetic composition.

J. Peile, *Introduction to Greek Etymology* (Macmillan, 1875); Goodwin, *Greek Grammar*.

GREEK LITERATURE.

Greek literature falls into six divisions—(1) Early lit. (up to *c.* 475 B.C.), including epic and lyric; (2) Attic (up to *c.* 300 B.C.), including the drama and the development of prose; (3) Alexandrian period of the decadence (up to *c.* 146 A.D.); (4) the Græco-Rom. period (up to c. 529 A.D.); (5) the Byzantine period (up to 1453 A.D.—the date of the capture of Constantinople by the Turks); (6) Modern Gk. (up to the present day).

Ancient.—Gk. lit., as it was a spontaneous growth and uninfluenced by previous and extraneous models, affords a peculiarly instructive study of a natural evolution. The progress of Gk. letters is traced from impersonal epic to personal lyric, and from individualistic lyric to democratic drama. Prose developed later than poetry, and side by side with the drama. Ancient Gk. poetry commences with the *Iliad* and the *Odyssey*—the supposed work of HOMER. Sprung as these epics certainly were from a ballad epoch, in the shadowy times of unwritten lit., their construction is so artistic, and their unity (despite a few inconsistencies) so complete that they must have taken their final form from the genius of a great artist. The groundwork of the poems is a body of Achæan ballads transmuted by the Æolian bards in Asia Minor, and finally shaped by Ionic genius. Their dialect is Ionic, with an admixture of Æolic, and the metre is hexameter.

The epic tradition was continued by the so-called cyclic poems, which completed the tale of Troy divine. In the VIII. cent. B.C. arose the great poet, HESIOD. The keynote of the Homeric poems is joyousness unalloyed by stern reflection; the Hesiodic poems are essentially didactic; the gospel of the *Works and Days* is a gospel of toil unceasing. The didactic tradition was continued by the early cosmologists, *e.g.* Xenophanes and Parmenides. Attributed to Homer is a collection of hymns (the *Homeric Hymns*) addressed to various deities. These hymns really belong to the VI. cent. B.C., when a recitation of the poems of Homer was one of the competitions of the Panathenæa. The reciter was called a rhapsodist, and the hymns are the preludes sung to the presiding gods.

The epic period was succeeded by the LYRIC AGE. Lyric verse, like epic, had its origin among the Ionians, and is the outcome of the intellectual awakening that followed the great migratory enterprise. There are two broad divisions of lyric—elegiac and iambic. Elegiac metre consists of the smooth, flowing hexameter, followed by the broken flow of the pentameter, a metre peculiarly well adapted for meditation and reflection. Elegiac verse suits manifold subjects; Tyrtæus employed it for martial themes, Mimnermus for erotic, Solon for gnomic, and Simonides for commemorative. Subsequently elegiac and iambic verse lost their instrumental associations, and Greek melic poetry was confined to the Dorian and Æolian species. The Æolian was personal and monodic; the Dorian was civic and choral. Æolian verse had its most glorious representative in SAPPHO. The fragments of her poetry show deep passion and supreme beauty of form. PINDAR gave to the Dorian choral lyric the breadth of Panhellenic spirit.

Out of the dithyramb (triumphal song to Dionysus) was developed **Drama**. In the history of the early development of the dithyramb stand Arion and Stesichorus, but the real history of the drama commences with Thespis of Icaria, who introduced one actor, and so made dialogue possible with the leader of the chorus. To this stage belonged Phrynichus, the author of the historical drama, *The Capture of Miletus*. ÆSCHYLUS introduced the second actor, and reduced the importance of the chorus—an epoch-making advance. Thus dialogue became dominant, and three parts became possible, as an actor could take two rôles. Among the dramas of Æschylus that remain is the great trilogy on the house of Agamemnon. The *Agamemnon* tells of the murder of the king by Clytæmnestra, the *Choëphori* deals with the Nemesis that tracked the avenger Orestes, and the *Eumenides* shows the final reconciliation between the Furies and the avenger. The dramas of Æschylus are essentially idealistic. The laws of heaven fulfil their purpose, and that purpose is good, though attained at the cost of individual sacrifice. This is the dominant thought—the fathers sin, and their sins are visited upon the children unto the third and fourth generations.

SOPHOCLES is less universal in his themes. With him the psychological problem is supreme. Tragedy arises where there are duties in conflict, where the will is other than the deed. Thus Antigone has to choose between duty to the written law, or duty to the greater unwritten law. Œdipus had to front the awful consequences of a rash action.

With EURIPIDES we pass from idealistic to realistic drama. The hero, though he be demigod of story, becomes a man, and the conflict he has to face is some subtle, sophistical problem of contemporary Athenian life. Too frequent use is made of the *Deus ex machina*, and the chorus is made a mere embellishment with no vital connection with the story.

Gk. comedy, like tragedy, had its origin in the cult of Dionysus. It springs from the extempore banter of the harvest festivals. Old comedy is represented by Eupolis and ARISTOPHANES, with its fearless ridicule of contemporary events and personalities. The middle comedy criticises movements and not individuals. The new comedy, represented by MENANDER, deals with the humorous aspects of domestic life. See also DRAMA.

The earliest traces of Gk. **Prose** belong to the VI. cent. B.C., and these are mainly genealogies and cosmologies. HERODOTUS was the father of literary Gk. prose. His sentences follow the 'loose' construction. His history is intended to corroborate his theory of the conflict of the East and West.

THUCYDIDES is a much more critical historian. His sentences are periodic in structure, and his chief virtue is the revelation of character. His style is restrained and sterling. He is the most characteristically Greek prose writer. The work of Xenophon is less profound in character, less perfect in finish.

Gk. oratory vacillates between the plain and the ornate, the simple and the florid, till it culminates in the perfect balance of style attained by DEMOSTHENES.

The writings of PLATO cannot be overlooked. As a stylist he is almost as great as he is as a philosopher.

The poetry of Alexandria was not truly Greek in character. It was artificial and scholarly; its appeal was very limited. THEOCRITUS was the most natural poet of the **Alexandrian school**. Less spontaneous were Apollonius Rhodius, Bion, and Moschus.

The **Byzantine** lit., though it affords much invaluable information, has no permanent value for purely literary qualities.

Modern Gk. lit. has produced nothing that is really great. Some of the ballads, folk-songs, and pastorals are beautiful in sentiment and sweet in expression, but the glory of Gk. lit. is of the ancients.

F. B. Jevons, *History of Greek Literature*; Gilbert Murray, *History of Ancient Greek Literature* (London, 1897).

GREEK ART.

Gk. art may be conveniently classified under three heads—architecture, sculpture, and painting. From what survives of the architecture and sculpture, one can conjecture with some degree of certainty to what heights of perfection Gk. art developed in these two branches; but the remains of Gk. painting give us no adequate idea of what was the degree of development in that art.

Architecture.—Out of primitive or Mycenæan arch., which showed genius of a bold and virile type, the Doric, Ionic, and Corinthian orders were developed.

The column is the distinguishing feature of these three types, as it is perhaps the distinguishing feature of Gk. arch. in general. The column had its origin in the tree-trunk used as a prop in primitive dwellings. In Gk. the columns were fluted and slightly tapered. The *Doric* column is simplest and most impressive, being capped by a simple square abacus. Its development culminated in the exquisite proportions of the Parthenon. The distinguishing feature of the *Ionic* column is the volute and torus. The *Corinthian* pillar is more ornate, and belongs to a later age in the history of Gk. arch. Tradition states that its head, with the graceful leaf designs, was suggested to its inventor, Callimachus, by the twining of the leaves of the acanthus plant. The Corinthian pillar was susceptible to embellishment, and with the decay of the pure Gk. genius it degenerated into designs tawdry and trivial.

Gk. arch. at its best is marked by a noble and simple symmetry. That definiteness which is so characteristic of the Gk. genius is reflected in the exquisite precision of the temples and their chaste beauty. G. in the structure of her temples was true to her motto, that there ought to be 'Nothing in excess.' See ARCHITECTURE.

Sculpture.—To pass from Gk. arch. to Gk. sculpture is a natural step, because the metopes of the temples were adorned with the finest masterpieces of sculpture, and within the temples stood the statues of the gods. Gk. sculpture, like the other Gk. arts, is in spirit ethical and ideal. It is an exquisite mingling of the human and the divine. Inspiration was sought from the gods, on whom the Gk. mind loved to dwell, but the sculptor's material was found in the palæstra. It was the perfection of the human physique, produced by the system of Gk. physical culture, which produced the magnificent statuary which will ever be the glory of G. and a wonder of the world. The temple statue developed out of the rude image of a deity rough-hewn out of a tree-trunk. Up to classical times, such rude images survived in the ancient temples; and the Hermes busts that stood, in the time of the highest civilisation of G., at the cross-roads mark the transition from tree-trunk to marble statue. Moreover, just as the most perfect of Gk. columns, the Doric, was marked by a solemn simplicity of line, so the finest examples of Gk. statuary were marked by a sublime freedom from all traces of sentimentality. The pose, too, of the statue at first showed the obvious influence of the tree-trunk type. The members were arranged in rigid symmetry—the legs and arms being stiff and straight.

At the period of the perfection of Gk. sculpture—the period of PHEIDIAS and his school—the statue had lost its rigidity, but still retained a suggestion of calm and dignified composure. Gk. art was really on the decline when the sculptor sought to portray complex distortions of the frame, though the beauty of such a group as the *Laocoön* of the Rhodian school cannot be denied. Such distortions are conspicuous by their absence in the sculptures of the Parthenon, which, if they are not the actual work of the great Pheidias, belong to his school. The calm dignity of these works has fixed them for all time as the perfect types of classic beauty. Just as in lit. the noble grandeur of Æschylus and Sophocles was followed by the more human and sentimental dramas of Euripides, and just as in arch. the solemn severity of the Doric column was superseded by the ornate and more complex designs of the Corinthian order, so the sentimentality of the decline invaded Gk. sculpture. Thus, if Pheidias is the Æschylus of Gk. sculpture, PRAXITELES is the Euripides. As Euripides made his gods human, so Praxiteles made his statues human. His statue of Venus, coloured (as Gk. statues usually were), seemed the very incarnation of sensuous beauty; and if the exquisite tenderness of the famous statue of Hermes with the infant Dionysus (the best-preserved and most authentic masterpiece of Gk. sculpture) is a sign of the decay of the sublime in Gk. art, it is not a sign of the decay of its beauty.

Painting.—As no paintings of the classical age in G. survives, criticism on this art is reduced to conjecture. One can make deductions from Rom. wall-paintings excavated at Pompeii. Very probably Gk. painting was weak in regard to perspective. More valuable material is derived from Gk. *vase-painting*. The specimens which have survived of Mycenæan vase-painting reveal beauty of the bold and virile type, and stand comparison in some respects with the art of the best period. The Dorian conquest, as it temporarily threw back the progress of Gk. civilisation, seems to have had a similar influence on art. The art of vase-painting evolved from crude geometric designs and rigid figures arranged with laboured balance. The potter of the early ages set black figures on a light background. The result always tended to be ludicrous. Later, red figures on a dark background were introduced. Lines of expression and anatomy were applied in black glaze. Normally the vase was black and red. White and brown embellishments belong to a later age. The decline in Gk. vase-painting is traced by the growth of elaborate detail and ornament.

Gk. art borrowed from the art of the East, but what it borrowed it made its own, by infusing into it its characteristic spirit of beauty and idealism. While the art of the East distorts the human frame and degenerates into the quaint and the grotesque, Gk. art ennobles what is real and rises into beauty and sublimity. Moreover, there is a chastity in Gk. art which is unique in the history of the world. The Gk. artist knew that what is imperfect cannot be made perfect by elaboration and embellishment. The key to Gk. art is found in the method of the sculptor, who studied the perfect human physique of the wrestling-ground and, working by an inductive method, conceived hence his ideal of the divine nature. This conception gave birth to the beauty which is truth, for it was always faithful to what is. Gk. art, therefore, idealises the real rather than realises the ideal.

Tarbell, *History of Greek Art* (London, 1896); Walters, *Art of the Greeks* (London, 1906).

Greek Law.—We possess no systematic code of Greek law, and our knowledge is derived mainly from indirect sources. The earliest information is found in Homer; rough and ready oral law is in question here, and there appear, besides the death penalty, to have been fines or blood-money. The first mention of written law is in the VII. cent. B.C., Zaleucos of Locri being the first code compiler; Catana, Rhegium, Corynth, and Crete followed. The Athenians were the first to set up a regular magistrature, and in 621 *Draco* drew up a code. It was altered by *Solon* (594 B.C.), and again during the democratic revision of 411 B.C., but in its main lines, especially as regards criminal law, it preserved its essential character. Solon abolished slavery for debt, and gave every citizen a right to trial before a tribunal both in civil and in criminal cases. A jury of a large number of citizens judged questions of constitutional law. Solon also instituted a rough form of will, whereas previously no one had the right to dispose of his property. In the absence of male heirs to an intestate succession, the daughter inherited. In 508 Cleisthenes introduced the law of ostracism, and Ephialtes (462) and Pericles (453) limited the powers of the Areopagus. Pecuniary penalties could be inflicted both in civil and in criminal cases; personal penalties only in criminal cases. Slavery as a penalty could only be inflicted on foreigners. What is known of Athenian law has been collected in Telfy's *Corpus Juris Attici* (1867).

Government is a limited monarchy; legislative power is vested in chamber of representatives, called Bulé, and Council of State; former was only legislative chamber till 1911, when the Council was established among other modifications of the constitution. Deputies number 173, and are elected by popular vote. There are seven ministerial departments—War and Marine, Foreign Affairs, Home, Finance, Commerce and

Agriculture, Justice, Public Instruction. For purposes of local administration G. is divided into twenty-six departments or *nomes*. System of justice is somewhat unsatisfactory, partly owing to Minister's right to dislodge judges, which leads to political intrigue. Military service is obligatory. G. has a small navy which played no unimportant part in the Turko-Balkan War (*q.v.*).

Resources and Productions.—The chief towns are Athens (capital), Piræus, Patras, and Valo. The predominant industry is agriculture, which is still in a very backward condition. Chief products are grapes for currants (mostly from Ionian Islands and S. side of Gulfs of Corinth and Patras); olives, figs, wine, tobacco, silk cocoons, in Messenia district, S.W. Morea; wheat, barley, rye, maize, cotton. Oranges, lemons, and other fruits are also grown. Forests cover about 2,000,000 acres, the chief trees being oaks, firs, Aleppo pine, black pine. Manufactures, though still unimportant, are increasing, and include weaving of coarse textiles, silk-spinning, paper-making, manufacture of gunpowder and dynamite, soap-making, distilling. At Laurium there are valuable mines of lead, silver-lead, manganese, iron, zinc; iron, manganese and sulphur also occur in various districts. There are marble quarries at Larissa (verd antique), Skyros (alabaster, violet, yellow, and red and white), Styra, Pentelicon (blue and white), and Tinos. The Paros quarries are still worked. Chrome, copper, lignite, emery, and petroleum are also found. Exports include currants, ores, wine, tobacco, olive-oil, figs, silk, sponges, cognac; imports cereals, textiles, timber, coal, live stock. Railway mileage in 1911 was 850.

Population.—The inhabitants are mainly Greeks, with an admixture of Albanians, who are found in the east central districts and N.E. Morea, and some Rumanians in the N. Question whether modern Greeks are of Hellenic or Slavonic descent has been subject of discussion for many ethnologists; but it is now generally believed that although not pure-blooded descendants of the Greeks of classical times, they are yet mainly of Hellenic descent and represent the mixed race which inhabited the country when it came under Rom. control. The Slavs, who invaded the country from the V. cent. onwards, were gradually absorbed by this race, on which they have left little trace. The Albanians first settled in G. in the XIV. cent., and, like the Rumanians or Vlachs, still form a distinct section of the population. The peasants preserve many interesting customs and ceremonies, some of which date back to very early times; at funerals, farewell speeches are made, and dirges are sung. The old-style calendar is retained in G., Gk. Jan. 1 being Jan. 14 (new style). The national white kilt costume is not now much in evidence, except as the uniform of certain regiments.

Primary education is free, and nominally compulsory; secondary education is under State control, but in a backward condition. There are trade and agricultural schools, and Athens has a univ. (founded 1836). State religion is Gk. Orthodox Church, but there is complete religious toleration. See GREEK CHURCH.

The population in 1907 was 2,631,952.

Baedeker's *Greece* (1908); *Statesman's Year-Book*; L. Sargeant, *Greece* (1880); E. Abbot, *Hellenica* (1898).

GREEK CHURCH, ORTHODOX EASTERN CHURCH, is the name given to that group of Christian Churches in the East which, while not owing allegiance to Rome, has preserved an ecclesiastical and sacerdotal system much resembling hers, and has continued with but little internal change from primitive times. While in the West one see, the Roman, towered into pre-eminence, in the East there were several patriarchates of about equal standing—Jerusalem, Alexandria, Antioch, and Constantinople. Most of the Early Christian heresies broke out in the East, rather than the West, and in Egypt, Abyssinia, and Syria monophysite churches arose. The East has always been more metaphysical than the West, but the great point of theological dispute between the two was the addition of the word *Filioque* to the creed by the Rom. Church, thereby asserting the double procession of the Holy Ghost from the Father 'and from the Son.' Mutual excommunication followed, and though there have been various attempts at reunion, the breach has never been healed.

In doctrine the Eastern Church agrees on the whole with the Roman, in some things with Protestants. Its ultimate authority is a general synod; there is therefore nothing corresponding to the centralisation of the papal authority. Its sacerdotal and sacramental system is Catholic, but its priests may marry (and this in effect means that they *must*, as bishops prefer to ordain married deacons), though they may never marry a second time. Bishops must be unmarried, and are therefore chosen from the monastic orders. The Orthodox Eastern Church as at present constituted consists of the four ancient patriarchates mentioned above, and several national churches in communion with these, but independent in government. Most important of these are the Hellenic Church, the Russian Church (now the strongest of all, tending to encroach on the authority of the patriarchate of Constantinople), the Orthodox Church of the Austrian Empire, the national Churches of Servia, Bulgaria, and Montenegro, the Churches of Cyprus and Mount Sinai (under the jurisdiction of which is the great monastery of St. Catherine where valuable Early Christian manuscripts have been found). The Bulgarian Church split off from Constantinople, which regards it as schismatical. The Eastern Church has recently had friendly intercourse with the Anglican, and projects of reunion have been mooted, so far without definite result.

Stanley, *Eastern Church*; Adeney, *Greek and Eastern Churches*.

GREEK FIRE, liquid inflammable and explosive mixture, used in mediæval warfare.

GREELEY (40° 25′ N., 104° 45′ W.), city, Colorado, U.S.A.; seat of state Normal School; sugar industries. Pop. (1910) 8179.

GREELEY, HORACE (1811–72), Amer. politician and writer; b. Amherst, New Hampshire; started and edited *The New Yorker*, 1834; edited *The Jeffersonian*, 1838; began publication of *The Log Cabin*, 1840, afterwards united with *The New Yorker* as *The Weekly Tribune*. In 1841 G. started a daily paper, *The Tribune*, with which he was henceforth identified. His principal work was in connection with abolition of slavery; opposed Mexican War; was indicted in Virginia for publishing incendiary papers; addressed appeal called *Prayer of Twenty Millions* to Lincoln, one month after which emancipation was proclaimed. In politics, originally Whig, G. was subsequently a founder of Republican party; helped to secure Lincoln's election; at close of Civil War became unpopular through his advocacy of general amnesty and universal suffrage; unsuccessfully opposed Grant for presidency, 1872.

Biographies by James Parton (New York, 1855; Boston, 1872) and W. A. Lynn (New York, 1903).

GREEN BAY (45° N., 87° 30′ W.), city and port, Wisconsin, U.S.A., on Green Bay; large lumber trade, flour-mills, furniture, and machinery. Pop. (1910) 25,236.

GREEN EARTH, popular name for various soft minerals, specially *glauconite* (q.v.), celadonite, and chlorite.

GREEN HEART, term used for wood of Bibiri tree, Brit. Guiana and West Indies. See BIBIRINE.

GREEN, JOHN RICHARD (1837–83), Eng. historian; wrote *Short History of English People*, *Making of England*, *Conquest of England*.

GREEN MOUNTAINS, see APPALACHIAN MOUNTAINS.

GREEN RIBBON CLUB, Eng. Whig club (between 1675 and 1685), named from members' green

ribbon badge; associated chiefly with the Petitioners' Movement of 1679.

GREEN SICKNESS, Chlorosis, see Anæmia.

GREEN, THOMAS HILL (1836–82), Eng. philosopher; ed. Rugby and Balliol Coll., Oxford; elected fellow, 1860; prof. of Moral Philosophy, 1878. His *Prolegomena to Ethics* and lectures on the *Principles of Political Obligation* were pub. after his death. G. was perhaps the most important Eng. philosopher of his day, and led the reaction against Hume's empiricism and Herbert Spencer's teaching. He considered problems of ethics and philosophy in relation to social and political well-being. Nettleship edited his *Works*.

GREEN, VALENTINE (1739–1813), Eng. engraver; famed for mezzotint portraits after great Eng. and foreign masters.

GREEN, WILLIAM HENRY (1825–1900), Amer. Hebrew scholar; wrote a *Grammar of the Hebrew Language*, and numerous works of Biblical criticism.

GREENAWAY, KATE (1846–1901), Eng. artist; noted for her delightful drawings of children. She also wrote much of the verse and prose in some of the juvenile books which she illustrated.

GREENBACKS, U.S.A. treasury notes, with green printing on back; issued during Civil War, 1862–65; made convertible, 1879.

GREEN-BOTTLE FLIES, see under House Fly.

GREENCASTLE (39° 38′ N., 86° 50′ W.), city, Indiana, U.S.A.; lumber manufactures. Pop. 4000.

GREENE, GEORGE WASHINGTON (1811–83), Amer. historian; wrote *Historical View of the American Revolution* (1865).

GREENE, NATHANAEL (1742–86), Amer. soldier; brigadier-general of Rhode Island division of Boston forces, 1775; skilfully conducted retreat after disaster of *Brandywine*, 1777; quartermaster-general, 1778; superseded Gates in command of army of South, 1780, and reorganised force; chiefly due to him that Cornwallis was brought to a stop; by victory at *Eutaw Springs* secured independence of S. Carolina.

GREENE, ROBERT (*c.* 1560–92), Eng. dramatist; b. Norwich; ed. Oxford and Cambridge; before graduating, travelled in France, Germany, Italy, and other countries; subsequently settled in London; married, and became a dramatist, tale-writer, and pamphleteer. G. deserted his wife, after squandering her fortune; led a loose life and died as the result of a carouse. His plays include *Friar Bacon and Friar Bungay*, *Alphonsus, King of Aragon*, *Orlando Furioso*, and he was possibly the author of *George-a-Greene, the Pinner of Wakefield*. These works are distinguished by their humour, and are invaluable as pictures of Elizabethan life. His prose writings are innumerable, and upon one of these, *Pandosto, the Triumph of Time*, Shakespeare founded *The Winter's Tale*. He also wrote some delightful lyrics; and *A Groat's-worth of Wit*, written in his last hours, was the product of repentance.

Plays and Poems, edit. by Churton Collins (1905).

GREENFIELD (42° 35′ N., 72° 37′ W.), town, summer resort, Massachusetts, U.S.A., near Connecticut River; cutlery. Pop. (1910) 10,427.

GREENFINCH, see under Finch Family.

GREENLAND, Danish Grönland (70° N., 40° W.), large island belonging to Denmark; between Baffin Bay and Atlantic Ocean, N.E. of America; larger part in Arctic circle; stretches from 59° 45′ N. beyond 82°–83°; extreme length, about 1650 miles; greatest breadth, about 800 miles; area, 612,000 sq. miles; interior completely buried under ice with a thickness over some valleys of 6000–7000 ft. Surface generally is mountainous; several mountains on east coast between 5000 and 8000 ft.; highest peak, Petermann's Spitze, 9000 ft., near Franz Joseph Fjord; coast-line broken by numerous bays and fjords of great depth—Scoresby (180 miles long), South Ström, Petermann Fjords, Kane Basin, Inglefield Gulf, etc.; Disco, on west coast, is the largest of many islands; no large rivers; drainage mainly done by enormous glaciers, which move with surprising rapidity, and small streams of melted snow and ice; largest glaciers are Humboldt, Petowik, Jakobshaven, and Great Karaiak; part of north-east and north-west coasts still unexplored. Fauna includes lemming, musk-ox, white wolf, polar bear, reindeer, fox, and hare; numerous birds; copsewoods on coast; climate colder on east coast owing to north polar current; west coast washed by Atlantic water. Principal settlements are Julianehaab (most southerly station), Frederikshaab, Godthaab, Sukkertoppen, Godhaven, Egedesminde, Kristianshaab, Jakobshaven, Umanak, and Upernivik (most northern settlement).

G. was first discovered by Norse settlers from Iceland, X. cent.; the Norwegian, Erik the Red, established two colonies, *c.* 986; under Norwegian rule, 1261; western settlements destroyed by Eskimos, XIV. cent.; rediscovered by John Davis, 1585–87, followed by Hudson, 1610, Baffin, 1616; Egede established several Dan. missionary stations on W. coast, 1721; Julianehaab founded, 1775; E. coast explored by Scoresby, 1822, Graah, 1829–30, 2nd Ger. North Pole Expedition, 1869–70, Nathorst, 1899, Amdrup, 1900. G. first crossed by Nansen (E. to W.), 1888; northern limits traced by Peary, 1892; exploration of inland ice by Nordenskiold, 1883, Von Drygalski, 1892, Garde, 1893; Mylius Erichsen, 1906–8, followed by Mikkelsen, 1909–12, explored extreme N.E. Principal exports: whale and seal oil, eiderdown, fox and seal skins; cryolite mine at Tvigtut; copper, lead, iron, zinc, are found; large cod and haddock fisheries on W. coast; trade a monopoly of Dan. Government. Population on coast (1911), *c.* 13,000 (Eskimos and some 300 Danes). See Polar Regions.

Fischer, *The Discovery of Norsemen in America* (Eng. trans., 1903); Nordenskiold, *Greenland* (1886); Nansen, *First Crossing of Greenland* (1891). Recent works by Peary and Mikkelsen.

GREENLAW (55° 43′ N., 2° 27′ W.), town, on Blackadder, Berwickshire, Scotland; woollen mills.

GREENLEAF, SIMON (1783–1853), Amer. lawyer; author of a *Treatise on the Law of Evidence* (1842–53).

GREENOCK (55° 56′ N., 4° 45′ W.), burgh, prosperous seaport and manufacturing town, on Clyde estuary, Renfrewshire, Scotland; picturesquely situated; birthplace of James Watt; head of large fishery district; shipbuilding is largely carried on, also iron-working, especially construction of boilers and engines; sailcloth and woollen factories; sugar-refining; rope-works, tanneries, etc. Pop. (1911) 75,160.

GREENORE (54° 1′ N., 6° 9′ W.), watering-place, County Louth, Ireland, on Carlingford Lough.

GREENOUGH, HORATIO (1805–52), Amer. sculptor; executed the statue of Washington for the U.S.A. capital.

GREENSAND, Cretaceous deposits found in S.E. England and Isle of Wight, where they are over 800 ft. thick. Numerous tiny particles of glauconite are found in most deposits, hence the name. G. consists of clays, sands, and limestones, and is a marine deposit containing molluscan and other fossils. Between lower and upper g. is clay or gault (*q.v.*).

GREENSBORO (36° 5′ N., 79° 47′ W.), city, N. Carolina, U.S.A.; contains Greensboro Female Coll., Bennett Coll., State Agricultural and Mechanical Coll.; cotton and tobacco factories. Pop. (1910) 15,895.

GREENSBURG (40° 20′ N., 79° 30′ W.), town, Pennsylvania, U.S.A.; coal region; iron and brass manufactures. Pop. (1910) 13,012.

GREENSHANK, bird; popular name for two species of sandpipers, *Totanus nebularius* and *T. canescens*.

GREENVILLE (33° 24′ N., 91° 5′ W.), city, Mississippi, U.S.A., on Mississippi; important cotton trade. Pop. (1910) 9610.

GREENVILLE (40° 6′ N., 84° 33′ W.), city, Ohio, U.S.A.; agricultural region; foundries; tobacco trade. Pop. (1910) 6237.

GREENVILLE (34° 50′ N., 82° 12′ W.), city,

S. Carolina, U.S.A., on Reedy River; seat of several educational institutions; important cotton trade. Pop. (1910) 15,741.

GREENVILLE (33° 7′ N., 95° 55′ W.), city, Texas, U.S.A.; seat of Burleson Coll. and Holiness Coll.; cotton industries. Pop. (1910) 8850.

GREENWICH (41° 2′ N., 73° 35′ W.), town, summer resort, Connecticut, U.S.A., on Long Island Sound; residential suburb of New York. Pop. (1910) 16,463.

GREENWICH (51° 28′ N., 0°), parliamentary borough, county of London, England, on S. bank of Thames; has celebrated Royal Observatory in G. park. G. Hospital (handsome building on site of royal palace) was made hospital for seamen by William and Mary; now Royal Naval Coll. Other buildings are Seamen's Hospital, Royal Hospital School, Naval Museum. G. has engineering, telegraph, and chemical works. Pop. (1911) 95,977.

See TIME (*Time Standard*).

GREENWOOD, FREDERICK (1830–1909), Eng. journalist; editor of *Cornhill* (1864–68), later of *Pall Mall Gazette* and *St. James's Gazette*. One of greatest and most influential journalists of XIX. cent.

GREENWOOD, JOHN (d. 1593), Eng. Puritan; became a leading member of the Separatists; hanged for sedition.

GREG, WILLIAM RATHBONE (1809–81), Eng. agnostic author; wrote *The Creed of Christendom*, *Enigmas of Life*, and *Rocks Ahead*.

GREGARINES, a group of Sporozoa (*q.v.*).

GRÉGOIRE, HENRI (1750–1831), Fr. politician and ecclesiastic; sided with Third Estate, 1789; bp. of Blois, 1790; advocated destruction of royal authority, but tried to prevent king's execution; opposed Napoleon's religious and imperialist policies, wrote *Mémoires*, *Histoire des Sectes Religieuses*, and other works.

GREGORAS, NICEPHORUS (fl. 1300–60), Byzantine historian; his *Roman History* covers the period, 1204 to his death.

GREGOROVIUS, FERDINAND (1821–91), Ger. historian; principal work, *History of the City of Rome in the Middle Ages* (1859–72).

GREGORY, Scot. family. DAVID (1661–1708), prof. of Astron., Oxford; wrote on maths. JAMES (1638–75), wrote on math's; invented Gregorian telescope. JAMES (1753–1821), prof. of Med., Edinburgh; wrote essays on literary and philosophical subjects; invented *Gregory's powder*. JOHN (1724–73), prof. of Med., Aberdeen; wrote on physic. WILLIAM (1803–58), prof. of Chem.; wrote *Outlines of Chemistry*.

GREGORY, name borne by sixteen popes and one antipope. The most important were the following:—

Gregory I., SAINT, surnamed THE GREAT (*c.* 540–604), was b. at Rome; inherited great wealth, which he devoted chiefly to service of Church; became a monk in one of monasteries founded by himself. Elected pope in 590, G. became distinguished by his missionary zeal, and sent Augustine with forty monks to attempt Christianisation of England. His struggle for supremacy with the patriarch, John of Constantinople, tended to widen breach between Eastern and Western Churches. His *Liber Pastoralis* was one of the works trans. into Anglo-Saxon by order of Alfred the Great. His name is traditionally associated with *Gregorian chants*. G. was last Latin Father of Church.

J. Barmby, *Gregory the Great* (1892); F. Homes Dudden, *Gregory the Great* (1905).

Gregory II., SAINT (d. 731); b. Rome; when deacon accompanied Pope Constantine to Constantinople as canonist; became pope, 715; sent St. Boniface as missioner to Germany; opposed the Gk. emperor's (Leo III.'s) taxation and proscription of image-worship.

Gregory VI. (d. 1047); archpriest of San Giovanni by the Latin Gate, and godfather of the profligate Benedict IX., from whom in innocence bought Papacy, 1045; deposed, 1046, for simony, and exiled to Germany; man of great learning and uprightness.

Gregory VII., HILDEBRAND (*c.* 1020–85), was the pope who did most to establish ecclesiastical supremacy of the Papacy, and laid foundations of its temporal power. Before his election as pope in 1073, he had directed the policy of the four preceding popes, had managed to place their election entirely in hands of cardinals, and was in reality the most prominent and influential man in the Church. Entered service of Johannes Gratianus when in minor orders, and became his chaplain when Gratianus became pope as Gregory VI. He went with Gregory into exile, and stayed with him at Cologne until his death. He became pope with reluctance; a fearless man, he describes his trembling at the responsibility. But his action was prompt and bold. Simoniacal and incontinent priests he pronounced suspended, and though his action met with widespread hostility, he enforced it unswervingly. With Henry IV., Holy Rom. emperor, who took oath of obedience in 1074, and subsequently repudiated it, he took a high-handed course; he deposed the simoniacal prelates appointed by the emperor and cited him to appear at Rome. When Henry retorted by getting his supporters to pronounce Hildebrand deposed, the latter excommunicated Henry; and the emperor found it necessary, in order to avoid deposition, to do penance at Canossa in Italy in 1077. The dispute was subsequently renewed, and Henry caused a rival pope to be set up in 1084, and marched on Rome. He entered the city, 1084, but was driven out by the Normans, who were in turn expelled by the people, when G. retired to Salerno. G. was canonised by Benedict XIII. in 1728.

W. Martens, *Gregor VII.* (Leipzig, 1904); *Lives* by Delarc (1889–90), Vincent (1896), Mathew (1910).

GREGORY VIII. (d. 1121), antipope, 1118; banished from Rome in 1121.

GREGORY VIII. (d. 1187), was pope for short time in 1187; concluded treaty of peace with Emperor Henry VI., and began to make arrangements for a crusade, but died before these were completed.

Gregory IX. (d. 1241), was elected pope, 1227. His pontificate is marked by long struggle against Emperor Frederick II., whom he excommunicated (1227) for refusing to join crusade; by exciting revolt against him in Germany, compelled emperor to submit and petition for absolution. Dispute was afterwards renewed, and emperor again excommunicated in 1239. Frederick then prepared to besiege Rome, and was marching towards the city, when G. died.

GREGORY X. (1208–76) was member of Visconti family; went on crusade; elected pope, 1271; reunited Eastern and Western Churches.

GREGORY XI. (1330–78) was elected to Papacy in 1370; retransferred papal see to Rome in 1397; tried to suppress heresy and to reform religious orders.

GREGORY XIII. (1502–85) was elected pope, 1572; founded Jesuit College at Rome; reformed calendar (*q.v.*), 1582; strongly opposed heresy; built Gregorian Chapel at St. Peter's.

GREGORY XVI. (1765–1846) was elected pope, 1831; an autocrat, he discouraged democracy on principle, but encouraged learning and research in all directions; founded Etruscan and Egyptian museums at the Vatican; favoured Jesuits; wrote *Triumphs of the Papacy*.

GREGORY, EDWARD JOHN (1850–1909), Eng. artist; Pres., R.W.S. (1898); excellent technique.

GREGORY, ST. (*c.* 213–70), bp. of Neocæsarea from 240; an energetic prelate and theologian; much increased the Church's strength during his episcopate.

GREGORY, ST., OF NAZIANZUS (329–89), called (like St. John) 'the Theologian'; wrote five orations, delivered against Macedonians and Eunomians in 379: these contain best statement of doctrine of Trinity in Gk. orthodox theol. G. was scarcely an original thinker, but a graceful and powerful expounder; also wrote poems and letters to Basil, bp. of Cæsarea. These two, with Gregory of Nyssa, are known as *Cappadocian fathers*.

GREGORY, ST., OF NYSSA (*c.* 331–86), bp. of Nyssa; one of 'Cappadocian fathers'; wrote many works, perhaps best is his *Catechetical Oration*, where he summarises his theological system; a disciple of

Origen and constructive and original thinker; his style is often rhetorical and his thought speculative; anticipates doctrine of transubstantiation.

GREGORY, ST., OF TOURS (530–94), theologian and historian; ordained 563; chosen bp. of Tours by people, 573; took part in various political quarrels of Merovingian kings; wrote several theological works, but greatest work is *History of the Franks*. This for earlier books is based on other works (some now lost); for later books, on personal information, of great hist. value.

GREGORY, THE ILLUMINATOR (fl. 290), saint and abp. of Cæsarea; his history is partly legendary; said to have been brought up in Christian faith at Cæsarea; imprisoned for many years in Armenia, but, eventually released, established Christianity in that country; ordained at Cæsarea, *c.* 290.

GREIFENBERG (53° 55′ N., 15° 12′ E.), town, on Rega, Pomerania, Prussia; iron manufactures. Pop. (1910) 7770.

GREIFENHAGEN (53° 15′ N., 14° 29′ E.), town, Pomerania, Prussia; agricultural trade. Pop. (1910) 7259.

GREIFSWALD (54° 5′ N., 13° 21′ E.), town, Pomerania, Prussia, on Baltic; has univ. (founded 1456); manufactures machinery; fish-curing industries. Pop. (1910) 24,680.

GREISEN, rock consisting chiefly of quartz and white mica, with usually traces of topaz; abundant with tin ore, and supposed to be variety of granite (unlike which, has no felspar or biotite).

GREIZ (50° 39′ N., 12° 13′ E.), town, Germany, capital of Reuss (the Elder), on White Elster; woollen manufactures. Pop. (1910) 23,245.

GRENADA (12° 5′ N., 61° 40′ W.), one of Brit. W. India Islands, most southerly of Windward (*q.v.*) group; mountainous; several crater lakes and mineral springs; very fertile, good climate; chief products—cocoa, fruit, spices, wool; capital, St. George; colonised by French, 1650; taken by British, 1762; held by French, 1779–83, then ceded to Britain. Area, 133 sq. miles. Pop. (1911) 66,750.

Handbook by Colonial Sec. (1905).

GRENADE, earliest form of modern explosive shell. It was a ball of metal, or strong glass, filled with gunpowder, and exploded by a fuse; thrown by hand.

GRENADIER, originally the name applied to the soldiers of a company attached to each regiment, who led the assault on trenches and fortresses, and hurled hand *grenades*. The name is now applied to a foot regiment of the Household Brigade of Guards.

GRENADINES (12° 45′ N., 61° 15′ W.), group of small islands, Brit. West Indies, between islands of Grenada and St. Vincent, and forming dependency of these islands; exports corn and cattle. Pop. *c.* 7000.

GRENOBLE (45° 12′ N., 5° 42′ E.), town, France, on river Isère; capital of Isère department; ancient *Gratianopolis*; old capital of Dauphiné; ceded to France, 1349; a Prot. stronghold; beautiful situation among mountains, near famous Chartreuse Monastery (*q.v.*); first-class fortress; has univ. and cathedral; manufactures kid gloves, liqueur, cement, straw hats, etc. Pop. (1911) 77,500.

GRENVILLE, SIR BEVIL (1596–1643), Eng. Royalist; beloved leader of the Cornishmen; killed at *Lansdown*.

GRENVILLE, GEORGE (1712–70), Brit. prime minister (1763); attacked liberty of press in Wilkes' case, 1764; carried out imposition of Stamp Tax in colonies, 1765, the immediate cause of America's secession.

GRENVILLE, SIR RICHARD (*c.* 1541–91), Eng. mariner; commander of *Revenge* in expedition against Azores, 1591; had celebrated fight for fifteen hours against fifteen Span. ships; d. shortly after action.

GRENVILLE, SIR RICHARD, GRANVILLE (1600–58), Eng. Royalist; grandson of hero of *Revenge*; failed to capture Plymouth for king; took little further share in war, and followed Charles II. into exile.

GRENVILLE, WILLIAM WYNDHAM, BARON (1759–1834), Brit. politician; Speaker of Lower House, 1789; Home Sec., 1789; Foreign Sec., 1791; formed 'All the Talents' ministry, 1806, which abolished slave trade.

GRESHAM, SIR THOMAS (1519–79), Eng. merchant; helped to consolidate and improve Eng. trade by building the Royal Exchange, 1566–71; devoted much of his wealth to educational and charitable purposes.

GRESSET, JEAN BAPTISTE LOUIS (1709–77), Fr. poet and dramatist; famed chiefly for his humorous poem, *Vert Vert* (1734); *Œuvres Complètes* (1811).

GRETNA GREEN (55° N., 3° 3′ W.), village, Dumfriesshire, Scotland, near the Border; long famous for 'runaway' marriages—Eng. couples taking advantage of the greater ease with which the marriage ceremony could be performed in Scotland.

GRÉTRY, ANDRÉ ERNEST MODESTE (1741–1813), Belg. composer; b. Liége; lived in Paris; famous for comic opera; *Zémire et Azor*, and *Richard, Cœur de Lion*, best works.

GREUZE, JEAN BAPTISTE (1725–1805), Fr. artist; famed for his genre pictures and female studies. His works, as a rule, have a moral tendency; among best known are *The Broken Pitcher* (Louvre), *Girl with Doves* (Wallace Collection), and *Girl with Dead Canary* (Scot. National Gallery).

Macklin, *Greuze* (Jacks' Masterpieces in Colour Series).

GREVILLE, CHARLES CAVENDISH FULKE (1794–1865), Clerk of the Council in Ordinary (1821–65); is famed for his *Memoirs* (pub. 1875–87), valuable for sidelights on social and official life in the first half of XIX. cent.

GREVILLE, SIR FULKE, see **BROOKE, FULKE GREVILLE, 1ST BARON.**

GRÉVIN, JACQUES (*c.* 1539–70), Fr. dramatist; a pioneer of the Fr. classical school; his works include *Jules César* (tragedy) and some comedies.

GRÉVY, FRANÇOIS PAUL JULES (1807–91), Pres. of the Fr. Republic; succ. MacMahon, 1879. Without possessing brilliant talents he was noted for his sagacity and patriotism; resigned, 1887.

GREW, NEHEMIAH (1641–1712), Eng. physician and botanist, author of many scientific works, especially on the anatomy of plants.

GREY, CHARLES, 2ND EARL GREY (1764–1845), Brit. politician; b. at Falloden, Northumberland; took part in impeachment of Warren Hastings; moved Pitt's impeachment, and protested against his policy by seceding from House, 1797; First Lord of Admiralty, 1806; after Fox's death became Foreign Sec. in 'All the Talents' ministry; succ. to earldom, 1807; carried Act abolishing African slave trade. G. became Prime Minister in 1830; the Reform Bill was introduced by Lord John Russell (1831), and carried (1832) by G.'s obtaining royal permission to create sufficient peers to ensure its passing; retired, 1834.

Hon. C. Grey, *Life of Grey*.

GREY DE RUTHYN, Eng. barony, cr. 1324, now held by Clifton family.

GREY DE WILTON, Eng. barony, cr. 1295; 13th and 14th holders of this title were distinguished in Henry VIII.'s wars with Scotland and France; present holder belongs to Egerton family.

GREY FRIARS, Franciscans (*q.v.*).

GREY, HENRY, 3RD EARL GREY (1802–94), Brit. politician; M.P., 1826; Colonial Under-Sec., 1832; War Sec., 1835; Colonial Sec., 1846–52; advocated emancipation of slaves; established free trade between colonies and mother country; opposed Crimean War.

GREY, LADY JANE (1537–54), Eng. 'Nine days' Queen'; granddau. of Henry VIII.'s sister Mary; early acquired wide knowledge of classical and modern languages; m. Lord Guildford Dudley, whose f., Duke of Northumberland, proclaimed her queen in 1553; but on Mary's accession she was sent to Tower; beheaded, 1554.

Davey, *The Nine Days' Queen*.

GREY, SIR EDWARD, 3RD BART. (1862–), Brit. Liberal statesman; Under-Sec. for Foreign Affairs, 1892–95; an Imperialist and one of founders of Liberal League; Sec. for Foreign Affairs, 1905– ; signally honoured by Order of Garter, 1912; helped to maintain continuity of foreign policy under system of party government; authority on angling and ex-tennis champion.

GREY, SIR GEORGE (1812–98), Brit. Colonial administrator, politician, and bibliophile; led exploring expeditions in N.W. and Western Australia, 1837–38; gov. of S. Australia, 1841, of New Zealand, 1846, conciliating the Maoris; gov. of Cape Colony, 1854–61; tried to federate South African States; crushed Kaffir revolt; gov., New Zealand, 1861; ended Maori War, 1870; premier of New Zealand, 1877–84. *Life*, by Henderson.

GREY-HEN, the female of Black Grouse (*g.v.*).

GREYHOUND, dog of Eastern origin, thoroughbred racer; run in many coursing meetings in this country; Scotch, Italian, Irish, and English breeds.

GREYMOUTH (42° 25′ S., 171° 19′ E.), seaport, at mouth of Grey River, S. Island, New Zealand; coal and gold mines. Pop. (1911) 5469.

GREYTOWN, SAN JUAN DEL NORTE (10° 59′ N., 83° 42′ W.), chief seaport, Nicaragua, Central America, on E. coast; exports hides, fruit. Pop. 2500.

GRIBOYEDOV, ALEXANDER SERGIEVICH (1795–1829), Russ. dramatist; famed for satirical comedy, *Goré ot uma*, dealing with Moscow official life.

GRIEG, EDVARD HAGERUP (1843–1907), Nor. composer and pianist; of Scot. descent; b. Bergen; studied at Leipzig under Richter and Reinecke; Copenhagen, under Gade; excelled in shorter pianoforte pieces and songs; most popular work, *Peer Gynt* music.

Lee, *Grieg*; Finck, *Grieg and his Music*.

GRIESBACH (48° 26′ N., 8° 13′ E.), watering-place, Baden, Germany; mineral springs.

GRIESBACH, JOHANN JAKOB (1745–1812), Ger. theologian; prof. at Halle, and from 1775 at Jena; famous for his New Testament work.

GRIFFENFELDT, PEDER, COUNT (1635–99), Dan. politician; became imperial Chancellor, 1673, and until 1676 had entire control of Dan. foreign policy; tried to restore country's prestige by alliances with Sweden and France, but failed; charged with treason, 1676; imprisoned for life; wrote the *Kongelov*, which helped to make Denmark an absolute monarchy.

GRIFFIN (33° 11′ N., 84° 17′ W.), city, Georgia, U.S.A.; large cotton factories. Pop. (1910) 7478.

GRIFFIN, GRYPHON, mythical monster which was said to guard the earth's treasures. It is usually represented as having the body and hind legs of a lion and the wings and beak of an eagle; a figure in heraldry.

GRIFFIN, GERALD (1803–40), Irish novelist; author of *The Collegians* (1829), upon which Boucicault founded *The Colleen Bawn*; also other novels, plays, and lyrics.

GRIFFITH, SIR RICHARD JOHN (1784–1878), Irish geologist; carried out boundary survey of Ireland (completed, 1844); pub. geological map of Ireland, scale 4 miles to 1 inch.

GRILLE (Fr.), metal screen or grating; usually fitted into a door for purpose of observation.

GRILLING, see COOKERY.

GRILLPARZER, FRANZ (1791–1872), Austrian dramatist and poet; regarded as perhaps the greatest dramatic poet of his country; b. Vienna; his plays include *Sappho* (1819), and *Das Goldene Vlies* (1821), *König Ottokar's Glück und Ende* (1825), *Des Meeres und der Liebe Wellen* (1840), and others. His lyric poetry is of high literary quality, though coloured to some extent by the sadness and loneliness of his life. He wrote also a prose romance, *Der Arme Spielmann* (1848) and some literary criticisms. Eng. trans. of several of his plays have appeared.

Ehrhard, *Franz Grillparzer: Le Théâtre en Autriche* (1900).

GRILSE, see under SALMON FAMILY.

GRIMALD, NICHOLAS (1519–62), Eng. poet; contributed to Tottel's *Songs and Sonnets* (1557), and wrote two Latin dramas.

GRIMALDI, GIOVANNI FRANCESCO (1606–80), Ital. artist and architect; hist. subjects, portraits, and landscapes; architect to the popes.

GRIMALDI, JOSEPH (1779–1837), Eng. clown; one of the greatest drolls known to Eng. stage; *Memoirs* edit. by Charles Dickens (1838).

GRIMKÉ, SARAH MOORE (1792–1873) and **ANGELINA EMILY** (1805–79), Amer. reformers; took part in Anti-slavery movement; lectured on slavery; established school for blacks and whites.

GRIMM, FRIEDRICH MELCHIOR, BARON VON (1723–1807), Ger. author; famed for his *Correspondance Littéraire*, an invaluable commentary on contemporary events; lived mostly in Paris.

GRIMM, JAKOB LUDWIG KARL (1785–1863), Ger. philologist; b. at Hanau; first important appointment was that of librarian to King Jérôme at Wilhelmshöhe in 1806. In 1816 he joined his bro., **Wilhelm Karl** (1786–1859), at the Cassel library as sub-librarian. In 1829 the bro's went to Göttingen, Jakob being appointed librarian and Wilhelm sub-librarian; in 1841 they were called to the Univ. of Berlin. The lives of the bro's were devoted to a scientific study of the Ger. languages and folk-lores, and their researches were epoch-making. They collaborated in the famous collection of fairy-tales. Jakob wrote a *Deutsche Grammatik, Geschichte der Deutschen Sprache*, and a *Deutsche Mythologie*.—**Grimm's Law**, term loosely applied to rules regulating 'consonant-shift' in various Indo-European languages. The elder G. applied it to the change into Teutonic dialect, then into High German, *e.g.* Lat. *pater*, English (from Teuton dialect) *father*, German *vater*; Latin *tu*, English *thou*, German *du*. See Jesperson's *Growth and Structure of the English Language* (1912).

GRIMMA (51° 13′ N., 12° 43′ E.), town, Saxony, Germany, on Mulde; iron-founding; agricultural industries. Pop. (1910) 11,441.

GRIMMELSHAUSEN, HANS JAKOB CHRISTOFFEL VON (1625–76), Ger. novelist; wrote *Simplicius Simplicissimus* (1669), a military novel drawn from his own experiences of the Thirty Years War.

GRIMOARD, PHILIPPE HENRI, COMTE DE (1753–1815), Fr. military historian; *Lettres et Mémoires de Turenne* (1780), *Mémoires de Gustave-Adolphe* (1790), etc.

GRIMSBY, GREAT GRIMSBY (53° 34′ N., 0° 4′ W.), seaport, on Humber, Lincolnshire, England; important commerce; chief fishing port in country; has docks covering area of about 150 acres. Industries include shipbuilding, brewing, tanning, flax-dressing. Pop. (1911) 74,663.

GRIMSTON, SIR HARBOTTLE (1603–85), Eng. politician; member of Short and Long Parliaments; took little part in Civil War; imprisoned after Pride's Purge; speaker in Convention Parliament, 1660; Master of Rolls, 1660.

GRIMTHORPE, EDMUND BECKETT, 1ST BARON (1816–1905), Eng. authority on horology; associated with the restoration of St. Albans Abbey.

GRINDAL, EDMUND (*c.* 1519–83), Eng. abp.; engaged in religious disputation, 1549; was one of clerics who examined the Forty-two Articles, 1552; or. bp. of London, 1559; abp. of York, 1570; of Canterbury, 1575; sequestered from 1577 till 1582, when restored.

GRINDELWALD (46° 38′ N., 8° 2′ E.), village and mountain-valley, Swiss canton of Bern; tourist resort.

GRINDLE, see BOWFINS.

GRINGOIRE, PIERRE (*c.* 1480–1539), Fr. poet and dramatist; author of satirical comedies directed against Pope Julius II., the enemies of Louis XII., and

the vices of society; subject of play by T. de Banville.

GRINNELL (41° 45′ N., 92° 43′ W.), city, Iowa, U.S.A.; seat of Iowa Coll.; manufactures gloves, carriages. Pop. (1910) 5036.

GRIQUALAND EAST AND GRIQUALAND WEST, divisions of the Cape Province, Union of South Africa.

Griqualand East (31° S., 29° E.), part of Transkeian territories, surrounded by Natal, Basutoland, Cape Province (Proper), Tembuland, and Pondoland; area, 7594 sq. miles. Kokstadt chief town; named after Griqua settlers (mixture of white and Hottentot), 1862. Pop. *c.* 250,000.

Griqualand West (29° S., 23° E.), surrounded by Bechuanaland, Transvaal, Orange Free State, and Cape Province (Proper); area, 15,197 sq. miles; chief town, Kimberley, with famous diamond mines, discovered 1867; originally inhabited by Bushmen and Hottentots, then by Griquas; taken from Boers by British, 1871; annexed to Cape Colony, 1880.

GRISELDA, GRISELDIS, female character, immortalised by her patience and virtue, in Boccaccio's *Decameron*; derived thence by Chaucer (*Clerkes Tale*); subject of a ballad, *Patient Grissel* (1565).

GRISI, GIULIA (1811–69), Ital. prima donna; sang in Paris, London, and New York.

GRISONS (46° 40′ N., 9° 30′ E.), most easterly canton of Switzerland; largest, but most thinly populated; chief town, Coire or Chur. Surface is completely mountainous, with narrow valleys and forests; chief glacier groups are the Tödi and the Medels; magnificent mountain and gorge scenery. G. contains three sources of Rhine, upper course of Inn or Engadine, and tributaries of Adda and Po. Juf and St. Moritz are among highest villages in Alps. Principal industry, cattle breeding; maize and chestnuts grown; wine produced; mineral springs found; climate severe. Canton is visited yearly by great numbers of tourists, especially at Davos, Arosa, and Engadine; has few railways, but many fine roads. Ger., Ital., and Romansch dialects spoken. Pop. (1910) 117,069.

GRISWOLD, RUFUS WILMOT (1815–57), Amer. editor; pub. *Poets and Poetry of America* (1842), and other anthologies; also biographical and critical editions of Poe and other writers.

GROAT, mediæval, thick, silver coin, worth fourpence, first issued in England in XIV. cent., and in circulation until latter half of XVII. cent.

GROCYN, WILLIAM (*c.* 1446–1519), Eng. scholar and ecclesiastic; Gk. lecturer at Oxford; prebendary of Lincoln (1485); Rector of St. Lawrence, Jewry, London (1493–1517); friend of Erasmus; noted for generosity in the cause of learning.

GRODNO (53° N., 24° E.), government, W. Russia; generally flat, pine-covered, and swampy, with fertile tracts producing good crops, grain and flax; chief rivers, Nieman and Bug. Area, 14,896 sq. miles. Pop. (1910) 1,951,700. Capital, GRODNO, on Nieman; has two palaces of Polish kings; tobacco, machinery, soap. Pop. (1910) 53,340.

GROEN VAN PRINSTERER, GUILLAUME (1801–76), Dutch historian; edit. *Archives et Correspondance de la maison d'Orange* (12 vol's, 1835–45).

GROIN, in human anatomy the fold between the lower part of the abdomen and the thigh; in arch. the curve formed by the intersection of two arches.

GROLMANN, KARL WILHELM GEORG VON (1777–1843), Prussian general; aided in resuscitation of Prussia, 1809–12; commanded in many actions against Napoleon.

GROMATICI, Rom. land surveyors; great numbers employed under Empire; various books on the subject of land-surveying were written from I. cent. onwards.

GRONINGEN (53° 13′ N., 6° 35′ E.), province, N.E. Holland; low and flat; rich pastures; climate damp; chief occupation dairy-farming and grazing; some fishing and boat-building. Area, 909 sq. miles. Pop. 328,045.

GRONINGEN (53° 13′ N., 6° 34′ E.), town, Holland; capital of G. province, at junction of Drentsche Aa and Hunse; connected by canals with Dollart and Zuider Zee; chief town of northern Netherlands and great trading centre; Martini-kerk (1477), Brœder-kerk, town hall, antiquity museum, univ. (1614), fine art academy and many XVI.- and XVII.-cent. houses; manufactures of woollen and linen goods; boat-building, rope-making, sugar-refining, Dutch tiles, printing, machinery, pianos, etc. Pop. (1912) 78,100.

GRONLUND, LAURENCE (1846–99), Amer. socialistic writer; wrote *The Coming Revolution*, *An Exposition of Modern Socialism*, *The New Economy*, etc.

GRONOV, JOHANN FRIEDRICH, GRONOVIUS (1611–71), Ger. scholar; edit. various Latin authors and wrote critical books; his s., JAKOB (1645–1716), produced *Thesaurus antiquitatum græcarum*.

GROOT, GERHARD (1340–84), Dutch preacher; founder of 'Brethren of the Common Life'; had distinguished scholastic career at Paris, then canon and missionary at Utrecht; accused of heresy for denouncing worldliness of clergy, but d. soon after; not really a 'pre-Reformation Protestant.'

GROS, ANTOINE JEAN, BARON (1771–1835), Fr. artist; pupil of Louis David; chiefly famed for military pictures (Napoleonic), including *The Battle of Eylau*, *The Battle of Aboukir*, and others.

GROSART, ALEXANDER BALLOCH (1827–99), Scot. Presbyterian minister; student of Elizabethan and Jacobean lit.

GROSBEAK, see under FINCH FAMILY.

GROSE, FRANCIS (*c.* 1730–91), Eng. antiquary; wrote on the *Antiquities* of England, Wales, Scotland, and Ireland; also on arms and armour; subject of poems by Burns.

GROSSE, JULIUS WALDEMAR (1828–1902), Ger. author; his dramas include *Die Steinerne Braut*, *Johann von Schwaben*, and *Die Ynglinger*; his novels, *Sophie Monnier* and *Maria Mancini*; also several vol's of lyric poems.

GROSSENHAIN (51° 17′ N., 13° 32′ E.), fortified town, Saxony, Germany; woollens, cottons. Pop. (1910) 12,220.

GROSSETO (42° 45′ N., 11° 5′ E.), town (and province), Tuscany, Italy; cathedral. Pop. 6153.

GROSSI, TOMMASO (1791–1853), Ital. poet and novelist; his works include *Marco Visconti*, a hist. novel, and several epic and patriotic poems.

GROSSMITH, GEORGE (1847–1912), Eng. comedian; associated with the operas of Gilbert and Sullivan.

GROSSTESTE, ROBERT (1175–1253), Eng. scholar and theologian; teacher at Oxford and chancellor of Univ.; bp. of Lincoln, 1135; staunch defender of rights of Church against king, but after 1250 attacked policy of Papal Curia; somewhat violent as controversialist; greatest as mathematician and scientist and intellectually among ablest men of his day. G. knew some Gk. and Hebrew.

GROSSWARDEIN, see NAGY-VARAD.

GROTE, GEORGE (1794–1871), Eng. historian; b. at Clay Hill, Kent; M.P., 1832–41; began systematic study of Gk. history in 1822; pub. famous *History of Greece*, in 12 vol's (1846–56); also wrote *Plato and the other Companions of Socrates*, *Aristotle*, and some minor works. G. was prominent supporter of Univ. Coll., London, and of Univ. of London, becoming vice-chancellor in 1862; buried in Westminster Abbey. His democratic views well fitted him to interpret Athenian history and culture. *Life*, by Mrs. Grote (1873).

GROTEFEND, GEORG FRIEDRICH (1775–1853), Ger. scholar; famed for his successful deciphering of the Babylonian cuneiform writing.

GROTESQUE, extravagant style of ornament

containing unnatural forms of animals, the human figure, etc.

GROTH, KLAUS (1819–99), Ger. poet; prof. of German Lang. and Lit. at Kiel Univ.; chiefly known for his Low Ger. poems—*Quickborn* (1852; 25th ed., 1900).

GROTIUS, HUGO, Huig van Groot (1583–1645), Dutch politician and jurist; b. Delft; entered profession of law; wrote Latin plays and verses; app. historiographer to United Provinces, 1603; sent to England to make arrangements concerning Greenland whale fisheries, 1613. In the disputes in Holland between rigid Calvinists and the followers of Arminius, G. tried to restrain the Calvinist clergy by maintaining supremacy of State in Church affairs, and composed edict counselling toleration, the publication of which aroused popular resentment. G. was arrested and sentenced to lifelong confinement; but his wife, who shared his imprisonment, soon afterwards contrived his escape; going to Paris, G. later held the post of Swed. ambassador. His most celebrated works are *De Jure Belli et Pacis*, a treatise on jurisprudence, and *Annales et Historiæ de Rebus Belgicis*, an historical work.

Life, by Buller (1827); Lehmann, *Hugonis Grotii Manes vindicati* (1727).

GROUCHY, EMMANUEL, MARQUIS DE (1766–1847), Fr. soldier; supported Revolution and rose rapidly in republican army; distinguished at *Hohenlinden*, *Wagram*, and in Russia in 1812; marshal, 1814; defeated Blücher at *Ligny*; exiled from France after *Waterloo*, returning in 1821.

GROUND BEETLES, see Caraboidea.

GROUND-ICE is porous ice formed on rocks on the bottom of a stream when the temperature of the water is above *freezing-point*. Cold, clear nights when heat radiates rapidly from the bottom upwards produce it.

GROUND-IVY, popular name for *Nepetaglechoma*; hedgerow plant, purple flowers, aromatic leaves, common in Britain.

GROUNDLING, small freshwater fish, rare in Britain; *Cobitis tænia* (see Carps).

GROUND-NUT, general name for various nuts and roots, *e.g.* roots of dwarf ginseng and *Bunium Esculentum*, fruit of ground pea-nut.

GROUND-RENT, in Eng. law, is the rent paid to the owner of the freehold in the ground.

GROUNDSEL, popular name for *Senecio vulgaris*, herb of Compositæ family; yellow flowers; a troublesome weed.

GROUPS, THEORY OF, a branch of mathematics dealing with the sets of operations which may be performed on a given set of objects; has wide applications in higher mathematics, notably in the theory of invariants, of algebraic and especially of differential equations, of geometrical transformations, etc. An operation will, in general, have no meaning except in regard to a particular set of objects. Again, if two operations are so related that when performed on some object successively, the result is independent of the order of the operations, each operation is called a *definite* operation, and each is the *inverse* of the other. If S, T, U, . . . be a set of definite operations, which may be performed on a given object or set of objects, and if the set contain the operation PQ (P and Q being any two operations of the set), also the inverse operation of P ($\bar{P}$ being any operation of the set), then the set of operations is called a *group*. If the number (r) of operations in a group is finite, the group is a *group of finite order* and r is the order of the group. When r is infinite, three cases occur: when the group is represented by a set of geometrical operations, each operation will be defined in terms of a set of parameters. If none of these parameters is capable of continuous variation, we have then a *discontinuous group*. If all the parameters may vary continuously, the group is a *continuous group*. If some are capable of variation and the rest are not, the group is a *mixed group*.

If S and S^1 are inverse operations, SS^1 is called the *identical operation*, since it leaves the original object unchanged. S^1 is sometimes represented by S^{-1}, and the set of operations . . . S^{-2}, S^{-1}, I, S, S^2 . . . constitutes a cyclical group. The symbol I denotes the identical operation. S and T being two operations of a group G, the operations S and $T^{-1}ST$ are called *conjugate* operations. If $S=T^{-1}ST$, *i.e.* if T transforms S into itself, S and T are *permutable* operations. A group whose operations are all permutable with each other is called an *Abelian* group.

Theory of continuous groups has been developed largely by Sophus Lie, and applied to the theory of invariants, contact-transformations, curvature of curves and surface, systems of differential equations, etc. No general theory of discontinuous groups at present exists, though many large classes have been investigated. A large number of discontinuous groups are given by limiting the range of variation of the parameters of continuous groups. Another large class arises from the combination and repetition of a finite number of operations such as displacements, inversions, projections. Groups of finite order have special properties depending on the finite number of operations in the group. Thus, every group of finite order can be represented by a transitive group of permutations of N symbols. Also, if the order of a group G is N, which is a multiple of n, then the number of operations of G, whose orders are equal to, or are factors of, n, is a multiple of n. The chief application of this class of groups is to the theory of algebraic equations.

Campbell, *Lie's Theory of Finite Continuous Transformation Groups*; Burnside, *Theory of Groups of Finite Order*.

GROUSE include black g. (*Tetrao tetrix*) and red g. (*Lagopus scoticus*), so named from colour of male plumage. They inhabit moorland areas; birds of strong but heavy flight; cock is polygamous, fighting for mates; nest on ground, open, containing from six to ten eggs; males of the two species further distinguished by lyrate curvature of tail-feathers in black g.; strictly preserved under Game laws. The red g. is the species that attracts sportsmen to the Scot. and Yorkshire moors from Aug. 12 to Dec. 10.

The Grouse (Fur and Feather Series, 1893).

GROVE, SIR GEORGE (1820–1900), Brit. publicist; chiefly wrote about Palestine exploration and music; secretary, Crystal Palace (1852); director, Royal College of Music. *Dictionary of Music* and other works.

GROVE, SIR WILLIAM ROBERT (1811–96), Eng. judge and scientist; constructed *platinum-zinc voltaic cell* and first employed *incandescent* electric lamps. His great work is *Correlation of Physical Forces*.

GROZNYI (43° 20′ N., 45° 42′ E.), town, Terek, Russia; petroleum wells. Pop. 15,599.

GRUB, the larvæ of insects, or more particularly the underground larvæ of Crane Flies or Daddy-long-legs, known as 'the grub'—destructive to corn crops.

GRUB STREET, former name of Milton Street, near Moorfields, London, where in Dr. Johnson's time lived colony of needy hack-writers, penny-a-liners, 'whence any mean product is called G. S.'

GRUBER, JOHANN GOTTFRIED (1774–1851), Ger. author; wrote biographies of Klopstock and Wieland; and produced with Prof. Ersch an exhaustive *Encyclopædia of Science and Art*.

GRUMBACH, WILHELM VON (1503–67), Ger. military adventurer; was associated with the efforts of the Duke of Saxony to dethrone Frederick II. of Denmark.

GRUMENTUM (40° 20′ N., 16° 30′ E.), ancient town, Lucania, S. Italy, on Aciris.

GRÜN, HANS, see Baldung.

GRÜNBERG (51° 56′ N., 15° 31′ E.), town, Silesia, Germany; active industrial and wine-growing centre. Pop. (1910) 23,162.

GRUNDTVIG, NIKOLAI FREDERIK SEVERIN (1783–1872), Dan. author and theologian; Church reformer, and founder of the sect known as *Grundtvigians*; pub. *Sangverk til den Danske Kirke* (1837–42) and numerous books on literary subjects.

GRUNDY, MRS., character in Morton's play, *Speed the Plough* (1800), who does not appear, but whose opinion is much feared by a neighbouring farmer's wife; hence the Eng. archetype of puritanical prudery and straight-laced conventionality.

GRUNDY, SYDNEY (1848–), Eng. dramatist; author of numerous original plays and adaptations from the Fr., including *A Fool's Paradise*, *A Pair of Spectacles*, and *Sowing the Wind*.

GRUYÈRE (46° 35′ N., 7° 5′ E.), town, Fribourg, Switzerland; famous cheese.

GRYPHIUS, ANDREAS (1616–64), Ger. poet and dramatist; wrote lyric poetry of considerable merit, but melancholy in tone. His most distinctive work is contained in his comedies and tragedies; the former including *Peter Squenz*, *Horribilicribrifax*, etc.; the latter, *Carolus Stuardus*, *Katharina von Georgien*, and others.

GUACHARO, or OIL BIRD (*Steatornis*), a Picarian bird confined to Trinidad and the coastal region of the N.W. of South America; so called on account of the fat contained in the nestlings, which is used for lighting and as a butter-substitute by the natives; a twilight feeder, which nests in caves.

GUADALAJARA (40° 50′ N., 3° W.), province, Spain; generally level; fertile; traversed by Tagus; produce chiefly agricultural; area, 4676 sq. miles. Pop. (1910) 208,447. Capital, GUADALAJARA; has fine old ruined palace; cotton and woollen industries. Pop. 11,144.

GUADALAJARA (21° 9′ N., 103° 2′ W.), town, Mexico; capital of Jalisco State; contains cathedral, univ., art academy, mint; many interesting churches; various charitable institutions; important trade, cotton, woollen, iron, and steel manufactures, leather, pottery. Pop. (1910) 118,799.

GUADALQUIVIR (36° 47′ N., 6° 22′ W.), river, Spain; rises in Sierra de Cazorla; flows S.W. for 360 miles, into Atlantic; navigable to Seville; ancient *Bœtis*.

Gwynn, *Guadalquivir* (1912).

GUADALUPE HIDALGO, town, Mexico, near Mexico City; peace signed here between Mexico and U.S.A. (1848). Pop. 5000.

GUADELOUPE (16° 12′ N., 61° 40′ W.), island in Lesser Antilles (W. Indies), forming important Fr. colony with five island dependencies; capital, Basse Terre; climate hot, but healthy; soil fertile and well cultivated. Sugar, coffee, and rum are exported. G. was discovered by Columbus; acquired by France, 1634; taken by British, 1794, 1810; restored to France, 1814; sends 1 Senator and 2 Deputies to Fr. Parliament. Area, 687 sq. miles. Pop. (1906) 182,238.

GUADIANA (37° 10′ N., 7° 20′ W.), river, Spain and Portugal; rises in Span. province, Albaceté; flows through Ciudad Real, Badajoz, and Portug. province Alemtejo; separates Huelva from Portug. province Algarve; falls into Atlantic; length, 500 miles; navigable 40 miles above mouth; ancient *Anas*.

GUADIX (37° 19′ N., 3° 8′ W.), town, Granada, Spain. Pop. c. 12,000.

GUADUAS (c. 5° S., 74° 50′ W.), town, Colombia, S. America, near Magdalena River, 50 miles N.W. of Bogotá. Pop. 10,000.

GUAIACUM, genus of trees, natural order *Zygophylleæ*; dark greenish, dense, hard wood heavier than water. The heart wood and resin of *G. officinale* and of *G. sanctum* from the W. Indies have an acrid and aromatic taste and a balsamic odour. The resin on dry distillation yields *cresol* and *guaiacol*. It is a gastro-intestinal irritant.

GUAIRA, port of Caracas (*q.v.*).

GUALDO TADINO (43° 14′ N., 12° 45′ E.), town, Perugia, Italy; cathedral; ancient *Tadino*.

GUALEGUAY (33° 7′ S., 59° 14′ W.), town, river port, Argentina, S. America, on Gualeguay; meat factories; exports cattle, hides. Pop. 9000.

GUALEGUAYCHÚ (33° 2′ S., 58° 34′ W.), town, river port, Argentina, S. America, on Rio Gualeguaychú; meat products, hides. Pop. 13,282.

GUAM, GUAHAN (13° 26′ N., 144° 39′ E.), most southerly and largest of the Marianne (or Ladrone) Islands, Pacific Ocean; capital, Agaña; mountainous; well-watered, fertile; chief products—rice, cocoa-nuts, sugar; ceded by Spain to U.S.A., 1898; used as naval station. Area, 207 sq. miles. Pop. *c.* 12,000.

GUAN (*Penelope*), a native of tropical America, is a handsome relative of common poultry bird; of blackish-bronze colour, with naked throat furnished with large pendant scarlet wattle.

GUANABACOA (23° 7′ N., 82° 19′ W.), town, sea bathing resort, Cuba, West Indies; residential suburb, 5 miles E. of Havana. Pop. 14,000.

GUANACO, HUANACO, animal included in *Camelidæ*; native throughout southern half of S. America; smaller and thicker set than camel, and without hump. See CAMEL FAMILY.

GUANAJAY (22° 53′ N., 82° 40′ W.), town, health-resort, Cuba, W. Indies. Pop. 6000.

GUANAJUATO (21° N., 100° 48′ W.), inland state, Mexico; mountainous in N., the southern portion forming part of a fertile plain; chief river, Rio Grande de Lerma; very rich in minerals (gold, silver, lead, tin, iron); some cattle reared; cotton and woollen manufactures, tanneries. Area, 11,374 sq. miles. Pop. (1910) 1,075,270.

GUANAJUATO, SANTA FÉ DE GUANAJUATO (21° N., 100° 48′ W.), city, capital of G. State, Mexico; centre of large mining district; manufactures cotton, pottery; founded by Spaniards, 1554. Pop. (1910) 35,147.

GUANCHES, GUANCHOS, original inhabitants of the Canary Islands; supposed to have been of Berber stock, of fine physique, and a highly intelligent race. They embalmed the dead, and many mummies and skeletons have been brought to light. They offered a stubborn resistance to the Spaniards, but were finally reduced to subjection at the end of the XV. cent.; now practically extinct.

GUANO, valuable fertilising manure, consisting chiefly of the excrement of sea-birds that feed on fish. Deposits to a depth of 60 ft. have been found off the coast of Peru, Bolivia, and Chile. A good substitute has been found in fish g., obtained by grinding to powder the heads and bones of cod and herring. The chief constituents of g. are phosphoric acid and nitrogen (ammonia).

GUANTA (10° 6′ N., 64° 47′ W.), seaport town, Bermudez State, Venezuela, S. America; exports coffee, sugar.

GUANTÁNAMO (20° N., 75° 10′ W.), town, S.E. coast of Cuba, W. Indies, U.S.A.; naval station; exports coffee, sugar. Pop. 14,600.

GUARANIS, S. Amer. Indians inhabiting Paraguay and Uruguay.

GUARANTEE, a promise by one person to be answerable for the debt, default, or miscarriage of another. Originally at Common Law it need not be in writing, but the Statute of Frauds provided that 'no action shall be brought whereby to charge the defendant upon any special promise to answer for the debt, default, or miscarriages of another person, unless the agreement upon which such action shall be brought or such memorandum or note thereof shall be in writing and signed by the party to be charged therewith, or some other person thereunto lawfully authorised.' Upon this section, it was held for many years that the note or memorandum of the agreement, to comply with the Statute, must set forth the consideration for the contract, but eventually the Mercantile Law Amendment Act provided that such a memorandum was not to be considered invalid to support an action merely by reason that the consideration did not appear

in writing or by necessary inference from a written agreement.

After the debt has become due, the creditor may sue the guarantor without its being necessary to sue the principal debtor first. The surety, or guarantor, then has, as against the principal debtor, the same rights as the creditor had. A g. being a contract in which the surety is strictly held to the terms of his agreement, a corresponding strictness is exercised in his favour, and he may be released not only by the discharge of the debt, but in certain other ways. Amongst these may be named a change of parties, *i.e.* a change of partners in the debtor firm; or if the terms of the agreement under which the guarantor agreed to become liable are varied in any way he can claim discharge. Further, if a person has become guarantor for an employee's honesty, and the employee, having been found to be dishonest, is still retained in employment without the guarantor having been informed of the act of dishonesty, the latter can claim discharge from liability.

GUARATINGUETÁ (22° 45′ S., 45° 15′ W.), city, São Paulo, Brazil, S. America, on Parahiba; agricultural centre.

GUARDA (40° 35′ N., 7° 16′ W.), city, Portugal: ancient *Lancia Oppidana*; ruined castle; cathedral; woollen manufactures. Pop. 6092.

GUARDAFUI, CAPE (10° 50′ N., 51° 20′ E.), cape, N.E. of Abyssinia, Africa.

GUARDI, FRANCESCO (1712–93), Venetian artist; prolific painter, whose works are similar to those of his master, Canaletto; fine examples in Louvre and Manfrini Palace, Venice.

GUARDIAN, Eng. weekly periodical founded in 1846 by Gladstone and others as an Anglo-Catholic organ.

GUARDS, THE, military term applied to regiments that serve officially as bodyguard of sovereign. In Brit. army the regiments forming the Household Brigade of Guards are the 1st and 2nd *Life Guards*, the *Royal Horse Guards*, and four regiments of foot—the *Grenadier*, *Coldstream*, *Scots*, and *Irish Guards*. During times of peace they garrison the metropolis, and from them are chosen guards for Royal Palaces, and escorts for the sovereign on state occasions. The Life G., Grenadier G., and Scots G. were founded by Charles II.; Royal Horse G. and Coldstream G. by Cromwell; and the Irish G. were first formed in 1900. Also included in Brit. bodyguard corps are the non-combatant bodies of the *Yeomen of the Guard*, the Gentlemen-at-Arms, and, in Scotland, the Royal Company of Archers.

GUARD-SHIP, a depot warship in home ports, which lodges seamen until drafted into their appointed vessels.

GUÁRICO (8° 30′ N., 67° 30′ W.), state, Venezuela, S. America; Capital, Calabozo. Area, 25,631 sq. miles. Pop. 183,930.

GUARINI, GIOVANNI BATTISTA (1537–1612), Ital. poet; friend of Tasso, whom he succ. as court poet at Ferrara. His masterpiece is *Pastor Fido*, (1590), a pastoral drama, the scene of which is laid in Arcadia. The literary style is highly finished, and the work is invaluable as a picture of contemporary manners and vices.

GUARINO DA VERONA, GUARINUS (1374–1460), Ital. scholar; an important figure in connection with the revival of Gk. learning in Italy; translated and wrote commentaries on Gk. authors.

GUARNIERI, JOSEPH DEL GESU, GUARNERI (1687–1745), principal member of a Cremona family of famous violin-makers.

GUASTALLA (44° 55′ N., 10° 39′ E.), town, Emilia, Italy; cathedral.

GUATEMALA, republic in Central America; bounded by Mexico, Brit. Honduras, Gulf and Republic of Honduras, Salvador, and Pacific Ocean; capital, Guatemala la Nueva; area, 48,290 sq. miles. Surface consists of low-lying marshy plains along Pacific coast. N. and W. of these lies the Sierra Madre, the watershed between Pacific and Atlantic, with many volcanoes, including Tajamulco (*c.* 13,520 ft.), Acatenango (*c.* 13,615 ft.), Fuego (*c.* 12,075 ft.). Farther N. and E. extends mountainous country and great plain of Peten, mostly Indian pasture-land. Principal river is Montagua (*c.* 250 miles); lakes include Lake of Peten, Gulfo Dulce, Atlitan. There are vast forest lands.

G. was taken by Spaniards, 1524; independence declared, 1821, and G. joined Confederation of Central America; present republic established, 1847; San Salvador defeated, 1863; Carrera dictator (1845–65); constant strife with neighbouring states led to Central American Arbitration Treaty, 1907.

The most important crop is coffee; rubber, tobacco, sugar, wheat, fruit, and medicinal plants are also produced; gold, silver, lead, and salt mines are worked; timber is extensively exported. Prevailing religion is R.C. Majority of inhabitants are Indians; many half-castes, few Europeans. Pop. *c.* 2,000,000.

Niederlim, *The Republic of Guatemala* (1898); Brigham, *Guatemala* (1887).

GUATEMALA, GUATEMALA LA NUEVA (14° 36′ N., 90° 30′ W.), capital, Republic of Guatemala, Central America; on plain *c.* 5000 ft. above sea-level, and 70 miles from its port, San José, on Pacific. Among chief buildings are cathedral, government house, mint; numerous educational institutions, churches, hospitals; woollen and cotton industries. Pop. c. 90,000.

Old Guatemala, the original city (founded 1527), was destroyed by flood, 1541; destroyed by earthquake, 1773; the third capital was then removed to present site, about 30 miles N.E.

GUAVA, tropical American shrub (*Psidium Guayaba*) and its fruit, much used for jelly and preserves; family *Myrtaceæ*.

GUAYAMA (18° N., 66° 5′ W.), town, Porto Rico, W. Indies; exports sugar, rum, coffee. Pop. (1910) 8321.

GUAYAQUIL (2° 10′ S., 79° 56′ W.), city, chief port, Ecuador, S. America; built mainly of wood. Among principal structures are government buildings, town hall, cathedral, bp.'s palace, univ. G. exports cacao, coffee, rubber; has shipyards and various manufactures; hot and unhealthy. Pop. 60,000.

GUAYAS (2° 30′ S., 80° W.), maritime province, Ecuador; S. America; most important (industrially and commercially) of the republic; climate hot, humid, unhealthy; soil fertile; agriculture is chief pursuit; principal products—cacao, coffee, tobacco, sugar-cane; capital, Guayaquil. Area, 8300 sq. miles. Pop. *c.* 100,000.

GUAYMAS (28° 10′ N., 110° 50′ W.), seaport, Mexico, on Gulf of California; good harbour; exports metals, hides. Pop. 8648.

GUBBIO (43° 22′ N., 12° 34′ E.), city (ancient *Iguvium*, or *Eugubium*), Perugia, Italy, at foot of Monte Calvo; has a cathedral (XIII. cent.) and ducal palace (XIV. cent.); the famous Eugubine Tablets, discovered in the neighbourhood in 1446, are preserved in the museum; manufactures, majolica; was independent in Middle Ages. Pop. 26,718.

GUBEN (51° 58′ N., 14° 42′ E.), town, Brandenburg, Prussia, on Neisse; woollen cloth, yarn. Pop. (1910) 38,593.

GUBERNATIS, ANGELO DE, COUNT (1840–), Ital. author; his dramas include *Cato*, *Don Roderigo*, and *Romolo*; has written also on mythological and Oriental subjects.

GUDE, MARQUARD (1635–89), Ger. scholar; promoted classical knowledge by manuscript researches and copies of inscriptions.

GUDEMAN, ALFRED (1862–), Amer. scholar; author of a *History of Classical Philology* (1902), etc.

GUDGEON, small freshwater fish, genus *Gobio*, of carp family (see CARPS); common in European streams.

GUDRUN, legendary dau. of King Hettel, betrothed to King Herwig of Heligoland, but carried off by Hartmuth, king of Norway; famed for heroic fortitude and resignation.

GUÉBRIANT, JEAN BAPTISTE BUDES,

COMTE DE (1602–43), marshal of France; served with distinction in Thirty Years War.

GUELDERLAND, see GELDERLAND.

GUELPH (43° 30′ N., 80° 21′ W.), city, river port, Ontario, Canada; seat of Ontario Agric. Coll.; flour mills, woollen mills. Pop. 11,496.

GUELPHS AND GHIBELLINES, names of great conflicting parties into which Germany and Italy were divided in later Middle Ages (XII.–XV. cent.); names Italianised from German *Welf* and *Waiblingen*, warcries of Saxony and Empire respectively; Ghibellines were aristocratic party, supporting the emperor; Guelphs (or Guelfs) were democratic party, favouring the pope. Houses of Brunswick and Hanover are Guelphs by descent, whence British throne has been held by a Guelph since George I.

Browning, *Guelphs and Ghibellines* (1893).

GUENON MONKEYS, see under CERCOPITHECIDÆ.

GUÉRET (46° 10′ N., 1° 52′ E.), town, Creuse, France; breweries, tanneries. Pop. 8000.

GUERICKE, OTTO VON (1602–86), German physicist; invented air-pump.

GUÉRIDON, ornamental occasional table, generally supported by the carved figure of negro.

GUÉRIN, JEAN BATISTE PAULIN (1783–1855), Fr. artist; famed for portraits; works include *The Dead Christ, Cain and Abel, Anchises and Venus.*

GUÉRIN, MAURICE DE (1810–39), Fr. author; distinguished both as poet and prose writer; prose is marked by masterly style; shows remarkable sympathy with nature. His sister, EUGÉNIE (1805–48), whose *Journal* and *Lettres* are highly valued, was intimately associated with his work; see Arnold's *Essays in Criticism.*

GUÉRIN, PIERRE NARCISSE, BARON (1774–1833), Fr. artist; famed for paintings of classical and hist. subjects, including *Marcus Sextus, Phædra and Hippolytus, Andromache and Pyrrhus* (in the Louvre).

GUERNSEY (49° 27′ N., 2° 35′ W.), second largest of the Channel Islands, 30 miles W. of Normandy; surface undulating, sloping gradually N. to S.; climate mild; popular health resort; produces large quantities of fruit, flowers, and vegetables; famous breed of cattle; some granite quarried, and fishing carried on. Capital, St. Peter Port; good harbour; residence of lieut.-gov. Area, 25 sq. miles. Pop. (1911) 44,997. See CHANNEL ISLANDS.

GUERRAZZI, FRANCESCO DOMENICO (1804–73), Ital. author; wrote two hist. novels, *Battagli di Benevento* (1827) and *L'Assedio di Firenze* (1836); also an *Apologia* and works on Andrea Doria and Beatrice Cenci.

GUERRERO (17° 40′ N., 101° W.), Pacific state, Mexico; mountainous; rich in minerals; fertile; produces coffee, cereals, tobacco; capital, Chilpancingo; chief port, Acapulco. Area, 25,000 sq. miles. Pop. (1910) 605,437.

GUERRILLA, method of harassing an army by small bodies of irregulars. G. Span. troops, opposed to French, played a prominent part in the Peninsular War.

GUESDE, JULES BASILE (1845–), Fr. Socialist; editor of *L'Egalité* and other Socialist organs; pub. *Quatre ans de lutte de classe, 1893–98* (1901).

GUEST, EDWIN (1800–80), Eng. antiquary; author of a *History of English Rhythms* (1838).

GUEUX, LES ('the Beggars'), name given to the Netherlanders who, in the XVI. cent., revolted against the oppression of Philip II. The 'Beggars of the Sea' harassed the Span. navy.

GUEVARA, ANTONIO DE (*c.* 1490–1544), Span. author; wrote a moral story, *Reloj de Principes* (1529), which enjoyed great popularity; Eng. trans. by Bourchier (1546). Span. 'Guevarism' anticipated Eng. Euphuism (*q.v.*).

GUEVARA, LUIS VELEZ DE (1579–1644), Span. dramatist and novelist; wrote several hundred plays, including *La Luna de la Sierra*; and a popular story, *El Diablo Conjuelo* (1641).

GUIANA (4° N., 55° W.), part of S. America lying between Orinoco and Amazon Rivers, and consisting of Venezuelan, Brit., Dutch, Fr., and Brazilian Guianas (for Venezuelan and Brazilian G., see VENEZUELA and BRAZIL). Physical geography is much the same in all three colonies; along coast are flat, swampy tracts, with rich, fertile soil; beyond this, land rises to undulating savannahs, behind which are mountainous regions covered with almost impenetrable forest. G. contains innumerable rivers, which form chief means of communication; almost all larger streams are connected by creeks and channels, and are navigable up to rapids and falls. Vegetation is remarkably rich and luxuriant; sugar, coffee, rice, cacao, fruits cultivated; forests yield fine timbers, balata, rubber, oil, balsams, gums, tonka-beans, nuts, etc. Birds are particularly brilliant in plumage and include humming-birds, parrots, macaws, and orioles; tiger-cats, jaguars, tapirs, peccaries, manatees, capybaras, alligators, and great variety of insects to be found. Gold and diamonds are produced. Inhabitants are chiefly Europeans, Indians, and negroes. Climate not unhealthy though tropical; earthquakes and hurricanes practically unknown.

British Guiana, largest of three colonies, is bounded on W. by Venezuela, S. by Brazil, and E. by Dutch G.; area, *c.* 90,000 sq. miles. Chief towns are Georgetown, capital, on mouth of Demerara River, and New Amsterdam, on Berbice River; colony divided into counties of Berbice, Demerara, and Essequibo; in W. are Pacaraima Mts., culminating in Roraima, on Venezuelan boundary; principal rivers are Essequibo, Corentyn, Berbice, Demerara, Mazaruni, and Cuyuni; railways connect Georgetown with New Amsterdam, Demerara with Essequibo, and a line runs from Demerara a few miles along W. coast. Among principal exports are sugar, rum, rice, molasses, coffee, balata, timber, shingles, and gold. Administration is under governor, assisted by court of policy and combined court. Pop. 296,000.

Dutch Guiana, SURINAM, bounded on W. by Brit. G., S. by Brazil, and E. by Fr. G.; area, *c.* 50,000 sq. miles. Capital, Paramaribo, near mouth of Surinam River; contains great extent of dense forest and unexplored country; watered by Surinam, Saramacca, Coppename, and Nickerie Rivers. Exports embrace sugar, rum, balata, timber, and gold. Pop. 92,500, exclusive of negroes of forests.

French Guiana, CAYENNE, bounded on W. by Dutch G., S. by Tumac Humac Mts., and E. by Brazil; area, *c.* 51,000 sq. miles. Cayenne capital and chief centre of population; chief streams are Sinnamarie, Mana, and Oyapock. Fr. G. is penal settlement and least prosperous of three colonies; little agricultural industry; gold-mining principal occupation. Pop. *c.* 40,000.

G. was sighted by Columbus in 1498; later visited by adventurers in search of El Dorado; in 1595 and 1617 explored by Raleigh; first settlements made by Dutch in Demerara and Essequibo (*c.* 1613); English settled in Surinam and French in Cayenne; in 1616 English seized Dutch and Fr. G., but restored them (1617), and handed over Surinam to Netherlands in exchange for New York. By 1674 Dutch claimed all territory now known as Dutch and Brit. G.; after prolonged struggle British captured Berbice, Demerara, and Essequibo, and in 1831 formed colony of Brit. G. Venezuelan and Brit. G. boundaries fixed, 1899 (see SCHOMBURGK). Fr. and Brazilian boundary dispute settled, 1900.

Bayley, *Handbook of Brit. G.* (1909); Rodway, *Guiana, Brit., Dutch, and Fr.* (1912).

GUIART, GUILLAUME (fl. 1300), Fr. poet-chronicler; his *Branche des royaulx lignages*, dealing with the history of the Fr. kings, is valuable for the later period.

GUIBERT (WIBERT), **OF RAVENNA** (*c.* 1030–1100), antipope, as CLEMENT III., 1080; elected by Henry IV.; banished from Rome, 1097.

GUIBERT, JACQUES ANTOINE HIPPOLYTE, COMTE DE (1743–90), Fr. gen. and military authority; wrote *Essai général de tactique* (1770), *Défense du système de guerre moderne*, and other valuable military treatises.

GUIBERT OF NOGENT (1053–1124), Fr. historian; wrote *Gesta Dei per Francos*, an account of the First Crusade.

GUICCIARDINI, FRANCESCO (1483–1540), Ital. politician and historian; b. Florence; ambassador to Span. court, 1512; became papal ruler of Reggio and Modena, 1515; of Parma, 1521; of Romagna, 1523; of Bologna, 1531; supported the Medici at Florence, and successfully defended Duke Alexander from charges levelled against him at imperial court in 1535. Alexander's successor, Cosimo, dismissed G., who withdrew from public life. He wrote *Storia d'Italia* and other hist. and political works: *Storia d'Italia* is a masterly analysis of Ital. history between 1494 and 1532.

Agostino Rossi, *Francesco Guicciardini* (Bologna, 1896).

GUICHARD, KARL GOTTLIEB (1724–75), military historian and Prussian officer; of Fr. descent; fought for Prussia in Seven Years War, 1757–62; gazetted as *Quintus Icilius* by order of Frederick the Great, whom he corrected for so miscalling *Quintus Cœcilius*.

GUICHEN, LUC URBAIN DE BOUËXIC, COMTE DE (1712–90), Fr. admiral; served against Britain in W. Indies, 1780; defeated in Bay of Biscay by Kempenfelt, 1781.

GUIDI, CARLO ALESSANDRO (1650–1712), Ital. poet; wrote *Amalasunta in Italy*, and other poetic dramas; but chiefly famed for his fine lyrics.

GUIDO OF AREZZO, GUIDO ARETINUS (*c.* 995–1050), Fr. Benedictine monk and musician; birthplace uncertain; invented 'Harmonic' or 'Guidonian Hand' and was first to use stave with lines and spaces.

GUIDO RENI (1575–1642), Ital. artist; principal master of the Bolognese school; b. Bologna; studied first under Calvaert, and later under Caracci. Removing to Rome, he obtained the patronage of Pope Paul V. His best work in Rome is considered to be *Aurora and the Hours* (on the ceiling of the Rospigliosi Palace). After spending about twenty years in Rome he returned to Bologna, where he became a hack-worker for the dealers, thanks to his passion for gambling and other extravagances.

GUIENNE, GUYENNE (45° N., 1° E.), ancient province, S.W. France; now divided into departments of Gironde, Dordogne, Lot, Aveyron, Lot-et-Garonne, and Tarn-et-Garonne. G. belonged to England (1154) after marriage of Eleanor of Aquitaine to Henry II.; long disputed by English and French; annexed by French, 1453.

GUIGNES, JOSEPH DE (1721–1800), Fr. Orientalist; his chief work was a *History of the Huns, Mongols, and Turks* (1756–58).

GUILBERT, YVETTE (1869–), Fr. comedy artist; famed for her rendering of old and modern Fr. ballads.

GUILDFORD (51° 14′ N., 0° 34′ W.), market town, Surrey, England, on Wey; remains of ancient Norman castle; noted grain and live-stock markets; flour-mills. Pop. (1911) 23,823.

GUILDHALL, hall of London municipality; erected, 1411; destroyed, 1666; re-erected, 1669; restored, 1789; important library and art gallery.

GUILDS, GILDS, mediæval associations formed for the protection and development either of commerce or some particular trade. The earliest were of a semi-religious character, providing, amongst other things, for the payment for masses for souls of the departed, and some of them so remained until their suppression by Henry VIII. in 1547. The industrial g., however, was classed under two distinct heads—the 'gild merchant' (merchant g's), an organisation which came into existence in England soon after the Norman Conquest, and the 'trade' or 'craft' g., which first began to flourish during the XIV. cent. On the Continent the g. was of earlier origin. Members of the merchant g. enjoyed the privilege of regulating the trade of a borough. Their influence was very great, especially in freeing industrial cities and ports from the power of feudal lords. The trade g. was an association of craftsmen in the different branches of industry, to protect the common interests of the members. A subsequent development of the trade g's were the various *livery companies*, each of which followed its particular craft or 'mystery.' The word 'guild' is now generally used in connection with social or religious improvement societies, such as temperance g's, communicants' g's, etc.

J. T. Smith, *English Gilds* (1870); Gross, *The Gild Merchant* (1890).

GUILFORD (41° 18′ N., 72° 40′ W.), town, Connecticut, U.S.A., on Long Island Sound; iron foundries; wagon-wheel and canning factories. Pop. 3000.

GUILFORD, title of North family; barony granted in 1683 to Francis North, famous lawyer, whose grandson was raised to earldom, 1752. Second earl, more generally known as LORD NORTH, was prime minister, 1770–82, and by continuing policy of taxing colonies was largely responsible for outbreak of Amer. War of Independence; resigned, 1782; formed Coalition ministry with FOX, 1783; d. 1792.

GUILLAUME D'ORANGE (d. 812), hero of romantic cycle of poems of S. France, relating exploits of Charlemagne and his Twelve Peers. The *Geste* of G. consists of about twenty poems. G. was grandson of Charles Martel; captured Barcelona from Arabs, 803; retired to monastery of his own foundation, 806; called also G. *Fierabras*.

GUILLAUME DE PALERME, hero of a XIV.-cent. poem (derived from the French). He was a foundling who loved Melior, a princess, and the pair, fleeing to the woods, were befriended by a werewolf.

GUILLAUME, JEAN BAPTISTE CLAUDE EUGÈNE (1822–1905), Fr. sculptor and academician and writer on art; executed many public works in Paris and Fr. provinces.

GUILLEMOT AND AUK FAMILY (*Alcidæ*), a family of marine swimming birds confined to the colder regions of the northern hemisphere, characterised by short wings, heavy body, and fully webbed anterior toes, the first toe being absent. The most interesting and largest member of the family was the flightless Great Auk or Garefowl (*Alca impennis*), distinguished by its large, deep beak, equalling the head in length, black plumage on the upper surface and white on the under, as well as on a patch above the eyes. Confined to the North Atlantic, its chief breeding-places were rocky islands off Iceland and Newfoundland, where incessant slaughter for more than two centuries brought about its extinction in 1844. Its remains have been found in Orkney.

Inferior in size to the auk, and possessing well-developed wings, the shorter-beaked RAZOR-BILL (*Alca torda*) breeds in colonies on coasts and islands on both sides of the Atlantic. Closely allied are the more slender-billed GUILLEMOTS (*Uria*), of which three species occur in the North Atlantic and Pacific, while the smaller, short and thick-beaked LITTLE AUK or ROTCHE (*Mergulus alle*) breeds solely within the Arctic Circle. Most peculiar of all are the Arctic PUFFINS (*Fratercula*) or SEA PARROTS, with brilliantly coloured red or orange bills.

GUILLOTINE, machine used in France for decapitating criminals. Its chief feature, a heavy blade, with sharp oblique lower edge, can be made to fall by its own weight between two grooved upright posts, on to the neck of the victim fastened below; derives its present name from its reputed inventor, DR. GUILLOTIN (1792), but similar instruments had been in use before the Fr. Revolution.

Croker, *History of the Guillotine*.

GUIMARAES (41° 28′ N., 8° 11′ W.), fortified town, Portugal; cutlery, paper, leather; noted sulphur springs in vicinity. Pop. 8863.

GUINEA, Eng. gold coin, in circulation 1663–1817; so named because the gold of which it was first made came from the Guinea Coast; at first issue was worth 20s., in 1694 was 30s., by 1717 had become as now 21s.

GUINEA (12° N. to 16° S., 17° W. to 13° E.), district of West Africa, stretching along the shores of Gulf of G., between Senegal and Cape Negro; divided into Upper G. (E. and W.) and Lower G. (N. and S.). G. includes coast regions of Sierra Leone, Gold Coast, Lagos, Nigeria (Brit.); Fr. G., Ivory Coast, Dahomey, Fr. Equatorial Africa; Togo, Kamerun (Ger.); Portug. G. and Angola (Portug.); Span. G.; Belg. Congo; Liberian Republic; also G. Islands—Fernando Po, Annabom (Span.), Principe, São Thomé (Portug.).

GUINEA-FOWL (*Numida*), genus of Pheasants; Common G., or Pintado (*N. meleagris*) of W. Africa, is domesticated in Britain; head is naked, plumage is speckled with white. G's in wild state are gregarious.

GUINEA-PIG, see under CAVY FAMILY.

GUINEA-WORM (*Filaria medinensis*), a parasite of man common in tropical districts, particularly on the Guinea Coast, its habitat being the subcutaneous tissues of the back and legs, where it forms swellings which develop into abscesses. Its intermediate host is a water flea, *Cyclops*, and it appears to be introduced into man by swallowing infected water. The disease is cured by opening the abscesses and carefully extracting the parasite. See NEMATODA.

GUINES (22° 50′ N., 82° W.), town, Cuba, W. Indies; sugar-cane, tobacco. Pop. 8000.

GUINEVERE, see ARTHUR, KING.

GUINGAMP (48° 34′ N., 3° 9′ W.), town, France; church of Notre Dame, one of chief pilgrim resorts in Brittany; flour-mills, tanneries. Pop. 9300.

GUINNESS, family of Dublin Stout brewers, whose business dates from 1759; present representatives are Barons Ardilaun and Iveagh.

GUINOBATAN (12° 50′ N., 123° 43′ E.), town, Luzon, Philippine Islands; hemp. Pop. 21,000.

GUIPUZCOA (43° 6′ N., 2° 10′ W.), maritime province, N. Spain; surface mountainous; fruit, timber, cattle; rich in minerals (iron, lignite, copper); flourishing industries; good fisheries; climate mild, healthy; many mineral springs; capital, San Sebastian. Area, 728 sq. miles. Pop. (1910) 225,271.

GUISBOROUGH (54° 32′ N., 1° 4′ W.), town, Yorkshire, England; iron, steel, alum. Pop. (1911) 7062.

GUISCARD, ROBERT (1015–85), Norman conqueror of Sicily; Count of Apulia, 1057; reduced Sicily, 1061–72; conquered Bari, 1071; drove Henry IV. from Rome and restored pope, 1083–84. See ROGER I.

GUISE (49° 51′ N., 3° 40′ E.), town, health-resort, France, on Oise; iron industries. Pop. 7300.

GUISE, DUKEDOM OF, held by younger branch of family of Lorraine, founded by CLAUDE OF LORRAINE, 1st Duke of G., who served with distinction in Italy under Francis I., and later in Luxembourg, 1542; his dau. Mary m. James V. of Scotland, and his two eldest sons attained great importance. FRANCIS, 2nd duke, e. s. of Claude, acquired great military reputation by his defence of Metz against Charles V., 1552, and his conquest of Calais, 1558; he subsequently captured Guines and Arlon, and in 1562 defeated the Huguenots at *Dreux*; was for many years the most powerful personage in France; assassinated in 1563. His bro. CHARLES entered the Church, and became cardinal of Lorraine; he was prominent minister of Henry II., and introduced Inquisition in France. HENRY, 3rd duke (1550–88), is chiefly noted for his opposition to Huguenots, whom he defeated at *Jarnac* and *Moncontour*, 1568, and against whom he formed Catholic League, 1584; he also had considerable share in instigating the massacre of St. Bartholomew's Eve in 1572, and opposed Henry of Navarre; he was assassinated in 1588. HENRY, 5th duke, failed to secure crown of Naples, 1647, 1654. Title became extinct with death of Mary, Duchess of G., in 1688.

Forneron, *Les Guise et leur époque* (1887).

GUITAR, a stringed instrument of Oriental origin somewhat similar to the lute; popular in Spain and Italy. G. has a flat back with curved sides, large sound-hole, and six strings—the three highest of gut, the three lowest of silk, spun over with silver wire; sound is produced by plucking the strings with the fingers of right hand, while the left hand is used for altering the pitch by pressing a fretted finger-board; music is written in treble clef, but sounds an octave lower than written.

GUITRY, LUCIEN GERMAIN (1860–), Fr. actor; a leading exponent of contemporary Fr. drama.

GUIZOT, FRANÇOIS PIERRE GUILLAUME (1787–1874), Fr. politician and author; b. at Nîmes, of Huguenot stock; ed. at Geneva and Paris; early turned his attention to literature; appointed prof. of Modern History at Sorbonne, 1812, in which year he m. Pauline de Meulan, writer on educational subjects. In 1814 he was app. Sec. Gen. of Interior under Louis XVIII., but retired from office after Napoleon's escape from Elba in 1815. After final defeat of Napoleon, G. obtained office under Ministry of Justice; was conspicuous member of *Doctrinaire* party; dismissed from office, 1821, he devoted himself to historical research; entered Lower House in 1830; as Minister of Education, 1832–36, he had principal share in development of modern system of education in France. Ambassador to Britain, 1840, but was presently recalled to France to form cabinet; became Foreign Minister, and in 1847 succ. Soult as Premier. His attempts to foster friendly relations with Great Britain were at first crowned with success; but in 1846 the *entente* was broken by the discovery of the Span. marriage intrigues, which discredited both G. and the king. G. remained in office till Revolution of 1848, when with difficulty he escaped to England. G. wrote *Histoire de la Révolution d'Angleterre depuis Charles I. à Charles II.*, an important hist. work; also author of *Histoire de la Civilisation en France*, *Histoire de la Civilisation en Europe*, a biography of Washington, and other works.

Guizot, *Mémoires pour servir à l'histoire de mon temps* (1858–61).

GUJARAT, GUZERAT (22° N., 72° E.), region, Bombay Presidency, India; includes the N. districts of the presidency, the Gaekwar's territories, and numerous native states.

GUJARATI AND RAJASTHANI, two of the seven chief Aryan vernaculars of India; together with Punjabi they are known officially as the western subgroup of the Intermediate Group of Indo-Aryan tongues; they are spoken, as their name implies, in Gujarat and Rajputana (*Rajasthan*) by about 22,000,000 natives. The main dialects of R. (G. has few of importance) are Jaipuri and Marwari. They contain a small vocabulary of Arabic and Persian words. G. and R. have three genders, though the neuter is sparingly used in R.; nouns are inflected to form oblique cases; a locative case is present; in the verb finite tenses are derived from participles, while the infinitive is the neuter of the future participle passive; the system of phonetics is similar to that of Sanskrit (*q.v.*).

Both tongues have a rich store of songs and chronicles, but as yet no complete edition of either has been made.

Kellog, *Grammar of the Hindu Language* (1893); Taylor, *The Student's Gujarati Grammar* (1908).

GUJRANWALA (32° 10′ N., 74° 14′ E.), district, Lahore, Punjab, India; chief river, Chenab; manufactures brass-ware; area, 3198 sq. miles. Pop. 890,577. Capital, Gujranwala. Pop. 27,000.

GUJRAT (32° 47′ N., 74° 9′ E.), chief town, Gujrat district, Punjab, India; cotton goods; brass-ware; scene of defeat of Sikhs by Brit. under Gough, 1849. Pop. 19,048. District area, 2051 sq. miles. Pop. 750,548.

GULA, female Babylonian deity, 'the healer of pain'; wife of Ninib.

GULBARGA (17° 19′ N., 76° 54′ E.), town, Hyderabad State, India. Pop. 28,000.

GULF STREAM, a warm, slow-moving oceanic current, from 40 to 100 miles wide, and over 300 fathoms deep, issuing from Gulf of Mexico; flows N.E. along E. coast of N. America to near Newfoundland, where, turning E., it merges into a drift current; causes mildness of Brit. and Norwegian climate.

GULL FAMILY (*Laridæ*), a family of about 115 species of strong-flying and swimming birds with completely or partially webbed feet. They are mostly marine, and live upon fishes and crustacea, but some have taken to an inland life, breeding in marshy places and feeding on worms and insect grubs. They are found on all the oceans. Amongst them are the TERNS or SEA SWALLOWS (*Sterna*), so called because of their forked tails—active graceful birds which lay their eggs in depressions on sandy shores; with them are reckoned the tropical NODDIES (*Anous*). The SKIMMERS or SCISSOR-BILLS (*Rhynchops*), with long, scissor-like beak, the lower mandible of which protrudes far beyond the upper, occur in Africa, S.E. Asia, and America. Lastly, the GULLS and KITTIWAKES may be distinguished by possessing completely webbed feet, a beak shorter than the head, with the upper mandible shorter than the lower, and forming a slight hook at its tip.

GULL, SIR WILLIAM WITHEY, Bart. (1816–90), Eng. physician; physician to Guy's Hospital (1856), Fullerian prof. of Physiology for three years in Royal Institution (1847); famous as a clinical physician; he was the first to describe myxœdema, and he wrote on many other medical subjects.

GULLET, see DIGESTION.

GULLY, JOHN (1783–1863), Eng. sportsman and politician; s. of an innkeeper; in early life a pugilist; several times won the Derby; M.P. for Pontefract (1832–37).

GULLY, WILLIAM COURT, 1ST VISCOUNT SELBY (1835–1909), Brit. politician; Conserv. M.P., Carlisle, 1886; Speaker, House of Commons (1895–1905); peerage and pension (1905); member, Hague Arbitration Court (1907).

GULPAÏGAN (32° 25′ N., 50° 15′ E.), town, Central Persia.

GUM ($C_6H_{10}O_5$) is an amorphous *carbohydrate*, the watery solution of which is a jelly with adhesive properties. Gums are exudations from the stems of plants. *Tragacanth*, from *Astragalus gummifer*, yields two gums, *Tragancanthin* and *Arabin*. The oak and beech give *Xylan*, which on hydrolysis yields the sugar *Xylose*. The gum from *Acacia Senegal* is *Arabin*, used to suspend insoluble oils, powders, etc.

GUMBINNEN (54° 35′ N., 22° 9′ E.), town, on Pissa, E. Prussia, Germany; textiles, iron foundries. Pop. (1910) 14,539.

GUMBO, or OKRA, an annual African herb, natural order *Malvaceæ*, with edible fruit. The seeds are used for coffee: leaves for poultices.

GUMTI (25° 33′ N., 83° 20′ E.), river, India; joins Ganges, 17 miles N.E. of Benares, after S.E. course of 500 miles.

GÜMÜRDJINA, GUMULJINA (41° 15′ N., 25° 48′ E.), town, European Turkey; annual cattle fair; wine. Pop. 8000.

GUMUSH-KHANEH (40° 25′ N., 39° 25′ E.), town, vilayet Trebizond, Asiatic Turkey; silver and lead mines. Pop. 5000.

GUN, general name for firearms which discharge projectiles by means of an explosion. The earliest known was the 'hand-g.,' which was in use in Europe in the XIV. cent. This consisted of an iron tube, fixed in a piece of wood, with touch-hole at the top, and fired from a rest. Later, the touch-hole was placed at the side, and a pan was added for the reception of the priming-powder. This led to the development of the *match-lock*, in which the lighted match was fixed to a small cock, or *serpentine*, which caused it to fall, at the pull of the trigger, on to the priming-powder. A heavy match-lock weapon of the XVI. cent. was the *arquebus*; and of similar kind was the *musket*, used in England in the XVII. cent. Both these were heavy hand-guns fired from rests. An improvement on the match-lock gun was the *wheel-lock*, invented at Nuremberg in the early part of the XVI. cent. In this weapon a small grooved steel wheel revolved rapidly in contact with a piece of iron pyrites, fixed into a 'cock-head,' and the sparks thus produced fell into the pruning-pan. A later development was the *flint-lock* musket, which led to the many improved modern firearms. See ORDNANCE, and articles on particular weapons.

Greener, *The Gun and its Development.*

GUNA (24° 40′ N., 77° 20′ E.), town, Gwalior, Central India; military station. Pop. 12,000.

GUN-COTTON, explosive substance, is approximately $C_{12}H_{14}(NO_3)_6O_4$, *cellulose hexa-nitrate*, the washed and dried product obtained by soaking cotton-wool in a mixture of three parts of concentrated *sulphuric acid* and one part of *nitric acid* (Sp. Gr., 1·5) for twenty-four hours. It is insoluble in a mixture of alcohol and ether. When lighted, it burns quietly and quickly without smoke. When fused with a detonator it explodes with violence. Gun-cotton forms two non-explosive compounds, *colloidon* and *celluloid*.

GUNDULICH, IVAN (1588–1638), Servian poet; author of a political poem, *Osman*; and numerous translations of Ital. plays.

GUNNEL, see BLENNIES.

GUNNING, PETER (1614–84), Eng. ecclesiastic; supporter of Charles I.; subsequently bp. of Chichester and of Ely.

GUNNY, coarse jute cloth, extensively used in the making of bags to contain cotton, grain, etc.; the industry, carried on chiefly in and near Calcutta, employs many people of both sexes. This fabric is also made in Dundee.

GUNPOWDER, an *explosive* obtained by mixing *saltpetre*, *charcoal*, and *sulphur* together. Its discovery is attributed by some to Schwartz, a Ger. monk, and by others to Roger Bacon. It was known as an explosive, and used as a scientific amusement long before its propelling powers were known. It was probably first employed as a *propellant* by Edward III., since he possessed cannon. The chief combustible is charcoal, which is made from *dogwood*, *willow*, or *alder*. The charcoal must be free from grit and burn easily, leaving little ash. When made, the charcoal is ground, sifted, and carefully stored. The sulphur, after purification by distillation and melting, is cast in moulds and then ground and sifted. *Potassium nitrate* forms a very suitable source of oxygen as it does not become deliquescent. Each constituent is weighed carefully and passed through a sieve of known mesh. After moistening, the materials are *incorporated* or moved, twisted, and turned in every direction by iron rollers working on a circular bed. The whole apparatus can be douched with water if friction causes ignition. The product is '*mill-cake*.' The *mill-cake* is pressed and becomes *press-cake*. The higher the density the slower is the initial rate of burning. Excess of moisture reduces the explosiveness. The *press-cake* is broken up and granulated, the grains being afterwards separated and sorted by sieving. Final processes give different shapes (number of faces) to the grains to suit various requirements. The products of combustion should be *nitrogen* and *carbon dioxide* as gases, and *potassium sulphate* and *carbonate* as solids.

Hime, *Gunpowder and Explosives* (1904).

GUNPOWDER PLOT, conspiracy of Eng. Rom. Catholics (on account of James I.'s refusal to redress their grievances) to blow up with gunpowder the Houses of Parliament when the king and his ministers were there on Nov. 5, 1605. Originator of plot was Robert Catesby, the other conspirators including Thomas Percy, Sir Everard Digby, Francis Tresham, and Guy Fawkes. Barrels of gunpowder were secretly

lodged in coal cellar underneath House of Lords, and it was arranged that Fawkes should fire it at the appointed time. On Oct. 26 an anonymous letter, generally attributed to Tresham, was received by Lord Monteagle; this aroused suspicion and led to discovery of plot; cellars were searched on Nov. 4, and Fawkes was arrested; other conspirators took to flight, but were presently overtaken when some, including Catesby, were killed and others taken prisoner. Fawkes and others were executed, and Tresham died in captivity.

S. R. Gardiner, *What the G. P. was* (1897).

GUN-ROOM, mess-room of junior officers in warship; in aft lower deck, under care of gunner, in wooden men-of-war.

GUNTER, EDMUND (1581–1626), Eng. mathematician; ed. Oxford; became prof. of Astronomy, Gresham Coll., London, 1619; invented the *chain* for land measurement, also *Gunter's scale*, for working navigation problems.

GÜNTHER, JOHANN CHRISTIAN (1695–1723), Ger. lyrical poet of fine gifts, but drunken habits; praised by Goethe.

GUNTRAM (561–592), king of Burgundy; s. of Clotaire I., and inheritor, with his bro's, of the Frankish dominions; possessed some administrative ability, but few social virtues.

GUNTUR (16° 18′ N., 80° 29′ E.), town, Madras, India; trade in cotton and grain. Pop. 23,000.

GUPTA, Ind. dynasty, *c.* 320–480 A.D., founded by Chandragupta Maurya (*q.v.*); under Samudragupta, dominions comprised nearly whole of India; succumbed to Bengal.

GURDASPUR (32° 3′ N., 75° 27′ E.), district, Lahore, Punjab, India; area, 1889 sq. miles. Pop. 940,344. Chief town, Gurdaspur. Pop. 6000.

GURGAON (28° 37′ N., 77° 4′ E.), district, Delhi, Punjab, India; chief town, Gurgaon; trade in grain. Area, 1984 sq. miles. Pop. 746,208.

GURKHAS, or GOORKHAS, the principal race in Nepal (India). They are a sturdily built people, excellent soldiers; rendered valuable service in suppression of the Indian Mutiny.

GURNALL, WILLIAM (1617–79), Eng. author; wrote a notable collection of sermons, *The Christian in Compleat Armour* (1655–62).

GURNEY, EDMUND (1847–88), Eng. philosopher and scientist; ed. at Cambridge, studying classics and medicine, but best known for his pioneer work on psychical research; with Myers and Podmore edit. *Phantasms of the Living*; an acute, scientific thinker.

GURNEY, JOHN (1750–1809), Eng. banker; of a Norwich Quaker family; f. of Elizabeth Fry (*q.v.*); his s., SAMUEL G. (1786–1856), largely extended the banking business, and was a noted philanthropist.

GURWOOD, JOHN (1790–1845), Eng. military officer; served with distinction in Peninsula; became sec. to Wellington, and edit. of *Wellington's Dispatches*.

GUSTAVUS I., VASA (1496–1560), king of Sweden; b. at Lindholm, Upland; fought against Danes, 1517–18. His f. and other leaders of Swed. party were executed by Christian II. of Denmark, 1520; G. raised an army, and after various battles expelled Danes from Sweden; crowned king of Sweden, 1523. G. established Lutheran religion; excluded bp's from Senate; formed alliances with Denmark; put down peasant insurrections; Diet declared crown hereditary in his house, 1560.

GUSTAVUS II., ADOLPHUS (1594–1632), king of Sweden, hero of Thirty Years War; succeeded, 1611; warred against Denmark, 1611–13, Russia, 1614–17, and Poland, 1617–29; from Russia he acquired Karelia and Ingria, from Poland, Livonia, Courland, Esthonia. His objects in taking part in Thirty Years War were to defend and establish Swed. supremacy over Baltic Sea and shores, and to champion Ger. Protestantism. He landed in Germany with 13,000 troops in 1630; captured Stettin; failed to relieve Magdeburg, but inflicted severe defeat on Tilly at Breitenfeld, 1631; he attacked and defeated Wallenstein at Lützen, 1632, but was himself slain during the action. G. was a great soldier and leader of men, and will always live as a national hero.

C. R. L. Fletcher, *Gustavus Adolphus* (1892).

GUSTAVUS III. (1746–92), king of Sweden; succ. in 1771, when country was torn between rival factions of Hats and Caps; overthrew oligarchy by a successful revolution in 1772, and framed new constitution. He carried out various reforms, encouraged lit. and art, and developed trade of country; increased naval strength, established religious toleration. G. warred against Catharine II. of Russia, 1788–90, and at the naval engagement of Svensaksund inflicted a crushing defeat upon the Russians, who lost a great part of their fleet; concluded peace by Treaty of Värälä in 1790; tried to form league against Jacobins; assassinated, 1792.

Bain, *Gustavus III. and his Contemporaries* (1904).

GUSTAVUS IV. (1778–1837), king of Sweden; succ. 1792; joined European coalition against Napoleon; lost Pomerania and Finland; deposed as insane, 1809.

GUSTAVUS V. (1858–), king of Sweden; s. of Oscar II.; succ. 1907; m. (1881) Victoria, dau. of Grand-Duke of Baden.

GUSTAVUS ADOLPHUS UNION, German Evangelical Prot. Association, founded in 1832; aims at supporting needy Prot. communities.

GÜSTROW (53° 48′ N., 12° 11′ E.), town, on Nebel, Mecklenburg-Schwerin, Germany; has cathedral and ancient ducal castle; ironworks; active trade. Pop. (1910) 17,809.

GUTENBERG, JOHANNES (*c.* 1398–1468), Ger. printer; b. Mainz; followed various mechanical employments until 1450, when he entered into partnership with Johannes Fust (or Faust), a goldsmith, who furnished the capital to start a printing business. G. is credited with the invention of printing by movable blocks. The partnership was subsequently dissolved, Fust taking an action at law for the recovery of money advanced. G. afterwards started a rival press. See PRINTING.

GÜTERSLOH (51° 55′ N., 8° 20′ E.), town, Westphalia, Germany; famous for its 'pumpernickel' (rye-bread); exports hams and sausages; textile industries. Pop. (1910) 8334.

GUTHRIE (35° 59′ N., 97° 32′ W.), city, Oklahoma, U.S.A.; cotton industries. Pop. (1910) 11,654.

GUTHRIE, SIR JAMES (1859–), Scot. artist; R.S.A.; noted for portraits and genre subjects.

GUTHRIE, THOMAS (1803–73), Scot. preacher and philanthropist; minister successively of Old Greyfriars and St. John's, Edinburgh; seceded at Disruption, becoming minister of Free St. John's; wrote three *Pleas for Ragged Schools*; promoted establishment of Industrial Schools for destitute children.

GUTHRIE, THOMAS ANSTEY, see ANSTEY, F.

GUTS-MUTHS, JOHANN CHRISTOPH FRIEDRICH (1759–1839), Ger. educationist; did much to introduce improved methods of teaching geography and gymnastics in schools; wrote various handbooks on these subjects.

GUTTA-PERCHA is the evaporated milky *latex* of the trees *Dichopsis gutta* and *Dichopsis oblongifolia*, Natural Order *Sapotaceæ*. The trees, which are native to the Malay Peninsula, are felled, cut by a special method and the latex collected. Mature trees are the best. When felled during the wet season about 30 oz. per tree are obtained. After evaporation g.-p. is sent to the market as blocks of a dirty greyish appearance often with a reddish tinge. Chemically it consists of a *hydrocarbon* and two *oxygenated resins*. It is used to insulate cables and telegraph wires.

M'Intosh, *Gutta-Percha and India-Rubber*.

GUTZKOW, KARL FERDINAND (1811–78), Ger. novelist and dramatist; his successful plays include *Uriel Acosta*, *Richard Savage*, and *Zopf und Schwert*; his novels, *Die Ritter vom Geiste*, *Der Zauberer von*

Rom. In early life G. was a prominent figure in the 'Young Germany' movement.

GÜTZLAFF, KARL FRIEDRICH AUGUST (1803–51), Ger. missionary; from 1828 until his death was largely engaged in China; trans. the Bible into Chinese and Siamese; also wrote several works on China and its history.

GUY OF WARWICK, hero of a XIII.-cent. Eng. metrical romance, who traversed the world performing knightly deeds of valour to win the hand of Felice, dau. of the Earl of Warwick.

GUY, THOMAS (1644–1724), Eng. philanthropist; founded Guy's Hospital (1721), and subscribed to other charities.

GUYON, JEANNE MARIE BOUVIER DE LA MOTHE (1648–1717), Fr. mystic; disciple of the doctrine of quietism, or spiritual perfection; persecuted and imprisoned for her opinions, which were regarded as heretical; wrote *Autobiography* and numerous works.

GUYON, RICHARD DEBAUFRE (1803–56), Brit. soldier; settled in Austria; in Hungarian revolution, 1848, he was gen. in Austrian army and fought brilliantly; later entered service of Turkey, and became gov. of Damascus.

Kinglake, *General Guyon* (1856).

GUYOT, YVES (1843–), Fr. politician and economist; author of *La Tyrannie Socialiste*, *La Comédie protectionniste*; edit. *Le Siècle* (1892–1903) and *Journal des Économistes* (1909).

GUZERAT, see GUJARAT.

GUZMICS, IZIDOR (1786–1839), Hungarian writer; was a Benedictine abbot, and, besides writing theological works, trans. Theocritus and other Gk. classics; famed for social works.

GWADAR (25° 8′ N., 62° 7′ E.), seaport, on S.W. coast, Baluchistan.

GWALIOR (24° 30′ N., 77° 50′ E.), native state in Central India, consisting of several detached districts; situated partly in basin of river Jumna and partly in that of the Nerbudda; drains into Bay of Bengal and Arabian Sea; area, 29,047 sq. miles. Capital, Gwalior, in the N. The surface is generally level in N.; hilly in centre; and comprises, in S., part of the Vyndhya and Satpura Mts.; traversed by rivers Nerbudda, Chambal, Betowa, and Sind. Principal export is opium. G. is a Mahrattan principality under Brit. Protection; there are few Mahrattas, the inhabitants being mainly Hindus. At capital stands famous old citadel, on precipitous rock. Other towns are Dhar and Indore in the S. Pop. (1911) 3,092,639.

GWEEDORE (55° 4′ N., 8° 17′ W.), hamlet, on N.W. coast County Donegal, Ireland.

GWILT, JOSEPH (1784–1863), Eng. architect; author of *The Encyclopædia of Architecture* (1842), *Treatise on the Rudiments of Architecture*, and similar works.

GWYN, NELL, ELEANOR (1650–87), Eng. actress; originally an orange-seller; famed for her performances in comedy; mistress of Charles II.; had two sons, one of whom became Duke of St. Albans.

GYANGZE (29° N., 89° 30′ E.), city, Tibet; celebrated for manufacture of woollen cloth.

GYGES (687–54 B.C.), king of Lydia. Plato tells that he was a herdsman who discovered a magic ring which rendered the wearer invisible. With its aid he assassinated the king of Lydia and seized the throne.

GYLIPPUS (fl. V. cent. B.C.), Spartan general who rescued Syracuse from Athenians, 414 B.C.; Athenian captives were then slain, possibly by G.'s advice.

GYLLEMBOURG-EHRENSVÄRD, THOMASINE CHRISTINE, BARONESS (1773–1856), Dan. novelist; author of *An Everyday Story*, *The Cross Ways*, *Near and Far*, and numerous other stories of a domestic type.

GYMKHANA, sports of various kinds held at Indian military stations.

GYMNASIUM, a place used for the performance of athletic exercises; in ancient Greece it was an elaborate combination of halls and courts for exercises, wrestling, and running, with baths and porticoes, frequented by philosophers, who instructed the youths who took part in the exercises, *e.g.* the Academy, where Plato taught; in modern Germany the g. is an advanced school, preparing for the univ's, corresponding to the public schools and high schools of Britain and America.

GYMNASTICS, athletic exercises practised for improving the condition and development of the body, as opposed to athletic sports and games, *e.g.* running, jumping, football, golf, into which the competitive element enters. G. were practised by the Greeks as training for open-air sports and games, and recognised as of benefit to health, and a valuable adjunct to the moral and literary training carried on in the same buildings as the physical training. In mediæval times horsemanship, field sports, and exercises with arms took the place of the older and more systematic training of the body, and it was not until the second half of the XIX. cent. that the therapeutic value of g., as known to Hippocrates and Galen, was again recognised. Physical exercises are regularly taught in Britain in the elementary schools, while the higher schools and univ's have gymnasia fitted up with apparatus, which is less elaborate now than it was a few years ago. Clubs for gymnastic exercises are common everywhere, and g. play an important part in the training of the army. G. are practised with benefit for such conditions as digestive derangements and (under medical supervision) diseases of the lungs and heart. The dumb-bell, which has been employed since Elizabethan times, is the most generally popular gymnastic apparatus, its weight being easily proportioned to the person using it, and bar-bells, or two-handed dumb-bells, and Indian clubs are also much used. The vaulting-horse, parallel bars, trapeze, swinging rings, horizontal bar, and bridge ladder are more elaborate gymnastic apparatus on a larger scale, but, although these and similar apparatus have been very popular for many years, there is a tendency to-day to discard them in favour of free gymnastic exercises without any apparatus. In France, Germany, Sweden, Denmark, Switzerland, Italy, among other countries, g. are much practised and much esteemed for hygienic purposes, and many competitions of gymnastic teams are held, the Olympic Games even including such competitions among its events.

Wide, *Handbook of Medical Gymnastics.*

GYMNOBLASTEA, see under HYDROMEDUSÆ.

GYMNOSPERMS, naked-seeded plants in which the seed lies on the surface of the *carpel*, and is not enclosed in an *ovary*. They form the smaller, less developed and more ancient of the two divisions of the *Phanerogams* or *Spermaphyta* (seed-bearing plants). G's are divided into four classes, all trees or shrubs—(1) *Conifers*; (2) *Cycads*; (3) *Gnetales*; (4) *Ginkgoales*. These classes, although differing widely in appearance, have in common with each other and their fossil ancestors—(*a*) exposed *ovule* at which the pollen can get directly; (*b*) simplicity of wood structure; (*c*) formation of *endosperm* before fertilisation.

The CONIFERS, cone-bearing trees, arose in the Mesozoic period, and since then have varied little in structure or number, but the decline of the other g's has made them the dominant modern type. Over 2000 of the 2500 species of g. are Conifers. They include *Taxaceæ* and *Pinaceæ* (pines, firs, larches, yews, spruces, junipers, and araucarias). Except in the forests where *Pinaceæ* flourish, g. have been completely supplanted by *Angiosperms* (most highly developed *Spermaphyta*). Conifers are mostly evergreen with needle-shaped leaves, thick cuticle, sunken *stomata*, and other devices to lessen transpiration. The seedling has two or many *cotyledons* and a tap-root. There is no pith, and the stele is *diarch* or *triarch*. The stem shows no true vessels in the *xylem* (wood), which consists of *tracheids* (column of long cells placed on end) with bordered pits. The *cambium* is collateral and open, and therefore there is secondary growth in thick-

ness. Large resin passages occur in the cortex. The *medullary rays* are complex, consisting of cells containing starch and radially running *tracheids*. The venation of the leaves varies. Different leaves may occur on one plant, e.g. *cotyledons*, ordinary foliage leaves, *scale* leaves, and *acicular* leaves (needles). Some trees bear *dwarf* shoots (branches of limited growth), which with their leaves form *spurs*. Flowers are unisexual, and may be borne on the same tree (*monœcious*) or on different trees (*dicœcious*). Only essential flower-parts, *stamens* and *carpels*, are present. Usually they are wind-pollinated, and fertilisation takes place a year afterwards, followed by germination in the third year.

CYCADS are tropical plants. They include *Cycas* and *C. revoluta* (sago-palm). They were the predominant Mesozoic flora, and comprised many genera of world-wide distribution, of which nine only survive. The stem has a large pith, cf. Conifers. Fossil Cycads show highly specialised reproductive organs and exalbuminous seeds unknown in modern forms. Botanists think that an offshoot of these gave rise to *Dicotyledons*. Modern and primitive fossil Cycads show three fern-like characters: (1) the shape of the leaves; (2) their arrangement; (3) fertilisation by a motile male cell in presence of water. They are therefore considered to form a step in the evolution of *Pterydophyta* (ferns) into *Spermaphyta*.

GINKGOALES survive only as *Ginko biloba* (maiden-hair tree of Japan), called the 'living fossil,' with leaves like maiden-hair fern. Motile male cells fertilise ovum in presence of water, an animal characteristic not shown by any of the higher plants except Cycads and Ginko.

GNETALES show true vessels in secondary wood. They are the only living g. with any angiosperm characteristics.

GYMPIE (26° 15′ S., 152° 38′ E.), town, Queensland, Australia; gold-mining centre. Pop. 11,959.

GYNÆCEUM, the women's part in ancient Gk. houses.

GYNECOLOGY, GYNÆCOLOGY, the branch of medicine which deals with the diseases peculiar to women, a subject which has received much attention since ancient times, Egyptian and afterwards Gk. and Rom. physicians making a special study of it, while Galen gave it a place of some importance in his works. The rise and development of modern scientific g. began about the first half of the XIX. cent., when Récamier (1774–1852) began to advocate the use of the speculum and sound, and Simpson, Hughes Bennett, and others did much to advance its progress.

DISEASES OF UTERUS.—*Menstruation* is the normal flow of from 4 to 6 oz. of blood with mucus from the uterus, about every twenty-eight days, from about the age of fourteen or sixteen to forty-five or fifty, and derangements of menstruation are usually symptomatic of various physiological and pathological conditions of the uterus. The most usual cause of *amenorrhœa*, or cessation of menstrual flow, is pregnancy, while the flow stops altogether about the age of forty-five or fifty, an occurrence which is termed the climacteric; but the cessation may also be due to anæmia, phthisis, or local malformations. *Dysmenorrhœa*, or painful flow, may be due to displacements of the uterus, ovarian disease, chronic inflammation, or tumours of the uterus. *Menorrhagia*, or excessive flow, is usually due to inflammation or displacements of the uterus, and tumours; while *metrorrhagia*, or irregular flow, apart from menstruation, may be due to polypi, extra-uterine gestation, or new growths, and must be regarded seriously when occurring above the age of forty, as it is then often an early sign of malignant disease. The uterus may be affected by *cervicitis*, or inflammation of the cervix or entrance, treated by douching or scraping, and applying a caustic endometritus; inflammation of the lining mucous membrane of the uterus, treated by douching or curetting (removing the inflamed membrane); and it may be the site of various tumours, simple (including fibroid and polypus) or malignant (including cancer, sarcoma, and deciduoma), the former class being simply excised, while the latter requires very radical treatment. The uterus may also be displaced in various ways, the chief displacements being anteversion and anteflexion, displacements forwards; retroversion and retroflexion, displacements backwards; prolapse, in which the uterus descends through the floor of the pelvis; and inversion, in which the uterus is turned inside out. In slight degrees of displacement, the uterus can be replaced and kept in place by a bent ring-like apparatus called a pessary, but in more advanced degrees surgical operations are required to hold the uterus in place.

DISEASES OF FALLOPIAN TUBES.—The Fallopian tubes may be the site of inflammation, septic, gonorrhœal or tubercular, on one or both sides, the tubes being much swollen, and the treatment being fomentations, douching, plugging, and rest for slight, and removal by an abdominal incision for severe cases. An ovum may be fertilised and develop in the tube instead of in the uterus, which usually leads to serious complications, and has to be removed as soon as detected. If not removed, it usually bursts sooner or later, and peritonitis ensues.

DISEASES OF OVARY.—The ovaries may be displaced, usually prolapsing down to the pouch of Douglas behind the uterus, and causing pain, and may require a surgical operation before being replaced. *Ovaritis*, or inflammation of the ovary, is usually due to secondary infection from the Fallopian tube, and is treated by fomentations and douching. Tumours of the ovary may be solid (including fibroid, sarcoma, cancer) or cystic (simple, compound, malignant, dermoid), the treatment being removal by operation as soon as detected.

DISEASES OF THE VAGINA.—The opening of the vagina may be congenitally absent, a slight surgical operation being necessary to correct the abnormality, or it may be affected by spasm, usually due to chronic irritation, which should be removed. Inflammation may be septic, gonorrhœal, or diphtheritic, and it is treated by rest, swabbing with antiseptic and astringent, and douching.

DISEASES OF THE VULVA.—The vulva may be the site of inflammation, treated by antiseptic swabbing, and applying a dusting powder (*e.g.* zinc oxide and starch); or tumours may be present, fibroma, cancer, or cystic, which require to be excised, a somewhat more radical operation being necessary for cancer.

DISEASES OF URETHRA AND BLADDER may complicate conditions of the genital system.

Hart and Barbour's *Manual of G.*; Fothergill, *Gynæcology*; Kelly, *Operative G.*, and *Medical G.*

GYÖR (47° 41′ N., 17° 40′ E.), Hungarian name of Raab (*q.v.*), a town of Hungary.

GYP, pseudonym of GABRIELLE RIQUETTI DE MIRABEAU, COMTESSE DE MARTEL DE JANVILLE (1850–), Fr. novelist; her works deal freely with social conventions, and include *Chiffon's Marriage*, *Petit Bob*, *Mlle Eve*, *Elles et Lui*.

GYPAËTUS, member of VULTURE FAMILY (*q.v.*).

GYPS, member of VULTURE FAMILY (*q.v.*).

GYPSIES, Eng. name given to a nomadic race found all over Europe, great part of Asia, in N. and S. America, Africa, and Australia. They have also been known in England as 'Egyptians' (of which Gypsy is a diminutive), 'Greeks,' 'Heathens,' 'Bohemians,' etc. The g. calls himself *Romany* or 'Rómano'; and his language, which is practically the same in all countries, is *Rómani chiv*. Where the g. first came from is unknown. They are generally described by themselves as of *Little Egypt*, which some students have identified with Epirus. They probably first appeared in Europe in the early part of the XIV. cent., and seem to have reached England at about its close. It is recorded that certain g's danced before James V. of Scots at Holyrood; and,

in 1540, the same king granted permission to 'oure louit Johnne Faw, lord and erle of Litill Egipt,' to punish any offenders against the Romany laws. At first they seem to have been well received in Europe, and were known for skilled metal-workers, but subsequently charges of kidnapping and other crimes were brought against them, and in England and other places they were mercilessly hunted down and imprisoned or put to death. In past times these nomads used to be famed for their skill in music and dancing, besides metal-working. Now the chief male occupation is horse-dealing; the female, fortune-telling and basket-making. Amongst common surnames are Smith, Boswell, Stanley, Lee, and Lovell. The Eng. g's conform to no religion; and their moral code is far from strict. Amongst physical characteristics may be noted lithe figures, olive skin, dark, lustrous eyes, exceedingly fine teeth, and black or dark hair.

Works by George Borrow, Leland, Groome.

GYPSUM, $CaSO_4+2H_2O$, mineral composed of hydrated sulphate of lime; occurs abundantly in the more recent sedimentary rocks, although it may occur in any geological age. Varieties: *alabaster*, which is white and resembles marble; *selenite*, transparent and crystalline; *satin spar*, has pearl-like lustre. G. contains a large amount of water, and when this is evaporated off in kilns plaster of Paris is left. This, when mixed with water again, quickly sets, and is used for moulds, casts, etc. G. is also used in a powdered form as agricultural manure, and in the manufacture of porcelain.

GYRINIDÆ, see under POLYMORPHA.

GYROSCOPES and **GYROSTATS** are instruments by means of which the dynamics of a rotating body such as the earth or a spinning-top have been investigated. In the GYROSCOPE, invented towards the end of the XVIII. cent., the principal axis of rotation always passes through a fixed point, and accordingly the rotating wheel or disc is mounted in *gimbals*. GYROSTAT was invented by Kelvin to illustrate the movement of a rotating body left free to wander about on a horizontal plane. It illustrates the action of a top spun on a table. When the gyroscope is rotated at a very high speed it resists any forces coming from without and tending to change its axis of rotation. Hence it can be used to give stability to a moving body through its inertia. The *Moment of Inertia* can be calculated, and is equal to the product of the mass of each particle of the body into the square of its distance from the axis of rotation. It will, therefore, to some extent depend on the geometrical shape of the body.

The *Radius of gyration* of a rotating body is the distance from the axis of rotation at which, if the whole mass of the body were concentrated there, the energy of rotation of the body would be the same as it really is. The first practical application of the gyroscope was Sersen's apparatus for providing a false horizon at sea when the real one was obscured by fog. It consisted of a top with a highly polished upper plane surface. *Centrifugal machines, cream separators*, are really tops held in a frame and obliged to rotate about a vertical axis, *i.e.* they are an application of the gyrostatic principle in which one degree of freedom is suppressed. Other modifications of this principle are used on the platforms of quick-firing guns and for searchlights on board ships. A gyroscopic fly-wheel travels in its original direction only when it is perfectly free in all directions in space. In the form of a small heavy wheel fixed in gimbals rotating at at least 2000 revolutions per minute it is used to control the course of a torpedo or submarine.

The fly-wheel acts on a valve to which rudders are attached. The rolling of a ship can be neutralised by the presence of a gyrostat the movement of which is restrained in one direction, and the same principle can be used to give stability to a mono-rail car. In 1911 the gyroscopic compass was invented, and the gyroscope was used for steadying cinematograph cameras. Bicycle wheels are an instance of gyrostatic movement. Any deviations from the original direction of the movement can be corrected by forces of the required direction acting through the handlebars. Many complicated composite movements can be explained by the fact that, given forces acting in the proper direction, it is possible to overcome the inertia due to gyrostatic movement. The earth can be considered as a large top with a slow backward motion of the equinoctial points due to the attractive force by the sun, moon, and planets. The axis of the earth describes in space a conical motion in about 26,000 years. Various applications of the gyroscope have been used to demonstrate the inclination of the earth's axis.

Crabtree, *Theory of Spinning-Tops and Gyroscopic Motion*; Barnard, *The Gyroscope*.

GYTHIUM (36° 46′ N., 23° 34′ E.), seaport town of ancient Greece, on Gulf of Laconia; was Spartan naval station; now mostly submerged.

GYULA-FEHÉRVAR, Ger. KARLSBURG (46° 5′ N., 23° 34′ E.), town, Transylvania, Hungary, on Maros; bp.'s see; cathedral; museum of antiquities; trade in wine, cattle.

H, eighth letter of the Eng. alphabet; derived from the Phœnician, and originally consisted of two upright and three transverse bars. It is an aspirate, or simple breath sound, neither consonant nor vowel; sounded in words of native origin, but in a few words derived from the Latin, such as 'hour' and 'honour,' mute.

HAAG, CARL (1820–), Anglo-Bavarian artist; famed for water-colours of Eastern scenes.

HAAKON I. (c. 910–61), king of Norway; defeated Danes; murdered.

HAAKON IV. (1204–63), fought against Alexander III. at Largs.

HAAKON VII. (1872–), Charles, the second s. of Frederick VIII. of Denmark; m. (1896) princess Maud, dau. of late Edward VII.; received crown of Norway on its separation from Sweden in 1905.

HAARLEM (52° 22′ N., 4° 40′ E.), town, capital of N. Holland, Netherlands, on Spaarne; the Cathedral of St. Bavo (Groote Kerk) dates from XV. cent.; has collections in art and science, an academy of science, and several royal schools; trade in flower bulbs; surrendered to the Spaniards, 1573. Pop. 70,000.

HAARLEM LAKE (52° 20′ N., 4° 40′ E.), Dutch HARLEMMER MEER, a former shallow lake of the Netherlands, about 20 miles in length, 2 miles S.E. of Haarlem; drained in 1853.

HAASE, FRIEDRICH (1827–1911), Ger. actor; retired, 1898; one of the leading players of the modern Ger. stage.

HAASE, FRIEDRICH GOTTLOB (1808–67), Ger. classical scholar; distinguished edit. of Tacitus, Seneca, Thucydides, and other authors.

HABAKKUK, eighth minor prophet of Old Testament, of whom personally nothing is known, but probably a Levite. Book is dramatic in form, consisting of colloquy between prophet and Jehovah; former begins by lamenting surrounding violence and is told that God has raised up Chaldæans as instrument of judgment; prophet then complains of greater wickedness of Chaldæans, and is told that they shall perish after accomplishment of their task. Then follows a series of woes pronounced against Chaldæans; and in conclusion the prophet breaks into a sublime lyrical poem, describing a divine theophany. H. is quoted in *Acts, Romans, Galatians, Hebrews.*

Driver, *Introduction to Literature of Old Testament*; Robertson. *Old Testament.*

HABBERTON, JOHN (1842–), Amer. novelist and journalist; chief work, *Helen's Babies* (1876).

HABEAS CORPUS, in Eng. law, writ protecting personal liberty of the citizen. Where a person is detained on criminal charge without being brought to trial, or where he is unlawfully detained by private individuals, any one may on his behalf apply to judge of High Court for writ of H. C. commanding governor of gaol, or person detaining the individual on whose behalf the request is made, to bring him before the court in order that the reasons for his detention may be investigated; if there be no sufficient reason, the court will then order him to be set at liberty, or, if he is a child, will order him to be given up to his lawful guardians. Writ must be issued by judge on good reason being shown; and any judge who refuses to issue it forfeits £500 to the aggrieved person. The Act was passed in 1679, and can be suspended by Parliament at various times of national peril.

Short and Mellor, *Crown Practice* (1890).

HABERDASHER, retail dealer in small wares; the name is used by Chaucer; the H's' Company is an important Eng. livery company.

HABINGTON, WILLIAM (1605–54), Eng. poet; author of a poem, *Castara* (1634), in which he celebrated the virtues of his wife; also a tragi-comedy, *The Queen of Arragon,* and a *Historie of Edward IV.*

HABSBURG, see HAPSBURG.

HACHETTE, JEANNE, famous Frenchwoman who, when the Burgundians, in 1472, had practically reduced Beauvais, tore down their flag and reinspired the garrison to resistance.

HACHETTE, LOUIS CHRISTOPHE FRANÇOIS (1800–64), Fr. publisher, founder of firm, Hachette et Cie.

HACKENSACK (40° 53′ N., 74° 7′ W.), town, New Jersey, U.S.A., on Hackensack; chiefly residential; silk goods; wall-paper. Pop. (1910) 14,050.

HACKLÄNDER, FRIEDRICH WILHELM VON (1816–77), Ger. writer; his novels include *Eugen Stillfried* and *Krieg und Frieden*; and his comedies, *Magnetische Kuren* and *Der Geheime Agent.*

HACKNEY, metropolitan borough of London, England, 3 miles N.E. of St. Paul's. Pop. (1911) 222,587.

HACKNEY, horse for riding or driving as distinguished from finer breeds, such as hunters or race-horses; carriage for hire; 'to hackney' is to make common, by frequent use.

HACO V., HAAKON, see under NORWAY, *History.*

HADAD, name found in Bible, as Ben H. (s. of H.); kings of Damascus called Ben H. possibly assumed title from Syrian god H.

HADDINGTON (55° 57′ N., 2° 47′ W.), county town on Tyne, Haddingtonshire, Scotland; ancient royal burgh; among chief buildings are the XV.-cent. abbey church ('Lamp of Lothian'), Corn Exchange, and Knox Memorial Institute; important grain market; corn-mills. Alexander II., John Knox, Samuel Smiles, and Jane Welsh Carlyle were natives. Pop. (1911) 5424.

HADDINGTON, EARLDOM OF.—Thomas Hamilton, 1st earl, minister for Scotland, 1612; 6th earl was present at Sheriffmuir; 9th earl held office under Peel.

HADDINGTONSHIRE, or EAST LOTHIAN (55° 55′ N., 2° 45′ W.), maritime county in S.E. of Scotland, bounded by Firth of Forth, Ger. Ocean, Berwickshire, and Edinburghshire; total area, 280 sq. miles; county town, Haddington. Lammermuir Hills rise in S.; highest point, Lammer Law (1733 ft.); centre and N. mostly plain; considerable extent cultivated; higher regions pasturage. Of great historical interest, with numerous antiquities. Royal burghs are Haddington, Dunbar, and North Berwick. Pop. (1911) 43,253.

HADDOCK (*Gadus æglefinus*), fish found plentifully in N. hemisphere; belongs to Cod (*q.v.*) family; length of male, *c.* 2 ft., of female (which lays about one million pelagic eggs), *c.* 15 inches; h.-fishing is an important Brit. industry.

HADDON HALL, fine example of O.E. baronial mansion, on the Wye, near Bakewell; associated with Dorothy Vernon; owned by Duke of Rutland.

HADEN, SIR FRANCIS SEYMOUR (1818–1910), Eng. surgeon and artist; pres. and part founder of the Royal Society of Painter-Etchers; stands in the foremost rank of etchers, and author of numerous works on etching.

HADENDOA, tribe of African nomads of the Suakin district. Osman Digna belonged to the tribe.

HADERSLEBEN, Dan. HADERSLEV (55° 15′ N., 9° 10′ E.), seaport town, Schleswig-Holstein, Prussia,

on inlet of Little Belt; iron foundries. Pop. (1910) 13,050.

HADES, see HELL.

HADING, JANE (1859–), Fr. actress; has played with Coquelin; achieved great success in *Le Maître de forges*, *La Châtelaine*, *Le Demi-monde*, etc.

HADJ, HAJJ, Arabic name for the pilgrimage to Mecca, the person performing it being afterwards known as HADJI. Pilgrimages to Jerusalem are also so called.

HADLEIGH (52° 2′ N., 0° 58′ E.), market town, Suffolk, England; corn mills, malt-houses. Pop. (1911) 3201.

HADLEY (42° 22′ N., 72° 35′ W.), town, Massachusetts, U.S.A., on Connecticut; tobacco factories.

HADLEY, ARTHUR TWINING (1856–), Amer. pol. economist; pres., Yale University (1899); wrote *Railroad Transportation, its History and Laws* (1885).

HADLEY, JAMES (1821–72), Amer. scholar; author of a noted *Gk. Grammar* (1860), *Introduction to Roman Law*, etc.

HADRAMUT (18° N., 50° E.), district along S. coast of Arabia from Yemen on W. to Oman on E.; narrow belt of land, chiefly mountainous; many wadis, or valleys, without running water, except after rains; country irrigated by wells. Main productions are wheat, millet, indigo, dates, and tobacco. Chief towns—Shibam, Tarim, Keshin, and Makalla. Shrines of Kabr Salih and Kabr Hud visited by pilgrims. Pop. *c.* 150,000.

HADRIAN, PUBLIUS ÆLIUS HADRIANUS (76–138 A.D.), emperor of Rome. After distinguishing himself in wars in Dacia and holding various important offices of state, he succeeded Trajan as emperor in 117; soon afterwards he gave up his claim to Armenia, and made peace with Parthians, to whom he retransferred Assyria and Mesopotamia. He spent several years of his reign in visiting all the provinces of his empire, and in course of his first journey, which he began *c.* 119, he visited Britain, where he caused a wall, **Hadrian's Wall**, to be built between Bowness-on-Solway and Wallsend-on-Tyne, to secure Rom. provinces to the S. from incursions of Caledonians. The wall was repaired by Severus and considerable portions remain. He lived for some time at Athens, where he built magnificent temple; founded Ælia Capitolina on site of Jerusalem; put down Jewish insurrection, 134.

Bury, *Students' Roman Empire* (1893).

HADRUMETUM (*c.* 35° 50′ N., 10° 30′ E.), ancient city, N. Africa; on E. coast Tunisia; originally a Phœnician and later a Rom. colony; site now partly occupied by modern Susa.

HAECKEL, ERNST HEINRICH (1834–), Ger. biologist; prof. of Zool. at Jena. His biological achievements lie in two main directions: minute systematic classification, and general biological philosophy. In the first he has pub. masterly monographs on several divisions of protozoa, sponges, and cœlenterates; in the second are his 'gastræa,' theory of development, emphasis of zoological evolution, and support of a chemico-physical or mechanical explanation of the phenomena of life.

Life, by Bölsche (Eng. trans. by Joseph M'Cabe, 1906).

HÆDUI, ÆDUI, Gallic people dwelling between Saône and Loire; gave allegiance to Julius Cæsar.

HÆMATITE, or HEMATITE (Ger. *Hämin*, blood), a distinct iron ore of fibrous structure, consisting chiefly of peroxide iron, and found in Cumberland, Lancashire, in Spain, Scandinavia, and near Lake Superior. There are two varieties, red and brown, the former being variety of red oxide, and giving the name on account of its blood-like colour.

HÆMATOCELE, collection of blood in the tunica vaginalis of the testis or in the spermatic cord, due to injury or, rarely, to malignant disease; treatment is rest, cold wet dressings or ice-bag to promote absorption, or, in chronic cases, a slight operation to remove the clot may be necessary.

HÆMATOXYLIN, see LOGWOOD.

HEMATOZOA, parasites in blood, *e.g.* Gregarines, Bilharzia, Nematodes. See SPOROZOA, NEMATODA, BILHARZIOSIS.

HÆMATURIA, see KIDNEY, HÆMORRHAGE.

HÆMOGLOBIN, see BLOOD.

HÆMOPHILIA, hereditary condition, transmitted through the females, who are not subject to it, to the males of the next generation, characterised by a tendency to severe bleeding from very slight wounds or for no apparent reason at all, especially from the nose, mouth, or bowel. It is believed to be due to decrease of the coagulability of the blood, and is treated by internal administration of calcium chloride, and by applying suprarenal extract locally.

HÆMOPTYSIS, see HÆMORRHAGE.

HÆMORRHAGE, the escape of blood from a blood vessel; in bleeding from an *artery*, bright red blood spurts in jets, keeping time with the beating of the heart; in bleeding from a *vein*, dark blood flows steadily; and in *capillary* bleeding, the blood oozes from a raw-looking wound surface. Bleeding into the tissues is termed *extravasation*; bleeding from the nose, *epistaxis*; vomiting of blood, *hæmatemesis*; coughing up of blood from the air-passages, *hæmoptysis*; the presence of blood in the urine, *hæmaturia*; in the fæces, *melæna*. To arrest bleeding, pressure is applied to the bleeding point, or a tourniquet is tied round the limb between the bleeding point and the heart; the application of cold, especially for an oozing wound, hot water (130° F. and over), perchloride of iron, or suprarenal extract, are also found to be valuable remedies.

HÆMORRHOIDS, PILES, a dilated condition of the veins of the lowest part of the rectum and the anus; the former—*internal* piles—are covered with mucous membrane, the latter—*external* piles—are covered with skin. The causes are constipation, pregnancy, tumours of the pelvis or abdomen, or liver diseases obstructing the return of the venous blood. The treatment is to keep the bowels regular and open, rest, fomentations, astringent lotions, ointments, and injections; an operation may be necessary, especially for internal piles, in persistent cases.

HÆMOSPORIDIA, an order of Sporozoa which consists of highly specialised intracellular parasites living in the red blood corpuscles of vertebrates. The most important form economically is *Laverania malariæ*, causing the deadly malarial fever of the tropics. Its life-cycle falls into two phases, asexual, in the human host, and sexual, in the intermediate invertebrate host, a mosquito of the genus *Anopheles*. The parasite is introduced into the human subject by the 'bite' of an infected mosquito, which leaves a minute quantity of saliva in the wound. This saliva contains large numbers of minute sickle-shaped structures, the *sporozoites*, which enter the red blood corpuscles and become amœboid. Each is then termed a *trophozoite*, and feeds and grows until mature. The nucleus then divides into a varying number of daughter nuclei, each of which becomes surrounded by a portion of the parental protoplasm forming a *merozoite*. The merozoites are liberated into the blood plasma by the disintegration of the corpuscular host-cell, and repeat the stages initiated by the sporozoite. The result of continued repetition of this cycle is that the infected person soon becomes extremely feeble, and consequently the parasite prepares for its sexual phase by the formation of *gametocytes*, which are sausage-shaped structures termed crescents. If the patient is then bitten by an Anopheles the blood absorbed by the mosquito will contain all stages of the sporozoon. Of these only the gametocytes survive the action of the digestive juices, and they produce zygotes which bore through the wall of the gut. These subdivide, producing a fresh generation of sporozoites, which recommence the asexual part of the life-cycle if introduced into a second human host.

HAETZER, LUDWIG, HETZER (d. 1529), Swiss religious reformer; b. at Bischofzell, Switzerland;

repudiated the sacraments; executed for heresy, 1529; pub. Ger. translation of Hebrew Prophets.

HAFFKINE, WALDEMAR MORDECAI WOLFF (1860–), bacteriologist to Indian Government; b. Odessa; has done valuable original research in microbiology, cholera, and plague.

HÁFIZ (d. 1389), the greatest of Persian lyric poets. His real name was Muhammad Shams ed-Din; b. and d. at Shiraz, but little is known of his life. His book, or *Divan*, consists of *ghazals* (short odes), which, though sensuous in tone, are claimed to be mystical in meaning, and impregnated with Sufi philosophy. They are known by heart in Persia. Eng. trans. by McCarthy, Payne, and others.

HAGEDORN, FRIEDRICH VON (1708–54), Ger. poet; writer of lyrics and verse fables of high quality.

HAGEN (51° 22′ N., 7° 28′ E.), town, Westphalia, Prussia; ironworks; textile industries. Pop. (1910) 88,631.

HAGEN, FRIEDRICH HEINRICH VON DER (1780–1856), Ger. philologist; edit. the *Nibelungenlied* (1810), *Gottfried von Strassburg*, etc.

HAGENAU (48° 35′ N., 7° 48′ E.), town, on Moder, Alsace-Lorraine, Germany; cotton and woollen industries. Pop. (1910) 18,868.

HAGENBACH, KARL RUDOLF (1801–74), Ger. theologian; prof. at Basel.

HAGENBECK, CARL (1844–1913), Ger. naturalist; world-famous importer of wild animals, whose headquarters are at Stellingen, near Hamburg.

HAGERSTOWN (39° 36′ N., 77° 44′ W.), city, Maryland, U.S.A.; machine shops; flour-mills. Pop. (1910) 16,507.

HAGGADA, part of Talmud, which gives ethical and hist. commentary on and amplification of Bible; to it is joined the *halakha*, or legal exposition of the Scriptures; it is of great literary value.

HAGGAI, first Hebrew prophet after the return from Exile; contemporary of Zerubbabel and Joshua, whom he was inspired to support in rebuilding of Temple, the reconstruction having been suspended for fourteen years. His prophecy dates from 520 B.C., and consists of four parts: the first reproves apathy of the people in not carrying out the work; the second gives an assurance that the new temple shall equal the glory of the former one; the third promises blessing; and fourth contains message of encouragement for Zerubbabel. H. is quoted in *Hebrews* 12^{26}.

Minor Prophets, vol. ii., Driver (*The Century Bible*).

HAGGARD, SIR HENRY RIDER (1856–), Eng. novelist; author of *King Solomon's Mines* (1886), *She* (1887), and other highly popular stories; has also written on rural and agricultural questions.

HAGGIS, Scots pudding, consisting of sheep's lung, heart, and liver, chopped fine, and mixed with oatmeal, suet, and spices; boiled for three or more hours in a sheep's stomach.

HAGIOLOGY, as the critical study of lives of saints, has only existed for two cent's, but collections of lives were made from time of Eusebius; called *menologies* in Eastern and *legendaries* in Western Church: among important collections are *Sanctorum priscorum patrium vitæ* (pub. by Lippomano, 1560) and *Vitæ patrium* (by Rosweyde, 1615).

HAGIOSCOPE.—(1) Slit in church wall to give view of altar to worshippers in transepts. (2) Kind of magic lantern.

HAGONOY (14° 25′ N., 120° 45′ E.), town, Philippine Islands; fertile region; produces rice, Ind. corn, and sugar; woven fabrics. Pop. 20,000.

HAGUE, THE HAGUE, 'S GRAVENHAGE (52° 3′ N., 4° 18′ E.), capital of Netherlands; two miles from North Sea; traversed by numerous canals; royal palace, castle of Counts of Holland (Dutch Parliament House), famous picture-gallery, museums, Carnegie (*q.v.*) Palace of Peace, fine Bosch Park, etc.; originally a hunting lodge of Counts of Holland, XII. cent.; numerous Treaties arranged here; Triple Alliance between England, Sweden, and Netherlands, 1668; identified with peace movement (famous Peace Conferences, 1899, 1907) and seat of international arbitration courts; peace between Austria, Spain, and Savoy, 1717; chief industries, copper and lead smelting, iron-foundries, printing-works, carriages, gold and silver lace. Pop. (1911) 288,577.

HAHN, AUGUST (1792–1863), Ger. divine; author of *Lehrbuch des Christlichen Glaubens* (1828), and other works.

HAHNEMANN, SAMUEL CHRISTIAN FRIEDRICH (1755–1843), Ger. physician; made researches on drugs and their effects, and introduced the homeopathic method of treatment.

HAHN-HAHN, IDA, COUNTESS VON (1805–80), Ger. novelist; her stories are sentimental and deal chiefly with aristocratic life. The best are *Ulrich*, *Gräfin Faustine*, and *Eudoxia* (Eng. trans. of two last).

HAIBAK (36° 15′ N., 68° E.), town, Afghan-Turkestan.

HAIDA, small N. Amer. Indian tribe dwelling in Queen Charlotte Islands (British Columbia); skilled in various crafts.

HAIDARABAD, see HYDERABAD.

HAIDINGER, WILHELM KARL, RITTER VON (1795–1871), Austrian mineralogist and geologist; b. Vienna; came to live at Edinburgh, 1822; app. Counsellor of Nîmes, 1840, and lectured on mineralogy, 1843; discovered optical appearances known as 'H.'s brushes.'

HAIDUK.—(1) Hungarian infantry soldier; term applied in XVI. cent. to mercenary soldiers who protected frontiers against Turks, and received various privileges as reward. (2) Retainer.

HAIFA (32° 48′ N., 35° 1′ E.), seaport town, ancient *Sycaminum*, Syria, on Bay of Acre, at foot of Mt. Carmel. Pop. *c.* 12,000.

HAIL MARY, see AVE MARIA.

HAILES, DAVID DALRYMPLE, LORD (1726–92), Scot. historian; author of *The Annals of Scotland* (1776–79), *Antiquities of the Christian Church* (1783), and other works.

HAILEYBURY SCHOOL, see HERTFORD.

HAILSHAM (50° 52′ N., 0° 16′ E.), market town, Sussex, England. Pop. 4000.

HAILSTONES. — When water-drops, suspended in the air, are carried upward by air-currents there is a consequent fall in their temperature, and this may be so great as to cause them to freeze. While h's so formed are small they may still be carried upward, and more water will condense upon them until they are so large that they fall to the earth.

HAINAN, KIUNG-CHOW-FU (19°N.,109° 45′ E.), island in province of Kwang-tung, extreme S. of China, lying between China Sea and Gulf of Tong-king; extending *c.* 150 by *c.* 100 miles; capital, Kiung-chow (with port Hoi-how). Island is almost entirely agricultural; centre and S. are mountainous, and earthquakes and typhoons occur; there are good harbours; exports include timber, rice, and sugar. Pop. *c.* 2,500,000.

HAINAU (51° 18′ N., 15° 55′ E.), town, Silesia, Prussia; gloves; scene of defeat of French by Prussians, 1813. Pop. (1910) 10,459.

HAINAUT, HAINAULT (50° 30′ N., 4° E.), province, Belgium; surface generally level; traversed by the Sambre, Scheldt, Dender, and Haine; rich coal-fields; fertile soil; agriculture and mining chief pursuit of inhabitants; capital, Mons. Area, 1437 sq. miles. Pop. (1910) 1,232,867.

HAINBURG, HAIMBURG (48° 8′ N., 16° 57′ E.), town, on Danube, Austria-Hungary; tobacco, needles. Pop. (1910) 7304.

HAINICHEN (50° 58′ N., 13° 6′ E.), town, Saxony, Germany; centre of Ger. flannel manufacture. Pop. (1910) 7863.

HAI-PHONG (20° 52′ N., 106° 39′ E.), seaport, Tong-king, Fr. Indo-China, on branch of Red River delta; rice. Pop. 20,000.

HAIR, a characteristic of all mammals, even if in some it is reduced to a few bristles on the lips, as in

whales. It is a product of the superficial skin or epidermis, is nourished by blood-vessels, and consists of a spongy centre and a harder outer layer. In mammals, where to preserve life the temperature of the body must be kept at a constant high pitch, the primary value of an external coating of hair lies generally in its retaining in its interstices a non-conducting layer of air, which conserves the heat gained at the expense of energy and checks excessive dissipation of heat by radiation. Obviously, the longer the hair the thicker will be the non-conducting layer of air, and the less will the animal be influenced by changes of temperature. So it is that in the animals of cold regions a long and close coat is the rule. Another elemental function of hair lies in keeping the body dry; hence it is arranged in definite directions, so that the run of the hair will most readily conduct rain off the animal. In the sloths, for example, conforming with their upside-down mode of life, it flows from belly to back, instead of in the opposite direction as in other animals.

Hair simply as a warm coat occurs in many forms—sometimes as short, thick fur, as in seals, again as fine wool, as in sheep, or as a coarse, shaggy coat, as in goats, or still more coarsely, as bristles in pigs. Sometimes it almost disappears, as in whales and dolphins, where a thick layer of blubber below the skin takes on the function of retaining warmth.

Only one kind of hair may be present, as in the cat, but often the long, coarse, apparent over-hair is supplemented by a fine, soft, thick, under-fur, as in seals. It is this latter coat—the 'staple fur'—which renders its primary value to commercial fur, used for warm garments, rugs, or wraps; but the over-fur—or 'fancy fur'—adds to the pelt the charm of character and beauty. This double coat is best developed in animals exposed to cold temperatures. Favourite furs are those of Carnivores—the martens of Northern America and Europe, which include the most valuable Russ. sable, the Arctic and Antarctic foxes, the ermine from Asia and Europe, and the fur seal of the Pacific. Chinchilla from Peru and Chile and Persian lamb afford examples of well-known furs from tropical regions. Unfortunately the trade names of many furs give little clue to their real character, *e.g.* 'Baltic White Fox' and 'Baltic Lynx' are made from the Arctic hare, 'French Ermine' from selected French coney skins, and 'Iceland White Fox' from White Tibet lamb.

Hair, besides appearing in fur and wool, and as bristles, sometimes undergoes profound modifications. Thus in the hedgehog and porcupine, belonging to different orders, it develops into long, hard, and sharp spines, which are clearly specialised defensive structures.

It should be mentioned that hair, like feathers, is seasonably moulted, and that the winter coat, which is thickest and warmest, often changes in northern animals to a colour matching or approaching that of the snow amongst which they move.

Human Hair.—Human h. and beards are possibly sexual ornaments. Racial varieties are: curly or smooth, generally fair h. of Northern Europeans; crisp and short, woolly, very black h. of most negroes; black coarse straight h. of Mongols, Chinese, Amer. Indians; crinkly black h. of Australian Blacks. It was customary in the East to allow free growth to h. of the face, and Assyrian sculptures show long, elaborately curled beards. Egyptian faces were nearly clean shaved, with small, spade-like projection from foot of the chin. Greece and Rome set up ideal for men of classic head with short h., usually curly, and clean-shaven face, while their women's coiffures always showed shape of the skull, their long h. being bound to the head by fillets and gathered up behind in teapot-handle shape. Celtic and Teutonic men cultivated h. and beard. The Normans introduced into England the fashion of shaving the back of the head from ear to ear, besides clean-shaven face, but by beginning of XII. cent. h. and beard were grown to exaggerated length, while women wore long, thick plaits tied with ribbons and sometimes encased in coloured silks.

The clean-shaven face recurred under the early Lancastrian kings; Henry VII.'s reign was the time of the monstrous *periwig*, and at the close of the XVIII. cent. after the classical revival which came to its height in the First Fr. Empire; Early Victorian side-whiskers were introduced by the Count d'Orsay (*q.v.*). The beard was frequently dyed red in time of Henry VIII. Under Elizabeth the 'cathedral' beard marked out a prelate, the 'spade' or 'stiletto' beard, a soldier. In the modern Brit. army moustaches are *de rigueur*, while naval men are either clean shaven or wear beard and moustache. Short h. for men was introduced in 1521 by Francis I. of France, and h. continued to be fairly short throughout the century. At this time women ceased to wear their h. down their backs, and under Elizabeth the fashion set in of tier over tier of wired rolls, adorned with gems. Long, 'wanton' love-locks were fashionable for men in first half of XVII. cent., calling forth the Puritan Prynne's *Unloveliness of Love-Locks*; and powdered periwigs were worn.

Powder to conceal dust was a necessity of the elaborate modes, which obtained until the Fr. Revolution, when not only did simple head-dress become fashionable, but a powder tax (1795) put an end to this becoming but filthy custom. The 'Roundheads' were distinguishable by their cropped polls. At the Restoration the great periwig came in, and under William III. it culminated and was succeeded by the Ramilie wig (called after the battle of 1706) and the *pigtail* wig. In 1772 the Maccaroni Club was formed, and introduced the *toupée* (h. brushed straight up to great height) with curls at sides and tied with ribbon behind. Women meanwhile, who had cultivated graceful ringlets ('heart-breakers') in late XVII. cent., commenced in XVIII. cent. to use enormous quantities of false h. stuffed with greased wool, pomaded, curled, wired, powdered, sometimes not readjusted for months, and the height grew from beginning of the cent. to the close. Women imitated the masculine *toupée* after 1772, and placed on top plumes and flowers till several feet were added to the stature, while long curls or short puffs adorned the sides of the face. This was the period, too, when grotesque ornaments, carriages, tents, ships, were piled on the h.

Chin. men shave their heads with the exception of one long tuft, which descends from the crown in a pigtail, but since establishment of Chin. Republic pigtails are no longer fashionable. Chin. women plait their h. in pigtail, but Jap. women comb it high above the head and place combs, flowers, fans, etc., in the elaborate erection.

Human h. has high though varying commercial value for sale for wigs, etc. A good quality is obtained from the peasants of Switzerland, Bavaria, and Brittany, a cheaper kind in great quantity from Chin. convicts. Chairs are stuffed with short horse-h.; cloth is woven from long horse-h. and h. of goats, especially the Angora variety. Felt, for roofing and packing for pipes, is manufactured from cow-h. Artists' brushes are made from h. of camel and sable, clothes brushes from hog bristles. Its possession of h. is distinguishing mark of mammal. See also FUR and WOOL.

HAIR-TAIL, small, tapering, tropical fish, with one fin (dorsal); occasional visitor to Cornish coast; genus *Trichiurus*.

HAIR-WORMS, see NEMATODA and NEMATOMORPHA.

HAITI, HAYTI, HAÏTI (17° 37′ to 20° N., 68° 20′ to 74° 28′ W.), second largest island in W. Indies (area, *c.* 29,000 sq. miles), and separated from Cuba (the largest) by the Windward Passage and from Porto Rico by Mona Passage. Capital, Port-au-Prince. H. island is divided into two republics, H. in W. and Santo Domingo in E. REPUBLIC OF H., originally a Fr. colony, was formed, 1804. Language of whites is French; religion is R.C. In 1910 education was made compulsory. It

possesses a small fleet and army. Surface is mountainous, ranges running to both coasts. Highest pt. Loma Tina (*c.* 10,300 ft.). These mountains are covered with pine, oak, and other forests—much valuable timber being produced. Rivers are not navigable. There are many large lakes. Earthquakes are frequent and hurricanes common; climate is hot in low-lying parts. S. Domingo is an important town. Cotton, rice, maize, sugar, coffee are cultivated. H. is rich in minerals, gold, silver, iron, copper, etc., which are as yet undeveloped. H. was discovered by Columbus; aboriginals were speedily exterminated by Spaniards; negroes were introduced, many struggles between blacks and whites resulting.

Government is by Commons (99 members elected for 3 years by community) and Senate (39 members chosen for 6 years by Commons from list drawn up by electors and President). Both chambers choose president for 7 years. Payment of members obtains.

Pop. of republic, *c.* 2,030,000; of island, *c.* 2,500,000. See SANTO DOMINGO.

HAJIPUR (25° 41′ N., 85° 14′ E.), town, Muzaffarpur, Bihar and Orissa, India, on Gandak; has large river trade. Pop. 22,000.

HAJJ, see HADJ, MUHAMMADAN INSTITUTIONS.

HAKE (*Merluccius vulgaris*), fish common in Atlantic and Mediterranean; of predatory habits; member of Cod (*q.v.*) family.

HAKE, EDWARD (fl. 1579), Eng. satirist; author of *Newes out of Paules Churchyarde* (1567), a rhymed satire on social abuses of the time.

HAKE, THOMAS GORDON (1809–95), Eng. poet; sometime engaged in medical profession; associated with the Rossetti circle; his volumes include *New Day Sonnets, Madeline.*

HAKKAS, very ancient native race now dwelling in Formosa and parts of S.W. China.

HAKLUYT, RICHARD (*c.* 1553–1616), Eng. geographer and ecclesiastic; having taken orders, he held several livings and became archdeacon of Westminster (1602). He was early devoted to the study of navigation. He was the intimate friend of Drake, Raleigh, Gilbert, and others. His *Divers Voyages* appeared in 1582; and his monumental work, *The Principal Navigations*, was pub. 1589–1600. He also wrote and trans. several minor works, and his unpublished MSS. were afterwards used by Samuel Purchas in his *Pilgrims.*

HAKODATE (41° 47′ N., 140° 51′ E.), seaport, island Yezo, Japan, on Bay of Hakodate; exports sulphur, dried fish, rice. Pop. 87,875.

HAL (50° 43′ N., 4° 13′ E.), town, on Sienne, Brabant, Belgium; place of pilgrimage. Pop. 13,857.

HALA (25° 48′ N., 68° 27′ E.), town, Hyderabad district, Sind, India; pottery. Pop. 5000.

HALAESA (*c.* 38° N., 14° 15′ E.), ancient town, N. coast of Sicily.

HALBERSTADT (51° 54′ N., 11° 3′ E.), town, Saxony, Germany; XIV.-cent. cathedral; sugar, cigars, machinery. Pop. (1910) 46,397.

HALBERT, HALBERD, military weapon, consisting of an axe-like head, and spike, fixed on a long pole, being a combination of the bill and pike; first used in England in reign of Edward IV.; was commonly employed during reign of Henry VII.; did not fall into disuse until reign of George III.

HALDANE, JAMES ALEXANDER (1768–1851), Scot. preacher; b. Dundee; ed. Edinburgh; entered East India Co.'s service, and rose to be captain; left the sea about 1795 and became an itinerant preacher in Scotland; subsequently (1799) became head of a Congregational body in Edinburgh; in later years adopted Baptist doctrines.

HALDANE, RICHARD BURDON, VISCOUNT H. OF CLOAN (1856–), Brit. statesman; educated Edinburgh and Heidelberg Universities; barrister, (1879); Liberal M.P., East Lothian (1885); Secretary for War (1905–12); Viscount and Lord Chancellor (1912); reorganised army, and created Territorial Force; has written on philosophy; an authority on explosives.

HALDANE, ROBERT (1764–1842), Scot. theologian; served in navy during Fr. war, then devoted himself to religion; helped to form 'Soc. for the Propagation of the Gospel.'

HALDIMAND, SIR FREDERICK (1718–91), Brit. gen. of Swiss birth; entered Brit. military service and served with distinction in America; Gov.-Gen. of Canada (1778–85).

HALE, EDWARD EVERETT (1822–1909), Amer. author and journalist and Unitarian minister; used his realistic style in anti-slavery interest. Short tales, and *Ten Times One is Ten* (1870), *Philip Nolan's Friends* (1876), *Memories of 100 Years* (1902). Complete edit., 10 vols., 1899–1901.

HALE, JOHN PARKER (1806–73), Amer. statesman, Democrat, and pioneer Abolitionist; Free Soil candidate for presidency, 1852; faithfully supported Union and Lincoln.

HALE, SIR MATTHEW (1609–76), famous Eng. judge and chief justice; took no part in Civil War; justice of Common Pleas, 1653; chief baron of Exchequer, 1660; Chief Justice of England, 1671; wrote numerous works on law and history; many of his collected MSS. at Lincoln's Inn library.

HALE, NATHAN (1755–76), Amer. soldier; celebrated for his daring in the Amer. War of Independence; seized as a spy, and hanged.

HALE, WILLIAM GARDNER (1849–), Amer. scholar; author of *The Anticipatory Subjunctive in Greek and Latin, The Sequence of Tenses in Latin*, etc.

HALEBID (13° 13′ N., 76° 2′ E.), village, state of Mysore, S. India; on site of Dorasamudra, ancient Hoysala capital.

HALECIUM, see under HYDROMEDUSÆ.

HALES, JOHN (1584–1656), Eng. author; his political writings include *Declaration of the Succession of the Crowne Imperiall of Inglande, Discourse of the Common Weal*, etc.

HALES, STEPHEN (1677–1761), Eng. physiologist and inventor; curate of Teddington in Middlesex; made investigations in plant and animal physiology and on gases; on treatment of stone in bladder and kidneys; devised a ventilating machine, and a process for distilling sea-water.

HALESOWEN (52° 28′ N., 2° 3′ W.), market town, Worcestershire, England; large iron and steel works. Pop. 4057.

HALEVI, JUDAH BEN SAMUEL (d. 1140), Span.-Hebrew poet; famed for religious poems.

HALÉVY, JACQUES FRANÇOIS FROMENTAL ÉLIE (1799–1862), Fr. composer; real name, Levi; chief operas: *La Juive, Les Mousquetaires de la Reine.* Musical author.

HALÉVY, LUDOVIC (1834–1908), Fr. dramatist and novelist; chiefly associated with Henri Meilhac. They wrote the libretti for operas by Offenbach and Bizet (*La Belle Hélène, La Grande Duchesse de Gérolstein, Carmen*, etc.), *Froufrou*, and other plays. His successful novels include *L'Abbé Constantin* and *La Famille Cardinal.*

HALIAËTUS, SEA-EAGLE, see HAWK FAMILY.

HALIBURTON, THOMAS CHANDLER (1796–1865), Anglo-Canadian humorist; famed for his *Sam Slick* satirical stories; was a Nova Scotian judge; later M.P. for Launceston, England.

HALIBUT (*Hippoglossus vulgaris*), large flat fish of predatory habits, found in N. hemisphere; distinguished by large mouth, right-sided eyes, and narrowness of body; length, 2–5½ ft.; female lays up to five million pelagic eggs.

HALICARNASSUS, modern BUDRUN (37° N., 27° 20′ E.), ancient Gk. city, Caria, Asia Minor, on Ceramic Gulf; site of the world-famous mausoleum, built 352 B.C., fragments of the sculptured decoration of which are now in the Brit. Museum.

HALICHONDRIA, see under SPONGES.

HALICZ (49° 7′ N., 24° 43′ E.), town, on Dniester, Austria-Hungary; salt and soap. Pop. (1910) 4957.

HALIFAX.—(1) (53° 43′ N., 1° 52′ W.) town, on Calder, W. Riding, Yorkshire, England; chief industry is woollen; carpets, cotton, iron, steel are manufactured; good communication with ports at Hull and Liverpool; XII.-cent. church (St. John), Akroyd Museum, Cloth Hall. Pop. (1911) 101,556. (2) (44° 38′ N., 63° 36′ W.) capital, Nova Scotia; terminus of C.P.R. and Intercolonial Railway; machinery, boots and shoes, cotton, woollen goods; harbour one of greatest in the world; seat of Dalhousie Univ., R.C. abp., and Anglican bp.; large sea trade, especially in fish, apples, lumber; suburb, Dartmouth, stands on opposite side of harbour. Pop. (1911) 46,000.

HALIFAX, CHARLES MONTAGU, EARL OF (1661–1715), Eng. politician and poet. Lord of Treasury, 1692; raised loan of £1,000,000, creating National Debt; foundation of Bank of England due to him, 1694; Chancellor of Exchequer, 1694; reformed coinage, 1695; First Lord of Treasury, 1697; auditor of Exchequer, 1699; again First Lord of Treasury, 1714; collaborated with Prior in *Country Mouse and City Mouse.*

HALIFAX, GEORGE MONTAGUE DUNK, 2ND EARL OF (1716–71), Brit. administrator; pres., Board of Trade (1748); Lord-Lieut. of Ireland (1761); accused by H. Walpole of political jobbery.

HALIFAX, GEORGE SAVILE, 1ST MARQUESS OF (1633–95), Eng. politician and author; b. Thornhill, Yorkshire. M.P., 1660; cr. peer, 1667; P.C., 1672; supported Test Act, 1673, and Habeas Corpus Act, 1679; opposed bill excluding James, Duke of York, from succession, 1680; Lord Privy Seal, 1682. Under James II. he became pres. of council in 1685, but shortly afterwards was dismissed from office and from Privy Council; was one of the commissioners sent by James II. to arrange terms with William of Orange; but after king's flight he assumed control of public affairs and transferred his allegiance to the Prince, to whom he offered the crown; held office as Lord Privy Seal in early part of William's reign, but retired in 1690, and died five years later. H. was author of a famous pamphlet entitled *Letter to a Dissenter,* which he wrote in 1687; among his other works are his *Character of King Charles II.* and his *Character of a Trimmer*; in latter he defends and explains his policy of maintaining balance of power between the two political parties of the state, to which the apparent inconsistency of his conduct, and the consequent application to him of the name of trimmer, were due.

Foxcroft, *Life and Letters* (1898).

HALIOTIS, tropical and sub-tropical gasteropod with auricular shell, which is prized for its mother-of-pearl. See ABALONE, GASTEROPODA.

HALKETT, HUGH, FREIHERR VON (1783–1863), Brit. gen.; distinguished in Hanoverian army, in Peninsular War, at Waterloo, and in Dan. War, 1848. Bro., SIR COLIN HALKETT (1774–1856), Brit. gen., served in Hanoverian army.

HALL.—(1) SCHWÄBISCH-HALL (49° 6′ N., 9° 43′ E.), town, Württemberg, Germany; salt-works. Pop. (1910) 9321. (2) BAD-HALL (48° 2′ N., 14° 10′ E.), town, Upper Austria; mineral springs.

HALL, in modern usage is the name given to a mansion; large public building, such as 'Guildhall,' or 'town hall'; large room within a building, used for assemblies, etc.; and the entrance-room of a house. In earlier times it was the principal apartment in a castle, mansion, coll., etc. Fine examples are Westminster H., and Christ Ch., Oxford.

HALL, BASIL (1788–1844), Brit. naval officer; wrote *Voyages and Travels* (1831–40), and other works of travel.

HALL, CARL CHRISTIAN (1812–88), Dan. politician; b. Christianshavn, Denmark; entered Rigsforsamlung, 1848, and became Liberal leader; minister of public worship, 1854; pres. of council, 1857; foreign minister, 1858; failed to establish constitution; retired after succession of Christian IX.; minister of public worship, 1870.

HALL, CHARLES FRANCIS (1821–71), Amer. explorer; commanded the U.S. Polar Expedition (1871); spent several years among the Eskimos, and pub. *Arctic Researches* and *Life among the Esquimaux* (1864).

HALL, CHRISTOPHER NEWMAN (1816–1902), Eng. Nonconformist minister; was a popular preacher and temperance advocate; his *Come to Jesus, The Call of the Master,* and other works had a wide circulation.

HALL, EDWARD (*c.* 1498–1547), Eng. lawyer; wrote 'Hall's Chronicle,' or, more properly, *The Union of the Two Noble Families of Lancaster and York,* invaluable for information about Henry VIII.'s reign; it was completed by Grafton.

HALL, FITZEDWARD (1825–1901), Amer. Orientalist; prof. of Sanskrit, King's Coll., London; edit. the *Vishnupurâna.*

HALL, JAMES (1793–1868), Amer. judge and author; wrote *Legends of the West, The Wilderness and the War-Path, Sketches of the West,* etc.

HALL, JOSEPH (1574–1656), Eng. ecclesiastic and satirist; b. at Ashby-de-la-Zouch; dean of Worcester, 1616; deputy to Synod of Dort, 1627; bp. of Exeter, 1627; supported Laud's ecclesiastical policy; attacked by five Puritans, who wrote under name 'Smectymnuus'; and carried on dispute with Milton. Bp. of Norwich, 1641; imprisoned during Long Parliament, and was expelled from his see, 1643. H. wrote *Virgidemiarum* and other works.

HALL-MARKS, the mark placed on gold or silver articles to indicate the quality of the gold or silver; *e.g.* in the case of gold, a crown and the number 22 indicate that the article is of 22 carat gold, *i.e.* contains 22 parts of gold out of 24. On silver ware the marks of Britannia and a lion *passant* indicate respectively that the articles are of 11 oz. 10 dwt., and 11 oz. 2 dwt. fineness, showing the proportion of pure silver in 1 lb. (=12 oz.) of the metals thus marked. Hall-marks on silver plate were introduced in the XIII. cent. by the Eng. Gild of Gold- and Silversmiths; these were the king's mark, the maker's mark, and the year's mark. In addition, various provincial towns have their own assay marks. The lion *passant* was introduced in 1554; from 1784 to 1890 the sovereign's portrait was used.

HALL, MARSHALL (1790–1857), Eng. physician and physiologist; practised medicine in Nottingham, and later in London; carried out important experiments on nervous system, and introduced new method for resuscitation of the apparently drowned; author of many medical and scientific works.

HALL, ROBERT (1764–1831), Eng. Baptist minister; b. at Arnesby, Leicestershire; wrote *Christianity consistent with the Love of Freedom* (1791), *Apology for the Freedom of the Press* (1793); fine pulpit orator.

HALL, SAMUEL CARTER (1800–89), Eng. journalist; founded *The Art Journal*; his wife was a popular writer of fiction.

HALL, WILLIAM EDWARD (1835–94), Eng. legal writer; famed for his valuable *Treatise on International Law* (1880) and other legal works.

HALLAM, HENRY (1777–1859), great Eng. historian; b. at Windsor; ed. Eton and Oxford; wrote three great works, which are still standard authorities: *View of the State of Europe during the Middle Ages* (1818); *Constitutional History of England from Accession of Henry VII. to Death of George II.* (1827); *Introduction to the Literature of Europe in the XV., XVI., and XVII. Centuries* (1838–39). His s., Arthur Henry H., who d. in 1833, is subject of Tennyson's *In Memoriam.* H. advocated the abolition of slave trade; was elected Fellow of Royal Soc.

HALLAM, ROBERT (d. 1417), bp. of Salisbury, 1407; Eng. representative at Council of Constance,

1414, supporting Conciliar party, deposition of Pope John XXIII., and Church reform.

HALLE-AN-DER-SAALE (52° 5′ N., 8° 22′ E.), town, Prussian Saxony, Germany; cathedral and famous university, founded 1694, 2500 students; salt-works. Pop. (1910) 180,496.

HALLÉ, SIR CHARLES (1819–95), pianist and conductor; b. Hagen (Westphalia); settled in England, 1848; knighted, 1888; m. Norman Neruda, famous violinist.

HALLECK, HENRY WAGER (1815–72), Amer. general and lawyer, possessed brilliant administrative powers, and was a prominent figure during the period of the Civil War; pub. *Elements of Military Art and Science* (1846), *International Law* (1861), and other legal works.

HALLELUJAH, ALLELUIA (Heb. 'Praise the Lord'), exclamation of religious praise or exaltation; *Psalms* 113–118, called H., in R.C. Church, as song of gladness, not used throughout Lent.

HALLER, ALBRECHT VON (1708–77), Swiss anatomist, physiologist, pathologist, botanist, and poet; after wide course of study he practised as physician at Bern, and became prof. of Medicine, Anatomy, Bot., and Surgery at Göttingen (1736), establishing a botanic garden, anatomical museum, school of obstetrics, etc.; returned to Bern as a magistrate; his most valuable researches are in physiology and bot., and he took a prominent part in the literary movement of the time, writing three political romances and descriptive lyrical and other poems.

HALLEY, EDMUND (1656–1742), Eng. astronomer; ed. Queen's Coll., Oxford; stayed at St. Helena, 1676–78; made catalogue of stars of S. hemisphere and arranged them in constellations; discovered (1682) comet which bears his name, and correctly predicted its return in 1759; made astronomer-royal, 1719.

HALLGRÍMSSON, JÓNAS (1807–44), Icelandic lyrical poet; the most prominent figure in the modern lit. of his country.

HALLIDAY, ANDREW (pseudonym for ANDREW HALLIDAY DUFF) (1830–77), Eng. playwright and journalist; noted for Dickens adaptations and light essays.

HALLIWELL-PHILLIPPS, JAMES ORCHARD (1820–89), Eng. scholar; his works include an edit. of Shakespeare (1853–65), *Life of S.* (1848), *Dictionary of Old English Plays* (1860), etc.

HALLOWE'EN (Oct. 31), the Eve of All Saints' Day; usually devoted to merry-making and divination.

HALLSTATT (47° 34′ N., 13° 38′ E.), village, Upper Austria, Austria-Hungary; salt-mining centre.

HALLUCINATION, term applied to a false appreciation of sense impressions, the individual believing that a sense-organ has received an impression from some object which has in reality no physical existence; the h. may involve any of the senses, but most commonly it is auditory or visual, due to the more striking character of such impressions and to the more constant use of the ears and eyes; the h. may, in rare cases, involve two senses. H's may be experienced by certain individuals under conditions of quite normal health and sanity, to which no precise cause can be assigned; they may be experienced under conditions differing but slightly from the normal, as when one or other of the senses has been subjected to a strain, or when the body has been in want of food for a considerable period, or when an individual is under the influence of certain drugs, *e.g.* opium or Indian hemp, or in the transitional state between sleep and waking, or in a state of hypnosis (see HYPNOTISM), or under conditions of intense emotional excitement; they may be experienced when the body or mind is in a diseased condition, as in diseases of the heart, lungs, or abdominal organs, or in delirium tremens, hysteria, or epilepsy, as well as in conditions of more advanced mental disease, melancholia, mania, monomania, and other forms of insanity.

Normally the brain-cells register impressions of objects which they have received from the sense-organs, and these can be recalled by the memory and distinguished from new impressions on the sense-organs; the physiological explanation of h. is that, under the various conditions enumerated above, impressions are called up from the brain-cells where they have been registered, but the mind does not realise that they are old impressions, and they are experienced as new impressions upon the sense-organs. See INSANITY.

Podmore, *Modern Spiritualism* (1902).

HALLUIN (50° 47′ N., 3° 8′ W.), fortified town, Nord, France; textiles. Pop. 16,600.

HALM, CARL FELIX (1809–82), Ger. scholar; famed for critical editions of Cicero and other Lat. authors.

HALMAHERA (1° N., 128° E.), island of the Dutch East Indies, E. of Celebes; area, *c.* 6800 sq. miles; consists of four peninsulas, each traversed by a mountain chain from 3000 to 4000 ft. high, with several active volcanoes; produces sago, spices, cocoa-nuts; belongs in part to the sultanate of Ternate; chief town, Gilolo. Pop. *c.* 100,000.

HALMSTAD (56° 39′ N., 12° 49′ E.), seaport, Sweden, on Cattegat; breweries, cloth manufactures; exports granite. Pop. (1911) 18,297.

HALO, a luminous circle around sun or moon, caused by refraction of light passing through ice-crystals suspended in the atmosphere; true h's are large circles of definite diameters, 45° and 92°, which are seldom both seen together; usually whitish, but occasionally exhibit prismatic colours, red being on inside; smaller coloured circles sometimes seen round the moon are due to diffraction of light by cloud or mist.

HALO, originally a circular metal plate to preserve heads of statues; adopted by Christian artists as symbol of holiness; may be cruciform, square, or stellate, but generally takes form of circle or ring; found also in early Oriental paganism.

HALOGENS are Fluorine, Chlorine, Bromine, and Iodine (*q.v.*). Each forms monobasic gaseous acid.

HALS, FRANS (*c.* 1580–1666), Dutch artist; famed for portraits and genre subjects, in the latter of which he is one of the greatest of Dutch masters. He was particularly successful in dealing with scenes of carousal, depicting laughter, etc. (e.g. *The Laughing Cavalier*). Fine examples of his work are in the galleries of Amsterdam and Haarlem. He was notorious for his drunken and disorderly life. His bro., DIRK H., and his s., FRANS H., THE YOUNGER, were also artists of distinction.

Staley, *Franz Hals* (Masterpieces in Colour).

HALSBURY, HARDINGE STANLEY GIFFARD, 1ST EARL OF (1825–), Brit. Conservative statesman; Lord Chancellor, 1895–1905; M.P. for Launceston, 1877–85; Solicitor-Gen., 1875–80; cr. Baron H., 1885; Earl, 1898; formerly held large criminal practice; was engaged in Tichborne trial; gave judgment in House of Lords (1904) in the appeal of Scot. Free Church against the Scot. U.F. Church; led extreme 'Die-Hard' party in Lords against Parliament Bill.

HALSTEAD (51° 57′ N., 0° 39′ E.), market town, on Colne, Essex, England; silk and crape mill. Pop. (1911) 6265.

HAM (49° 45′ N., 3° 2′ E.), town, Somme, France; noted mediæval castle. Pop. 3300.

HAM, one of the sons of Noah (*Genesis*), founder of the Hamitic race, including the Ethiopians, Egyptians, and others.

HAMADAN (34° 55′ N., 48° 20′ E.), town, Persia, near foot of Mt. Elvend; important entrepôt of trade; extensive manufactures of leather; contains tomb of Avicenna, and another, said to be that of Mordecai and Esther; occupies site of ancient *Ecbatana.* Pop. *c.* 40,000.

HAMAH, or HAMATH, famous Hittite city, referred to in Bible, situated on the Orontes, about 100 miles from Damascus; conquered by the Assyrians, VIII. cent. B.C.

HAMANN, JOHANN GEORG (1730–88) Ger. philosopher, 'Wizard of the North'; friend of Kant, Herder, Jacobi; distinguished by originality of mysticism; defended specific dogmas of Christianity, which is not credible without its mysteries; held that Christian tenets are not to be proved, but inwardly experienced.

HAMAR (60° 44′ N., 11° 14′ E.), small town, on Lake Mjösen, S. Norway; breweries, iron foundries. Pop. 6046.

HAMĀSAH, a collection of brief Arabian poems, compiled by Abū Tammām (807–32). The poems, which deal with fortitude, valour, and other virtues, number about 880, and are taken from the works of native poets from the earliest times down to the compiler's own period. The literary value of the collection is considerable. Eng. trans. (selections) by Sir Charles Lyall (1885).

HAMBURG (53° 33′ N., 10° E.), free city and state, Germany, on north branch of Elbe; second largest city of Ger. Empire; greatest seaport and commercial town on Continent. The old town is intersected by canals (Fleete) and is surrounded by fine shaded promenades. To N. lie two wide sheets of water, the Binnen- and Aussen-Alster, separated by Lombard's Brücke; fashionable quarter surrounds Binnen-Alster. Docks on both sides of river cover huge area; part of harbour is a free port. H. trades chiefly with Britain and America, also with Scandinavian, Russ., S. Amer., Eastern, and other ports; chief imports are sugar, tea, coffee, chocolate, lard, rice, wine, herrings, skins, leather, wax, hemp, tobacco, jute, indigo, oils, rubber, coal; chief industries, food-stuffs, breweries, shipbuilding (including warships), ironworks, machinery, chemicals, furnitdre, musical and scientific instruments, and factories where above imports are treated. Little of mediæval H. survives owing to great fire, 1842. Among chief buildings are St. Peter's, St. Nicholas, St. Michael's churches, Rathaus, Kunst-halle, museums, etc. H. has important schools of navigation and commerce, and world-famous Zoological Garden. A Univ. is projected (1913). H. was founded by Charlemagne, 808; in mid-XIII. cent. formed Hanseatic League with Lübeck and Bremen; made free imperial city, 1510; joined Deutscher Bund, 1815; Nord-Deutscher Bund, 1866; Ger. Empire, 1871; and Zollverein, 1888; great cholera plague, 1892. H. State (area, 60,000 sq. miles) is a republic governed by Senate and House of Burgesses; sends one member to Bundesrat, three to Ger. Reichstag. Pop. (1910), city, 932,116; state, 1,014,664. Fulke, *Hamburg* (1908).

HAMDĀNĪ (d. X. cent.), Arabian geographer; wrote a *Geography of the Arabian Peninsula*.

HAMELIN, FRANÇOIS ALPHONSE (1796–1864), Fr. admiral and naval administrator; was engaged in bombardment of Sebastopol (1854); as Minister of Marine was responsible for construction of the first ironclad, *Gloire*, launched 1859.

HAMELN (52° 7′ N., 9° 21′ E.), town, Hanover, Prussia; formerly fortified; many quaint buildings associated with legend of the Pied Piper; iron- and paper-works. Pop. (1910) 22,054.

HAMERLING, ROBERT (1830–98), Austrian poet; wrote *Der König von Sion*; *Danton und Robespierre* (drama).

HAMERTON, PHILIP GILBERT (1834–94), Eng. artist and author; wrote *Etching and Etchers*, *The Intellectual Life*, and numerous other works of art criticism.

HAMI, KHAMIL, or KOMUL (42° 45′ N., 93° 30′ E.), town, Eastern Turkestan; important trading centre. Pop. 6000.

HAMILCAR BARCA (d. 228 B.C.), Carthaginian general; maintained Carthaginian rule against Romans in Sicily, 247–241; opposed Romans in Spain, *c.* 236–228; great military genius; f. of Hannibal.

HAMILTON (53° N., 60° W.), river, Labrador, Canada; flows into the Atlantic through Hamilton inlet.

HAMILTON.—(1) (43° 16′ N., 79° 57′ W.) city, port of entry, Ontario, Canada, on Burlington Bay, Lake Ontario; seat of an Anglican and of a R.C. bp.; various educational institutions; important railway centre and head of navigation; centre of fruit and grain-producing region; extensive manufactures of iron implements; cotton and woollen goods. Pop. (1911) 81,969. (2) (55° 47′ N., 4° 3′ W.) town, on Clyde, Lanarkshire, Scotland; near it is Hamilton Palace, a seat of the Duke of Hamilton; in neighbourhood are remains of ancient castle of Cadzow; chief industry, coal and iron mining. Pop. (1911) 38,644. (3) (37° 45′ S., 142° 1′ E.) town, Victoria, Australia; has fine racecourse; is centre of agricultural and pastoral district. Pop. (1911) 4900. (4) (39° 20′ N., 84° 12′ W.) city, Ohio, U.S.A., on Great Miami; paper and flour mills; iron foundries. Pop. (1910) 35,279. (5) (42° 48′ N., 75° 34′ W.) city, New York, U.S.A., on Chenango; seat of Colgate Univ. (Baptist); canneries, woollen industries. Pop. 4000. (6) (32° 10′ N., 64° 51′ W.) capital of the Bermudas.

HAMILTON, Scot. family, descended from Walter Fitz-Gilbert, a supporter of Bruce who was granted barony of Cadzow in return for his services; his s. David was captured at Neville's Cross, 1346, and was founder of chantry in Glasgow Cathedral, 1361. In 1445 Sir James H. of Cadzow became Lord H., and in 1503 his s. James was cr. Earl of Arran. The second Earl of Arran was tutor to Mary, Queen of Scots, for whom his eldest s. James was proposed as husband. James afterwards lost his reason, and his brother John, as head of family, became 1st Marquess of H. in 1599; he was accused of share in murder of Regents Lennox and Murray.

JAMES, 1ST DUKE OF HAMILTON (1606–49), 3rd marquess, obtained dukedom in 1643; served under Gustavus Adolphus, 1631; took part in disputes between Charles I. and Covenanters, and went to Scotland with the king in 1641; for a short time he deserted the Royalist cause and threw in his lot with Argyll, but was subsequently restored to favour. In 1648 he commanded Scots army in England in support of king, but was defeated and captured at Preston, and executed in the following year. WILLIAM, 2ND DUKE (1616–51), Royalist in Civil War, was mortally wounded at Worcester. JAMES, 4TH DUKE (1658–1712), opposed Union of Parliaments. JAMES, 6TH DUKE, m. Elizabeth Gunning. Present duke (13th) succ. 1895. Dukes of Abercorn are cadet branch of H. family, and Earls of Haddington also came from Walter FitzGilbert.

HAMILTON, ALEXANDER (1757–1804), Amer. statesman and writer; b. in Nevis Island, W. Indies; entered business, 1769, but afterwards went to coll. at New York; on outbreak of Amer. War of Independence he wrote under pseudonym two political pamphlets of extraordinary talent, and soon afterwards received commission as captain of artillery; acted as Washington's aide-de-camp, 1777–81; distinguished himself in field, 1781. Entering Congress, 1782, he took part in deliberations which culminated in the organisation of federal constitution. H. accepted office as Sec. of Treasury under Washington in 1789, and displayed great financial talent; established a National Bank and reorganised tariff on protective basis; retired from office in 1795. In 1798 H. was once more in the field, holding command, under Washington, of army, which had been called out from fear of Fr. invasion; after Washington's death in 1799 he became commander-in-chief of the army, and one of leaders of Federalist party. He subsequently quarrelled with the other leader, John Adams (*q.v.*), and their dispute contributed to the downfall of the party. In 1804, a duel was forced upon him by Aaron Burr; he was mortally wounded and died next day. H. was author of *The Federalist*, a series of brilliant essays on constitutional law of America; and *Report on Manufactures*, a celebrated economic treatise which is still quoted by advocates of protective tariff.

Oliver, *Alexander Hamilton* (1906).

HAMILTON, ANTHONY (1646–1720), Fr. author;

grandson of Earl of Abercorn; exile in France; famous for *Mémoires* of his bro.-in-law, Comte de Gramont.

HAMILTON, ELIZABETH (1758–1816), Brit. author; wrote *The Cottagers of Glenburnie* (1808), and several educational and hist. works.

HAMILTON, EMMA, LADY (c. 1765–1815), was the humbly born and beautiful wife of Sir William H., ambassador at Naples; principally remembered as mistress of Nelson; subject of many pictures by Romney; d. in poverty at Calais; *Life*, by Sichel.

HAMILTON, GAIL, pseudonym of MARY ABIGAIL DODGE (c. 1830–96), Amer. author; wrote *Woman's Wrongs* (1868), etc.

HAMILTON, SIR IAN STANDISH MONTEITH (1853–), Brit. soldier; General Officer Commanding-in-Chief Mediterranean and Inspector-General Oversea Forces since 1910.

HAMILTON, JAMES (1769–1831), Eng. teacher of languages; discarded grammar and used an interlinear word-for-word trans.; method is explained in his *Principles, Practices, and Results of the Hamilton System* (1829).

HAMILTON, JOHN (c. 1511–71), Scot. ecclesiastic; was abp. of St. Andrews; hanged, at Dumbarton, for complicity in the Darnley murder.

HAMILTON, PATRICK (1504–28), Scot. theologian; became Prot., meeting Luther and other reformers; on his return to Scotland burnt as a heretic.

HAMILTON, ROBERT (1743–1829), Scot. political economist, whose *National Debt* threw new light on problems of finance.

HAMILTON, THOMAS (1789–1842), Scot. author; wrote *Annals of the Peninsula Campaign* (1829).

HAMILTON, WILLIAM (1704–54), Scot. Jacobite and poet; wrote *The Braes of Yarrow*.

HAMILTON, SIR WILLIAM (1730–1803), Brit. diplomatist and antiquarian; envoy at Naples; his wife became the mistress of Lord Nelson.

HAMILTON, SIR WILLIAM, Bart. (1788–1856), Scot. philosopher; ed. Balliol Coll., Oxford; called to Scot. Bar, 1813, but devoted most of his time to learning and research; app. prof. of Civil History at Edinburgh, 1821, and of Logic and Metaphysics, 1836; pub. *Philosophy of the Unconditioned*, 1829; edit. Reid's works, 1846, and *Discussions in Philosophy, Lit., and Education*, 1852–53; thought Logic purely formal; a follower of Aristotle, and widely read in philosophy, lit., and science.

HAMILTON, SIR WILLIAM ROWAN (1805–65), Scot. mathematician; b. Dublin; brilliant linguist and mathematician. H. gained highest honours at Trinity Coll., Dublin, and was appointed (1827) prof. of Astronomy there, and astronomer-royal; knighted, 1835; pres. of Royal Irish Academy, 1837; made contributions to the higher branches of mathematics; famed chiefly for his invention of the calculus of quaternions; wrote *Lectures on Quaternions*, and *Elements of Quaternions*. Other works include *General Method in Dynamics, Algebra as the Science of Pure Time, Memoirs on Discontinuous Functions*.

HAMIRPUR (25° 58′ N., 80° 11′ E.), town, capital of H. district, Allahabad, Brit. India; at junction of Betwa and Jumna; cotton and grain. Pop. 7000.

HAMITIC LANGUAGES AND PEOPLES.—HAMITIC LANGUAGES are agglutinative or inflectional, and are generally grouped as the Ancient Egyptian, N. African, and Ethiopian or Cushite languages; of these the first are still represented by liturgy of Coptic Church, second by modern Berber dialects, and third by tongues spoken in Abyssinia and elsewhere.—HAMITIC PEOPLES are generally classed as belonging to Caucasian family; include Berbers of N. Africa, Ethiopians, Egyptians, and other races. They are generally dark in complexion and of fine physique. See RACES OF MANKIND.

HAMLET.—The story of Shakespeare's great tragedy is derived from the Lat. history of Denmark by Saxo Grammaticus (end of XII. cent.), first printed at Paris, 1514. It was subsequently included in François de Belleforest's *Histoires Tragiques* (1570). An Eng. trans. from this source later appeared under title of *The Historie of Hamblet*, and this served as foundation of a play which was popular on London stage c. 1589. Shakespeare's version was produced c. 1601–2.

HAMLEY, SIR EDWARD BRUCE (1824–93), Eng. gen. and author; served in Crimean and Egyptian Wars; pub. *The Operations of War* (1866), *The War in the Crimea* (1891), and some novels.

HAMLIN, HANNIBAL (1809–91), vice-pres. of U.S.A. during Civil War; took prominent part in Emancipation measures.

HAMM (51° 40′ N., 7° 50′ E.), town, Westphalia, Prussia, on Lippe; iron foundries, wire-works; thermal baths; ancient capital of Mark. Pop. (1910) 43,658.

HAMMĀD AR-RĀWIYA (fl. VIII. cent. A.D.), Asiatic who made collections of Arabian antiquities.

HAMMER, tool consisting of a steel head, fixed generally on a wooden shaft, and used for striking purposes. The powerful 'steam-hammer,' now largely used in engineering works, was invented by James Nasmyth, about 1840.

HAMMER, FRIEDRICH JULIUS (1810–62), Ger. author; wrote dramas, novels, and moral poems.

HAMMERBEAM, in arch. name given to short horizontal beam, or cantilever, projecting from wall, and serving as support to Gothic timber roof. The roof in Westminster Hall is fine example of h. roof.

HAMMERFEST (70° 40′ N., 23° 30′ E.), seaport town, Norway, on island of Klavö; the most northerly town in Europe; exports fish, fish-oil, hides, and down.

HAMMER-HEAD, see under SHARKS AND DOG FISHES.

HAMMER-PURGSTALL, JOSEPH, FREIHERR VON (1774–1856), Austrian Orientalist; voluminous translator and edit. of hist. and literary works from the Arabic, Turkish, and Persian.

HAMMERSMITH (51° 29′ N., 0° 14′ W.), borough, Middlesex, England; on N. side of Thames, forming part of W. London. Pop. (1911) 121,603.

HAMMER-THROWING, an athletic exercise which has been popular in England, Scotland, and Ireland from very early times. By modern rules a hammer weighing about 16 lb. is thrown from a restricted circle; greatest distances thrown range from about 120 to 176 ft.

HAMMER-TOE, condition in which a toe, usually the second, is bent so that the interphalangeal joint projects and is subjected to pressure by the boot, accompanied by considerable pain and corn forming. It is treated by excision of the joint, so that toe lies flat.

HAMMOND (41° 37′ N., 87° 30′ W.), city, Indiana, U.S.A., on Calumet; meat-packing and iron industries. Pop. (1910) 20,925.

HAMMOND, HENRY (1605–60), Eng. ecclesiastic; held various appointments during reign of Charles I., by whom he was greatly esteemed; author of a *Practical Catechism* (1644).

HAMMURABI, see BABYLONIA (LAW).

HAMON, JEAN LOUIS (1821–74), Fr. painter who revived Renaissance detail, etc., in painting.

HAMPDEN, JOHN (c. 1595–1643), Eng. politician; entered Parliament, 1621; chiefly famous for his refusal to pay ship-money (*q.v.*) in 1637; his trial before Court of Exchequer resulted in judgment against him, 1638. He was a determined opponent of Charles I., and a member of Short and Long Parliaments; had share in prosecution of Strafford; was one of five members impeached by Charles in 1642. On outbreak of Civil War he raised troops for Parliament; mortally wounded at Chalgrove Field, 1643.

HAMPDEN, RENN DICKSON (1793–1868), Eng. ecclesiastic; Bp. of Hereford (1847); author of *Christ and the Spirit, Fathers of Greek Philosophy*.

HAMPDEN, VISCOUNTY OF, ROBERT LORD TREVOR, great-great-grandson of John Hampden; cr. viscount, 1776; title extinct, 1824; HENRY BOUVERIE WILLIAM BRAND became 1st viscount of 2nd creation, 1884, after serving as speaker of House of Commons from 1872; first to use 'Closure'

(1881); grandson, Thomas Walter Brand, is 3rd viscount.

HAMPDEN-SYDNEY (37° 15′ N., 78° 28′ W.), village, Virginia, U.S.A.; seat of Hampden-Sydney Coll. (Presbyterian).

HAMPOLE, RICHARD ROLLE DE, see ROLLE.

HAMPSHIRE, SOUTHAMPTON, HANTS (51° N., 1° 30′ W.), county, S. England; bounded N. by Berkshire, W. by Dorset and Wiltshire, S. by Eng. Channel, E. by Surrey and Sussex. Isle of Wight, separated from mainland by Solent and Spithead, is included in county. On coast are Portsmouth Harbour, Southampton Water, Christchurch and Poole Bays; inland are fertile valleys, hills, and woods; crossed by Downs, highest points being Inkpen Beacon and Sidown Hill. W. of Southampton Water is New Forest; remains of forests also at Bere, Woolmer, and Waltham Chace. Principal rivers, Lymington, Test, and Itchen, abound in trout.

Chief towns: Southampton (one of chief ports in kingdom), Portsmouth, Winchester, Christchurch, Lymington, and Romsey; seaside resorts at Bournemouth, Milford, Southsea; and in Isle of Wight, Cowes, Ryde, Ventnor, and Newport; Aldershot, military training centre. Sheep, cattle, and horse-rearing, fishing, shipbuilding, brewing, tanning are carried on. Most notable places of interest are Winchester Cathedral, Netley and Beaulieu Abbeys, St. Denys Priory, castles of Hurst and Porchester, besides numerous beautiful mansions and many interesting churches. Isle of Wight contains Carisbrooke Castle and Quarr Abbey. Pop. 916,000.

Hampshire, in Victoria County Histories.

HAMPSTEAD (51° 33′ N., 0° 11′ W.), a N.W. district and residential suburb of London; associated with the names of Pope, Keats, Shelley, and many other men-of-letters; H. Heath is a popular pleasure-ground. Pop. (1911) 85,510.

HAMPTON.—(1) (37° N., 76° 26′ W.) city, Virginia, U.S.A., at mouth of James River; contains Hampton Normal and Agricultural Institute (for coloured pupils); ships fish and oysters. Pop. (1910) 5505. (2) (51° 25′ N., 0° 24′ W.) village, Middlesex, England, on Thames; *Hampton Court*, a former royal residence, contains a fine gallery of paintings. Pop. (1911) 9221.

HAMPTON ROADS (37° N., 77° W.), channel between Old Point Comfort and Sewell's Point, through which James, Nansemond, and Elizabeth Rivers enter Chesapeake Bay. Fortress Monroe and fortified island of Rip Raps guard entrance from bay. Important commercial highway and chief centre of U.S. navy. Scene of naval battle (1862) between Federal warship *Monitor* and Confederate *Virginia*; first encounter in history between ironclads.

HAMPTON, WADE (1818–1902), Amer. soldier; founder of 'Hampton's Legion,' which took part in the first battle of the *Bull Run* on Confederate side; served at *Gettysburg* and elsewhere; gov. of S. Carolina (1877–79).

HAMSTER, a member of MOUSE FAMILY (*q.v.*).

HANAPER, old name for wicker basket in which chancery documents were kept; the modern word 'hamper' is a corruption.

HANAU (50° 9′ N., 8° 55′ E.), town, Hesse-Nassau, Prussia, on Main; gold and silver work; diamond-cutting; scene of defeat of Bavarians by French, 1813. Pop. (1910) 34,411.

HANBAL, AHMED IBN (780–855), Eastern scholar and ascetic; writer on Koran; founded *Hanbalite* school, one of the four orthodox sects.

HANBURY, WILLIAMS, SIR CHARLES (1708–59), Brit. diplomatist; was a member of Parliament, and employed in various diplomatic missions abroad; celebrated as a wit and writer of light verse; committed suicide.

HANCOCK (47° 8′ N., 88° 34′ W.), city, Michigan, U.S.A., on Portage Lake; copper mines; machinery. Pop. (1910) 8981.

HANCOCK, JOHN (1737–93), Amer. statesman; leader in refusal of customs duties before Amer. revolution; took initiative in Massachusetts opposition to Britain.

HANCOCK, WINFIELD SCOTT (1824–86), Amer. soldier, distinguished in Civil War at Williamsburg, Antietam, Fredericksburg, Chancellorsville; rendered notable service at Gettysburg, receiving serious wound; outstanding in subsequent campaigns; major-general, 1866; commander of fifth division, 1867; unsuccessful as Democratic candidate for presidency, 1880.

HAND, see SKELETON.

HANDCUFFS, pair of articulated steel bracelets, self-locking, fastened to each other by a chain. Used to secure prisoner; not applicable to prisoner on suspicion unless he behaves violently or attempts escape.

HANDEL, GEORGE FREDERICK (1685–1759), Anglo-Ger. composer; b. Halle; showed musical precocity from earliest childhood; first teacher—Zachau, organist; app. organist at Schloss and Domkirche, and studied law at Univ. of Halle, 1695; joined opera orchestra, Hamburg, 1703; visited Italy, 1709, where he became friend of Scarlatti and Corelli; app. *capellmeister*, Hanover, 1710. H. twice visited England, 1711–15; offended Elector of Hanover, but on latter's accession as George I. became reconciled by writing *Water Music* in king's honour; director of music to Duke of Chandos, 1718; directed Ital. Opera for Royal Academy of Music, London, 1720, which eventually failed; settled in England, becoming naturalised, 1726; lost eyesight towards end of life.

H. was a man of independent and upright character and artistic temperament, loving pictures as well as music; a good friend, although possessed of violent temper. He was one of the finest organ and harpsichord players of his time. The energy and rapidity with which he worked was remarkable; one opera (*Rinaldo*) was written in fourteen days, and *The Messiah* in three weeks. His name will always be associated with oratorio, and he is the undisputed master of choral music. On England he exercised the greatest influence. H. founded no school. Among best works are: Operas—*Almira*, *Nero*, 1705; *Daphne*, *Florinda*, 1708; Latin Psalms—*Dixit Dominus* and *Laudate Pueri*; oratorios—*Resurrezione* and *Il Trionfo del Tempo*; *Utrecht Te Deum*, 1713; *Concerto in F*, 1715; *Passion* Oratorio, 1716. To Eng. period belong over forty operas no longer performed, and his greatest oratorios—*Chandos Anthems*, 1718–20; *Saul*, *Israel in Egypt*, 1738; *Samson*, *Messiah*, 1741; *Joseph*, 1743; *Judas Maccabæus*, 1746; *Joshua*, 1747; *Jephtha*, 1751.

Streatfeild, *Life* (1909).

HANDFASTING was in O.E. period a betrothal. Later, in Scotland, it was a loose marriage-contract lasting for a year and a day only.

HANDICAPPING, the putting of competitors in a game or contest upon an equality, by imposing penalties upon the more powerful or skilful. Time allowances, based upon tonnage and sail area, are granted in a yacht race, and in a motor-car speed trial upon weight and horse-power.

HANDSEL, term with three significations: a personal gift; part-payment; the first money of the week taken in the way of trade.

HANDSWORTH.—(1) (52° 30′ N., 1° 57′ W.) N.W. suburb of Birmingham, England. Pop. (1911) 68,618. (2) (53° 22′ N., 1° 23′ W.) urban district, Yorkshire, England; 4 miles S.E. of Sheffield; extensive collieries and quarries. Pop. (1911) 14,199.

HANDWRITING, see PALÆOGRAPHY and WRITING.

HANG-CHOW-FU (30° 20′ N., 120° 10′ E.), city, port, Che-Kiang, China, on Tsien-Tang River; centre of silk manufacture; opened to foreign commerce in 1896. Pop. *c.* 400,000.

HANGING, the method of execution employed in Great Britain and her colonies as punishment for capital offences. As the penalty for homicide it has been employed in England from very early times.

Thieves and pirates were hanged in chains, *i.e.* gibbeted —down to a comparatively recent period. The bodies were left hanging until they gradually decayed away. Hanging in chains was discontinued after 1832, and the last public execution took place in 1868. Executions are now carried out within prison walls, in the presence of the sheriff and other officials. After death, the body of the criminal is buried in quicklime.

HANGING GARDENS, see BABYLON, SEVEN WONDERS OF THE WORLD.

HANGO (59° 47′ N., 22° 59′ E.), seaport, Finland, on Gulf of Finland; exports wood and fish. Pop. 3600.

HANKOW (30° 30′ N., 114° 20′ E.), city, river-port, Hu-peh, China, on Han, at junction with Yang-tze-Kiang; harbour accessible to ocean steamers; large transit trade; chief export, tea. Pop. *c.* 900,000.

HANLEY (53° 2′ N., 2° 12′ W.), town, Staffordshire, England; extensive potteries; coal and iron mines; united to Stoke-on-Trent, 1910.

HANNA, MARCUS ALONZO (1837–1904), senator of U.S.A.; important financier; chief supporter of Republican party under M'Kinley; one of founders of National Civic Federation, 1901.

HANNAY, JAMES (1827–73), Scot. author; wrote *Satire and Satirists* (1854); two nautical novels, and other works.

HANNIBAL (*c.* 247–183 B.C.), great Carthaginian general, who provoked, controlled, and carried on the second Punic War, also known as Hannibalic War, against Rome; s. of Hamilcar Barca (*q.v.*). H. took Saguntum in 218, after which he marched from Spain across Pyrenees into Gaul, followed Rhône, and led his troops over Alps into Italy in space of five months; maintained war for fifteen years; won great victories at Trasimene Lake, 217, and Cannæ, 217; took Tarentum, 212; failed to capture Rome, 211; he was at last compelled to withdraw to Carthage, and was finally defeated by Scipio at Zama, 202 B.C. H. poisoned himself, 183 B.C., to prevent his being surrendered to Romans. See PUNIC WARS.

Morris, *Life.*

HANNIBAL (39° 40′ N., 91° 24′ W.), city, Missouri, U.S.A., on Mississippi; exports lumber, agricultural produce; flour-mills, tobacco factories. Pop. (1910) 18,341.

HANNINGTON, lake, Brit. East Africa; named after Bp. James Hannington.

HANNINGTON, JAMES (1847–85), Eng. missionary; first bp. of Equatorial East Africa. In 1885, whilst trying to discover a new route from Mombasa to Lake Victoria Nyanza, he was seized by Mwanga, king of Uganda, and murdered.

HANNO (V. cent. B.C.), Carthaginian navigator; author of *Periplus,* an account of his travels.

HANNO 'THE GREAT' (III. cent. B.C.), Carthaginian general, leader of the aristocrats, and opposed to Hamilcar.

HANOI, capital, Tonkin, Fr. colony (1873); native industries. Pop. *c.* 105,000.

HANOTAUX, ALBERT AUGUSTE GABRIEL (1853–), Fr. statesman and author; Foreign Minister, 1894–98; wrote *Histoire du Cardinal de Richelieu* (1893–1903); member of *Académie française.*

HANOVER (52° 30′ N., 9° E.), province of Prussia, surrounded by North Sea, Holstein, Mecklenburg-Schwerin, Saxony, Brunswick, Hesse-Nassau, Westphalia, Lippe, Pyrmont, and Netherlands; area, 148,338 sq. miles; traversed by Harz Mountains (*q.v.*) in S.E.; remainder forms part of great N. Ger. plain, covered with moor and immense stretches of heath, such as Lüneburger Heide; chief rivers, Elbe, Weser, Ems, Leine; traversed by numerous canals; principal towns, Hanover (capital), Hildesheim, Osnabrück, Göttingen (with univ.), Borkum, and Norderney (famous watering-places), rich agriculture; also coal, salt, silver, copper, iron-ore, lead, pottery, asphalt, flax, tobacco, etc., famous poultry-rearing (especially geese).

Ernst August of Brunswick became elector of H., 1692, and was succ. by his s. George Ludwig, who became George I. (*q.v.*) of England, 1714; the union of Britain and Hanover under the Guelphs lasted until Queen's Victoria's accession, 1834, when H. passed to Ernst August (Duke of Cumberland), bro. of William IV. H. sided with Austria during Austrian War of Succession (1727), with Prussia during Seven Years War, and against Fr. Republic, 1793. H. was made a kingdom by Congress of Vienna, 1814; joined Zollverein, 1854; sided with Austria against Prussia, 1866; Hanoverians forced to capitulate at Langensalza, and H. annexed to Prussia, 1866; purest German spoken in H. Pop. (1910) 2,942,436.

Ward, *Great Britain and Hanover.*

HANOVER, HANNOVER.—(1) (52° 22′ N., 9° 44′ E.) town, Prussia, capital of H. province, on Leine; fine parks and suburbs, picture galleries, museums, stately town hall, public and royal libraries, large theatre, state palace with magnificent internal decorations and valuable art collection; manufactures—hardware, chemicals, machinery, linen, cloth, pianos, tobacco; became ducal residence, 1641. Pop. (1910) 302,384. (2) (38° 44′ N., 85° 27′ W.) town, Indiana, U.S.A., on Ohio; seat of Hanover Coll. (Presbyterian), founded 1833. (3) (43° 43′ N., 72° 11′ E.) town, New Hampshire, U.S.A., on Connecticut River; seat of Dartmouth Coll. (1770), agricultural district. (4) (39° 50′ N., 77° W.) town, Pennsylvania, U.S.A.; manufactures machinery, wagons. Pop. (1910) 7057.

HANRIOT, FRANÇOIS (1761–94), Fr. revolutionist; commander of the Commune forces in Paris; associated with the fall of Robespierre, with whom he was guillotined.

HANSARD, LUKE (1752–1828), Eng. printer; printed the *Journals of the House of Commons* (1774–1828); highly esteemed by Burke and Johnson. Since his time the printed records of parliamentary debates, etc., have been known as 'Hansards.'

HANSEATIC LEAGUE, confederation of N. German towns, formed in XIII. cent. for mutual protection and for promotion of commercial privileges; exercised great influence in Europe for more than two cent's, and at one time included ninety free cities, of which most important were Lübeck, Hamburg, and Bremen, these three being still known as Hanse towns. The first confederation was formed early in XIII. cent. at Wisby, which for some years remained centre of Baltic trade, but was eventually superseded by Lübeck. Lübeck and Hamburg were united for trading and protective purposes from 1241 onwards; in 1252 they received certain privileges from Flanders, and in 1266–67 were allowed to establish their own associations in London. Early in XIV. cent. the confederation obtained important concessions from Bruges, and at later date from Bergen; in this cent. also it came into conflict with Waldemar of Denmark, who was defeated; war ended with treaty of Stralsund, 1370, by which League gained increase of power. Its importance began to decline in the XV. cent.; waged war against Holland without success in first half of this cent., hostilities ending with treaty of Copenhagen in 1441. In following cent. it waged unsuccessful war against Norway and Sweden, and by 1670 had ceased to exist.

Sartorius, *Geschichte des hanseatischen Bundes* (1802–8).

HANSEN, PETER ANDREAS (1795–1874), Dan. astronomer; Director of Seeberg observatory, Gotha; revised lunar theory; results embodied in *Nautical Almanac.*

HANSI (29° 6′ N., 76° E.), town, Hissar district, Punjab, India. Pop. 15,000.

HANSOM, JOSEPH ALOYSIUS (1803–82), Eng. inventor and architect; b. York; invented (1834) the Patent Safety Cab which bears his name; founded (1834) *The Builder* journal; was extensively employed throughout the kingdom as architect.

HANTHAWADDY (17° N., 96° E.), district, Lower Burma, India; constituted a separate district

in 1880; capital, Rangoon. Area, 3023 sq. miles. Pop. 484,811.

HANUMAN (Hindu myth.), monkey god who bridged the distance between India and Ceylon to aid Rama when searching for his wife, Sitá; hero of *Rámáyana*.

HANWAY, JONAS (1712–86), Eng. philanthropist; wrote account of his travels in the East (1753); introduced the umbrella into England; responsible for many social reforms.

HANWELL (51° 31′ N., 0° 20′ W.), parish, Middlesex, England. Pop. (1911) 19,131.

HAPARANDA (65° 52′ N., 24° 3′ E.), town, Norbotten, Sweden, at head of Gulf of Bothnia.

HAPLOCERUS, Rocky Mountain goat.

HAPLODRILI, a small group of regularly segmented marine worms, of extremely simple structure, occurring in coastal mud; larvæ free swimming and ciliated, and live at ocean surface; setæ or bristles, characterising the remaining *Chætopoda*, are entirely wanting in this group.

HAPSBURG, or HABSBURG, Ger. noble family, deriving name from castle of H. on Aar, built about 1020. Rudolph of H., who became Holy Rom. emperor in 1273, acquired Austria in XIII. cent.; his descendants held Empire at various times, and from 1438 the imperial title remained practically hereditary in House of H. Family was remarkable for its continuous acquisition of territories in the east; annexed Styria, Carinthia, Tyrol; and Bohemia and Hungary were both subject to it for some time. Practice of subdivision frequently weakened family, but all their dominions were reunited under Frederick III. and his s., Maximilian. Latter married Mary of Burgundy, 1477, and established his family as great European power. In reign of Charles V. Spain was united to Empire; when he abdicated, 1556, it was transferred to his s., Philip, while the Empire passed to his bro., Ferdinand. Family thus divided into Span. (elder) and Austrian (younger) branches. Span. line became extinct with death of Charles II. of Spain in 1700; Austrian H's claimed throne, but war with France resulted in its passing to Bourbons. Austrian H's were founded by Ferdinand I.; lands were divided among his sons at his death, but were reunited under Ferdinand II., 1619. Male line became extinct with death of Charles VI. in 1740; he had previously issued document known as Pragmatic Sanction, securing succession to his dau., Maria Theresa. She married Francis of Lorraine, who became emperor in 1745. Henceforth Hapsburg-Lorraine family were Holy Rom. emperors till 1806, since when they have been emperors of Austria.

Gilbert-Smith, *Cradle of Habsburgs* (1907).

HAPUR (28° 43′ N., 77° 50′ E.), town, Meerut, United Provinces, Brit. India; exports sugar, cotton, grain. Pop. 15,000.

HARA-KIRI, method of suicide by disembowelment, formerly common in Japan amongst the higher ranks. This was done by a self-inflicted cut across the abdomen with a dagger, followed by a sword stroke by another hand, which severed the head from the body. As an obligatory act it was abolished in 1868. On the day of the Jap. emperor's burial, 1912, General Nogi and his wife committed hara-kiri.

HARALD I., HAARFAGER (850–933), king of Norway; won battle of Hafrsfjord, 872, and conquered whole of Norway.

HARALD III., HAARDRAADA (1015–66), king of Norway; fought against Saracens; after succeeding to Norwegian throne he tried to conquer Denmark, but without success; invaded England, 1066; killed at Stamford Bridge.

HARAR, see HARRAR.

HARBIN, KHARBIN (45° 46′ N., 126° 35′ E.), town, on Sungari, Manchuria; railway workshops; breweries, flour-mills. Pop. 35,000.

HARBINGER, one who goes before; originally one whose business was to provide accommodation.

HARBOUR, a port or haven, which by its natural conformation or artificial construction affords safe refuge and anchorage to ships. A h. should be easily accessible in any weather, and should have a sufficient depth of water at all tides; the majority of h's, however, are tidal, and are provided with enclosed docks into which vessels enter at high tide. The dock gates are closed before the ebb, and a uniform level is thus maintained. Every effort is made to secure the utmost possible depth of water, as it has been calculated that the value of a h. increases as the cube of the depth. The entrance to the h. must be proportioned to the area, as upon this depends the tranquillity of the h. Portland Harbour is one of the finest artificial h's in the world, and it encloses 1500 acres of water with a depth of 30 ft. at low tide.

HARBURG (53° 28′ N., 9° 59′ E.), seaport, Hanover, Prussia, on Elbe; manufactures palm-oil, rubber goods, chemicals; active trade. Pop. (1910) 67,024.

HARCOURT (49° 8′ N., 0° 37′ E.), village, Eure, France.

HARCOURT, SIMON, 1ST VISCOUNT HARCOURT (*c.* 1661–1727), Eng. lord chancellor; called to Bar, 1683; solicitor-gen., 1702; helped to promote Union with Scotland; attorney-gen., 1707, 1710; defended Sacheverell, 1710; Lord Keeper of Great Seal, 1710; Lord Chancellor, 1713; P.C., 1721.

HARCOURT, SIR WILLIAM, GEORGE GRANVILLE VENABLES VERNON (1827–1904), Brit. statesman; P.C., 1866; knight and solicitor-gen., 1873; Sec. of State under Liberal government, 1880; Chancellor of Exchequer, 1886, 1892–95; reformed incidence of death duties, 1894. His Local Veto Bill was one of the causes of Liberal defeat, 1895; leader of Opposition, 1895–98, and continued to be prominent parliamentary figure; constant political writer.

HARCOURT, WILLIAM VERNON (1789–1871), Eng. ecclesiastic; canon of York, etc.; deeply interested in scientific subjects; founder and pres. of Brit. Association.

HARDANGER FJORD (60° 20′ N., 6° 10′ E.), inlet, on W. coast, Norway; magnificent scenery; tourist resort.

HARDEE, WILLIAM JOSEPH (1815–73), Amer. military commander; author of a noted drill manual; served with distinction in Confederate service.

HARDENBERG, KARL AUGUST VON, PRINCE (1750–1822), Pruss. politician; entered service of Hanover, 1770; Brunswick, 1782; Prussia, 1792; concluded Treaty of Basel, 1795; Minister of Foreign Affairs, 1804; twice dismissed from office through Napoleon's influence; Chancellor, 1810; carried out many social and educational reforms, and reorganised army; prominent in War of Liberation; signed first Treaty of Paris, 1814, and cr. prince; Minister of Interior, 1815–22.

HARDERWIJK (52° 22′ N., 5° 37′ E.), seaport, Netherlands, on Zuider Zee; chief exports, grain, fish. Pop. (1910) 7289.

HARDICANUTE, or HARDACNUT (*c.* 1019–42), king of England; s. of Canute; succ. his half-bro., Harold, 1040.

HARDING, JAMES DUFFIELD (1798–1863), Eng. artist; was a noted water-colour landscape painter; pub. several books on art subjects.

HARDING, SAINT STEPHEN (*c.* 1050–1134), third abbot of Citeaux; received St. Bernard into abbey and helped Cistercian reform.

HARDINGE, CHARLES, 1ST BARON H. OF PENSHURST (1858–), Viceroy of India since 1910; educated at Harrow and Cambridge; diplomatic service (1880), posts at Teheran, St. Petersburg; Assistant Under-Secretary for Foreign Affairs (1903–4), Ambassador, St. Petersburg (1904); Permanent Under-Secretary for Foreign Affairs (1906); cr. baron (1910); life attempted, Delhi (1912).

HARDINGE, HENRY, VISCOUNT H. (1785–1856),

Brit. gen. and Ind. gov.; distinguished in Napoleonic wars; Gov-Gen. of India, 1844–47; fought in second Sikh War, 1845–46; commander-in-chief of Brit. army, 1852–56; field-marshal, 1856.

HARDOI (27° 28′ N., 80° 15′ E.), district, United Provinces, India; area, 2331 sq. miles. Pop. 1,092,834. Capital, HARDOI; exports grain. Pop. 11,000.

HARDOUIN, JEAN (1646–1729), Fr. scholar; held that, with the exception of Homer and a few others, most of the classical works of antiquity were the invention of XIII.-cent. monks; edit. Pliny's *Natural History*.

HARDT MOUNTAINS (49° 18′ N., 7° 40′ E.), N. extension of Vosges mountains, in Bavarian Palatinate, Germany; average elevation, 1300 ft.

HARDWAR (29° 58′ N., 78° 13′ E.), town, on Ganges, United Provinces, Brit. India; place of pilgrimage; every twelfth year a sacred festival is held. Pop. 30,000.

HARDWICKE, PHILIP YORKE, 1ST EARL OF (1690–1764), Eng. Lord Chancellor; b. at Dover; called to Bar, 1715; M.P., 1719; Solicitor-Gen., 1720; Attorney-Gen., 1723; supported many of Walpole's measures and his policy of war with Spain; became P.C. and Chief Justice in 1733; Lord Chancellor in 1737. As chairman of council of regency in 1743–45, H. directed proceedings against Jacobites in rebellion of 1745; he subsequently effected legislative reforms in Scotland, and framed Marriage Act, which made Fleet marriages illegal; became 1st Earl of H., 1756; was member of government under Pitt in 1757.

George Harris, *Life* (1847).

HARDY, ALEXANDRE (c. 1569–1631), Fr. dramatist; prolific writer of tragedies, pastorals, histories, and tragi-comedies for his own troupe of actors. His plays, remarkable for effective stagecraft and vigorous action, represent the transition from mediævalism to classical style.

HARDY, THOMAS (1840–), Eng. novelist and poet; famed for his 'Wessex' novels, including *Far from the Madding Crowd* (1874), *Tess of the D'Urbervilles* (1891). Of late years he has devoted himself entirely to poetry, and has pub. *The Dynasts*, a Napoleonic drama, and several volumes of lyrical poems; O.M., 1910.

HARDY, SIR THOMAS DUFFUS (1804–78), Eng. antiquary; deputy-keeper of Record Office, 1861–78; an industrious edit. of the Roll Series of chronicles. His bro., Sir William H. (1807–87), succ. him at the Record Office.

HARDY, SIR THOMAS MASTERMAN, Bart. (1769–1839), Brit. vice-admiral; captain of the *Victory* at *Trafalgar*, and greatly esteemed by Nelson, who d. in his arms.

HARDYNG, JOHN (1378–1465), Eng. chronicler; after military service wrote an unreliable *Chronicle* (Eng. and Scot.), which was altered to suit different patrons.

HARE (*Lepus europæus*), rodent closely allied to rabbit, but larger and speedier owing to superior development of hind limbs; differs also from rabbit in solitary life, in not forming burrows, and in young being born fully furred and with open eyes. The pursuit of the h. with dogs is called coursing.

HARE, AUGUSTUS JOHN CUTHBERT (1834–1903), Eng. author; wrote *Memorials of a Quiet Life*, and numerous travel books.

HARE, JULIUS CHARLES (1795–1855), Eng. ecclesiastic; archdeacon of Lewes; chaplain to Queen Victoria; typical Broad Churchman; pub. numerous theological works.

HARE, SIR JOHN (1844–), Eng. actor and manager; probably the most finished of modern 'character' actors; famed for his performances in *Caste*, *A Pair of Spectacles*, *A Quiet Rubber*, etc.; knighted, 1907.

HAREBELL, Campanulaceous plant (*C. rotundifolia*) with blue flowers; popularly termed bluebell; name also applied to wild wood-hyacinth.

HARELIP, congenital vertical cleft in upper lip; may be *single* or *double*; often associated with cleft palate (*q.v.*); should be treated surgically during infancy.

HAREM, or SERAGLIO, name given in Muhammadan countries to the apartment in a palace or house set apart for the use of the wives and concubines of the owner. The name is also applied collectively to the women themselves. The law of the Koran only permits of a man having four wives, but he is not limited in the number of his concubines. Each wife has a separate establishment within the h., and is waited upon by a separate staff of servants. A woman must always appear veiled except before her husband or immediate male relatives. The h. is guarded by eunuchs. Death is the penalty for a woman who seeks to escape.

HARFLEUR (49° 29′ N., 0° 17′ E.), seaport town, Seine-Inférieure, France; potteries, distilleries; iron foundries. Pop. 3000.

HARGREAVES, JAMES, a Lancashire weaver, inventor of spinning-jenny, through which he suffered much persecution from fellow-workmen; died, 1778.

HARIANA (29° N., 76° E.), tract of country, Punjab, India; includes parts of Hissár and Rohtak districts.

HARI-KARI, see HARA-KIRI.

HARINGTON, SIR JOHN (1561–1612), Eng. author and translator; wrote *A Short View of the State of Ireland*, *Nugæ Antiquæ*—an interesting literary medley, and trans. Ariosto's *Orlando Furioso*.

HARĪRĪ, ABU MUHAMMAD QĀSSIM (1054–1122), Arab. author who wrote in verse valuable works on grammar and lit.

HARI-RUD, HERI-RUD (34° 40′ N., 61° E.), river, Afghanistan; rises in the chain of Koh-i-Baba, flows N. and W., and loses itself in the Tejend oasis.

HARKNESS, ALBERT (1822–1907), Amer. classical scholar; author of numerous extensively used textbooks, including *Complete Latin Grammar* (1898).

HARLAND, HENRY (1861–1905), Amer. novelist; edit. *The Yellow Book*; wrote *The Cardinal's Snuff-Box*, etc.

HARLAW, battlefield near Inverurie, Aberdeenshire, where Earl of Mar defeated Donald, Lord of the Isles, 1411.

HARLECH (52° 52′ N., 4° 7′ W.), town, Merionethshire, N. Wales, on Irish Sea; has ruined XIV.-cent. castle.

HARLEQUIN, familiar figure in the modern pantomime; supposed to be an invisible mischievous sprite; derived originally from early Ital. comedy.

HARLEY, see OXFORD, EARL OF.

HARLINGEN (53° 10′ N., 5° 24′ E.), seaport, Friesland, Netherlands, on Zuider Zee; various manufactures; exports dairy and farm produce. Pop. (1910) 10,209.

HARMODIUS, a young Athenian, who with his friend, Aristogeiton, was concerned in the assassination of the tyrant, Hipparchus. Both were slain, but after death were revered as heroes (514 B.C.).

HARMONIA (classical myth.), dau. of Ares and Aphrodite, and wife of Cadmus; was possessor of a necklace which brought woe to those who wore it.

HARMONIC ANALYSIS is a general mathematical method of investigating certain physical problems such as wave motion, pendulum motion, vibrations of strings and springs, etc. A particle is said to move with Simple Harmonic Motion if, starting from rest, it moves in a straight line with an acceleration always directed towards a fixed point C in the line and varying as the distance from C. The equation representing such motion is $\frac{d^2x}{dt^2} = -\mu x$ where x is the distance of the particle from C at any time t, and μ is a constant either known or to be found from another condition governing the motion.

HARMONICA, term applied to musical instruments consisting of glasses tuned with more or less water, and producing sound by friction, or bell instru-

ments of percussion; in vogue during XVIII. cent.; now a toy instrument.

HARMONIUM, a keyed instrument, somewhat resembling piano and organ, which produces sounds by means of 'free vibrating reeds'; used in churches, halls, etc., in place of the costlier organ. Although the guiding principle was then far from new, h's were first constructed in France by Grenié at the beginning of XIX. cent. and called *Orgue Expressif.* Various improvements were made in France and elsewhere (notably by Debain, Alexandre, and Mustel of Paris); but h.-construction was revolutionised by invention of *American organ.* Outstanding features of h. are keyboard of 5 octaves, stops (*Expression, Bourdon,* etc.), and treadles to supply wind which, by internal mechanism, acts upon rows of reed vibrators.

HARMONY is the combination of several sounds. These combinations are termed *Chords,* which in their formation and progression are determined by fixed laws. The union of any bass-note with its 3rd and 5th (for instance, C, E, G) is called a chord or *Triad*; it may be either 'Concord' or 'Discord,' and may be formed on any note of the major or minor scale. *Concords* or *Common Chords* are those which seem complete in themselves. *Discords* are incomplete in themselves, and must be resolved to a concord before the ear is satisfied. By the addition of the 7th to any triad the *Chord of the 7th* is formed, the principal one being the *Chord of the Dominant 7th,* which usually resolves to the tonic chord. All chords may be 'inverted,' *i.e.* the 3rd, 5th, or 7th may become the bass-note. If in 4-part writing the notes of each chord are placed so near one another that no note belonging to the chord can be inserted between them, we have 'Close' h.; if, on the other hand, the notes are placed at a wider distance, so that a note belonging to the chord can be again interposed, we have 'Extended' h. The conclusion of a musical phrase or of a composition is termed *Cadence.* Cadences may be Authentic, Plagal, Imperfect, Interrupted. *Modulation* is the change from one key to another. Besides the above h. deals with passing notes, suspensions, chromatic chords, chords of the 9th, 11th, 13th, etc.

HISTORY.—The history of h. really dates from the Middle Ages. In ancient times Gk. music consisted of melody; the limitations of their scales prevented their evolving h. The ecclesiastical scales, which took the place of the Gk. scales, prepared the way for h. and, gradually developing with the progress of h., eventually led to modern music. The most primitive form of h. (*Diaphony*) may be traced to the X. cent., and seems to have been the addition of an extra part to a Canto Fermo, generally in 4th or 5th and 8th. In XI. cent. an advance on diaphony was made in *Discantus* (the crude blending of two distinct melodies), which in its turn gave rise to *Counterpoint* (q.v.). Counterpoint engaged the close attention of the musicians of the following cent's, and its perfection at their hands was followed by a study of h. as the term is now understood. At the beginning of the XVII. cent. Monteverde revolutionised counterpoint by using 'unprepared discords,' and in other ways breaking away from the older school of Palestrina (d. 1594) and his predecessors. Rameau (1683–1764) pub. his famous *Traité de l'harmonie,* 1722, in which he points out that each individual tone comprises harmonic sounds. With Rameau and the contemporary Ital. theorist, Tartini, a new epoch was opened in the history of h. As music grew richer and fuller, old laws were superseded and new laws introduced, and the system of h. is continually changing its aspect from generation to generation, although the fundamental laws may remain the same. The musical genius of the XVIII. and XIX.-cent. masters, such as Bach, Händel, Beethoven, Schumann, Wagner, left its impress indelibly on h. and musical science. H., as has been well said, is the 'grammar of music.'

See manuals by Stainer, Prout, and Macfarren.

HARMSWORTH, SIR ALFRED CHARLES, see NORTHCLIFFE, LORD.

HARNACK, ADOLF (1851–), Ger. scholar; prof. at Leipzig, Giessen, Marburg, and since 1888 of Church History in Berlin; one of greatest living authorities on the New Testament and Early Church History; many of his works are translated into English.

HARO, Norman cry to a ruler for redress of wrong.

HAROLD I., HAREFOOT (d. 1040), king of England; succ. Canute as his elder s., though opposed by his bro. Harthacnut in Wessex.

HAROLD II. (c. 1022–66), Eng. king; Earl of Wessex, 1053; elected king, 1066; routed and killed his bro. Tostig and Hardrada, king of Norway, at Stamford Bridge, 1066; was defeated and slain at Hastings by William the Conqueror.

HAROLD HAARDRAADE, HARALD III. (*q.v.*).

HAROUN AL-RASCHID, see HARUN ER RASCHID.

HARP, largest and one of oldest instruments; played by plucking or striking strings with fingers or plectrum; has survived from earliest times in almost original form—triangular and remarkably graceful in line. H. was in common use in ancient Egypt, and held in highest honour by Celts, Franks, and Northmen. Old Brit. and continental bards accompanied their lays on h. The national symbol of Ireland is still the h. (*Clairseach*). Modern h. owes much to Hochbrucker and Erard; former (1720) invented pedal action method of retuning notes, thus freeing hands hitherto occupied with turning tuning pins; Erard (1810) invented *Double-action h.,* in which pedals raise strings one or two semitones. H. is now an orchestral rather than solo instrument; tuned in C flat, compass 6½ octaves; catgut strings, increasing in length and coloured for identification purposes, are stretched between 'neck' (top side) and sound-board (next to player), which, with 'pillar,' give h. its triangular form.

Armstrong, *Irish and Highland Harps* (1905).

HARPE, JEAN FRANÇOIS DE LA, see LA HARPE.

HARPENDEN (51° 49′ N., 0° 22′ W.), town, Hertfordshire, England. Pop. (1911) 6173.

HARPER, WILLIAM RAINEY (1856–1906), Amer. educationalist and scholar; first president of Chicago University.

HARPER'S FERRY (39° 17′ N., 77° 48′ W.), town, W. Virginia, U.S.A.; arsenal and armoury here were taken by John Brown in 1859; and burned, 1861, lest they should be seized by Confederates.

HARPIES, THE (classical myth.), monsters who served the gods; bird-like and horrible; best known from connection with the blind Phineus, whose food they kept defiling or carrying off; they were driven off by Argonauts (*q.v.*).

HARPIGNIES, HENRI (1819–), Fr. landscape painter, of great delicacy and finish.

HARPOCRATES, Gk. deity introduced from Egypt; a Hellenised form of Horus, the Egyptian sun god; and became god of silence.

HARPOCRATION, VALERIUS, Gk. literary critic of uncertain date, whose *Lexicon of the Ten Orators* is important source of literary history.

HARPOON, powerful dart used in whale-fishing; formerly thrown by hand, but now chiefly fired from a harpoon-gun in bows of vessel.

HARRAN, CHARRAN (33° 30′ N., 36° 35′ E.), town of Palestine; supposed dwelling-place of Laban in the Old Testament.

HARRAR, HARAR (9° 19′ N., 42° 6′ E.), town, Abyssinia, N.E. Africa; encircled by walls; trading centre; coffee, durra, tobacco. Pop. c. 39,000.

HARRADEN, BEATRICE (1864–), Eng. novelist; wrote *Ships that Pass in the Night,* etc.

HARRATIN, Berber tribes of Africa, thought to have negro blood in their veins.

HARRIER, breed of hounds, for hunting hares, like small foxhound.

HARRIER HAWK, member of HAWK FAMILY (*q.v.*).

HARRIMAN (35° 56′ N., 84° 32′ W.), town, Tennessee, U.S.A. Pop. (1910) 3061.

HARRIMAN, EDWARD HENRY (1848–1909), Amer. 'railroad king.'

HARRINGTON, EARLDOM OF.—William Stanhope, 1st earl, Sec. of State, 1730. 1744; Charles, 3rd earl, commander-in-chief in Ireland, 1805; Leicester, 5th earl, worked for Gk. Independence, 1823–24.

HARRINGTON, or **HARINGTON, JAMES** (1611–77), Eng. political theorist; wrote *Oceana*, 1656, describing ideal constitution on basis of land property, and a continually changing executive.

HARRIS, see LEWIS WITH HARRIS.

HARRIS, GEORGE, 1ST BARON (1746–1829), Brit. general, served in America and India. George (1851–), 4th baron, best known as cricketer.

HARRIS, JAMES (1709–80), Eng. philologist, politician, and essayist; father of 1st Earl of Malmesbury.

HARRIS, JOEL CHANDLER (1848–1908), Amer. writer; author of many amusing sketches, including the 'Uncle Remus' and 'Br'er Rabbit' stories.

HARRIS, JOHN (*c.* 1666–1719), Eng. divine; drew up *Collection of Voyages and Travels*, and valuable *Lexicon technicum*.

HARRIS, THOMAS LAKE (1823–1906), Amer. poet and founder of a new religion accepted by many prominent people; of great gifts, but practised black magic and probably fraud.

HARRIS, SIR WILLIAM SNOW (1791–1867), Eng. electrician; ed. Plymouth Grammar School and Edinburgh Univ. (Medicine). His ship's lightning conductor, invented 1820, was later adopted by Brit. and Russ. navies. Elected F.R.S., 1831; knighted, 1847.

HARRIS, WILLIAM TORREY (1835–1909), Amer. educational reformer and philosophical writer.

HARRISBURG (40° 15′ N., 76° 54′ W.), capital, Pennsylvania, U.S.A.; situated on Susquehanna River and surrounded by beautiful scenery. Has handsome capitol, court-house, arsenal, R.C. cathedral, etc.; manufactures machinery, boilers, and other steel and iron goods; flour, shoes, cigarettes, and cotton goods; contains several blast furnaces and rolling-mills. Pop. (1910) 64,186.

HARRISMITH (28° 24′ S., 28° 36′ E.), town, Orange Free State, S. Africa; exports wool and hides. Pop. (1911) 49,321.

HARRISON (40° 45′ N., 74° 10′ W.), town, New Jersey, U.S.A.; manufactures iron, steel, and brass goods, cotton thread. Pop. (1910) 14,498.

HARRISON, BENJAMIN (1833–1901), Amer. statesman; 23rd Pres. of U.S.; distinguished in Civil War; senator, 1881; served on various committees; pres., 1888; enlarged navy, developed civil service reforms, settled Bering Sea question with Great Britain; reduced national debt; encouraged commerce; defeated in presidential election, 1892.

Life, by Wallace (1888).

HARRISON, FREDERIC (1831–), Eng. writer and jurist; b. London; ed. Oxford; called to Bar, 1858; prof. of Jurisprudence, Inns of Court (1877–89); helped to codify Eng. Law; follower of Comte; studied labour problems; distinguished literary critic and historian. Chief works are *Oliver Cromwell* (1888), *Ruskin* (1902), *Chatham* (1905), *The Creed of a Layman* (1907).

HARRISON, JOHN (1693–1776), Eng. mechanician; received (1765) government grant of £20,000 for invention of chronometer for ascertaining longitude within error of 30 miles; invented gridiron pendulum.

HARRISON, THOMAS (1606–60), Eng. Roundhead; present at Marston Moor, Naseby, and siege of Oxford; signed king's death warrant; held military command during Cromwell's absence; instrumental in expelling Long Parliament; opposed Cromwell's protectorate; suspected of plots, he was twice imprisoned; executed at Restoration.

Life, by Simpkinson (1905).

HARRISON, THOMAS ALEXANDER (1853–), Amer. painter noted for representations of the sea; bro., **Birge H.** (1854–), is a well-known landscape painter.

HARRISON, WILLIAM (1534–93), Eng. ecclesiastic and antiquary; Canon of Windsor; his *Description of England* (1577) is invaluable for topography of the country and manners and customs of Elizabeth's reign.

HARRISON, WILLIAM HENRY (1773–1841), 9th Pres. of U.S.; entered army, 1791; commanded at Fort Washington, 1797; resigned from army, 1798; and became Sec. of North-West Territory; Gov. of Indiana, 1801; tried to secure better treatment of Indians, and to modify slavery legislation; defeated Indians at Tippecanoe River, 1811; fought against Britain, 1812–15; won battle of Thames, 1813; negotiated treaty with Indians, 1814. Member of Congress, 1816–19; of Ohio Senate, 1819–21; of U.S. Senate, 1825–28. First U.S. minister to Colombia, 1828. Pres. 1841.

Life, by Stoddard (1888).

HARRODSBURG (37° 43′ N., 84° 53′ W.), town, Kentucky, U.S.A.; sulphur springs. Pop. (1906) 3528.

HARROGATE (54° N., 1° 33′ W.), town, Yorkshire, England; health resort, noted for saline, chalybeate, and sulphur springs. Pop. (1911) 33,706.

HARROW, agricultural implement for breaking the soil into fine pieces after it has been ploughed, and for covering the seed sown; chief varieties are the straight-tooth and the spring-tooth.

HARROWBY, DUDLEY RYDER, 1ST EARL OF (1762–1847), Eng. politician; Foreign Sec., 1804; Pres. of Council, 1812–27.

HARROWING OF HELL, Eng. poem of XIII. cent.; its dialogue form was the initiation of the vernacular drama.

HARROW-ON-THE-HILL (51° 34′ N., 0° 20′ W.), town, Middlesex, England; famous for school founded by John Lyon, 1571. Pop. (1911) 17,076.

HARRY, blind minstrel of Scot. court in latter part of XV. cent.; wrote long epic poem called *William Wallace*, of importance in the formal history of verse, but of little value as hist. source or poem.

HARSHA, HARSHAVARDHANA, last native ruler of the whole of N. India (606–648 A.D.).

HARSNETT, SAMUEL (1561–1631), abp. of York (1629), repressed for Rom. Catholicism under Elizabeth, but great favourite of the Stewart kings.

HART, ALBERT BUSHNELL (1854–), prominent Amer. historico-political writer.

HART, CHARLES (fl. 1660), Eng. actor who played leading parts in Restoration tragedies; grandson of Shakespeare's sister Joan; d. 1683.

HART, ERNEST ABRAHAM (1835–98), Eng. medical journalist; practised as ophthalmic surgeon; became connected with *Lancet* (1857); appointed edit. of *British Medical Journal* (1866); took a leading part in public health and social reform, many Acts of Parliament dealing with those subjects being due largely or in part to his efforts; had a great share in the development of the Brit. Medical Association.

HART, SIR ROBERT (1835–1911), Anglo-Chinese official; entered Consular service, China, 1854; inspector-gen. of Chin. Customs department, 1863; greatly increased revenues; his house, containing valuable official documents, burnt down in Boxer rising, 1900; retired in 1907.

HART, WILLIAM (1823–94), Amer. artist; of Scot. birth; excelled as painter of animals and landscapes.

HARTE, FRANCIS BRET (1839–1902), Amer. novelist and poet; was a voluminous writer of fiction, his best-known works being *The Luck of Roaring Camp* and other sketches of Californian life, and *Condensed Novels* (parodies). Much of his verse won marked popularity. He was U.S. consul at Glasgow, and Crefeld, Germany.

Life, by Pemberton (1903); Boynton (1905).

HARTEBEEST, see ANTELOPES.

HARTFORD (41° 42′ N., 72° 42′ W.), capital of Connecticut, U.S.A.; situated on right bank of Connecticut River, *c.* 50 miles from mouth, and 112 miles by rail from New York city. Handsome city, well

laid out and compactly built; outstanding buildings include State Capitol (in white marble, with statues), arsenal, etc., with Trinity Coll. on outskirts; seat of R.C. bp.; manufactures—Colt's pistols, Gatling guns, engines, boilers, machines, hardware; trades in Connecticut tobacco. Site of Dutch fort (*c.* 1633) and colony of Dutch settlers; incorporated as city in 1784, and has since been capital of state; H. Convention (meeting of New England delegates) took place in 1814. Pop. (1910) 98,915.

HARTFORD CITY (40° 26′ N., 85° 17′ W.), town, Indiana, U.S.A.; oil and natural gas wells in vicinity. Pop. (1910) 6187.

HARTLEPOOL (54° 42′ N., 1° 11′ W.), seaport, Durhamshire, England; including municipal borough of H. and county borough of West H. H. is an old market town; West H. is modern, with municipal buildings, Athenæum, exchange, etc.; considered as one port which has large trade; engineering works, shipbuilding, iron and brass foundries, flour and paper mills. Pop. (1911) 20,618; W. Hartlepool (1911), 63,932.

HARTLEY, DAVID (1705–57), Eng. philosopher, physician, and psychologist; wrote *Observations on Man*; anticipated modern theories of close interdependence of the physical and mental; called founder of *Association* school of psychologists.

HARTLEY, JONATHAN SCOTT (1845–1912), Amer. sculptor, noted as portraitist.

HARTLIB, SAMUEL (*c.* 1599–*c.* 1670), Eng. economist and political philosopher; inspired Milton's *Tractate on Education*.

HARTMANN, KARL ROBERT EDUARD VON (1842–1906), Ger. philosopher; wrote *Philosophy of the Unconscious* (1869) and many other works; a pessimist, but believed that by social progress some happiness might be attained.

HARTMANN, MORITZ (1821–72), popular Ger. novelist and verse-writer.

HARTMANN VON AUE (*c.* 1170–1210), famous Middle High Ger. poet; b. Swabia; wrote excellent epics (*Erec*, *Iwein*, etc.); also lyrics.

HARTS-TONGUE (*Scolopendrium*), genus of ferns with undivided fronds.

HARTZENBUSCH, JUAN EUGENIO (1806–80), Span. playwright and scholar.

HĀRŪN-ER-RASHID (763–809), V. Abbasid Caliph of Bagdad; famed for the greatness of his empire, the splendour of his court, and his patronage of learning and letters; one of the greatest princes of his day; known to Eng. readers from his association with the *Arabian Nights*.

HARUSPICES, ARUSPICES (singular, **Haruspex**), Rom. prophets whose duty it was to explain omens, particularly to inspect entrails of offerings; probably Etruscan practice adopted by Rome.

HARVARD UNIVERSITY, the oldest, wealthiest, and most important of Amer. univ's, situated 3 miles W. of Boston. Named (1639) after Rev. John Harvard, a Cambridge graduate who died, 1638, leaving books, and money for its establishment; it was founded, 1636 (at place called Cambridge in honour of old Eng. Univ.), for the training of young men for the Puritan ministry. The constitution gradually changed in a liberal direction, and in 1866 it was freed from all sectarian tests by the abolition of compulsory attendance by the students at prayers. Unitarian and Transcendental teaching were the conspicuous notes of Harvard in the XIX. cent., and Channing, Theodore Parker, Emerson, Thoreau, Longfellow, Oliver Wendell Holmes, Lowell, were all H. men. There are now over 700 lecturers, tutors, and persons in authority, and over 5000 students. Radcliffe Coll., for women students, is essentially since 1894 a part of H. Univ., with the same regulations for admission and for degrees.

HARVEST (O.E. *hærfest*, autumn), the period of gathering in crops or fruit; also the crops or fruit so gathered. Religious festivals to celebrate the h. date back to remote times. Thus the custom of worshipping the Gk. goddess, *Demeter*, the 'corn-mother,' and her dau., *Persephone*, finds its survival in salutations paid to two small sheaves of corn, called 'the old woman' and 'the maiden,' which hang in some Scottish farm-kitchens from one harvest to another.

HARVEST-BUG, HARVEST-MITE, see under ARACHNIDA.

HARVEY (41° 38′ N., 87° 40′ W.), town, Illinois, U.S.A.; suburb of Chicago. Pop. (1910) 7228.

HARVEY, GABRIEL (*c.* 1545–1630), Eng. poet; wrote sonnets, satires, and controversial pamphlets; was the intimate friend of Spenser; and claimed to have introduced hexameter verse into Eng. lit.

HARVEY, SIR GEORGE (1806–76), Scot. historical and genre painter.

HARVEY, WILLIAM (1578–1657), Eng. physician, discoverer of the circulation of the blood; born at Folkestone, s. of a yeoman in good circumstances; ed. at the grammar school, Canterbury; at Caius College, Cambridge (B.A., 1597); and at Padua Univ. (M.D., 1602). Returning to England, he commenced to practise medicine in London, becoming a fellow of the Coll. of Physicians (1609), physician to St. Bartholomew's Hospital (1609), and Lumleian lecturer at the Coll. of Physicians (1615). He began to expound his theory of the movements of the heart and the circulation of the blood in his first course of lectures as Lumleian lecturer, but it was not until 1628, when he pub. his treatise, *Exercitatio Anatomica de Motu Cordis et Sanguinis*, that he made his great discovery. He showed that the blood was sent by the contractions of the heart from the right ventricle to the lungs, and returned by the pulmonary veins to the left ventricle, when it was sent into the arteries, carried to the tissues by the smaller arteries, then by the smaller veins to the *venæ cavæ*, and conveyed by them again to the heart. He also disproved the theories that had been held by former anatomists—for example, undulations of the blood in the veins, the presence of air in the arteries, and the idea that the liver was the centre of the circulatory system. His discovery was based upon a very complete knowledge of anatomy, gained from books, from the Ital. anatomists, and from extensive dissections, as well as upon observations on living animals. H. was appointed physician to James I. and to Charles I., having charge of the young royal princes at the battle of Edgehill; he lived at Oxford for some years, being elected warden of Merton College, but on the surrender of the city to the Parliamentarians he returned to London to live in retirement. He was elected pres. of the Coll. of Physicians (1654), but declined the position, and d., after being long affected by gout, in London, leaving his estate at Burwash, Sussex, to the Coll. of Physicians, with provision for the endowment of an annual oration.

Power, *Life* (1897).

HARWICH (51° 51′ N., 1° 17′ E.), port, Essex, England; packet station for Holland; fine harbour and docks; large export and import trade; strongly fortified. Pop. (1911) 13,623.

HARZ MOUNTAINS (51° 41′ N., 10° 37′ E.), a mountain range of N.W. Germany, extending through part of Prussia, Brunswick, and Anhalt, between Leine and Saale; divided into Ober, Unter, and Vorharz; highest peak, Brocken (*q.v.*), 3745 ft.; length, 57 miles; breadth, 20, and area, 784 sq. miles; rich in iron, copper, lead, silver, sulphur, zinc, granite, marble; large fir and pine forests; numerous mineral springs; figures prominently in Ger. legend and lit.

HARZBURG (51° 54′ N., 10° 32′ E.), town, Brunswick, Germany; saline springs; famous ruined castle. Pop. (1910) 4730.

HASA, EL (*c.* 27° 30′ N., 48° 20′ E.), E. coast district, Arabia; area, *c.* 30,000 sq. miles; produces rice, cotton, dates, pearls; under suzerainty of Turkey. Pop. *c.* 150,000.

HASAN (d. 669), Muhammadan caliph; s. of Ali and Fatima.

HASAN UL-BASRÍ (fl. VII.–VIII. cent.), prominent Arab. teacher.

HASBEYA, HASBEIYA (33° 25′ N., 35° 42′ E.), town, Syria, Asiatic Turkey. Pop. *c.* 5000.

HASDAI IBN SHAPRUT (fl. X. cent.), Span. Jew; patron of scholars.

HASDEU, or HAJDEU, BOGDAN PETRICEIOU (1836–1907), Rumanian scholar and nationalist.

HASDRUBAL (slain 221 B.C.), succ. his f.-in-law, Hamilcar Barca, as leader of the Carthaginians. **Hasdrubal**, Hamilcar's younger s., aided his bro. Hannibal (*q.v.*) in the Punic Wars against Rome.

HASE, CARL BENEDICT (1780–1864), distinguished archivist and Byzantine scholar.

HASE, KARL AUGUST VON (1800–90), Ger. ecclesiastical historian and scriptural apologist.

HASHISH, see ASSASSIN, HEMP.

HASLINGDEN (53° 43′ N., 2° 20′ W.), town, Lancashire, England. Pop. (1911) 18,723.

HASPE (51° 20′ N., 7° 20′ E.), town, Westphalia, Prussia; industries—iron-founding, iron, steel, and hardware. Pop. (1910) 23,480.

HASSAM, CHILDE (1859–), Amer. impressionist painter.

HASSAN (13° N., 76° 7′ E.), town, Mysore, India. Pop. *c.* 9000. District has area of 2546 sq. miles; produces coffee, cereals. Pop. *c.* 569,000.

HASSAN-IBN-SABAH, see ASSASSIN.

HASSANÍAS, Semitic people of the Sudan.

HASSE, JOHANN ADOLPH (1699–1783), Ger. composer; very popular in XVIII. cent.; composed innumerable operas, besides symphonies, masses, etc., with genuine pleasing melodies.

HASSELT (51° 56′ N., 5° 20′ E.), town, Limburg, Belgium. Pop. 16,179.

HASSELT, ANDRÉ HENRI CONSTANT VAN (1806–74), Belgian poet of Fr. Romantic school.

HASSENPFLUG, HANS DANIEL LUDWIG FRIEDRICH (1794–1862), Ger. politician; held state offices in Hesse-Cassel, 1832–37; in Hohenzollern Sigmaringen, 1838; Luxembourg, 1839; Prussia, 1841–50; head of Hesse government, 1850; tried to destroy constitution of Hesse; retired, 1855.

HASTINAPUR, capital of the Pandavas in the Hindu epic, *Mahabharata*; traces *c.* 20 miles N.E. of Meerut, United Provinces, India.

HASTINGS.—(1) (50° 52′ N., 0° 36′ E.) municipal, parliamentary, and county borough, Sussex, England; fashionable watering-place and one of Cinque Ports. Beautiful situation; has ancient castle, interesting churches of All Saints and St. Clement's, town hall, public library, museum, schools of art and science, grammar and technical schools; joined by terraces to St. Leonards. Small shipbuilding and fishing industry. Site of battle of H. (1066) is 6 miles inland. Pop. (1911) 61,146. (2) (40° 30′ N., 98° 25′ W.) town, Nebraska, U.S.A. Pop. (1910) 9340.

HASTINGS, Eng. family; descended from Sir Henry de H. (d. 1268), supporter of Montfort. Family held H. barony from *c.* 1290; earldom of Pembroke, 1339–89; extinct in XVI. cent. Barony is now held by Astley family. Another branch of family became barons, 1461; Earls of Huntingdon, 1529.

HASTINGS, FRANCIS RAWDON, 1st MARQUESS OF HASTINGS (1754–1826), Brit. soldier and administrator; served in Amer. War, 1775–82; gained victory at Hobkirk's Hill; led force to assist Duke of York in Flanders, 1794; master general of ordnance, 1806; Gov.-Gen. of Bengal and commander-in-chief in India, 1812; defeated Gurkhas; extended Brit. territories, 1816; crushed Pindaris and Mahrattas, 1817–18.

HASTINGS, FRANK ABNEY (1794–1828), Brit. naval commander; fought at *Trafalgar*, 1805; dismissed for insubordination, 1820; volunteer in Gk. War of Independence; won over public opinion to side of steam, and provided Gk. navy with steamer *Karteria*.

HASTINGS SANDS, lowest members of Wealden (*q.v.*); 500 to 1000 ft. thick.

HASTINGS, WARREN (1732–1818), Brit. administrator; b. at Churchill, Oxfordshire; entered East India Company's service, 1750; resident at court of Murshidabad, 1758; member of council, 1761; second in council at Madras, 1768; pres. of council and Gov. of Bengal, 1772. H. effected reforms in system of government; transferred centre of administration from Murshidabad to Calcutta; reformed military and police organisation; began settlement of land revenue on five-year leases.

The consolidation of Ind. Empire was largely due to his administrative genius. He became Gov.-Gen. of India, 1773. Members of council were inimical to him, and condemned all his measures. He was accused by Brahmin Nuncomar of receiving bribes; shortly afterwards Nuncomar was accused of forgery, found guilty, and hanged, a circumstance tending to alienate public sympathy from H. During these events H. sent in his resignation, but subsequently remained in office. Between 1777 and 1785 he conducted war against Mahrattas and against Hyder Ali; suppressed insurrection of Chait Sing, Rajah of Benares, and deposed him; caused begums of Oude to give up land and treasure, 1780, some of which he afterwards restored. He returned to England in 1785, and was impeached by Burke in a famous speech, 1786, for oppression, maladministration, and corruption. Trial lasted seven years, after which he was acquitted, 1795. Costs of trial swallowed up his entire fortune, but he subsequently obtained pension from East India Co.

G. B. Malleson, *Life of Warren Hastings* (1894).

HAT, name given to head-covering, with brim, the principal materials used being silk, fur, wool, merino, straw. The frame of a silk h. is composed of calico and other materials, stiffened in shellac, and is shaped on a block. The crown and brim are then sewn on, the silk covering and trimmings added, and the finished article is then polished for wear. Opera hats are covered with silk or merino, and a collapsible steel frame provides means of adjustment. Felt hats are made from fur, fur and wool, or wool alone, according to quality. Both silk or felt hats are extensively manufactured at Stockport (Cheshire) and Denton (Lancs). Straw hats are largely made at Luton (Beds). For history, see COSTUME.

HATCH, to incubate from eggs; to develop a hidden scheme; term used by surveyors for shading, and by engravers for similar lines; lower part of divided door.

HATCHMENT, diamond-shaped panel, enclosing arms of a deceased person, suspended on wall of his dwelling for short period after death.

HATFIELD (51° 47′ N., 0° 14′ W.), town, Hertfordshire, England; H. House is residence of Marquesses of Salisbury. Pop. (1911) 8592.

HATHERLEY, WILLIAM PAGE WOOD, 1st BARON (1801–81), Eng. Lord Chancellor.

HATHERTON, EDWARD JOHN LITTLETON, 1st BARON (1791–1863), Irish Sec. without brilliant success, 1833–35; but rewarded with peerage, 1835.

HATHOR, see EGYPT (*Ancient Religion*).

HATHRAS (27° 36′ N., 78° 11′ E.), town, United Provinces, Brit. India. Pop. *c.* 43,000.

HATS AND CAPS, parties in Sweden in XVIII. cent.; Hats was war party, Caps favoured peace and denounced royal autocracy.

HATTERAS, CAPE (35° 15′ N., 75° 31′ W.), cape, N. Carolina.

HATTIESBURG (31° 20′ N., 89° 17′ W.), town, Mississippi, U.S.A.; lumber trade. Pop. (1910) 11,733.

HATTINGEN.—(1) (51° 23′ N., 7° 11′ E.) town, Westphalia, Prussia. Pop. (1910) 12,760. (2) (47° 55′ N., 8° 47′ E.) town, Baden, Germany.

HATTO I. (*c.* 850–913), bp. of Mainz; alleged to have been eaten at Bingen (where the Mouse Tower is still shown) by rats as a punishment for his cruelty.

HATTON, SIR CHRISTOPHER (1540–91), Eng. lord chancellor; held various positions under Elizabeth; denounced Mary, Queen of Scots, in Parliament, 1587; Lord Chancellor, 1587; was favourite of Elizabeth; encouraged literature.

HATTON, JOHN LIPTROT (1809–86), Eng. composer; b. Liverpool; wrote over two hundred songs, many still popular; operas met with little success.

HATZFELD, ZSOMBOLYA (45° 48′ N., 20° 44′ E.), town, Hungary. Pop. *c.* 10,000.

HAUCH, JOHANNES CARSTEN (1790–1872), Dan. poet, novelist, and playwright of the romantic school.

HAUFF, WILHELM (1802–27), Ger. poet and novelist; b. Stuttgart; best works: *Lichtenstein* (novel), *Phantasien im Bremer Rathskeller*; *Reiter's Morgengesang* (poems).

HAUGE, HANS NIELSEN (1771–1824), Norwegian religious revivalist.

HAUGESUND (59° 28′ N., 5° 20′ E.), town, Norway; herrings exported. Pop. (1910) 9144.

HAUGHTON, SAMUEL (1821–94), Irish priest and prof. of Geol., Trinity Coll., Dublin; wrote on *Granite Cleavage*, *Frost Planes in Sandstone*, and *Geological Climates*.

HAUGHTON, WILLIAM (fl. late XVI. cent.), Eng. dramatist to whom *English-Men for My Money* and other old plays are ascribed.

HAUGWITZ, CHRISTIAN AUGUST HEINRICH KURT (1752–1831), Pruss. politician; ambassador to Vienna, 1792; entered Berlin cabinet, 1792; began negotiations resulting in treaty between Britain and Prussia, 1794; influenced treaty with France, 1795; as Foreign Minister signed treaty of Schönbrunn, 1805; retired after battle of Jena.

HAUNTING by spirits of the dead has been observed or credited in all ages. Until recently belief in ghosts was generally discredited, but owing to 'Psychical Research' and elaborate investigation of various phenomena many people believe there is some foundation for ghost stories in fact; possibly mysterious experiences are due only to telepathic suggestion.

HAUPT, MORITZ (1808–74), prominent Ger. classical scholar and philologist.

HAUPTMANN, GERHART (1862–), Ger. poet and dramatist; his plays include historical and realistic dramas and comedies: *Einsame Menschen* (1891), *Die Weber*, *Das Friedensfest*, *Kollege Crampton*, *Florian Geyer*, and others; his *Die Versunkene Glocke* (1897) and *Und Pippa Tanzt* (1905) are masterly fairy tales.

HAUPUR, see HAPUR.

HAURÉAU, JEAN BARTHÉLEMY (1812–96), Fr. writer; on staff of *Nationale*; director of national printing press, 1870; wrote *Histoire de la philosophie scolastique*.

HAUSAS, HOUSSAS, African race inhabiting W. Africa between Lake Tchad and the river Niger; busy traders; language spoken by over 15,000,000 people.

HAUSER, KASPAR (1812–33), mysterious youth appeared in Nuremberg, 1828, who could give no account of himself, and possessed no memory of his previous life. A letter in his possession stated that he was born in 1812. Earl Stanhope, and others, took charge of him, and he d. from a wound in his breast (December 1833). Nothing was discovered as to his origin.

HAUSRATH, ADOLPH (1837–1909), Ger. theological writer and novelist.

HÄUSSER, LUDWIG (1818–67), Ger. politician and author of a history of Germany, not superseded, from death of Frederick the Great to the formation of the *Bund*.

HAUSSMANN, GEORGES EUGÈNE, BARON (1809–91), Fr. administrator; as Préfet de la Seine (1853–69) greatly embellished Paris, by planning and opening new streets and boulevards.

HAUSSONVILLE, JOSEPH OTHENIN BERNARD DE CLÉRON, COMTE D' (1809–84), Fr. writer and politician who held various diplomatic appointments; wrote historical works; life-senator, 1878.

HAUTBOIS, see OBOE.

HAUTE-GARONNE (43° 20′ N., 1° E.), S.W. department, France; area, 2457 sq. miles; crossed by Garonne; produces timber, cereals, wine, fruit; chief town, Toulouse. Pop. (1911) 432,126.

HAUTE-LOIRE (45° 10′ N., 3° 50′ E.), department, central France; area, 1930 sq. miles; surface mountainous; crossed by Loire; coal, timber, cereals, lace; chief town, Le Puy. Pop. (1911) 303,838.

HAUTE-MARNE (48° 10′ N., 5° 10′ E.), N.E. department, France; area, *c.* 2420 sq. miles; surface slopes upwards from N. to S., where is plateau of Langres; crossed by Marne; cereals, vegetables, wine, iron; chief town, Chaumont. Pop. (1911) 214,765.

HAUTERIVE, ALEXANDRE MAURICE BLANC DE LANAUTTE, COMTE D' (1754–1830), influential Fr. minister under Napoleon.

HAUTES-ALPES (44° 40′ N., 6° 20′ E.), S.E. department, France; area, 2178 sq. miles; drained by Durance; sheep raised; chief town, Gap. Pop. (1911) 105,083.

HAUTE-SAÔNE (47° 40′ N., 6° 10′ E.), E. department, France; area, 2074 sq. miles; crossed by Saône; nearly half surface under cultivation; produces cereals, cherries; iron, steel, and copper works, cotton manufacture; chief town, Vesoul. Pop. (1911) 257,606.

HAUTE-SAVOIE (46° N., 6° 25′ E.), E. department, France; area, 1774 sq. miles; mountainous; beautiful scenery; produces wine; chief town, Annecy. Pop. (1911) 255,137.

HAUTES-PYRÉNÉES (43° N., 0° 10′ E.), department, S.W. France; bounded S. by Spain, W. by Basses-Pyrénées, N. by Gers, E. by Haute-Garonne. Chief towns, Tarbes, Lourdes, and Bagnères-de-Bigorre; principal rivers, Gave de Pau, Adour, and Neste. In N. are plains and hills, and in S. Fr. Pyrenees. Cattle- and sheep-rearing, horse-breeding, fruit-growing, and wine-making carried on. Pop. (1911) 206,105.

HAUTE-VIENNE (45° 50′ N., 1° 15′ E.), central department, France; area, 2119 sq. miles; crossed by Vienne, Isle; produces fruits, cereals, porcelain; chief town, Limoges. Pop. (1911) 384,736.

HAUT-RHIN (47° 50′ N., 7° 10′ E.), former department, France. See BELFORT.

HAÜY, RENÉ JUST (1743–1822), Fr. mineralogist; discovered geometrical law of crystallisation; his bro. VALENTIN (1745–1822) invented educational system for the blind.

HAVANA, HABANA (23° 10′ N., 82° 22′ W.), capital and seaport of Cuba, situated on S. side of island; chief commercial city of West Indies. H. consists of old or inner town, with narrow, dirty streets, and well-laid-out new part, with beautiful promenades and gardens. Notable features are the old Span. cathedral (1724, with bones of Columbus), governor's and bp.'s palaces; admiralty, State univ., library, museum, theatres, arsenal, bull-ring, and splendid harbour with strong fortifications (Punto and Murro Castles, Cabañas fort, etc.); chief industries—famous H. cigars; also sugar, chocolate, coffee, rum, molasses, woollen fabrics and straw hats.

Founded by Diego Velasques on S. coast, 1515, and removed to present position, 1519; captured by French, 1563, by English, 1762, and restored, 1763. In XVII. cent. chief naval station of Span. W. Indies fleet; blockaded by Amer. fleet, 1898, and made independent, 1902. See CUBA. Pop. (1910) 302,526.

HAVANT (50° 52′ N., 0° 59′ W.), town, Hampshire, England. Pop. (1911) 4093.

HAVEL (52° 43′ N., 12° 11′ E.), river, Prussia, Germany; unites with Elbe above Wittenberge.

HAVELBERG (52° 50′ N., 12° 4′ E.), town, Brandenburg, Prussia; has XII.-cent. cathedral. Pop. (1911) 6170.

HAVELOCK, SIR HENRY (1795–1857), Brit. soldier; served in Burma, 1825–26; Afghan wars, 1839; distinguished in Mahratta and Sikh campaigns,

1843, 1845; commanded division in Persia, 1857; sent to India during Mutiny; defeated rebels at Fatehpur, Cawnpore, and other places; relieved Lucknow, 1857.

HAVELOK THE DANE, hero of Anglo-Scandinavian romance, s. of Birkbagen, king of Denmark, who, by treachery, was set adrift on raft, which bore him to the Lincolnshire coast. He was befriended by a fisherman, Grim; subsequently m. a distressed Eng. princess, and became king of Denmark and part of England; Eng. versions of Middle Eng. poem by Skeat and others.

HAVERFORDWEST (51° 48′ N., 4° 58′ W.), town, Pembroke, S. Wales; parliamentary and municipal borough and county of itself; Flemings settled here, XII. cent.; picturesque town with ancient castles, priory, walls, fortifications, and other hist. buildings; exports coal and agricultural produce. Pop. (1911) 5920.

HAVERHILL.—(1) (42° 44′ N., 71° 8′ W.) town, Massachusetts, U.S.A.; industrial centre, manufactures leather, boots, shoes, woollens, bricks; has fine system of parks, finest being Winnikenni Park; many schools and charitable institutions. Pop. (1910) 44,115. (2) (52° 5′ N., 0° 27′ E.) town, Suffolk, England. Pop. (1911) 4749.

HAVERSACK, canvas bag to strap on shoulders; originally receptacle for oats (*haver*), which were the usual fare of soldiers on the march.

HAVERSTRAW (41° 10′ N., 74° W.), town, New York State, U.S.A.; brick-manufacturing centre. Pop. (1910) 5670.

HAVET, JULIEN (1853-93), Fr. writer; wrote *Du sens du mot 'romain' dans les lois franques*, and other critical historical works.

HAVRE, Le Havre de Grace (49° 29′ N., 0° 6′ E.), second greatest seaport of France; in Seine-Inférieure, on estuary of Seine; first-class fortress, with Church of Notre-Dame, town hall, museum, marine arsenal, etc.; large shipbuilding yards; cannon foundries, machinery, glassware, lace, cotton goods, etc. Pop. (1911) 136,159.

HAWAIIAN ISLANDS (20° N., 156° W.), called Sandwich Islands by Captain Cook, lie in midst of N. Pacific Ocean and form a territory of U.S.A.; total area, *c.* 6500 sq. miles. There are some twelve islands (eight inhabited), stretching *c.* 300 miles, E.S.E. to W.N.W.; a minor group, valuable only for shark-fishing and guano deposits, lies several hundred miles farther W.N.W. The inhabited islands are: Hawaii, the largest area, *c.* 4200 sq. miles, Maui, Oahu, Kauai, Molokai, Lanai, Niihau, and Kahulaui.

Hawaii has the largest volcano in the world—Mauna Loa (Great Mountain), still active and extending at sea-level about 75 miles by 50, and over 13,600 ft. in height; also Mauna Kea (White Mountain), *c.* 13,823 ft. The eruptions of Mauna Loa have consisted mainly of quiet discharges of enormous quantities of lava. About 16 miles S.E. lies hill called Kilauea, with largest active crater in world (over 8 miles in circumference). Maui (*c.* 750 sq. miles) has two large mts. Mauna Haleakla in E. (*c.* 10,030 ft.) has the largest (extinct) pit-crater in world (*c.* 19 sq. miles in area). Separated by low-lying sandy isthmus of Wailuku are the Western mts. Oahu (*c.* 600 sq. miles) is traversed by two parallel ranges of hills with a fertile plain of Ew-a between them. The coast is irregular and almost entirely surrounded with coral. Honolulu (*q.v.*), capital of the group, lies on S. coast. Pearl Harbour, near Honolulu, is being fortified, and a naval base is to be established by U.S.A. Kauai (*c.* 550 sq. miles) has precipitous coast-line in N.W. (over 2000 ft. in places), and is sometimes called the 'Garden Isle.' Molokai (*c.* 250 sq. miles), a small mountainous island, has a leper settlement. Lanai (*c.* 150 sq. miles) has considerable pasture-land for sheep on S. side. Niihau (*c.* 100 sq. miles) the most westerly, consists of low plains in W. and rises precipitously in E. Kahulaui (*c.* 70 sq. miles), which, like Lanai, is owned privately, is a small island—mountainous, bare, and rugged.

Climate is cool and healthy. There are large quantities of pumice, sandstone, sulphur, etc., and notwithstanding mts. and volcanoes, there are considerable forests and the soil is highly fertile and productive. Sugar and rice are most important products; coffee, honey, hides, fruit, tobacco, cotton, and rubber also exported; main industries are manufacture of sugar and cleaning of coffee and rice. History is obscure until discovery by Captain Cook in 1778; Cook killed by natives, 1779; kingdom established by Kamehmeha I. (d. 1819); Queen Liliukalani deposed, 1893; islands annexed by U.S.A., 1898; organised as U.S.A. territory, 1900. H. has a Gov., a House of Representatives, and Senate, and sends a delegate to U.S.A. Congress. The pop. is very mixed; half are Japanese and Chinese; pure Hawaiians form about one-eighth, and Portuguese another eighth. Japanese and Chinese immigration is now prohibited. Pop. (1910) 191,900.

Twombly, *Hawaii and its People* (London, 1900); Gordon Cumming, *Fire Mountains: The Kingdom of Hawaii* (2 vol's, 1883); Logan, *Hawaii: Its People, Climate, and Resources* (1903).

HAWARDEN (53° 11′ N., 3° 1′ W.), town, Flint, N. Wales. Hawarden Castle was Gladstone's seat. Pop. (1911) 26,912.

HAWAWIR, Semitic tribe of Sudan.

HAWEIS, HUGH REGINALD (1838-1901), Eng. author; incumbent of St. James's, Marylebone; famed as preacher and lecturer; author of *Music and Morals*, *Thoughts for the Times*, *Christ and Christianity*, etc.

HAWES, STEPHEN (d. *c.* 1523), Eng. poet; Groom of the Chamber to Henry VII.; his works include *Pastyme of Pleasure* (1509), *Convercyon of Swerers* (1509), *The Exemple of Vertu* (1512), etc. His works contributed to the formation of the Eng. literary language.

HAWFINCH, see under Finch Family.

HAWICK (55° 26′ N., 2° 48′ W.), burgh, Roxburghshire, Scotland, on both sides of Teviot; regular, well-built town; chief manufacturing town in S. Scotland; centre for hosiery, tweeds, blankets, etc.; also dye-works, tanneries; district rich in historic houses. Pop. (1911) 16,877.

HAWK FAMILY (*Falconidæ*), a large family of diurnal birds of prey (*Accipitrines*), comprising nearly 500 species found all the world over. They are distinguished from other birds of prey by the presence of a voice-box at base of windpipe, of a circlet of feathers surrounding the oil gland, of an aftershaft on the feathers, and by their feathered heads. The following are a few of the many types belonging to the Hawk family: the New World Caracaras (*Polyborinæ*) feed on living prey or on carrion, run rapidly, and nest on the ground. They differ from all other Hawks in having three toes instead of two, connected by a web. Long-legged Hawks, with the lower leg-joint or metatarsus at least equal to that above it, the tibia, form the group *Accipitrinæ*, found in all lands.

Among them are the active and destructive Sparrow Hawks (*Accipiter*), found in woods, where they feed on small mammals and birds; the larger Goshawks (*Astur*), used in hawking game-birds, hares, and rabbits; and the Harrier Hawks (*Circus*), found in marshy districts or on hillsides, roosting near the ground, and feeding on small mammals, birds, frogs, fishes, and even insects. The remaining 'Hawks' have the tibia longer than the metatarsus. The Buzzards (*Buteo*) generally frequent woods and have moderately long, square-cut tails and weak beaks. The Aquilinæ, with shorter tails, edges of beak straight or waved, and naked nostrils, include the Honey-Buzzard (*Pernis*), which feeds mainly on adult insects and the larvæ of bees; the Kites (*Milvus*) with partially forked tails, which feed on carrion and general refuse; the large fish-eating Sea-Eagles (*Haliaëtus*), with long wings, found nesting either on rocky headlands or in woods; and the true Eagles (*q.v.*) (*Aquila*), such

as the Golden Eagle, second in size only to the preceding. Lastly come the Hawks with notched beaks, among which are grouped the FALCONS (*Falco*)—the PEREGRINE (*F. peregrinus*), being specially noted for its speed and strength of flight, is on this account a favourite hawker, being flown at game and herons; it nests on seacoast cliffs. The HOBBY (*F. subbuteo*) is a harmless woodland inhabitant, while the MERLIN (*F. æsalon*) nests on the ground, and preys upon the smaller birds, in the latter respect resembling the KESTREL (*Cerchneis tinnunculus*), which, however, prefers trees or old buildings as a nesting site. All the above groups of hawks have resident or migratory representatives in Britain.

HAWKBIT, composite plant akin to dandelion (*q.v.*); leaves are strap-shaped; flowers in autumn.

HAWKE, EDWARD, BARON HAWKE (1705–81), Brit. admiral; b. London; entered navy at an early age and became commander when twenty-eight; served against Spain in W. Indies; rendered good service at Toulon, 1744; in 1747, off Belleisle, and in 1759, in Quiberon Bay, he inflicted ruinous defeats on Fr. fleets; also led an unsuccessful expedition against Rochefort in 1757; Admiral of the Fleet, 1768; First Lord of Admiralty, 1766–71; cr. peer, 1776.

HAWKER (*Hauker*, XVI. cent.), itinerant vendor; since 1888 distinguished from a 'pedlar' as travelling with a beast of burden.

HAWKER, ROBERT STEPHEN (1803–74), Eng. antiquary and poet; vicar of Morwenstow (Cornwall); famed for High Church views, strong personality, eccentricities; best known for ballad 'And shall Trelawny die?'; *Poetical Works* (1899).

HAWKESWORTH, JOHN (d. 1773), Eng. writer; edit. Captain Cook's *Journals* (1773); edit. Swift, and pub. much miscellaneous work.

HAWKHURST (51° 2′ N., 0° 31′ E.), town, Kent, England. Pop. (1911) 7296.

HAWKINS, CÆSAR HENRY (1798–1884), Eng. surgeon; surgeon to St. George's Hospital, London; pres. of Royal Coll. of Surgeons (1852 and 1861); introduced new operative methods, and author of several medical works. EDWARD, his bro., provost of Oriel Coll., Oxford, was a prominent figure in the Tractarian movement.

HAWKINS, HENRY, see BRAMPTON, BARON.

HAWKINS, SIR JOHN (1532–95), Eng. admiral; engaged in slave trade; defeated by Spanish, 1567; treasurer of navy, 1572; rear-admiral, 1588; fought against Armada; d. on voyage to West Indies.

HAWKINS, SIR JOHN (1719–89), Eng. author; chief work, *History of Music*.

HAWKINS, SIR RICHARD (1562–1622), Eng. admiral; s. of Sir John H.; commanded *Duck* galliot in Drake's raid on Span. Main (1585); captain of *Swallow* in attack on Great Armada (1588); sailed in the *Dainty* for the Pacific (1593), plundered Valparaiso, and, in San Mateo Bay, kept up a three days' fight with two Span. galleons; finally capitulated, and was for ten years prisoner; subsequently ransomed; knighted by James I.; and made vice-admiral of Devon.

HAWKMOTH, see LEPIDOPTERA.

HAWKS, FRANCIS LISTER (1798–1866), Amer. ecclesiastical historian.

HAWKSHAW, SIR JOHN (1811–91), Eng. engineer; chief engineer for many important undertakings, including Lancashire and Yorkshire Ry., East London Ry., Holyhead harbour, Penarth dock, Amsterdam Ship Canal, Inquiry on Suez Canal, Channel Tunnel Co., Severn Tunnel.

HAWKSMOOR, NICHOLAS (1661–1736), Eng. architect of school of Wren, whom he frequently assisted.

HAWKWEED (*Hieracium*), yellow-flowered plant of order *Compositæ* (q.v.).

HAWKWOOD, SIR JOHN, L'ACUTO (d. 1394), Eng. soldier-of-fortune; served under Black Prince in France; afterwards fought as mercenary in Italy, assisting Pisa against Florence, Milan against pope, pope against Milan, and finally entered Florentine service, 1378; see Ruskin's *Fors Clavigera*.

HAWLEY, HENRY (*c.* 1679–1759), Brit. general; commanded cavalry at *Culloden*, etc.

HAWLEY, JOSEPH ROSWELL (1826–1905), Amer. politician; served with distinction on Federal side in Civil War; Gov. of Connecticut (1866–67); subsequently member of Congress and Senator; leader of Republican party.

HAWORTH (53° 50′ N., 1° 57′ W.), town, Yorkshire, England; associated with the Brontës. Pop. (1911) 6505.

HAWTHORN (37° 49′ S., 145° E.), town, Victoria, Australia. Pop. 21,339.

HAWTHORN, a tree, *Cratægus oxyacantha*, natural order *Rosaceæ*, sub-order *Pomeæ*, with *polypetalous* white or red flowers and numerous *stamens* in whorls; the *stigma* ripens first, but *self-pollination* is possible. The fruit is a *pome*, the *carpels* of which are stony. H's are commonly used in Britain for hedges and for ornamental purposes.

HAWTHORNE, NATHANIEL (1804–64), Amer. author; b. Salem, Mass.; s. of a sea-captain; ed. Bowdoin Coll., where he had Longfellow as classmate; held positions in the Customs Service; was for a year associated with the transcendentalists at Brook Farm; Amer. Consul at Liverpool (1853–57); d. at Concord. He published *Twice-Told Tales* (1837), *Mosses from an Old Manse* (1846), *The Scarlet Letter* (1850), *The House of the Seven Gables* (1851), *The Snow Image*, and *The Blithedale Romance* (1852). Besides other novels, he wrote for children, *Tanglewood Tales* and *The Wonder Book*. H. ranks among the greatest of the imaginative writers that America has produced, and the high quality of his prose style has rarely been surpassed. He waited long for recognition in his own country, but *The Scarlet Letter* has long since achieved a world-wide popularity. His s., JULIAN (1846–), has written, among other works, *Nathaniel Hawthorne and his Wife* (2 vol's, 1883), *Nathaniel Hawthorne and his Circle* (1903).

Monographs by Henry James (1879), J. R. Lowell (1890), Woodberry (1902), Conway, Lathrop, Stearns.

HAWTREY, CHARLES HENRY (1858–), Eng. actor, manager, and playwright (light comedy).

HAWTREY, EDWARD CRAVEN (1789–1862), Eng. educationist; headmaster of Eton; responsible for many progressive reforms; famed for his classical scholarship.

HAXO, FRANÇOIS NICOLAS BENOÎT, BARON (1774–1838), Fr. general and most famous of Napoleon's engineers.

HAXTHAUSEN, AUGUST FRANZ LUDWIG MARIA, BARON VON (1792–1866), Ger. economist; author of valuable works on Prussian and Russ. land-laws.

HAY.—By the word hay we mean the dried stems and leaves of herbaceous plants which are used as fodder for domestic animals during periods when fresh food is not available. The methods of preparing hay vary considerably in details in different localities, but in principle they are the same. The herbage is first mown and then spread out in the fields to dry under the action of wind and sun. The more quickly this drying process is finished the finer is the aroma of the hay, and the more palatable is it to animals. It is next gathered into *coils* and finally stored in *hay-ricks*. The time of drying varies from two to ten days, and may be longer in unfavourable weather conditions. Insufficient drying may cause subsequent heating (due to bacterial action) in the rick, but this is sometimes held to improve the product. In England it is usual to cut natural pasture for hay; while in Scotland a special hay crop is generally grown. The chief hay plants are clover and the grasses—the most important being rye-grass, timothy, foxtail, and several species of fescue.

HAY (52° 4′ N., 3° 8′ W.), town, Brecknockshire, S. Wales; has castle, dating from Nor. times (twice burnt in XIII. cent.). Pop. (1911) 1603.

HAY (31° 27′ S., 152° 46′ E.), town, New South Wales, Australia. Pop. c. 3000.

HAY, GEORGE (1729–1811), Scot. R.C. theologian; restorer of Scot. R.C. hierarchy.

HAY, GILBERT DE LA, GILBERT HAY, Scot. poet of XV. cent., but chiefly interesting for his translations—early examples of vernacular prose.

HAY, JOHN (1838–1905), Amer. politician and writer; Assistant-Sec. of State, 1879; ambassador to England, 1897; Sec. of State, 1898–1905; wrote *Pike County Ballads.*

HAYASHI, TADASU, COUNT (1850–), Jap. statesman, who helped to bring about the alliance of Britain and Japan.

HAYDN, FRANZ JOSEPH (1732–1809), Austrian composer; b. Rohrau, near Vienna; a wheelwright's s.; joined St. Stephen's Cathedral choir, Vienna, 1740; app. conductor of Count Morzin's band, 1759; patronised by Esterhazy family; exceedingly popular in Vienna, then greatest European music centre. Among his pupils was Beethoven. H. greatly influenced his young friend, Mozart. H. was a slow but prolific composer; the first great writer of quartet and the 'Father of Symphony,' paving the way for Beethoven. Compositions: 118 symphonies, including *Farewell* (1772), *Toy*, and 12 written for Eng. visits (1791, 1794); 83 quartets, trios, operas, and oratorios—greatest, *The Creation* (1799) and *The Seasons* (1800).

Cuthbert Hadden, *Haydn* (1902); Cowen, *Haydn* (Masterpieces of Music, 1912).

HAYDON, BENJAMIN ROBERT (1786–1846), Eng. hist. painter; b. at Plymouth; studied at Royal Academy. Quarrels with the Academy and debt troubles made his life a burden, and he committed suicide. His best pictures are *The Judgment of Solomon* (1814), *Christ's Entry into Jerusalem*, and *The Resurrection of Lazarus.*

HAYES, RUTHERFORD BIRCHARD (1822–93), Amer. statesman; pres. of U.S.A.; b. at Delaware, Ohio; practised at Bar; served with distinction in Civil War; entered Congress, 1865; gov. of Ohio, 1867; nominated as Republican candidate for presidency, 1875, and elected, 1877. His term of office was marked by restoration of order in S. states, and introduction of civil service reforms.

HAY-FEVER, HAY ASTHMA, or SUMMER CATARRH, disease, often hereditary, occurring in the summer, which has been shown to be due to extreme sensibility to the pollen of grasses, at that time floating in the atmosphere; characterised by headache, swelling with watery discharge of the nasal mucous membrane, paroxysms of sneezing, and cough. Treatment is change of air, with avoidance of vegetation; cocaine or suprarenal extract applied to the mucous membrane, or destruction of the sensitive part of it by the cautery; and tonics, *e.g.* arsenic or quinine preparations, for the general system. A serum has been prepared, which is a very effective cure.

HAYLEY, WILLIAM (1745–1820), Eng. poet and biographer; his poetical works include *Triumphs of Temper, Essays and Epistles*, which were very popular; declined laureateship; also wrote *Lives* of Cowper (1803–4), Milton, and Romney.

HAYNAU, JULIUS JACOB (1786–1853), Austrian field-marshal; execrated in Liberal countries for his severity towards revolutionaries.

HAYNE, ROBERT YOUNG (1791–1839), Amer. politician; senator, 1823; advocated free trade; Gov. of S. Carolina, 1832; opposed Jackson.

HAYTER, SIR GEORGE (1792–1871), Eng. hist. painter and court painter to Queen Victoria.

HAYTI, see HAITI.

HAYTON (fl. 1250), king of Cilicia, 1224–69; allied himself with Mongols; travelled in W. Africa, Mongolia, and elsewhere, an account of his travels being written by Kirakos Gandsaketsi; abdicated, 1269, and entered monastery.

HAYWARD, ABRAHAM (1801–84), Eng. author; by profession a barrister, but became an extensive contributor to the *Quarterly Review* and other critical journals; pub. *Biographical and Critical Essays, Eminent Statesmen and Writers*, etc.; possessed a prodigious memory and exercised much influence on public opinion.

HAYWARD, SIR JOHN (*c.* 1560–1627), Eng. historian; pub. *The First Part of the Life and Raigne of King Henrie IV.* (1599), *Lives of the Three Norman Kings of England* (1613), *The Life and Raigne of King Edward VI.* (1630).

HAYWOOD, ELIZA (*c.* 1693–1756), Eng. novelist; wrote *Secret History of the Court of Caramania* (1727) and other novels.

HAZARA (34° N., 73° 5′ E.), district, Peshawar, India; surface is valley between mountain ranges; drained by affluents of Indus. Pop. 560,288.

HAZARAS, Mongolian people of Afghanistan.

HAZARD, Eng. game of dice, fashionable in the XVIII. cent.

HAZARIBAGH (23° 59′ N., 85° 20′ E.), town, Bihar and Orissa, India. Pop. 15,799. District has area of 7020 sq. miles. Pop. 1,177,961.

HAZEBROUCK (50° 44′ N., 2° 31′ E.), town, Nord, France. Pop. 12,819.

HAZEL, a shrub (*Corylus avellana*), natural order *Cupuliferæ*. It is *monœcious*, but the *stamens* and *carpels* do not occur in the same flowers. The *staminate* flowers hang in *pendulous inflorescences* named *catkins.* The small bud-like *carpellary inflorescences* are distinguished by the protruding tufts of red *stigmas.* These are borne on special *dwarf* shoots. The fruit is a one-seeded edible nut (cob or filbert), around which the *bracts* form a green cup.

HAZLETON (40° 53′ N., 76° 7′ W.), town, Pennsylvania, U.S.A.; centre of rich coal district. Pop. (1911) 25,452.

HAZLITT, WILLIAM (1778–1830), Eng. essayist and critic; b. Maidstone; s. of Unitarian minister; studied theol., and later, art, but subsequently took up journalistic work; formed friendships with Leigh Hunt and the Lake poets. He published *The Round Table* (1817), a vol. of literary sketches; *Characters of Shakespeare's Plays* (1817); *View of the English Stage* (1818); *Lectures on the English Poets* (1818); *English Comic Writers* (1819); *Dramatic Literature of the Age of Elizabeth* (1821); *Table Talk* (1821–22); *The Spirit of the Age* (1825); *Life of Napoleon Buonaparte* (1828–30), etc. H. stands in the front rank of Eng. essayists, and was one of the most penetrating of literary critics. His domestic life was unhappy, and his peculiar temper frequently involved him in quarrels with his contemporaries.

Birrell, *William Hazlitt* (Eng. Men of Letters Series).

HEAD, SIR EDMUND WALKER, Bart. (1805–68), Brit. administrator and writer; Gov. of Canada (1854–61).

HEAD, SIR FRANCIS BOND, Bart. (1793–1875), Brit. soldier, administrator, and writer; as Lieut-Gov. of Upper Canada put down revolt, 1837.

HEADON BEDS, see OLIGOCENE SYSTEM.

HEALTH, BILL OF, see under BILL.

HEALTH-RESORTS, see under MINERAL WATERS.

HEALY, GEORGE PETER ALEXANDER (1808–94), Amer. artist; excelled in portraits; painted several Amer. Presidents and other public men.

HEANOR (53° 1′ N., 1° 22′ W.), town, Derbyshire, England; coal, iron, hosiery. Pop. (1911) 19,851.

HEARING, see EAR.

HEARN, LAFCADIO (1850–1904), writer; b. in Ionian Islands, of Irish-Greek parentage; ed. in England; some years a journalist in America; subsequently naturalised in Japan, and turned Buddhist; author of *Glimpses of Unfamiliar Japan, Gleanings in Buddha Fields, In Ghostly Japan*, etc. His *Life and Letters* were pub. 1906.

HEARNE, SAMUEL (1745–92), Eng. Arctic

discoverer; found copper by Coppermine River, whose mouth he discovered.

HEARNE, THOMAS (1678–1735), Eng. antiquary; was assistant-keeper of the Bodleian Library, and later declined the chief librarianship; edit. Camden's *Annals*, Fordun's *Scotichronicon*, Leland's *Itinerary* and *Collectanea*, and numerous other antiquarian works.

HEARSAY EVIDENCE, see EVIDENCE.

HEARSE (Fr. *herse*, from Lat. *hirpex*, harrow), vehicle used to convey body to grave; usually black framework with glass sides. The framework resembles that of harrow-like candle-stands used in Rom. Catholic funeral ceremonies; formerly a funeral monument.

HEART, a cone-shaped, hollow, four-chambered, muscular organ, about the size of the closed fist, which acts as the central pump of the circulatory system, and is situated in the central part of the chest, resting upon the diaphragm, between the two lungs. It is held in place by the great vessels which leave or enter the organ, and by a serous membrane, the *pericardium*, in the form of a double bag, which ensheaths it completely, holding the h. in position by its attachment to the upper surface of the diaphragm. The two upper and posterior chambers of the h., or the *auricles*, are the receiving chambers for the blood; the right auricle receives the impure or venous blood conveyed to the h. by the superior and inferior *venæ cavæ*, carrying the blood from the upper and lower parts of the body, and the *coronary vein*, carrying the venous blood from the substance of the h. itself; the left auricle receives the purified blood from the lungs, conveyed to it by the pulmonary veins.

From the auricles the blood passes to the two lower and anterior chambers, or *ventricles*, which are larger than the auricles and have strong muscular walls; the right ventricle propels the impure blood to the lungs, where it is purified, while the left ventricle, which is the strongest and most muscular chamber, propels the purified blood throughout the body. The right auricle communicates with the right ventricle by an opening which is guarded by a valve, the *tricuspid*, opening towards the ventricle and composed of three triangular flaps which are attached by fibrous cords to muscular projections on the walls of the right ventricle. The opening by which the left auricle communicates with the left ventricle is guarded in the same way by a valve, the *mitral*, composed of two flaps. At the point where the pulmonary artery leaves the right ventricle, and similarly where the aorta leaves the left ventricle, there is a valve to prevent the flow of blood back to the respective chambers, composed in each case of three pocket-like cusps.

The action of the h. consists, first, of the simultaneous contraction of the auricles, which drives the blood into the flaccid ventricles, the quantity and weight of the blood in the large veins preventing any flow backwards into them; this is followed by the contraction of the ventricles, which drives the blood into the main arteries, the reflux of blood into the auricles being prevented by the closure of the tricuspid and mitral valves; after the contraction of the ventricles there is a pause, when the h. is at rest, then the contraction of the auricles recommences, and so on.

DISEASES OF THE H. may be divided into valvular disease, diseases of the various tissues, and diseases affecting the nervous control. Valvular *myocarditis* is inflammation of the myocardium, or h. muscle, which leaves the h. wall in a weakened state due to the pathological changes, fibrous tissue taking the place of muscle fibres, and often ends fatally in the acute stage; lesions result from inflammation of the valves, or *endocarditis*, which is a common sequel of acute rheumatism, especially in children, but may be due to other micro-organisms, such as those of pneumonia and influenza. The valve may become obstructed or may become incompetent and leak, so that extra work is thrown on one or more of the h. chambers, which in consequence enlarge and hypertrophy, and the effect of the valvular lesion is neutralised. So long as this compensation is efficient no treatment is necessary, except that violent exertion, excitement, alcohol, and tobacco should be avoided; but when the compensation fails there must be rest in bed until the h. recovers; digitalis and strychnine are administered as h. stimulants, and saline purgatives to relieve the circulation. Diseases of the various tissues of the h. include PERICARDITIS, or inflammation of the pericardium, the membranous sac surrounding the h., most commonly occurring after acute rheumatism; the h. muscle is also liable to be affected by *fatty degeneration*, occurring in anæmia, after acute fevers, or in such a condition as phosphorus poisoning; *cloudy swelling*, a swollen and granular condition of the muscle fibres, may take place, particularly in fevers; while great *hypertrophy* of the muscle fibres may take place in valvular lesions; ENDOCARDITIS, or inflammation of the lining membrane, is, as has been noted, a common complication of acute rheumatism, and most commonly affects the valves of the h.

ANGINA PECTORIS, a condition in which there are spasmodic attacks of pain, is due to disease of the coronary arteries, which supply the substance of the heart. *Palpitation* is often due to nervous derangement, resulting from over-indulgence in tobacco or alcohol or from fright or other emotional causes, and nervous conditions, affecting the nervous control of the h., may lead to irregularity, slowing, or rapidity of action.

HEARTH.—(1) Part of floor where fire is placed; (2) lowest part of blast-furnace above the crucible; (3) bottom of reverberatory or open-h. furnace; (4) brazier. H. MONEY (2s.) was levied 1662–89 on every house liable to poor-rates. H. PENNY was payment to Rome, dating from Saxon times.

HEARTS, Eng. card game for two or more players; each player tries to get rid of all hearts in his hand.

HEARTSEASE, see PANSY.

HEAT is that particular form of energy which consists in the kinetic and potential energy of the molecules of matter (see ENERGY). The ultimate particles of any mass are, at all temperatures above the lowest, in a state of agitation; each atom may be moving as a whole and it may have internal motions; the molecules (consisting of an assemblage of two or more atoms chemically alike or different) may have similar motions, and with them there may be associated potential energy due to the separation of their constituent atoms. All energy dependent on such motion or position is classed as heat, using the term in its strictest sense. The popular acceptation of the term is different and is associated with the relative hotness or coldness of a body as perceived by the senses, *i.e.* it is related to the *temperature* of the body, not to the heat-energy contained in the body.

The terms *latent* h. and *radiant* h. are also used. The former is applied to h. which when supplied to a body produces no change in temperature so as to be appreciated by a thermometer; *e.g.* if h. be supplied to a well-stirred mixture of ice and water, the temperature remains constant until the ice is completely melted. The h. so supplied is said to be *latent*. Correctly speaking, it has been transformed into potential energy due to the separation of the molecules of the ice during the passage of the substance into the liquid form. *Radiant* h. is not h. in the sense used above, but is energy of wave motion in the ether and only differs from light in the length of its waves (see RADIATION).

In ordinary circumstances, *i.e.* when no change of physical state takes place, any change in the heat-energy contained in a body produces a change in the state of hotness or coldness of the body, and to this state the name *temperature* is given. In order to give numerical expression to temperature, a scale is chosen. The common attribute of all temperature scales is that they have two definite points, fixed by reference to two definite conditions of a standard substance as regards its hotness or coldness, and this interval of temperature is divided into a certain

number of degrees. Any instrument which will indicate by means of such a scale the temperature of a body is termed a *thermometer* (q.v.).

Being one form of the objective reality which we term energy, h. must be capable of measurement. The unit of heat generally employed in scientific work is the *calorie*, which is the amount of h. required to raise the temperature of 1 gram of water 15° to 16° Cent. For engineering purposes the *Brit. thermal unit* is employed. It is the amount of h. required to raise the temperature of 1 lb. of water by 1° Fahr., and is equal to 252 calories. Another unit in practical use is the amount of h. required to evaporate 1 lb. of water at the boiling-point under standard atmospheric pressure, and is equal to 243,583 calories. The determination of a given quantity of h. in terms of these units is dealt with under CALORIMETRY. H. must also have quantitative relations with other forms of energy, and it is found that 1 calorie is equivalent to 42 million *ergs* (see ENERGY), and that the Brit. thermal unit is equivalent to 776 foot-pounds (see THERMODYNAMICS).

H. may be transferred from one body to another or from one part to another of the same body in three ways, viz. conduction (*q.v.*), convection, radiation (*q.v.*). In most cases all three modes of h. transference operate together. In *Convection*, h. is borne by moving masses of matter, such as steam in steam-heating apparatus (see HEATING). It is difficult to dissociate convection and conduction, but in the latter, h. is transferred by contact, and conduction is therefore more perfect just where convection is least perfect—in dense solids. H. has also very important effects when supplied to or withdrawn from a body. Indeed, there are few physical properties of matter which, otherwise constant, are not thus affected. The first effect is, in general, a change in temperature. The relation between the amount of h. added to a body and the consequent rise in temperature is expressed by the *specific* h. of the substance, and this is defined as the number of units of h. required to raise the temperature of unit mass of the substance by 1° Cent. Dulong and Petit showed that the product of the specific heat and atomic weight of elements in the solid state is approximately the same for all such elements, and to this product the term *atomic* h. is applied. It has also been proved that the product (known as the *molecular* h.) of the specific h. and molecular weight of a solid chemical compound is equal to the sum of the atomic h's of the elements contained in the compound. The complete generality of these statements is, however, qualified by the fact that specific h's rise with increasing temperature, and in all probability are, in the neighbourhood of the absolute zero of temperature (see THERMOMETERS), extremely low. The methods of determining specific h's is detailed under CALORIMETRY.

The next important effect of adding h. to a body is to change the volume, and in general all bodies increase in volume when heated. The increase is expressed numerically by the *coefficient of linear expansion*, which is the increase in length of unit length of a substance when heated by 1° Cent. The coefficient of cubical (or volume) expansion is correspondingly defined, and it is approximately thrice the linear coefficient. In gases, the coefficient of volume expansion is approximately ·00366. The expansion of bodies when heated and their contraction on cooling finds many useful applications in industry and in the arts. Obviously, there is need for a substance that will not be so affected, and this has been found in an alloy of steel and nickel, containing 36 % of nickel, known as *Invar*, which has the remarkably low coefficient of expansion of ·00000087, about thirteen times smaller than the coefficient of either of its constituents. It is now used for pendulum rods in clocks, and in various measuring instruments.

The third important effect of h. on matter is change of physical state. In general, the continuous addition of h. to a body causes it to pass from the solid to the liquid, and then to the gaseous (or vaporous) state. It is probable that if the means were available, all bodies could be made to assume any of these three states, provided that such assumption involves no chemical change (see FUSION, VAPORISATION). Changes of temperature also cause changes in the viscosity of fluids, electric resistance (see CONDUCTION, ELECTRIC), magnetic properties of matter, etc. Lastly, there must be noted the important fact that 'the velocity with which a chemical system strives to reach its state of equilibrium increases enormously with the temperature' (Nernst). Usually, the rate at which a chemical reaction takes place is doubled or trebled by a rise in temperature of 10° Cent.

Calorimetry is concerned with the measurement of quantities of heat. The apparatus used is termed a *calorimeter*. In the metric system the unit quantity of heat is the *calorie*, and *Great Calorie* = 1000 calories. Substances other than water, except liquid hydrogen, do not require so much heat for 1° rise, *e.g.* ice, mercury, copper, air, steam. Mercury absorbs about ·033, copper about ·091 calories. These numbers are the specific heats (S.H.), and increase with increase of temperature of measurement. Carbon, boron, and silicon show this increase remarkably, so that at high temperatures they tend to conform to *Dulong and Petit's Law*, specific heat × atomic weight = 6·4 nearly. A simple calorimeter may be made from a small sheet-copper vessel supported on corks and isolated from air currents by being placed inside a larger vessel. Such a vessel has a definite *water-equivalent*, which may be found by placing a given mass of heated water (A) at temperature t inside it and stirring it, when a rapid fall takes place, due to heat taken by the calorimeter and the stirrer. If tc is the original temperature of the calorimeter and tf the final temperature of the water and calorimeter, the water equivalent (W.E.) is $WE = A(t - tf)(tf - tc)$.

Once this is found, the specific heat of a body may be found where it is practicable to place such a body at a given temperature in a given mass of liquid in the calorimeter. If M be the mass of the substance heated to temperature ts, m the mass of the water (any substance of known specific gravity would do), to, the original temperature of the water, we, the water equivalent of the calorimeter, and tf the final temperature of the mixture, then the specific heat (S.H.) of the substance is given by $SH \cdot M(ts - tf) = (m + we)(tf - to)$, or if some other liquid of specific gravity sh be used, $SH \cdot M(ts - tf) = (sh \cdot m + we)(tf - to)$.

For any body the specific heat × mass gives the water equivalent or *thermal capacity*. A substance with a low specific heat like mercury comes rapidly to the temperature of its environment and is suited for thermometers. Water, again, stores much heat, is heated and cooled slowly, and is adapted for heating purposes. This property of water also causes certain meteorological effects. For gases and vapours, there exist a specific heat when the volume is kept constant, and a specific heat when the pressure is constant. The latter is greater than the former, owing to the work done in expansion against the pressure. The specific heats of steam in steam-engine theory and of air in gas- and oil-engine theory are of high importance.

Again, when a solid becomes liquid or a liquid a vapour, heat is absorbed in the change and is called latent. The one is latent heat of fusion; the other, of vaporisation. Engineers employ the *Brit. Thermal Unit* (B.Th.U.), the quantity of heat absorbed by 1 lb. of water in rising through 1° F. at 39° F.—more recently at 62° F. This equals about 252 calories, and, heat being a form of energy, is equivalent to 776 foot-pounds of work (Rowland and others).

Tait, *Heat*; Poynting and Thomson, *Heat* (1911); Soddy, *Matter and Energy* (1912); Preston, *Theory of Heat*; Nernst, *Theoretical Chemistry* (1911).

Animal Heat is the h. continuously produced in the body of an animal, depending on the activity of the disintegration and oxidation of protoplasm.

Both cold-blooded and warm-blooded animals are h.-producers to a very considerable extent, but the proportional loss of h. is greater in the cold-blooded. H. is produced by the muscles in working, by the secretory glands, particularly the liver, and by the brain. H. is lost from the skin, by respiration, and by the excretions.

HEATH, HEATHER, LING, comprises a group of woody, low-growing shrubs, natural order *Ericaceæ*. *Erica tetralix* (cross-leaved heath) and *E. cinerea* (bell-heather) are insect-pollinated and *gamopetalous*. *Calluna vulgaris*, *Erica vulgaris*, *Ling* or *Heather*, has sepals resembling petals, very small petals, and is wind-pollinated. All are moor-plants, mostly evergreen, with narrow rolled leaves to prevent excessive evaporation.

HEATH, BENJAMIN (1704–66), Eng. writer on classical and religious subjects; f. of BENJAMIN H. (1771–85), headmaster of Harrow, who formed the noted *Bibliotheca Heathiana*.

HEATH, NICHOLAS (1501–78), Eng. theologian; bp. of Rochester, then of Worcester; of Catholic belief, though not a persecutor; abp. of York, 1555; supported Elizabeth, but refusing to accept Protestantism retired into private life.

HEATH, WILLIAM (1737–1814), Amer. general; failed in attack on Fort Independence, 1777; member of Board of War, 1779; Senator, 1791.

HEATHCOTE, SIR GILBERT (c. 1651–1733), Lord Mayor of London; associated with foundation of Bank of England; Whig M.P. The holders of the earldom of Ancaster are descended from him.

HEATHEN, Teutonic word of doubtful derivation, applied after acceptance of Christianity to those who clung to the Teutonic deities.

HEATHER, see HEATH.

HEATHFIELD, GEORGE AUGUSTUS ELLIOTT, BARON (1717–90), Brit. general who as gov. of Gibraltar defended it against French and Spaniards, 1779–82.

HEATING is usually carried out in dwelling-houses by COAL or GAS FIRES. Although 75 to 90 % of heat is lost through the chimney, such fires are the cheapest heaters. They also provide an efficient system of ventilation. STOVES and FURNACES are neither economical nor efficient. STEAM is largely used in public buildings and is very efficient. In factories the waste steam is utilised for heating, but otherwise the steam is manufactured in a boiler in the basement. From this it is carried in pipes throughout the building, *radiators* being placed in each room. RADIATORS consist of short vertical lengths of pipe through which the steam passes. They are of many patterns, and aim at providing a large surface from which the heat can radiate. Their position requires careful study, as much of the success of the system depends on it. From the radiator the heated air ascends to the roof, then passes to an inside wall, and finally to the floor. The condensed steam returns to the boiler by its own gravity, and this is therefore called the *gravity system*, and is used for heating small buildings. Larger buildings are heated by steam under pressure. The HOT WATER SYSTEM of heating is more economical but less satisfactory. The hot water rises by convection into a pipe in the top of the boiler. After circulation through pipes, radiators, etc., it is returned cold to the bottom of the boiler. There is an *expansion tube* to prevent rupture. *Steam*, *water*, and *electricity* have the common disadvantage of requiring the installation of a ventilation system. *Electricity* is too expensive for general use.

HEAVEN, the firmament, or empyrean; the atmospheric region, and the space in which the sun, stars, and planets are seen; the abode of God; the dwelling-place of the blest; a state of supreme happiness, etc. See PARADISE, ESCHATOLOGY.

HEAVY SPAR, see BARYTES.

HEBBEL, CHRISTIAN FRIEDRICH (1813–63), Ger. dramatist; b. Wesselburen (Holstein); best works are: *Gyges und sein Ring*, *Herodes und Mariamne* (dramas), the trilogy *Die Nibelungen*, and *Neue Gedichte*.

HEBBURN (54° 58′ N., 1° 45′ W.), town, Durham, England; shipbuilding yards. Pop. (1911) 21,766.

HEBDEN BRIDGE (53° 45′ N., 2° W.), town, Yorkshire, England. Pop. (1911) 7170.

HEBE (classical myth.), dau. of Zeus and Hera; cup-bearer to the gods; subsequently became wife of Hercules; gave place to Ganymede. She is usually represented as a beautiful maiden, bearing wine-cup and pitcher.

HEBEL, JOHANN PETER (1760–1826), Ger. pastoral poet and writer of essays and stories.

HEBER, REGINALD (1783–1826), Eng. hymnologist; bp. of Calcutta (1822); a man of great learning and piety; now chiefly remembered by his hymns, *From Greenland's Icy Mountains*, etc.

HEBER, RICHARD (1773–1833), Eng. book-collector; possessed one of the largest private libraries in the country; M.P. for Oxford Univ. (1821–26), and D.C.L. of that foundation.

HEBERDEN, WILLIAM (1710–1801), Eng. physician; practised med. at Cambridge, where he lectured on materia medica, and afterwards at London; author of works on medical subjects.

HÉBERT, JACQUES RENÉ (1757–94), Fr. revolutionary; led sect of *Hébertistes* against the *Girondins*; edit. *Le Père Ducheene*; instigated September Massacres; guillotined.

HEBREW LANGUAGE belongs to the Canaanitish branch of the Semitic group of languages, and approximates closely to Phœnician and Moabite, with which it shares the following characteristics: two genders, three-consonant roots, an inability to form compounds except in the case of proper nouns, two tenses in verb, imperfect and perfect, changed by prefix *wĕ* into aorist and future. The ancient angular type of lettering was replaced by square characters written from left to right, while the vowels were—if indicated at all—represented by 'points,' a system now elaborated by scholars and called the *Massoretic* punctuation (see H. LITERATURE). Hebrew was after the Exile replaced as spoken language by Aramaic, but it still persists as literary and cultured tongue, while modern vernacular is called 'Yiddish.' The alphabet in square characters is: א (*aleph*, a breathing), ב (*beth*, b), ג (*ghimel*, g, gh), ד (*daleth*, d), ה (*he*, h), ו (*wau*, w), ז (*zayin*, z), ח (*heth*, ch), ט (*teth*, t), י (*yodh*, y), כ, final ך (*caph*, c, k), ל (*lamedh*, l), מ, final ם (*mem*, m), נ, final ן (*nun*, n), ס (*samech*, s), ע (*ayin*, guttural), פ, final ף (*pe*, p, ph), צ, final ץ (*tsade*, ts), ק (*qoph*, q), ר (*resh*, r), ש (*sin*, s), שׁ (*shin*, sh), ת (*tau*, t, th).

Literature.—Hebrew literature is almost entirely based on the Old Testament, which comprises the highest literary productions of the race for a period of about 800 years. There are exhibited in the course of it not only the normal changes which such a lapse of time always makes in a language, but deeper-cutting differences—*e.g.* in Daniel, Chronicles, Nehemiah, and Ecclesiastes there is a very large proportion of Persian words. Yet there is a distinctly unifying tendency noticeable over the whole, and this is especially true of the Psalms, which do not probably belong to any particular period, but are a collection of slow and gradual growth. The most recent portions of the Old Testament are those mentioned above (330–160 B.C.), the oldest being parts of the Pentateuch (c. 800 B.C.). The later form of the language, Aramaic, with its admixture of Persian elements, became the common language of the people, and the older portions were, about the III. cent. A.D., in great part translated into this vernacular for use in the synagogues. This forms the *Targum*. Another process came into being, of amplification, especially of the Mosaic Law, not only that given in the Pentateuch but of the Oral or Traditional Law, which had been handed down among the elders; this compilation formed the *Halakhah*, and was collected in written form by Judah-ha-Nasi in the *Mishnah*. Side by side with this there grew up

a mass of expository writings which received the name of *Midrash*, and the compiling of which went on till the VIII. cent. As time wore on, these explanatory works themselves became the subject of critical commentary out of which grew the *Talmud* (first edition, Venice, 1520). So far most of the work had been a mere collection of anonymous commentaries, but from the XV. cent. onwards Hebrew literature acquired a more personal character. The Hebrew historians and theologians began to publish—such as Elias Levita, Dei Rossi, Joseph ben Joshua, Moses Cordovero, and, in the XVII. cent., Leon di Modena and David Conforte. In addition to these works, which were mainly of a historical and scientific nature and possess no striking literary merit, the liturgical literature grew steadily in volume.

Moses Mendelssohn, at the close of the XVIII. cent., attempted to tear Hebrew literature out of its groove and infused it with a new and more practical spirit. His great work, the German translation of the Pentateuch, marked, however, in reality the end of purely Hebrew writings. Henceforth, though Hebrew thinkers and scholars were to contribute powerfully to modern culture, they used the various European languages as the vehicle of their thought.

Abraham's *Short History of Jewish Literature* (London, 1906), and Winter and Wünsche's *Jüdische Literatur* (Leipzig, 1895).

Hebrew Religion.—It is impossible in the present state of our knowledge to give a complete account of Hebrew religion, as the materials for it are not adequate, being many of them of uncertain, and all of comparatively late date. Something, however, is known of primitive H. r. by archæology, and something more may be learnt by the comparative method. The evidence of the Tell-el-Amarna tablets shows that from 2000–1400 B.C. the Hebrews were much under Babylonian influence, and until about 600 B.C. they were merely one of a congeries of Semitic tribes closely akin not only in blood and language, but also in religion. There were probably tribal deities, much as in Arabia before Muhammad. Little can be said with certainty of H. r. before Moses, but then there was at any rate some progress in the direction of monotheism, though as yet only monolatry was attained.

The cult of Jahweh, Israel's god, was, however, purer than that of other Semitic deities, though when the Hebrews entered Canaan they took over some religious ideas and practices from the peoples whose land they conquered. The impure rites against which the prophets inveighed were not a native Hebrew growth. But the conflict between Israel and the neighbouring peoples developed a new order—the prophets. At first they were only *seers*, those possessed of 'second sight'; then they became the witnesses and declarers of God's will to men. Prophecy was one of most remarkable developments of the Hebrew religious genius, and one which marked it off from other peoples, whose religion started similarly, but failed to rise to any great height. In the VIII. cent. Amos and Isaiah denounced a religion merely of rites and sacrifices, and preached gospel of righteousness—the idea of religion as something largely ethical was only just beginning to emerge. But higher spiritual results could not be attained before the national kingdoms of Israel and Judah had been overthrown and the people had endured the weary discipline of the Exile.

The religious teaching of Jeremiah and his career present, it has been said, as close a parallel to that of Christ as any in the Old Testament. Religion, too, became more individual, and the feeling of personal responsibility to God was realised; 'The soul that sinneth it shall die.' The conception of the 'suffering servant' (*i.e.* the Hebrew nation) was evolved. Meanwhile the turning-point in religious history was the reformation under King Josiah, 621 B.C., when was established the 'Law of the One Sanctuary.' Henceforward people had to come up to Jerusalem to sacrifice, and about this time the Book of *Deuteronomy* was produced. Though these tended in some ways to a too *legal* religion, it was probably only thus that monotheism could be safely secured. After the return from Exile the reconstruction of religion in the restored nation was largely due to Ezekiel, who with the functions of a prophet also combined those of a priest. The elaborate sacrificial system which was to last till the destruction of the Temple was organised, and during the V. cent. the so-called Priestly Code, the latest embodiment of Hebrew ritual, was evolved.

From this period until the time of Christ several important developments took place. H. r. became intensely legal, and its idea of God transcendent. The nation passed through the fiery trial of the conflict with debased Hellenism under the Seleucid kings, and was brought through by the energy and devotion of the Maccabees (to this date some would assign many portions of the Book of *Isaiah* often thought to be earlier). The Exile left its mark on Hebrew theology, particularly in angelology; eschatology (*q.v.*) became prominent, and various conceptions of a coming Messiah floated in men's minds. Each of these was destined to have enormous effect on early Christian theology; the genesis of these ideas is in some cases uncertain, but the ideas of angels and of a resurrection were due to Zoroastrian influence, and the various woes through which Israel had passed gave rise to the longing for a better age. In the *Book of Enoch* the Messiah is pre-existent—an important development. Hebrew thought also came into contact with Gk. philosophy, so the 'Wisdom' literature was written, and the curious tendency to personification or semi-personification of divine attributes and spiritual forces, 'half persons and half powers,' resulted from this or other causes. Thus H. r. at the time of Christ, while retaining its ancient sacrifices and traditions, was a complex thing, in which various elements were mingled.

Barney, *Theology of the Old Testament*; Addis, *Hebrew Religion*; Cook, *Religion of Ancient Palestine*; Davidson, *Old Testament Theology*.

HEBREWS, EPISTLE TO THE, stands quite by itself in the New Testament Canon. Although bearing in the title in the Eng. versions the name of St. Paul, this is wanting in the oldest MSS.; besides this the whole style, tone, and theol. is different from that of St. Paul. Its author is really unknown—possibly Apollos; one suggestion is Priscilla, in which case it would be the only New Testament writing by a woman. Its language is the finest and most polished Greek in the New Testament. Its theol. is distinct in some ways from the rest of the New Testament. Its central idea is the *high-priesthood* of Christ. The opening chapter declares the function of the Son in Creation, and His relation to the Father, the effulgence of His glory and the very image of His substance. Christ as high-priest offers Himself as a perfect sacrifice, of which the ancient Jewish sacrifices are the antitype. Chapter 2 on Faith is very remarkable. The Epistle is unsurpassed for its profundity of thought, spirituality, and beauty of expression.

Hebrews, A. S. Peake (*The Century Bible*).

HEBREWS, GOSPEL OF, see APOCRYPHA.

HEBREWS, NEW, see NEW HEBRIDES.

HEBRIDES, THE, or WESTERN ISLES (57° 45′ N., 6° 50′ W.), large group of islands extending over 200 miles along W. coast of Scotland; area, *c.* 2810 sq. miles; divided by Little Minch into OUTER HEBRIDES, consisting of, from N. to S., Lewis and Harris, N. and S. Uist, Benbecula, and numerous islets; and INNER HEBRIDES, consisting of Skye, Rum, Eigg, Canna, Coll, Tyree, Mull, Ulva, Staffa, Iona, Colonsay, Jura, and Islay. Scenery is wild and picturesque; climate mild and moist; industries—sheep-rearing, fishing, fowling, tweeds. The Hebrides were ceded by Norway to Scotland, 1266; subdued by Lord of the Isles (*q.v.*), 1346; annexed to Scot. Crown, 1540.

HEBRON (31° 31′ N., 35° 8′ E.), town, Palestine; has enclosure built over rock cave, which is traditional

tomb of Abraham and other patriarchs. Pop. c. 10,000.

HECATÆUS OF ABDERA (IV. cent. B.C.), Gk. philosopher; a source of Diodorus Siculus.

HECATÆUS OF MILETUS (*c.* 550–470 B.C.), Gk. historian and geographer; wrote *Travels about the Earth* and a hist. work in which he endeavoured to separate mythology from fact; latter contained in Müller's *Fragmenta Historicorum Græcorum*.

HECATE (classical myth.), dau. of Perses and Astræa, sometimes identified with Persephone; was the goddess of witchcraft and enchantments, also of fertility, her power extending over heaven, earth, and hell. She was sometimes represented as triple-bodied, at other times as a tall woman, with sword and torch. Dogs and black lambs were sacrificed to her.

HECATOMB, the sacrifice or slaughter of many victims; amongst the ancient Greeks and Romans, sacrifice of one hundred oxen.

HECKER, FRIEDRICH FRANZ KARL (1811–81), Ger. revolutionary; member of Baden Chamber of Deputies, 1842; with object of founding Ger. republic, raised military force against government, but was defeated, 1848; withdrew to Switzerland; subsequently served on Federalist side in Amer. Civil War.

HECKER, ISAAC THOMAS (1819–88), Amer. R.C. evangelist; of Ger. parentage; became R.C., 1844; entered Redemptorists; ordained priest, 1849; undertook evangelisation of America, realising it must be by Amer. methods; went to Europe, 1857, provoking hostility of anti-republicans and those who imagined he would 'liberalise' Church; but H. was a quite orthodox Catholic.

HECKMONDWIKE (53° 43′ N., 1° 40′ W.), town, Yorkshire, England. Pop. (1911) 9017.

HECLA, Hekla, see Volcanoes.

HECTOR (classical myth.), Trojan hero; s. of Priam and Hecuba, husband of Andromache, f. of Astyanax; killed Ajax in single combat, and slew Patroclus; was himself afterwards slain by Achilles.

HECUBA (classical myth.), wife of Priam, king of Troy; at the fall of the city became the spoil of Odysseus; subject of a tragedy by Euripides.

HEDGE, feature of Eng. agriculture now largely giving place to the fence. Hedging and ditching at the king's command were among the duties of the Anglo-Saxon thegn.

HEDGE SPARROW, see under Thrush Family.

HEDGE-ACCENTOR, see under Thrush Family.

HEDGEHOG or Urchin (*Erinaceus*), a short-snouted Insectivore characterised by spiny covering and short tail; nocturnal; feeds on worms, lizards, snakes, eggs, and even rats and mice; hibernates in winter.

HEDGE-MUSTARD (*Sisimbrium*), plant of *Cruciferæ* order (*q.v.*); 1–2 feet high; yellow flowers; common Brit. weed.

HEDJAZ, see Hejaz.

HEDON (53° 45′ N., 0° 13′ W.), town, Yorkshire, England; has fine cruciform church dedicated to St. Augustine; important port in XIV. cent. Pop. (1911) 2376.

HEDONISM, ethical theory which may be of two kinds—(1) that every man makes pleasure his goal; (2) that pleasure is the only ultimate good. The ancient Cyrenaics and (differently) Epicureans were hedonists.

HEDYMELES, grosbeak. See under Finch Family.

HEEK, ALEXANDER VON, Hegius (d. 1498), Ger. who founded or reformed school at Deventer, where Erasmus was a scholar.

HEEL, back division of foot; possibly regarded as hinge in walking, hence to h. over, to turn; anything that covers the h. Leavings of liquor in a glass are h. taps. See also Achilles.

HEEM, JAN DAVIDSZ VAN (fl. XVII. cent.), Dutch painter; chief painter of flowers, insects, glass, and similar still-life studies, of his school. His son, **Cornelius** (fl. XVII. cent.), was a lesser master in the same kind.

HEEMSKERK, MARTIN JACOBSZ (1498–1574), Dutch religious painter of Ital. school; many of his principal works were burned at Haarlem in 1572; those left are remarkable for sculpturesque figures.

HEEREN, ARNOLD HERMANN LUDWIG (1760–1842), Ger. historian of classical institutions.

HEFELE, KARL JOSEF VON (1809–93), Ger. R.C. theologian and ecclesiastical historian; bp. of Rottenburg, 1869.

HEGEL, GEORG WILHELM FRIEDRICH (1770–1831), Ger. philosopher, founder of Absolute Idealism; b. Stuttgart; ed. Tübingen Univ.; went to Jena, 1801, and app. prof., 1805. In 1808, app. rector at Nuremberg gymnasium; prof. at Heidelberg, 1816, and at Berlin, 1818. Henceforth the leading philosophic thinker in Germany. Chief works, *Phenomenology of Spirit* (1807), *Science of Logic*, *Encyc. of Philos. Sciences*, *Philosophy of Rights* (1821), and the posthumous lectures on *Æsthetics*, *Phil. of Religion*, and of *History*.

H. propounds absolute idealism, the highest point of the idealistic movement initiated by Kant. The dualisms of noumena and phenomena, rational form and sensuous matter, speculative and practical reason, are rejected. Reason becomes the essence of reality, no longer a human faculty. The identity of subject and object is accepted as indisputable, whence whatever is true of the idea is also true of the thing, i.e. ideas and objects are correlates. A basis for this position is found in the principle of the 'identity of contraries'—that contradictories do not mutually exclude each other. Nothing exists but 'relations' of subject and object; things we know are appearances both to us and in themselves; the real objectivity is that our Thoughts are at once Thoughts and the reality of Things. The universe is a process of the development of an Idea (Idee). Everything must be considered *per se*, then in its negation, as some other thing, and these contraries must be identified in a third thing, the Relation of the two. Hence, in order, logic, philosophy of nature, and philosophy of spirit.

Logic is an examination of Things, as well as of forms of Thought, since, as above, object and subject are identical. It therefore takes the place both of the ancient Logic and of Metaphysics. It contains the whole system of Science, and the other parts are but applications of it. Nature shows a development from the lowest to the highest, a struggle of the Idee to realise itself objectively. Every modification of the Idee in the realm of pure thought it attempts to express in that of Nature. Subjectively, the Idee realises itself first as Soul, then, returning upon itself, as Consciousness; finally it becomes self-conscious and is then Reason. Objectively, the Idee becomes Will, realising itself in History and Law.

There are four great 'moments' of History: (1) In the East, substantiality predominant; the rights of men unknown. (2) In Greece, individuality predominant, some men being free. (3) In Rome, an opposition between the subjective and objective; political universality and individual freedom both developed, yet not united. (4) In Teutonic nations, the unity of the contradictions; all men free.

In ethics, good conduct, as with Kant, is conscious realisation of the free reasonable will. But the universal will is conceived as objectively presented to each man in the institutions and customs of his community.

Caird, *Hegel* (1886); Macintosh, *H. and Hegelianism* (1903); M'Taggart, *A Commentary on Hegel's Logic* (1910); Hutchison Stirling, *The Secret of H.* (1898).

HEGEMON OF THASOS (V. cent. B.C.), Gk. comic writer; praised in Aristotle's *Poetics*.

HEGEMONY (Gk. *hegemonia*, leadership), primacy of one state in a federation, *e.g.* pre-eminence of Athens in the Delian Confederacy (*q.v.*).

HEGESIAS OF MAGNESIA (fl. III. cent. B.C. ?), Gk. orator; much condemned in the Augustan Age; author of life of Alexander the Great.

HEGESIPPUS (fl. IV. cent. B.C.), Athenian states-

man; probably author of speech, *De Halonneso*, ascribed to Demosthenes.

HEGESIPPUS (fl. II. cent.), patristic writer.

HEGESIPPUS, putative author of *De Bello Judaico*, IV.-cent. rendering of Josephus.

HEGIUS, see HEEK.

HEIBERG, JOHAN LUDWIG (1791–1860), Dan. poet and critic; wrote plays, vaudevilles, verse and literary criticism.

HEIDE (54° 12′ N., 9° 5′ E.), town, Schleswig-Holstein, Prussia. Pop. (1905) 8758.

HEIDEGGER, JOHANN HEINRICH (1633–98), Swiss scholar and controversialist.

HEIDELBERG (26° 30′ S., 28° 20′ E.), town, Transvaal, Brit. S. Africa. Pop. (1911) 38,580.

HEIDELBERG (49° 24′ N., 8° 42′ E.), city, Baden, Germany; beautifully situated on Neckar, near Rhine, surrounded by hills covered with forests and vineyards. St. Peters-Kirche (XV. cent.), Gothic Heilige-Geist-Kirche Jesuiten-Kirche; town hall; fine castle on hill, 330 ft. high, with great vat capable of holding 50,000 gallons of wine; celebrated univ. (1385); beer, wine, and book industry; residence of Counts Palatine, *c.* 1155–1721; great centre of Ger. Calvinism; sacked by French, 1688, 1693; annexed to Baden, 1803. Pop. (1910) 56,016.

HEIDELBERG CATECHISM, THE, Prot. catechism compiled by order of Elector Frederick III. in 1563, by Zacharias Ursinus and Caspar Olevianus; accepted by Heidelberg synod, but attacked by extreme Lutherans; on somewhat different lines from most catechisms, it possesses great spiritual beauty, and has been often translated.

HEIDELOFF, KARL ALEXANDER VON (1788–1865), Ger. architect; designed many celebrated castles, including Landsberg, Reinhardsbrunn, and Rosenburg.

HEIDENHEIM.—(1) (48° 40′ N., 10° 10′ E.) town, Württemberg, Germany. Pop. (1910) 17,780. (2) (49° 1′ N., 10° 45′ E.) town, Bavaria, Germany.

HEIGEL, KARL AUGUST VON (1835–1905), Ger. novelist; pub. *Der Roman einer Stadt*, *Die Dame ohne Herz*, *Die nervöse Frau*, etc.; also plays and short stories.

HEIJERMANS, HERMANN (1864–), prominent Dutch playwright and novelist.

HEIJN, PIET, see HEYN, PIETER PIETERZOON.

HEILBRONN (49° 8′ N., 9° 13′ E.), town, Württemberg, Germany; has XI.-cent. Gothic church and other interesting buildings; industrial centre. Pop. (1905) 40,026.

HEILIGENSTADT.—(1) (51° 23′ N., 10° 7′ E.) town, Pruss. Saxony, Germany. Pop. (1910) 8218. (2) (49° 51′ N., 11° 10′ E.) town, Bavaria, Germany.

HEILSBERG (54° 7′ N., 20° 35′ E.), town, E. Prussia, Germany. Pop. (1905) 6042.

HEILSBRONN (49° 20′ N., 10° 46′ E.), town, Bavaria, Germany. Pop. *c.* 1300.

HEIM, FRANÇOIS JOSEPH (1787–1865), Fr. historical painter.

HEIMDALL (Scand. myth.), s. of Odin; guardian of the rainbow bridge, Bifröst. He bore the horn, Gjallar; scarcely ever slept; could see vast distances; and could hear the grass grow.

HEIMSKRINGLA, see SNORRI STURLASON.

HEINE, HEINRICH (1797–1856), Ger. poet; b. Düsseldorf, of Jewish parents; studied law at Bonn, Göttingen, Berlin; adopted Christianity, 1825; pub. *Reisebilder* (1826), *Buch der Lieder* (1827), which made him the most popular poet of Germany; visited England, 1827; *Engliche Fragmente* appeared, 1831. H. settled in Paris, 1831, after unhappy love affairs with his cousins; to this period belong *Französische Zustände*, 1833, *Der Salon*, 1834, *Ludwig Börne*, 1840, *Die Romantische Schule*, 1836 (prose works); *Atta Troll*, 1847, *Romancero*, 1851, and *Letzte Gedichte und Gedanken*, 1853, 1855, rank among his finest poetical works; bedridden, 1848–56; d. Paris. H. ranks as perhaps the most cosmopolitan Ger. poet; belongs partly to Romantic movement, partly to 'Young Germany' revolt; great lyric and *spiritual* writer, marred at times by cynicism, sentimentality, and bad taste.

Life, by Stigand (1875), Sharp (1888).

HEINECCIUS, JOHANN GOTTLIEB (1681–1741), Ger. writer on Rom. jurisprudence. His bro., JOHANN MICHAEL (1674–1722), wrote *De veteribus . . . sigillis*.

HEINECKEN, CHRISTIAN HEINRICH (1721–25), 'the child of Lübeck'; Ger. child of marvellous learning and reasoning powers.

HEINICKE, SAMUEL (1727–90), Ger. deaf and dumb educationist.

HEINSE, JOHANN JAKOB WILHELM (1749–1803), prominent Ger. novelist.

HEINSIUS, DANIEL, HEINS (1580–1655), distinguished Dutch scholar who edit. classics, wrote Lat. poems, etc. His s. NIKOLAES (1620–81), equally famous on the same lines, left an illegitimate s. NIKOLAES, author of the romance *Mirandor* (1675).

HEIR, originally inheritor in fee (*h. at law*), afterwards inheritor, next of kin, or devisee. *H. apparent* is person who will inherit if he lives; *h. general* is h. at law; *h. presumptive*, person who will inherit if conditions remain the same; *right h.* is next of kin. See INHERITANCE.

HEJAZ (25° N., 40° E.), vilayet and province of Arabia, along shores of Red Sea; bounded N. by Syria, E. by Nafud desert and Nejd, S. by Asir. Contains Tehama range of mts., and is almost all stony desert; northern portion desolate and thinly populated; in S. more cultivation, dates, wheat, and barley being chief products. Chiefly interesting on account of sacred cities of Mecca and Medina, which it contains along with seaports Jiddah and Yambu; railway connecting cities of H. with Damascus under construction, and completed as far as Medina in 1908. Area, *c.* 97,000 sq. miles. Pop. 300,000.

HEJIRA, HIJRAT, see under MUHAMMADAN LAW.

HEKLA, see VOLCANOES.

HEL, HELA, the goddess of death in Scandinavian mythology; dau. of Loki and Angurboda; to her went all who died by disease; dwelt in Niflheim, place of eternal snow and darkness.

HELDENBUCH, DAS, Ger. poetic cycles of XIII. cent.; chief figures are Dietrich of Bern, Wolfdietrich, Hugdietrich, and Ortnit. The first printed edition appeared without date, the second 1491; many modern edit's.

HELDER, THE (52° 57′ N., 4° 45′ E.), port, Holland; strongly fortified. Pop. (1910) 27,358.

HELEN OF TROY (classical myth.), dau. of Zeus and Leda, wife of Tyndareus, king of Sparta; famed for her beauty; became the wife of Menelaus, but eloped with Paris, s. of Priam, king of Troy, which act led to the Trojan War.

HELENA (34° 30′ N., 90° 36′ W.), town, Arkansas, U.S.A.; cotton trade. Pop. (1910) 8770.

HELENA (46° 34′ N., 112° 3′ W.), capital, Montana, U.S.A.; has univ., cathedral; industrial centre. Pop. (1910) 12,515.

HELENA, ST. (*c.* 247–328), wife of Rom. emperor Constantius I., and mother of Constantine the Great; accepted Christianity and made pilgrimage to Jerusalem, where she is said to have discovered the Cross and built churches of the Holy Sepulchre and Nativity.

HELENSBURGH (56° N., 4° 43′ W.), town, watering-place, Dumbartonshire, Scotland. Pop. (1911) 8529.

HELENUS, s. of Priam; mentioned in the *Iliad*, and prominent character in later Gk. legend.

HELGAUD (fl. early XI. cent.), chaplain of Robert II. of France and author of *Epitoma vitæ Roberti regis*.

HELGESEN, POVL (fl. early XVI. cent.), Dan. political and religious controversialist.

'HELIAND' (the Saviour), Old Saxon poem of about 6000 lines on New Testament history by unknown author; written early in IX. cent.; four MS. *Codices* of it are extant.

HELIANTHUS, see SUN-FLOWER.

HELICON (38° 17′ N., 22° 53′ E.), mountain range, Bœotia, Greece; traditional home of Muses.

HELIGOLAND, HELGOLAND (54° 11′ N., 7° 53′ E.), small island and fortress in North Sea, about 28 miles from mainland, belonging to Germany; consists of Oberland and Unterland; famous seaside resort; once possessed by Schleswig-Holstein-Gottorp; taken by Danes, 1714; by British, 1807; ceded to Germany, 1890; area, ½ sq. mile. Pop. (1910) 3416.

HELIODORUS (fl. c. III. cent. A.D.), author of the *Æthiopica*, a Gk. story which had great influence on Renaissance writers.

HELIOGABALUS, ELAGABALUS (*c.* 205–22), Rom. emperor; became priest to sun-god Elagabal; emperor, 218; assassinated during army mutiny, 222.

HELIOGRAPH, signalling instrument that reflects sun's rays by mirrors; range of 190 miles has been reached.

HELIOMETER is an instrument used for measuring the sun's diameter and for micrometrical work on the stars. It is based on the fact that measures can be made by double images. Dollond in 1754 observed that although an object-glass be divided through its axis a single image is still produced if the optical centres of the segments coincide, *i.e.* if the segments are in the same relative position as before the glass was cut. When they are separated each forms its own image of the object. Since 1820, when Frauenhofer used *achromatic* glasses which concentrate all the rays at one focus and give a distinct image, the h. has consisted of an *achromatic* telescope with its object-glass divided (by a plane passing through the optic axis of the telescope) into two segments, one fixed in the telescope tube, the other mounted so that it can be moved in a plane perpendicular to the telescope's optic axis. The movement is obtained by the revolution of a screw connected with an apparatus for counting the revolutions.

In very recent h's this reading is checked independently by a *micrometer* which measures directly the separation of the segments. When the two halves of the glass are coincident a single image of the sun is obtained, because the separate images are superposed. If now the glasses be separated till two images just touching each other are obtained, the one image will have moved through a distance equal to the sun's apparent diameter. From a circle of known diameter at known distance from the telescope the angle which a diameter of the circle subtends at the object glass of the telescope is calculated. The value of a revolution of the micrometer screw is obtained by measuring a circle of known diameter through the h. From these two measurements the actual diameter can be calculated. Recent modifications of the apparatus aim at increasing facility of movement and avoiding the effects of temperature changes.

HELIOPOLIS (the ON of the Bible), city of Lower Egypt, near Cairo, slightly N. of the Nile Delta; was one of the principal centres of sun-worship and of Egyptian learning. Cleopatra's Needle (on Thames Embankment) came from here. H. was also the name of Baalbek (*q.v.*).

HELIOS, see under APOLLO.

HELIOSTAT, instrument for reflecting a beam of sunlight in a fixed direction. A mirror is mounted on a spindle driven by clockwork whose rate can be adjusted. The clockwork case is so arranged as to allow the initial adjustment to be made.

HELIOTROPE, a plant with a sweet scent, belonging to a genus of 200 species of the natural order *Boraginaceæ*. They are small hairy shrubs. HELIOTROPE (*Cherry-Pie*) has terminal *spikes* of lilac flowers.

HELIOTROPE, see BLOODSTONE.

HELIOTROPISM, turning of a plant towards light; stems curve towards sun (*positive h.*), roots and stems of certain climbers turn away from sun (*negative h.*).

HELIOZOA, unicellular organisms, uninucleate or multinucleate, popularly called *sun animalculæ*, from possession of close-set, radiating, protoplasmic processes, each with a median rod passing into the deeper-lying parts of the animal; protoplasm highly vacuolate; reproduction takes the form of simple fission or budding, under favourable conditions, or consists in the formation of cysts in adverse periods; typical forms—*Actinophrys sol* and *Actinosphærium eichornii*, both commonly occurring among weeds in fresh water.

HELIUM, a gaseous element abundant in radioactive minerals, especially *thorianite*. A.W., 4. B.P., 4°·3 absolute. No stable chemical compound of it can be obtained. Its presence in minerals is due to mechanical absorption. It occurs in springs and the atmosphere, and is produced by the disintegration or *radium* emanations. It has a distinct *spectrum*.

HELIX, term in architecture for volute of capital, in Ionic and Corinthian orders, or other spiral.

HELIX, snail. See under GASTEROPODA.

HELL, the abode of the dead; also the place of punishment of the wicked, numerous times mentioned in the New Testament. Alternative names are the Gk. *Hades*; Heb. *Gehenna*; Scand. *Hela*.

HELLANICUS OF LESBOS (V. cent. B.C.); Gk. historian; wrote history of Attica (683–404); a chronological work on the Carnean games; also histories of Troy and Persia.

HELLEBORE is a genus of herbs belonging to natural order *Ranunculaceæ*.—HELLEBORE (*Christmas Rose*) has five or more petaloid sepals. The 'petals' are slipper-shaped *nectaries*. The stigma ripens first (*protogynous*) and self-pollination is impossible. The fruit is an aggregation of three *follicles*. It illustrates the transition from foliage leaves to *bracts* and *sepals*. In ancient times h. was used as a drug to cure insanity.

HELLENISM, a type of culture peculiar to the ancient Greeks. The Gk. character as reflected in Hellenic religion, poetry, art, and philosophy makes for clearness, measure, and balance, and eschews the vague, the undefined, the excessive. The Gk. ideal is therefore the antithesis to the Gothic. In architecture the Gothic mind expressed itself in soaring arches and mysterious curves. The Gothic mythology deals with vast, titanic, cloud-like beings, neither human in character nor restricted in power. The Gk. mind is well illustrated by the motto of the ancient Delphic temple, 'Nothing in excess.' In Gk. mythology the outstanding characteristic is the extraordinary definiteness of the gods and goddesses. Each god has his peculiar attributes, his fixed bodily shape, and his allotted functions. Mystery has no place in the Gk. Pantheon. Similarly in philosophy the theory that virtue lies in preserving the 'mean' is characteristically Gk. Thus bravery is regarded as a mean between rashness on the one hand and cowardice on the other.

But it is in the Periclean age that we find H. in its most perfect expression. It is as though the conflict with so alien a people as the Persians had (by showing the contrast) helped the Greek to realise his own true being. Moreover, the common peril had united the Gk. states as they had never been united before, and forced them to realise their own kinship and ideals in common. In the age of Pericles, then, Gk. art and lit. reached the zenith, and true H. found its supreme expression.

The greatest and noblest architectural creation of the Periclean age was the Parthenon. The outstanding features of the Parthenon are nobility, sanity, and restraint. The temple is of the Doric order, and of the three great Gk. orders the Doric is the severest and yet the most sublime. The shaft of the Doric column springs straight from the step, and culminates in the simple square abacus. Adornment and elaboration there is none. Sublimity is reached through perfect symmetry and perfect balance. The Parthenon also contained the finest examples of Gk. sculpture—the work of Pheidias. Unfortunately time has not spared

us the masterpieces of Pheidias, but from the magnificent pediment figures, which are at least of his school, we can have some conception of their beauty and grandeur. The keynote in these figures is calm, symmetry, and repose.

In the dramas of Æschylus and Sophocles we see reflected the same spirit. Sentimentality has no place there; the emotion is vast, yet restrained and controlled. Even in *Prometheus Vinctus*, where the theme had a natural bias towards the Gothic ideal, we find the same perfect measure and completeness—the same obedience to the command that there be nothing in excess. H. set a limit to the infinite and crystallised the ideal.

HELLESPONT, ancient classical name of the Dardanelles (*q.v.*), the strait connecting the Sea of Marmora and the Ægean Sea; so called from Hellē, dau. of Athamas and Nephele, who, fleeing from the cruelty of her stepmother, Ino, fell from the air into the strait and was drowned.

HELLEVOETSLUIS, HELVOETSLUIS (51° 50′ N., 4° 7′ E.), port, S. Holland; fortified. Pop. (1910) 4518.

HELL-GATE, see under BLASTING.

HELLIN (38° 29′ N., 1° 38′ W.), town, S.E. Spain. Pop. 12,558.

HELLO, ERNEST (1828–85), author of *Physionomie de Saints* (Eng. trans., 1903).

HELMERS, JAN FREDERIK (1767–1813), Dutch political poet.

HELMET, headpiece in armour. Early h's were simply caps made of leather or metal, with attachments for protection of face and neck. In mediæval times some h's had a fixed nasal, while others had movable covers for protecting both upper and lower face, the whole head being covered during action. In XIV. cent. barred visors came into use. The *armet* first appears about 1443, and was a closed h., used only by horsemen. The XVI.-cent. *morion* had a projecting brim. Modern h's worn by policemen and firemen are made of metal, felt, leather, or cork.

HELMET SHELL, see GASTEROPODA.

HELMHOLTZ, HERMANN LUDWIG FERDINAND VON (1821–94), Ger. philosopher and physicist; prof. of Physiology in Heidelberg, and later of Physics in Berlin. He discovered nerve-cells in *ganglia*, invented the opthalmoscope, and measured the velocity of nervous impulse. It was by his inspiration Hertz commenced his work, which resulted in discovery of 'Hertzian' waves of wireless telegraphy. H. also perfected notion of electron.

Life, by M'Kendrick.

HELMOLD (fl. XII. cent.), Ger. chronicler; author of valuable *Chronica Slavorum*.

HELMOND (51° 28′ N., 5° 39′ E.), town, Holland. Pop. (1910) 14,767.

HELMONT, JEAN BAPTISTE VAN (1577–1644), Belg. physician, physiologist, and chemist; practised med. at Vilvorde, near Brussels; carried out experiments and propounded important theories regarding plant and human physiology, but value of his observations was marred by introduction of the supernatural to explain certain natural processes. His researches in chem., particularly regarding gases, are also valuable, but he was also an alchemist, believing in the philosopher's stone.

HELMSTEDT, HELMSTÄDT (52° 13′ N., 11° E.), town, Brunswick, Germany; ruined Benedictine abbey, fine churches; seat of univ. till 1809. Pop. (1910) 16,420.

HELM WIND, wind which succeeds cloud shaped like a helm on the Pennine Hills.

HELMUND (31° N., 61° 50′ E.), river, Afghanistan; has its source in Hindu Kush Mountains and flows to Lake of Hamun or Seistan.

HÉLOISE, see ABELARD.

HELOTS, the ancient serf population of Greece and the property of the Spartan State. They are supposed by some authorities to have been the original inhabitants of Laconia. They were employed in agricultural pursuits by the Spartans, and in war were required to perform military service. A revolt of the h's, in 464 B.C., was with difficulty suppressed.

HELPS, SIR ARTHUR (1813–75), Eng. essayist and historian; Clerk to Privy Council (1860–75); author of *Friends in Council*, *Companions of my Solitude*, *Conquerors of the New World*, etc.

HELSINGBORG (56° 2′ N., 12° 42′ E.), port, Sweden; fine harbour, docks; manufacturing centre. Pop. c. 32,000.

HELSINGFORS (60° 14′ N., 24° 57′ E.), capital of Finland (since 1819); strongly fortified; important naval station; has univ.; two cathedrals; excellent harbour; extensive Baltic trade. Pop. c. 169,500.

HELST, BARTHOLOMÆUS VAN DER (1613–70), Dutch artist; lived at Amsterdam; celebrated as portrait painter. One of his best pictures, *The Peace of Münster*, is in the Amsterdam Gallery.

HELSTON (50° 7′ N., 5° 16′ W.), town, Cornwall, England. Pop. (1911) 2938.

HELVETIC CONFESSIONS, ecclesiastical constitutions of Reformed Churches; drawn up in Switzerland; that of 1536 was prepared under influence of Bullinger and Bucer but was largely superseded by the second H.C., written by Bullinger in 1562.

HELVETIC REPUBLIC was established in Switzerland, 1798, after conquest by French.

HELVETII, inhabitants of S. Gaul (modern Switzerland). Cæsar praises their bravery. Their invasions of Italy were suppressed by Cæsar's victory at *Bibracte* and the establishment of Rom. colonies. They were separated from Gaul by Tiberius. The H. gave name HELVETIA to Switzerland.

HELVETIUS, CLAUDE ADRIEN (1715–71), Fr. philosopher; became farmer-general of taxes, 1738, gaining great wealth; retiring to country estate, wrote *De l'esprit*, which evoked storm of abuse. Many have denied its originality. Bentham was influenced by him. H.'s view of morals was utilitarian.

HELY-HUTCHINSON, JOHN (1724–94), Irish lawyer and politician; entered Irish Parliament, 1759; provost of Trinity Coll., Dublin, 1774; Sec. of State, 1777; advocated removal of Catholic disabilities, and free trade.

HELYOT, PIERRE (1660–1716), Fr. Franciscan historian; devoted many years to writing standard celebrated *Histoire des Ordres monastiques, religieux, et militaires*.

HEMANS, FELICIA DOROTHEA (1793–1835), Eng. poet; b. Liverpool; m. Captain H. (1812), but separated (1818). Her poetry is marked by excess of sentiment.

HEMATITE, see HÆMATITE.

HEMEL HEMPSTEAD (51° 46′ N., 0° 28′ W.), town, Hertfordshire, England; manufactures iron goods, paper. Pop. (1911) 12,888.

HEMEROBAPTISTS, Jewish sect (possibly Essene), whose members observed daily ablution.

HEMICHORDATA, primitive Chordate animals which have a 'notochord' only in the anterior end of the body.

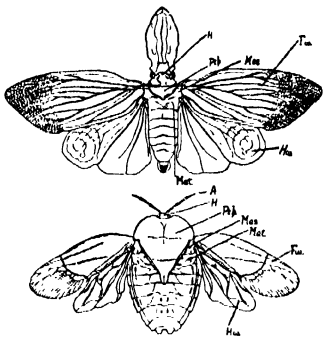
HEMICYCLE, semicircular plan characteristic of Rom. architecture and readopted at the Renaissance.

HEMINGBURGH, WALTER DE (fl. early XIV. cent.), Eng. chronicler; canon of Guisborough, Yorks; trustworthy source.

HEMIPLEGIA, see PARALYSIS.

HEMIPTERA, or BUGS, are *Insecta* invariably characterised by modification of mouth organs to form a suctorial, jointed proboscis, generally flexed so as to occupy a position on under side of body. The wings are four in number as a rule, and are external growths developed in successive moults from the hinder dorsal portions of the middle and posterior body-segments. They differ considerably in character in the two great sub-orders, *Heteroptera* and *Homoptera*,

the pairs varying in texture and folding flat on the back in the former, and in the latter covering the abdomen. The two sub-orders are further distinguished by the extent of the flexure of the head, this being much less in the *Heter.* than in the *Homo.* The young resemble the adult in general features, the transition from the juvenile to the adult being gradual. Amongst the most interesting forms, from an economic standpoint, are the *Aphides* or *Plant Lice*, which often swarm in incredible numbers over the host plant, and the scale insects or *Mealy-bugs*, which form small hard scales on fruit, twigs, etc. The *Anopleura* (Lice, *q.v.*) are degenerate wingless members of this order.



Sketches show (above) HOMOPTERA, *Laternaria phosphorea* (Linn.), and (lower) HETEROPTERA, *Tessaratoma Javanica* (Thunb.). *H*, head; *Pth*, prothorax; *Mes*, mesothorax; *Met*, metathorax; *Fw*, fore-wing; *Hw*, hind-wing; *A*, antennæ.

HEMLOCK, a herbaceous plant, *Conium Maculatum*, natural order *Umbelliferæ*, with white *inflorescence* of compound umbels and purple-spotted fluted *glaucous* stem. The leaves and fruit have a disagreeable odour and contain *alkaloid* poisons.

HEMORRHAGE, see HÆMORRHAGE.

HEMP is an annual herb, *Cannabis sativa*, natural order *Cannabineæ*. Originally an inhabitant of Persia it is now grown in all parts of Europe, because its bast fibres are used in the rope industry. The plant is *diœcious* with opposite lower leaves and deeply *partite* strongly *dentate* rough alternate upper leaves, with two lateral *stipules*. The male *inflorescence* is a *raceme* and the female flowers occur in the axils of the leaves. Petals are absent. The fruit is one-seeded. Intoxicating preparations for drinking and smoking, *e.g.* Arab. *Hashish*, Indian *Bhang*, are made from the female flowers, resin, and leaves.

HEMS, see HOMS.

HEMY, CHARLES NAPIER (1841–), Eng. marine artist; famed for studies of London shipping, and later scenes associated with Falmouth.

HÉNAULT, CHARLES JEAN FRANÇOIS (1685–1770), Fr. historian; wrote *Abrégé chronologique de l'histoire de France*, down to year 1715.

HENBANE, a flowering biennial plant, *Hyoscyamus niger*, natural order *Solanaceæ*. It contains in its leaves and flowers two *alkaloid* poisons, *Hyoscyamine* and *Hyoscine*, and a poisonous oil.

HENDERSON (37° 52′ N., 87° 31′ W.), town, Kentucky, U.S.A.; manufactures textiles, tobacco. Pop. (1910) 11,452.

HENDERSON, ALEXANDER (1583–1646), Scot. Presbyterian divine; prof. at St. Andrews; protested against liturgy in Eng. model; helped to draw up *National Covenant*; one of commissioners to interview Charles I., who liked him; tried to mediate between Charles and Parliament, 1642; Moderator of General Assembly; commissioner to Westminster Assembly; has been called 'the second founder of the Reformed Church in Scotland.'

HENDERSON, EBENEZER (1784–1858), Scot. missionary; travelled in Scandinavia, Russia, and various other countries; returned to England, 1825; an accomplished Oriental linguist.

HENDERSON, GEORGE FRANCIS ROBERT (1854–1903), Brit. soldier and military author; served with distinction in Egyptian campaign; Director of Intelligence in Boer War (1900–1); prof. of Military Art, Staff Coll. (1892–99).

HENDERSON, JOHN (1747–85), Eng. actor; achieved great success in leading Shakespearean parts at Drury Lane and Covent Garden; rival of Garrick; buried, Westminster Abbey.

HENDIADYS (Lat. from Gk. *hen dia duoin*, one by two), term in rhetoric for connecting two equivalent nouns by 'and'; common Virgilian usage, *e.g.* '*Vinclis et carcere frenat*,' or '*Italiam Lavinaque litora*.'

HENDON (51° 36′ N., 0° 14′ W.), town, Middlesex, England; chief English flying ground. Pop. (1911) 38,806.

HENDRICKS, THOMAS ANDREWS (1819–85), Amer. Democratic statesman; vice-pres., 1885.

HENGELO, HENGELOO (52° 16′ N., 6° 47′ E.), town, Holland. Pop. (1910) 20,522.

HENGIST and **HORSA**, two bro. Jutes, the first of the Teutonic invaders, called in to aid the Brit. king, Vortigern (*c.* 450), against the Picts. Horsa was subsequently killed in battle, but Hengist made himself king of Kent (458).

HENGSTENBERG, ERNST WILHELM (1802–69), Lutheran ecclesiastic; studied at Bonn, specially devoting himself to Old Testament and Oriental languages; prof. at Berlin, 1826; vigorously defended conservative positions in Biblical criticism.

HENKE, HEINRICH PHILIPP KONRAD (1752–1809), and his s., **ERNST LUDWIG THEODOR** (1804–72), Ger. ecclesiastical historians.

HENLEY, JOHN (1692–1759), Anglican clergyman, from 1729, at Lincoln's Inn Fields; called 'Orator Henley'; attracted attention by absurd innovations as preacher.

HENLEY, WILLIAM ERNEST (1849–1903), Eng. poet; b. Gloucester; edit. successively *The Magazine of Art*, *National Observer*, and *New Review*; collaborated with R. L. Stevenson in several plays; part author of a Slang dictionary and a *Life* and edition of Burns; a trenchant and fearless critic; wrote some exquisite lyrics.

HENLEY-ON-THAMES (51° 36′ N., 0° 54′ W.), town, Oxfordshire, England; noted for yearly regatta in June. Pop. (1911) 6456.

HENNA, the powdered leaves of *Lawsonia inermis*. These contain a red stain used, in Persia and India, to dye the finger-nails, etc.

HENNEBONT (47° 50′ N., 3° 17′ W.), town, W. France; tin foundry. Pop. *c.* 7250.

HENNEQUIN, PHILIPPE AUGUSTE (1763–1833), Fr. hist. painter and engraver patronised by Napoleon. His grandson, ALFRED NÉOCLES (1842–87), was a prominent comic playwright.

HENNER, JEAN JACQUES (1829–1905), Fr. painter; noted for his figure drawing.

HENRIETTA MARIA (1609–66), consort of Charles I. of Great Britain; dau. of Henry IV. of France; raised money for king during Civil War; encouraged impeachment of five members; fled to France, 1644; twice visited England after Restoration.

HENRY I., BEAUCLERC (1068–1135), king of England; youngest s. of William the Conqueror; succ., 1100. Elder bro., Robert, claimed crown, but was defeated and imprisoned, his duchy of Normandy being added to H.'s dominions. Various conspiracies formed in Normandy in favour of Robert's s., William, were supported by Fr. king, whom H. defeated at *Brémule*, 1119. H.'s son William was drowned in *White Ship*, 1120. Exchequer was instituted in this reign.

HENRY II. (1133–89), king of England; s. of Matilda and Geoffrey Plantagenet; grandson of Henry I.; succ., 1154; revoked Stephen's grants of crown lands, and revived King's Court and Exchequer; at first supported by his minister, Becket, whom he cr. abp.; quarrelled with Church, issued Constitutions of Clarendon, 1164, which Becket opposed; after latter's murder, 1170, H. had to make various concessions to Church; conquered Ireland, 1172; crushed

barons' rebellion, 1173, and reduced their power by legal reforms; sons intrigued against H. towards end of reign. *Life*, by Green (1888).

HENRY III. (1207–72), king of England; succ. his f., King John, 1216; during minority French were expelled from England; assumed government, 1227; unsuccessfully invaded Poitou, 1230; defeated at *Taillebourg*, 1242; aimed at arbitrary power; left many important offices vacant; aroused hostility of barons, who compelled him to assent to Provisions of Oxford, 1258, subsequent annulment of which resulted in outbreak of Barons' War; H. defeated at *Lewes*, 1264; henceforth a cipher. See *Misrule of Henry III.*, edit. by Hutton.

HENRY IV. (1367–1413), king of England; s. of John of Gaunt; fought in East, 1392–96; helped to suppress Gloucester's rebellion, 1397; banished, 1398. On Richard II.'s seizing his estates, H. invaded England, defeated Richard, and became king, 1399; defeated Scots, 1402; defeated Percies, who had joined Glendower's revolt, at *Shrewsbury*, 1403; crushed Scrope's rebellion, 1405; subdued Percies, 1408, and ended Welsh rebellion; opposed Lollards. See *History of England under Henry IV.*, by Wyllie.

HENRY V. (1387–1422), king of England; s. of Henry IV.; succ., 1413; repressed Lollards; invaded France and won battle of *Agincourt*, 1415; successfully besieged Rouen, 1417–19; formed alliance with Philip of Burgundy, 1419; m. Princess Catherine of France; attained regency of France and succession to Fr. crown by Treaty of Troyes, 1420; spent remaining years in suppressing Fr. risings against Eng. rule; took Meaux, 1422.

Lives, by Church (1859); Kingsford (1902).

HENRY VI. (1421–71), king of England; s. of Henry V.; succ., 1422; minor till 1442; Cade's rebellion suppressed, 1450; Fr. possessions lost, 1453; insane in 1453, subsequently recovered. Wars of Roses began, 1455; ended in 1461 with H.'s defeat, when Edward IV. became king. H. was murdered in Tower, 1471. He founded Eton School, and King's Coll., Cambridge.

HENRY VII. (1457–1509), king of England; founder of Tudor line; half-bro. of Henry VI.; m. Edward IV.'s dau. Elizabeth; defeated Richard III. at *Bosworth Field* (1485), and became king; instituted Court of Star Chamber (*q.v.*), 1487; suppressed Lambert Simnel's rebellion by victory at *Stoke*, 1487; supported Brittany against France; formed alliance with Span. and Ger. kings, and invaded France, 1492; concluded commercial treaty with Flanders, 1496; overthrew Perkin Warbeck's insurrection, defeating his supporters at Blackheath, 1497; amassed large fortune; strengthened crown at expense of nobles.

Life, by Gardiner (1889).

HENRY VIII. (1491–1547), king of England and Ireland; second s. of Henry VII.; succ., 1509, and m. Catharine of Aragon, his bro.'s widow; invaded France, winning *Battle of Spurs*, 1514; held conclave with Francis I. at Field of Cloth of Gold, 1520, but sided with Francis's rival, Charles V.; made peace with France in 1527. Having no male heir, H. desired divorce; Wolsey's failure to obtain the necessary papal decree led to his downfall. H. disavowed papal supremacy in England, and, with Cromwell's aid, broke with Rome and established himself as head of Eng. Church; divorced Catharine, 1533, and m. Anne Boleyn, who was beheaded in 1536; dissolved monasteries, 1536, and put down Pilgrimage of Grace, 1537. After Anne Boleyn's execution, H. m. Jane Seymour, their son afterwards reigning as Edward VI.; subsequent wives were Anne of Cleves, Catharine Howard and Catharine Parr. Later years marked by wars with France and Scotland; led expedition to France; took Boulogne, 1544. See ENGLAND: *History*.

Pollard, *Henry the VIII.* (1905); Hume, *The Wives of Henry VIII.*

HENRY I., THE FOWLER (*c.* 876–936), Holy Rom. emperor; duke of Saxony, 912; elected king of Romans, 919; acquired Lorraine, 923; defeated Slavs, Danes, Hungarians.

HENRY II., THE SAINT (973–1024), Holy Rom. emperor; succ. Otto III., 1002; king of Italy, 1004; crowned emperor at Rome, 1014; waged intermittent war with Poland, 1002–18; liberated Bohemia from Polish yoke, 1004; concluded peace at Bautzen, 1018; supported Benedict VIII. against Greeks, 1021.

HENRY III., THE BLACK (1017–56), Holy Rom. emperor; s. of Conrad II.; Ger. king, 1028; emperor, 1039; waged war with Bretislaus of Bohemia, whom he finally forced to acknowledge his suzerainty, 1041; defeated Hungarians, 1045, and reinstated Peter of Hungary; crowned emperor by Clement II., whose election to papal chair he had obtained; put down rebellion in Lorraine, 1050; built Worms, Mainz, and Spires cathedrals.

HENRY IV. (1050–1106), Holy Rom. emperor; s. of Henry III. elected Ger. king, 1053; emperor, 1056; engaged in struggles with Swabia and Carinthia; deposed and defeated Otto of Bavaria, 1071; waged war against Saxony and Thuringia, 1073–88; came into conflict with Pope Gregory VII. (*q.v.*), who excommunicated him in 1076, and forced him to do penance at Canossa, 1077. H. subsequently repudiated his vow of obedience, deposed pope, and elected antipope, Clement III.; invaded Italy, 1081; took Rome, 1083; was crowned emperor, 1084. Ger. princes elected another king, but H. gradually overcame all opponents. Later years marked by further disputes with popes and Ger. princes; abdicated, 1105.

HENRY V. (1081–1125), Holy Rom. emperor; s. of Henry IV.; elected Ger. king, 1098; emperor, 1106; subdued Robert of Flanders, 1106; reign marked by dispute with pope concerning investitures. H. took Paschal II. prisoner, 1111; was excommunicated, 1112; ban removed and dispute settled by Concordat of Worms, 1122; waged intermittent war with Lothair of Saxony; later years marked by war in Holland and invasion of France.

HENRY VI. (1165–97), Holy Rom. emperor; s. of Frederick I.; elected Ger. king, 1169; m. Constance, heiress to throne of Sicily, 1186; crowned king of Italy, 1186; emperor, 1191; succession to Sicily opposed by Tancred, after whose death H. became king; coalition formed against him in Germany, 1191, but he put down all opponents both there and in Italy.

HENRY VII. (*c.* 1269–1313), Holy Rom. emperor; s. of Henry III., Count of Luxembourg; elected Ger. king, 1308; emperor, 1309; tried to unite Germany and Italy, and was crowned at Milan, 1311; revolts occurred, in dealing with which he met with little success; d. while marching to Naples.

HENRY I. (1008–60), king of France; waged war with Odo, Count of Blois, and William, Duke of Normandy.

HENRY II. (1519–59), king of France; persecuted Protestants; recovered Boulogne from England, 1550; took Metz, Toul, Verdun, from Emperor Charles V.; recovered Calais, 1558.

HENRY III. (1551–89), king of France; reign marked by war between Catholics and Huguenots; participated in massacre of St. Bartholomew, 1572; very dissolute; assassinated.

HENRY IV., HENRY OF NAVARRE (1553–1610), king of France; king of Navarre, 1562; leader of Huguenots; m. Margaret of Valois, sister of Charles IX., 1572; succ. to Fr. throne, 1589; had to fight Spain and the League; became Catholic, 1593; peace with Spain, 1598; passed Edict of Nantes in favour of Huguenots, 1598; developed agriculture and commerce; introduced silk industry; carried out financial reforms; directed influence against Hapsburgs; assassinated by Ravaillac. See FRANCE: *History*.

Henry of Navarre, Willert.

HENRY I. (*c.* 1210–74), king of Navarre; s. of Theobald I.; m. Blanche of Artois; his dau. Johanna

m. Philip IV., by which marriage the crowns of Navarre and France were united.

HENRY II. (1503–55), titular king of Navarre; s. of Jean d'Albret; his claim to the crown, in right of his wife Catherine of Navarre, was successfully disputed by Ferdinand I. of Spain. He m. Margaret, Duchess of Alençon, and had issue, Jeanne d'Albret, mother of Henry IV. of France.

HENRY VII. (1211–42), Ger. king; elected, 1220; led rebellion against f., Emperor Frederick II., 1233, but submitted, 1235; imprisoned.

HENRY RASPE (*c.* 1202–47), Ger. king; aided Emperor Frederick II.; Landgrave of Thuringia, 1242; Ger. king, 1246; defeated Conrad.

HENRY II. (1489–1568), duke of Brunswick-Wolfenbüttel; opposed Reformation; defeated by League of Schmalkalden, 1542; defeated Albert of Bayreuth, 1553.

HENRY I. (1512–80), king of Portugal; succ., 1578, and proved a feeble administrator. He had previously held the archbishopries of Braga, Lisbon, and Coimbra; was cr. cardinal, 1542.

HENRY, four kings of Castile.—HENRY I., reigned 1214–17.—HENRY II. (1333–79), became king, 1369, after killing bro., Peter the Cruel; supported France against England.—HENRY III. (1379–1406), succ., 1390; called Cortes to Madrid, 1394.—HENRY IV. (1425–74), succ., 1453; deposed, 1468.

HENRY (*c.* 1174–1216), emperor of Constantinople; s. of Baldwin, Count of Flanders; shared in Fourth Crusade; noted for bravery, toleration, and wise administration.

HENRY STEWART (1725–1807), Cardinal York, was younger son of James, the Old Pretender, bro. of Charles Edward, the Young Pretender; cr. cardinal, 1747; called himself 'Henry IX.' on death of his bro., 1788.

HENRY THE LION (1129–95), duke of Saxony and Bavaria; defeated Abotrites, and extended his dominions; established claim to Bavaria, 1156; acquired Lübeck, 1158; aided Frederick I. in Poland and Italy; waged war against Denmark, which ended, 1171; went as pilgrim to Jerusalem, 1172; banned by emperor, 1180; submitted, 1181; obtained Brunswick and Lüneberg; banished, 1189; subsequently rebelled against Henry VI.

HENRY THE MINSTREL, see HARRY.

HENRY THE PROUD (*c.* 1108–39), duke of Saxony and Bavaria; put down revolt in Bavaria; supported Lothair against Hohenstaufens.

HENRY, PRINCE OF BATTENBERG (1858–96), s. of Prince Alexander of Hesse and Countess von Hauke; m. Princess Beatrice of England, 1885; engaged in Ashanti War; d. off Sierra Leone.

HENRY FITZ HENRY (1150–83), Eng. prince; 2nd s. of Henry II., and subsequently heir to the throne; was frequently at variance with his f.; famed for knightly accomplishments; d. of fever.

HENRY OF BLOIS (1101–71), bp. of Winchester (1129); nephew of Henry I. and bro. of King Stephen; papal legate, 1139–44; ardent ultramontanist; quarrelling with Stephen, proclaimed their cousin Matilda queen, 1141; reverted to Stephen's side; but never regained his favour.

HENRY OF HUNTINGDON (*c.* 1084–1155), Eng. chronicler; was archdeacon of Huntingdon; his *Historia Anglorum* extended to 1154, and was first pub. 1596.

HENRY OF GERMANY (1235–71), s. of Richard, Earl of Cornwall, bro. of Henry III.; murdered as a Royalist by Simon de Montfort's sons.

HENRY OF PORTUGAL, THE NAVIGATOR (1394–1460), Portug. prince; s. of John I. and Philippa, John of Gaunt's dau.; served with great distinction at siege of Ceuta, 1415; subsequently took great interest in navigation and discovery, and for years sent expeditions along W. coast of Africa at his own expense; among his discoveries were the Madeira Islands and Azores, where he established colonies; constructed observatory at Sagres, near Cape St. Vincent; in later years he again distinguished himself in the field in Morocco, and took Alcazar the Little in 1458; encouraged education.

Raymond Beazley, *Prince Henry the Navigator* (1895).

HENRY OF TOULOUSE, or DE BRUYS (fl. early XII. cent.), Fr. evangelist who influenced development of the Albigensian movement (*q.v.*); preached moral reformation rather than new tenets, but attacked the Church and caused the personal intervention of St. Benedict, who crushed the movement.

HENRY, EDWARD LAMSON (1841–), Amer. painter; noted for character studies.

HENRY, JOSEPH (1797–1878), Amer. physicist; prof. of Natural Philosophy at Princeton, and later sec. and director of Smithsonian Institution; introduced insulated or silk-covered wire for magnetic coils, and conducted researches on phosphorescence, solar spots, and heat radiation, and the acoustics of public buildings. His investigations on illuminants enabled him as a member of the Amer. Lighthouse Commission to provide America with very perfect beacons and fog-signals.

HENRY, MATTHEW (1662–1714), Welsh Presbyterian preacher; held charges at Chester and Hackney; famed as author of *Exposition of the Old and New Testaments*, a work of sincerity and charm, left unfinished at his death.

HENRY, PATRICK (1736–99), Amer. orator and politician; in Virginia legislature spoke against Stamp Act and drew up Virginia Resolutions, 1765; delegate to Continental Congress at Philadelphia, 1774; gov. of Virginia, 1776–79, 1784–86; supported Washington; retired, 1791.

HENRY, ROBERT (1718–90), Scot. historian and divine; author of widely read *History of Gt. Britain*.

HENRYSON, ROBERT (*c.* 1430–1506), Scot. poet; disciple of Chaucer; wrote in 'Middle Scots'; schoolmaster in Dunfermline; possessed of humour and descriptive powers; author of *Moral Fables of Esope*, *The Testament of Cresseide* (sequel to Chaucer's *Troilus and Cressida*), and the early pastoral, *Robene and Makyne*. *Works*, edit. by D. Laing (1865).

HENSLOW, JOHN STEVENS (1796–1861), Eng. scientist; prof. of Mineralogy, and later of Bot., at Cambridge. His discoveries established the *phosphate industry* in England.

HENSLOWE, PHILIP (d. 1616), Eng. theatre owner; built the 'Rose' and 'Fortune' theatres, and held shares in others, where many famous Elizabethan plays were performed. His *Diary* (MS. in Dulwich Coll.) contains valuable information relative to his period.

HENTY, GEORGE ALFRED (1832–1902), Eng. war correspondent and boys' author; served in purveyor's department in Crimea; acted as newspaper correspondent in Franco-Prussian and Turco-Servian Wars and other campaigns; wrote about eighty popular historical and military stories for boys.

HENZADA (17° 36′ N., 94° 27′ E.), town (and district), Brit. Burma, India. Pop. c. 25,000. District has area of 2871 sq. miles. Pop. 484,558.

HEPATICÆ, see BRYOPHYTA.

HEPATITIS, see LIVER.

HEPBURN, SIR JOHN (*c.* 1598–1636), Scot. soldier of fortune; commanded the Scot. brigade in army of Gustavus Adolphus; subsequently entered Fr. service, and performed many brilliant services; killed at siege of Zaberu.

HEPHÆSTION (d. 324 B.C.), Macedonian soldier who m. Drypetis, sister of wife of Alexander the Great, whose inseparable friend he was.

HEPHÆSTION (II. cent. A.D.), Gk. grammarian; wrote a valuable work on Gk. prosody; Eng. trans. by Barham (1843).

HEPHÆSTUS (classical myth.), the god of fire and metal-working (Roman **Vulcan**); s. of Zeus and Hera; lame from birth; was flung from Olympus by his f., whose anger he had incurred. He forged

the thunderbolts of Zeus, made the armour of Achilles, the crown of Ariadne, etc. The chief seat of his worship was the isle of Lemnos.

HEPPENHEIM (49° 39′ N., 8° 37′ E.), town, Hesse-Darmstadt, Germany. Pop. (1910) 7050.

HEPPLEWHITE, GEORGE, noted Eng. cabinet-maker, who fl. during latter portion of XVIII. cent.; contemporary of Chippendale, but his work was of a lighter and more elegant character. Painted designs upon satinwood were a feature of many of his productions.

HEPTAMERON, see MARGARET OF NAVARRE.

HEPTARCHY, condition of government by seven persons; generally applied to the 'Saxon H.' in Britain, dating from about the VI. cent., when the country was divided into seven kingdoms: Kent, Sussex, Wessex, Essex, Northumbria, East Anglia, and Mercia.

HEPTATEUCH, first 7 books of Old Testament.

HERA (classical myth.), known by the Romans as **Juno,** dau. of Cronus and Rhea; wife of Zeus; mother of Hephæstus, Ares (Mars), Hebe, and Eileithyia. As queen of heaven she participated in the supreme honours paid to Zeus; famed as the embodiment of wifely chastity; celebrated for her surpassing beauty, of which she was extremely vain. She was devoted to the Greeks and their country, and was principally worshipped at Argos and Samos.

HERACLEA, several ancient Gk. towns.—H. LUCANIA, where Pyrrhus defeated Romans, 280 B.C.; H. MINOA, Sicily, naval post of Carthaginians. H. PONTICA, Bithynia, destroyed by Romans, I. cent. B.C.

HERACLEON (fl. II. cent. A.D.), Gk. gnostic and Biblical commentator.

HERACLEONAS, Byzantine emperor for a short space in 641 A.D.

HERACLES, see HERCULES.

HERACLIDÆ, children of Heracles, who sought asylum in Athens from Eurystheus, king of Mycenæ. After several unsuccessful attempts they conquered the Peloponnesus and founded the kingdoms of Sparta, Messenia, and Argos.

HERACLIDES OF PONTUS (IV. cent. B.C.), Gk. philosopher.

HERACLITUS (*c.* 540–475 B.C.), Gk. philosopher; of aristocratic birth; called the *Weeping Philosopher*; did much for study of metaphysics; thought 'everything is and is not,' and that in diversity true unity was to be found; fire is the original principle, and out of it the soul was created.

HERACLIUS (*c.* 575–642); Byzantine emperor; beset by Avars from Danube, and by Persians in East; made Treaty with Avars, 620; defeated Persians, 627–28; lost Syria and Egypt to Arabs.

HERALD, originally an officer whose duty it was to convey messages from commander of force to his opponent; function afterwards included making military proclamations of all kinds, and, later, superintending public ceremonies and processions. About XIV. cent. colleges of h's were founded in most European countries to record armorial bearings of nobility and gentry.

HERALDRY, science of blazoning coats of arms. *Armorial bearings,* or devices blazoned on shields, were unknown in England at time of Norman Conquest; by XIII. cent. they were in general use throughout Europe, and a regular science of h. had been developed; probably largely influenced by the crusades, as in warfare, where closed helmets rendered recognition impossible, some bold representation on the shield, as mark of identity, became necessary to the leaders. These being of the upper class, armorial bearings came to be prerogative of that class, and were, and still remain, the outward sign of noble or gentle rank, the granting or creation of which rests with the sovereign.

In mediæval times the undifferenced arms belonged to a single holder, from whom it descended to his heirs, while cadet branches had to show their cadency by various marks of difference. Marks of difference are still in use, although not compulsory in England; the *label,* a file of three points placed across top of shield, is now properly used only by the eldest son, while the signs of younger sons are the crescent, mullet, martlet, amulet, etc.; these marks are quite small, and are generally placed in centre near top of shield. *Marshalling* arms is the disposition of several coats of arms on the same shield, to show descent, marriage, alliance, etc. In modern times, when a man marries an heiress the two coats of arms are generally marshalled by the wife's arms being shown on a small escutcheon superimposed on the husband's coat; and their children bear the two coats quarterly, the father's arms in the first and fourth quarters, the mother's in the second and third. When the wife is not an heiress the arms are marshalled by impalement, *i.e.* the shield is parted and the husband's arms are shown on right side, and wife's on left.

Technical name for whole device is *achievement,* which consists of arms (shield and device), helmet, mantling, wreath, crest, and motto. Other adjuncts are supporters, compartment, *cri-de-guerre,* standard, badge, augmentation, all of which may be possessed by commoners. Knights of any order may have circle and badge of order, and peers may add coronet of rank. *Shield* consists of coloured background called the field, and device thereon known as charge; it varies in shape. *Helmet,* placed above shield, may vary in shape, style, and design, but certain rules regulate its position and form. *Mantling* is cloth hanging from point on top of helmet; originally plain cloth to protect armour from weather. *Wreath* is used to attach crest to helmet; originally a fillet of silk twisted round it. *Crests* only came into general use in England in XVI. cent. and are now most important adjunct of armorial bearings. *Mottoes* are a late development and only appeared when standard was represented as a drawing and no longer carried in battle; they became usual in late XVII. cent. *Supporters* are granted to Knights of the Garter, Thistle, St. Patrick, and to Knights Grand Cross and Grand Commander of any order who petition and pay for them, and to peers. They are sometimes granted as mark of royal favour. The *compartment* is for the supporters to stand upon; generally a golden scroll. *Cri-de-guerre* is very exceptional; it was a family battle-cry and could be inserted on standard. *Badges,* simple devices used for purpose of speedy recognition, date from even earlier times than armorial bearings. *Standards* originally represented arms, like the shield, but were later charged with badge, as more easily recognisable. *Augmentations* are additions to existing arms granted by sovereign for services rendered; they may be supporters, additional crest, innerscocheon, etc. Peers' coronets, another accessory to shield, are gilt metal circlets varying in pattern according to rank.

Turning to details of shield, the *field* is the tincture of the background, which may be a colour, metal, or fur. Colours are *gules, azure, sable, vert, purpure* (red, blue, black, green, purple); metals, *or* and *argent* (gold, silver); principal furs, *ermine* (white, with black spots), *ermines* (black, with argent spots), *erminois* (gold, with black spots), *vair,* and *potent* (silver and blue in alternate divisions). The field may be of one or more tinctures, variously disposed. Partition lines are generally plain, but there are twelve varieties of such lines, named *engrailed, invected, embattled, indented, dancetty, wavy, nebuly, raguly, potenté, dovetailed, flory,* and *rayonné.*

The ordinary charges, called *ordinaries,* are nine in number. The *pale, fesse,* and *bend* are bands which respectively cross shield perpendicularly, horizontally, and diagonally. *Cross* is a common bearing from very early times and occurs in various forms, as *cross flory, cross pateé, cross botonny,* etc. *Saltire* is a diagonally set cross, in form of St. Andrew's cross.

Chevron, an early charge, resembles a gable. *Pile* is wedge-shaped device from chief to foot of shield. *Chief* is band at top of shield. *Quarter* is dexter top quarter of shield. Pale, bend, saltire, and chevron all have diminutives, respectively *pallet, bendlet, gyron, chevronel.* Diminutive of quarter is *canton*; of canton, *chequer. Fesse* duplicated becomes a *bar*; diminutive, *barrulet.* Other ordinary charges are the *lozenge*, diamond-shaped figure; *flaunches*, sides of shield cut off by curved lines; *innerscocheon*, small superimposed shield; *tressure*, inner border of shield decorated by fleur-de-lys; *mascle, voided lozenge*; *fret*, voided lozenge and saltire interlaced.

Principal animal used as heraldic charge is lion, whose position may be *rampant, passant, statant, sejant, sejant-erect, couchant, dormant*, or *salient.* A lion full faced is *guardant*; head looking backwards, *regardant.* These terms supposed to apply to all heraldic animals with few exceptions. Mythical animals represented are dragon (four-legged), wyvern (two-legged), griffin, unicorn, pegasus, and other winged animals. Other animals are given sea characteristics, series including mermaids, sea-wolves, sea-lions; etc. Eagle is most important bird represented in armoury, it is generally found *displayed* (with spread wings), and often double-headed. Other positions of birds are *close, volant;* and *rising.* Pelican resembles eagle. Peacock with spread tail is called 'peacock in his pride.' Fish are less frequent; positions are *hauriant* (erect) and *naiant* (swimming). Flowers and trees often occur; fleur-de-lys is generally considered a conventional iris; rose is represented without stalk or leaves; unless mentioned; trefoil, quatrefoil, and cinquefoil are conventional forms of leaves.

Fox-Davies, *The Art of Heraldry* and *A Complete Guide to Heraldry* (1910); Woodward, *Treatise on Heraldry*; Planché, *The Pursuivant of Arms.*

HERAT (34° 26′ N., 62° 8′ E.), city, in Afghanistan, situated on Hari-Rud, 2500 ft. above sea-level; owing to central position, of great hist. and political interest, and formerly of commercial importance. Once a large city with magnificent buildings, now a mass of ruins; strongly fortified by ditch, walls with 5 gates, and a citadel on N. side; built in form of quadrangle, with 4 principal streets (called Chahar-Suk) meeting in centre; other streets filthy and almost desolate. Great Mosque, or Mesjid-i-Juma, remains of mosque of Mosa-alla, tomb of Abdullah Ansari, ruined palaces of Bagh-i-Shah and Takhd-i-Sefer, marble mausoleums, and other ruins testify to former splendour.

H. was scene of struggles throughout history of Central Asia; date of foundation unknown; flourished under princes of house of Timur, when finest buildings were erected; captured by Shah (1856), but forced to surrender, 1863.

Surrounding country fertile and well irrigated; chief exports: dried fruits, rice, dyes, carpets, silk, wool, raw, hides, and leather-ware. Pop., including Persians, Tajiks, and Chahar-Aimaks, 12,000.

HÉRAULT (43° 30′ N., 3° 20′ E.), S. department, France; area, 2402 sq. miles; surface rises from S. coastal plain to Cévennes in N.W.; drained by Hérault, Orb; wine, fruits, coal; chief town, Montpellier. Pop. (1911) 480,484.

HÉRAULT DE SÉCHELLES, MARIE JEAN (1759–94), Fr. lawyer and politician; supported Revolution; Pres. of Legislative Assembly, 1792; of Convention, 1793; executed for treason.

HERBARIUM, or HORTUS SICCUS, a classified collection of plants which have been dried and preserved so that their characteristic features are illustrated as far as possible. The plants should be as perfect specimens as can be obtained, and should be accompanied by seeds and drawings or photographs illustrating such points as are lost in dried material. Each should be mounted on a sheet of stout paper ($16\frac{1}{2}'' \times 10\frac{1}{2}''$ is standard size) and should bear a label giving the genus and species, locality, collector, and other important details. Where the specimen is too large to be accommodated on the sheet, it should be marked in such a way as to indicate the parts originally joined. Specimens should be dried rapidly and poisoned by immersion in a weak alcoholic solution of corrosive sublimate before mounting.

HERBART, JOHANN FRIEDRICH (1776–1841), Ger. philosopher; studied at Jena; lecturer at Göttingen, 1805; prof. at Königsberg, 1809; prof. of Philosophy, Göttingen, 1833–41. The importance of H.'s work is largely in psychology, and he arrived at his results by a combination of metaphysics, mathematics, and experience. He believed the soul to be a simple being, having relations with other simple beings, which relations he called presentative activities. These may be either above the threshold (conscious) or below it (unconscious). They affect each other when they are together above the threshold. His theories and his applications of mathematical symbols to psychology have not won entire acceptance, but much of his work is of permanent value. He worked, too, at the application of psychology to pedagogy.

HERBELOT DE MOLAINVILLE, BARTHÉLEMY D' (1625–95), Fr. Orientalist, chiefly known for his monumental work, the *Bibliothèque Orientale*, completed by another hand after his death.

HERBERAY DES ESSARTS, NICOLAS DE (d. *c.* 1557), Fr. prose writer, chiefly noted for translation, *Amadis de Gaul.*

HERBERT, Eng. family. Sir William H. became 1st Earl of Pembroke, 1468; title extinct on death of 2nd earl, 1491, but was in 1551 granted to William H., s. of Richard, an illegitimate s. of 1st earl. To same family belong marquesses of Powis and earls of Carnarvon.

HERBERT, GEORGE (1593–1633), Eng. ecclesiastic and poet; after vainly seeking preferment at court, took orders, and was made rector of Bemerton, Wilts (1630); famed for piety and kindliness of disposition. In *The Temple: Sacred Poems and Private Ejaculations*, pub. the year after his death, are some of the finest religious poems in the language; d. of consumption. *Life*, by Izaak Walton.

HERBERT, HENRY WILLIAM (1807–58), Eng. novelist and sporting writer; wrote, under the name of 'Frank Forester,' *Field Sports of the United States, Young Sportsman's Complete Manual*; also historical works, including *The Chevaliers of France, The Captains of the Old World*, etc.

HERBERT, SIR THOMAS (1606–82), of York city, Eng. traveller in the East who wrote valuable travels.

HERBERT, VICTOR (1859–), Amer. musician and composer; b. Dublin; has pub. comic operas.

HERBERT OF CHERBURY, EDWARD, BARON (1583–1648), Eng. soldier, diplomat, and writer; b. at Eyton-on-Severn; fought in Netherlands, 1610, 1614; ambassador to France, 1619–21, 1622–24; having been imprisoned by Parliament in 1642, he took no part in Civil War. Author of *De Veritate*, an important metaphysical work, *De Religione Gentilium*, a comparative history of religion and other philosophical treatises. Hist. works are *Life and Raigne of Henry VIII.* and *Expeditio Buckinghami ducis.*

HERBERT OF LEA, BARONY OF, Sidney H., younger s. of Earl of Pembroke, was War Minister during Crimean War, and cr. Baron H. of Lea in 1861; his s. and heir succ. to Earldom of Pembroke, with which dignity this barony then coalesced.

HERBERTON (17° 22′ S., 145° 15′ E.), mining town, Queensland, Australia. Pop. 2806.

HERB-ROBERT, see GERANIUM.

HERBS, plants with no woody tissue in stems.

HERCULANEUM, ruined city of Italy, situated at eastern base of Mt. Vesuvius. In 79 A.D. it was annihilated by eruption, when a stream of lava and shower of ashes covered it so completely that it was lost sight of for cent's; since early XVIII. cent., however, excavations have been more or less constantly going on,

and now a good part of the city is open to view, including the theatre and two small temples; the discoveries render possible the reconstruction of domestic life of the ancients, and many beautiful wall-paintings and statues have been brought to light, as well as philosophical MSS., coins, mosaics, etc. City was traditionally connected with Hercules; taken by Romans in Samnite Wars, and again in Social War, 88 B.C.; an important town at time of its destruction.

Waldstein and Shoobridge, *Herculaneum Past, Present, and Future* (1908).

HERCULANO DE CARVALHO E ARAUJO, ALEXANDRE (1810–77), Portug. historian and poet; b. at Lisbon; lived in France and England, 1831–32; took part in occupation and defence of Oporto, 1832; author of *Historia de Portugal, History of Origin and Establishment of the Inquisition.*

HERCULES, HERACLES (classical myth.), s. of Zeus and Alcmene, wife of Amphitryon, king of Thebes. As he grew to manhood he became celebrated for his great stature, strength, and beauty. He performed many feats of valour. Subsequently he was driven mad by the enmity of Hera, and killed his own children. At a later date, Eurystheus, king of Mycene, imposed upon him the punishment of twelve great labours: to slay the Nemean lion; to destroy the Hydra; to capture the Arcadian stag; also the Erymantian boar; to cleanse the Augean stables; to slay the Stymphalian birds; to capture the Cretan bull; to capture the wild mares of Diomedes; to secure the girdle of Hippolyte, the Amazon; to capture the oxen of the giant, Geryon; to obtain the golden apples of the Hesperides; and to bring up Cerberus from the lower world.

Winter, *Myth of Hercules at Rome* (1910).

HERD, a company of animals, usually cattle, assembled or driven together.

HERDER, JOHANN GOTTFRIED VON (1744–1803), Ger. author; b. Mohrungen (East Prussia); studied med. and theology at Königsberg, 1762–64; greatly influenced by Kant and Hamann; teacher at Riga, 1764–69, where he wrote *Fragmente über die neue Deutsche Litteratur* and *Kritische Wälder* (prose works); visited France, 1769; intimate friends with Goethe at Strassburg, 1770; court preacher at Bückeburg, 1771–75; to this period belong *Über den Ursprung der Sprachen* (1772), *Von Deutscher Art und Kunst* (1773), *Auch eine Philosophie der Geschichte zur Bildung der Menschheit* (1774), prose works; app. court preacher at Weimar, 1776; *Volkslieder* (1778–79, songs and ballads), *Vom Geist der Hebräischen Poesie*, 1782, *Ideen zur Philosophie der Geschichte der Menschheit* (pub. 1785–94), prose works, and his famous translations of the *Span. Romances of the Cid* rank as his best works; exercised powerful influence on Romantic Movement.

HEREDIA, JOSÉ MARIA DE (1842–1905), Fr. poet, chief of the 'Parnassiens'; pub. *Les Trophées* (1893), a series of sonnets, a poetical history of humanity, the work of thirty years, perfect of their kind.

HEREDIA Y CAMPUZANO, JOSÉ MARIA (1803–39), of Cuba; one of greatest Span. poets of the cent.

HEREDITAMENT, legal term for hereditable possession; 'tenements and h's' is constant phrase of land conveyance.

HEREDITY is a term which expresses in a word the most obvious relationship in ancestry—that children resemble in general and even in particular their parents and forebears, that like begets like. The recognition of h. is an old story, but Darwin gave new life to the critical study of its significance, and as a result of innumerable researches the obscurity in which genetic relationship was shrouded has been partly dispelled.

The means of ancestral resemblance lies in the continuity of the germ plasm, in the fact that there are set aside definite cells which are handed down from generation to generation, and that from this continuous line of sexual cells each succeeding generation arises. Heredity is thus the total inheritance with which a new generation starts, before outside influences, 'nurture,' have played upon it. The inheritance obviously depends on both parents, but it may be expressed in various ways in the offspring. When parents derived from a long line of the same pure-bred stock are paired, the characters of the pure breed are as a rule obvious to the minutest detail in the progeny, as any breeder can testify; but the mating of non-selected parents gives different results. Thus the offspring may exclusively resemble in one or all of its characters only one of its parents (exclusive inheritance), or it may be a compound of its progenitors' characters, a piebald foal, let us say, resulting from diversely self-coloured parents (particulate inheritance). Again, a blending of features may take place, as when a tall pea is fertilised by pollen from a dwarf pea, and a pea of intermediate height results (blended inheritance); or the children may not resemble their parents at all, but may 'throw back' to some more distant ancestor, as when the indiscriminate interbreeding of domesticated rabbits of different colours finally results in the production of greys like the ancestral wild rabbit (reversion). Lastly, the offspring may break away from its ancestral line, and produce a new feature of its own, such an occurrence being known as a sport, freak, or discontinuous variation. See also MENDELISM, HYBRIDS, and EVOLUTION.

HEREFORD (52° 3′ N., 2° 43′ W.), city, municipal and parliamentary borough, Herefordshire, England, pleasantly situated on Wye; contains beautiful cathedral, with various styles of architecture from Norman to Perpendicular; chief features are central tower, north porch, bp.'s cloisters, and tower called Lady Arbour; other interesting buildings are: Coll. of Vicars Choral, churches of All Saints and St. Peter's, shire hall, town hall, and county coll.; in olden times frequently attacked by Welsh; trades chiefly in agricultural produce. Pop. (1911) 22,568.

HEREFORDSHIRE (52° 10′ N., 2° 45′ W.), county, England, on Welsh border; bounded N. by Shropshire, E. by Worcestershire, S. by Monmouth and Gloucestershire, W. by Radnor and Brecknock; area, 833 sq. miles; chief towns are Hereford (capital), Leominster, Ross, and Ledbury; rich, fertile county, well watered by Wye, celebrated for its beauty, and its tributaries, Lugg, Arrow, Frome, and Monnow; hills separate various valleys; in E. are Malvern Hills and in S.W. Black Mts. Soil produces fine wheat, barley, and hops; orchards occupy large area; celebrated cattle, sheep, and horses reared; cider-making main industry carried on; good salmon and trout fishing; limestone quarries at Ledbury; some iron foundries.

There are remains of border castles at Wilton, Goodrich, Pembridge, Kilpeck, Loughtown, and Wigmore; fine cathedral at Hereford; some beautiful half-timbered houses and mansions; many interesting churches, most notable being those at Ledbury, Leominster, Moccas, Abbey Dore, Madley, and Ross. Pop. (1911) 114,269.

HERENCIA (39° 20′ N., 3° 25′ W.), town, Ciudad Real, Spain; soap. Pop. 6000.

HERENTHALS (51° 11′ N., 4° 51′ E.), town, Anvers, Belgium; lace. Pop. *c.* 8000.

HERERO, OVAHERERO, Bantu race inhabiting Damaraland, Ger. South-West Africa.

HERESY (Gk. 'choice'), used classically of a sect. In New Testament used of Pharisees and Sadducees, and by St. Paul of parties within the Church. Gradually h. came to mean theological difference, and has generally denoted any departure from the recognised belief of the Church. It is often said that the growth of h. within the Church forced her to define dogmas, that is the contradiction of opposition to that which had always been accepted, but never defined. The first five cent's of Christianity saw a series of religious doctrines and movements developed, which were rejected by the Church as a whole, of which Gnosticism and Arianism were the chief. The Fathers denounce h. in un-

measured terms, few even admitting the honesty of the heretics. The Early Church had defended the rights of each man to choose his own religion, but when Christianity had become the religion of the Empire the Church sought the help of the state to suppress h. The Mediæval Church was ruthless, and sought by every possible means to crush it out, though recent research has shown there was more of it than is sometimes imagined. The Reformation did not involve either dogmatic freedom within the Church nor freedom from persecution by the state. Calvin was as severe as Laud. Many Christian Churches allow a certain latitude of dogmatic interpretation, particularly in modern times. Religious toleration has been gradual, in R.C. countries coming only in the XIX. cent., and it is only partial in Russia to-day. Laws against heretics date from 1400 (Statute *De Heretico Comburendo*). Episcopalian and Puritan harried one another by turns in the XVII. cent., since the end of which there has been practical toleration in England.

Harnack, *History of Dogma.*

HEREWARD 'THE WAKE,' Eng. patriot who, after the Norman Conquest, long defied the authority of William I., and dwelt secure in the morasses of the Isle of Ely. He was at length subdued, but escaped capture.

HERFORD (54° 7′ N., 8° 40′ E.), town, Westphalia, Prussia; formerly site of Benedictine abbey. Pop. (1910) 32,540.

HERGENRÖTHER, JOSEPH VON (1824–90), Ger. Catholic theologian; prof. at Munich, 1855; staunch defender of doctrine of Papal Infallibility; created cardinal-deacon, 1879.

HERGEST, RED BOOK OF, see CELTS (*Welsh Literature*).

HERINGSDORF (53° 57′ N., 14° 10′ E.), popular seaside resort, on Usedom island, Pomerania, Prussia.

HERIOT, in Eng. law, fine due on death of a person holding copyhold land of a manor; it consists of best beast or jewel of deceased.

HERIOT, GEORGE (1563–1623), Scot. goldsmith; known as 'Jingling Geordie'; acquired considerable wealth in the exercise of his calling, which, after his death, was devoted to the building and endowment of 'Heriot's Hospital,' Edinburgh.

HERISAU (47° 23′ N., 9° 17′ E.), town, Switzerland. Pop. (1910) 15,250.

HERISTALL, see HERSTAL.

HERITABLE AND MOVABLE, see INHERITANCE.

HERITABLE SECURITY, see INHERITANCE.

HERKIMER (42° 58′ N., 75° 3′ W.), town, New York State, U.S.A. Pop. (1910) 7500.

HERKOMER, SIR HUBERT VON (1849–), Eng. artist; of Bavarian birth; founded famous art school, at Bushey; celebrated as painter both in oils and water-colours; has painted many subject-pictures, but excels in portraiture. R.A. (1890); Slade prof. of Fine Arts, Oxford (1885–94).

HERLEN, or HERLIN, FRITZ (d. 1491), Ger. religious painter of Flemish school.

HERMÆ, architectural term for pillars with head, usually that of Hermes, at the top; large numbers found in Gk. towns where they were objects of worship; used as boundaries.

HERMAGORAS (fl. early I. cent. B.C.), Gk. who founded school of rhetoric at Rome.

HERMANDAD, private association for purposes of local government, common in mediæval Spain.

HERMAN DE VALENCIENNES (fl. late XII. cent.), Fr. poet; wrote *Histoire de la Bible*, a free rendering of the Scriptures.

HERMANN I. (d. 1217), landgrave of Thuringia; one of chief figures in Ger. history of his time.

HERMANN, COUNT OF WIED (1477–1552), elector and abp. of Cologne; deposed for introducing Reformation into his dominions.

HERMANN, FRIEDRICH BENEDICT WILHELM VON (1795–1868), Ger. prof.; student of economics, on which he wrote several works; held various academic and other appointments.

HERMANN, JOHANN GOTTFRIED JAKOB 1772–1848), Ger. editor of the classics and grammarian.

HERMANN, KARL FRIEDRICH (1804–55), Ger. prof. of Philology and author of works on classical antiquities.

HERMANN OF REICHENAU (1013–54), Ger. monk of Reichenau and author of *Chronicon ad annum, 054.*

HERMANNSTADT, see NAGY-SZEBEN.

HERMAPHRODITISM, see SEX.

HERMAPHRODITUS, deity of both sexes in Gk. mythology. H. in Ovid's *Metamorphoses* was s. of Hermes and Aphrodite, and united at her request to a nymph who had fallen in love with him.

HERMAS, 'THE SHEPHERD' OF, was written at Rome in the first half of the II. cent., traditionally by H., bro. of Pius, bp. of Rome. It enjoyed at first a high reputation, and was nearly included in the canonical Scriptures. H. was a prophet, and he represents the Church under the guise of a female figure. The work is arranged under Visions, Mandates, and Similitudes. H.'s function is to deliver a message of repentance, declared to him by an angel. It was probably written at different times; theologically it has Adoptionist tendencies.

The Apocryphal Books, Andrews (The Century Bible Handbooks).

HERMENEUTICS (Gk. *hermeneuein*, to explain, from Hermes, Zeus's messenger), art of interpreting the wisdom of the ancients, or divine law.

HERMES (classical myth.), known to the Romans as **Mercury,** the swift-footed messenger of the gods, who also conducted the dead to Hades. He was notorious for cunning and dissimulation, was the patron of commerce, and the god of Eloquence. His parents were Zeus and Maia. He is generally represented as a beautiful, naked youth, bearing a caduceus.

HERMES, GEORG (1775–1831), Ger. R.C. Neoplatonist whose theological books were condemned by the pope in 1835.

HERMES TRISMEGISTUS, name by which the Greeks denoted the Egyptian god Thoth, looked on as the originator of learning and culture; considered in the early centuries A.D. to be author of many occult treatises known as the HERMETIC BOOKS, an encyclopædia of Gk. learning.

HERMESIANAX (fl. IV. cent. B.C.), Gk. poet whose works were much read by the Romans.

HERMETIC BOOKS, see HERMES TRISMEGISTUS.

HERMIPPUS (fl. early V. cent. B.C.), Athenian poet who wrote satirical comedies.

HERMIT, one who lives apart from others, a frequent practice of Early Christian saints; Paul, the initiator of the practice, St. Anthony, and St. Jerome are well known. Founder of the pillar h's was Simeon Stylites.

HERMIT-CRAB, see CRAB, MALACOSTRACA, COMMENSALISM.

HERMON (33° 26′ N., 35° 50′ E.), or Jebel-es-Sheikh, highest peak of Anti-Lebanon range, Syria; height, *c.* 9150 ft.; on slopes are ruined temples.

HERMON, MOUNT, see LEBANON.

HERMOSILLO (22° 23′ N., 110° 58′ W.), city, capital of Sonora State, Mexico; distilleries, wine, silver; has a mint. Pop. 18,000.

HERMOUPOLIS, see SYRA.

HERMSDORF (54° 27′ N., 20° 11′ E.), town, Pruss. Silesia, Germany. Pop. (1910) 11,379.

HERNE (51° 34′ N., 7° 15′ E.), town, Westphalia, Prussia. Pop. (1910) 57,167.

HERNE BAY (51° 22′ N., 1° 8′ E.), watering-place, Kent, England. Pop. (1911) 7781.

HERNE, JAMES A. (1840–1901), Amer. actor and playwright; author of popular melodramas.

HERNE THE HUNTER, ghostly huntsman, said to haunt Windsor Great Park by night. He is referred to in Shakespeare's *Merry Wives of Windsor.*

HERNIA is the term in surgery applied to the protrusion of an organ, or part of an organ, through an opening in the wall of the cavity in which it is normally contained; most commonly denoting such a protrusion of an organ of the abdomen, popularly termed 'rupture.' The most common situations of abdominal h. are the groin (inguinal canal), the upper part of the thigh (crural canal), and the navel or umbilicus, and the cause may be either *congenital*, due to arrested development of certain parts, or to hereditary weakness of the abdominal wall, or *acquired*, from various causes which may weaken the abdominal walls or increase the internal pressure of the abdomen, *e.g.* pregnancy, hard coughing in chronic bronchitis, and similar violent efforts, or injury.

A h. consists of a sac of peritoneum, containing any abdominal organ, usually part of the intestine and omentum, covered by the structures lying over the protrusion. The symptoms are the presence of a rounded swelling, increased by coughing, which cannot be separated from the abdominal cavity, and which, in most cases, can be reduced by pressure. Treatment is either palliative, by means of trusses, or radical, in suitable cases, by a surgical operation. Various forms of trusses are employed, consisting of a steel spring which passes transversely round the body, holding a pad of cork and leather, or of other materials, in place, to prevent the hernia coming down. The truss must be carefully fitted to be of any value, and this cannot be done by inexperienced persons.

Irreducible h. is due to adhesions either between the sac and its contents, or between the contents themselves, but by keeping the person affected in bed, and by careful attempts from time to time at reduction by a medical man, the h. may become reducible. If it does not, an operation for radical cure is best performed.

Strangulated h. is the term applied to the case when the contents of the sac are so constricted that the circulation of blood is obstructed and may be arrested. Severe pain comes on suddenly at first in the umbilical region and then at the hernia, the pulse is weak, the skin cold, and vomiting occurs. If the pressure on the h. is allowed to go on, gangrene follows, and the individual dies of general peritonitis with toxæmia, or general blood-poisoning. The treatment is immediate operation to free the sac, which, if gangrenous, is removed, and either an artificial anus is made to the surface of the abdomen, or, if the patient can stand it, an end-to-end union of the healthy intestine is made.

Hernia cerebri is the term applied to protrusion of the brain, usually after injury; *hernia pulmonum*, to protrusion of part of the lung.

HERNÖSAND (62° 35′ N., 17° 49′ E.), port, Swedon. Pop. c. 10,000.

HERO AND LEANDER (classical myth.), two famous lovers of ancient times. H. was priestess of Aphrodite, at Sestos, and L. a handsome youth of Abydos, who nightly swam the Hellespont to visit his love, guided by a lamp; on a night of storm, the lamp was extinguished, and L. drowned. H., in despair, cast herself into the sea.

HERO OF ALEXANDRIA (I. or II. cent. B.C.), Gk. mathematician and writer on mechanical and physical subjects; invented, as toys, number of machines and automata; wrote *Catoptrica* (on reflecting surfaces), three books on *Mechanics*, *Pneumatica* (descriptions of his machines), *Automatopoietica*, and numerous treatises on *Geometry*.

HEROD, princes of Judæa. H. THE GREAT was appointed king of all Judæa in 40 B.C., and in 37 B.C. he took Jerusalem and deposed Antigonus, the last Asmonæan prince; he rebuilt Temple, and laid out a new palace on Zion; had great numbers of his relatives put to death, and ordered massacre of Innocents; d. in 4 B.C.—H. ANTIPAS, tetrarch of Galilee and Perœa; beheaded John the Baptist; deposed 40 A.D.—H. PHILIP, tetrarch of region beyond Jordan; founded Cæsarea Philippi; m. Salome; d. 33 A.D. H. AGRIPPA I. (d. 44 A.D.), king of Judæa; s. of Aristobulus; g.s. of H. the Great; Caligula showered honours and favours upon him, and he became one of the most powerful kings of the East; imprisoned St. Peter, and put James, bro. of John the Evangelist, to death; according to *Acts* 12, d. 'eaten of worms.' H. AGRIPPA II. (d. c. 100 A.D.), s. of H. Agrippa I., last king of H. the Great's line; appears in *Acts* 26.

HERODAS, HERONDAS (III. cent. B.C.), Gk. poet and writer of mimes; probably native of Cos. A papyrus with seven mimes of H. was discovered in 1890. The scenes are very lively and vivid.

HERODIANS, associated by Christ with the Pharisees for condemnation (*Mark* 8^{15}; cf. 3^{6}); supposed to have been a Jewish political party in favour of Herod, king of Judæa, 37–4 B.C.

HERODIANUS, Gk. historian; fl. during first half of III. cent. A.D., and wrote a valuable narrative of his period.

HERODIANUS, ÆLIUS (fl. II. cent. A.D.), Alexandrian scholar whose treatises on Gk. prosody and style are valuable.

HERODOTUS (c. 490–420 B.C.), early Gk. historian, generally regarded as the father of history; b. at Halicarnassus, Asia Minor; during his youth occurred the great uprising of Greeks against Persians; spent many years in travelling, visiting Egypt, Babylon, Greece, and other countries, and was thus able to give lifelike descriptions of the various peoples mentioned in his history. The latter is an account of the great victory of Greeks over Persians, and is also an epitome of the life and thought of the time; the main theme is preceded by a lengthy introduction which relates the earlier history of both nations, and gives incidentally long accounts of many other great nations with which they came in contact. The part dealing with his own times is of great hist. value, but much of his work on earlier periods is untrustworthy. His style is unstudied and harmonious, and is praised by both ancient and modern writers.

Bouhier, *Recherches sur Hérodote* (1746); J. B. Bury, *Ancient Greek Historians* (1908). Trans. by Rawlinson.

HEROIC, THE (Gk. *heros*, a superior being). Nearly every country has its h. age, in which men performed more than mortal feats. Historians have not yet decided whether the hero should be regarded as an original god or the god as a deified hero, but there is a strong current of opinion in favour of the latter view. Science has done much of late years in sifting the myths and obtaining a historical residuum, Niebuhr's treatment of early Rom. history marking an epoch in this process. The result has been, so far, to establish a line of demarcation, the h. being claimed for history, the mythical remaining among religions. Thus, so far, efforts to humanise Zeus and Woden have failed, but the heroes of Greece and Troy, whose deeds are sung in Homer, receive a place in modern accounts of Ægean civilisation, and the symbolism of the stories of regal Rome has been so plausibly explained as to be generally accepted as historical.

The h. in romance, again, is very valuable for history. Charlemagne is mentioned by name in the *Chanson de Roland*, but in many cases pseudonyms are given, sometimes well-known (for instance, Dietrich of Bern, hero of a cycle in the XIII. cent. *Heldenbuch*, is Theodoric). The love of the h. in literature is one of the most important characteristics of the Romantic as opposed to the Classical school; it was a favourite theme of the Middle Ages, went out of fashion at the Renaissance, and returned with the Romantic revival; it had, however, a brief renaissance in the early XVII. cent. in France. The Hôtel de Rambouillet resuscitated the noble and high-flown attitude towards life which Cervantes had just destroyed; the romances of the Scudéry had their fascination for an age which disliked simplicity, and

it was as part of the Cavalier revolt against Puritanism that they became the rage in England, where several of the same sort were written (*e.g.* Dryden's *Conquest of Granada*, a play full of excess and bombast). The mediæval h. is dead, but there remains an attitude towards life treated by many modern writers as hypocritical; hence the romance *v.* realism battle in XX. cent. lit.

HEROIC VERSE amongst the Greeks and Romans was the hexameter measure used by Homer and Virgil; synonymous term amongst the Fr. for Alexandrine verse; in Eng. verse it is the name given to two-rhymed iambic lines, each consisting of ten syllables. It was first popularised by Chaucer; was the favourite measure of Dryden and Pope; but sank into disfavour in the early part of the XIX. cent. See COUPLET.

HERON (*Ardea cinerea*), a large marsh bird with long legs and a stout, powerful beak; plumage slaty grey above, with pale breast and neck, whilst head is characterised by a dark crest. The h. is a voracious feeder, devouring eels, fish, worms, water-voles, field-mice, which it impales on its beak. The breeding haunts are termed heronries, and the nests are large, flat structures, built in groups in high trees. H.-hawking was a favourite sport in falconry.

HERONDAS, see HERODAS.

HEROPHILUS (fl. IV. and III. cent's B.C.), physician; b. Chalcedon. See MEDICINE.

HEROSTRATUS, see under EPHESUS.

HERPES, inflammation of the skin, accompanied by the appearance of vesicles on the surface, due to inflammation of the cutaneous nerve supplying the part; *herpes labialis* occurs about the lips in acute fevers, pneumonia, or even in a severe cold, soon passing away; *herpes zoster* usually occurs on the body along the course of an intercostal nerve, neuralgic pain usually preceding the eruption, and it is treated by applying a dusting powder, with potassium bromide or quinine internally.

HERPESTES, a carnivore; see under CIVET FAMILY.

HERRERA, FERNANDO DE (*c.* 1534–97), Span. poet who introduced Ital. Renaissance into Spain.

HERRERA, FRANCISCO (1576–1656), the elder, and his s., FRANCISCO H., the younger (1662–85), Span. painters; the former famous for depth in subject and treatment, and founder of a Span. school.

HERRERA Y TORDESILLAS, ANTONIO DE (1549–1625), Span. historiographer-royal; wrote history of early Span. colonies in America.

HERRICK, ROBERT (1591–1674), Eng. poet; s. of goldsmith, to which calling he was apprenticed; subsequently went to Cambridge, took orders, and became vicar of Dean Prior, Devon (1629); ejected (1648); but reinstated (1662); d. unmarried. His *Noble Numbers* was pub. (1647), and his *Hesperides* in 1648; prolific writer of lyrics dealing with love, country life, etc. Much of his work has little merit, but many of his lyrics are amongst the most exquisite things of their kind in Eng. lit.

F. W. Moorman, *Herrick* (1910).

HERRIES, JOHN CHARLES (1778–1855), Brit. Conservative statesman; Chancellor of the Exchequer, 1827; Pres. of Board of Trade, 1830.

HERRIES OF TERREGLES, BARONY OF, Scot. honour bestowed on HERBERT H. (d. *c.* 1500), *c.* 1490; the 3rd Lord H. left a dau., AGNES, who m. (1547), JOHN MAXWELL (*c.* 1512–83), 4TH LORD H., younger s. of Robert, Lord Maxwell; he was a prominent supporter of Mary, Queen of Scots. This honour merged with the Earldom of Nithsdale in 1667. The 5th earl was attainted for his share in the rebellion of 1715, but in 1858 the lordship of H. was restored to WILLIAM CONSTABLE-MAXWELL, whose s. MARMADUKE was cr. baron of the U.K., 1884.

HERRING FAMILY (*Clupeidæ*), the most valuable of all groups of fishes, on account of their importance as food fishes. They are marine and surface feeders and are taken in drift nets. Most are small fishes, with large, thin, silvery scales and without a lateral line, but the related Mexican Silver-King, or Tarpon, a favourite game-fish, may reach a length of 6 feet. The Menhaden (*Brevoortia tyrannus*) is one of the most valuable of Amer. fishes—the yield of oil extracted from it exceeding in value that of whale oil. Its young are preserved as 'sardines.' About half a dozen of the 200 members of the family (which is cosmopolitan) are found in Brit. seas, amongst them being the Herring (*Clupea harengus*),—the most valuable of food fishes,—whose migrating shoals are followed by vast fleets of fishing-boats. The egg of the herring is one of the few fish eggs that do not float. The smaller Sprat (*C. sprattus*), with serrated belly, the young of which, with those of the herring, are known as 'Whitebait'; the silver and green Pilchard (*C. pilchardus*), commonest on the S. coasts of Britain, the young of which are Sardines; the Shad, which may weigh 8 lb., and spawns, like the Salmon, in rivers; and the Anchovy (*q.v.*).

HERRING-BONE, term in masonry for arrangement of bricks in h.-b. pattern.

HERRINGS, BATTLE OF THE (Feb. 12, 1429), so called because the Eng. force, under Sir J. Fastolf, carrying provisions to Orleans, defended themselves behind barrels of herrings, and repulsed a Fr. attack under Comte de Clermont.

HERRNHUT (51° 1′ N., 14° 45′ E.), town, Saxony, Germany; Moravian sect established colony here, 1722. Pop. (1910) 1360.

HERSCHEL, SIR JOHN FREDERICK WILLIAM, Bart. (1792–1871), Eng. astronomer; only s. of Sir William H.; b. Slough (Bucks); grad. at Cambridge, 1813, and was Senior Wrangler and Smith's Prizeman; spent some time after his f.'s death reviewing the nebulæ and star clusters his f. had discovered; to these he added several hundreds more, and made observations on over 3000 double stars; set up at his own expense an observatory near Cape Town, 1834, and there completed his survey of the whole heavens, publishing his results in 1847; cr. baronet, 1837.

HERSCHEL, SIR WILLIAM (1738–1822), astronomer; b. Hanover; came to England, 1757, and held various musical appointments, studying maths. and astron. in spare time; began (1779) systematic survey of individual stars with a 7-ft. reflecting telescope constructed by himself; discovered, 1781, planet *Uranus* (being thereupon granted a pension of £400 a year), and later its satellites. He also discovered two of *Saturn's* satellites, and observed the phenomena of its rings. In 1787 he completed the erection of a 40-ft. reflector at Slough (Bucks), and continued his studies there; in 1802 presented to the Royal Society a catalogue of 5000 nebulæ and star clusters which he had discovered; knighted in 1816.

Sime, *Wm. Herschel and his Work* (1900).

HERSCHELL, FARRER, 1ST BARON HERSCHELL (1837–99), Eng. Lord Chancellor; b. at Brampton, Hants; called to Bar, 1860; app. Q.C., 1872; Recorder for Carlisle, 1873–80; M.P., 1874; Solicitor-Gen. under Gladstone, 1880; defeated for Londsale in general election of 1886, but in same year was app. Lord Chancellor and raised to the peerage; again sat on the Woolsack, 1892–95; Chancellor of London Univ., 1893; G.C.B., 1893. While in Washington, as pres. of Anglo-Amer. boundary commission, he met with accident which resulted in his death, 1899.

HERSENT, LOUIS (1777–1860), Fr. hist. and court painter.

HERSFELD (50° 52′ N., 9° 41′ E.), town, Hesse-Nassau, Germany; formerly site of Benedictine abbey. Pop. (1910) 9613.

HERSTAL, HERISTAL (50° 41′ N., 5° 38′ E.), town, Belgium; centre of iron and steel manufactures. Pop. 20,114.

HERTFORD (51° 48′ N., 0° 5′ W.), town, Hertfordshire, England; has castle originally built in X. cent.; in neighbourhood is Haileybury Coll. Pop. (1911) 10,384.

HERTFORD, EARLDOM AND MARQUISATE OF, titles held by Clares, Seymours, and Conways in succession; third marquess was prototype of Thackeray's 'Lord Steyne.'

HERTFORDSHIRE, Herts (51° 45′ N., 0° 15′ W.), county, England; bounded N. by Cambridge, E. by Essex, S. by Middlesex, S.W. by Buckingham, N.W. by Bedford; area, *c.* 634 sq. miles. Beautiful undulating county of hills, valleys, parks, and woods; in N. is branch of Chiltern Hills, highest being Kensworth Hill. Principal rivers are Lea, Stort, Colne, Maran, and artificial New River; chief towns, Hertford (capital), St. Albans, Hemel Hempstead, Watford, Hitchen, Bishop Stortford, and Ware. Wheat principal grain grown; water-cress, fruits, roses cultivated; stock raised; manufacturing industries small; brewing at Watford; straw-plaiting, paper-making, tanning, and brick-making carried on. Grand Junction Canal crosses S.W. part of county.

H. contains battlefields of St. Albans and Barnet; Waltham Cross; St. Albans Abbey; ruined priories at Ware and Hitchen; interesting churches at Abbots Langley, Baldock, Hemel Hempstead, Hatfield, and elsewhere; Hertford Castle, Hatfield Palace, and many notable mansions. Pop. (1911) 287,000.

HERTHA, Nerthus, in Teutonic myth. the personification of the Earth; worshipped by Norsemen, Germans, and A.-Saxons.

HERTOGENBOSCH, see 'S Hertogenbosch.

HERTZ, HEINDRICH RUDOLF (1857–94), Ger. physicist; was assistant to Helmholtz and later prof. of Physics at Carlsruhe Polytechnic. *Wireless telegraphy* is a practical application of one of his investigations. He demonstrated the similarity between *electromagnetic, light,* and *heat waves,* and worked at *electric discharges* in gases.

HERTZ, HENRIK (1798–1870), Dan. satirical and lyrical poet and dramatist; Sir Theodore Martin translated his poetical play, *King René's Daughter,* into English (1850), and it has found three other translators.

HERTZ, JOSEPH (1872–), Chief Rabbi of United Hebrew Congregations of Brit. Empire since 1912; b. Hungary; Rabbi at Johannesburg, and from 1910–12 of the Orooh Chaim congregation, New York.

HERTZBERG, EWALD FRIEDRICH, COUNT VON (1725–95), Pruss. lawyer and politician; after holding several posts in government service, he became chief minister in 1763; supported foreign policy of Frederick the Great, and for several years guided policy of Frederick William II.; dismissed from office for opposing the king in his dealings with Great Britain, Poland, and Russia, 1791; wrote on Ger. lit.

HERTZEN, ALEXANDER (1812–70), Russ. author; b. Moscow; banished as political offender, 1834; left Russia, 1847, and lived in Italy, Geneva, London, Paris, where he died; best works, *Kto Vinovat,* novel; political works, *Baptized Property, Kolokol, Golosa, iz Rossii* (Voices from Russia), etc.

HERTZOG, JAMES BARRY MUNNIK (1866–), Dutch leader in S. Africa; Free State general in Boer War; as Minister for Education urged rights of Dutch language in Orange Free State, hence term Hertzogism; member of first Union Cabinet, 1910–12.

HERULI, Teutonic people said to have been driven S. when the Danes settled in Denmark; allied with the Goths against the Rom. Empire.

HERVAS Y PANDURO, LORENZO (1735–1809), Span. author of famous book on equinoctial tongues.

HERVEY, JAMES (1714–58), Anglican clergyman who played part in Methodist revival; author of *Meditations among the Tombs* (1745).

HERVEY, JOHN, Baron H. of Ickworth (1696–1743), Brit. statesman and author; deserted Pulteney for Walpole when latter was about to retain power under George III.; suspected author of *Sedition and Defamation Display'd* (1831), which led to duel with Pulteney; crooked character, derided in writings of time as effeminate beau; wrote clever satirical *Memoirs of the Court of George II.*

HERVEY DE SAINT DENYS, MARIE JEAN LÉON, Marquis de (1823–92), Fr. writer on Chin. antiquities.

HERVEY ISLANDS, see Cook Islands.

HERVIEU, PAUL (1857–), Fr. psychological novelist and writer of successful plays dealing with sex problems.

HERWARTH VON BITTENFELD, KARL EBERHARD (1796–1884), Pruss. field-marshal; commanded right wing at Königgrätz and directed movements of 1870.

HERWEGH, GEORGE (1817–75), Ger. poet; b. Stuttgart; became famous through his political poems, *Gedichte eines Lebendigen* and *Neue Gedichte.*

HERZBERG (51° 43′ N., 13° 14′ E.), town, Saxony, Germany. Pop. 4043.

HERZBERG (51° 39′ N., 10° 20′ E.), town, Hanover, Prussia. Pop. 3896.

HERZEGOVINA, see Bosnia-Herzegovina.

HERZL, THEODOR (1860–1904), Jewish politician; b. at Budapest; founded Zionist movement, and in 1896 wrote *Der Judenstaat,* advocating the establishment of a Jewish autonomy in Palestine; to this end he organised a number of congresses at Basel.

HERZOG, HANS (1819–94), Swiss artillery general.

HERZOG, JOHANN JAKOB (1805–82), Ger. ecclesiastical historian; prof. of Theology at Halle, then at Erlangen.

HESEKIEL, JOHANN GEORG LUDWIG (1819–74), Ger. author; famed for his patriotic songs, pub. under title of *Preussenlieder* and *Neue Preussenlieder*; *Life of Bismarck,* etc.

HESILRIG, SIR ARTHUR (d. 1661), Eng. politician and soldier; Roundhead in Civil War; raised cavalry force for Parliament; conducted defence of Newcastle, 1647–48; imprisoned at Restoration, and d. in Tower.

HESIOD (*c.* VIII. cent. B.C.), one of the earliest Gk. poets; b. Ascra, in Bœotia. His poems are (1) *The Works and Days*—a didactic work on peasant life; (2) *The Theogony*—an account of the origin of the gods and heroes; (3) *The Shield of Heracles*—a description of the hero's shield, in imitation of Homer's account of the shield of Achilles; exemplar for Vergil.

HESPERIDES, THE (classical myth.), three maidens, Ægle, Arethusa, and Hesperia, dau's of Erebus (darkness) and Nox (night); guardians together with the hundred-headed dragon, Ladon, of the tree bearing golden apples, which was presented by Gæa (Earth) to Hera, on her marriage with Zeus.

HESPERORNIS, fossil bird. See under Odontornithes.

HESPERUS, Gk. name for planet Venus (*q.v.*) when seen as evening star.

HESS, HEINRICH HERMANN JOSEF, Baron von (1788–1870), Austrian field-marshal; won laurels as chief-of-staff to Radetzky in Italy.

HESS, KARL ERNST CHRISTOPH (1755–1828), Ger. engraver, whose three sons, **Peter** (1792–1871), **Heinrich Maria** (1798–1863), and **Karl** (1801–74), were prominent painters.

HESSE (50° 30′ N., 9° E.), grand-duchy and state of Ger. Empire; in S.W. of Prussia, comprising the provinces Oberhessen, Starkenberg, Rheinhessen, and 11 small enclaves; watered by Rhine, Lahn, Main, Fulda; chief towns—Darmstadt (capital), Giessen, Mainz, Wörms, Offenbach; famous mineral springs, iron, salt, manganese ore; numerous industries. H. ruled by landgraves from XIII. cent. till 1567; then divided into Hesse-Cassel, Hesse-Darmstadt, Hesse-Marburg, etc., which by 1866 were annexed by Prussia, with exception of Hesse-Darmstadt, from that date simply known as H. Area, 2968 sq. miles. Pop. (1910) 1,282,051.

HESSE-CASSEL (51° N., 9° 20′ E.), now part of Pruss. province of Hesse-Nassau; H.-C. was formed by the division of Hesse (*q.v.*) in 1567, and founded by William IV. (the Wise); ruled by landgraves until 1803; then landgrave William IX., having fought against French, received title of Elector; Elector

William I. having sided with Austria, H.-C. was annexed to Prussia, 1866.

HESSE-DARMSTADT (50° 15′ N., 9° E.), former grand-duchy of Germany, formed by division of Hesse, 1567; since 1866 known simply as HESSE (*q.v.*).

HESSE-HOMBURG, old landgraviate, Germany; incorporated with Prussia, 1866.

HESSE-NASSAU (*c.* 51° N., 9° E.), Pruss. province, Germany; area, 6062 sq. miles; magnificent forests; wine, fruits; mineral springs. Pop. (1910) 2,221,021.

HESSE-ROTENBURG, former landgraviate, Germany; partly incorporated with Hesse-Cassel, 1834.

HESSIAN, cloth made chiefly from jute; used for sacking and linings.

HESSUS, see EOBANUS.

HESTIA, Gk. goddess of the hearth. The hearth in the city prytaneum was sacred to H., and the fire never allowed to become extinct; brands were taken from it to light the city fire in a new colony.

HESYCHASTS (Gk. *hesychazein*, to be quiet), name given to a Greek sect which arose among monks of Mount Athos in XIV. cent.

HESYCHIUS (fl. IV. or V. cent. A.D.), Gk. philologist of Alexandria.

HESYCHUS OF MILETUS (fl. V. cent. A.D.), Byzantine historian.

HETÆRISM (Gk. *hetaira*, concubine), state of society before custom of marriage has been introduced.

HETEROCERA, see under LEPIDOPTERA.

HETEROMERA, a sub-order of Beetles, with five joints on tarsi of fore and middle legs and four on hind legs. It includes the *Tenebrionidæ*, with the common 'meal-worm,' the larva of *Tenebrio molitor*; the Churchyard Beetles (*Blaps*), whose funereal appearance, and habits of frequenting dark places and of feeding upon animal refuse, have gained them their name; the Blister- and Oil-Beetles (*Cantharidæ*), which often contain an irritant capable of blistering human skin.

HETEROPOD, see GASTEROPODA.

HETEROPTERA, see HEMIPTERA.

HETMAN, ATAMAN, commander of Russ. Cossack troops, and formerly title of Polish general.

HETTNER, HERMANN THEODOR (1821–82), Ger. literary historian; pub. *Literaturgeschichte des 18 Jahrhunderts*, *Die romantische Schule*, *Das moderne Drama*.

HETTSTEDT (51° 37′ N., 11° 30′ E.), town, Pruss. Saxony, Germany. Pop. (1910) 8857.

HEUGLIN, THEODOR VON (1824–76), Ger. traveller; was an authority on the zool. and ornithology of Egypt and Abyssinia.

HEULANDITE, mineral of Zeölite group, composed of hydrous calcium and aluminium silicate

HEUSCH, WILLEM DE (fl. XVII. cent.), Dutch landscape painter of school of Jan Both.

HEVELIUS, JOHANN (1611–87), Ger. astronomer; studied sun-spots; discovered four comets, and suggested revolution of such bodies round the sun; founded lunar topography.

HEWITT, ABRAM STEVENS (1822–1903), Amer. Democrat politician and manufacturer; helped to reconstitute Tammany, 1871; sat in Congress, 1875–86.

HEWLETT, MAURICE HENRY (1861–), Eng. novelist and poet; pub. *The Forest Lovers* (1898), *Richard Yea-and-Nay* (1900), *The Queen's Quair* (1904), and other novels; also poems, dramas, and miscellaneous works.

HEXACTINELLIDA, see under SPONGES.

HEXAMETER, dactylic measure, and the noblest of the Gk. and Roman verse measures, used by Homer and Vergil and other early poets. The form has been used in Ger. poetry and also in Eng. poetry, the best examples of the latter use being Kingsley's *Andromeda*, Clough's *Bothie*, and Longfellow's *Evangeline*.

HEXAPLA (the sixfold), an edit. of the Old Testament by Origen (fl. III. cent.), giving six versions.

HEXAPODA, see INSECTA.

HEXATEUCH, the Pentateuch (*q.v.*) and the Book of *Joshua*, joined to the Pentateuch as also treating of the conquest of Canaan.

HEXHAM (54° 58′ N., 2° 7′ W.), town, Northumberland, England, on Tyne; quaint old market town with narrow streets; most interesting feature is Abbey Church, with remains of ancient monastery; site of battle between Yorkists and Lancastrians, 1464; manufactures gloves and leather; coal and baryte mines near; trade chiefly agricultural. Pop. (1911) 8417.

HEYDEN, JAN VAN DER (1637–1712), Dutch painter who excelled in rendering architectural tones.

HEYLIN, or HEYLYN, PETER (1600–62), Eng. hist. writer; app. royal chaplain, 1630; treasurer of Westminster Abbey, 1637; suffered great hardships during Civil War; wrote great number of historical and controversial works, including *Cyprianus Anglicus*, a biography of Laud, and some lectures on cosmography.

HEYN, PIETER PIETERZOON (1578–1629), Dutch admiral; seized Span. bullion fleet, 1628; killed in action against Dunkirk pirates.

HEYNE, CHRISTIAN GOTTLOB (1729–1812), Ger. writer on classical antiquities.

HEYSE, PAUL JOHANN LUDWIG (1830–), Ger. novelist; b. Berlin; wrote excellent 'novellen' (short stories), *e.g. L'Arrabbiata*, fine lyrics, and *c.* 30 dramas; awarded Nobel prize, 1910.

HEYSHAM (54° 2′ N., 2° 54′ W.), port, Lancashire, England. Pop. (1911) 3350.

HEYWOOD (53° 35′ N., 2° 14′ W.), town, Lancashire, England. Pop. (1911) 26,698.

HEYWOOD, JOHN (*c.* 1497–1580), Eng. dramatist and epigrammatist; a distinguished writer of interludes, amongst which were *The Play of Love*, *The Pardoner and the Frere*, and *The Play of the Wether*. He was also author of many noted epigrams.

HEYWOOD, THOMAS (d. 1650), Eng. dramatist; very voluminous and popular writer of plays chiefly with a domestic interest; his best include *A Woman killed with Kindness* (1603), *Rape of Lucrece* (1608), *Fair Maid of the Exchange*, *Love's Mistress*; also wrote *An Apology for Actors*.

HEZEKIAH (fl. VIII. to VII. cent. B.C.), king of Judah; had great difficulty in putting down revolts of subject states; Bible relates how Sennacherib of Assyria invaded Judah and lost 180,000 men in single night by stroke of the 'angel of the Lord,' but episode is doubtful. H. was famous prophet and administrator; builder of aqueducts at Jerusalem.

HIATUS (Lat. gap), term in logic for break in chain of reasoning; generally, temporary pause.

HIAWATHA, mythical chief of the Iroquois Indians, who is said to have promoted the arts of peace and progress; taught medicine, navigation, etc.

HIBBING (47° 30′ N., 93° 20′ W.), small town, Minnesota, U.S.A. Pop. (1910) 8830.

HIBERNATION, the state of quiescence or torpor in which many organisms tide over natural conditions unfavourable to their active life. The state of h. has much resemblance to a deep and prolonged sleep, and indeed sleep is often the starting-point which leads to h.; but there are great differences between the two types of unconsciousness. In h. the functions of the body are so reduced that the animal becomes practically inanimate, nutrition ceases, respiration is almost stopped, and, most strange of all, the body temperature, which may have been anything from 35° to 40° C. in mammals, falls almost to that of the surrounding air, with the fluctuations of which it now fluctuates. Almost the first moment of awaking, however, restores the lowered temperature to its normal pitch.

The conditions unfavourable to life with which h. and its equivalent summer state—*æstivation*—are connected are mainly cold, associated with lack of food and the danger of starvation, and summer's drought, associated with the danger of drying up. The former, it is apparent, affects most intimately those creatures which depend solely upon food ac-

obtainable in winter, such as insects, and vegetation. At any rate, it is amongst the Bats, Insectivores, Reptiles and Amphibians, Rodents, Mollusca, and Insects that hibernation most provails. The majority seek a sheltered corner, some cranny or crevice in a tree or old building, or burrow in the earth, or in mud, or a shelter under dead leaves for their winter sleep. But its intensity varies much: amongst bats the noctule appears to hibernate continuously throughout autumn, winter and spring, while almost any mild evening during the year will bring the pipistrelle out on the wing. Intense hibernators include the hedgehog, the dormouse, the marmot, and almost all frogs in temperate and cold climates. Land molluscs, in drought as well as winter's cold, close the mouths of their shells with a calcareous plate—the epiphragm—and become quiescent; the bear stores fat in its tissues upon which it depends for sustenance; and the squirrel hides nuts to serve as food-supply during the feeding intervals which break its long fast. In the summer of tropical countries, when pools and rivers dry up, many fishes, snakes, crocodiles, and tortoises, in order to avoid desiccation, bury themselves in mud, tiding over the dry season unconsciously in the hard-baked ground.

HIBERNIA (also Ierne), ancient Rom. name for Ireland.

HIBISCUS, genus of plants of order *Malvaceæ* (q.v.). *H. syriacus* grows in Britain.

HICHENS, ROBERT SMYTHE (1864–), Eng. novelist; wrote *The Green Carnation* (1894), *Garden of Allah* (1904), etc.

HICKES, GEORGE (1642–1715), prominent Eng. nonjuror, but submitted; suffragan bp. of Thetford, 1694; chiefly noted for his *Linguarum veterum septentrionalium Thesaurus*.

HICKORY, an Amer. tree, genus *Carya*, with strong elastic wood, easily decayed by worms and moisture, but greatly valued as fuel; used for golf-clubs, hammer and tool handles.

HICKS, ELIAS (1748–1830), Amer. Quaker and anti-slavery agitator.

HICKS, WILLIAM (1830–83), Brit. general; entered Egyptian army, 1883; commander-in-chief against Mahdi, 1883; slain at Kashgil.

HICKS-BEACH, SIR MICHAEL, see ST. ALDWYN, VISCOUNT.

HIDALGO (Span. *hijo de algo*, son of something), Spaniard of gentle birth.

HIDALGO (c. 20° 30′ N., 98° 45 W.), state, Mexico; gold, silver, cereals, coffee. Pop. (1910) 641,895.

HIDALGO Y COSTILLO, MIGUEL (1753–1811), Mexican priest; led revolt against Spaniards; defeated at Calderon Bridge; put to death.

HIDE, the space that might be ploughed with a single plough, and would suffice to maintain a family or the household of a mansion-house. Authorities are not agreed upon the exact area. In Anglo-Saxon times and in Domesday Book the h. is given at 30, 40, 50, and 80 acres. It is estimated at anything from 30 to 40 acres by J. M. Kemble, and at 48 acres by R. W. Eyton. Prof. Maitland decided in favour of 120 acres. Prof. Vinogradoff has pointed out that its extent was determined by local usage—that it was 48 acres in Wilts and 40 acres in Dorset. Feudal aids were levied on the h. until the XII. cent.

HIDES, see SKINS, LEATHER.

HIEL, EMMANUEL (1834–99), Flem. patriotic poet.

HIEMPSAL II. (fl. I. cent. B.C.), king of Numidia; deposed, but reinstated by Romans under Pompey.

HIERAPOLIS.—(1) ancient ruined town in N.E. Syria, on high road from Antioch to Mesopotamia; possessed great temple, and was once one of the chief seats of worship of Astarte. (2) ancient city of Great Phrygia, lying between Lycus and Meander and near Laodicea and Colossæ; possessed temple to Cybele, and hot springs; early seat of Christianity, Church being founded by St. Paul.

HIERARCHY, government in sacred things; applied to varying ranks of Church officers.

HIERATIC, term given to a more cursive form of Egyptian hieroglyphics.

HIERAX (fl. c. 300), Egyptian Biblical commentator, who exercised strong influence for asceticism in the early Church.

HIERO, name of two tyrants of Syracuse.—H. I. defeated Etruscans, 474 B.C.—H. II. made treaty with Rome, 263 B.C.

HIEROCLES OF ALEXANDRIA (V. cent. B.C.), Gk. philosophical writer.

HIEROGLYPHICS, name given to figures sculptured or written on Egyptian monuments and papyri, and found on monuments of the Aztecs; translation found on the Rosetta Stone (1799).

HIERONYMITES, order of hermits whose rule was founded on the Augustinian; established in Italy and Spain, XIV.–XV. cent.

HIERONYMUS OF CARDIA (fl. IV. cent. B.C.), Gk. commander under Alexander the Great and his successors; his history is chief historical source of the period.

HIERRO, FERRO (27° 43′ N., 18° W.), island, Canary Isles (*q.v.*), Atlantic. Pop. 6508.

HIGDON (HIGDEN), RANULF (c. 1300–c. 1363), Eng. chronicler; monk of Chester and author of the excellent *Polychronicon*.

HIGGINS, MATTHEW JAMES (1810–68), Irish writer (pseudonym, JACOB OMNIUM); subject of one of Thackeray's ballads.

HIGGINSON, THOMAS WENTWORTH (1823–1911), Amer. soldier and writer; fought as volunteer in Civil War; wrote *Army Life in a Black Regiment*, etc.

HIGH COMMISSION COURT, established by Queen Elizabeth, 1559, dealt with ecclesiastical cases; members were Crown nominees; misused by Laud; abolished, 1689. Similar court in Scotland, 1606–38.

HIGH PLACE (Hebrew *Bāmāh*), often means place of worship (originally on hilltops); h. p's were the centre of religious worship among Canaanites; the rites associated with them drew down the fierce denunciations of the prophets; abolished in reformation of Josiah, 621 B.C., but restored later.

HIGH PRIEST, see under PRIEST.

HIGH RELIEF, relief work whose degree of projection is half natural circumference. See RELIEF.

HIGH SEAS, seas over which no individual sovereignty is recognised by international law.

HIGH TREASON, see TREASON.

HIGH WYCOMBE, see WYCOMBE.

HIGHAM FERRERS (52° 19′ N., 0° 36′ W.), town, Northamptonshire, England; has beautiful old church, Bede house, and school; manufactures boots and shoes. Pop. (1911) 2726.

HIGHGATE (51° 34′ N., 0° 8′ W.), N. suburb, London; has stone connected with Dick Whittington.

HIGHLAND DRESS.—Chief articles: kilt, pleated skirt worn knee-high, made of tartan (*q.v.*); sporran, fur or leather pouch worn in front of kilt; tartan plaid, depending from shoulder or wrapped diagonally over chest, secured with circular brooch; short jacket; Glengarry or Balmoral bonnet; tartan stockings; brogued shoes. In full evening H. d., lace ruffles replace collar and tie.

HIGHLANDS, THE, N. and N.W. districts of Scotland (*q.v.*).

HIGHNESS, title of honour, used in speaking of or to princes, grand-dukes, and minor royalties. Members of Imperial family addressed as 'Imperial H.'; of Royal family, 'Royal H.'

HIGHWAY, public road, which every one has right to use; generally created by Act of Parliament or by dedication, but uninterrupted use of any road for certain time may also establish right-of-way. Obligation to repair highway, in England, rests generally with parishes through which they pass, but may devolve upon owner of land the road passes through. In Scotland, highways are managed by county councils and burgh commissioners. See ROADS.

HIGINBOTHAM, GEORGE (1827–93), politician

and chief justice of Victoria, Australia; codified statutes of Victoria.

HILARION, ST. (291–372), abbot; after hermit's life in Egypt, introduced the monastic system into Palestine.

HILARIUS (fl. XII. cent.), mediæval goliardic poet, possibly of Eng. birth.

HILARY, ST. (d. 367), bp. of Poitiers who wrote learned theological books and treatises against Arians; his day is Jan. 13, and has given name Hilary to Eng. legal term between Michaelmas and Easter (these terms were abolished, 1873), and to Lent term at the Univ. of Oxford.

HILARY, ST. (*c.* 400–49), bp. of Arles, 429; the dispute as to his episcopal rights led to strengthening of papal influence over the Gallican Church; festival, May 5.

HILDA, ST. (614–80), Eng. abbess; took the veil about 647; became abbess of Hartlepool, and subsequently founded (658) Whitby Abbey for monks and nuns; exercised great influence on the religious life of her period.

HILDBURGHAUSEN (50° 26′ N., 10° 43′ E.), town, Saxe-Meiningen, Germany. Pop. (1910) 7700.

HILDEBERT OF LAVARDIN, GILDEBERT, ALDEBERT (*c.* 1050–1133), bp. of Le Mans, 1096; abp. of Tours, 1125; noted preacher and theological writer.

HILDEBRAND, see GREGORY VII.

HILDEBRAND, LAY OF, Ger. alliterative poem, (IX. cent.); variant of the Persian story of *Sohrab and Rustum*; a father, long absent from home, returns, and is challenged to single combat by a youth whom he, too late, discovers to be his son.

HILDEBRANDT, EDUARD (1818–68), Ger. court painter and academician.

HILDEBRANDT, THEODOR (1804–74), historical painter of Romantic school.

HILDEGARD, ST. (1098–1179), Ger. religious mystic; became abbess of Disibodenberg (Lorraine), and subsequently founded (1147) a nunnery near Bingen; famed for prophetic powers.

HILDEN (51° 7′ N., 6° 46′ E.), town, Rhenish Prussia, Germany. Pop. (1910) 16,900.

HILDESHEIM (52° 8′ N., 9° 58′ E.), town in Pruss. province of Hanover, at base of Harz Mountains, with fine cathedral (XI. cent.), St. Godehard Church (XII. cent.), St. Michael's; town hall, Carthusian monastery, Knochenhauer-Amtshaus, and many other old houses; chief industries—machinery, vehicles, church bells, bricks, sugar-refining, cigars. A free city of Empire in XIII. cent., H. joined Hanseatic League, 1249; annexed to Prussia, 1866. Pop. (1910) 54,850.

HILDRETH, RICHARD (1807–65), Amer. editor and writer on finance, slavery, etc.

HILGENFELD, ADOLF BERNHARD CHRISTOPH (1823–1907), Ger. theological prof. and author.

HILL, geographical term for height above a bank and below a mountain; bank is the only word for h. in certain N. of England dialects.

HILL, AARON (1685–1750), Eng. dramatist and poet; was a person of means, a considerable traveller, and unsuccessful speculator in commerce; wrote numerous pieces for the stage, of which *Zara*, his chief success, was derived from Voltaire.

HILL, AMBROSE POWELL (1825–65), Amer. general on Confederate side in Civil War.

HILL, DANIEL HARVEY (1821–89), Amer. general on Confederate side in Civil War.

HILL, DAVID BENNETT (1843–1910), Amer. lawyer and Democratic statesman; gov. of N.Y. State, 1885.

HILL, GEORGE BIRKBECK NORMAN (1835–1903), Eng. writer, especially noted for editions of Dr. Johnson's works.

HILL, JAMES J. (1838–), Amer. railway constructor and director.

HILL, JOHN (*c.* 1716–75), Eng. author; wrote *The Vegetable System* and other botanical works, also novels and miscellaneous works. He was frequently involved in literary quarrels with his contemporaries.

HILL, MATTHEW DAVENPORT (1792–1872), and his bro. FREDERICK (1803–96), bro's of Sir Rowland H., and criminal administration reformers.

HILL, MIRANDA (1836–1910), and her sister, OCTAVIA H. (*q.v.*), Eng. social reformers; chief interest, housing of poor.

HILL, OCTAVIA (1838–1912), Eng. philanthropist; with Ruskin improved working-class dwellings.

HILL, ROWLAND (1744–1833), famous Eng. preacher; s. of Sir R. H.

HILL, ROWLAND, 1ST VISCOUNT HILL, (1772–1842), Brit. general; distinguished in Egypt, 1801, and in Peninsular War; took forts of Almaraz, 1812; present at Waterloo.

HILL, SIR ROWLAND (1795–1879), Brit. statesman; originator of penny postage, 1840; induced government to undertake carriage of letters, irrespective of distance, within United Kingdom, at charge of one penny for maximum weight of ½ oz.; sec. to Postmaster-Gen., 1846; chief sec., 1854.

HILL TIPPERA, TRIPURA (23° 30′ N., 91° 40′ E.), native state, adjoining Bengal, India; area, 4086 sq. miles; rice, cotton. Pop. (1911) 229,613.

HILLAH (32° 28′ N., 44° 49′ E.), town, Turkey-in-Asia. Pop. *c.* 30,000.

HILLARD, GEORGE STILLMAN (1808–79), Amer. barrister and journalist.

HILLEBRAND, KARL (1829–84), Ger. critic and prose-writer.

HILLEL (*c.* 30 B.C.–*c.* 10 A.D.), famous Jewish Rabbi; his gentler view of the law was opposed to that of his sterner rival, Shammai; author of some very beautiful sayings proclaiming the duty of love to one's neighbour, and of others emphasising the value of learning.

HILLIARD, NICHOLAS (*c.* 1537–1619), Eng. craftsman and miniature painter, whose works are the treasures of collectors. His s. LAWRENCE (d. 1640) excelled him in the same field.

HILLSDALE (41° 53′ N., 84° 38′ W.), town, Michigan, U.S.A. Pop. (1910) 5000.

HILTON, JOHN (1804–78), Eng. surgeon; surgeon to Guy's Hospital, London; pres. of Royal Coll. of Surgeons, 1867; the greatest anatomist of his time, his chief investigations being on the brain and spinal cord; introduced new methods of surgical procedure, particularly in opening deep abscesses, the method for this being called after him.

HILTON, WILLIAM (1786–1839), Eng. artist; painter chiefly of historical and classical subjects; several examples in Nat. Gallery.

HILVERSUM (52° 13′ N., 5° 11′ E.), town, N. Holland. Pop. (1910) 31,792.

HIMALAYA (*c.* 31° to 34° 50′ N., 70° 30′ to 96° E.), the highest system of mountains in the world, stretching, in an irregular curve, almost 1500 miles along the N. boundary of India; with a varying breadth of 100 to 160 miles, they divide India from Tibet, and lie roughly between the Indus and the Brahmaputra. The H. consist of several ranges of peaks, separated by deep gorges through which rivers flow. Rising steeply from the plain of the Ganges stands a range (some 4000–5000 ft.) between which and the higher ranges lie the beautiful and fertile valleys of Nepal and Bhutan. The greater system, starting from the Pamir Plateau in the extreme N.W., is divided into two main parallel chains, one lying N. of the other. The N. chain, forming a watershed between India and Tibet, has been little explored; its only point under 16,000 ft. is called Drass Pass (*c.* 11,300 ft.), which leads to Kashmir; and the Niti Pass (*c.* 16,700 ft.) connects India with E. Turkestan. The S. chain, consisting of lofty snowclad peaks, includes many of the highest mountains in the world—many rising over 20,000 ft.; the highest, Mt. Everest (29,000 ft.), is the loftiest peak known in the world; other peaks are K2 or Godwin-Austen (*c.* 28,260 ft.); Kinchinjunga (*c.* 28,150 ft.); Dhawala-

giri (*c.* 26,280 ft.); Nanda-Devi (*c.* 25,700 ft.); Trisul (*c.* 23,400 ft.). From this chain flow the Ganges, Indus, Brahmaputra, and many other rivers; on its slopes also stand many sanatoria—Simla, Darjiling, Almora, etc.—which are taken advantage of during the hot seasons.

There are few lakes; but in E. are Yamdok-cho and Chomto-dong; in W. lie the holy Tibetan lakes of Manasarowar and Rakas Tal (whence flows the Sutlej River), and also Lake Kashmir. There are numerous glaciers, and the snow-line is higher on the Indian side than on the Tibetan; metal ores exist and gold is worked in Tibet. On the Indian side, most of the inhabitants are Hindus, the Tibetans being mostly of Turanian stock.

F. B. and W. H. Workman, *Ice-bound Heights of the Mustagh* (1908); Bruce, *Twenty Years in the Himalaya* (1910).

HIMANTOPUS, see PLOVER FAMILY.

HIMERA (37° 58′ N., 13° 40′ E.), ancient town, Sicily, modern THERMÆ HIMERÆÆ; ruined by Hannibal, 409 B.C.

HIMERIUS (315–86), Gk. philosopher; studied at Athens; wrote many speeches; his writings suffer from the over-elaboration fashionable in his day.

HIMLY, LOUIS AUGUSTE (1823–1906), Fr. scientific historian; chief work, *Histoire de la formation territoriale des États de l'Europe centrale.*

HIMYARS, SABÆANS (*q.v.*).

HINCKLEY (52° 33′ N., 1° 23′ W.), town, Leicestershire, England. Pop. (1911) 12,838.

HINCKS, EDWARD (1792–1866), Irish palæographical scholar.

HINCKS, SIR FRANCIS (1807–85), Irish-Canadian publicist; Premier of Canada, 1851; Finance Minister, 1869.

HINCMAR (*c.* 805–82), abp. of Reims; came to court of Louis the Pious, 844; abp., 845; had heresy of Gottschalk condemned; attacked Lothair II. of Lorraine for divorcing his queen; had various conflicts with other ecclesiastics and with Pope John VIII. over his metropolitan rights; wrote life of *St. Remigius.*

HINDERSIN, GUSTAV EDUARD VON (1804–72), Prussian soldier; reorganised Pruss. artillery; present at Sedan and siege of Paris.

HINDI, EASTERN AND WESTERN, Indo-Aryan tongues of district of India lying E. of the Punjab; Hindustani (*q.v.*) arose out of a W. H. dialect.

HINDKI, Hindu race of Afghanistan.

HINDLEY (53° 32′ N., 2° 34′ W.), town, Lancashire, England. Pop. (1911) 24,106.

HINDU CHRONOLOGY, see under CHRONOLOGY.

HINDU KUSH (35° 50′ N., 70° 30′ E.), range of mountains in Central Asia, stretching from Pamirs to Koh-i-Baba Mts. at Bamian Pass, *c.* 500 miles long; forms S. boundary of Afghanistan, and for some distance separates Badakhshan from Kafiristan and divides Kabul and Oxus basins. Contains sources of many important rivers; mts. crossed by many passes, most important being Khawak, leading from Badakhshan to Charikar and Kabul; Dorah, conducting to Chitral valley from Oxus; Barroghil, leading from Chitral and Kashmir to Upper Oxus and Yarkand; Lowarai, between valleys of Panjkora and Chitral.

HINDUISM, the name used for the religion of more than two hundred millions of the peoples of India. Hindus do not form one ecclesiastical organisation, nor do they all hold one creed. Yet this congeries of peoples is more or less loosely united by certain principles which are common to them all: (1) a rigid and elaborate *caste* system—so different from anything in Western religion; (2) a pessimistic view of life which makes it something on the whole evil, and is involved with the specially Oriental doctrine of reincarnation. The origin of H. dates back to before 1000 B.C., when the Aryan tribes invading from the N. were conquering the Dravidians of India. There was some intermingling of conquerors and conquered, but not enough to prevent a rigid caste system; the conquered people were secluded not only from social but from religious privileges. The primitive Vedic religion of the Aryan conquerors had many gods, but no elaborate worship. By about 800 B.C. the class of priests was developing into the Brahman caste. Four castes were evolved—the *Brahmans*, *Kshatriyas* (warriors), *Vaisyas* (traders), and *Sudras* (serfs). Not only does caste involve something of what we mean by 'class distinctions,' but a Brahman might not eat food prepared by any one but a Brahman. Certain trades became hereditary in certain castes, and those born into them had to remain at them. At the same time ritual became much more elaborate, and Brahmanism as a religion tended to be crushed under a weight of ritual.

The old gods that came to be worshipped most were *Vishnu* and *Siva*—the former, genial and protective; the latter, the god of change, death, and destruction. *Sakti*, the wife of Siva, is worshipped under various forms, among them that of *Kali*, of whom there are hideous images; her worship is accompanied with degrading rites and animal sacrifices. In the VI. cent. B.C. two new developments took place in *Buddhism* and *Jainism*, both growths from H. The two agreed in certain principles, particularly in their rejection of animal sacrifices; an instinctive dislike of shedding the blood of live creatures was helped by the belief in universal reincarnation. Buddhism, however, has now hardly any hold in India itself. *Baba Nanak* (1469–1539) was a religious reformer and believed in a Supreme Being to be worshipped by meditation. Though the *Vishnuite* sects often have a fairly high religious level, amongst some of them immoral rites are still practised. Hindu religious emotion has always had a strong tendency to become sensual. The *Sivaite* sects, however, have a generally lower tone, though among them there are some, *e.g.* the *Dandis*, which are better.

H. has several times produced religious reformers. In the IX. cent. *Sankara Acharya* thought the world unreal. His philosophic system was modified by *Ramanuja* in the XII. cent., who denied the identity of the Supreme with individuals. Further developments came in the XV. cent. from *Vallabhacharya*, a Brahman. He taught that any pleasure could be made sacred to religion, hence his followers have lapsed into immoral rites. In the XVI. cent. a further reformation took place under *Chaitanya*. *Krishna*, 'the Lord,' is the revelation of the Supreme in the Universe.

In the XIX. cent. there have been several religious movements starting from within H. in the direction of a pure and lofty monotheism. Muhammadanism had already exerted some influence in this direction. *Rammohan Ray* (1774–1833) studied Christianity and other religions, and founded the *Brahma-samaj*, which sought to combine everything that was best in the monotheistic faiths, and used concurrently various sacred scriptures. *Keśab Chandra Sen* was another leader of the Brahma-samaj. The *Prarthana-samaj* was on similar lines, but rejected the Christian element. Likewise the *Arya-samaj*, also somewhat anti-Christian. These theistic movements have not attained a very great influence, being naturally looked at askance both by Christians and Hindus.

The greatness of H. is not only in its long history, or the millions who in one form or another have professed it, but in the beauty of many of its ideas and the lofty heights to which it has risen. Its great limitation is that it has not been able to shake off crude forms.

Barnett, *Hinduism*; Arnold, *Hinduism* (1905).

HINDUR, NALAGARH (31° 0′ N., 76° 40′ E.), state, Punjab, India. Area, 2505 sq. miles. Pop. 52,551.

HINDUSTANI is merely a variety of Hindi, being derived from Braj Bhāsha dialect of Western Hindi. In India, where it has become *lingua franca*, it is better known as Urdu, a name derived from Turk. word meaning 'camp' (cp. English 'horde'); it arose out of necessities of intercourse between Persian-speaking Mughal conquerors and Hindi-speaking people of Hindustan. Many Persian, Arabic, and Turk. words

and forms of expression thus found their way into the Hindu of Delhi and surrounding districts, and the new mixed dialect acquired a richness, flexibility, and power of growth which soon enabled it to develop national lit. (see HINDUSTANI LIT.).

Although Muhammadan invasions of Hindi-speaking territories began in XII. cent. A.D., Urdu does not really begin till middle of XVI. cent., there being no difference between Hindi and Urdu. But it became the fashion for Urdu under Mughal rule to employ Persi-Arabic script, and to borrow Persian and Arabic words for literary purposes, while literary Hindi, always written in Devanāgari (Sanskrit) characters borrowed exclusively from classical Sanskrit. This is the only distinction between Urdu and Hindi, which, apart from the writing, differ chiefly in forms of prosody. But it is incorrect to speak of them as two different languages, merely because of the vocabulary of literary pedants. As Urdu employs Arabic alphabet, which is script of the Qur'ān, it has naturally become language of Ind. Muhammadans; and a religious element of divergence, which easily becomes exaggerated, is thus introduced into current controversies regarding adoption of a common national script. See INDO-ARYAN LANGUAGES.

Chapman, *How to learn H.* (1910); Pincott, *The Hindi Manual* (1882).

Hindustani Literature.—Bearing in mind that Urdu (called *Rekhta* by poets) really begins when Hindi poems were composed according to Persian forms of prosody, we may divide H. l. into four periods:—

Period I. EARLY HINDI, 1200–1550 A.D.—Language rude, but being fashioned for literary purposes. Represented by Rajput heroic ballads, and lit. of Vaishnava reformers. Oldest specimen: Chand's *Prithvirāj Rāsan.* Among reformers who influenced literary development, most famous is KABÍR.

Period II. MIDDLE HINDI, 1550 TO 1750 A.D.—Hindi poetry at its best, chiefly religious and philosophical, and attaining high degree of metrical perfection. Best specimen, Tulsi Das's *Rāmāyana,* celebrated throughout N. India.

Period III. RISE AND DEVELOPMENT OF LITERARY URDU, XVI.–XVIII. CENT. A.D.—Persian models were so closely followed in form and substance as to deprive Urdu of all claim to originality. To obtain variety, poets had recourse to metaphors, similes, alliteration, and other rhetorical devices. First Urdu poet was AMIR KHUSRAU, whose beautiful lyrics are still sung in N. India. It was under royal patronage that Urdu poetry found its best development. Earliest schools were at courts of Golconda and Bijapur, but later and most famous literary centres are Delhi and Lakhnau.

Names or pseudonyms of principal poets connected with each centre: 1. GOLCONDA. Nuri (earliest poet after Amir Khusrau); Nishāti; Tahsínuddin; and Qutb Shahi kings. 2. AURANGABAD. Valí (1680–1720 A.D.), 'Father of the Rekhta'; and Sirāj. 3. DELHI. Sauda, most distinguished poet and satirist of N. India; Khan Arzu (1689–1756), another master, whose pupil, Mir Taqi, lyric and narrative poet, d. 1810, ranks next to Sauda but surpasses him in style and purity of language; Yaqín, *c.* 1750; and Mir Dard. MODERN SCHOOL. Zauq; Zafar (pseudonym of last Emperor Bahadur Shah II.); Ghalib (d. 1869), most eminent modern Urdu poet; Sayyad Ahmad, Wahabi reformer, introduced lithographic printing and newspaper press, 1837. School ended with final establishment of Brit. rule, 1857. 4. LAKHNAU. Owing to Delhi having been frequently sacked between 1739 and 1760 A.D., centre was transferred to Lakhnau. Principal poets: Mir Hasan (d. 1786); Miskín, elegiac; Mir Sóz (d. 1800) and Jura't (d. 1810), somewhat licentious satirists. MODERN SCHOOL. Atash (d. 1847) and Nasikh (d. 1841), lyrical; Aris (d. 1875) and Dabír (d. 1876), elegiac. School ended with Brit. annexation of Oude, 1856.

Period IV. RISE OF URDU PROSE, chiefly under patronage of Fort William Coll., Calcutta, directed by Dr. Gilchrist. Best works: Mir Ammán's *Bagh o Bahár,* Nihal Chand's *Gul-i-Bakavali,* Ikram Ali's *Ikhwan-us-Safa.*

CONTEMPORARY LITERATURE.—Under national revival now taking place, interesting developments may be expected. Aligarh and Haidarabad are principal centres, former owing to Aligarh Coll., founded by Sayyad Ahmad, great prose writer and publicist; latter owing to patronage of Nizam's court, which attracts talented writers from N. India. Poetic expression more spontaneous; novel and drama being developed. Best modern writers: Afsós and Dágh, poets; Nazir Ahmad and Ratan Nath, novelists; Muhammad Hussain Azad, poet and critic; Altáf Hussain Háli, poet and greatest living prose writer.

HINGANGHAT (20° 33′ N., 78° 53′ E.), town, Central Provinces, India. Pop. 12,662.

HINGHAM (42° 13′ N., 6° 8′ E.), town, Massachusetts, U.S.A. Pop. (1910) 4963.

HINNOM, see GEHENNA.

HINOJOSA DEL DUQUE (38° 26′ N., 5° 8′ W.), town, Cordova, Spain; woollens, cottons, copper. Pop. *c.* 11,000.

HINSCHIUS, PAUL (1835–98), Ger. canonist; author of masterly treatise on the Pseudo-Isidor and of highly esteemed *Kirchenrecht.*

HINTERLAND, Ger. name for tract beyond district occupied by a colony, but claimed by the colony as territory which they will require for expansion.

HINTON, JAMES (1822–75), Eng. surgeon and author; aural surgeon to Guy's Hospital, and author of works on aural surgery and pathology; author of popular scientific works and of several works dealing with ethical and social problems.

HIOGO, HYOGO (34° 48′ N., 135° 14′ E.), town, Japan; has colossal statue of Buddha and temples; shipbuilding; textile manufactures. Pop. *c.* 300,000.

HIONG-NU, people who had a vast empire N. of China in the Early Christian era; possibly Turks.

HIP (O.E.), part of the human body called the haunch in cattle, being connection of legs and body; architectural term for meeting-place of sloping sides of roof, the finial on which is called the **Hip-knob.**

HIP-JOINT DISEASE, see JOINT, TUBERCULOSIS.

HIPPARCHUS (190–120 B.C.), Gk. astronomer; invented trigonometry; discovered precession of equinoxes; measured sun's distance from earth.

HIPPEASTRUM, a genus of plants, natural order *Amaryllidaceæ.* It comprises fifty species of showy tropical bulbous plants with funnel-shaped flowers.

HIPPEL, THEODOR GOTTLIEB VON (1741–96), Ger. author of light and learned narrative of the school of Sterne.

HIPPIAS OF ELIS (V. cent. B.C.), Gk. sophist, a rival of Protagoras; figures in Plato's *Hippias major* and *minor.*

HIPPOCRAS, old medicinal cordial composed of wine mixed with sugar and cinnamon, ginger, or other spices, and strained.

HIPPOCRATES (V. cent. B.C.), Gk. philosopher and physician; a descendant of Æsculapius; b. at Cos, 460 B.C.; called 'Father of Medicine,' and first to treat it scientifically; a firm believer in recuperative force of nature, which he endeavoured to stimulate and direct; wrote *Prognostics, Epidemics, Aphorisms.*

HIPPOCRENE (Gk. *hippou krene,* spring of the horse), fountain on Helicon supposed to have been formed by stroke of Pegasus's hoof; sacred to the Muses and source of inspiration to poets.

HIPPODAMUS OF MILETUS (fl. V. cent. B.C.), Gk. architect employed by Pericles at Athens.

HIPPODROME (Gk. *hippos,* horse; *dromos,* racecourse), Gk. racecourse, oblong, with semicircular end. The LONDON H. (opened 1900) is chiefly a music-hall.

HIPPOLYTA (classical myth.), queen of Amazons (*q.v.*); slain by Hercules; another version makes her marry Theseus, who conquered her forces in Attica.

HIPPOLYTUS (b. II. cent.), presbyter of Rom Church under bp. Zephyrinus; quarrelled with

Callixtus I.; martyred in persecution, *c.* 235; wrote numerous works, but all attributed to him are probably not his; some exist in translations only.

HIPPOLYTUS (classical myth.), s. of Theseus, king of Athens, by Antiope or Hippolyta, the Amazon queen. His stepmother, Phædra, conceived a passion for him, but, her advances being rejected, she accused him to her husband of having violated her chastity. Theseus laid a curse upon him, and he met with a violent end; but was restored to life by Æsculapius.

HIPPOLYTUS, CANONS OF, a work preserved only in an Arabic trans. of a Coptic trans. of the original Gk., written in the name of H., and dealing with Church order, ordination, sacraments, prayer, almsgiving, etc.; date and authorship are uncertain, but it probably appeared in Egypt in the IV. cent. Its exact connection with the *Egyptian Church Order*, *Apostolic Constitutions*, and *Testament of the Lord*, with which it undoubtedly has some relation, is a complicated literary problem. Probably the canons and the Egyptian Order are derived from the same source.

HIPPONAX (VI. cent. B.C.), Gk. satirical poet; inventor of parody and the choliambus metre.

HIPPOPOTAMUS (Gr. *hippos*, a horse; *potamos*, a river), a single genus of even-toed Ungulate Mammal, with two species, found in African lakes and rivers south of the Sahara. They are huge creatures, with thick, almost hairless skins, which lie concealed in their lakes and rivers during the day, but at night feed on grass and the reedy vegetation of the banks. Fossil remains of the Common H. have been found even in N. England.

HIPPOTHERIUM, see under HORSE FAMILY.

HIPPURIC ACID, $C_9H_9NO_3$, found in urine of horses and cows; colourless crystals; splits into glycocoll and benzoic acid.

HIPURINAS, Ind. tribe of Brazil, notorious for savagery before modern missionary efforts.

HIRA (32° N., 44° E.), ruined Arab city, formerly capital of a kingdom on the Persian Gulf.

HIRADO (33° 16′ N., 129° 26′ E.), mountainous island, lying off W. coast of Japan.

HIRE-PURCHASE, system of purchase by instalments, the payments being considered as payments for hire until the seller is completely satisfied.

HIRINGS, THE, Eng. fairs at which servants are engaged, now uncommon; held at Martinmas. At the Mop Fair, now obsolete, badges or 'mops' were worn as signs of occupation desired by the labourers who stood in the market-place to be hired.

HIROSAKI (40° 35′ N., 140° 30′ E.), town, Nippon, Japan. Pop. 37,487.

HIROSHIGE, adopted name of three Japanese artists of XIX. cent. whose prints are much valued. See Arthur Morrison's *The Painters of Japan*.

HIROSHIMA (34° 21′ N., 132° 33′ E.), port, Nippon, Japan. Pop. 142,763.

HIRPINI, Samnite race of Italy.

HIRSAU (48° 43′ N., 8° 43′ E.), village, Württemberg, Germany; formerly site of celebrated Benedictine monastery, of which beautiful ruins remain. Pop. *c.* 800.

HIRSCH, MAURICE DE, BARON (1831–96), Jewish capitalist and philanthropist; devoted much time and money to schemes for bettering condition of Jews; endowed the *Alliance Israélite Universelle*, 1889; gave £500,000 for establishment of schools in Galicia and Bukowina; founded Jewish Colonisation Association, to benefit persecuted Jews.

HIRSCH, SAMSON RAPHAEL (1808–88), Jewish theologian and Neoplatonist; his clever writings have had widespread influence.

HIRSCHBERG (50° 54′ N., 15° 40′ E.), town, Pruss. Silesia, Germany; textiles, chemicals, porcelain. Pop. (1910) 20,560.

HIRSON (49° 56′ N., 49° E.), town, Aisne, France. Pop. 8335.

HIRTIUS, AULUS (d. 43 B.C.), Rom. consul, 43; slain on Antony's side at Mutina; continued Cæsar's *Commentaries*.

HIRUDINEA, HIRUDO, see LEECHES.

HIRUNDINIDÆ, SWALLOWS (*q.v.*).

HISHAM IBN AL-KALBI (d. *c.* 819), Arab. antiquarian.

HISPELLUM, Ital. colony founded by Augustus; called Flavia Constans by Constantine; now *Spello*; important ruins.

HISSAR (38° N., 69° E.), district, Central Asia, between Oxus on S. and Hissar Mts. on N. Chief towns, Hissar and Kabadian. Soil fertile; rice and flax main products; towns celebrated for damascened swords and silks. Pop. 10,000.

HISSAR (29° 9′ N., 75° 44′ E.), capital, H. district, Punjab, India; horse and cattle fairs. Pop. 17,647. H. district has area *c.* 5000 miles. Pop. 781,717.

HISSARLIK, see under TROY.

HISTIÆUS (d. 494 B.C.), tyrant of Miletus, who at first Medised, but afterwards led the fruitless Ionian revolt against Darius; was captured and crucified.

HISTOLOGY, the study of microscopic physiology, dealing with cells and tissues of living things. See CELL, CYTOLOGY.

HISTORY is both the biography and unwritten events of the life of the human race. The beginnings of h. are to be seen in the rude weapons, bones, and barrows left by what used to be called 'prehistoric' man. It is impossible to decide how far back into this early period the myths and sagas go, and how far these are inventions, how far glorifications of actual events. Niebuhr's *Römische Geschichte* (1812–32) first turned attention to their possibly historical nature, and much history has since been read into the story of Romulus and myths in general. The reverse of the process which turned heroes into supernatural beings is also seen: the Wade who is a hero of some parts of the Eng. countryside, and is treated by Scott and others as a mediæval personage, is possibly Woden. The point is that h., even in the old-fashioned sense, may begin with Eolithic man.

Before the first Egyptian dynasty, dated by Mariette from 5004 B.C., there is a tradition of nearly 20,000 years of rule of gods, demi-gods, and shades; with the Memphite dynasties (*c.* 4000 B.C.) Egyptian monumental h. begins, and papyri, our first-written records, are found in the tombs. Inscriptions were for long the only h.; among them are the cuneiform writings of Assyria, perhaps contemporary with first Egyptian papyri; they recorded important events, names of rulers, etc.; similar but fuller accounts (*Annales*) of events of the years were afterwards kept by the Romans. The Greeks never cleared their early history from its encumbrance of myth, though sceptics arose like Hecatæus of Miletus (VI. cent. B.C.), and in Greece itself in age of Pericles; but Thucydides, Xenophon, and afterwards Polybius definitely set before themselves the ideal of historical veracity.

H. through Gk. example has, from Roman times to the present day, been taken to be an account of events truthfully but elegantly narrated; sometimes accuracy has impinged on elegance, sometimes everything is sacrificed to the love of literary effect; sometimes scrupulous intention of accuracy is to be found in masterpieces of style, as in Thucydides, Tacitus, Brantôme, Gibbon, Macaulay, and, as many people now think, Froude. The acceptance of Christianity had as enormous an effect on historical perspective and on the growth of the spirit of historical criticism as it had on h.; and a similar remark may be made about the Reformation. Discussion of questions, still unsettled, as to usages of Early Church trained men's minds to consider historical evidence, and from that time critical attention has been given to the past. The Fr. house of St. Maur started, in XVII. cent., the work of editing texts which is now being unintermittently carried out by Record Commissions and private initiative in every modern country. The

importance of the research element in modern hist. writing has led to system of specialists on minute points. See ANCIENT HISTORY. The bibliography of h. is wide subject in itself; for Eng. h. to 1485 Gross's *Sources and Lit. of Eng. H.* is essential; after 1485 there is no single guide. A general survey is Langlois, *Manuel de bibliographie historique.*

HIT (33° 39′ N., 42° 50′ E.), town, Turkey-in-Asia; produces naphtha, bitumen. Pop. *c.* 5000.

HITA, GINÉS PEREZ DE (*c.* 1540-*c.* 1604), Span. author; wrote well-known romance, *Guerras civiles de Granada.*

HITCHCOCK, EDWARD, Amer. geologist; b. Deerfield (Mass.), 1793; ordained pastor of Congregational Church, Conway (Mass.), 1821; surveyed the Western States and made speciality of study of footprints from Triassic sandstones of Connecticut Valley; pres. (1845–54) and prof. of Natural Science (1845–64), Amherst Coll.

HITCHIN (51° 57′ N., 0° 17′ W.), town, Hertfordshire, England. Pop. (1911) 11,905.

HITTITES.—The origin of the race is uncertain. Probably the H. came from Cappadocia, and poured south into Palestine, where to a large extent they lost their racial individuality by intermarriage with Semitic peoples, and by adopting the Babylonian religion and customs. From the XVI. cent. B.C. till 717 B.C. they occupied a territory of vague extent. For the country between the Lebanon and the Euphrates to the north of Palestine is described as 'the land of the H.' (*Joshua* 1^4); they are represented as dwelling in the mountains in the heart of Palestine (*Numbers* 13^{29}); and they are also identical with the 'children of Heth,' and are found by Abraham at Hebron (*Genesis* $23^{3\text{-}20}$ and 25^{10}). Usually in the Old Testament the H. are dwelling in the south-central part of Palestine, but they are certainly mentioned as also inhabiting the north, for the city of Luz is in the 'land of the H.' (*Judges* 1^{26}). There are many other references in the Old Testament, and their relations with the Hebrews were friendly.

Apart from Biblical data, all we know of the H. is derived from Egyptian and Assyrian monuments, and the cuneiform inscriptions of Van, in Armenia. According to the Egyptian inscriptions they had conquered Syria (1503–1449 B.C.), and were at war with Egypt, at intervals, till 1366 B.C. In the reign of Rameses III. (1180–50) they were amongst the invaders of Egypt, were repulsed, their country was laid waste, and they disappear from Egyptian history. From 1100 to 717 B.C. they are the enemies of Assyria, according to Assyrian inscriptions, and are finally defeated by Sargon. The Vannic inscriptions refer to several expeditions against the H. in the IX. and VIII. cent's B.C. Hittite monuments, revealing a marked Babylonian influence, are numerous, and have been discovered over a very wide area in Syria and Asia Minor, notably near Smyrna, in Galatia, in Isauria, at Ivris, and at Sipylus, and as far south as Hamath. The inscriptions are partly pictographic, and partly alphabetic and ideographic. The upturned snowshoe is common on these monuments, and the winged horse made its way into Europe through Hittite art. The chief Hittite god, according to Egyptian inscriptions, was Sutekh (or Atys), and the chief goddess Antarata.

Sayce, *The Hittites*; Messerschmidt, *The Hittites*; Wright, *Empire of the Hittites.*

HITTORFF, JACQUES IGNACE (1792–1867), Fr. architect who constructed many of the buildings of modern Paris and wrote architectural treatises.

HITZACKER (53° 9′ N., 11° 2′ E.), town, Hanover, Prussia. Pop. (1910) 976.

HITZIG, FERDINAND (1807–75), Ger. Biblical commentator and philologist, now largely superseded.

HIVITES, people of Palestine mentioned in the Bible; expelled by the Jews (*Exodus* 3^8).

HJÖRRING (57° 27′ N., 9° 59′ E.), ancient town, Denmark. Pop. *c.* 8000.

HKAMTI LONG (*c.* 27° 30′ N., 97° 30′ E.), district of India dependent on Burma; area, 900 sq. miles. Pop. *c.* 12,000.

HLOTHHERE, king of Kent (673–85); slain in battle by his nephew Eadric.

HOACTZIN, or HOATZIN (*Opisthocomus hoazin*), an interesting S. American bird, smaller than a pheasant, olive coloured, varied with white, with yellow crest. The young have a remarkable habit of climbing by means of claws on each wing. Anatomically peculiar, it is probably a survival of a primitive type.

HOADLY, BENJAMIN (1676–1761), Eng. bp., author of controversial works on relation of Church and State; himself latitudinarian, he hotly disputed with High Churchmen; successively bp. of Bangor, Hereford, Salisbury, and Winchester; in 1717 preached before king sermon on kingdom of Christ, the power of the Church, which gave rise to *Bangorian Controversy.*

HOANG HO, HWANG HO, YELLOW RIVER (37° 30′ N., 118° 20′ E.), one of the principal rivers of China; rises in the mountains of Tibet, and flowing N.E. traverses N.W. part of China and part of Mongolia; re-enters China, flowing S., E., and N.E.; enters Gulf of Pe-chi-li; length, 2500 miles; liable to floods.

HOAR, SAMUEL (1778–1856), Amer. politician; b. Lincoln, Massachusetts; State Senator, 1825; entered Congress, 1835; challenged certain laws concerning imprisonment of negroes in S. Carolina. His s's were Ebenezer and George; former was Attorney-Gen. in 1869; latter was Senator from 1877 till 1904.

HOARE, SIR RICHARD COLT, Bart. (1758–1838), Eng. antiquary; historian of Wiltshire; s. of Earl of Buckinghamshire.

HOBART (42° 56′ S., 147° 21′ E.), capital, Tasmania; fine harbour; has two cathedrals, Parliament Houses, Government House; iron foundries, breweries. Pop. (1911) 27,719.

HOBART, GARRET AUGUSTUS (1844–99), Vice-Pres. of U.S.A; leading Republican.

HOBART, JOHN HENRY (1775–1830), Amer. divine; assistant bp. of New York, 1811; bp. 1816; strong High Churchman, defender of Episcopacy, and keen controversialist.

HOBART PASHA, AUGUSTUS CHARLES HOBART-HAMPDEN (1822–86), distinguished Brit. admiral; became admiral in the Turkish navy.

HOBBEMA, MEYNDERT (*c.* 1638–1709), famous Dutch landscape painter; lived and died in poverty and obscurity; made unsurpassed studies of sober and peaceful landscapes, perfect in their kind; widely different manner from that of his contemporary Ruysdael, but their works often confused through dealers forging signatures.

HOBBES, JOHN OLIVER, see CRAIGIE, P. M. T.

HOBBES, THOMAS (1588–1679), Eng. philosopher; b. Malmesbury; ed. at Magdalen Hall, Oxford, and in 1608 became tutor to the s. of William Cavendish, 2nd Earl of Devonshire; remaining with this family, except for two short intervals, for the rest of his life. He travelled abroad with his pupil, who became an intimate personal friend. H. became imbued with the scientific rather than the philosophic spirit of his day. He then devoted himself to the study of the classics. Cavendish died in 1628, and H. became tutor to the s. of Sir Gervase Clifton, 1629, then to the Earl of Devonshire, s. of his former pupil, 1631. About this time he began to devote himself to philosophy. The years 1640–51 he spent abroad. The idea of his great book, *Leviathan,* was forming in his mind, and he devoted most of his attention to it. His ideas were certainly affected by the civil strife of the time. The *Leviathan* was a great monster made up of a mass of human beings. While he anticipated later thinkers in believing that government was for the benefit of the people as a whole, he believed that the civil power residing in the people was absolute, and that no internal organisations which might conflict with it should be allowed to exist.

The *Leviathan* was published in 1651 and provoked a storm of abuse on one side and of praise on the other.

Meanwhile, the political views therein expressed were thought dangerous both in England and France. H., after making his submission, contrived to live quietly in London. He then became involved in various controversies, one with Bramhall, another with John Wallis, Savilian prof. of Geometry at Oxford, which lasted on and off for many years. H. was not really a profound mathematician, hence he was often worsted, but would never allow himself beaten, and the two men furiously assailed each other by turns, the controversy often being most virulent and personal. Though he was now getting old H.'s energy was unwearied. In 1666 some believed that his 'atheistic' teaching had provoked the wrath of Heaven in the shape of the great plague, and H. was alarmed lest he might be tried for heresy. However, the king protected him, but H. was obliged to get his books printed out of England. His reputation abroad was very great. He worked on at translating Homer and other things till near the end, dying aged ninety-one. He has left the mark of his work on many subjects; in mathematics only was he thoroughly unsuccessful. He laid the foundation on which political philosophers of the XIX. cent. were to build.

Sir Leslie Stephen, *Hobbes*; G. Croom Robertson, *Hobbes*.

HOBBY.—(1) hob or hobgoblin; (2) a slow and steady horse; (3) an occupation followed as a pastime. Classical examples of riding a h. are to be found in Sterne's *Tristram Shandy*.

HOBBY, a member of HAWK FAMILY (*q.v.*).

HOBHOUSE, JOHN CAM, see BROUGHTON, LORD.

HOBOKEN (40° 44′ N., 74° 6′ W.), town, New Jersey, U.S.A.; shipping trade in coal; iron foundries; silk and lead pencil manufacturers. Pop. (1910) 70,324.

HOBOKEN (51° 11′ N., 4° 21′ E.), town, Belgium. Pop. 13,000.

HOBSON'S CHOICE, phrase derived from Thomas Hobson (*c.* 1544–1630), the Cambridge carrier, commemorated by Milton. He insisted on horses being taken from his stable only in their regular turn—hence meaning, 'this or none.'

HOBY, SIR THOMAS (1530–66), Eng. diplomat and writer; translated *The Courtyer of Count Baldessar Castilio* and other works.

HOCCLEVE, THOMAS, see OCCLEVE.

HOCHE, LAZARE (1768–97), Fr. soldier; commanded army of Moselle against Austrians, whom he defeated at Weissenburg; ended Vendée insurrection, and defeated Royalists at Quiberon and Penthièvre, 1795; obtained command of Sambre and Meuse force, 1796, and routed Austrians at Neuwied; War Minister, 1797; d. at Wetzlar.

HOCHHEIM (50° 2′ N., 8° 23′ E.), town, Hesse-Nassau, Germany. Pop. 4000.

HOCHST (50° 7′ N., 8° 30′ E.), town, Hesse-Nassau, Germany; machinery, dyes. Pop. (1910) 17,224.

HÖCHSTÄDT.—(1) (48° 36′ N., 10° 33′ E.) town, Bavaria, Germany. Pop. 2305. (2) (50° 8′ N., 11° 4′ E.) town, Bavaria, Germany. Pop. *c.* 2000.

HOCK, see WINE.

HOCKEY (cf. O.Fr. *hoquet*, shepherd's crook), Eng. game played by two teams of 11 players on ground 100 yds. by 50–60 yds.; the goal is 7 ft. high, 12 ft. broad; round the goal line is the striking circle 12 ft. long and 15 yds. from the goal; on each side 5 yds. of the breadth of the course is 'outside.' There are 5 forwards, 2 backs, 3 half-backs, and a goal-keeper on each side.

HOCK-TIDE, Eng. holiday observed XII. cent., and probably earlier, to XVIII. cent., on Monday and Tuesday after Easter Sunday.

HOCUS, or Hocus Pocus, a supposed corruption of *Hoc est corpus* used by priests in the Mass; was used (*temp.* James I.) as a cant-term for a juggler's trick. Its later meaning refers to a hoax with criminal intent.

HODDEN, rough grey cloth, formerly made from a combination of black and white undyed wool.

HODDESDON (51° 46′ N., 0° 2′ W.), town, Hertfordshire, England. Pop. (1911) 5196.

HODEDA (14° 36′ N., 43° 4′ E.), fortified town, Arabia; exports coffee, grain. Pop. *c.* 30,000.

HODENING, Eng. Christmas Eve mummery, in which a horse's head (model) is fixed on a draped pole, lighted from the interior and carried round from door to door for the purpose of collecting money.

HODGE, CHARLES (1797–1878), Amer. Presbyterian divine; studied in America and at Paris, Halle, and Berlin; prof. at Princeton Theological Seminary.

HODGKIN, THOMAS (1831–), Eng. historian; wrote *Theodoric the Goth*, *The Dynasty of Theodosius*, *Italy and her Invaders*.

HODGSON, BRIAN HOUGHTON (1800–94), Eng. administrator; Orientalist and naturalist; spent many years in the East Indian service, and was a noted authority on Buddhism and natural history; pub. *Literature and Religion of Buddhists* (1841).

HÓDMEZÖ-VÁSÁRHELY (46° 27′ N., 20° 20′ E.), town, Hungary. Pop. (1910) 62,445.

HODOGRAPH, curve obtained by joining ends of lines drawn from any point parallel and proportional to the velocity of a moving particle.

HODSON, WILLIAM STEPHEN RAIKES (1821–58), Brit. soldier; served against Sikhs; accused of misuse of regimental money, 1855; at outbreak of Indian Mutiny raised regiment of irregular horse, known as H.'s Horse; greatly distinguished himself during war, and at fall of Delhi took the old emperor prisoner and slew his sons; killed during attack on Lucknow.

G. H. Hodson, *Hodson of Hodson's Horse*; Trotter, *A Leader of Light Horse*.

HOE, ancient gardening tool, useful for making holes for planting; in XVII. cent. many h's commenced to be united in a HORSE HOE (grubber) for breaking up ground in fields.

HOEFNAGEL, JORIS (1545–1601), noted engraver and miniature painter.

HOF.—(1) (50° 19′ N., 11° 54′ E.) town, Bavaria, Germany; manufactures textiles. Pop. (1910) 41,120. (2) (60° 34′ N., 11° 59′ E.) town, Hedemarken, Norway. Pop. 5000.

HOFER, ANDREAS (1767–1810), Tyrolese statesman; with Austrian encouragement raised Tyrol against Napoleon, April 1809; Napoleon recovered possession in July, but country rose as he departed; H. came from hiding; won battle of Iselberg against Lefebvre; ruled for three months; forced to fly in Oct. 1809; betrayed, he was shot by Napoleon's orders.

HÖFFDING, HAROLD (1843–), Dan. philosopher; prof., Copenhagen Univ.; works trans. into many languages.

HOFFMAN, FRIEDRICH (1660–1742), Ger. physician; practised and taught at Jena and afterwards at Minden; first prof. of Medicine (1693), and also of Natural Philosophy at Halle; member of many foreign learned societies, and author of many medical works.

HOFFMANN, AUGUST HEINRICH, HOFFMANN VON FALLERSLEBEN (1798–1874), Ger. poet; b. Fallersleben, and called himself after his birthplace; prof. at Breslau Univ.; dismissed, 1842, on account of his *Unpolitische Lieder*; also wrote Volkslieder.

HOFFMANN, ERNST THEODOR WILHELM (1776–1822), Ger. novelist; b. Königsberg (Prussia); studied law; for some time musical director at Bamberg, Leipzig, and Dresden Theatres; composed several operas; became famous through *Phantasiestücke in Callots Manier* and *Die Serapionsbrüder* (weird stories), and *Die Elexiere des Teufels* (novel).

HOFFMANN, FRANÇOIS BENOÎT (1760–1828), Fr. critic and author of amusing operas.

HOFFMANN, JOHANN JOSEPH (1805–78), Ger. Orientalist; wrote various Jap. studies and *Catalogus librorum et manuscriptorum japonicorum* (1845).

HOFMANN, AUGUST WILHELM VON (1818–92), Ger. chemist; first director of School of Practical Chem., London; became prof. of Chem. in Berlin, 1864. He and his pupils brought the coal-tar industry under notice. His researches on analin, rosanilin, and quinoline red are classics.

HOFMANN, JOHANN CHRISTIAN KONRAD VON (1810–77), Ger. theologian and historian; pub. *Theologische Ethik, Schutzschriften, Der Schriftbeweis.*

HOFMANN, MELCHIOR (*c.* 1498–1544), Ger. Anabaptist preacher; at first a furrier, became follower of Luther; adopted extreme views on Eucharist; preached at Strassburg and Emden; became Anabaptist; sometimes thought anti-Trinitarian, but was really Valentinian.

HOFMEISTER, WILHELM FRIEDRICH BENEDICT (1824–77), Ger. botanist; prof. of Bot. at Heidelberg and an eminent morphological botanist; pointed out the analogies between *Coniferæ* and *Cryptogams.* He also worked on *Bryophytes, Pteridophytes,* and the embryology of plants.

HOFMEYR, JAN HENDRIK (1845–1909), South African politician and journalist; was for many years ruling spirit in Cape Colony of Afrikander Bond; supported Cecil Rhodes till Jameson Raid, 1895; tried to influence Kruger and to prevent outbreak of war between Boers and British; was in favour of federation of S. African colonies.

HOFSTEDE DE GROOT, PETRUS (1802–86), Dutch prof., divine, and theological writer.

HOGARTH, WILLIAM (1697–1764), Eng. artist and engraver; b. London; s. of a schoolmaster; apprenticed to an engraver, and later set up in that calling on his own account; *m.* Jane, dau. of Sir James Thornhill; achieved his first artistic success with his series of six paintings representing *The Harlot's Progress* (1731), shortly afterwards engraved by himself. This series was followed by eight scenes depicting *The Rake's Progress* (1735), *Marriage à la Mode, Industry and Idleness, The Stage Coach, The March to Finchley,* portraits of Garrick, Lavinia Fenton, scriptural pieces, etc. H. achieved immediate success with his engravings, but his original paintings found little appreciation in his own day, and many remained unsold at the time of his death. In portraiture he was more successful. H. is now recognised as one of the great Eng. artists. His purpose, in his more famous series, was to paint a story dramatically in a set of scenes, and the best of these are at once remarkable for realism and masterly humour, for H. was not only great as an artist, but equally so as a satirist and humorist.

C. Lewis Hind, *Hogarth.*

HOGG, JAMES (1770–1835), Scot. poet, known as 'the Ettrick Shepherd'; herded cattle and sheep in his youth; made disastrous ventures in farming; pub. *Scottish Pastorals* (1801), *The Mountain Bard* (1807), *The Queen's Wake* (1813)—his best work in poetry. Other writings include collections of tales, and a treatise on diseases of sheep.

Life, by Sir George Douglas.

HOGG, THOMAS JEFFERSON (1792–1862), Eng. author; was the Oxford associate and subsequent biographer of Shelley. His work was incomplete and gave offence to his relatives, but makes good reading.

HOGMANAY, name given in parts of Scotland to New Year's Eve; also called *hogg-night.*

HOGSHEAD, standard measure for liquids; made 63 wine gallons or 52½ imperial gallons in 1423.

HOHENASPERG (48° 57′ N., 10° 5′ E.), former fortress, Württemberg, Germany.

HOHENFRIEDBERG, HOHENFRIEDEBERG (50° 54′ N., 16° 14′ E.), village, in Silesia, Prussia. During the War of Austrian Succession great battle was fought at H., June 3, 1745, between Prussians under Frederick the Great, and Austrians and Saxons under Prince Charles of Lorraine; total defeat of Allies, whose losses were 15,224; Prussian losses about 4700.

HOHENHEIM (48° 42′ N., 9° 12′ E.), small town, Württemberg, Germany; famous agricultural coll. Pop. *c.* 300.

HOHENLIMBURG (51° 20′ N., 7° 33′ E.), town, Westphalia, Prussia. Pop. (1910) 13,900.

HOHENLINDEN (48° 9′ N., 11° 59′ E.), village, Upper Bavaria; scene of defeat of Austrians, under Archduke John, by French, under Moreau, Dec. 3, 1800.

HOHENLOHE, Ger. family, which held title of Count from XII. cent., and attained princely rank in XVIII. cent. The family was frequently subdivided, and many of its branches are now extinct; but there remain those of Bartenstein, Jagstberg, Schillingsfürst, and Waldenburg, which represent the R.C. line of H.-Waldenburg, founded in 1551; and those of Ingelfingen, Langenburg, and Ohringen, which are descended from the Prot. family of H.-Neuenstein, founded at the same time. The most distinguished member of the family was CHLODWIG KARL VICTOR (1819–1901), prince of H.-Schillingsfürst; he at first entered service of Prussia, but left it in 1846; in 1866 he became chief minister of Bavaria; aimed at uniting N. and S. Germany; opposed Ultramontanes in 1869, and had to resign office in 1870; ambassador to France, 1873–80; appointed gov. of Alsace-Lorraine in 1855; Imperial Chancellor in 1894. Other notable members of family are: FRIEDRICH, prince of H.-Ingelfingen (1746–1818), who served against Napoleon and was defeated at Jena; LUDWIG (1765–1829), prince of H.-Waldenburg-Bartenstein, who became marshal of France; ALEXANDER (1794–1849), prince of H.-Waldenburg-Schillingsfürst, who became priest and is credited with performing supernatural cures; and H. INGELFINGEN (1827–92), prince of Kraft, who served in Franco-Ger. War of 1870–71.

Weller, *Geschichte des Hauses Hohenlohe* (1904).

HOHENSTAUFEN (48° 44′ N., 9° 45′ E.), village, Württemberg, Germany; site of ruined castle which belonged to H. family from 1080 till 1525, when it was destroyed in Peasant Rising.

HOHENSTAUFEN, Ger. family, holding imperial crown, 1138–1254; founded by Frederick von Büren, whose son Frederick took name H. from H. Castle; emperors of family were Frederick I. (1152–90), Henry VI. (1190–97), Philip I. (1198–1208), Frederick II. (1212–50), Conrad IV. (1250–54). See EMPIRE, HOLY ROMAN.

HOHENSTEIN.—(1) (50° 47′ N., 12° 43′ E.) town, Saxony, Germany. Pop. 15,600. (2) (53° 34′ N., 20° 18′ E.) town, E. Prussia. Pop. 2500.

HOHENZOLLERN, Ger. imperial family; name derived from castle in S. Germany; family first came into prominence in 1415, when one of its members became Elector of Brandenburg; in 1701 Frederick III., Elector of Brandenburg, became first King of Prussia, and in 1871 William I., seventh King of Prussia, became first Emperor of Germany; Kaiser William II. is present head of family. Swabian branch, which dates from 1227, is represented by the present King of Rumania, a member of house of H.-Sigmaringen.

HOKKAIDO, Jap. term, denoting N. part of empire.

HOKUSAI (1760–1849), famous Jap. painter; works include great book of colour prints, *Mangwa.*

HOLBACH, PAUL HEINRICH DIETRICH BARON D' (1723–89), Fr. philosopher; denounced Christianity as source of all ill; friend of *Encyclopædists.*

HOLBEACH (52° 49′ N., 0° 1′ E.), town, Lincolnshire, England. Pop. (1911) 5259.

HOLBEIN, HANS, THE ELDER (*c.* 1460–1524), Ger. artist; painter of average ability; chiefly religious subjects; examples at Basel, Munich, and Augsburg, also at Hampton Court. He is chiefly famous as being the f. of an illustrious son.

HOLBEIN, HANS, THE YOUNGER (1497–1543), Ger. artist; s. of Hans H. (*q.v.*); b. Augsburg; in his youth assisted his f., subsequently going to Basel, where he became a member of the painters' guild, 1519. Here and at Lucerne he was extensively engaged in portraiture, mural decoration, and the

production of woodcuts, including the famous series, 'The Dance of Death.' In 1526 he visited London and executed many fine portraits of notabilities, but returned to Basel in 1528. He was settled in London again in 1532, became court painter to Henry VIII., and subsequently d. of the pestilence. H. ranks amongst the greatest of the old Ger. masters. His notable works include *The Ambassadors* (National Gallery), *Anne of Cleves* (Louvre), *Duke of Norfolk* (Windsor), *Jane Seymour* (Vienna), and numerous portraits in Eng. mansions. See Bensusan, *Holbein.*

HOLBERG, LUDWIG, BARON (1684–1754), Dan. author; b. Bergen; lived in England, 1706–8; became prof. of Metaphysics at Copenhagen, subsequently of Rhetoric and History. His earliest literary successes were his satirical poems, *Peder Paars*, *Hans Mikkelsen's Metamorphoses*, etc. Upon the opening of the Dan. theatre at Copenhagen, H. supplied its stage with a long series of brilliant comedies, which have taken a high place in Dan. literature. Other important works include his *Autobiography*, *History of Denmark*, and *History of the Jews.*

HOLBORN, central metropolitan borough, London, England; contains Chapel of Ethelreda, St. Andrew's Church, City Temple, Lincoln's Inn, Gray's Inn, Brit. Museum, and many other public buildings.

HOLCROFT, THOMAS (1745–1809), Eng. dramatist; was in turn pedlar, stable-boy, schoolmaster, stage-promoter, and actor; his melodrama, *The Road to Ruin* (1792), was highly successful, and is still played. He also wrote novels and verses, and pub. trans. from German and French.

HOLDEN, SIR ISAAC, Bart. (1807–97), Eng. inventor; after a life of struggle, invented a wool-comber (1847), and established, near Paris, wool-combing industry, which brought him wealth.

HÖLDERLIN, JOHANN CHRISTIAN FRIEDRICH (1770–1843), Ger. poet; b. Lauffen; became insane, 1802; wrote excellent lyrics; *Empedokles* (tragedy, unfinished), *Hyperion* (romance in letters), etc.

HOLDERNESS, EARLDOM OF, Eng. honour bestowed on John Ramsay, Lord Haddington, in 1621, who died childless. In 1644 Prince Rupert received the earldom, which again became extinct on his death, 1682. Conyers, Lord Conyers and D'Arcy, representative of ancient Yorks families, was cr. Earl of H. in 1682, and the earldom descended in his line until 1778, when it became finally extinct.

HOLDHEIM, SAMUEL (1806–60), Jewish nationalist; rabbi at Berlin.

HOLDING, see SMALL HOLDINGS, CROFTER.

HOLGUIN (20° 50′ N., 76° 29′ W.), town, Cuba, W. Indies. Pop. 7592.

HOLIDAYS, originally 'holy' days, *i.e.* days on which no work should be done; in modern England Bank H's are the only h's recognised by the State; these are not observed in Scotland, nor is Good Friday, which is customarily kept in England. Quebec still observes some of the old feast days (the h. properly so called), but the rest of the Dominion and the Brit. Colonies have their own new systems.

In U.S.A. there are no legal h's; the presidential proclamation of Thanksgiving Day (usually last Thursday in Nov.) makes it legal holiday in Columbia and the Territories, though it is generally observed. Other h's generally observed are Independence Day (July 4), Labor Day (first Monday in Sept.), and these are legal in most states, which have also various other statutory h's.

HOLINSHED, or HOLLINGSHEAD, RAPHAEL (d. *c.* 1580), Eng. chronicler; wrote *Chronicles of England, Scotland, and Ireland* (pub. 1578), from which Shakespeare's Eng. hist. plays were largely drawn.

HOLKAR, title of Mahratta ruler of Indore.

HOLL, FRANK (1845–88), Eng. artist; R.A., 1884; achieved distinction as painter of genre subjects, but later devoted himself to portraiture, his sitters including Gladstone, Chamberlain, Bright, Lords Wolseley and Roberts.

HOLLAND, NETHERLANDS, a kingdom on the coast of N. Europe, without mountains, and only protected in many places by dams from inundation by the sea. The coast-line and area of the country have often changed, through the reclaiming of land on one side and floods on the other. The country is covered by a network of canals, and is entirely drained into the North Sea.

CLIMATE is similar to that of S. England, but in mid-summer is unhealthy in low parts near the sea.

History.—For one or two cent's B.C. the land we call Holland was occupied by the Frisians and Batavi. The country was conquered by Rome, but let slip in the IV. cent. on the coming of the Franks. It was converted to Christianity about the VIII. cent., and formed part of the Empire of the Karlings. The name Holland was given to the district which still forms the provinces of N. and S. Holland in the XI. cent., when the Counts of Holland rose to importance. The various states which made up the *Netherlands* passed, some by marriage, some by conquest, to the Dukes of Burgundy, and then by descent to the Emperor Charles V. He was a firm though a harsh ruler, but the accession of his s., Philip II., in sympathy a Spaniard, and nothing of a Dutchman, meant terrible oppression for the country by king and Inquisition. The result was the famous revolt of the Netherlands under William of Orange, a lieut. of Philip, and member of a princely house in the S. of France. William's great protagonist in war was the Duke of Alva.

In 1572 a successful rising took place of the N. provinces (the Southern romained under Span. then Austrian domination till they became 'Belgium'). William of Orange became virtual ruler. The Union of Utrecht was formed in 1579, and the provinces declared themselves free of Span. control, 1581. William was murdered at Philip's instigation in 1584. The war with Spain grew fiercer, but in 1609 a truce was signed for twelve years. But the next few years were largely taken up with religious struggles between the Orthodox and Arminian parties, with the result that the Arminians were banished. Thenceforward Holland grew rapidly, not only politically, for she became famous in arts and science as well. In the XVII. cent. she exerted a greater influence in Europe than she has ever done before or since. She became a rival of England, and there was war between the two countries under Cromwell and Charles II. The wars (THE DUTCH WARS, 1652–53, 1663–67, 1672–78) left things much as they were. In the first, the two Eng. victories off Kent and the *Three Days Battle*, Feb. 18–20, 1653, seriously damaged commerce and left both sides exhausted. The second war saw the Dutch fleet in the Medway, and London struck with terror. In 1672 the English and French made an abortive attempt to invade Holland, and John de Witt, who had really guided the affairs of the Dutch, became so unpopular that he was murdered. William of Orange now came into power. French took Bonn, 1673, and Ghent and Ypres later: but Peace of Nimeguen, 1678, ended the war.

William of Orange became king of England and Scotland in 1688, and Dutch troops fought with English in the campaigns against Louis XIV. After William's death in 1702, a republic was established once more, and a period of general decline set in. By the Treaty of Utrecht, 1713, the Span. Netherlands, which France had tried to obtain, had become Austrian. But the Dutch Republic ceased from that time to have much say in European politics. In 1747 William IV. of Orange was elected Stadtholder of all the seven provinces, and the office was declared hereditary in his family. War broke out with Britain as the result of a quarrel over naval matters in 1780, and by the Treaty of Paris, 1793, certain colonies were surrendered to Britain. Meanwhile there was a certain party adverse to the house of Orange, and after internal disputes, William of Orange was re-established under Prussian and Brit. auspices.

But the Fr. Revolution again upset matters, and in 1795 the country was conquered by Republican troops. The Orange family fled, and the anti-Orange party

was overjoyed at the Fr. victory. A BATAVIAN REPUBLIC was established: nominally, a Fr. alliance was formed; practically, the country was under Fr. domination. Britain got the Dutch colonies: there was a short respite from war after the *Peace of Amiens*, 1802, but soon came more conflicts, and in 1806 Napoleon made his brother, Louis Bonaparte, king of Holland. A revolt broke out in 1813, and William V. of Orange was recognised as sovereign prince, and as king in 1815, the Belgian provinces being united to the Dutch. But a quarrel arose between the Dutch and Belgians (different in many ways by race, religion, and temperament), and an independent kingdom of Belgium was established in 1831. The constitution was revised in 1848. Quarrels about religious education took place continually during the reign of William II. (1849–1900), the father of the present Queen Wilhelmina. Another political question has been that of the suffrage: in 1896 it was extended so as to almost double the number of electors. In 1901 the queen married Prince Henry of Mecklenburg-Schwerin. During the South African War, Dutch sympathies were strongly with the Boors.

The GOVERNMENT is a constitutional monarchy with an Upper Chamber or States General, consisting of 50 members elected by the provincial estates from the wealthiest citizens, and of high officials (members to be at least 30 years old), and a Second Chamber of 100 members elected for 4 years (electors to be 25 and members 30). Justice is administered by a high court at The Hague and several other tribunals.

RELIGION.—The Dutch are a religious people; complete religious toleration exists, and there have been many refugees, consequently many faiths are represented. There is a Dutch Reformed Church, which is the National Church, and several other Prot. bodies which are offshoots from it. There are a fair number of Rom. Catholics, also Old Catholics and Jews.

EDUCATION is entirely under State control; primary education is free, and for secondary education the fees are low. There are univ's at Amsterdam, Groningen, Utrecht, and Leyden.

FINANCE.—Revenue (1912) was £16,839,018; expenditure, £18,501,488.

The army is recruited by lot from men of 20; in the land militia service is for 8 years, in the sea militia for 5. About 12,000 serve 8½ months in a foot, and 18 months in a mounted regiment; the remainder, *c.* 5000, only for 4 months. Every citizen must serve from 25 to 35 in the Civil Guard. The total war strength is about 175,000. The navy is recruited voluntarily.

COLONIAL POSSESSIONS.—Holland owns parts of the E. Indies, and less important possessions in the W. Indies. E. Indies possessions (with areas in sq. miles) are: Java and Madura, 50,554; Sumatra, 161,612; Borneo, W. coast, 55,825; Borneo, S. and E., 156,912; Billiton, 1863; Banka, 4460; Riau-Lingga Archipelago, 16,301; Celebes, 71,470; Molucca Islands, 43,864; New Guinea, 151,789; Timor Archipelago, 17,698; Bali and Lombok, 4065. Total area, 736,413 sq. miles.

W. Indies possessions are: Dutch Guiana, 46,000; Curaçao Colony, 403. Total area, 46,403 sq. miles. Total area of Dutch colonies, 782,816 sq. miles.

RESOURCES AND INDUSTRIES.—Agriculture and pasturage are of greater importance than industries; cheese and butter and flower bulbs are exported. Chief industries are shipbuilding, diamond-cutting, manufacture of sugar, salt, cocoa, paper, glass, vinegar, earthenware; brewing and distilling are important. Coal is found, but in small quantity. Chief ports are Amsterdam, Rotterdam, Flushing, and The Hague (capital). H. is a free-trade country. Canals are more important than railways for transport.

Pop. (1910) 5,945,155. Map, see BELGIUM.

Rogers, *Holland*; Wharton, *Holland of To-day* (1912).

Dutch Language and Literature.—Dutch is one of the Low-German languages, of the same family as Old English and Frisian. Its development belongs to three periods: *Old* D., derived from various Teutonic tribal dialects, which first began to take shape about the IX. cent.; *Middle* D. (XII. to end of XIV. cent's), which became the language of a considerable portion of Germany, Belgium, and northern France; and *Modern* D., which dates from the XV. cent. Dutch is spoken not only in Holland, but in the Union of South Africa, by colonials of Dutch descent who use for conversational purposes a *patois* known as the 'Taal.'

The Middle D. period witnessed the introduction of numerous epics and romances, chiefly derived from foreign sources, including *Floris en Blancefloer*, *Reinaert* (Reynard the Fox), *Roman van Lancelot*. During the XIV. cent., however, the flourishing trade of Holland had made that country one of the chief industrial markets of the world, and so with the rise of commercial prosperity there gradually came into being a more distinctive form of expression, out of which grew a lit. which was characteristic of the people and the times. This lit. began with Jacob van Maerlant, whose social satires, under the name of *Naturen Bloeme*, appeared about 1263, and was followed in 1284 by his greater work, *De Spieghel Historiael* (Mirror of History); after him came other writers, chiefly on hist. or moral subjects, including Jan van Boendale (1280–1365), Jan de Weert, and Melis Stoke. The romantic school of poetry was still represented by the works of Jan van Heelu, Hein van Aken, and Dirk Potter, but their influence was not lasting, and the moralists of the Maerlant type maintained their supremacy.

Modern D. is represented in its pioneer stage by the works of Coornhert, Spieghel, and Visscher, and a master stylist in Pieter Cornelissen Hooft (1581–1647), whose work in history, poetry, and drama is of high character. The greatest poet Holland has produced was Joost van den Vondel (1587–1679), whose tragedies, chiefly on Scriptural subjects, are marked by great imagination and expression, and are said to have influenced Milton. The greatest of these is *Lucifer*. Jacob Cats (1577–1660) was a poet of another order, whose work was invariably witty though sometimes coarse, and secured a lasting popularity. Other writers of outstanding abilities belonging to this period include Van der Goes, Oudaen, and the historian Geeraerdt Brandt. The XVIII. cent. witnessed a decline in D. poetry, but a writer of remarkable attainments arose in William Bilderdijk (1756–1831), whose influence on the D. lit. was very marked; and the XIX. cent. has witnessed the rise of many writers of poetry, history, fiction, and belles-letters whose works are distinguished by charm and originality.

Flemish Literature.—As distinct from the Old Dutch lit., modern Flem. lit. came into existence during early part of the XIX. cent. Its exponents include a number of poets and realistic and hist. novelists, amongst whom may be named Karel Ledeganck, Jan van Beers, J. T. van Rijswijck, P. van Duyse, Peter van Kerckhoven, J. L. D. Sleeckx, Jan Snieders, Julius de Geyter, Emmanuel Hiel, and numerous other writers.

HOLLAND (42° 48′ N., 86° 6′ W.), town, Michigan, U.S.A. Pop. (1910) 10,490.

HOLLAND, an unbleached linen cloth originally manufactured in H.

HOLLAND, CHARLES (1733–69), Eng. actor, of days of Garrick; his s. CHARLES (1768–1849) was also a prominent player.

HOLLAND, HENRY FOX, 1ST BARON (1705–74), Brit. politician; held various offices of state; Leader of Lower House, 1755, 1762; Paymaster-Gen., 1757.

HOLLAND, HENRY RICH, 1ST EARL OF (1590–1649), Eng. soldier and politician; arranged marriage between Charles I. and Henrietta Maria; changed sides several times during Civil War; taken prisoner at St. Neots, 1647, and executed, 1649.

HOLLAND, HENRY RICHARD VASSALL FOX, 3RD BARON (1773–1840), Brit. politician; Lord Privy Seal in 'All the Talents' Cabinet, 1806; Chancellor of Duchy of Lancaster, 1830; wrote *Memoirs of Whig Party*.

HOLLAND, JOSIAH GILBERT (1819–81), Amer. essayist, verse-writer, novelist; founder of *Scribner's Monthly* (1870), called later *The Century*.

HOLLAND, PHILEMON (1552–1637), Eng. translator of Gk. and Lat. classics. His s. HENRY (1583–c. 1650), wrote *Baziliologia* (1618) and *Heroologia* (1620).

HOLLAND, RICHARD DE (fl. second half of XV. cent.), Scot. poet; author of the *Book of the Howlat*, an alliterative rhymed poem.

HOLLAND, SIR HENRY, Bart. (1788–1873), Eng. physician; practised medicine with great success in London; travelled much abroad, and knew most eminent people of his time; author of works on medicine, travel, and other subjects.

HOLLANDS, or GIN. See SPIRITS.

HOLLAR, WENCESLAUS (1607–77), Bohemian engraver who took up his residence in England (1637), and has left numerous fine architectural and topographical prints, besides portraits and miscellaneous studies; illustrated (*inter alia*) 1st vol. of Dugdale's *Monasticon*.

HOLLES, DENZIL, BARON HOLLES (1599–1680), Eng. politician; b. at Houghton, Nottinghamshire; M.P., 1624; in 1629 he forced Speaker to remain seated while resolutions against the king's unjust taxes were put to the House, and was accordingly arrested and imprisoned in Tower till 1630, when he was set free, and withdrew temporarily to private life. H. sat in Short and Long Parliaments, 1640; helped to formulate the Grand Remonstrance in 1641, and in 1642 was one of the five impeached members. During Civil War he at first played an active part, served with some distinction at Edgehill, but suffered defeat at Brentford; later he withdrew from active service and made efforts for peace; twice impeached by army, in 1645 and 1647, and subsequently fled to France. H. had considerable share in Restoration of Charles II., by whom he was appointed ambassador to Paris; concluded *Treaty of Breda*, 1667; in later years he opposed the king's policy. Author of *Memoirs* and a number of political pamphlets.

HOLLESCHAU (49° 19′ N., 17° 36′ E.), town, Moravia, Austria; linen. Pop. (1911) 5954.

HOLLOWAY, THOMAS (1800–83), Eng. patent medicine manufacturer, who made large fortune from pills and ointment, and built **Holloway College** for women, at Englefield Green, Surrey (1887).

HOLLY, an evergreen shrub, *Ilex aquifolium*, with smooth grey bark and dark glossy leaves with spines on the margin. It will not grow in the shade of other trees. The flowers are *dioecious*. The female flowers have abortive *stamens* and the male ones an abortive *pistil*. The bright crimson berries severely irritate the digestive tract of man, but are eaten by birds. The wood, used for turned articles, is smooth, hard, white, even-grained, stains well, and when dyed black is used as imitation ebony.

HOLLY SPRINGS (34° 46′ N., 89° 26′ W.), town, Mississippi, U.S.A. Pop. (1910) 2192.

HOLLYHOCK, *Althea rosea*, a plant belonging to natural order *Malvaceæ*. Flowers are regular *polypetalous*, *hypogynous*, and the *stamens* ripen first.

HOLMES, OLIVER WENDELL (1809–94), Amer. author and physician; b. Cambridge, Mass.; ed. at Harvard; practised med. at Boston; prof of Anatomy at Harvard for thirty-five years from 1847. H. made his mark with *The Autocrat of the Breakfast Table* (1857), which was followed by the equally successful *Professor* (1860) and *Poet* (1871), of the same series. Amongst his other important works are a novel, *Elsie Venner* (1861), *Our Hundred Days in Europe* (1887), and several collections of poems. His poetry is generally of a popular character, but as a prose essayist he ranks high.

Life, by Kennedy (1883), Morse (1896), Townsend (1909).

HOLMFIRTH (53° 34′ N., 1° 47′ W.), town, Yorkshire, England. Pop. (1911) 9248.

HOLOCEPHALI, see under FISHES.

HOLOFERNES, see JUDITH, BOOK OF.

HOLOSTEI, see under FISHES.

HOLOTHUROIDEA, see ECHINODERMATA.

HOLROYD, SIR CHARLES (1861–), Eng. Director of National Gallery since 1906; formerly keeper of Tate Gallery; amongst his important pictures are *The Satyr King*, *Pan and the Peasants*, *The Supper at Emmaus*; also famed as etcher.

HOLSTE, LUC (1596–1661), Ger. classical scholar and learned author.

HOLSTEIN (c. 54° N., 10° E.), S. division of Schleswig-Holstein (*q.v.*), Germany.

HOLSTEIN, FRIEDRICH VON (1837–1909), Ger. politician; minister of foreign affairs for many years; opposed increase of Ger. fleet.

HOLT, SIR JOHN (1642–1710), Eng. chief justice; Recorder of London, 1686; Member of Convention Parliament, 1689; Lord Chief Justice of King's Bench, 1689.

HOLTEI, KARL EDWARD VON (1798–1880), Ger. poet; b. Breslau; writer of 'Singspiele' (*Der Alte Feldherr*, *Die Wiener in Berlin*, *Lenore*, etc.); poems in dialect—*Schlesischen Gedichte*; also novels.

HÖLTY, LUDWIG HEINRICH CHRISTOPH (1748–76), one of chief Ger. poets of the '*Göttinger Dichterbund*.'

HOLTZENDORFF, JOACHIM WILHELM FRANZ PHILIPP VON (1829–89), Ger. prof. of Law and author of books on jurisprudence.

HOLTZMANN, HEINRICH JULIUS (1832–1910), Ger. higher critic in theology.

HOLUB, EMIL (1847–1902), Bohemian African explorer and author of books of travel.

HOLY ALLIANCE, THE (1815), a sort of treaty drawn up by the Emperor Alexander I. of Russia, in which he, the Austrian emperor, and king of Prussia agreed to govern their dominions on principles of 'Justice, Christian Charity, and Peace.' Though Alexander's intentions were good the H. A. came to stand for reactionary principles in Europe.

HOLY GRAIL, see GRAIL, THE HOLY.

HOLY ISLAND, LINDISFARNE (55° 42′ N., 1° 48′ W.), island, off Northumberland, England; connected with mainland at low tide by sandy tract; has ruined Benedictine monastery. Pop. 650.

HOLY LAND, see PALESTINE.

HOLY ROMAN EMPIRE, see EMPIRE, HOLY ROMAN.

HOLY SEPULCHRE, KNIGHTS OF THE, see under HOSPITALLERS.

HOLY WATER.—In Early Church running water was used for baptism, and was not specially consecrated. Water in baptism not only symbolised purity, but carried away sin. The h. w. now used in churches is consecrated in various rites. For royal or special baptisms water from the Jordan is used.

HOLY WEEK, week before Easter, observed in the R.C. and Gk. churches by special religious exercises.

HOLYHEAD (53° 18′ N., 4° 39′ W.), port, Holy Isle, Anglesey, N. Wales; fine harbour; old church. Pop. (1911) 10,638.

HOLYOAKE, GEORGE JACOB (1817–1906), Eng. journalist and pioneer of the Co-operative movement in England; named his views 'secularism.'

HOLYOKE (42° 12′ N., 4° 25′ E.), town, Massachusetts, U.S.A., on Connecticut River, which is here dammed to supply water power; great seat of paper manufacture; cotton and woollen mills. Pop. (1910) 57,730.

HOLYROOD, royal palace, Edinburgh; founded, 1128, by David I., as an abbey; palace foundations laid, c. 1501; sacked by English, 1544 and 1650; rebuilt by Charles II., 1671–79.

HOLYSTONE, piece of stone used for scrubbing

the decks of ships; so called because its use demands a kneeling attitude.

HOLYWELL (53° 17′ N., 3° 13′ W.), town, Flintshire, Wales; above St. Winifred's well is Perpendicular chapel. Pop. (1911) 2549.

HOLYWOOD (54° 38′ N., 5° 50′ W.), port, County Down, Ireland; site of former monastery.

HOLZMINDEN (51° 50′ N., 9° 25′ E.), town, Brunswick, Germany. Pop. (1910) 10,250.

HOMAGE, term used under the feudal system for formal acknowledgment made by tenant that military service was due from him for the lands into which he was entering; the tenant knelt, placed his hands between the lord's hands, and swore fealty.

HOMBURG-VOR-DER-HÖHE (50° 14′ N., 8° 36′ E.), town, Hesse-Nassau, Germany; noted watering-place; has saline and chalybeate springs; in vicinity is Saalburg. Pop. (1910) 14,315.

HOME, EARLDOM OF, title bestowed on Alexander, 6th Lord H., in 1605. Third earl's estates were sequestered during Commonwealth, but subsequently recovered.

HOME, JOHN (1722–1808), Scot. dramatic poet; b. Leith; ed. for Church; officiated in E. Lothian; his famous play, *Douglas*, was produced in Edinburgh (1756), with great success, and was seen at Covent Garden in the year following; later became Secy. to Lord Bute, and subsequently tutor to Prince of Wales (George III.).

HOME OFFICE, department of Brit. government; at head is Home Sec., under whom are parliamentary and permanent under-sec., two permanent assistant under-sec's (one of whom is a barrister), numbers of clerks, inspectors of factories, prisons, etc. Sec. of State for Home Department maintains law and order in England and Wales, controls prisons, administers Labour Acts, Licensing Acts, Vivisection Act, Cruelty to Animals Act, etc. In 1913 he took over the control of Aerial Navigation Acts of 1911 and 1913 (see FLIGHT).

HOME RULE, see IRELAND (*History*), ENGLAND (*History*).

HOMEL, GOMEL (52° 26′ N., 30° 52′ E.), town, Mogilev, Russia. Pop. 80,900.

HOMER, greatest epic poet; b. between 1100–900 B.C., in Greece; exact birthplace uncertain, traditionally Chios; known by his poems, the *Iliad* and the *Odyssey*, which were originally ascribed to him but are almost certainly of different authorship. From internal evidence it is calculated that about a century separates the poems. They existed before the introduction of writing, and were handed down by word of mouth by the *rhapsodists*, who sometimes perverted the order of lines or interpolated passages of their own composition. Many poems are ascribed to H., the *Homeric Hymns*, the *Thebaid*, etc., but they are of different authorship though roughly contemporaneous. His writings correspond with the Mycenean and Cretan civilisations; his style is graphic and picturesque, abounding in similes; the vocabulary is large and contains many *hapax legomena*. The *Odyssey* and *Iliad* were recited at many Gk. festivals and were taught in schools; served as model for Vergil (*q.v.*) and Apollonius of Rhodes (*q.v.*). See also GREECE (LITERATURE).

HOMER, WINSLOW (1836–1910), popular Amer. genre painter.

HOMESTEAD (40° 20′ N., 79° 40′ W.), town, Pennsylvania, U.S.A.; iron and steel works. Pop. (1910) 18,713.

HOMESTEAD LAWS are statutes in force in America, whereby a settler may establish right to his dwelling. By an Act passed in 1862 any Amer. citizen of twenty-one years of age may claim 160 acres of public land; this he receives on condition of his settling there for five years, after which time he receives a title to it from government. The homestead is also protected by law from seizure by creditors. Similar laws obtain in various Brit. colonies.

HOMEYER, KARL GUSTAV (1795–1874), Ger. jurist and antiquarian.

HOMILETICS (Gk. *homilein*, to gather together), science of preaching as branch of rhetoric.

HOMILY, a religious composition simpler than a sermon. Justin Martyr says that after the reading of Scripture the minister exhorted the people. Preaching has sometimes been subordinate, *e.g.* in the Middle Ages and in some Catholic countries now. An Anglican clergyman may read one of the Homilies in the Prayer Book instead of his own sermon, a practice now obsolete.

HOMINIDÆ, a family of PRIMATES (*q.v.*).

HOMŒOPATHY, system of therapeutics, founded by S. C. F. Hahnemann (1755–1843), a Ger. physician, the main theory of which is that a disease is cured by drugs which produce in a healthy person similar symptoms to those of the disease, the therapeutic effect of any drug being ascertained or 'proved' by administering it to healthy persons in gradually increasing doses. In regard to the dose of a drug which should be given in homœopathic treatment opinions differ; but most homœopathists are agreed that small doses are necessary, while the drugs should be administered in the same form as when it was 'proved.' Hahnemann also promulgated a theory that all chronic diseases were due, directly or indirectly, to psora (itch), syphilis, or sycosis (fig-warts)—a theory which has been entirely disproved with the advance of the science of medicine, but which has had the unfortunate effect of assisting the opponents of homœopathy to ridicule the main theory of the system, with which it has really no connection. Considerable success has attended the introduction of homœopathic methods of treatment, and, according to its advocates, the development of serum therapy (*e.g.* in diphtheria, tetanus, plague) bears out the truth of the fundamental theory. In addition, it has had a great share in influencing the diminution of the quantity of drugs considered necessary for the treatment of disease, while it has also stimulated the study of the action and effects of drugs.

The opposition with which homœopathy was received by the medical profession in Britain has of late become somewhat lessened, and in addition to the London Homœopathic Hospital, founded 1850, there are a number of similar hospitals and dispensaries in provincial towns. The barriers between homœopathy and more orthodox medical treatment have, with the modern development of therapeutics, been largely broken down. In America the theory is taught in many medical schools and univ's. There are a great number of homœopathic hospitals and journals, and a large proportion of medical practitioners work in accordance with its principles.

Guernsey, *Principles and Practice of H.*; Clarke, *H. Explained*.

HOMOPTERA, see HEMIPTERA.

HOMS, HEMS, HUMS (34° 46′ N., 36° 46′ E.), walled town, Syria; formerly site of famous temple of the sun; produces silk. Pop. *c.* 60,000.

HO-NAN (34° N., 113° E.), province, Central China; area 67,940 sq. miles; mountainous in W.; drained by Hoang-ho and affluents of Han-kiang. Pop. *c.* 35,316,800.

HONAWAR, ONORE (14° 17′ N., 74° 27′ E.), port, Bombay, Brit. India. Pop. *c.* 7000.

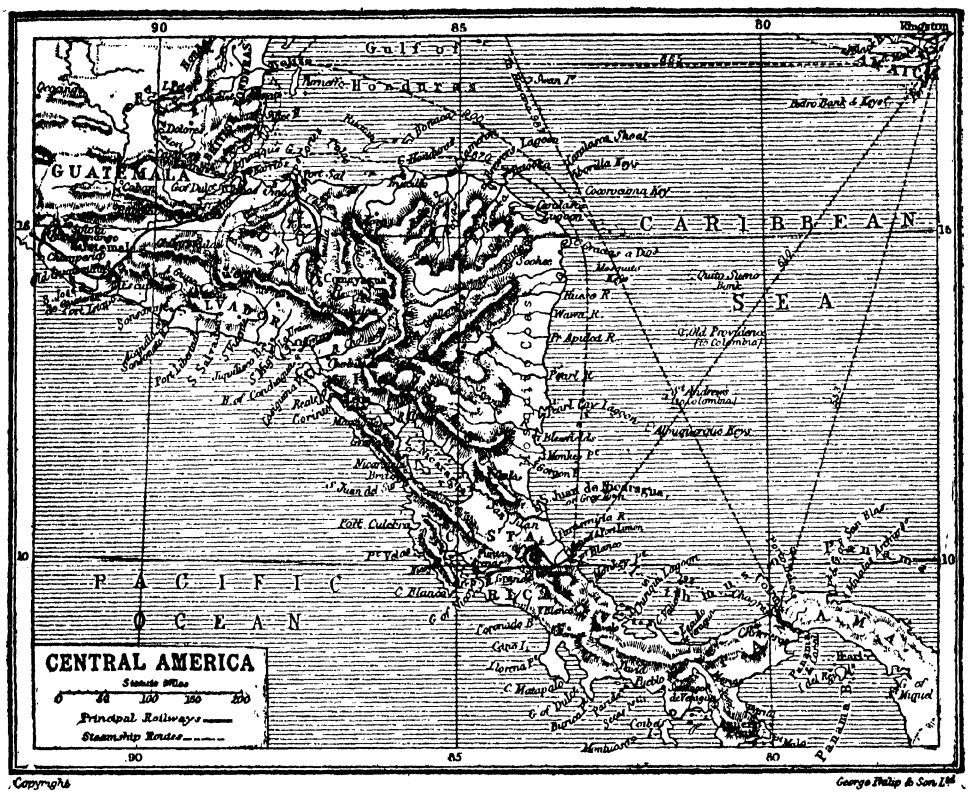
HONDA, SAN BARTOLOMEO DE HONDA (5° 12′ N., 74° 50′ W.), town, Colombia, S. America. Pop. *c.* 7000.

HONDECOETER, MELCHIOR D' (*c.* 1636–95), Dutch painter of birds; belonged to a family of painters, being s. of GISBERT and grandson of GILLIS D'H., both painters.

HONDO, see JAPAN.

HONDURAS (14° 50′ N., 87° W.), republic in Central America, bounded N. by Caribbean Sea; E. and S., Nicaragua; S., Pacific and Salvador; and W., Guatemala; area, *c.* 46,500 sq. miles; coast-line, *c.* 400 miles; capital, Tegucigalpa. Surface,

excepting narrow strip of swamp-land on the coast, is mountainous, traversed by continuation of Nicaraguan Cordillera, and forming elevated tableland with fertile plains and valleys, and rising in mountain ridges—highest point being Montaña de Salaque (*c.* 10,120 ft.); many streams, including Segovia (*c.* 350 miles) and Ulua; only large lake is Yojoa. Climate is healthy in highlands, but oppressive in lowlands. H. is rich in minerals—gold, platinum, silver, iron, etc.; bananas, cocoa-nuts, and rubber are produced; sarsaparilla is exported; industries are cattle-


CENTRAL AMERICA
Statute Miles
0 50 100 150 200
Principal Railways
Steamship Routes
GUATEMALA
HONDURAS
SALVADOR
NICARAGUA
COSTA RICA
PANAMA
CARIBBEAN SEA
PACIFIC OCEAN
Gulf of Honduras
Belize
Kingston
Swan Is.
Roncador Bank
Serrana Bank
Quita Sueño Bank
Gorgona I.
Gorgona
Gorgona Pt.
Pearl Is.
Pearl R.
Chame Pt.
Taboga I.
Taboga
Perico I.
Flamenco I.
Naos I.
Culebra
Panama
Panama R.
Chagres R.
Chagres
Portobello
Limon Bay
Limon
Aspinwall
Colon
Navy Bay
Porto Bello
Nombre de Dios
Escudo de Veraguas
Bastimentos I.
Bocas del Toro
Chiriqui Lagoon
Almirante
Chiriqui
Boca del Toro
Cape Gracias a Dios
Cape Gracias
Blewfields
Bluefields
Greytown
San Juan R.
San Juan del Norte
Corn Is.
Great Corn I.
Little Corn I.
Roatan
Utila
Bonacca
Ruatan
Truxillo
Truxillo Bay
Omoa
Omoa Bay
Puerto Cortez
Cortez
Cortez Bay
Ulua R.
Ulua
Lake Ulua
Lake Yojoa
Segovia R.
Segovia
Gulf of Fonseca
Fonseca Bay
Amapala
Tigre I.
Conchagua
Conchagua Bay
La Union
Meanguera I.
Meanguera
Meanguera Bay
Goascoran R.
Goascoran
Port Cutter
Port Cutter Bay
Port Caledonia
Port Caledonia Bay
Port Barrios
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Izabal
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Golfete
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Rio Dulce
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Livingston
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Quirigua Ruins
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species confined, with one exception, to Australia, New Zealand, and the islands of the S. Pacific. They have long bills and a long, extrusible tongue wherewith they extract honey from flowers. The Parson Bird and Bull Bird are New Zealand honey-eaters.

HONEY-GUIDES (*Indicatoridæ*), a family of about 20 species of climbing picarian birds found in Africa and Western Asia. Their name is due to the fact that some forms guide travellers to nests of bees. Like cuckoos, they make no nests, but lay their eggs in those of other birds.

HONEYSUCKLE, a twining shrub, *Lonicera Periclymenum* (*Woodbine, twisted Eglantine*); natural order *Caprifoliaceæ*, with sweet-scented, *bilabiate* flowers, night-moth *pollination*, and crimson berries.

HONFLEUR (49° 25′ N., 0° 14′ E.), port, Calvados, N.W. France; tidal harbour; exports dairy produce, fruit, vegetables; has ruined castle and fine church. Pop. *c.* 9600.

HONG-KONG (22° 18′ N., 114° 10′ E.), an island belonging to Britain and lying off S.E. coast of China at estuary of Canton River; along with a small portion of the mainland on peninsula of Kow-Lung, constitutes colony of H.-K., with an area of *c.* 30 sq. miles; capital, Victoria; extreme length, *c.* 10 miles, and breadth, *c.* 7 miles; separated from mainland by fine strait, which makes an excellent harbour. The interior is barren and rocky; trade is mostly done with China, also largely with India; chief exports being tea, silk, and opium. H.-K. has a Brit. governor and is a naval station; occupied by Britain *c.* 1840, ceded by Treaty of Nanking; univ. of H.-K. opened March 11, 1912. Pop. 366,145.

HONITON (50° 48′ N., 3° 11′ W.), town, Devonshire, England; noted for lace manufacture; produces butter; has XV.-cent. church. Pop. (1911) 3191.

HONNEF (50° 48′ N., 7° E.), town and spa, Rhenish Prussia, Germany. Pop. (1910) 6770.

HONOLULU (21° 30′ N., 157° 50′ W.), capital and principal port of Hawaiian Islands, situated on harbour on S. coast of Oahu; pleasant, well protected, clean, healthy, well planned, and highly civilised town; exports include coffee, sugar, and wool; coaling-station. Pop. *c.* 52,200.

HONORIUS I. (d. 638), pope; elected to papal chair, 625; excommunicated after death for his views concerning Monothelite heresy.

HONORIUS II. (d. 1130) became pope, 1124; ratified foundation of Knights Templars; opposed Roger of Sicily. HONORIUS II. was antipope from 1061–64; d. 1072.

HONORIUS III. (d. 1227) became pope, 1216; authorised orders of St. Dominic and St. Francis; promoted crusades; aided Henry III. of England.

HONORIUS IV. (d. 1287) elected pope, 1285; confirmed Carmelite and Augustinian eremite orders; assisted Anjou against Aragon.

HONORIUS, FLAVIUS (384–423), W. Rom. emperor from 395; reign marked by Gothic invasions; sack of Rome, 410; persecuted pagans.

HONOUR.—(1) a sense of h. is often considered the only motive of morality outside religion and fear, but its origin may perhaps be found in the two last named. (2) a feudal franchise sometimes composed of only a few manors, over which the tenant had special jurisdiction, sometimes coterminant with a hundred. The h. was often spoken of as a manor, of which the lesser manors were members.

HONOURABLE, courtesy title given in United Kingdom to younger sons of earls, children of viscounts and barons, maids of honour, and to certain officials; Privy Councillors and peers below rank of marquess are 'right h.'; marquesses, 'most h.' In America all members of Congress and important State officials are styled h.

HONTHEIM, JOHANN NIKOLAUS VON (1701–90), Ger. jurist and historian; suffragan bp. of Trier, 1748; best known as 'Febronius,' under which name he pub. *De Statu Ecclesiæ et Legitima Potestate Romani Pontificis*, a critical study of pretensions of popes; also wrote history of Trier (Treves). See FEBRONIANISM.

HONTHORST, GERARD VAN (1590–1656), fashionable Dutch painter in the Ital. manner; executed several religious pictures and many portraits of royalties, including Charles I. of England.

HOOCH, PIETER DE (1629–77), Dutch painter of interiors; obtains wonderful effects of material, reflections of light in pots and pans, and subtle expression in countenances.

HOOD, loose head-covering attached to the cloak; moulding projecting over an arch.

HOOD, ARTHUR WILLIAM ACLAND, BARON HOOD OF AVALON (1824–1901), Brit. admiral; distinguished at Sebastopol and in capture of Canton.

HOOD, JOHN BELL (1831–79), Amer. general in Confederate army in Civil War; suffered crushing defeat at Nashville.

HOOD, ROBIN, see ROBIN HOOD.

HOOD, SAMUEL, VISCOUNT HOOD (1724–1816), famous Brit. admiral; after considerable service in N. America, and in W. Indies, where he distinguished himself against French at Martinique, 1781, St. Kitts and Dominica, 1782, he obtained command of Mediterranean fleet, 1793, and captured Toulon; took Corsica, 1794.

HOOD, SIR SAMUEL (1762–1814), Brit. naval commander; served in Mediterranean, 1793; distinguished at Santa Cruz, 1797, and Battle of the Nile, 1798; commanded the *Venerable* at Algeciras and Gibraltar, 1801; defeated French in W. Indies, 1802, at Rochefort, 1805; took Madeira, 1807; aided Sweden against Russia, 1808.

HOOD, THOMAS (1799–1845), Eng. humorist and poet; b. London; ed. as an engraver; became sub-editor of *London Magazine* (1821); pub. *Odes and Addresses to Great People* (1825), *Whims and Oddities* (1826); launched *Hood's Comic Annual* (1830); was sometime edit. of Colburn's *New Monthly Magazine*; pub. *The Song of the Shirt* in *Punch* (1843); at heart a serious writer, noted for his kindly nature. His life was a long struggle with ill-health and debt. His serious poetry was overshadowed by the popularity of his comic verse.

Jerrold, *Life and Times of Thomas Hood* (1907).

HOOD, TOM (1835–74), Eng. humorist; s. of the well-known Thomas H.; author of T. H.'s *Comic Annual*.

HOODED CROW, see under CROW FAMILY.

HOOFT, PIETER CORNELISSEN (1581–1647), Dutch historian and poet; held several offices under Maurice of Orange; author of *Dutch History* in 27 vol's, *History of Henry the Great*, and of several tragedies, including *Geeraerdt van Velzen* and *Baeto*; also wrote *Granida*, a fine pastoral, and lyrical poems; a master of style.

HOOGLY, see HUGLI.

HOOGSTRATEN, SAMUEL DIRKSZ VAN (*c.* 1627–78), Dutch painter, who excelled in portrait and atmosphere.

HOOK, JAMES CLARKE (1819–1907), Eng. painter, who painted much, and with great success, from youth; noted for lightness and purity of colouring; his fame chiefly rests on seaside sketches.

HOOK, THEODORE EDWARD (1788–1841), Eng. novelist, dramatist, and wit; s. of a composer; began to write successful comic operas and sketches as a youth; was Accountant-General of Mauritius (1813–17), but owing to the defalcations of an assistant was arrested and imprisoned; became edit. of *John Bull*, a Tory organ (1820); his *Sayings and Doings* (1824–28) were highly popular; his novels include *Jack Brag*, *Gilbert Gurney*, and others; famed for his improvisations and practical jokes.

HOOK, WALTER FARQUHAR (1798–1875), Eng. ecclesiastic; dean of Chichester; wrote *Lives of the Abp's of Canterbury* (1860–76), *Ecclesiastical Biography*.

HOOKAH, large tobacco pipe much used in Turkey, Persia, and other Eastern countries; the stem passes

through two bowls, the lower containing water, which absorbs harmful ingredients of the smoke.

HOOKE, ROBERT (1635–1703), Eng. scientist; educated at Oxford; surveyor of London during rebuilding after Great Fire of 1666; invented anchor escapement of clocks and spring-balance wheel of watches; sec. of Royal Soc., 1677–82.

HOOKER, JOSEPH (1814–79), Amer. soldier; fought on Federal side in Civil War; distinguished in N. Virginia and Maryland; defeated at Chancellorsville, 1863; led 20th corps in Atlanta campaign, 1864.

HOOKER, RICHARD (1553–1600), Eng. theologian; b. Heavitree, Devon; ed. Oxford; took orders and received the living of Drayton-Beauchamps (Bucks); was appointed Master of the Temple, 1585; and subsequently held livings at Boscombe (Wilts) and Bishopsbourne (Kent). *The Four Books of the Lawes of Ecclesiastical Polity* was pub. 1594; the fifth book in 1597; and subsequent books were pub. after his death. This monumental work is a masterpiece of theological reasoning and eloquence, and is one of the finest examples of Eng. prose. Apart from his writings, H. was remarkable for his sweetness and dignity of character. *Life*, by Isaac Walton, by Vernon Staley (1907).

HOOKER, SIR JOSEPH DALTON (1817–1911), Eng. botanist and traveller, succ. his f. as director of Kew Botanical Gardens, 1865; pub. *Genera Plantarum* and a *Flora of the British Isles*; O.M., 1907; a friend of Darwin.

HOOKER, SIR WILLIAM JACKSON (1785–1865), Eng. botanist; prof. of Bot. at Glasgow, 1820; Director of Royal Botanic Gardens at Kew, 1841; collected a well-known *herbarium*, and published alone and in collaboration works on the Brit. mosses.

HOOKER, THOMAS (1586–1647), Puritan theologian; lectured in Leicestershire; emigrated to Massachusetts, 1633; helped to found Hartford, Connecticut, 1636; wrote *The Soule's Humiliation*.

HOOKE'S LAW, see ELASTICITY.

HOOLE, JOHN (1727–1803), Eng. translator and author of plays commended by Dr. Johnson.

HOOLIGAN, term applied in latter part of XIX. cent. to London street ruffians of criminal class. The earlier 'garrotters' were of a more brutal type, who half-strangled their victims from behind and rifled their pockets. The 'Mohocks' of the XVIII. cent., referred to in the *Spectator*, belonged to a better class, and though violence was often used, it was chiefly with humorous intent.

HOOPER, JOHN (*c.* 1495–1555), Prot. martyr; went to Switzerland during last reactionary years of Henry VIII.; reforming preacher under Edward VI.; chaplain to Protector Somerset; bp. of Gloucester, 1550; objected to priestly vestments; bp. of Worcester *in commendam*, 1552; imprisoned on Mary's accession, 1553; burned at Gloucester, 1555; called 'Father of Nonconformity.'

HOOPING-COUGH, see WHOOPING-COUGH.

HOOPOES (*Upupa*), so called from their call; form a genus and family of picarian birds widely distributed in desert regions of Europe, Asia, and Africa. One species (*U. epops*), with long slender bill, crested head, and orange-brown plumage marked by black and white bars, is an occasional migrant to Britain.

HOORN.—(1) (52° 36′ N., 5° 4′ E.) town, N. Holland; trades in cattle and dairy produce; has interesting XVI.- and XVII.-cent. buildings. Pop. (1910) 11,000. (2) (53° 24′ N., 5° 20′ E.) town, Friesland, Holland.

HOOSICK FALLS (42° 54′ N., 73° 20′ W.), village, New York State, U.S.A. Pop. (1910) 5532.

HOP is a twining plant, *Humulus lupulus*, natural order *Cannabineæ*, which twines in the direction of the hands of a watch (right-handed spiral). It is a perennial plant with opposite lobate leaves, and grows wild in hedges and upon river-banks. The hop is *diœcious*. The male flowers are small and terminal and borne in the axils of leaves, the floral envelope has five segments and there are five *stamens*; the female flowers are cone-like in arrangement. Each has a tubular floral envelope and is invested by a *bracteole*. The cone is made up of a series of *bracts* with two female flowers at the base of the upper surface of each. The *bracts* are membranous and covered with *glands* which secrete an oil which keeps off insects. Flowers are pollinated by the wind (*anemophilous*). The fruit is composite and is called a *Strobilus*.

The STROBILES are 1¼ in. long, with imbricated, greenish, membranous bracts which help the dispersal of the individual fruits by the wind. Each fruit is an *achene*, *i.e.* one-seeded, indehiscent, and dry. The plants are cultivated in England, Germany, France and Belgium for the strobiles, which are used in beer manufacture. They contain *lupulin*, a liquid *alkaloid*; 11 % *lupulinic acid*, a bitter crystalline principle; 1 % of an aromatic volatile oil, *valerol*, which gives them the characteristic odour; *resin*; *tannin*; a *terpene*. Owing to the valerol they have a *stomachic*, *carminative*, and *soporific* action. From April to Sep. hops, grown extensively in Kent, are tied to poles. From Oct. to Nov. they are picked. The drying of the strobiles is carefully carried out on a roller floor by blowing hot air through them. In recent years there have been recurring attacks of blight due to *Aphis humuli*. The red spider also sucks the sap. Mildew and mould attack the strobiles.

Simmonds, *Hops, their Cultivation*.

HOPE, ANTHONY, Eng. novelist; pseudonym of A. H. Hawkins; has achieved distinction in the romantic style with *The Prisoner of Zenda* (1894), and in light modern comedy with *The Dolly Dialogues*, and similar works; author of several plays, and *The Prisoner of Zenda* was successfully dramatised.

HOPE, THOMAS (*c.* 1770–1831), Eng. connoisseur, designer, and author; his houses at Deepdene and London contained wonderful art collections; won celebrity with novel, *Anastasius*.

HOPEDALE (42° 7′ N., 71° 31′ W.), town, Massachusetts, U.S.A., where socialistic community was established in 1842 by Adin Ballou. Manufactures machinery, cotton goods. Pop. 2048.

HOPE-SCOTT, JAMES ROBERT (1812–73), Eng. Q.C.; prominent in Oxford Movement; became Roman Catholic with Manning.

HOPFEN, HANS VON (1835–1904), Ger. lyrical poet and novelist.

HOPI, MOKI, tribe of N. Amer. Indians inhabiting S.W. of U.S.A.

HÔPITAL, MICHEL DE L', see L'HÔPITAL, MICHEL DE.

HÖPKEN, ANDERS JOHAN, COUNT VON (1712–89), Swed. statesman; leader of the Hats; noted for classical style of speeches.

HOPKINS, EDWARD WASHBURN (1857–), Amer. comparative philologist.

HOPKINS, ESEK (1718–1802), admiral of the first U.S.A. fleet (1776–77).

HOPKINS, JOHNS, see JOHNS HOPKINS UNIVERSITY.

HOPKINS, MARK (1802–87), Amer. theologian and pres. of Williams Coll. His bro., **ALBERT** (1807–72), won some distinction in science.

HOPKINS, SAMUEL (1721–1803), Amer. theologian; ordained 1743; made attack on slavery, arousing much opposition; wrote *Life of Jonathan Edwards* and various theological works.

HOPKINSON, FRANCIS (1737–91), Amer. politician and writer; delegate at Continental Congress, 1776, 1777; signed Declaration of Independence; wrote *The Political Catechism*, *A Prophecy*.

HOPKINSON, JOHN (1849–98), Eng. engineer; b. Manchester, 1849; senior wrangler, Trinity Coll., Cambridge, 1871; took up engineering at f.'s works and practised as consulting engineer in London from 1878; accidentally killed on Alps, 1898.

HOPKINSVILLE (36° 50′ N., 87° 31′ W.), town, Kentucky, U.S.A. Pop. (1910) 9419.

HOPLOPTERUS, see PLOVER FAMILY.

HOPPNER, JOHN (1758–1810), Eng. artist; distinguished for brilliant colouring; painted 'A Sleeping Nymph' and other classic subjects, but excelled in portraiture; a follower of Reynolds, and a rival of Lawrence; R.A., 1795; examples in Nat. Gallery.

HOP-SCOTCH, Brit. pavement game; ground is chalked into different-sized beds and the player kicks a stone from one to the other with the foot on which he hops.

HOPTON, RALPH, BARON HOPTON (1598–1652), Eng. Royalist in Civil War; gained Cornwall for king; won battle of Stratton, 1643.

HORACE, QUINTUS HORATIUS FLACCUS (65–8 B.C.), Rom. poet; b. at Venusia, in Apulia; his father, of the freedman class, contrived to have him educated at the same schools as the sons of senators and magnates at Rome and at Athens. At Athens H. joined the forces of Brutus, and served at Philippi as tribune. His depreciation of his valour is an imitation of Archilochus and Alcæus, and does not imply real cowardice. His homestead appears to have been twice confiscated, but his patron Mæcenas stood by him in his time of trouble and bestowed on him the beloved Sabine farm. In 37 B.C. H., with Mæcenas, Vergil, and others, made the famous journey to Brundusium (*Sat.* i. 5). When Vergil died (19 B.C.) Horace became chief court poet and voiced the ideals of Augustus.

His *Satires* are not vindictive in tone; they employ ridicule and not invective. The *Epistles* in tone are not unlike the moral essays of Pope. The *Epodes* are less delicate in sentiment, less restrained in passion. The *Ars Poetica* and the 2nd book of the *Epistles* are poetic treatises on literary art and criticism. The *Odes*, his lyrical poems, are H.'s greatest work; they are not original in sentiment or passionate in feeling, but they are polished, chaste, and perfect in expression.

Sellar, *The Rom. Poets of the Augustan Age* (1892); Sir Theodore Martin, *Horace*.

HORÆ (classical myth.), the 'Seasons'; three beautiful maidens, Eunomia, Dike, and Eirene, dau's of Zeus and Themis, who presided over spring, summer, and autumn, and, in a lesser degree, the hours. In the latter capacity it was their daily duty to harness the heavenly horses to the chariot of the Sun.

HORAPOLLON (fl. IV. cent. A.D.), Greek of Egypt to whom Gk. treatises on Egyptian hieroglyphics are ascribed.

HORATII, THE THREE, three Rom. bro's, who in legendary Rom. history met in battle three bro's called the Curiatii, of the Alban nation, to decide a national dispute. Two of the Horatii were slain, the third feigned flight, then, turning, slew his foes one by one.

HORATIUS COCLES, hero of Rom. legend; said to have held the Tiber bridge single-handed against the Etruscans under Lars Porsena.

HORDE (51° 30′ N., 7° 30′ E.), town, Westphalia, Prussia. Pop. (1910) 32,785.

HOREB (28° 33′ N., 33′ 56′ E.), mountain, Palestine; alternatively called Sinai (*q.v.*).

HOREHOUND (*Marrubium*), genus of plants of order *Labiatæ*; White H. (*M. vulgare*) is used medicinally as tonic, laxative, and as sedative for coughs.

HORGEN (47° 16′ N., 8° 33′ E.), town, Switzerland. Pop. (1910) 8000.

HORIZON, circle of which the centre is the person beholding, the circumference at the eyesight limit; the dip of the farther part of an object on the h. is one of proofs of spherical shape of earth.

HORMAYR, JOSEPH, BARON VON (1782–1848), Ger. historian and politician; conducted affairs during Tirolese rebellion, 1809; Austrian imperial historiographer, 1816; afterwards entered Bavarian service. Wrote *Geschichte der Tirol*.

HORMISDAS, pope, 514–523, healed schism between Eastern and Western Churches.

HORMIZD, five Sassanid kings of Persia, of whom best known is HORMIZD IV.; he became king, 578 A.D.; reformed army; warred against Romans and Turks; was deposed, 588, and slain, 590.

HORMUZ, or ORMUZ (27° 3′ N., 56° 26′ E.), ancient and famous city on Persian Gulf; exact date of foundation unknown; occupied various sites during course of history. In XIII. cent. one of chief centres of trade with India; *c.* 1300, inhabitants forced to abandon city owing to Tartar raids, and settled on island of Jerun not far distant. Here fine fortified city was built; in XVI. cent. taken by Portuguese, but still of great commercial importance; Portuguese forced to surrender to Eng. a cent. later, and Persians transferred trade to Gombroon on mainland. Minaret, portion of mosque, and other traces of city still to be found on island.

HORN, brass wind-instrument used in ancient, mediæval, and modern times for military, hunting, and state purposes; now also employed in orchestra. The term embraces a large number of instruments, from the simple coach-driver's h. to the complicated orchestral or 'French' h. (*cor de chasse, waldhorn*, or *corno*). During the XVI. and XVII. cent's the lengthening of the original hunting h. led to its being twisted into a spiral form, capable of being carried over the shoulder. By the beginning of the XVIII. cent. the h. had won a place in the orchestra. Its harshness of tone and primitive character soon suggested the need of improvement, and efforts were made to render the instrument more delicate in sound and pliable in manipulation. In experimenting with a view to refining the tone, Hempel, a well-known Dresden h. player, discovered in 1770 the means of lowering the pitch by inserting the hand into the bell of the instrument, and so invented the *hand-horn*. Tuning slides and detachable crooks of various lengths were introduced to alter the pitch and key, which was impossible in the natural h. The inferior quality of the closed or 'stuffed' notes, as compared with the 'open' notes, was finally overcome by the invention of the *valve-horn* by Stölzl and Blühml in 1815. Three valves are now generally used, being placed upon the U-shaped slides in centre of the h., which lower the pitch by altering the length of the instrument, and are thus able to produce, as open notes, every note in the chromatic scale, and execute rapid passages more evenly.

The body of the h. is about 7½ ft. in length, and, with the addition of the longest crook, more than double. The h. is a transposing instrument; music is written in treble clef, with the exception of some lower notes, which are written in bass clef, and an octave lower than they sound; two, four, or more h's are generally used in the orchestra. Horn in F, which is most often employed in the orchestra, is seldom built in that key. Bach and Händel were amongst the earliest musicians who scored for the h., and since their day all composers have regarded the h. as an integral part of the orchestra, and have assigned it solo and *ensemble* passages. In 1843 Adolphe Sax invented the *saxhorn* by using the valve-system for a keyed bugle. The mouthpiece of the saxhorn is cup-shaped, not funnel-shaped like the valve-h. The saxhorn is used chiefly in military and other brass bands.

Among the best known works written for h. may be mentioned Schumann's *Concerto* for four h's and orchestra (Opus 86); Mozart's three *Concertos* (Op. 92, 105, 106), with orchestra; Beethoven, *Sonata* for piano and h. (Op. 17), *Septet* (Op. 20); Strauss, *Concerto* (Op. 11), with orchestra; and Kalkbrenner (Op. 13), *Septet* for piano, two violins, two h's, tenor and bass.

HORN, ARVID BERNHARD, COUNT (1664–1742), Swed. politician; ambassador to Poland, 1704; secured Stanislaus I.'s election to Polish throne; premier, 1710; virtual ruler of Sweden, 1720–38; established new constitution.

HORN, KING, XIII.-cent. Eng. metrical romance. Horn, s. of an Eng. king, is set adrift at sea by pirates, lands in Cornwall, and after many vicissitudes marries the Cornish king's dau. See Ritson's *Metrical Romances*.

HORN, PHILIP DE MONTMORENCY, COUNT (1518–68), Dutch statesman who, with William of Orange

and Egmont, led the revolt of the Netherlands against Spain; executed at Alva's command.

HORNBEAM is a genus of trees, natural order *Cupuliferæ*, cohort *Fagales*; flowers resemble those of hazel, but the male *catkins* have no *bracteoles*.

HORNBILLS (*Bucerotidæ*), so called on account of their large, hollow, horny beaks; a family of picarian birds confined to Africa from the Sudan southwards, South-Eastern Asia, and the neighbouring islands. While sitting on her eggs the female is built into the tree-hollow by a mud wall, the male feeding her until the young are hatched; arboreal and terrestrial, feeding on seeds, insects, and even reptiles.

HORNBLENDE, see AMPHIBOLE.

HORN-BOOK, article once used in elementary education, consisting of a sheet of paper bearing the alphabet, Lord's Prayer, etc., placed between a flat piece of wood, with handle, and a thin sheet of horn.

HORNBY, SIR GEOFFREY THOMAS PHIPPS (1825–95), Brit. admiral; commander-in-chief in Mediterranean, 1877; Admiral of the Fleet, 1888.

HORNCASTLE (52° 43′ N., 0° 7′ W.), town, Lincolnshire, England; has old church dedicated to St. Mary, and Elizabethan grammar school; annual horse fair in August. Pop. (1911) 3900.

HORN-DANCE, old Eng. dance still performed at Abbots Bromley, Staffordshire; named from stag's antlers worn by the dancers.

HORNE, GEORGE (1730–92), Eng. cleric; bp. of Norwich; famed for *Commentary on the Psalms* (1771).

HORNE, RICHARD HENGIST (1803–84), Eng. poet and critic; pub. *Orion* (1843), an epic poem; *Death of Marlowe*, *Cosmo de Medici* (tragedies); and *A New Spirit of the Age* (criticism).

HORNE, THOMAS HARTWELL (1780–1862), Eng. theologian and scholar; pub. *Critical Study of the Holy Scriptures*, *Introduction to the Study of Bibliography*; long connected with Brit. Museum.

HORNELL (42° 21′ N., 77° 44′ W.), town, New York, U.S.A.; formerly *Hornellsville*; railway works. Pop. (1910) 13,617.

HORNEMANN, FREDERICK (fl. 1800), Ger. explorer; carried out explorations in Africa for London African Association between 1797 and 1799.

HORNER, FRANCIS (1778–1817), Brit. politician and economist; M.P., 1806; chairman of Bullion Committee, 1810; wrote for *Edinburgh Review*.

HORNET (*Vespa crabro*), reddish-brown wasp; largest in England; eats fruit, insects, etc.; U.S.A. variety is Whitefaced H. (*V. maculata*).

HORNFELS (plural, hornfelses), a rock found in diabases, basalts, and other igneous rocks, composed of felspar, hornblende, and pyroxene; of tough, durable composition, also hard and brittle; colour, dark brown and black; generally contains numerous small bright crystals of black mica.

HORNGARTH, MAKING OF THE, mediæval forensic service which still survives in the making of the Penny Hedge at Whitby; possibly the Dan. name given to the O.E. thegn's duty of hedging and ditching.

HORNPIPE, lively Eng. dance, popular amongst sailors; so called because originally accompanied on a reed pipe having horn fittings at either end.

HORNSEY (51° 35′ N., 0° 6′ W.), borough, suburb of London, Middlesex, England. Pop. (1911) 84,602.

HORODENKA (48° 40′ N., 25° 31′ E.), town, Galicia, Austria; linen, soap. Pop. (1911) 11,250.

HOROLOGY, science of measuring time. See CLOCK, TIME, CALENDAR.

HOROSCOPE, signs of the heavens at person's birth; in 'casting' the h. astrologers made diagram of 12 houses, or zodiac signs. See ASTROLOGY.

HOROWITZ, ISAIAH (*c.* 1555–*c.* 1630), Jewish rabbi; author of an important religious work, *Shelah*.

HORROCKS, JEREMIAH (1619–41), Eng. astronomer; first to show how moon follows Kepler's laws, and to account for its irregularities; revised Kepler's Rudolphine tables; predicted and first observed transit of *Venus*; first to make tidal observations.

HORROCKS, JOHN (1768–1804), Eng. manufacturer, who developed Lancashire cotton industry.

HORSE CHESTNUT, see CHESTNUT.

HORSE FAMILY (*Equidæ*), the most highly specialised family of odd-toed, hoofed (*Ungulate*) mammals, including horses, asses, and zebras, as well as many extinct forms. The compact, clean-cut bodies, long heads and tails, and maned necks of the horse and its relatives are familiar, but there are skeletal characters of more importance in separating it from its nearest allies, the Tapirs and Rhinoceroses, and these mainly reside in the teeth and limbs. The skull is very long, the eye-socket is a closed ring, and the teeth number, at highest, 44, although the early disappearance of the first cheek-tooth on each leaves 42 as the usual number. The surfaces of the back teeth, obviously grinders, are thrown into complicated crescentic folds of hard enamel, with softer cement between; and the incisors are prominent and chisel-shaped, with a central pit lined by enamel—the 'mark' whose decrease in size indicates the age of its possessor. The limbs are furnished with one hoofed digit (the third), which is functional, but it is sometimes accompanied by the second and fourth, reduced to mere splint bones, or at any rate always functionless.

Horses in a general sense are found throughout the world, but the various wild species are confined in range and are found only in the Old World, especially in Asia and Eastern Africa. Semi-wild forms occur in Australia and America, but these are the descendants of domesticated horses which have escaped from captivity, in the latter country since the Spanish conquest. In nature horses are gregarious, living in herds, the movements of which are dominated by an experienced stallion or male, the female being known as mare, and the young as foal; but they are ever on the watch and habitually move against the wind so that they may receive early notice of the scent of an enemy. They are entirely vegetarian, feeding mainly on grass, but also on young shoots of trees and herbage.

To consider less generally the members of the horse family, all the living species of which belong to the one genus *Equus*.

Heading the list on account of its familiarity and of its usefulness to man is the domestic HORSE (*E. caballus*), representatives of which roamed the plains of Europe and Asia in freedom till about the end of the XVI. cent., although the horse as a domestic animal probably dates from prehistoric times. It is characterised by a hardened lump—the 'chestnut'—on the inner side of the legs above the hock, and by the fact that the hairs of the tail grow in a tassel from its base. During the ages of servitude to man many varieties of horses have been selected and bred for special purposes. Thus perhaps most useful are the heavy cart-horses, distinguished by their weight of body and stoutness of limb, the best known being the Shire, Clydesdale, and Suffolk Punch. While bred for very necessitating cleanness and lightness of limb and body are the English Racers and American Trotters, differing in descent from the cart-horses, which are comparatively pure natives of Europe, by the interbreeding with such graceful African horses as the Arab. The characteristically small, rugged, and hardy ponies of the Shetlands, and the somewhat similar Exmoors and Dartmoors, must not be omitted, creatures particularly fitted for a hard life in barren regions where food is scanty and coarse. Last to be mentioned amongst domesticated horses are the semi-wild reversions of South America and Australia, for in neither country on its discovery did horses exist. The former are known locally as mustangs, bronchos, or cimarrones, the latter as brumbies.

Closely related to the domestic horse are the active TARPANS or WILD HORSES of the steppes, probably a decaying remnant of the original wild horses of Europe; and the small, shaggy, erect-maned PRZEVALSKI'S HORSE of Central Asia.

Differing markedly in their external appearance from

the horses are the Asses, with long ears, tail bushy at the tip and devoid of long hairs at the base, erect mane, chestnuts only on fore-limbs, and back marked with a longitudinal dark stripe. The asses are fleet, active creatures, widely distributed on the grassy plains of Central Asia and North-East Africa. The Asiatic varieties are the large reddish KIANG (*E. hemionus*) of Tibet and Mongolia, the smaller Persian and Syrian ONAGER or GHORKAR (*E. onager*), and the Indian Wild Ass (*E. indicus*). The only African representative is the African Wild Ass (*E. asinus*) of Abyssinia and the neighbourhood, the ancestor of the domestic ass or donkey.

A particularly useful, sure-footed breed for mountainous regions is the Mule, a hybrid obtained by crossing the domestic horse and ass, but mules amongst themselves produce no offspring.

Approximating in external characters to the asses are the ZEBRAS, of which four or five species are distinguished. In them, however, the solitary dorsal stripe of the ass is replaced by numerous beautiful dark brown or black bands separated by a tawny or brownish yellow ground colour. In habit they resemble asses, but they are confined to Africa, from Somaliland where the large GREVY'S ZEBRA (*E. grevyi*) is found, southwards by the plains of Portuguese and German West Africa, inhabited by BURCHELL'S ZEBRA (*E. burchelli*), to the highlands of Cape Colony to which the MOUNTAIN ZEBRA (*E. zebra*) is confined. Formerly another zebra-like creature—the QUAGGA (*E. quagga*)—also roamed the plains of South Africa, but it has been exterminated by ruthless slaughter.

The horse, as we know it, has been traced back to Pliocene times, but the remains of earlier forms have been discovered which seem to point to the ancestral line along which the modern horse developed. The differentiation appears to have followed these directions: an increase in size, a reduction in the number of functional digits, and an increasing complexity in the structure of the teeth. Thus the Eocene *Phenacodus*, at the source of the horse group, was an animal about the size of a bull-dog and had five functional toes on each foot; *Palæotherium* and *Anchitherium*, the former from the later Eocene, the latter about the size of a sheep, had three digits, and link the tapir group to the horses, while in the Pliocene *Hippotherium*, as big as a donkey, the middle digit was already outstandingly developed.

HORSE GUARDS, see GUARDS, THE.

HORSE, MASTER OF THE.—The title *Magister Equitum* was applied in Rome to the lieutenant of a Dictator; in modern times term signifies official who has charge of royal stables, equerries (minor officials in charge of departments), and artificers; third officer in royal household.

HORSE-FLIES, see GAD-FLIES.

HORSEMANSHIP, see RIDING.

HORSENS (55° 52′ N., 9° 50′ E.), town, Jutland, Denmark. Pop. (1911) 23,843.

HORSE-POWER, see under ENGINE.

HORSE-RADISH, *Cochlearia armoracia*, natural order *Cruciferæ*. The root, long, cylindrical, and fleshy, with an enlarged upper end, is used as a condiment.

HORSE-SHOEING, the custom of protecting horses' hoofs is probably coeval with domestication of horse; machine-made shoes have been largely used since Goodenough's patent invention, 1860.

HORSETAIL, vascular cryptogam with green stem and branches and brown, scale-like leaves. One generation reproduces by spores, the next by male and female cells.

HORSHAM (51° 3′ N., 0° 20′ W.), town, Sussex, England; has old church dedicated to St. Mary; site of Christ's Hospital since 1902. Pop. (1911) 11,314.

HORSLEY, JOHN (1685–1732), Eng. scholar, scientist, and Presbyterian minister; wrote *Britannia Romana, or the Roman Antiquities of Britain*, etc.

HORSLEY, JOHN CALLCOTT (1817–1903), Eng. genre painter; sturdily conservative academician.

HORSLEY, SAMUEL (1733–1806), Eng. theologian; bp. of St. David's (1788), Rochester (1793), and St. Asaph (1802); author of learned works and pamphlets defending doctrine of the Trinity against Priestly.

HORSMAN, EDWARD (1807–76), Eng. Liberal statesman; prominent Adullamite.

HORT, FENTON JOHN ANTHONY (1828–92), Anglican divine; prof. at Cambridge, 1878; known specially for edition with Westcott of the New Testament.

HORTA (27° 30′ N., 30° W.), town, on Fayal, Portug. Azores; fisheries. Pop. *c.* 7000.

HORTEN (59° 24′ N., 10° 28′ E.), port, Norway. Pop. (1910) 9820.

HORTENSE (1783–1837), see BEAUHARNAIS.

HORTENSIUS, QUINTUS, dictator to end of plebeian secession at Rome, 286 B.C.; passed *lex Hortensia*, giving independent legislative power to *plebs*.

HORTENSIUS, QUINTUS (141–50 B.C.), Rom. orator; became consul in 69 B.C.; attained fame as advocate.

HORTICULTURE, see GARDEN.

HORTON, CHRISTIANA (fl. *c.* 1714–56), Eng. actress; for long a leading performer at Drury Lane and Covent Garden.

HORTON, ROBERT FORMAN (1855–), prominent Eng. Congregational minister and theological author.

HORTON, SAMUEL DANA (1844–95), Amer. bimetallist.

HORTUS SICCUS, see HERBARIUM.

HORUS, Egyptian sun-god, represented by the hawk; divided Egyptian reverence with Osiris.

HORWICH (53° 36′ N., 2° 33′ W.), town, Lancashire, England. Pop. (1911) 16,286.

HOSAIN (d. 680), younger s. of the Caliph Ali by Fatima; tragedy of his death is re-enacted annually by the Shiites.

HOSANNA, salutation of the crowd when Christ made His triumphal entry into Jerusalem (*Mark* 11[9,10]), being part of an ancient Heb. ceremonial. See PALM SUNDAY.

HOSE, skintight foot and leg coverings, formerly reaching to the waist; the XVI.-cent. breeches were called *trunk-hose*.

HOSEA, Old Testament minor prophet. H. was a contemporary of Isaiah, and prophesied during reigns of last six kings of Israel, from Jeroboam II. to Hoshea. The book may be divided into two parts: the first (chaps. 1–3) relates the unfaithfulness of the prophet's wife, which is used as a symbol of idolatry of nation; and the second (chaps. 4–14) is a series of accusations against Children of Israel for their wickedness, which is unsparingly denounced. H. makes use of illustrations taken from domestic and rural occupations, such as baking, reaping, and sowing. Book is frequently quoted in New Testament, quotations occurring in the Gospels of *Matthew* and *Luke*, the *Apocalypse*, and the Epistle to the *Romans*.

Minor Prophets (vol. i.), Horton (*The Century Bible*); Driver, *Introduction to Literature of Old Testament*.

HOSE-PIPE, india-rubber implement for conveyance of water. The fire h.-p. is covered with carefully woven linen cloth, made circular, without seam, and done by handloom for important purposes.

HOSHANGABAD (22° 43′ N., 77° 39′ E.), town (and district), Central Provinces, India. Pop. *c.* 15,000; district has pop. *c.* 449,000.

HOSHEA (slain 721), last king of Israel; refused to pay tribute to Shalmeneser IV., king of Assyria, who attacked Israel.

HOSHIARPUR (31° 33′ N., 75° 48′ E.), town, Punjab, India; manufactures lacquer, cottons. Pop. *c.* 18,000. H. district has area of 2244 sq. miles. Pop. *c.* 990,000.

HOSIERY, stockings (see HOSE) and garments similarly manufactured by knitting. Unlike weaving, knitting is supposed to have been a late mediæval, probably Scot., invention. Shawls, when made by

hand, are knitted with two long bone needles, stockings and other round seamless things with four steel needles; one needle suffices for crochet. The stocking-frame was invented in 1589 by Lee, and completed by the addition of Jedediah Strutt's invention for rib-stitch in 1758. The warp loom was first introduced in 1775. Matthew Townsend introduced the latch needle in 1858. Circular and flat frames by which seamless h. is obtained have been invented by Fr., Ger., Belg., Eng., and Amer. manufacturers.

HOSIUS (d. 359), bp. of Cordova; authoritative member of Council of Nicæa, 325.

HOSIUS, STANISLAUS (1504–79), Polish cardinal, who suppressed Reformation in Poland.

HOSKINS, JOHN (d. 1664), Eng. miniature painter, whose works are much sought after by collectors.

HOSMER, HARRIET GOODHUE (1830–1908), remarkable Amer. sculptor.

HOSPICE, house of shelter for pilgrims and travellers, usually founded and maintained by some religious order.

HOSPITAL, an institution for the treatment of the sick and the injured. Among the ancient Egyptians and Greeks, who cultivated the art of healing to a wonderfully high degree, the sick and injured were brought to the temples of the gods for treatment, and with the development and spread of Christianity the treatment of the sick retained a close connection with religious foundations, although it is not until the time of the reign of Constantine that records exist of the establishment of h's by Christians. Separate hospitals were at an early period built for the reception of lepers and the insane, the first leper hospital in England being founded in 1118 A.D.

Until the beginning of the XVIII. cent. the number of hospitals in Britain was entirely inadequate to the needs of the country—London, for instance, having practically only St. Bartholomew's (founded 1546) and St. Thomas's (founded 1553) Hospitals; but from that time the larger towns throughout Britain began to provide themselves with more or less adequate hospital accommodation.

Of the general hospitals those with a medical school attached rank as the best, and such hospitals have well-equipped special departments for the treatment of diseases of the eye, ear, throat and nose, skin, and teeth; electrical departments, X-ray and radium departments, frequently medicinal baths departments, often wards for children and for special diseases, in addition to the ordinary medical and surgical wards.

The chief hospitals in London to which medical schools are attached are St. Bartholomew's H., Charing Cross H., St. George's H., Guy's H., King's College H., London H., St. Mary's H., Middlesex H., St. Thomas's H., University College H., and Westminster H. The Royal Infirmary, Edinburgh (founded 1730), with which the Edinburgh Medical School is connected, is the largest general hospital in Britain, and there are important h's connected with the medical schools in Manchester, Leeds, Newcastle, Liverpool, Birmingham, Sheffield, Bristol, Cardiff, Glasgow, Aberdeen, Dundee, Dublin, and Belfast.

These h's are supported by voluntary subscriptions, and most are endowed to a greater or less extent. Admittance in some of them is free, under the control of the medical officers, to all necessitous cases; in others it is necessary first to obtain a letter of introduction from a subscriber, except in cases of emergency when such a letter is not required. Some hospitals reserve certain wards for the reception of patients who pay for their accommodation.

The term *Hospital* is also applied to certain schools, endowed (*e.g.* Heriot's Hospital, Edinburgh) or supported by voluntary contributions (*e.g.* Christ's Hospital, Horsham, formerly in London), and also to certain institutions for pensioners (*e.g.* Greenwich and Chelsea Hospitals).

See INSANITY, MEDICINE.

HOSPITALLERS (*Ordo fratrum hospitalariorum Hierosolymitanorum* and *Ordo militiæ Sancti Johannis Baptistæ hospitalis Hierosolymitani*), religious military order. Its pre-Christian foundation is merely traditional. The constant stream of pilgrims to Holy Land, from the beginning of Christian era, increased after the erection of Church of Holy Sepulchre by Constantine. Pope Gregory the Great, at close of VI. cent., founded a hospital at Jerusalem. Persians captured Jerusalem, 614, but Charlemagne established a protectorate over Holy Places, 797–99, and refounded Pope Gregory's hospital, which was served by Benedictine monks from Mount of Olives. Turks captured Jerusalem, 1070–78, and destroyed all Christian edifices. Christian merchants of Amalfi obtained permission from Turks and established a hospital, c. 1050, again probably served by Benedictines; still under invocation of St. Mary. A XII.-cent. book, *Miracula*, recounts a legend that Zacharias, f. of St. John the Baptist, was its first high priest. This possibly led to dedication of hospital to St. John.

The *Miracula* relates that the administrator of the hospital, Gerard, assisted the besiegers of Jerusalem, 1099, in First Crusade, and was miraculously saved from the sultan's wrath. Gerard (d. 1120) was the true founder and first Grand Master of the later hospital, of which he became Institutor by papal bull, 1113. The Crusaders and every Western country bestowed lands on the hospital, and in 1113 the pope confirmed these grants. From the beginning it was pre-eminently a Fr. Order. It is still a vexed question whether it became a military institution and received rule under Gerard. Gerard was succeeded by Raymond du Puy (d. 1158–60). Mention of a Constable in 1126 seems to point to military character already. From 1137 the Knights Hospitallers took prominent part in crusades. Augustinian rule was given to the Order before 1153, as it was confirmed by Pope Eugenius III.; threefold vow of poverty, chastity, obedience; duty to be servants of the poor (*fratres pauperibus servientes*). Successive regulations were codified by Grand Master Pierre d'Aubusson, 1489. Friars were divided into three ranks: the knights, who were of noble birth (*chevaliers de justice*) or of distinguished merit (*chevaliers de grâce*), priests (*capellani*), and servants (*servientes armigeri*). Knights in peace wore black robe with white cross, eight-pointed, subsequently known as Maltese; in war (after 1248), red robe with white cross; standard, white cross on field gules; the Teutonic Order was subjected to this, 1143, and on suppression of Templars (1313) their lands were granted to Hospitallers.

They were forced to fly from Jerusalem, 1187; held out against Saracens at Acre till 1291; held Rhodes, 1310–1522, and became known as *Knights of Rhodes*; Turks at last took Rhodes, 1522, and knights retired to Malta, granted them by Charles V., 1530. Grand Master Philippe de Villiers de l'Isle d'Adam strenuously continued war against Turks from the Order's new home, and his successor, La Vallette, defended Malta in famous siege, 1565. In XVIII. cent. Order became merely rich aristocratic picturesque institution. Possessions in England were lost at Reformation; possessions in France confiscated, 1792. Napoleon captured Malta, 1798. Malta is still seat of the Order.

Delaville Le Roulx, *Les Hospitaliers, Mélanges, Cartulaire*; Porter, *History of the Knights of Malta.*

HOSPITIUM, Rom. term, applied to public hospitality extended to strangers from a foreign state. H. was European name for an inn in mediæval times.

HOSPODAR, title of rulers of some Slavonic states, and found in states which have been subject to Slav rule.

HOST (Lat. *hostia*, sacrifice), the element of bread in the Eucharist; circular unleavened wafers marked with emblems of the Crucifixion are used in the R.C. Church; these emblems were forbidden at the Reformation.

HOSTAGE, a person given up to an enemy as a security for the performance of certain articles of a treaty or other conditions. On the surrender of a town,

victors and vanquished gave such personal security for fulfilment of terms, the h's being later exchanged.

HOSTE, SIR WILLIAM (1780–1828), Brit. naval captain who took prominent part against France, 1809 and 1811.

HOSTIUS, Lat. poet; author of *Bellum Histricum* in verse.

HOSUR (12° 43′ N., 77° 50′ E.), town, Madras, India. Pop. *c.* 7000.

HOT SPRINGS.—(1) (34° 29′ N., 93° 1′ W.) health-resort, Arkansas, U.S.A.; thermal mineral springs; site of army and navy hospital. Pop. (1910) 14,434. (2) (37° 59′ N., 79° 50′ W.) village and health-resort, Virginia, U.S.A. Pop. 1761.

HOTCHPOT, HOTCHPOTCH.—(1) by the Statute of Distributions, 1670, in case any child other than the heir-at-law of an estate shall have any estate by settlement from the intestate, or any portion advanced, such estate or portion shall be brought into h.—that is, deducted from this child's share when division is made of the intestate's effects. (2) vegetable soup.

HOTEL, see INN.

HÔTEL-DE-VILLE, Fr. term corresponding to Eng. town hall; it usually contains barracks, prison, court-house, offices of local bodies, and residence of chief magistrate. Famous H. of Paris, burnt during riots of Commune, 1871, has been rebuilt.

HÔTEL-DIEU (God-house), Fr. name for important hospitals; some, like those of Angers and Beaune, are of architectural interest.

HOTHAM, SIR JOHN (d. 1645), Eng. gentleman of old Yorks family; inspired Yorks resistance to ship-money. He and his s. held Hull for Parliament, and were executed for planning to give it up to the king.

HOTHAM, WILLIAM, 1ST BARON (1736–1813), Brit. admiral; distinguished at St. Lucia, 1778; fought against French in Mediterranean, 1794.

HOTHO, HEINRICH GUSTAV (1802–73), Ger. writer; author of an important work on Flemish and Ger. painters.

HOTI-MARDAN, MARDAN (34° 10′ N., 72° 5′ E.), town, Peshawar, Brit. India. Pop. 3572.

HOTMAN, FRANÇOIS (1524–90), Fr. author; embraced Reformed religion; undertook Huguenot missions to Ger. princes; prof. of Law in various univ's; Councillor to Henry of Navarre, 1580; wrote *Franco-Gallia*, etc.

HOTSPUR, see PERCY, SIR HENRY.

HOTTENTOTS, South African aborigines (calling themselves *Khoikhoi*, Men of Men); sometimes but erroneously supposed to include Bushmen (*q.v.*). Their quaint language, with its 'click' sounds, led the early Dutch settlers to dub them H's (*i.e.* 'jabberers'). They were decimated and driven southwards by Bantu (or Kafirs) and pure H's now number only from 50,000 to 100,000; mostly in Cape of Good Hope, but several thousand survive in Ger. S.W. Africa. They are of middle stature, have yellowish-brown skins, woolly hair, and are characterised by steatopygia. Their tribes were pastoral and peaceful under patriarchal rule; they used poisoned arrows. Their folk-lore is described in Bleek's *Reynard in South Africa*.

Stow, *Native Races of South Africa*.

HOTTENTOT'S BREAD, see ELEPHANT'S FOOT.

HOTTINGER, JOHANN HEINRICH (1620–67), Swiss theologian and grammarian.

HOUBRAKEN, JACOBUS (1698–1780), much-admired Dutch engraver.

HOUDENC, RAOUL DE, HOUDAN (fl. XII. cent.), Fr. *trouvère* of note.

HOUDETOT, COMTESSE DE, ÉLISABETH FRANÇOISE SOPHIE DE LA LIVE DE BELLEGARDE (1730–1813), wife of the Fr. general CLAUDE CONSTANCE CÉSAR, COUNT DE H., of old territorial family; she rejected Rousseau's advances, preferring St. Lambert.

HOUDIN, ROBERT (1805–71), see CONJURING.

HOUDON, JEAN ANTOINE (1740–1828), Fr. sculptor; won *Prix de Rome* (1761); studied in Italy for ten years; achieved great success with statue of St. Bruno; later works included statues of Washington, Cicero, and Voltaire; and busts of Napoleon, Molière, Rousseau, Ney, and D'Alembert.

HOUFFALIZE (50° 8′ N., 5° 48′ E.), town, Luxemburg, Belgium. Pop. 1486.

HOUGHTON, RICHARD MONCKTON MILNES, 1ST BARON (1809–85), Eng. poet and critic; received a peerage (1863); pub. *Poetry for the People* (1840), *Palm Leaves* (1848), and other vol's of verse; also a life of Keats; a generous patron of poets and authors.

HOUGHTON-LE-SPRING (54° 51′ N., 1° 29′ W.), town, Durham, England. Pop. (1911) 9753.

HOUND'S-TONGUE (*Cynoglossum*), genus of plants of order Boraginaceæ (*q.v.*). Common hound's-tongue (*C. officinale*), found in Britain, has small red flowers and downy leaves.

HOUNSLOW (51° 28′ N., 0° 22′ W.), town, Middlesex, England; formerly site of priory. H. Heath was a highwayman's haunt. Pop. 12,000.

HOUR-GLASS, see CLOCK.

HOURI, name given in the Koran to the seventy-two beautiful women who are assigned to every 'Faithful' as spouses on entering the Muhammadan paradise.

HOURS, CANONICAL, special times in the day for devotion in Catholic Church, viz. Matins, Lauds, Prime, Terce, Sext, None, Vespers (Evensong), and Compline.

HOUSE AND HOUSING.—As most people in civilised communities are born, die, and spend a great part of each day in a house, domestic architecture, sanitation, and the conditions of occupation are matters of the first importance. Not until the XIX. cent., when the changes in modern industry created with amazing swiftness a new town population, was any serious attention given to the question of housing. The disclosures in England in 1844, concerning the housing of the working class,—the damp cellars, dark passages, vermin, lack of sanitary conveniences, absence of water-supply, and ill-repair,—were the beginning of a long series of reports, investigations, and legislative enactments on housing, that have taken place in nearly every country in Europe and in the U.S.A. To-day, crowded city tenements, slum areas, and want of accommodation in rural districts are facts of common life, proclaiming that in housing much remains to be done.

Heat, light, ventilation, and sanitation are the necessities of housing, whether rich or poor are concerned; but the housing question is primarily and essentially one of poverty. Amongst Southern nations and in semi-tropical and tropical countries housing is not so serious a matter, and here we are only concerned with those lands where it demands serious attention.

Bad housing, with its necessary accompaniment, overcrowding, means physical uncleanness and disease, want of privacy, and in many cases unavoidable intercourse with criminals; and the overcrowded town district is usually a centre of crime, vice, and epidemic sickness. Legislation, municipal activity, private enterprise, and philanthropy have all been at work to remedy the evil.

In Great Britain five Housing of the Working Classes Acts have been passed (in addition to earlier measures for sanitary reform and public health), in 1890, 1896, 1900, 1903, and 1904. The principal Act (1890) gives power to local authorities to order the demolition of houses unfit for habitation (with due compensation to the owner), and to erect dwellings for the working classes; but while whole districts have thus been cleared, and a certain number of working-class dwellings erected, in too many places the tenants evicted from the condemned slum have been driven to overcrowd elsewhere, so far in excess of rebuilding has been the pulling down. At the same time there is not a 'house famine' in the cities; for, according to the statement of Mr. John Burns, Pres. of the Local Government Board, 1909, no less than 104,107 houses were then to let, and 60,000 of these were in London.

These houses were unoccupied because the rent was too high for working-class tenants; small and cheap houses never stand empty in modern cities.

Private enterprise, often inspired by philanthropy, has also been responsible for many efforts to improve the housing conditions in cities. The late Miss Octavia Hill was famous for the excellent work her association did in London, 1864,—purchasing and renewing old house property,—and in America, Philadelphia, New York and Boston, can all point to Housing Reform on Miss Hill's lines. Twenty years before this (1845) Lord Shaftesbury's 'Association for improving the Dwelling of the Industrial Classes' (which pays 4½ % to its shareholders) began its operations. It now owns fourteen estates in London. The Peabody Fund (1864) also owns vast blocks of tenement dwellings in London. Similar commercial and semi-philanthropic housing associations exist in other cities, especially in Berlin, New York, Boston, and Philadelphia.

Well-built lodging-houses for single men (and in far fewer cases for single women) have also in the last twenty years been replacing the foul old common lodging-houses, hotbeds in their time of crime, vice, and disease. The Rowton Houses, started in 1892, charge 7d. a night, or 3s. 6d. a week, and keep up a high standard of decency.

Improved and quickened methods of transit have made it possible for multitudes of working people to live outside the city and to travel daily to and from their place of work, with the result that miles of mean streets now surround most industrial centres. But here steady improvements are at work. Building societies, co-operative societies, and Garden City associations all demand that houses shall be better built and be less ugly than the erections of the speculative builder of previous generations. By becoming shareholders in building and co-operative societies large numbers of workmen now own their dwellings—the purchase-money being borrowed on mortgage. In Belgium, France, and Germany the co-operative building companies and co-operative loan companies have been particularly successful on these lines.

The Garden City movement (started by Mr. Ebenezer Howard, 1899) promises a far better type of suburban dwelling for the comparatively prosperous middle-class person than could formerly be obtained, and its popularity is proved by the many fresh experiments made since the first garden city was planned at Letchworth in Hertfordshire. But garden cities do not provide housing accommodation at rents within the means of labouring people except to a very limited extent.

In Ireland, by the Act of 1906, houses in rural districts for workmen are erected on the demand of three residents by the local authority without all the delay that occurs in England, where rural housing, hampered by stringent building bye-laws, and want of legal driving power, is generally far behind town building.

E. R. Dewsnup, *Housing Problem in England*; W. Thompson, *Housing Up-to-Date*; J. S. Nettleford, *Practical Housing Reform*.

HOUSE-FLY (*Muscidæ*).—With the House-Fly (*Musca domestica*) are ranked the Blue-bottles (*Calliphora*), Green-bottles (*Lucilia*), and the dreaded African Tse-tse Fly (*Glossina*). The eggs of Muscid flies are generally laid upon dung, decaying matter, or carrion, and upon this the larvæ feed. In this way they are of some value as scavengers; but otherwise they cause much trouble. The House-Fly may carry germs of disease upon its feet or proboscis, and transfer these to human food; the larvæ of Blue-bottles and Green-bottles frequently bore into the skin of sheep, causing great irritation and sometimes death; the 'screw-worm' larva of one species of *Lucilia* bores in the nasal cavities of man and higher animals; and Tse-tse Flies are the carriers of the organisms which cause the fatal native disease of sleeping sickness and the troublesome animal disease, nagana, in Africa.

HOUSE OF COMMONS, see PARLIAMENT.

HOUSE OF LORDS, see PARLIAMENT.

HOUSEBREAKING, see under THEFT.

HOUSEBURNING, see ARSON.

HOUSEHOLD, ROYAL.—King and queen have each a separate household, some of the officials being honorary, while others are paid out of Civil List. The greater officials go out of office with every change of government, and are chosen from persons of high rank in the political party which happens to be in power. The principal officials are the Lord Steward, the Lord Chamberlain, and the Master of the Horse; there are also certain personal appointments made by king himself, most important being Master of Household.

HOUSEL, meaning sacrifice, obsolete Eng. name for Eucharist.

HOUSE-LEEK (*Sempervivum*), genus of plants of order Crassulaceæ (*q.v.*).

HOUSMAN, ALFRED EDWARD (1859–), Eng. poet and scholar; prof. of Latin, Cambridge; author of *A Shropshire Lad* (1896).

HOUSMAN, LAURENCE (1867–), Eng. writer and artist; first achieved celebrity as book-illustrator; author of *An Englishwoman's Love Letters* (1900), *A Modern Antæus*, *Sabrina Warham*, etc.; also plays and several vol's of verse.

HOUSSAS, see HAUSAS.

HOUSSAYE, ARSÈNE (1815–96), Fr. novelist and poet; his novels include *Les Filles d'Ève*, *La Couronne de Bluets*, etc.; poetry, *Cent et un sonnets*, also dramas, critical and hist. works. His s. HENRI (1848–) is a historian and academician.

HOUSTON (29° 46′ N., 95° 24′ W.), town, Texas, U.S.A.; important railway centre; manufactures machinery, railway carriages, iron goods; has large shipping trade in cotton, grain, oil. Pop. (1910) 78,800.

HOUSTON, SAMUEL (1793–1863), Amer. soldier and politician; as commander-in-chief in Texas, he defeated Mexicans in 1836; pres. of Texas, 1836–38, 1841–44; gov. of Texas, 1859–61.

HOUWALD, CHRISTOPH ERNST, FREIHERR VON (1778–1845), Ger. dramatist and author; pub. *Romantische Akkorder*, *Jakob Thau*, *der Hofnarr*, etc.; also some plays.

HÒVA, or MERINA, the dominant tribes of Madagascar, occupying the plateau of Imerina; small and slightly built, yellow complexion, hair black and long; converts to Christianity.

HOVE (50° 50′ N., 0° 21′ W.), town, Sussex, England. Pop. (1911) 42,173.

HOVENDEN, THOMAS (1840–95), popular Amer. painter.

HOVER-FLIES (*Syrphidæ*), conspicuous flies, often with body wasp-like in colour, to be seen resting on or poised over flowers in summer.

HOW, WILLIAM WALSHAM (1823–97), Eng. Churchman; bp. of Wakefield (1888); prominent East End work; writer of hymns.

HOWARD, old Eng. family, said to have been settled in Norfolk as far back as X. cent. In XV. cent. Sir Robert H. married the dau. of Mowbray, Duke of Norfolk, and his s., Sir John H., was in 1483 cr. Duke of Norfolk and Earl Marshal of England, an office hereditary in the family ever since. The first duke was killed at *Bosworth* and attainted; but his s. Thomas won battle of *Flodden*, and regained the dukedom in 1514; third duke was uncle of Anne Boleyn and Catherine Howard, queens of Henry VIII.; his grandson and successor m. heiress of Arundel earldom, thus bringing that title to the H. family; this duke was afterwards attainted and beheaded for plotting in favour of Mary, Queen of Scots, 1572. The family regained dukedom from Charles II. after the Restoration. Present is 15th duke, and is premier duke of England. The Earls of Effingham, Suffolk, and Carlisle are of same stock.

HOWARD, BRONSON (1842–1908), Amer. playwright; among his plays are *Young Mrs. Winthrop* and *Old Love Letters*.

HOWARD, CATHERINE (1521–42), fifth queen of Henry VIII.; dau. of Lord Edmund Howard; m.

Henry, 1540; charged with unfaithfulness, and beheaded in Tower.

HOWARD, JOHN (1726–1790), famous Eng. philanthropist; b. in London. On being app. high sheriff of Bedford, he inspected the prison, and, finding many abuses both there and in other Eng. gaols which he subsequently visited, gave himself up to securing reforms in management of prisons and prisoners. He afterwards visited the prisons of many European countries, which he described, with those of England, in his *State of Prisons* (pub. 1777). He also carried out researches on the plague.

Stoughton, *Howard and his Friends.*

HOWARD, LORD WILLIAM (1563–1640), Eng. antiquary; known as 'Belted Will,' of Naworth Castle, Cumberland; famed for his genealogical studies.

HOWARD OF EFFINGHAM, CHARLES, 2ND BARON (1536–1624), Eng. admiral; Lord High Admiral, 1585–1619; commanded Eng. fleet against Armada, 1588; joint-commander in expedition against Cadiz, 1596; cr. Earl of Northampton, 1596; ambassador to Spain, 1605. His first wife, Katharine Carey, according to legend, failed to deliver Essex's ring to Queen Elizabeth.

HOWARD OF EFFINGHAM, WILLIAM, 1ST BARON (*c.* 1510–73), Eng. admiral; gov. of Calais (1552); Lord High Admiral (1553); raised to peerage (1554); highly esteemed for his public services under Henry VIII. and Elizabeth.

HOWARD, OLIVER OTIS (1830–1909), Amer. general; fought for union in Civil War; distinguished at *Fair Oaks, Antietam, Gettysburg, Chattanooga*; served on Freedmen's Bureau, 1865–74; established Lincoln Univ., Cumberland Gap, Tennessee.

HOWARD, SIR ROBERT (1626–98), Eng. dramatist; s. of Earl of Berkshire; fought on king's side in Civil War; wrote *The Committee* (1663), a comedy, and collaborated with his bro.-in-law, Dryden, in *The Indian Queen.*

HOWE, ELIAS (1819–67), Amer. inventor; granted patent (1846) for the sewing-machine which bears his name.

HOWE, JOHN (1630–1706), Eng. Nonconformist divine; ed. Cambridge and Oxford; app. domestic chaplain to Cromwell; after 1662 became Nonconformist; wrote theol. works; a zealous and broad-minded man.

HOWE, JOSEPH (1804–73), Canadian politician; had considerable share in obtaining responsible administration for Nova Scotia; Prime Minister, Nova Scotia, 1860.

HOWE, JULIA WARD (1819–1910), Amer. author and philanthropist; was associated with her husband, DR. S. G. HOWE, in editing the *Boston Commonwealth*, and in numerous philanthropic and social reform movements; wrote *The Battle-hymn of the Republic*, and several vol's of verse; also *Sex and Education, Life of Margaret Fuller*, etc.

HOWE, RICHARD, EARL HOWE (1726–99), Brit. admiral; saw considerable service during war of Amer. Revolution; as commander of Channel fleet, relieved Gibraltar in 1782; First Lord of Admiralty, 1783; on June 1, 1794, defeated French off Cape Ushant, day of this victory being long known as *Glorious First of June.*

HOWE, SAMUEL GRIDLEY (1801–76), Amer. philanthropist; served in Gk. war of independence; helped to establish Perkins Institution for blind at Boston; founded school for idiots at South Boston, subsequently removed to Waltham; advocated abolition of slavery; sanitary commissioner in Civil War.

HOWE, WILLIAM, 5TH VISCOUNT HOWE (1729–1814), Brit. general; distinguished himself at *Abraham's Heights*, Quebec; commander-in-chief in Amer. War of Independence.

HOWEL DDA ('the Good') (d. 950), king of Wales (943); maintained peace and codified the laws.

HOWELL, JAMES (d. 1666), Brit. author; travelled extensively and famed for his Royalist sympathies; wrote *Dodona's Grove*, an allegory, and numerous other works, but chiefly noted for his *Familiar Letters* (1645–55), written in the Fleet prison.

HOWELLS, WILLIAM DEAN (1837–), Amer. novelist and critic; famed for realistic studies of modern life; *The Rise of Silas Lapham, A Woman's Reason, A Modern Instance*, etc.; also vol's of poems and essays.

HOWITT, WILLIAM (1793–1879), Eng. author; wrote *History of Priestcraft, Rural Life in England, Visits to Remarkable Places*, etc. His wife, MARY (1799–1888), wrote novels, trans. Frederica Brema and Hans Andersen, and was joint-author with her husband of *The Forest Minstrel, The Ruined Abbeys and Castles of Great Britain*, and numerous other works.

HOWITZER, light ordnance used in field and siege operations; of 5-in. and 6-in. calibre, throwing shells of from 50 to 120 lb.

HOWRAH (22° 31′ N., 88° 20′ E.), town, Bengal, India; jute, cotton. Pop. *c.* 160,000. District has area 509 sq. miles. Pop. *c.* 860,000.

HOWSON, JOHN SAUL (1816–85), Anglican divine and theological writer; dean of Chester, 1867.

HOWTH (53° 23′ N., 6° 3′ W.), town, County Dublin, Ireland. Pop. 1166.

HOXTER (51° 46′ N., 9° 22′ E.), town, Westphalia, Prussia; interesting old buildings. Pop. (1905) *c.* 7700.

HOY (58° 50′ N., 3° 18′ W.), mountainous island, Orkney, Scotland; has celebrated Dwarfie Stone, in which are excavated rooms. Pop. 1216.

HOYLAKE (53° 24′ N., 3° 11′ W.), town, Cheshire, England. Pop. (with W. Kirby, 1911) 14,029.

HOYLAND NETHER (53° 30′ N., 1° 26′ W.), town, Yorkshire, England. Pop. (1911) 14,639.

HOYLE, EDMOND (1672–1769), Eng. pioneer authority on whist; wrote on games, and taught whist in London; his *Short Treatise on Whist* was pub. 1742.

HOZIER, PIERRE D', SEIGNEUR DE LA GARDE (1592–1660), Fr. record-searcher; historiographer and genealogist of France, 1634; *juge d'armes*, 1641; wrote *Recueil Armorial des anciennes maisons de Bretagne*, etc. Several of his descendants also became *juges d'armes.*

HRABANUS MAURUS MAGNENTIUS (*c.* 776–856), pupil of Alcuin, abbot of Fulda, 822–42; retired for study and devotion; abp. of Mainz, 847; wrote commentaries on Scripture, and numerous theological and other works.

HRADSCHIN, see PRAGUE.

HRÓLFR KRAKI (fl. *c.* VI. cent.), semi-mythical Dan. king, celebrated in the sagas.

HROSVITHA, ROSWITHA (*c.* 930–1000), early mediæval dramatist; entered Benedictine nunnery of Gandersheim *c.* 959; wrote religious poems, 6 dramas (her best works), and historical chronicles, viz. *Carmen de Gestis Oddonis* (epic), *De primordiis et fundatoribus cœnobii Gandersheimensis* (a poem narrating the history of the convent).

HSUAN-TSANG (fl. 664), Chin. writer of travels; became a Buddhist monk in early life, won great reputation for learning and sanctity, and finally visited India in order to penetrate Buddhist arcana; he traversed vast deserts alone, and left invaluable accounts of the districts through which he passed. The Ind. pilgrimage was considered specially meritorious by the Chin. Buddhists, whose writings are an important source for history of India.

HUAMANGA, GUAMANGA, see AYACUCHO.

HUAMBISIS, S. Amer. tribe of mixed Span. and Ind. descent.

HUANACO, see CAMEL FAMILY.

HUANCAVELICA (12° 55′ E., 75° 2′ W.), town, Peru, S. America. Pop. *c.* 6000; of dept. *c.* 167,840.

HUÁNUCO, GUANUCO (9° 54′ S., 76° 49′ W.), town, Peru, S. America. Pop. *c.* 7000.

HUARAZ (9° 16′ S., 77° 23′ W.), town, Peru, S. America. Pop. 7046.

HUARTE DE SAN JUAN (1530–92), Span.

physician; renowned for his writings showing the connection between psychology and physiology.

HUASTECS, Mayan tribe of N. Amer. Indians.

HUBER, JOHANN NEPOMUK (1830–79), Ger. theologian; wrote, as **Janus,** *The Pope and the Council*; an Old Catholic leader.

HUBER, LUDWIG FERDINAND (1764–1804), Ger. dramatist, critic, and journalist of some influence.

HUBERT, ST. (656–728), bp. of Liége; feast-day, Nov. 3; patron saint of hunters. Legend says that he was converted by appearance of Christ on the Cross above the deer's head when shooting.

HUBERTUSBURG (51° 17′ N., 12° 56′ E.), old castle, Saxony, Germany. Treaty of H., 1763, ended Seven Years War.

HUBLI (15° 18′ N., 75° 11′ E.), town, Bombay, India. Pop. (1911) 60,214.

HÜBNER, EMIL (1834–1901), Ger. philologist, who wrote important works on inscriptions.

HÜBNER, JOSEPH ALEXANDER, COUNT (1811–92), Austrian diplomat; ambassador to France, 1849–79; to Italy, 1865–67; wrote *Sixte Quint* and other works.

HUC, ÉVARISTE RÉGIS (1813–60), Fr. missionary; after an unsuccessful mission to Tibet, wrote *Voyage dans la Tartarie, le Thibet et la Chine* (1851–52), and other valuable books on those regions.

HUCBALD (*c.* 840–930), Benedictine monk, author of the *Harmonica Institutio* and possibly of other works on music.

HU-CHOW-FU (30° 49′ N., 120° 5′ E.), town, Cheh-kiang, China.

HUCHOWN 'OF THE HALL ROYAL,' person stated by Wyntoun the chronicler (XIV.–XV. cent.) to have written 'the great geste of Arthur,' *The Awntyrs of Gawain,* and *The Pistyl of Susan.* See *Huchown,* by Geo. Neilson.

HUCHTENBURG, JAN VAN (1646–1733), Dutch painter of battle-scenes.

HUCKABACK, thick linen material much used for face towels.

HUCKNALL TORKARD (53° 2′ N., 1° 12′ W.), town, Nottinghamshire, England. Pop. (1911) 15,870.

HUDDERSFIELD (53° 39′ N., 1° 47′ W.), town, Yorkshire, England; situated in extensive coal-field; centre of 'fancy' woollen industry; manufactures iron goods, machinery; fine public buildings and park. Pop. (1911) 107,825.

HUDSON (42° 12′ N., 73° 51′ W.), town, New York, U.S.A.; manufactures Portland cement, hosiery, etc. Pop. (1910) 11,417.

HUDSON BAY (*c.* 60 N., 87° W.), great inland sea, N.E. of North America; receives drainage of great part of Canada by Churchill, Nelson, Albany, and other rivers. Area, *c.* 500,000 sq. miles; connected with Atlantic by Hudson Strait. A railway is being built to connect H. B. with the centre and west of Canada. Hudson Strait is open to navigation for two or three months in the year.

HUDSON, GEORGE (1800–71), Eng. financier; called 'railway king'; promoted railway extensions in England; acquired large fortune, subsequently lost.

HUDSON, HENRY (d. 1611), famous Brit. explorer. In 1607 he attempted to discover a north-east passage to Pacific; in 1609 explored H. River; afterwards sailed to Arctic Ocean, hoping to find a north-west passage; discovered H. Strait and Bay. On last voyage crew mutinied, and H. and others were cast adrift and never heard of again. *Life,* by Asher (Hakluyt Soc.), and by E. M. Bacon.

HUDSON RIVER (41° 50′ N., 73° 58′ W.), beautiful and important river in New York State, U.S.A.; called after Henry Hudson, who first explored it (1609); rises in Adirondack Mts.; total length, *c.* 350 miles (tidal, *c.* 150). Principal tributaries are Sacondaga, Mohawk, and Wallkill. About 60 miles from New York (at mouth) river passes through picturesque highlands into great expanse—Haverstraw and Tappan (*c.* 12 miles by 4½) Bays—after which a steep wall (called the Palisades), rising 300–500 ft. from brink of river (here 1 or 2 miles broad and called *North River*), extends to upper part of New York.

Bruce, *The Hudson* (1895); E. M. Bacon, *The Hudson River from Ocean to Source.*

HUDSON'S BAY COMPANY, joint-stock company, founded 1670 by Prince Rupert and seventeen others, under charter from Charles II., for the importation of furs and skins into Gt. Britain from N. America. In 1869 its exclusive rights were ceded to the Brit. Government for £300,000, but the trade is still continued under certain reservations. See Willson, *The Great Company, 1667–1871* (1900).

HUÉ (16° 24′ N., 107° 32′ E.), fortified town, Fr. Indo-China; capital of Annam; has royal palace. Pop. *c.* 50,000.

HUE AND CRY, old process, in Eng. law, of pursuing felons with horn-blowing and shouting; if taken, they were summarily dealt with; later meaning, police proclamation regarding offenders, etc.

HUEHUETENANGO (15° 30′ N., 91° 41′ W.), town, Guatemala, Cent. America. Pop. (1905) *c.* 12,000. H. department has area of 5700 sq. miles. Pop. *c.* 120,000.

HUELVA (37° 32′ N., 6° 50′ W.), frontier province, S.W. Spain; area, 3913 sq. miles; has valuable copper mines. Pop. (1910) 309,744. Its capital, HUELVA, has pop. (1910) 27,700.

HUERCAL OVERA (37° 26′ N., 2° 1′ W.), town, S.E. Spain. Pop. 15,763.

HUESCA (42° 11′ N., 0° 10′ W.), province, Spain; area, 5848 sq. miles; watered by Aragon and other affluents of Ebro, N. occupied by Pyrenees; produces wine, grain, fruit. Pop. (1910) 247,027. Its capital, HUESCA, has a cathedral. Pop. (1900) 12,600.

HUET, PIERRE DANIEL (1630–1721), Fr. scholar; student of math's, astron., and anat.; edit. Latin classics; bp. of Avranches, 1689, then abbot of Fontenay; left valuable library.

HUFELAND, CHRISTOPH WILHELM (1762–1836), Ger. physician; prof. of Med. at Jena (1793); principal of Medical Coll. (1798) and prof. of Pathology and Therapeutics (1809) at Berlin Univ.; author of many medical works.

HUFELAND, GOTTLIEB (1760–1817), Ger. jurist; wrote *Lehrbuch des Naturrechts* and other works on legislation and political economy.

HUG, JOHANN LEONHARD (1765–1846), Ger. Biblical (R.C.), Oriental, and classical scholar; prof. at Freiburg, 1791–1845.

HUGGINS, SIR WILLIAM (1824–1910), Eng. astronomer; pioneer in stellar spectroscopy and photography; made many striking discoveries relative to origin, constitution, and condition of the heavenly bodies; list of papers in his *Atlas of Representative Stellar Spectra.*

HUGH THE GREAT (d. 956), Duke of the Franks and Count of Paris; founder of the fortunes of his house, and father of H. Capet.

HUGH CAPET (*c.* 938–96), king of France; founder of Capetian dynasty; s. of Hugh, Count of Paris and Duke of France; elected and crowned, 987; warred against Charles of Lorraine, his capture of whom in 991 closed the war.

HUGH DE PUISET (*c.* 1125–95), bp. of Durham and Earl of Northumberland; exercised powerful influence upon the political affairs of the reign of Richard I.

HUGH OF ST. CHER (*c.* 1200–63), Fr. Dominican priest and cardinal; besides playing prominent part as a churchman, wrote theological works of interest.

HUGH OF ST. VICTOR (*c.* 1079–1141), canon of Hamersleben, Saxony; had great reputation as mystic in XII. cent.

HUGH, ST., OF LINCOLN, OR OF AVALON (*c.* 1140–1200), prior of first Eng. Carthusian house at Witham (Somerset); bp. of Lincoln, 1186; strong defender of rights of Church, and pious man; not to be confused with HUGH OF WELLS, bp. of Lincoln, or ST. HUGH OF

LINCOLN, Christian boy traditionally crucified by Jews.

HUGHES, DAVID EDWARD (1831–1900), Eng. electrician; made fortune by invention of type-printing telegraph instrument, adopted everywhere; perfected telephone by invention of microphone.

HUGHES, SIR EDWARD (*c.* 1720–94), Brit. admiral; served at *Porto Bello* under Vernon; commander-in-chief in East Indies, 1778–83; took Goree from French; promoted admiral, 1793.

HUGHES, HUGH PRICE (1847–1902), Brit. Wesleyan minister; b. Carmarthen; founded *Methodist Times*, 1885; started West London Mission, 1887; pres. of Wesleyan Conference, 1898; famed for fearless utterances in cause of social reform.

HUGHES, JOHN (1677–1720), Eng. author; chiefly known as writer of successful tragedy, *The Siege of Damascus* (1720); wrote for *Spectator*; produced numerous trans. in prose and verse.

HUGHES, JOHN (1797–1864), R.C. divine; went to America from Ireland, 1817; bp. of New York; keen Catholic controversialist.

HUGHES, THOMAS (XVI. cent.), Eng. dramatist; wrote *The Misfortunes of Arthur*, played before Queen Elizabeth at Greenwich (1588).

HUGHES, THOMAS (1822–96), Eng. judge and author; ed. Rugby and Oxford; became a County Court judge; was greatly influenced by the religious views of F. D. Maurice and Kingsley; pub. *The Manliness of Christ* (1879). He is best known, however, by his famous story, *Tom Brown's School-days* (1857), and its sequel, *Tom Brown at Oxford* (1861).

HUGLI, HOOGHLY (22° 57′ N., 88° 19′ E.), town, Bengal, India, on H. River; has fine mosque and various educational establishments. Pop. 29,383. H. district has area of *c.* 1200 sq. miles. Pop. 1,049,282.

HUGLI, HOOGHLY (21° 40′ N., 87° 50′ E.), most westerly mouth of Ganges, entering Indian Ocean, and that up which trade passes to Calcutta.

HUGO, GUSTAV VON (1764–1844), Ger. jurist; chiefly known for his *Lehrbuch eines Zivilistischen Kursus* (1792–1821).

HUGO, VICTOR MARIE (1802–85), Fr. author; b. at Besançon; travelled with his f., General Count Hugo (1774–1828), through Spain and Italy during Napoleonic campaigns; returned to Paris for education. From outset H.'s private and public life were troubled. Nearly all his children died in his lifetime, and he lived his last years with his grandchildren. H. entered Parliament after Revolution of 1848; became ardent Republican, and after *coup d'état* of Dec. 2, 1851, retired to Channel Islands until 1870; returned to Paris, and took deep interest in politics, working with all his might for abolition of capital punishment, etc. His funeral was a magnificent one, and he was laid to rest in the Panthéon as perhaps the greatest figure in Fr. Lit.

H. was the great leader of Romantic school of Fr. lit. (see under FRANCE). His poems, dramas, and romances, on every subject and in numberless forms, aroused an enthusiasm almost unparalleled in lit.; through him the current set definitely in favour of the new Romantic movement; his dramas, *Hernani* (1830), *Le Roi s'amuse* (1832), *Lucrèce Borgia* (1833), etc., and novels, *Le Dernier Jour d'un condamné* (1829), *Notre-Dame de Paris* (1831), *Les Misérables* (1862), *Les Travailleurs de la Mer* (1866), *L'Homme qui Rit* (1869), were epoch-making and were only surpassed in greatness by his lyrics. One of the great features of H.'s writing was frequent use of *motif* of oppressed virtue and evil fate: the hero from opening of life to close of story is subject of misfortunes, which are final word of tragical imagination; he is deformed, like the bell-ringer of *Notre-Dame*, or distorted, like terrible '*homme qui rit*,' or a convict with the luck against him, like Jean Valjean; he does not so much struggle against destiny as suffer a continuous series of attacks, and finally succumb. This 'eternal note of sadness' is one of the charms of H., as of the whole school. Love of liberty, justice, glory, nature, children, are also outstanding features of his work; his 'Paradise Lost and Regained,' *La Légende des Siècles* (1859 onwards), was praised by Swinburne as the greatest poem of XIX. cent. H.'s rhetorical effects are somewhat alien to the austerer age which has followed; but he will always remain one of the literary giants of the XIX. cent.

Swinburne, *A Study of Victor Hugo* (1886); monographs by J. P. Nichol (1892), Claretie (1902), Marzials, etc.

HUGUENOTS, name given to Fr. Protestants who in XVI. and XVII. cent's banded themselves together to secure personal liberty and religious freedom. Long struggle began in 1562, with massacre of number of H's at Vassy by R.C. followers of the Guises, and towards close of same year the H's were defeated at *Dreux*; two months later the murder of Duke of Guise by a Calvinist fanatic put an end to hostilities, and peace of Amboise was arranged, 1563. In 1567 war again broke out, and H's were defeated at *St. Denis*; by Treaty of Longjumeau (1568) peace was restored for a short time; but the following year saw a resumption of hostilities; the H's again suffering defeat at *Jarnac*, while Condé was murdered, 1569. Henry of Navarre and Coligny then became leaders of Prot. party, and in 1570 hostilities again came to an end by Treaty of St. Germains.

Two years later occurred the terrible massacre of St. Bartholomew's Eve, Aug. 24, 1572; the example of Paris was followed in other towns, and in two months from 20,000 to 30,000 H's were slain in France. The remainder again took up arms and were successful in obtaining in 1575 numerous concessions, some of which were subsequently revoked. In 1589 Henry of Navarre came to Fr. throne, and in 1598 he granted religious freedom by Edict of Nantes; but after his death civil war recommenced and H's were again defeated. For many years, in spite of confirmation of Edict of Nantes, they were subjected to persecution; and in 1685 the Edict was revoked, great numbers of H's fled from the country, and their church was annihilated; revived in XVIII. cent., and after various vicissitudes finally obtained equality with rest of population after the Revolution.

Browning, *History of the Huguenots* (1840); Smiles, *History of the Huguenots* (1867); and works by H. M. Baird.

HUGUES, CLOVIS (1851–1907), Fr. Socialist, politician and author of amusing comedies, poems, etc.

HUICHOL, tribe of Indians of Central America.

HUITZILOPOCHTLI, ancient Mexican war-god, to whom wholesale human sacrifice was made.

HULDA, Teutonic goddess of the spindle and marriage.

HULL (45° 23′ N., 75° 46′ W.), town, Quebec, Canada; paper- and sawmills. Pop. 14,000.

HULL, KINGSTON-ON-HULL (53° 45′ N., 0° 20′ W.), river-port and borough, Yorkshire, England, with Holy Trinity Church, St. Mary's Lowgate (1333), town hall, library, theatre, nautical school, and extensive docks. Shipbuilding, machinery, chains, ropes, canvas, chemicals, tanning, sugar-refining, etc. H. made free borough of Kingston-on-Hull by Edward I., 1299; besieged by Royalists, 1643; extensive trade with Continent, and headquarters for deep-sea fisheries. Pop. (1911) 278,024.

HULL (from A.-S. *helan*, to cover), capsule or chrysalis; whole lower part of a ship.

HULL, ISAAC (1775–1843), Amer. naval commander who took the Brit. ship *Guerrière*, 1812.

HULLAH, JOHN PYKE (1812–84), Eng. composer; prof. at King's, Queen's, and Bedford Colleges, London; strongly opposed Tonic Sol-Fa movement.

HULME, WILLIAM (1631–91), Lancashire man who founded exhibitions at Oxford with endowment in Manchester; the property has appreciated enormously and now supports several Manchester institu-

tions; district of Manchester where the property lies is called H.

HÜLS (51° 23′ N., 6° 31′ E.), town, Rhine prov., Prussia. Pop. (1910) 6868.

HULSE, JOHN (1708–90), Eng. divine who bequeathed funds to Cambridge Univ. for four lectures (HULSEAN LECTURES) to be delivered before the univ. annually on the evidences of the Christian religion.

HUMACAO (18° 16′ N., 65° 44′ W.), town, Porto Rico, W. Indies. Pop. 4428.

HUMANE SOCIETY, ROYAL, established 1774 to teach methods of resuscitating the half-drowned; it maintains boats and boatmen to watch swimmers at many bathing-places, grants medals for rescues, and offers swimming prizes.

HUMANISM, literally that which attaches primary importance to man, but used more specifically of Renaissance movement of XV. cent., and beginning of modern thought.

HUMANITARIAN.—(1) humane; (2) denying divinity of Christ, while accepting God the Father; (3) erecting morality into a religion.

HUMAYUN, NASR ED-DIN, MUHAMMAD (*c.* 1510–56), emperor of Delhi; second of the Mogul line, and preserved realm acquired by his f., Baber (*q.v.*), though first spent many years in fighting.

HUMBER (53° 40′ N., 0° 12′ ..), estuary of Trent and Yorkshire Ouse, E. coast f England, between Yorks and Lincoln.

HUMBERT I., RANIERI CARLO GIOVANNI MARIA FERDINANDO EUGENIO (1844–1900), king of Italy, s. of Victor Emmanuel II.; succ. 1878; supported Triple Alliance and also maintained friendly relation with Britain; advocated colonisation on Red Sea littoral; assassinated by anarchist Bresci.

HUMBOLDT, FRIEDRICH HEINRICH ALEXANDER, BARON VON (1769–1859), Ger. naturalist and explorer; explored course of the Orinoco, the Andes, the Amazon, and Mexico. He introduced *guano* into Europe and in 1817 delineated *isothermal* lines. Besides accounts of the natural history of the regions he explored he wrote works on plant distribution, laws of temperature, magnetism, volcanoes, terrestrial magnetism, and the igneous nature of rocks. He devoted much attention to climate and the conditions which control it. As a favourite of Frederick William III, of Prussia, he could not undertake further expeditions, with the exception of a journey to Siberia, in his sixtieth year, during which he determined the height of the plateau and discovered diamonds in the gold washings of the Ural. In his seventy-sixth year he wrote the *Kosmos*, in which are embodied the results of his personal observations and his generalisations from those and his wide scientific knowledge.

Lowenberg, *Humboldt* (trans. by Lassell).

HUMBOLDT, KARL WILHELM VON (1767–1835), Ger. statesman and author of valuable philological works; bro. of above; as Prussian member of Public Instruction established Univ. of Berlin (1809).

HUME, ALEXANDER (1557–1609), Scot. poet, author of *Hymns, or Sacred Songs* (1599).

HUME, DAVID (1711–1776), Scot. historian and philosopher; b. Edinburgh; s. of a small landowner in Berwickshire; studied at Edinburgh Univ., and became interested in speculation; in 1739 pub. first two vol's of *Treatise of Human Nature*, but to his bitter disappointment the work was a failure; tried, unsuccessfully, to get chair of Moral Philosophy at Edinburgh, 1744; made librarian at Advocate's Library, Edinburgh, 1751. His *Philosophical Essays* were pub. in 1748, and *Political Discourses*, 1751. In 1753 H. set to work to write the history of England. His qualifications and aims in writing were distinctly above those of his day, though by no means equal to those of ours. His *Natural History of Religion* appeared in 1757. He was much honoured during the visit he paid to Paris in 1763; app. Under-Sec. of State to the Home Department, 1766; in London, 1767–69; returned to Edinburgh; had a furious quarrel with Rousseau; latterly in much better financial circumstances than before; d. a much respected man.

H.'s philosophy, it has been said, is more self-consistent than that of either Berkeley or Locke, and he has been called the typical *empiricist* philosopher, the 'empiricists' being those who assert that all our knowledge comes from experience. His philosophy is not a completely worked out system, but several of his theories are important. He distinguishes only between *impressions* and *ideas*, the latter the outcome of the former, but what impressions he does not know. If the two are difficult to fit together, the idea is the *manner of conceiving* the impression. The two together constitute conscious experience. Space and time have hardly any real existence. His theory of math's is sometimes thought to conflict with his empiricism. In dealing with the theory of knowledge he says: 'All our distinct perceptions are distinct existences, and the mind never perceives any real connection among distinct existences.' His theol. was really agnostic. His philosophy makes empiricism as satisfactory as it can be made.

H.'s hist. work was important, but his *History of England* has long been superseded and does not survive to the extent, *e.g.*, of Gibbon's *Decline and Fall.* In economics he was an opponent of the Mercantilists. He perceived the connection between economics and sociology, and the importance of hist. treatment. He believed firmly in free trade.

Burton, *Life and Correspondence of David Hume*; Calderwood, *David Hume*; Works edit. by H. Green and Grose.

HUME, JOSEPH (1777–1855), Brit. politician; entered Ind. medical service, 1797; M.P. 1812; advocated removal of R.C. disabilities and economy in government expenditure.

HUMILIATI, Ital. religious order; origin uncertain, perhaps at Rome, 1178; rule granted by Innocent III., 1201, to order of priests (the third, a lay order originally, then also one of women); suppressed, 1571.

HUMMEL, JOHANN NEPOMUK (1778–1837), composer and pianist; b. Pressburg, Hungary; brilliant extempore player; best compositions pianoforte and chamber music.

HUMMING-BIRD, name given to members of the *Trochilidæ* on account of humming sound produced by their extremely rapid wing-pulsations. The *Trochilidæ*, which include the smallest known birds, are confined to the New World, the majority occurring in equatorial and subtropical belts, although the family's range extends from Alaska to Tierra del Fuego. The males' exquisitely lustrous and gorgeous plumage defies description, and its distribution in tufts, gorgets, crests, and the like, enhances its native brilliance. H-b's seldom rest, but flit tirelessly from blossom to blossom, feeding on honey-loving insects, by means of long, tubular, forked tongues, and doubtless assisting in fertilisation of the flowers visited. The nest is a highly finished structure, closely resembling its surroundings, being clothed with mosses and lichens. The males are exceedingly pugnacious, fighting fiercely among themselves, and also attacking, with remarkable valour, any creature passing near the sitting hen.

Gould, *Monograph on the Trochilidæ* (5 vol's, 1849).

HUMOUR (Lat. *humor*, damp) had already become an Eng. word of the same equivalence as its Lat. progenitor in 1382, but had then already been applied to what the Schoolmen named the cardinal fluids of the body—blood, choler, melancholy, and phlegm. The predominant h. became the means of classification of temperaments; thus the word is used by Shakespeare and the XVII.-cent. writers of 'comedies of h's.' In late XVII. cent. h. appears as a term for a sense of broad fun. To-day, wit is an intellectual cleverness which raises a smile; it may be unkind, unsympathetic. H. is more elemental, it is of the heart, not the intellect; it is born of incongruous incidents, and its product is

laughter. Oscar Wilde is a wit; J. M. Barrie is a humorist.

In drama wit is the province of comedy; h., of farce. Notable humorists are Aristophanes, Chaucer, Dunbar, Rabelais, Molière, Cervantes, Shakespeare (great wit also), Swift, Sterne, Addison, Fielding, Smollett, Goldsmith, Dickens, O. Wendell Holmes, Mark Twain, Max Adeler, Charles Lever, Jerome K. Jerome, W. W. Jacobs, Stephen Leacock.

HUMPERDINCK, ENGELBERT (1854–), Ger. composer; prof. at Berlin; wrote *Hänsel und Gretel*, a fairy opera, music for *The Miracle* (1912), etc.

HUMPHREY, LAWRENCE, Humfrey (*c.* 1527–90), Eng. ecclesiastic; pres. of Magdalen Coll., 1561; promoted Reformed religion; dean of Gloucester, 1571, Winchester, 1580.

HUMPHREYS, ANDREW ATKINSON (1810–83), Amer. military engineer; performed engineering services early in Civil War, subsequently distinguishing himself in the field.

HUMPHRY, OZIAS (1742–1810), Eng. painter, whose miniatures are valued by collectors.

HUMS, see Homs.

HUNALD, Duke of Aquitaine (from 735–45); crushed by Charles Martel and Pippin.

HU-NAN (27° 30′ N., 111° 30′ E.), province, Central China; area, *c.* 83,380 sq. miles; surface hilly; lies in Yangtse-Kiang basin; coal, tea, rice. Pop. (1910) 22,169,673.

HUNDRED (A.-S. *hund*, hundred; *red* signifies computation), Eng. numeral. The h. as a division of the shire may have been originally the land inhabited by 100 families; tradition ascribed the institution of the h. to Alfred the Great, but it is probably much older; divisions corresponding to the h. are called *wards* in N., *wapentakes* in Yorks and Midlands, *rape* in Sussex, *lathe* in Kent.

HUNDRED DAYS, see France (History: 1815).

HUNDRED YEARS WAR, struggle between England and France, 1337–1453, originating in English claim to crown of France; from 1337 to 1364 fortune favoured English; then ensued a period of French success; after 1380 French again suffered disaster, but they rallied under Joan of Arc in 1429, and the English were expelled in 1453. See England and France (History).

HUNGARY, the eastern and larger of the two states forming the monarchy of Austria-Hungary (*q.v.*); situated in S.E. of Central Europe, and bounded on E. by Austria and Rumania; W. and N. by Austria; S. by Rumania, Servia, Bosnia, and Austria. Total area, *c.* 125,400 sq. miles; only seaboard is on the Adriatic, and is not quite 100 miles long. H. is hemmed in on N.W., N.E., and S.E. by Carpathian Mts., and S. by the Danube, Save, and Unna rivers.

The kingdom of H. in its widest sense—the 'Realm of the Crown of St. Stephen'—comprises H. proper, with which is included the former grand-principality of Transylvania and the province of Croatia-Slavonia; of the total area of the kingdom H. proper has *c.* 109,000 sq. miles and Croatia-Slavonia *c.* 16,400 sq. miles.

H. consists of an extensive central plain surrounded by high mountains—mostly belonging to the Carpathians and also the Alps, separated by the Danube valley; the Carpathian portion begins in the N., at Dévény (near Pressburg, Pozony), on left bank of Danube, and after running N.E. and E. turns S.E. and W. in great irregular circles, ending near Orsova, meeting the Balkan Mts. at the 'Iron Gates' of the Danube; the greatest elevations reached are in the Tátra Mts., in N. H. proper, in E. and S. of Transylvania (Transylvanian Alps), and in E. portion of the Banat; the highest peak is Gerlsdorf or Spitze, or Gerlachfalva —in Tátra group, and *c.* 8700 ft. in height. The portion of H. situated on right bank of Danube is filled by Alpine System—the southern outlying group of the Alps; the groups are the Leitha Mts., the Styrian Mts., the Lower Hungarian Highlands—a continuation of the former and the Bakony Forest; the latter, lying entirely in Hungarian territory, extends to Danube, near Budapest; the highest peak is Koroshegy (*c.* 2320 ft.); ramifications of this group, lying to N.E., are called the Vertes group (1570 ft.) and Pilis group (2470 ft.). The Lower Hungarian Highlands extend between the Danube, Mur, and Lake Balaton, and attain an altitude of *c.* 2200 ft. in Mesek Hills. The province of Croatia-Slavonia belongs mostly to the Karst region, and is traversed by the Dinaric Alps. These mountain systems enclose two extensive plains, of which the smaller, called the 'Little Hungarian Alföld,' or Pressburg Basin, covers an area of *c.* 6000 sq. miles, and lies W. of Bakony or Mávra, which separates it from the Great Hungarian Alföld, the largest plain in Europe, extending over *c.* 37,000 sq. miles, and with an average height of 300 to 350 ft. The Pest extends over greater part of central and S. H., and is traversed by the Theiss (Tisza), and though frequently barren and sandy, is rich and productive. H. is well provided with rivers and springs, except in some mountainous districts—notably the districts between Danube and Drave and Danube and Theiss; in N. and E. rivers are common; all rivers belong to the Danube watershed, except Poprád in N. and a few small streams flowing into the Adriatic; the Danube, the greatest river, enters H. at *c.* 400 ft. above sea-level and leaves it at *c.* 130 ft.; it enters through a narrow defile called Porta Hungarica at Dévény (near Pressburg), and after flowing *c.* 585 miles leaves at the 'Iron Gates'—another narrow defile. It forms several islands, many of remarkable size, including the island of Schütt, St. Andrew's Island, Csepel and Margitta islands; the principal tributaries in H. are, on right, Rab, Drave, and Save; on left, Waag, Neutra, Gran, Eipel, Theiss,—which receives many tributaries,—Temes, and Cserna. The total length of the Hungarian system is *c.* 8800 miles, of which about a third is navigable.

There are two large lakes in H., viz. Balaton, or Platten-See (the largest in S. Europe), and Ferto, or Neusiedeler See; there are many small lakes, and large tracts of marches along banks of rivers, besides other marches. There are many interesting caverns; the Aggtelek or Baradla Cave, in county of Gömör, is one of the largest in the world, and contains various fossil mammalian remains. Fonacza Cave, in Bihar, has also fossil remains; other remarkable caverns are the Okno and Vodi Caverns, and the ice cave at Dobsina.

Geology.—The centre plain shows Eocene and Miocene Age deposits. The N. hills are connected with the Carpathians and are of Palæozoic and Mesozoic rocks.

Climate is, in general, continental; the minimum temperature is obtained in Jan., maximum in July; rainfall is small except in mountains, and in the Carpathians the winters are severe and last half the year.

Literature of H. was for a long time confined to Lat., under the influence of the Catholic clergy; at the close of the XVIII. cent., however, the natural language was revived, and Hungarian lit. is now in a healthy state; the Magyars have no lack of dramatic art and excel in belles-lettres; owing to their strong political character, legal and constitutional questions have long been a popular subject with writers, statesmen, and scholars; there are many writers on jurisprudence, one work, *The Theory of Law and Civil Society*, by Prof. Pulszky, being written in English.

The Magyars have been no less successful in lit. of an hist. naturo, especially in monographs; these histories, written in early times in Latin, have of late made very good progress, but the tendency is to lean towards monographs with a resulting dearth of more general histories; there is the same want in literary histories; the monographs, however, are of an excellent standard. A favourite subject of study is that of æsthetics, and XX.-cent. writers have also made excellent progress in the departments of science proper. A notable feature is the tremendous growth of Magyar periodicals.

Resources.—H. has great wealth and variety of

minerals; the more important are coal, nitre, sulphur, alum, soda, saltpetre, gypsum, porcelain earth, pipeclay, asphalt, petroleum, marble, and ores of gold, silver, mercury, copper, iron, lead, zinc, antimony, cobalt, and arsenic; gold and silver are chiefly found in Transylvania; salt mines are a State monopoly; and H. possesses a large number of cold and several hot mineral springs, the most important being at Budapest, Mehádia, and Eger.

The cultivation of the soil is the chief industry, furnishing employment (including forestry) to over 65 % of the population. Of the total area about 54 % is arable land, about 18 % woodland, and about 13 % meadowland; the chief agricultural products are wheat, rye, barley, oats, maize (the latter being the principal product of Croatia-Slavonia); the principal fruits—which are important both for inland consumption and exportation—are apricots (*Kecskemét*), cherries (*Körös*).

About a quarter of H. is occupied by forests—especially the slopes of the Carpathians; almost a half are State-owned, and are chiefly oak, fir, pine, and beech. Live stock has improved both in quality and numbers; the Magyar horse has been improved by Government efforts and is now largely exported; the Government is also interested in cattle-breeding, the principal breeds being native or Swiss; pigs are reared extensively throughout the country; other rural occupations are dairy-farming, sheep-breeding, poultry- and bee-keeping, market-gardening, and horticultural pursuits.

The principal manufacturing industries are flour-milling, the chief mills being at Budapest, and the flour forming chief export; brewing and distilling; the sugar industry has made rapid progress, and other industries are State tobacco manufactures; iron-foundries—chiefly at Budapest; leather manufactures; paper-mills (largest at Fiume); glass and earthenware works; manufactures of chemicals and wooden products; petroleum refineries; woollen yarns and cloth manufactures, as well as establishments for knitting and weaving. The chief imports are cottons, woollens, prepared leathers, coal, clothes, furniture, linen; and the chief exports are flour, wheat, etc., oxen, swine, eggs, wine, woods, and leathers. Trade is chiefly carried on with Austria and Germany; the imports from Britain are mostly woollen goods, steam vessels, and coal; and exports mostly flour, raw sugar, and barley.

The principal towns are Budapest, Szegod, Szabadka, Debres, Debreczen, Zágráb, Temesvár, Hecskemét, Nagyvárad, Arad, Hodmedzö-Vasarhely, Kolozsvar. Among the chief watering-places are Balaton-Fured, on Lake Balaton Schmecks in the High Tátra; and Hercules Furds (Baths of H.), near Mehádia. On the Adriatic lies the port of Fiume, the only direct outlet by sea.

The extent of railway lines is very considerable, although many parts are still reached solely by roads; there are few canals, the principal being Franz Josef (70 miles); total length of navigable rivers is *c.* 3100 miles; the only foreign river communication is furnished by the Danube.

There are three univ's maintained by the State, at Budapest, Kolozsvar, and Zágráb; there are also numerous coll's—industrial, technical, agricultural, theological, etc. Perfect equality is enjoyed among all legally recognised religions, viz. R.C. (over 60 %), Gk., Evangelical, and Jewish, as well as others.

H. is peopled by numerous distinct races, speaking different languages; the dominant race is the Magyar or Hungarian. Numbers are: (1910) Hungarians, 10,050,575; Rumanians, 2,949,032; Germans, 2,037,435; Slovaks, 1,967,970; Croatians, 1,833,162; Servians, 1,106,471; Ruthenians, 475,587. Total pop. (1910) 20,886,487.

For HISTORY, see AUSTRIA-HUNGARY.

Alden, *H. of To-day* (1909); Bovill, *H. and the Hungarians* (1908); Stokes, *Hungary* (1909); Riedl, *A History of Hungarian Lit.* (1906).

HUNGER AND THIRST, sensations which lead animals to eat and drink; whether they are experienced by plants still remains a mystery, nor are they always a faithful index of need for nourishment.

HUNGERFORD (51° 25′ N., 1° 30′ W.), town, Berkshire and Wiltshire, England. Pop. (1911) 9009.

HUNGERFORD, WALTER, BARON HUNGERFORD (d. 1449), Eng. soldier; fought at *Agincourt*. His descendant, SIR EDWARD, fought for Parliament in Civil War.

HÜNINGEN (47° 37′ N., 7° 32′ E.), town, Alsace, Germany. Pop. 3304.

HUNNERIC (d. 484), king of Vandals of Africa.

HUNS, Mongolian race who invaded Europe in IV. cent. A.D. They waged war with the Goths then inhabiting Central Europe, and drove them S. into Spain, Italy, and Balkan Peninsula, thus indirectly causing destruction of Rom. Empire. Under Attila (*q.v.*) they founded a large empire, which after his death was disintegrated. All trace of them in Europe has now been lost, although at one time they reached as far W. as Gaul. Probably akin to the White H's who invaded Persia in V. cent.

HUNSDON, BARONY OF, granted in 1559 to HENRY CAREY (*c.* 1524–96), nephew of Anne Boleyn, a brave soldier and favourite of Queen Elizabeth. His s. and heir, GEORGE (1547–1603), 2nd baron, received various royal grants; his nephew, HENRY, 4th baron, was cr. Earl of Dover in 1628. The barony became extinct in 1765.

HUNSTANTON (52° 57′ N., 0° 30′ E.), town, Norfolk, England. Pop. (1911) 2510.

HUNT, ALFRED WILLIAM (1830–96), Eng. landscape painter; praised by Ruskin.

HUNT, HENRY (1773–1835), Eng. radical politician; famous as 'Orator Hunt'; associated with the risings occasioned by distress resulting from Napoleonic wars.

HUNT, HENRY JACKSON (1819–89), U.S.A. army officer; distinguished himself as chief of artillery in the Civil War.

HUNT, JAMES HENRY LEIGH (1784–1859), Eng. poet and essayist; b. Southgate; ed. Christ's Hospital; became clerk in War Office; subsequently editor of *The Examiner* (1808), a Radical newspaper, founded by his bro.; was fined and imprisoned (1813) for two years for publishing an uncomplimentary truth about the Prince Regent; pub. his best-known poem, *The Story of Rimini* (1816). Amongst other journalistic ventures may be mentioned the starting of *The Indicator* (1818), *The Companion* (1828), *The Tatler* (1830), and *Leigh Hunt's London Journal* (1834). Amongst his original works may be named *Lord Byron and his Contemporaries* (1828), *Collected Poems* (1832), *A Legend of Florence* (drama), *Sir Ralph Esher* (novel), *Imagination and Fancy, Wit and Humour, The Town, Men, Women, and Books*, etc. His *Autobiography* was pub. 1850. H. was intimately associated with Keats, Byron, and other poets of the day. His own verse is now little read, and his fame rests chiefly upon his genial essays.

Monkhouse, *Life* (1893).

HUNT, WILLIAM HENRY (1790–1864), Eng. genre painter, whose water-colours show perfection of colour and technique.

HUNT, WILLIAM HOLMAN (1827–1910), Eng. artist; b. London; turned from commerce to art; formed friendship with Millais, and became one of founders of Pre-Raphaelite Brotherhood. His earlier pictures dealt chiefly with hist. subjects, but he later devoted himself to painting Biblical and allegorical pictures, and became recognised as the greatest of modern religious artists. His *The Light of the World* is at Keble Coll., Oxford, *The Hireling Shepherd* and *The Shadow of Death* at Manchester, *The Triumph of the Innocents* at Liverpool.

Mary Coleridge, *Holman Hunt* (Masterpieces in Colour Series).

HUNT, WILLIAM MORRIS (1824–79), Amer. painter who helped to found Amer. impressionist school.

HUNTER, JOHN (1728–93), Scot. surgeon, ana-

tomist, and physiologist; b. (Feb. 13) at Long Calderwood, East Kilbride, Lanarkshire, the youngest of ten children. H. had but little schooling; in 1748 he became assistant in his bro. William's dissecting-room in London; later took charge of his bro.'s practical class, and attended Cheselden's lectures at Chelsea Hospital; a surgeon's pupil at St. Bartholomew's (1751); surgeon's pupil (1754) and house-surgeon (1756) at St. George's Hospital; staff-surgeon in the army (1760), serving in the Belle Isle and Portugal expeditions; retired (1763) on half-pay, and commenced to practise as a surgeon in London, teaching, in addition, anat. and operative surgery. H. was elected F.R.S. (1767), obtained post of surgeon to St. George's Hospital (1768), and began to take pupils, one of the first being Edward Jenner (*q.v.*). His reputation as a surgeon was now greatly increasing; app. surgeon-extraordinary to the king (1776); built a museum and lecture-rooms for himself (1783–85); app. deputy-surgeon-general to the army (1786); surgeon-general and inspector-general of hospitals (1790); awarded the Royal Society's Copley medal (1787), and, on Pott's death (1788) became acknowledged head of surgical profession in England; d. suddenly on Oct. 16, 1793. In 1859 his remains were transferred to Westminster Abbey. His museum of over 10,500 specimens was purchased by the nation for £15,000, the custody being accepted by the Corporation (afterwards Royal College) of Surgeons. H.'s works include, in addition to scientific papers on many varied subjects, *Natural History of the Human Teeth, Venereal Disease, Observations on Certain Parts of the Animal Economy*, and, his most important work, *Treatise on the Blood, Inflammation and Gunshot Wounds*. His most famous operation was the ligature of the femoral artery in the thigh for the cure of popliteal aneurism. He is one of the founders of pathology, and it was during his lifetime that surgery was raised from the art of the barber-surgeon to the dignity of a science.

Stephen Paget, *Life* (1897).

HUNTER, ROBERT MERCER TALIAFERRO (1809–87), Amer. statesman; Sec. of State for the Confederacy in the Civil War.

HUNTER, SIR WILLIAM WILSON (1840–1900), Brit. writer; superintended statistical survey of India, epitomised in *Imperial Gazeteer of India*; wrote *The Indian Empire*, etc.

HUNTER, WILLIAM (1718–83), Scot. physician and anatomist; elder bro. of John Hunter (*q.v.*); ed. at Glasgow Univ., went to London, and commenced to lecture on operative surgery (1746), afterwards including a course on anat., in addition to practising as a surgeon. He gave up surgery for obstetrics, being app. surgeon-accoucheur at Middlesex Hospital (1748) and at Brit. Lying-in Hospital (1749). He built a house, with lecture-room, dissecting-rooms, and museum, in Great Windmill Street, where he carried on his teaching and lecturing work; eventually left fine collection of specimens and library to Glasgow Univ.

HUNTER, WILLIAM ALEXANDER (1844–98), prominent Scot. writer on law, especially Rom. law.

HUNTING is a sport of the highest antiquity; depictions of wild beasts with hunters in pursuit are found on Assyrian and Egyptian sculptures. Hounds were in common use, while even lions were trained to follow game. The Greeks hunted big game on horseback or by trapping, and were particularly fond of hare-hunting (see Xenophon's Cynegeticus).

In mediæval times the stag was extensively hunted by kings and nobles, and stringent forest-laws were passed by William I. and other rulers. It is still practised in Devonshire; powerful hounds are employed to track down quarry. Fox-hunting (*q.v.*) is found in most English-speaking lands. Otter-hunting is practised on foot with otter hounds; hunters are armed with spear. Beagles are employed in hare-hunting, which is quite different from coursing; owing to the timidity of the quarry, this is a sport which necessitates quietness.

Big-game hunting is a sport which, owing to its expense, can be followed by comparatively few.

HUNTINGDON.—(1) (52° 20′ N., 0° 11′ W.) county town, Huntingdonshire, England, on Ouse; has XIII.-cent. grammar school and interesting churches; birthplace of Oliver Cromwell. Pop. (1911) 4003. (2) (40° 32′ N., 78° 3′ W.) town, Pennsylvania, U.S.A. Pop. (1910) 6861.

HUNTINGDON, EARLDOM OF.—George, Baron Hastings (d. 1545), was a favourite of Henry VIII., by whom he was cr. Earl of H. (1529); helped to put down Pilgrimage of Grace. Henry, 3rd earl, was at one time charged with custody of Mary, Queen of Scots.

HUNTINGDON, SELINA HASTINGS, COUNTESS OF (1707–91), Eng. religious worker; supporter of Methodism; founded chapels where Eng. Church liturgy was used, but her movement severed itself from Church of England, 1799; her *Connexion* still exists. See *Countess of H. and her Circle*, by Tytler.

HUNTINGDONSHIRE (52° 29′ N., 0° 15′ W.), midland county, England, bounded N. and W. by Northampton, S.W. by Bedford, E. by Cambridge. Surface mostly level, with slight risings in S.E. In N.E. is fen-district called Bedford Level. Chief towns, Huntingdon (capital), St. Ives, and Godmanchester. Principal rivers are Nene and Ouse. Chiefly agricultural county; much pasture-land; wheat chief grain grown; market-gardening and fruit-growing, brewing, tanning, iron-founding, and manufactures of paper and parchment. Among places of interest are abbeys of Ramsey and Sawtry; priories at St. Ives and St. Neots; churches at Hartford, Old Fletton, Ramsey, and Alwalton; remains of palace at Buckden; ancient castles of Kimbolton and Huntingdon, and Hinchingbrook House, seat of Cromwell family. Pop. (1911) 55,600.

HUNTINGTON.—(1) (40° 52′ N., 85° 25′ W.) town, Indiana, U.S.A. Pop. (1910) 10,272. (2) (40° 53′ N., 73° 27′ W.) town, Long Island, New York, U.S.A.; shipbuilding. Pop. (1910) 12,004. (3) (38° 30′ N., 82° 26′ W.) town, W. Virginia, U.S.A.; manufactures machinery. Pop. (1910) 31,161.

HUNTINGTON, DANIEL (1816–1906), Amer. painter, who executed portraits of several prominent people, and was pres. of the National Academy.

HUNTINGTOWER AND RUTHENVENFIELD (56° 24′ N., 3° 27′ W.), village, Perthshire, Scotland; site of H. Castle, where Raid of Ruthven took place, 1582.

HUNTLY (57° 27′ N., 2° 47′ W.), town, Aberdeenshire, Scotland. Pop. (1911) 4229.

HUNTLY, EARLDOM AND MARQUISATE OF, titles held by Gordons since 1449 and 1599 respectively; George Gordon, 1st marquess (1562–1626), conspired against James I. His s., the 2nd marquess, fought for Charles I. in Civil War, and was executed, 1649. Fourth marquess raised to ducal rank as Duke of Gordon, 1684.

HUNTSVILLE (34° 45° N., 86° 40′ W.), town, Alabama, U.S.A.; cotton factories. Pop. (1910) 7611.

HUNYADI, JÁNOS (*c.* 1387–1456), Hungarian soldier and politician; instrumental in obtaining Wladislaus of Poland's election as king of Hungary; subsequently conducted war against Turks, whom he defeated at *Hermanstadt* and near Iron Gates of Danube, 1442; he was defeated at *Varna* in 1444, when the king was slain; during heir's minority H. acted as regent; in 1448 he was defeated by Turks at *Kossovo*, and in 1456, with support of Giovanni da Capistrano, he accomplished relief of Belgrade; d. in following month.

HUNYADI, LÁSZLÓ (1433–57), Hungarian statesman; executed through plots of his enemies; eldest s. of the great János.

HUNZA (36° 22′ N., 74° 50′ E.) and **NAGAR** (36° 6′ N., 74° 50′ E.), towns and small states, Kashmir, Brit. India.

HUON OF BORDEAUX, a hero of Charlemagne

cycle of Fr. romances, H., Duke of Guienne, being one of Charlemagne's paladins.

HU-PEH (*c.* 31° N., 113° E.), province, Central China; area, *c.* 71,410 sq. miles. Pop. (1910) 35,280,685.

HUPFELD, HERMANN (1796–1866), Ger. writer on Bible sources and Hebrew antiquities.

HURD, RICHARD (1720–1808), Eng. ecclesiastic and author; bp. successively of Lichfield and Worcester; declined primacy; pub. *Letters on Chivalry and Romance, Dissertations on Poetry, An Introduction to the Prophecies*, etc.

HURLSTONE, FREDERICK YEATES (1800–69), Eng. hist. and portrait painter.

HURON (45° N., 82° 30′ W.), one of great N. American lakes, between Michigan state and Ontario; connected with Lakes Superior, Michigan, and Erie by St. Mary River, Mackinac Strait, and St. Clair River respectively.

HURONS, members of tribe of N. Amer. Indians, who inhabited shores of Lake H., but were early exterminated.

HURRICANE, violent storm, with rain, thunder, and lightning, common in West Indies and other places during autumn months.

HURRY, SIR JOHN (d. 1650), Eng. military leader; served with distinction in Civil War, but frequently changed sides; beheaded at Edinburgh.

HURST, JOHN FLETCHER (1834–1903), Amer. Methodist Episcopal bp., and author of several books on ecclesiastical history.

HURSTMONCEAUX (50° 52′ N., 0° 20′ E.), village, Sussex, England; ruined XV.-cent. castle.

HUSBAND, originally the owner of the house (A.-S. *hus*), with feminine 'housewife' (A.-S. *húswif*); general idea of a caretaker developed from this meaning.

HUSBAND AND WIFE, LEGAL RELATIONS OF, see MARRIAGE, DIVORCE, EVIDENCE.

HUSHI, Rumanian HUSI (46° 45′ N., 28° 11′ E.), town, Moldavia, Rumania; bp.'s see; produces wine; Treaty of Pruth signed here, 1711. Pop. 15,000.

HUSKISSON, WILLIAM (1770–1830), Brit. financier and politician; Sec. of Treasury, 1804; pres., Board of Trade, 1823; Colonial Sec., 1827. Advocated free trade, and secured reduction of import duties.

HUSS, JOHN (*c.* 1373–1415), Bohemian religious leader, of peasant family; studied at Prague Univ., where he lectured, becoming rector of Bethlehem chapel, 1402. H. studied Wycliffe's writings, and gradually adopted unorthodox views; proceedings taken against him, 1408; forbidden to preach or perform priestly duties; elected rector of Univ., 1409, but this led to further proceedings against him; excommunicated, 1410, and writings burnt; after further troubles obliged to leave Prague in 1412, and wrote *De Ecclesia*. In 1414 he went to the general council at Constance to defend his views, being granted a safe conduct from King Sigismund; after lengthy trial condemned July 6, 1415, and, refusing to recant, burnt. Continuing the work of Wycliffe, H. helped to prepare the way for the Reformation.

Count Lützow, *Life and Times of John Huss* (1909).

HUSSAR, name originally given in 1458 to Hungarian light cavalry soldiers; name means 'twenty,' since one man in twenty was chosen for service.

HUSSITES, religious party in Bohemia, named from John Huss (*q.v.*), soon after whose death they arose. The special conditions of Bohemia aided them; the avarice and corruption of its priests was infamous, and the Slav peasantry disliked Ger. domination. The H's split into two groups—the *Utraquists* (or *Calixtines*), those whose main claim was communion in both kinds, and the *Taborites*, who were extreme. Continual fighting took place between these two, and also with Ger. troops. As it seemed impossible to crush them, a treaty was signed by the H's, Rom. delegates, and King Sigismund, the main clause of which allowed communion in both kinds. This concession continued till 1620. The H's were mostly absorbed in Protestantism at the Reformation.

Count Lützow, *Bohemia: an Historical Sketch.*

HUSTING, Early Eng. court, of which traces are found in the old Danelagh (*q.v.*); it survived as the county court of London city, and gave its name to election platforms.

HUSUM (54° 29′ N., 9° 3′ E.), seaport town, Schleswig-Holstein, Germany; large cattle markets; oyster fisheries. Pop. (1910) 9429.

HUTCHESON, FRANCIS (1694–1746), Brit. theologian and metaphysician; b. N. of Ireland; ed. Glasgow Univ., 1710–16; became minister of a dissenting congregation in Dublin, and established a school; though a dissenter, he was on good terms with the bp's of the Irish Church; in 1729 became prof. of Moral Philosophy at Glasgow; many Eng. and Irish dissenters came to study under him. His writings deal with metaphysics, logic, and ethics, of which the last are best known. H. held man has a number of senses—consciousness, sense of beauty, a public sense, a moral sense, sense of the ridiculous, etc., of which the 'moral sense' is fundamental. His philosophy follows Locke in many points (not in all), and is in opposition to Hobbes.

Scott, *Francis Hutcheson*; Martineau, *Types of Ethical Theory.*

HUTCHINSON (38° 1′ N., 98° W.), city, Kansas, U.S.A., on Arkansas; salt-works. Pop. (1910) 16,364.

HUTCHINSON, ANNE (1600–43), religious fanatic; b. in England; m. and emigrated to America, 1634; caused a schism in Boston congregation and was excommunicated.

HUTCHINSON, JOHN (1615–64), Eng. soldier; colonel in parliamentary army in Civil War and died in prison.

Life, by his wife, LUCY H.

HUTCHINSON, JOHN (1674–1737), Eng. theologian, who made stalwart stand against the march of science; characteristic treatise was *Glory or Gravity.*

HUTCHINSON, SIR JONATHAN (1828–1913), Eng. surgeon; prof. of Surgery and Pathology at Royal Coll. of Surgeons (1877–82); pres. Royal Coll. of Surgeons (1889); founder of the London Postgraduate School of Med.; made important researches in different branches of med., particularly regarding leprosy, and on which he became the greatest living authority; author of numerous works on medical subjects.

HUTCHINSON, THOMAS (1711–80), Brit. gov. of Massachusetts; constrained to order Brit. troops from Boston, 1770; Loyalist gov. of Massachusetts, 1771–74, though not in sympathy with government actions; superseded by Gage.

HUTTEN, PHILIPP VON (*c.* 1511–46), Ger. adventurer whose Venezuelan discoveries were turned to profit of Spain.

HUTTEN, ULRICH VON (1488–1523), Ger. humanist and reformer; first trained as monk, but left in disgust; from 1504–15 wandered about Germany and Italy; author (in part) of famous *Epistolæ Obscurorum Virorum*; attacked Papacy and quarrelled with Erasmus, but was received by Zwingli; a passionately sincere reformer, but a man of dissolute life, headstrong, and lacking in self-control; wrote much in Latin and German.

HUTTER, LEONHARD (1563–1616), Ger. religious controversialist, called the second Luther.

HUTTON, CHARLES (1737–1823), Eng. mathematician, taught at Newcastle till 1773; then prof. of Mathematics at Woolwich. Pub. *Mathematical Tables* (1785), *Mathematical and Philosophical Dictionary* (1795–96), *Course of Mathematics* (1798 and 1811).

HUTTON, JAMES (1726–97), Scot. geologist; ed. Edinburgh High School and Univ.; abandoned study of law for that of medicine; took M.D. (London) 1749, and after some little time abandoned the profession and took up agriculture; began study of geology as hobby and put forward theory that geology is not cosmogony; studied also atmospheric changes and several branches of physics.

HUTTON, RICHARD HOLT (1826–97), Eng. miscellaneous prose writer and edit.; joint-edit. of the *National Review*, 1855–65, and of the *Spectator*, 1861 onwards.

HUXLEY, THOMAS HENRY (1825–95), one of the greatest of Eng. zoologists and biologists; b. at Ealing in 1825; app. assistant-surgeon on H.M.S. *Rattlesnake*. During the four years' cruise in Australian seas, he studied the delicate surface fauna of the ocean. The result was the forsaking of medical for biological science. From 1854 till he retired in 1885, H. was palæontologist and lecturer on Natural History at the Royal School of Mines.

Keen as he was on scientific research, H.'s mind was essentially practical, and he laboured strenuously in popular lectures and 'Lay Sermons' to make abstruse science—the Evolution Theory of Darwin in particular—clear to the people. He was a member of the Fisheries Commission and of the London School Board; he was a constant critic of political and social progress, and a bitter opponent of all narrowness of thought. More than any of his predecessors, he made the study of zoo. in the univ's a practical training instead of an accumulation of hearsay information.

From examining the anatomy and relationships of Medusæ, he wandered to Vertebrate Anat., where he discussed the structure and origin of the skull, the characters of fossil Ganoid Fishes, and the systematic arrangement of Birds. Besides his printed lectures and essays, he wrote many masterly general works, e.g. *Man's Place in Nature* (1863), *Lessons in Elementary Physiology* (1866), *Anat. of the Invertebrates* (1870), and *The Crayfish* (1881).

Life and Letters, by his s. Leonard (1900), Mitchell (1900), Davis (1907), Clodd (1902).

HUY, Flemish HOEY (50° 32′ N., 5° 15′ E.), town, on Meuse, Belgium; distilleries; paper-mills. Pop. 14,500.

HUYGENS, CHRISTIAN (1629–95), Dutch mathematician; studied civil law at Leyden, Breda, and Paris; investigated oscillations of pendulum and was first to show Saturn's ring surrounds planet; measured its inclination to ecliptic; was founder of undulatory theory of light; in *Traité de la lumière* (1690) gave explanation of reflection and refraction, also accounted for double refraction in uniaxal crystals. Discovered polarisation of light. Work unrecognised for many years.

HUYGENS, SIR CONSTANTIJN (1596–1687), Dutch poet and statesman; best works are *Batara Tempe*, *Dagwerck* (a didactic poem), and *Oogentroosi* (a consolatory poem). H. accomplished many important diplomatic missions.

HUYSMANS, CORNELIS, THE YOUNGER (1648–1727), Dutch landscape painter of luxuriant Ital. style.

HUYSMANS, JORIS KARL (1848–1907), Fr. novelist, whose realism is mixture of Zola with Maupassant, without the latter's polish; later works are psychological studies of religious experiences.

HUYSUM, JAN VAN (1682–1749), Dutch painter of wonderful vases of fruit, flowers, butterflies, etc.; considered master of this kind of painting.

HWANG-HO, see HOANG-HO.

HWEN-TSANG, HSUAN-TSANG (*q.v.*).

HYACINTH, a genus of monocotyledonous plants; natural order, *Liliaceæ*. The hyacinth, *Hyacinthus orientalis*, is a perennial herb with a bulb. Foliage-leaves are long, narrow, parallel-veined, with sheathing bases. A bare stem terminates in a raceme of pendulous brightly coloured flowers in the axils of bracts; three petaloid sepals and three petals form a single tube with six free segments.

HYACINTH, JACINTH, red stone used by ancients as ornament; variety of ZIRCON (*q.v.*).

HYACINTHUS (classical myth.), beautiful youth slain accidentally by Apollo; from his blood grew Gk. hyacinth (clearly not our flower of that name), inscribed with exclamation of woe, 'Ai!' Great Spartan midsummer festival, the *Hyacinthia*.

HYADES, in Gk. myth., seven maidens who watched over Dionysus; changed by Zeus into stars and placed in constellation Taurus.

HYÆNAS (HYÆNIDÆ), a family of carnivores comprising seventeen species and races, confined to the tropical and sub-tropical areas of the Old World. Remains of the Cave-Hyæna have been found in Britain.

HYALONEMA, see under SPONGES.

HYBLA MAJOR (*Megara Hyblæa*), ancient city, Sicily, site uncertain.

HYBLA MINOR (mod. Paterno) (37° 32′ N., 14° 53′ E.), ancient city, Sicily, on S. slope of Mt. Etna.

HYBRIDS.—One of the chief causes of the separation of species of animals and plants has been the fact that members of a species are fertile amongst themselves, but are not fertile with members of another species. This rule is not universal, however, for occasionally species are found which interbreed with other species, the progeny of such a union being known as hybrids, and the phenomenon as hybridism. But it must be remembered that where hybridism occurs the species concerned are *closely* related, for while a Hare and a Rabbit may interbreed occasionally, it is absurd to think of either breeding with a Porcupine, although distantly related in the same natural order of Mammals. Another general fact is that hybrids are seldom fertile amongst themselves, although there is no apparent reason why this should be so. Mules—the offspring of horses and asses—are infertile with each other, but sometimes produce young when mated again with the pure parental forms. In the animal world hybrids seem to occur in nature not infrequently amongst deer, game-birds, ducks, and fishes, *e.g.* Roach mating with Bream or Rudd, and Carp with Tench or Bream. And artificial hybrids among these and many others, such as the species of such lowly creatures as Sea Urchins, are not uncommon. In the vegetable world the artificial crossing or hybridising of species of plants has led to many new forms. It is unfortunate, for clearness' sake, that the word 'hybrid' is used for the progeny not only of two species, but also of two varieties of one species, when the word 'mongrel' would have indicated the latter class more distinctly. Varietal mongrels or hybrids are so much under man's control and have given rise to so many useful breeds, that they are of the utmost importance. A few are mentioned in the article on MENDELISM.

HYDASPES, river JHELUM (*q.v.*).

HYDE (53° 27′ N., 2° 5′ W.), town, Cheshire, England; cotton manufactures; coal mines. Pop. (1911) 33,444.

HYDE, Eng. family; held Clarendon and Rochester earldoms, XVII.–XVIII. cent's. SIR NICHOLAS (d. 1631), chief justice; SIR LAURENCE, attorney-gen. to Anne, James I.'s wife.

HYDE DE NEUVILLE, JEAN GUILLAUME, BARON (1776–1857), Fr. diplomat; ambassador to U.S., 1816; Portugal, 1823; Marine Minister, 1828.

HYDE, EDWARD, see CLARENDON, EARL OF.

HYDE, THOMAS (1636–1703), Eng. Oriental scholar and pioneer in study of Persian antiquities.

HYDE PARK (42° 15′ N., 71° 8′ W.), town, Massachussetts, U.S.A.; machinery, cotton. Pop. (1910) 15,507.

HYDER ALI, HAIDAR ALI (*c.* 1722–82), famous soldier; native of India, who became Maharajah of Mysore; conquered Calicut and other native states; formed alliance with French, and took Arcot in 1769; defeated in several engagements by Sir Eyre Coote, 1781.

HYDERABAD, HAIDARABAD (17° 50′ N., 78° 40′ E.), principal native state in India, lying between provinces of Madras and Bombay in the Deccan; area, *c.* 82,700 sq. miles; capital, Hyderabad. Country fertile, but badly cultivated. Tableland traversed by the Godavari in N., and Kistna in S.; climate healthy; chief products are rice, wheat, maize, cotton, etc. Nizam and State are Muhammadan; otherwise mostly Hindu. Pop. *c.* 11,500,000.

HYDERABAD, HAIDARABAD (17° 21′ N., 78° 30′ E.),

city; capital of above state; surrounded by walls; principal buildings are the Mecca mosque and Brit. Residency; fourth largest city and one of chief seats of Muhammadanism in India; important commerical centre; extensive water-works. Pop. 452,000.

HYDERABAD, HAIDARABAD (25° 23′ N., 68° 24′ E.), city; capital, Hyderabad, Scind, Bombay, Brit. India; near E. bank of Indus; strongly fortified; manufactures silks, gold-work. Pop. 71,000.

HYDRA, in Gk. legend, nine-headed monster inhabiting Lerna in Argolis; slain by Heracles.

HYDRA, ancient *Hydrea* (37° 20′ N., 23° 30′ E.), small island on S.E. coast of Argolis, Greece; took prominent part in the Gk. war of independence; contains seaport of H.; active trade. Pop. 20,000.

HYDRA, see under HYDROMEDUSÆ.

HYDRACTINIA, see under HYDROMEDUSÆ.

HYDRANGEA, a deciduous shrub, *Hydrangea hortensia*, with oval, strongly veined opposite leaves. The *inflorescence* is a *corymb* of pink or blue flowers; the petals are absent and sepals are petaloid.

HYDRATES, compounds containing water of crystallisation and other salts where water molecules do not change.

HYDRAZINE, DIAMIDOGEN ($H_2N . NH_2$), is a colourless liquid, B.P. 113°·5 C., formed by complex organic decomposition. It is heavier than and soluble in water, and at 0° C. forms colourless crystals. It reacts vigorously with the *halogens* and is a strong reducing agent.

HYDRIDA, see under HYDROMEDUSÆ.

HYDROCARBONS, organic compounds of hydrogen and oxygen. See CHEMISTRY.

HYDROCELE, collection of fluid, usually serous, in vicinity of the testis or spermatic cord, commonly due to chronic inflammation, perhaps syphilitic, of testis, manifested as a fluctuating swelling of the scrotum with a dragging feeling; treated by slight operation of tapping, injecting various substances, or excising part of tunica vaginalis and draining.

HYDROCEPHALUS, condition of brain in which the ventricles or cavities are distended with fluid, due either to malformation or to chronic inflammation; it is either congenital or develops in the first few months of life, and the upper part of the head is increased in size out of proportion to the rest of the body; the brain may be pressed on by the fluid, so that the intelligence is impaired, and hydrocephalics do not usually live long. Treatment is unsatisfactory, and best is merely maintenance of the health of the individual with nourishing foods and tonics.

HYDROCHARITACEÆ, monocotyledonous, natural order of aquatic character, the majority of forms possessing narrow, submerged leaves; flowers are regular, trimorphic, and unisexual; represented in Britain by *Hydrocharis morsus ranæ*, with floating leaves.

HYDROCHLORIC ACID (HCl), colourless gas, liquefying under cold and pressure, liquid boiling at −83·6 C.; when dry, inactive with metals; readily soluble in water, saturated solution at 15° C. having S.G. 1·21; solution called MURIATIC ACID, SPIRITS OF SALT; manufactured by strong sulphuric acid on common salt (see also ALKALI); commercial a. is yellow and used for making bleaching powder and in soldering; forms chlorides.

HYDROCHŒRUS, see CAVY FAMILY.

HYDROCYANIC ACID, PRUSSIC ACID (*q.v.*).

HYDROFLUORIC ACID, see FLUORINE.

HYDROGEN (H=1) is a tasteless, odourless, and colourless gas. It is the lightest known substance and therefore constitutes the standard of *Atomic Weight* and *Valence*. At −253° C. it is a colourless liquid. *Hydrogen* burns in air and oxygen with a non-luminous blue flame. It is prepared—(1) by the action of metals on water, different metals abstracting the oxygen at cold, moderate, and high temperatures; (2) by the action of a suitable acid on a suitable metal. All acids contain *hydrogen*. *Hydrogen*, either as a gas at a high temperature, or in the nascent condition at ordinary temperature, is a reducing agent, for it abstracts *oxygen* from compounds. A mixture of *hydrogen* and *oxygen* when ignited unite with explosive violence to form water. The position of *hydrogen* in the *periodic* system is not definite. As a univalent element it must be placed at the head of either the alkali metals or the halogens, but it resembles neither closely.

Hydrogen peroxide (H_2O_2), unstable viscid liquid obtained by combination of hydrated peroxide of barium and sulphuric acid (dilute); strong oxidising agent employed largely in bleaching and dyeing.

HYDROGRAPHY, see MAP.

HYDROLYSIS, see ELECTRICITY (*Hydrolysis*).

HYDROMECHANICS is the study of the dynamical properties of fluids, and naturally consists of two divisions. The first, *Hydrostatics*, is the study of fluids in equilibrium or at rest. The second, *Hydrodynamics*, is concerned with fluids in motion. For these purposes, a fluid is defined as any substance which can yield continuously to any force which tends to divide it along any plane. If through any body we draw an imaginary plane surface, the stress (tension, pressure, or shearing force) acting across this plane can be resolved into two components: one perpendicular to, the other along, the plane. In a solid, both components may be present. In a fluid at rest, the perpendicular component alone can be present. Fluids, therefore, include both liquids and gases.

The basis for the first division of the subject—**Hydrostatics**—is given by the principle just enunciated, that in a fluid at rest the stress in any plane drawn through the fluid must always be normal to that plane. This stress generally takes the form of a pressure, which is measured *at* any point by the thrust or pressure exerted over unit area including the point. It may be expressed in atmospheres, pounds weight, or tons weight per square inch or square foot, or (if the C.G.S. system be adopted) in dynes per square centimetre. The principal theorems of hydrostatics may be summarised as follows, it being understood, of course, that they apply to fluids *at rest* or *in equilibrium*: (1) the pressure at any point of a fluid is the same in all directions; (2) pressure is transmissible from one point to another in the same mass of fluid—*i.e.* any additional pressure applied to an incompressible fluid will be transmitted equally to every point of the fluid; (3) in liquids acted on by gravity, the pressure is uniform over all points in the same horizontal plane, and therefore the free surface of a liquid at rest under gravity is a horizontal plane; (4) the pressure at any point in a homogeneous liquid acted on by gravity is proportional to the depth of the point below the free surface—hence, liquids 'find their level,' as the saying is, and where two liquids do not mix, their surface of separation is a horizontal plane; (5) the pressure on any plane area immersed in a fluid is equal to the weight of a column of the liquid whose cross-sectional area is equal to the immersed area and whose height is equal to the depth below the free surface of the centre of gravity of the immersed area; (6) any body which is wholly or partially immersed in a fluid acted on by gravity experiences an upward thrust equal in amount to the weight of fluid displaced by the body, and this thrust acts vertically upwards through the centre of gravity of the displaced fluid (*Archimedes' principle*); (7) in order that a body floating freely in a fluid may be in equilibrium, the condition involved in (6) above must be satisfied, and, further, the centres of gravity of the displaced fluid and of the floating body must lie in the same vertical line.

These theorems (for the proofs of which the reader is referred to any treatise on the subject) have a very extensive application in the sciences, arts, and industries, and we have only space to mention a few in illustration. The transmissibility of fluid pressure is applied to the conveyance of power from one point to another. At a central station, hydraulic presses or accumulators apply pressure to a body of water; pipes in communication with the press convey the pressure to cranes, motors, lifts, and other hydraulic

machines. The principle that water finds its own level is familiar to all. The variation of pressure with depth is the principle of Hare's hydrometer and of similar methods of determining the density of liquids. It is also illustrated by the diminishing pressure of the atmosphere as we ascend from sea-level, but in this case the rate of diminution is complicated by the fact that air is compressible. In the case of the water in an ocean, the proportionate increase of pressure with depth is more nearly correct, owing to the low compressibility of water. The expression given in (5) above for the total thrust on an immersed surface is constantly in use for calculating the stresses on dock gates, reservoir walls, dams, and other immersed surfaces.

Archimedes' principle, taken together with the conditions of equilibrium given in (7), introduces the whole question as to the equilibrium of ships, submarines, diving-bells, caissons, balloons, and all other bodies which are supported vertically by the upward thrust of the fluid in which they are wholly or partially immersed. In this connection, the question of *stability* of equilibrium of a floating body arises, and thus introduces matters of the utmost importance in naval architecture. The principle of Archimedes also forms the basis of a method for ascertaining the *specific gravity* of a body. For if the upward thrust of a body when totally immersed in water is equal to the weight of an equal volume of water, the weight of the body when weighed in water will be diminished by this amount. Hence the ratio of the weight of the body to the difference between the weights in water and air gives the specific gravity. Obviously, also, the ratio of the diminutions in weight of the same body when weighed in a given liquid and in water, is equal to the specific gravity of the liquid. In the case of a body specifically lighter than water, it floats in water with that proportion of its whole volume immersed which equals the specific gravity of the body. This is the basis for the construction of *hydrometers*, which are used to give direct readings of the specific gravity of liquids.

In **Hydrodynamics**, we start with the assumption that liquids are perfect—*i.e.* that the relative motions of their parts are not impeded by viscous friction. There is no liquid in nature which satisfies this condition, but in many liquids the effects of viscosity are so slight that they may be neglected. Later on in the treatment of the subject, the equations of motion are modified so as to allow for viscosity, but their complicated character has rendered their solution difficult except in a few simpler cases. It is not possible to give here any explanation of the hydrodynamical equations, but one or two of the leading ideas connected with them may be mentioned. The motions of a fluid may be treated in two ways. We may fix attention on a given volume of space and take into account the amounts of fluid which enter or leave that space. Or we may choose a certain small volume of the liquid and study the changes which, during its motion, it may undergo in shape, position, speed, pressure, etc. In either case we are led to the equations which describe the motion of the fluid. The whole mass may then be mapped out by lines which at each point have the same direction as the velocity of the fluid at that point. These are termed *lines of flow*, or *stream-lines*. Following the gravitational analogy, according to which water, in flowing down a hillside, always takes the steepest possible course, we can draw a series of surfaces in the fluid such that they are always at right angles to the stream-lines.

Such surfaces are termed *surfaces of equi-velocity potential*, and the fluid will always move from places of higher to places of lower velocity potential. The term *irrotational* is applied to those species of fluid motion in which a velocity potential exists, in order to distinguish them from cases of rotational or vortex motion where such potential does not exist. Another way of looking at irrotational motion is to imagine that each stream-line begins at some point where fluid is continuously produced and ends at some point where it is continuously annihilated—that is, to start from a *source* and end at a *sink*. In rotational or vortex motion, a cylindrical portion of the fluid of very small diameter is in rotation about its axis. Such motion is accompanied by a tension between the ends of the vortex and a pressure on its cylindrical surface or boundary. It can be proved that, in a perfect fluid, vortex motion cannot be created, and if in existence it cannot be destroyed. In a viscous fluid, however, vortices can be produced, but if left to itself without a supply of energy from without, the vortex is destroyed in time by the viscous forces in the fluid.

Greenhill's *Hydrostatics*; Minchin's *Hydrostatics and Hydrokinetics*; Edser's *General Physics*.

HYDROMEDUSÆ, Hydrozoa (Gk. *hudor*, water; *medusa*, a Gorgon), one of the largest classes of the Cœlenterates, containing individuals which at first sight seem to have little in common, such as the plant-like Zoophytes, the gelatinous Swimming-Bells, and Portug. Man-of-War. The diversity is due, first, to the occurrence of alternation of generations (*q.v.*) and the consequent difference between a vegetative asexual and a free-swimming individual; and second, to the grouping of individuals in colonies in which a considerable amount of specialisation may take place.

The vegetative asexual stock is known as the polyp or hydranth. It consists of a two-layered, fixed, elongated sac, opening to the exterior by a projecting mouth, surrounded by tentacles, which leads directly, without a pharynx, into a simple gastric cavity. Where differentiation of polyps occurs (as in *Hydractinea* or the *Siphonophora*) the structure may be considerably modified.

The structure of the sexual swimming-bell or medusoid is more complicated, though essentially like that of an inverted polyp. It is bell-shaped, a margin furnished with tentacles and bearing within a narrow horizontal ledge,—the velum or craspedon (Gk. *kraspedu*, a fringe),—which gives the name craspedote to this type of medusoid. Within the bell hangs a clapper—the manubrium—at the lower end of which is situated the mouth. In the ectoderm of both medusoid and polyp are many stinging cells (nematocysts), but these are specially abundant in the tentacles.

The movement of the polyp is almost confined to the lengthening and contracting of body and tentacles, but the medusoid swims freely by means of regular pulsations of the bell.

In the polyp special nerve cells exist, although there seems to be no nervous system except in a few cases, such as *Tubularia*; but in the medusoid the edge of the bell is furnished with a double ring of nerve fibres which control the swimming movements. The medusoid also possesses marginal sense organs—statocysts—utilised in equilibration, but these have no representatives in the polyp.

Both free and fixed individuals live on minute animals, chiefly crustaceans, which are killed by the poisoned threads of the stinging cells. From the mouth the food passes directly into the simple gastric cavity, where it is digested. There is no excretory system, and undigested particles are simply ejected by the mouth.

Asexual reproduction is common. Simple buds may arise on the body of a polyp, as in *Hydra*, which develop into new individuals and in some cases are set free, or in other cases remain attached to the parent, thus forming a colony; or again, especially in running water, shoots may break away and form the basis of a new colony. Sexual reproduction in general involves an 'alternation of generations.' From the polyp or vegetative colony, buds arise, some of which develop into medusoids in which sexual products are formed; but many modifications occur. The medusoid buds may become free swimming-bells, may remain as medusoids attached to the polyp, or may degenerate into simple reproductive sacs. In some cases, the polyp directly bears the sexual organs without any trace of alternation. Amongst some of the H., hermaphroditism

is the rule, while in others, male and female products are borne by separate individuals or even separate colonies. The egg, discharged directly to the exterior, is fertilised outside the parent and becomes a free-swimming larva, from which a sedentary polyp develops. The majority of the H. are marine.

A few polyp forms, such as *Hydra* and *Cordylophora*, occur in fresh or brackish water, and medusoid forms, *Limnocodium* and *Limnocnida*, in African and Southern Asiatic lakes. The marine plant-like forms occur attached to rocks and stones at the bottom of the sea, or to floating foreign bodies such as seaweeds, the hulls of ships, etc. To these they remain attached throughout life. The free-swimming forms are generally found floating near the surface of the ocean. Owing to the free stage which occurs in most H., their distribution is cosmopolitan. They occur at all depths, but are most common in the shallow water of the coralline zone. In arctic and subarctic seas, individuals are especially numerous and vigorous.

As represented by the Graptolites, H. appear early in geological time, these forms being found in Upper Cambrian, Ordovician, and Silurian systems, while the uncertain or doubtful Hydrocorallines—the Stromatoporoids—also occur in primary formations. Recent types, however, for example, *Hydractinia*, appear only in the Tertiary period.

Owing to their beauty and the readiness with which they can be obtained, many polyps are objects of interest to naturalists. Colonial individuals form part of the food supply of shore fishes, and the minute medusoid forms, such as *Lizzia*, which sometimes occur in drifting patches estimated to contain as many as 1,600,000,000,000,000 individuals, are the main food of whales and many fishes. On account of their stinging properties some h. are troublesome to naked divers in tropical seas, but the class as a whole has little direct significance for mankind.

The H., which compose the simplest class of Cœlenterate animals, are divided into these orders:—

Order I. **Hydrida or Eleutheroblastea.**—Fixed solitary polyps, without alternation of generations, e.g. *Hydra*, found in fresh water and probably cosmopolitan.

Order II. **Milleporina.**—Colonial forms with massive thick-set calcareous skeleton ('coral'), and polyps of different kinds, e.g. *Millepora*—a shallow-water reef-coral found in all warm seas.

Order III. **Symnoblastea or Anthomedusæ.**—Polypoid form, solitary or colonial, without highly developed chitinous vessels protecting the polyp (hydrothecæ) or the sexual products (gonangia). Medusoid form when set free, with sexual cells on manubrium, e.g. *Tubularia, Syncoryne, Hydractinia*, common on Brit. coasts; or the fresh-water *Cordylophora*.

Order IV. **Calyptoblastea or Leptomedusæ.**—Polypoid forms, almost all colonial, with well-developed chitinous external skeleton produced into hydrothecæ and gonangia. The medusæ bear the sexual cells under the radial canals. Examples, *Halecium, Sertularia, Plumularia*, common off the coasts of Britain.

Orders III. and IV. are commonly grouped under the name Zoophytes (Gr. *zoon*, an animal; *phutos*, a plant), a name descriptive of the plant-like appearance of the polyp colonies.

Order V. **Stylasterina.**—Colonial forms with tree-like 'coral' skeleton and polyps of different kinds. Widely distributed corals, usually found in deep water and warm seas, e.g. *Stylaster, Sporadopora*.

Order VI. **Trachymedusæ.**—Minute free-swimming jelly-fishes, found in all seas, most common in the warmer parts of the great oceans, sometimes at a depth of 100 fathoms, but more often at or within a few fathoms of the surface. Characterised by an entire margin bearing tentacles and protected sense-organs (statocysts); radial canals, 4 to 8 in number, bearing reproductive products. Examples are *Liriope, Geryone*, and the fresh-water *Limnocodium*.

Order VII. **Narcomedusæ.**—Minute jelly-fishes, which, like the last order, occur in the sea, and more commonly in warm waters. They live at or near the surface, but one form has been found in the Atlantic at a depth of 1675 fathoms. From the Trachymedusæ they are distinguished by possessing a lobed margin, tentacles on the upper surface, sense-organs unprotected, radial canals 8 to 32 in number, sexual products on the stomach wall. Examples are *Cunina* and *Æginа*.

Order VIII. **Siphonophora.**—Jelly-fishes of complicated structure composed of greatly specialised individuals aggregated into a colony. Sexual products are produced in gonophores, which are rarely set free. Found in all seas, but especially in tropical and sub-tropical regions, generally drifting near the surface, *e.g.* Portuguese Man-of-War (*Physalia*), *Physophora, Velella*.

Extinct Groups.—(1) **Graptolites.**—Small colonies found in Palæozoic rocks (Upper Cambrian, Ordovician, and Silurian). Their structure resembles that of some zoophytes, and on this account they are generally placed near the Calyptoblastæ.

(2) **Stromatoporoids.**—Massive forms arranged in layers, found in the Primary formations, and generally placed with the Hydrocorallinæ (although some authorities regard these as Protozoa).

HYDROMETER is an instrument for determining the *density* of liquids and solids. It is an application of the principle that when a body floats in fluid under the action of gravity the weight of the body is equal to that of the fluid displaced. Boyle was the first to employ h's. A h. consists of a glass bulb with a long stem sealed and graduated. The bulb is weighted with mercury or small shot, a sufficient quantity being used to immerse the whole of the bulb in the heaviest liquid in which it is to be used. The height and diameter of the stem must be such that the h. will float in the lightest liquid in which it is to be used. The point to which the h. sinks in the lightest liquid, and that to which it rises in the heaviest liquid, are then marked on the stem with the densities of these liquids, and the distance between graduated. The *density* of any liquid not greater or less than those marked on the stem can be obtained by placing the h. in a tall cylindrical vessel full of the liquid and reading the mark to which it sinks. Care must be taken that no air-bubbles adhere to its surface and that it does not touch the sides of the vessel.—Nicholson's Hydrometer, made of metal, has a pan above and below the bulb and only one mark on the stem. From these pans the weights in air and water of a solid are obtained, and the formula weight in air divided by weight in water is the required density.

HYDROPATHY, the treatment of disease by pure water, is a method which has been employed since ancient times, Hippocrates, Galen, and other classical medical writers praising it highly. In the XVIII. cent. water began to be used externally and internally for fevers, and Priessnitz (1799–1851), a farmer at Gräfenberg, Silesia, treated sprains, wounds, and many other conditions, with great success, by applying water to every part of the body; and during the first half of the XIX cent. treatment by water became very popular, hydropathic establishments springing up in numbers in England (*e.g.* Malvern and Matlock), Scotland, France, Germany, and America. Water is best drunk about an hour before meals; only very little, and that hot, during meals; while, early in the morning and late at night, water is of benefit in flushing out the stomach and bowels. In the form of steam, water has a valuable effect in irritation or inflammation of the respiratory passages and lungs. The methods of applying water externally to the body include hot or cold packing, for cooling or inducing sweating; hot-air baths (Turkish) to stimulate the nervous and vascular systems and for the treatment of gout and rheumatism; spray, shower, plunge, douche, needle baths, having a stimulating and tonic effect on the system; sitz, head, and

foot baths, for local congestions and inflammations; and hot and cold fomentations or poultices for numerous local conditions, wounds, sprains, etc.

See BATHS; also Metcalfe, *Rise and Progress of Hydropathy*.

HYDROPHILY, see POLLINATION.

HYDROPHOBIA, an infectious disease occurring among certain animals, particularly dogs and other animals of the canine species, and communicable by them to man, infection being most usually carried by the bite of a rabid animal. The first symptom of the disease in a dog is a change in its habits; it is gloomy and restless; the restlessness increases, the animal snaps at everything and tears up and swallows all kinds of unusual things; the eyes are dull, the mouth continually open, and it has a characteristic high-toned bark; it becomes much excited in the presence of another dog and tries to attack it; gradually convulsions, paralysis, and coma come on and death ensues.

In man the incubation period is from about a fortnight to seven or eight months, but six weeks is the average period. The first symptoms are mental depression and restlessness, sleeplessness and nervous excitability; the symptoms become worse and the person suffers much from thirst, but on making the effort to drink is seized with a spasm of the muscles of swallowing and breathing; these and other paroxysms increase in severity, then weakness and paralysis develop, convulsions and coma ensue, and result in death.

The former treatment was to excise the part infected or to apply to it a caustic or the actual cautery, but the researches of Pasteur have revolutionised the treatment. It depends on the fact that a virus can be extracted from the tissues of a rabid animal and then either attenuated or intensified. The spinal cords of rabbits which have been inoculated are dried for different periods, the diminution of virulence being proportional of the length of time they are kept, and emulsions made from them are injected into the individual affected, the strength of the virulence of the emulsion being gradually increased up to the standard strength. An individual so treated does not exhibit any symptom of hydrophobia.

HYDROPLANES, see under FLIGHT.

HYDROSTATICS, see HYDROMECHANICS.

HYDROTHECÆ, see GRAPTOLITES.

HYDROXIDES, compounds containing hydrogen and oxygen not in form of water, thus differing from hydrates (*q.v.*); mostly basic in action; common h. is Sodium H. ($NaOH$).

HYDROXYLAMINE, HYDROXY-AMMONIA ($NH_2.OH$), is a liquid which with acids forms salts; prepared by acting on nitric acid with nascent hydrogen.

HYDROZOA, HYDROMEDUSÆ (*q.v.*).

HYENA, see HYÆNAS.

HYÈRES (43° 7′ N., 6° 5′ E.), town, dep. Var, France, near Mediterranean, on Riviera; noted winter health-resort; trade in fruits and salt; birthplace of Massillon. Pop. 18,500.

HYGIEIA, Gk. goddess of health, dau. of Æsculapius, god of med.; bore snake in her hand.

HYGIENE, the science of the preservation of health, including all principles concerning the well-being of man physically and mentally, and in regard to his environment. See DIGESTION, FOOD, BACTERIOLOGY, VENTILATION, PUBLIC HEALTH.

HYGINUS, THE SURVEYOR (98–117 A.D.), author of Lat. treatise on surveying.

HYGINUS, GAIUS JULIUS, Rom. writer, whose *Fabularum Liber* and *De Astronomia* have survived.

HYGINUS, ST., pope (*c.* 136–140); feast on Jan. 10 or 11.

HYGROMETER (Gk. *hugros*, damp), apparatus for gauging humidity of atmosphere; commonest form is 'wet and dry bulb h.,' consisting of two thermometers, one with moistened bulb. The difference between the two marks the humidity, and may amount to several degrees on a dry day, or nothing if air is saturated. Daniel's h. (1820) was bent tube containing ether, each end terminating in a bulb, one of which was covered with cloth. Evaporation took place when ether was poured upon cloth, and this resulted in cooling of cloth-covered bulb and condensation of ether inside the tube, producing moisture upon surface of other bulb. The temperature at which this condensation takes place is called the 'dew-point.'

The first h. was invented in 1676 by Coniers.

HYKSOS, SHEPHERD KINGS, an Asiatic race who conquered Egypt in XV. cent. B.C., and kept possession of country for several cent's, after which a rebellion occurred, and they were expelled; they have been identified with the Jews by some writers, including Josephus.

HYLAS (classical myth.), s. of Theiodamas, and beloved by Heraklos; removed from earth by water-nymphs.

HYLOBATIDÆ, a family of PRIMATES (*q.v.*).

HYLOZOISM, term applied to any doctrine which affirms life and spiritual processes to be a property of matter.

HYMEN, Gk. god of marriage, s. of Apollo and Urania; represented with veil and torch.

HYMENOPTERA (Gk. *hymen*, marriage; *pteron*, a wing), an order with between 30,000 and 40,000 members, which include Saw-Flies, Gall-Flies, Ichneumon Flies, Bees, Wasps, Ants, etc., and includes the most highly developed of Insects. The name signifies that the upper and under wings on each side are 'wedded' or linked together in flight by a row of hooks in the latter, which catch in a hard rim of the former. H. are generally active, neat insects, with four usually transparent wings, strong mandibles, often with a 'waist,' the females furnished with a saw, sting, or boring or piercing ovipositor; and the larva undergoing a complete and abrupt metamorphosis in assuming the adult form.

There is great diversity in the habits of H. Some are 'Solitary' Bees, others live in societies which show marvellous organisation and co-operation; the industry of some is proverbial, but others live parasitically on the produce of that industry. Yet all show a nervous energy, a rapidity, accuracy, and skill in action that suggests intelligence.

Parthenogenesis is common amongst H., as also is the occurrence of different forms, such as queen, drones, workers, soldiers, in one species.

H. are on the whole beneficial to man—bees, for example, store honey, and ichneumons destroy insect pests, but others, such as saw-flies, do considerable harm by damaging the young shoots of forest trees.

HYMENOSTOMATA, a group of INFUSORIA (*q.v.*).

HYMETTUS, modern TRELLO VOUNI (37° 56′ N., 23° 49′ E.), mountain, Attica, Greece; famous for its honey; height, 3370 ft.

HYMN.—The Gk. *hymnos* denotes a poem written in memory of heroes or addressed to the gods. The *Homeric* h's are very ancient, but the so-called *Orphic* h's were only composed about the beginning of the Christian era. Though our *hymn* is of Gk. derivation, the hist. antecedents of Christian h's are to be sought in ancient Israel. The words *hymn* and *psalm* were practically interchangeable. It is recorded of Christ and the Twelve that 'when they had sung a h. they went out,' after the Last Supper, and in the Epistles h's are several times referred to. But a h. does not necessarily mean one that is in metre, like our modern h's—*e.g.* the *Benedictus* and *Magnificat* have always had a prominent place in Christian devotion, and are spoken of by early writers as h's. Hymnody developed in Eastern Christian Churches before those of the West; in Pliny's letter to Trajan, about 100 A.D., which is so valuable as throwing light on the Church in Bithynia, he speaks of the Christians singing h's to Christ.

In the Syrian Church of the II. and III. cent's, Bardesanes and his s. Harmonius wrote h's, as also did Ephraim. At the outbreak of the Arian con-

troversy, first the Arians and then the orthodox made use of h's to popularise their views. Certain h.-books were very popular in the Gk. Church in the VI. and VII. cent's, but by the X. were hardly used at all. The Emperors Leo the Philosopher and Constantine Porphyrogenitus and several saints wrote h's. In the Western Church, Hilary is said to have been the first hymnologist, and after him St. Ambrose in the IV. cent. introduced h's into the Church of Milan. His h's were used in Benedictine houses. Later h. writers were Pope Gregory the Great and the Venerable Bede. Until the VI. cent. the metrical forms of classic Latin verse were used, but rhyme and rhythmical metre were used in the later part of the Middle Ages. The famous h., *Veni Creator Spiritus*, was possibly the work of the Emperor Charles the Bald, and the *Veni Sancte Spiritus* of King Robert II. of France. Other famous mediæval h's are the *Dies Iræ* of Thomas of Celano, the follower of St. Francis, and the *Stabat Mater Dolorosa* of Jacobus de Benedictis. Mediæval hymnody was closely allied with monasticism.

With the Renaissance everything essentially mediæval fell into disrepute, and mediæval h's were 'edited' to conform to a more classical Latinity. A new h.-book and breviary was commanded in 1525 to be produced by the pope. The present breviary is that of 1631. Many famous h's were written at, or soon after, the Reformation, particularly those in the 'vulgar tongue,' though Latin was still used even by reformers. Luther wrote *Ein Feste Burg ist unser Gott*. The use of h's is not prohibited in the Eng. Prayer Book, but they are not enjoined. Several metrical versions of the Psalms were produced in Eng., but they have had a wider vogue in Scotland. Charles I. tried unsuccessfully to introduce the version of the Psalms made by his father, James I. In 1696 Tate and Brady issued their 'New Version' of the Psalms. This met with a mixed reception, but the balance of opinion tends to prefer the plainness of the older versions to the more regular poetic form of the later. It is, however, now agreed that no metrical translation of the Psalms can be entirely satisfactory, and that their spirit is best caught and expressed in other ways. There were several Eng. h. writers in the XVII. cent., among them John Cosin, Bp. of Durham; John Milton, Jeremy Taylor; and Bp. Ken.

But it was not till the beginning of the XVIII. cent. that Eng. h's were either numerous or, on the whole, striking or beautiful. Philip Doddridge and, still more, Isaac Watts, did much to raise Eng. hymnody to the place it now holds. Though much that Watts wrote is now (perhaps deservedly) neglected, some of his h's are undoubtedly among the finest in English, for of some of them—*O God, our help in ages past, When I survey the wondrous Cross, There is a land of pure delight*—congregations seem never to tire. The Methodist revival again did much for hymnody. Charles Wesley, whose h's have a somewhat different flavour from those of Watts, wrote *Jesu, lover of my soul*, and *Rejoice, the Lord is King*, and many others. Nor did he stand alone. Among his contemporaries were John Byrom, who wrote *Christians Awake*; Toplady, author of *Rock of Ages*; and Cowper, of *Sometimes a light surprises* and *There is a fountain filled with blood*. The XIX. cent. produced even more h's than the XVIII. Until recently h's were more popular among Nonconformists and Evangelicals, for the older school of High Churchmen had a feeling against collections of h's officially unauthorised. Among well-known h. writers of the XIX. and XX. cent's have been James Edmeston, H. F. Lyte, J. Mason Neale, Christopher Wordsworth, F. R. Havergal, Cardinal Newman, Dean Stanley, Horatius Bonar, and in America, Edmund H. Sears and the Quaker poet Whittier. Some very beautiful h's are comparatively little known, e.g. *Eternal Light*, by Thomas Binney.

Of collections of h's the most popular in the Anglican church is *Hymns Ancient and Modern*. In the Nonconformist Churches a large number of different h.-books are used. Certain h's are to be found in nearly all, and thus hymnody often unites dogmatically or ecclesiastically sundered Christians. Few h's are more universally loved among orthodox Protestants than *Lead, kindly light*, of Cardinal Newman, and *Nearer, my God, to Thee*, of the Unitarian, Sarah Flower Adams.

Various collections of h's often give list of authors, with dates of birth and death. The historical edition of *Hymns Ancient and Modern* gives additional information. Julian, *Dictionary of Hymnology*, best work on the whole subject; J. M. Neale, *Hymns of the Eastern Church*; Donehoe, *Early Christian Hymns*; R. E. Prothero, *The Psalms in Human Life*.

HYOGO, see HIOGO.

HYOID BONE, see SKULL.

HYOSCYAMUS, see HENBANE.

HYPÆTHROS, name given by the Rom. architect Vitruvius (I. cent. B.C.) to openings in the roofs of the larger Gk. temples; his mention of the h. is a factor in the disputed question of the lighting of Gk. temples.

HYPALLAGE, term of rhetoric for change of usual relation of words, *e.g.* Vergil, *Æneid*, i. 237: *Quæ te . . . sententia vertit?*

HYPATIA (370–415), dau. of Theon; lecturer, Platonic school at Alexandria, founded by Plotinus; mathematician and philosopher; murdered by fanatics.

HYPERÆSTHESIA, over-activity of sensory nerves; symptom of diseases of brain or spinal cord or of hysteria (*q.v.*).

HYPERBATON (Gk. *huperbaton*, stepping over), term of rhetoric for alteration of order of words for sake of emphasis.

HYPERBOLA, a conic section obtained by cutting a cone with a plane perpendicular to base of cone.

HYPERBOLE (Gk. *huperballein*, to throw beyond), term of rhetoric for exaggeration.

HYPERBOREANS, in Gk. legend, people who lived in unknown regions of north (*i.e.* of the north wind, Boreas).

HYPEREIDES (*c.* 390–322 B.C.), Attic orator; pupil of Isocrates; opposed Philip and Alexander of Macedon; advocated Lamian War; was captured and killed by Antipater.

HYPERION, a Titan in Gk. mythology; s. of Uranus and Gæa and f. of Helios; title-character of unfinished masterpiece of Keats.

HYPEROODON, bottle-nosed whale. See under WHALES.

HYPERSTHENE, mineral found in Skye and Labrador; orthorhombic, with bronze lustre or brown or green coloration; belongs to pyroxene group; S.G. *c.* 3·5.

HYPERTROPHY, overgrowth of an organ or other part of the body, either through increase in the size of the components of the tissues or through increase in their number, or by a combination of both. H. is due to increased exercise of a part in its functions or to increase of its blood supply; some forms of h., *e.g.* goitre, elephantiasis, are due to disease.

HYPNOTICS, see NARCOTICS.

HYPNOTISM, term including everything relating to the induction of a state resembling sleep, called hypnosis. This state differs from sleep in an increased and extreme suggestibility of the individual, in a loss of sensitiveness of the sense organs, in a tendency to anæsthesia, and in an increased rapidity of the pulse and the respirations. Usually an individual awakened from hypnosis does not remember what has happened during the state, but the memory of this may be brought back by post-hypnotic suggestion. Somnambulism, or sleep-walking, is a state resembling hypnosis, which seems to be induced generally under the influence of mental excitement, and is hereditary in some persons, while certain *yogis* in India, dervishes in Northern Africa, and others can bring about a similar state voluntarily.

Hypnosis is induced usually by the subject fixing his eyes on some small object in such a position that there is slight muscular strain in gazing at it, and passively allowing the hypnotiser to suggest to him the ideas of weariness of the limbs, heaviness of the eyes, and sleep. Some hypnotisers pass the hands monotonously and slowly close to or over the face. Soon the eyes close, the subject becomes drowsy, but instead of allowing him to pass into a natural sleep the hypnotiser, by speaking, etc., keeps in contact with him and thus maintains control. In this state the subject knows what is going on around him, but is only able to do what the hypnotiser allows or commands him, and he may pass into a deeper state of hypnosis, resembling coma, in which he is more profoundly influenced than in the lighter stages. Under suggestion the subject may use his limbs with much greater strength than ordinarily, while anæsthesia of a part of the body, so deep that a surgical operation may be performed, may also be brought about by suggestion.

Several theories regarding hypnosis have been propounded, but the explanation which seems to give most promise of solution of the problem, upon which research, still being made, is that hypnosis is the temporary blocking of the nervous links between the different systems of neural dispositions (the conditions of the rise of ideas to consciousness) of the brain, so that each idea works out its effects free from the interference or inhibition of antagonistic ideas, and thus is more effective than normally.

On the Continent and in America h. has been employed to a considerable extent in the treatment of disease, and its benefit is now beginning to be recognised in Britain. It is chiefly of value in the cure of drug and other bad habits, in insomnia, neuralgia, hysteria, and other nervous derangements, in epilepsy, paralysis, sea-sickness, dyspepsia, and other similar conditions, but it requires much careful study and judgment by the physician, and should not be employed by inexperienced persons.

Tuckey, *Treatment by Hypnotism and Suggestion*; Milne Bramwell, *Hypnotism*.

HYPOCAUST (Gk. *hupo*, beneath; *kauein*, to burn), Rom. chamber containing heating apparatus.

HYPOCHLOROUS ACID (HClO), strong bleaching agent formed by combination of nitric acid (dilute) and bleaching powder.

HYPOCHONDRIASIS, nervous condition characterised by mental depression and delusions regarding the state of the health; the general health and appetite are usually quite good, but no persuasion as to the real condition is of any avail; in its most advanced form h. is a form of insanity. The treatment is general—change of air and scene, moderate exercise, and such interests as serve to turn the sufferer's mind to other matters.

HYPODERMA, see Bot Flies.

HYPOGASTRIC PLEXUS, see Nervous System.

HYPOGLOSSAL, see Nervous System.

HYPOGYNOUS, see Flower.

HYPOSTASIS, personality (*persona*), an independent and incommunicable existence; used to mean person of the Trinity in early Christian controversies.

HYPOSTOMATA, see Ostracoderms.

HYPOSTYLE (Gk. *hupo*, under; *stulos*, a column), architectural term for Egyptian and classical buildings in which rows of columns support flat ceiling. See Architecture.

HYPOTHEC (Gk. *hupotheke*, thing pledged), right given by Scot. law over effects of a debtor (Eng. lien).

HYPOTHESIS, supposition accepted by scientific thought as a guide to further inquiry; requires verification before being held to be a demonstrated theory. See Logic.

HYPOTRACHELIUM (Gk. *hupo*, under; *trachelos*, neck), name given by Rom. architect Vitruvius to moulding between the annulet of the capital and the shaft in Gk. buildings.

HYRACOIDEA, see Procavia.

HYRCANIA, modern Astarabad (36° 40′ N., 54° 30′ E.), ancient district, Persia, S. of Caspian Sea.

HYRCANUS, JOHN, I. (d. 105 B.C.), Jewish chief priest (135); youngest s. of Simon Maccabeus; forced to acknowledge suzerainty of Antiochus, but conquered Samaria and restored Jewish prosperity. His unfortunate grandson, John Hyrcanus II. (executed 30 B.C.), Jewish chief priest (78–40), was the obedient vassal of the Romans.

HYRAX, see Procavia.

HYSSOP (*Hyssopus officinalis*), small perennial herb of natural order *Labiatæ*, with thin quadrangular stems, elliptical leaves growing in pairs, and spikes of small violet flowers; grows in S. Europe and as far as Central Asia; an infusion of the leaves was formerly used to relieve bruises, swellings, catarrh, etc. Hedge H. (*Gratiola officinalis*) is a herb of natural order *Scrophulariaceæ*, with cylindrical stems and solitary reddish flowers, native of S. Europe and growing in Britain; once used as a drug, with purgative, diuretic, and emetic action; formerly a remedy for dropsy and gout.

HYSTASPES.—(1) legendary Persian ruler of time of Zoroaster; (2) father of Darius I.

HYSTERIA, a form of disturbance of the nervous system, characterised by exaggeration of reflex and mental excitability with diminished will-power and control over the emotions. The causes are hereditary predisposition to nervous disease, nerve exhaustion, various conditions of the genital system, and the condition often appears at such a time as puberty, pregnancy, or the climacteric. Women are affected very much more than men, most frequently girls between fifteen and twenty-five. The symptoms are varied, and may simulate many different conditions, common symptoms being—(1) *sensory disturbances*, hyperæsthesia or anæsthesia; (2) *motor disturbances*, epilepsy, spasms [*e.g.* vaginismus (spasms of vagina), globus hystericus (spasms of throat)], paralysis; (3) *visceral disturbances*, palpitation, vomiting; (4) *mental disturbances*, melancholia, apathy, craving for sympathy, etc. Moral influence has been found to be of greater value than drugs. Changes of air, moderate exercise, tonics, and massage are of benefit.

HYSTERON-PROTERON, Gk. name given to that figure of speech which reverses the natural order (generally for emphasis).

HYSTRICOMORPHA, a sub-order of Rodents (*q.v.*).

HYSTRIX, see Porcupines.

HYTHE (51° 5′ N., 1° 5′ E.), market town and watering-place, Kent, England, near Eng. Channel; one of the Cinque Ports. Pop. (1911) 6387.

I (Phœnician and Heb. *yodh*; Gk. *iota*), ninth letter in Eng. alphabet, adopted from Lat. use of Gk. *iota*; the form was a zigzag, straightened by the Gk's; dot added to distinguish it among m's and n's in Middle Ages.

I.O.U. ('I owe you'), private document of simple nature witnessing indebtedness; of no legal value.

IAMBIC, term in prosody for verse composed of *iambi*, feet of two syllables with first short, second long, *e.g.*:—

Thĕ fring | ĕd cŭr | tăins ŏf | thine ēye | ădvance.

IAMBLICHUS (fl. II. cent. A.D.), Syrian Gk.; author of love-romance, *Babuloniaka*, of which only fragments are extant.

IAMBLICHUS (fl. 300 A.D.), Syrian philosopher; a pupil of Porphyry. Fragments of his works survive, but *On the Egyptian Mysteries*, often ascribed to him, is not really his. I. was a Neo-Platonist of great learning, and constructed an elaborate theological scheme. The Emperor Julian thought him as great as Plato. I. believed in an Absolute, and many other deities, arranged in groups. Zeus was the world-creator (Demiurge). There were also demons and angels. Thus above the world there are numbers of supernatural beings. He finds it difficult to place evil in his system.

IAPETUS (classical myth.), Titan son of Uranus and Gæa, and f. of Prometheus, Atlas, etc.; grandfather of Deucalion (*q.v.*), and possibly to be identified with Hebrew Japhet.

IAPYDES, race of Illyria subjugated by Romans, II. to I. cent. B.C.

IATROCHEMISTS, see CHEMISTRY.

IAZYGES, Sarmatian tribe now extinct, which gave Rome trouble on the Danube, I.–IV. cent. A.D.

IBADAN (8° 22′ N., 4° 3′ E.), town, in Yoruba, S. Nigeria, Brit. W. Africa. Pop. *c.* 150,000.

IBAGUÉ, SAN BONIFACIO DE IBAGUÉ (4° 30′ N., 75° 15′ W.), town, Colombia, S. America; commercial centre of an agricultural district, producing cacao, tobacco, sugar-cane. Pop. 25,787.

IBARRA (0° 23′ N., 77° 53′ W.), city, Ecuador, S. America; at foot of volcano of Imbabura; cotton and woollen industries. Pop. *c.* 11,000.

IBERIANS.—All is obscure concerning the origin of this ancient people; sometimes the term 'Iberian' was applied anciently to all who dwelt in Spain, but it was also given to the tribes dwelling particularly round the Ebro. Humboldt, in 1821, started the theory—since widely accepted—of an early Iberian population, still surviving in the Basques, found in Spain, Southern France, Corsica, Sardinia, Sicily, and in Celtic Britain.

IBERIS, CANDYTUFT, genus of plants, order Cruciferæ; annual C. is popular garden flower.

IBEX (*Capra*), animal of Goat family; varieties: Alpine i. (*C. ibex*), Arab. i. (*C. walie*), Himalaya i. (*C. siberica*), Abyssinian i. (*C. walie*); have long, ridged horns; gregarious, but males and females form different flocks after breeding-time.

IBIS (*Ibis æthiopica*), a bird allied to storks and spoonbills; head and neck dark and naked; plumage white, apart from glossy black dorsal feathers; beak long and curved; held sacred by ancient Egyptians, and often found in mummified condition.

IBLIS (Arab. from Gk. *diabolos*), fallen angel whose history is related in the *Koran*.

IBN 'ABD RABBIHI (860–940), Arab. poet; author of valuable anthology.

IBN 'ARABI (1165–1240), Muhammadan theological writer and mystic; chief work, the valuable *Al-futûhât almakkija* (The Meccan Revelations).

IBN BATUTA, ABU ABDULLAH MUHAMMAD (1304–78), Arab. traveller and writer; b. at Tangier; spent many years travelling in Asia, Africa, and Europe, visiting Egypt, Palestine, Persia, Mesopotamia, Arabia, Asia Minor, Russia, India, China, and Spain; he made pilgrimage to Mecca four times, and during visit to India was appointed kazi at Delhi; wrote an interesting account of his travels.

IBN DURAID (837–934), Arab. poet and writer on Arab. etymology.

IBN EL ATHÎR, name of three bro's, noted Arab. authors; the greatest was IZZ ED DÎN (1160–1234), historian, whose works are of much value.

IBN EL FÂRIDH (1181–1235), Arab. mystical poet; author of much-read *Diwan*.

IBN FARADI (962–1012), Span. Arab. historian; wrote works on Andalusia.

IBN GABIROL, AVICEBRON (XI. cent.), Jewish thinker; wrote poetic, liturgical, and philosophical works; his philosophy was influenced by Neoplatonism and sometimes thought heretical by Jews; his Arabic works trans. into Latin influenced the Schoolmen.

IBN HISHÂM, ABD EL MALIK (d. 834), Arab. philosopher and edit. of Ibn Ishâk's (*q.v.*) biography of Muhammad.

IBN ISHAK, MUHAMMAD (d. 766), Arab. historian; author of Life of Muhammad, of which valuable excerpts are preserved by Ibn Hishâm (*q.v.*).

IBN JUBAIR (1145–1217), Span. Arab. author of travels in the East.

IBN KHALDÛN (1332–1406), Arab. historian; served various rulers, at Fez, Tlemçen, and Tunis; app. cadi at Cairo, 1384, 1399; author of *Universal History*, a work dealing chiefly with Arabs and Berbers.

IBN KHALLIKAN (1211–82), Arab. author of a dictionary of Muhammadan biography.

IBN USAIBI'A (1203–70), Arab. physician; practised med. in Cairo and afterwards near Damascus; author of *Lives of the Physicians*.

IBO (5° 24′ N., 6° 27′ E.), district, Brit. W. Africa, on lower Niger; chief town, Ibo; palm-oil.

IBRAHIM PASHA (1789–1848), adopted s. of Muhammad Ali, viceroy of Egypt; supported Turkey in Gk. War of Independence, and was defeated by Allies at Navarino, 1827; twice invaded Syria; defeated Turks at Nezib, 1839; viceroy of Egypt, 1848.

IBSEN, HENRIK (1828–1906), Norwegian dramatist and poet; born at Skien; served seven years in a chemist's shop at Grimstad; wrote blank-verse plays, which were produced, and took part in stage-management, 1850 onwards, at Bergen. *The Warriors in Helgeland*, a romantic dramatic poem, was printed, 1858, but refused by managers. His first great protest against social conventions was *Love's Comedy*; its hero made eloquent poetic diatribes (furnishing Shaw with some attractive characters), and epitomises the moral in the last line—'"A health to Amor, late of earth, in tea."' *Brand*, a beautiful lyric against moral deadness, appeared in 1866; its theme was repeated in the greater *Peer Gynt* with its marvellous songs. From this time I.'s position in literature was assured. He now abandoned verse and substituted analysis and irony for lyrical attacks on middle-class vices. *The Pillars of Society* (1877) started an exposure of the *bourgeoisie*, a constant theme of novelists and playwrights since. *A Doll's House*

(1879), *Hedda Gabler* (1890), and other plays have largely destroyed the XIX. cent. ideal of womanliness. It is unfortunate that in the light and characteristic satire, *An Enemy of the People* (1882), 'Dr. Stockmann,' when played in England, should be represented as a figure of fun. In *The Wild Duck* (1884) I. ironically ridicules the attempts of reformers. In numerous other plays he analysed modern life and created characters which have become literary personalities. *The Master-Builder* (1892), perhaps his chief work, has hardly yet become absorbed into common thought.

Jæger, *Life* (1894); Bernard Shaw, *The Quintessence of Ibsenism* (1892); Edmund Gosse, *Life* (1908); R. E. Roberts, *I.: a Critical Study* (1912).

IBYCUS (fl. VI. cent. B.C.), poet of Gk. colony of Rhegium; fragments remain; cranes discovered his murderers.

ICA, ECCA, or YCA (14° S., 75° 52′ W.), maritime department, Peru, S. America, between Lima and Arequipa; capital, Ica; wine, fruits. Pop. *c.* 100,000.

ICARUS, see DÆDALUS.

ICE is solid water, and is precipitated as *snow*, *frost*, or *hail*. It consists of colourless crystals of *hexagonal* form, with a well-marked habit of *twinning*. Ice at 0° C. is less dense than water, and floats on it. Ice contracts on melting.

Iceberg is mass of ice, floating in water, retaining its equilibrium by submersion of most of its bulk; frequently 300 feet high; of great danger to vessels; if in quantities, affect surrounding temperature considerably. ICE-FLOES are floating fields of ice driven together by pressure of bergs.

ICELAND (13° 22′ to 24° 35′ W., 63° 12′ to 66° 33′ N.), large island belonging to Denmark; in north part of Atlantic Ocean, on fringe of Arctic Circle; it is situated about 500 miles N. of Scotland, 160 miles S.E. of Greenland, and 570 miles from Norway; length from E. to W., 300 miles; breadth, 200 miles; area, 39,756 sq. miles; length of coast, *c.* 3730 miles; coast-line rugged with numerous bays and fjords on N., W., and E. coasts, forming excellent harbours; S. coast flat and unbroken; largest bays are Faxaflói and Breidifjord in west. The island is roughly oval in form; in north-west is an irregularly shaped peninsula almost cut off from main island by the bays of Hunafloi and Breidifjord; interior a barren plateau covered with immense lava-fields, ice-plains, and volcanic mountains; most of the peaks are covered with perpetual snow and ice; highest mountain, Oräfacjökull, 6241 ft., near S.E. coast. I. has over 100 volcanoes; the best known are Hekla, 5110 ft., Askja (with crater of some 30 sq. miles), Katla, Laki, Skapterjökull, etc.

The largest lava-field, Odadahroun, is over 1500 sq. miles; the ice-fields cover an area of more than 5000 sq. miles; largest glaciers are Vatnajökull, in S.E. (nearly 3300 sq. miles), Hofsjökull (520 sq. miles), Langenjökull (500 sq. miles) and Myrdalsjökull (390 sq. miles). I. has many rivers and lakes formed by ice and melting snow; the largest rivers are Hvitá (White River), Thjorsá, Olfusá, Jökulsá; principal lakes, Thingvallavatn in S., and Mývatn in N.; numerous hot springs, the Geyser best known; fine pasture-land on coast and along rivers, but vegetation on the whole very poor; fauna consists mainly of fox and reindeer; polar bear is sometimes floated down with ice from Greenland; numerous birds, seals, and whales; climate damp, cold, stormy, and very changeable; winters comparatively mild; N. coast washed by Arctic current, S., W., and E. coasts by Gulf Stream; principal towns, Reykjavik (capital), on S.W. coast, with school of med., theology, navigation, etc., national library, and good harbour; Seysdisfjord in east, Akursyri in north; transport done chiefly by horses; bridges have been built since 1888, and roads have been improved.

I. was discovered by Irish Culdees in VIII. cent.; visited by Norwegian vikings, 870; permanent Norwegian settlements on S.W. coast, 870–90; on N. and W. coast, 890–900; on S., E., and S.E. coasts, 900–30; Icelandic Republic formed, X. cent.; united to Norway, 1262; came under Dan. rule, 1380; received home rule, 1874, which was extended in 1903. Famous volcanic eruptions: Mount Katla, 1721; Hekla, 1766; Laki, 1783 (lava covering an area of 2188 sq. miles); Askja, 1875; violent earthquakes in 1784, 1885, 1896. The Icelandic language now spoken is very much the same as in XII. and XIII. cent's and earlier; at that time named *Dönsk tunga* (Dan. tongue) or *Norroena* (northern tongue), and spoken in Scandinavia and elsewhere until XIII. cent.

Icelandic lit. flourished from middle of XI. cent. to end of XIII. cent., and from XIX. cent. onwards, and consists of songs, scaldic poetry, and sagas; until the XII. cent. the songs and lit. were handed down by word of mouth by wandering minstrels or skalds; among the best-known works are mythical and heroic songs (Voluspa, Hamerscheimt, Hávamál, etc., compiled in the poetical Edda (*q.v.*); and sagas, including Volsunasaga, Egla, Eyrbyggia, Laxdoela, Viga-Glum, Gretti the Strong, Egil, Gisli, Burnt Njal, etc.; a collection of the sagas was made by Ari (1067–1148) in the famous prose Edda (*q.v.*); he also wrote the Konungábók (Book of Kings), Landnamábók (Book of Settlements); other celebrated writers were Saemund (1056–1133); Snorri Sturlason (1179–1241), who wrote Hemskringla or the Lives of the Kings of Norway; Sturla Thordarson (1214–84), who wrote Islendingasaga and Life of Hakon the Old. To the modern period belong John Thorlaksson (1714–1819), Halgrimson (1807–45), and Steingrimur Thorsteinsson (1830), poets; Jon Thoroddson (1819–68) and Gestur Palsson (1852–59), novelists.

I. is administered by a minister (app. by king of Denmark) and legislative assembly (Althing); women vote for Parliament; education universal; religion Lutheran; bp. resides at Reykjavik; trade, now chiefly carried on with Denmark and Britain, in the hands of Norsemen and Icelanders, XIV. cent., English, XV. cent., Germans, XVI. cent.; a monopoly of Dan. Government, 1602–1786; open to all nations, 1854; chief exports, whale oil, cod-liver oil, salt fish, eiderdown, wool, fur, sheep, horses; potatoes, vegetables, and hay are grown; sulphur, lignite, spar, and coal are found; cattle-breeding and fishing chief occupations; many tourists are now attracted to I. by fine fishing and interesting scenery; population concentrated on coast and lowlands, only a quarter of the island being habitable. Pop. (1911) 85,089.

Annandale, *The Faroes and Iceland* (1905); W. Morris and Magnusson, *The Saga Library* (1891–95).

ICELAND MOSS, a lichen, *Cetraria islandica*, found in Iceland and N. Europe; edible.

ICELAND SPAR, see CALCITE.

ICE-PLANT (*Mesembryanthemum crystallinum*), creeping plant bearing white flowers; leaves have glistening appearance, whence name.

ICE-YACHTING, sport carried on principally in Scandinavia, Gulf of Finland, and N. America; a sailing-vessel is used, with runner-plank instead of keel. A speed of over 80 miles an hour can be attained on the Hudson River with a favourable wind.

ICENI, see BOADICEA.

I-CHANG (30° 48′ N., 111° 32′ E.), town, treaty port, Hu-peh, China, on Yang-tze-kiang. Pop. (1911) 45,000.

ICHNEUMON, a small mammal allied to weasel, living in Egypt and N. Africa generally; feeds on snakes and on crocodile eggs.

ICHNEUMON FLIES (*Ichneumonida*), a family of Hymenopterous insects, with long, thin bodies, and long ovipositors. They pierce and lay their eggs in the larvæ of other insects, on which the young feed. Many agricultural pests are thus kept in check.

ICHNOGRAPHY, architectural name for ground-plan or horizontal section of a building.

ICHNOLOGY, science of footprints. See FOSSIL, PALÆONTOLOGY.

ICHTHYOLOGY.—Günther, in his *Study of Fishes*, 1880, defines I. as 'the branch of zoology which treats

of the internal and external structure of fishes, their mode of life, and their distribution in space and time,' and perhaps to these should now be added a study of the economic aspect of the group.

ICHTHYOPHAGI (Gk. *ichthus*, a fish; *phagein*, to eat), tribes of various coast-regions so called by Gk. geographers.

ICHTHYOPHIS, see BATRACHIA.

ICHTHYOPSIDA, see FISHES.

ICHTHYORNIS, see under ODONTHORNITHES.

ICHTHYOSAURUS, see REPTILES.

ICHTHYOSIS, XERODERMA, dry and scaly condition of the skin, due to general thickening, with atrophy of sebaceous glands, occurring either congenitally or at an early stage of life. The only treatment is palliative ointments, etc.

ICKNIELD STREET, name of pre-Rom. road to be traced in Berks and Bucks, England; Rom. road running north and south through Midlands.

ICONIUM, ancient city, Asia Minor, situated on plateau on slopes of Taurus Mts. Capital of Lycaonia under Romans. Walls of modern city (KONIEH or KONIA) built from materials taken from buildings of I. Contains famous monastery of dancing dervishes, ruins of mosques and tombs; manufactures carpets and coloured leather. Pop. *c.* 45,000.

ICONOCLASTS.—In the primitive Church there was a general feeling against the use of art in Christian worship. This was owing partly to the idolatry which accompanied heathen worship. That they, like the Jews, had no images in their churches amazed their heathen neighbours. From the IV. cent. paintings and sculptures were employed in Christian worship. Only then the symbol of the cross came into use, and there was strong prejudice against a crucifix. The famous *iconoclastic* controversy arose in the Eastern Empire in the VIII. cent. The attack on images was begun by Leo III. (d. 740); it was continued by Constantine V., but the Empress Irene restored them; another iconoclastic reaction took place, but came to an end with the Emperor Theophilus (d. 826). The later Church did not take up the position of the extremists that images were themselves possessed of sacramental power, neither did it reject them altogether. In the Eastern Church *icons* like flat pictures are used, whereas the Catholic Church in the West has always believed in images, crucifixes, etc., as means of instruction.

ICONOGRAPHY (Gk. *eikon*, image; *graphein*, to describe), writing about engravings; history of Christian relics or pictures.

ICONOSTASIS (Gk. *eikon*, image; *stasis*, standing), division in Gk. churches between outer choir and inner sanctuary; adorned with *ikons*, *i.e.* pictures of saints, etc.

ICTICYON, see DOG FAMILY.

ICTINUS, Gk. architect of temple of Apollo, of which sculptures are in Brit. Museum, of Parthenon (433 B.C.).

IDA (d. 559), king of Bernicia; established Anglian rule over Bernicia (547).

IDAHO (43° N., 115° W.), a W. state of U.S.A., bounded N. by Brit. Columbia and Montana, E. by Montana and Wyoming, S. by Utah and Nevada, W. by Oregon and Washington. Area, *c.* 84,000 sq. miles, of which *c.* 500 are water. Principal city is Boise City. Except small area in S. the surface is rugged and mountainous; the S.E. region lies in the Great Basin of U.S., while the rest, some 70,000 sq. miles, lies in the drainage basin of the Columbia River; in the N. and E., part of the Rocky Mountain system is embraced—the principal range being the Salmon River Range—separating I. from Montana; other ranges are the Saw Tooth and Baisé, on the Columbian Plateau; a prominent physical feature are the Snake River Plains; the more important lakes are Pend d'Oreille, Cœur d'Alene, and Naniksu, in the Pan-Handle in the N.; and the John Day and Bear lakes in the S.E. There is abundant vegetation in the N. and centre; forests extend on the W. slopes of the Bitter Root and Cœur d'Alene Mts. The climate is healthy. Mineral deposits, which are owned by the state, include gold, copper, lead, silver, and coal, while in the S.E. soda, gypsum, and sulphur are found; there are many state forests; grain farming is mostly confined to river valleys, but extensive irrigation works have been carried out—the most important crop being wheat; other crops are oats, barley, potatoes, hay, etc.; The principal industries are lumber and timber working, flour and grist milling; stock-raising is carried on. A large percentage of the people are Mormons. Pop. *c.* 325,000.

Resources and Attractions of Idaho (St. Louis, 1893).

IDAR, EDAR (23° 50′ N., 73° E.), native state, Gujarat, Bombay, India.

IDAS (Gk. myth.), s. of Aphareus and bro. of Lynceus; successfully rivalled Apollo for Marpessa's hand; slew Castor and then wounded Pollux, who had slain Lynceus, but was struck by thunderbolt of Zeus; strongest of mortals.

IDDESLEIGH, STAFFORD HENRY NORTHCOTE, 1ST EARL OF (1818–87), Eng. politician; held various offices of state, and as Chancellor of Exchequer in Disraeli's Ministry introduced sinking fund for reduction of National Debt, 1874; Foreign Minister, 1886.

IDEA, term which has been used in a great variety of meanings: (1) In Plato, Ideas (or Forms) are universal natures, not 'in the mind,' but the objects of knowledge; (2) in later Platonism, they are conceptions in the mind of God; (3) in Locke, they are objects of knowledge, but tend to be regarded as representations of things in the mind; in Berkeley and Hume they are definitely subjective; (4) and (5) for the Kantian and Hegelian uses, see KANT and HEGEL; (6) in modern psychology idea generally means a process of conceiving and imaging at once, or an object conceived and imaged at once; but the term is better avoided.

IDEALISM, in a general sense, means the tendency to regard everything from an ideal or imaginative standpoint; its use in philosophy is to denote that theory of the universe according to which everything (either really or as perceived) consists of *ideas*. I. has different forms: in the absolute I. of Hegel the universe consists of ideas entirely, but ideas of the universal mind not ours; in other forms of absolute i. objects have no ultimate reality except in the minds of those who perceive them—this is more properly termed *subjective* I. In Kant's I. all human experience consists of ideas, though this does not preclude the existence of objects outside our minds. I. can fairly be said to have begun with Plato. The Platonic theory of ideas is that beyond our world of sense there is an ideal world. They stand as types from which objects in our world derive whatever reality they possess. Aristotle somewhat modifies this, and makes the individual dependent on the universal will. He showed that matter cannot really be opposed to mind, nor the particular to the universal. It was not Aristotle's i. but his formal grouping into categories which the mediæval Schoolmen followed. Of modern idealists the first was really Bp. Berkeley. In some respects he carried on the work of Locke. Berkeley held that things have no real existence apart from a mind which can perceive them, though it need not be our mind but the mind of God. Though many would refuse to follow him here, he at least was the first to show that, whatever a thing be in itself, we can only know it by our own senses—a most important step in advance of that unthinking view which would make a thing just what it appears.

Works of above philosophers, and those of Bosanquet, William James, and Haldane. H. Jones, *Idealism as a Practical Creed*; Sturt, *Personal Idealism*.

IDENTIFICATION, science of the anthropometric system of identification of criminals was used by the Brit. Government, 1898–1901, but with large amount of labour for little result; i. by finger-prints was

adopted, 1901, with remarkable results, and has become the recognised way of keeping record of prisoners.

IDEOGRAPH, palæographical term for picture-writing, such as hieroglyphics.

IDES, 15th day of Rom. month.

IDIOCY, see INSANITY.

IDIOM (Gk. *idios*, peculiar to an individual or thing), form of a particular language or language of a particular locality.

IDIOSYNCRASY, peculiar physical or mental condition characteristic of an individual, often taking the form, for example, of an undue feeling of discomfort in the presence of certain animals, odours, etc., or of undue susceptibility to certain drugs, or of eccentricity of habits.

IDLE (53° 50′ N., 1° 45′ W.), town, W. Riding, Yorkshire, England; woollen goods. Pop. (1911) 17,999.

IDOCRASE, see VESUVIANITE.

IDOLATRY.—Worship of idols or 'graven images' was not, as some have supposed, first stage in religious evolution, but posterior to animism. The idol worshipper fails to distinguish between his god and the idol, in whom he thinks his god dwells. 'Idolatry' in New Testament is used loosely for pagan rites.

IDOMENEUS, in Gk. legend, king of Crete who when sailing to Trojan War promised to Poseidon in return for protection the first thing he met on landing; this was his s., whom he sacrificed; Crete being smitten with plague, his subjects banished him.

IDRIA (46° N., 14° 1′ E.), town, Carniola, Austria; quicksilver mines. Pop. (1910) 6090.

IDRISI, EDRISI (*c.* A.D. 1099–1154), Arab. geographer; born at Ceuta, of famous Muhammadan family; studied at Cordova; travelled through Asia Minor, Egypt, Morocco, Spain, and Portugal. Pub. geographical work, 1154; constructed a globe of silver, divided it on the Ptolemaic system, and wrote explanatory book, pub. in 1592, and several times reissued and translated, notably 1866, *Description de l'Afrique et de l'Espagne*, by Dozy, and *l'Italia*, by Amari and Schiaparelli, 1883.

IDUMÆA, Gk. for Edom, territory of Moab; first inhabited by Horites, then by Edomites; for some time under suzerainty of kingdom of Judah, but later independent, then conquered by Assyria; Edomites were settled in S. Palestine, II. cent. B.C.

IDUN, IDUNA, Scandinavian goddess of spring and summer; seized by Loki (winter).

IDYLL, IDYL, name given by Greeks to short creative work, at first of general but afterwards of pastoral nature; cf. I's of Theocritus, Bion, Moschus.

IFFLAND, AUGUST WILHELM (1759–1814), Ger. actor-manager and playwright; excellent as author of melodramatic comedies.

IGLAU (49° 23′ N., 15° 35′ E.), town, Moravia, Austria; textiles, tobacco. Pop. (1910) 25,914.

IGLESIAS (39° 19′ N., 8° 32′ E.), town, Sardinia; bp.'s see; lead and zinc mines. Pop. 21,000.

IGNATIEFF, NICHOLAS PAVLOVICH, COUNT (1832–1908), Russ. diplomatist, who made treaties advantageous to his country with China, Khiva, and Bokhara.

IGNATIUS (d. *c.* 117 A.D.), one of Apostolic Fathers (*q.v.*). Though so famous, very little known of him. His epistles are preserved in three recensions, and controversy has raged over the complicated literary problem they present. I. contains seven epistles preserved in Greek, also Latin, Armenian, Syriac, and Coptic versions; II. contains these seven and six others, Gk., and Lat. version; III. (discovered by Cureton, 1845), three of first seven, preserved in Syriac. The controversy over the claims of I. and II. to be the original was mostly theological. Scholars mostly now recognise II. as original and III. as shortened from it. Ignatius defends Episcopacy and protests against Docetism and Judaising tendencies in Church.

Lightfoot, *Apostolic Fathers*.

IGNATIUS LOYOLA, see LOYOLA, IGNATIUS OF.

IGNATIUS'S BEANS, seeds of *Strychnos Ignatii*, containing strychnine; found in Philippines; so named by Jesuits.

IGNEOUS ROCKS, see GEOLOGY.

IGNIS FATUUS, see WILL-O'-THE-WISP.

IGNORAMUS (Lat. pres. tense 1st person plural of verb 'to know not'), word formerly written by jury on dorso of bill of indictment which they did not find 'true'; term for stupid person.

IGNORANCE OF THE LAW does not in England excuse a man from the consequences of his acts.

IGNORANTINES, name of a religious order instituted at Rheims, 1680, now with 14,000 members from all parts of the world.

IGUALADA (41° 35′ N., 1° 34′ E.), town, Barcelona, Spain, on Noya; textiles. Pop. 10,000.

IGUANA, see LIZARDS.

IGUANODON, see REPTILES.

IGUVIUM, modern GUBBIO (*q.v.*); ancient town, Umbria, Central Italy; *c.* 23 miles N.N.E. of Perusia, with Rom. remains. Famous *Eugubine Tables*, 7 in number, with religious writings in Lat. and Umbrian, were discovered, 1444, and kept in town-house. I. was famed for majolica work up to XV. cent.; an important town in pre-Rom. period; received Rom. citizenship after Social War; destroyed by Goths, 552.

IKI-SHIMA (33° 55′ N., 129° 45′ E.), small island of Japan, N.W. of Kiushiu; area, 5858 sq. miles. Pop. *c.* 37,000.

ILAGAN (17° 5′ N., 121° 50′ E.), town, Luzon, Philippine Islands; tobacco region. Pop. *c.* 17,000.

ILCHESTER, ancient *Ischalis* (51° N., 2° 41′ W.), decayed town, Somersetshire, England, on Yeo.

ÎLE-DE-FRANCE, ancient province, France; enclosed between rivers Seine, Marne, Oise, Aisne, and Ourcq; corresponded to departments Seine, Seine-et-Oise, Seine-et-Marne, Aisne, Oise, and a small part of Nievre and Loiret; capital, Paris.

ILETSK, ILETSKOI-GORODOK (51° 29′ N., 53° 29′ E.), town, Orenburg, Russia, near junction of Ilek and Ural; salt-works. Pop. 12,500.

ILEUM, see DIGESTION.

ILEX, see under HOLLY and OAK.

ILFELD (51° 35′ N., 10° 47′ E.), town, at foot of Harz, Hanover, Germany.

ILFORD (51° 34′ N., 0° 5′ E.), town, Essex, England; photographic material works. Pop. (1911) 78,205.

ILFRACOMBE (51° 12′ N., 4° 7′ W.), watering-place and seaport, Devonshire, England, on Bristol Channel. Pop. (1911) 8935.

ILHAVO (40° 34′ N., 8° 38′ W.), seaport town, Aveiro, Portugal; manufactures glass, porcelain. Pop. 13,500.

ILI (45° N., 75° 30′ E.), river, Central Asia; rises in Tian-Shan mts., and flowing W., then N.W., enters Lake Balkash; length, 900 miles; navigable in lower course.

ILIAC PASSION, popular name for COLIC (*q.v.*).

ILIAD, see HOMER.

ILION (43° 3′ N., 75° 3′ W.), village, New York, U.S.A., on Mohawk; Remington firearms and typewriters. Pop. (1910) 6588.

ILIUM, TROY (*q.v.*).

ILKESTON (52° 58′ N., 1° 20′ W.), market town, Derbyshire, England; hosiery, lace; coal and iron mines. Pop. (1911) 7092.

ILKLEY (53° 55′ N., 1° 50′ W.), town, health-resort, W. Riding, Yorkshire, England.

ILL (48° 30′ N., 7° 30′ E.), river, Alsace, Germany; joins Rhine 9 miles below Strasburg; length, 125 miles.

ILLAWARA (34° 30′ S., 150° 30′ E.), maritime district, New South Wales, Australia; fertile; coal and iron mines. Pop. 8500.

ILLE-ET-VILAINE (48° 10′ N., 1° 40′ W.), maritime department, N.W. France, formed from part of ancient Brittany; mostly level, with occasional marshes and numerous lakes; watered chiefly by the Ille and Vilaine; fine horses and cattle are reared; cereals, flax, hemp, apples, and pears grown; pro-

duces cider, butter, and cheese; iron mines, slate quarries; oyster fisheries; capital, Rennes. Pop. (1911) 608,098.

ILLEGITIMACY is the condition of being born out of lawful wedlock. The mother may apply to the magistrate for an order of maintenance against the father of the child, or the Guardians of the Poor may make such application if the child is chargeable to the parish, and when paternity is proved or acknowledged a sum not exceeding 5s. per week for the care of the child can be required of the father. The responsibility for the bringing up of such child rests on the mother. In Scotland, but not in England, the marriage of the parents legitimises children born before wedlock. An illegitimate child cannot inherit by right of succession—for in law he has no father—but otherwise is under no legal disabilities. Eng. law recognises that the offspring is legitimate no matter how soon the birth takes place after marriage, but declares the offspring illegitimate when born of parents incompetent to marry, *i.e.* persons who are within the prohibited degrees of consanguinity or affinity.

ILLER (48° 20′ N., 10° E.), river, Bavaria, Germany; joins Danube near Ulm; length, *c.* 100 miles.

ILLINOIS (40° N., 89° 30′ W.), N. central state of U.S.A.; bounded N. by Wisconsin, E. by Lake Michigan and Indiana, S.E. and S. by the Ohio River (which separates it from Kentucky), S.W. and W. by Mississippi River (which separates it from Missouri and Iowa). Area, *c.* 56,650 sq. miles, of which *c.* 650 are water. Capital is Springfield. Situated in the prairie-plain region, partly in the valley of the Mississippi and touching the Great Lake district in the N.E., the surface slopes gently to the S. and S.W.; the average height above sea-level is 600 ft., the highest elevation being Charles Mound (*c.* 1200 ft.), on the boundary between I. and Wisconsin; bluffs are encountered along the principal rivers—the best-known being Starved Rock. There are several elevations, the largest stretching across the south from 6 to 10 miles broad, and reaching *c.* 1050 ft. above sea-level.

There are almost 300 streams—mostly tributaries of the Mississippi, but some, tributaries of the Wabash and Ohio Rivers; the most important river is the Illinois, traversing the N., central, and W. regions, and at times broadening into vast lakes—notably the lovely Peoria Lake; the Kaskaskia River in the S. and the Rock in the N. enter the Mississippi; tributaries of the Wabash and Ohio include the Embarrass, Little Wabash, Saline, and Cache in the E.; the Chicago River—only 1 mile long—originally entered Lake Michigan, but now flows, by Chicago Drainage Canal, into Mississippi; several shallow lakes lie to the N.E. The soil, especially in the river valleys, is exceedingly fertile. The climate is varied—the mean annual temperature being some 11° Fahr. higher in the S. than in the N., which again varies; but summers and winters are both severe.

The chief mineral product is coal, I. being the second largest producer in U.S., and the coal-fields extending over a vast area of *c.* 42,900 sq. miles; there are also many petroleum wells; zinc is worked, as also are lead, limestone, salt, and fluor-spar. I. is the richest of the U.S. in agriculture, the chief cereal crops being maize, wheat, oats, and hay; tobacco is grown and an active live-stock industry carried on. Chief industries are slaughtering and meat-packing, iron and steel foundries. Commerce is conducted by rivers, lakes, canals, and electric and other railroads.

Chicago—the largest city—is second largest in America; other important cities are Peoria, East St. Louis, Quincy, Springfield, Rockford, Joliet. There are many univ's. The name of the state is derived from Illinois confederacy of Indians—the original inhabitants; explored (*c.* 1673) by a Frenchman, Joliet; passed into the hands of English (*c.* 1763), and admitted to Union as State in 1818. Pop. (1910) 5,638,591.

J. F. Mather, *The Making of Illinois* (Chicago, 1900); J. H. Finley, *Illinois*.

ILLORIN, see ILORIN.

ILLUMINATI (Lat 'enlightened'), term assumed originally by sects of Christian mystics, who claimed that their minds were illuminated by supernatural light; title assumed by Rosicrucians and modern associations of political idealists.

ILLUMINATION, ART OF, the ornamentation of manuscript. The Celtic and Teutonic races of Europe had their own art before coming into contact with Rome, Celtic civilisation being at its height in the VI. cent. B.C., and the ornamentation which they afterwards applied to MSS. was largely copied from the characteristic forms of their metal-work. Byzantine art, however, which retained the classical tradition, exercised a considerable influence on Italy, where the Eastern Empire retained possessions until XI. cent., and through Italy on Europe. The earliest examples extant of Byzantine illumination (VI. cent) are of extreme splendour, some of silver writing on purple vellum, others with gaily painted designs on gilded vellum, and gracefully drawn figures in miniature as illustrations. Initials have been called attention to by the apparently independent instinct of all schools of illuminators, but all may have been influenced in some way not now to be traced by the Byzantine tradition. The great moment of the commencement of a book was not, however, celebrated so impressively in the Byzantine as in the Western schools. The great age of Byzantine illumination was the XI. cent. The characteristic Celtic interlacing of geometric designs, dragons, etc., in medallion and leaf-shapes, appear in the elaborate borders of Celtic MSS. and in the tail of the intricate initials, and the human figure is sometimes equally elaborately conventionalised with the animal. Celtic school had more influence than the Rom. on England until the Conquest. In France, Merovingian illumination of a simple kind was replaced in 800 by the Carolingian school which culminated in the X. cent.; it was marked by splendour of pigment and some success in the drawing of the miniatures. Illumination of XII.–XV. cent's has some features of ornaments of architecture of those cent's, and the miniature initial was a characteristic feature. Eng. work was noted in XIII. and XIV. cent's, but the greatest of all were the Ital. and Flemish schools of the early Renaissance, mastery of perspective and figure-drawing appearing for the first time.

Johnson, *Writing, Illuminating, and Lettering* (1906).

Illumination, the amount of light falling upon an object. If an object is illuminated it must be opaque, *i.e.* must not absorb all the light. The eye is a very poor judge of intensity of i., but it judges equality of i. fairly accurately, and all i. experiments take account of this. I. depends on the candle-power of the source and its distance.

ILLUSTRATION.—The history of i. commences with the Egyptian *Book of the Dead*. There remain no Gk. or Rom. writings which can be dated with certainty before the Christian era, but it is known that i. was practised by the Romans. It is found in the III.-cent. *Iliad* of the Ambrosian Library at Milan, developed in the miniatures of Christian art (see ILLUMINATION, ART OF), and became an important feature of printed books. The earliest impressions of the printing press, where text and i. were both engraved on wood together, are known as xylographic books. Bohner's illustrated *Fabulæ* were printed at Bamberg in 1461, Burgh's illustrated *Parvus et Magnus Catho* in England *c.* 1481. One of earliest and greatest illustrators was Albrecht Dürer (1471–1528). England hardly entered the field of art in any line in the XV. and XVI. cent's, but took the lead in i. in the XVIII. and XIX. cent's. Not only in his set i's, as for Butler's *Hudibras* (1726), but in *Marriage à la mode, The Rake's Progress*, etc., Hogarth gave interest to 'subjects of a modern kind and moral nature,' and thus stimulated i. Wood-engraving gave place to metal for i. in the XVI. cent., but the former method was revived at the close of the XVIII. cent. by Thomas Bewick whose *Quadrupeds* (1790) and *British Birds* (1797–1804)

were models of i.; the use of lithography in 1796 marked the beginning of cheap i.

At the same time the early XIX. cent. used steel for *éditions de luxe*, such as Whitaker's *History of Richmondshire*, illustrated by Turner. The most wonderful perhaps of all i's, Blake's *I's to the Book of Job*, belong to this period. Cruikshank, Leech, and Hablot K. Browne were followed by Tenniel, Mulready, and others, and they by the Pre-Raphaelites whose works, engraved by the Dalziels in *Good Words*, etc., made 'the Sixties' a great period in i. *Punch* has held a unique position among periodicals in excellence of i. since its commencement, and the *Graphic* (founded 1869) has had work of best black-and-white artists. Modern i. has been revolutionised by photogravure and (since 1875) by process. William Morris, who founded the Kelmscott Press in 1891, represents a second Pre-Raphaelite movement, but the general trend of i. is against mediævalism. A list of prominent illustrators of late times must include Abbey, Mrs. Allingham, Barnard, Beardsley, Tom Browne, Caldecott, Caton Woodville, Crane, Fildes, Frost, Furniss, Garth Jones, Dana Gibson, Green, Greenaway, Gregory, Hall, Herkomer, Holt, Phil May, Millet, Nicholson, Parsons, Partridge, Pennell, Herbert Railton, Raven Hill, Reinhardt, Renouard, Ricketts, Sambourne, Savage, Shannon, Sullivan, Hugh Thomson, Townsend, Strang, Sturge Moore, Woods.

Pennell, *Modern Illustration* (1895); Crane, *Decorative Illustration of Books* (1896).

ILLUSTRES (Lat. 'illustrious ones'), title of chief dignitaries of later Rom. empire.

ILLYRIA, wide extent of country along W. shore of Adriatic, between Fiume and Durazzo; stretches inland to Danube and Servian Morava; embraces modern provinces of Dalmatia, Bosnia, Herzegovina, and Montenegro; also S. half of Croatia-Slavonia, W. part of Servia, the sanjak of Novibazar, and extreme N. of Albania; inhabitants never clearly identified; coast colonised by Greeks, VI. and VII. cent's B.C., but some 300 years later Latin civilisation spread rapidly. After long history of continued warfare, I. (excepting some mountain tribes) ultimately became entirely Serbo-Croatian, in population, language, and culture.

ILMEN (58° 15′ N., 31° 30′ E.), fresh-water lake, near Novgorod, European Russia; area, *c.* 360 sq. miles.

ILMENAU (50° 41′ N., 10° 54′ E.), town, summer esort, grand-duchy Saxe-Weimar, Germany; porcelain and glass. Pop. (1910) 12,198.

ILMENITE, a mineral similar to hæmatite in appearance; opaque and slightly magnetic; generally found in gneisses and schists together with magnetite.

ILOILO (10° 50′ N., 122° 42′ E.), seaport, Panay, Philippine Islands; exports sugar, tobacco, rice. Pop. *c.* 20,000.

ILORIN, Illorin (8° 27′ N., 4° 30′ E.), town and province, N. Nigeria, W. Africa; important trading centre; wood-carving and leather industries. Pop. (prov.) *c.* 73,000.

ILSENBURG (51° 52′ N., 10° 40′ E.), small town, health-resort in the Harz, Saxony, Germany; iron-works. Pop. (1910) 4911.

IMAGE, term used in psychology for the impress made by an object on the eye, or for a mental impress; in theol. and art for any likeness of a person or thing; i's have played a considerable part in some religions (see Iconoclasts); in the Anglican Church adoration of i's is forbidden in art. XXII.

Image Worship.—In most great religions images have been important, not the least so in Christianity. There are different conceptions of an image: (1) it is that and nothing more; (2) it is the abode of the person or deity whom it represents, or retains a mysterious connection with him. Thus by getting possession of a man's image one could injure the man himself. This idea is called *sympathetic magic*. Images are forbidden to Muhammadans. Eating, moving, and other acts have been ascribed to images of Christ, the Virgin, and Saints, as to those of heathen gods of antiquity. See Iconoclasts.

Tylor, *Primitive Culture*; Farnell, *Evolution of Religion* (1905); Frazer, *The Golden Bough* (1900).

IMAGINATION, used generally for calling up to the mind ideas other than those conveyed by senses, and, in psychology, for calling up ideas formerly received through the senses.

IMÂM, the title of the caliph or leader of the Muhammadans; various sects have disputed as to nature and extent of his powers. See Shiites and Sunnites.

IMATRA FALLS, see Finland.

IMBECILE, weak, especially mentally weak; used of a state of mental weakness less advanced than idiocy.

IMBREX (from Lat. *imber*, rain), Lat. term for roof-tile curved to carry off rain.

IMBROS (40° 10′ N., 25° 50′ E.), Turkish island, in Ægean Sea; fertile; seat of Gk. bp. Pop. *c.* 8500.

IMERITIA, Imeretia (42° N., 43° E.), district, forming part of Kutais, Transcaucasia, Russia.

IMHOTEP, see Egypt.

IMITATION, copying the movements of a model, or the results of such movements. It may be (1) impulsive, *e.g.* 'contagious' coughing and yawning, or (a higher type, presupposing more attention) the rhythmical movements of a spectator of dancing; (2) inventional, arising from admiration of the agent copied, or of the dexterity copied, or from desire for a remoter end to which acquirement of the dexterity is a necessary means. The tendency to imitate is in most respects similar to instinctive tendencies, and is the young child's or animal's earliest mode of acquiring the habits of the race. See Psychology.

IMITATION OF CHRIST, famous devotional book dating from XV. cent.; authorship much disputed; some have ascribed it to John Gerson of Paris, and others to a John Gersen who probably never lived; but these do not now find many defenders. It must be either anonymous or (much more probably) by St. Thomas à Kempis (1380-1471); he lived near Utrecht, and the I. certainly emanates from Holland. The I. is intensely loved by Catholics and Protestants alike.

IMMACULATE CONCEPTION, see Mary.

IMMANENCE, meaning 'indwelling' as opposed to 'transcendence'; so the I. of God is the view of Him as a spiritual force in the universe, not a power controlling it from without.

IMMANUEL, Emmanuel (*q.v.*).

IMMANUEL, BEN SOLOMON (*c.* 1265–*c.* 1330), Jewish satirical poet of Italy in Dante's time.

IMMERMANN, KARL LEBERECHT (1796–1840), Ger. Romantic dramatist and novelist; b. Magdeburg; best works, *Merlin* (dramatic poem), *Die Epigonen* and *Münchhausen* (novels).

IMMIGRATION into U.S.A., Canada, and Australia has increased greatly during the XIX. and XX. cent's, owing to superabundance of population in most European countries. With the opening up of every new tract of land comes a tide of immigration. In 1910, 94,495 persons immigrated into Australia, while in 1911, 878,587 were admitted into U.S.A., 22,349 being rejected owing to strict Amer. i. laws.

Gt. Britain also attracts foreign i.; there are about 290,000 foreigners resident in the United Kingdom, but it is calculated that in 1911 there were 260,000 emigrants.

IMMORTELLES, see Everlastings.

IMMORTALITY.—Belief in I. has been widespread, but not universal. It developed in Judaism comparatively late, but it has always formed a part, perhaps the chief part, of the Christian hope, and exists in many other religions. In early Christianity it was allied with the expectation of the speedy end of the world. Many arguments have been used to uphold it, and although no one of them can prove it, the sum-total possesses great cumulative force. Besides the feeling that another world is required to redress this, it can be said matter is eternal, so must spirit be too; the materialistic argument against it can be

met by the assertion we do know that we are something more than our bodies. The pantheistic view that we shall be absorbed into divine life fails to satisfy those who believe there will be intensification rather than annulling of our personality. See HEBREW RELIGION; ESCHATOLOGY.

Charles, *Critical History of Doctrine of Future Life*; Sir Oliver Lodge, *Life and Matter*; Ward, *Naturalism and Agnosticism*; Buckle, *The After Life* (1907).

IMMUNITY, resistance to a certain disease or to a certain organism, either natural or artificially produced by different means. See BACTERIOLOGY.

IMOLA, ancient *Forum Cornelii* (44° 21′ N., 11° 43′ E.), town, Bologna, Italy; bp.'s see; manufactures cream of tartar, pottery. Pop. 33,000.

IMP, formerly scion, then child; from phrase 'i. of Satan' came modern use.

IMPEACHMENT, criminal process; in Great Britain, form of procedure in trial by House of Lords at instance of House of Commons. Of great importance in Eng. history in bringing to trial offenders too powerful to be condemned by ordinary law courts; disused in XIX. cent.; retained in constitution of U.S.A.

IMPERIAL CHAMBER (Ger. *Reichskammergericht*), from 1495 till its dissolution Court of Holy Rom. Empire; consisted of 16, then 18, judges and officials app. by empire; took place of old Imperial Court whose members were emperor's nominees. Its work was unsystematic and often taken over by the Aulic Council.

IMPERIAL CITIES in former times were cities in Germany which were directly under the emperor and owed allegiance to no intermediate lord; name became common in XIII. cent. (Ger. *Reichstadt*); cities attained their status by imperial grant or by buying their freedom from the intermediate lord; examples are Basel, Cologne, Mainz, Strassburg, Worms.

IMPERIALISM in modern usage signifies the desire to develop and consolidate an Empire; term specially applied to British Imperialists (opposed to 'Little Englanders'). Under the Imperial idea come the schemes of preferential tariff, conjoint defence of over-seas possessions, and the representation of Brit. Dominions in the Imperial Parliament.

IMPETIGO CONTAGIOSA, see SKIN (SKIN DISEASES).

IMPEY, SIR ELIJAH (1732–1809), chief-justice of Bengal; supported Warren Hastings; impeached in 1783 for action in trial of Maharajah Nand Kumar, but acquitted.

IMPHAL, MANIPUR (24° 48′ N., 94° E.), town, capital Manipur, Assam, India. Pop. 67,000.

IMPLEMENT (Lat. *implere*, to fill), Scot. legal term for fulfilment of contract.

IMPLUVIUM (Lat. from *impluere*, to rain into), receptacle in atrium of Rom. house for rain falling through *compluvium* of roof.

IMPOSITION (Lat. *imponere*, to place upon), arrangement of type after composition in printing.

IMPOST, architectural term for part of door-post on which arch rests; often forms capital of a pilaster, or is moulded.

IMPOTENCE, inability of male to perform function of reproduction; may arise from excessive nervous strain, disease, or excess.

IMPRESSIONISM IN PAINTING.—The term i. is said to have originated in Manet's claim (expressed in the preface to the catalogue of his works at the *Exposition Universelle*, 1867) that the painter's function was to render his own 'impression' of things seen. Impressionists and Post-Impressionists are united in belief that the artist may exaggerate a feature which interests him in his subject and may omit a feature which does not interest him; thus the art of this school is, above all, the expression of the individuality of the artist. Technical differences also characterise i. Manet preached pure colours and, in avoiding mixing of pigments, introduced the patchiness of i. at a near view; for this Velazquez's authority was cited. From Delacroix and Turner the Fr. school learned the interaction of colours and commenced experiments in the production of new effects by adjacent dots of colour, a process known as *pointillisme*; facility and invention in obtaining effects of texture and light are characteristic. Monet, Degas, Pissarro, Gauguin, are among the great Fr. Impressionists. England has a remarkable school of Post-Impressionists, led by the Rothensteins, who unite extreme delicacy of colouring and detail with a sense of fun, a new thing in high art. The Post-Impressionists have largely abandoned daub for pastel effects.

Lewis Hind, *Post-Impressionism* (1911); Dewhurst, *Impressionist Painting*.

IMPRESSMENT, the seizing and compelling men to enter navy; practice was resorted to in this country from the XIV. cent. till reign of George III., laws being passed to regulate the system; it has now died out, although these laws have not been repealed. Right to exercise power of i. is claimed by all sovereign authorities, and it has been resorted to by all European states.

IMPRISONMENT, punishment by incarceration (with or without hard labour) for offences which are not serious enough for penal servitude. I. in first division amounts to little more than confinement—prisoners may wear ordinary clothes, receive friends, etc.; in second division, special rules somewhat similar to above are in force; while criminal offenders are placed in third division (hard labour). The maximum term is generally two years.

Rules for i. are regulated by Home Secretary, the Secretary for Scotland, the General Prisons Board of Ireland. See PRISON.

IMPROVISATORE, poet or musician who has *gift* of composing without study and recites as he composes; apparently common in Middle Ages, but only appears as a freak in modern times.

IN CŒNA DOMINI (Lat. 'at the Lord's Supper'), papal bull, thus commencing, issued yearly against heretics, 1363–1770.

IN FORMÂ PAUPERIS (Lat. 'as a pauper'), legal term for qualification by which free counsel and solicitor may be obtained by defendant; the pauper must be worth under £25, clothes excepted.

IN-ANTIS, architectural term for classical buildings in which two columns are placed between the *antæ* of the entrance.

IN-BREEDING, see BREED.

INAGUA, see under BAHAMAS.

INCANTATION (Lat. *cantare*, to sing), spell fashioned on the belief universal in primitive men that words placed in a certain order have magical power.

INCAS, see under PERU.

INCE, WILLIAM (fl. XVIII. cent.), Eng. furniture-maker whose early work was in classical school of Chippendale; assisted later in mediæval revival.

INCE-IN-MAKERFIELD (53° 31′ N., 2° 37′ W.), town, Lancashire, England; collieries, ironworks. Pop. (1911) 22,038.

INCENDIARISM, ARSON (*q.v.*).

INCENSE, a term given to various substances which when burnt give off a sweet smell—generally used in religious worship. It was used in many ancient Oriental worships, particularly in Egypt, as appears from various monuments. It was common, too, in ancient India, where its use still survives—even among Muhammadans, who elsewhere do not use it much—and in Persia and Babylonia; it is also used in Buddhist countries. The ancient Greeks burnt i. to their gods, and it was employed in Rome on festal occasions. Among the Jews the burning of i. accompanied animal sacrifices, and in the Temple its object was partly fumigatory to overcome the stench of the blood of the slaughtered beasts. In the Christian Church its use is not definitely proved before the V. cent., as the Early

Fathers do not refer to it, but it was certainly used in the catacombs at Rome, though this may have been for sanitary reasons. Its use was regular in the Middle Ages, and is enjoined at certain portions of sung Mass in the Rom. Missal. It is likewise common in the Gk. and Eastern Churches, where there are liturgical formulæ for the censing of the bread and wine. In England, according to the uses of Sarum and Bangor, the altar was to be censed during Mass, but at the Reformation its use was generally abandoned. It was revived together with so many other ancient customs in the XIX. cent., and there was sharp controversy as to its legality, as its use in the reign of Edward VI. could not be proved. In 1899 the two abp's decided that its ceremonial use was illegal. Sometimes it has been used non-ceremonially to disinfect a church or to give a pleasant odour before service began.

INCEST (Lat. *incestus*, unchaste), sexual intercourse between persons who could not marry on account of affinity; punishable in England under Act of 1908, for the purposes of which alone the illegitimate child is not *filius nullius*. The death penalty for the offence in Scotland was abolished by the Criminal Procedure Act, 1887.

INCH, 12th part of an Eng. ft.; divided formerly into 3 barleycorns and supposed to measure 3 barleycorns placed end to end.

INCHBALD, MRS. ELIZABETH (1753–1821), Eng. actress, dramatist, and novelist; beautiful and skilful player, but never overcame impediment in speech; the writings show too much cultivation of 'sentiment.'

INCHCAPE, see BELL ROCK.

INCHCOLM and **INCHKEITH**, islands in FORTH (*q.v.*).

INCHIQUIN, BARONY AND EARLDOM OF, Irish honours. Murrough O'Brien, descendant of Brian Boroimhe, Irish king, was persuaded by the Eng. government to accept the barony of I. and earldom of Thomond. Murrough O'Brien, 6th baron, was made Earl of I. in 1654 by Charles II. for services to Charles I. His s. William, 2nd earl, was chosen out of many rivals for governorship of Tangier, the Duchess of Portsmouth interceding for him on her knees. Murrough, 5th earl, was cr. Marquess of Thomond in 1800. The marquessate and earldom became extinct in 1855, but the barony passed to a descendant of the first baron, Sir Lucius O'Brien (1800–72), grandfather of Sir Lucius William O'Brien (b. 1864), present Lord I.

INCLINOMETER, instrument for measuring the *dip* (inclination of earth's magnetic field to horizontal). Two kinds of i's are in use—the *dipping needle* and the *earth inductor*. The former is a suitably mounted, light, magnetised needle, free to move about a horizontal axis; the latter, a coil of wire spun about a diameter, adjusted until no current is induced. The inclination of the needle, or of the diameter of the coil, to the horizontal measures the dip.

INCLOSURE, AWARD, permission given by parliament for i. of Commons (*q.v.*), and division between lord of the manor and the commoners, the former receiving the largest share.

INCOME TAX, in Gt. Britain, a tax levied by state upon income whether derived from land, houses, mine shares, trades, or any other source; it was first levied in 1799, abolished in 1806, reimposed in 1842, and continues to present day; originally a war tax, it is now a permanent part of revenue. Amount has varied considerably, lowest being 2d. in the pound in 1874, highest 1s. 4d. in 1855–56. Before 1907 no distinction was made between earned and unearned incomes, but in that year an abatement was made of 3d. in the pound on all earned incomes up to £200 (rate 9d. in the pound), 1s. in the pound being the rate on earned incomes between £2000 and £3000. By the Finance Act of 1909 these rates remained unchanged; but the rate on all unearned monies and on the earned part of incomes over £3000 was raised to 1s. 2d.; a special allowance equal to the amount of income tax on £10 was allowed to parents whose total income did not exceed £500, in respect of every child under age of sixteen; and a super-tax of 6d. in the pound was levied on incomes over £5000, charged on amount by which total income exceeded £3000. Incomes not exceeding £160 are exempt, and those between £160 and £700 are allowed graduated abatements.

The levying of Taxes upon Income has now been adopted in U.S.A.

Robinson, *Law Relating to Income Tax* (1908); Fry, *Income Tax* (1910).

INCORPORATION, granting of certain powers of self-government to a town (which then becomes a borough) or a company; the town receives i. after successful petition to the crown, the company by certificate from the registrar of Joint Stock Companies.

INCUBATION AND INCUBATORS.—Incubation, originally the sitting of a hen on her eggs, now means the exposure of a living organism to a uniform temperature, under suitable conditions of moisture and ventilation; incubators are enclosed spaces with devices for securing this. For each organism there is a maximum, minimum, and optimum temperature. Incubation should be conducted at the optimum temperature and never reach the maximum or minimum. EGG INCUBATORS are employed to hatch eggs artificially, a practice known to the early Chinese and Egyptians. The latter employed *Mamals*, large closed brick ovens in which thousands of eggs were hatched. These were heated by low fires, which after the twelfth day were allowed to go out. Modern egg incubators are heated by hot air or hot water. The essential is that the incubator shall maintain a constant temperature, notwithstanding changes in temperature of the outer air, fluctuations in gas pressure, and the occasional opening of the incubator. After the tenth day the chick, having developed a fœtal respiratory organ, produces more heat, and the incubator should automatically adjust itself to this. The providing of increased air for respiration increases evaporation, and the eggs should be provided with additional moisture.

Hot-air incubators are double-walled metal cylinders, the space between the walls being packed with non-conducting material. In the centre of the floor there is a box with pipes which, after traversing the incubator, open to the exterior at the top. Inside the box there is a lamp which heats the air. The hot air then circulates through the pipes in the incubator. Fresh air is supplied to the incubator by a tube on either side of the heating box. A jar of water supplies sufficient moisture. The temperature is regulated by a valve over the main pipe from the heating chamber. Increase in temperature opens the valve, decrease closes it. The valve is worked by the expansion of a column of mercury actuating a system of levers.

BACTERIOLOGICAL INCUBATORS may be hot or cool; the former are kept at 37° C., the latter at 20° C. Cool incubators are used for gelatin cultures of pathogenic bacteria or to grow non-pathogenic bacteria and moulds. The temperature is maintained in summer by the passage of cold water round the walls and in winter by warm water. The hot incubators for pathogenic bacteria are square double-walled metal boxes covered with wood. Warm water is poured into the space between the metal walls and heated underneath by oil, gas, or electricity. The flame is regulated by a system of levers which can decrease or increase it when the temperature of the water makes a valve open or shut. The temperature of such an incubator remains constant for months. The air surrounding the incubator should be kept as still as possible and should be some degrees below the temperature of the incubator. A very carefully regulated and ventilated form of this incubator is used to rear prematurely born infants. When the child has grown sufficiently the temperature is gradually decreased.

INCUBUS (Lat. *incubare*, to lie upon), demon supposed to visit women and engender witches, etc.; the feminine form was the *succuba*.

INCUMBENT (Lat. *incumbere*, to lean upon; the reason for this name is not known), holder of a benefice in Anglican Church.

INCUNABULA (Lat. cradle; plural of *incunabulum*), title (nationalised in various countries) given to printed books of XV. cent.; of these there are about 30,000; Ger. scholars are engaged in making a complete list for the government. Previous bibliographies are Beughem, *I. typographiæ* (1688); Panzer, *Annales typographici* (1793 and 1803); Hain, *Repertorium bibliographicum* (1826–38); Proctor, *Index to the Early Printed Books in the Brit. Museum* (1898); Copinger, *Supplement to Hain's Repertorium* (1898–1902). Many facsimiles were printed in the late XIX. cent.

INDABA, intertribal conference of Kaffirs.

INDEMNITY, ACT OF, passed every session by Brit. parliament for relief of office-holders who had omitted qualifying oaths, etc.; abolished by Promissory Oaths Act, 1868.

INDENTURE, name for legal deed between two or more parties. Formerly the duplicates of the agreement were written on one parchment, which was then cut into two by indented line, so that the deed and counterpart could be fitted into one another and thus give evidence of being the same agreement.

INDEPENDENCE (39° 7′ N., 94° 30′ W.), city, Missouri, U.S.A.; iron foundries, flour-mills. Pop. (1910) 9859.

INDEPENDENCE, DECLARATION OF, instrument whereby the U.S.A. repudiated the suzerainty of Great Britain in 1776; document was signed by fifty-six members, among whom were John Adams, William Ellery, William Floyd, Benjamin Franklin, Francis Hopkinson, Thomas Jefferson, John Penn and Roger Sherman. The resolution of independence was passed on July 2, and the Declaration published on July 4, which has ever since been a national holiday; it was drawn up by Jefferson, and relates the whole history of Anglo-Amer. relations; the original document is now partly illegible. Has exercised incalculable influence on U.S. constitution.

Hazleton, *The Declaration of Independence* (1906).

INDEPENDENTS, name given to churches where the individual church is supreme; often called 'Congregationalist.'

INDEX, list of words about which book contains information, arranged in alphabetical order. In learned books there used to be, and still often is, an *I. personum*, *I. locorum*, and *I. rerum*. The Eng. I. Soc. was founded 1877, and established useful rules for the important art of indexing.

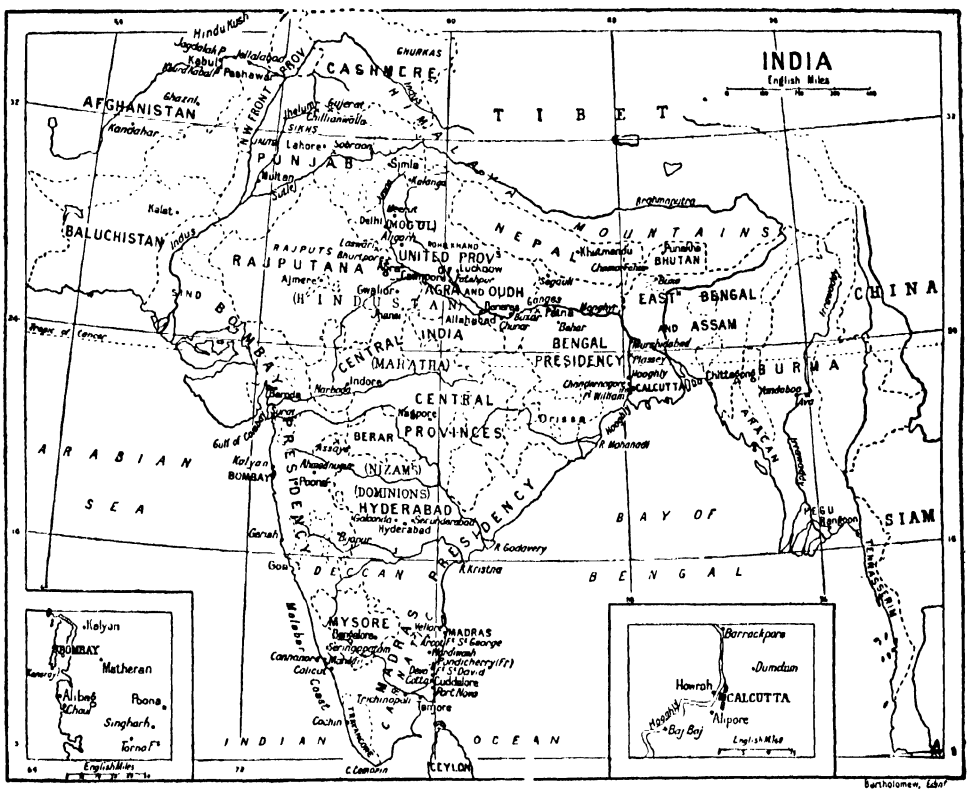
Wheatley, *How to make an I.* (1902).

INDEX LIBRORUM PROHIBITORUM, or simply 'The Index,' list of books which R.C. Church officially prohibits her members from having or reading. First list was issued by Pope Paul IV. in 1557; reissued from time to time, and recast by Leo XIII., 1897, when books defending heresy were prohibited, but not necessarily books by heretics not so doing; likewise immoral books must not be read. Special permission can be given to scholars and others to read prohibited works.

INDIA, the central peninsula of S. Asia; it lies between 8° and 38° N., and 67° and 95° E. (or, including Burma, 75° E.), and is bounded N.E. by Tibet, N. by Russ. and Chin. Turkestan, N.W. by Afghanistan and Baluchistan, S.W. by the Arabian Sea, S.E. by the Bay of Bengal. It is *c.* 2000 miles long from N. to S., and *c.* 2000 miles wide from near Kurrachee to the E. boundary of Assam, the area *c.* 1,300,000, the coast-line *c.* 2000 miles. Starting from the Pamir, in the extreme N. the Karakoram Range and great mass of the Himalayas curve round along the N.E.; the Sulaiman and other ranges of Afghanistan and Baluchistan pass along the N.W. S. of all these, something like an inverted V, is a great lowland plain, from 150 to over 300 miles wide, comprising the valleys of the Ganges and lower Brahmaputra on the N.E. and the Indus on the N.W. In the centre, stretching N. from the Kathiawar Peninsula, are the Aravalli Hills; extending from the Gulf of Cambay to near Benares are the Vindhya Hills and the Kaimur Hills, immediately S. of which are, on the W., the valley of the Nerbudda, on the E. the Son, a tributary of the Ganges. S. of these are the Satpura and Mahadeo Hills, below which the great central plateau of the Deccan (1500 to 12,000 ft. of average height) stretches S. with the W. and E. Ghauts along its borders. The latter ranges meet in the S. at Nilgiri Hills, S. of which is the Palghat Gap (1000 ft.), round which hills rise to over 8500 ft. It is the only pass from E. to W. for over 700 miles. From it the Anamalai and Cardamon Hills stretch to the extreme S. of the peninsula. The Tapti enters the sea between the Satpura Hills and the N. end of the Western Ghauts; otherwise the Deccan is drained E. by the Mahanadi, Godavery, Kistna (Krishna), Cauvery, etc. The climate varies from the cold of the perpetual snows of the Himalayas to the intense, moist heat of the plains and the dry heat of the plateau, while other differences are caused by the continental conditions of the N. and insular conditions of the S. The S.W. (summer) and N.E. (winter) monsoons are much modified by local configuration. The three seasons are: hot (March to May), wet (June to Oct., later in S. Madras), and cool. The rainfall varies from 8 in. in Sind and Cutch to 12 in Rajputana, 21½ in the Punjab plains, 31 in the N. Deccan, 40–60 in Central I., W. Bengal, and Orissa, 65 in Lower Bengal, 95 in Assam and Cachar, 114 in the E. Ghauts, 139 in the W. Ghauts, and 152–73 in Lower Burma, while among the Assam Hills it is said to reach 500 to 600 ins. Owing to density of population and great evaporation any failure of the regular rains is disastrous and leads to serious famine. The subsoil of the great Indo-Gangetic plain of the north is Recent Alluvium, that of the Himalayas possibly at points Cambrian, with Crystalline, Upper and Lower Tertiary rocks, Volcanic and Cretaceous strata. Large districts of E. and S. peninsula have Crystalline rocks; fringing the Crystalline rocks of the Deccan is a strip of Recent Alluvium along the Bay of Bengal.

History.—The earliest peoples found in I. are the Dravidians (*q.v.*), who were driven S. and into the less eligible hill-districts by an Aryan invasion. This took place possibly in the II. millennium B.C., possibly earlier, and is commemorated in the contemporaneous poem the *Rig-Veda*. By the VI. cent. B.C. sixteen Aryan states had been established S. of the Himalayas, and Brahmanism, apparently not known to the Dravidians, was flourishing. In the VI. cent. Buddhism and Jainism were taught. The Hindu epic the *Mahâbhârata* gives a legendary history of this period. Magadha (Behar) became the chief state. The invasion of Alexander the Great in 327 B.C., a famous event in European history, left a permanent mark on I., as inscriptions and art show. Alexander reached the Hydaspes and retired, leaving garrisons to secure his conquests. He died (323) before revisiting I., which, shortly afterwards, became part of the Seleucid Empire. The Indian monarch, Chandragupta (321–297), recovered a good deal of territory from the Greeks and founded the dynasty of the Mauryas, which lasted until 184 B.C.; and despite various efforts of the Seleucidæ, I. broke away from Macedonian rule, the process being completed by Kadphises (fl. I. cent. A.D.), founder of the great Kushan dynasty, which had its seat at Peshawar. History has not yet been disentangled from legend for these early cent's, but the invasions of the White Huns in the V. and VI. cent's B.C. stand forth. In the early days of militant Muhammadanism I. successfully repelled several Arab inroads, but in 1001–24 the great Turk. leader Mahmud established the Ghazni dynasty in I. (1024–1186). There followed the Mongol invasion of Genghis Khan in 1219, and the inroad of Tatar hordes under Timour (the Tamerlane of E. legend) in 1397,

who captured Delhi 1398. Timour established his rule in Hindustan, but the Persian Sultan, Baber, who established his rule in I. (1519–26), was the true founder of the great Mogul Empire, famous until the close of the XVIII. cent. Renowned rulers were Akbar (1556–1605) and Aurungzebe (d. 1707), the most brilliant of the line. The last king of Delhi was deposed by the Brit. in 1858 for taking part in the Mutiny of 1857. Trade with I. was carried on by European states from the beginnings of history, its mart being Alexandria. The Cape route was discovered by Vasco da Gama (1497–98), who in 1502 established a Portuguese station at Cochin. The Dutch founded their E.I. Co. in 1602, the Fr. in 1664. The Eng. E.I. Co. received its first charter from Queen Elizabeth in 1600. In the next cent. and a half it continued to be merely a trading company, with stations at Surat, Bombay, Madras, and Calcutta, and ousted in turn Portuguese and Dutch rivals. A new era



of *Assaye*, 1803. Lord Hastings, Gov.-Gen. (1813), reduced Nepal to submission without depriving it of independence. Britain was now practically supreme over the peninsula S. of a line from the mouth of the Indus to that of the Ganges, and over the basin of the Ganges itself. Between 1848 and 1856 the Marquess of Dalhousie annexed more territory than any other Gov.-Gen. before or since. By the defeat of the Sikhs at Gujerat and elsewhere the Punjab was brought under Brit. rule. S. Burma, including the Port of Rangoon, was annexed, and, most important of Dalhousie's achievements, Oudh, 'the garden of I.' His high-handed proceedings in Oudh had much to do with the Indian Mutiny. The Mutiny broke out in 1857 at Meerut; the chief centres of the war were Delhi, Cawnpore, and Lucknow. Cawnpore was the scene of the 'Bloody Well'; Lucknow is celebrated for the relief brought to the Brit. garrison by General Havelock (*q.v.*). With the capture of Delhi, the

commenced in 1748, when Dupleix, the brilliant Fr. governor, interfered in disputes between rival princes for the throne. Britain followed suit and won first great success at Arcot in 1751 (see CLIVE). Clive was sent in 1757 to take vengeance on Surajah Dowlah, the Nabob of Bengal, for the outrage of the 'Black Hole of Calcutta,' and by his victory at Plassey laid the foundation of Brit. rule in I. The success of Sir Eyre Coote at Wandewash in 1760 led to the extinction of Fr. rule in I. Warren Hastings, Governor-General under the I. Act of 1773, played an important part in building the Brit. Empire. He subdued the Mahratta princes and collected the army with which Sir Eyre Coote crushed Hyder Ali, Sultan of Mysore, at Porto Novo, 1781. Marquess Wellesley, Gov.-Gen. 1798–1805, induced the Nizam of the Deccan and other native princes to accept Brit. protection, stormed Seringapatam, capital of Hyder Ali's successor, Tippoo, and subdued the Mahrattas, his bro. Arthur, future Duke of Wellington, winning the hard-fought battle

hes lquarters of the rebel troops, the back of the reb ellion was broken. The Derby-Disraeli Ministry the n transferred the government from the E.I. Co. to the Crown (1858). The Co. was dissolved in 1874. Th last flames of the Mutiny, kept alight by Nana Sal ib, were quenched by Lord Canning, 1859–62, but the unrest in many parts, especially Bengal, has been a ser.ous danger ever since. There have been terrible famines in 1861, 1866, 1868–69, 1874, 1876–77, and 1899. The Brit. government has made many attempts to win Muhammadan goodwill, ceasing to subsidise Hinduism in 1863, and putting a stop to various Hindu rites. Sir John (afterwards Lord) Lawrence, who became Viceroy in 1864, had to meet Hindu discontent and was forced, after some losses of Brit. forces, to agree to terms offered by Bhootaneese (1865). The Earl of Mayo became Viceroy in 1869, and was faced with serious deficiency of the revenue, and wide dislike of the new income tax (abolished 1873). Lord Ellenborough succ. him after his assassination by a convict in 1872,

and was succ. by Lord Northbrook in 1872, and Lord Lytton (1876–80). In 1876 Queen Victoria was proclaimed Empress of I. in London, and in the following year at Delhi. The invasions of N.W. tribes culminated (1878–80) in the Afghan War, by which Britain obtained possession of the mountain passes of I. Lord Ripon (Viceroy, 1880–84) by various democratic measures, including Ilbert's visionary Criminal Procedure Amendment Bill (1883, amended and passed 1884), won much unpopularity among Europeans, and at the same time countenanced the noted libel suit of 1883 against a native. He enjoyed, however, unusual native goodwill. Lord Dufferin (1884–88) introduced various reforms, annexed Upper Burma (1886) and passed an Income Tax Bill (1886). Lord Lansdowne (1888–94) and Lord Elgin (1894–99) restored the finances, the former introducing gold standard. Lord Curzon (1889–1905) reorganised the N.W. provinces, naming them the United Provinces, and called forth the latent revolutionary spirit in Bengal, which in 1905 he divided into the province of E. Bengal and Assam. He resigned after a serious dispute with Lord Kitchener, commander-in-chief, as to the respective authorities of the latter and the military member of the governor's council in time of war. The matter was decided in 1906, to the satisfaction of Lord Kitchener and the new Viceroy, Lord Minto (1905–10). The plague had been raging in the Punjab since 1897, and in 1907 there was an alarming increase of sedition there and in Bengal. Severe measures of repression were taken against both Muhammadans and Hindus. Lord Morley now brought forward measures for giving natives representation, and native satisfaction was expressed for the I. Council's Act (1909). Lord Hardinge succ. as Viceroy in 1910. George V. visited I., 1911–12, was proclaimed Emperor at Delhi Durbar (see DURBAR), and declared Delhi (*q.v.*) capital, in place of Calcutta. In 1912 E. Bengal was reunited to Bengal, and Assam was again constituted a separate province. At the same time Bihar and Orissa were combined in a province which includes Chota Nagpur. The most important vernaculars (of which there are 147) of I. are the Aryan (spoken by over 200,000,000 natives) and the Dravidian (spoken by 56,000,000), probably the indigenous speech. The former are the speeches of nearly all the tribes of N.I., the latter belong to the S. and the hill-tribes of the centre. The chief races are the Turko-Iranian of the N. (including the Afghans, Baluchi, and Brahni of Baluchistan and the N.W. Frontier Province), the Indo-Aryan of the Punjab, Rajputana, and Kashmir (represented by the Rajputs, Khatris, and Jats), the Scytho-Dravidian of the west (represented by the Mahrattas and possibly by the Kunbis and Coorgs), the Aryo-Dravidian of Behar, the United Provinces and parts of Rajputana (including Hindi), the Mongolo-Dravidian of Bengal and Orissa, the Mongoloid of the N. frontier, and the Dravidian of the Indo-Gangetic plain and the Central Provinces. The caste system of I. is an extreme example of the differences in social rank always produced by foreign conquest; the tribes who conquered the original Dravidians must, however, have largely adopted their speech. According to the census of 1911 there are in I. 3,876,000 Christians, 217,587,000 Hindus, 3,014,000 Sikhs, 1,248,000 Jains, 10,721,000 Buddhists, 100,100 Parsis, 10,295,000 Animists, 66,623,000 Muhammadans, 20,980 Jews. Christianity is on the increase; very much the largest sect is that of the Rom. Catholics. The five univ's of Calcutta, Allahábád, Bombay, Madras, and the Punjab are examining bodies for numerous dependent colleges. In 1910 there were 6443 secondary, 119,270 elementary schools. There remains a large proportion of illiteracy. Newspapers are pub. in twenty-two dialects.

Costume.—A common Hindu costume of all ranks is the loin-cloth (*dhoti*); the men's heads are shaved except for the top-knot descending from the crown. In Rajputana, however, moustache and beard, parted in the middle, are worn. Except in Bengal, modern Hindus usually wear turban or cap. The Brahmans wear a symbolical cord (*janeo*) over the left shoulder. Hindu women wear their hair parted in the middle and done closely to the head, with, sometimes, long plaits. The face is veiled. A tight-fitting bodice is worn sometimes with a skirt, sometimes with drapery gracefully wreathed round waist and shoulder. They usually go barefoot. Much the same as the Hindus' is the Parsi men's and women's dress, men invariably shaving the head; both sexes invariably wear head covering, within doors and without; little girls have long frilled knickerbockers, loosely flowing hair, and caps. The Sikh's long hair is tied in a knot behind and surmounted by an immense turban; his long beard is combed upwards from the parting in the middle. The Muhammadans shave the head, but allow the beard and moustaches to grow. They wear turbans or caps, white shirt and trousers. Both asceticism and cleanliness in dress are enjoined by their religion. The women wear trousers (pa'ejāmās), tight-fitting bodice, plaited hair, and long veil.

Government.—In 1858 I., hitherto under the rule of the E. I. Co., was transferred to the Brit. Sovereign, who in 1876 assumed the title of Emperor of I. Indian affairs are managed by a Sec. of State for I. and a Council in this country, and in I. itself by a Gov.-Gen. or Viceroy (usually appointed for five years), with a Council, while Madras, Bombay, and Bengal have governors; the United Provinces, Bihar and Orissa, Burma, and the Punjab have lieutenant-governors; and the Central Provinces, the N.W. Frontier Province, Assam, Coorg, Brit. Baluchistan, Ajmere-Merwara, the Andaman Islands, and Delhi have chief commissioners. Under these, administration is carried on by a large body of Brit. civil servants. The Council of I. in England, established under Act of 1858 abolishing the Board of Control app. by Pitt in 1784 and reformed in 1861, consists of not less than ten and not more than fourteen members, app. for seven years by the Sec. of State. At least nine must have resided ten years in I., and have been resident within five years of their appointment. No appropriation of Indian revenue can be made without consent of the Council, but this is its only controlling power.

Law.—The courts in India administer English, Hindu, and Muhammadan law. In 1726, when the East India Company established Mayor's Courts in Calcutta, Bombay, and Madras, the common and statute law in force in England at that date were supposed to be transplanted to India. A Supreme Court was set up at Fort William, in Bengal, in 1774, and an Act of 1781 defining its powers provided that the Hindu and Muhammadan law regarding succession and inheritance to lands, rank, and goods, and all matters of contract and dealing between party and party, should be applicable when Hindus and Muhammadans were parties. Supreme courts were afterwards established in Bombay and Madras with the same powers. Side by side with these courts were provincial courts which had nothing to do with English law and procedure. The duplication of systems was abolished in 1861, after the Crown took over the government of India. Other sources of Indian law in addition to English law as it stood in 1726 and the Hindu and Muhammadan laws are Brit. Acts relating to India, and the Acts of the Ind. Legislative Council. Eng. lawyers who do not agree that the benefits of an English code would outweigh the disadvantages, admit that the case is different in India, where distances are so great and the assistance of highly trained advocates and large law libraries are not always at hand. The law of India has been compressed into four codes—penal, penal procedure, civil, civil procedure. Codification in India does not prevent a supplementary development of the law by judicial decisions. Case-law is unknown to many continental countries where codes exist, the judge merely applying the principles of the code as best he can without reference to previous decisions. In India the courts, as in

England, follow a previous decision as authoritative. The courts enforce the customs as well as the laws of the Hindus and Muhammadans. Indian codification has been in progress since 1833, and may be attributed to Macaulay, who in a speech in Parliament after debates on the defects of Indian law said that no country ever stood in such need of a code. He was a member of the first commission app. to draft a code, and Sir Henry Maine and Sir Fitzjames Stephen are among the famous jurists who have taken part in the work. Indian codes are regarded as the best yet produced. A novelty in them is that each principle laid down is accompanied by an illustrative set of facts. Both the Civil and Penal Codes were drafted and enacted in sections. The Indian Succession Act of 1865 is the first instalment of the Civil Code. It is based on the Eng. law, and does not apply to Hindus and Muhammadans, whose complex and peculiar laws are enforced by the court. In this part of the code there are two interesting deviations from Eng. law, both making for simplicity. One is the abolition of the distinction between real and personal property in the rules governing the succession to a dead person's estate—a reform long overdue in England. The other is the abolition of the rights acquired by marriage over the property of the wife or husband. In India the assignment of a debt need not be absolute and may be by word of mouth, though the notice of assignment made to the debtor must be in writing. Rights under a contract can be transferred, as by Hindu law and English equity. An important step is the compulsory registration of all dealings in land of the value of over 100 rupees. Other sections of the Civil Code deal with Trusts, Transfer of Property, Contracts, Easements, and Specific Relief (specific performance of contracts).

A special feature of the Penal Code is the retention of the punishment of transportation—which is regarded with a peculiar terror in India. Severe punishments are prescribed for acts offending religious susceptibilities.

Salt, coal, and small quantities of gold are worked in the N.W. mountains; the ruby mines of Burma have an output valued at £100,000 yearly; 80 % of the entire coal comes from Bengal; petroleum is obtained in Burma and Assam, salt in Rajputana and the Punjab, saltpetre and mica from Bengal. The gold obtained from Mysore is valued at £2,000,000 yearly. I. is in the main an agricultural country. Of the 545,000,000 acres which are Brit. territory, 135,000,000 are not available for cultivation, 106,400,000 are waste lands that might be cultivated, 57,100,000 lie fallow, 65,800,000 are under forest, and 180,200,000 under crop; 23,700,000 acres produce two or more crops yearly; 37,500,000 require irrigation, while 13,000,000 have regular supply from 12,000 miles of main canals and 31,000 miles of distributaries. The crops in order of extent of cultivation are rice, millet, and maize, food-grains and pulse, wheat, oil-seeds, cotton, chick-peas, barley, fodder, and similar crops, sugar, jute, and other fibres, indigo, tobacco, tea and coffee, poppies, and cinchona. Weaving of cashmere shawls, carpets, etc., wood-carving, and metal work is still important, through giving way before Brit. and native manufactures. There are nearly 200 cotton mills, 146 of which are in Bombay presidency. Madras produces 76 % of the finer goods. Jute is mainly spun round Calcutta. There are two woollen mills (at Cawnpore and Dhariwal in the Punjab), paper, timber, and other mills carried on after W. methods. The exports amounted to 217,000,000 rupees in 1911. There are 435 million miles of railway; the great rivers of the N. are useful for locomotion, and there is good canal system in S. The towns with over 200,000 inhabitants are the former capital, Calcutta (1,222,313 with the suburbs), Bombay, Madras, Hyderábád, Rangoon, Lucknow, Delhi (made the capital in 1911), Lahore, Ahmedábád, and Benares. The entire population of the Brit. provinces is (1911) 244,267,542, that of the Native States, 70,864,995.

Language.—The languages spoken in India are divisible into four families: I. INDO-ARYAN (*q.v.*); II. TIBETO-BURMAN (*q.v.*); III. KOLARIAN, spoken by aboriginal hill-tribes, *e.g.* Santals in Central Provinces; IV. DRAVIDIAN, spoken by *c.* 60 millions in whole S. India and northern half of Ceylon, of uncertain origin and having no relation to linguistic groups outside India. Four best-known Dravidian languages are Tamil (*q.v.*), Telegu, Malayālam, Kanarese. Tamil is parent of other three and has oldest lit. Telegu lit., modelled on Sanskrit, begins XI. cent. A.D. General characteristics: (1) literary language often widely different from spoken; (2) tendency to pronounce short vowel after every final consonant; (3) harmonic sequence, *i.e.* tendency to approach vowel-sounds in syllables consecutive to each other.

Elliot, *History of I. as told by its own Historians* (1867); Smith, *Early History of I.* (1908); Lane-Poole, *Mediæval I.* (1903, 'Story of the Nations'), *The Mogul Emperors* (1892), *The Mohammedan Dynasties* (1894); Festing, *When Kings rode to Delhi* (1912).

INDIA, FRENCH.—The Fr. possessions in India comprise Pondicherry, Chandernagore, Karikal, Mahé, and Yanaon; administered by the governor of Pondicherry.

INDIA-RUBBER, see RUBBER.

INDIAN CORN, see MAIZE.

INDIAN CRESS, NASTURTIUM (*q.v.*).

INDIAN FIG, BANYAN (*q.v.*).

INDIAN INK, see INK.

INDIAN MUTINY, rebellion of native army of Bengal, 1857. The immediate cause of outbreak is supposed to have been the introduction into the army of cartridges greased with cows' and pigs' fat, the handling of which was abhorrent both to Hindus and Muhammadans; but discontent with British rule had long been gaining ground. After several slight outbreaks early in the year the mutiny began in earnest with the revolt of the native regiments at Meerut in May 1857, when the Sepoys murdered the Eng. officers and massacred European residents; the mutineers then marched towards Delhi, which they captured and retained for four months.

In July occurred the terrible massacre of English at Cawnpore by the Nana, whom Havelock defeated on the following day; on Sep. 14 Delhi was at last stormed and taken by English; and Lucknow, which at first was defended by Sir Henry Lawrence, was partially relieved by Havelock in Sep. 1857, and in Nov. by Sir Colin Campbell (afterwards Lord Clyde), who finally captured it in July 1858.

Others who distinguished themselves during the mutiny were Lord Canning, Gov.-Gen., who conducted affairs in Calcutta; Sir John Lawrence, who enlisted support of Sikhs and contributed greatly to Brit. success by sending large contingent to Delhi; General Outram, who served under Havelock; General Nicholson, killed in storming of Delhi; and Sir Hugh Rose, who conducted campaign in Central India, and by his capture of Jhansi and other positions practically ended the war. On re-establishment of Brit. authority, a royal proclamation announced that the governing power of the East India Company was abolished, and that henceforth the sovereign of England would be supreme ruler of India.

Forrest, *Indian Mutiny* (1904).

INDIAN OCEAN (*c.* 4° N., 75° E.), bounded W. by Africa, N. by Asia, E. by Australia and Malay Archipelago; divided in N. by Ind. Peninsula into Bay of Bengal (E.) and Arabian Sea (W.); mean depth, *c.* 2300 fathoms; area, *c.* 17,320,300 sq. miles; receives many important rivers from Asiatic continent; chief islands are Madagascar, Mauritius, Réunion, and Comoro Islands.

INDIAN ORDERS, see under KNIGHTHOOD.

INDIAN TERRITORY, see OKLAHOMA.

INDIANA (40° N., 86° W.), N. central state of U.S.A., lying between Lake Michigan and the Ohio River—which constitutes S. boundary line—and bounded N. by Lake and State of Michigan, E. by

Ohio, S. and S.E. by Kentucky, and W. by Illinois. Area, *c.* 36,350 sq. miles, of which *c.* 440 sq. miles are water surface. The capital is Indianapolis. The surface is mostly undulating prairie, with a gentle S. slope, and having a range of sand-hills in the N.; S. of this, the country is flat and marshy with shallow lakes; and along the Ohio River, in S., a chain of hills (called 'Knobs') rises steeply.

The more important rivers are the Wabash, a tributary of the Ohio, and measuring over 500 miles, of which *c.* 350 are navigable; it is the boundary between I. and Illinois; tributaries are the Salamonie, Mississinewa, Wild Cat, Tippecanoe, and White River—the latter being the most important; other rivers are the Kankakee—tributary of the Illinois—and the St. Joseph and Elkhart into Lake Michigan, the Maumee into Lake Erie, and White Water into the Ohio. English Lake—part of the Kankakee—is the only large lake.

The climate is even; the soil—excepting sandy region, S. of Lake Michigan—is exceedingly fertile, especially the Wabash valley. The state coal-fields have an area of *c.* 6500 sq. miles; petroleum, natural gas, sandstone, limestone, and cement are worked. The land is largely agricultural—the chief crops being maize, wheat, oats, hay, and potatoes; tobacco is also grown, as well as fruits and vegetables of all varieties. Manufactures and industries are important, and include clay-working, flour and grist milling, slaughtering and meat packing, iron and steel foundries, as well as woollen works and manufacturing of agricultural implements. Indianapolis is an important centre for live stock. Natural facilities for transport are provided by the Ohio and Wabash Rivers and Lake Michigan; there are extensive railroads. Admitted to Union as State in 1816. Pop. (1910) 2,700,876.

J. F. Dunn, *Indiana*; J. H. Levering, *Historic Indiana* (1909).

INDIANAPOLIS (39° 46′ N., 86° 6′ W.), capital of Indiana, U.S.A., in Marion County, on White River. Well-laid-out and handsome city, built on flat plain, with wide imposing streets and avenues and spacious parks. Most important buildings are State Capitol, city hall, Propylæum, and county court house. Contains many educational institutions, including I. Coll. of Law and Indiana Medical Coll. Important railway centre; meat-packing chief industry; large trade in agricultural produce; manufactures include furniture and carriages. Pop. (1910) 233,650.

INDIANOLA (41° 23′ N., 93° 35′ W.), city, Iowa, U.S.A.; seat of Simpson Coll. (Methodist).

INDIANS, RED, called I. by Brit. as inhabitants of what the early discoverers of America believed to be the W. Indies, but known to most nations as Red-Skins (*e.g.* Fr. *Peaux-rouges*). They are confined to the Amer. continent, and now generally believed to be a Mongolian people separated from Asia by the comparatively recent subsidence of the 'Pacific continent.' In the convenient approximation to racial division of the classification Black, Brown (or Red), Yellow, and White, they constitute the Brown group (see RACES OF MANKIND). The Palæolithic remains show early habitation. The numerous tribes may be divided into these main stocks: 1. (N. America) Algonquin, Athabascan, Eskimo, Iroquoin, Muskhogean, Pawnee, Pueblo, Salish, Shoshone, Siouan; 2. (Central America) Cuna, Leucan, Maya-Quiché, Mixtec, Nahuan, Opata-Pima; 3. (S. America) Antisuyu, Araucan, Arawak, Aymara, Bororo, Botocudo, Carib, Chibcha, Chiquito, Choco, Chuncho, Fuegian, Jivaro, Mataco, Pano, Payagua, Puelche, Quichua, Tehuelche, Ticuna, Toba, Tupi-Guarani, Warrau, Zaparo. The largest remaining tribes are the Sioux, Cherokees, Choctaws, and Creeks. Over sixty different languages, all polysynthetic, have been recorded in N. America; the processes by which these have been differentiated, and, indeed, the existence in some cases of any relationship to each other, are interesting philological problems.

I. territories steadily decrease, but the race, which seemed in the stages of extermination fifty years ago, is now slowly increasing, at all events in the U.S.A. There are about 6 million I. in N. America, about 4½ million in S. America, in both cases including half-breeds, of which there are about 1½ million in S. America, where, however, the estimation of the Indian population is only a rough one, owing to the amount of almost unexplored forest region. The half-breeds of N. America belong chiefly to the 'Five Civilised Tribes,' of whom *c.* 60,000 (*i.e.* two-thirds) are pure I. Excluding Alaska, there are about 300,000 pure I. in the U.S.A., where there are now only 77,446 sq. miles of Indian reservations (tracts of land set apart for their habitation), the chief being in Arizona, S. Dakota, Montana, and Oklahoma. Alaska has *c.* 30,000 I. The very few I. who have abandoned their tribes in the U.S.A. pay taxes but have no political rights. The I. of Arizona and New Mexico, who are U.S. citizens by treaty, exercise no political rights, but have so far shown no political interest. The total I. of Canada are *c.* 111,000. The various estimations of the numbers of I. vary, but seldom fall below the figures given above. The various stocks are characterised by copper-coloured skin, lank black hair, high cheek bones, long, deep-set eyes, and powerful, often aquiline, noses. They vary in stature and development, the finest specimens being found among the Patagonians of S. America and the Iroquois, Pawnees, and Sioux of the U.S. and Canada.

Before they were ousted by Europeans they were skilled hunters, trained observers, of extraordinarily acute senses, capable of enduring without a murmur great hardships and torture which they freely employed on others, and they have never shown any liking for European comforts or any sympathy with European ideals. Both Fr. and Spaniards showed adaptability to I. ways (this being one of the reasons for their respective successes in colonising S. America and Canada), but the I. have always receded before the Eng. Most of them were still in the Stone Age when Columbus landed. Iron seems never to have been known to the makers of the old civilisations of Peru and Mexico (*q.v.*). An interesting attempt at rudimentary political unity was made in the XVI. cent. by Hiawatha, chief of the Onondagas; he established a federation for offence and defence of the Onondagas, Cayugas, Mohawks, Oneidas, and Senecas. The I., however, are the least political of races, and some of the tribes come near to forming an exception from the universal rule that primitive man is never found without some form of government. The I. are of the utmost importance for the study of primitive institutions and religions, and this importance has been recognised in late years by a growing number of students. The matriarchate was common if not universal, and at the close of the XVIII. cent. European commissioners still found that the tribe was to be treated with through its head women; polygamy is rare, monogamy the rule; the chieftainship was very rarely hereditary, the strongest man of the tribe being chosen by varying systems of election. The 'medicine-men,' *i.e.* magicians, have great power. Their tales of the Creation are interesting as giving prominence to the Deluge.

The accounts of the Pawnees and Arikaras agree as to the creation of a race of powerful and disrespectful giants whom the Creator Atiuch (Atius) destroyed in a flood. The Pawnees have the legend of a second creation, which succeeded, but the Arikaras told of a second destroyal and third creation, and a long story of early wanderings and final settlement by the Missouri River. Their well-known belief in a future Happy Hunting-Ground seems widely spread, but is not universal. Grinnell tells of tribes who believe that 'the ghost country is a land of unrealities, where the unhappy shadows endure an existence which is an unsubstantial mockery of this life. Here they hunt shadow buffaloes with arrows, which, on being lifted from the ground, are found to be only blades of grass;

their camps or their buffalo traps when approached vanish from sight; or their canoes, though real to the ghosts, are to mortal eyes rotten, moss-covered, and full of holes; their salmon and trout are only dead branches and leaves, floating on the river's current, and even the people themselves, though to all appearance human, turn to skeletons if a word is spoken above a whisper.' The ghosts of the dead take animal forms or appear as skeletons or unsubstantial bodies, and may inflict harm on the living. Many tribes believe in reincarnation as human beings. In their creed is a strong element of animism, but over all deities and spirits is 'Atiuoh' or the 'Father' or 'Manito,' to whom alone direct prayer is offered. He is sometimes conceived as the sun. Corn is worshipped, credited with miraculous powers, and named the 'Mother.'

Reverence for certain animals, the white eagle, beaver, buffalo, etc., is seen in the curious picturesque names of chieftains and braves—White Bear, Many Horses, Buffalo Ribs—and in names of women, such as White Antelope. Dreams are supposed to be communications from animals. A young man is bidden to blow (in the ritual which precedes enjoyment of the pipe) 'four smokes to the east, to the night; for in the night something may come to you which will tell you a thing which will happen' (Grinnell, *Story of the I.*, 1896). The Pawnees preserve sacred bundles of legendary antiquity which contain a grain of corn, scalps (a favourite object with the I. collector), pipes, etc. Like the Greeks the I. have a stock of poetical legends about the heavenly bodies. They make sacrifices of animals, etc., and fast as a religious act; they also fast when they wish to receive visions. The Navajo have numerous incantations, magical dances, and religious ceremonies; the custom of initiation by which a boy becomes a brave of the tribe is an ordeal calculated to break him for ever of the relics of childhood, and was perhaps originally devised for this reason; he is then taught the tribal secrets and has a voice in tribal concerns.

One of the few I. revolts, the Sioux rising of 1890, was of a crusade against the whites through the medium of the famous 'Ghost Dance.' The first white men to come in contact with the brown were the Danes, who settled in Greenland in the X. cent., and were gradually exterminated by the Eskimos. The Spaniards took with them an army of priests, who had considerable success. In the XVII. and XVIII. cent's the Brit. and Fr. were continual rivals for the favour of the I's, and the dispatches of Eng. colonial governors to the home government often express admiration of Fr. methods of dealing with the natives. These dispatches generally have large sections set aside for the consideration of I. affairs and describe the governor's occasional journey into I. territory to an appointed meeting-place, his interview with the chief, and the terms by which he occasionally obtains a large cession of I. lands. This important material is not yet published, but is to be found in the colonial papers at the Public Record Office. There were 'friendly' or Brit. Indians and Fr. Indians. The early colonists lived in constant dread of the 'I. peril,' and the State of New York was particularly exposed until Fr. alliance with the Algonquins led to the Iroquois becoming firm friends of the British. These two peoples played an important part in the history of N. America. The Algonquin tribes were the principal power from Labrador on the north to the Carolinas and nearly as far west as the Rocky Mountains. Their lands surrounded those of the Iroquois. Among their tribes are the Blackfoots, Cheyennes, Crows, Delawares, Illinois, Massachusetts, Ojibwas, and Sacs or Foxes. The 'Princess' Pocahontas, dau. of the chief, Powhatan (*c.* 1550–1618), m. a Virginian, John Rolfe, and was ancestress of prominent Virginians.

The Iroquois inhabited the district round St. Lawrence River and the Great Lakes, part of New York state, and lands in Virginia, the Carolinas, and Georgia. Their tribes included the federation formed by Hiawatha, important in Brit. colonial history as the Five Nations which became Six Nations by the accession of the Tuscaroras. The Cherokees of this stock were the chief tribe with which the Carolinas and Virginia had to deal in the XVIII. cent. They were transferred bodily to the other side of the Mississippi in 1838. The Iroquois, however, by their bitter enmity to the French in Canada, did much towards the establishment of Brit. N. America. The Athabascan tribes were of great importance in the W. North America; the Apaches and Navajos are said to be able to run down the deer while hunting, and the grim, mysterious, and skilled Apache has given his name to the Parisian thug, while Navajo blankets are widely known. The Siouan tribes formerly spread over the N. and centre of the present U.S.A. To this stock belonged the now extinct tribe of Catawbas, prominent in the history of S. Carolina, and it includes the Assiniboines and famous Dakotas, or confederate Sioux, who were allies of the British in the XVIII. cent.

The Sioux, roused by a religious prophet, gave much trouble in the late XIX. cent. Gen. Custer was slain by a force under Sitting Bull while invading Sioux territory in 1876, but they were put down by Sheridan, and in 1889 sold 11,000,000 acres, parcel of the Dakota reservation to the U.S. A rising in Badlands, S. Dakota, followed immediately after (1890), other tribes joined, and the I's laid waste surrounding territory. Col. Cody ('Buffalo Bill') was sent against them, and before the close of the year Gen. Miles' forces captured and slew Sitting Bull, his s. Crow Foot, etc. A small, heroic band under Big Foot sought to revenge Sitting Bull's death, but were exterminated at *Wounded Knee Creek* (1890); further forces surrendered to Brook and Miles (1891). Risings of the Chippewa (1892) and Navajo (1893) followed. Unrest seems to have ceased with the union of I. Territory and Oklahoma in the state of Oklahoma (1906).

Grinnell, *Pawnee Hero Stories* (1893), *Blackfoot Lodge Tales* (1893), *Story of the I.* (1896); Washington Matthews, *Navaho Legends* (1897); Brinton, *Religions of Primitive Peoples* (1900).

INDICATOR, in engineering, a mechanical device for registering pressure in steam boilers, cylinders; number of revolutions, speed, etc. I's generally work by some contrivance using resistance against a spring as motive and show their readings by means of movable pointer on a graduated face. In other cases the pointer may be operated by a pair of governors depending on centrifugal force, as in speedometers.

Indicator, in chemistry, term used to apply to certain reagents or chemicals which are used to indicate the presence of very small quantities of other substances in certain chemicals or minerals.

INDICATORIDÆ, HONEY-GUIDES (*q.v.*).

INDICTIONAL PERIOD, see CHRONOLOGY.

INDICTMENT, the charges preferred in writing for offences in law punishable upon summary conviction, or after trial by jury, constitute an i., and the counts of an i. are its several parts, charging distinct offences. Indictable offences must be tried before a jury and the accusation must be set down in writing.

INDIES, see EAST INDIA, WEST INDIES.

INDIES, LAWS OF THE, name applied either to Span. colonial law code in general, or to the special codes of certain colonies.

INDIGESTION, see DYSPEPSIA.

INDIGO is a dye-stuff which exists in the leaf of plants of genus *Indigofera*, natural order *Leguminosæ*, as a glucoside *indican*, $C_{14}H_{17}O_6N_3H_2O$. An enzyme in the leaf acting on a water extract of the colourless glucoside in presence of atmospheric oxygen gives indigotine, the colouring matter of indigo. About ½ % indigo is obtained from leaves and after evaporation sold as 3-in. cubes. A 20 % paste made by melting the carboxylic acid of phenylglycocoll with

caustic alkalies has supplanted the natural Indian product.

INDIUM is a white malleable metal. When ignited the hydrate yields oxide, In_2O_3, brown when hot, yellow when cold. Three chlorides exist—InCl, $InCl_2$, and $InCl_3$.

INDIVIDUALISM, view that governmental interference with conduct of individual citizens should be jealously restrained; opposed to collectivism and socialism (*q.v.*). See POLITICAL PHILOSOPHY.

INDO-ARYAN LANGUAGES, important group of seven languages—Hindi, Marâthi, Bengâli, Panjâbi, Gujrâti, Sindhi, Uriya—belonging to Indo-European family. All descended from Sanskrit (*q.v.*), to which they bear same relation as European Romance languages to Latin, and from which principal portion of vocabulary and whole inflectional system are derived. Usual theory is that they arose from Prâkrits, or local dialectical forms of Aryan speech (Sanskritic and non-Sanskritic), which received great stimulus from adoption as medium of Buddhist teaching.

Three classes of materials entered into formation of Indo-Aryan languages: (1) TATSAMA, words unaltered from pure classical Sanskrit; (2) TADBHAVA, words Sanskrit and Prâkrit, much changed in process of derivation; (3) DÊSAJA, words obtained by contact with aboriginal and other races conquered by Indian Aryans.

In first few cent's A.D., change took place from synthetic to analytical. Alphabets employed are all varieties of Devanâgari (Sanskrit). Most important of seven languages is Hindi, which, written in pure Devanâgari, spoken by *c.* 100 millions, understood throughout N. India, bids fair to become national language. There are two varieties of Hindi, western and eastern, Hindustani (*q.v.*) being dialect of former.

Distribution: HINDI, United Prov., Central Prov., C. India, Panjab, etc.; BENGÂLI, 50 millions, Bengal; PANJÂBI, 17 millions, Panjab; MARÂTHI, 19 millions, Bombay, Haidarabad, C. Prov.; GUJRÂTI, 10 millions, Bombay, Baroda; URIYA, 10 millions, Orissa; SINDHI, 3 millions, Sind.

INDO-CHINA, FRENCH (8° 30′ to 23° 20′ N., 100° 10′ to 109° 30′ E.), Fr. territory, S. Asia, consisting of dependencies of Tonkin, Annam, Laos territory, Cambodia, Cochin-China. The French have had continous relations with country since 1787, when they first acquired dominions here; Fr. force, sent to avenge persecution of Fr. subjects and murder of Bp. Diaz, seized Tourane, 1858, routed Annamese army, 1861; cession of Lower Cochin-China to France followed in 1862, while Cambodia became Fr. protectorate in 1863; in 1867 remainder of Cochin-China was incorporated in Fr. possessions, and in 1873 war between France and Tonkin occurred, with result that Annam and Tonkin were included in Fr. protectorate by treaties of 1883, 1884, and 1885.

Region is bounded N. by China, E. by Gulf of Tonkin and China Sea, S.W. by Gulf of Siam, W. by Siam, Burma; area estimated at 85,000 sq. miles. Surface of Tonkin consists of Red River delta in S.E., plateaux in N., forests in W.; Annam is mountainous except along coast; Laos territory flat along Mekong River, mountainous elsewhere; Cambodia has mountain ranges in N. and W., forests in N.E., and elsewhere great alluvial plains; Cochin-China is low and flat except in N. and E. Whole region is administered by gov.-gen., while the protectorates and colonies are respectively under local control of resident-superiors and lieut.-governors. Native religion is Buddhism. Army numbers 25,476 in all. Produces rice, cotton, sugar-cane, tobacco, gutta-percha, spices, pepper, maize, coffee, vanilla. There are teak and other valuable trees in Laos, and minerals include coal, gold, silver, tin, salt. Exports rice, fish, pepper, tin, coal, cotton, hides. Imports textiles, wheat, iron goods, etc. Railway mileage, *c.* 2000. Pop. (1911) 16,990,229.

INDO-EUROPEAN LANGUAGES are a group of languages with certain characteristics in common, and otherwise called Aryan, or Indo-Germanic. The following are the Indo-European languages: A., the so-called *Centum* group—(1) Greek, (2) Italic, (3) Celtic, (4) Germanic or Teutonic (including Swedish, Danish, Norwegian, Icelandic, English Frisian, Dutch, Flemish, German); B., the so-called *Satem* group—(1) Aryan (including Sanskrit, Zend, and Old Persian), (2) Armenian, (3) Balto-Slavonic group (including Old Bulgarian, Russian, Servian, Polish), (4) Albanian.

The resemblances between these languages of Europe and Asia force on our attention the problem of their hist. connection, their relation to the original language, and the original land of the parent race. Round these problems there have been long and divers controversies. Some claim the East as the original home of the languages; others claim the West; the claims for the East being older. The obviously great antiquity of the language of the Hindus was the basis on which the theories of an Eastern origin were built. Linguistic evidence seemed to point to Central Asia as the original home of the parent race. But claims began to be put forward for Europe, and various tracts were suggested as the original home, *e.g.* South Russia, West Germany, the region of the Baltic, and Scandinavia.

The inhabitants of Europe may be divided into two distinct classes—the dolichocephalic and the brachycephalic, and the pivot of the problem is ultimately which of these two classes is the Aryan. Modern opinion seems to favour the dolichocephalic race; or, to be more exact, European civilisation and culture are regarded as derived from the Aryan race, the tall, fair, dolichocephalic peoples most purely represented to-day by the English, Germans, and Scandinavians. This theory is technically called Aryanism.

INDONESIAN, Indo-inhabitants to be found in Malaysia, etc.

INDORE (22° 42′ N., 75° 54′ E.), native state, Central India; consists of various isolated tracts; capital, Indore; commercial centre. Pop. *c.* 850,000.

INDORSEMENT, ENDORSEMENT, writing on back (Lat. *dorsum*) of document as description, or, in case of money, as quit claim, the possessor becoming owner.

INDO-SCYTHIANS, Asiatic races of N. India.

INDRA, Hindu deity represented as covered with eyes and riding on an elephant.

INDRE (46° 50′ N., 1° 30′ E.), department, Central France, formed principally from ancient province Berry; surface flat; watered by the Indre; produces cereals, fruit, wine; capital, Châteauroux. Pop. (1911) 287,673.

INDRE-ET-LOIRE (47° 16′ N., 0° 45′ E.), department, Central France, formed principally from ancient province Touraine; produces grain, fruits, wine; capital, Tours. Pop. (1911) 341,205.

INDUCTION, in logic, the process of reasoning from particular instances to a general law; the opposite of DEDUCTION (*q.v.*).

INDUCTION, ELECTRICAL.—If two circles of wire, equal in diameter, be placed parallel to each other and a short distance apart, the starting or stopping of an electric current in one circle produces a momentarily induced current in the other. When the current in the first (or *primary*) is started, the induced current in the other (or *secondary*) is opposite in direction to the primary current. When the primary current stops, the secondary current is in the same direction as the primary. The electromotive force of these induced currents is high, and is greater in proportion to the suddenness with which the primary current is 'made' or 'broken.' These effects are intensified in the **Induction Coil** by (1) arranging the primary circuit in the form of a number of turns of wire placed cylindrically, thick wire being used for this purpose; (2) laying over these a large number of turns of the secondary circuit, for which thin wire is used; (3) increasing the inductive effect by placing a core of iron wires along the axis of the cylinder; (4) providing an automatic and sudden 'make' and 'break' arrange-

ment, which can act many times per second; and (5) connecting the primary circuit to a condenser which acts so as to suppress the secondary current induced at 'make' of the primary, and to intensify the current induced at 'break.'

The terminals of the secondary circuit are led to insulated brass rods whose ends can be adjusted to varying distances from each other, and when the coil begins to work by turning on the primary current, a rapid succession of sparks passes between these terminals. The sparks may be of any length up to about 2 feet, and are increased in violence when the terminals are connected to the inner and outer coats of a Leyden jar. The induction coil is used in researches on the conduction of electricity in gases, for the production of cathode rays and Röntgen rays, in electrotherapeutics, for the transmission of signals in wireless telegraphy, and for other purposes, such as firing mines, where the passage of an electric spark is required.

INDULGENCE, in R.C. theology 'the remission of the temporal punishment which often remains due to sin after its guilt has been forgiven.' Pope Urban II. granted a plenary i. for the first crusade, 1095; and since then i's, plenary or partial, have been frequent. The abuse of i's was one of the signs of decay of the mediæval Church. According to the official R.C. view the Saints have done more than was necessary in expiation of their own sins, and the benefit of this can be transferred to others.

INDULINES are amidated azonium salts which dye blue, bluish-red, and black. Rosindulines and Napthindulines are basic. The salts give red fluorescent solutions.

INDULT (from Lat. *indulgere*, to permit), papal licence for non-performance of religious duty.

INDUNA, Kaffir magnate.

INDUS (24° N., 67° 30′ E.), river, India; rises in S.W. Tibet near sources of Sutlej; general course N.W. through Ladak, Kashmir, etc.; turns S.W. in N.W. Frontier Province, flows through Punjab and Sind, and enters Arabian Sea by numerous mouths; chief tributaries, Zanskar, Shayok, Kabul, and Punjnud (five united rivers); delta begins at Hyderabad (chief town); total length, 1800 miles; navigation begins near Attock; drainage basin, 375,000 sq. miles; fish and crocodiles abound; subject to great floods.

INDUSTRIA (*c.* 45° 10′ N., 8° E.), ancient town, Liguria, Italy.

INDUSTRIAL SCHOOL, voluntary school for giving manual and commercial training to the poor; regulated by Children Act, 1908.

INDY, VINCENT D' (1851–), Fr. musical composer, dramatic and orchestral; strongly original.

INE, king of West Saxons from 688 to 726; issued important code of laws.

INEBOLI (41° 57′ N., 33° 47′ E.), seaport, Asia Minor, on Black Sea; wool and mohair. Pop. 9000.

INEZ DE CASTRO, see CASTRO, INEZ DE.

INFALLIBILITY, a theological term used of Pope, Church, or Bible, though for the last *Inspiration* (q.v.) is more commonly found. The doctrine of Papal I. is of gradual growth; defined by the Vatican Council of 1870. By this the Pope is infallible when he speaks on faith or morals *ex cathedra*, that is formally and finally as teacher of all Christians. Those who strongly defended this view were called *Ultramontane*: the rejection of it by a small minority led to the formation of the *Old Catholics*. The I. of the Church is held by some High Churchmen.

INFAMY, technical term among Romans for publicity given to disgraceful conduct; in England legal state of a person once convicted of crime.

INFANT (law term), see AGE.

INFANT SCHOOLS, see EDUCATION.

INFANTE, title of younger sons of kings of Spain and Portugal, eldest s. being called prince.

INFANTICIDE, a common crime in ancient Greece and Rome, and until comparatively recent times (in the matter of female infants) in China and India. It is a capital offence in the United Kingdom, and when the exposure or abandonment of a newborn child has resulted in death, and a verdict of wilful murder has been returned, the capital sentence is pronounced. But public opinion has long refused to sanction the hanging of a mother who in despair and distraction of mind has abandoned her illegitimate child, and the death sentence is always revised and imprisonment substituted.

INFANTRY.—As long as there has been fighting in the world there has been i. of a sort, but it was only by degrees that it came to be developed as an *arm*, one worthy to be put by the side of cavalry; for all who could tended to get horses, and the foot were sometimes the inferior or unfortunate men left over. The phalanx, which fought in a wedge-shaped formation, was first practically utilised by Epaminondas of Thebes, and developed and improved by Philip of Macedon and Alexander the Great. The Romans had well-drilled and disciplined i., for discipline is absolutely essential in an i. army. The Rom. legion, as reorganised by Gaius Marius, consisted of 4000–6000 infantry, armed with javelin (*pilum*) and short sword. It fought in line and was flanked by cavalry and lightly armed troops, *e.g.* slingers and archers. It was the main centre of Rom. strength in Republican times, but under the Empire hardly more than a unit in a large and miscellaneous host. With the fall of the Western Empire i. ceased to be of importance, for the legions were cut down ruthlessly by the Barbarians, notably before Adrianople, 378 A.D. During the Middle Ages, the age of feudalism, i. was quite subordinate, and only became of first importance in battles now and again. In the XIV. cent., however, it revived.

The growth of towns produced a militia, and the increase of archery led to important results. The battle of Crécy, 1346, showed what could be done by the sturdy Eng. yeomen. This was partly the result of the Eng. social system, for the close relation between yeomen and knight would have been impossible in the more thoroughly feudalised France. Thus, by the close of the Hundred Years War, i. was not merely something inferior to cavalry, but existed alongside of, and worked with, it. In Germany the burghers firmly defended themselves against feudal interference, and the townsmen were more often than not successful in repelling the knights who tried to attack them. At the end of the XV. cent. feudal hosts were being superseded by hired armies, and the mercenary troops who fought in the first part of the XVI. cent. in the Ital. wars have been called the 'nursery of modern i.' They were mainly Swiss, Spanish, and French. By the middle of the XVI. cent., however, i. had taken their place as a regular 'arm.' The keenest conflict took place in the Netherlands between the trained Span. troops and the equally efficient Dutch militia. The XVI. cent. was the time of the professional soldier, for only a well-trained man was able to use the musket of the day. The pistol was used by cavalry who still wore armour. I. showed they were equal to any troops in discipline and organisation.

A fresh period of military history begins with the Thirty Years War, in which both sides harked back to ancient models; the Swedes imitated the Rom. legionaries, while the Austrians imitated the Gk. phalanx. Meanwhile firearms were improved by being made lighter. At this time the discipline and *morale* of an army was seen to be of fundamental importance. The Swedes were more amenable to a rigid disciplinary system than either the English or the French, and only when they were trained was it seen what could be done with soldiers lacking in initiative, but thoroughly drilled. In the Civil War in England i. played comparatively little part. In the XVIII. cent. the 'linear' formation was evolved. The soldiers were formed in two long lines. Battalions were drawn up in long lines so as to have as great a range of fire as possible. At the time of the Seven

Years War the Prussians were the best-drilled troops. At the battle of Leuthen, 1757, the Prussians conquered a much larger force than their own by greater skill in manœuvring; an attack was made on the enemy's flank, which was nearly annihilated. The Prussian army now had the *prestige* enjoyed by the Swedish in the preceding cent. The latter part of the XVIII. cent. was occupied with many disputes as to modes of attack, and the question of skirmishing was discussed.

Another era was opened by the Revolutionary and Napoleonic wars. *Close order columns* and *loose order skirmishers* were often used in combination.

The most fundamental part of the i. then was the attacking column. Only a small part was generally drawn up in line formation, and there were only a few skirmishers. That Napoleon had different methods from Frederick the Great was largely due to his having a much greater number of troops at his disposal, but insufficiently trained, and in this respect his army was like modern continental armies. The Brit. army, however, maintained the earlier method of attack, but the column formation of Napoleon was followed after his day by most continental armies. In the middle of the XIX. cent. the best i. in Europe was the Prussian; the Prussian military superiority was shown beyond question in the Austro-Prussian War of 1866 and still more in the Franco-Prussian of 1870–71; the Prussians had not only better guns and fired better at close range, but were better trained and disciplined.

Skirmishers are most important in modern battles, but scouts now do what was formerly done by them. Of the greatest importance in the last generation has been the improvement in rifles and the great increase in firing range. The importance of drill is now recognised and a reaction is setting in against the reliance on individual initiative, which was customary in the South African War. It is recognised that soldiers must be so trained as to act instinctively when their ordinary reasoning faculties are overpowered by the strain of battle.

MOUNTED INFANTRY is a force which fights as i., but employs horses or bicycles for other military services. When possible, m. i. do entire duty of reconnoitring in modern campaigns, to save fatigue of ordinary foot-soldier. In Brit. army special training as m. i. follows ordinary i. training for selected members of i. corps. See TACTICS.

Oman, *Art of War*; *Middle Ages*; Fortescue, *History of the British Army*; *Field Service Regulations*, and various official publications.

INFECTION, see BACTERIOLOGY, PARASITIC DISEASES.

INFERNAL MACHINE, BOMB (*q.v.*).

INFINITE, that which is without end. It is impossible to conceive a point in past time without something before, or in future time without something after; so also in space; hence idea of infinity. But infinity cannot be imagined. Some assert space and time are finite.

INFINITESIMAL CALCULUS, DIFFERENTIATION.—(I.) If u is a given function of an independent variable x, and the value of x changes by an amount δx, the value of u will change by some corresponding amount δu. If δx and δu are finite quantities, the ratio $\frac{\delta u}{\delta x}$ has in general a finite value. Assuming this ratio has a definite limiting value when δx becomes indefinitely small, we denote this value by $\frac{du}{dx}$, which is called the *first differential coefficient of u with respect to x*. In the differential calculus the values of such limiting ratios are investigated for different forms of functions. If $u=f(x)$, then $\delta u=f(x+\delta x)-f(x)$, and $\frac{\delta u}{\delta x}=\frac{f(x+\delta x)-f(x)}{\delta x}$

Hence
$$\frac{du}{dx}=\mathrm{L}_{\delta x\to 0}\frac{f(x+\delta x)-f(x)}{\delta x} \quad . \quad (1)$$

Giving different forms to the function $f(x)$, we can deduce $\frac{du}{dx}$ from (1).

(II.) If $f(x)$ and x define a point P on the graph of $f(x)$, then $f(x+\delta x)$, $x+\delta x$ define a neighbouring point Q on the graph, and $\delta u/\delta x$ gives the slope of the line PQ with respect to the axis of x. Proceeding to the limit, when Q approaches indefinitely near to P, we see that du/dx gives the tangent of the angle of slope (θ) of the tangent to the curve at the point $f(x)$, x, i.e. $du/dx=\tan\theta$. So the differential coefficient measures the rate of increase of $f(x)$ with regard to x, e.g. if u is the distance of a given point from a given origin at time x after starting, du/dx gives the velocity at any time.

(III.) If $y=u\times v$, where u and v are given functions of x, then
$$\frac{dy}{dx}=u.\frac{dv}{dx}+v\frac{du}{dx} \quad . \quad . \quad . \quad . \quad (2)$$

If $y=u/v$,
$$\frac{dy}{dx}=\frac{v\frac{du}{dx}-u\frac{dv}{dx}}{v^2} \quad . \quad . \quad . \quad . \quad (3)$$

If $y=f(z)$, where $z=\phi(x)$, then
$$\frac{dy}{dx}=\frac{dy}{dz}.\frac{dz}{dx} \quad . \quad . \quad . \quad (4)$$

Formulæ (2) and (4) may be extended to any number of variables.

(IV.) Taking $u=x^2$, formula (1) gives
$$\frac{du}{dx}=\mathrm{L}_{\delta x\to 0}\frac{x^2+2x.\delta x+(\delta x)^2-x^2}{\delta x}=\mathrm{L}_{\delta x\to 0}(2x+\delta x)=2x$$

Similarly, if $u=x^n$ we may show that $\frac{du}{dx}=nx^{n-1}$.

Other functions, as $\sin x$, $\log x$, l^x, etc., may be differentiated using formula (1), and from these other more complicated expressions may be dealt with by means of formulæ (2), (3), and (4).

(V.) If $f'(x)$ denote $\frac{d}{dx}f(x)$, and we obtain $\frac{d}{dx}f'(x)$, we get the second differential coefficient of $f(x)$, written $f''(x)$. In the same way we get the successive derived functions $f'''(x)$, $f^{\mathrm{iv}}(x)$ . . . $f^n(x)$.

Taylor's Theorem.—Assuming the function $f(x+y)$ can be expanded in powers of y, and that it is continuous, Taylor (1715) showed that, when $f(x)$, $f'(x)$, etc. are finite and continuous,
$$f(x+y)=f(x)+\frac{y}{1}.f'(x)+\frac{y^2}{1.2}f''(x)+\ldots+\frac{y^n}{n!}f^n(x)+\ldots(5)$$
This expansion is known as Taylor's Theorem.

Rigorous treatment shows the series to be convergent. The Binomial Theorem, Exponential and Logarithmic Series, may be deduced from this as particular cases. Putting $x=0$ in (5) we get
$$f(y)=f(0)+\frac{y}{1}.f'(0)+\frac{y^2}{1.2}f''(0)+\ldots+\frac{y^n}{n!}f^n(0)+\ldots(6)$$
where $f(0)$, $f'(0)$, etc. are the values of $f(x)$, $f'(x)$, etc. when $x=0$. This expansion is **Maclaurin's Theorem.**

(VI.) Problems concerning maxima and minima values of a function $f(x)$ are dealt with by solving the equation $f'(x)=0$, which gives abscissæ of points where max. or min. values occur; for since $f'(x)=\tan\theta$, and $\theta=0$ where there is a max. or min., $f'(x)$ must be zero at such points. But $f'(x)=0$ gives other singularities, and so further tests are required for discrimination.

INTEGRATION.—(I.) Integration may be regarded as the inverse of differentiation, for the fundamental problem is to find the sum of a certain infinite series of indefinitely small terms, and for this we must be able to find the function of which a given function is the differential coefficient. If $\psi(x)$ is any function of x, and $\phi(x)$ its differential coefficient, supposed finite and continuous for all values of x between a and b, and if $nh=b-a$, n being a positive integer, then the limit when n is indefinitely increased of
$$h\{\phi(a)+\phi(a+h)+\phi(a+2h)+\ldots+\phi(b-h)\}$$
is $\psi(b)-\psi(a)$. The limit of the above expression is denoted by $\int_a^b\phi(x)dx=\psi(b)-\psi(a)$.

$\int_a^b \phi(x)dx$ is called a *definite integral*. When we are not concerned with the limits of integration, and write $\int\phi(x)dx=\psi(x)$, we are merely making the same statement as $\frac{d\psi(x)}{dx}=\phi(x)$ in a different way. $\int\phi(x)dx$ is called an *indefinite integral*.

(II.) Many integrals may be written down by inspection, the given function being recognised as the differential of some known function. Thus we have—

$$\int x^n dx=\frac{x^{n+1}}{n+1};\ \int\cos\ x\ dx=\sin\ x;\ \int\frac{1}{x^2+a^2}\,dx=\frac{1}{a}\tan^{-1}\frac{x}{a};\ \text{etc.}$$

Other integrals may be transformed to known types by some simple substitution; *e.g.* $\int\frac{dx}{\sqrt{2ax-x^2}}$ is made to depend on the standard form $\int\frac{dz}{\sqrt{a^2-z^2}}$ by the substitution $x=a-z$. Knowledge of the proper substitution must be gained by experience.

Integration by Parts.—From the formula $\frac{d}{dx}(uv)=u\frac{dv}{dx}+v\frac{du}{dx}$ we have by integration and rearrangement

$$\int\left(u\frac{dv}{dx}\right)dx=u.v-\int\left(v\frac{du}{dx}\right)dx.$$

Use of this formula is known as *integration by parts*; e.g. $\int\theta\sin\ \theta\ d\theta$ may be written $-\int\theta\frac{d\cos\ \theta}{d\theta}.d\theta$; and we get

$$\int\theta\sin\ \theta\,d\theta=-\theta\cos\ \theta+\int\cos\ \theta\,d\theta=-\theta\cos\theta+\sin\theta.$$

Rational Fractions are of constant occurrence; they are dealt with by decomposition into partial fractions. Special forms require special methods which can only be learned by practice.

(III.) **Applications.**—(*a*) If (x,y) is a point P on the curve $y=f(x)$, and s is the length of the arc AP measured from a fixed point A, we have $\frac{ds}{dx}=\sqrt{1+\left(\frac{dy}{dx}\right)^2}$. Hence $s=\int\sqrt{1+\left(\frac{dy}{dx}\right)}\,dx$, and from this we can find s.

(*b*) If P and Q are two points (x_1y_1), (x_2y_2) on the curve $y=f(x)$, M and N the feet of the perpendiculars from P and Q on the axis of x, then it can easily be shown that, A being the area of the figure PQNM,

$$\mathrm{A}=\int_{x_1}^{x_2}f(x)dx=\psi(x_2)-\psi(x_1)$$

where $\psi(x)$ is the integral of $f(x)$. Thus plane areas may be found. If the polar equation of the curve is given, the corresponding formula is $\mathrm{A}=\frac{1}{2}\int_{\theta_1}^{\theta_2}\{f(\theta)\}^2d\theta$.

(*c*) To find volumes of solids we use the formula $\mathrm{V}=\iint z\,dx\,dy$, using appropriate limits. $\iint z\,dx\ dy$ is a *double integral* and denotes $\int[\int z\,dy]dx$.

(*d*) *Centres of gravity* in mechanics, and *centres of pressure* in hydrostatics may in many cases be found quickly by simple integration. *Moments of inertia* also may be very simply obtained; *e.g.* the M.I. of a disc of radius a and surface density $=\int_0^a 2\pi\rho r^3.\,dr=\frac{\pi\rho a^4}{2}$, the axis being perpendicular to the disc and through its centre. For higher work, elliptic integrals, Gamma, and other functions, etc., special treatises should be consulted.

H. Lamb, *Infinitesimal Calculus*; B. Williamson, *Differential and Integral Calculus*; J. Edwards, *Differential Calculus*; I. Todhunter, *Integral Calculus*; A. G. Greenhill, *Differential and Integral Calculus*; Picard, *Traité d'Analyse*.

INFIRMARY, see HOSPITAL.

INFLUENCE, power exercised by the stars. See ASTROLOGY.

INFLUENZA, acute infectious disease caused by a specific bacillus, *Bacillus influenzæ*, characterised by fever and by symptoms affecting the respiratory, digestive, or nervous systems. It occurs in epidemics, appearing most frequently in the winter months, and has spread, at one time or another, to practically all parts of the world, adults between the ages of twenty and forty being attacked most often, children and aged persons less frequently. Infection is from the secretions of the mucous membrane of the nasal passages and the trachea and bronchial tubes. The incubation period of the disease is from two to six days. The onset is sudden, with pains in the back and loins, and headache, often accompanied by giddiness and nausea or vomiting. The temperature rises quickly to about 100° to 104°, and a feeling of weakness and discomfort is marked. After a few days the disease may assume one of four varieties, *respiratory*, with bronchitis or broncho-pneumonia developing; *gastro-intestinal*, with pain in the abdomen, vomiting and diarrhœa; *nervous*, with great depression, insomnia, severe headache and other pain, irregular heart and perhaps delirium; *febrile*, with pronounced prostration and high temperature, especially in children. The death-rate in proporton to the number of cases is not high, in the London hospitals in the well-known epidemic of 1890 it was 1·6 per 1000, but the prolonged weakness and nervous exhaustion following an attack of i. leads frequently to complications.

The treatment is simply rest in bed, warmth, and nourishing foods, complications being treated as they arise. For the pains at the commencement of an attack, salicylate of soda, aspirin, and quinine are valuable, phenacetin if headache is pronounced, while quinine in small doses (2 grs. every morning) is also an effective preventive of the disease in epidemics and at other times.

INFORMATION (law), suit filed by the Attorney-General in the court of King's Bench against person guilty of offence for which ordinary legal process is not suitable.

INFORMER, legal term for person who brings a suit against another as a law-breaker; a *common i.* is one who shares the profits of convictions. The system was brought to an art in the later Rom. Empire, and was common in Ireland during the XVIII. and XIX. cent's.

INFUSORIA, the highest class of Protozoa, with many members which are among the most familiar of the group. Their name is due to the fact that, where any infusion of vegetable matter is exposed to the air, Infusoria abound therein in a short time. As the other classes of Protozoa are distinguished by the presence or absence of characteristic locomotor organs, so the Infusorians are known by the coating of fine, short, vibratile hairs or cilia, which, present often in hundreds or even thousands, enable them to swim through the water or glide over solid substances. The free-swimming forms are generally round or oval in shape, while the gliding forms are flattened, with a permanent creeping surface; but the essential structures are the same—a protoplasmic body formed of external ectoplasm and internal endoplasm, containing usually two nuclei (*macronucleus* and *micronucleus*), food vacuoles and numerous contractile vacuoles, and furnished frequently with a mouth and œsophagus which guides the food to the endoplasm.

As is often the case in Protozoa, the bodies of many Infusoria are preserved from desiccation in continuous dry weather by the formation of a protective covering—*encystment*—but this process is also related to reproduction and to lack of food. When encystment precedes reproduction the contents of the cyst break up into very many minute individuals, but a more usual mode of reproduction is that of simple division, where an individual splits into two, crosswise if free, lengthwise if fixed.

Most Infusoria live in the sea or in fresh water, where they swim independently or are attached to rocks, seaweeds, zoophytes, etc., by means of a long contractile stalk or by adhesive organs, or simply by modified cilia. They live on small organisms, such as Bacteria, Diatoms, and minute Protozoa, which are wafted towards the mouth (where it is present) by the continuous action of the neighbouring cilia. Some Infusoria are parasitic, and live in the bodies of other animals, upon the juices of which they feed. The parasitic forms, however, do little apparent harm, with the exception of one form (*Ichthyophtheirus*), which occasionally causes fatal epidemics amongst fresh-water fishes.

The class **Infusoria** falls into two distinct groups:—Sub-Class I., CILIATA, in which cilia occur throughout life; some without mouths (*Astomata*), such as *Opalina*, parasitic in the food canal of frogs; or the group of GYMNOSTOMATA, with simple pore-like mouths; or the large permanently open-mouthed HYMENOSTOMATA, of which the common Slipper Animalcule or *Paramœcium* of infusions is a member. Or there are forms distinguished by a spiral band of well-developed cilia which leads to the mouth (*Spirigera*), including the sedentary *Stentor*, which has a body covered with an even, fine coating of cilia, and which builds a gelatinous tube within which it can withdraw for refuge; the closely related sluggish *Balantidium*, parasitic in the human food canal; or the stalked forms, such as *Epistylis*, with a stiff, rigid stalk, or *Vorticella*, with long stalk which contracts spirally under excitation.

Sub-Class II., SUCTORIA, with cilia only during the early stages, the functions of these being taken up, in the adults, by peculiar suctorial tentacles. Such are flattened forms with branched arms, as *Dendrocometes*, or stalked species with knobbed tentacles, as *Acineta*.

INGEBORG (*c.* 1176 to *c.* 1238), queen of France, whose repudiation by Philip Augustus led to his excommunication (1196) and the placing of France under an interdict.

INGELHEIM, NIEDERE, and **INGELHEIM, OBER** (*c.* 49° 58′ N., 8° 6′ E.), two small contiguous towns, Hesse, Germany, on Selz; wine. Pops. (1910) 3853 and 3500.

INGELOW, JEAN (1820–97), Eng. poet and novelist, who became known by publication of poems in 1863; her best-known novels—*Off the Skelligs* and *Fated to be Free*.

INGEMANN, BERNHARD SEVERIN (1789–1862), most popular Dan. poet and novelist of his day; his writings are somewhat mawkish, but graceful and finished.

INGERSOLL (43° 3′ N., 80° 58′ W.), town, Ontario, Canada, on Thames; agricultural implements; furniture. Pop. 5000.

INGERSOLL, ROBERT GREEN (1833–99), Amer. barrister and free-thinker; noted for lectures attacking the Bible.

INGHAM, CHARLES CROMWELL (1796–1863), prominent Amer. portrait painter.

INGHIRAMA, FRANCESCO (1772–1846), Ital. antiquary; made valuable Etruscan researches. His bro., GIOVANNI I. (1779–1851), wrote astronomical books.

INGHIRAMI, TOMMASO (1470–1516), distinguished Ital. humanist.

INGLEBY, CLEMENT MANSFIELD (1832–86), Eng. scholar; author of books on Shakespeare.

INGLEFIELD, SIR EDWARD AUGUSTUS, KT. (1820–94), distinguished Eng. Arctic navigator; made admiral, 1879.

INGLIS, SIR JOHN EARDLEY WILMOT (1814–62), Brit. general. During the Indian Mutiny he commanded the Residency at Lucknow from death of Lawrence to relief by Havelock, 1857.

INGLIS, SIR WILLIAM (1764–1835), Scot. officer distinguished in Peninsular War; bade his regiment 'Die hard!' with result that nearly all were slain; this regiment (57th foot) has retained the name of Die-hards.

INGOLDSBY, see BARHAM.

INGOLSTADT (48° 47′ N., 11° 25′ E.), fortified town, Bavaria, Germany, on Danube; seat of a univ., founded 1472, transferred in 1800 to Landshut, and in 1826 to Munich; manufactures cannon and gunpowder. Pop. (1910) 23,760.

INGRAM, JAMES (1774–1850), Eng. scholar, edit. *Saxon Chronicle* (1832).

INGRAM, JOHN KELLS (1823–1907), Irish literary man, political philosopher, and philologist.

INGRES, JEAN AUGUSTE DOMINIQUE (1780–1867), Fr. painter; belonged to the classical school, withstood the Romantic inrush and lived to enjoy short classical revival of the Second Empire; born at Montauban; became pupil of David (1796) and speedily his rival; executed portraits of Napoleon and other pictures, including famous *Girl after Bathing*, of which the marked individuality led to the charge of affectation; numerous historical subjects followed, including the *Chapelle Sistine*, one of the few pictures in which I. shows any Romantic feeling; elected to the Institute, 1825, and for a while most prominent painter of France, but his *Martyrdom of St. Symphorien* (1834) was coldly received by a Romantic age; I.'s work suffered from this adverse criticism, never again attaining the artistic conviction of his earlier products. Among best works are *Ambassadors of Agamemnon*, *Stratonice*, and *La Source*.

INHAMBANE (23° 50′ S., 35° 20′ E.), seaport (and district), Portug. E. Africa; exports rubber, wax, oil-nuts. Pop. 3500; district, *c.* 300,000.

INHERITANCE.—According to Eng. law, if a person dies intestate his *real* property passes according to certain rules. The person who last held it is the *purchaser*, unless he can be proved to have inherited. It descends first to lineal descendants, male coming before female, and the issue of a dead heir before the next living bro. or sister. If there are no descendants then it passes to ancestors. Relatives of the half-blood inherit much as relatives of the whole, with certain differences. The present law depends on the —(1) *Inheritance Act* of 1833, and the (2) *Law of Property Amendment Act*, 1859. See also HEREDITY.

Heritable and Movable, in Scots law, a division of things. Heritable subjects (*e.g.* land, annuities, leases) descend to an heir; movable subjects (*e.g.* furniture, stocks and shares) descend to next of kin.

Heritable Securities, in Scots law, are equivalent to mortgages (*q.v.*) on land in Eng. law.

INHIBITION (from Lat. *inhibere*, to prevent), legal expression for qualified superior's forbidding an offending clergyman perform his office.

INISFAIL (Gaelic for island of the *fail*, or stone), Ireland; the country which possessed the *fail*, or stone, on which Jacob slept. This stone was afterwards taken to Scone in Scotland, and thence to Westminster Abbey, where it forms part of Coronation Chair.

INITIALS, see ILLUMINATION, ART OF.

INJUNCTION.—A legal remedy for the enforcement of covenants, particularly negative covenants. Thus, where a tenant covenants not to carry on a particular trade the court will grant an i. to restrain him from doing so, or an i. may be obtained from the courts to restrain the publication and sale of books and newspapers pending the trial for breach of contract, or to prevent a public singer from singing in certain places when the contract has been made to sing elsewhere.

INK contains dissolved or suspended colouring matter; it should not mould nor form a thick deposit; it should be non-erasable, non-poisonous, and non-corrosive. Since the XI. cent. ink has been made from an *iron* salt and *tannin*. TANNIN INKS are made by fermenting *galls* with *yeast* and mixing the *tannic acid* so obtained with *ferrous sulphate*. *Gum arabic* is added to suspend the precipitate. Oxidation by air develops the intensity of the colour. Coloured inks

are obtained by adding different pigments. PRINTING INK contains lamp-black, linseed oil, and some yellow soap. CHINA or INDIAN INK is soot from wood or lamp-black mixed with glue from ox-skin, and made into cakes. COPYING INKS are made from *logwood, ammonium alum,* and *metallic salt.* They are corrosive. The colour develops by oxidation. ANILIN INKS are non-corrosive, and have no sediment, but are fugitive. MARKING INK, indelible ink for marking linen, etc., is a solution of silver nitrate, or other salts. SYMPATHETIC INKS are *chlorides* of *nickel, cobalt,* etc., which become visible only on the application of heat or a chemical agent.

Mitchell, *The Manufacture of Ink.*

INKERMANN, village in the Crimea, 33 miles from Sebastopol; noted for defeat of the Russians by the English and French on Nov. 5, 1854.

INK-SAC of cuttles, see under CEPHALOPODA.

INLAND REVENUE, see EXCISE, FINANCE.

INLAYING, method of decoration by inserting one material into another, differing in nature or colour; different kinds are bidri, damascene, buhl work, marquetry, pietra dura, mosaic.

INMAN, HENRY (1801–46), Amer. artist, who executed many portraits of celebrities.

INN (48° 34′ N., 13° 28′ E.), river, Central Europe; ancient *Œnus*; rises in Swiss canton of Grisons; joins Danube at Passau; length, 320 miles; navigable to Hall.

INN.—An 'inn' has been defined as 'a house, the owner of which holds out that he will receive all travellers and sojourners who are willing to pay a price adequate to the sort of accommodation provided.' Generally a hotel is an inn. The ale-house, or tavern, is merely a refreshment-house, and a fully licensed public-house is not necessarily an inn. Neither is a boarding-house, for the proprietor of the latter makes what arrangements he, or she, pleases with the boarders. But the innkeeper is bound by law to receive and afford proper entertainment to every one who offers himself as a guest, if there be sufficient room and no good reason for refusal. In the event of neglect or non-fulfilment of duty on the part of the innkeeper proceedings should be taken against the person who is, in fact, the innkeeper.

INNER HOUSE, higher divisions of Scot. Court of Session.

INNER TEMPLE, see INNS OF COURT.

INNERLEITHEN (55° 37′ N., 3° 5′ W.), town, health-resort, Peeblesshire, Scotland, seat of woollen industry; saline springs (Scott's *St. Ronan's Well*).

INNESS, GEORGE (1825–94), Amer. landscape painter, remarkable for poetry of conception and colouring.

INNOCENT, INNOCENTIUS.—The name of numerous popes, of whom the most important are:—

INNOCENT I., reigned 402–17; confirmed actions of Synod of Carthage, 416; commemorated in Rom. Church, July 28.—INNOCENT II., reigned 1130–43; supported St. Bernard against Abelard and Arnold of Brescia.

INNOCENT III., reigned 1198–1216; one of the greatest of the popes; exercised enormous power; as pope and as an Ital. prince he opposed imperial power; enforced his decisions on marriage question on Philip of France and Peter of Aragon; more significant still were his relations with King John and his putting England under interdict; promoted Fourth Crusade, 1204, and crushed the Albigenses; d. soon after presiding at the Lateran Council of 1216. I. was a statesman rather than a theologian, and under him the papacy reached the height of its power.

INNOCENT IV., reigned 1243–54; engaged in long conflict with Emperor Frederick II., carrying on the lofty ideal of power of Innocent III.; had more personal ambition and less loftiness of aim than his predecessor; promoted study of canon law.—INNOCENT VI., reigned 1352–62, at Avignon; a firm ruler, he carried through various reforms, but has sometimes been charged with nepotism.—INNOCENT VII., reigned 1404–06; tried to summon general council in 1404, which never assembled.—INNOCENT VIII., reigned 1484–92; unsuccessfully preached a crusade; without real ability, and guilty of nepotism; influenced by Cardinal della Rovere (Julius II.).—INNOCENT X., reigned 1644–55; condemned the Jansenists, 1653; largely swayed by his sister-in-law, Donna Olimpia Maidalchini.

INNOCENT XI., reigned 1676–89; carried out reforms in papal court, and tried to secure greater simplicity and spirituality in Church life; came into conflict with the Jesuits; took some part in politics, opposing Louis XIV. over *Declaration of Gallican Liberties,* which I. resisted; an unsuccessful attempt was made to canonise him.

INNOCENT XII., reigned 1691–1700; a reforming pope, tried to abolish nepotism by declaring popes should not give offices to relatives.—INNOCENT XIII., reigned 1721–24; supported Old Pretender and opposed the Jesuits.

INNOCENTS' DAY, CHILDERMAS, Church holiday to commemorate massacre of innocents by Herod; Dec. 28 in Rom. Church; considered unlucky.

INNS OF COURT.—Corporate bodies of which all barristers and students of law must be members. (The phrase is also applied to the buildings belonging to these societies.) Four of these courts exist in London: The *Inner Temple,* the *Middle Temple, Lincoln's Inn,* and *Gray's Inn*—all the smaller inns have long been abolished. Each of these societies is governed by a body of benchers. The privileges of the inn are to admit men to become students of law, and to confer the right, by calling them to the Bar, to practise in the Law Courts. The Inns have the power of refusing to admit a person as a student without stating a reason, and of disbarring a member whose conduct is considered unworthy of the profession. Each student before admission must pass an entrance examination or produce a certificate from a university, and before being called to the Bar must keep twelve terms (three years) and pass other examinations. In Ireland, King's Inn, Dublin, is the only Inn of Court. In Scotland there are no Inns of Court, and an advocate, corresponding to the Eng. barrister, is trained in the Faculty of Advocates.

Loftie, *Inns of Court and Chancery*; Home and Headlam, *Inns of Court.*

INNSBRUCK (47° 17′ N., 11° 24′ E.), town, Austria, capital of Tyrol; beautifully situated at head of Brenner Pass; seat univ., founded 1677. Among principal edifices are Franciscan Church (with magnificent monument to Maximilian I.), imperial castle, and Ferdinandeum museum; textile and glass-painting industries. Pop. (1910) 53,194.

INNUENDO (from Lat. *innuere,* to nod towards), method of defamation by insinuation which may constitute libel (*q.v.*).

INOCULATION, see BACTERIOLOGY (ARTIFICIAL IMMUNITY).

INOUYE, KAORU, MARQUESS (1835–), Jap. Meiji statesman, who won some success for European innovations.

INOWRAZLAW, HOHENSALZA (52° 47′ N., 18° 15′ E.), town, Posen, Germany; iron-works; salt-works in vicinity. Pop. (1910) 25,695.

INQUEST (Lat. *inquisitio,* search), legal inquiry made by Coroner (*q.v.*) and jury in England; held in cases of death from unusual causes; formerly held at death of every tenant-in-chief, or at his coming of age, which he had to 'prove' before the Crown surrendered his lands, and to ascertain extent of Crown lands, etc.

INQUISITION, THE.—In the IV. cent. the Christian Church, which till then had been persecuted, became itself persecuting. Laws were passed in the Christianised Empire against heretics. In the Dark Ages there was not much persecution, but about the X. cent. rigorous measures were adopted, and in various countries heretics were burnt. It came to be established that heretics, after being condemned by the

Church courts, should be handed over to the 'secular arm' for punishment. The Emperors Frederick I. and Frederick II. and Pope Innocent III. urged increased severity. Gregory IX. really created the mediæval inquisition which he entrusted to the Dominicans. The judicial procedure of the I. was quite different from that to which we are accustomed. The accused was assumed to be guilty; he did not know who had accused him, and all proceedings were in secret. Hardly a case is known of complete acquittal, but if the prisoner confessed, he had to suffer various pains and penalties, such as scourging, penance, imprisonment. Torture was frequently used to extort confession, and every effort made to induce the heretic to accuse others also. Those who were obdurate were liable to be burnt. The heretic's goods were confiscated, the spoils going sometimes to the secular monarch, sometimes to the Church, and occasionally confiscation was so great as to involve impoverishment in a district where the I. had been acted. The I. extended its activities to the suppression of heretical lit. and to magic.

The I. never had a real existence in England, although from the XV. cent. onwards heretics were burned at the stake, particularly in the Marian persecution. In France the Albigenses were suppressed in the XIII. cent. with great cruelty, and the Waldenses in the XIV. In Italy persecution was often for political reasons, and in Germany heretical mystics suffered most.

It is the SPANISH I., however, of which the influence was greatest. Owing to the independent policy of Span. kings the I. never did much in the Middle Ages. It was reorganised by Ferdinand and Isabella in 1480. Despite its independence of the Holy See it was recognised by the popes. (It is noteworthy that while no country in Europe was more orthodox than Spain, none was so jealous of papal interference.) No class in Spain was exempt from its vigilance, but some came off worse than others—*e.g.* the descendants of converted Moors or Jews were always regarded with suspicion. The Span. I., after having been twice temporarily abolished, finally disappeared in 1834. Its work had been more thorough and far-reaching in Spain in modern, than elsewhere in mediæval times. It is very difficult to summarise justly the work of the I. as a whole, partly owing to the theological passions engendered when its very name is mentioned, partly to the fact that in many cases records have been destroyed. It must be remembered that competent authorities estimate the actual number of persons burnt alive by the mediæval I's at much less than is generally supposed, and that in Spain victims were generally strangled before they were burnt, and that it was sometimes directed against moral and political offenders; still, a very serious indictment remains.

Lea, *History of the Inquisition in the Middle Ages: History of the Inquisition of Spain.*

INSANITY is a term applied to certain abnormal mental conditions due to disorder, disease, or imperfect development of the brain, but i. is such an indefinite term, and takes so many forms, that no short definition is satisfactory, the important point, however, being that it is not a mere disorder of the understanding, but is the result of an actual pathological condition of the brain. It has been calculated that among civilised peoples the ratio of insane to sane is about 1 to 300, but the proportion varies in different countries. The most important predisposing cause of i. is a hereditary tendency towards mental disease, about 60 or 70 % of the insane having a hereditary taint, the predisposition developing into an actual manifestation of disease on an exciting cause arising. It is said that marriage of near relations is a source of mental disease, but this does not apply to healthy persons whose family history is good. Epilepsy, hysteria, nervous diseases of different kinds, intemperance, tuberculosis, over-work, advanced age of one of the parents, are all apt to produce i. in offspring. Such periods as puberty, pregnancy, the climacteric, which have a considerable effect upon the nervous system, alcoholism, drugging, and other intemperances, injury to the brain, various diseases, such as gout, rheumatism, influenza, diabetes, and other morbid conditions due to organic or inorganic toxins in the body, and personal afflictions, religious excitement, financial worry, etc., are all important factors in the causation of i.

GENERAL SYMPTOMS of i. may be considered under the heads of physical and mental symptoms, the physical generally appearing before the mental. Sleeplessness is frequently a symptom in the early stages of i., and derangement of speech may be noticeable, unusual rapidity or slowness, changes in articulation, incoherence. The natural expression of the features is often changed, control over the expression of the emotions may be lost and an apathetic look present, or the emotions may be unusually vividly indicated by the expression; the eyes may show changes in the pupils, they may be extremely dull and lifeless, or feverishly brilliant. The nutrition of the body is very generally affected, the digestion is much deranged, and weight is rapidly lost. The liver, kidneys, heart, and other organs may be considerably affected, and the skin, perspiration, hair, and nails suffer from the disorder of nutrition. The chief mental symptom is loss of self-control, undue emotional depression or emotional exaltation. The power of judgment and reasoning also fails, the power of attention is lost or weakened, and delusions are common, for which theories, which seem quite logical, are often worked out by the patient. There may be hallucinations of hearing, seeing, taste, and smell, natural affection for near relatives and close friends is frequently lost, and suspicion or dislike takes its place. There is a tendency to suicide, particularly in those persons who are in a depressed state, and sometimes great pains are taken to carry out this design; while some persons are affected by irresistible impulses in other directions, smashing furniture or windows, or attempting to kill their children or other people in their vicinity.

CLASSIFICATION OF INSANITY.—Cases of i. differ from one another so much that the only thing any two may have in common is that in both the mind is affected. Nor can any classification be considered as dividing up the cases into separate, definite classes, as many cases are on the borderland of two or more different types of i., merging more or less into several of them. The classification of the different main varieties of mental disease has continually been undergoing modification since it was first laid down according to mental symptoms by Philippe Pinel (1745–1826), the classification given here being both convenient and generally accepted.

Congenital I. is due to imperfect development of the brain, to injuries to the brain before or at birth or in early infancy, or hereditary predisposition, or to the occurrence of such conditions as hydrocephalus. *Idiocy* is the term applied to the lower conditions of mental development, which may be weakness of mind or entire lack of intelligence, while *imbecility* is applied to the more advanced states of mental development. *Cretinism* (q.v.) is a condition of undeveloped intellect due to absence or atrophy of the thyroid gland.

Melancholia includes all states of morbid mental depression, among the secondary symptoms being delusions and hallucinations, nervous and digestive derangements, while a tendency to suicide is a very marked symptom in the majority of cases. Under suitable treatment a large percentage of cases recover completely.

Mania embraces all states of morbid mental excitement or exaltation, the symptoms being great restlessness and mental excitement, an unnatural expression of the face, bright eyes, muscular excitement and sleeplessness, the body loses weight rapidly, and death may even ensue from an attack. Of acute cases, the majority recover, and in regard to recurrent cases usually the intervals between attacks gradually become

longer, and the attacks less violent until they cease. *Folie Circulaire* includes regularly alternating mental states of melancholia and mania, and in the early stages of the condition moral changes, recklessness, obscenity, drunkenness, are often seen. A tendency to recurrence and relapse is common, but the majority of cases recover even after several years, although a recurrence is always possible.

Delusional I., or *Monomania*, is a somewhat loose term including those forms of i. in which the chief mental symptoms are insane delusions, *e.g.* of grandeur or pride, unseen agencies (imaginary annoyance by poisonous gases, electricity, etc.), or persecution (by unknown or known persons or classes of people). The state may resemble melancholia or mania at different stages. Recovery in the early stages is common, in the later rare. *Dementia* denotes the mental state in which the will power is lost, reasoning power, attention, and mental sensation weakened, and resembles congenital imbecility. It usually occurs as a sequel to melancholia or mania, being practically the incurable stage of those conditions. *Impulsive I.* is a state of the mind in which self-control is lacking, and is often due to hereditary influence, actions being done on impulse without reasoning, or it may be that the individual knows that he is doing wrong and has not sufficient control over his actions to prevent himself. The condition is often curable. *Stupor* includes those mental states in which the mind is shut off from the world around, the senses recording no impressions, the person being able to walk about, eat, and so on, but having no mental sensations, and taking no notice of anything. It may be due to some severe shock, and is usually curable. *General Paralysis of the Insane* is a disease characterised by degeneration of the central nervous system, motor power, and the senses as well as the intelligence being gradually destroyed. The onset of the disease is slow, the moral sense and self-control are affected, extravagant delusions are often present, writing, speaking, etc., become more difficult, and paralysis of all the muscles gradually appears. The disease is usually fatal in from eighteen months to three years. *Epileptic Insanity* is a term which has been applied to i. accompanying epilepsy (*q.v.*), often characterised by violence, but is now believed to have no connection with epilepsy, a mind affected by the one mental condition being more or less liable to be affected by the other. *Alcoholic I.* may be very slight or very acute, and may last for a very short or for a long time; it may take the form of *delirium tremens* (which may also be due to injury or other cause), in which there is mental excitement, hallucinations, sleeplessness, or it may take the form of *dipsomania*, in which there is an extreme craving for drink, with loss of self-control, with hallucinations, etc., usually occurring in recurring attacks. Women are subject to attacks of i. at special periods, such as *insanity of pregnancy, puerperal insanity, lactational insanity*, all of which are usually easily curable. Various forms of i. are associated with puberty, adolescence, and the climacteric, and with derangements of the reproductive organs and functions.

Senile I. may come on in extreme old age, with failing mental power, accompanied by hallucinations, with melancholia or mania, or by sleeplessness, neurasthenia, and apathy. Attacks may be recurrent, and recovery from them may often take place, but treatment is rather hopeless. I. may be the result of injury to the head, *Traumatic I.*, or a sequel of such diseases as diabetes, Bright's disease, many fevers, especially scarlatina, lead-poisoning, anæmia. The terms *Katatonia*, for a form of usually adolescent i. mainly characterised by stupor and muscular spasm, and *Hebephrenia*, for a form of adolescent i. distinguished by failure of the power of concentration and attention along with arrested physical development, have been introduced by certain authorities, but are not generally recognised as distinct diseases.

Treatment.—Although it appears that the ancient Egyptians and Greeks treated the insane as suffering from disease, this was succeeded by the mediæval idea that they were possessed of devils, and the treatment applied was scourging, torture, plunging afflicted persons into pools of water until they were nearly drowned, chaining them up in dungeons. In somewhat later times the harmless insane wandered about the country or were taken care of at holy shrines, and those considered dangerous were put in chains in prisons along with criminals. Asylums where the insane were detained were built (or in some cases former monasteries, etc., were used) in the XVII. and XVIII. cent's, but the treatment was much as before. More humane treatment was first advocated by Pinel and Esquirol in France at the end of the XVIII. cent. It was not, however, until near the middle of the XIX. cent. that physical restraint began to be abolished from asylums, and a scientific treatment with light work and exercise in the open air began to be introduced.

Short attacks of delirious mania and alcoholism and such comparatively transient states as acute puerperal insanity may be treated quite well at home under a good nurse and the supervision of a physician, but a good modern ASYLUM has the advantages of a healthy situation, spacious grounds, a healthy and systematised régime and dietary under skilled nursing and medical supervision, and proper accommodation for violent and invalid cases. In fact, instead of the old asylums of detention with strait waistcoats and other appliances, they are nowadays mental hospitals conducted on scientific principles. Indeed, certain mild forms of i. can well be treated in special wards of general hospitals.

The treatment consists of plenty of nourishing food, over-feeding rather than under-feeding. Cod-liver oil, malt extract, and the like are valuable in cases where nutrition is poor, and in many such cases wines and malt liquors are of distinct benefit. Quinine, iron, and dilute mineral acids are valuable tonics, but nerve stimulants, *e.g.* strychnine, require more care in administration, as they may lead to mental excitement. Moderate exercise in fresh air is most important, simple open-air, such as gardening, and social amusements, dancing, etc., in moderation, help to divert patients' minds from morbid thoughts into more healthy channels. Massage, which has been recommended, is suitable in very few cases. Many cases of i. suffer from sleeplessness or from morbid brain excitement, which are treated with benefit by hypnotic, sedative, and motor depressant drugs, paraldehyde being the best of the first class, a combination of cannabis indica and the bromides of the second, and hyoscine, or sulphonal and trional, which have also hypnotic and sedative qualities, of the third; but these drugs must all be carefully employed, their dangers being considerable. *Hypnotism* is employed with marked benefit in the treatment of many types of insanity, particularly in cases of mental depression or delusions, or to relieve troublesome symptoms.

LUNACY LAWS.—The first laws in England dealing with the insane were passed in Edward III.'s reign, since when numerous statutes have been enacted concerning the subject. The most important was that carried through by the exertions of the philanthropic Lord Shaftesbury in 1845, by which asylums were established throughout the Eng. counties, Commissioners app. to control them, and other provisions made for the well-being of the insane. The present asylum administration is regulated by the Acts of 1890 and 1891, visiting committees of the local authority, Commissioners in Lunacy, and Chancery Visitors being appointed. A person not being a pauper, or a lunatic so found by an inquisition ordered by the judge in lunacy before one of the masters in lunacy, cannot be received into an asylum without a 'reception order' by a magistrate, which is given after a private hearing of evidence supported by two medical certificates, except under an 'urgency order' made by a near relative, and supported by one medical certificate, on which the person may be detained for seven days. There are also asylums for the detention and treatment

of criminal lunatics, the criminal responsibility of an insane person being founded in Eng. law upon the Rules in the case of Macnaughton, tried in 1843 for the murder of Mr. Drummond, the private sec. of Sir Robert Peel. In Scotland the laws for the detention of an insane person are somewhat simpler than in England; while in Ireland, America, the Brit. Colonies, France, Germany, and other European countries, the main features of legislation affecting the insane are the same as in England.

Clouston, *Hygiene of the Mind* and *Mental Diseases*; Mercier, *Text-Book of Insanity*.

INSCRIPTIONS, ANCIENT, archaic writings on a durable material, writings on papyrus, vellum, or paper belonging to the branch of palæography (*q.v.*). There is this difference between i. and palæography: the former is never cursive except in the *graffiti* (wall-scribblings) found in buried towns and generally considered, despite their material, as palæographical rather than inscriptional. I. were the models from which all cursive scripts were formed, and in any case it would be natural, from the difference in material, to expect earlier examples of the former than the latter.

The CUNEIFORM (*q.v.*) i. begin about 4500 B.C.; this form was employed by Assyrians, Babylonians, and Persians, and there is an enormous quantity of cuneiform literature of which the secret of decipherment was not disclosed until the XIX. cent. The cuneiform alphabet had been everywhere superseded by the Phœnician by the beginning of the Christian era. The Phœnician alphabet, which began to spread in the Mediterranean early in the 1st millennium B.C., was probably derived from Egypt (*q.v.*), where i. in hieroglyphics are still extant of the 4th millennium B.C. Phœnician i., probably of the IX. B.C., have been found on bronze bowls in Cyprus; at Marseilles was found a sacrificial tablet which has thrown great light on the nature of Punic civilisation. Jews and Greeks probably received their alphabets from Phœnician merchants.

HEBREW i. date back to the IX. cent. B.C. and, although few in number, have great importance from their relation to the *Old Testament* narrative, which, in its turn, has aided in their interpretation. This has been the case with the Moabite Stone (discovered in 1868) and the i. in the tunnel from the spring to the pool of Siloam. Many Semitic i. of all dates are discovered in the great archæological storehouse, Egypt.

GREEK i. exist in great numbers and, being to many scholars of greater intrinsic interest than the i. of other nations, are the subject of the labours of a large and distinguished band of modern scholars. The i. on marble filled in a Gk. city the place of public notices in a modern town and the function of the *London Gazette*; and, moreover, monuments in honour of distinguished citizens, funeral steles, etc., abounded. The city archives, collections of i., were in the temples. One of the earliest Gk. i. is that inscribed by Gk. travellers on the leg of a statue at Abu-Simbel in Egypt in the VII. or early VI. cent. B.C., but some of the i. lately excavated in the Ægean district may be earlier. The Gks. of the V. cent. B.C., who were the first to form an ideal of scientific history, were the first to commence the study of i., of which collections began to be made in the III. cent. B.C. This ideal of history almost entirely vanished in the Middle Ages, but the reverence for things Gk. of the Renaissance led to a new period of collection and copying of Gk. i. The first publication of the results of this toil was Boeckh's great *Corpus Inscriptionum Græcarum* (1828, 1833), continued by Franz and Kirchhoff under the auspices of the Berlin Academy, and in 1840 Franz wrote his valuable *Elementa Epigraphicis Græcæ*. Amer., Austrian, Brit., Fr., and Ger. societies, with their headquarters at Athens, are now engaged in the excavation of classical sites and deciphering of i.

LATIN i., which are to be found in every country ruled by the Romans, and are often a guide to the site of a Rom. station, were collected like those of Greece by Renaissance scholars of the XV. and XVI. cent's. Among these scholars was Poggio, whose devotion to antiquity makes one of the characteristic stories of the movement. Several other antiquarians made collections before the days of the printing-press, and Spreti's collection of the interesting i. of Ravenna (one of the last strongholds of antique civilisation in Italy) was one of the *Incunabula*, appearing in 1489. Smetius, Pighius, Justus Lipsius, etc., made inscriptional studies in the XVI. cent., the famous Scaliger and others in the XVII. cent. Marini published his important *Atti dei fratelli arvali* in 1795. Borghesi, who in 1818–20 published *Frammenti dei Fasti Consolari Capitolini*, won the support of the Berlin Academy for the great work of making a *Corpus Inscriptionum Latinarum*, largely carried out by Mommsen (*q.v.*), who did an enormous work in this field.

Niebuhr, who collected *Inscriptiones Nubienses*, gave a great stimulus to antiquarian zeal by his new hypotheses on Rom. history. Besides the great *Corpus* there are various local treatises, and much information about the Rom. antiquities of the U.K. is to be found in Bruce's *Lapidarium septentrionale* (1875), the *Archæologia, Archæologia Æliana, Archæol. Journ.*, etc. A special Fr. journal of i., *L'Année épigraphique*, is published. Mediæval Lat. i. did not fall within the scope of the *Corpus*, but have been collected by Rossi and others. The bold and simple Rom. lettering, often painted with *minium*, a bright red pigment from Spain, has never been surpassed for monumental purposes. Funerary i. (*tituli*) are among the earliest Lat. i., dating back to the VI. cent. B.C.; the well-known i. of the Scipios are of the III. and II. cent's B.C. These i. were on stones very like the Gk. stele, but instead of the acanthus scroll, anthemian, and figure offering libations in low relief of the Gk. stele, a head in high or low relief surrounded by a garland was a more usual ornament of the Rom. grave-stone. The *titulus honorarius*, or eulogy bestowed by the state in the form of an i., was adopted from Gk. practices. As in Greece laws and public and private muniments were inscriptional, as also were ecclesiastical records; Rome had not the excellent marbles of Greece, and, moreover, made a considerable use of metal for i., with the result that less material has been preserved than in Greece. Fire, which in charring the papyri of Herculaneum and Pompeii preserved them from the invariable fate of papyri in all but the driest climates, has been fatal to a large number of the i. of Italy. The *runes* (q.v.) of the Scandinavian peoples are also believed to be derived from Phœnician sources.

CHINESE i's, which date back to at least the XVIII. cent. B.C., are to be found on bronze pots, bones, rocks, and ordinary stone tablets. The letters are evolved almost certainly from original picture-writing. In *India*, although clay, metals, and even crystal are used for i., the principal material is stone. As Indian chroniclers have been few and particularly unreliable, the wealth of i. is of great historical importance. All over India are temples and monuments inscribed with the record of hist. events, and there are valuable and numerous coins and seals.

Berger, *Histoire de l'écriture* (1892); *Corpus Inscript. Semit.* (1881, etc.); Chabert, *Epigraphie grecque* (1906); Egbert, Lat. I's (1896); Hopkins, *Development of Chinese Writing* (1910); *Corpus Inscriptionum Indicarum* (1877, incomplete); Mommsen, *Res Gestæ divi Augusti* (1883). See PALÆOGRAPHY.

INSECTA, or HEXAPODA, are a class of arthropods characterised by the following features: (*a*) the body is segmented, and in the adult is divisible into three regions—the head, bearing a pair of sensory antennæ and a number of highly specialised mouth-parts, the thorax, to which are attached three pairs of legs (hence *Hexapoda*), and, generally, two pairs of wings, and the abdomen. (*b*) The mode of respiration is tracheal, the tracheæ communicating with the exterior by means of special apertures termed stigmata. (*c*) The young invariably differ from the adult in a greater

or less degree, and during development undergo slight, incomplete, or complete metamorphosis. In common with the remaining Arthropoda the body secretes an exoskeleton of chitin and the appendages are jointed. Insects constitute by far the largest number of terrestrial animals known, both generically and individually, the rapidity with which many multiply being little short of marvellous. Typically they are either aerial or creeping in the adult condition, although some (e.g. *Dytiscus*) are aquatic, but many pass a part, or the whole, of their larval life in the water.

External Characters.—The head, which contains the so-called 'brain,' and also bears the more important sense-organs (eyes, ocelli, etc.), is usually rounded in character and is divisible into two main portions, the *clypeus*, situated between the two antennæ and bearing the labrum or upper lip, and the *epicranium*. The mouth-parts consist primarily of three pairs of paired appendages, the mandibles, and first and second maxillæ respectively, the last pair being fused to form the labium, but in many forms they are highly modified in connection with the suctorial habit. The thorax consists of three segments, namely, the pro-, meso,- and meta-thorax, each of which bears one pair of legs, whilst the meso- and meta-thorax bear the wings where these are present. In the Coleoptera the anterior pair are modified as wing cases (*elytra*), whilst in the Diptera (*q.v.*), where only one pair occur, they are mesothoracic, and in some groups (springtails, lice, and fleas) they may be entirely wanting. The wings are outgrowths of the skin and are traversed and supported by nervures, the disposition of which is of considerable systematic importance. The abdomen consists of a variable number of segments—twelve, according to Heymons, being the maximum. They are typically without appendages, but the hinder end often bears stings, ovipositors, claspers, or other specialised structures.

Internal Anatomy. — The alimentary canal consists of three main portions: (*a*) the *stomodæum*, formed by the mouth, into which the products of the salivary glands pass, the œsophagus, crop, and gizzard; (*b*) the *mesenteron* or true gut, lined by endoderm and possessing a number of blindly ending cæcal glands; (*c*) the *intestine*, into the anterior portion of which the excretory organs, termed the Malpighian tubules, discharge. The blood is normally colourless, being mainly nutritive in character. It fills the body cavity and is circulated by the action of a pulsatile heart, surrounded by a pericardial cavity containing fat cells, and continued anteriorly into an aorta, whence it passes into the cœlom. The tracheal respiratory system is essentially a system of much branched tubes, ramifying throughout the body and oxygenating the various parts directly. They are lined internally by chitin and are supported internally by a closely coiled spiral thread. Each system is connected with its neighbours, and communicates with the exterior by means of a, usually protected, stigmatic aperture. The nervous system is typically invertebrate, consisting of a dorsal, ganglionic mass, united by a circum-œsophageal loop, to the ventral nerve chain, which bears a pair of ganglia in each segment. In many forms, however, notably in the Diptera, this arrangement is considerably modified by ganglionic fusions. The eyes may be either simple ocelli or elaborate compound structures similar to those of the Crustacea (*q.v.*). In addition there occur auditory and other organs, the significance of which is very imperfectly understood. In insects the sexes are distinct, but Aphides and certain 'Stick Insects' are parthenogenetic, whilst drone bees are also produced from unfertilised ova. The male sexual organs consist of paired testes opening into vasa deferentia, which are often coiled. These swell posteriorly to form seminal vesicles in which the ripe sperms aggregate and are eventually discharged by way of the ejaculatory duct during copulation. The ovaries are also paired, and consist of ovarian tubules from which the ova are discharged into paired oviducts, these usually uniting posteriorly to form a muscular vagina.

In the majority the life-history is very complex, but three main types are distinguishable as follows: (*a*) those in which the differences between young and adult are comparatively slight and in which the young, after a series of moults, assume the mature form (e.g. *Aptera, Orthoptera, Hemiptera*); (*b*) those, such as the dragon-fly (*q.v.*), in which the larva differs considerably both in structure and habits from the adult, and is often aquatic; this larva never pupates, but after a period of quiescence sheds its skin for the last time and emerges a perfect insect; (*c*) in the third type the larva also differs markedly from the adult (*e.g.* maggot, caterpillar), but undergoes a definite, resting, pupal, or chrysalid stage during which the larval organs disintegrate and are replaced by those of the adult (e.g. *Hymenoptera, Coleoptera, Lepidoptera*, and many *Neuroptera*). Such are said to undergo *complete metamorphosis* as distinguished from the incomplete metamorphosis of the second type. The principal features utilised in the classification of insects are, the absence, or occurrence, and character of the wings, the structure of the mouth-parts, and the nature of the change from larva to adult, and upon this basis Sharp separates the nine following orders: (1) *Aptera*, springtails and bristletails; (2) *Orthoptera*, cockroaches, grasshoppers, earwigs, locusts, and crickets; (3) *Neuroptera*, dragon-flies, May-flies, caddis-flies, and termites; (4) *Hymenoptera*, bees, wasps, ants, and saw-flies; (5) *Coleoptera*, beetles; (6) *Lepidoptera*, butterflies and moths; (7) *Thysanoptera*, thrips; (8) *Diptera*, flies proper; (9) *Hemiptera*, bugs, aphides.

Economic.—Either the adult forms or larvæ of many insects are injurious to cereal crops, fruit trees, and numerous other cultivated plants. Where large crops are to be dealt with the only remedy seems to lie in the thorough breaking up of the soil in autumn, the burning of refuse, and the encouragement in reason of natural enemies (*e.g.* moles and birds). In the case of trees and garden crops the treatment will vary with the type of insect, thus in the case of biting insects the food supply is poisoned, whilst suctorial insects are dealt with by contact spraying. There are three chief periods when spraying is useful, namely, winter, late spring, and summer. The object of the winter spraying is to cleanse the plant and to clear out all places where the eggs or young might be hidden. As the plants are dormant a strong solution may be used, the following being a standard one: sulphate of iron ½ lb., lime ½ lb., caustic soda 2 lb., paraffin 5 pints, water to 10 gallons. April and summer sprayings must be much weaker, their object being to exterminate any larvæ which have escaped the previous sprayings. For contact spraying against mealy bugs and the like a solution of soft soap and quassia, or an emulsion of soft soap and paraffin is generally used. For biting insects spray the foliage with the following: arsenate of soda 8 oz., lead acetate 1 lb., water 24 gallons. (For details as to separate life-histories consult the Leaflets of the Board of Agriculture and Fisheries.)

See Coleoptera, Diptera, etc., and also Sharp, *Insecta* (Cambridge Nat. History); Packard, *Text-Book of Entomology*; Lubbock, *Origin and Metamorphoses of Insects*.

INSECTIVORA (Insect Eaters), are Mammalia of the class Rodentia, usually small in size and nocturnal in habit. They may possess a smooth velvety fur, as in the mole (*Talpa*), or have a covering of spiny erectible quills, as in the hedgehog (*Erinaceus*). They run partly or wholly upon the sole of the foot, and the first digits of both feet (corresponding to the human thumb and great toe respectively) are not apposable. In addition to moles and hedgehogs, the order also includes shrews, tree-shrews, potamogale (an elongate animal and a powerful swimmer, inhabiting the river banks of the W. African tropics), and galopitheous (a bat-like creature inhabiting S.W. Asia, which possesses

a membranous skin-fold, the *patagium*, by means of which it is able to glide parachute-fashion from tree to tree). In nearly all, the snout is peculiarly delicate and sensitive and projects beyond the apex of the upper jaw. The teeth are characteristic, the mandible bearing more than two incisors, whilst the molars possess tuberculate roots. The milk dentition is extremely transitory, and is absorbed in the majority of cases before birth. The brain is small, the cerebrum leaving the cerebellum exposed, and being, with the exception of a lateral groove, quite smooth. The characters of the molars, and the small, smooth brain, are strongly indicative of the primitive character of the group, and this is confirmed by the absence of scrotal sac and the abdominal position of the testes. With the exception of the West African elephant-shrews, the urinogenital and anal apertures are partially or wholly enclosed in a common skin-fold suggesting a cloaca.

The order, which is not represented in Australasia, first makes its appearance in the Lower Eocene. The fossil forms are more or less synthetic in type, and suggest nearer affinities with the marsupials, the wholly extinct creodonts, and the lemurs than do their modern representatives. The I. are grouped in twelve families, of which the *Soricidæ* (shrews), *Talpidæ* (moles), and *Erinaceidæ* (hedgehogs) have Brit. representatives. The wide and often extremely limited geographical distribution of many of the families lends further support to the primitive character of the order.

INSECTIVOROUS PLANTS, besides feeding in usual way, capture and devour insects. Varieties: (1) with leaves provided with pit-like traps filled with a viscid fluid, *e.g. Drosophyllum lusitanicum* of Portugal and Morocco; (2) with no pits on leaves, but secreting a viscid fluid, *e.g.* Sundew; (3) with viscid fluid, along with a movement to capture insect, *e.g.* Venus' Fly-Trap. See PITCHER-PLANTS.

INSOLVENCY, see BANKRUPTCY.

INSOMNIA, inability to sleep, which is usually accompanied by emaciation, dryness of the skin, and nervous disturbances; may be due to anæmia or hyperæmia of the brain secondary to diseases of the heart, lungs, and other organs; while the abnormal state of the blood in gout, rheumatism, etc., or through excessive use of tobacco or alcohol will also produce i. It may be due, also, to over-work, or nervous derangements, neurasthenia, etc., from various causes. The treatment depends on the cause, which, if possible, is removed by suitable remedies, and various drugs, potassium bromide, chloral hydrate, belladonna, opium, when administered under the direction of a doctor, are valuable.

INSPIRATION (Lat. 'inbreathing').—The idea that a human being can be an organ or vehicle for the manifestation of the divine, or can receive divine communications, appears in all religions. Often the inspired person is in a state of great emotional excitement. The Old Testament prophet was at first a seer, then moral, spiritual, and to some extent predictive. I. is most frequently used in connection with sacred writings; all great religions have their sacred books; in Muhammadanism the conception of i. of the Koran is more rigid than that of the Bible has ever been among Christians. In the Christian Church the literal and verbal inerrancy of Scripture has been largely believed in, but it is now generally abandoned. Another view is that the Bible is infallible in matters of faith and morals, though not always necessarily in others. Most Christian theologians would now accept the Bible as spiritually more inspired than any other book, and as containing all things necessary to salvation, but would admit moral and spiritual progress.

Sanday, *Inspiration*.

INSTERBURG (54° 37′ N., 21° 50′ E.), town, E. Prussia, Germany; iron foundries, tanneries. Pop. (1910) 31,627.

INSTINCT, a word used in a vague and popular and also in a more exact scientific sense, in which it is defined as meaning those mental faculties which are for a specific end, but which do not necessarily imply conscious knowledge on the part of the creature who exercises them. Some would try to separate the biological and psychological aspects of i. among animals, but it is in the connection of the two that the problem really consists. The i's of animals popularly so-called are only partly i's proper, and partly what they have acquired. Many instinctive actions, again, are due to imitation. The problem of i. is closely connected with heredity. There is undoubtedly such a thing as racial preparation, and the capacity for certain actions is inherited.

Lord Avebury, *On the Instincts of Animals*.

INSTITUTE (Lat. *instituere*, to establish, appoint), name given to laws and commentaries thereon (see JUSTINIAN); to places in which training is given, or to associations for scientific purposes. The *Institut de France* (established 1795) comprises the five Academies (*q.v.*).

INSTITUTE OF FRANCE, see ACADEMY.

INSTITUTIONAL CHURCH, one which makes social activities besides worship important in Church life (some think to the exclusion of religion).

INSTRUMENT OF GOVERNMENT, a paper constitution drawn up in Dec. 1653 by officers of the army, making Cromwell Protector under control of Council of State and a reformed Lower House; Cromwell ruled under it till 1657, when it was superseded by the *Humble Petition and Advice*.

INSTRUMENTATION is virtually synonymous with ORCHESTRATION, and signifies the distribution of parts of a musical composition among the various instruments of an orchestra. The history and development of i. run parallel, as it were, to the history and development of the orchestra (*q.v.*). Up to the XVIII. cent. the orchestra served almost exclusively as an accompaniment to vocal music (opera, choral, etc.). Within these limitations, however, marked progress was made in the art of i. by Scarlatti, Bach, and Händel. With Gluck the orchestra and orchestration attained more importance in opera, while Haydn laid foundation of symphonic music. In Mozart's day the orchestra was still small (about forty instruments), and brass and percussion parts were insignificant, almost artificial. Beethoven gave a greater share to brasses and drums, and improved the rôle of almost every instrument. XIX.-cent. inventions led to an enormous advance in tone, compass, and flexibility of winds in particular. New instruments were introduced and the orchestra was considerably enlarged. The art and science of i. naturally became more complex as the orchestra's capabilities increased. Wagner first fully realised the dramatic power of orchestral music, and by applying new laws and original ideas to the improved instruments of his day, attained effects never previously attempted or possible. Tchaikovsky and the Russ. school gave even greater prominence to brass and percussion instruments, and imparted new colouring to orchestral music. The modern masters, Strauss and Debussy, strive after emotional effects which add still further to the difficulties and complexities of i. See ORCHESTRA.

Prout, *Primer of Instrumentation*; Berlioz, *Instrumentation*.

INSUBRES, Celtic people who crossed the Alps and founded Milán, 396 B.C.; crushed by Romans, 222 B.C.; last rising defeated, 194 B.C.

INSURANCE may be defined as 'a contract by which a person (called the insurer or assurer), in consideration of a lump sum of money, or of a periodical payment, undertakes to pay to another (called the insured or assured) a larger sum on the happening of a particular event.' In other words, it is the making of financial provision against loss of income, through accident or through death. The instrument in which the contract of i. is contained is called the *policy*

of insurance, the term policy being derived from an Ital. word signifying a promise. Nearly every risk that threatens the average man may be insured against. Unusual and extraordinary risks are not as a rule undertaken by the ordinary i. offices, but by members of Lloyd's and similar companies. A man may be insured against loss through bad debts, or through the failure to meet bills of exchange of which he is the holder or payee. Football and cricket clubs frequently insure against loss in the receipts from the season's play. Merchants and business men insure themselves against loss when they anticipate an increase in the duties or taxes levied on the goods in which they traffic. These latter, of course, do not as a rule go direct to the *underwriters* (*i.e.* the persons who jointly undertake the business of i.); they employ a *broker*, whose business is to know the underwriters or insurers likely to undertake this kind of i., and through the broker the i. is effected with the underwriter. The oldest and commonest forms of i. are Marine, Fire, and Life. Only in quite recent times have i. against accidents and burglary been added, and national and compulsory i. against unemployment and ill-health is a still later development. In U.S.A. all i. is state controlled.

Marine Insurance was in existence as far back as the XIII. and XIV. cent's, when Lombard, Florentine, and Venetian shipowners insured against the loss of cargo or vessel. In the XVI. cent. Eng. shipping-masters followed their example. The contract of marine i. is one 'of indemnity in which the insurer, in consideration of the payment of a premium, agrees to make good to the insurer all losses not exceeding a certain amount, that may happen to thing insured, from the risks enumerated in the policy during a certain voyage or period of time.' The person effecting the i. must have an insurable interest (*i.e.* a personal pecuniary interest, or be liable or accountable for any loss arising) in the thing insured; and this interest must be a continuing one—that is, the insured person must have an interest in the subject-matter of the i., not only at the time of effecting the policy, but also at the time when the loss occurred. Any concealment or misrepresentation of a material fact renders the policy void. Everything likely to influence the insurer in estimating the risk which he is asked to undertake must be made known to him. In effecting a policy of marine i. with the underwriters (so called because they subscribe their names to the policy) it is usual to employ a broker. It sometimes happens that an underwriter after subscribing his name to a policy finds the risk greater than he anticipated, and he tries to secure himself by reinsuring with another underwriter, who, of course, charges a high premium. The common form of marine policy is Lloyd's, and all other policies are based upon it. Application without policy may effect i. in U.S.A., and unless otherwise provided constructive total loss is taken to be damage of over 50 % of vessel's value when repaired.

Fire Insurance in England dates from 1680. In that year a private office, near the Royal Exchange, was set up. In 1864 a Friendly Society against fire was established in London. Here again the contract is one of indemnity, by which the insurer, in return for the payment of a sum of money, agrees to compensate the insured for any loss or damage (not exceeding a specified amount) to his property, caused by fire during a given period. The maximum amount of compensation which can be claimed is stated in the policy, but, of course, the insured person will not necessarily receive this amount; he will receive only such compensation as will cover the amount of damage done by the fire. Hence there is no advantage in over-insuring property, or in insuring property at its full value in different offices. For should the property be totally destroyed by fire the different offices between them will make up the amount. The insured will not be allowed to make a profit out of a fire—if the fire offices can prevent it. Fire i. is dearer in U.S.A. owing to state interference, taxing companies, and forbidding them to combine to arrange rates, and (*Valued Policy laws*) taking the amount of the policy to be the amount of the loss.

Life Insurance, or ASSURANCE, as it is usually called professionally, commenced in England in 1762 when the Equitable Society began business. It is not a contract of indemnity, but one 'by which the insurer, in return for a lump sum, or a periodical payment, undertakes to pay to the person for whose benefit the i. is effected, or to his executors, or administrators, a certain sum of money or an annuity on the happening of a given event, or on the death of the person whose life is insured.' Every life i. company established since 1870 in the U.K. must deposit £20,000 in the High Court, and no certificate of incorporation can be issued until the deposit has been made. The form of i. adopted by working people, who in return for the payment of a few pence per week receive a sum on the death of the person insured, is a very costly business for the insured. For the expenses of management, due to the enormous number of canvassers and collectors employed, amount to nearly half of the total incomes from premiums. In the ordinary life assurance the expenses of management in well-conducted offices vary roughly from one-sixth to one-eighth of the annual income from premiums. In 1864 the Post Office established a system of life assurance for any sum from £5 to £100.

In U.S.A. first life insurance society was founded in Philadelphia, 1759, and the Mutual Co., N.Y. Life and the Equitable are largest institutions in world. The standard mortality rate from 35 to 75 is lower than British, but above and below higher. Including assessment i. total life i. is nearly 30,000,000,000$, about five times that of Great Britain.

Accident and Burglary Insurance.—By the contract of accident i. the insurer undertakes to provide against loss if the insured sustains injury or disablement, partial or temporary, or to pay to the personal representatives of the insured if he meets with death in a particular way. There is no limit to the amount for which a life may be insured against accident. Burglary i. is subject to the same laws as fire i. There can be no over-insurance of property against theft.

National Insurance.—The principle of compulsory i. for workmen was adopted in Germany in 1879, largely as the result of Socialist agitation for State interference. The theory that the working man who has become incapacitated through age or in consequence of his work should not be a burden upon the public was accepted by the Government, and legislation was enacted in 1883 ordering compulsory i. against sickness. In 1884 i. was extended to accidents, and in 1889 to invalidity and old age. Austria, France, Norway, and Holland subsequently adopted workmen's compulsory i., and in 1911 the Brit. Parliament passed a National Insurance Act for the compulsory i. of all workmen and other employees, the State, the employer, and the employee all contributing. It applies to all whose incomes are less than £160. Opposition to the Act is raised on these grounds: i. 'cards' are badges of poverty and servitude, and the unemployed, having cards not stamped up-to-date, are rejected by prospective employers; doctors on the 'panel' are too few, and adequate attention to patients is impossible.

F. W. Lewis, *State Insurance*; W. A. Robertson, *Insurance as a Means of Investment*; William Gow, *Marine Insurance*; Comyns Carr and others, *National Insurance*, 1912.

INTAGLIO, representation of an object made by cutting away the object from the ground, not, as in relief, cutting away the ground from the object.

INTEGRAL CALCULUS, see INFINITESIMAL CALCULUS.

INTELLIGENCE IN ANIMALS.—I. has been defined as the 'conscious adaptation of means to ends.' It is closely connected as regards animals

with instinct (*q.v.*). Romanes asserted and Mivart denied that animals possess i. and reason. But a distinction is drawn by psychologists between perceptual and conceptual thought, the former involving the perception of some relation between two things, the other abstract analysis. Much human and, at any rate, most animal thought is 'perceptual,' but it is still an open question whether animals are capable of 'conceptual' thought as human beings undoubtedly are. The question can only be settled by psychological experiments properly conducted; mere stories of 'intelligent' animals are not enough. Probably animals are not capable of reasoned thought.

INTEMPERANCE, see TEMPERANCE.

INTENDANTS, officials of Fr. kings, before Revolution. *Intendants des finances* were under controller-general of finances. *Intendants des provinces* from about 1570 had considerable authority in provinces; they came into collision with provincial gov's and with parliaments over administration; very powerful in XVIII. cent.

INTENT, element of purpose which, with attempt at offence, constitutes legal crime; the i. is an important question in criminal, but is not considered in civil matters. Many legal documents have saving clause, by which the verbal expression is to be interpreted 'according to the true i. and meaning of these presents.'

INTERCALARY DAYS, days inserted in the calendar (*q.v.*) to restore correspondence of solar and civil year; this is secured by leap-year system.

INTERCOLUMNIATION, spacing of columns in classical architecture, differing in different orders.

INTERDICT, forbidding of divine worship and administration of sacraments by ecclesiastical authority as punishment for sin; pronounced by Pope against persons or countries; (Scots law) an injunction (*q.v.*).

INTERDICTION (Scots law), action of restraint which may be placed under certain conditions on a person's disposal of his real property.

INTERESSE TERMINI (Lat. interest for a term), title to entry of lessee into land leased.

INTEREST, sum paid in return for loan of money; since repeal of Usury Laws in 1854 borrowers have been liable for payment of such interest as they have agreed to pay. See USURY.

INTERFERENCE OF LIGHT, see LIGHT.

INTERIM (Lat. meanwhile), name given to temporary settlements of controversial points during the Reformation, by order of the emperor, to remain in force until a general council should meet; noted i's are those of Ratisbon (or Regensburg), 1541, Augsburg and Leipzig, 1548.

INTERLAKEN (46° 42′ N., 7° 52′ E.), town, Swiss canton of Berne, on Aar, between lakes Thun and Brienz; tourist centre. Pop. 3000.

INTERMITTENT FEVER, see AGUE, MALARIA.

INTERNATIONAL LAW (also called *jus inter gentes*, or erroneously, *jus gentium*), the usages observed in relations between civilised states. I. L. may be divided into the Natural and Conventional elements. The former, generally known as the *Law of Nature*, is based on those principles which are supposed to be universally accepted as rules of conduct for both states and individuals in their dealings with each other; it is thus a moral rather than a legal obligation. The Conventional element is the result of obligations imposed upon states by treaties and agreements between themselves, and of precedents and cases whereby the customary practice has been established. In many European states the writings of lawyers on the subject are also regarded as law. The chief question which has to be decided is that of the lawfulness or unlawfulness of war; and to prevent war the states may refer their disputes to international arbitration (see ARBITRATION). This is becoming increasingly common, and has on various occasions been made compulsory.

The state as the unit of I. L. has certain rights which other states must recognise; these include: (1) The right to do whatever is necessary for its own conservation; (2) the right to acquire new dominions; (3) to buy or sell property; (4) to choose its own form of government or to change it; (5) to increase its army and navy and develop its commerce. And among the obligations morally binding on states are: (1) To allow no plots against sovereign of a foreign state to be organised within its bounds; (2) to put down sedition; (3) to protect its subjects in foreign countries; (4) to see that justice is impartially administered. In I. L. the sea beyond the three-mile limit is regarded as free to all, every nation having rights of navigation and fishing on the high seas. Only ships of war and merchant vessels are recognised in I. L.; the former are armed vessels used in public service; they are considered to be part of the national territory of the state to which they belong, and when entering the ports of foreign states are not subject to the local jurisdiction of those states. Merchant vessels, on the other hand, are subject to the laws of any foreign state whose ports they may enter. Pirate vessels are not recognised and may be seized; and by most states ships engaged in slave trade are treated as pirates. In 1899 the International Peace Conference met at The Hague, and arranged for the constitution of an arbitration court, to which disputes between states might be referred. This tribunal has already amicably settled two disputes—the one between the U.S. and Mexico, the other certain questions concerning the Venezuelan difficulty.

F. E. Smith, *International Law.*

International Private Law.—Rules whereby persons living in one country are affected by the laws of another; among the cases where these rules apply are those concerning marriage, property, succession, legal proceedings, commission of crime, the status of any person and his capacity to enter into contracts. A person's national character may be decided either by his native country or place of origin, or by his domicile; in England and America the law of domicile governs the person's status and capacity, but in France, Italy, and other European countries these are ruled by the law of origin. In 1881 Signor Mancini, the Italian foreign minister, with a view to obviating the conflict of private I. L., entered into correspondence with other powers on the subject of establishing certain fixed rules concerning aliens which should obtain in all states; and since that time international conferences have been held on various occasions at The Hague, with the object of establishing fixed rules on such subjects as marriage, wills, and wardship. Great Britain has had no share in these proceedings; and, accordingly, while among the European states generally a marriage between persons of different nationality is valid everywhere if valid according to the law of the place at which it was contracted, yet the validity of a marriage between an English person and a foreigner depends on whether it was celebrated in accordance with the law of the husband's domicile; if not so celebrated the husband may subsequently repudiate the contract.

Westlake, *International Private Law* (1905).

INTERNATIONAL, THE, an international association of working men, founded 1864 in London; came to an end at Philadelphia in 1876; most important members were Karl Marx and Bakunin, leaders respectively of moderate and extreme factions.

INTERPELLATION, term in legislative procedure for interruption, with the consent of the Assembly, of ministerial business, by question attacking ministerial policy; sometimes weapon of obstruction.

INTERPLEADER, term in Eng. law for process by which defendant is relieved of suit brought against him by parties claiming against each other.

INTERPOLATION (in math's), term denoting primarily the insertion of missing terms in a series whose law of formation is known; but used in a wider

sense to denote the calculation, assuming some law of continuity, of any term of a series from the values of those given. In the case of almost all tabulated functions the successive orders of differences rapidly diminish. Assuming the nth order of differences constant, the function u_x in question may be expressed as a rational integral function of x; thus

$$u_x = a + bx + cx^2 + \ldots + kx^n.$$

If n values of u_x are given, we can obviously by substitution obtain n equations, giving $a, b, c \ldots k$, and thus intermediate values of u_x may be calculated. But shorter methods are available. (i.) Given n equidistant values $u_0, u_1 \ldots u_{n-1}$ of a function u_x, the properties of finite differences lead to the result

$$u_x = u_0 + x\Delta u_0 + \frac{x(x-1)}{2\,!}\Delta^2 u_0 + \ldots + \frac{x(x-1)\ldots(x-n+2)}{(n-1)\,!}\Delta^{n-1}u_0;$$

where $\Delta^p u_0$ is the pth difference.

e.g. given $\log 2{\cdot}10 = {\cdot}3222193$, $\log 2{\cdot}11 = {\cdot}3242825$, $\log 2{\cdot}12 = {\cdot}3263359$, $\log 2{\cdot}13 = {\cdot}3283796$; required $\log 2{\cdot}115$. We have, omitting the decimal point

	u_0	u_1	u_2	u_3
	3222193	3242825	3263359	3283796
Δ	20632	20534	20437	
Δ^2	−98	−97		
Δ^3	1			

Hence $$u_x = 3222193 + 1{\cdot}5 \times 20632 - \frac{1{\cdot}5(1{\cdot}5-1)}{1\cdot 2}\cdot 98 + \frac{1{\cdot}5(1{\cdot}5-1)(1{\cdot}5-2)}{1\cdot 2\cdot 3}\cdot 1 = 3253104$$

which is correct to the last figure. The ordinary method of *proportional parts* would have given 3253092.

(ii.) When the values given and that sought constitute a series of equidistant terms, we proceed thus: Taking the series as $u_0, u_1, u_2 \ldots u_n$, we have $\Delta^n u_0 = 0$.

$$\therefore u_n - nu_{n-1} + \frac{n(n-1)}{2\,!}u_{n-2} \ldots + (-1)^n u_0 = 0$$

an equation from which any one of the quantities u_0, u_1, etc., may be found. Thus for a term midway between two others we get $u_0 - 2u_1 + u_2 = 0$. $\therefore u_1 = \frac{u_0 + u_2}{2}$ and is the ordinary arithmetic mean. For five terms the middle one is $u_2 = \frac{4(u_1+u_3) - (u_0+u_4)}{6}$.

(iii.) When the given values are not equidistant, Lagrange's interpolation formula is used.

H. L. Rice, *Theory and Practice of Interpolation*: G. Boole, *Finite Differences*; *Text-Book of Institute of Actuaries*.

INTERPRETATION OF STATUTES ACT (1889), a guide to authority and meaning of statutes.

INTERREGNUM, period between death of king and election of successor; in Middle Ages this often meant lapse of government.

INTERREX (Lat. *inter.*, between; *rex*, king), official app. by Rom. senate on death of a king to govern until appointment of new king (period called an *interregnum*), sometimes ten *interreges* were elected with duty of choosing a king. Under the republic an inter-consular 'i.' was sometimes appointed.

INTERSTATE COMMERCE, see UNITED STATES.

INTERVALE, term used geographically in America for low-lying land between hills.

INTESTACY.—In the case of persons dying without making a will (*i.e.* intestate), if the whole estate does not exceed £100, the widow or any of the children may apply to the Registrar of the nearest County Court, and the Registrar will send the necessary papers to the Court of Probate, and in due course supply Letters of Administration. In other cases of intestacy these Letters of Administration are to be obtained from the Probate Registry at Somerset House by the next of kin.

INTESTINE, the lower part of the alimentary canal, divided in man into small and large intestines, communicating by the ileo-cæcal valve. See DIGESTION.

Intestinal Obstruction may be *acute*, caused by strangulation by bands or adhesions, by volvulus or rotation of the intestine on its own axis so as to produce strangulation, by acute intussusception or the telescoping of one portion of the intestine into the part below, by the termination of chronic obstruction, by kinking or through peritonitis; or the obstruction may be *chronic*, due to impaction of fæces or foreign bodies, to stricture, tumours, and other affections of the intestinal wall, or to compression of the intestine from tumours or adhesions without. The symptoms of the former are sudden severe pain, later becoming continuous, in the region of the umbilicus, shock and collapse. There is persistent vomiting, which soon becomes very offensive, the bowels do not move, the abdomen becomes distended, and peritonitis comes on if the obstruction is not relieved by immediate operation. Massage of the abdomen is harmful. In regard to chronic obstruction, there are colicky pains, with constipation alternating with diarrhœa, and finally acute obstruction takes place. The treatment before the case becomes acute is a fluid diet, enemata, and small doses of cascara or calomel. Operative treatment is generally carried out at an early stage.

INTOXICATION, poisoning by drugs or other poisonous substances; used chiefly as denoting the condition produced by excessive consumption of alcohol. See TEMPERANCE.

INTRA (45° 57′ N., 8° 34′ E.), town, Piedmont, Italy, on Lake Maggiore; cotton and silk industries. Pop. 7100.

INTRADOS (Lat. *intra*, within; Fr. *dos*, back), the concave side or soffit of an arch.

INTRANSIGEANTS (irreconcilables), political party uncompromisingly hostile to an existing government, the term being used chiefly in Spain (1873), France, and Italy.

INTUITION, a philosophical term for that which is directly perceived or apprehended, whether in logic or ethics, as opposed to that arrived at by a reasoning process.

INVENTORY, BENEFIT OF (Lat. *beneficium inventarii*), term in Rom. and Common law for right of heir to enter into estate without being liable for encumbrances beyond its value as inventoried.

INVERARAY (54° 14′ N., 5° 4′ W.), seaport, county town, Argyllshire, Scotland, on Loch Fyne; herring fishery. I. Castle (built 1744–61) is seat of Duke of Argyll.

INVERCARGILL (46° 26′ S., 168° 23′ E.), town, Otago, South Island, New Zealand, on New River estuary; breweries, foundries; exports, preserved meat, wool, and timber. Pop. 12,000.

INVERELL (29° 45′ S., 151° 8′ E.), town, New South Wales, Australia, on Macintyre; centre of agricultural district; tin and diamond mines in vicinity. Pop. 3350.

INVERKEITHING (56° 2′ N., 3° 23′ W.), town, Fifeshire, Scotland, on Firth of Forth. Pop. (1911) 3291.

INVERNESS (57° 28′ N., 4° 13′ W.), royal burgh, seaport, and county town, Inverness-shire, Scotland, on Ness; tweed centre; 'Capital of Highlands'; near end of Caledonian Canal; has coasting trade; woollen industries; breweries, distilleries. I. was ancient Pictish capital; has remains of castle built by Cromwell and destroyed by Jacobites in 1746; scene of 'Northern Meeting'; has Episcopal cathedral; famed for purity of Eng. accent. Pop. (1911) 22,216.

INVERNESS-SHIRE (57° N., 4° 40′ W.), Highland county, Scotland, extending from Moray Firth on E. to Atlantic and Outer Hebrides on W.; area, c. 4200 sq. miles; county town, Inverness. Surface is mostly wooded country, rough hill-grazing, heath, peat, and stony waste little cultivated; deer-forests and grouse-moors; excellent fishing; many wild glens. I. is

largest and most mountainous county in Scotland; flat strip near Inverness gradually rises into mountain-land, culminating in Ben Nevis (4406 ft.) in S.W., highest point in Brit. Isles. There are many rivers, the largest being Spey, Ness, Beauly, and Lochy. Among the numerous lochs are Ness, Morar (deepest in Brit. Isles), Shiel, Archaig, Lochy, Ericht, and Laggan. Caledonian Canal traverses I. A geological 'fault' runs across Scotland through I.; slight earthquake shocks frequent; interesting signs of glaciation. Pop. (1911) 87,270.

INVERURIE (57° 17′ N., 2° 23′ W.), royal burgh, Aberdeenshire, Scotland, at confluence of Don and Ury; important centre of cattle trade; manufactures paper. Pop. (1911) 3960.

INVESTITURE.—In feudal times some token of i. was commonly given when a man was installed in lands or office. Many of the bp's and abbots held land under the Crown from the days of Charlemagne and were invested with ring and crozier on appointment to their sees. This soon was plainly objectionable, for simony and other abuses became common. The Lateran Synod of 1059 forbade clerical i. by a layman, and papal prohibitions followed in 1078, 1080, 1087, 1089. The final prohibition came from the Lateran Council of 1123. In England the struggle over i. was between Abp. Anselm and Henry I.

INVOLUTION, in math's, the raising of a quantity to a given power, *e.g.* $4^2=16$. **Evolution**, the extracting of roots (*e.g.* $\sqrt{16}=+4$) is included with i. under *Theory of indices*. See ALGEBRA.

IO.—(1) legendary dau. of Inachus, king of Argos; beloved by Zeus, who, to save her from Hera, changed her into white heifer; Hera sent Argus to guard her, but Hermes slew him; eventually was restored to human form. (2) (Astron.) an asteroid, and also a satellite of Jupiter.

IODINE (I., At. Wt. 126·8), non-metallic element with bluish-black metallic lustre; S.G. 4·95, M.P. 115° C., B.P. 200° C. Formerly it was manufactured from *kelp*, a species of seaweed, but it is now worked up from the salts of which large natural deposits exist. In presence of potassium iodide, i. dissolves in water, forming a brown solution. It forms a brown solution in alcohol and in ether, and a violet solution in carbon disulphide and in chloroform. With starch i. gives an intense blue coloration. I. is present in the thyroid gland, and from the earliest times bodies containing i. have been much prized medicinally. There are two series of salts, *Iodides* and *Iodates*, and two acids, *Hydriodic Acid* (HI) and *Iodic Acid* (HIO_3). Of the *Halogens*, i. has the least affinity for other elements.

IODOFORM, CHI_3, yellow crystalline substance with strong smell; antiseptic and disinfectant; much used in surgery.

IOLA (37° 55′ N., 95° 20′ W.), city, on Neosho, Kansas, U.S.A.; zinc-works: machine-shops; natural gas region. Pop. (1910) 9032.

ION, OF CHIOS (d. 421 B.C.), Gk. poet and historian; won prize for tragedy at Athens.

IONA, ICOLMKILL (56° 19′ N., 6° 29′ W.), island at S.W. corner of Mull, Inner Hebrides, Scotland; about 3½ miles long and 1½ miles wide; area, *c.* 2000 acres; scarcely half cultivated; coast rocky and surface mostly rough. I.'s chief interest lies in association with St. Columba (*q.v.*) and introduction of Christianity into Scotland; great centre of learning and religion, VI. cent. onwards; frequently ravaged by Norsemen; abounds in hist. antiquities; ruins of ancient nunnery, monastery, and chapels; also restored ruins of cathedral, with choir, sacristy, transepts, and a 70-ft. tower, as well as Columba's tomb and numerous crosses and carved stones. Pop. 200.

Trenholme, *The Story of Iona* (1909).

IONIA (42° 59′ N., 85° 7′ W.), city, Michigan, U.S.A., on Grand River; iron foundries, furniture factories. Pop. (1910) 5030.

IONIAN ISLANDS (38° 30′ N., 20° 30′ E.), group of islands on W. coast of Greece, consisting of 7 islands—Corfu, Cephalonia, Paxos, Santa Maura (Leuks), Ithaca, Cerigo (Kythēra), Zrante (Zakynthos); surface mountainous; highest peak, Monte Nero, 5310 ft., in Cephalonia; subject to frequent earthquakes; rich in marble, sulphur, salt, coal, wine, olives, currants, fruit. Formed into a province called Thema of Cephelenia, IX. cent.; gradually taken by Venetians from XIII. cent. onwards; passed to France, 1797; made an independent state, 1800; retaken by French, 1807; came under the protection of Britain, 1815; ceded to Greece, 1863. Area, *c.* 1100 sq. miles. Pop. *c.* 265,000.

IONIAN SCHOOL OF PHILOSOPHY, name given to group of philosophers about 600–400 B.C., who interpreted the universe scientifically rather than, like others, metaphysically. They may fairly be said to have started European philosophy. Thales declared water to be the underlying principle of all things. Anaximenes thought it was air, and Hippo moisture. Anaxagoras thought the Universe the work of mind, conceived as thin substance.

IONIANS, inhabitants of Attica (held by some to have been the cradle of the race), Eubœa, west coast of Asia Minor, Cycladic Islands, and of colonies in Thrace, Propontis, Pontus, and Egypt. Origin of name is unknown, but Homer and Herodotus use it. A mythical ancestry is attributed to Ion.

IONS, see ELECTRICITY (*Electrolysis*).

IOPHON (fl. early V. cent. B.C.), prominent Gk. poet of age of Pericles.

IOVILÆ, name given locally to Osco-Umbrian monuments (of V. and preceding cent's B.C.) in Italy.

IOWA (42° N., 93° 30′ W.), N. central state of U.S.A.; bounded N. by Minnesota; E. by Mississippi River, which separates it from Wisconsin and Illinois; S. by Missouri; W. by Missouri and Big Sioux Rivers (separating it from Nebraska and S. Dakota); area, *c.* 56,030 sq. miles, of which *c.* 550 are water. Surface is mostly rolling tableland or prairie (average elevation being scarcely 1000 ft. above sea-level) broken by vertical cliffs at river banks in N.E.; and bluffs near rivers in S.W. I. is divided into two drainage systems—the larger, on the E., drained by tributaries of the Mississippi—Des Moines, Skunk, and Iowa; and on the W. by tributaries of the Missouri. There are several small lakes in the N. The climate is healthy. Valuable deposits of coal, which is of good quality and extends over vast areas, are found; other minerals are lead, gypsum, limestone, clay, etc. The land is almost entirely devoted to farming—about half to the growing of cereals, chiefly maize, wheat, barley, oats, rye, potatoes, hay, etc.; naturally, industries are mainly agricultural and live stock rearing; other industries are meat-packing and preparing food-stuffs; dairy-farming and poultry-keeping are also of importance. There are no important manufactures. Chief towns are Des Moines (capital), Dubuque, Sioux, Davenport, Council Bluffs, and Cedar Rapids. I. was organised as territory, 1838, and admitted as State of U.S.A., 1846. I. has a Gov., a Senate and House of Representatives, and sends 2 Senators and 11 Representatives to Congress. Pop. (1910) 2,224,771.

Shaw, *Iowa.*

IOWA CITY (41° 40′ N., 91° 33′ W.), city, Iowa, U.S.A.; seat of Iowa State Univ. and of Iowa City Academy; various mills. Pop. (1910) 10,091.

IPECACUANHA, a creeping plant (*Uragoga ipecacuanha*), with drooping flowers, growing in clumps in Brazil and other parts of tropical S. America. The root is used as a drug in med., being a powerful emetic, acting both upon the stomach and the vomiting centre in the medulla of the brain; especially valuable for children in bronchitis, diphtheria, and laryngitis for emptying the air-passages by the act of vomiting; used as a specific in dysentery, and also as an expectorant in bronchitis, etc. The chief active principle is analkaloid, *emetine* ($C_{30}H_{42}N_2O_4$), which is a white, bitter, uncrystallisable substance.

IPEK (42° 34′ N., 20° 27′ E.), town, Albania, Euro-

pean Turkey; until 1690 seat of the Servian patriarchs. Pop. *c.* 15,000.

IPHICRATES (d. *c.* 353 B.C.), Athenian general distinguished in Corinthian War (395–87), Egypt (378–74), and against Sparta (372–71); inventor of new armour.

IPHIGENIA (classical myth.), Gk. legendary character, fixed to some extent by Euripides and other poets; dau. of Agamemnon and Clytæmnestra; sacrificed to Artemis (Euripides' *I. in Aulis*); according to one of the floating stories she was miraculously caught away by Artemis; with her bro. Orestes became chief character of another play of Euripides', *I. in Tauris*.

IPSAMBUL, see ABU SIMBEL.

IPSUS, see ANTIGONUS CYCLOPS.

IPSWICH.—(1) (52° 4′ N., 1° 10′ E.) seaport, Suffolk, England, on Orwell estuary. Noteworthy public buildings are the town hall, corn exchange, museum, and church of St. Mary le Tower. I. has a grammar school refounded by Queen Elizabeth in 1565; manufactures agricultural implements; artificial manures; and has breweries and tanneries; sacked by the Danes in 991 and 1000. Pop. (1911) 73,939. (2) (42° 41′ N., 70° 37′ W.) town, Massachusetts, U.S.A., on Ipswich; cotton and woollen industries. Pop. (1910) 5777. (3) (27° 38′ S., 152° 48′ E.) town, on Bremer, Queensland, Australia; coal mines. Pop. 10,000.

IQUIQUE (20° 10′ S., 70° 7′ W.), seaport, Chile, S. America; exports nitrate of soda and iodine. Pop. (1910) 40,171.

IQUITOS (3° 40′ S., 72° 57′ W.), town, river port, Peru, S. America, on Upper Amazon; centre of trade; exports rubber. Pop. *c.* 20,000.

IQUITOS, tribe of uncivilised S. Amer. Indians.

IRAK (34° 30′ S., 50° E.), fertile province, Persia; carpet-weaving industry; capital, Sultanabad.

IRAK-AJEMI (34° N., 52° E.), province, Central Persia; produces grain and fruits; contains Teheran, the capital, and Ispahan. Area, 138,190 sq. miles. Pop. *c.* 3,000,000.

IRAK-ARABI (32° N., 46° E.), name since Arab conquest for district lying between Tigris and Euphrates, and corresponding to Ancient Babylonia. Consists of flat plain made up of steppes and swamps; in swamps vegetation is luxuriant, and wild animals abound; some districts infested by lawless tribes over whom Turk. government has no authority. Some efforts made at irrigation; chief products are dates, fruits, grains, millet-seed, and rice; considerable caravan commerce; navigation on rivers difficult, and in certain parts impossible. Chief towns, Bagdad, Basra, Kufea, and Wasit. Once prosperous, well-watered, and cultivated country, now fallen into decay; everywhere may be seen traces of ancient canals, cities, and villages. Pop. *c.* 2,000,000.

IRAN (30° N., 60° E.), the great plateau including Persia, Afghanistan, and Beluchistan; now official name of Persia (*q.v.*).

IRAWADI, see IRRAWADDY.

IRBIT (57° 29′ N., 63° 4′ E.), town, Perm, Russia; famous annual fair. Pop. 20,000.

IRELAND, the western island of the U.K., lies between 51½° and 55½° N., and between 5½° and 10½° W., and is bounded N., S., and W. by the Atlantic Ocean, N.E. by the North Channel (separating it from Scotland, Mull of Kintyre, 14 miles), E. by the Irish Sea and St. George's Channel (separating it from England and Wales, 44 to 86 miles). The area is 32,600 sq. miles, exclusive of 938 sq. miles of inland water; the coast is about 2200 miles long, with so many inlets that no place is more than 50 miles from the sea. The island has a basin-shaped central plain, 250 to 300 ft. in height, surrounded by the mountainous coasts (2000 to over 3000 ft. in height). As there is a great deal of rain from W. and S.W. this configuration naturally results in a large area of bogland. Rivers are (N.) Foyle, Bann; (E.) Laggan, Boyne, Liffey; (S.) Barrow, Suir, Blackwater, Lee; (centre and W.) Erne, Moy, Galway, and Shannon. Good-sized lakes are Neagh, Erne, Allen, Ree, Derg, Conn, Mask, Corrib, Killarney.

The rim of mountains in the direct path of the warm, damp W. and S.W. winds (the wind is in the west for about three-fourths of the year) off the Atlantic gives wet, warm climate of W. Ireland. The rainfall in the hilly districts varies from 70 to 75 in., and in the centre and along some parts of the E. coast from 25 to 30; the summer temperature ranges from 58° Fahr. in the N. to 62·5° in the S., and in winter 39° surrounds an oval in the centre and N.E., and the rest of the country ranges from that up to 43° on the S. and S.W. coasts. It is believed that Archæan rocks show in County Tyrone; there is no Cambrian stratum, with the possible exception of tracts in the E. and central plain, where the Silurian rocks appear; there are Devonian strata in Kerry, Cork, and round the Silurian tracts of the wide Carboniferous Limestone district of the central plain. There are Upper Carboniferous strata in Clare, Limerick, Trim, Kilkenny, and Tipperary; Lower Carboniferous sandstone and slate in S.W. Cork, Donegal, Tyrone, and Antrim. The coal (79,802 tons in 1910) is obtained chiefly in Kilkenny and Tipperary. The excellent slate, marble, and stone are little worked, but there is some report of limestone and iron ore (Antrim). There are 4,839,000 acres of arable land, 9,822,000 acres of permanent grass, and 301,000 acres of woods and plantations; about 4,200,000 acres are mountain-land, peat bog, or marsh. The crops in order of extent are oats, sown grass, potatoes, turnips, and flax. The cattle number about 4,700,000: sheep, 4,400,000; pigs, 1,200,000; horses, 560,000. Efforts are being made to extend the cultivation of flax, which has declined in last fifty years, and to introduce grass- and straw-plait as domestic industries. Horse-breeding is important all over the country, and there is a valuable trade in bacon, ham, and pork, the chief centres being at Belfast, Limerick, Cork, and Waterford. Efforts are being made to extend co-operation in dairy-farming, as in Denmark. The co-operative trade in butter has already reached a yearly value of £700,000, and there are signs that Irish dairy produce may recover its old repute. The valuable E. coast fisheries (mackerel, cod, ling, and herring) are largely exploited by Eng. and Scot. fishers, and those of the W. are too far from the markets; there are salmon fisheries on coast and river.

I., whose dyed and woven linens and serges were known as far as Italy in the Middle Ages, ceased to be a great manufacturing country in the XVI. cent., and in modern times has been handicapped by lack of coal. A considerable linen industry, however, has developed round Belfast, where 835,000 spindles are employed, and nearly 31,500 looms; in connection there is extensive shirt-making industry in Londonderry. Dublin manufactures poplin. Domestic and convent industries in hand-made lace and embroidery, spinning of wool and hand-loom weaving of woollens, carpets, rugs, etc., are noted and being fostered by technical instruction. There are small leather and boot and shoe industries in various parts. Brewing of porter and ale and distilling are also important, the chief centres being Dublin, Cork, Dundalk, Kilkenny, Limerick, and Belfast. Belfast and Londonderry have shipbuilding yards. 0·3 % of Brit. exports are from I.

I. is divided into the four provinces of Ulster (in which are Counties Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Monaghan, Tyrone), Leinster (Counties Carlow, Dublin, Kildare, Kilkenny, King's Co., Longford, Louth, Meath, Queen's Co., Westmeath, Wexford, Wicklow), Munster (Counties Clare, Cork, Kerry, Limerick, Tipperary, Waterford), and Connaught (Counties Galway, Leitrim, Mayo, Roscommon, and Sligo).

There is an excellent canal system of nearly 600 miles in length. From Dublin the Royal Canal passes W.

and N. to the upper Shannon; thence other canals lead N. and W. to the Erne, which is navigable thence; the Ulster Canal goes to Loch Bann and continues to the sea at Coleraine, Belfast, and Newry. The Grand Canal goes W. to the middle Shannon, from which there is communication by lough and river to the N. line near Longford, and down the river to the sea. There are a number of short branches, including that of the Grand, which connects County Kildare with Waterford and the Suir. There are 3401 miles of railway; the chief lines are the Gt. Northern (Dublin to Belfast and Londonderry), the Belfast and N. Co's, the Dublin, Wicklow, and Wexford, the Midland Gt. W. (from Dublin), and the Gt. S. and W. from Dublin to Cork, Valentia, Waterford, Tuam, and Athlone; the turnpike road is almost confined to the neighbourhood of towns; Atlantic liners by the N. passage call at Moville, those by the S. at Queenstown.



Church of I.—When Christianity was first preached in Ireland is unknown, but the real conversion of Ireland was undoubtedly due to Saint Patrick in the V. cent. Till the XI. cent. the Celtic Church flourished, producing saints and scholars and maintaining customs different from those of Rome. At length it succumbed, and Christianity followed the Rom. model. The Irish Supremacy Act was passed in 1537, and the Church was reformed like the English, but the bulk of the people remained faithful to Rome. The Irish Church, which has always been more definitely Prot. than the English, was disestablished and disendowed in 1869. It has 2 abp's, 11 bp's, and 1400 churches, and about 1 in 10 of the general population are served by it.

The R.C. Church has 4 abp's (of Armagh, Cashel, Dublin, and Tuam), 23 bp's, and a bp. auxiliary. The great majority (3,238,656 in 1911) of the population is R.C. There are 575,489 Protestant Episcopalians, 439,876 Presbyterians, 61,806 Methodists, and small bodies of Independents, Baptists, and Jews. Dublin University was founded in 1591, the National Univ. of I. (Dublin), 1909, Queen's Univ. (Belfast), 1909.

History.—There are remains in I. of the Neolithic and Bronze Ages. It is believed that a good deal of pre-Celtic blood runs in the inhabitants of western I., but no human remains of that time have been found to throw light on early history. The Goidels possibly colonised I. in the great age of Celtic civilisation, the VI. cent. B.C. Unfortunately for I. it escaped the Rom. domination, and so had no tradition of central government to modify the tribal system, which did not die out until the XVI. cent., when neighbouring countries had become strong modern states. Some parts of I. seem, however, to have learned Christianity from the Romans; Palladius is said to have been sent here by the Pope in 431 to missionise, and in the following year St. Patrick commenced the systematic conversion of I. By Irish missionaries the north of England was converted, and, like I., came to differ from the Rom. Church as to the date of observance of Easter, the tonsure, etc. According to Bede it was merely a chance, the childish logic of Oswi, which made Northumbria decide for Rom. against Celtic usages at the Synod of Whitby (664). The great monastic schools of the north of Eng. owed their foundation and their characteristics to I. The Danes invaded I., but never settled there.

I. was a rich country at this time, and the Norman rulers of England turned their thoughts towards its conquest; but the first step towards Eng. rule was taken under Henry II. It was afterwards stated that the Eng. Pope Adrian IV. bestowed I. on Henry II.; it is probable that he blessed Henry's Irish enterprise, but the fact is a matter of controversy, as has been also the alleged papal title to dispose of all islands. The occasion of Henry's interference was the appeal of Dermot of Leinster to the barons of Wales for aid in a tribal dispute. They assisted him in 1167, and then settled in Ireland, intermarrying with the native chiefs. In 1171 Henry II. landed in I., received the homage of both Eng. and Irish chieftains, and made his s. John lord. Eng. authority was, however, nominal. The Norman lords settled round Dublin in the district known as the Pale. In this district Eng. law was supposed to be administered, but Irish customs crept in, and Normans (for instance, the Butlers and Fitzgeralds) became the heads of clans and regarded England in much the same way as the 'mere' Irish did.

While England was in the throes of the Wars of the Roses I. became practically a foreign country. Henry VII. made an attempt to reduce the country. English policy in allowing the Fitzgerald earl of Kildare to be Deputy (then the title of the Eng. Governor) was merely a recognition of the *de facto* ruler, and would, no doubt, have been continued but for the support given by Kildare to the Yorkists. Henry replaced him by the Eng. Deputy, Poynings. Poynings made the celebrated law (1494) by which the independence of the Irish parliament was taken away, but he found his position untenable without a large army, and Henry VII. practically abandoned the task by replacing Kildare. Henry VIII. sent generals to make demonstrations in I., but followed his father's policy in the main until Thomas Cromwell persuaded him to enrich his coffers by forcing the Reformation on I. Besides suppressing the monasteries, Henry persuaded the chieftains to accept Eng. titles and acknowledge his supremacy, and in 1542 took the title king. Edward VI. continued the reforming of I., and Mary, although she restored Catholicism, carried out the new policy of colonisation, King's County and Queen's County being planted and named after herself and Philip. With the whole of Catholic Europe against her the tenure of I. was a life-and-death matter to Elizabeth. She was the first to subjugate the entire country, and methods less fair than war, massacre, or devastation were employed in the final subjugation of the chieftains and breaking up of the tribes. After baffling England for years, Shane O'Neill was entrapped and slain in 1567.

After the Desmond revolt Munster, devastated so as to be almost uninhabitable, was planted by Eng. colonists (1583); the second Desmond revolt, which brought about the disgrace of Elizabeth's favourite, Essex, the last rising of an Irish chieftain, was put down in 1601. The O'Neill renounced his tribal leadership in 1603, James I. introduced the shire system into I. and the Eng. system of land tenure, while in 1610 Ulster was planted with settlers whose descendants have ever since upheld Eng. ideas and the Protestant religion. I. enjoyed some prosperity under Earl of Strafford, who not only ruled despotically as Deputy of Charles I., but exploited I. in order to furnish money for Charles, offering the Irish army to the king for his struggle against the parliament. Strafford went to England with the king's promise of protection, but was attainted and executed (1641). Strife between the Catholics and Protestants in I. was now complicated by the question of Eng. king versus the ardently puritanical Eng. parliament, until Oliver Cromwell landed in Ireland in 1649, captured Drogheda and Wexford, and carried out massacres which have left his name as hated there as that of Elizabeth. Emigration was freely allowed: Cromwell, like Elizabeth, 'made a solitude and called it peace.' By the Act of Settlement in 1661 a large proportion of the lands confiscated by Cromwell was confirmed to Eng. tenants, and the Rom. Catholics gained nothing at first by the religious change, since Puritanism merely gave way to restored Episcopacy. James II. cr. the Catholic Talbot Earl of Tyrconnel, and in 1687 made him Deputy as an encouragement to Romanism. The result of the Revolution of 1688, therefore, was that I. became a stronghold of the Jacobean cause, Tyrconnel leading an anti-Protestant revolt. James II. landed in I. in 1689, and the Irish parliament repealed the Act of Settlement. This led to the final conquest. In Ulster the Prot. towns of Londonderry and Enniskillen held out for the Orange cause until aid came. William III. landed, won the *Battle of the Boyne*, and drove the Irish army before him into *Limerick*, which repelled every attack. James fled after the Irish defeat at *Aghrim* (1691), William again laid siege to *Limerick*, and the city capitulated after a famous resistance (1691). The terms of the Treaty of Limerick were disputed and their intent disregarded by the English. Further Irish lands were confiscated and the penal laws against Catholics introduced. These laws merely strengthened the hold of Rom. Catholicism on the Irish, but fines reduced the propertied Irish classes, and deliberate discouragement of Irish trade prevented the growth of a Catholic middle class. Opposition gradually grew during the XVIII. cent., potato famines commenced their ravages, secret societies committed outrages, and the hatred, still strong, between Ulster and the rest of I. sprang up. A new danger to England was the growing Prot. discontent. The revolt of the Amer. colonies was received with acclamation in I., where hopes of emulation arose. The agitation of Flood and Henry led to commercial concessions in 1779, but Britain found herself obliged to grant political rights. The Irish parliament made a declaration of independence (1782), and Rockingham's ministry was forced to assent to the repeal of Poynings' Act. Under the influence of Grattan the newly emancipated parliament passed measures of Catholic relief, and in 1793 the Catholics received the franchise. The Society of United Irishmen was formed in 1791 to unite all creeds in political opposition to England, but Irish Protestants, alarmed by Grattan's measures, began to arm against the Catholics. The rebellion of the United Irishmen, put down at *Vinegar Hill* in 1798, led, therefore, to nothing but Brit. conviction of the necessity for legislative union. The separate Irish parliament was abolished by Pitt's ministry in 1800, and owing to the pious obstinacy of George III. the condition of Catholic emancipation was not granted.

Catholic emancipation was the next subject of struggle. Daniel O'Connell founded in 1823 the Catholic Association which in 1829 wrested emancipation from the government, Peel supporting the cause, and Wellington finding himself obliged to give way. O'Connell, however, continued his agitation for repeal of the Union until his death in 1847. The Whig ministries of Grey and Melbourne passed the Irish Church Act (1833) and the Tithes Commutation Act (1838), which settled the tithe disputes; but the agitation of O'Connell proved a serious danger, and he was tried and imprisoned for sedition in 1844. The Young I. party, however, took his place. The terrible potato famine of 1846–47 led to the Fenian outrages. The Fenian movement was not suppressed until 1867. The first act of Gladstone's first ministry was the disestablishment of the Irish Episcopal Church (1869), and the first Land Act followed, making eviction illegal except for non-payment of rent (1870).

The Home Rule party now commenced its agitations, and the Land League was established in 1879, with Parnell as president. It worked for separation from England and boycotted those who rented tenements from which the previous holder had been evicted; this severe ostracism was named from a

landlord's agent, Capt. Boycott, whose crops would have rotted on the ground but for the intervention of the Ulster organisation of Orangemen, fierce opponents of the Home Rule party through fear of Catholic supremacy. The indictment of Parnell for conspiracy failed, it was believed, through terrorisation of the jury. Parnell and thirty-five other Irish members were suspended for their obstruction of the Coercion Bill in the House of Commons, Parnell introducing that Irish method which has often made Home Rule seem desirable to its opponents. Gladstone's second administration passed the second Irish Land Act (1881), granting free sale, fair rents, and fixity of tenure (the 'three F's'). Parnell's denunciation of the Act and incendiary speeches led to his speedy imprisonment. The Phœnix Park murders, among other outrages, followed, and in 1882 the National League took the place of the suppressed Land League. To aid the tenants the Arrears Act was passed in 1882, Labourers Acts in 1883, and the Ashbourne Act in 1885. Gladstone now became an upholder of Home Rule, and as premier for the third time in 1886 wrecked his government by Home Rule and Irish Land Purchase Bills, his proposals causing wild riots in Ulster. The split in the Liberal party on this theme created the branch of Liberal Unionists.

Balfour's secretaryship under the Salisbury ministry (1886–92) was marked by repressive Acts, the taming of Parnell (who died in 1891), and new agrarian Acts for relief of tenants. In 1892 Lord Houghton became Lord-Lieut., and John Morley Sec. in Gladstone's last administration; Balfour's repressive measures were undone, and a new Home Rule Bill passed the Commons in 1893. Lord Salisbury in 1896 passed a Land Act which displeased the landlords. Further agrarian Acts are Wyndham's Land Purchase Acts of 1903–4 and Birrell's Evicted Tenants Act (1907). In 1912 Mr. Asquith introduced a new Home Rule Bill (Irish Government Bill), passed by Commons, 1912, rejected by Lords, 1913, and demonstrations against it in Ulster were conducted by Sir Edward Carson and Mr. F. E. Smith. Mr. John Redmond, leader of the Nationalists, Mr. John Dillon, Mr. William O'Brien, and Mr. T. M. Healy are now leading Irish politicians.

I. is administered by a Lord-Lieutenant appointed by the Eng. party in power; 28 Irish peers and 103 Commons' representatives sit in the Brit. parliament. At the head of the legal department is the Lord Chancellor.

The population in 1911 was 4,381,951. The capital is Dublin (pop. 309,272), but the largest town is Belfast (pop. 385,492); next come Cork (76,632), Londonderry (40,799), Limerick (38,403), Waterford (27,430).

Gilbert, *Viceroys of I.* (1865); Bagwell, *I. under the Tudors* (1885–90); Froude, *English in I.* (1872–74); Alice S. Green, *Making of I. and its Undoing* (1908); J. W. Russell, *I. and the Empire, 1800–1900* (1901); Plunkett, *I. in the New Century* (1905).

IRELAND, JOHN (1761–1842), dean of Westminster; founder of Ireland scholarships at Oxford.

IRELAND, JOHN (1838–), Amer. R.C., apb. of St. Paul, Minn.; noted for nationalism.

IRELAND, WILLIAM HENRY (1777–1835), forger of Shakespearean documents (pub. 1795–96); the fraud and its disclosure caused even greater excitement than the Payne Collier forgeries later.

IRENÆUS, ST. (*c.* 120–200), pupil of Polycarp (disciple of St. John), brought up in Asia Minor; then bp. of Lyons; wrote *Adversus omnes hæreses* ('Against all heretics') in Greek; Latin version and fragments of original survive; in it I. assails Gnosticism and defends Catholic doctrine and tradition; one of most important authorities for history of Christian Church in II. cent.; shows four gospels clearly established as canonical.

IRENE (752–803), Byzantine empress; murdered her s. Constantine, and reigned 797–802, when exiled; beatified by Gk. Church for restoring image worship.

IRENE (fl. 1100), Byzantine empress; intrigued against her s.

IRETON, HENRY (1610–51), Eng. soldier; general in Parliamentary army during Civil War; m. a dau. of Cromwell, and took leading part in trial of Charles I.; assisted in reduction of Ireland during Commonwealth.

IRIARTE Y OROPESA, TOMÁS DE, YRIARTE (1750–91), Span. poet; author of amusing *Fábulas literarias.*

IRIDACEÆ, IRIDEÆ, order of cotyledonous plants with creeping, bulbous, or tuberous roots and root-leaves, *e.g.* Crocus, Iris, Gladioli.

IRIDIUM (Ir=193·1), metal of platinum group; S.G. 22·4; M.P. very high; used for tips of fountain pens; forms hard alloy with platinum employed for standard length bars; salts derived from Ir_2O_3 and IrO_2.

IRIGA (*c.* 13° 20′ N., 123° 30′ E.), town, S. Camarines, Luzon, Philippine Islands. Pop. c. 20,000.

IRIS, the personification of the rainbow; in Gk. myth. dau. of Thaumas and Electra and messenger of the gods to mortals; (anat.) see EYE.

IRIS is a genus of perennial herbs of natural order *Iridaceæ*; the root is a horizontal rhizome; leaves are long, narrow, and green; flowers, yellow or purple, are epigynous and regular. There are three petals, sepals, stamens, and stigmas. The sepals and stigmas function as petals. The ovary is tri-locular and inferior. The floral envelope is united at the base and carries broad bands of hairs. The *fleur-de-lis* is an iris.

IRISH LITERATURE, see under CELTS.

IRITIS, inflammation of iris. See EYE.

IRKUTSK (55° N., 104° E.), government, E. Siberia, separated from China by the Sayan Mts.; traversed by the navigable Angara and Lena; has gold, iron, and salt mines; agriculture and cattle breeding industries. Climate is severe. Inhabitants are chiefly Russians, Buriats, and Tunguses. Pop. 674,900. The capital, IRKUTSK (52° 30′ N., 104° 10′ E.), is an important commercial centre and abp's see. Pop. (1910) 85,860.

IRMIN (Teutonic myth.), deity possibly invented to explain the *Irminsäulen* (Irmin pillars) of the Herminones. There are considerable remains of an Irminsal in Westphalia; it is possibly a relic of pillar-worship.

IRNERIUS (*c.* 1050–*c.* 1130), famous jurist of Bologna, little of whose work remains.

IRON (Fe; At. Wt. 56) is only found in its native state in meteorites and in certain platinum ores, and as such is very rare, but it exists abundantly as an oxide in the iron ores. Its S.G. varies from 7·84 to 8·14 in different varieties. It fuses at a very high temperature, but before doing so it becomes soft, in which condition it is easily welded. It is unaffected by dry air, but when moist, or in a moist atmosphere, especially in the presence of carbon dioxide, it easily rusts, the rust being a hydrated oxide of iron. At a red heat it decomposes water, liberating hydrogen and combining with the oxygen to form the black magnetic oxide of iron.

COMPOUNDS.—It combines with oxygen in various proportions to form three oxides—(1) *ferrous oxide* (FeO), also called *protoxide* and *iron monoxide*; (2) *ferric oxide* (Fe_2O_3), *sesquioxide*, or *red oxide*, used as a pigment (rouge) and polishing powder; (3) *ferroso-ferric oxide* (Fe_3O_4), *black oxide*, or *magnetic oxide*. This form is considered a combination of the first two, viz. $Fe_2O_3 . FeO$. The first two oxides form the bases of the *ferrous* and *ferric salts* of iron respectively, whilst the third yields both ferrous and ferric salts. Some of the ferrous salts, such as the carbonate and phosphate of iron, are largely used for medicinal purposes.

The physical properties of iron cannot be definitely stated, because they are diametrically opposite in different varieties of the metal; thus, iron is both extremely hard and very soft, brittle in one form and

ductile in another, easily susceptible to magnetism in one state and non-magnetic in another; one variety readily welds whilst another does not; and so for a number of other physical properties. The chief factors which profoundly affect its properties are (*a*) the treatment it has received in process of manufacture, (*b*) the quantity of carbon it contains, and (*c*) the presence of impurities, however small in amount. Microscopic study has shown that foreign substances such as sulphur and phosphorus form a weak kind of mortar between the crystals of the metal and greatly reduce its strength. The presence, however, of small quantities of carbon results in the production of a carbide which has a much finer structure than that of pure iron and adds to its strength.

The amount of the carbon content so greatly modifies the metal that, broadly speaking, iron may be divided into two classes, *wrought iron* and *steel*, containing less than 2·2 % of carbon and *cast iron*, with a greater percentage of carbon. The thermal treatment of iron produces remarkable changes—steel becomes very hard and brittle if cooled quickly by plunging it while hot into a bath of water or oil, but if cooled slowly it is malleable; iron at a red heat is malleable and easily forged into any required shape, but not so when cold; steel rails after prolonged use gradually become brittle and consequently dangerous, but if heated for some time at a temperature of about 900° C. they can be made tough and elastic again.

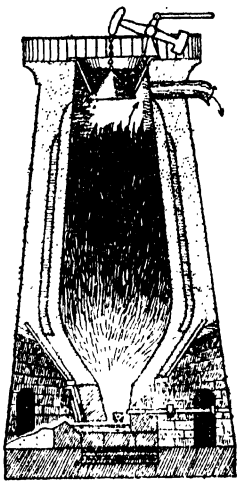
The use of iron by man dates back for thousands of years, although, historically, it comes later than gold, silver, or copper, these metals being more easily obtained from their ores than iron. There is abundant evidence that the Romans manufactured iron in great quantities during their occupation of Britain. Their process was, however, very crude and wasteful. It was the inventions of the last two cent's that resulted in the cheap production of iron in large quantities and its use for purposes hitherto undreamed of. About 1735 coke supplanted charcoal as a fuel; the processes of puddling and rolling were invented by Henry Cort in 1784; the hot blast was introduced by Neilson in 1830, and in 1856 Bessemer patented his process of manufacturing steel.

Commercially, iron is extracted from its ores, the chief varieties of which are: *magnetite* (Fe_3O_4) or *magnetic iron ore*, which contains about 73 % of iron; *red hæmatite* (Fe_2O_3) or *red oxide* (specular iron ore), yielding about 70 % of iron; *brown hæmatite* ($2Fe_2O_3.3H_2O$) or *limonite*, which is really the red hæmatite containing water, and yields about 60 % of iron; *spathic iron ore* ($FeCO_3$) or *siderite*. This is found either as *clay band* (spathose iron mixed with clay) or as *black band* (clay band containing from 20 to 25 % of bituminous coal); *iron pyrites* (FeS_2), an ore not used for extracting iron, but for manufacturing sulphuric acid.

All these ores are impure, being associated with mineral substances such as quartz, limestone, etc. About two-thirds of the ore mined in Great Britain is siderite. The chief sources of supply extend from Northampton to Glasgow, and about half of this supply comes from the Cleveland district of North Yorkshire.

In the manufacture of iron from clay or black band three steps are necessary: (1) water, carbon dioxide, and any sulphides present are expelled from the ore by calcination or roasting. The ore is broken into small pieces, spread in open heaps, mixed with small coal, and set to burn slowly for a long time. The roasting is also carried out in kilns. (2) The ore is deoxidised, that is, the iron is separated from the oxygen with which it is in chemical combination, and (3) separated from the mineral matter with which it is associated. These last two processes are performed in the blast furnace, in which the calcined ore, mixed with limestone and coke, is smelted. The coke acts as fuel, and the limestone as a reagent, which combines with the siliceous substances in the ore and forms a fusible 'slag.'

The BLAST FURNACE is shown in section. Externally its form is that of a truncated cone with a broad base, internally it is barrel shaped; in height it varies from 70 to 100 ft. The furnace is kept going for years without cessation. The mixture of coke, ore, and lime is put in at regular intervals at the top, the furnace being there closed by a cup and cone arrangement, which prevents the escape of heat. A machine forces through the furnace a powerful blast of air, which burns the fuel. The air before being admitted is first passed through pipes in an oven, heated by the hot waste gases from the furnace; this raises the blast to a temperature of from 300° to 600° C., and results in an enormous saving of fuel. The introduction of the hot blast has played a very important part in the development of ore-smelting. The chemical reactions which take place in the furnace are of too technical a nature to be dealt with here. The fused iron, on account of its weight, sinks to the bottom of the furnace with the slag floating on its surface; the latter as it accumulates is permitted to overflow through the 'slag hole.' The molten iron, carburised by the fuel, is drawn off at regular intervals and allowed to run on to a sanded floor, the sand being arranged to form moulds. In many works a casting machine now takes the place of the sanded floor. The product of the blast furnace is termed *pig iron* or *cast iron*, and of this two kinds are produced—grey and white—depending on the proportions in which the coke, limestone, and ore are mixed. The white pig iron contains its carbon in a chemically combined form, and is used for making wrought iron and steel, while the grey iron, which has its carbon physically mixed throughout, is utilised for castings.



SECTION OF BLAST FURNACE.

Pig iron is converted into *wrought iron* in a reverberatory furnace by a puddling process, which expels most of the carbon and other impurities from the metal. The furnace, the bed of which has a lining of ferric oxide, is so arranged that the iron does not come into contact with the fuel. The carbon combines with the oxygen of the furnace bed lining and passes off as a gas; the iron becomes soft and pasty, and while in this condition it is worked up into lumps (*blooms*), removed, and each bloom either hammered by a steam-hammer or squeezed in a squeezer. The hammer or squeezer squeezes out any slag which may have become mixed with the iron, and welds the metal into a solid mass. The bloom is then rolled into a bar and cut. Frequently the bars are reheated and rolled again. Wrought iron contains only a trifling quantity of carbon—from ·06 to ·15 %.

Steel only differs from iron in the quantity of carbon it contains, a quantity which is less than that in cast iron and greater than that in wrought iron. Hence it can be manufactured either from an iron containing a quantity of carbon by the removal of some of that element, or from a pure iron by the addition of carbon or by a combination of these two processes. This last is the means adopted in the *Bessemer Process*, by which steel is at present mostly produced. In this process liquid cast iron is run into a large pear-shaped vessel, called a *converter*, mounted on trunnions so that it can be swung either into a horizontal position in which it receives and empties its charge, or into a vertical position in which the 'blowing' is effected. A strong blast of air is blown through the liquid iron, and the impurities are thus burnt away in a very short time

(5 to 10 minutes). As soon as all the carbon has been removed—the operator can judge this accurately by the appearance of the flame issuing from the top of the converter—the exact quantity of carbon required (depending on the kind of steel to be produced) is added —generally in the form of *spiegeleisen* (a pig iron rich in manganese and carbon). The molten steel is then turned out into casts.

Steel alloys are coming largely into use for special purposes. An enormous number of these, possessing special qualities, can be made by alloying with the steel various percentages of certain metals with varying percentages of carbon. The chief steel alloys at present in use are *chrome* steel, *chrome-tungsten* steel, *nickel* steel, and *manganese* steel.

The numerous other methods in vogue, besides the Bessemer Process of manufacturing steel and the processes to which iron and steel are subjected in iron founding, castings, forging, drawing, rolling, etc., cannot be dealt with here. For these the reader is referred to books specially dealing with the subject.

Phillips and Bauerman, *Elements of Metallurgy*; T. Turner, *The Metallurgy of Iron*; F. W. Harbord, *The Metallurgy of Steel.*

IRON AGE, see AGE, ARCHÆOLOGY.

IRON CROSS, order of knighthood for bravery in battle; founded by William III. of Prussia, 1813; revived, 1870.

IRON DUKE, see WELLINGTON.

IRON GATES, narrow gorge and rapids (now navigable) between Carpathians and Balkans.

IRON HAND, see BERLICHINGEN.

IRON MASK, name applied to a prisoner in the Bastille in Louis XIV.'s reign. The mask was in reality of black velvet, and its wearer's identity still remains matter for speculation. It is known that he was brought from Pignerol to Sainte-Marguérite, and transferred to Bastille in 1698; that his face was always masked and his name never divulged; and that he died in 1703 and was buried at St. Paul, his name being then given as Marchiali, his age as forty-five. Early theories concerning his identity were numerous; among other conjectures, he is said to have been an illegitimate son of Louis XIV., an illegitimate son of Anne of Austria, a twin bro. of Louis XIV.; but all these and many other theories are now known to be incompatible with facts of history.

A later theory, which for some time gained credence, was that the Mask was Count Mattioli, Duke of Mantua's minister, who was imprisoned for treachery to Louis XIV.; but against this it is argued that Mattioli did not reach Pignerol until several years after the masked prisoner's arrival there, and that he remained behind when the latter was transferred, with the gov., Saint-Mars, to Exiles. He has also been identified with an Ital. adventurer, M. de Marchiel, imprisoned on suspicion of plotting to assassinate Louis XIV., but other writers say that Marchiel was put to death in 1669. And, finally, he is thought by many critics to have been one Eustache Dauger, who, when in Bastille, acted as valet to Foucquet and whose previous history remains obscure.

Andrew Lang, *The Valet's Tragedy* (1903); Jung, *La Vérité sur le Masque de Fer* (1873).

IRON MOUNTAIN (45° 48′ N., 88° 5′ W.), city, Michigan, U.S.A.; iron mines. Pop. (1910) 9216.

IRON, RALPH, see SCHREINER, OLIVE.

IRONSIDE, surname of Eng. king, Edmund (1016–17); applied by Prince Rupert to Cromwell after *Marston Moor* (1644), and afterwards to his soldiers.

IRONTON (38° 30′ N., 82° 30′ W.), city, Ohio, U.S.A., on Ohio; iron and coal industries. Pop. (1910) 13,147.

IRONWOOD (46° 27′ N., 90° 10′ W.), city, Michigan, U.S.A., on Montreal River; iron mines. Pop. (1910) 12,821.

IRON-WORK, important branch of hist. ornament; Germany had famous mediæval and Renaissance workers in this style.

IRONY, mode of speech conveying a meaning directly opposite to natural meaning of the words used; cf. Plato's dialogues, or Swift's arguments.

IROQUOIS, N. Amer. Indians, who formed the famous six nations (Cayugas, Mohawks, Oneidas, Onondagas, and Senecas); took Brit. side against French and Americans. Morgan, *League of the Iroquois*. See INDIANS, RED.

IRRAWADDY, IRAWADI (16° 30′ N., 95° 5′ E.), principal river of Burma, India; total length, c. 12,300 miles; navigable for small craft; spreads into wide delta with some dozen mouths in W. of Martaban Bay; affords chief means of communication in Burma. On its banks stand Rangoon, Mandalay, Bassein, Prome, and Ava. Largest tributary is the Chindwin.

IRREDENTISTS, political party in Italy, which in 1876 was placed at head of government; aimed at recovery of *Italia Irredenta* ('Unredeemed Italy'), *i.e.* those territories which at one time formed part of Italy, and were held by Austria and other powers.

IRRIGATION is the artificial distribution of water for purposes of vegetation. In the form of *baling* water on to the fields it was used in the earliest times, and is still used in remote districts of India. The *reservoir* system, consisting of tanks in which rain-water is collected, is very old, but is bad because the system is dependent on the amount of rainfall, and the tanks are apt to become filled with mud or silt. *River-fed canals* vary according to the river and the situation. The water may be almost pure, filled with barren mud, or charged with fertilising material. This system succeeds best when the river maintains a fairly uniform supply of water throughout the season, whereas, if it is almost dry at one season and excessively flooded at another, *sluices*, *dams*, and waste outlets are necessary as controls, and they are very costly. Where the rivers are large, the canals are easily managed, because the rivers are not so liable to sudden change. Thus the Nile, with its African lake supply, and the Ind. rivers fed from the glaciers, are never entirely diminished, and are very favourably situated for this river-fed canal system. In most parts only seasonal i. is wanted. Where water has to be distributed throughout the year it is satisfactory if one-third of the crop-bearing area can be supplied. If the land is irrigated it must be drained or the soil will deteriorate, for the water, if allowed to evaporate, will, in time, leave behind on the surface soil excess of salts which it has carried in solution. In Egypt and most other countries the canals are taken along crests and the drains are led along the hollows.

WATER MEADOWS are fields which are flooded with water during the winter and on which certain crops are grown. The soil filters out and retains certain materials which the ensuing crop makes use of. Clear water is used for grass meadows. River water with sewage is suitable for arable land. Water from peat moors, as it contains acid, is not suitable for any kind of i. If water is once used for i. it loses a great deal of its value, as plant food is filtered out of it.

BEDWORK IRRIGATION is the most suitable for level ground. It is the most efficient and most costly. The ground is thrown into beds or ridges. A *conductor* carrying the water supply should start at the highest end of the meadow and should terminate in a feeder, or, where there are no feeders, the main drain should be at the lowest part of the field. The ground is formed into beds at right angles to the line of the conductor. The length and width of the beds is regulated by the amount of water which can be supplied and by the steepness of the slope from the conductor to the drain. *Feeders*, channels with a wide lower end, are led between the beds. A too rapid flow of water along the feeders is prevented by placing stones or turf, *stops*, in them. The main conductor should be controlled by *sluices* of stone and mortar.

CATCHWORK IRRIGATION is suitable for the slopes of valleys. The conductors, except the main, are used both as drains and distributors. In UPWARD IRRIGATION the water which should be carried away by drains is

carried by means of pipes upwards through the soil and there evaporated. WARPING raises the level of the ground, and manures and irrigates the soil. It is carried out on the land near estuaries or tidal rivers. Main conduits are led from stone sluices with strong iron doors. Mud and water are carried to the fields; the mud remains, while the water returns to the river with the falling tide. The mud so deposited is very rich and suitable for any crop.

The object of i. is not only to supply moisture to plants, because comparatively few plants require so much moisture as has to be supplied if i. is to be successful. The water always brings with it a certain amount of nourishment. I. aids in the solution and distribution of the food already present, and helps in the oxidation of any excess of organic matter in the soil. Water meadow i. keeps the frost from acting so severely on the roots in winter, and encourages the growth of the roots of grasses. It has been observed that after repeated i's of this kind several persistent weeds become extinct.

IRULAS, tribe of the Nilgiris, India, numbering *c.* 80,000.

IRUN (43° 21′ N., 1° 47′ W.), town, Guipúzcoa, Spain, on Bidassoa; iron-works. Pop. 10,000.

IRVINE (55° 36′ N., 4° 39′ W.), royal burgh and seaport, on river Irvine, Ayrshire, Scotland; chemical works; foundries. Pop. (1911) 10,180.

IRVING, EDWARD (1792–1834), Scot. preacher; ed. at Edinburgh Univ.; teacher at Haddington and Kirkcaldy; obtained a preaching licence, 1815; went to Edinburgh, 1818, and to the Caledonian Church, London, 1821; became a popular preacher, his passionate utterance and remarkable personality drawing large crowds to listen to him; after a time popularity dwindled; owing to the revival, as he thought, of prophecy and healing, founded the *Catholic Apostolic* or *Irvingite Church* in 1832; d. exhausted with his labours. *Life*, by Mrs. Oliphant.

IRVING, SIR HENRY (1838–1905), Eng. actor; changed his name from JOHN BRODRIBB; early went on stage; his tenure of the Lyceum as actor-manager was epoch-making in history of Eng. drama. I.'s success depended on wonderful poetic imagination; his school has been displaced by strong modern current in favour of realism. His sons, HENRY B. (1870–) and LAURENCE (1872–), are actors with much of I.'s quality.

IRVING, WASHINGTON (1783–1859), Amer. author; called to the Bar, but never practised; first literary success, amusing sketches, *Salmagundi*, written in collaboration with his bro. William and Paulding. In 1809 appeared satirical *History of New York*, by 'Diedrich Knickerbocker.' He went to England (1810) and wrote sketches of Eng. life, visited Spain and wrote biography of Columbus, etc. His various biographies are still read for the sake of their style and judgment, though contributing little new in fact. I. was a master of mockery. *Life* by Warner (Amer. Men of Letters Series).

IRVINGITES, CATHOLIC APOSTOLIC CHURCH (*q.v.*).

IRVINGTON (40° 43′ N., 74° 13′ W.), town, New Jersey, U.S.A.; residential suburb 3 miles S.W. of Newark. Pop. (1910) 11,877.

ISAAC, Bible character; only child of Abraham and Sarah, and f. by Rebecca of Esau and Jacob. Abraham's faith was tried by being bidden to slay him. Christ was his antitype, and he was held up as a model by St. Paul (*Hebrews* 11).

ISAAC I., COMNENUS (d. 1061), East Rom. emperor (1057–59), and founder of dynasty of the Comneni; made important reforms.

ISAAC II., ANGELUS (d. 1204), East Rom. emperor; defeated Normans in Sicily; obstructed Third Crusade; deposed and blinded by his bro.; illustration of Byzantine decadence and vice.

ISAAC OF ANTIOCH (fl. V. cent.), writer to whom are ascribed nearly 200 eloquent didactic sermons in metre in the Syrian tongue.

ISABELLA (1451–1504), in own right Queen of Castile; m. Ferdinand V. (*q.v.*), king of Aragon, 1469; a wise ruler, but fanatical; patron of Columbus.

ISABELLA II. (1830–1904), queen of Spain; succ., 1833; her uncle, Don Carlos, disputed her right, and her reign was marked by plots and intrigues; abdicated, 1870.

ISABELLA, or ELIZABETH, OF BAVARIA (1370–1435), queen of France; wife of Charles the Mad (1385); misruled the kingdom, which she granted to England at Troyes (1420); of evil fame and hated in France.

ISABELLA OF HAINAULT (1170–90), queen of France, who brought Artois to the Crown.

ISABEY, JEAN BAPTISTE (1767–1855), Fr. miniature painter of First Empire; one of greatest masters of this art.

ISÆUS (fl. 365 B.C.), Attic forensic orator; pupil of Lysias and teacher of Demosthenes; first speech written about 389 B.C.; continued in his profession for about thirty-six years; specially noted for skill in inheritance cases. Twelve of his speeches are still in existence, eleven concerning inheritance suits; less graceful in style than Lysias, but more logical in reasoning, though inferior to Demosthenes.

Jebb, *Attic Orators*.

ISAIAH, the greatest of the Old Testament prophets; received the call *c.* 740 B.C., and d. some time after 701. His book has given rise to a great theological and critical lit. It is not one continuous work, but a collection of prophesies of varying date. Large portions of chaps. 1–39 are the work of I. himself. But it is now universally held that chaps. 40–66 date from after the return from exile, and were written therefore *c.* 540 B.C.; chaps. 60–66 may be later still,—V. cent. B.C.,—while Kenneth would date considerable portions of the whole book in the II. cent. Its hist., spiritual, and theological importance is as great as that of any Old Testament book.

Cheyne, *Isaiah, Chronologically Arranged*; Driver, *Introduction to Old Testament Lit.*, and *Isaiah: Life and Times*; Commentaries in *Cambridge Bible* (Skinner), *Century Bible* (Whitehouse), *Churchman's Bible* (Barnes), *Expositor's Bible* (Smith); Kenneth, *Composition of Isaiah* and *Servant of the Lord*.

ISAIAH, ASCENSION OF, apocryphal work dating in present form from probably about A.D. 200. R. H. Charles, who has thoroughly examined it, believes it made up of (1) *Martyrdom of Isaiah*, (2) *Testament of Hezekiah*, (3) *Vision of Isaiah*. Written in Gk.; (2) possibly in Semitic; these three probably written end of I. cent.

ISANDHLWANA, ISANDULA (28° 24′ S., 30° 38′ E.), hill, Zululand, S. Africa; scene of memorable Brit. disaster in Zulu War (1879). See NATAL.

ISAR (48° 36′ N., 12° 19′ E.), river, Bavaria, Germany; ancient ISARUS; rises in Tyrol; joins Danube near Deggendorf; length, *c.* 200 miles.

ISAURIA (37° 20′ N., 32° 10′ E.), ancient district, Asia Minor, on N. slope of Taurus; seat for cent's of a race of robbers who, defeated successively by Servillus and Pompey, remained still barbarous and unsubdued.

ISCHIA (40° 44′ N., 13° 55′ E.), island of Italy, W. of the Bay of Naples; of volcanic origin; very fertile; wine, fruit, oil, and corn produced; has warm mineral baths; chief towns, ISCHIA and Casamiccola; visited by earthquakes in 1881 and 1883. Pop. 28,000.

ISCHL, BAD ISCHL (47° 44′ N., 13° 37′ E.), watering-place, Austria, at junction of Traun and Ischl; brine and other baths; important centre of salt industry. Pop. (1910) 10,188.

ISEGHEM (50° 55′ N., 3° 12′ E.), town, W. Flanders, Belgium; linen, lace, tobacco. Pop. 12,172.

ISEO (45° 45′ N., 10° 3′ E.), lake, Lombardy, Italy, traversed by the Oglio; length, *c.* 15 miles; ancient *Lacus Sebinus*.

ISÈRE (45° 25′ N., 5° 25′ E.), department, S.E

France, formed from part of ancient Dauphiné; surface mountainous; chief rivers, Rhône and Isère; produces wheat, wine, fruit; coal and iron worked; manufactures gloves, paper, iron and steel goods; chief town, Grenoble. Pop. (1911) 555,911.

ISÈRE (45° 2′ N., 5° 10′ E.), river, S.E. France; traverses Savoy and Dauphiné; joins Rhône 6 miles N. of Valence; course, c. 180 miles.

ISERLOHN (51° 23′ N., 7° 42′ E.), town, Westphalia, Germany, on Baar; iron- and steel-works. Pop. (1910) 31,294.

ISFAHAN, see ISPAHAN.

ISHIM (56° 6′ N., 69° 25′ E.), town, Tobolsk, W. Siberia, on Ishim; large annual fair. Pop. c. 7000.

ISHMAEL (Book of *Genesis*), son of Abraham and Hagar; an 'ethnic' name.—ISHMAELITES, tribe to whom Israelites were akin.

ISHPEMING (46° 30′ N., 87° 42′ W.), city, Michigan, U.S.A.; in centre of iron district. Pop. (1910) 12,448.

ISHTAR, ISTAR, Babylonian and Assyrian goddess, worshipped in Phœnicia as Astarte (*q.v.*).

ISIDORE OF ALEXANDRIA (fl. 500 A.D.), a Neo-Platonic philosopher; and mystical thinker.

ISIDORE OF SEVILLE, ISIDORUS HISPALENSIS (c. 560–636), learned ecclesiastic of Western Church; collected numerous propositions covering entire plan of salvation.

ISIDORIAN DECRETALS, see DECRETALS.

ISINGLASS, the cleaned, dried swimming-bladder of fish, that from sturgeon being most valuable; uses are to clarify beer and wine by mechanical precipitation of particles, and to give lustre to silk.

ISIS, Egyptian goddess; wife of Osiris; often represented with her s. Horus in way suggestive of Virgin and child; her worship spread to Greece and Rome and was powerful rival of Christianity; her sacred animal was the cow. See EGYPT.

ISIS, old name for upper Thames (*q.v.*).

ISKANDERUN, see ALEXANDRETTA.

ISKELIB (40° 45′ N., 34° 10′ E.), town, Angora, Asia Minor. Pop. c. 15,000.

ISLA, JOSÉ FRANCISCO DE (1703–81), Span. Jesuit; author of witty burlesque, *Fray Gerundio de Campazas*, etc.

ISLAM (Arab. 'obedience,' 'pious'), name applied to the Muhammadan religion from its salient trait, resignation to will of Allah. See MUHAMMADANISM.

ISLAMABAD (33° 43′ N., 75° 17′ E.), town, Kashmir, India, on Jhelum; cotton and woollen goods. Pop. 9500.

ISLAND, a piece of land wholly surrounded by water, originating either by submersion of connecting portion of mainland, or volcanic upheaval of parts of the ocean bed.

ISLAY (55° 45′ N., 6° 15′ W.), island, Inner Hebrides, Argyllshire, Scotland; ancient seat of Lord of the Isles; industries—stock-raising, dairy-farming, and whisky-distilling. Pop. (1911) 6387.

ISLE OF FRANCE, former name of MAURITIUS.

ISLES OF THE BLEST, or FORTUNATE ISLANDS (classical myth.), islands inhabited after death by those who received immortality; sought for in Atlantic between Portugal and the New World by navigators of the Renaissance.

ISLINGTON, parliamentary borough of London, 2 miles N. of St. Paul's. Pop. (1911) 327,423.

ISLIP (40° 45′ N., 73° 25′ W.), town, summer resort, New York, U.S.A. Pop. (1910) 18,346.

ISLY (c. 34° 30′ N., 2° W.), small river, E. Morocco; scene of defeat of Moroccans by Fr., 1844.

ISMAIL, see IZMAIL.

ISMAIL HADJI MAULVI-MUHAMMAD (1781–1831), founder of new Muhammadan sect.

ISMAIL PASHA (1830–95), khedive of Egypt; grandson of Mehemet Ali; made Egypt virtually independent of Sultan of Turkey, who acknowledged him as khedive, 1873; engaged in internal reforms and great public works, chief of which was construction of Suez Canal; became so involved in debt that he sold his shares in Canal to Brit. Government; compelled to abdicate by France and Britain, 1879.

ISMAILIA (30° 40′ N., 32° 20′ E.), town, Lower Egypt, on Lake Timsah, Suez Canal; founded 1863. See also GONDOKORO, IZMAIL. Pop. 10,000.

ISMAY, THOMAS HENRY (1837–99), Brit. shipowner; founded White Star Co. (I., Imrie, & Co.).

ISMID (40° 45′ N., 29° 57′ E.), town, on Gulf of I., Asia Minor; seat of Gk. and Armenian abp's; ancient *Nicomedia*. Pop. c. 20,000.

ISNARD, MAXIMIN (1758–1825), Fr. revolutionary regicide and leader of Girondists, later became Imperialist and Royalist.

ISOBARS, lines joining places which have same barometric pressure. See METEOROLOGY.

ISOBUTYL ALCOHOL, see BUTYL ALCOHOLS.

ISOCHRONISM (Gk. *isos*, equal, and *chronos*, time), property possessed by pendulum when its oscillations, large and small, are performed in equal times; this occurs only when it moves in a cycloid arc. See CYCLOID.

ISOCLINIC, see MAGNETISM (TERRESTRIAL).

ISOCRATES (436–338 B.C.), Gk. orator; friend of Plato, who highly esteemed his talent for rhetoric and philosophy; b. at Athens; ed. by Socrates and several of best-known Sophists. Most of his speeches were published as pamphlets, as weakness of voice prevented his appearance in public as an orator; he gave lessons in oratory at Chios, and later at Athens, many well-known writers and orators being among his pupils (*e.g.* Isæus, Lycurgus, Timotheus, Æschines). For a few years he adopted the profession of speech-writing, but in this he was less successful than as a teacher. In politics he aimed at uniting all Greece against Persia, and late in life he appealed to Philip of Macedon to lead the Greeks against Persia; subsequently, hearing of Philip's victory over the Athenians at *Chæronea*, he starved himself to death. His writings include the *Panegyricus* (written c. 380 B.C.), exhorting Athens and Sparta to take the lead against Persia, and the *Philippus*, the aforementioned appeal to Philip of Macedon, the *Areopagiticus*, and other political works. He also wrote some educational pamphlets, some letters containing moral exhortations, the *Panathenaicus*, an historical work, and the *Encomium on Helen*. His style shows great polish and perfection; but his matter is marked by paucity of ideas. Jebb, *Attic Orators*.

ISODICTYA, see under SPONGES.

ISOGONIC, see MAGNETISM (TERRESTRIAL).

ISOLA DEL LIRI (41° 40′ N., 13° 34′ E.), small town, on Liri, Caserta, Italy. Pop. 8700.

ISOMERISM (chem.) is the phenomenon seen when compounds occur having the same molecular formula but different constitutions. Such compounds are called *Isomers* or *Isomerides*, and they differ in the arrangement of their atoms. For every possible arrangement of atoms with a given *valency*, there is a *Graphic Formula* representing an isomer. Thus supposing carbon to be tetravalent, the hydrocarbon butane with the molecular formula C_4H_{10} can be represented by two graphic formulæ. There should be and there are two isomers. The number of possible isomers increases with the number of carbon atoms in the molecule.—OPTICAL, PHYSICAL, or STEREO-ISOMERISM: these isomers have the same graphic formula, but they differ in their action on polarised light and in certain physical properties. Such isomerism occurs only in substances which have a carbon atom combined directly with four different groups (asymmetric carbon atom).

ISOMORPHISM, see under CRYSTAL.

ISOPLEURA, a sub-class of GASTEROPODA.

ISOPODS, see under MALACOSTRACA.

ISOPTERA, see TERMITES.

ISOTHERM, see METEOROLOGY.

ISPAHAN, ISFAHAN (32° 41′ N., 51° 52′ E.), province and town, Persia. Province bounded N. by

Kashan, Natany, and Irak, E. by Yeyd, S. by Fars, W. by Bakhtiari district and Arabistan; mostly fertile country, producing quantities of rice, wheat, barley, cotton, opium, and tobacco. Town, once capital of Persia, situated on the Zāyendeh River, surrounded by beautiful orchards, avenues, and fields; formerly magnificent city of great importance, now practically in ruins, with deserted streets and dilapidated houses. Of many splendid buildings little remains but ruins; most interesting features are square, called Maidan Shah, numerous mosques (particularly Mesjid Shah), minarets, ruined palaces, castle of Tabarrak, ruinous mud walls, some fine bridges, and line of covered bazaars; some buildings lately rebuilt. Suburb of Julfa, once extensive Armenian town, now almost uninhabited. I. is still of considerable commercial importance; manufactures include firearms, glass, earthenware, brocade and velvet fabrics. Pop. 75,000.

ISRAEL, name given to Jacob after his wrestle with the angel (*Genesis* 32[28]); 'Children of I.' shows mixed patriarchal and theocratic elements in early chief of a tribe. See also JEWS.

ISRAELI, ISAAC BEN SOLOMON (*c.* IX. and X. cent's), Jewish physician and philosopher; flourished in N. Africa; author of medical and philosophical works in Arabic, later trans. into Latin.

ISRAËLS, JOSEF (1824–1911), great Dutch-Jewish painter; his characteristics are tragic sense, delicacy and richness of treatment, and choice of poverty and misery for subject.

ISSACHAR, tribe of Israel named from Jacob's ninth son.

ISSEDONES, extinct Asiatic tribe of cannibals mentioned by Herodotus.

ISSERLEIN, ISRAEL (d. 1460), Ger. writer on Hebrew antiquities.

ISSERLES, MOSES BEN ISRAEL (*c.* 1520–72), Polish Jew; author of theological works.

ISSOIRE (45° 32′ N., 3° 15′ E.), town, Puy-de-Dôme, France; ancient *Issiodorum*; nearly destroyed during the religious wars, 1574–77. Pop. 5650.

ISSOUDUN (46° 57′ N., 2° E.), town, Indre, France; textiles, agricultural implements. Pop. 14,200.

ISSUS, ancient city, Cilicia, Asia Minor; scene of victory of Alexander the Great (*q.v.*).

ISSYK-KUL (42° 30′ N., 77° 30′ E.), lake, Central Asia; area, *c.* 2200 sq. miles.

ISTAHBANÁT (29° N., 54° E.), town and district, Fars, Persia; fertile, fruit and grain. Pop. *c.* 11,000.

ISTAMBOUL, see CONSTANTINOPLE.

ISTER, ancient name for Danube (*q.v.*).

ISTHMUS, a narrow neck of land connecting two larger portions of land, *e.g.* i. of Corinth, i. of Panama.

ISTRIA (45° 20′ N., 13° 55′ E.), margraviate, Austria, forming a peninsula in N.E. of Adriatic; generally mountainous; produces fruit and wine. Pop. (1910) 403,566.

ISYLLUS, Gk. poet of Epidaurus (fl. IV. or III. cent. B.C.); name and inscription alone commemorate his existence.

ITAGAKI, TAISUKE, COUNT (1837–), Jap. politician; helped to suppress Shogunate rebellion, 1868; has held various offices of state; Home Minister, 1898; advocated constitutional government.

ITALIA IRREDENTA, 'Unredeemed Italy,' embraces those districts out of Italy where Ital. speech prevails, such as S. Tyrol, Trieste, Istria, Dalmatia. See IRREDENTISTS.

ITALIC, term applied to Composite order of architecture; also to a Lat. edit. of the *Bible*; Italian as distinguished from 'Roman'; kind of type, e.g. *Italic*.

ITALY, a kingdom in S. Europe, is about 700 miles long, and the peninsula of which it mainly consists varies in breadth from 100 to 150 miles. It is bounded on the N. by the long chain of the Alps, and is therefore a natural besides a political entity; only on the N.E. is the boundary artificial. The N. is largely filled with the basin of the Po, which takes into itself the waters of many tributaries. Just N. of the mouth of the Po is that of the Adige, on one of the lagoons of which stands Venice. The long chain of the Apennines, almost an offshoot from the Alps, runs right down the peninsula, starting at the N.E. corner, where they fringe the beautiful coast strip known as the Riviera. The Apennines spread out into a number of ranges in Central Italy, and have thus broken up the country and facilitated political disunion. The climate of this central part varies considerably, for the higher land is bleak while the valleys are warm and comparatively luxuriant. The two rivers of Central Italy are the Arno and the Tiber; on the former stands Florence, on the latter Rome, and the country they flank is volcanic. The Po is the only Ital. river that surpasses the Arno in size. S. of Rome is the Campagne, an open plain. S. Italy is mostly broken up, particularly Calabria, but here there are no rivers of importance. The only important lakes in Italy are those in the N. The Lake of Garda is the biggest, that of Maggiore is the longest (37 miles). Como has a depth of over 1300 ft.

The Ital. *climate* varies greatly in different places and in different times of the year. Summer heat in the N. is as great as in the S. of Italy, but in winter it is as cold as N. Europe. Oranges and lemons grow on the coast of Calabria, but a few miles inland the climate more resembles that of England. The great scourge of the S. is malaria, and parts formerly inhabited are now dreary wastes. Malaria is, however, being reduced; pellagra is prevalent. Earthquakes at intervals convulse the S. (especially Calabria and Sicily); Vesuvius and Etna are active volcanoes.

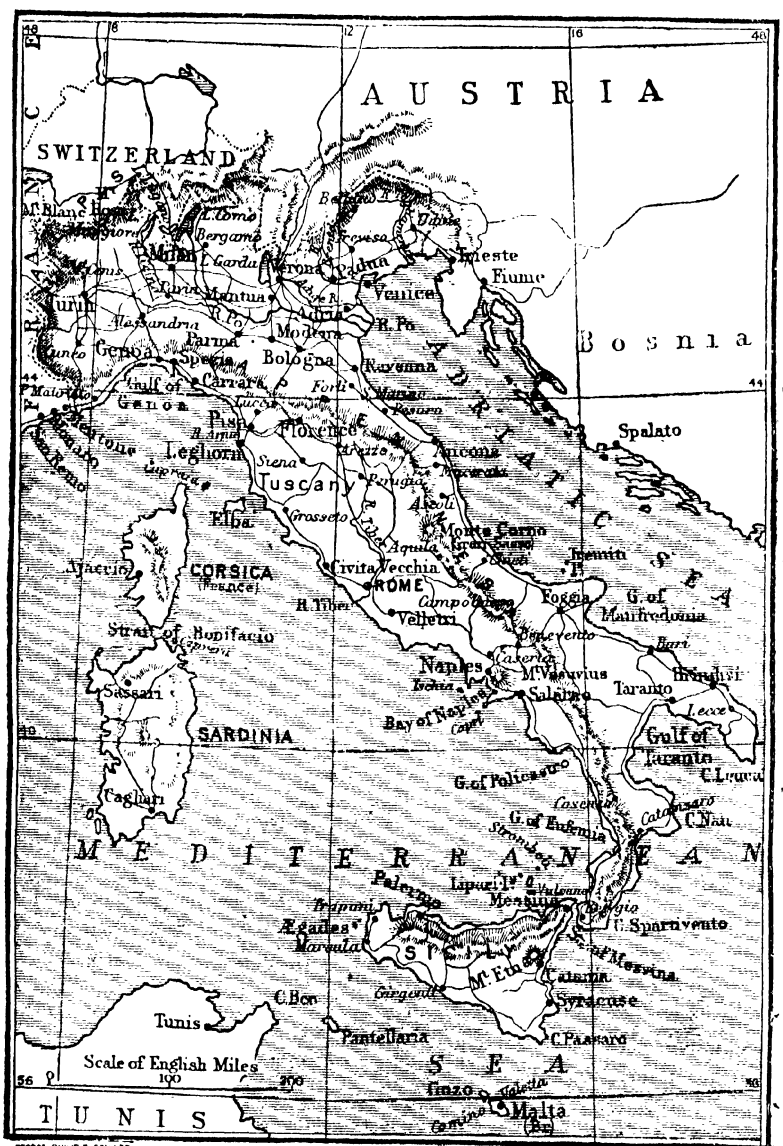
HISTORY.

Ancient Times.—Until the XIX. cent. Italy was never a political unity, but either a number of states and peoples or a member of a larger whole—the Roman Empire. The name Italy was applied by the Greeks to a district in the S., only later to the whole peninsula. Her early history is dark, but ethnology and archæology afford us some glimpse of her condition, and fairly reliable maps have been constructed showing her as she was—say, 500 B.C. The greater part of the peninsula was occupied then by the 'Italic' branch of the Aryan (or at any rate Aryan-speaking peoples). These, however, can be subdivided into the *Latin* on the one hand and the *Oscan*, *Volscian*, and *Umbrian* on the other. These last three are really *Sabine* (or, as some modern scholars prefer, Safine). This is a linguistic classification, but also ethnological.

Rome was a Latin community, though not the earliest town founded, according to tradition, which is probably correct. The early history of Rome is much obscured by myth, but it is probable that an originally pure population (the patricians) won the supremacy over a mingled 'plebeian' population. There was probably a Sabine element in early Rome. In the N.E. of Italy dwelt the *Veneti*; they and the *Iapygians* in the S.E. were probably of Illyrian stock—speaking an Aryan but hardly an Italic language. In Sicily there were *Siculi* and *Sicani*, one probably, the other possibly, Italian; Phœnician traders had settled on the towns on the coast and there were the remnants of a strange people called the *Elymi*. Greek settlers, too, were a most important factor in primitive Italy from about the VIII. cent. B.C. onwards, and part of the S. was called *Magna Græcia*. A great part of N. Italy and one or two isolated districts farther N. were held by the *Etruscans*, one of the most interesting peoples of the ancient world, over whose linguistic and ethnological affinities there has been much dispute. It seems certain, however, that they were not Aryan. The remains of their language have never been properly deciphered. Their power reached its greatest *c.* 500 B.C. and then declined. N. of the Etruscans and all over the valley of the Po were the *Gauls*, who swooped down to sack Rome, 390 B.C. E. of them, around what is now the Gulf of Genoa, dwelt the

Ligurians, again of people of disputed race—certainly different from the Etruscans.

Thus Ancient Italy was made up of a number of diverse peoples who were ultimately welded together under the sway of Rome. The stages of this process really belong to Rom. history (see ROME). The influx of barbarian tribes on the collapse of the Empire brought a further infusion of diverse peoples, and this lack of homogeneity of race, together with geographical and political circumstances, was largely responsible for the subsequent divisions.



Middle Ages.—It is impossible to draw a sharp dividing-line at any one point between mediæval and modern times, for the change took place at different times in different places. But we can fairly take 476 A.D. as the starting-point of mediæval history. Then the separate W. Roman Empire came to an end, and though the Empire continued in the E. for nearly a thousand years, and even in the W. recovered some of its territory in the next cent. under Justinian, in 476 Italy fell under the rule of a barbarian and alien, and by foreigners she was ruled for many cent's to come. Odoacer became king, but his reign did not last long, for in 488 Theodoric, king of the E. Goths, was ordered by the Emperor Zeno to subdue Italy. This he succeeded in doing by 493. He was in many ways a fine man, but an Arian, and this proved a hindrance to his power. Under Justinian Italy was invaded, and after a struggle of some years the Gothic kings came to an end in 553. Another Germanic invasion soon followed, for in 568 the *Lombards* came down into the valley of the Po; the Lombard king Albion made Pavia his capital. The pope, alarmed at this new power, called in the aid of the *Frank*. This is the first instance of a continued policy of disaster—the tendency of Ital. rulers to apply for foreign help against other powers in the peninsula. The immediate result of this was a firm alliance between the Franks and the Papacy, and the 'Donation of Pippin,' the founding of the temporal possessions of the Papacy in 756. Meanwhile much of S. Italy continued to belong to the Byzantine Empire, and the Lombard Duchy of Benevento still survived.

A new epoch begins in Ital. as in general European history with the Frank kings and the assumption by them of the Imperial title. Displacing the feeble Merovingian dynasty in the VIII. cent., they started on a career of conquest which culminated in the coronation of Charles the Great as Emperor of the Romans by Pope Leo III. in 800. But the exact powers of Pope and Emperor were not stated—a fact which led to future difficulties, for at the time each wanted the help of the other. The new Empire, however, soon fell to pieces, and it finally came to an end with the inglorious reign of Charles the Fat in 888. Meanwhile Sicily was a prey to Arab conquerors, and the Byzantine Empire again got a firmer hold in Italy. The political and social disruption of the decaying Karling had its parallel in the terrible degradation of the Papacy in the X. cent. A brighter period began again with the Saxon emperors when Otto the Great assumed the Imperial title at Rome in 962. There was still nominally an Italian king, Berengar, the successor of the

Karling kings, but he was conquered by Otto, and afterwards there was no real kingship till the XIX. cent.

Henceforth the control of the Holy Rom. emperors over Italy was but slight, and the states which were to play a prominent part till, only in our own day, Italy became united, now took shape. City life, which was to be such a prominent feature of Ital. life, began to develop, and the lead was here taken by Milan. Meanwhile a new ecclesiastical movement comes into prominence under the monk Hildebrand, who became pope under the title of Gregory VII. in 1073. He set himself a twofold task—(1) a moral reformation, particularly enforcing the celibacy of the clergy; (2) taking away from secular princes any control over the Church, particularly in the appointment to benefices. The result was the so-called Investiture Controversy, which ended in a nominal compromise, though the Church really came off victor. Hildebrand also strengthened the influence of the cardinalate in papal elections.

The XI. cent. saw also the advent of the *Norman* power in S. Italy and Sicily, where Greek, Lombard, and Saracen still contended for power. The Normans first landed in Apulia, 1017; William of Hauteville became Count, 1029; the years 1060–90 were spent in the conquest of Sicily; the title King of Sicily was taken in 1130.

From this time the communes in the N. became more and more important. Some memory of ancient liberties still lingered in Rome, where Arnold of Brescia tried to establish a republic, but without the permanent success of republican institutions in the N. The N. cities provoked the opposition of the Emperor Frederick I. (Barbarossa), but in the long-run they maintained their position. Frederick II.'s dominions were torn by the struggle between Empire and Papacy, and each Ital. city was rent by Guelph and Ghibelline factions, though the terms lost their original significance. Frederick II. was a 'brilliant failure,' and had he been able to rule in Italy alone it might have been well.

The XIV. cent. was the culmination of the Middle Ages, and 1300 was the date of Dante's vision. Afterwards all is on the decline, and the 'Babylonish Captivity' of the Papacy at Avignon marked a lowering of papal prestige. The popes were largely, though not entirely, under the influence of the Fr. kings. By the XV. cent. the great Ital. states, which were to last to the middle of the XIX. cent., were fairly marked out. Milan was under the family of the Visconti, who were succeeded by the Sforza. In Florence the Albizzi came into power in a reaction against commercial domination; they were succeeded by the Medici. Venice had lived her life apart from the rest of Italy, more in touch with the East than with the West. The Venetian constitution is one of the most remarkable in history (see VENICE); the power gradually passed from the hands of the doge to the oligarchy, particularly the 'Council of Ten.' After the fall of Constantinople in 1453, Venice had to throw in her lot with the Western powers.

The Papacy, after the return from Avignon, became Ital., princes putting secular power and the 'New Learning' of the Renaissance before spiritual affairs.

The kingdom of the Two Sicilies was fought for by houses of Aragon and Anjou.

The Italy of the XV. cent. is displayed in the work of Machiavelli, with its cleverness, brilliance, and political intrigue; there was a revival of learning and artistic splendour, but the general tone alike of private morals and of politics was bad.

But the Italy of the Middle Ages had produced one of the sweetest characters known to history in St. Francis, and the glories of Italian art had never been surpassed. But the moral collapse of the Renaissance would not have been so bad had Italians possessed something of the sturdier conception of national unity.

Modern History.—At the end of the XV. cent., therefore, Italy was divided against itself and at the mercy of rival foreign conquerors. The Papacy had shared in the splendour and worldliness of the classical Renaissance, and then its prestige in Europe was undermined by the Prot. revolt. Turkish aggression since the fall of Constantinople (1453) loomed in the background. The detailed history during the XVI. cent. is very intricate, but certain facts stand out. France ceased to meddle so much in the internal affairs of Italy, and the influence of Spain became predominant. The N. was a cluster of small states. Pope Paul III. (Alessandro Farnese) planted a dynasty in Parma. The Medici still ruled in Florence. Venice and Genoa were the only important republics. *Savoy*, under its duke, Emmanuel Philibert (1553–80), was in the ascendant. His family dated from the XI. cent., and in his time Italy really became an Ital. power. Its capital was moved from Chambéry to Turin. Venice fell from her great position in the XVII. cent.; mainly because of the opening up of new trade routes, and then for the time Italy became involved in the three great wars of the Spanish Succession, Polish Succession, and Austrian Succession. After the first, which was brought to an end by the *Treaty of Utrecht*, 1713, Victor Amadeus of Savoy became king of Sicily, which country was afterwards exchanged for Sardinia. The second, finished 1738, settled the succession in Parma and Tuscany. After the third had been brought to a close in 1748 by the *Treaty of Aix-la-Chapelle*, Milan and Tuscany became Austrian property. Genoa handed Corsica over to France in 1755. The latter part of the XVIII. cent. saw Italy slumbering under several benign despotisms—in some provinces under despotisms not benign, particularly in Naples.

A new era in Ital. history opened in 1796, when the country was drawn into the vortex of Napoleonic activity. At that time considerable parts of the country were held by Spain and Austria—by the former the Two Sicilies (a name frequently given to Naples and Sicily together) and Parma; by the latter, Tuscany, Mantua, and Milan. In 1796 a *Cispadane Republic* was founded at Modena and supported by Bonaparte, and next year a *Cisalpine* or *Transpadane Republic* at Milan. In 1798 the Venetian Republic, whose best days had been long since over, was finally crushed and her territory divided between Austria and France. Fr. troops took Rome (1798) and next year a *Parthenopean Republic* was founded at Venice. Then followed the invasion of Italy by the allied Austrian and Russian armies. In 1801, by the *Treaty of Lunéville*, Austria recognised the Ligurian and Cisalpine Republics so long as they were not under France. Meanwhile Napoleon had practical control over most of Italy and was determined to maintain it. In 1803 he was elected Pres. of the Cisalpine Republic, and next year his bro., Joseph Bonaparte, took the title of king of Italy. In 1805 he annexed the Ligurian Republic, whereupon Britain, Austria, and Russia combined against France; but after Napoleon's victory of Austerlitz, Austria gave up to France her share of Venetia and some of the Austrian lands along the Adriatic. Still many reforms were carried out by the Fr. rulers of Italy, particularly in the judicial sphere. Joseph Bonaparte exchanged his Ital. kingdom for Spain in 1808, and Murat was created king of Naples. Meanwhile, Napoleon quarrelled with the Pope and annexed the Papal States and took the Pope away, annexing Rome in 1810.

The *Papal States* were now under the direct government of Napoleon, and many salutary reforms were introduced, but trade was practically limited to France, and the number of men required for the Napoleonic armies was rather a strain. Napoleon's power in Italy declined after the disaster of the Russ. campaign, Austrian forces captured Milan in 1814, and by the *Treaty of Paris*, 1814, the *status quo* before the Revolution was restored. Sardinia got back Savoy and Nice and annexed Genoa; Austria got back her N. Ital. and Danubian lands. The restoration of the old régime was received with bitter feeling, particularly in Naples, where the Bourbon government, with its cruelty, bigotry, and incompetence was deservedly detested.

The period from 1815 to 1870 is often called the *Risorgimento*, that is, 'Reawakening.' Austrian

influence was predominant, repression provoked inevitable reaction of feeling, and revolutionary societies grew apace.

There was a revolution, for a time successful and then checked, in Naples in 1820, and another outburst in several parts of Italy in 1830. The famous Ital. patriot, Mazzini, wrote in 1831 to Charles Albert of Sardinia, asking him to renovate Society, and there were various schemes, some moderate, some extreme, afoot. 1846 saw the death of Pope Gregory XVI. and the election of Pius IX., a well-meaning man of some liberal sympathies, but neither a clear thinker nor a good statesman. He carried through some reforms, but things soon got beyond his control. 1848 was a time of revolutionary agitation all over Europe. In March there were disturbances in Lombardy, and there was an Ital. alliance against Austria—a war which the Pope, much to his distress, was obliged to sanction. In August there was a truce between Austria and Piedmont, in which the former relinquished Lombardy and Venetia.

There were commotions in Rome. The Pope's authority was defied and a republic was proclaimed. Ferdinand II., the King of Naples, was deposed, but restored. War broke out again between Piedmont and Austria, and the former was defeated at Novara. Garibaldi took Rome, but was then obliged to flee from the country. Austria won back Venice and again things became as they were before. For ten years Austria carried out a policy of vigorous repression in Lombardy and Venetia. The great reforming statesman in Piedmont was now Cavour, but he had to bide his time. At last Austria took to milder measures, but in Rome the government remained quite reactionary. A 'Societale Nazionale' was formed which looked to Victor Emmanuel of Piedmont to become the leader of a free and united Italy, though to unite N. Italy was the first step. Victor Emmanuel won the support of the Emperor Napoleon III., and war was declared by France and Piedmont against Austria in 1859.

But after a time Napoleon backed out and made an agreement with Austria by which Lombardy should be given to Piedmont and Venetia retained by Austria. Tuscany was annexed by Piedmont and the Grand Duke fled. In 1861 Cavour died, and Piedmont was deprived of her greatest statesman at a most critical time. But the new **kingdom of Italy** was really founded. In 1864 an agreement was arrived at between Italy and France, by which Fr. troops were to be taken away from Rome, and Italy not to move against it within six months. In 1865 the capital was removed to Florence. An alliance was made between Italy and Prussia against Austria in 1866, which was followed by war. Austria was defeated and Venetia annexed by Italy. The year 1870 was marked by the meeting of the Vatican Council in Rome, when the doctrine of Papal Infallibility was formulated. In July Italy went to war with the Papal States, and in September Rome was entered. On October 2, Rome was united to Italy by popular vote. A law was passed defining the position of the Vatican under the new régime (see above). The relations of Vatican and Quirinal have gradually become friendlier despite a certain amount of official friction. Meanwhile, the country was in a state of financial exhaustion, and all the energies of the State were required to get the kingdom in a happier condition. On Jan. 9, Victor Emmanuel died, to the great grief of his people, and was succeeded by his son, Humbert, and on the 28th, Pope Pius IX., who had sent his benediction to the dying king, likewise passed away. In 1882 Garibaldi, to whom the union of Italy owed so much, died. In 1887 Crispi came into power, but fell in 1891; when, after a short coalition government, Giolitti came in with a liberal programme, but in defence of monarchical principles. A scandal, however, occurred when it was discovered that several members of the government had had suspicious dealings with the Banca Romana. Crispi returned to power, but in 1896 came the terrible defeat of Adowa in Abyssinia, and a wave of popular fury drove the government from office.

In 1898 there were riots and social disturbances more or less all over Italy, particularly in Milan, followed by military trials and far too rigorous repression. At length there was an amnesty, but many were exempted from it. In 1900 King Humbert was murdered, and his son, Victor Emmanuel III., came to the throne. There were several strikes, partly caused by the more sympathetic attitude of the government to the Labour movement. In 1903 Leo XIII., who had done much to raise the prestige of the Papacy in the world, died, and Giuseppe Sarto, the Patriarch of Venice, was elected under the title of Pius X. In 1904 there was a general strike, and the feeling of the middle classes was roused against the proletariat. The taking over of the railways by the government in 1905 caused a general upset of the traffic. The XX. cent. has seen some new forces emerge in Ital. life. Large numbers of the Catholic laity take a moderately Conservative line, while, on the other hand, Socialism is a strong and rising force. The pressure of taxation, particularly local, is very great, hence, on economic lines, Ital. statesmen will have to go carefully.

Italy's foreign policy has largely been concerned with Africa. From 1884 the government had relations with Abyssinia; in 1895 war broke out and the Ital. army suffered the overwhelming disaster of Adowa in 1896.

Meanwhile, trouble had for some time been brewing in the Balkans, and in September 1911 war, for which Italy was really responsible, broke out between her and Turkey, as a result of a dispute over Tripoli. On Oct. 18, 1912, the *Peace of Lausanne* ended the war in favour of Italy, which secured Tripoli and Cyrenaica. In 1913 the Triple Alliance with Germany and Austria was renewed.

Symonds, *Age of the Despots* (1888); Burckhardt, *Civilisation of the Renaissance in Italy* (Eng. trans., 1890); Bolton King, *History of Ital. Unity* (1899); Stillmann, *The Union of Italy* (1898); Hodgkin, *Italy and Her Invaders* (1896–99); Corner, *History of Italy*; Hunt, *History of Italy*; Orsi, *Modern Italy* ('Story of the Nations' Series).

ITALIAN LANGUAGE.

Italian is one of the **Romance Languages** (*q.v.*), and is the one which most closely resembles their common source, Latin. Barbarian invasions of Italy were of a less permanent character than in France or Spain, and Roman culture had a firmer grip of the population. There is hardly a leading language to-day with so many dialects as Italian; this is due partly to the lack of political unity of the country until lately, partly to the fact that certain districts were more open to foreign influences than others. The differences, however, are seldom of a deep nature, and are more a matter of pronunciation. Caix gives the distribution of the leading dialects as follows: (1) Venetian, the most unorthodox of all, spoken in South Tyrol and on the Austrian Adriatic coast. It is coloured with German, Romansch, and Dalmatian. (2) Gallic Italian, influenced mainly by French. It in its turn comprises several local dialects, viz. Bolognese, Lombard, Piedmontese. (3) Pure Italian, spoken where Roman influence was strongest, in the old Papal States, in Tuscany, Umbria, Campania, Apulia, and Abruzzi. (4) Ibero Italian, including a group of dialects strongly influenced by Spanish or the now dead Sardinian, *e.g.* Corsican, Ligurian, Genoese, Calabrian, and Sicilian.

The political unity of Italy and the standardisation of elementary education are having their inevitable effect in levelling down these local differences, and the probability is that the next 50 years will see the disappearance of many of these dialects as languages spoken by any but the very poor, and the formation of a uniform Italian language-standard, probably holding the balance between pure and Gallic Italian.

See D'Ascoli's *Archivio Glottologico.*

ITALIAN LITERATURE.

The chief characteristic of early Ital. lit. is its contempt

for the vernacular and its leaning towards Lat., and not until XIII. cent. is there a serviceable vernacular.

Poetry.—In XI. cent. Troubadours invaded Italy, and in XIII. cent. the Sicilian-Provençal school, headed by Emperor Frederick II. of Hohenstaufen, produced lyrics imitating the, by that time, decadent Provençal lyrics. The Umbrian school of St. Francis of Assisi and Jacopone da Todi wrote religious lyrics; and the Tuscan poets, Cavalcanti, Pistoia, and Dante, wrote lyrics in almost pure Italian. The poetry of the Troubadours by its beauty and perfect versification encouraged men to make the vernacular a beautiful literary language, but the Provençal subject-matter gave to Italy a stilted, conceited, conventional style. What the vulgar lit. wanted was ideas. Dante saw the possibilities of Italian, and his *De Vulgari Eloquentia* is a vindication of the vernacular; he eschewed the empty rhetoric of Provençal lyrics, and wrote lyrics full of thought and passion. With his *Divine Comedy* he reached the highest Ital. poetry of all time. Petrarch, his contemporary, brought the sonnet to excellence. Both poets had imitators, mostly of inferior type.

In XV. cent. the cultured classes contemned the vernacular, but the Medici rulers of Florence, Cosimo, and Lorenzo de' Medici, encouraged a return to the vulgar tongue. The Romantic epic introduced by Pulci was elaborated by Boiardo and perfected by Ariosto (*q.v.*), and Lorenzo de' Medici, Pulci, and Sannazaro wrote pastoral poetry. All are Renaissance poets, but Ariosto is the greatest of all. In XVI. cent. Trissino adopted the classical manner in hist. epic, but his imitators returned to the Romantic epic with its pseudo-classicism. Berni headed a group of humorous satirical poets which included Grazzini. Italy, torn by invaders in XVI. cent., brought forth a decadent lit.—the lit. of the *Secentismo Period*. Tasso alone stands out as a great poet with his *Jerusalem Delivered*. Marini's epic *Adone* (1623) shows the bombastic, artificial style of the period. In 1690 the 'Academy of Arcadia' strove to combat 'Marinism' by seeking simplicity. About 1760 the Ital. Romantic movement began, with Manzoni as leader, and in Leopardi, the greatest Ital. lyric poet since Dante, found its highest expression.

The revolt against romanticism was led by Carducci (1836–1907) and his pupil Pascoli. D'Annunzio (b. 1864) is a writer of lyrics of great originality of form; he combines classicism and romanticism and adds XX. cent. realism.

Drama.—The first sign of drama is found in the *lauda*, a religious song with dialogue used by Todi. The first secular drama is Sannazaro's pastoral poem *Arcadia*. In XVI. cent. Ariosto and Machiavelli wrote comedies in the classical manner of Plautus and Terence. Tasso, in *Aminta*, brought pastoral drama to perfection, and he was rivalled by Guarini in *Pastor Fido*. Aretino (1492–1536) shows in his comedies the corruption of an age that produced Machiavelli, and in his tragedy *Orazia* the Renaissance sense of beauty. Trissino in his tragedy *Sofonisba* (1515) and Giraldi imitated Senecan drama. At the end of XVI. cent. the pastoral drama developed into opera (cf. Rinuccini's *Dafne*), and in XVII. cent. the melodrama of Metastasio is set to music. In early XVIII. cent. Fr. drama and that of Shakespeare was imitated by Martelli and Conti. Goldoni (1707–93) raised comedy above the level of the *commedia dell' arte* with its conventional clowns. The great tragedian, Alfieri (1749–1803), wrote twenty-two tragedies, the greatest of Ital. lit. The romanticist Manzoni in tragedy followed Shakespeare, and Giambattista Niccolini also wrote romantic drama. In XIX. cent. realism came into drama, cf. Rovetta and Giacosa, Testo, Martini, D'Annunzio.

Prose.—Ital. prose began about mid. XIII. cent. with Guittone d'Arezzo's epistles, and at the same time short stories, sermons, and chronicles were written in the vernacular. No prose of importance appeared before Boccaccio's *Decamerone*, a collection of tales. This great work inspired men like Guardini to write prose tales. After the Renaissance there is no great prose till Machiavelli wrote *Il Principe*, and Guicciardini his famous histories. Blandello and Grazzini in their tales show the blending of classicism and vernacularism. In XVI. and XVII. cent's, when 'Marinism' is obsessing poetry, prose becomes tainted, and writers of history like Rosa and Menzini continually criticise the evils.

Literary criticism flourished under men like Zeno and Mazzuchelli, and Manzoni wrote hist. novels which influenced Grossi and D'Azeglio. In XIX. cent. Verga is the first realist in prose fiction; Foggazaro is realistic and romantic, while D'Annunzio is acknowledged as a master of the novel.

Garnett, *Short History of Ital. Lit.* (1898); Symonds, *Ital. Lit.*

Constitution.—The Government of Italy is a constitutional monarchy, the legislation being shared by monarch with the two houses. The Chamber of Deputies contains 508 members, elected for five years; electors must be over 21, and those eligible for election over 30. The Senate contains 390 members, nominated for life by the king; it includes a prince of the Blood Royal, and the rest are chosen for eminence in politics or other walks of life.

The official relations with the Vatican are of considerable importance. When the temporal monarchy of the Papacy was abolished in 1870 the Vatican and Lateran Palaces, St. Peter's and the Papal Villa at Gandolfo, were left in the absolute possession of the Pope, and outside Ital. territory. The Pope is given sovereign honours, and the diplomatic corps of the Vatican enjoys the same privileges as that of the Quirinal. A certain sum is granted every year to the Pope. The only other state within a state in Italy is the Republic of San Marino.

Finance.—The financial condition of Italy can hardly be called satisfactory, as no country in Europe is oppressed with such a burden of taxation, many of the common necessaries of life being subject to taxation. There are duties on almost all imports, and monopolies on tobacco and salt.

Thus the revenue is in excess of the expenditure, but the adjustment and lightening of the burden of taxation is one of the great needs of Italy to-day. In 1910–11 the former was £94,635,641, the latter £93,231,540; the National Debt was £539,764,404. Of the total imports, £131,081,666, rather less than one-sixth (£19,052,000), and of the exports of £85,123,750, £8,416,000 were from and to the United Kingdom.

Defence.—Army.—The Ital. army is recruited by conscription, but many are dismissed as physically unfit; some, whose families are dependent on them, are exempted, while others again are chosen by lot to serve for a shorter time. The full training begins at 19 and lasts 19 years, and comprises 2 years with the colours, 6 in the permanent army, 4 with the mobile militia, and 7 with the territorial militia; for those exempted by lot 2 to 6 months of military instruction at a time over several years. Those exempt for family reasons undergo 30 days' training a year for 17 years. In war time they can be called on as a last reserve. For those of better education, who undergo an examination and pay a sum, 1 year with the colours suffices. Various reforms have been carried out since 1907, and it is estimated that the active army should reach 1,000,000 in 1915.

Navy.—The Ital. navy has very much increased in the last forty years, for while the expenditure on it was then under one million it now exceeds five. In 1912 Italy had 290 ships.

Oversea Possessions.—Politically the Italian Kingdom includes Sicily and Sardinia (Corsica belongs to France), the colony of Eritrea, with a population of about 300,000, and also part of Somaliland and the town of Tientsin in China. In Sept. 1911 Italy invaded Tripoli, and by *Peace of Lausanne*, Oct. 1912, secured Tripoli and Cyrenaica from Turkey.

Resources and Industries.—The State owns about

three-fourths of the 11,000 miles of railway, the post-office, and telephones.

Minerals are plentiful, sulphur ore working employs more labourers than any other mineral; lead and zinc are important; coal, iron, mercury, antimony, gold, silver, manganese, and copper are found. Carrara and Massa produce marble.

Chief crops of N. Italy are maize and rice; of S. Italy, olives, oranges, lemons, chestnuts, almonds; flax and hemp are grown, and tobacco is under State control. Cheese of Gorgonzola is famous. Manufactures are silk and cotton in N., woollens, furniture, glass (at Venice), porcelain, beetroot sugar, olive oil, paper.

Coral- and tunny-fishing employ over 26,000 fishermen.

The exports in order of value are raw silk, cotton, manufactured silk, olive oil, wines, cheese, dried fruits, hemp, hides, eggs, acid fruits, sulphur, flour, wheat pulp, etc.

EDUCATION.—Education is under State control, and the cost is borne partly by local authorities, partly by the State itself. The proportion of the population which remains illiterate is steadily decreasing. In 1871 it was 73 %, now it is only 51 %. Illiteracy is greatest in the S. provinces.

LIBRARIES.—Italy is very rich in libraries, particularly those containing rarities. The Vatican Library is one of the most valuable in the world, and is particularly strong in Biblical and other MSS. The archives of the Vatican were thrown open for research by Leo XIII.

RELIGION.—The religion of Italy is Rom. Catholic, less than 3 % of the total population of the country belonging to other religions; there are altogether about 65,000 Protestants. There are a few members of the Greek rite of the Roman Church, and some of the Greek Orthodox Church, and about 40,000 Jews.

POPULATION.—The population of Italy at the census of 1911 numbered 34,686,683. The chief cities are Naples, with 723,208; Milan, 599,266; Rome, 538,634; Turin, 427,733; Palermo, 341,456; Genoa, 272,077; Florence, 232,860; Catania, 211,699; Bologna, 172,639; Venice, 160,727. Of recent years there has been a considerable increase in emigration. In 1910, 402,779 persons emigrated beyond the seas (mostly to America, North and South), and 248,896 to neighbouring lands.

ITASCA LAKE, see MISSISSIPPI.

ITCH, see SCABIES.

ITHACA.—(1) (38° 25′ N., 20° 40′ E.) small island, Ionian Isles; celebrated as the traditional home of Ulysses; area, *c.* 43 sq. miles; surface mountainous; principal town, Vathy; produces currants, sponges, olive oil, wine. Pop. *c.* 13,000. (2) (42° 46′ N., 73° 34′ W.) town, on Cayuga Lake, New York, U.S.A.; seat of Cornell Univ. Pop. (1910) 14,802.

ITO, HIROBUMI, PRINCE (1841–1909), Jap. statesman; studied educational and military systems, as well as constitutional forms of government, in Europe and America; on returning to Japan took leading part in political revolution; drew up constitution, and negotiated alliance with Britain; assassinated in Korea.

ITRI (41° 16′ N., 13° 33′ E.), town, Italy. Pop. 5800.

ITURBIDE, AUGUSTINE DE (1783–1824), Mexican emperor for less than one year; originally adhered to Spain, later adopted national cause; emperor, 1822; forced to abdicate, 1823; outlawed; on returning, executed.

ITZEHOE (53° 55′ N., 9° 31′ E.), town, Schleswig-Holstein, Prussia; trading centre. Pop. (1910) 16,548.

IUKA (34° 50′ N., 88° 12′ W.), town, Mississippi, U.S.A.; site of indecisive battle in Civil War, 1862.

IVAN, or JOHN, name of several Russian rulers: IVAN I., Grand-Duke of Vladimir (succ., 1328); acquired Tver and other dominions; took title Grand-Duke of Moscow. IVAN III., THE GREAT (1440–1505), Grand-Duke of Muscovy, began to reign, 1462; abolished Tatar rule and brought provinces and principalities of Muscovy under central government; patron of art and learning. IVAN IV. (1530–84), *Ivan the Terrible*, was first to assume title of Tsar; he succ. in 1533, and did a great deal in developing art and commerce in the country, besides extending his dominions and introducing many reforms. He annexed Kazan and Astrakhan, and later Siberia, but failed in his attempts to acquire Livonia. In his later years the cruelty of his rule made his name a byword; at Novgorod in 1570 he is said to have put to death about 60,000 people for alleged treason in six weeks. In 1580 he killed his s. Ivan in a fit of rage, and passed the rest of his life in sorrow for the deed. IVAN V., Tsar of Russia (1666–96), was of weak mind, and the conduct of affairs devolved upon his bro. Peter. IVAN VI. (1740–64) succ. his great-aunt, the Empress Anne, in 1740; deposed, 1742; imprisoned twelve years, and then put to death.

IVANGOROD (51° 37′ N., 21° 59′ E.), fortified town, Russian Poland.

IVANOVO-VOZNESENSK (57° 2′ N., 41° 1′ E.), town, Vladimir, Russia; great cotton manufactures. Pop. 68,540.

IVIZA, IVIÇA, IBIZA (39° N., 1° 25′ E.), one of Balearic Isles, Mediterranean; area, *c.* 229 sq. miles; salt, lead, fruit, cereals. Pop. (1900) *c.* 23,500. Chief town, IVIZA (38° 54′ N., 1° 26′ E.), is episcopal see; fortified. Pop. 6500.

IVORY, material found especially in form of tusks in elephants, boars, etc.; developed from vascular pulp in concentric layers forming a compact mass, the pores of which are filled with a gelatinous substance. It is a variety of dentine.

I. has been used from earliest times as an article of commerce. The chief source is from male African elephants, while boars, hippopotami, and walruses (*qq.v.*) produce a smaller quantity.

Elephant i. is easily workable and takes a high polish; it is therefore in demand both for useful and ornamental articles, such as knife handles, piano keys, billiard balls, and carved work. London, Antwerp, and Hamburg are the chief markets.

Mammoth ivory has been found in Siberia and N. Europe, but only about half is sufficiently well preserved to be used.

Substitutes for i. include colluloid and corozo nuts ('vegetable ivory').

IVORY COAST, CÔTE D'IVOIRE (5° N., 5° E.), Fr. colony, N. coast of Gulf of Guinea, between Liberia and Gold Coast; part of Fr. West Africa. Area is *c.* 130,000 sq. miles. Surface rises from low coastal region to mountainous Kong territory in N.E.; much of interior densely forested. Among largest towns are Grand Bassam, Bingerville (capital), Abijean, Assinie. Maize, coffee, rubber, fruit, gold, mahogany are among products. Fr. trading ports were founded here in XVIII. and XIX. cent's; French acquired concessions on coast in 1843, and have actively occupied district since 1883. Pop. (1910) 1,132,812.

IVORY, SIR JAMES (1765–1842), Scot. mathematician; b. Dundee; contributed many papers to *Philosophical Transactions*, one of which contained his theorem relating to attraction of a homogeneous ellipsoid.

IVREA (45° 28′ N., 7° 52′ E.), town, Italy; seat of bishopric; X.-cent. cathedral. Pop. 12,000.

IVRY-SUR-SEINE (48° 49′ N., 2° 20′ E.), town, Seine, France; glass, steel, chemicals. Pop. (1911) 38,307.

IVY (*Hedera helix*), an evergreen, climbing, by means of an extensively developed system of adventitious rootlets, upon trees, walls, and similar places. The leaves are dimorphic; being five lobed on the climbing shoots and lanceolate on the free, flowering shoots. The flowers are inconspicuous, but appear in the autumn, and hence are eagerly visited by insects. The fruit is a berry. When regularly pruned i. forms

an excellent protection of walls against rain, and is commonly grown for this reason as well as for its ornamental qualities. I. was held sacred to Osiris by the Egyptians, and to Bacchus by the Greeks.

IXION (classical myth.), king of the Lapithæ, Thessaly; chained by Zeus to burning wheel for attempting to violate Hera.

IXÓDES, see under MITES.

IXTACCIHUATL, IZTACCIHUATL (*c.* 19° N., 98° 32′ W.), extinct volcano, Mexico.

IZBARTA, SPARTA (37° 44′ N., 30° 22′ E.), town, Asia Minor. Pop. *c.* 20,000.

IZHEVSK (56° 52′ N., 53° E.), town, Vyatka, Russia. Pop. 23,000.

IZMAIL, ISMAIL (45° 22′ N., 28° 50′ E.), town, Bessarabia, S.W. Russia; acquired by Russia, 1878. Pop. 44,290.

IZU-NO-SHICHI-TŌ (*c.* 34° N., 139° 30′ E.), seven islands of Izu, Japan, extending S. from Tokyo Bay.

J, a modified *I*; dates from XIV. cent.; consonantal sound when initial letter of word, often vocalic sound in middle or end.

JABALPUR, see JUBBULPORE.

JABLONSKI, DANIEL ERNST (1660–1741), Ger. Moravian pastor; tried with Leibnitz to unite all Prot. churches.

JABORANDI, name applied to species of the genus *Pilocarpus*, natives of tropical America and the W. Indies. The foliage of *P. pennatifolius* yields the *tinct. Jaborandi* of pharmacy. The genus is included in the *Rutaceæ*, to which the orange also belongs.

JACA (42° 32′ N., 0° 29′ W.), fortified town, Spain: seat of bishopric; Gothic cathedral. Pop. (1900) 5000.

JACINI, STEFANO (1827–91), Ital. author and politician.

JACINTH, see HYACINTH.

JACK, corrupt form of John, the commonest name in European countries, and hence used as a general name with a contemptuous signification, *e.g.* j.-of-all-trades, j.-ass, j.-an-apes; and of common implements, etc.—boot-j., j. (knave in cards), and j.-a-lantern.

JACK FRUIT, see BREAD FRUIT.

JACKAL, member of Dog Family (*q.v.*). Common j. (*Canis aureus*) of S. Asia and N. Africa, *c.* 3 ft. long, has bushy tail and is brownish; nocturnal, it hunts in packs; feeds on offal, and is general scavenger; howls hideously. S. African varieties are black-backed j. (*C. mesomelas*) and striped j. (*C. adustus*).

JACKDAW, see CROW FAMILY.

JACK-O'-LANTERN, see WILL-O'-THE-WISP.

JACKSON.—(1) (42° 16′ N., 84° 26′ W.) city, Michigan, U.S.A.; iron-founding. Pop. (1910) 31,433. (2) (32° 17′ N., 90° 9′ W.) capital, Mississippi, U.S.A.; large cotton trade. Pop. (1910) 21,262. (3) (35° 33′ N., 88° 42′ W.) city, Tennessee, U.S.A.; seat of Baptist Univ.; cotton trade. Pop. (1910) 15,779.

JACKSON, ANDREW (1767–1845), 7th pres. of U.S.A.; b. at Waxhaw, N. Carolina; helped to draw up constitution of Tennessee; entered Congress, 1796; Senator, 1797; justice of Supreme Court of Tennessee, 1798; in war with Britain, 1812, he commanded Tennessee militia and defeated Indians at Tohopeka, 1813; later obtained a command in U.S. army, occupied Pensacola, and defeated British at New Orleans in 1814; app. governor of Florida, 1821, holding office only for a few months. He was elected Democratic Pres. of U.S., 1828; re-elected in 1832. During his administration the national debt was paid up in 1835; and the U.S. bank was destroyed by J.'s exercising his right of veto when the question of renewing its charter came up, and his removal of government deposits to other banks.—Colgar, *Life and Times*.

JACKSON, FREDERICK GEORGE (1860–), has explored in Siberia, Franz Josef Land, Australia.

JACKSON, HELEN MARIA (1831–85), Amer. novelist, poet and commissioner to investigate state of Cal. Indians; m. first Lieut. Hunt, whence pseudonym 'H.H.'; author of *Ramona*.

JACKSON, THOMAS JONATHAN, 'STONEWALL JACKSON' (1824–63), Amer. soldier; served in Mexican War; taught military subjects at Lexington, 1851–61; commanded Virginian army in Civil War; defeated Federals at Cedar Mountain, Bull Run, Harper's Ferry (1862); commanded right wing at Fredericksburg (1862); accidentally shot dead by his own men at Chancellorsville. J. resembled Cromwell in religious fervour and military genius. *Life*, by Henderson (1902). Mary Johnston's novel, *The Long Roll*, gives an excellent picture of him.

JACKSON, WILLIAM (1730–1803), Eng. composer; organist, Exeter Cathedral; wrote operas, songs, and church music.

JACKSONVILLE.—(1) (30° 19′ N., 81° 51′ W.) city, Florida, U.S.A.; railway centre; trades in lumber, fruit, cotton. Pop. (1910) 57,699. (2) (39° 41′ N., 90° 6′ W.) city, Illinois, U.S.A.; has many educational and charitable institutions. Pop. (1910) 15,326.

JACOB, or ISRAEL, the patriarch of the Israelites; s. of Isaac; there are accounts of J. in *Genesis*.

JACOB, BIBLIOPHILE, see LACROIX, PAUL.

JACOB OF EDESSA (b. *c.* 645 A.D.), Syriac bp.; was bp. of Edessa; at the monastery of Teleda he revised the Peshitta version of the Old Testament by comparing it with Gk. texts—his great work.

JACOBA, JACQUELINE (1401–36), Countess of Holland; Bavarian claims disputed by uncle, John of Bavaria; defeated by Philip of Burgundy.

JACOBABAD (28° 15′ N., 68° 30′ E.), town, Bombay, India. Pop. 11,000.

JACOBI, FRIEDRICH HENRICH (1743–1819), Ger. philosopher; pres., Academy of Sciences, Munich.

JACOBINS, members of a Fr. political club formed at the outbreak of the Fr. Revolution, 1789; so called from Jacobin Convent in Paris, where they held meetings; club had branches all over France, and became the principal power in the country, being supreme during the 'Reign of Terror.' Its members included Mirabeau, Marat, and other Revolutionary leaders; later on, Robespierre became pres., and under his influence the policy of the club became more extreme; his fall in 1794 led to its dissolution the same year, and the meeting-place was closed.

JACOBITE CHURCH, name given to Syrian Monophysites who refused to accept the Chalcedonian definitions; many have seceded to Rome and are called Syrian Uniats.

JACOBITES, Brit. supporters of fallen royal house of Stewart; with the death of Cardinal York in 1807 the male line ended. The present representative is Marie, wife of Prince Louis of Bavaria; she is now considered lawful queen (Mary III. and IV.) by Brit. 'legitimists.'

JACOBS CAVERN (36° 36′ N., 94° 23′ W.), cave, Missouri, U.S.A., where human and animal remains and flint and bone implements were discovered by Mr. Jacobs, 1903.

JACOTOT, JEAN JOSEPH (1770–1840), Fr. educationist; prof. successively of Humanity, Math's, French; invented 'Universal method,' which recognised mental equality of all men.

JACQUERIE, see FRANCE (HISTORY).

JADE, greenish, hard stone, a native silicate of calcium and magnesium; generally found in veins in schists and gneisses. Owing to the veins having multitudinous fissures, large pieces are rare. Varieties are jadite and nephrite. J. is found in Persia, Turkey, Corsica, China, Siberia, and South Sea Islands, while in New Zealand it is known as 'greenstone,' in China as 'yu-stone,' where it is elaborately carved for ornamental purposes. J. ornaments have been found in lake dwellings in Switzerland.

JADE, JAHDE (*c.* 53° 27′ N., 8° 12′ E.), bay, Oldenburg, Germany.

JAEN.—(1) (37° 51′ N., 3° 30′ W.) S. province, Spain; area, 5203 sq. miles; drained by Guadalquivir; cereals, wine, oil, lead. Pop. (1910) 532,368. (2) (37° 47′ N., 3° 50′ W.) cathedral town, capital of above; seat of bishopric. Pop. (1910) 29,164.

JAFARABAD (20° 52′ N., 72° 20′ E), town and state, Bombay, India. Pop. 13,000; of town, 6500.

JAFFA, see JOPPA.

JAFFNA (9° 42′ N., 80° E.), town, on island J., Ceylon; tobacco, palmyras. Pop. *c.* 35,000.

JÄGERNDORF (50° 6′ N., 17° 44′ E.), town, Austria. Pop. (1910) 16,681.

JAGERSFONTEIN (29° 45′ S., 25° 27′ E.), town, Orange Free State, S. Africa; diamonds. Pop. (1911) 9018.

JAGUAR, see under CAT FAMILY.

JAHANABAD (28° 37′ N., 79° 44′ E.), town, Patna division, Bihar and Orissa, India. Pop. 8000.

JAHANGIRPUR, see JANGIPUR.

JAHN, FRIEDRICH LUDWIG (1778–1852), Ger. patriot; invented a system of raising the moral and physical standard of his country by means of gymnastics. He founded the first *Turnplatz* and originated the corps of Lützow.

JAHRUM (28° 3′ N., 53° 37′ E.), town, Persia; district produces dates. Pop. *c.* 15,000.

JAINA ARCHITECTURE, see ARCHITECTURE, INDIAN.

JAINS, an Ind. sect, numbering over a million, an offshoot from Hinduism. They began about 500 B.C. in direct opposition to Buddhism, which dates from the same time. They believe that many earlier prophets, Jinas (whence their name), taught their system. The Jains are animists, *i.e.* they believe that everything has a soul, and the most rigid asceticism is a sign of piety. They are divided into two schools, called *Digambaras* and *Svetambaras*. The Digambaras generally go naked. There is an extensive lit., much of it still unpub., dating from about 400 A.D., the earlier works being in Prākrit, and from 1000 A.D. in Sanskrit.

Bühler, *Sect of the Jainas*.

JAIPUR, JEYPORE.—(1) (27° N., 76° E.) native state, Rajputana, India; area, 15,579 sq. miles; hilly in N.W. and E.; level in interior; produces salt. Pop. (1911) 2,636,647. (2) (26° 56′ N., 75° 52′ E.) town, capital of above; royal palace; jewellery. Pop. (1911) 137,098.

JAISALMER, JEYSULMERE.—(1) (*c.* 27° N., 71° E.) native state, Rajputana, India; area, 15,579 sq. miles. Pop. (1911) 2,636,647. (2) (26° 55′ N., 70° 55′ E.) fortified town, capital of above. Pop. 8000.

JAJCE (44° 16′ N., 17° 10′ E.), ancient fortified town, Bosnia; scene of hostilities between Turks and Hungarians, XV.–XVI. cent's. Pop. *c.* 4500.

JAJPUR, JAJPORE (20° 53′ N., 86° 24′ E.), town, Bihar and Orissa, India. Pop. *c.* 13,000.

JAKOVA (43° 9′ N., 27° 9′ E.), town, Turkey-in-Europe. Pop. c. 12,000.

JALALABAD, JELLALABAD (34° 27′ N., 70° 28′ E.), fortified town, Afghanistan; held by Sir Robert Sale during five months' siege (1841–42). Pop. *c.* 3500.

JALALPUR (32° 38′ N., 74° 10′ E.), town, Punjab, India; shawls. Pop. *c.* 12,000.

JALANDHAR, see JULLUNDUR.

JALAP, drug consisting of the dried tuberous roots of a plant, *Ipomœa purga*, of natural order *Convolvulaceæ*, growing in Mexico; has a slight smoky odour, and a sweetish, nauseous taste, the chief constituent being the *jalap resin*; the extract, the powder, and the tincture are the pharmaceutical preparations; used medicinally as a purgative, especially in Bright's disease and dropsy, as it gets rid of much fluid.

JALAPA, XALAPA, HALAPA (19° 30′ N., 96° 54′ W.), cathedral town, Mexico. Pop. (1910) 24,816.

JALAUN.—(1) (*c.* 26° 4′ N., 79° 25′ E.) district, United Provinces, India; area, 1479 sq. miles. Pop. 410,000. (2) (26° 9′ N., 79° 22′ E.) town, capital of above. Pop. 9000.

JALISCO, XALISCO, GUADALAJARA (20° 30′ N., 104° W.), state, Mexico; crossed by Rio Grande de Santiago; volcanic district; cereals, rubber, cotton, gold. Pop. (1910) 1,202,802.

JALNA, JAULNA (19° 48′ N., 75° 54′ E.), town, India. Pop. 22,000.

JALPAIGURI, JULPIGOREE.—(1) (*c.* 26° 42′ N., 89° E.) district, Bengal, Brit. India. Pop. *c.* 793,000. (2) (26° 33′ N., 88° 46′ E.) town, capital of above. Pop. 10,000.

JAMAICA (*c.* 18° 10′ N., 77° 20′ W.), largest and most important of Brit. W. Indian islands; discovered by Columbus, 1494; annexed by Spain, 1509; in 1655 Eng. force commanded by Venables and Penn banished Spaniards and took possession of island, which subsequently became great centre of slave trade. In 1831–32 negro rising occurred, and in 1834 slavery was abolished; consequent lack of labour caused ruin of many sugar-plantations. Negro insurrections later were suppressed by Governor Eyre. In 1907 island suffered from severe earthquake. J. has area of 4207 sq. miles; surface is mountainous, being crossed by Blue Mts., rising to 7423 ft., from E. to W. J. is drained by Black River and other streams. Best harbour is Port Royal; largest towns, Kingston (capital), Spanish Town. Climate generally is pleasant and healthy. J. is administered by governor, aided by Privy and Legislative Councils. No established Church since 1870. Education is free, but not obligatory. Inhabitants include whites, negroes, Indians, Chinese, half-breeds. J. produces valuable timber, fruits, vegetables, sugar, coffee, ginger, pimento, cocoa, cinchona; cattle and horses raised. Railway mileage is *c.* 200. Pop. (1911) 831,383.

Ford and Cundall, *Handbook of J.* (annual).

JAMAICA (40° 45′ N., 73° 50′ W.), village, Queens, New York City, U.S.A.; formerly post-village, now absorbed.

JAMAICA PEPPER, see PIMENTO.

JAMES, name in New Testament of (1) J., son of Zebedee, bro. of Apostle St. John, and called with him. According to Acts 12², Herod Agrippa slew him with the sword. (2) J. 'the less,' s. of Alphæus, and one of the Apostles. (3) J., 'brother of the Lord,' traditionally author of Epistle of J., and first bp. of Jerusalem, certainly one of 'pillars' of Church.

JAMES, THE OLD PRETENDER (1688–1766), Prince of Wales, s. of James II.; led unsuccessful expedition from France to Scotland, 1708; in rising of 1715 he landed at Peterhead, after the surrender of his supporters at Preston; seeing his cause was hopeless, he returned to France; m. Clementina Sobieski; lived at Rome.

JAMES I., THE CONQUEROR (1207–76), king of Aragon; succ., 1213; conquered Balearic Isles, 1232; took Valencia, 1238, and subdued surrounding district; established suzerainty over Catalonia, 1258; warred against Moors.

JAMES I. (1394–1437), king of Scotland; s. of Robert III.; captured by English when on his way to France, 1406; succ. while captive in England, 1406; released, 1423; crowned, 1424; made Parliament efficient representative body; curbed power of nobles; warred against England, 1436; murdered at Perth, 1437, reputed author of *King's Quair*, and *Good Counsel*.

JAMES II. (1430–60), king of Scotland; s. of James I.; succ., 1437; killed Douglas, 1452; killed at siege of Roxburgh Castle, 1460.

JAMES III. (1451–88), king of Scotland; s. of James II.; succ., 1460; defeated by rebels at Sauchieburn; treacherously murdered during flight.

JAMES IV. (1473–1513), king of Scotland; s. of James III.; succ., 1488; m. Margaret, d. of Henry VII. of England; as ally of France he led an army against England, and was defeated and slain at Flodden.

JAMES V. (1512–42), king of Scotland; s. of James IV.; succ., 1513; reduced the Borders to order; m. Mary of Guise; was defeated by English at Solway Moss, 1542; d. at Falkland.

JAMES I. (1566–1625), king of Great Britain and Ireland; s. of Mary, Queen of Scots, and Darnley; proclaimed **James VI.** of Scotland, 1567; under regents till 1581; captured in raid of Ruthven (*q.v.*), 1582; m. Anne of Denmark; curbed power of nobles in Scotland. James succeeded Elizabeth on Eng. throne, 1603;

two years later occurred Gunpowder Plot (*q.v.*). J. had an obstinate belief in divine right of kings, and in duty of passive obedience on part of subjects; his reign was marked by constant struggle with Parliament, which in the following reign led to Great Rebellion. He had great learning, and was much influenced by favourites. See ENGLAND, SCOTLAND: *History.*

Henderson, *James I. and VI.*

JAMES II. (1633–1701), king of Great Britain and Ireland; second s. of Charles I.; distinguished himself in Fr. and Span. service, and in Dutch Wars; professed Rom. Catholicism, 1672; succeeded bro.; Charles II., 1685; put down insurrections of Monmouth and Argyll, 1685; persecuted Covenanters in Scotland; issued Declaration of Indulgence, 1687; escaped to France on landing of William of Orange; defeated at the Boyne, 1690; subsequently lived in France.

Fea, *James II. and his Wives.*

JAMES, EPISTLE OF, a short book of New Testament traditionally assigned to James, first bp. of Jerusalem, and brother of the Lord. Though the argument is not very connected, there is distinct style and language throughout, which seem to indicate one author, though some think there has been a redactor. If work of J., it was probably written about 50 A.D. Despite its Jewish colouring, it has little of what would be expected of a Christian writing of so early a date, and is more akin to the writings of the early II. cent., at which period many critics put it. It is probably based on teaching of Jesus, Jewish wisdom, and Gk. philosophy; not mentioned by name before Origen.

Mayor, *Epistle of St. James.*

JAMES, GEORGE PAYNE RAINSFORD (1799–1860), Brit. novelist; known chiefly by his hist. romances. Thackeray made a notable parody of his two horsemen in his 'Barbazure.'

JAMES, HENRY (1843–), Amer. novelist; novels usually depict Americans in Europe; excellent psychologist; literary critic too.

JAMES, JOHN ANGELL (1785–1859), Eng. Congregationalist theologian and popular preacher.

JAMES OF HEREFORD, HENRY JAMES, 1ST BARON (1828–1911), Eng. lawyer; solicitor-gen., 1873; attorney-gen., 1873, and again, 1880–85; carried Corrupt Practices Bill, 1883; disagreed with Gladstone's Home Rule policy, and, in 1886, became Liberal Unionist M.P. for Bury; Chancellor of Duchy of Lancaster in Unionist government, 1895–1902.

JAMES, WILLIAM (1842–1910), Amer. philosopher and psychologist; prof. at Harvard; known specially as exponent of 'Pragmatism'; author of *Varieties of Religious Experience,* etc.

JAMESON, ANNA BROWNELL (1794–1860), Brit. authoress and art critic; b. Dublin; wrote *Memoirs of Female Sovereigns* (1831), and well-known *Characteristics of Shakespeare's Women* (1832). Five volumes represent her work as an art-critic.

JAMESON, SIR LEANDER STARR (1853–), S. African statesman; b. Edinburgh; entered medical profession; went to South Africa, 1878; Rhodesian Administrator, 1891; led *Jameson Raid,* and imprisoned, 1896; Premier of Cape Colony, 1904–7; took active part in arranging Union of S. Africa, and led Opposition in first Union Parliament, 1910–12; cr. Bart., 1911.

JAMESTOWN.—(1) (42° 7′ N., 79° 17′ W.) city, New York, U.S.A. Pop. (1910) 31,297. (2) (46° 50′ N., 98° 38′ W.) town, N. Dakota, U.S.A. Pop. (1910) 4358. (3) (*c.* 37° 10′ N., 76° 35′ W.) site of former village, James City County, Virginia, where English established first permanent colony, 1607; afterwards declined; fortified during Civil War.

JAMI, see PERSIA (*Language and Lit.*).

JAMKHANDI (16° 30′ N., 75° 24′ E.), town and native state, Bombay, India. Pop. *c.* 14,000; of state, *c.* 107,000.

JAMMU, JUMMOO.—(1) (32° 40′ N., 75° 20′ E.) native state, upper Chenab valley, India. Pop. *c.* 3,000,000. (2) (32° 44′ N., 74° 53′ E.) town, capital of Jammu and Kashmir. Pop. (1901) *c.* 37,000.

JAMNIA (31° 52′ N., 34° 47′ E.), Gk. name for Gebna, Palestine; where Sanhedrin met in I. and II. cent's.

JAMRUD (33° 59′ N., 71° 18′ E.), frontier fort, Punjab, India.

JAMSETJEE JEEJEEBHOY, SIR, see JEEJEEBHOY.

JAMUNA, see JUMNA.

JAN MAYEN (*c.* 70° 58′ N., 7° 30′ E.), uninhabited volcanic island, Greenland Sea.

JANAUSCHEK, FANNY (1830–1904), Bohemian-Amer. tragic actress.

JANESVILLE (42° 40′ N., 89° W.), town, Wisconsin, U.S.A.; tobacco, textiles. Pop. (1910) 13,894.

JANET, PAUL (1823–99), Fr. philosopher; follower of Hegel and idealist.

JANGIPUR, JAHANGIRPUR (24° 25′ N., 88° 8′ E.), town, Bengal, India. Pop. 12,000.

JANIN, JULES GABRIEL (1804–74), Fr. critic and novelist.

JANINA, YANINA (39° 48′ N., 20° 54′ E.), town, capital of vilayet of same name, European Turkey, on Lake J.; seat of Gk. abp.; manufactures gold and silver embroidered goods; under Turkish rule since 1431; fl. in the time of Ali Pasha, 1788–1822; besieged by Greeks, 1912–13; captured, March 1913. Pop. 25,000.

JANISSARIES, body of Turk. infantry formed about 1330 as the sultan's bodyguard, originally composed chiefly of Christian captives, who were compelled to profess Muhammadanism. The numbers were kept up by recruiting from Christian families in Turkey. Their rules included obedience, religious conformity, and abstinence; but they soon became lawless and violent, rebelled and plotted against the sultans, and in 1807 even deposed Selim III. The corps was dissolved in 1826, after a revolt said to have been purposely provoked by Mahmoud II.

JANIUAY (11° N., 122° 20′ E.), town, Panay, Philippines. Pop. (1910) 20,738.

JANJIRA.—(1) (18° 8′ N., 73° 6′ E.) native state, Bombay, India. Pop. *c.* 89,000. (2) (18° 16′ N., 73° 4′ E.) town, capital of above.

JANSEN, CORNELIUS (1585–1638), Dutch Catholic theologian; opponent of Jesuits and founder of *Jansenism*; bp. of Ypres, 1636; also student of St. Augustine and opponent of Protestantism.

Jansenism was a religious movement in opposition to the logic of Scholasticism, the ethical rationalism of moralists, and to popular forms of devotion. Jansen wrote a work entitled *Augustinus,* and was particularly antagonistic to the Jesuits. His follower Arnauld published *Frequent Communions,* which roused violent opposition, and several of his propositions were condemned by the pope, 1653. Jansenists had to fight for their existence in France, where they were persecuted; they found a refuge in Holland, where they joined the Old Catholics.

JANSSEN, JOHANNES (1829–91), Catholic historian; wrote *History of the Ger. People from the Close of the Middle Ages.*

JANSSENS VAN NUYSSEN, ABRAHAM (d. 1832), Flemish painter.

JANSSENS, VICTOR HONORIUS (1664–1739), Flemish painter.

JANUARIUS, ST. (III. cent.), Neapolitan saint; traditionally martyred.

JANUARY, 1st month of year; named after Janus.

JANUS (Lat. *janua,* a gate), ancient Rom. deity; had double head and looked both ways. For 'Janus,' the *nom de guerre,* see HUBER, J. N.

JAORA (23° 40′ N., 75° 12′ E.), town and native state, Central India; opium. Pop. of town, 24,000; state, *c.* 87,000.

JAPAN (22° to 51° N., 130° to 156° E.), empire of Eastern Asia, consisting of irregular chain of islands extending from S. end of Kamchatka down towards N. end of Philippines and the peninsula of Korea (*q.v.*); bounded N.W. by Sea of Okhotsk, Sea of Japan, and Eastern Sea, and S.E. by Pacific Ocean. In the N. are

Kurile Islands; in the centre, S.W. of Saghalien, from which they are separated by La Perouse Strait, are the main islands of the empire—Yezo (or Hokkaido), Hondo (or Nippon), Shikoku, and Kiushiu—S. of which the Liu-Kiu or Loo-Choo Islands carry the line on to Formosa and the Pescadores, which were transferred from China to Japan in 1895; total area, 259,759 sq. miles. Largest of Kuriles are Paramushir in N., and Urup and Iterup in S. Yezo has area *c.* 30,000 sq. miles, Hondo *c.* 99,000 sq. miles, Shikoku *c.* 7000 sq. miles, Kiushiu *c.*14,000 sq. miles.

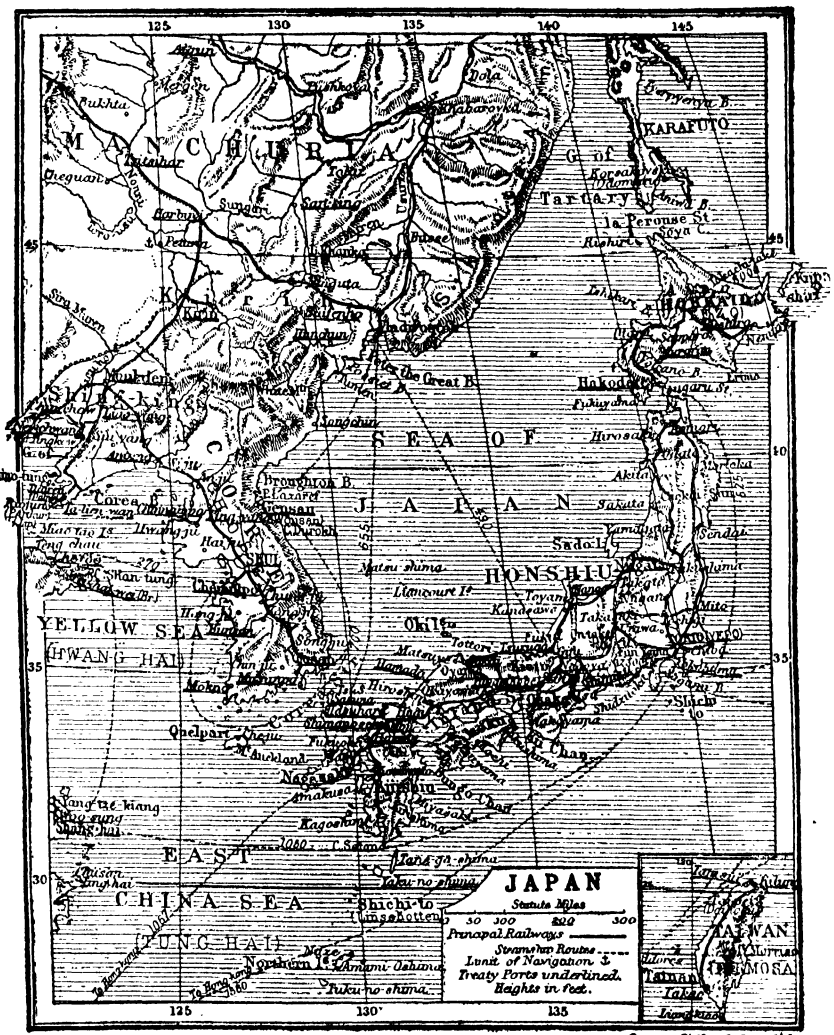
Surface generally is very mountainous, with large number of active or dormant volcanoes, and the country is subject to frequent earthquake shocks, except along the N.; several of the peaks are between 10,000 and 12,000 ft. above sea-level, among highest being the beautifully shaped cone of Fuji-san (12,400 ft.), in Hondo, 60 miles S.W. of Tokio; Ontake, Tatyama, and Yari-ga-take in the Hida-Echu mountains reach height of *c.* 10,000 ft.; Asamayama in Shinshu is an active volcano of 8200 ft., and Mt. Morrison in Formosa is highest peak in empire, reaching 14,300 ft.

The outline of all the islands is much broken; Yezo has coast-line of over 1400 miles, Hondo of over 4700 miles, Shikoku *c.* 1100 miles, Kiushiu over 2100 miles; total coast-line of empire *c.* 18,000 miles. Rivers are short and rapid, and in summer torrential, from the heavy rains and melting of snow; are useful for irrigation but not for navigation; most important are Kitakamgawa, Tonegawa, Shinanogawa, and Kisogawa, in Hondo, and the Ishikarigawa, in Yezo; largest lake is Biwa, in Omi province, Hondo.

Geology.—Jap. islands are most notable seismic line in the eastern hemisphere; the mountain cores are composed of ancient rocks; Tertiary and Quaternary deposits cover about half the area, including the coastal plain, and Triassic, Jurassic, and Cretaceous formations about one-twelfth; about one-eighth is covered with older igneous rocks, of which granite is most important, and more recent igneous rocks, such as andesite, basalt, and liparite, form about one-fifth.

Climate naturally varies greatly; taking main islands, the temperature ranges from about 5° Fahr. (winter) to 80° (summer) in the N., and from 42° to 98° in the S.; rainfall increases from 40 inches in the N. to over 80 in the S., and in some places may rise as high as 150. Hottest period is during July, Aug., and first half of Sept. Branch of N. Pacific Current known as the Kuroshiwa or Black Stream, which passes northward along whole S.E. coast, makes this much warmer than the N.W. Typhoons occur in summer and are most destructive in autumn. Snowfall very heavy in N.W.

Fauna shows that at an early geological period the islands must have been connected with the Amer. and Asian continents; wild animals include bears, foxes, wild boars, deer, and monkeys, while there are many rats and other rodents. Principal domestic animals are dogs, horses, cattle, and pigs. Birds include crows, larks, pheasants, owls, nightingales, cranes, cormorants, and storks. There are numerous varieties of fish—salmon, bream, and carp, and many snakes are found. Insects include some beautiful moths and many kinds of beetles, while fleas and mosquitoes are common pests.



Flora is remarkably varied; trees include oak, beech, pine, elm, cedar, wax tree, chestnut, maple, and sago-palms, and bamboos abound. Cherry tree is largely cultivated, and the paper-mulberry and lacquer tree are characteristic and of great economic value. Fruits include oranges, persimmons, and peaches, and there are many beautiful flowers, including Jap. lilies and azaleas. Cereals and tea are largely cultivated.

HISTORY.

There are no authentic records of Jap. history until beginning of V. cent. A.D., when under the Emperor

Richu an attempt was made to construct a history of the country from old traditions and legends. The islands are said to have been formed by the gods, from whom Jimmu, the legendary founder of the present dynasty in 660 B.C., is descended. One of most important legends refers to the conquest of Korea by the Empress Jingo *c.* 201 A.D., to which date the beginnings of Korean civilisation in J. are ascribed.

The introduction of Buddhism took place in mid. VI. cent.; soon afterwards the Emperor Susun was murdered, and under his successor, the Empress Suiko, the Buddhist religion was firmly established; friendly relations with China were fostered, and Chin. civilisation was soon acquired. Empress Suiko belonged to the Soga family, which thus attained supremacy in J., but lost power in reign of Empress Kokyoku (642–45); Kokyoku was succeeded by the Emperor Kotoku, whose accession was secured by the statesman Kamatari, founder of the powerful family of Fujiwara. The name Fujiwara was given to Kamatari in recognition of his gallant deeds, and the family he founded obtained the chief power in the State and retained it for five cent's, although they never assumed the imperial title, contenting themselves with that of regent, an office which became hereditary in the family; under their administration the power and civilisation of J. greatly increased.

During the VIII. cent. a code of laws was drawn up; the power of the emperor was gradually reduced and that of the Fujiwara increased; a law was passed which enacted that the regent must control every official action of the emperor; and the army and the church greatly increased in power. The country continued to enjoy great prosperity until the XII. cent., when a quarrel broke out between two clans called the Minamoti and the Taira, both of which were akin to the Fujiwara; this originated in a dispute as to succession to imperial throne at Kyoto, and resulted in civil war which lasted for five cent's. The Fujiwara had been accustomed to allow only those whom they could dominate to wear imperial crown; in 1159 there were two rival candidates for the empire, and these were supported by the Taira and Minamoto respectively. The former were successful, and secured the accession of the Emperor Nijo; Yoshitomo, the Minamoto leader, was executed, but his son Yoritomo was allowed to escape. In later years Yoritomo raised an army against the Taira, and with the aid of his bro. Yoshitsune succeeded in defeating them and in seizing the Shogunate and becoming virtual ruler of J. The Mikado remained as nominal ruler, to whom the Shogun paid homage, but all real power was in hands of the latter. Yoritomo made Kamakura his centre of government, and established a system of military organisation; he d. in 1198, after which his father-in-law, Hojo Tokimasa, became the real head of affairs and established his family as Shikken or directors of the Shoguns.

The Hojos became so powerful that the emperor at Kyoto sent a force against them in 1221; this, however, was routed, and the emperor sent into exile; and the Hojo remained in power for another 100 years, still retaining their title of Shikken, and securing the succession of children to the imperial throne and the Shogunate, both of which were at this time merely nominal dignities. During their administration occurred the great Mongol invasion of J.; the first invading force was defeated at Inazu in 1274, and compelled to return to China; Kublai Khan then dispatched embassies to J. for tribute, and as the only notice taken of this request was the execution of the ambassadors, he prepared a mighty fleet which appeared in Jap. waters, 1281; in spite, however, of the invaders' superior forces, they were unable to effect a landing; and after many desperate conflicts in which great deeds of valour were performed by the Japanese, the Chinese fleet was destroyed by a storm, the boats foundering by scores. A few survivors found a temporary refuge on Taka Island, where they were soon afterwards attacked and almost all killed by Japanese.

In first part of XIV. cent. the Mikado Go-Daigo, who was older than most of the Hojo-controlled emperors, ventured to oppose the Shikken, and was banished; his cause, however, was supported by the great generals Nitta Yoshisada, Ashikaga Takauji, and others, who gained great victories over the Hojo, drove them from power, and re-established Go-Daigo on the throne in 1334. He was not long allowed to hold any real power, however, the Shogunate being revived by Ashikaga Takauji in 1335; Go-Daigo, not consenting to this, was deposed. Another Mikado was appointed by Takauji, and for over 50 years there were two rival dynasties, one in the N. and one in the S. of J. These were eventually reunited under the Mikado Go-Komatsu during the administration of the Shogun Yoshimitsu, a member of the Ashikaga family, which held the Shogunate till 1573. That office during the XV. cent. lost a great deal of power, and during this time also the country was torn almost to pieces by civil war among the nobles and chiefs.

This condition of anarchy was ended by three great generals, Hideyoshi, Iyeyasu, and Nabunaga, the last-named being the most distinguished figure in the Jap. history of his time; he obtained control of Echizen and five other provinces, made Ashikaga Yoshiaka Shogun, and himself conducted affairs in Mikado's name; he was assassinated in 1582, after which Hideyoshi, who was one of his generals, continued his work of restoring order in the country, and obtained supreme authority under the emperor; he fortified Kyoto and Osaka, carried out various reforms, opposed the Jesuits, who had been introduced into J. by the Portuguese, and organised an invasion of Korea. After his death in 1598 his general and bro.-in-law, Tokugawa Iyeyasu, assumed the chief power; he also opposed the Jesuits, and won a great victory over the nobles who supported his nephew Hideyori, the young son of Hideyoshi, at Sekigahara in 1600; he was app. Shogun in 1603, reduced all J. to submission, and established a united empire; his defeat of the Jesuits at Osaka in 1615 was last important battle on Jap. ground. Iyeyasu established a feudal system of government which was brought to greater perfection by his grandson Iyemitsu; and the Tokugawa dynasty, which he founded, retained the Shogunate till 1868.

During this period the country enjoyed peace and great prosperity, and increased in wealth and civilisation. Foreigners were excluded until 1853, after which commercial treaties with America, Britain, and Russia were made, and a number of ports were declared open to foreign trade. The power of the Shogunate, meantime, had greatly declined; and the coming of foreigners hastened the break-up of the feudal system. The last Shogun resigned in 1867, after which civil war broke out between his followers and the imperial party, the latter ultimately triumphing in 1868. The Mikado then established his seat of government at Tokio; and for the first time since the Fujiwara regents arrogated supreme power to themselves and relegated the emperors to a position of only nominal authority, the titular sovereign was also the real ruler of the country. Feudalism was abolished and Buddhism superseded by Shintoism; army and navy were reorganised, railway and postal services inaugurated, and many reforms introduced. In 1872 Tokio was destroyed by fire, and a modern town was constructed upon the site, stone buildings superseding the former wooden houses; in the same year the slave trade was abolished in Japan.

In 1874 the desire of one section of the nation for war with Korea led to a rising which, however, was soon put down; and in the same year an expedition was directed against Formosa, where some Jap. sailors had been killed by savages; China, to whom Formosa belonged, protested, and eventually the matter was settled by China's paying an indemnity of 700,000 dollars to Japan to defray the cost of the expedition, which had established order in the hitherto uncivilised

Island. In 1877 there was an insurrection in Satsuma, which was suppressed; Saigo and many of the other leaders were killed either in action or by their own or their friends' hands.

The year 1878 was marked by great progress and by a great development of the postal service. Loo Choo was annexed in spite of the threatening attitude of China in 1879. In 1881 the Mikado pub. a decree promising to establish a constitution in 1890, and in the following year education was made obligatory. In 1889 the constitution was established, and religious freedom was granted; and new treaties were concluded with America, Russia, and other countries. Extra-territoriality for foreigners was abolished in 1899.

War with China broke out in 1894, and originated in the interests of both powers in Korea. An agreement was made whereby China promised not to dispatch armed troops to the peninsula without informing the Mikado; but as she ignored this promise and continued to send forces to the country in question, the Jap. Government informed her that war would be declared if this policy were persisted in. China taking no notice of this warning, war began in July 1894; first engagement, in which Chinese were utterly defeated, was fought at A-San, July 29; shortly afterwards an alliance between J. and Korea was concluded. Further victories were gained by Jap. arms at Chiu-lien-Cheng, Newchang, and elsewhere, and on Nov. 21 Port Arthur was taken by Oyama; the Chinese also suffered defeat at Hai-tcheng, Kai-phing, and Yung-tcheng, and in Jan. 1895 they were compelled to surrender Wei-hai-Wei. The result of the war, in which from first to last the Japanese were uniformly successful, and suffered a loss of only 1000 men out of 340,000, was now a foregone conclusion; peace was negotiated in April 1895, the terms being: J. to retain the places she had conquered, including Formosa, the Pescadores, part of Liao-tung peninsula, and Liao; Korea to remain independent; China to pay a heavy indemnity, and several ports in China to be opened to foreign trade. France, Russia, and Germany, however, objected to the incorporation of Liao-tung and Port Arthur in Jap. Empire; and J. accordingly relinquished her claim to the peninsula. While the war was still in progress, new treaties with Britain and America had been concluded, and in 1902 Britain and J. formed an offensive and defensive alliance, which is still in force (1913).

Russo-Japanese War.—Meantime the occupation of Manchuria by the Russians, who, disregarding a former agreement, failed to withdraw from that province in 1903, led to strained relations between Russia and J.; J., having designs on Korea, regarded Russ. proximity as national danger. War broke out, Feb. 1904. J. had great advantage in vicinity to disputed territory and took Russia by surprise. Russia communicated by Eastern Siberian Railway, not yet completed, and Lake Baikal, now frozen, had to be navigated; thus nothing could be done till after spring thaw. Russia had fleet and garrisons at Port Arthur, at Vladivostók, 900 miles from Port Arthur, and in two or three minor forts; these J. determined to attack before European reinforcements could come.

Admiral Togo sailed for Port Arthur without raising any suspicion of object, Feb. 8; engaged Russ. fleet in harbour, defeated it, and attempted blockade of port. Land army, under Kuroki, sent to force Korean Government to promise neutrality and seize Korean ports, successfully repulsed Russ. outposts and crossed Yalu. Admiral Makaroff arrived from Russia in March, but sank in battleship *Petropávlovsk*, blown up by Jap. mine; Russ. General Kuropatkin arrived, March 27, and decided to make Liaoyang his base, as routes from Korea and S. and W. Manchuria met here, and it would be probable Jap. line of attack; disadvantage of policy was that it meant abandoning minor positions. Kuropatkin superseded the viceroy, Admiral Alexéyeff, as commander-in-chief in the Far East, and had to face his opposition and lack of support; Alexéyeff's great idea was to save Port Arthur and keep sea free.

Kuropatkin retained chief force at Liaoyang, sent reinforcements to Lieut.-Gen. Stoessel at Port Arthur and to Lieut.-Gen. Linevich at Vladivostók, and dispatched 19,000 men under Lieut.-Gen. Zasulich to Korean frontier and S. coast of Manchuria, where Kuroki was established; Japanese made surprise attack, May 1, and by victory of the *Yalu* established Jap. pre-eminence in Korea. J., which had been training for years, now attained self-confidence, and the victory facilitated loans; Russians showed hardiness and heroism, but antiquated methods and lack of brilliance. Togo drew nearer in, and Jap. armies, under Oku, cut off Port Arthur by land, while General Kawamura disembarked with small force at Takushan, to serve as link between Port Arthur and Korea.

To protect Port Arthur, Russians had run strong fortifications across Kwantung peninsula, at Nanshan, which were carried by Oku, May 26; Russia sent reinforcements and ordered relief of Port Arthur; Marshal Oyama came as Jap. commander-in-chief in July; Nogi attacked Port Arthur by land, July; the Russ. fleet attempted to escape to Vladivostók and was annihilated by Togo, Aug.; Kuroki advanced, won many days' battle of *Liaoyang*, and drove Kuropatkin back behind Sha-ho, Aug.–Sept.; desperate attack on Port Arthur ended in Stoessel's capitulation, Jan. 1, 1905; combined Jap. armies won battle of *Mukden* in Feb. and drove Kuropatkin from Sha-ho; Kuropatkin resigned and was succ. by Linevich. Russ. Baltic fleet under Admiral Rozhdestvensky was annihilated by Togo in *Straits of Tsushima*, May 27–28. By the *Treaty of Portsmouth*, 1905, Russia agreed to evacuate Manchuria, to recognise J.'s pre-eminence in Korea, and to cede Liao-tung peninsula. These terms caused great displeasure among the people of J., who considered that too great concessions had been made by the Jap. ministers, and riots occurred in various towns. At Tokio these were so serious that about 800 rioters were arrested, and martial law was proclaimed; but before long order was restored.

In Sept. 1905 a new treaty with Britain was concluded, the terms of which were very popular; this treaty aimed at maintaining peace in the East and preserving the commercial interests of all Powers in China. In 1907 *ententes* concerning China were arranged with Russia and France. Recent events include severe earthquakes in Formosa and floods in J. in 1906, the signing of a commercial agreement with U.S.A. in 1908, and the agreement with China concerning boundary of Korea in 1909. Korea was annexed 1910. Yoshihito succ. his f. Mutsuhito as Mikado, July 1912.

LITERATURE.

The language is polysyllabic and is akin in structure to the Altaic group; the written language differs widely from the spoken, and there are two forms of speech and two modes of writing Japanese; it may be written in Chin. characters, which were introduced and adapted to the Jap. language in the VI. cent., or in the simpler signs of the native alphabet known as the Kana. The verb comes at the end of the sentence and the preposition after the noun it governs.

Jap. lit. is of considerably less interest to foreigners than Jap. art. The VIII. cent. A.D. is said by Mr. Aston to have been the golden age of poetry, while the prose literature of that period is of little importance; but Jap. poetry is of little interest even at its best, and most of it is included in two compilations dating from the IX. and X. cent's. The earliest prose works are the *Kojiki*, or Book of Ancient Traditions, and the *Nihongi*, or Chronicle; these were both written about the same time in the VIII. cent., and profess to narrate the early history of J., but are of no value as authentic records.

The Heian era (IX.–XII. cent's) is regarded as the great age of Jap. prose; during this time there was a great development of literary culture, and histories, essays,

romances, and other compositions were written in great numbers, some of them in Chinese and others in the vernacular. Romances of this period were generally written by women, in the vernacular; the best of these are *Makura-no-Zoshi*, by Sei Shonagon, and *Genji Monogatari*, by Murasaki no Shikibu. From end of XII. until beginning of XVII. cent. J. was under military control, and so constantly engaged in civil war that there was little opportunity for lit. to flourish; yet one or two hist. works were produced, of which most important were the *Heike* and the *Jinkoseitoki*; and during the time of the Ashikaga Shogunate the 'No,' or drama, originated.

The Tokugawa period was marked by a great literary renascence, when numbers of hist. and philosophical works and romances were written. Bakin is generally considered by the Japanese to be the greatest novelist of this epoch. The introduction of Western ideas in J. has had considerable effect upon lit., although so far no works of outstanding genius have appeared; among the modern writers of the greatest repute are Koyo and Rohan, both of whom owe much to European culture. The influence of lit. and the drama on the national character can hardly be overestimated, novelists and playwrights alike aim at leaving a deep impression, generally of a moral nature, on the minds of their public; they are timid of realism in fiction. There are many daily newspapers in Japan, including a number of 'Yellow' papers, which have a greater sale than the larger and more politically important journals.

Art.—The keynote of Jap. art is impressionism. The painter sets himself to express the massed grandeur of mountains, the rush of torrents, the flight of birds, the pliancy of trees and plants, the strength and grace of animals, etc. The fundamental difference in the outlook of the painters of East and West is that to the latter mankind is the centre of the universe; while to the former the universe itself is his subject. With us landscape art is the invention of recent times, but in the East it has afforded the artist one of his chief means of expression for a thousand years. Therefore the slightest sketch of a master, be it a figure or bird, or a few leaves, never fails to suggest its part in the visible universe.

In the beginning the art was borrowed from China, and dates from the introduction of Buddhism; but in Kanaoka (928–87) there arose a native artist who broke from the trammels of the Chin. school, and became, in fact, the founder of Jap. art. Since that time various influences have been at work. Thus in the XVII. cent. Matabei (1578–1650) started the Ukioye, or popular school, taking his subjects from the daily life of the people. The XX. cent. is a period of transition. Famous artists are dealt with under their names.

Morrison's *The Painters of Japan*, 2 vols.

The arch. of J. is also derived from that of China; before the introduction of Chin. civilisation in the VI. cent. all buildings were of the most primitive kind; but after the establishment of the Buddhist religion many fine temples were built, although private houses remained very simple in construction. Wood is generally used for the walls, and the heavy roofs are tiled; but interest attaches more to the decoration of the buildings than to the general architecture.

The town of Nikko is famed for its temples and shrines, which are visited annually by many thousand pilgrims; the principal temples are the old Buddhist temple (716), and those of Iyeyasu and Iyemitsu, which are ornamented with wonderful painted carvings and contain many beautiful bronze figures and some fine lacquer frescoes.

Sculpture in stone is not of great importance, but numerous statues cast in bronze or carved in wood show great artistic merit. The finest image of Buddha stands in a grove near the temple of Hachiman at Kamakura; it is in bronze, is nearly 50 ft. high, and was cast in 1251. A still larger and much older image of the god stands in the park at Nara, but is not generally considered so artistic a masterpiece.

The decorative arts have flourished in J. for many cent's; these include very beautiful china, cloisonné enamel, lacquer work, and wonderful embroideries. The manufacture of china dates from the XIII. cent., and shows the influence of both China and Korea; and although J. does not on the whole reach the standard of China in this particular, she has yet produced many varieties of great artistic excellence. The most celebrated is Satsuma ware, an enamelled crackled china of which very few genuine old specimens are to be found outside J. Other well-known varieties are Banko, Hizen, Kutani, and Owari. Towards the close of the XIX. cent. a great deal of very inferior china was manufactured for export to the Western world; but now some very fine work is being produced.

Cloisonné enamel as a Jap. manufacture dates only from the XIX. cent., but many specimens of unusual excellence have been produced. Lacquer-work (*q.v.*) has been an important industry since very early times, and during the XVII. cent. reached a perfection which has in no other country been attained. Embroidery has also reached a very high standard; and many of the most beautiful examples are so perfectly finished, and executed with such regard for perspective, as to resemble paintings. Jap. inlaid metal work is very highly thought of by connoisseurs.

Government is a constitutional monarchy, the present constitution having been drawn up by the Marquis Ito in 1889. The executive is in the hands of the Mikado, who is assisted by a Cabinet of 10 Ministers nominated by himself; legislative authority is also exercised by him, subject to the consent of the Imperial Diet. Cabinet consists of the Premier and Ministers for Foreign Affairs, Interior, Finance, War, Marine, Justice, Education, Agriculture and Commerce, Communications; and there is a Privy Council. Diet comprises a House of Peers, the members of which hold their seats by hereditary right, by appointment, or by election, and a House of Representatives, the 379 members of which are elected by popular vote.

Most of the country is subdivided into prefectures for local administrative purposes; but Chosen (Korea), Hokkaido, Karafuto (Sakhalin), and Taiwan (Formosa) are differently organised, Hokkaido being under a governor and the other three under military gov's-gen. The prefectures are again subdivided into counties and municipalities, and these counties into towns and villages; prefectures are administered by governors, assemblies, and councils, while counties and towns are respectively governed by sheriffs and mayors, in each case assisted by an assembly and council. The members of all these assemblies are elected by the people.

There is a modern system of justice; law-courts are of four kinds—courts of cassation, presided over by 7 judges; courts of appeal, by 5; district courts, with 3 judges; and subdistrict courts, with 1. Judges are nominated by the Mikado, and hold their appointments for life unless they are dismissed as a punishment. Laws are based on Western principles, and the Code Napoleon is the foundation of the criminal laws.

The finance department of the administration is of great importance; estimates of revenue and expenditure are given in the Budget of each year, which must be approved by the Imperial Diet, and without the consent of the Diet no new tax may be levied. Principal sources of revenue are the liquor tax, land tax, monopolies, customs duties, posts and telegraphs, and income tax; and the chief items of expenditure are those connected with the finance department, army, navy, communications, home affairs, and justice; revenue for year 1911–12 estimated at £56,890,391. The unit of account is the gold yen = 100 sen = 2s. 0½d.

Defence.—Before 1871 the army had for several cent's been a feudal organisation, consisting of the retainers of the Daimios, or feudal lords. In early

XVII. cent. a number of provinces were granted by Iyegasu to military nobles, who were vassals of the Shogun, but had absolute control over their own dominions; and the people were ranked in four classes, of which the Samurai, who rendered military service for the lands bestowed upon them by the nobles or overlords, were the first. The Samurai were noted for their unstained honour, their loyalty and courage; and they trained themselves in the stoical endurance of pain to so great a degree that they were able to commit suicide by the terrible method of hara-kiri (*q.v.*) without hesitation when honour demanded such a sacrifice.

The modern army system dates from *c.* 1871, when a conscriptive system was first introduced. The supreme command is held by the Mikado, who nominates the War Minister, Chief of General Staff, and Director of Military Instruction, as well as the Military Council. Service is obligatory, all men between 17 and 40 being liable to service in either army or navy. The Geneki, or active army, comprises 27 cavalry and 80 infantry regiments, 28 garrison artillery and 19 engineer battalions, 150 field and 9 hill batteries. The Kobi, or second line, consists of 228 battalions, 57 squadrons, 114 field batteries, 12 garrison artillery and 19 engineer battalions. There is also a territorial force known as the Kokumin. Army expenditure for 1911–12 was estimated at over £7,600,000. There are numerous military schools and training colleges.

The navy became a separate department of the administration in 1872. The coast is divided into five naval districts, of which the headquarters respectively are Yokohama, Kuré, Sasebo, Maizuru, and Chinkai. Fleet includes (1913) 3 Dreadnoughts, 16 pre-Dreadnoughts, 13 armoured cruisers, 17 protected cruisers, 6 torpedo gunboats, 61 destroyers, 50 torpedo boats, and 12 submarines. Naval expenditure for 1911–12 was estimated at over £4,070,000.

Inhabitants.—The Japanese are of Mongoloid stock, but they are not a pure race, and a striking difference exists between the upper and lower classes. The former are white or light yellow in colour, with oval face, obliquely set eyes, and small mouth; the latter are darker in complexion and stronger in build, and have coarser features and straight eyes. The early inhabitants were the ancestors of the Ainus, a hyperborean race of cave-dwellers, who migrated from N.E. Asia to the Jap. islands in early times, and were subsequently conquered by the race from whom the upper classes are descended. The Japanese attain their full height at an earlier age than the Caucasian races do; the average height of the men is an inch or two above 5 feet, that of the women about 4 ft. 8 in. They are of weak physique, and it is said that 40 % of the students die before completing their univ. course. The head is large and the lower limbs are short in comparison with the size of the body.

Native dress for men consists of a silk or cotton shirt, and a *kimono*, with a silk belt round the waist; in cold weather several kimonos may be worn at once; and over all are the *hakama*, or divided skirt, and the *hasri*, or cloak, both of which are generally removed in the house. The native women's dress consists of a short underskirt with a *kimono* above, and an *obi* or belt, 1½ ft. wide, which is wound round the body above the *kimono*; the hair is kept in place by means of large pins and a considerable amount of oil; it is taken down only about once a week, and to prevent its becoming untidy a wooden block curved to fit the neck is used instead of a pillow.

In character the Japanese are light-hearted and philosophical; they have great powers of endurance and are extremely economical. There is an elaborate code of politeness; it is considered good manners to apologise for all one's possessions, and as the wife is regarded as the property of the husband, the latter, on welcoming a stranger to his house, may beg him to 'excuse his disgraceful and abominable old woman.'

Large families are an exception, five being above rather than below the average number. Jap. houses are low, never above two storeys; they are bare of furniture, having neither chairs nor tables; the people sit on the floor and have their meals placed on trays beside them, the staple article of diet being rice, while green tea is the usual beverage. Like the ancient Egyptians, the Japanese are extremely punctilious in regard to personal cleanliness; there are boiling hot open-air baths where every one bathes in public. This custom may be responsible for the spread of the various skin diseases so prevalent. Other complaints are heart disease, which is common among the coolie class, and is ascribed to the introduction of *jinrikshaws* (light two-wheeled vehicles drawn by coolies); dyspepsia; leprosy, or elephantiasis, which is considered a terrible disgrace.

Sports and pastimes include wrestling, juggling, jumping, etc.; wrestling is said to be the oldest sport known in Japan (see Ju-Jitsu), and traditionally dates from 25 B.C. Kite-flying is indulged in by adults as well as children. The principal indoor amusement is dancing.

Education is obligatory for children between 6 and 14; elementary schools in 1909 numbered 26,386; technical schools, 5253; kindergartens, 406; and middle schools, 297. Subjects taught in primary schools are morals, Jap. language, arithmetic, history, geography, gymnastics, etc.; and in secondary schools, besides the foregoing subjects, Chinese, English, French, German, mathematics, physics, and political economy are included in the curriculum. There are over 100 high schools for girls; a girl's coll. at Tokio, called the Higher Normal School for Women, provides training for women teachers, and there is another coll., called the Women's Univ., also in Tokio. Tokio, Kyoto, Tohoku, and Kiushiu are seats of State-supported univ's; Tokio Univ. is the largest, and had, in 1910, 344 prof's and lecturers, and 5503 students. The Education Department of the administration was founded in 1871, and the present educational system established in 1873.

Religion.—J. has no State religion, and all creeds are tolerated; principal religions are Shintoism and Buddhism, each of which has twelve sects. Many Christian missions have been established, and the R.C. Church has had an episcopate here since 1891. Shintoism was the original religion of the country, whereas Buddhism was imported from China about mid. VI. cent. A.D. Shintoism is a form of nature-worship, and has elements of ancestor-worship as well; thus the chief goddess, Amaterasu (sun-goddess), is said to be the ancestress of the Mikados. There are numerous minor deities who are associated with mountains, streams, and other physical features. Religious festivals are a characteristic of Jap. life, many of them being observed as national holidays, and most of them relating to ancestor-worship; among the most important are the 'Genshi-Sai' on Jan. 3, the 'Komei Tenno-Sai' on Jan. 30, the 'Kigen-Setsu' on Feb. 11, the 'Kan-Name-Matsuri' on Oct. 7, and the 'Shin-Sho-Sai' on Nov. 23. There are numerous Shinto temples, most of which are simple buildings. Buddhist temples, which numbered 71,927 in 1908, are more elaborate structures, and in the same way the Buddhist ritual is more resplendent than that of Shinto. Confucianism is professed by many people of the upper classes.

Towns.—The largest are: Tokio, Osaka, Kyoto, Yokohama, Nagoya, Kobé, Nagasaki, Hiroshima, Kanazawa, and Kuré. The most important ports are Yokohama, Kobé, Osaka, Moji, and Nagasaki.

Railways.—Japan had 6042 miles of railway in 1909–10, and of this 5536 miles were controlled by State, which took them over, 1906; the gross income of the State railways in that year was over £8,200,000, and the expenditure over £4,200,000; and the gross income of private railway companies was over £400,000, and the expenditure over £200,000. The first railway in the country was that between Yokohama and

Shimbashi, which was opened by the Mikado in 1872. Later in the same year the line between Osaka and Kyoto was begun, and since then railway construction has increased every year; 40 years ago there were only 18 miles of railway in the country. The Diet has passed a plan for further construction and improvement, which will extend over several years and for which about £17,450,000 has been voted. J. is well provided with postal and telegraphic communications.

Industries.—The principal are those connected with agriculture, sericulture, forestry, and fisheries. Agriculture has been the most important industry of J since the earliest times, and about 60 % of the inhabitants are engaged in farming. The country has, however, a large amount of sterile ground among the hills, and the cultivation of the productive part is greatly hampered by the difficulties of communication, which render prohibitive the cost of transport for many agricultural products. Of the whole area (exclusive of Formosa) over 23,437 sq. miles are under cultivation, and of this nearly 60 % is under rice, after which come rye, barley, and wheat. Owing to the use of spade husbandry and the plentiful application of manure, the produce is much greater than might be expected, and the soil maintains, in consequence, a much larger population. The thoroughness of the cultivation renders it possible to raise two or three crops on the same field every year. Millet, beans and peas, buckwheat, colza, potatoes, cotton, hemp, tobacco, indigo, and tea are all grown, as well as mulberries for silkworms, which are placed in vacant spaces between other crops. Cotton crop has greatly decreased in recent years, and the import of raw cotton from other countries has correspondingly increased. Tobacco is a Government monopoly. Sericulture is of great importance, as silk is the principal item in Jap. foreign trade; the industry dates traditionally from the VI. cent. B.C.; in 1910 silk-manufactured goods to the value of over £2,927,500 were exported.

Cattle, horses, pigs, and goats are reared in considerable numbers. Over 18,000,000 acres are under forest—bamboos, bananas, sago, and other palms, lacquer trees, camphor trees, vegetable wax, paper trees, mulberry, etc., being mingled with cypress, oak, pine, beech, and almost all the ordinary trees of the temperate latitudes of Europe and America.

Minerals are important, but are not yet sufficiently developed; coal-production, especially from Kiushiu and Yezo, is increasing, and silver, copper (noted for its purity), antimony, gold, sulphur, iron, graphite, and china-clay are all worked, as well as petroleum (central Hondo and Yezo), but the iron output is hampered by the difficulty of getting the ore to coal. Labour is abundant and cheap, and manufactures prosper rapidly. Among those of importance are cotton, yarn and piece goods, silk piece goods, lacquer-ware, bronzes, mats and matting, carpets and rugs, porcelain, pottery, straw-plait, bamboo and cane work, matches, glass, flannel, umbrellas, fans, iron and steel goods. There are large shipbuilding yards at Nagasaki and important iron and steel works at Wakamatsu. Fishing gives employment to about 5 % of the population, and fish and marine raw and manufactured products have an annual value of about £11,700,000.

Shipping has greatly increased in the last 35 years, and there is a large mercantile marine, including 338 steamers of over 1000 tons and 1325 sailing vessels of over 100 tons. The tonnage of Jap. steam and sailing vessels entered in 1910 was 9,348,659, and cleared, 9,463,875; foreign ships entered in 1910 had tonnage of 10,825,128, cleared, 10,734,043. In 1910 the imports amounted to the value of over £46,400,000; exports, over £45,800,000. A considerable part of the trade is carried on by foreign merchants. Of the imports about 23 % are raw cotton, 13 sugar, 7½ iron and other metals; and others of importance are machinery, woollens, cottons, oil-cake, dyes, leather, fibres, chemicals, drugs. Of the exports about 40 % are silk and silk goods, 13½ cotton goods, 6½ coal; and others of importance are copper, tea, matches, rice, camphor, straw-plait, earthenware, cuttle-fish, fish-oil, etc. About 45 % of the imports come from the Brit. Empire, about 11 % from U.S.A., and about 14 % from China. Of the exports, about 18 % go to the Brit. Empire, about 31 % to U.S.A., and about 20 % to China. Principal exports to Brit. Empire are silk, copper, straw-plaits, rice; principal imports from Brit. Empire are raw cotton (from India), iron and steel, machinery, textiles. There are Brit. consuls at Kobé, Nagasaki, Shimonoseki, Tainan, Tamsui, and Yokohama. Pop. (1912) (Japan) 52,200,685; including possessions, 69,647,025.

J. Year Book; D'Aautremer, *The J. Empire and its Economic Conditions* (1910); Browne, *J., the Place and the People* (1905); Gubbins, *Progress of J.* (1911); Longford, *J. and the Japanese* (1912); Okakura-Kakuzo, *The Awakening of J.* (1905); Saito, *A History of J.* (1912); Wenckstern, *Bibliography of the Jap. Empire* (1895, 1907); Stead, *J. by the Japanese* (1904); Aston, *History of Jap. Literature* (1899); Hearn, *J.* (1904); Knox, *Imperial J.* (1905); Scherer, *Young J.* (1905).

JAPANNING, art of coating metal, wood, papier-maché, etc., with varnish, so as to resist heat.

JAPETH, according to *Genesis* 9^{27}, son of Noah; believed to be ancestor of peoples of W. Asia.

JARKENT (*c.* 44° N., 80° E.), town, Semiryechensk, W. Turkestan. Pop. 17,000.

JARNAC (45° 41′ N., 0° 10′ W.), town, France. Pop. 5000.

JARO (10° 51′ N., 122° 41′ E.), town, Panay, Philippines. Pop. 11,000.

JARRAH WOOD, hard timber of Australian eucalypt used for paving blocks, railway sleepers, etc.

JARROW (54° 59′ N., 1° 28′ W.), town, Durham, England; industrial centre; monastic remains, associated with Venerable Bede. Pop. (1911) 33,732.

JASHAR, BOOK OF, a lost book, the nature of which is uncertain; referred to in *Joshua* 10^{13} and *2 Samuel* 1^{18}; possibly a book of songs.

JASHPUR (*c.* 22° 50′ N., 84° E.), feudatory state, Central Provinces, India. Pop. *c.* 134,000.

JASMIN, JACQUES (1798–1864), Provençal poet of lowly birth; wrote in Provençal simple, popular songs, and was at last made *Maistre ès Jeux* by Academy of Toulouse; not connected with Félibrige movement, for which he prepared way.

JASMINE, or JESSAMINE (*Jasminum*), a genus included in the *Oleaceæ*, and comprising a number of erect or twining shrubs with opposite or alternate leaves; often cultivated for their fragrantly scented flowers, and for ornamental purposes (e.g. *J. grandiflorum*). From the blossoms is extracted an essential oil used in perfumery.

JASON, see ARGONAUTS, GOLDEN FLEECE.

JASSY, YASSY (47° 10′ N., 27° 37′ E.), town, Rumania; R.C. archiepiscopal see; seat of Gk. Orthodox metropolitan; univ.; fine churches; trades in cereals, wine, petroleum; Turko-Russ. Treaty arranged here, 1792. Pop. *c.* 80,000.

JASZBERENY (47° 29′ N., 19° 57′ E.), town, Jasz, Hungary; wine, cloth manufacture; agricultural centre. Pop. *c.* 26,000.

JÂTAKA, name of the many stories of incarnation of Buddha, and of a particular collection of j's known to have been made not later than the III. cent. B.C. This collection is an important source for the history of folklore and fable, 'Æsop' (*q.v.*) deriving much from it. See BUDDHISM.

JATH.—(1) (17° N., 75° 12′ E.) native state, Bombay, India. Pop. *c.* 70,000. (2) (17° 4′ N., 75° 11′ E.) town, capital of above. Pop. 6000.

JÁTIVA, SAN FELIPE DE JATIVA (39° 24′ N., 0° 53′ W.), town, Spain; wine, fruit. Pop. 13,000.

JAUER (51° 3′ N., 16° 11′ E.), town, Silesia, Prussia. Pop. (1910) 13,556.

JAUNDICE, term applied to a condition in which

the skin and other parts of the body are yellow in colour, accompanied by other symptoms, due to the circulation of bile in the blood, and to its absence from the intestines preventing the proper digestion of food. It may be due to obstruction of the bile duct by (1) foreign bodies, *e.g.* gall-stones or hydatids; (2) stricture of the duct; (3) catarrhal inflammation, with exudation of the duct or of the duodenum; (4) tumours within or at the opening of the duct; (5) pressure from tumours in the liver or other organ; or it may be due to other causes, such as (1) the toxins of certain fevers, or of pyæmia, poisoning by snake poison, phosphorus and certain other mineral poisons, chloroform; (2) nervous derangements, *e.g.* concussion or fright; (3) absorption of bile into the blood through habitual constipation; (4) undue secretion through congestion of the liver.

The symptoms include the following in addition to the tinting of the skin, conjunctivæ, and other parts; gastric disturbances are present; constipation, which frequently alternates with diarrhœa, in which the fæces are pasty and fatty, the fats in the food not having been digested by bile as occurs normally; the pulse is slow; there is itchiness of the skin; cerebral symptoms are often present, depression and irritation; bile acids and bile pigments are present in the urine. The treatment of jaundice implies, since jaundice is merely a symptom, the removal of the cause, and naturally the number of treatments is as great as the number of possible causes, catarrh of the duodenum or gall-stones being the most common causes in mild cases. Usually the treatment should be commenced by a dose of two or three grains of calomel followed by a saline purge (*e.g.* Epsom salts) to clear away the old bile.

JAUNPUR (25° 40′ N., 82° 30′ E.), district, United Provinces, India; area, *c.* 1552 sq. miles. Pop. *c.* 1,220,000. Chief town, JAUNPUR (25° 44′ N., 82° 43′ E.), has fine mosques, ruined fort; formerly capital of Muslim kingdom; manufactures perfumes. Pop. *c.* 43,000.

JAUNTING-CAR, one-horse vehicle in which passengers sit at right angles to horse; used in Ireland; drivers known as 'jarvies.'

JAURÈS, JEAN LÉON (1859–), Fr. politician and journalist; founded socialist organ, *L'Humanité*, 1904; became head of new party of 'unified socialists,' 1905.

JAVA (5° 52′ to 8° 50′ S., 105° 13′ to 114° 39′ E.), island belonging to Holland, East Indies; lies to S.E. of Sumatra, and is bounded N. by Java Sea and Borneo, E. by Bali Strait, S. by Indian Ocean, W. by Strait of Sunda. Area, *c.* 48,500 sq. miles, or, with Madura, 50,554 sq. miles. S. coast is inaccessible owing to the surf, and from it the surface rises steeply to line of volcanic mountains, which run from end to end of island. There are many active volcanoes, some of the peaks reaching heights of 10,000 to 12,000 ft.; among highest peaks are Smeru, Gedeh, Sumbing. Along the N. are fertile alluvial plains. Rivers, short and commercially unimportant, include Tji Manuk and Tji Tarun.

Long before its existence was known to Europe, J. had attained considerable degree of civilisation under Hindus, who founded here several independent states. Under them Buddhism and Sivaism became in turn the prevailing religion, traces of both being seen in the numerous Hindu temples which still exist. In XV. cent. the island gradually became Muhammadan; visited from about 1520 by Portuguese traders, who were overcome by Dutch in *c.* 1596. Dutch carried on long warfare with natives, and gradually obtained possession of most of the island, acquiring Preanger regions in 1705 and Bantam in 1808. During Napoleonic wars J., with rest of Dutch possessions, was incorporated in French empire. It was taken by Britain in 1811 and occupied by them until 1817, when it was restored to Holland. In 1825 rebellion against Dutch rule was led by Depa Negara, who was ultimately defeated and exiled in 1830. Since then various unsuccessful risings have taken place, but Dutch control is now practically complete, although the native states of Jukjakarta and Surakarta have still a nominal independence.

Java's chief source of wealth lies in rich vegetation. The mountains are covered with trees to heights of 10,000 ft. Forests occupy probably one-fifth of whole surface, and produce valuable teak, cocoanuts, palms, bamboos, spice trees. Cultivated products include rice, maize, sugar, coffee, indigo, tea, cinchona, tobacco, rubber. Minerals include petroleum, coal, salt, sulphur. Exports, chiefly to Netherlands, are sugar, coffee, tobacco, cinchona, quinine, tea, copra, indigo, kapok, hides, teak, tin. Imports include cottons, cutlery, hardware, ground-nut cake, bean cake. Trade is mainly carried on by Arabs and Chinese, the native inhabitants being engaged chiefly in agriculture. There are few industries, the most important being manufacture of coarse cloth, mats, and soap. Railway mileage is *c.* 1400.

Principal towns are Batavia (capital), Semarang, Surabaya, Surakarta. Climate, unhealthy in low-lying districts, is hot and damp, but heat is tempered by regular sea breezes. Average temperature in lower parts is 78° Fahr.; rainfall about 75 in. J., with Madura, is divided for administrative purposes into seventeen residencies, each of which is controlled by a Resident, who is assisted by various minor officials. Supreme executive authority is vested in Gov.-Gen. of Dutch India, who is app. by the Crown; legislative power also rests with him, assisted by a Council of five members. There is complete religious liberty; prevailing belief, Muhammadanism.

There is a distinct Javanese language, of which various dialects are in use. Old language called Kavi is that of early Javanese lit., of which there is a considerable amount. Modern Javanese lit. is unimportant. The natives are of three distinct races of Malayan stock—the Javanese themselves, the Sundanese in W., and Madurese in E. They are brown in colour, with prominent cheek-bones and thick lips. Foreign inhabitants include Chinese, Arabs, and Europeans. Pop. *c.* 30,100,000.

Cabaton, *Java, Sumatra, and the Other Lands of the Dutch East Indies* (1911); Scidmore, *Java* (1898).

JAVELIN, spear for casting by hand or with twisted thong; term less frequently used for stouter thrusting spear or pike. J.-throwing as a sport revived in modern Olympic Games.

JAWHAR (73° 20′ E., 19° 55′ N.), town and native state, Bombay, India. Pop. *c.* 50,000; of town, 4000.

JAWORÓW (49° 57′ N., 23° 3′ E.), town, Galicia, Austria. Pop. (1911) 10,208.

JAXARTES, SYR-DARYA (*q.v.*).

JAY, see under CROW FAMILY.

JAY, JOHN (1745–1829), Amer. lawyer and statesman; b. at New York; attended first and second Continental Congresses, and formulated addresses to Brit. and Canadian peoples; drew up constitution of New York State, 1777; chief justice of New York, 1777; entered Congress, 1778, and was chosen as pres.; went on diplomatic mission to Spain, 1780; helped to arrange peace with Great Britain, 1781–83; foreign sec., 1784; chief justice of U.S. Supreme Court, 1789; negotiated commercial treaty with Great Britain ('Jay's Treaty'), 1794; governor of New York, 1795; retired, 1801. Author of several political papers which appeared in the *Federalist*. His s., William J., was well known as an advocate of abolition of slavery.

W. Jay, *Life of John Jay* (1833).

JAZYGES, see IAZYGES.

JEAN CLOPINEL DE MEUN, MEUNG (d. *c.* 1305), Fr. poet; b. at Meun-sur-Loire; continued the *Roman de la rose* fifty years after Guillaume de Lorris had begun it (1230). The first part was only an allegory of love (the rose), the second, 18,000 verses long, a kind of encyclopædia; its mirth, satire, and

verbal excellence delighted France until well on into period of Renaissance.

JEANNE D'ARC, see JOAN OF ARC.

JEANNETTE (40° 19′ N., 79° 38′ W.), town, Pennsylvania, U.S.A. Pop. (1910) 8077.

JEBB, SIR RICHARD CLAVERHOUSE (1841–1905), Brit. classical scholar; b. Dundee; ed. Cambridge; prof. of Greek, Glasgow, 1875; Cambridge, 1889; knighted, 1900; famous for his translations of Sophocles, Theophrastus, and other Gk. writers; a great humanist and a brilliant translator.

JEBEIL, JEBAIL (34° 8′ N., 35° 43′ E.), walled town, Syria. Pop. *c.* 3000.

JEDBURGH (55° 29′ N., 2° 33′ W.), town, Roxburghshire, Scotland; ruins of beautiful Augustinian abbey founded by David I., XII. cent.; on site of old royal castle is disused county gaol; manufactures tweeds, woollens. Birthplace of Sir David Brewster. Pop. (1911) 3982.

JEDDA, see JIDDA.

JEEJEEBHOY, SIR JAMSETJEE, Bart. (1783–1859), Parsi merchant and philanthropist; b. Bombay; in business partnership with his father-in-law, Framjee Pestonjee, at early age; amassed immense fortune by 1820, and gave away *c.* £250,000 in philanthropy between 1822 and 1858. First native of India to be made a baronet of United Kingdom, 1857.

JEFFERIES, RICHARD (1848–87), Brit. naturalist and author; made his first success with *The Gamekeeper at Home*, and later wrote many books on open-air subjects.

JEFFERSON CITY (38° 34′ N., 92° 6′ W.), capital, Missouri, U.S.A.; has government armoury and penitentiary; manufactures boots and shoes, and has railway works. Pop. (1910) 11,850.

JEFFERSON, JOSEPH (1829–1905), Amer. comedian, celebrated for his representation of Rip van Winkle.

JEFFERSON, THOMAS (1743–1826), great Amer. statesman; third Pres. of U.S.; b. at Shadwell, Virginia; became lawyer; entered Virginia House of Burgesses, 1769; was chosen member of State Convention, 1774, and, being unable to be present, wrote his *Summary View of Rights of British Americans*, attacking policy of Mother Country; member of Continental Congresses of 1775 and 1776; drew up the Declaration of Independence. After this he again devoted his services to Virginia, where he introduced some great legal reforms, and carried bills establishing religious liberty and abolishing primogeniture; he was in favour of giving a large measure of independence to individual states, and drew up the constitution for Virginia; became gov. of the state, 1779, and conducted affairs during the British invasion; he was subsequently criticised for his ineffective resistance to the invaders, and withdrew from Virginian politics.

He entered Congress, 1783, and had large share in introducing decimal coinage; in 1784 he was associated with Adams and Franklin in arranging commercial treaties with various European nations; minister to France, 1785; on returning to America in 1789 he was appointed Sec. of State under Washington, and became great opponent of Alexander Hamilton (*q.v.*) and head of the Democratic party. He resigned office in 1794, and retired to private life for a time, but in 1796 he became Vice-Pres. under Adams. Elected Pres. in 1801, he arranged the purchase of Louisiana by the U.S. from France in 1803; he also carried out various reforms, and insisted on retrenchment in public expenses; waged war against Tripoli, and admitted Ohio to the Union; his second term of office began in 1804, and was marked by the trial of Aaron Burr and the abolition of the slave trade. J. withdrew from public life in 1809.

A man of high principles and brilliant intellect, J. was one of the most remarkable personalities of his time. He gave a great deal of his attention to education, and founded the Univ. of Virginia at Charlottesville.

Forman, *Life and Writings of Thomas Jefferson* (1900).

JEFFERSONVILLE (38° 19′ N., 85° 40′ W.), town, Indiana, U.S.A.; state reformatory; railway engineering works. Pop. (1910) 10,412.

JEFFREY, FRANCIS, LORD JEFFREY (1773–1850), Scot. judge and critic; ed. at Glasgow and Edinburgh Univ's; advocate, 1774; edited the *Edinburgh Review* (Whig) from its foundation, 1803–29; Dean of the Faculty of Advocates, 1829; M.P. for Malton, 1831–32, and then for Edinburgh, 1832; Lord-Advocate, 1830–34; judge of the Court of Sessions, 1834; four vol's of contributions to the *Edinburgh*, pub. 1844.

Life, by Cockburn.

JEFFREYS, GEORGE, 1ST BARON JEFFREYS (1648–89), Eng. Lord Chancellor; b. at Acton, Denbighshire; called to the Bar, 1668, and by his great skill in cross-examination rose in his profession, becoming Recorder of London, 1678. After Monmouth's rebellion he was sent on Western Circuit to try the rebels, and at the 'Bloody Assizes,' which he opened at Winchester in 1685, he condemned 320 persons to death. Soon afterwards he was made Lord Chancellor of England, but after the flight of James II. he was imprisoned in the Tower, where he died.

H. B. Irving, *Life of Judge Jeffreys* (1898).

JEHLAM, see JHELUM.

JEHOIAKIM (fl. *c.* 600 B.C.), s. of Josiah, king of Judah (*2 Kings* and *2 Chronicles*).

JEHOL, CH'ENG-TE-FU (40° 59′ N., 118° E.), town, Chi-Li, China. Pop. *c.* 10,000.

JEHORAM.—(1) succ. his bro. Ahaziah as king of Israel, *c.* 854 B.C.; wounded at Ramoth-Gilead, *c.* 842 B.C. (2) s. of Jehoshaphat, king of Judah, *c.* 850–843 B.C.; m. Athaliah, sister of Jehoram of Israel.

JEHOSHAPHAT, son of Asa, king of Judah, *c.* 874–850 B.C.; f. of Jehoram.

JEHOVAH, the proper name of the God of Israel. It is now agreed that it should more properly be called JAHWEH, the form *Jehovah* having arisen through the addition to the consonants of the vowels of *Adonai* (Hebrew, 'My Lord'), as Jahweh itself being too sacred was not pronounced. When the Jews read the Scriptures aloud, it was always read 'Adonai.' In the Eng. versions it is rendered 'The Lord,' though this somewhat obscures the fact that it was originally the name simply of a tribal deity. According to *Exodus* 3^{14} the name was revealed to Moses on Mount Hebron (according to E); *Exodus* 6^{3} (P) also gives an account of its revelation to Moses; in J it is used from the beginning (E and P have Elohim, 'God,' in *Genesis*); thus there were varying traditions of its origin. Its etymological significance is disputed, but it is probably from the verb *hayah* (to be), and means *the self-existent* or *unchangeable One*, the *One who is*.

Driver, *Genesis* (Appendix on Divine Names); Burney, *Old Testament Theology*.

JEHU, son of Jehoshaphat; king of Israel, *c.* 842–816 B.C.; supported by the prophet Elijah.

JEJUNUM, part of small intestine. See DIGESTION.

JELÁL-UD-DIN, see PERSIA (*Language and Lit.*).

JELETZ, ELETS (*q.v.*).

JELLACHICH JOSEF, COUNT (1801–59), Croatian general; took part in crushing Hungarian rebellion, 1848.

JELLALABAD, JALALABAD (*q.v.*).

JELLY-FISH, see MEDUSA.

JEMAPPES (50° 26′ N., 3° 53′ E.), town, Belgium; French defeated Austrians, 1792; coal centre. Pop. 11,600.

JENA (50° 54′ N., 11° 35′ E.), town, Saxe-Weimar, Germany. Univ. dates from 1558. Schiller's *Wallenstein* and Goethe's *Hermann and Dorothea* were written here; town also has associations with Luther, Fichte, Hegel, Humboldt, Haeckel. Here Napoleon defeated Prussians, 1806. Pop. (1910) 38,487.

JENATSCH, GEORG (1596–1639), Fr. Prot. pastor and soldier; fought against the Catholic Planta

family; became governor of Valtelline; murdered at Coire.

JENGHIZ KHAN (1162–1227), Mongol emperor, and one of greatest conquerors of world; b. near river Onon, Mongolia; originally named Temujin; succ. to Mongol throne in 1175; after consolidating the various Mongolian tribes, he twice overran China; conquered Chinese states Hia and Kin (1208–14). His envoys to Transoxiana having been killed, he started in 1219 on his great career of conquest; looted Bokhara and Merv, and conquered Herat and other towns; drove the Turks into South-Eastern Europe, while his armies successfully ravaged S. Russia and N. India; d. while overrunning China for the third time.

Sir Robert K. Douglas, *Life of Jenghiz Khan* (1877).

JENKIN, HENRY CHARLES FLEEMING (1833–85), prof. of Engineering at Univ. Coll., London, 1865, at Edinburgh Univ., 1868.

JENKS, JEREMIAH WHIPPLE (1856–), prof. at New York Univ., U.S.A., since 1912; author of economic works.

JENNÉ (13° 4′ N., 5° 39′ W.), walled and fortified town, Fr. W. Africa; trading centre; boat-building. Pop. c. 8000.

JENNER, EDWARD (1749–1823), Eng. physician, the discoverer of vaccination; was born at Berkeley, Gloucestershire, 1749, third s. of Rev. Stephen J., vicar of the parish, and rector of Rockhampton; ed. at Wotton-under-Edge and Cirencester; became apprenticed to Daniel Ludlow, a well-known surgeon at Sudbury, near Bristol, proceeding afterwards to London to live with (for two years) and study under John Hunter. He commenced the practice of med. in his native place in 1773, and had considerable success, also carrying out investigations in biology. He obtained the degree of M.D. from St. Andrews in 1792. In his native county there was a popular belief that persons who had suffered from cow-pox could not contract small-pox, and, after much investigation, J. became of the opinion that cow-pox, 'grease' in horses, and small-pox were all types of the same disease, modified under different conditions. He carried out careful researches on the subject for sixteen years, and at length, in May 1796, he inoculated a boy, James Phipps, with cow-pox, so that, when the boy was inoculated with small-pox in July, an attack of the latter disease did not ensue. This experiment was followed by others, and in 1798 J. published the result of his investigations. He met with much opposition from the public and from many members of the medical faculty, but received support from many eminent physicians and surgeons, and honours were showered upon him by foreign sovereigns and learned societies at home and abroad, the College of Physicians being, however, a notable exception. He received grants of £10,000 and later of £20,000 from Parliament, and steps were taken, by the formation of the Royal Jennerian Society, which became defunct in a few years, the national vaccine establishment, and by other means, for the propagation of the benefits of his discovery. After his death, statues of J. were erected in Gloucester Cathedral and in London.

Baron, *Life and Correspondence*.

JENNER, SIR WILLIAM, Bart. (1815–98), Eng. physician; prof. of Pathology (1849) and afterwards of Clinical Med. and Med. at Univ. Coll., London; pres. of Coll. of Physicians (1881–88); he was the first to distinguish typhus from typhoid fever.

JENNINGS, SARAH, see MARLBOROUGH.

JENOLAN CAVES (*c.* 149° 40′ E., 33° 20′ S.), stalactite caves, N.S.W., Australia.

JENSEN, ADOLF (1837–79), Ger. composer, famous for song-writing.

JEPHTHAH, Israelite judge; son of Gilead (*Judges* 11, 12).

JERASH, see GERASA.

JERBA (33° 45′ N., 10° 50′ E.), island, Gulf of Gabes, off Tunisian coast, Africa; area, 425 sq. miles; sponges, dates, olives, woollens. Pop. *c.* 40,000.

JERBOAS, small terrestrial and nocturnal rodents with exceedingly long hind legs and tail; found burrowing in the desert plains of Europe, Asia, and Africa; relatives, JUMPING MICE (*Zapus*), are Amer.

JEREMIAH, Old Testament prophet; received his call in the time of King Josiah, *c.* 626 B.C.; he played a prominent part in the religious and political history of Israel from 604, when the Assyrian power under Nebuchadnezzar conquered the Egyptians at Carchemish. J. saw that it was best that Israel should yield to Assyria, but his word was not heeded, with the result that the nation went into captivity, and J. after various sufferings was carried off to Egypt. The book of J. is the longest and one of the greatest of the prophetical books. It is probably largely the work of J. himself, but to some extent recast, and the arrangement is often unchronological.

Driver, *Book of the Prophet Jeremiah*; Peake, *Jeremiah*; *Jeremiah and Lamentations* (Century Bible).

JEREMY, EPISTLE OF, see APOCRYPHA.

JERÉZ DE LA FRONTERA, formerly XERES (36° 40′ N., 6° 8′ W.), town, Spain; centre of sherry trade. Pop. (1910) 62,628.

JERÉZ DE LOS CABALLEROS (38° 15′ N., 6° 48′ W.), town, Spain. Pop. 10,500.

JERICHO (31° 23′ N., 35° 46′ E.), town, Palestine; taken by Israelites under Joshua; in later times destroyed by Romans; rebuilt by Hadrian; finally ruined during Crusades.

JEROBOAM (son of Nebat), king of Israel; first of northern kingdom, *c.* 932–912 B.C., on rupture after death of Solomon, J. refusing to acknowledge Rehoboam; denounced later as one who 'made Israel to sin.'

JEROME BONAPARTE, see BONAPARTES.

JEROME, JEROME KLAPKA (1859–), Eng. humorist; author of *Idle Thoughts of an Idle Fellow* (1886), *Three Men in a Boat* (1889), and the play *The Passing of the 3rd Floor Back* (1907).

JEROME OF PRAGUE (d. 1416), Bohemian theologian; studied at Prague, Oxford, Paris, Cologne, and Heidelberg; an admirer of Wycliffe, and friend of Huss; got into trouble with the authorities of the Church; arrested, 1415; imprisoned and recanted; afterwards defended his former positions, and was burnt as a heretic.

JEROME, ST., HIERONYMUS (340–420), doctor of the Church; ed. Rome; spent his life in Gaul, the East, and at Rome as fellow-worker with Pope Damasus. J. was a scholar rather than a saint, and his great work was his translation of the Bible into Lat.—the Vulgate, in use in the West since his days. He began in 383 by revising the existing Old Lat. versions of the Gospels, of which there were several, then the rest of the New Testament, then the Old Testament, finished *c.* 404. He also wrote commentaries, letters, controversial works, etc. Cutts, *Jerome*.

JERROLD, DOUGLAS WILLIAM (1803–57), Brit. dramatist, wit, and man-of-letters; became a dramatic critic; and in 1829 produced his famous *Black-Eyed Susan* at the Surrey Theatre; contributed to *Punch*, in his characteristic light vein. His *Mrs. Caudle's Curtain Lectures* enjoyed a great vogue.

JERSEY (49° 13′ N., 2° 7′ W.), largest of Channel Islands, belonging to United Kingdom; area, 45 sq. miles; surface undulating, mostly cultivated; potatoes, apples; good fishing; famous strain of cattle; butter produced. Chief town, St. Helier. J. is administered by lieut.-gov. and bailiff nominated by Crown. Pop. (1911) 51,903. See CHANNEL ISLANDS.

JERSEY CITY (40° 44′ N., 74° 6′ W.), town, on Hudson, New Jersey, U.S.A.; practically a suburb of New York; important railway terminus; excellent harbour; meat-packing, manufactures of iron, steel, machinery, chemicals, tobacco, pottery; has fine system of parks. Pop. (1910) 267,779.

JERSEY, EARLS OF, title in Villiers family, created, 1697; the family has an hereditary interest in Child's Bank.

JERUSALEM (31° 47′ N., 35° 15′ E.), sacred city of

Palestine, standing on hills of Zion, Acra, Moriah, and Bezetha, and thus a natural fortress almost impregnable in ancient times. Its earliest inhabitants, the Jebusites, were defeated by Joshua and David; latter made it his capital, fortified it, and selected situation for Temple, built in Solomon's reign. After separation of Israel and Judah, J. was frequently engaged in war against kings of Israel, and suffered successive attacks by Egyptians, Philistines, Assyrians, and Babylonians; taken and sacked by Nebuchadnezzar, king of Babylon, in 188 B.C., when chief inhabitants were carried off to Babylon. First return of exiles under Zerubbabel occurred *c.* 536 B.C.; new Temple was completed by 515 B.C.; and under Ezra and Nehemiah the city was rebuilt in V. cent. B.C.

For many years it knew no peace; was captured in succession by Persians, Macedonians, Syrians, and Egyptians; sacked by Ptolemy Soter of Egypt; only regained independence for brief period under the Maccabees, *c.* 165 B.C.; came under sway of Rome, 37 B.C., and flourished under Herod; destroyed by Titus, 70 A.D., and again by Julius Severus, 132 A.D.; rebuilt under Hadrian, with name of Ælia Capitolina; sacked by Chosroes II. of Persia, 614; captured by Muhammadans, 637, from whom it was taken by Crusaders under Godfrey de Bouillon, in 1099; recaptured by Saladin, 1187, remaining subject to Egypt till 1517, since when it has belonged to Turks. J. is episcopal see of Anglican, Greek, and R.C. Churches; site of several monasteries; among notable buildings are Church of Holy Sepulchre, said to occupy site of our Lord's tomb, Mosque of Omar, and Russ. cathedral. Pop. *c.* 60,000.

JERUSALEM ARTICHOKE, see ARTICHOKE.

JERUSALEM HADDOCK, see OPAH.

JERUSALEM, SYNOD OF (1672), on behalf of the Eastern Church denounced Calvinism.

JERVIS, SIR JOHN, see ST. VINCENT, JOHN JERVIS, EARL OF.

JESI (43° 32′ N., 13° 13′ E.), town, Italy; seat of bishopric. Pop. 24,000.

JESSAMINE, see JASMINE.

JESSE, f. of David, king of Israel, and therefore in the New Testament genealogies an ancestor of Christ.

JESSEL, SIR GEORGE (1824–83), Eng. judge, of Jewish birth; ed. at Univ. Coll., London; called to Bar, 1847; M.P. for Dover, 1868; Solicitor-General, 1871; Master of Rolls, 1873; under Judicature Act (1881) pres. at first Court of Appeal; a good judge and brilliant lawyer.

JESSORE.—(1) (23° 10′ N., 89° 8′ E.) district, Bengal, India; area, 2925 sq. miles; produces sugar, timber, rice. Pop. *c.* 1,800,000. (2) (23° 8′ N., 89° 8′ E.) town, capital of above. Pop. 9000.

JESTER, prominent member of mediæval society; retainer in noble households, where they were expected to make jokes to order: best description of j. is Touchstone in *As You Like It.*

JESUITS, a famous religious community of the R.C. Church, founded (1540) by a Span. soldier, St. Ignatius of Loyola (*q.v.*). It came into existence, first as a band of missionaries destined for the conversion of the Turks, then, as the practical impossibility of this task became apparent, it broadened into a society, whose work it should be to become a weapon, adaptable for every purpose the Church might need. To secure this object the more effectively, every outward sign of an especial Order with an especial aim was omitted. Monastic life and monastic habit alike were given up. To the triple vow, taken in all religious communities of the R.C. Church (poverty, chastity, obedience), St. Ignatius added a fourth, that of going without question or delay wherever the pope might see fit to send them for the salvation of souls. This was taken for the first time on Aug. 15, 1534. Soon after, 1540, a definite rule was composed and presented to Paul III. By a Bull, dated Sept. 27, 1540, Paul III. solemnly confirmed the new 'Company of Jesus,' and in April 1541 St. Ignatius was elected the first General. His *Book of Constitutions* (first pub. 1558) shows the purposes of the society, his *Spiritual Exercises* its inward force and efficacy.

It is natural that the organisation of Loyola should be military and autocratic, with all the advantages and disadvantages of such a system. The obedience demanded (save in matters of sin) is absolute. The General has practically unlimited power, though he can be deposed by a General Congregation of the whole society. The various grades into which the Order is divided are—(*a*) *Professed*, who, after several years, have been admitted to final vows. From these only can the Superiors and Professors of Theology be chosen; (*b*) *Coadjutors*, whether priests or lay-brothers, who carry on the affairs of the society; (*c*) *Scholastics*, who in their study and preaching are preparing themselves for the priesthood and their future work; (*d*) *Novices*, who by purely manual and spiritual tasks are being trained and tested. The work of the society has been, through the influence of Claudio Aquaviva (*q.v.*)—General, 1581–1615—mainly educational and missionary; but preaching, natural science, and theology owe much to Jesuit enterprise. In the last-named department, the society has always leaned to the broadest interpretation of moral principles, and thus gave colour to the brilliant attack of Pascal's *Provincial Letters*, the effects of which have been felt till our own day.

Its force and military organisation made it feared and hated by political rulers, and it has been repeatedly suppressed in various countries of Europe. After a career of splendid success and triumphs, both missionary and intellectual, it became so unpopular that, 'for the peace of the Church,' Clement XIV., by a Bull of July 21, 1773, *Dominus et Redemptor Noster*, without approving or denying any of the charges made against the society, suppressed it in all the states of Christendom. But it was too useful and too powerful to suffer anything more than a temporary eclipse, and it was re-established by Pius VII., Aug. 7, 1814—*Solicitudo Omnium Ecclesiarum*. It now numbers about 15,000 members. It is still forbidden in certain countries of Europe (Germany, Switzerland, Portugal, etc.). In England its work is mainly educational, with its brilliant colleges of Stonyhurst, Beaumont, etc.

Crétineau, *Histoire de la Compagnie de Jésus* (1845); Parkman's *Jesuits in N. America in the 17th Cent.* (1886); Ethelred Taunton, *Jesuits.*

JESUS, son of Sirach. See ECCLESIASTICUS.

JESUS CHRIST ('Jesus' is a personal name; 'Christ,' 'The anointed one,' a title) was born between 8 and 4 B.C., and crucified at Jerusalem between 29 and 37 A.D. Despite all the ingenuity of scholars, the exact dates have never been arrived at with certainty. Our authorities for His life are the New Testament writings; Jewish tradition and extra-canonical sources contribute hardly anything of value. A few of the non-canonical sayings may be authentic, but that is all. The apocryphal gospels are entirely untrustworthy. The life of Christ cannot be studied apart from New Testament criticism. It seems undoubted that we have in *Mark* a fairly primitive account of the life of Christ based partially on St. Peter's reminiscences, and that there are other independent sources, one particularly of Sayings of Jesus embedded in the First and Third Gospels. The historical value of the Fourth Gospel has been more questioned, but it is probable there are independent traditions enshrined in it.

The chronology of the life of Christ is complicated by the Gospel narrative covering the same ground, but with varied arrangement. Mark is chronological, but the other material arranged and combined by Matthew and Luke is often uncertain in chronology. To combine the Johannine with the Synoptic is very difficult. The life of Christ can scarcely even be summarised here, but some facts stand out. His first thirty years, or thereabouts, were passed in obscurity; His public work immediately followed that of John the Baptist; Jesus' work was not only healing and teaching but had for its central point the proclamation of the imminence of the kingdom of God; His proclamation of Himself as

Messiah was not made public at first, though after Peter's confession at Cæsarea Philippi made known to the disciples; the turning-point in the life of Christ was His setting forth on the journey to Jerusalem, conscious of His own death as the result; it is impossible not to see the impression of gloom and coming disaster in the later sayings and parables, which form one of the strongest proofs of the essential historicity of the Gospel narrative; the difference of tone in the narrative of the earlier and latest parts of the ministry could not be due to accident or intention; it is undeniable that the Crucifixion meant to the Apostles the crushing of all their hopes, and that, whatever explanation of the Resurrection accounts we accept, it cannot be denied that within a short time of the death of Jesus those who had known Him on earth were convinced that they had seen Him alive.

For the teaching of Jesus on its practical side the Gospel evidence is clear and indisputable. Of its theological and personal side it is not so easy to speak with certainty. The phrase 'Kingdom of God' has been recently much discussed (see ESCHATOLOGY). Did it mean the slow growth of righteousness in the world or a violent catastrophe in which the old order would be swept away? Many scholars now assert that Jesus expected the immediate coming of the kingdom, and identified Himself with the Son of Man who in the later Judaism was expected to bring it in.

The place of Christ in Christian theology cannot be discussed here, but it must never be forgotten that Christ is the centre of His own religion, more even than other religious leaders have been in theirs.

Several attempts have been made to prove that Jesus never existed, and that the Gospels are pure myth—the humanising of a Divine hero. These vagaries of criticism have won no acceptance among competent scholars.

The bibliography is stupendous; a recent list enumerates 7000 works, and this cannot be complete. See CHURCH HISTORY, CHRISTIANITY, RELIGION, THEOLOGY. The best-known *Lives* of Christ are those of Keim, Edersheim, Renan, and Weiss, though none are entirely satisfactory; Sir J. Seeley's *Ecce Homo* is original; Farrar is devout, but deficient in critical ability; Sanday's *Life of Christ in Recent Research* and other writings, particularly *Christologies, Ancient and Modern*, are important; Schweitzer's *The Quest of the Historical Jesus* is a brilliant book.

JET, compact black variety of lignite (brown coal), easily carved and polished, and so especially suitable for making mourning ornaments and trimmings. Whitby (Yorks) was once the seat of a flourishing industry; but the use of jet has been supplanted by that of vulcanite.

JETHRO, Old Testament character; father of Zipporah, the wife of Moses.

JETSAM, see FLOTSMAN, JETSAM, AND LAGAN.

JETTY, term used in engineering to designate structures thrown out (Fr. *jeté*) from shore into river or sea for various purposes; wooden j's projected into harbours to facilitate loading and coaling, or to contract breadth of river in order to deepen channel; pile-work; largely used in Venice to narrow channel and prevent formation of sand-bar; used at narrow river-mouth where water tends to spread.

JEVER (53° 35′ N., 7° 54′ E.), town, Oldenburg, Germany. Pop. (1910) 5787.

JEVONS, WILLIAM STANLEY (1835–82), Eng. philosopher and economist; assayer to Mint in Sydney, 1854–59; then studied at London Univ.; prof. at Owens College, Manchester, 1866, and at Univ. College, London, 1876; his life was cut short by drowning; eminent both in logic and economics; specially emphasised doctrine of utility and mathematical aspects of economics; his works, *Pure Logic* (1864), *Theory of Political Economy* (1870), *Principles of Science* (1874), show independence of thought.

JEW FISHES, see BASSES.

JEW, THE WANDERING.—According to the legend a Jew mocked Jesus when bearing the cross by saying, 'Go faster,' and Jesus replied, 'I go, but thou shalt wait till I return.' The origin of this legend is a pamphlet printed at Leiden, which states that the bp. of Schleswig had met a Jew called Ahasuerus at Hamburg, who claimed to be eternal and condemned to await Christ's return. The pamphlet spread over Europe, and for centuries claimants appeared under different names. Around the legend has grown a mass of lit., the subject being specially popular during the Romantic revival. The real source of the legend is probably *Matthew* 16^{28}, 'There be some of them that stand here which shall in no wise taste of death till they see the Son of Man coming in his kingdom.'

JEWEL, JOHN (1522–71), Eng. theologian; bp. of Salisbury, 1559; pub. *Apologia ecclesiæ Anglicanæ* against Rom. Church, 1562; engaged in controversy with Thomas Harding; at first of Prot. sympathies, but became anti-Puritan.

JEWELLERY, articles of personal adornment, often of great value owing to their being manufactured from precious metals and set with precious stones. Term includes such articles as swords, the scabbards or handles of which are set with gems; and caskets and insignia of various knightly orders. J. is not to be confused with gems (*q.v.*), which are engraved stones. Probably the first articles of j. were carved beads; native gold was used from an early date, and from the many examples of ancient j. it is evident that the ancients had a complete command over the metal, hammering it into very thin plates or drawing it into very fine wires for plaiting or twisting. The metal was sometimes very beautifully chased and embossed. Rings found in their tombs show that the early Egyptians were skilful engravers, and could chase, solder, and enamel metals and also set precious stones. The ancient Greeks and Romans were highly artistic; the Etruscans were very fine metal-workers, and one of their lost arts is the giving of a granulated appearance to a golden surface. The Celts and Scandinavians were skilful engravers, and some results of their work is seen in the ancient brooches of Scotland and Ireland. Sometimes very fine examples of inlaying and filigree work (*q.v.*) are seen in these brooches.

The Hindoos have always been fond of rich j., and have produced much beautiful filigree work and enamelling. Ancient j. was produced entirely by craftsmen, but in modern times machinery is much used, especially in the manufacture of cheap j. The centre of this industry is Birmingham, but nearly all the better-class goods are made at Clerkenwell, London. Silver and pebble j. is made in Scotland, while in Ireland tiny ornaments are carved from bog oak. Jet (*q.v.* ornaments of all descriptions come from Whitby.

The j. trade is carried on in most of the large cities of the world, but especially at Paris, Vienna, and New York. Fine filigree work is done at Malta, and red coral j. comes from Naples.

Jewellery, by Clifford Smith, by Davenport.

JEWS, a Semitic race descended from Abraham, through his grandson Jacob, from whose sons the twelve tribes were traditionally descended. So called because the majority of those who returned to S. Palestine after the captivity in Babylon were of the tribe of Judah; also known as ISRAELITES, from the name given to Jacob, and as the HEBREWS, a name which may possibly be derived from the Habiru, who are found in Palestine in the XV. cent. B.C. Greater part of early history of race is covered by books of Old Testament, which, however, must not be regarded as unimpeachable authority. Abraham is said to have settled in Canaan about 2000 B.C., having migrated thither from his native place, 'Ur of the Chaldees,' on the W. bank of Euphrates; and after Jacob's return from Gilead he and his family settled at Shechem and afterwards at Beersheba.

They were subsequently driven by famine to migrate to Egypt, on the invitation of Joseph, Jacob's son, who had become Viceroy there. The children of Israel re-

mained in Egypt for 215, or, according to some chronologists, 400 years; at first well treated, they were afterwards subjected to oppression and reduced to slavery, from which they were finally delivered by Moses, after the tenth plague had frightened Pharaoh into allowing them to go. After crossing the Red Sea they are said to have wandered in the wilderness forty years, during which time they received from God a code of social, political, and religious laws, and at the end of which they successfully invaded the Promised Land, their ancestral home under the leadership of Joshua, c. 1270 B.C. The country to the W. of Jordan was apportioned to Asher, Benjamin, Dan, Ephraim, Issachar, Judah, Naphtali, Simeon, Zebulon, and the half-tribe of Manasseh; while that to the E. of the river was given to Gad, Reuben, and the other half-tribe of Manasseh. The Levites were given a number of towns in different parts of Canaan, and received also a tenth of the produce of the earth. The period succeeding the death of Joshua is marked by disputes among the tribes, anarchy, and infidelity, and by the attempts of surrounding nations to dispossess the Israelites of their country.

From time to time Judges, or Deliverers, arose, who shook off the foreign yoke: thus Ehud delivered the nation from Eglon, king of Moab; Gideon from Midianites; Jephthah from Ammonites; Samson from Philistines; while the seer Samuel prepared the people for the establishment of a monarchy.

Kings of Israel.—The first king was Saul, who conquered many surrounding peoples, but was defeated by the Philistines at Mt. Gilboa, when he killed himself. His successor, David, the greatest figure in the history of Israel, and the founder of a long line of kings, carried out a series of successful wars, and gave to the nation the full possession of the country from Euphrates to river of Egypt, as promised to Abraham in *Genesis* 15[18]. David was succeeded by his son Solomon, who was celebrated for his wisdom and vast wealth, and built the Temple, but, subsequently, lapsed into idolatry; after his death the kingdom was rent in two; ten tribes revolted under Jeroboam, and formed the *kingdom of Israel*, while the other two, Judah and Benjamin, formed the *kingdom of Judah* under Rehoboam, Solomon's son. Among the nineteen kings of Israel, most of whom 'did evil in the sight of the Lord,' perhaps the most notorious were Jeroboam, s. of Nebat, 'which made Israel to sin' by establishing worship of the Golden Calf, and Ahab, whose name is a synonym for cruelty. The last king of Israel, Hoshea, was conquered and imprisoned by Shalmanezer, king of Assyria, who also carried off the people into captivity, whence they never returned, their ultimate destiny being veiled in obscurity.

The history of **Judah** presents a less uniform spectacle of depravity than that of the northern kingdom; among the kings of David's line, although many were addicted to idolatry, there were several, such as Hezekiah and Josiah, who were enthusiastic in the cult of the national religion, and who also carried out numerous reforms. At its best, however, the prosperity of Judah was intermittent; and after a long struggle against Assyria, Egypt, and the Chaldeans, which endured for over 130 years, the southern kingdom was overtaken by the same fate as the northern; Jerusalem was taken by Nebuchadnezzar in 588 B.C., and the nation was carried off to *Captivity* in Babylon. Unlike the kingdom of Israel, however, Judah remained a separate people, retaining its own institutions in exile, and never becoming merged with the conquerors. Some account of the *Exile* is given in books of Daniel, Ezekiel, and other prophets; the exiles apparently settled down in comfort, if not content, and were treated with consideration.

Persian and Greek Domination.—In 539 B.C. they came under the rule of Persia, and three years later a number of them were allowed by Cyrus the Great to return; Jerusalem and the Temple were rebuilt under direction of Ezra and Nehemiah, who also established a system of government in Palestine. Supreme administrative control was at first held by Zerubbabel, from whom it afterwards passed to others, and a Council of Elders was founded which inaugurated an epoch of great literary activity. Study of law was carried on by a special class of scholars, who exercised supreme control in spiritual matters, and are represented in later times by the *Sanhedrin* or great council of the Jews.

The period of Gk. domination begins with the break-up of the Persian Empire before the victorious forces of Alexander the Great, to whom Jerusalem surrendered in 332 B.C. The Jews received many privileges from the conqueror, who invited many of them to settle in his new city of Alexandria. After his death in 323 B.C. the country came to hands of one of his generals, Laomedon, from whom it was subsequently taken by Ptolemy Soter; between 314 and 301 it was in possession of Antigonus of Syria, but reverted to the Ptolemies at the latter date. Under the Ptolemies the Jews enjoyed considerable prosperity, and were allowed to build synagogues in all their settlements. During several decades the possession of Palestine was contested by the Seleucids, and eventually the country was captured by Antiochus the Great in 198 B.C. He also granted the Jews various privileges, as well as religious liberty; but his successors, Seleucus Philopator and Antiochus Epiphanes subjected them to merciless persecution; the former pillaged the Temple, the latter slew and enslaved many of the people and dedicated the Temple to Jupiter Olympias.

His determination to eradicate Judaism and to hellenise the people resulted in a **national rebellion**, the standard of liberty being raised by Mattathias, a priest, and head of the Asmonæan family. Mattathias died in 166 B.C.; and his son, Judas Maccabæus, after a series of magnificent victories, succeeded in expelling the Syrians and establishing the *Maccabæan* or *Asmonæan dynasty*, under which the Jews attained a splendour resembling that of the time of David. On Judas's death his bro's Jonathan and Simon reigned in turn with wisdom and success; Simon was succeeded in 135 by his son, John Hyrcanus, who conquered Edom and Samaria, and supported the Sadducees, who, like the Pharisees, became an important sect during his reign. His son and successor, Aristobulus I., was first to assume kingly title. About this time the power of the Asmonæans began to decline; civil wars disturbed the reign of Alexander Jannæus (103–79 B.C.), and after the death of his wife Alexandra, who reigned 79–69, quarrels arose between their sons Hyrcanus and Aristobulus.

Roman Government.—This led to the intervention of the Romans, who in 63 took Jerusalem and established their supremacy in Judæa. Hyrcanus II. was nominated high priest by Pompeius, but he weakly allowed Antipater the Idumæan to take the control of affairs into his own hands; the result of this was that Antipater was in 47 appointed procurator of Judæa by Julius Cæsar, and his son Herod the Great became governor of Galilee. Herod was made king of Judæa in 40 B.C., and three years later he seized Jerusalem and deposed Antigonus, last prince of Asmonæan family. After Herod's death in 4 B.C. his kingdom was subdivided into a set of principalities; his son Archelaus received Idumæa, Judæa, and Samaria; Herod Antipas became tetrarch of Galilee and Peræa, and Herod Philip tetrarch of districts beyond Jordan. Soon afterwards Judæa and Samaria became provinces of Rome and were ruled by Rom. procurators; Pontius Pilate, during whose administration occurred the crucifixion of Jesus Christ, was procurator from 26–36 A.D.

After Pilate's death the old kingdom of Palestine was temporarily restored under Herod Agrippa, who was allowed by Claudius to reign over whole country; his reign was marked by persecution of Christians, but lasted only for three years. When he died, the country was again placed under administration of Rom. governors.

many of whom treated the Jews with great severity, with the result that insurrections were of frequent occurrence. Among the most merciless governors were Alexander, an apostate Jew, Felix, Albinus, and Gessius Florus. Under the last-named an open revolt broke out against Rome in Cæsarea, 66 A.D., and spread in all directions. The suppression of this rebellion was entrusted by Nero to Vespasian, who, on succeeding to the imperial throne, left the conduct of affairs in Judæa to his son Titus. Titus brought to a successful issue the siege of Jerusalem, planned by his father; and the utter destruction of the city in 70 A.D. finally deprived the Jews of their national habitat, their history henceforward being that of a people scattered all over the world. Great numbers fled to Egypt, Italy, Spain, Cyprus, and elsewhere. Those remaining in Palestine made one or two further attempts at insurrection, the last of which was led by Bar-Cochba and was put down by the Romans after a three years' war, 133-35 A.D.; during this war great numbers of Jews were slain, and those remaining were forbidden to enter the new city of Ælia Capitolina, built by Hadrian on site of Jerusalem.

The national religion, however, survived all catastrophes, and the Jews everywhere retained their own religious customs and traditions. Everywhere persecuted, they were yet everywhere successful; and it has been suggested that their material prosperity was the cause of the ill-treatment to which they were from time to time subjected by the nations among whom they lived. Little more than half a century after the suppression of Bar-Cochba's rebellion there were two regularly organised Jewish communities; of these one was under the Prince of the Captivity, to whom all Eastern Jews acknowledged allegiance; and the other was under the patriarch of Tiberias, and included all the Jewish inhabitants of the Rom. Empire. Compilations of oral laws were begun by scholars, and when complete were called the *Talmud*; the Palestinian Talmud was finished in IV. cent., the Babylonian Talmud in 500 A.D.

Emigration and Persecution.—Already in Rom. times great numbers of Jews settled in Europe; they were generally subjected to severe persecution by the Christians, partly on account of their practice of usury, but continued to prosper, and by their genius for finance and commerce made themselves masters of international trade. In Arabia the rise of Muhammadanism resulted in the expulsion of the Jews of Homeritis; but in most Muhammadan countries they were, although heavily taxed, allowed to live in comparative comfort. In Spain they attained their greatest prosperity and lived on terms of close friendship with the Moors; many of them held offices of state, and letters and scholarship reached a high development; but they were banished from Spain, along with the Moors, late in the XV. cent. In Germany in early and mediæval times they were mercilessly persecuted, reduced to a condition of slavery, and frequent massacres took place; from time to time they were expelled, and persecution continued even in the XVIII. cent.; in 1812 an Edict of Toleration removed many of their disabilities, but they are still looked down upon by the Christian population, and at present day no Jew is allowed to become an officer in the German army.

In France they were at first regarded with toleration, but from the XI. cent. onwards they were decimated by a series of massacres, and in the XIV. cent. they were banished from the country; in 1791 their citizenship was established by the National Assembly, and in 1805 a Jewish Sanhedrin was established. In England they were regarded with favour by the first two Norman kings, but in the XII. cent. hostility to them broke out, and during the Crusades they were subjected to cruel oppression. In 1290 they were banished, and for several cent's few were to be found in Britain; since the XVII. cent. they have been tolerated and have received many concessions, so that they are now on terms of perfect equality with the rest of the population, the highest offices of State being open to them. In Russia and Rumania they met with great cruelty, and are still harshly dealt with in these countries. In the U.S. they have had rights of citizenship since 1783.

About 1880 an anti-Semitic movement began in Europe among those nations whose jealousy was excited by the continually increasing wealth and influence of the Jewish inhabitants (see ANTI-SEMITISM). In 1893 the idea of an autonomous Jewish State was revived by Theodor Herzl, founder of the Zionist movement, which aimed at establishing such a state in Palestine.

Milman, *History of the Jews* (1878); H. Graetz, *Geschichte der Juden* (Eng. trans., 5 vol's, 1891-92), *Jewish Encyclopædia*; Leroy-Beaulieu, *Israel among the Nations* (1895).

JEW'S HARP, JEW'S TRUMP, small musical instrument in form of metal lyre held between teeth and played by plucking vibrating tongue.

JEYPORE, see JAIPUR.

JEZEBEL, the wife of Ahab, king of Israel; represented as a depraved woman and the enemy of Israel's God.

JHABUA (22° 45′ N., 74° 38′ E.), town and native state, Central India. Pop. *c.* 82,000.

JHALAWAR (25° 7′ N., 77° 4′ E.), native state, Rajputana, India. Pop. *c.* 92,000. Capital, **Jhalrapatan** (24° 31′ N., 76° 8′ E.), is commercial centre. Pop. 8000.

JHANG.—(1) (31° 18′ N., 72° 25′ E.) district, Punjab, India. Pop. 380,000. (2) (31° 16′ N., 72° 23′ E.) town, capital of above. Pop. 25,000.

JHANSI.—(1) (25° 24′ N., 79° 10′ E.) district, United Provinces, India; area, with Lalitpur, *c.* 3600 sq. miles; produces cereals, cotton; frequently suffers from famine. Pop. 618,000. (2) (25° 37′ N., 78° 35′ E.) walled town, capital of above; has fort. Pop. (1911) 55,724.

JHELUM, JEHLAM.—(1) (33° 12′ N., 72° 30′ E.) district, Punjab, Brit. India; area, 3995 sq. miles; crossed by Salt Mountains and J. River. Pop. (1901) *c.* 595,000. (2) (32° 56′ N., 73° 41′ E.) town, capital of above. Pop. 15,500.

JHELUM, JEHLAM (34° N., 73° 27′ E.), river, India; unites with Chenab.

JHERING, RUDOLF VON (1818-92), Ger. jurist; prof. of Rom. Law at Basel, Rostock, Kiel, Giessen, Vienna, and Göttingen successively; wrote *Geist des römischen Rechts auf den verschiedenen Stufen seiner Entwickelung*, famous work on Rom. law; also *Der Kampf ums Recht*, and other works.

JHIND, see JIND.

JIBUTI (11° 36′ N., 43° 9′ E.), capital, Fr. Somaliland; fine harbour; exports coffee, rubber, ivory, live stock. Pop. (1911) *c.* 11,000.

JIDDA (21° 30′ N., 39° 22′ E.), port, Arabia, on Red Sea; important as chief port of Mecca, many thousand pilgrims landing here every year; extensive harbour; exports mother-of-pearl, coffee, carpets, balsams. Pop. variously estimated, 18,000 to 30,000.

JIG, dance of cheerful nature common among peasants, especially popular in Ireland, where it has assumed a national character; generally written in ⅜ time ('jig-time').

JIGGER, CHIGOE, SAND-FLEA (*Sarcopsylla penetrans*), Amer. parasitic flea; female buries abdomen in skin, usually of human feet, and distends greatly with eggs; unless tampered with, the wound is harmless. See also FLEAS.

JIMENES, see XIMENES DE CISNEROS.

JIND (29° 17′ N., 76° 22′ E.), native state and town, Punjab, India. Pop. (1911) 271,728; of town, 9000.

JINGOISM, hysterical, aggressive imperialism; term derived from song popular during Brit. Anti-Russian Movement, 1878, 'We don't want to fight, but, by jingo, if we do.'

JIU-JITSU, see JU-JITSU.

JIZAKH (40° 12′ N., 1° 50′ E.), fortified town, Western Turkestan. Pop. 17,000.

JOAB, s. of Zeruiah and nephew of King David (*2 Samuel*).

JOACHIM I. (1484–1535), elector of Brandenburg, 1499; vigorous opponent of Reformation.

JOACHIM II. (1505–71), elector of Brandenburg; succ. his f., Joachim I., 1535; strengthened position in Brandenburg; in ecclesiastical questions took a *via media*.

JOACHIM, JOSEPH (1831–1907), violinist and composer; b. near Pressburg, Hungary; studied in Vienna and Leipzig; royal conductor of concerts, Hanover, 1853–66; m. famous contralto, Amalia Weiss; app. head of Berlin Hochschule, 1866; organised J. Quartet; foremost violinist of his day.

Moser, *Life of Joachim* (1899); Maitland, *Joseph Joachim* (1905).

JOACHIM OF FLORIS (1145–1202), Ital. theologian and mystic; b. in Calabria; abbot of Corazzo, 1177, then founded abbey on Monte Nero; his theological view is that there are three stages of revelation, those of the Father, Son, and Holy Spirit—the last yet to come; his influence was considerable in heretical circles in France and Italy.

JOACHIMSTHAL (50° 23′ N., 12° 54′ E.), town, Bohemia, Austria; silver, nickel, uranium, lace, gloves; first *thalers* coined here, 1519 (see DOLLAR). Pop. (1911) 7550.

JOAN, POPE, a woman, who, pretending to be a man, became Pope John XII., 855; Döllinger proved the story a myth.

JOAN OF ARC, ST., JEANNE D'ARC, 'The Maid of Orleans' (c. 1410–31), Fr. patriot; b. at Domrémy; moved by visions and voices of saints calling her to deliver France, she sought Charles the Dauphin, who entrusted her with leadership of an army; she entered Orleans in triumph in April 1429; and after several victories over the English she was captured by the Burgundians when leading a sally from Compiègne. She was then handed over to the English, who burnt her at Rouen as a sorceress. Beatified, 1908.

Andrew Lang, *The Maid of France* (1908); *Life*, by Fabre (1892), Mrs. Oliphant (1896), Murray (1902), Anatole France (1909), Grace James (1910).

JOANNA (1479–1555), queen of Castile, 1504; lost her reason; married Philip, son of Maximilian I.; their son was Emperor Charles V.

JOANNA I. (1327–82), queen of Naples; married (1) Andrew of Hungary, (2) Louis of Taranto, (3) James of Majorca, (4) Otto of Brunswick.

JOANNA II. (1371–1435), queen of Naples; succ., 1414; reign marked by intrigues between queen, her ministers and lovers, and the rulers of Anjou and Aragon.

JOANNES DAMASCENUS, see JOHN, ST., OF DAMASCUS.

JOB, BOOK OF, belongs to the 'Wisdom Literature,' and deals with the problem of suffering, which, in the later stages of Old Testament theol., perplexed men. Formerly it was held that all suffering comes as punishment for sin, and it is against this J. was written. J. was a wealthy and prosperous, and also a pious, man, and the Satan (*i.e.* Adversary), whose function it is to try men, is allowed by God to see whether J.'s piety is merely the result of his prosperity. He does so, and J. is cast down by misery. J.'s friends try to persuade him that he has done wrong. J. is bewildered and sometimes defiant, and his friends do not really help him solve the problem. The solution is due to Elihu, who helps J. see the real meaning of his trial. Elihu's speeches, which some think a later addition, are meant to emphasise the discipline of suffering.

The text of J. is shorter in the LXX than the Hebrew. The date is uncertain. Formerly it was thought to be patriarchal, as J. leads a patriarchal life, and it was conjectured that he was Moses, as the book was then taken as literal history. But its whole tone and reflection on moral and spiritual problems indicate a much later date. These questions scarcely pressed for solution among the Israelites before the VI. cent. B.C. Its language, too, shows traces of Aramaic and Arabic influence which would not be possible earlier, so J. is probably V. cent.

Driver, *Book of Job*; Peake, *Job* (Century Bible); Froude, *Short Studies*, vol. i.

JOCASTA, see ŒDIPUS.

JOCKEY, see RACING.

JODHPUR, MARWAR (26° 20′ N., 72° 30′ E.), native state, Rajputana, India; area, 34,963 sq. miles; watered by Luni and its affluents; produces salt (from Sambhar and other salt lakes), tin, iron, marble, cereals; joined Mutiny, 1857. Pop. (1911) 2,057,553. **Jodhpur** (26° 19′ N., 73° 2′ E.), the capital, a walled town, has a huge fortress in which are several ancient palaces. Pop. (1911) 60,437.

JOEL, BOOK OF, one of 'minor prophets.' The first part, to 2^{17}, contains a description of the approach of the 'day of Jehovah' heralded by portents, but there is still time for repentance. The latter part recounts God's mercy, and contains the famous passage, 'And it shall come to pass afterward that I will pour out my spirit upon all flesh, etc.'; the people are to prepare for war; the day of Jehovah will come, Judah will prosper, but Edom will be a 'desolate wilderness.' The date of J. is disputed; formerly it was thought the reign of Joash was suitable, but now criticism inclines to the view that it is post-exilic. There are close parallels with the *Book of Amos*.

Driver, *Joel and Amos* (Cambridge Bible).

JOHANNESBURG (26° 12′ S., 28° E.), important commercial city and mining centre of S. Africa, situated in Witwatersrand goldfield in Transvaal; founded in 1886 on discovery of gold, and rapidly grew in importance; during war J. taken by British in 1900; city possesses many spacious streets and squares and handsome structures; among public buildings are stock exchange, law courts, Univ. Coll., clubs, theatres, and churches; has several large suburbs; other industries besides mining are printing, milling, brewing, and founding. Pop. (1911) 237,220.

JOHANNISBERG (53° 37′ N., 21° 49′ E.), village and castle, Germany; produces Johannisberger wine.

JOHN (c. 1167–1216), king of England; youngest s. of Henry II.; succ., 1199; murdered nephew Arthur, 1203. On his mother's death he lost Anjou, Normandy, Maine, Touraine; quarrelled with pope over Langton's election as abp. of Canterbury, and was excommunicated; signed Magna Carta, 1215. J. was unscrupulous, false, gross—'the worst king England ever had.' See ENGLAND (*History*).

JOHN, name of twenty-three popes: **John XII.** (955–64) was deposed by Otho the Great, but drove out Leo VIII., his successor.—**John XXI.** (1276–77), probably same as 'Peter the Spaniard,' a learned medical writer.—**John XXII.** (1249–1334), b. at Cahors, France; elected to papal chair on death of Clement V., 1316; supported Frederick of Austria in his struggle against Louis of Bavaria for the imperial throne; excommunicated Louis, who in 1328 deposed him and secured the election of another pope, Nicholas V. J., however, regained the pontificate in 1330; wrote the decretals called *Extravagantes*, and pub. the *Constitutions of Clement V.*, 1317.—**John XXIII.** (d. 1419), antipope; original name, Baldassare Cossa; passed years before entering Church as corsair; was elected on death of antipope, Alexander V. (1410). Gregory XII. still reigned and the antipope, Benedict XIII. John XXIII. was deposed (1415) by Council of Constance; was imprisoned for three years in Germany; app. bp. of Tusculum, 1419.

JOHN, DON, OF AUSTRIA (1546–78), illegitimate s. of Charles V.; defeated Moors in Granada, 1569–71; commanded fleet against Turks, on whom he inflicted severe defeat at Lepanto, 1571; occupied Tunis, 1573; governor of Netherlands, 1576; won battle of Gembloux, 1578; d. same year.

JOHN OF AUSTRIA (1629–79), Span. soldier;

putative s. of Philip IV. of Spain; put down Neapolitan rising, 1647; Catalonian revolt, 1651–52; fell from favour for subsequent defeats, but ultimately obtained chief power after Philip's death.

JOHN (1296–1346), king of Bohemia; aided Louis of Bavaria against Frederick of Austria in struggle for imperial throne; put down several risings in Bohemia; annexed Silesia; twice invaded Italy; supported France against England; killed at Crécy; lost eyesight in 1340.

JOHN VI., or V., CANTACUZENE, Byzantine emperor, 1341–54; became joint-emperor, by revolution, with pupil, John Palæologus; feeble, extortionate ruler; forced to abdicate; wrote a history of his time.

JOHN II., THE GOOD (1319–64), king of France; defeated by Black Prince at Poitiers, 1356; taken prisoner to England.

JOHN II. (1397–1479), king of Aragon; m. Blanche of Navarre, and through her became lifelong possessor of the throne of Navarre.

JOHN ALBERT (1459–1501), king of Poland; succ., 1492; planned an invasion of Turkey; defeated by hospodar of Moldavia, 1496.

JOHN III., SOBIESKI (1624–96), king of Poland; had share in driving Charles XII. from Poland; saved Poland from Cossacks and Tatars, and afterwards from the Turks; elected king in 1674, and in 1683 gained brilliant victory over Turks, who were besieging Vienna; freed Hungary from Turkish domination. His efforts to reform country were frustrated by nobles.

JOHN (1801–73), king of Saxony; put down revolt, 1848; succ., 1854; supported Austria against Prussia, 1866; subsequently joined North Ger. Confederation and took part in Franco-Ger. War, 1870–71.

JOHN I. (d. 1294), Duke of Brabant and Lorraine. By defeating Henry III. of Luxemburg, acquired duchy of Limburg, 1288.

JOHN, DUKE OF BURGUNDY (1371–1419), aided Hungarians against Turks; succ., 1404; carried on struggle for several years with Louis of Orleans, whose assassination he contrived in 1407; took little part in wars between France and England; reconciled to the Dauphin, 1419; killed by followers of Dauphin.

JOHN (1468–1532), elector of Saxony, 1525; strong supporter of Luther.

JOHN GEORGE I. (1585–1656), elector of Saxony; succ., 1611; allied himself with Sweden, 1631; defeated by Wallenstein; signed Peace of Prague, 1635; warred against Sweden; defeated, 1636.—**JOHN GEORGE II.** (1613–80), encouraged art.—**JOHN GEORGE III.** (1647–91), fought against France.—**JOHN GEORGE IV.** (1668–94), quarrelled with Emperor.

JOHN FREDERICK I., THE MAGNANIMOUS (1503–54), elector of Saxony; succ., 1532; promoted Lutheran religion; defeated duke of Saxony, 1546; captured by Charles V., 1547; temporarily deprived of electorate.

JOHN MAURICE OF NASSAU, THE BRAZILIAN (1604–79), Dutch gov.-gen. of Brazil, 1636; organised new colony and extended its frontiers; subsequently took part in European wars; made famous collection of pictures.

JOHN ZAPOLYA (1487–1540), king of Hungary; put down peasant rebellion, 1514; elected king of Hungary, 1526; claim disputed by Ferdinand, Ger. king, whom J. Z. eventually defeated.

JOHN (1513–71), margrave of Brandenburg, 1535; became Protestant, 1538.

JOHN OF ASIA, OF EPHESUS (fl. 550), early Syriac historian; founded great number of religious houses; suffered persecution under Justin II.; author of *Ecclesiastical History* and other works.

JOHN OF GAUNT, see **LANCASTER, JOHN OF GAUNT, DUKE OF.**

JOHN OF LEYDEN, **BUCKHOLDT, JOHANN** (*q.v.*).

JOHN OF RAVENNA.—(1) (b. *c.* 1347) Secretary to Petrarch, and an extensive traveller; (2) (fl. 1370) a prof. at Florence; (3) **MALPAGHINI** (b. *c.* 1356), also a prof. at Florence, and teacher of Poggio Bracciolini.

JOHN OF SALISBURY (*c.* 1115–80), friend and adviser of Becket; bp. of Chartres; wrote a *Life of Becket*, and *Polycraticus*, a satire on the vices of court circles.

JOHN, THE APOSTLE, bro. of James and s. of Zebedee; traditional author of *Gospel of John*, *Epistles of John* and *Revelation* (q.v.); called 'disciple whom Jesus loved' (*John* 13^{23}); said to have lived at Ephesus, dying in extreme old age; another tradition makes him die earlier; sometimes identified with John the Presbyter (Elder).

John, Gospel of, the fourth of the Gospels and a unique book. It has been almost more than any other book the battleground of criticism. It differs markedly from the first three 'Synoptists.' The discourses in it are quite unlike those in *Matthew* and *Luke*. Alone it gives the turning of water into wine, and the raising of Lazarus. Scholars are still sharply divided as to whether it is from the hand of J., the s. of Zebedee. Its defenders argue it is the work of an eye-witness, a Jew, a Jew of Palestine, an apostle, the Apostle St. J. Its assailants argue such a work could not be the work of one who had known Jesus, and that its style and theology are later. The question of evidence is exceedingly complicated, and here it can only be said that the external evidence is doubtful; the internal evidence is curiously conflicting, but on the whole, against the traditional authorship. Even its defenders allow that the thought of Christ's discourses is coloured by the writer, while, on the other hand, it is generally admitted that J.'s date for the Crucifixion is right as against the Synoptists. It can hardly be earlier than 90 A.D., or much later than 110 (Schmiedel, 140, is too late), though it is uncertain it was used by Justin Martyr. It has been attributed to J. from Irenæus downwards. Some think it is the work of a presbyter J., confused with the apostle and s. of Zebedee. It seems impossible to deny the difficulties in accepting it entirely, or to deny not only its spiritual but hist. value. It can hardly be unconnected with the other Johannine writings, or, ultimately, with the apostle.

Green, *Ephesian Canonical Writings*; M'Clymont, *John* (Century Bible); Drummond, *Character and Authorship of Fourth Gospel*; Peake, in *Critical Introduction to New Testament*; works by Westcott, Schmiedel, Wendt, Bacon, Sanday, Abbott, Wellhausen, Réville.

John, Epistles of, three in number. *1 John* has been held to be by the author of the Gospel since Irenæus, and only a few critics deny it. The traditional authorship is supported by the Muratorian fragment on the Canon, Origen, Clement of Alexandria, and Tertullian. It probably dates from the first quarter of the II. cent. The heresy denounced is probably Docetism. *2* and *3 John* were sometimes reckoned among the 'doubtful' writings. They appear in the Muratorian fragment, but the early Syriac Church did not recognise them. *2 John* is addressed to an 'elect lady,' and by this some Asian Church is probably signified. *3 John* is written to Gaius, and is probably closely connected with *2 John*. All three Epistles are of the same school, and are connected with the Gospel.

Commentaries by Plummer in *Cambridge Gk. Testament*, Bennett in *Century Bible*, Westcott, and Harnack.

JOHN THE BAPTIST, in New Testament s. of Zacharias and Elisabeth, and forerunner of Jesus; preached repentance and baptized in wilderness; imprisoned and slain by order of Herod, whom J. rebuked for marrying his bro. Philip's wife.

JOHN, ST., OF DAMASCUS (d. *c.* 754), Gk. Father and theologian; entered Palestinian monastery; strong opponent of iconoclasm; wrote works which, though not in themselves remarkable, sum up Gk. theology; wrote original of hymn, *The Day of Resurrection*; his Christology tended towards Apollinarianism.

JOHN DORY, see **DORY.**

JOHN O' GROAT'S HOUSE (58° 39′ N., 3° 3′ W.), traditional site of John Groot's octagonal house, Caithness, Scotland; synonymous with most northerly point of Scotland.

JOHN, SIR WILLIAM GOSCOMBE (1860–),

Brit. sculptor; R.A.; works include statue of King Edward VII. at Cape Town, memorial to Lord Salisbury in Westminster Abbey; he designed insignia for Prince of Wales' investiture.

JOHNS HOPKINS UNIVERSITY, Baltimore, Maryland, U.S.A.; founded by Johns Hopkins (1794–1873), a wealthy merchant, who appointed the first trustees, and endowed it with $3,500,000; formally opened, 1876; important scientific school. It is non-sectarian, and in 1910 had staff of 198, and 785 students (mostly following post-graduate courses).

JOHNSON, ANDREW (1808–75), Amer. statesman; 17th Pres. of U.S.; b. at Raleigh, N. Carolina; entered Congress, 1843; gov. of Tennessee, 1853; Senator, 1857; was a prominent anti-secessionist, and remained loyal to Federal government during Civil War; military governor of Tennessee, 1862. On Lincoln's assassination he became Pres. of U.S.; opposed enfranchisement of negroes, and vetoed many bills passed by Congress on this subject; impeached by Congress in 1868 for violating the Tenure of Office Act, which had been passed despite his veto in 1867, but was acquitted. Retired, 1869.

Foster, *Life and Speeches of Andrew Johnson* (1866); Jones, *Life* (1902).

JOHNSON, EASTMAN (1824–1906), Amer. artist; famous for portraiture and pictures of national life.

JOHNSON, SAMUEL (1709–84), Eng. man of letters; s. of a Lichfield bookseller; ed. Lichfield, Stourbridge, and Pembroke Coll., Oxford; left Oxford (1731) without a degree. Till 1762 he had a severe struggle with destitution; after failing as a schoolmaster, started journalism in connection with Cave's *Gentleman's Magazine*, on which he was parliamentary reporter. Published poem *London* (1738), and started (1747) work on a new *Dictionary of the English Language*; there followed *Vanity of Human Wishes*, *The Rambler* (1752), the novel *Rasselas* (1759), and the periodical essay paper *The Idler* (1758). In 1735 he had married a Birmingham widow, who died in 1752. In 1762 he was given a royal pension of £300 a year, and lived comfortably after that. In 1763 began his friendship with BOSWELL (*q.v.*), and soon after the Literary Club was founded, with Burke, Boswell, Hawkins, Goldsmith, Johnson, among its members. J. now began to travel both in Britain and on the Continent with newly made friends, Mr. and Mrs. Thrale. In 1773 he visited Scotland. The rest of his life was embittered by ill-health, and the death or defection of many of his friends. The only literary fruits of this period were the *Journey to the Hebrides* and the *Lives of the Poets* (1781). He was buried in Westminster Abbey.

His Work.—In criticism J. belongs to the 'correct' school; he deprecates Milton's freedom of prosody; he objects to the Romantic Movement, and is suspicious of Gray's poetry. Yet he is a great critic, in spite of his 'correctness.' *The Vanity of Human Wishes* is not great poetry; it is too correct, too scholarly. The novel *Rasselas* fails in character delineation; nominally it is a tale of Imlac, an Abyssinian prince; in reality it is a book of wisdom and literary criticism. His prose, 'Johnsonese,' is much Latinised, sometimes ponderous; it is balanced, but regular antithesis makes it rhetorical sometimes.

Boswell, *Life*; Raleigh, *Six Essays on J.* (1910).

JOHNSON, SIR WILLIAM (1715–74), Brit. soldier; b. in Ireland; emigrated to America, 1738; acquired great influence over Indians; appointed sole superintendent of Indian affairs, 1755; took part in the expedition against Canada, and compelled the surrender of Niagara, 1759.

JOHNSTON, ALBERT SIDNEY (1803–62), Amer. soldier; in Civil War became general on Confederate side; killed at battle of Shiloh.

JOHNSTON, ALEXANDER KEITH (1804–71), Scot. geographer; pub. numerous atlases and geographical works.

JOHNSTON, ARTHUR (1587–1641), Scot. physician; after studying at Aberdeen and at Padua, lived in Sedan with Andrew Melville (*q.v.*), and later practised med. at Paris; became rector of King's Coll., Aberdeen, 1637; author of translation of the Psalms into Latin verse, and of other Latin poems, mainly in an anthology of works of Scot. poets which he produced.

JOHNSTON, JOSEPH EGGLESTON (1807–91), Amer. soldier; distinguished himself in war with Mexico; joined Confederates in Civil War, and became general; defeated Federalists at Bull Run, but was wounded at Fair Oaks; after offering stout resistance to Sherman's opposing force, he had to surrender in April 1865.

JOHNSTON, SIR HENRY HAMILTON (1858–), Eng. traveller, administrator, and writer; explored Portuguese Congo, 1883; led Kilimanjaro scientific expedition, 1884; consul in Kamerun, 1887; restored order in Nyasa district, 1889; helped to establish Brit. Central African Protectorate, of which he became consul-general, 1891; commissioner in Uganda, 1899–1901; wrote various works on Africa.

JOHNSTONE (55° 51′ N., 4° 31′ W.), town, Renfrew, Scotland; cotton, flax, iron, machinery, shoelaces. Pop. (1911) 12,045.

JOHNSTOWN.—(1) (42° 59′ N., 74° 25′ W.) town, New York, U.S.A.; manufactures gloves, clothing; Americans defeated British here in 1781. Pop. (1910) 10,447. (2) (40° 19′ N., 78° 57′ W.) town, Pennsylvania, U.S.A.; iron and steel manufactures. Pop. (1910) 55,482.

JOHOR (*c.* 1° 46′ N. to 2° 39′ S., 103° 50′ to 105° E.), independent sultanate, southern extremity of Malay peninsula; area, including islands to S., 9000 sq. miles; surface low-lying; forested; produces timber, sago, pepper, gambier. Foreign policy controlled by Britain. Pop. *c.* 200,000. J. BAHRU (1° 46′ N., 103° 56′ E.), chief town.

JOIGNY (47° 59′ N., 3° 24′ E.), town, Yonne, France; interesting churches. Pop. 5000.

JOINERY is a development of carpentry. The carpenter is chiefly concerned with the construction of solid and usually rather rough timber work, such as is used to give strength and solidity to buildings; whereas the joiner is employed in more complicated work where perfect fit and finish is important. Most of the joiner's work consists of planing and sawing, and preparing and finishing all varieties of joints; there is a wide range of side and angle joints. Mouldings are largely used to give relief to plain surfaces. Small mouldings, such as beadings, are generally directly worked on to the framing; large ones are mostly worked separately and screwed into position. The joiner's work includes the making of floors (plain, woodblock, or parquet), skirtings, dados, doors, window-frames, etc., and the fixing of hinges, locks, window-sash fastenings, finger-plates, etc. The making of shop-fronts and the fitting of church interiors are two important and special branches of j. In England the wood most used is Scandinavian pine, other woods being mahogany, teak, oak, and Amer. pine.

JOINT, in anatomy, the structure which unites two parts of the skeleton. J's may be immovable, or *synarthroses*, when the two bones are united by a prolongation of the periosteum between them, or by a plate of cartilage, both forms being exemplified in the skull; or they may be movable, *amphiarthroses* and *diarthroses*. Of the former there are two varieties, in the simpler type the bones being joined by bundles of strong fibro-cartilage, as the j's between the vertebræ, while in the other, surfaces of cartilage on each bone are joined by strong fibro-cartilage in the centre of which is a small cavity lined with synovial membrane, as in the case of the j. of the *symphysis pubis*. Diarthroses are freely movable j's, the ends of the two bones involved having each a surface of cartilage, so that they move upon each other with as little friction as possible. The cavity between them is lined with synovial membrane secreting a synovial fluid which acts as a lubricant.

The bones are bound together outside the j. by

strong fibrous ligaments. There are several varieties of this type, in the knee and the j. of the lower *maxilla*, there are pads of cartilage in the j. cavity, so that there is greater elasticity in the j. In hinge-j's, as, for example, the j's of the fingers and toes, there are elevations on the cartilage surface of one bone, which fit into corresponding depressions in the other, so that movement can only be effected in one direction. In ball-and-socket j's the end of one bone is cup-shaped, and into it the end of the other, which is spherical, fits, and is kept in place by a ligamentous capsule which surrounds the j.; this type of j. gives the widest range of movement, examples being the hip-j. and shoulder-j. In a rotary j. one projecting bone fits into a ring formed by the other, and is held in place by suitable ligaments, movement being permitted in a rotary direction, as, for example, the j. between the axis (second vertebra) and the atlas (first vertebra).

A j. may be affected by inflammation of the synovial membrane, or *synovitis*, in which the j. is hot, swollen, and painful—treated by absolute rest, elevation of the limb, and hot fomentations; adhesions may form and may require to be broken down under an anæsthetic. In *arthritis* the cartilage of the j. is involved as well as the synovial membrane, there is severe pain, fever, the j. is swollen, and the fluid in it soon becomes purulent. In regard to treatment the j. must be opened and washed out by a surgeon, the prognosis being best when this is carried out at an early stage. A *loose body* may be formed in a j., a cartilaginous piece of synovial fringe being detached, or it may be formed of fibrin, and the j. may be locked when the loose body is caught between the articular surfaces; the j. must be opened by a surgeon and the loose body removed.

See ANKYLOSIS, TUBERCULOSIS, RHEUMATOID ARTHRITIS.

JOINT-STOCK COMPANY, see COMPANIES, LIABILITY.

JOINTS, used in engineering to prevent leakage of steam, air, or water; generally made of packing, *e.g.* asbestos or hemp; j's in gas or petrol engines made gas-tight with a washer of asbestos surrounded with a ring of copper; j's in wood made by 'grooving' or caulking with oakum. J's in building are made with mortar.

JOINTS (in geology), cracks in rocks which run along natural planes of division and render quarrying of large regular blocks of stone practicable. Although often irregular, in sandstones they are nearly always at right angles to the bedding of the stone. Horizontal beds of rock generally have vertical j's. They are probably due to several causes—strain imposed upon rocks by movements of earth's crust in contraction; drying of sedimentary rocks; cooling of igneous rocks, etc. The latter effect produces a regular columnar structure, as at the Giant's Causeway, Ireland.

JOINTURE, in law, originally estate settled jointly on husband and wife, now estate belonging to wife alone. See DOWRY.

JOINVILLE, FRANÇOIS FERDINAND PHILIPPE LOUIS MARIE, PRINCE DE (1818–1900), third s. of King Louis Philippe; distinguished soldier; exiled at Revolution, 1848, but returned to France and sat in National Assembly, 1871–76.

JOINVILLE, JEAN, SIRE DE (1224–1319), Fr. historian; entered service of Thibaut of Champagne; subsequently went on crusade with Louis IX. of France, 1248–54; after his return he lived a good deal at court, but refused to go on second crusade. Towards close of his life he wrote his *Histoire de St. Louis*, an important work describing the king's life and character, and giving an interesting account of the Crusades; it also includes a number of personal reminiscences, and is written in an easy and conversational style of considerable charm.

H. F. Delaborde, *Jean de Joinville* (1894).

JOKAI, MAURUS (1825–1904), Hungarian writer; b. Komorn; his output was enormous, and consisted of novels, romances, and poems. Some famous volumes are *The New Landlord*, *The Modern Midas*, *God is One*, and *Timar's Two Worlds*.

JOKJAKARTA, JOKJOKARTA (7° 56′ S., 110° 30′ E.), residency, Java, Dutch East Indies; sugar, indigo; chief town, J., has large citadel. Pop. *c.* 900,000.

JOLIET (41° 30′ N., 88° 3′ W.), town, Illinois, U.S.A.; iron and steel. Pop. (1910) 34,670.

JOLY DE LOTBINIÈRE, SIR HENRI GUSTAVE (1829–1908), Fr. Canadian statesman; lieut.-gov. of Brit. Columbia, 1900–6.

JOMINI, ANTOINE HENRI (1779–1869), general and military writer, of Swiss birth; served with French at *Austerlitz* and *Jena*; went over to Russ. army, 1813; wrote extensively on military subjects.

JONAH, Hebrew prophet, mentioned in *2 Kings* 14^{25} as s. of Amittai, under Jeroboam II. (VIII. cent. B.C.); traditional author of Book of *Jonah*, which probably dates from V. cent., and is allegorical rather than historical.

JONAH, RABBI (*c.* 990–1050), great Hebrew exegete and lexicographer; b. Cordova; revolutionised Biblical criticism by basing his arguments on linguistic evidence.

JONATHAN, name of Old Testament characters: (1) son of Saul and friend of David; (2) a Maccabean prince.

JONES, HENRY ARTHUR (1851–). Eng. playwright; has written successful comedies and problem plays.

JONES, INIGO (1573–1652), Eng. architect; arranged scenery for Jonson's masques; surveyor-gen. of royal buildings; designed banqueting hall (now Chapel Royal), Windsor.

JONES, JOHN PAUL (1747–92), Amer. sailor; b. Scotland; shipmaster's apprentice, 1759; took part in slave trade; made lieut. on outbreak of War of Independence, 1775; fought for France in war with Britain, 1778; went back to America, 1781; served under Empress Catharine of Russia, 1788, in Turk. campaigns; lived in Paris, 1790–92; called 'Father of Amer. Navy.' *Life*, by Brady (1900).

JONES, RICHARD (1790–1855), Eng. prof. of Political Economy, and author of economic works.

JONES, SIR WILLIAM (1746–94), Brit. Orientalist; b. in London. In 1783 he was appointed judge in Bengal, and during his stay in India studied Hindu law; works include *Digest of Hindu Law* (1800), *Institutes of Manu* (1794), a *Persian Grammar* (1772), and *Moallakat* (a trans., 1783).

JÖNKÖPING (57° 47′ N., 14° 12′ E.), town, Sweden; manufactures matches, carpets, paper, arms. Pop. (1910) 26,971.

JONSON, BEN (1573–1637), Eng. dramatist and poet; b. London; posthumous son of minister of Scottish extraction; ed. Westminster; for a short time followed his stepfather's trade of bricklaying, but abandoned it for the army; served in campaigns in the Netherlands; returned to London and married, 1591–92; the union was not happy, and J. survived his family; became actor-playwright, fraternising and sometimes working in conjunction with Dekker, Porter, and others; was tried for killing a fellow-actor in a duel, pleaded benefit of clergy, escaped death, but suffered branding and confiscation of property, 1598.

His first play, *Every Man in his Humour*, was staged about 1596, and taken over by Shakespeare in 1598, and produced at the Globe Theatre—a bright play, abounding in variety of interest; its sequel, *Every Man out of his Humour*, is flat when compared with the original. Then followed several comedies, including *Cynthia's Revels* (1600), *The Poetaster* (1601, in which his dramatic rivals were satirised), *Volpone* (1605), *Epicene* (1609), *The Alchemist* (1601), *The Magnetic Lady* (1633). *Sejanus* (1603) and *Catilina* (1611) are two rather dull tragedies. *The Alchemist* is his masterpiece; Sir Epicure Mammon is a gem of character portrayal, the situations are good, the story absolutely coherent, the minor parts worked out accurately.

After the production of this, J.'s work grew inferior in quality.

J. wrote about 40 masques, mostly written in collaboration with Inigo Jones; they are charmingly beautiful, and form some of his best work. His poems are many and varied, ranging from graceful lyrics to scurrilous epigrams; they are classical in form and phraseology, but are nevertheless independent in spirit. The elegies on his eldest son and daughter are characterised by tenderness and affection. Of his songs, 'Drink to me only with thine eyes' is still popular.

J.'s prose marks a step in advance of Jacobean floridity; it is compressed and expressive without ornateness; his *English Grammar*, and *Discoveries*, a collection of 171 short pieces, are extant.

His last years were made unhappy by poverty and disease; his tomb is in Westminster Abbey.

Life, by Symonds (1886).

JOPLIN (37° N., 94° 20′ W.), town, Missouri, U.S.A.; centre of zinc and lead district; smelting works. Pop. (1910) 32,073.

JOPPA, JAFFA (32° 2′ N., 34° 47′ E.), port, Palestine; centre of fruit trade. Ancient town is frequently mentioned in Old and New Testaments; associated with St. Peter. Pop. *c.* 45,000.

JORDAN (31° 45′ N., 35° 35′ E.), sacred river, Palestine; headstream, Hasbany, rises on slopes of Mt. Hermon and unites with Banias and Leddan about lat. 33° 14′ N.; river then flows in S. direction and enters Sea of Galilee at its N. extremity, emerging at other end and flowing still S. till it empties itself into Dead Sea. See *The Jordan Valley*, by Libby and Hoskin.

JORDAN, CAMILLE (1771–1821), Fr. politician; urged moderate reform at Revolution; proscribed, 1797; led constitutional party at Restoration.

JORDAN, DOROTHEA (1762–1816), Irish actress; played for thirty years in Drury Lane; mistress of Duke of Clarence (William IV.).

JORDANES, JORNANDES (fl. VI. cent.), writer on Gothic history; entered service of Gunthigis, a Gothic chieftain, but subsequently, embracing Christianity, became a monk; said to have been bp. of Kroton. His most notable work is *De Origine Actibusque Getarum*, a history of Goths down to fall of Ostrogothic kingdom in Italy; narrative mainly taken from a lost history by Cassiodorus. J. also wrote *De Breviatione chronicum*, generally known as the *Romana*, a history of world down to Justinian's time; without hist. value except for period after middle of V. cent.; edition (with Preface) by Mommsen.

JORDANUS, JORDAN CATALANI (fl. 1321–30), Fr. Dominican missionary; worked in India; bp. of 'Columbum,' Kulam, Travancore, 1330; author of *Epistles* urging a papal fleet in Indian Ocean, and of *Mirabilia*, containing famous descriptions of manners, customs, climate, fauna, and flora of India.

JORIS, DAVID (1501–56), heretic; at outbreak of Reformation violently attacked Catholicism and became Anabaptist; viewed himself as revealer of new dispensation, calling himself CHRISTUS DAVID; lived at Basel and wrote several works.

JORNANDES, see JORDANÉS.

JOSAPHAT, see BARLAAM.

JOSEPH, in New Testament, husband of Mary and 'father' of our Lord; not mentioned during Ministry, so was probably dead.

JOSEPH, in Old Testament, s. of Jacob; sold by his bro's into Egypt; rose to power under Pharaoh.

JOSEPH, BARSABAS, follower of Jesus, deemed worthy of nomination as one of the Twelve Disciples in Judas's place.

JOSEPH, king of Naples, afterwards of Spain. See BONAPARTES.

JOSEPH II. (1741–90), Holy Rom. emperor; b. Vienna; Ger. king, 1764; emperor, 1765; shared authority in Austria with his mother, Maria Theresa, who retained supreme power; signed treaty for partition of Poland, 1772; opposed Frederick the Great; succ. to Austrian throne, 1780; established religious toleration; furthered education, abolished serfdom, subordinated Church to State; joined Russia against Turkey with little success.

JOSEPH, FATHER (1577–1638), Fr. ecclesiastic famous for his connection with Richelieu, whose secretary and confidant he became; tried to convert Huguenots.

JOSEPH OF ARIMATHÆA, in New Testament, comes after the Crucifixion and asks Pilate for the body of Jesus: called in *Mark* a 'wealthy councillor'; *Matthew*, a 'rich man'; *Luke*, 'councillor'; according to *John*, a 'secret disciple for fear of the Jews.' He buries Jesus in his own new rock-tomb.

JOSÉPHINE (1763–1814), empress of France; b. Martinique; m. Vicomte de Beauharnais (*q.v.*), who was executed during Terror; subsequently m. Napoleon Bonaparte, 1796; no son being b., Napoleon had marriage dissolved for State reasons, 1809; J. retired to Malmaison. See *The Empress Joséphine*, by Sergeant.

JOSEPHUS, FLAVIUS (*c.* 37–97 A.D.), celebrated Jewish historian; became a Pharisee; was leader in Jewish rebellion in Galilee, but on his capture was spared by Vespasian, and subsequently marched with Titus against Jerusalem; author of *Jewish Antiquities* and *The Jewish War*, both dealing with history of the Jews.

JOSETSU (XIV. cent.), Jap. artist; left his mark chiefly as teacher, being the master of Sokokuji Shiubun, Sesshiu, and Kano Masanobu, founders of three distinct types of Jap. art.

JOSHEKAN (33° 16′ N., 51° 14′ E.), province, Persia. Pop. *c.* 5000.

JOSHUA, BOOK OF, separated in Jewish canon from the *Torah* (Law), or Pentateuch, but really by structure and origin to be grouped with them to form the Hexateuch. Chaps. 1–12 describe the crossing of the Jordan and the conquest of Canaan by the Israelites, and chaps. 13–24 the division of the land among the tribes. *Joshua* is composed from the same sources as the Pentateuch; it is probable that J and E (two narratives of about the IX. cent. B.C.) were combined into one first, then these were combined with other material by a Deuteronomic editor, and the whole united into the Priestly Code. The latter part of *Joshua* is rather fragmentary, and in the earlier forms of the narrative the conquest seems to have been much more gradual and by no means so thorough as it was afterwards supposed to have been: the partition among the tribes is represented as it was later.

Driver, *Introduction to Old Testament Lit.*; Carpenter and Harford-Battersby, *Hexateuch*; Robinson, Commentary in *Century Bible*.

JOSHUA THE STYLITE (V. cent.), traditional author of Syrian chronicle of importance for history of Eastern Empire.

JOSIAH, s. of Amon, king of Judah (639–609 B.C.); during his reign Jeremiah preached, and a religious reformation took place.

JÓSIKA, BARON MIKLÓS (1796–1865), Hungarian writer of romances, mostly historical.

JOTUNHEIM, JOTUN FJELDE (61° 30′ N., 8° 20′ E.), mountainous district, S. Norway; traditional home of Norse giants (*Joturs*).

JOUBERT, BARTHÉLEMY CATHERINE (1769–99), one of youngest, most promising generals in Napoleon's army in Austrian invasion, 1798–99; commander of Ital. army, 1799; slain at *Novi*.

JOUBERT, JOSEPH (1754–1824), Fr. *littérateur*; most brilliant figure in salon of Madame de Beaumont, author of *Pensées*, maxims on ethics, theol., lit., and politics.

JOUBERT, PETRUS JACOBUS (1834–1900), Transvaal commandant-general; defeated British at *Laing's Nek*, *Ingogo*, *Majuba Hill* (1881); d. during last South African War.

JOUFFROY, THÉODORE SIMON (1796–1842), Fr. philosopher; assistant prof. in Paris, 1817; de-

voted himself to lecturing and literary work; became follower of Scot. philosophers; prof. at Collège de France, 1833; emphasised distinction between physiology and psychology; a learned populariser of ideas rather than an original philosopher.

JOUGS, chain with iron collar attached, used in Scotland, XVI.–XVIII. cent's, as pillory.

JOULE, JAMES PRESCOTT (1818–89), Eng. physicist; b. Salford; pupil of Dalton; formulated law of production of heat by passage of electric current in a conductor. By a long series of laborious experiments, determined mechanical equivalent of heat, *i.e.* the number of work units required for a given rise of temperature. See ENERGY.

JOURDAN, JEAN BAPTISTE, COUNT (1762–1833), Fr. soldier; defeated Austrians at *Wattignies*, 1793; at *Fleurus*, 1794; commanded in Rhine campaign, 1795; defeated at *Amberg* and *Würzberg*, 1796; *Stockach*, 1799; marshal of France, 1804.

JOVE, see JUPITER.

JOVIANUS, FLAVIUS (332–64), Rom. emperor, succeeding Julian, 362; reversed pagan policy of Julian.

JOVIUS, PAULUS, PAOLO GIOVIO (1483–1552), Ital. historian; b. Como; studied med. at Padua and Pavia, but renounced the profession in favour of lit.; Leo X. advanced him, and he became attached to the family of the Medici; great work was a history of his own times.

JOWETT, BENJAMIN (1817–93), Anglican scholar and divine; ed. Balliol Coll., Oxford; became tutor of his coll.; prof. of Greek, 1855; Master of Balliol, 1870; suspected for his liberal views in theology; had enormous influence in Oxford; best known as a scholar for his translations of Plato, Aristotle, and Thucydides.

Abbott and Campbell, *Life and Letters* (2 vols., 1897); Tollemache, *Memoir*.

JOYEUSE (44° 29′ N., 4° 15′ E.), small town, Ardèche, France; gave name to noble family whose ducal title passed to Guise family in XVII. cent.

JUAN FERNANDEZ ISLANDS (33° 42′ S., 78° 45′ W.), volcanic islands (belonging to Chile), S. Pacific; largest is Mas-a-Tierra, where Alexander Selkirk (prototype of Robinson Crusoe) lived, 1704–9; few inhabitants.

JUAN MANUEL (1282–1349), Infante of Castile; served in many military campaigns, specially in Moorish wars; known even better as author; though active in other ways, wrote much; among his writings are—*Cronica abreviada*, *Libro de la caza*, *Cronica de España*, *Cronica complida*; learned in classical and Oriental lore.

JUANGS, primitive Indian race, living in forests of Orissa.

JUBA, JUB (0° 30′ S., 42° 30′ E.), river, E. Africa; headwaters, Ganale, Webi, Dawa, rise in S. Abyssinia, unite near Dolo; river then flows S., separating Ital. Somaliland from Brit. E. Africa, and enters Ind. Ocean below Gobwen.

JUBA I., king of Numidia, 61–46 B.C., who assisted Pompey and slew himself after *Thapsus*. His S., **Juba II.**, received his f.'s kingdom from Augustus (30 B.C.), but surrendered it in return for Mauritania (25 B.C.); he wrote works of scholarship, now lost.

JUBBULPORE, JABALPUR (23° 9′ N., 79° 58′ E.), town, Central Provinces, India; manufactures cotton, carpets. Pop. (1911) 160,651. J., district, has area *c.* 3920 sq. miles. Pop. 685,000. J., division, has area *c.* 18,600 sq. miles. Pop. *c.* 2,090,000.

JUBILEE YEAR, celebration in R.C. Church every 25th year, when faithful are granted indulgence if they visit specified churches; 'extraordinary' jubilees on special occasions are also held.

JUBILEE, YEAR OF, the 50th year, which, it is commanded in *Leviticus* 25, should always be observed by not gathering then the harvest—even of wild fruits or plants; nor was there to be sowing or reaping; property which had been alienated was to be restored; these regulations were not observed.

JUBILEES, BOOK OF, Old Testament apocryphal book, written about II. cent. B.C., to defend Judaic nationalism against encroachments of Hellenic civilisation. The Jewish law had existed in heaven from eternity; its author, a Pharisee, believed in gradual coming of Messianic age; book is preserved in an Ethiopic version, and fragments in Gk., Latin, and (possibly) Syriac; Latin and Ethiopic were made from Gk.; original language probably Hebrew.

Charles, *The Book of Jubilees or the Little Genesis*.

JUCAR (39° 10′ N., 0° 13′ W.), river, E. Spain; flows to Mediterranean.

JUDÆA, term applied to S. Palestine in time of Christ.

JUDAH (31° 30′ N., 35° 15′ E.), district of ancient Palestine, between Philistia and Dead Sea; belonged to tribe of Judah in Old Testament times; tributary to Egypt, 608 B.C.; conquered by Babylon, 587 B.C.; by Greece, *c.* 333 B.C.; by Rome, *c.* 63 B.C. See JEWS.

JUDAS ISCARIOT was chosen as one of Apostles by Christ (meaning of *Iscariot* uncertain, perhaps *man of Kerioth*); given thirty pieces of silver for betraying Christ. According to *Matthew* 27^5, Judas repented and hanged himself; according to *Acts* 1^{18}, he burst asunder; his place in the Twelve was filled by Matthias.

JUDAS TREE (*Cercis*), genus of tree of order Leguminosæ; *C. siliquastrium*, a S. European tree with rose-coloured flowers, is, in legend, the tree on which Judas hanged himself.

JUDE, Epistle written in the name of Jude, bro. of James, bro., therefore, also of Christ; whether actually written by him is doubtful, for its attestation is not particularly strong. It was accepted by 200 A.D., witness the Muratorian fragment on the Canon. Origen, Tertullian, and Clement of Alexandria quote it. It presents close literary parallels with *2 Peter*, and the probability is that *2 Peter* is dependent on Jude, though some scholars invert the relation. Jude quotes the apocryphal Book of *Enoch*.

Commentaries by Bigg in *International Critical Commentaries*; Bennett in *Century Bible*.

JUDGE, an officer of the law whose chief functions are deciding on points of law, and passing of sentence. In England *Puisne* j's of the High Court must be barristers of not less than ten years' standing; County Court j's, barristers of not less than seven years' standing.

JUDGE-ADVOCATE-GENERAL, Eng. judge who advises the Crown in military matters; title of two officers in the U.S.A. War and Navy Departments respectively, who control administration of martial law.

JUDGES, BOOK OF, so named from the 'Judges' who ruled over Israel. 1^1–2^5 contains an account of the land itself; 2^6–16 gives in detail the history of the thirteen judges. Reckoned consecutively with the intervals between them, the total period of the judges would be 410 years. But, as this is far too long, it is probable that several may have been contemporary, and the author has pieced the separate stories into one continuous narrative. Chapters 17–21 contain a sort of appendix. The book shows traces of the incorporation of older materials. The 'Song of Deborah' is among the most ancient parts of Old Testament lit.

Moore, *Judges* in *International Critical Commentaries*; Thatcher, in *Century Bible*; Driver, *Introduction to Old Testament Lit.*

JUDGMENT, see PSYCHOLOGY.

JUDICATURE ACTS, Eng. statutes, simplifying legal procedure; first enactment, Supreme Court of Judicature Act, passed 1873; subsequent Acts passed on various dates between 1875 and 1899. Under these Acts all the courts now sitting at Royal Courts of Justice in Strand were united and consolidated into one Supreme Court of Judicature, consisting of two permanent bodies, Court of Appeal and High Court of Justice. Latter is divided into three sections: (1) Chancery; (2) King's Bench; (3) Probate, Divorce, and Admiralty.

JUDICIAL COMMITTEE, see PRIVY COUNCIL.

JUDICIAL SEPARATION, see DIVORCE.

JUDITH, BOOK OF (Apocrypha), religious romance; relates saving of Jerusalem by Judith, who kills Holofernes, general of Nebuchadnezzar; hardly historical; its date may be Maccabæan, or more probably *c.* 50 B.C., as it somewhat resembles *Psalms of Solomon*.

JUDSON, ADONIRAM (1788–1850), Amer. Congregationalist minister; missionary to Burma, 1812; became Baptist; translated Bible into Burmese; one of earliest and most important of Amer. missionaries.

JUEL, JENS (1631–1700), Dan. diplomatist; ambassador to Sweden, 1660–68, 1672, 1674, 1697; approved of Griffenfeldt's policy of alliances to isolate Sweden; established ostensible friendship with Sweden.

JUEL, NIELS (1629–97), Dan. admiral; commander of first rank; by victories over Sweden temporarily relieved humiliating position of Denmark; won battle of *Kjöge*, 1677, against enormous odds.

JUGGERNAUT, town in Bengal, famous for annual rites, when idols of Hindu gods are drawn outside the city; formerly accompanied by immorality and human sacrifice.

JUGURTHA (II. cent. B.C.), king of Numidia; served in Numantia, 134 B.C.; co-ruler of Numidia with his cousins, Hiempsal and Adherbal, 118; assassinated former, defeated and killed latter, 112; waged war with success against Romans, 110; subsequently defeated by Quintus Metellus; finally captured by Marius and put to death at Rome, *c.* 104.

JUJU, W. African generic term for any kind of charm; a witch-doctor may 'lay' j. on a man or object; the man probably dies. The object is considered sacred, hence j. in certain cases resembles taboo (*q.v.*).

JU-JITSU is defined by Inazo Nitobe in *Bushido: the Soul of Japan*, as 'an application of anatomical knowledge to the purpose of offence and defence. It does not depend upon muscular strength, but consists in clutching or striking such part of an enemy's body as will make him numb and incapable of resistance.' Incapacity, not death, is its object.

JUJUBE (*Zizyphus*), shrubs of order Rhamnaceæ; fruit of *Z. vulgaris*, when dried, is a sweetmeat. J. sweets, made of sugar and gum-arabic, have no connection with plant.

JUJUY (23° 30′ S., 66° 30′ W.), province, N.W. Argentina, S. America; mountainous; produces salt, gold, silver-lead, copper, petroleum, cereals. Pop. (1910) *c.* 62,400. Chief town, Jujuy, has pop. *c.* 6000.

JULIAN (331–63), 'THE APOSTATE,' Rom. emperor; s. of Julius Constantius and nephew of Constantine the Great; obtained title of Cæsar and governorship of Gaul, 355; gained great victory over Alemanni, 357, and reduced Frankish tribes to submission; became emperor in 361, and proclaimed toleration of all religions, while personally preferring paganism to Christianity. In 363 he prepared to invade Persia; and, having led a powerful army through Mesopotamia and Assyria, crossed the Tigris and prepared to besiege Ctesiphon, but abandoned project, and marched inland to meet Shapur II.; was surrounded by Persian army, and mortally wounded. He was remarkable as last champion of paganism.

JULIAN CALENDAR, see CALENDAR.

JÜLICH, JULIERS (50° 55′ N., 6° 21′ E.), town, Rhenish Prussia, Germany; formerly fortified; manufactures sugar. Pop. (1911) 6620. Was capital of former DUCHY OF JÜLICH, created 1356, succession to which was question of great political importance in XVII.–XVIII. cent's; annexed by France, 1801; acquired by Prussia, 1814.

JULIEN, STANISLAS (*c.* 1797–1873), Fr. Chinese scholar; great gift of tongues; librarian at Fr. Institut (1827); Conservateur of Royal Library (1839); administrator of the Collège de France (1859); wrote on Taoism and Buddhism, and trans. many important Chin. works.

JULIUS I., pope; elected to papal chair, 337; supported Athanasius in Arian dispute.—**Julius II.** (1443–1513) became pope, 1503; banished Cesare Borgia from Italy, and recovered Romagna; arranged league of Cambrai with Maximilian I. and Louis XII. against Venice, 1508; subsequently concluded Holy League against France, 1511; opened 5th Lateran council; encouraged the fine arts and lit.—**Julius III.** (1487–1555), pope, 1550; favoured Jesuits; founded Collegium Germanicum.

JULLUNDUR, JALANDHAR (31° 19′ N., 75° 28′ E.), town, Punjab, India. Pop. 69,000. District has area *c.* 1330 sq. miles. Pop. 920,000.

JULPIGOREE, see JALPAIGURI.

JULUS, a genus of Millipeda. See MYRIAPODA.

JULY, 7th month of year; *Quintilis* (5th month) in Rom. calendar; named after Julius Cæsar, who fixed days at 31.

JUMIÈGES (49° 27′ N., 0° 49′ E.), town, Seine-Inférieure, France; ruined Benedictine abbey.

JUMILLA (38° 27′ N., 1° 18′ W.), town, E. Spain. Pop. 16,700.

JUMMOO, see JAMMU.

JUMNA, JAMUNA (25° 20′ N., 81° 57′ E.), river, N. India; rises in W. Himalayas, flows S. through Silawik Hills to form boundary between Punjab and United Provinces; turning S.E., it crosses United Provinces, and unites with Ganges near Allahabad.

JUMPING.—(1) high jump; competitor must clear bar and land on his feet for fair leap; each allowed three attempts; (2) long jump from mark; ground is broken to allow easy descent; competitors must not overstep mark, and must maintain balance on alighting.

JUMPING MICE, see JERBOAS.

JUNAGARH, JUNAGADH (21° 29′ N., 70° 22′ E.), town, Bombay, India. Pop. 34,500. JUNAGARH, feudatory state, has pop. 397,000.

JUNCTION CITY (38° 40′ N., 96° 50′ W.), town, Kansas, U.S.A.; flour-milling. Pop. (1910) 5598.

JUNE, 6th month of year; 4th in Rom. calendar, where it had 26 days; Julius Cæsar added 4 days.

JUNEAU (58° 20′ N., 134° 25′ W.), town, Alaska, N. America; formerly called HARRISBURG; gold mines. Pop. (1910) 1644.

JUNG-BUNZLAU (50° 25′ N., 14° 24′ E.), town, Bohemia, Austria; former seat of Moravian sect. Pop. (1911) 16,340.

JUNGERMANNIALES, see under BRYOPHYTA.

JUNGFRAU (46° 32′ N., 7° 58′ E.), mountain, Bernese Oberland, Switzerland (13,669 ft.); J. means the 'maiden.'

JUNIN (10° 53′ S., 75° 28′ W.), central department, Peru, S. America. Pop. *c.* 305,000.

JUNIPER, coniferous shrubs possessing needle-shaped leaves in the majority of cases (e.g. *Juniperus communis*). *J. Sabina* has closely packed scaly leaves, like the cypress, but exhibits the simpler type in the seedling. The so-called 'berry' is due to the cone scales becoming fleshy on ripening. The berries are used for flavouring gin (see SPIRITS), which derives its name from j. From the unripe nuts is obtained the oil of j.

JUNIUS, pseudonym of contributor of *Letters of Junius to Public Advertiser*, London, 1769–72; attacked George III. and his ministers in a way that showed the author knew the inner secrets of the government; attributed to several politicians, Burke, Wilkes, Temple, Horne, Tooke, etc., especially Sir Philip Francis, enemy of Warren Hastings. As lit. the letters are bombastic and cheaply rhetorical, arrogant, and scurrilous, although tricks of style and rhythm to some extent redeem them.

Francis, *Junius Revealed* (1894); Smith, *Junius Unveiled*.

JUNIUS, FRANZ, two Huguenot scholars.—(1) the elder (1545–1602) made a famous translation of the Old Testament (1590). (2) son of the above; a theologian and an authority on Old English and the old Teutonic languages.

JUNO, see HERA.

JUNOT, ANDOCHE, Duke of Abrantes (1771–1813), Fr. soldier; served in Italy and Egypt under Napoleon; in 1807 commanded Fr. force which invaded Portugal and captured Lisbon; gov. of Portugal, 1807; expelled by Wellington.

JUNTA, Spanish word for an assembly of men.

JUPITER, the largest planet; mean distance from sun, 483 million miles; period, 11·86 years; rotation period, about 10 hours; diameter, nearly 11 times that of earth; has five satellites, whose orbits lie almost in that of J.; surface shows belts of dark and light shade, which are usually parallel to each other, undergo quick changes, and seem to merge into one another. Different spots, even in the same latitude, have different periods of rotation, and hence it is reasonable to suppose we see the gaseous envelope of the planet, and not its actual surface. The great 'Red Spot' of J. (first observed, 1877) has persisted up till now, though it has often faded and been lost since then. The spot is to be found at the southern edge of the great equatorial belt. From rapid changes which constantly take place in J.'s atmosphere, it is seen that J. itself must possess great internal heat. See Planets, Astronomy.

JUPITER, Jove, identified with Gk. Zeus, was the chief deity of the Romans. He was regarded as the lord of heaven, wielding thunder-bolts and casting lightning. His chief temple as guardian of the Rom. people was situated on the Capitol, and his formal title was J. Optimus Maximus. At the temple of J. on the Capitol ended the great triumphal processions, and the victorious general sacrificed white oxen to the god.

JURA (*c.* 47° N., 6° 30′ E.), mountain range stretching from N.E. to S.W. along borders of France and Switzerland between Rhine and Rhône for nearly 200 miles; forms a high plateau rising in several parallel chains to heights of from 5000 to over 5600 ft. above sea-level. Highest peaks are Crêt de la Neige and Reculet, both over 5600 ft., La Dôle and Mont Tendre, over 5500 ft. Climate varies with elevation. N. part is well wooded, and chain is crossed by several railways. Rivers rising here are Ain, Creuse, Doubs, Loue, Orbe, some of which disappear into ground, reappearing at considerable distance. Geological composition is chiefly limestone, range giving its name to *Jurassic* system; caves frequently occur, some of which have fine stalactites. The German Jura begin at the Rhine and run N.W. for some 300 miles to the Main valley, in two ranges—the *Schwäbischer Jura* and the *Fränkischer Jura.*

JURA (46° 45′ N., 5° 40′ E.), E. department, France; area, *c.* 1950 sq. miles; drained by Doubs, Ain, Orbe; large forests; vines, cereals, cheese, salt. Pop. (1911) 252,712.

JURA (55° 57′ N., 5° 55′ W.), mountainous island, Inner Hebrides, Scotland.

JURASSIC, series of Mesozoic rocks, which includes the Lias and overlies the Oolites; well developed in Jura Mts.—hence name; found in Yorkshire from Tees to Filey, Lincolnshire, across Midlands to Bristol Channel, and again at Lyme Regis; also seen in Germany, Caucasus, Spain, and India. *Life of period*—Land plants: conifers, ferns, cycads, and equisetums. Animal life: Foraminifera, corals, crinoids, and starfish. Crustaceans: decapods and crabs. Insects: forms of grasshopper, cockroach, earwig, ant, and fly. Reptiles: very abundant, including turtles, lizards, and crocodiles. Sea saurians: Ichthyosaurus, Plesiosaurus. See Geology, Reptiles.

JURAT, term applied to certain officials in Channel Islands.

JURIEU, PIERRE (1637–1713), Prot. theologian, ordained in Anglican Church, then in France; prof. at Sedan and Rotterdam; an able controversialist.

JURISPRUDENCE (Lat. *jurisprudentia,* knowledge of the law) is best defined as 'the formal science of positive law' (T. E. Holland). In ancient Rome, Republican and Imperial, the *jurisprudentes* were men skilled in law, who foretold what the legal issue would be in novel and doubtful cases, and the *jurisprudentia* was the body of law built up and developed by their interpretations. But in modern times John Austin's *Province of Jurisprudence Determined,* and the work of Holland, Maine, Pollock, and others, have brought a general acceptance of the definition above. According to Austin it was the function of j. to distinguish between laws proper and improper; to determine what are the essential elements in our conception of law; to analyse and define the relations of law to rights and duties. J. has nothing to do with what are called 'natural laws,' and it carefully distinguishes between 'commands' and 'laws,' and between positive law and the 'laws of God,' 'the dictates of the heart,' the 'light of reason,' and all other similar authorities that claim the obedience of man. Positive law is not exclusively a matter of legislation; it may be common law, the result of custom, or it may be the work of judicial decisions—judge-made law.

Although the great 'analytical' school, as it is called, represented by Hobbes and Austin and their followers, maintains that j. is only concerned with positive law, another school, the natural-law jurists, argue that law is antecedent to the State, is to be grasped by pure reason, and is only the application of ethics to everyday life. This school has the foundations of its doctrines in the Stoic philosophy and the Roman j., and it was predominant in the XVII. and XVIII. cent's, when the natural rights 'of men,' a mythical state of nature, and the republican 'democracies' of classical Greece and Rome were the watchwords of revolutionaries and the ideals of political reformers. In the XIX. cent. *natural* rights had to be given up before the scientific knowledge that revealed evolution, and all the false teaching built up on an alleged primitive happiness in nature crumbled. Only in the U.S.A. to-day can any considerable number of natural-law jurists be found.

Analytical j., by insisting on the importance of authority as a condition of positive law, helped to get an answer to the question that troubled legal and political philosophers in the XVII. cent., viz., Where sovereignty resides? It showed that authority was here and there strong enough in custom to compel obedience to law, and that in other places it was found in the duly qualified legislator or the duly appointed judge. Thus the influence of this j. can be seen very plainly in the theories and practice of Brit. j.—Whig constitutionalists, with their checks and safeguards in the relations of the Crown, and Parliament, and people. Yet Hobbes, the first to declare the principles of analytical j., was equally convinced that absolute monarchy alone gave the stable authority that could ensure obedience to law, and his teaching has been generally the doctrine of Toryism.

Comparative Jurisprudence is concerned with historical methods and the study of the evolution of law. It demands that each existing system of national law shall be studied historically and scientifically, and that the various national systems shall be compared at similar stages of development. It seeks to learn the origin of all legal institutions. Then by the knowledge of origins and by comparisons the normal course of legal development may be discovered, and that which is universal and human be distinguished from that which is local, tribal, or peculiar to a particular nation or a special stage of development. So we get at the idea of a history of the legal institutions and decrees of the world. Here the absorbing question is, of course, not, What is law? but, Do general common principles of law exist amongst the peoples of the world? The studies of legal historians and ethnologists are mutually assistant on this point, and in the region of early family customs and primitive marriage law (for instance) an enormous number of interesting facts have been collected. One result of all these investigations is the obstacles they set up against hasty generalisations on the subject of primitive man. Leaving out of the discussion all question of Divine Providence, comparative j. shows that all sorts of

causes may be responsible when a similar law is found in widely different communities. By various experiments civilised nations and savage tribes achieve law. Savage tribes are seen to be in different stages of development, differing as widely in customs and habits as the nations of Europe, so that it becomes worse than useless to argue from present-day customs of savage tribes to the institutions of primitive man in Europe. Many tribes and nations have remained in a backward state of civilisation through missing the right experiment in social progress, or through failing to discern the significance of some experiment.

Another important point brought out by comparative j. is the steady stream of borrowing of race from race, and the power of racial influence on race, that have been at work from the beginning of human intercourse in the world, and throughout the ages. The susceptibility to influence and the readiness to borrow ideas from more highly developed races and nations are seen as vividly in legal institutions as in social customs.

Of the early periods of the world comparative j., assisted by the scientific investigations of the historian and ethnologist, has added to our knowledge, and still more has taught us how to avoid false generalisations, and the lines of work for further knowledge. At the present time the Fr. Société de Législation Comparée publishes monthly and annual reports of home and foreign legislation, while the *Journal* of the Brit. Society of Comparative Legislation is concerned with the progress of legislation throughout the Empire.

J. Austin, *Lectures on Jurisprudence*; T. E. Holland, *Elements of Jurisprudence*; Sir F. Pollock, *A First Book on Jurisprudence*; Sir H. Maine, *Early History of Institutions*.

JURY, a body of men, selected according to law, whose function it is to decide, under the guidance of a judge, what is the truth in questions of fact arising in the course of a trial, whether in a civil or a criminal case. In civil cases, either a *common* or a *special* j. is summoned. In the majority of cases the former is the method; but either plaintiff or defendant may apply for a special j., and the applicant is liable to the costs over and above those which would have been incurred had a common j. been engaged, unless the judge specially certifies for a special j. If he so certifies, then the costs of the special j. fall in the ordinary way on the loser of the action. Every man in England and Wales between the ages of twenty-one and sixty, possessing property to the extent of £10 freehold, or £20 leasehold, or being assessed to the Poor Rate at £20 (Middlesex £30), is liable to serve in his county as a *juryman*. In the city of London the qualification is £100. Peers, Members of Parliament, professional men, and public servants are exempt. *Special jurymen* are either esquires, knights, or baronets, or bankers, or persons of considerable property. A duly summoned juryman failing to attend, and not showing reasonable cause for absence, is liable to a fine. Women cannot act on a j. except to determine whether a woman convicted of murder is pregnant. For that purpose a j. of matrons is empanelled, for no pregnant woman can be sentenced to death.

In criminal cases a *grand* j. of not more than twenty-three and not less than twelve persons decides whether there is a *prima facie* case for a *petty* j. in the case of every person committed for trial at the sessions or assize. In County Court cases when the claim exceeds £5 either party has the right to demand trial by j., and even in cases under £5 the judge may order a j. to be summoned. A *Coroner's* j. consists of not less than twelve, nor more than twenty-three, 'good and lawful men,' summoned to decide under the Coroner's guidance the cause of death where no medical certificate has been granted.

JUS GENTIUM, see ROME (LAW).

JUS PRIMÆ NOCTIS, supposed mediæval privilege of overlord to deflower vassal's daughters on their wedding night; relic of barbarism; no traces of legal foundation can be discovered.

JUSSERAND, JEAN ADRIEN ANTOINE JULES (1855–), Fr. writer; ambassador to U.S.A. (1902–); brilliant critic of Eng. lit.; authority on Shakespeare.

JUSSIEU, DE, Fr. family of botanists.—ANTOINE (1686–1758) edit. Tournefort's *Institutiones rei herbariæ*. BERNARD (1699–1777) arranged plants in Trianon. ANTOINE (1748–1836) wrote *Genera Plantarum*, foundation of modern classification of plants. ADRIEN (1797–1853) wrote *Botanique*, a hand-book. LAURENT (1792–1866) wrote *Simon de Mantua*.

JUSTICE OF THE PEACE, 'J.P.', title of the petty county or borough magistrate, who sits to administer summary justice in minor matters, and to see that the peace is kept; first app. by Edward I., 1327, and now app. by the Lord Chancellor; property qualification for the office abolished 1906.

JUSTICIAR (judge).—From reign of Henry II. king's chief minister was called chief j.; originally officer who acted in king's absence; after 1231 j.'s place was taken by chancellor.

JUSTICIARY COURT, highest Scot. criminal court; usually sits in Edinburgh; circuit courts 6 times a year in Glasgow, 4 in Perth, Aberdeen, Dundee, 2 in Inverness, Ayr, Jedburgh, Dumfries; judges are those of Court of Session; no appeal to House of Lords.

JUSTIFIABLE HOMICIDE, see MURDER.

JUSTIN I. (450–527), Roman emperor, 518; uncle of Justinian.

JUSTIN II. (d. 578), Rom. emperor, succeeding his uncle Justinian, 565; defended Italy against Lombard attacks.

JUSTIN MARTYR (fl. II. cent.), one of 'Apostolic Fathers'; b. in Samaria; lived at Ephesus; after being Stoic and Pythagorean, converted to Christianity; then went to Rome, where he was martyred c. 165; addressed his *Apology* to Emperor Antoninus, wherein he meets Pagan attacks on Christianity; wrote also *Dialogue with Trypho the Jew*, very valuable for history of early Christian thought and worship, and for Old and New Testament Canon.

JUSTINIAN I., FLAVIUS ANICIUS JUSTINIANUS (483–565), Byzantine emperor; b. at Tauresium, Illyria; of barbarian extraction, but was adopted by his uncle, Justin I., whom he succ. on imperial throne, 527. By the aid of his wife Theodora, who exercised great influence over him, and of his two great generals, Belisarius and Narses, who subdued the Vandals and Ostrogoths in Africa and Italy, he restored these countries to the Byzantine empire; but his war against Chosroes of Persia was unsuccessful, and he could only obtain peace by agreeing to pay an annual tribute. After the foreign wars the most notable event of his reign was the outbreak of the Nika riot at Constantinople in 532, which was eventually put down with great severity.

J. is best known for the thorough revision of the whole system of law which he caused to be made; he appointed commissioners to draw up codes both of the *jus novum*, or later imperial statutes, and of the *jus vetus* or earlier ordinances; this resulted in the publication of four legislative works, which under the collective name of *Corpus Juris Civilis*, constituted the Rom. law in Europe for the next four cent's. The *Corpus Juris Civilis* includes: (1) The *Institutiones*, an introductory treatise, pub. 533; (2) the *Codex Constitutionum*, a compilation of imperial ordinances, pub. 529; (3) the *Pandects*, or *Digesta*, a selection of earlier decrees and writings, pub. 533; and (4) the *Novellæ Constitutiones*, containing subsequent reforms and amendments and pub. between 535 and 565. J.'s reign was also marked by the building of many forts and strengthening of the Empire's frontiers; he also built many palaces and churches, of which most famous is the Church of St. Sophia at Constantinople, now used as a mosque. His extravagance in these matters made necessary the severe taxation of his subjects, which caused revolts

on various occasions. During most of his life J. was an orthodox Christian, and persecuted heathens and heretics with considerable severity.

Holmes, *Age of Justinian and Theodora* (1905); Bury, *Later Roman Empire* (1889).

JUSTINIAN II. (669–711), Eastern emperor, 685 to 695, when he was deposed; ruled again from 704.

JUSTINUS JUNIANUS, wrote history of Macedonia; lived (probably) in II. cent.

JUTE (*Corchorus capsularis*), an annual plant belonging to the family of Brit. lime tree (*Liliaceæ*). It produces little-branched stems, growing to a height of about 12 ft., and a thickness of 1½ in. On these are borne fairly large leaves, lance-shaped, and with serrate edges. The flowers are yellowish in colour, and occur in clusters. The plant is a native of Bengal, and has been cultivated in India for many thousand years. Of late, attempts have been made to grow it in other tropical countries where the climatic conditions are suitable—it requires moisture, and an even, fairly high temperature. Economically it is important as yielding a fibre which may be manufactured into coarse cloth. In Bengal it is sown in March and cut four months later. The stems are freed from foliage, and rotted in slow-running water. After a few days they are beaten to break up the wood, and combed to separate out the bast fibre. This is pressed into bales for export. The export of j. from India to the United Kingdom amounted in 1911 to almost £6,000,000. J. was first made known to this country in 1795, but only in 1830 was much attention paid to it. In that year it began to be manufactured in Dundee, and since then Dundee has possessed the most extensive jute-mills in the world. It is used for the manufacture of sacking and other coarse fabrics. For India it is fortunate that a great decrease in domestic consumption—due to the introduction of cotton, which soon usurped the place of jute as a clothing for the natives—was accompanied by an enormous increase in export trade.

JÜTERBOG, GÜTERBOG (51° 59′ N., 13° 2′ E.), town, Brandenburg, Prussia. Pop. (1910) 7634.

JUTIGALPA, JUTICALPA (14° 55′ N., 85° 30′ W.), town, Honduras, Cent. America. Pop. (1910) 17,800.

JUTLAND (56° 30′ N., 9° 20′ E.), peninsular province, Denmark; area, *c.* 9898 sq. miles; surface generally level, rising to 560 ft. in S.E.; large part of area under wood; drained by Gudenaa, Skjerne, and other streams. Chief centre of Baltic trade is Aarhus. Pop. (1911) 1,198,457.

JUVENAL, DECIMUS JUNIUS JUVENALIS (*c.* 60–140 A.D.), Rom. satirist. There is not a reliable biography extant, but the following statements, taken from the many existing 'lives,' are probably near the truth: b. Aquinum, s. of prosperous freedman; successful as amateur declamator; aroused anger of prominent actor, favourite of emperor; banished (possibly to Egypt, in military capacity) at an advanced age. An inscription, relating to the dedication of an altar to Ceres by Junius Juvenalis, was found at Aquinum; this man, who may have been the poet, was tribune of 1st Dalmatian cohort and provincial magistrate.

J.'s *Satires*, 16 in number (collected into 5 books), were probably composed between 100 and 130; they deal mainly with abuses prevalent in Domitian's reign; the sixth is slashing condemnation of woman.

J. possesses considerable graphic and descriptive force; undoubtedly coarse in parts, and his intimate knowledge of contemporary vice, coupled with a reference in Martial, seem to indicate that his own character was not above reproach. He has, however, a genuine hatred of the tyranny and savage cruelty and, above all, the vile system of espionage (*delatio*) which at that time characterised the Rom. Empire.

JUVENILE OFFENDERS.—By the Summary Jurisdiction Act, 1879, and the Children Act, 1908, juvenile offenders are to be tried summarily, instead of being committed for trial by jury. Special juvenile courts of summary jurisdiction were established by the Act of 1908, and to these courts children under 14, and 'young persons' between 14 and 16, charged with offences against the law are brought. A child under 16 cannot be sentenced to death, or sent to penal servitude. Children under seven years of age are held incapable of committing a crime. Children between 7 and 14 years of age are also held to be incapable of committing a crime unless it can be shown that the child has sufficient capacity to know that the act is wrong. The law presumes that between these ages innocence still continues; but if it can be shown that malice, revenge, or cunning exist, then the doer of the act is held responsible—*Malitia supplet ætatem.* Any children's court may order the parent or guardian of a child under 16 to pay the fine, damages, or costs imposed on a j. o. Male j. o's between 7 and 14 years of age may be punished by strokes with a birch rod, and j. o's of either sex convicted of a crime punishable by imprisonment may be sent to an industrial school if under 12, or to a reformatory if over 12 and under 16. The cost of maintaining a child, or young person, in a reformatory or industrial school may be recovered from parent or guardian. Children under 14 found begging, or destitute, or in the company of thieves and prostitutes, or who are beyond parents' or guardians' control, may also be sent to an industrial school.

K, 11th letter of alphabet, was evolved from Egyptian symbol for a bowl; generally replaced by *C* in Lat. alphabet derivatives; first seen in England in XII. cent.

K$_2$, Mt. Godwin-Austen (35° 54′ N., 76° 30′ E.), mountain, Muztagh Mountains, Himalayas; second highest in world—*c.* 28,260 ft.

Ka'ba, see Mecca.

Kabardia (43° 20′ N., 43° 30′ E.), district, Terek, S. Russia; horses bred; inhabited by Circassian race. Pop. *c.* 70,000.

Kabba (*c.* 7° 55′ N., 6° E.), province, Brit. N. Nigeria; cereals, rubber, tobacco, indigo, tin. Pop. *c.* 70,000.

Kabbabish, an Egyptian Arab tribe.

Kabbalah (late Hebrew, *received lore*), name given to a body of Jewish theosophy and mysticism, traditionally supposed to have been handed down from the patriarchs. It owes its origin to a conglomeration of Jewish, Gk., Egyptian, and Babylonian elements in Alexandria about I. cent. B.C. The chief doctrine of the K. is its cosmogony. There are ten *Sephiroth*, or emanations from God; these are the heavenly man, the archetype of man on earth. God is called *En Soph*, the boundless one, and created the universe through the Sephiroth (intelligences). The universe consists of four worlds, and last of all came man. These ideas are all said to be in the Scriptures, but to obtain them resort was had to mystical and allegorical exegesis paralleled elsewhere, *e.g.* in Philo. The influence of the K. in Judaism has been on the whole good, as it formed a counteractive to formalistic tendencies. But it sometimes led, as mystical ideas have done in Christianity, to neurotic and exaggerated forms of piety, and to the practice of magic and much superstition. As the K. contained Messianic conceptions similar to Christian, but not elsewhere developed in Jewish theol., it was much studied by Christians, particularly in the XV. and XVI. cent's.

Schechter, *Studies in Judaism*; elaborate article, *Cabala*, in *Jewish Encyclopædia*.

Kabinda, Cabinda (*c.* 5° S., 12° 25′ E.), detached part of Portug. colony of Angola, W. Africa, on coast between Belg. and Fr. Congo. Chief town, Kabinda (5° 35′ S., 12° 15′ E.). Pop. *c.* 10,000.

Kabir (d. *c.* 1449), Ind. reformer; at first Muhammadan; after his death both Muhammadans and Hindus asserted he belonged to them, and his teaching was undoubtedly syncretistic; believed in a personal God, and thought falsehood was the root of all evil; thought by some that his teaching was ultimately in part derived from Christianity, which penetrated into India.

Kabul (34° 53′ N., 69° E.), capital, Afghanistan (*q.v.*), on K. River; an ancient town containing high citadel and Emir's palace. Situated on trade route between Central Asia and Punjab, K. has large transit trade; was known to Greeks through Alexander the Great by Ind. campaign; was seized by Timur, 1394; by Nadir Shah, 1739; destroyed by British, 1842; occupied by Lord Roberts, 1880. Pop. *c.* 145,000.

Kabul River (34° 20′ N., 70° 50′ E.), river, Afghanistan; source in Hindu Kush; joins Indus.

Kabyles, Berber tribes of N. Africa, akin to, but not the same as, Arabs. They belong to Islam, and have no written lit.

Kach Gandava, Kachhi (28° 30′ N., 68° 10′ E.), level district, Baluchistan. Pop. 86,000.

Kachin Hills (*c.* 26° 15′ N., 97° 30′ E.), hill region, N. Burma, Farther India; area, *c.* 19,180 sq. miles; crossed by several mountain chains; watered by Irrawady; inhabited by numerous native tribes. Pop. 66,000.

Kadur (*c.* 13° 30′ N., 75° 30′ E.), district, Mysore, India; well forested. Pop. *c.* 367,000.

Kaempfer, Engelbrecht (1651–1716), Ger. physician and traveller; went in an embassy from Charles XI. of Sweden to Persia, travelling through Russia; voyaged to Arabia, India, Java, Siam, and Japan, where he remained two years; returned to Europe, 1693, and practised med. in his native town, Lemgo; from his unpub. MSS. a valuable history of Japan was prepared.

Kaffa (*c.* 7° 30′ N., 36° 40′ E.), region, N.E. Africa; tributary to Abyssinia; produces coffee; chief towns, Bonga, Jiren.

Kaffirs (sometimes spelt *Caffres*), an African Bantu race, which, including Zulus and Kaffirs proper, forms the bulk of the natives of S. Africa. The name is Arabian, and signifies 'infidel,' *i.e.* who refuses the creed of Islam. A K. *kraal* consists of conical huts, and while the men mind the cattle the women work on the land. At intervals throughout the XIX. cent. Great Britain was engaged in suppressing this stalwart and warlike people, and in annexing their land. On the Stock Exchange *Kaffirs* is the name given to S. African mining shares.

Kidd, *Kaffir Socialism*; Stow, *Native Races of South Africa*.

Kaffraria, old name for region of S. Africa now called Transkeian Territories (*q.v.*).

Kafiristan (35° 30′ N., 71° E.), district, Afghanistan. Its history, both early and modern, is veiled in obscurity, although country is occasionally mentioned by travellers. K. came into contact with British in XIX. cent. Brit. government formally acknowledged it to be under Afghan control in 1895, since when it has been ruled by the Amir, concerning whose methods of enforcing his authority and the Muhammadan religion the rest of the world remains in ignorance. K., roughly speaking, is bounded by Hindu Kush Mt's, Chitral, Kabul, and Panjshir Rivers; area, *c.* 5000 sq. miles. Surface is mountainous, with numerous narrow glens and valleys between the hills; drained by various affluents of Indus and Kabul, of which largest is Bashgal. Climate is hot in summer, severe in winter. Inhabitants are called Kafirs, from Muhammadan word, meaning infidel; they include many tribes of same race; of medium height and brown in colour, though some of the mountain tribes are fair. Native religion was a low form of animism, but it is probable that this has been suppressed and Muhammadanism enforced since the establishment of Afghan rule. Men wear garments made of goatskin. Women, who are, comparatively speaking, of low stature, wear woollen robes; they hold an inferior position, and carry out great deal of heavy work. Polygamy is practised, and morality, in European sense of the word, is unknown. Pop. *c.* 175,000. See Afghanistan.

Robertson, *The Kafir of the Hindu Kush* (1897).

Kagera (0° 59′ S., 30° 50′ E.), river, E. Africa; head-water of Nile; enters Victoria Nyanza.

Kagoshima (35° 10′ N., 139° 36′ E.), town, Kiusiu Island, Japan; arms, cotton, pottery; bombarded by British, 1863. Pop. 63,640.

Kahlur, Bilaspur (31° 20′ N., 77° 50′ E.), native Ind. state in Punjab. Pop. *c.* 95,000.

Kahulaui, see Hawaiian Islands.

K'ai-fêng fu (34° 50′ N., 114° 35′ E.), walled town, capital of Honan, China; near Hwang-ho R.; gov.'s seat; several mosques. Pop. *c.* 180,000.

Kailas (31° 4′ N., 81° 15′ E.), Hindu sacred mountain, Tibet.

Kain.—(1) (33° 40′ N., 59° 5′ E.) walled town, Khora-

san, Persia; ruined mosque and castle. Pop. *c.* 4000. (2) sub-province, Khorasan, Persia. Pop. *c.* 150,000..

KAIRA.—(1) (22° 50′ N., 72° 50′ E.) district, Bombay, India; rice, cotton; often ravaged by famine. Pop. 720,000. (2) (22° 46′ N., 72° 37′ E.) walled town, K., India; also called KHEDA. Pop. 11,000.

KAIRWAN, KAIROUAN (35° 40′ N., 10° 3′ E.), ancient walled town, Tunisia, Africa; sacred to Muhammadans; has citadel and many beautiful mosques, of which most remarkable are Mosque of the Companion (Prophet), which stands beyond walls, and that of Okba, founder of K.; visited by many pilgrims. Pop. *c.* 24,000.

KAISER, see CÆSAR, GERMAN EMPIRE.

KAISER WILHELM'S LAND, see NEW GUINEA.

KAISERSLAUTERN (49° 26′ N., 7° 46′ E.), town, Bavaria, Germany; manufactures iron goods, cotton, woollens; here Prussians defeated French, 1793–94. Pop. (1910) 54,659.

KAISERSWERTH (51° 20′ N., 6° 48′ E.), town, Rhenish Prussia, Germany; deaconesses' house established here by Fliedner.

KAITHAL, KYTHAL (29° 45′ N., 76° 24′ E.), town, Punjab, India. Pop. 16,500.

KAKEMONO, name for Jap. picture on paper or silk, with roller at foot. They are exposed for a day only at a time, after which they are rolled up and put away. A *gaku* is a picture stretched on a frame. A folding screen with pictures painted thereon is called a *biyobu.*

Morrison's *The Painters of Japan.*

KAKODYLE, CACODYL (*q.v.*).

KALA-AZAR, DUM-DUM FEVER, tropical disease characterised by remittent fever, anæmia, and an enlarged spleen, resembling malaria, and due to a parasitic protozoon. The treatment, as in malaria, is to give quinine promptly, in doses up to 30 grs. in twenty-four hours in the early stages, and continued until slight singing in the ears is experienced, the dose being then gradually reduced, treatment being continued, however, for about three months.

KALABAGH (32° 58′ N., 71° 27′ E.), town, Punjab, India; salt and alum extensively worked. Pop. 6000.

KALACH, DONSKAYA (48° 42′ N., 43° 20′ S.), town, Don Cossacks County, Russia. Pop. *c.* 1100.

KALAHANDI (*c.* 19° 35′ N., 83° E.), native state, Bihar and Orissa, India. Pop. *c.* 355,000.

KALAHARI DESERT (*c.* 20° to 27° S., 19° to 25° E.), vast steppe region, N. of Cape Province, S. Africa, with elevation of 3000 to 4000 ft.; almost waterless; inhabited by agricultural race called *Bakalahari,* and by nomadic Bushmen or hunters; many parts covered with vegetation; cattle raised, crops grown; big game abundant.

KALAMATA (37° 2′ N., 22° 7′ E.), town, Greece; archiepiscopal see; exports silk and olive oil. Pop. 14,500.

KALAMAZOO (42° 20′ N., 85° 37′ W.), town, Michigan, U.S.A.; railway centre; machinery, flour, etc. Pop. (1910) 39,437.

KALAT (29° N., 66° 36′ E.), capital and fortress, Baluchistan; citadel contains khan's palace; occupied by British, 1839. K. district had pop. 356,000.

KALAT-I-GHILZAI (32° 20′ N., 61° 15′ E.), fort, Afghanistan.

KALBE, CALBE (*q.v.*).

KALEIDOSCOPE, optical instrument invented by Sir David Brewster (*q.v.*), 1815; consists of tube containing mirrors having their reflecting surfaces inclined at 60° or other sub-multiple of 360°; coloured glass pieces at foot of tube by reflection assume beautiful regular forms, which vary when tube is shaken.

KALEWALA, KALEVALA, see FINLAND (*Language and Literature*).

KALGAN (40° 55′ N., 114° 58′ E.), fortified town, Chih-Li, China; has extensive transit trade. Pop. *c.* 80,000.

KALGOORLIE (30° 50′ S., 123° 19′ E.), town, Western Australia; goldfields; terminus of railway from Perth; is being linked by rail with South Australia. Pop. 7000.

KALI (Hindu myth.), Ind. goddess, wife of Siva; wears a string of human heads round her neck.

KÂLIDÂSA (fl. *c.* 550 A.D.), famous Sanskrit writer; greatest work is drama *Sâkuntala* ('The Lost Ring'), which has been translated into several European languages; second to his masterpiece is *Vikramorvasi* ('The Hero and the Nymph'); two epics and several poems are also ascribed to him.

KALIF, see CALIPH.

KALIMPONG, village, Darjeeling, Bengal, India; mission centre.

KALINGA, CALINGA (*c.* 16° N., 84° 9′ E.), ancient kingdom, S. India.

KALINJAR (25° N., 80° 30′ E.), hill fortress and town, United Provinces, India. Pop. 3100.

KALISZ (51° 45′ N., 18° 5′ E.), town, Russ. Poland; episcopal see. Pop. 47,000.

KALK (50° 56′ N., 7° E.), town, Rhenish Prussia, Germany; incorporated with Cologne (*q.v.*).

KALLAY, BENJAMIN VON (1839–1903), Austro-Hungarian statesman; sent as finance minister and administrator to newly occupied province of Bosnia and Herzegovina, 1882; created national feeling and prosperity.

KALMAR (56° 39′ N., 16° 22′ E.), port and cathedral town, Sweden; former fortress. By *Union of K.,* 1397, Sweden, Norway, and Denmark were united as a single kingdom. Pop. (1910) 15,536.

KALMUCK, KALMYK STEPPE (45° 50′ N., 43° E.), region inhabited by Mongol race of same name, Astrakhan, Russia; area, *c.* 37,000 sq. miles; many Buddhist monasteries.

KALNÓKY, GUSTAV SIEGMUND, COUNT (1832–98), Austro-Hungarian statesman, who, as ambassador to Russia in 1880, and Foreign Minister, 1881–95, brought about the commercial treaty of 1894.

KALOCSA (46° 31′ N., 18° 58′ E.), town, Hungary; archiepiscopal see. Pop. 12,000.

KALPI, CALPEE (26° 6′ N., 79° 45′ E.), town, United Provinces, India; mutineers defeated here, 1858. Pop. 10,500.

KALUGA.—(1) (54° 20′ N., 35° 30′ E.) government, Russia; area, 11,942 sq. miles; surface generally flat; watered by Oka; iron and glass works, textiles, leather, cereals. Pop. (1910) 1,387,100. (2) (54° 32′ N., 36° 18′ E.) cathedral town, K., Russia; leather, tallow, K. cakes. Pop. (1910) 53,854.

KALYAN (19° 13′ N., 73° 10′ E.), town, Bombay, India. Pop. 11,500.

KAMCHATKA (51° to 61° 40′ N., 155° 40′ to 163° E.), peninsula, E. Siberia, E. of Sea of Okhotsk; area, *c.* 104,280 sq. miles; traversed by mountain range, of which notable volcanic peaks are Kluchevskaya, Belaye Sopka, Kojerevska; drained by K. and other streams; thermal springs; produces valuable furs; annexed to Russia, XVII. cent. Pop. *c.* 8000. See SIBERIA.

KAMENETS PODOLSKIY, PODOLIAN KAMENETS (48° 36′ N., 26° 30′ E.), town, Podolia, Russia; R.C. and Gk. cathedrals. Pop. (1910) 46,707.

KAMENZ (51° 17′ N., 14° 5′ E.), town, Saxony. Pop. (1910) 11,533.

KAMERUN, CAMEROON, Ger. colony, equatorial W. Africa; bounded N. by Lake Chad, E. and S. by Fr. Congo, W. by Bight of Biafra and Nigeria; area, 291,950 sq. miles. Surface generally consists of series of plateaus in interior and low-lying coastal strip. K. mountains are in N., near coast; culminate in Mongo ma Loba (13,000 ft.); drained by K. River, Sanaga, Mungo, etc. Buëa is seat of government; Duala, Victoria, and Campa are important trading stations. Administration is by imperial gov., assisted by three councillors; colony is subdivided into four administrative districts. Inhabitants include about 1300 whites, most of whom are Germans; natives include numerous Bantu tribes. Pop. *c.* 4,000,000.

Soil is extremely fertile round coast; large quantities of cocoa, copper, rubber, kola, tobacco, produced;

cattle reared; principal exports, palm oil and kernels, rubber, ivory, cocoa; imports, textiles, timber, hardware, spirits, salt; railway mileage over 300 miles. K. has been Ger. colony since 1884, when territories obtained by Ger. traders from natives were handed over to imperial government, and boundary treaties



have since been concluded with France and Britain. In 1911 the area of K. was extended by the inclusion of 107,270 sq. miles from Fr. Congo (included above), ceded by France as compensation for recognition by Germany of her suzerainty over Morocco.

René, *Kamerun* (Berlin, 1905).

KAMES, HENRY HOME, Lord (1696–1782), Scot. philosopher; pub. works on law, economics, and philosophy.

KAMMIN, Cammin (53° 32′ N., 17° 30′ E.), town, Prussia, Germany. Pop. 6000.

KAMPEN (52° 33′ N., 5° 55′ E.), town, Holland; monastic ruins and fine mediæval church. Pop. 20,000.

KAMPTEE, Kamthi (21° 15′ N., 79° 20′ E.), town, Central Provinces, India. Pop. 40,000.

KAMRUP (26° 24′ N., 91° 20′ E.), district, Assam, India; area, *c.* 3800 sq. miles; crossed by Brahmaputra; rice, timber. Pop. 593,000.

KAMYSHIN (50° 5′ N., 45° 18′ E.), town, Russia. Pop. *c*, 17,000.

KANAOKA, KOSÉ NO (fl. 928–87), Jap. artist; most famous of ancient native masters, who, breaking from Chin. influence, founded a school which remained dominant until XV. cent.; famed for landscapes, portraits, and animals. See Japan (Art).

KANARA, NORTH, Canara (15° N., 74° 30′ E.), district, Bombay, India; area, *c.* 3930 sq. miles; produces rice. Pop. 455,000. **K., South** (13° N., 75° E.), district, Madras; area, *c.* 4000 sq. miles. Pop. 1,134,713.

KANARIS, CONSTANTINE, Canaris (1790–1877), Gk. leader; fought in Gk. War of Independence; victorious in several naval battles; Prime Minister, 1864–65.

KANAUJ (27° N., 79° 55′ E.), ancient Hindu town, United Provinces, India. Pop. 19,500.

KANCHINJANGA, Kinchinjunga (*q.v.*).

KANDAHAR, Candahar (31° 36′ N., 65° 35′ E.), town, Afghanistan (*q.v.*), commanding western entrance of Bolan Pass; traditionally founded by Alexander the Great; captured in turn by Mahmoud of Ghaznai, Jenghiz Khan, Timur, Baber, Abbas, and Nadir Shah; modern town founded by Ahmed Shah, XVIII. cent.; occupied by British, 1839, 1879–81; siege relieved by Lord Roberts, 1880. Situated on main route between India and Persia, K. trades largely with Herat, Samarcand, Bokhara, and Bombay; produces silks and felts in large quantities; imports cotton goods; exports raw wool, fruit, vegetables, provisions. K. is encircled by walls; on high rock to N, is strong fortress.

KANDI (23° 58′ N., 88° 5′ E.), town, Bengal, India. Pop. 12,500.

KANDY (7° 18′ N., 80° 41′ E.), town, Ceylon; many native temples (one containing Buddha's tooth), and ruined royal palace. Pop. 27,000.

KANE, town, Pennsylvania, U.S.A. Pop. (1910) 6626.

KANE, ELISHA KENT (1820–57), Amer. explorer; surgeon to first, commander of second, expedition in search for Franklin.

KANGAROO RAT, see Pocket Gophers.

KANGAROOS, see under Marsupials.

KANGRA (32° 5′ N., 76° 16′ E.), town, Punjab, India; damaged by earthquake, 1905. Pop. 5000. K. district has area *c.* 9980 sq. miles. Pop. *c.* 786,000.

KANIZSA, see Nagykanizsa.

KANKAKEE (41° 6′ N., 87° 54′ W.), town, Illinois, U.S.A. Pop. (1910) 13,986.

KANKER.—(1) (*c.* 20° 20′ N., 81° 20′ E.) native state, Central Provinces, India. Pop. 105,000. (2) (20° 14′ N., 81° 32′ E.) town, K., India. Pop. *c.* 4000.

KANO (11° 59′ N., 8° 19′ E.), walled town, capital of K. province, N. Nigeria; has royal palace; is great

trading centre; manufactures leather, cottons, slippers, etc.; occupied by British, 1903. Pop. estimated at 100,000. K. province (*c.* 11° 38′ N., 8° 20′ E.) has area (including Katagum, with which it was united in 1905) of over 30,000 sq. miles. Pop. *c.* 2½ millions.

KANSAS (37° to 40° N., 94° 40′ to 102° 1′ W.), a central state of U.S.A.; bounded N. by Nebraska, E. by Missouri, S. by Oklahoma, W. by Colorado; area, 82,080 sq. miles. Surface generally consists of undulating prairie, rising from 800 ft. in S.E. to 4000 ft. in N.W.; drained by Kansas and Arkansas and their tributaries, flowing to the Missouri and Mississippi. Principal towns are Kansas City, Topeka (capital), Wichita, Leavenworth. Climate is healthy, although subject to occasional extremes of both heat and cold.

K. was originally inhabited by various Ind. tribes, to one of which it owes its name. It was partially explored by Span. adventurers in XVI. cent., and was held by France for some years in XVIII. cent. Greater part was included in Louisiana Purchase in 1803, and it was organised as territory of U.S. half a century later. Scene of great political struggle between slavery and emancipation parties for several years, in course of which occurred hostilities almost amounting to civil war. K. was admitted as state to Union in 1861; during Civil War supported Federalist army by sending force consisting of about one-fifth of total population. After close of war great number of settlements sprang up, and the state has since then steadily increased in prosperity. Administration is carried out by gov., assisted by six ministers; legislative authority vested in Senate of 40 members and House of Representatives of 125 members, elected by popular vote for four and two years respectively; sends to Congress two Senators and eight Representatives. Principal religious denominations are Methodist, R.C., Baptist. Education is free and obligatory. Army numbers 1512 in all.

K. is pre-eminently an agricultural state; produces large crops of maize, wheat, oats, sorghum, beet, cotton. Live stock is largely raised, horses, cattle, sheep, pigs. Minerals include vast quantities of coal; oil, petroleum, zinc, limestone, lead, salt, gypsum also found. Industries include meat-packing, flour-milling, dairying. Railway mileage is over 9000.

Inhabitants include Americans, Europeans, negroes, Indians. Total pop. (1910) 1,690,949.

Spring, *History of Kansas*; Ewing, *The Struggle for Freedom in Kansas* (1894).

KANSAS CITY (39° 7′ N., 94° 38′ W.), town, Kansas, U.S.A., on Missouri; practically part of K. City, Missouri, which it adjoins; has Methodist Univ. and other educational establishments; noted for meat-packing and live stock trade. Pop. (1910) 82,331.

KANSAS CITY (39° 7′ N., 94° 37′ W.), town, Missouri, U.S.A., on right bank of Missouri River, adjoining Kansas City, Kansas; important railway and trading centre; served by seventeen railways; has grain elevators, stockyards, meat-packing houses; deals in butter substitutes, lumber, beer, grain, and in live stock, an important show of animals being held every year; fine system of parks, various educational and charitable institutions, public library, many churches. Pop. (1910) 248,381.

KANSK (56° 20′ N., 95° 50′ E.), town, Siberia. Pop. 8000.

KAN-SUH (36° N., 105° E.), province, China; drained by Hwang-ho. Pop. *c.* 10,000,000.

KANT, IMMANUEL (1724–1804), Ger. philosopher; founder of Transcendental or Critical Philosophy; b. Königsberg, where he lived all his life. Univ. lecturer, 1755; prof. of Philosophy, 1770; of frail constitution, and prolonged life by adherence to strict routine. Chief works, *Kritik of Pure Reason*, *Theory of Ethics*, *Prolegomena*, *Kritik of Judgment*.

K.'s mental development shows three stages: (1) earliest, adherence to views of Wolff and Leibnitz; (2) partly influenced by Eng. empiricism; (3) the period of 'critical' philosophy, dating from *c.* 1770.

The critical philosophy investigates and determines the limits of reason before essaying a systematic philosophy. Through omission to do this, Wolffism attempts problems beyond the power of reason, and leads to scepticism. A distinction must be made between phenomena and noumena (things-in-themselves). Of the latter we can know nothing, not even that they exist, whence the old rational psychology, cosmology, and theology, professing knowledge respectively of the soul, the world, and God, must be rejected. Knowledge, however, is possible so long as the reason confines itself to phenomena. These phenomena exist not in themselves, but only in relation to mind, and must therefore conform to the laws of the constitution of the mind. The 'matter' of cognition is distinguished from its 'form.' The matter consists of sense-data; these are taken up and combined by the synthetic activity of the mind. The mind furnishes first, in order to perception, pure intuitions of space and time, prior to all experience and inseparable from our intelligence. Perceptions are combined by the understanding through certain *à priori* conceptions, or 'forms of synthesis' (categories—cause, existence, substance, etc.), and give a connected view of the external world. Understanding is limited to the empirical; but for Reason, the Absolute Totality of all possible experience, though itself no experience, is a necessary problem. Whence Reason contains in itself the grounds of 'Ideas' of such necessary conceptions not given in experience. These Ideas, corresponding to the forms of the Syllogism, are the Psychological (of the soul), Cosmological (of the world), Theological (of God). These make progress up to the limits of Reason necessary, and lead to contact with the void, of which we know nothing (noumena). Only in the cognition of things-in-themselves can Reason see its desire for completeness satisfied.

The distinction between phenomena and things-in-themselves is carried into K.'s ethics. All that is good is the goodwill, which is good only in virtue of the volition itself. An action, to be good, must be done from duty, *i.e.* from respect for the law. Every inclination, everything material, is excluded; the mere form, the universal conformity to law in general, alone remains. Hence the Categorical Imperative, never to act otherwise than so that I could will that my maxim should become a universal law. This law applies to all rational beings, and implies freedom of the will, for the bare form of the law can be conceived only by reason, and is not an object of the senses, so that the idea of it, which determines the will, must be independent of the natural laws controlling phenomena. The moral law thus affirms a double system of nature—sensible, existing under empirically conditioned laws, and supersensible, according to laws belonging to the autonomy of pure reason; of this latter, only freedom is known, and only in relation to the moral law. Though material principles, *e.g.* desire for happiness, are thus excluded from morality, K. postulates immortality of the soul to secure perfect accordance with the moral law, and the existence of God to secure happiness proportionate to virtue.

Sidgwick, *Lectures on Kant*; Adamson, *The Philosophy of K.* (1879); Kelly, *K.'s Ethics and Schopenhauer's Criticism* (1910); Bowne, *K. and Spencer* (1912); Stuckenberg, *Life of K.* (1882).

KAOLIN, a pure white clay, also known as *China clay*; k. is a hydrous aluminium silicate, and is used largely in manufacture of china and porcelain, rendering the paste plastic; found originally in China; first discovered in England (1750) in Cornwall.

KAPUNDA (34° 20′ S., 139° E.), town, S. Australia. Pop. 1805.

KAPURTHALA (31° 27′ N., 75° 22′ E.), native state, Punjab, India; area, *c.* 635 sq. miles. Pop. (1911) *c.* 268,244.

KARA SEA (73° N., 64° E.), part of Arctic Ocean between Novaya Zemlya and N.W. Siberia.

KARACHI, KURRACHEE.—(1) (25° N., 67° 40′ E.) district, Bombay, India; area, *c.* 12,000 sq. miles; pro-

duces rice, millet. Pop. 609,000. (2) (24° 53′ N., 66° 57′ E.) town; good harbour; trading and railway centre; exports wheat, cotton. Pop. (1911) 151,903.

KARAGEORGE, Tserni Petrovitch (*c.* 1752–1817), founder of Servian independence; stormy youth stained by murder and patricide and life of haidouk (robber chief); chosen leader of revolutionary party, 1804; Turks expelled and Belgrade captured by 1807; Russia sent reinforcements, but made peace with Turkey, 1812; Turks reoccupied Servia, 1813; assassinated; fierce, barbarous leader of genius.

KARAGEORGEVITCH, see Servia.

KARA-HISSAR, ICHJE, Isoha (40° 15′ N., 38° 22′ E.), village, Asia Minor; marble quarries. See also Afium K.-H.

KARA-HISSAR SHARKI (40° 15′ N., 38° 22′ E.), town, Asiatic Turkey; alum mines. Pop. *c.* 13,000.

KARAJICH, VUK STEFANOVICH (1787–1864), Servian author; broke away from old 'Slavonic-Servian' traditions in lit., and adopted the Servian vernacular as the literary language; best work is perhaps his songs and ballads.

KARA-KIRGHIZ, see Kirghiz.

KARAKORUM.—(1) (46° 58′ N., 102° 12′ E.) ancient capital of Uigur kingdom, Mongolia, China; ruins remain. (2) (*c.* 47° 27′ N., 102° 35′ E.) old capital of Mongol kingdom; founded, 1234.

KARA-KUL, GREAT (38° 40′ N., 72° 5′ E.), lake, Ferghana, Russian Turkestan. **Kara-Kul, Little** (44° N., 70° 30′ E.), lake, Ferghana, Turkestan.

KARA-KUM (46° N., 66° E.), desert, in Trans-Caspian province of Western Turkestan, between Amu Darya on N.E. and Persia on S.W.; area, 110,000 sq. miles.

KARAMAN (37° 9′ N., 33° 2′ E.), town, Asia Minor. Pop. *c.* 7000.

KARAMANIA (*c.* 37° N., 33° E.), region, Asia Minor.

KARAMNASA (25° 30′ N., 83° 58′ E.), river, India, joins Ganges.

KARAMZIN, NIKOLAI MIKHAILOVICH (1765–1826), Russ. historian; imperial historiographer; author of *History of Russian Empire*, *Letters of a Russian Traveller*, and a number of essays and stories; a master of Russ. prose.

KARASU-BAZAR (45° 3′ N., 34° 37′ E.), town, Crimea, Russia. Pop. *c.* 14,000.

KARATEGHIN (39° N., 71° E.), province of Bokhara, Russ. Central Asia; live stock, fruit, corn. Pop. *c.* 70,000.

KARAULI, Kerowlee (26° 27′ N., 77° 4′ E.), capital, native state of K., Rajputana, India. Pop. 24,000; of state, 156,786.

KAREZAG (47° 19′ N., 20° 56′ E.), town, Hungary. Pop. 21,000.

KAREN-NI (18° 55′ to 19° 51′ N., 97° 8′ to 97° 50′ E.), region between Siam and Lower Burma, consisting of number of small native states under Brit. control; inhabited by Red Karems and other tribes, said to be diminishing in numbers; produces teak, rice, tin. Pop. *c.* 30,000.

KARIKAL (10° 34′ N., 79° 40′ E.), Fr. possession, Coromandel Coast, India. Pop. (1911) 56,577.

KARLI (18° 46′ N., 73° 30′ E.), famous cave-temple and village, Bombay Presidency, India.

KARLINGS, see Carolingians.

KARLOWITZ, Karlocza (45° 10′ N., 19° 58′ E.), town, Croatia-Slavonia, Hungary. Pop. 6000.

KARLSBAD, Carlsbad (*q.v.*).

KARLSBURG, see Gyula-Fehérvár.

KARLSKRONA (56° 9′ N., 15° 39′ E.), port, Sweden. Pop. (1910) 27,448.

KARLSRUHE (49° N., 8° 25′ E.), capital of Baden, Germany; founded by Karl, margrave of Baden, 1715; has grand-ducal palace; manufactures machinery, hardware, chemicals. Pop. (1910) 134,313.

KARLSTAD (59° 23′ N., 13° 30′ E.), town, Sweden. Pop. (1910) 17,191.

KARLSTADT (45° 30′ N., 15° 34′ E.), town, Hungary. Pop. 7000.

KARMA, see Buddhism.

KARNAK, Carnac (25° 40′ N., 32° 43′ E.), village, Egypt, on Nile, where ancient Thebes (*q.v.*) stood; site of great Egyptian temple of K. and other ruins; building of great temple is due to many successive kings; especially celebrated is the Great Hall of Columns, remarkable for perspective and fine lotus capitals. On either side of principal temple are smaller temples, from one of which, built by Rameses III., an avenue of sphinxes leads to temple of Luxor (*q.v.*).

KARNAK, see Architecture (Egyptian).

KARNAL.—(1) (29° 36′ N., 76° 58′ E.) district, Punjab, India; cotton, sugar, cereals. Pop. 885,000. (2) (29° 42′ N., 77° E.) town. Pop. 23,700.

KÄRNTHEN, see Carinthia.

KARROO (33° 2′ S., 19° 42′ E.), scrubby tablelands, Cape Province, S. Africa; nearest coast is Little K., while Great K., farther inland, leads up to central S. African plateau; clay soil; pasturage; transformed from wilderness into verdant plains after rains.

KARS (40° 36′ N., 43° 9′ E.), fortress and cathedral town, Kars, Transcaucasia; K. was gallantly defended by Turks under Gen. Fenwick Williams against Russians, June to Nov. 1855; taken from Turks by Russians, 1877. Pop. 25,000.

KARS (40° 38′ N., 43° 12′ E.), province, Transcaucasia, Russia; surface on elevated plateau crossed by mountains; area, 7238 sq. miles. Pop. (1910) 370,600.

KARSHI (38° 43′ N., 68° E.), town, Bokhara, W. Turkestan. Pop. *c.* 25,000.

KARST (45° 50′ N., 13° 42′ E.), mountainous region, Carniola, Austria; limestone formation.

KARUN (31° 10′ N., 48° 30′ E.), river, Persia; has its source in mountains of Bakhtiari; unites with Shat-el-Arab at Mohammerah, by the Hafar Canal; open to foreign navigation as far as Ahvaz.

KARWAR (14° 48′ N., 74° 16′ E.), port, Bombay, India. Pop. 17,000.

KARWI (25° 12′ N., 80° 56′ E.), town, United Provinces, India. Pop. 7800.

KASAI, Cassai (3° 9′ S., 16° 15′ E.), river, Africa; source in Portug. W. Africa, which it separates from Belg. Congo; then flowing N.W. unites with Kwango and joins Congo near Ngato.

KASBEK (42° 41′ N., 44° 29′ E.), mountain peak, Caucasus; *c.* 16,550 ft.

KASCHAU, see Kassa.

KASHAN (33° 50′ N., 51° 47′ E.), province, Persia. Pop. over 30,000.

KASHGAR (39° 20′ N., 76° 4′ E.), town, Eastern Turkestan, on trade route between India, China, and Russia; divided by Kizil River into new and old towns, Yangi Shahr and Kuhna Shahr, both fortified and surrounded by clay walls. Yangi Shahr contains gov.'s palace; Kuhna Shahr contains Hazrat Afak's shrine, and mosque built by Yakub Beg; manufactures silks, cottons, carpets, saddlery; in Chinese hands since 1758, but under Russ. influence. Pop. estimated at 60,000.

KASHMIR, Cashmere (*c.* 34° N., 74° 50′ E.), native state, N.W. India; area, 80,900 sq. miles. Surface consists of mountains and rich valleys, the latter 5000 ft. above sea-level; forms basin of Upper Indus and is crossed by the Jhelum, which widens into several lakes, and its tributaries. Chief town is Srinagar. K. has fine climate and is much visited as health-resort. K. was inhabited in early times by various Aryan tribes; Buddhism introduced in III. cent. B.C., eventually superseded by Hinduism; came under Muhammadan control in XIII. cent.; invaded by Mongols under Timur, XIV. cent.; belonged to Afghans in XVIII. cent. and to Sikhs in early XIX. cent. After Sikh defeat by British in 1846 K. was sold by Brit. government to Golab Singh, prince of Jammu, who was acknowledged as independent ruler.

Soil is fertile, producing rice, maize, and other cereals, fruits and vegetables. Silkworms are reared. Principal industries are silk-weaving, shawl and carpet manufacture, metal work. Inhabitants belong chiefly to Muhammadan faith, but there are considerable numbers of Hindus, Buddhists, and Sikhs. Pop. (1911) 3,158,126.

Younghusband and Molyneux, *Kashmir* (1909); Wardle, *Kashmir and its Silk Industries* (1904); Neve, *Picturesque Kashmir* (1900).

KASHMIRI, language commonly spoken in Kashmir by over 1,000,000 people. It is an Indo-European or Aryan language forming a small sub-group by itself with Shinā, Khovvār, Kāfir, and Kōhistan. These are mere unliterary dialects, but K. has a lit. of its own. It is an old language, the first record of it being undoubted K. words in a Sanskrit MSS. of the XII. cent. A.D. Its lit. is small in bulk, and continuous to the present day. The language appears to have altered very little since the first extant work written wholly in K., the *Lallā-vākya*, a philosophical poem of disputed authorship.

KASHUBES, a Slav race inhabiting the shores of the Baltic in Prussian territory.

KASIMBAZAR, see COSSIMBAZAR.

KASIMOV (54° 53′ N., 41° 29′ E.), town, Russia. Pop. 14,000.

KASSA, KASCHAU (48° 42′ N., 21° 17′ E.), town, Hungary; has magnificent Gothic cathedral, built XIII. to XV. cent's; episcopal see. Pop. (1910) 44,211.

KASSALA (15° 30′ N., 36° 10′ E.), fortified town, Sudan, Egypt; important centre of trade. Pop. *c.* 19,000.

KASSASSIN, village, Egypt; British defeated Egyptians, 1882.

KASSEL, CASSEL (*q.v.*).

KASSITES, a non-Semitic people among the ancient Babylonians, in whom they were ultimately merged.

KASTAMUNI, KASTAMBŪL (41° 23′ N., 33° 43′ E.), capital, K. vilayet, Turkey in Asia. Pop. *c.* 16,500. K. vilayet has area 19,570 sq. miles. Pop. 961,200.

KASTORIA (40° 34′ N., 21° 19′ E.), town, Turkey in Europe. Pop. *c.* 10,000.

KASUR (31° 5′ N., 74° 30′ E.), town, Punjab, India. Pop. 22,500.

KATABOLISM, see ANIMALS.

KATAGUM (12° 23′ N., 10° 4′ E.), district, Kano, N. Nigeria; united with Kano in 1905; chief town, Hadeija; manufactures leather, cottons; watered by Waube.

KATANGA (*c.* 10° 52′ S., 27° 20′ E.), region, Belgian Congo, N. of Rhodesia; rich in copper; connected by rail with Cape Town, and objective of Benguella railway. Pop. *c.* 1,000,000.

KATER, HENRY (1777–1835), physicist; b. Bristol; of Ger. descent; invented K. pendulum for the accurate determination of gravity.

KATHA (24° 5′ N., 96° 7′ E.), region, Upper Burma; chief town, KATHA; area, *c.* 7000 sq. miles. Pop. 180,000.

KATHIAWAR, KATTYWAR (21° 40′ N., 71° E.), peninsula, W. coast, India, between Gulf of Cambay and Gulf of Cutch; area, 20,559 sq. miles; produces cotton. Pop. *c.* 2½ millions.

KATMANDU (27° 35′ N., 85° 21′ E.), town, Nepal, India. Pop. *c.* 51,000.

KATRINE, LOCH (56° 14′ N., 4° 27′ W.), lake, Perthshire, Scotland; scene of Scott's *Lady of the Lake*.

KATSENA.—(1) (11° 30′ N., 6° 50′ E.) district, N. Nigeria, W. Africa. (2) (12° 57′ N., 7° 30′ E.) town, capital of above, formerly important centre of learning. Pop. *c.* 7500.

KATSURA, TARO (1847–), Japanese politician and general.

KATTOWITZ (50° 16′ N., 19° 2′ E.), town, Silesia, Prussia. Pop. (1910) 43,170.

KATWA, CUTWA (23° 37′ N., 88° 4′ E.), town, Bengal, India. Pop. 7500.

KAUAI, see HAWAIIAN ISLANDS.

KAUB, CAUB (*q.v.*).

KAUFBEUREN (47° 53′ N., 10° 37′ E.), walled town, Bavaria, Germany. Pop. (1910) 8948.

KAUFFMANN, ANGELICA (1741–1807), Swiss painter; worked first in Italy, afterwards in London, where she attained fame for her classic and mythological pictures and her portraits. She was a friend of Reynolds and Goldsmith, and was one of the earliest of the Royal Academicians.

KAUKAUNA (44° 20′ N., 88° 10′ W.), town, Wisconsin, U.S.A. Pop. (1910) 4712.

KAULBACH, WILHELM VON (1805–74), Ger. painter; director of the Academy, Munich (1849). His pictures are mostly of a grandiose, realistic style. He illustrated works of Shakespeare, Goethe, Klopstock, and Wieland, and painted some portraits.

KAUNITZ-RIETBURG, WENZEL ANTON, PRINCE VON (1711–94), Austrian statesman; ambassador in Rome, Florence, Turin, and afterwards in Austrian Netherlands; member of Peace Congress at Aix, 1748; ambassador in Paris, 1750; Chancellor, 1753; negotiated alliances with France and Turkey; former resulted in Seven Years War.

KAVADH, name of two kings of Persia.—KAVADH I. (449–531) reigned 488–531; fought against Rom. Empire under Anastasius and Justin I.—KAVADH II. reigned some months, 628.

KAVALA, CAVALLA (40° 56′ N., 24° 23′ E.), port, Turkey-in-Europe; Rom. aqueduct; tobacco exported. Pop. *c.* 5000.

KAVERI, CAUVERY (*q.v.*).

KAVIRONDO, two immigrant races, Bantu and Nilotic, inhabiting the valley of the Nzoia River and the N.E. coast of Victoria Nyanza, Brit. E. Africa; fine physique; independent, peaceful, and brave; honest, and of strict sexual morality; unchastity was formerly a capital offence amongst the K.; agricultural, both men and women working in the fields, and cultivating sorghum, maize, tobacco, and hemp; increasing in numbers, owing to their clean living; under Brit. protection.

KAWARDHA (22° N., 81° 15′ E.), native state, Central Provinces, India. Pop. *c.* 60,000.

KAYE, SIR JOHN WILLIAM (1814–76), Eng. historian; wrote works on Ind. military history.

KAY-SHUTTLEWORTH, SIR JAMES PHILLIPS (1804–77), Brit. statesman; father of present (1913) Lord Shuttleworth.

KAZAKS, see KIRGHIZ.

KAZALA, KAZALINSK (45° 46′ N., 62° 8′ E.), fortified town, Russ. Turkestan. Pop. 7000.

KAZAN.—(1) (*c.* 54° 40′ to 57° N., 46° to 51° 45′ E.) government, Russia; area, 24,587 sq. miles; crossed by Volga; produces rye, oats; large forests. Pop. (1910) 2,711,000. (2) (55° 49′ N., 49° E.) capital of above; has fortress containing governor's castle, arsenal, monastery, cathedral; Gk. archiepiscopal see; univ., established 1804; centre of trade with Siberia, Bokhara, Persia. Pop. (1910) 167,400.

KAZERUN (29° 35′ N., 51° 47′ E.), town, Persia. Pop. *c.* 8000. Kazerun district has pop. *c.* 15,000.

KAZVIN (36° 11′ N., 49° 56′ E.), province and town, Persia; produces grain. Pop. *c.* 45,000.

KEAN, EDMUND (1787–1833), Eng. actor; b. London; s. of Nance Carey, actress; father unknown; after playing in various touring companies, made first appearance in London at Drury Lane as Shylock, 1814, which gained him popular favour. His misconduct in England drove him to America (1825–26), but he regained popularity on his return; acted last in Othello, March 1833; a great tragedian, but incapable of playing unemotional or dignified rôles.

Molloy, *Life*, 1888.

KEARNEY (40° 35′ N., 99° 9′ W.), town, Nebraska, U.S.A. Pop. (1910) 6202.

KEARNY (40° 45′ N., 74° 10′ W.), town, New Jersey,

U.S.A.; manufactures machinery. Pop. (1910) 18,659.

KEARNY, PHILIP (1815–62), Amer. military officer, killed in Civil War.

KEARSLEY (53° 33′ N., 2° 24′ W.), town, Lancashire, England; coal, paper, cotton, bricks. Pop. (1911) 9676.

KEATS, JOHN (1795–1821), Eng. poet; s. of livery-stable keeper; apprenticed to surgeon, 1810; became dresser at Guy's Hospital, 1816; abandoned med. for lit.; first poems pub., 1817; *Endymion* appeared, 1818; *Lamia, Hyperion*, and other poems, 1820; attacked by various journals, notably *Quarterly Review*; unfortunate in his love; driven from England by consumption; d. in Rome. K.'s poetry is immature, and much of it is mawkish in its sentimentality, but such poems as *La Belle Dame sans Merci, The Ode on a Grecian Urn*, and his sonnets are unsurpassable.

Life, by Sidney Colvin (E.M.L., 1887).

KEBLE, JOHN (1792–1866), Eng. priest and poet; b. Fairford; ed. at home and Corpus Christi College, Oxford, where he had a brilliant career; ordained priest, 1816; elected tutor of Corpus Christi, 1818; retired, 1823; published *Christian Year*, a book of meditations in verse for holy days, 1827; prof. of Poetry at Oxford, 1831–41; founder of Tractarian movement, which tried to produce a spiritual and modern awakening within the Eng. Church; closely associated with Newman and Pusey, with whom he issued *Tracts for the Times*. K. laid special stress upon the spiritual nature of the Church, thereby offending the supporters of the State Church theory, and disagreed with the Evangelical party in matters of taste and erudition.

K. College, Oxford, was founded in his memory, 1870.

KECSKEMÉT (46° 54′ N., 19° 44′ E.), town, Hungary; manufactures soap and leather. Pop. (1910) 66,834.

KEELING ISLANDS, Cocos Islands (*c.* 12° 8′ S., 96° 50′ E.), about twenty small coral islands, Indian Ocean; belong to Ross family; under Brit. protection since 1857; produce cocoa-nuts, copra; visited by Darwin, 1836; cable station.

KEENE (42° 53′ N., 72° 19′ W.), town, New Hampshire, U.S.A.; manufactures furniture, boots. Pop. (1910) 10,068.

KEENE, CHARLES SAMUEL (1823–91), Eng. black-and-white artist; chiefly celebrated by his drawings for *Punch*, to which he contributed from 1851 till near his death.

KEEP, see Castle.

KEEWATIN (*c.* 67° 45′ to 50° 30′ N., 85° to 100° W.), district, Canada, between Hudson Bay on E. and Mackenzie, Athabasca, Saskatchewan, and Manitoba on W. The portion south of 60° N. was in 1912 divided between Manitoba and Ontario (*qq.v.*).

KEF (36° 8′ N., 8° 44′ E.), fortified town, Tunisia, N. Africa. Pop. *c.* 6000.

KEHL (48° 35′ N., 7° 48′ E.), river-port, Baden, Germany; has trade in timber, tobacco, and coal. Pop. (1910) 8860.

KEI ISLANDS, archipelago, Dutch E. Indies; include Great K. (5° 30′ S., 133° E.) and Little K. (5° 30′ S., 132° 44′ E.). Pop. *c.* 23,500.

KEIGHLEY (53° 52′ N., 1° 55′ W.), town, W. Yorkshire, England. Pop. (1911) 43,490.

KEIM, KARL THEODOR (1825–78), Ger. Prot. divine; pub. *Jesus of Nazareth* and other works.

KEITH (57° 33′ N., 2° 57′ W.), town, Banffshire, Scotland; has annual horse and cattle fair. Pop. (1911) 4499.

KEITH, Scot. family; Sir William became 1st Lord K. and earl marshal, *c.* 1430; William, 7th earl, supported Montrose during Civil War; the 10th earl and his brother James, s. of 9th earl, were implicated in Jacobite rebellion of 1715. The Earls of Kintore are of same stock, being descended from Sir John K., brother of 7th earl.

KEITH, FRANCIS EDWARD JAMES (1696–1758), Scot. field-marshal in Pruss. service; slain in the Seven Years War; noted for valour.

KEITH, VISCOUNT, George Keith Elphinstone (1746–1823), Brit. admiral; defeated French, 1793; shared in reduction of Cape of Good Hope, 1795, and defeated Dutch in Saldanha Bay, 1796; suppressed mutiny at Nore, 1797; captured Genoa, 1800; naval commander in Egypt, 1801.

KEJ, Kech, Kiz, fort and group of villages, Baluchistan; produces dates.

KEKULÉ, FRIEDRICH AUGUST (1829–96), Ger. organic chemist; added marsh gas to Gerhardt's types; established constitution of benzene (C_6H_6); d. of overwork.

KELÁT, Kalat (*q.v.*).

KELLER, GOTTFRIED (1819–90), Ger. novelist and poet; wrote excellent short stories (*Die Leute von Seldwyla*, etc.), *Der Grüne Heinrich* (novel), *Neuere Gedichte* (lyric poems), etc.

KELLER, HELEN ADAMS (1880–), Amer. blind and deaf lady who won academic honours.

KELLERMANN, FRANÇOIS CHRISTOPHE DE, Duke of Valmy (1735–1820), supported Revolution; defeated Prussians at Valmy, 1792; marshal of France, 1803; duke, 1808. François Étienne, Duke of Valmy (1770–1835), his s.; won battle of Marengo, 1800, and further distinguished himself at Austerlitz, during Peninsular War, and at Quatre Bras.

KELLS (53° 43′ N., 6° 53′ W.), town, Meath, Ireland; where illuminated Book of K. was prepared in X. cent.

KELLY, NED (1854–80), Australian desperado who defied the Government from a stronghold in the hills for a long time; finally taken and executed.

KELP, ash of burnt seaweed; yields iodine, potassium chloride, paraffin oil, naphtha, ammonium sulphate.

KELSO (55° 37′ N., 2° 26′ W., town, Roxburghshire, Scotland, on Tweed, which is here crossed by a five-arched bridge; site of ruined abbey, which dates from 1128 and was destroyed in XVI. cent.; ruined abbey church is fine example of late Norman and early Gothic styles. Pop. (1911) 3982.

KELT, see under Salmon Family.

KELVIN, WILLIAM THOMSON, Baron (1824–1907), most eminent physicist of his time; b. Belfast; ed. Glasgow and Cambridge; second wrangler and Smith's prizeman; studied for a year at Paris under Regnault; at twenty-two appointed prof. of Nat. Phil., Glasgow Univ., a post he held for fifty-three years. His work covered every branch of physical science, and he published over three hundred original papers; made valuable contributions to science of thermodynamics, made submarine telegraphy a possibility, invented practically all the instruments at present used by electrical engineers for measurements, invented sounding apparatus, pressure gauge, tide gauge, tide predictor, and made great improvements in mariner's compass. Full list of his inventions would cover pages. He was honoured by numerous learned societies; knighted, 1866; pres., Royal Soc., 1890; peer, 1892; received Grand Cross, Royal Victorian Order, 1896. *Life*, by Russell (1912), by Fitzgerald (1899), by Thompson (1910).

KEMBLE, Eng. theatrical family: **John Philip** (1757–1823), first London appearance was as Hamlet in Drury Lane (1783); leading tragedian of his day. His bro. **Charles** (1775–1854) succeeded best in second parts when John played first, *e.g.* Laertes, Cassio, Macduff. **Frances Anne,** Fanny (1809–93), dau. of Charles, noted for her rendering of tragic parts and her Shakespearean readings. Her sister **Adelaide** (1814–79) was a distinguished operatic performer and author of some tales.

KEMBLE, JOHN MITCHELL (1807–57), Eng. philologist; s. of Charles K., the actor; licenser of plays; pub. *Beowulf* with trans. (1837), O.E. charters, 6 vols. (1839–48), *History of Saxons in England* (1849).

KEMP, GEORGE MEIKLE (1795–1844), Scot. architect; designed Scott Monument, Edinburgh, but was drowned before its completion.

KEMPE, JOHN (*c.* 1380–1454), bp. of Chichester, then London, 1421; chancellor and abp. of York, 1426; cardinal, 1439; abp. of Canterbury, 1452.

KEMPEN (51° 23′ N., 6° 26′ E.), town, Rhenish Prussia, Germany; manufactures silk goods, glass, etc. Pop. (1910) 7375.

KEMPIS, THOMAS À (1379–1471), religious writer; b. Kempen, near Cologne; joined *Brothers of Common Life*; became a priest, 1413, and lived in a convent till death. Most famous work is his *Imitation* (*of Christ*), which has been translated into nearly every language.

Life, by Montmorency (1906).

KEMPTEN (47° 43′ N., 10° 18′ E.), town, Bavaria, Germany; site of ancient abbey. Pop. (1910) 20,001.

KEN (25° 35′ N., 80° 17′ E.), affluent of river Jumna, N. India.

KEN, THOMAS (1637–1711), Eng. ecclesiastic; ed. Winchester and Oxford; ordained, 1662; prebendary of Winchester, 1672; bp. of Bath and Wells, 1684; one of bp's who resisted James II.'s Declaration of Indulgence, 1688; refused to take oath to William III.; deposed, 1691; author of well-known hymns.

KENÂ, KENEH (26° 11′ N., 32° 45′ E.), town, Upper Egypt; manufactures pottery, and has trade in grain and dates with Arabia. Pop. 20,100.

KENDAL (54° 19′ N., 2° 46′ W.), town, Westmoreland, England; has old Gothic church and ruined castle where Catharine Parr was born; manufactures heavy woollens, paper, leather; near are traces of Rom. occupation. Pop. (1911) 14,033.

KENEALY, EDWARD VAUGHAN HYDE (1819–1900), Irish lawyer; counsel in Tichborne case, 1873; expelled from Bar, 1874.

KÊNG-TÛNG (*c.* 21° 7′ N., 99° 51′ E.), Shan state, Burma, Asia; area, *c.* 12,000 sq. miles; surface generally mountainous; drained by affluents of Salwen and Mekong. Chief town is K.-T. (21° 23′ N., 99° 40′ E.). Pop. 5800. Region produces rice, sugar, cotton, opium, teak, pottery. Pop. *c.* 192,000.

KENILWORTH (52° 22′ N., 1° 35′ W.), town, Warwickshire, England; contains beautiful ruined castle, given to Leicester by Queen Elizabeth, and destroyed by Roundheads. Pop. (1911) 5776.

KENITES, ancient Palestinian folk, probably of Midianite stock.

KENMORE (56° 35′ N., 4° W.), village, Perthshire, Scotland.

KENMURE, WILLIAM GORDON, 6TH VISCOUNT, Jacobite, executed for complicity in rebellion, 1716; the title was then attainted; restored, 1824; dormant, 1847.

KENNEDY, Scot. family; 1st Lord K. received his title *c.* 1457, and early in XVI. cent. his grandson became 1st Earl of Cassilis; Gilbert, 3rd earl, held office during Mary Queen of Scots' minority. Archibald, 12th earl, was raised to marquisate of Ailsa in year 1831.

KENNEDY, BENJAMIN HALL (1804–89), Eng. schoolmaster; head at Shrewsbury, 1836–66; app. prof. of Gk., Cambridge, 1867; best-known work, *Public School Lat. Grammar*.

KENNETH I., MAC ALPIN (d. *c.* 860), Scot. king; defeated Picts; frequently invaded Northumbria. **KENNETH II.** (d. 995) led two expeditions into Northumbria; killed by his own followers.

KENNICOTT, BENJAMIN (1718–83), Eng. theologian; ed. at Oxford; a great Hebrew scholar; collated MSS. of Old Testament and pub. *Vetus Testamentum*, 1776–80.

KENNINGTON (51° 31′ N., 0° 5′ W.), southern district of London, England.

KENORA (49° 50′ N., 94° 30′ W.), town, Ontario, Canada; flour-mills, sawmills, gold. Pop. 5400.

KENOSHA (42° 33′ N., 87° 49′ W.), town, Wisconsin, U.S.A.; manufactures brass beds, motor-cars. Pop. (1910) 21,371.

KENSINGTON (51° 30′ N., 0° 11′ W.), borough of London; contains K. Gardens, with the palace in which Queen Victoria was born, Natural History and South K. Museums, St. Mary Abbot's Church, Brompton Oratory. Pop. (1911) 172,402.

KENT (*c.* 51° 15′ N., 0° 35′ E.), county in S.E. extremity of England, between Thames estuary and Eng. Channel; area, 1555 sq. miles; surface undulating in interior, rising in the Downs to over 800 ft.; drained by Thames, Medway, Stour, Darent; in S.E. is marshy district and in S. is region known as the Weald, famed for its scenery; N.W. corner is practically a suburb of London, with Woolwich Arsenal and Government dockyards of Sheerness and Chatham. K. suffered from Dan. invasions in X. cent. and was scene of various battles and insurrections from Norman times onwards; invaded by French in XIII. cent.; here occurred Wat Tyler's rebellion, 1381, Jack Cade's, 1450. During Civil War K. was subdued by Roundheads. In 1667 Dutch fleet destroyed ships in Medway. Most important towns are Gillingham, Chatham, Maidstone, Tunbridge Wells, Folkestone, Rochester, Ramsgate, Canterbury. K. is called the 'garden of England' from its beautiful scenery and rich cultivation. There are large tracts of woodland, with oaks and other valuable trees. Agriculture is chief industry; produces cereals, hops, fruits, vegetables; sheep and cattle raised; dairying and market-gardening carried on. At Whitstable and Faversham are oyster beds. Manufactures include gunpowder, bricks, paper. Pop. (1911) 1,019,870.

Jerrold, *Kent* (1908).

KENT, KINGDOM OF, Anglo-Saxon kingdom; said to have been established by Hengest and Horsa; here Christianity was first introduced into England during reign of Ethelbert, who d. 616; laws were codified by two of his successors, Hlothhere and Wihtred. K. apparently suffered from Saxon invasions in VII. cent.; in later times it was under control of earls.

KENT, EARLDOM AND DUKEDOM OF, titles held at various dates by Plantagenets, Hollands, Nevilles, Greys, and by members of royal family; important holders were William Neville, Earl of K. (d. 1463); supported Edward IV. in Wars of Roses; Edward Augustus, Duke of K. (1799–1820), was f. of Queen Victoria.

KENT, WILLIAM (1685–1748), Eng. artist and pioneer in landscape gardening.

KENTIGERN, ST. (*c.* 518–603), also called **St. Mungo**; bp. of Cumbria; founded monastery at Cathures (Glasgow); fled to Wales and founded monastery of St. Asaph, named after his disciple. His feast-day is Jan. 13.

KENTON (40° 41′ N., 83° 32′ W.), town, Ohio, U.S.A. Pop. (1910) 7185.

KENT'S CAVERN, KENT'S HOLE (50° 28′ N., 3° 31′ W.), cavern, near Torquay, England, where palæolithic tools, bone implements, remains of extinct animals have been found.

KENTUCKY (*c.* 36° 30′ to 39° 5′ N., 82° to 89° 37′ W.), state, U.S.A.; bounded N. by Illinois, Indiana, Ohio; E. by West Virginia and Virginia; S. by Tennessee; W. by Missouri; area, 40,400 sq. miles. Surface is undulating; mountainous in E., rising to about 3000 ft. in Alleghany plateau, which is continuation of Appalachians. In S.W. are great cypress swamps. Principal rivers are Ohio, which forms northern boundary, and its tributaries, Big Sandy, Licking, Kentucky, Green, Tradewater, Cumberland, Tennessee, and other streams; Mississippi forms part of W. boundary. There are some remarkable caves. Chief towns are Louisville, Covington, Lexington, Newport. Climate is temperate. K. was originally inhabited by various Ind. tribes, and was first explored by white men in latter half of XVIII. cent. John Finlay led an exploring expedition in 1752 and Daniel Boone visited country in 1769; first colony founded in 1774 by Harrod, from whom its name of Harrodsburg was derived. In 1776 K. became a county of

Virginia. During Revolutionary war K. was left by Virginia to its own resources; suffered from Indian raids instigated by British in 1777, but in 1778 settlers repulsed attack on Boonesborough and gained some victories against Indians and British, through aid of force under Colonel Clark. After this great number of settlements sprang up, and original county of K. was subdivided into counties of Jefferson, Lincoln, and Fayette. In 1782 occurred further and fiercer struggle against Indians, who were ultimately defeated. After peace was arranged between Britain and U.S., demand for independent existence arose in K. Between 1784 and 1790 nine conventions met upon this question, and in 1790 mother state consented to separation so universally desired. In 1792 K. was admitted as state to Union and a constitution was framed.

Administration is carried out by governor, assisted by 8 ministers; legislature consists of Senate of 38 members and House of Representatives of 100 members, elected by popular vote for four and two years respectively. K. sends 2 Senators, 11 Representatives to Congress. Principal religious denominations are Baptist, Roman Catholic, Methodist. Education is free and obligatory. Army numbers 1712 in all.

RESOURCES, ETC.—K. is pre-eminently an agricultural state, most fertile district being the Blue Grass country; produces more tobacco and hemp than any other district of U.S., while it has also large crops of maize, wheat, and great quantities of fruit. Stock-raising is largely carried on; especially famous for horses, while mules, cattle, sheep, and pigs are also raised in great numbers. There are large forests containing valuable timber. Extensive coal-fields are found in both E. and W., other minerals including iron, lead, salt, fluorspar, sandstone, petroleum. Among industries are lumbering, distilling, flour-milling, tanning, manufacture of cotton-seed oil, hardware, clothing, cigars. Railway mileage exceeds 4000. Population includes Americans, Germans, British, negroes. Pop. (1910) 2,289,905.

Shaler, *Kentucky* (1886).

KENYA (0° 10′ S., 37° 22′ E.), high volcanic peak, Brit. E. Africa; now extinct; its two points, Nelion and Batian, are both *c.* 17,000 ft.; lower slopes forested.

KEOKUK (40° 22′ N., 91° 28′ W.), town, Iowa, U.S.A.; railway centre; river trade. Pop. (1910) 14,008.

KEONJHAR (21° 30′ N., 85° 30′ E.), state, Bihar and Orissa, India. Pop. *c.* 288,000.

KEONTHAL, hill state, Punjab, India. Pop. 23,000.

KEPLER, JOHANN (1571–1630), Ger. astronomer; b. near Weil, Württemburg; studied at Tübingen univ.; app. prof. of Astron. at Gratz (Styria), 1593; owing to religious persecutions accepted Tycho Brahe's invitation to Prague, to assist in preparation of Rudolphine tables; succeeded Tycho as imperial astronomer; pub. great work, *The New Astronomy; Commentaries on the Motions of Mars*, 1609. The discoveries which this volume records form the basis of physical astronomy. In it K. enunciated his first two laws relating to the motion of the planets; enabled to establish these laws only by means of accurate astronomical data, obtained by Tycho. The third law was contained in *The Harmonies of the World* (1619), dedicated to James I. K. was continually embarrassed financially. His patrons were the Emperors Rodolph and Ferdinand, and the Dukes of Württemburg and Wallenstein.

Life, by Müller (1903), by Günther (1905).

KEPPEL, AUGUSTUS, VISCOUNT (1725–86), Brit. admiral; concluded treaty with Dey of Algiers, 1761; prominent at Quiberon, 1759; had share in capture of Havannah, 1762; held command against French, 1778; and fought unsuccessful action at Brest; First Lord, 1782.

KEPPEL, SIR HENRY (1809–1904), Brit. sailor; fought in China, 1837, and in Crimea, 1853.

KER, JOHN (1673–1726), an unscrupulous Scot who served Covenanters, then Jacobites, getting money by betraying secrets on both sides; 'worked' also in London and Vienna; pub. 'Memoirs.'

KERAK (32° 42′ N., 36° 23′ E.), town, Palestine; walled and fortified; taken by Saladin, 1188. Pop. *c.* 7800.

KERASUND (40° 55′ N., 38° 38′ E.), fortified town, Asiatic Turkey. Pop. *c.* 9800.

KERBELA, MESHAD-HOSAIN (32° 35′ N., 44° 7′ E.), town, Asiatic Turkey; site of shrine of Hosain, visited annually by pilgrims. Pop. *c.* 65,000.

KERCH, KERTCH (45° 22′ N., 36° 29′ E.), important fortress and seaport of S. Russia, on Strait of Yenikale, between Azov and Black Sea; has interesting catacombs and tombs, where wall-paintings and other works of art have been found; old Byzantine church; exports cereals, iron. Greatly damaged during Crimean War. Pop. (1910) 53,340.

KERGUÉLEN ISLAND, DESOLATION ISLAND (*c.* 50° S., 70′ E.), in Southern Ocean; named after discoverer, Kerguélen-Trémarec (1772); mountainous; highest peak, Mt. Ross (6140 ft.). Produces vegetable called K. cabbage. Annexed by France in 1893. Area, *c.* 1450 sq. miles. Uninhabited.

KERKUK, QERQUQ (35° 27′ N., 44° 22′ E.), town, Turkey-in-Asia. Pop. *c.* 13,500.

KERMADEC (30° 40′ S., 178° 30′ W.), islands, belonging to New Zealand, Pacific Ocean. Pop. (1911) 4.

KERMAN (29° 25′ N., 57° E.), province, Persia; area, *c.* 59,500 sq. miles; surface generally mountainous, especially in S., with great expanses of desert in N. and N.E.; produces cotton, dates, wool. Pop. *c.* 600,000. Capital, KERMAN, is fortified; manufactures carpets. Pop. *c.* 60,000.

KERMANSHAH, KERMANSHAHAN (34° 20′ N., 47° E.), town, K. province, Persia; carpets. Pop. *c.* 38,000. K. province has pop. *c.* 400,000.

KERMES, crimson dye from the dried female insect *Coccus ilicis*, found on *Quercus coccifera* in region of Mediterranean; inferior to, and largely superseded by, *cochineal*, but used for dyeing Turk. fez.

KERNER, JUSTINUS ANDREAS CHRISTIAN (1786–1862), Ger. poet of the 'Swabian school'; b. Ludwigsburg, Württemberg; wrote *Reiseschatten von dem Schattenspieler Lux*, *Romantische Dichtungen* and *Der letzte Blütenstrauss*; also works on animal magnetism.

KEROUALLE, LOUISE DE, see PORTSMOUTH, DUCHESS OF.

KEROWLEE, see KARAULI.

KERRY (52° N., 9° 50′ W.), W. coast county, Munster, Ireland; bounded N. by Shannon, E. by Limerick, Cork, S. by Cork, W. by Atlantic; area, 1813 sq. miles; coast deeply indented; surface generally mountainous, crossed by Macgillicuddy's Reeks, rising to 3410 ft. in Carran Tual, highest peak in Ireland. Rivers are unimportant. K. contains famous Lakes of Killarney, celebrated for beautiful scenery. Mineral springs occur in various parts. K. produces potatoes, oats, slate; well-known strain of cattle reared; dairy-farming carried on. Pop. (1911) 159,268.

KERSAINT, ARMAND GUY SIMON DE COETNEMPREN, COMTE DE (1742–93), Fr. naval officer; of noble birth, but joined Revolutionists; supported deposition of Louis XVI., but was against his execution; owing to increased opposition K. was tried and executed.

KERTCH, see KERCH.

KESHUB CHUNDER SEN (1838–84), Ind. religious leader; read Western theology; joined Brahma Samaj, 1867; visited England, 1870; disliked Western materialism and Westernising of the East; wrote *Jesus Christ, Europe and Asia*, and other works.

KÉSMÁRK (49° 8′ N., 20° 28′ E.), town, Hungary. Pop. 6000.

KESTREL, a member of HAWK FAMILY (*q.v.*).

KESWICK (54° 36′ N., 3° 8′ W.), town and tourist centre, Cumberland, England; manufactures lead pencils. Pop. (1911) 4403.

KESWICK CONVENTION, annual evangelical religious meetings, founded 1875.

KETCHUP, condiment made from tomato, mushroom, or walnut, boiled with salt and spices.

KETI (24° 7′ N., 67° 28′ E.), port, Sind, India. Pop. 2127.

KETONES, compounds of the carbonyl group, CO, with two hydrocarbon radicles; they are simple or mixed, aliphatic or aromatic; name derived from *acetone, dimethylketone*, $CH_3.CO.CH_3$, the simplest ketone. General method of preparation—by heating suitable calcium salts, *e.g.* $Ca\begin{matrix}/OOCCH_3\\\backslash OOCCH_3\end{matrix} = CaCO_3 + CO\begin{matrix}/CH_3\\\backslash CH_3\end{matrix}$; methylethylketone, $CH_3.CO.C_2H_5$ (mixed); acetophenone (aliphatic-aromatic), $CH_3.CO.C_6H_5$; benzophenone (aromatic), $C_6H_5.CO.C_6H_5$. Derivatives: oximes, $\begin{matrix}R_1\\R_2\end{matrix}\!\!>\!C=NOH$, phenylhydrazones, $\begin{matrix}R_1\\R_2\end{matrix}\!\!>\!C=N.NHC_6H_5$. Diketones $= R_1.CO.CO.R_2$.

KETTELER, WILHELM EMMANUEL, BARON VON (1811–77), Ger. politician; a staunch defender of the rights of the Catholic Church to freedom from State control.

KETTERING (52° 24′ N., 0° 44′ W.), town, Northamptonshire, England. Pop. (1911) 12,899.

KETTLEDRUM, musical instrument of percussion, consisting of wood or metal frame over which is stretched skin or parchment, which is beaten with drumsticks of whalebone, having wooden knob at end covered with sponge or other soft material. K. is of Eastern origin, generally cylindrical in shape, and plays a definite note in harmony with the music which it accompanies. Two or three are required with full orchestra, one large with compass from F to C, and smaller ones B♭ to F on bass stave. The k. is often used in cavalry bands, which use two, mounted one on each side of horse. Most effective operation is 'rolling,' which is accomplished by giving single and alternate strokes very rapidly.

KEUPER, term given to the uppermost division of the Triassic system. In Great Britain the K. are divided into Rhætic or Penarth beds, the Upper K. marl and the Lower K. sandstone.

The Rhætic contains rock salt, which is mined in Cheshire and other localities. K. has a few fossil remains including few plants of cypress order, calamites, and fishes.

KEW (51° 29′ N., 0° 18′ W.), town, suburb of London, Surrey, England; site of Royal Botanic Gardens, founded 1759 by mother of George III.

KEWANEE, town, Illinois, U.S.A. Pop. (1910) 9307.

KEWATIN, KEEWATIN (*q.v.*).

KEY, simplest form designed (by ancient Egyptians) to raise pegs placed through staples; later form to compress springs which hold lock. Modern locks consist of series of wards, to which key is shaped.

KEY, THOMAS HEWITT (1799–1875), Lat. scholar; prof. at London, 1832–42.

KEY WEST (24° 30′ N., 81° 53′ W.), seaport, Florida, U.S.A.; situated on small coral island; exports cigars, sponges, turtles, salt, fruit. Pop. (1910) 19,945.

KEYBOARD, a succession of keys set in the case or framework of certain musical instruments; supposed to have come into use about XIV. cent.; Spinet, one of oldest instruments, had k. consisting of black 'naturals' and white 'sharps,' compass four octaves and a half-tone; most modern pianofortes have white 'naturals,' black 'sharps,' and compass of seven octaves; in instruments having more than one k. (*e.g.* organ), each row is called a *manual*.

KHABAROVSK, CHABAROWSK (48° 28′ N., 135° 32′ E.), cathedral town, Russia-in-Asia; centre of trade in sables. Pop. (1910) 41,050.

KHAIBAR PASS, see KHYBER PASS.

KHAIRAGARH (21° 15′ N., 81° E.), native state, Central Provinces, India. Pop. 140,000.

KHAIRPUR.—(1) (26° 50′ N., 69° 10′ E.) native state, Bombay, India. Pop. (1911) 223,822. (2) (27° 33′ N., 68° 50′ E.) town, capital of above. Pop. 14,500.

KHAJRAHO (*c.* 25° N., 77° 35′ E.), village, Chhatarpur, Central India; fine old temples.

KHAKI, see UNIFORMS.

KHALIF, CALIPH (*q.v.*).

KHALIFA, THE (1846–99), Arab. MAHDI; assisted the Mahdi Muhammad Ahmed in agitation in the Sudan; succeeded him (1885), and died defending the Sudan against Britain.

KHAM, KHAMS (*c.* 31° N., 97° 30′ E.), province of Tibet; chief town, Chiamdo.

KHAMGAON (20° 45′ N., 76° 45′ E.), town, Berar, India; cotton, opium. Pop. 18,600.

KHAMSEH (36° 34′ N., 48° E.), province, Persia; chief town, Zenjan.

KHAN (Turk., Persian, and Arab.), word meaning 'lord' or 'ruler,' used sometimes simply as title of respect.

KHANDESH, EAST (20° 56′ N., 75° E.), district, Bombay, India; area, 4545 sq. miles. Pop. (1901) 957,728. K. WEST (21° 28′ N., 74° 10′ E.), district, Bombay, India; area, 5496 sq. miles. Pop. 475,000.

KHANDWA (21° 50′ N., 76° 24′ E.), town, Central Provinces, India. Pop. 20,000.

KHANIA, CANEA (*q.v.*).

KHAR (33° 16′ N., 58° 53′ E.), province, Persia; produces wheat, barley, and rice in great quantities. Pop. *c.* 10,000.

KHARAGHODA (23° 22′ N., 71° 35′ E.), village, on Little Runn of Cutch, Bombay, India; salt factory. Pop. 2108.

KHARGA, GREAT OASIS (*c.* 25° 30′ N., 30° 30′ E.), celebrated oasis in a deep depression in S. of Libyan Desert, Egypt; has Rom. and Egyptian remains; produces dates, cereals; chief town, K.; inhabited by Berber tribes. Pop. (oasis) 8500, (town) 5500.

KHARKOV.—(1) (49° 40′ N., 37° E.) government, S.W. Russia; area, *c.* 21,041 sq. miles; horses, cattle, sheep, silkworms, beet. Pop. (1910) 3,245,900. (2) (50° N., 36° 14′ E.) town, capital of above; seat of Gk. abp.; univ. established, 1805; famous for great fairs. Pop. (1910) 219,600.

KHARPUT (38° 45′ N., 39° 30′ E.), town, Asiatic Turkey; rich in minerals. Pop. *c.* 25,000.

KHARSAWAN (22° 50′ N., 85° 50′ E.), native state, Bengal, India. Pop. 37,000.

KHARTUM (15° 34′ N., 32° 31′ E.), capital, Sudan, Egypt; near junction of Blue and White Niles; for nearly a century served as emporium for ivory and gum of Sudan, and until recently was great slave market. Celebrated for Gordon's defence against Mahdi, who captured it in 1885. Retaken by Kitchener, 1898, since when it has been rebuilt; contains Gordon Memorial College. Pop. 18,235.

KHASI AND JAINTIA HILLS (*c.* 25° 30′ N., 91° 30′ E.), district, between Brahmaputra and Surma Rivers, Assam, Brit. India; area, 6025 sq. miles; mountainous; produces coal. Pop. *c.* 205,000.

KHASKOY (42° N., 25° 35′ E.), town, Bulgaria. Pop. 15,000.

KHATMANDU, KATMANDU (*q.v.*).

KHAYYAM, OMAR, see OMAR KHAYYAM.

KHAZARS, ancient people inhabiting the shores of the Caspian Sea and the country of the Caucasus, as far as the Crimea, and conducting the carrying trade between Persia, Armenia, Byzantium, and Russia. Origin of the race is much disputed, but it is generally agreed that they are related to the Georgians, the 'Iberians,' or the Turks. An important people from 190 A.D. to 1100 A.D., and at the height of their influence from 600 A.D. to 950 A.D. Chief cities, Itil, on the Volga, Tarkhu, and Sarkel, on the Don. The nation was conquered and dispersed by the Russians at the end of the X. cent.

KHEDA, see KAIRA.

KHELAT, KALAT (*q.v.*).

KHERI (30° 3′ N., 77° 56′ E.), district, United Provinces, India; area, 2960 sq. miles. Pop. 905,000.

KHERSON.—(1) (47° 40′ N., 32° 30′ E.) government, S.W. Russia, bordering on Black Sea; area, *c.* 27,337 sq. miles; produces cereals, tobacco. Pop. (1910) 3,447,100. (2) (46° 39′ N., 32° 32′ E.) town, capital of above; timber trade. Pop. (1910) 85,200.

KHEVENHÜLLER, LUDWIG ANDREAS (1683–1744), Austrian soldier; served in Wars of Span. Succession and Austrian Succession, etc.; Knight of Golden Fleece.

KHEVSURS, Caucasian race of low state of civilisation; they retain heathen rites though nominally Christian.

KHINGAN, GREAT (*c.* 43° to 54° N., 117° to 122° E.), mountain range, Chin. Empire, E. Asia, to E. of Gobi Desert; rises to *c.* 8000 ft. LITTLE K. is range to E. of Great K.

KHIVA (42° N., 58° E.), Russ. vassal State, Central Asia; area, *c.* 24,000 sq. miles; watered by Amu; produces cereals, fruits, tobacco, cotton, silk. K. has had relations with Russia since early XVII. cent., and was occupied by Russ. military force in 1873, when a heavy indemnity was exacted. Inhabitants are chiefly Turkomans; religion, Muhammadanism. Pop. *c.* 800,000. Capital, KHIVA, has pop. of *c.* 5000.

KHOI (38° 37′ N., 45° 5′ E.), town; capital of K. district, Azerbaijan, Persia; fortified. Pop. *c.* 33,000.

KHOJENT (40° 15′ N., 69° 32′ E.), walled town, Russ. Turkestan; silks, cottons. Pop. (1910) 40,520.

KHOKAND, KOKAND (41° 22′ N., 70° 38′ E.), town, Ferghana, Asiatic Russia; commercial centre; produces silk, cotton. Pop. (1910) 112,800. The former khanate of K. came under Russ. control in 1876, and now forms government of Ferghana (*q.v.*).

KHOLM (51° 8′ N., 23° 32′ E.), town, Russ. Poland. Pop. 20,000.

KHORASAN, KHORASSAN (34° 40′ N., 56° E.), province, N.E. Persia; area, *c.* 170,000 sq. miles; surface generally mountainous, with desert plains in S.; chief mountains, Elburz range; produces best wool in Persia, also rice, wheat, tobacco, aromatic plants, fruit, turquoises; manufactures carpets, textiles; capital, Meshed. Pop. *c.* 1,000,000.

KHORREMABAD (33° 30′ N., 48° 30′ E.), town, Persia. Pop. *c.* 6000.

KHORSABAD (*c.* 36° 26′ N., 43° 10′ E.), village, Asiatic Turkey, where Sargon's palace, dating from VIII. cent. B.C., was excavated by Fr. archæologists in XIX. cent.

KHOTAN (37° 4′ N., 80° 36′ E.), town and oasis, E. Turkestan; centre of oasis producing cereals, fruits; local products are carpets, silk, and jade. Pop. *c.* 5000. District has area 400 sq. miles; pop. *c.* 150,000.

KHOTIN (48° 32′ N., 26° 29′ E.), town, S. Russia; strongly fortified. Pop. 20,000.

KHULNA (22° 30′ N., 89° 32′ E.), district, Bengal, India. Pop. (1901) 1,253,043. KHULNA, chief town. Pop. 10,800.

KHUNSAR (33° 10′ N., 50° 24′ E.), town, Persia. Pop. *c.* 10,000.

KHURJA (28° 14′ N., 77° 52′ E.), town, United Provinces, India; important commercial centre. Pop. 30,000.

KHYBER PASS, KHAIBAR PASS (34° 14′ N., 71° E.), great pass from India to Afghanistan, through Safed Koh and Sulaiman mountains, 33 miles long, 10 to 450 ft. wide, with rocky precipices rising on each side to heights of 1400 to over 3300 ft. Summit is at Landi Kotal.

KIAKHTA (50° 21′ N., 106° 42′ E.), frontier town, Siberia; tea trade. Pop. *c.* 19,000.

KIANG, see under HORSE FAMILY.

KIANG-SI (28° N., 116° E.), province, E. China; area, *c.* 69,480 sq. miles. Pop. (1911) 26,532,125.

KIANG-SU (34° N., 119° E.), coast, province, China; area, *c.* 38,600 sq. miles. Pop. (1911) 13,980,235.

KIAOCHOW BAY (36° 18′ N., 120° 10′ E.), harbour, S. of Shantung peninsula, China.

KIDD, WILLIAM (1645–1701), Scot. captain and pirate; employed as privateer by Eng. Government, but turned pirate in the W. Indies; hanged.

KIDDERMINSTER (52° 23′ N., 2° 15′ W.), town, Worcestershire, England; important carpet manufactures; has old parish church. Pop. (1911) 24,333.

KIDNAPPING, abduction (*q.v.*) of children.

KIDNEY, term applied to each of two glands, forming part of the urinary system (*q.v.*), the function of which is the excretion of the urine. In man they are situated against the posterior wall of the abdomen, one on each side of the vertebral column, covered by the twelfth rib and opposite the last dorsal and first three lumbar vertebræ, the right k. being slightly lower in position than the left. In form they are characteristic, having a convex outer border and a concave inner border, with somewhat bulging extremities, the average length being rather over 4 in., and the weight 4 to 6 oz., while their colour is a brownish red. There is a fissure on the concave inner border at which the ureter, which conveys the urine to the urinary bladder, the branches of the renal vein, and the renal artery enter the k., the ureter dilating within to form a sac termed the pelvis of the k. A tough fibrous coat envelops the k., and if a longitudinal section is made through the organ it is found to consist of two more or less distinct layers, the outer termed the cortex, and the inner the medulla. The former contains minute round bodies, termed Malpighian bodies, to each of which runs an afferent artery, and from each of which comes an efferent vein, while from the capsule of the body goes a uriniferous tubule, the function of the Malpighian bodies being the excretion of the urine from the blood. The medulla consists of about a dozen pyramidal masses, each of which is composed of uriniferous tubules, the apices pointing into the pelvis of the k. The pelvis is lined with mucous membrane which is continuous with that of the ureter and the urinary bladder, and this sac acts as a preliminary receptacle for the urine before it is conveyed to the bladder.

Diseases of the Kidney.—The most important affections of the k. are the non-suppurative forms of inflammation included under the name of *Bright's Disease* (q.v.). An examination of the urine should be carried out in all cases of suspected k. disease. Albumen may be found in the urine, being due either to diseased conditions of the k., such as Bright's disease, waxy degeneration, renal calculi; or to disease of the urinary passages below the kidneys; to blood diseases, *e.g.* anæmia, leucocythæmia; to congestion supervening on liver, heart, or lung disease; to certain fevers, *e.g.* scarlatina; or to certain poisons, *e.g.* phosphorous, arsenic. Other symptoms will denote to which of these conditions it is due, but rest, bland fluids, and a non-nitrogenous diet are always of value. Blood in the urine may be due either to disease of the kidney or of the urinary apparatus below; or may be caused by injury, by scurvy (particularly in children), irritating drugs, or certain parasites. Bile salts and bile pigments in the urine usually are subsidiary signs to more obvious symptoms of jaundice, and denote some derangement of the liver and its functions.

Pyelitis, or inflammation of the pelvis of the k., may be due to calculi, tuberculous disease, extension of septic infection from the bladder or other parts of the urinary system, or to pyæmia, and is treated by removal, if possible, of the cause. *Abscess* of the k. may occur in extension of suppuration into the k. substance from the pelvis, or to pyæmia, and is treated by incision into the kidney, and drainage, or by more radical operative treatment.

Tuberculosis of the k. may be primary or secondary,

and is treated by a more or less radical surgical operation, part or all of the kidney being removed.

Floating k. most commonly occurs in women after parturition, and is treated by wearing a suitable belt and pad, or by holding the kidney in place by a surgical operation in more extreme cases. *Renal colic*, see COLIC.

KIDWELLY (51° 45′ N., 4° 18′ W.), town, Carmarthenshire, Wales; old castle. Pop. (1911) 3035.

KIEFF, KIEV (*q.v.*).

KIEL (54° 19′ N., 10° 8′ E.), town, Schleswig-Holstein, Prussia, on inlet of Baltic; near entrance to Kaiser Wilhelm Canal; important Ger. naval station; fine harbour, strongly fortified; has univ., observatory, museum, old palace; shipbuilding, foundries. Pop. (1910) 211,044.

KIELCE (*c.* 50° 30′ N., 20° 30′ E.), province, Russ. Poland; produces iron, coal, cereals. Pop. (1910) 965,200. KIELCE, the capital, has a pop. of 30,818.

KIEPERT, HEINRICH (1818–99), Ger. cartographer; issued many atlases and maps.

KIERKEGAARD, SÖREN AABY (1813–55), Dan. writer and student; original of Ibsen's 'Brand.'

KIEV.—(1) (50° N., 30° E.) province, S.W. Russia; surface forms plateau, well wooded; drained by Dnieper; produces beetroot, cereals, tobacco, oil; manufactures sugar, spirits, machinery, bricks, iron goods. Pop. (1910) 4,556,000. (2) (50° 27′ N., 30° 34′ E.) chief town of above; once capital of Muscovite empire; important ecclesiastical centre since 988, when Christianity was here introduced into Russia by St. Vladimir; Cathedral of St. Sophia, dating from XI. cent., is oldest in Russia; site of Pecherskoi Monastery, which, traditionally founded by St. Anthony, XI. cent., is annually visited by many thousand pilgrims and has famous catacombs; univ., established 1834, has over 5000 students; commercial centre for S.W. Russia; five annual fairs; strongly fortified. Pop. (1910) 446,800.

KILBARCHAN (55° 51′ N., 4° 33′ W.), town, Renfrewshire, Scotland; manufactures textiles, paper. Pop. (1911) 7491.

KILBIRNIE (55° 46′ N., 4° 41′ W.), town, Ayrshire, Scotland. Pop. (1911) 7618.

KILBRIDE, WEST (55° 40′ N., 4° 50′ W.), town, Ayrshire, Scotland. Pop. (1911) 3104.

KILDARE (53° 12′ N., 6° 45′ W.), county, Leinster, Ireland; area, 654 sq. miles; most of surface is flat, with bogs in N.; watered by Liffey, Boyne, Barrow, and crossed by two canals. Chief industry is agriculture; produces potatoes, oats, barley; live stock raised. Brewing and distilling are carried on. K. has numerous monastic ruins and some ancient earthworks and round towers. Pop. (1911) 66,498. KILDARE (53° 9′ N., 6° 54′ W.), the county town, has a cathedral.

KILHAM, ALEXANDER (1762–98), Eng. follower of John Wesley; became founder of Methodist New Connexion.

KILIA (45° 30′ N., 29° 20′ E.), town, S.W. Russia. Pop. 12,000.

KILIMANJARO (3° 5′ S., 37° 22′ E.), extinct volcanic mountain to E. of Victoria Nyanza, Ger. E. Africa; highest point is volcanic cone of Kibo (*c.* 19,700 ft.), which is connected with Kiwamenzi (*c.* 17,000 ft.) by high plateau 7 miles in length.

KILKEE (52° 41′ N., 9° 38′ W.), town, County Clare, Ireland.

KILKENNY (52° 35′ N., 7° 15′ W.), county, Leinster, Ireland; area, *c.* 798 sq. miles; surface undulating, rising in N.E. to over 1000 ft.; drained by Barrow, Nore, Suir. Produces black marble, anthracite coal; manufactures beer, whisky, flour, woollens. K. has several monastic ruins. Pop. (1911) 74,821.

KILKENNY (52° 39′ N., 7° 14′ W.), town, K., Ireland; name derived from cathedral of St. Canice, built here in XIII. cent.; ruins of Franciscan and Dominican abbeys and old round tower remain; castle, dating from XII. cent., is residence of Marquesses of Ormonde. Has R.C. cathedral. Pop. (1911) 10,513.

KILLALA (54° 13′ N., 9° 14′ W.), town, County Mayo, Ireland; has cathedral. Pop. 510.

KILLALOE (52° 48′ N., 8° 26′ W.), town, County Clare, Ireland; XII.-cent. cathedral. Pop. 885.

KILLARNEY (52° 3′ N., 9° 30′ W.), town, County Kerry, Ireland; has R.C. cathedral; in vicinity are the lakes of K., famous for beautiful scenery. Pop. 5656.

KILLDEER, see PLOVER FAMILY.

KILLIECRANKIE (56° 44′ N., 3° 47′ W.), pass, Perthshire, Scotland; where Claverhouse defeated Mackay, 1689.

KILLIFISHES (*Cyprinodontidæ*), herbivorous, worm- or insect-eating bony fishes, with long slender bodies, scarcely ever a foot long. Most interesting is the Double-Eyes or Four-Eyed Fish (*Anableps*), so called because each eye is divided into an upper and lower portion, for observing upwards into the air and downwards at the same time. Found in the warmer fresh or brackish waters of both hemispheres.

KILLIGREW, THOMAS (1612–83), Eng. dramatist; b. London; groom of the bedchamber to Charles II.; plays include *Claracilla*, *The Pilgrim*, and *The Parson's Wedding*.

KILLIN (56° 28′ N., 4° 19′ W.), small town, Perthshire, Scotland.

KILLIS (36° 43′ N., 37° 8′ E.), town, Syria. Pop. *c.* 20,000.

KILLYBEGS (54° 38′ N., 8° 27′ W.), town, Donegal, Ireland.

KILLYLEAGH (54° 24′ N., 5° 39′ W.), town, County Down, Ireland.

KILMALLOCK (52° 29′ N., 8° 34′ W.), town, Limerick, Ireland. Ruined abbey.

KILMARNOCK (55° 37′ N., 4° 29′ W.), town, Ayrshire, Scotland; manufactures carpets, textiles, cheese, iron goods. Pop. (1911) 34,725.

KILMAURS (55° 39′ N., 4° 31′ W.), town, Ayrshire, Scotland.

KILOGRAMME, see WEIGHTS AND MEASURES.

KILPATRICK, NEW, or **EAST** (55° 57′ N., 4° 21′ W.), town, Dumbartonshire, Scotland. Pop. (1911) 13,798.

KILPATRICK, OLD (55° 56′ N., 4° 27′ W.), town, Dumbartonshire, Scotland. Pop. (1911) 45,345.

KILRUSH (52° 38′ N., 9° 28′ W.), town, County Clare, Ireland. Pop. 4200.

KILSYTH (55° 59′ N., 4° 5′ W.), town, Stirlingshire, Scotland. Pop. (1911) 8106.

KILT, see HIGHLAND DRESS.

KILWA-KISIWANI (9° S., 39° 29′ E.), ancient walled town, on island, Ger. E. Africa; ruined mosques, palace.

KILWA-KIVINJE (8° 40′ S., 39° 25′ E.), seaport, Ger. E. Africa. Pop. (1910) 100,791.

KILWINNING (55° 40′ N., 4° 41′ W.), town, Ayrshire, Scotland; coal, ironwork, engineering; ruined monastery. Pop. (1911) 4945.

KIMBERLEY (28° 46′ S., 24° 51′ E.), town, Cape Province, S. Africa; besieged by Boers, 1899–1900; famous diamond mines, including Du Toit's Pan, Bultfontein, K., De Beers, and Wesselton; annual output of stones worth over £5,000,000. Pop. (1911) 29,519.

KIMBERLEY, JOHN WODEHOUSE, 1ST EARL OF (1826–1902), Brit. statesman; cr. earl, 1866; held various important portfolios in Liberal Cabinets from 1852 to 1895.

KIMERIDGE CLAY, a bluish shaley clay found at Kimeridge, in Dorset; is dark and bituminous, some varieties so much so as to be used for fuel; contains numerous fossils, including ammonites and dinosaurian reptiles. The clay is used for pottery (flower pots), bricks, tiles.

Kimeridgian, term used by geologists to describe the division of Upper Oolites in Jurassic system.

KIMHI, Qimhi, family of Jewish grammarians of XII. and XIII. cent's. (1) Joseph, a native of S. Spain, wrote a *Book of Demonstration* on Hebrew philology, etc. (2) Moses, author of a Hebrew grammar. (3) David wrote a *Book of Completeness*, embracing Hebrew grammar and etymology.

KINCARDINESHIRE (56° 58′ N., 2° 25′ W.), also called **The Mearns**, eastern maritime county, Scotland; area, *c.* 382 sq. miles; rises from coast to Grampian Mountains, which run E. and W. across county; watered by North Esk, Bervie, Dee, and other streams; chief towns, Stonehaven (capital), Laurencekirk, Bervie, Banchory; no important manufactures; produces oats; cattle and sheep raised; fishing important. Pop. (1911) 41,007.

KINCHINJUNGA (27° 45′ N., 88° 8′ E.), high mountain peak, Himalayas, over 28,000 ft.

KINDERGARTEN, see Education, *Infant Schools.*

KINEMATICS, see Dynamics, Mechanics.

KINETICS, see Dynamics, Mechanics.

KING, title of sovereignty; O.E. *cyning*, signified chief of the tribe; word found in various forms in all Teutonic languages; principle of heredity may be called the fundamental characteristic of kingship; at first any member of king's family might be chosen to succeed him, but at later date the system of primogeniture was established. The Divine Right theory, which still obtains in Germany, reached its apogee in England during the reign of Charles I.

KING BIRD, BEE-BIRD, BEE-MARTIN (*Tyrannus carolinensis*), an Amer. Tyrant Flycatcher whose names are due to the boldness with which it attacks birds trespassing near its nest, and to its alleged preference of honey-bees for food.

KING, EDWARD (1829–1910), bp. of Lincoln, 1885; high Churchman, and of saintly character.

KING, RUFUS (1755–1827), Amer. politician; prominent member of Federalist party; entered Congress, 1784; Senator, 1789; advocated abolition of slave trade; twice ambassador in London. His s., John, was gov. of New York, 1857; and his grandson, Rufus, was sent on embassy to Papal States in 1863.

KING, WILLIAM (1663–1712), Eng. poet and writer. In the controversy regarding the Ancients *v.* the Moderns, King supported Boyle against Bentley. Dr. Johnson includes him in the *Lives of the Poets.*

KING WILLIAM'S TOWN (32° 48′ S., 27° 30′ E.), town, Cape Province, S. Africa. Pop. (1911) 9023.

KING-CRAB (*Limulus*), a peculiar, old-fashioned Arachnoid, entirely covered by large horseshoe-shaped and hexagonal shields. It lives in shallow waters in the W. Pacific and Atlantic Oceans, burrowing in the mud or sand of sheltered bays, and subsisting on worms. Occurs as a fossil from Upper Jurassic times. Forms the order Xiphosura amongst Arthropods.

KING-FISH, see Opah.

KINGFISHERS (*Alcedinidæ*), a family of Picarian birds with 200 species scattered all over the world. The Water-K. have long, slender bills, frequent streams, and feed on fish; while the Wood-K. or King-Hunters have stouter, rounded or compressed bills, inhabit woodlands, and subsist mainly on locusts, crabs, and even reptiles, although a fish meal is not disdained. The Common K. (*Alcedo ispida*), the only Brit. native, belongs to the former group.

KINGHORN (56° 4′ N., 3° 11′ W.), town, Fifeshire, Scotland. Alexander III. was killed here, 1286.

KINGLETS and GOLDCRESTS (*Regulidæ*), a family of minute perching birds occurring in the northern hemisphere. They have straight, sharp beaks and are wren-like in appearance. Brit. examples are the Firecrest (*Regulus ignicapillus*) and Goldcrest (*R. regulus*).

KING-OF-THE-HERRINGS, see Ribbon Fishes.

KINGS, 1 AND 2, books of the Bible containing history of Israel from the end of David's reign (*c.* 1000 B.C.) to 562 B.C., when Jehoiachim was let out of prison in Babylon. The books are obviously made up of older materials. *1 Kings*, chapters 1 to 11 deal with Solomon's nomination as David's successor and his reign; *1 Kings* 12 to *2 Kings* 17 with the divided monarchy; and *2 Kings* 18 to 25 with the Kingdom of Judah. The 'Book of the Acts of Solomon' and the 'Book of the Chronicles of the Kings of Israel' (that of Judah) are referred to as sources. Many of the narratives are very brief, summarising political events, and are probably taken from official sources; others, which are longer, relate stories of the prophets, and are probably from independent sources. As there is much about the Temple, it is possible that special Temple documents were procured by the author. Driver thinks he can distinguish a pre-Deuteronomic framework of *1 Kings* 1 to 11 which describes the splendours of Solomon's reign, with other portions and less favourable details added by a Deuteronomic editor. Likewise the history of the two kingdoms has different strata, the stories of Elijah and Elisha are an important insertion, and may not themselves all come from the same source. They are among the most striking chapters of the Old Testament. *2 Kings* 18 to 25, dealing with the Southern Kingdom, begins with King Hezekiah. Some passages are the same as those in Isaiah. *1* and *2 Kings* were perhaps put together about 600 B.C.; a few passages which seem to refer to the Exile may have been added afterwards. The book is written from a Deuteronomic standpoint; its attitude to the Northern Kingdom is unfriendly.

Barnes, *1 and 2 Kings* (Cambridge Bible); Skinner, *1 and 2 Kings* (Century Bible); Driver, *Introduction to Old Testament Lit.*; Wade, *Old Testament History.*

KING'S BENCH, COURT OF, so called because in former times frequently the king sat there in person. It is presided over by the Lord Chief Justice and 14 puisne judges, who go on circuit through the county towns of England and Wales holding assizes for the trial of civil and criminal cases. The powers of the court are very great, and include the hearing of actions for writs of certiorari, prohibition, mandamus, and Habeas Corpus.

KING'S COUNSEL, in England and Ireland a barrister app. by letters-patent; wears silk gown instead of alpaca gown of 'utter' (outer) barrister, hence phrase 'take silk.' K. C's do not accept pleading or conveyancing, but in court they are the leaders. Colonial K. C's are app. by Brit. Lord Chancellor. See Barrister.

KING'S COUNTY (53° 15′ N., 7° 30′ W.), county, Leinster, Ireland; area, 771 sq. miles; surface generally level, with Bog of Allen in centre, Slieve Bloom Mts. in S.; drained by Shannon, Brosna, Barrow, Boyne; crossed by Grand Canal; dairy farming, live stock. Pop. (1911) 56,769.

KING'S EVIDENCE, see under Evidence.

KING'S EVIL, old term applied to scrofula, a condition usually of childhood manifested by enlargement and cheesy degeneration of the lymphatic glands, especially of the neck, with a tendency to chronic inflammation elsewhere, so named because of a popular belief that it could be cured by the royal touch. The sovereigns of France and of England were alone believed to have this power, James II. being the last English king to touch, but the practice was continued by his descendants, James, the Old Pretender, and his sons Charles (the Young Pretender) and Henry, also by Queen Anne.

KING'S LYNN, Lynn Regis (52° 46′ N., 0° 24′ E.), port, Norfolk, England; has remains of Franciscan friary, XII.-cent. church dedicated to St. Margaret, and XIV.-cent. chapel of St. Nicholas; large harbour; exports coal, oil-seed, shrimps; chief industries are fishing, iron-founding, brewing. Pop. (1911) 20,205.

KING'S MOUNTAIN, mountain, N. and S.

Carolina, near which Americans defeated British, 1780.

KINGSBRIDGE (50° 17′ N., 3° 46′ W.), town, Devonshire, England; has old church; shipbuilding yards and iron foundries. Pop. (1911) 3049.

KINGSLEY, CHARLES (1819–75), Eng. clergyman and novelist; b. Dartmoor, Devon; ed. Cambridge; became rector of Eversley, Hampshire, 1844. Pub. *Andromeda and other Poems* (1858), which included some excellent songs and ballads. His first novels, *Alton Locke* and *Yeast*, show K.'s 'Christian Socialism.' His romances and novels, *Hypatia*, *Westward Ho!*, *Two Years Ago*, *At Last*, and the inimitable *Water Babies*, are famous.

K.'s Letters and Memoirs, edit. by his wife (1899).

KINGSLEY, MARY HENRIETTA (1862–1900), Eng. author; niece of Charles and Henry K.; travelled in Africa and wrote *The Story of W. Africa*; d. while nurse in S. African War.

KINGSMILL ISLANDS, see GILBERT ISLANDS.

KINGSTON.—(1) (41° 52′ N., 74° 4′ W.) town, New York, U.S.A.; railway and canal terminus, trades in hydraulic cement and pavement; manufactures beer, leather, iron goods, flour, tobacco. Pillaged by British, 1777. Pop. (1910) 25,908. (2) (41° 14′ N., 76° 2′ W.) town, Pennsylvania; British defeated Americans, 1778. Pop. (1910) 6449. (3) (44° 22′ N., 76° 23′ W.) fortified town, Ontario, Canada; episcopal see of Anglican and R.C. Churches. Pop. (1911) 18,874. (4) (18° 1′ N., 76° 48′ W.) capital, Jamaica; greatly damaged by earthquake, 1907. Pop. (1911) 57,379.

KINGSTON, ELIZABETH, DUCHESS OF (1720–88), notorious for scandalous life; bigamously m. 2nd Duke of Kingston, 1769; tried at suit of his nephew and declared guilty, 1776.

KINGSTON-ON-THAMES (51° 25′ N., 0° 18′ W.), municipal borough, Surrey; has XIV.-cent. church, near which ancient royal chapel formerly stood. Pop. (1911) 37,977.

KINGSTON-UPON-HULL, EARLDOM AND DUKEDOM OF, titles held by Pierrepont family, 1628–1773. Evelyn, 5th earl and 1st duke (d. 1726), was Lord Privy Seal.

KINGSTON, WILLIAM HENRY GILES (1814–80), Eng. writer of boys' novels, e.g. *Peter the Whaler*, *The Three Midshipmen*; wrote over 120 books of healthy tone.

KINGSTOWN (53° 17′ N., 6° 8′ W.), town, Dublin, Ireland; mail packet station. Pop. (1911) 17,227.

KING-TÊ-CHÊN (29° 7′ N., 117° 31′ E.), town, China; noted for manufacture of porcelain. Pop. *c.* 1,000,000.

KINGUSSIE (57° 4′ N., 4° 2′ W.), town, Inverness-shire, Scotland; summer resort. Pop. (1911) 1171.

KIN-KIANG FU (29° 40′ N., 116° E.), town, Kiang-si, China; treaty port. Pop. (1910) 36,000.

KINNING PARK (55° 50′ N., 4° 16′ W.), suburban district, Glasgow, Scotland; engineering works, soap, paint.

KINO, drug consisting of the juice obtained from incisions in the trunk of a tree, *Pterocarpus marsupium*, of natural order *Leguminosæ*, growing in West Africa and the East Indies; obtained commercially in the form of angular, glistening, reddish-black, brittle fragments; inodorous, soluble in alcohol and boiling water. The chief constituent is kino-tannic acid. Used medicinally, being a powerful astringent, in gargles and diarrhœa mixtures.

KINORHYNCHA, a class of minute animals, comprising the single genus *Echinoderes*, of which there are somewhat less than a score of species. They are minute, segmented, spinous worms, occurring in the sea in mud and on seaweed, and living upon organic débris.

KINROSS-SHIRE (56° 13′ N., 3° 28′ W.), county, Scotland; area, 82 sq. miles; surface consists of hills encircling central plain in which is Loch Leven; watered by Leven R.; chief industry, agriculture; produces barley; sheep and cattle raised. County town, Kinross. Pop. (1911) 7528.

KINSALE (51° 42′ N., 8° 32′ W.), port, County Cork, Ireland; fishing trade. Pop. 4300.

KINTORE (57° 14′ N., 2° 21′ W.), town, Aberdeenshire, Scotland.

KIOTO (35° N., 135° 45′ E.), old capital, Japan; seat of Imperial Univ.; famed for splendid temples; old imperial palace; enamels, brocades, embroidery, porcelain. Pop. (1908) 442,462.

KIPLING, RUDYARD (1865–), Brit. poet and novelist; b. Bombay; awarded Nobel Prize for Lit., 1907; one of the greatest writers of the short story, cf. *Soldiers Three*; has pub. longer novels, e.g. *The Light that Failed*, *Kim*, and the realistic school-story, *Stalky and Co.*; poems, e.g. *Barrack-Room Ballads*, are great verse, rugged, strong, humorous. A master of terseness, K. paints a picture in two words; in spirit he is imperialistic, he sings of discipline and its glory; shows unique knowledge of native Indian life and technicalities of the sea.

KIPPER, popular term for herring cured by smoke-drying the split fish; origin of word apparently 'kip,' cartilaginous beak developed by male salmon. See SALMON FAMILY.

KIRCHHEIM-UNTER-TECK (48° 39′ N., 9° 28′ E.), town, Württemburg, Germany. Pop. (1910) 9669.

KIRGHIZ, a nomadic people of Tatar-Mongolian race, who inhabit the steppes of Asia between Ural and Altai Mountains; they number about 3,000,000, speak a Turk. dialect, and, though professing Muhammadanism, still retain many heathen customs; generally subdivided into two groups, the K. Kazaks and the Kara-K. The KAZAKS are found in Ural and other provinces of Russia; they number over 2,500,000, and have been under Russ. control since 1819. The KARA-K. (Black K.) inhabit the uplands of Pamir and Turkestan, and other regions in Central Asia; their numbers are variously estimated at from 350,000 to 800,000; and they also are subject to Russia.

Parker, *A Thousand Years of the Tartars* (1895).

KIRIN (43° 52′ N., 126° 53′ E.), town, K. province, Manchuria. Pop. *c.* 100,000. K. province has area, 105,000 sq. miles. Pop. 6,000,000.

KIRK, SIR JOHN (1832–), Brit. naturalist; ed. Edinburgh University; chief of Livingstone's Govt. Expedition to Africa, 1858; Brit. representative at African Conference, Brussels, 1889.

KIRKCALDY (56° 7′ N., 3° 9′ W.), town, Fifeshire, Scotland; has small harbour; great linoleum and floorcloth industries, potteries, breweries, linen manufactures; was Adam Smith's birthplace; called the 'Lang Toun' from its great length. Pop. (1911) 39,600.

KIRKCALDY, SIR WILLIAM, KIRKCALDY OF GRANGE (d. 1573), one of Scot. 'Lords of the Congregation'; party to murder of Cardinal Beaton, 1546; led opposition to Mary, Queen of Scots; but upheld her cause after her imprisonment; executed.

KIRKCUDBRIGHT (54° 50′ N., 4° 2′ W.), town, Scotland; royal burgh since 1455; has ruined castle; finest harbour in S. Scotland. Pop. (1911) 2191.

KIRKCUDBRIGHTSHIRE (55° N., 4′ W.), maritime county, S.W. Scotland, with rocky coast; surface hilly, rising in N.W. to over 2760 ft. in Mt. Merrick; drained by Dee, Fleet, Ken, Urr; area, *c.* 900 sq. miles. Chief towns, Kirkcudbright, Maxwelltown, Dalbeattie, Castle-Douglas. Great part of surface is under grass; cattle, sheep, horses raised; dairy-farming carried on; large quantities of granite quarried. Monastic ruins include Dundrennan, Lincluden. K. was frequently overrun by Danes and Saxons in X. and XI. cent's, and in later times was scene of hostilities between Scots and English, and of private feuds between great Border families. Pop. (1911) 38,363.

KIRKEE, KIRKI (18° 34′ N., 73° 53′ E.), town, Bombay, India. Pop. 11,000.

KIRKINTILLOCH (55° 58′ N., 4° 13′ W.), town, Dumbartonshire, Scotland; coal and iron works. Pop. (1911) 11,923.

KIRK-KILISSE (41° 43′ N., 27° 11′ E.), town,

Turkey-in-Europe; taken by Bulgarians, 1912. Pop. *c.* 16,000.

KIRKSVILLE (40° 10′ N., 92° 38′ W.), town, Missouri, U.S.A. Pop. (1910) 6347.

KIRKWALL (58° 59′ N., 2° 57′ W.), capital, Orkney, Scotland; cruciform cathedral, chiefly Norman, dedicated to St. Magnus, dates from XII. cent.; ruined episcopal and baronial palaces; royal burgh since 1486; shipping, distilling, fishing. Pop. (1911) 3310.

KIRRIEMUIR (56° 41′ N., 3° 1′ W.), town, Forfarshire; birthplace of Sir J. M. Barrie, Bart., who, in his novels, calls the town THRUMS. Pop. (1911) 3776.

Alan Reid, *The Regality of Kirriemuir* (1909).

KIR-SHEHR (39° 10′ N., 33° 59′ E.), town, Asia Minor. Pop. 10,000.

KIRWAN, RICHARD (1733–1812), Irish scientist; b. Cloughballymore; pres., Royal Irish Academy, 1791; wrote on chemistry, geology, magnetism, meteorology, philology.

KISFALUDY, KÁROLY (1788–1830), Hungarian author; b. at Téte; composed his tragedy *Gyilkos* (The Murder), 1808, and martial poems; wrote *Kldra Zdch*, a tragedy, 1812. The composition of three plays, *Ilka*, *Voivode Stiber*, and *The Petitioners*, placed him first among Hungarian writers. In 1822 he founded the *Aurora*, the pioneer journal of Hungarian romanticism.

KISH, KENN, KEISH (26° 32′ N., 54° E.), island, Persian Gulf; pearl-fisheries.

KISHANGARH.—(1) (26° 20′ N., 75° E.) native state, Rajputana, India. Pop. (1911) 87,093. (2) (26° 33′ N., 74° 54′ E.) town, capital of above. Pop. 13,000.

KISHINEV (47° N., 28° 52′ E.), town, Bessarabia, Russia; archiepiscopal see; cathedral. Pop. (1910) 118,610.

KISHM.—(1) (26° 45′ N., 55° 50′ E.) island, Persian Gulf; area, *c.* 500 sq. miles; salt, sulphur. Pop. *c.* 18,000. (2) (26° 58′ N., 56° 28′ E.) chief town. Pop. *c.* 5000.

KISKUNFÉLEGYHÁZA (46° 44′ N., 19° 50′ E.), town, Hungary; railway centre. Pop. (1911) 34,924.

KISLOVODSK (43° 50′ N., 42° 48′ E.), town, Terek, Russia. Pop. 5500.

KISMET, Muhammadan word for 'fate.'

KISS, token of salutation or, more frequently, affection, used since earliest times; Russ. peasants thus salute each other on Easter Day.

KISSINGEN (50° 12′ N., 10° 4′ E.), town, Bavaria; spa; mineral springs. Pop. (1910) 5830.

KISTNA, KRISHNA (*c.* 16° 10′ N., 81° 10′ E.), district, Madras, India; watered by K. and other rivers; produces cereals, tobacco, cotton; chief town, Masulipatam. Pop. *c.* 1,748,000.

KISTNA, KRISHNA (15° 57′ N., 81° 8′ E.), river, S. India; source in W. Ghats; enters Bay of Bengal.

KITAZATO, SHIBASABURO (1856–), Jap. physician and bacteriologist; studied under Koch (1885–91); discovered the bacilli of tetanus, diphtheria, and (in conjunction with Aoyama) plague.

KITCHENER, HORATIO HERBERT, VISCOUNT K. OF KHARTUM (1850–), Brit. field-marshal; Sirdar of Egyptian Army, 1892; broke power of Khalifa at Omdurman, 1898; ended Boer War in S. Africa, 1902; commander-in-chief, India, 1902–9; Brit. agent and Consul-Gen. in Egypt, 1911.

KITE, a member of the HAWK FAMILY (*q.v.*).

KITE-FLYING is largely practised as pastime by Chinese and Japanese; since the middle of XVIII. cent. has been used in Britain for scientific and later for military purposes. Franklin extracted electricity from clouds by this means in 1752; now used for measuring force of wind, barometric pressure, temperature, etc. Box kites have now superseded older patterns. Military kites are used for reconnaissance or photographing strategical positions.

KIT'S COTY HOUSE, see under STANDING STONES.

KITTIWAKE, see under GULL FAMILY.

KITTUR (15° 35′ N., 74° 46′ E.), village, Bombay, India. Pop. 5000.

KITZINGEN (49° 44′ N., 10° 8′ E.), town, Bavaria. Pop. (1910) 9108.

KIUNG-CHOW-FU, see HAINAN.

KIUSTENDIL, KÖSTENDIL, KUSTENDIL (43° 42′ N., 23° 24′ E.), town, Bulgaria; thermal springs. Pop. 13,000.

KIVU (*c.* 2° S., 30° E.), lake, Central Africa; surface *c.* 4800 ft. above sea-level; contains several islands, of which largest is Kwijwi.

KIWI, see under RUNNING BIRDS.

KIZIL IRMAK (41° 42′ N., 46° E.), river, Asia Minor; enters Black Sea.

KIZLYAR (43° 46′ N., 46° 44′ E.), town, Terek, Russia; textiles, wine. Pop. 8000.

KIZYL-KUM (43° 30′ N., 64° E.), desert tract, W. Asia.

KJÖBENHAVN, COPENHAGEN (*q.v.*).

KLADNO (50° 8′ N., 14° 7′ E.), town, Bohemia; coal, iron, steel. Pop. (1911) 19,339.

KLAGENFURT (46° 37′ N., 14° 19′ E.), town, Austria; cathedral, episcopal palace. Pop. (1911) 28,958.

KLAUSENBURG, see KOLOZSVÁR.

KLAUSTHAL, CLAUSTHAL (*q.v.*).

KLÉBER, JEAN-BAPTISTE (1753–1800), Fr. general; served with distinction at Fleurus (1794) and in Vendean, Egyptian, and Syrian campaigns; won battles of Mount Tabor and Heliopolis in Syria, 1799; assassinated.

KLEIST, HEINRICH BERNT WILHELM VON (1777–1811), Ger. dramatist; b. Frankfort-on-Oder; after unhappy life shot himself near Berlin; best works, *Prinz Friedrich von Homburg*, *Die Hermannschlacht* (dramas), *Der Zerbrochene Krug* (comedy), *Michael Kohlhaas* (romance).

KLEPTOMANIA, stealing by insane person; term generally used in relation to rich people with a weakness for purloining shop goods, etc., they could easily buy.

KLERKSDORP (26° 53′ S., 26° 42′ W.), town, Transvaal, S. Africa. Pop. 4500.

KLINGER, FRIEDRICH MAXIMILIAN VON (1752–1831), Ger. dramatist; b. Frankfort-on-Main; wrote *Sturm und Drang*, play which gave its name to literary epoch; *Die Zwillinge* (tragedy), etc.

KLINGER, MAX (1857–), Ger. painter and sculptor; a great etcher; combines classicism with modernism.

KLONDIKE (65° N., 140° W.), district, Yukon Territory, Canada; drained by K.; richly auriferous; gold first discovered, 1896; Dawson City is mining centre; output has decreased since 1901.

KLOPSTOCK, GOTTLIEB FRIEDRICH (1724–1803), Ger. poet; b. Quedlinburg; studied theology at Jena and Leipzig; lived in Copenhagen, 1751–70; d. Hamburg; K. was the first genuine Ger. poet of XVIII. cent.; aimed at giving the Ger. nation a Christian epic, viz. *Der Messias* (20 cantos pub. in 4 vols.); wrote numerous odes, lyric poetry, and several dramas.

KLOSTERNEUBURG (48° 18′ N., 16° 18′ E.), town, Austria; site of institution of Augustine Canons. Pop. (1911) 14,786.

KNARESBOROUGH (54° 1′ N., 1° 28′ W.), town, Yorkshire, England; has ruined castle; behind Dropping Well is Mother Shipton's Cave; St. Robert's Cave was where Eugene Aram murdered Clarke. Pop. (1911) 5315.

KNEE, see SKELETON.

KNELLER, SIR GODFREY (1648–1723), portrait painter; b. Lübeck; studied under Rembrandt, became Court painter to Charles II. of England, and died famous enough to have a monument in Westminster Abbey.

KNICKERBOCKER, Dutch family settled in New York since end of XVII. cent. See also IRVING, WASHINGTON.

KNIGHTHOOD.—Existing orders of k. in Great Britain are: (1) the most noble *Order of the Garter*, instituted by Edward III., c. 1348; tradition connecting its origin with a Countess of Salisbury is now discredited; consists of Sovereign, Prince of Wales, twenty-five knight-companions; officers are the Prelate, Chancellor, Registrar, King-of-Arms, and Usher of Black Rod; ribbon, Garter blue. Insignia consists of *Star, Collar, and George* (figure of St. George slaying the dragon), and *Garter*. (2) The most ancient and most noble *Order of the Thistle*, revived by James II., 1687, and after a period of desuetude re-established by Queen Anne, 1703; consists of Sovereign, princes of the blood, and sixteen knights, who are generally peers; officers are the Dean, Secretary, Lyon King-of-Arms, Gentleman Usher of Green Rod; ribbon, green. The chapel of the Order, in St. Giles' Cathedral, Edinburgh, was opened by King George V. in 1911. (3) The most illustrious *Order of St. Patrick*, instituted by George III., 1783; consists of Sovereign, Grand Master, and twenty-two knights; officers are Chancellor, Secretary, Genealogist, Usher of Black Rod, Ulster King-of-Arms, and Athlone Pursuivant; ribbon, sky-blue. (4) The most honourable *Order of the Bath*, founded in 1399, revived in 1725, enlarged in 1815, 1847, and on other occasions; there are three classes, Knights Grand Cross (G.C.B.), Knights Commanders (K.C.B.), and Companions (C.B.); officials are Dean, King-of-Arms, Secretary, and Usher of Scarlet Rod; ribbon, red. (5) The most exalted *Order of the Star of India*, founded by Queen Victoria, 1861, and enlarged in 1866 and 1876; there are three classes, and officers are Secretary and Registrar; ribbon, sky-blue, with white stripe near both edges. (6) The most distinguished *Order of St. Michael and St. George*, founded in 1818; extended in 1868; there are three classes; officials are Prelate, Chancellor, Secretary, King-of-Arms, Registrar, and Gentleman Usher of Blue Rod; ribbon, scarlet, between two stripes of Saxon blue. (7) The most eminent *Order of the Indian Empire*, founded in 1878; in three classes; officers are Registrar and Secretary; ribbon, purple. (8) The *Royal Victorian Order*, founded 1896; in five classes; officers are Lord Chamberlain and Keeper of His Majesty's Privy Purse; ribbon, dark blue, with narrow edge on either side of red, white and red stripes.

Among European orders the most illustrious is the *Toison d'Or* or *Golden Fleece* of Spain and Austria, established in 1429 by Philip of Burgundy; other important continental orders are: the *Order of Christ*, a papal order established by pope, John XXII., and Denis I. of Portugal in early XIV. cent.; the *Legion of Honour*, a Fr. order of Napoleon's foundation in 1802; the Prussian *Order of the Black Cross*, established by Frederick I. in 1701; the Bavarian *Order of St. Hubert*, instituted in 1444; the Russ. *Order of St. Andrew*, of Peter the Great's foundation in 1698; and the Ital. *Order of the Annunziata*, which dates from 1362. There are many others, of more or less importance. Orders also exist in many eastern countries, such as Persia, Japan, Siam, and in some of the states of the western world.

The origin of knighthood is veiled in obscurity; the word knight is derived from the Anglo-Saxon *cniht*, a youth or attendant, with which the Ger. *Knecht* may be compared; it afterwards came to be the equivalent of the Ger. *Ritter* and the Fr. *chevalier*, so that the term knighthood is practically identical with the term chivalry, though in general the former is taken to denote the estate itself, and the latter, the principles and usages of the upper classes in mediæval times. The institution of k. may perhaps be traced to the Gallic and Teutonic peoples who inhabited Western Europe from prehistoric times, and who established a distinction between the noble and gentle classes and the rest of the world.

K. in England developed later than on the Continent, and on lines somewhat different from those prevailing elsewhere. Except that King Alfred is said to have knighted his grandson Athelstan, there is little or no evidence of the institution in this country before the time of the Norman Conquest, although some writers are of opinion that it may have been among the Norman customs introduced by Edward the Confessor; at all events its development as a feudal institution, a part of military system, and a class in the social hierarchy, dates from Norman times. Under the system of feudalism (*q.v.*) established by William the Conqueror the king or overlord had power to compel every one who held a knight's fee to become a knight and perform a certain fixed amount of military service; these services were at a later date commuted for money payments, a custom which eventually developed into the levying of a war tax called *scutage*. A later custom, whereby subjects were allowed to compound by money payments for refusing the honour of knighthood, led to many abuses and ultimately resulted in the abolition of knight service after the Restoration of 1660.

In conferring knighthood different ceremonies obtained at different times, but there were two distinctive forms. The first of these was the simple *dubbing* of a knight, in which the entire ceremony consisted in the *accolade* or blow with the sword. The second was a much more intricate ceremonial of a religious nature, and was preceded by prayer and fasting and other preparations; the dubbing was performed by fastening the spurs and girding the sword on the candidate, whom the person conferring the honour then struck on face or neck; and in conclusion the knight swore to serve the Church and protect those in distress. The establishment of such militant religious orders as the Hospitallers and Templars was probably largely responsible for the religious nature of the investiture.

Simple knighthood now exists only in England, where it is still conferred by the accolade, the recipients being known as *knights bachelor*. In former times the degree of *knight banneret* might be conferred upon any one who performed an act of valour during battle; but it is generally considered that this degree fell into disuse soon after the middle of the XVI. cent.

F. W. Cornish, *Chivalry* (1901); Froissart, *Chronicles*.

Knight-Service.—System of land tenure in feudal times. Land was divided into knight's fees, for each of which one armed knight had to be provided by holder of fee to serve forty days in the field when summoned. Holder of knight's fee was also subject to obligations of relief, wardship, marriage, and feudal aids.

KNIGHTS OF LABOR, organisation founded, 1869, in U.S.A.; wider compass than trade unions; included clerks, etc.: membership was 700,000 in 1886, but diminishes yearly.

KNIGHTS OF MALTA, see HOSPITALLERS.

KNIGHTS OF RHODES, see HOSPITALLERS.

KNIGHTS OF THE GOLDEN CIRCLE, society formed in U.S.A. during Civil War to stop the war; membership about 250,000.

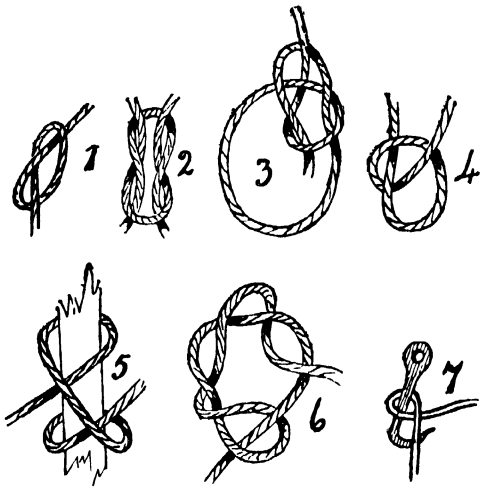
KNIGHTS TEMPLARS, see TEMPLARS.

KNIPPERDOLLING, BERNT (1490–1536), Ger. religious leader; a Münster merchant, became burgomaster, 1534, and then an Anabaptist leader; on crushing of Anabaptist movement K. was tortured and executed.

KNOLLYS, FRANCIS, BARON (1837–), private sec. to Edward VII. and George V.; cr. baron, 1902. One of his ancestors, Sir Francis K. (d. 1596), held various offices under Elizabeth; and another, William K. (d. 1632), was cr. earl of Banbury in 1616; the title afterwards lapsed.

KNOT, in its simplest form is a knob on end of a rope or cord to prevent slipping. More elaborate k's are used for fastening rope to rope, or rope to ring or

beam. Common k's used by sailors are the Overhand (Fig. 1), Reef (Fig. 2), Bowline (Fig. 3), Half Hitch



(Fig. 4), Clove Hitch (Fig. 5), Timber Hitch (Fig. 6), Blackwall Hitch (Fig. 7).

KNOWLES, SIR JAMES (1831–1908), Eng. architect and writer; with Tennyson founded the Metaphysical Soc., 1869; became edit. of *Contemporary Review*, 1870; founded the *Nineteenth Century*, 1877.

KNOW-NOTHING PARTY, Amer. political party, founded about middle of XIX. cent.; so called because members invariably answered 'I don't know' when asked questions concerning it. It aimed at depriving foreign-born inhabitants of political rights by strict naturalisation laws. It reached the height of its power between 1853 and 1856, and in latter year proposed Fillmore for Presidency. It ceased to exist *c.* 1860.

KNOX, JOHN (1505?–72), Scot. reformer: b. Haddington, Scotland; took orders as secular priest, and practised as a notary in Haddington *c.* 1540. In 1546 he came under influence of Wishart. After Wishart's arrest K. went to St. Andrews, where in 1547 he preached Protestantism in parish church. When St. Andrews was taken by the French in 1547 he was taken prisoner, and for nearly two years worked in Fr. galleys. On his release he returned and became minister at Berwick and afterwards at St. Andrews, being also appointed chaplain to Edward VI. During Mary's reign he lived on the Continent. In 1559 he returned to Scotland, joined Lords of Congregation, and drew up *Confession of Faith*, 1560. With Mary, Queen of Scots, he had several heated debates concerning her religion. His sermons after the marriage of Mary and Darnley resulted in his being forbidden to preach; nevertheless, after Mary's abdication he preached the coronation sermon of James VI. at Stirling. In 1569 he retired to St. Andrews, but returned to Edinburgh in 1572 and preached in St. Giles on the subject of the massacre of St. Bartholomew's eve. His *History of the Reformation in Scotland* is an important work. Other writings include the *Blast of the Trumpet against the Monstrous Regiment of Women.*

Life, by Hume Brown (1895), Cowan (1905), Andrew Lang (1905).

KNOXVILLE (35° 57′ N., 83° 57′ W.), town, Tennessee, U.S.A.; contains State univ.; fine public parks; important centre of trade; coal mines and marble quarries in neighbourhood; manufactures iron goods, flour, textiles, bricks; meat-packing carried on. Besieged by Federalists in Civil War. Pop. (1910) 36,346.

KNUCKLEBONES, ancient game played by Greeks; still survives as children's game, played with joint-bones of sheep; object to throw them up and catch them in various ways; five generally used.

KNUTSFORD (53° 18′ N., 2° 22′ W.), town, Cheshire, England; described in Mrs. Gaskell's *Cranford*; manufactures leather, cottons. Pop. (1911) 5760.

KOALA, see under MARSUPIALS.

KOBDO (47° 57′ N., 89° 58′ E.), town, Mongolia; fortified; sheep raised in district. Pop. *c.* 6000.

KOCH, ROBERT (1843–1910), Ger. bacteriologist; famous for his discoveries and isolation of the bacilli of anthrax, Asiatic cholera, and tuberculosis, and for his modes of preventative inoculation.

KODAIKANAL, health-resort, Madras province, India.

KODUNGALUR, CRANGANUR (10° 13′ N., 76° 12′ E.), town, Madras, India. Traditionally connected with St. Thomas. Pop. 30,000.

KOESFELD (51° 57′ N., 7° 9′ E.), town, Westphalia, Prussia. Pop. (1910) 9420.

KOHAT.—(1) (33° 25′ N., 71° 20′ E.) district, Peshawar, India; area, *c.* 2770 sq. miles; salt mines. Pop. (1910) 217,865. (2) (33° 33′ N., 71° 23′ E.) town and capital of above. Pop. (1901) 30,762.

KOHAT PASS (33° 35′ N., 71° 27′ E.), pass leading from Peshawar to Kohat, India.

KOH-I-NUR, see DIAMOND.

KOHISTAN (35° N., 73° 20′ E.), mountainous region, N.W. India; crossed by Indus. Pop. *c.* 15,000. K. (35° N., 70° E.), district, Afghanistan.

KOKOMO (40° 31′ N., 86° 5′ W.), town, Indiana. Pop. (1910) 17,010.

KOKO-NOR (36° 50′ N., 100° E.), lake, Tibet.

KOKSTAD (28° 30′ S., 29° 25′ E.), town, Griqualand East, S. Africa. Pop. 3000.

KOLA (67° 30′ N., 36° E.), peninsular district, Russia, between White Sea and Arctic Ocean; Ekaterininsk superseded Kola as capital, 1899.

KOLABA (18° 25′ N., 73° 12′ E.), mountainous district, Bombay, India; rice. Pop. 607,000.

KOLAPUR, KOLHAPUR (*q.v.*).

KOLAR.—(1) (13° 5′ N., 78° 5′ E.) district, Mysore, India; area, *c.* 3000 sq. miles; gold mines. Pop. (1901) *c.* 700,000. (2) (13° 6′ N., 78° 7′ E.) town, Mysore. Pop. 12,500.

KOLBERG (54° 10′ N., 15° 32′ E.), port, Pomerania, Prussia; former fortress; joined Hanseatic League. Pop. (1910) 24,909.

KOLDING (55° 29′ N., 9° 28′ E.), town, Denmark. Pop. (1911) 14,219.

KOLGUEV (69° N., 48° 45′ E.), island, off N. coast, Russia, in Arctic Ocean.

KOLHAPUR.—(1) (16° 30′ N., 74° 10′ E.) native state, Bombay; area, 3165 sq. miles; rice, tobacco; manufactures textiles. Pop. (1911) 833,441. (2) (16° 43′ N., 74° 13′ E.) town, capital of above; ruined Buddhist shrines. Pop. (1911) 54,373.

KOLIN, NEU-KOLIN (50° 4′ N., 15° 14′ E.), town, Bohemia. Here Austrians defeated Prussians, 1757. Pop. (1911) 16,442.

KÖLLIKER, RUDOLPH ALBERT VON (1817–1905), Swiss physiologist, anatomist, and zoologist. His microscopical researches into the minute structures of the tissues of man and of the lower animals, his studies of the embryological development of vertebrates and invertebrates, and his general zoological inquiries gave an early stimulus to a refined type of microscopical analysis.

KOLLONTAJ, HUGO (1750–1812), Polish reformer; left Poland because of reactionary government, 1791; imprisoned in Austria, 1795–1802.

KÖLN, see COLOGNE.

KOLOMEA (48° 31′ N., 25° 1′ E.), town, Galicia, Austria. Pop. (1910) 42,676.

KOLOMNA (55° 7′ N., 38° 46′ E.), cathedral town, Moscow, Russia. Pop. 21,500.

KOLOZSVÁR, KLAUSENBURG (46° 44′ N., 23° 33′ E.), town, Hungary; has univ., Gothic church, citadel; Episcopal see of Unitarian and Reformed Churches;

birthplace of Matthias Corvinus. Pop. (1910) 60,808.

KOLPINO (59° 33′ N., 30° 5′ E.), town, Russia; Crown ironworks. Pop. 8000.

KOLYVAŃ (55° 10′ N., 82° 40′ E.), town, Tomsk, Siberia. Pop. (1897) 12,000.

KOMÁROM (47° 46′ N., 18° 7′ E.), town, Hungary; strongly fortified. Pop. 17,000.

KOMATI (25° 45′ S., 32° 42′ E.), river, S.E. Africa; source in S.E. Transvaal; enters Delagoa Bay.

KOMOTAU (50° 27′ N., 13° 26′ E.), town, Bohemia; textiles, fruit, beer. Pop. (1911) 19,545.

KOMURA, JUTARO, COUNT (1855–), Jap. politician and diplomat.

KONG (8° 58′ N., 3° 23′ W.), town, Fr. Ivory Coast, W. Africa. Pop. *c.* 14,000. K. district has pop. *c.* 400,000. K. hills reach height of over 4500 ft.

KONGSBERG (59° 36′ N., 9° 43′ E.), town, Norway; silver mines. Pop. 6000.

KONIA (*c.* 37° 53′ N., 32° 19′ E.), vilayet, Asiatic Turkey; area, 39,410 sq. miles. Pop. *c.* 1,069,000. K., capital, was for several cent's Seljuk seat of government; manufactures carpets, woollens. Pop. *c.* 45,000. See ICONIUM.

KONIECPOLSKI, STANISLAUS (1591–1646), Polish general; defeated Swedes at Homerstein, 1627; Trzciand, 1629; also defeated Tatars, Turks, and Cossacks.

KÖNIG, KARL RUDOLPH (1832–1901), Ger. physicist and manufacturer of tuning-forks; made important investigations in acoustics.

KÖNIGGRÄTZ (50° 13′ N., 15° 49′ E.), town, Bohemia; XIV.-cent. cathedral. Pop. (1911) 11,064.

KÖNIGINHOF (50° 27′ N., 15° 46′ E.), town, Bohemia, founded by Wenceslaus II., XIII. cent. Pop. (1911) 15,062.

KÖNIGSBERG (54° 43′ N., 20° 29′ E.), town, Prussia, Germany; commercial and industrial centre of E. Germany, and a great tea centre of Europe; important military and naval fortress; has royal palace, univ., XIV.-cent. cathedral; various educational and charitable institutions; birthplace of Kant. Machinery, sugar, tobacco, beer manufactured. Exports cereals, timber, etc. Pop. (1910) 245,853.

KÖNIGSBORN (51° 33′ N., 7° 41′ E.), watering-place, Westphalia, Prussia; saline springs.

KÖNIGSHÜTTE (50° 19′ N., 18° 56′ E.), town, Silesia, Prussia. Pop. (1910) 72,642.

KÖNIGSLUTTER (52° 15′ N., 10° 56′ E.), town, Brunswick, Germany. Pop. 3300.

KÖNIGSSEE (47° 34′ N., 13° E.), lake, Bavaria, Germany.

KÖNIGSTEIN (50° 53′ N., 14° 3′ E.), town, Saxony, Germany; formerly important fortress; citadel used as State prison. Pop. (1910) 3924.

KÖNIGSWINTER (50° 40′ N., 7° 12′ E.), town, Rhenish Prussia, Germany. Pop. 4000.

KONITZ (53° 43′ N., 17° 34′ E.), town, W. Prussia, Germany. Pop. (1910) 12,010.

KONKAN (17° to 19° N., 73° E.), coast district, W. India; produces rice, salt.

KONRAD, CONRAD (*q.v.*).

KONTAGORA, province, Brit. N. Nigeria, Africa; under Brit. control since 1901.

KOORINGA (33° 42′ S., 138° 59′ E.), town, S. Australia. Pop. 2600.

KÖPENICK (52° 35′ N., 13° 32′ E.), town, Brandenburg, Prussia; manufactures carpets, sealing-wax. Pop. (1910) 30,882.

KOPRÜLÜ, KUPRILI (41° 43′ N., 21° 56′ E.), town, Turkey-in-Europe. Pop. *c.* 20,000.

KORA (13° 26′ N., 77° 6′ E.), old town, United Provinces, India. Pop. 3000.

KORAN, AL KORAN, QUR'ÁN, AL QUR'ÁN, the 'Bible' of Muhammadans, and the work of Muhammad himself. A divine inspiration is claimed for it by believers more rigid and absolute than the Christian Church has ever claimed for the Bible. The K. for Muhammadans is uncreated, having existed eternally in the mind of God until it was revealed to Muhammad; the K., therefore, exists in heaven, and that on earth is only a 'copy.' It is composed of chapters, called *Suras*, though the exact meaning of the word is uncertain. It covers a great variety of subjects, and confusion is produced by the suras having sometimes got out of their original order; but even when this is preserved, change is often abrupt. Muhammad, too, was a mystic rather than a systematic thinker, so the 'chaotic' character (as it has been called) of the book is not surprising. The K. is fiercely monotheistic, and the worship of Christ as Son of God is therefore denounced.

The subject-matter is largely taken from the Old Testament, and there are several references to Jesus and to the Virgin Mary, who is confused with Miriam, the sister of Moses. But it betrays little intimate knowledge of Judaism and none of Christianity. Its outlook is confined to Arabia. The K. is not only the first real literary production in Arabic prose, but is regarded by devout Muslims as faultless in form and phrase. This opinion is not shared by some competent Muslim scholars, and is rejected by all Europeans. It is rhetorical rather than poetical—is sometimes described as 'rhymed prose.' Though this style is suitable for parts of it, competent Arabic scholars declare it is monotonous in others. It was not written all at one time, but belongs partly to the Meccah and partly to the Medina period of the prophet's life. The latter part is easier to grasp in its hist. bearings, as more is known of this than the earlier time.

The K. attacks Jews more than Christians, with whom Muhammad seems to have come but little into contact. At the beginning of 29 of the suras certain letters stand, the meaning of which both native and European scholars have endeavoured to discover, but without success. The first sura has been called the 'Lord's Prayer' of Muslims. That portion of the K. which is concerned with women is the least edifying of the whole. It has been disputed whether Muhammad himself could write—probably he could a little; but his thoughts and revelations were certainly written during his lifetime, whether by his own hand or another. At his death the K. was both scattered and fragmentary. These were collected, and there was much dispute over the correct version. Finally, all copies except one were ordered by the Caliph Othman to be burnt, and the one was copied by Zaid. From this all existing MSS. (some of which go back to the I. cent. after the Flight) are derived, though sometimes other readings are found. But it is fairly certain our K. contains no interpolations. Several mediæval and modern commentaries exist.

Eng. trans. by Sale, Rodwell, and Palmer; various lives of Muhammad; Gibbon's *Decline and Fall* (Bury's edition); Margoliouth, *Mohammedanism.*

KORAT (15° 23′ N., 102° 20′ E.), town, Siam. Pop. *c.* 6500.

KORDOFAN (12° 30′ N., 31° 30′ E.), province, Anglo-Egyptian Sudan, W. of White Nile; area variously estimated at from 41,000 to 130,000 sq. miles; rolling plains, 1300 to 1900 ft., with isolated peaks rising to 2600; no rivers; millet, gums; cattle and camels reared; exports gum, hides, ivory, gold. K. belonged in turn to rulers of Senaar, Darfur, Egypt; passed under control of reorganised Sudan Government, 1899. Pop. over 5 millions, including persons of Arab, Turkish, Egyptian, and negro descent.

KOREA (34° to 43° N., 124° 30′ to 130° 30′ E.), peninsular country, E. coast of Asia. In early times K. included three independent kingdoms which, owing to Chinese influence, attained considerable degree of civilisation. After various vicissitudes, K. became an independent kingdom in X. cent.; overrun by Mongols under Jenghiz and Kublai Khan in XIII. cent.; came under suzerainty of Ming emperors of China in XIV. cent.; invaded and ravaged by Japanese in 1592–98, since when it has been subject of continual

dispute between China and Japan. In 1894 Chino-Japanese War broke out, which resulted in defeat of Chinese and proclamation of Korean independence. In 1904 occurred Russo-Japanese War, at end of which Japan obtained formal recognition of her right to control Korean affairs. In 1907 Emperor of K. abdicated, and in 1910 the country was annexed to Japanese empire. Administered by governor-general, who represents Japan.

K. lies between Yellow Sea and Sea of Japan; area, *c.* 82,000 sq. miles. Surface is mountainous, traversed from N. to S. by range which rises to height of over 8000 ft.; drained by Han, Tai-dong in W., Yalu, Tumen in N., and other streams. Chief towns, Seoul (capital), Ping-Yang, Songdo. Climate generally cool and bracing.

Principal industry is agriculture; about 5,600,000 acres are under cultivation, but agricultural methods are extremely primitive. K. produces rice, wheat, and other grains, tobacco, cotton, cattle. There is some whale-fishing. Minerals include gold, which is extensively worked, coal, copper, iron. Exports cereals, gold, ginseng, hides, cattle. Railway mileage, *c.* 700.

Religions are ancestor worship and Confucianism; Buddhism is not now important, and there are many converts to Christianity. Inhabitants, besides Koreans themselves, include Chinese, Japanese, Americans, English, French, Germans. Pop. (1911) 13,125,027.

Griffis, *Korea* (1905); Hulbert, *The Passing of Korea* (1906).

KOREA (23° 30′ N., 82° 30′ E.), feudatory state, India. Pop. 37,000.

KORIN, OGATA (*c.* 1655–1716), Jap. artist; painter of very individual gifts; examples much sought after by collectors; gave his name to the Korin school. Morrison, *The Painters of Japan.*

KÖRMÖCZBÁNYA, KREMNITZ (48° 42′ N., 18° 46′ E.), town, Hungary. Pop. 4500.

KÖRNER, KARL THEODOR (1791–1813), Ger. poet; b. Dresden; wrote patriotic poetry (*Leyer und Schwert*) and plays.

KORNEUBURG (48° 25′ N., 16° 21′ E.), town, Austria. Pop. (1911) 9058.

KOROCHA (50° 49′ N., 37° 14′ E.), town, Russia. Pop. 15,000.

KORSÖR (55° 19′ N., 11° 8′ E.), port, Denmark. Pop. (1911) 8065.

KORTCHA (40° 43′ N., 20° 51′ E.), cathedral town, Albania. Pop. *c.* 10,000.

KORYAKS, tribe in extreme N.E. Asia; have offered desperate hostility to Russ. power.

KOSCIUSCO (36° 22′ S., 148° 20′ E.), mountain peak, Australia (*c.* 7325 ft.).

KOSCIUSZKO, TADEUSZ ANDRZEJ BONAWENTURA (1746–1817), Polish statesman and general; b. at Mereczowszczyzna, Lithuania; served in Amer. army, 1776–86, becoming adjutant to Washington in 1777; returning to Poland, he became a leader in the reform of 1790, and served with distinction against Russia in 1792. He afterwards withdrew to Leipzig, whence he returned in 1794 to take command in the Polish rising of that year; gained some slight successes at first, and defeated Russians at Raclawice; but he was subsequently routed at Rawka, and after other reverses was finally defeated and captured at Maciejowice, Oct. 4, 1794. He was released from prison by Paul I. in 1796, and after twenty-one years spent in America, France, and Switzerland, he died at Salothurn, 1817.

Falkenstein, *Thaddäus Kosciuszko.*

KOSEL, see COSEL.

KÖSEN (51° 9′ N., 11° 44′ E.), small town, Germany. Pop. (1910) 3006.

KÖSLIN (54° 13′ N., 16° 10′ E.), town, Pomerania, Prussia. Pop. (1910) 23,247.

KOSSOVO (42° N., 22° E.), vilayet, Turkey-in-Europe; area, 12,700 sq. miles. Fruits, tobacco, cereals. Pop. *c.* 1,038,100.

KOSSUTH, LAJOS (1802–94), a noted Hungarian patriot; b. at Monok, Hungary; imprisoned in 1838 for circulating reports of debates in National Diet; after his release he edited the *Pesti Hirlap,* a party periodical, for several years, and in 1847 he entered Diet and became leader of National League, which aimed at Hungarian independence. In 1848 the Diet declared independence of Hungary, and app. K. governor; after suppression of the revolt by Emperor of Austria, he had to take refuge in Turkey; he subsequently lived in England and Italy, his hostility to Austria preventing him from taking advantage of general amnesty. Author of *Memories of My Exile.*

Stiles, *Austria in 1848–49.*

KÖSTENDIL, see KIUSTENDIL.

KOSTROMA (57° 10′ N., 42° E.), government, Central Russia; area, 32,432 sq. miles; surface, undulating plateau; timber. Pop. (1910) 1,700,900. KOSTROMA, capital, an old cathedral town, manufactures linen. Pop. (1910) 46,700.

KÖSZEG, GUNS (47° 23′ N., 16° 31′ E.), town, Hungary. Pop. 7500.

KOTAH.—(1) (25° N., 76° E.) native state, Rajputana, India; area, 5684 sq. miles; cereals, tobacco. Pop. (1911) 639,089. (2) (25° 8′ N., 75° 47′ E.) town. Pop. 35,000.

KÖTHEN, CÖTHEN (*q.v.*).

KOTKA, port, Viborg, Finland. Pop. (1904) 7628.

KOTRI (26° 8′ N., 71° 5′ E.), town, Sind, India. Pop. 7700.

KOTZEBUE, AUGUST FRIEDRICH FERDINAND VON (1761–1819), Ger. dramatist; b. Weimar; held high official post in St. Petersburg, 1871; app. director of Viennese Burgtheater, 1797; assassinated, 1819; wrote numerous plays; *Menschenhass und Reue* (drama) for long the most popular play in Germany and England.

KOTZEBUE, OTTO VON (1787–1846), Russ. Arctic explorer and traveller in Pacific.

KOUMISS, beverage prepared by the Tartars since ancient times by fermenting mare's milk; but may be made by dissolving ½ oz. of grape sugar in 4 fl. oz. of water and 20 gr. of yeast in 4 fl. oz. of cow's milk, pouring both into a quart bottle, which is then filled up with milk, corked, kept cool, and shaken frequently for four days; it is a valuable stimulant food in conditions of exhaustion and in convalescence after severe illness, being easily digested and containing a little alcohol.

KOUMOUNDOUROS, ALEXANDROS (1814–83), Gk. politician; Prime Minister, 1865.

KOUSSO, Cusso, drug consisting of the dried panicles of pistillate flowers of a tree, *Brayera anthelmintica,* of natural order *Rosaceæ,* growing in Abyssinia; obtained commercially in form of rolls, 1 ft. to 2 ft. long; has a bitter taste and tea-like odour, its active principle being the neutral *Koussin* ($C_{31}H_{38}O_{10}$); employed medicinally as anthelmintic for all kinds of tapeworms, but is rarely given in Britain.

KOVALEVSKY, SOPHIE, SONJA (1850–91), Russ. mathematician; did brilliant work on partial differential equations.

KOVNO.—(1) (55° 50′ N., 23° 30′ E.) government, Russia; area, 15,518 sq. miles; surface flat; watered by Niemen, Dvina; cereals, live stock, dairy produce. Pop. (1910) 1,775,900. (2) (54° 56′ N., 23° 53′ E.) fortified town, capital of above; trading centre. Pop. (1910) 79,600.

KOVROV (56° 21′ N., 41° 21′ E.), town, Central Russia. Pop. 17,000.

KOYETSU, HONNAMI (d. 1637), Jap. artist and artificer; brilliant exponent of the Korin school, whose pictures chiefly were illustrations of his own poems.

KOZLOV (53° 52′ N., 29° 18′ E.), town, Tambov, Russia. Pop. (1910) 45,030.

KRAFFT, ADAM (1455–1507), Ger. ecclesiastical sculptor; some of his works survive.

KRAGUYEVATS (44° 1′ N., 20° 53′ E.), town, Servia. Pop. (1911) 18,452.

KRAJOVA, CRAIOVA (*q.v.*).

KRAKATOA (6° 9′ S., 105° 26′ E.), volcanic island, Strait of Sunda, between Sumatra and Java, where one of most terrible volcanic eruptions ever known occurred in 1883. Disturbances continued from May to Sep., culminating in explosions of Aug. 26–28, when greater part of island was blown up; followed by enormous ocean waves which destroyed several hundred villages and caused great loss of life. See *The Eruption of Krakatoa*, by G. J. Symons.

KRALYEVO (23° 40′ N., 20° 43′ E.), town, Servia. In vicinity is celebrated monastery of Studenitsa. Pop. 4000.

KRANTZ, ALBERT (1450–1517), scholar and divine; dean of Hamburg, 1508.

KRASNOVODSK (40° 7′ N., 53° E.), fortified port, Caspian Sea, Russia. Pop. 6500.

KRASNOYARSK (56° 6′ N., 93° E.), town, E. Siberia. Pop. (1910) 62,430.

KRASZEWSKI, JOZEF IGNACY (1812–87), Polish novelist.

KRAUSE, KARL CHRISTIAN FRIEDRICH (1781–1832), Ger. philosopher; pupil of Hegel. His system combined Theism with Pantheism; God is not personal, the Universe is organic and divine.

KRAWANG (6° 25′ S., 107° 30′ E.), residency, Java; thermal mineral springs; rice, coffee; linen manufactured.

KRAY VON KRAJOVA, PAUL (1735–1804), Austrian general; fought in Napoleonic wars.

KREMENCHUG (49° 4′ N., 33° 37′ E.), cathedral town, Poltava, Russia; manufactures tobacco, leather. Pop. (1910) 72,730.

KREMENETS (50° 7′ N., 25° 36′ E.), town, Russia. Pop. 18,000.

KREMNITZ, KOEMOCZBANYA (*q.v.*).

KREMS (48° 25′ N., 15° 36′ E.), town, Austria. Pop. (1911) 14,385.

KREMSIER (49° 18′ N., 17° 23′ E.), town, Austria. Pop. (1911) 16,523.

KREUTZER, RUDOLPH (1766–1831), Fr. violinist and composer; Beethoven composed for him famous K. Sonata.

KREUZBURG (50° 58′ N., 18° 13′ E.), town, Prussian Silesia, Germany. Pop. (1910) 11,590.

KREUZNACH (49° 50′ N., 7° 50′ E.), town, Rhenish Prussia; mineral springs; Roman remains. Pop. (1910) 23,193.

KRIEG-SPIEL, see WAR-GAME.

KRIEMHILD, heroine of the Nibelungenlied and wife of Siegfried, who married Attila on the murder of Siegfried in order to prosecute her scheme of revenge.

KRILOFF, IVAN ANDREJEWITCH, KRYLOW (1768–1844), Russ. fabulist; b. Moscow; wrote *Philomela and Cleopatra* and excellent fables.

KRIMMITSCHAU, CRIMMITZSCHAU (*q.v.*).

KRISHNA, see KISTNA.

KRISHNAGAR (23° 22′ N., 88° 34′ E.), town, Bengal, India. Pop. 25,000.

KRISTIANSTAD, CHRISTIANSTAD (56° 1′ N., 14° 9′ E.), port, Sweden; industrial centre. Pop. (1910) 11,569.

KRIVOY ROG (47° 52′ N., 33° 27′ E.), town, Kherson, Russia. Pop. 11,000.

KRONENBERG (51° 12′ N., 7° 21′ E.), town, Rhenish Prussia. Pop. (1910) 12,942.

KRONSTADT, BRASSO (45° 37′ N., 25° 30′ E.), town, leading commercial and industrial centre, Transylvania; principal building, XIV.-cent. Prot. church; ironworks, leather goods. Pop. (1910) 41,056.

KRONSTADT (60° N., 29° 46′ E.), town, Russia; founded by Peter I.; important fortress, naval arsenal, principal base of Baltic fleet; has three harbours; cathedral. Pop. (1910) 66,624.

KROONSTAD (27° 38′ S., 27° 16′ E.), town, Orange Free State, S. Africa. Pop. (1911) 5696.

KROPOTKIN, PETER ALEXEIVICH, PRINCE (1842–), Russ. author and Nihilist; b. Moscow. In 1864 he undertook a geographical survey expedition through Manchuria; visited Switzerland, 1872, and joined the International Working Men's Association, but subsequently became an anarchist and devoted his time to spreading Nihilist propaganda; has been frequently arrested.

KROTOSCHIN (51° 43′ N., 17° 27′ E.), town, Posen, Prussia. Pop. (1910) 13,061.

KRÜDENER, BARBARA JULIANA, BARONESS VON (1764–1824), Russ. religious mystic; b. Riga (Livonia); married Baron K., 16 years her senior; visited France and published *Valerie* (novel), 1803; then Switzerland and Germany, and came in contact with Adam Müller, a peasant prophet, Jung-Stilling, Jean Frédéric Fontaines, and other religious fanatics; gave herself up to preaching and prophesying; settled at Schlüchten (Baden), 1815; had interviews with Alexander of Russia, greatly influenced him, and was the supposed author of the Holy Alliance; d. Karasu Bazar (Crimea).

Ford, *Life and Letters of Madame de K.* (1893); Muhlenbeck, *Etude sur les origines de la Sainte-Alliance* (1909).

KRUGER, STEPHANUS JOHANNES PAULUS (1825–1904), Pres. of Transvaal; b. in Cape Colony; took part in Great Trek, 1836; rapidly rose to power in Transvaal; led Boers in 1881, when they asserted their independence, and became pres. in 1883; re-elected, 1888, 1893, 1898; his rooted hostility to the British and Uitlanders generally precipitated the S. African War of 1899–1902; fled to Europe, 1900, first settling in Holland, and lastly at Mentone. Imbued with strong puritanical spirit, he was an ardent Dutch-Afrikander patriot, and a 'slim' diplomatist; pub. *Memories* (1902). See SOUTH AFRICA, TRANSVAAL.

KRUGERSDORP (26° 9′ S., 27° 46′ E.), town, Transvaal, S. Africa. White pop. (1911) 13,187.

KRUMAU (48° 48′ N., 14° 20′ E.), town, Bohemia; has famous old castle, associated with Rosenberg family. Pop. (1911) 8716.

KRUMBACHER, CARL (1856–1909), Ger. scholar; studied mediæval and modern Gk. subjects; prof. at Munich; wrote history of Byzantine lit.

KRUMEN, tribe of negroes much employed by British of Guinea; speech related to Mandingo; useful as boatmen along the Pepper Coast.

KRUPP, Ger. firm of steel manufacturers; from small beginnings rose to be largest in world; founded (1810) in Essen by FRIEDRICH KRUPP (1787–1826), who was succ. by his s. ALFRED (1812–87), under whom the foundry developed amazingly; Bessemer process and steam-hammer adopted; steel guns manufactured. Alfred's s., FRIEDRICH ALFRED (1854–1902), carried on the work, and his dau., FRAU KRUPP VON BOHLEN-HALBACH, turned the business into a company (1903). At centenary celebrations (1912) Krupps owned some 500 mines, quarries, sand-pits, and clay-pits; had factories at Essen, Annen, Rheinhausen, Buckau; possessed Germania shipbuilding yard at Kiel-Tagel (Imperial Government advancing £2,500,000); supplied guns, armour-plate, etc., to every part of world; and employed staff of 70,000.

KRUSENSTERN, ADAM IVAN (1770–1846), Russ. sailor and explorer.

KRUSHEVATS (43° 34′ N., 21° 20′ E.), town, Servia. Pop. 10,500.

KSHATRIYAS, see under CASTE.

KU KLUX KLAN, secret society founded in Southern States of N. America in 1865; aimed at depriving negroes of political power, to which end various outrages were committed, a number of negroes being maltreated and even killed. In 1871 Congress took steps to put it down by passing the Enforcement Act, and it soon afterwards disappeared.

KUBAN.—(1) (c. 45° N., 40° E.) province, Caucasia, Russia; area, 36,645 sq. miles; S.W. occupied by W. Caucasus range; drained by Kuban R. and other streams; produces cereals, honey; sheep and horses raised; iron, coal, petroleum, mineral springs. Chief

towns are Ekaterinodar, Yeisk, Maikop. Pop. (1910) 2,625,800. (2) (45° 15′ N., 38° 5′ E.) river, Russia; source in Caucasus; enters Black Sea.

KUBLAI KHAN (1216–94), grandson of Jenghiz Khan, and emperor of the Mongols; succ. his bro. Mangu as khan, 1259; invaded China in 1267, and established there the Mongol dynasty; extended his conquests over Cochin China, Tibet, and beyond the Ural Mt's westward, thus creating one of largest empires ever known; his Jap. expeditions were, however, unsuccessful. Marco Polo (*q.v.*) describes the splendour of his court and wisdom of his rule. He established Buddhism in his dominions.

KUCH BEHAR, Cooch Behar.—(1) (26° 18′ N., 89° 25′ E.) native state, Bengal, India; area, 1307 sq. miles: produces rice, tobacco, jute; many rivers. Pop. (1911) 592,952. (2) (26° 18′ N., 89° 20′ E.) town. Pop. 10,700.

KUCHAN (37° 8′ N., 58° 26′ E.), town, Persia; destroyed by earthquake, 1895. Pop. *c.* 11,000. K. district, pop. *c.* 100,000.

KUEI-HUA-CHENG, see Kuku Khoto.

KUEN-LUN (*c.* 36° N., 76° 15′ to 112° 30′ E.), great mountain ranges of Central Asia, extending from the Pamir by N. of Kashmir, and in a curve round N. of Tibet into China proper; length, c. 2400 miles; breadth, 100 to 150 miles, or, if the eastern parallel ranges in Tibet and China be included, about 620 miles; reaches extreme height of *c.* 24,000 ft., and is crossed by passes from 15,000 to 19,500 ft. above sea-level. K. is one of oldest mountain systems of world, consisting of archaic rocks; may be divided into Western, Central, and Eastern K. Western K. consists of many parallel ranges, including Muz-Tagh and Raskem; it extends eastward by Ullugh-Tagh chain, which unites with Arka-Tagh and Altyn-Tagh, the highest parts of Central K. In these regions are many lakes and high plateaux. Central K. includes also Nan-shan range to N.E., and a number of parallel chains lying farther S.; here the Hwang-ho, Yang-tse-Kiang, Mekong, and other rivers of S.E. Asia have their source. Eastern K. narrows to the single chain of the Tsing-ling-shan in China. Great part of region is covered with snow, and storms of snow and sand frequently occur; in eastern districts coniferous trees abound.

KUFA (32° 3′ N., 44° 37′ E.), ruined Muhammadan town, Asiatic Turkey.

KUKA (12° 58′ N., 13° 23′ E.), town, Bornu, Nigeria; formerly great trading centre; ruined by Rabeh, 1898; has revived since 1902.

KUKU KHOTO, Kuei-Hua-Cheng (40° 52′ N., 111° 40′ E.), walled town, China; trading centre.

KULJA, Ili (43° 38′ N., 81° 38′ E.), walled town (and district), N.W. China; has citadel, mosques. Pop. *c.* 12,000. New K., to W., was ruined in 1868. K. district has area, *c.* 21,000 sq. miles; fertile, produces rice, fruits, cotton, tobacco, while horses, sheep, and cattle are bred; held by Russia, 1871–81. Pop. *c.* 136,000.

KULM (53° 21′ N., 18° 25′ E.), town, W. Prussia, Germany; Episcopal see. Pop. (1910) 11,720.

KULMBACH (50° 6′ N., 11° 28′ E.), town, Bavaria, Germany; large breweries. Pop. (1910) 10,713.

KULMSEE (53° 11′ N., 18° 37′ E.), cathedral town, W. Prussia, Germany. Pop. (1910) 10,612.

KULP (40° 2′ N., 43° 40′ E.), town, Transcaucasia, Russia. Pop. 3500.

KULU (32° 4′ N., 77° E.), region, Punjab, India; fruits; thermal springs. Pop. 70,000.

KUM (34° 37′ N., 50° 56′ E.), sacred city, Persia; tomb of Fatima, sister of Imam Reza, annually visited by pilgrims. Pop. *c.* 28,000. K. province has pop. *c.* 48,000.

KUMAON, Kumaun (30° N., 79° 20′ E.), division, United Provinces, India; great part occupied by southern Himalayas; forests yield valuable timber. Pop. 1,210,000.

KUMASI, Coomassie (6° 40′ N., 2° 16′ W.), capital, Ashanti, Brit. W. Africa; destroyed by Brit. force under Sir Garnet Wolseley, 1874; again occupied, 1896; Gov. and Brit. force besieged, but relieved, 1900; has fort; trading centre. Pop. (1911) 8853. See Ashanti.

KUMBHAKONAM, Conbaconum (10° 58′ N., 79° 25′ E.), sacred city, Tanjore district, India, in Cauvery delta; formerly capital of Chola kingdom; brass and metal ware. Pop. (1911) 59,673.

KUMISHAH (32° N., 52° 1′ E.), town (and district), Persia. Pop. *c.* 14,000.

KUMTA (17° 43′ N., 74° 11′ E.), town, Bombay, India. Pop. 11,000.

KUMYKS, a Caucasian people subdued by Russia in XVI. cent.

KUNAR (34° 25′ N., 70° 30′ E.), river, Afghanistan; has its source in S. slopes of Hindu-Kush Mountains, and joins Kabul R. near Jelalabad.

KUNDUZ (36° 20′ N., 70° 30′ E.), town and khanate, Afghanistan.

KUNENE (*c.* 17° 20′ S., 11° 40′ E.), river, Angola, S.W. Africa; flows to Atlantic.

KUNERSDORF (52° 22′ N., 14° 37′ E.), village, Brandenburg, Prussia; Prussians defeated by Austrians and Russians, 1759. Pop. 5000.

KUNGRAD (43° 12′ N., 59° 10′ E.), town, Turkestan.

KUNGUR (57° 21′ N., 57° 13′ E.), town, E. Russia. Pop. 15,000.

KUNLONG (23° 23′ N., 97° 50′ E.), ferry and small district, Burma; railway being constructed.

KUOPIO.—(1) (63° 10′ N., 28° 30′ E.) province, Finland; area, 16,500 sq. miles; cereals, cattle, iron. Pop. 314,000. (2) cathedral town; capital of above. Pop. 14,500.

KUPRILI, see Koprülü.

KUPRILI, MUHAMMAD (*c.* 1585–1661), Turk. statesman; app. grand vizier, 1656; put down Spahi revolt; defeated Venetians and took Tenedos, 1657; subdued Transylvania; organised finances. His s. Ahmed (*c.* 1632–76) was also grand vizier; warred against Poles. Another s., Mustafa (d. 1691), was grand vizier in 1689; slain at *Salankamen*. Hussein (d. 1702) was grand vizier under Mustafa II.; negotiated Treaty of Carlowitz, 1699.

KURAKIN, BORIS IVANOVICH, PRINCE (1676–1727), Russ. ambassador at various courts.

KURDISTAN (*c.* 38° N., 43° E.), an extensive mountainous district of W. Asia, S. of Armenia, chiefly round upper reaches of Tigris, belonging partly to Turkey and partly to Persia; area, *c.* 52,000 sq. miles. Great part of surface consists of grass-covered tablelands, where sheep are raised in large numbers; district watered by affluents of Euphrates and Tigris. The inhabitants are the turbulent and almost uncivilised Kurds; they were conquered in turn by Persians, Macedonians, Parthians, Sassanians, Romans, Turks, and are now practically governed by their own tribal chiefs, although owing nominal allegiance to Persia and Turkey. Generally brown in colour and of medium height, they speak a dialect of Persian derivation, and practise a form of Muhammadan religion. The Christians of Armenia have frequently suffered terrible outrages at their hands. The population is between 2 and 2½ millions.

KURDISTAN (35° 40′ N., 45° 40′ E.), mountainous province, Persia.

KURGAN (55° 32′ N., 65° 30′ E.), town, W. Siberia. Pop. 11,000.

KURIA MURIA ISLANDS (17° 30′ N., 56° E.), high rocky islets (British), off Arabian coast.

KURILES (*c.* 47° N., 154′ E.), series of 32 small volcanic islands between Kamchatka and Japan, belonging to latter, to whom they were ceded by Russia, 1875; area, *c.* 6156 sq. miles; largest are Kunashiri, Iturup; generally infested by fog; numerous hot springs; seal-hunting carried on. Pop. *c.* 4500.

KURISCHES HAFF (55° 12′ N., 21° E.), lagoon of Baltic, between Memel and Königsberg.

KURLAND, Courland (*q.v.*).

KURNOOL.—(1) (15° 33′ N., 78° 5′ E.) district,

Madras, India; area, *c.* 7550 sq. miles. Pop. 875,000. (2) (15° 47′ N., 78° 5′ E.) town. Pop. 26,000.

KURO SIWO, warm stream in Pacific Ocean, off Jap. coast.

KUROKI, GENERAL COUNT (1844–), Jap. soldier; general in Chino-Jap. War, 1894, and in Russo-Jap. War.

KUROPATKIN, ALEXEI NIKOLAIEVITCH (1848–), Russ. soldier; Minister of War, 1898; commander-in-chief during Russo-Jap. War; resigned, 1905, owing to continued failure.

KURRACHEE, see KARACHI.

KURRAM (33° 30′ N., 70° 30′ E.), river, N.W. Frontier Province, India; tributary of Indus; gives name to district, with area, 1280 sq. miles. Pop. 56,000.

KURSEONG (26° 55′ N., 88° 18′ E.), sanatorium, Darjeeling, Bengal, India. Pop. 4500.

KURSK.—(1) (51° 20′ N., 36° E.) government, Central Russia; area, 17,937 sq. miles; surface generally level, hills in E.; produces cereals, tobacco, wool, leather. Pop. (1910) 3,016,700. (2) (51° 44′ N., 36° 13′ E.) town; capital of above; Gk. Episcopal see; cathedral. Pop. (1910) 82,530.

KURUBAS, primitive people in S. India.

KURUMAN (27° 19′ S., 24° 16′ E.), town and mission station, Bechuanaland, S. Africa.

KURUMBAS, primitive people in S. India.

KURUNEGALA (7° 30′ N., 80° 30′ E.), town, Ceylon; produces rice, tea. Pop. 6500.

KURUNTWAD (16° 42′ N., 74° 30′ E.), feudatory state, Bombay, India. Pop. *c.* 80,000.

KUSHK (35° N., 62° E.), river, Afghanistan; name also of Russ. military station, Turkestan.

KUSTANAISK, town, Turgai, Asiatic Russia. Pop. 15,000.

KUSTENDIL, see KIUSTENDIL.

KUSTENLAND (*c.* 45° N., 13° 45′ E.), name applied to Istria, Trieste, Görz, and Gradisca, Austria.

KÜSTRIN, CÜSTRIN (*q.v.*).

KUTAIAH, KUTAYA (39° 26′ N., 29° 52′ E.), town, Asia Minor. Pop. 41,000.

KUTAIS (42° 21′ N., 42° 50′ E.), town (and government—area, 8166 sq. miles), Transcaucasia, Russia; ruined cathedral. Pop. (1910) 39,500; (govt.) 990,800.

KUTCH, see CUTCH.

KUT-EL-AMARA (32° 28′ N., 45° 47′ E.), town, Asiatic Turkey.

KUTTALAM (8° 52′ N., 77° 17′ E.), health-resort, Madras, India.

KUTTENBERG (49° 57′ N., 15° 17′ E.), town, Bohemia; disused silver mines; manufactures tobacco, sugar, textiles; old royal castle, several Gothic churches. Pop. (1911) 15,671.

KUWÊT (29° 19′ N., 48° E.), seaport, head of Persian Gulf, Arabia. Pop. *c.* 15,000.

KUZNETSK.—(1) (53° 49′ N., 46° 25′ E.) town, Saratov, Russia. Pop. 22,500. (2) (53° 48′ N., 87° 21′ E.) town, Tomsk, Siberia. Pop. 3500.

KWANGCHOW BAY (21° 28′ N., 109° 35′ E.), bay and harbour, Kwangtung, China; leased to France (1898).

KWANG-SI (24° N., 108° 30′ E.), province, S. China; area, 77,200 sq. miles. Pop. (1910) 5,142,330.

KWANG-TUNG (23° 30′ N., 114° E.), province, S. China; area, 99,970 sq. miles; surface mountainous; capital, Canton; produces silk, tea, sugar, coal, iron, gold. Pop. *c.* 31,865,000.

KWANZA (9° 16′ S., 13° 22′ E.), river, Angola, W. Africa; enters Atlantic.

KWEI-CHOW (27° N., 106° 30′ E.), province, S.W. China; area, 67,160 sq. miles; produces quicksilver. Pop. (1910) 7,650,282.

KYAUKPYU.—(1) (19° 25′ N., 94° E.) district, Lower Burma; area, 4386 sq. miles. Pop. (1901) 172,000. (2) (9° 22′ N., 93° 40′ E.) town, K. Pop. 3500.

KYAUKSÈ (*c.* 21° 42′ N., 97° 12′ E.), town, Burma. Pop. *c.* 6000. District (KO-KAYAING) has area, 1274 sq. miles. Pop. *c.* 145,000.

KYD, THOMAS (1558–94), Eng. dramatist; first important work was *The Spanish Tragedy*, an epoch-making work in the history of play-writing as being the first secular Eng. play with a well-constructed plot. His next surviving work of merit, *Soliman and Perseda*, also a tragedy, showed the same 'blood and thunder' and bombast. The great bulk of K.'s work has perished.

KYFFHÄUSER (51° 26′ N., 11° 6′ E.), forested hills, Thuringia, Germany; ruins of two old castles.

KYLOES, a race of CATTLE (*q.v.*).

KYNETON (37° 14′ S., 144° 31′ E.), town, Victoria, Australia. Pop. 3700.

KYÔTO, KIOTO (*q.v.*).

KYRIE (Gk. 'lord'), words, 'Lord, have mercy upon us,' used in various liturgies.

KYSHTYM (55° 44′ N., 60° 30′ E.), mining town, Perm, Russia. Pop. 13,000.

KYTHAL, see KAITHAL.

L, 12th letter of Eng. alphabet; a 'front palatal,' usually termed a 'liquid'; evolved from Phœnician 'ox-goad' character.

LA BADIE, JEAN DE (1610–74), Fr. theologian; joined Reformed Church; preacher in Geneva, London, and Amsterdam; became severe disciplinarian; believed in communism, and that believers should form a community apart.

LA BOURBOULE, see BOURBOULE.

LA BOURDONNAIS, BERTRAND FRANÇOIS, COUNT MAHÉ DE (1699–1753), Fr. sailor; captured Mahé, Malabar, 1727; commanded fleet in India, 1740–46.

LA BRUYÈRE, JEAN DE (1645–96), Fr. prose author of classical age; advocate in *Parlement* of Paris (1666–73); Treasurer of Finances at Caen (1673–87); tutor to Duke of Bourbon, Great Condé's grandson (1684–86); remained in house of Condé attached to person of Duc d'Enghien, Great Condé's s., and studied the world, which he depicted in his *Caractères* (first edition, 1668). Book contained 420 separate *caractères*, or portraits, or thoughts constituting a whole; the eighth edition, pub. before the author's death, contained 1120 *caractères*. La B. was admitted to Fr. Academy, 1693; depicted his acquaintances with such skill as to win immediate renown; some of his wit keeps its savour, but greater part has perished.

LA CALLE (36° 52′ N., 8° 23′ E.), port, Algeria, N. Africa; coral fishing, sardine trade. Pop. 4700.

LA CARLOTA (10° 22′ N., 122° 54′ E.), town, Negros, Philippine Islands. Pop. *c.* 20,000.

LA CHAISE-DIEU (45° 19′ N., 3° 43′ E.), town, Haute Loire, France; beautiful Gothic church. Pop. 1203.

LA CHARITÉ (47° 11′ N., 3° 2′ E.), town, Nièvre, France; site of famous priory; formerly fortified. Pop. 4000.

LA CLOCHE, JAMES DE (*c.* 1644–69), impostor who claimed to be natural s. of Charles II. of England; came from Jersey to Rome, 1668; by means of forged letters supposedly written by Charles II. obtained money from Oliva, Jesuit general; disowned by Charles, 1669; identity unknown.

LA CROSSE (43° 50′ N., 91° 11′ W.), town, Wisconsin, U.S.A.; railway centre; lumber trade; R.C. episcopal see. Pop. (1910) 30,417.

LA FAYETTE, MARQUIS DE, MARIE JOSEPH PAUL YVES ROCH GILBERT DU MOTIER (1757–1834), Fr. revolutionary; aided Amer. Colonies in War of Independence; on return, promulgated democratic ideas; member of Assembly of Notables, 1787, and advocated summons of States-General; as commander of citizen army established National Guard and originated *tricolor*; helped to form National Assembly; co-founder of *Feuillants* club of moderates, and lost favour of court and people; retired to country; on outbreak of war, app. to command army of Ardennes, and won victories of *Philippeville*, etc.; left France as Jacobins became supreme; thrown into prison by Austrians, and remained captive till 1797, when Napoleon demanded release; upheld Liberal tradition under restored monarchy; leader of revolution, 1830.

LA FAYETTE, MARIE-MADELEINE PIOCHE DE LA VERGNE, COMTESSE DE (1633–93), Fr. novelist; revolutionised novel-writing; chief work, *Princesse de Clèves* (1678); simple, natural style, opposed to grand eloquence of predecessors; had long liaison with La Rochefoucauld.

LA FERTÉ (47° 50′ N., 5° 36′ E.), town, Haute-Marne, France.—**LA FERTÉ ALAIS** (48° 29′ N., 2° 21′ E.), town, Seine-et-Oise, France.—**LA FERTÉ BERNARD** (48° 12′ N., 0° 38′ E.), town, Sarthe, France. Pop. 4500.—**LA FERTÉ FRESNEL** (48° 49′ N., 0° 31′ E.), town, Orne, France.—**LA FERTÉ MILON** (49° 12′ N., 3° 8′ E.), town, Aisne, France; Racine's birthplace. Pop. 6500.—**LA FERTÉ SAINT-AUBIN** (47° 43′ N., 1° 58′ E.), town, Loiret, France. Pop. 3500.

LA FLÈCHE (47° 43′ N., 0° 4′ W.), town, Sarthe, France. Pop. 10,700.

LA FONTAINE, JEAN DE (1621–95), Fr. poet. When twenty-six, he succeeded his *f.* as Maître des Eaux et Forêts at Château-Thierry (his birthplace); the study of animal life occupied him more than survey of the royal grounds, which he nominally performed for twenty years. His friend and protector, Fouquet, inaugurated his poetic celebrity, and received dedication of his first works, *Épîtres* and *Le Songe de Vaux*. When Louis XIV. dismissed Fouquet, La. F. wrote the *Élégie aux nymphes de Vaux*, incurring the king's displeasure. The *Contes*, free and licentious, in mediæval manner, but masterpieces of lightness and grace, commenced to appear, 1665; the famous *Fables* (12 vol's) in 1668. He created a new style of fable, viz. a frame into which poetry as well as satire and comedy could fit, the poetry being of the simplest and least pretentious kind. He took subjects from Æsop and old Fr. *fabliaux*; language, concise and beautiful; uses old words, provincialisms, and even *patois* when it fits his meaning; reproached with want of responsibility in work and life, but successive friends provided him with homes; first Fouquet, and later in life Mme de la Sablière for twenty years; at her death, Mme d'Hervart took in the old poet. He, Racine, Molière, and Boileau, his attached friends, formed famous club of Rue du Vieux Colombier, though La F. cared little for his partners' classical ideals.

LA GRAND' COMBE (44° 16′ N., 4° 2′ E.), town, Gard, France. Pop. 11,500.

LA GRANJA, SAN ILDEFONSO, Span. royal residence, situated on old monastic site among hills of Segovia; palace, dating from 1721, and grounds, among finest in world.

LA GUAIRA, LA GUAYRA (10° 35′ N., 67° 2′ W.), port, Venezuela, S. America; good harbour; exports coffee, cocoa, hides. Pop. *c.* 15,000.

LA GUÉRONOMIÈRE, LOUIS ÉTIENNE ARTHUR DUBREUIL HÉLION, VICOMTE DE (1816–75), Fr. statesman under Napoleon III.

LA HALLE, see ADAM DE LA HALLE.

LA HARPE, JEAN FRANÇOIS DE (1739–1803), Fr. dramatist and critic; disciple and protégé of Voltaire; principal play was *Warwick* (1763); other work poor, but excelled as contemporary literary critic; life of quarrels and hardships.

LA HOGUE, BATTLE OF, actions which took place off Cotentin peninsula, Normandy, May 19 to 23, 1692, ended in defeat of French by Dutch and Eng. allies at La Hogue.

LA LINEA, LA LINEA DE LA CONCEPCION (36° 10′ N., 4° 40′ W.), town, Cadiz, Spain; formerly fortified. Pop. (1910) 33,296.

LA MADDALENA (41° 13′ N., 9° 25′ E.), island and fortress, off Sardinia. Pop. 9400.

LA MARGHERITA CLEMENTE, COUNT (1792–1869), Savoyard politician of strong Catholic and anti-liberal tendencies.

LA NOUE, FRANÇOIS DE (1531–91), Huguenot captain; captured Orleans, 1567; fought in aid of Protestants in Low Countries, 1580.

LA PAZ (16° 27′ S., 67° 52′ W.), department,

Bolivia, S. America; area, *c.* 53,800 sq. miles; produces coca, coffee, rubber, copper, tin. Pop. (1910) *c.* 517,000.

LA PAZ, La Paz de Ayacucho (16° 29′ S., 67° 59′ W.), capital, Bolivia, S. America; important commercial city; copper, alpaca, wool, cinchona; contains an unfinished cathedral. Here Spaniards were defeated by revolutionaries during War of Independence. Pop. *c.* 80,000.

LA PÉROUSE, JEAN FRANÇOIS DE GALAUP, Comte de (1741–88), Fr. explorer; destroyed Eng. forts in Hudson's Bay, 1782; sought N.W. Passage, 1785–88, after which he was no more heard of till 1826, when remains of expedition were found.

LA PLATA (35° S., 57° 56′ W.), town, Argentina, S. America; harbour; manufactures cottons, woollens; seat of univ. Pop. (1910) 95,000.

LA PORTE (41° 32′ N., 86° 30′ W.), town, Indiana, U.S.A.; manufactures woollens; large ice trade. Pop. (1910) 10,525.

LA RÉOLE (44° 35′ N., 0° 2′ W.), town, Gironde, France; formerly fortified. Pop. 3500.

LA RÉVELLIÈRE-LÉPEAUX, LOUIS MARIE DE (1753–1824), Fr. revolutionary leader; pres. of Assembly, 1795; left public life after end of First Republic.

LA ROCHE (50° 11′ N., 5° 34′ E.), town, Belgium. Pop. *c.* 2500.

LA ROCHEFOUCAULD, FRANÇOIS DE (1613–80), Fr. author; descendant of one of greatest Fr. families. As Prince de Marcillac spent first part of his life in plots against Richelieu and Mazarin; left ill and ruined after Civil War of *Fronde*; retired for ten years to his castle, where he wrote his *Memoirs*; at fifty returned to society at Madame de Sablé's *salon*. Apothegms being then the fashion, La R. for ten years composed and improved with help of the *Précieuses* his own famous *Maximes* (1665), which still retain charms of wit, paradox, and sense of spacious intellect.

LA ROCHEFOUCAULD-LIANCOURT, FRANÇOIS, DUC DE (1747–1827), Fr. philanthropist; fled at Revolution; visited U.S.A., 1795–97, and pub. account; returned under Napoleon, and laboured at introduction of vaccination; established first Fr. savings-bank.

LA ROCHEJACQUELEIN, DE, Fr. family; Royalists during and after Revolution. Henri, Comte de la R. (1772–94), headed Vendéan rising. Louis, Marquis de la R. (d. 1857), tried to organise another Vendéan rising, 1815.

LA ROCHELLE (46° 9′ N., 1° 9′ W.), port, W. France; episcopal see; has old episcopal palace now used as museum, and XVIII.-cent. cathedral; strongly fortified; was Huguenot stronghold in XVI. and XVII. cent's, and successfully resisted siege in 1572–73. Manufactures glass, cotton yarns, brandy; shipbuilding. Pop. (1911) 36,371.

LA ROCHE-SUR-YON (46° 40′ N., 1° 27′ W.), town, Vendée, France. Pop. 14,000.

LA SALLE (41° 19′ N., 89° 1′ W.), town, Illinois, U.S.A.; cement works, zinc smelting. Pop. (1910) 11,537.

LA SALLE, or SALE, ANTOINE DE (*c.* 1398–*c.* 1461), Fr. poet; completed *Petit Jehan de Saintré*, 1456, a skilful satire on mediæval chivalry; reputed author of anonymous masterpieces of Middle Ages—*Les cents nouvelles nouvelles*, stories of kind of *Decameron*, and *Les Quinze joies du mariage*.

LA SALLE, RENÉ ROBERT CAVELIER, SIEUR DE (1643–87), Franco-Canadian traveller; b. Rouen; set out on expedition to discover mouth of Mississippi, 1678; crossed Canada to Lake Michigan, erecting forts; occupied Arkansas, entered valley of Illinois, descended Mississippi to Gulf of Mexico (1682), naming province through which it flowed *Louisiana*; returned, 1684, to found port at mouth of stream; small colony failed and L. S. was murdered by a follower.

Parkman, *La Salle and the Great West.*

LA TOUR D'AUVERGNE, THÉOPHILE MALO (1743–1800), Fr. grenadier; distinguished in wars, 1792–1800; wrote on Breton language; killed at Oberhausen.

LA TRÉMOILLE, Fr. family, several of whose members have been distinguished in history.

LA UNION.—(13° 19′ N., 87° 49′ W.) port, Salvador, Central America. Pop. *c.* 5000. (2) (37° 34′ N., 0° 50′ W.) town, Spain; iron mines. Pop. (1910) 29,599.

LA VALLIÈRE, LOUISE FRANÇOISE DE (1644–1710), mistress of Louis XIV.; superseded by Mme de Montespan; retired to Carmelite Convent, 1674.

LA VOISIN, Catherine Monvoisin (d. 1680), Fr. witch; concocted love powders, etc.; executed for complicity in plot to poison Louis XIV.

LAACHER SEE (50° 26′ N., 7° 25′ E.), lake, Rhenish Prussia, Germany; to W. is Benedictine monastery.

LABEL, see Heraldry.

LABIATÆ, herbaceous dicotyledons, with square stem and paired, decussate leaves, each pair borne at right angles to adjacent pairs; vegetative parts possess glandular hairs containing a volatile oil, often with characteristic odour (mint, lavender); inflorescence is cymose, the units often being sessile, and forming a verticillaster; flower is pentamerous and zygomorphic, with four stamens and a bicarpellary ovary, which forms four nutlets at maturity.

LABICHE, EUGÈNE MARIN (1815–88), Fr. dramatist; wrote with extraordinary success plays, half comedy, half farce, in which he embodied real individuality; became member of the Academy; pub. great number of farces, acted publicly and privately. Chief works—*Le Chapeau de Paille d'Italie* (1851), *Le Voyage de Monsieur Perrichon* (his masterpiece, 1860), *Célimare le Bien-Aimé* (1863), *La Cagnotte* (1864).

LABICI (41° 47′ N., 12° 45′ E.), old town, Latium, Italy; on site is modern Monte Compatri.

LABIENUS, TITUS, Rom. soldier and statesman; at first on Cæsar's side in Civil War, then joined Pompeius; killed, 45 B.C.

LABLACHE, LUIGI (1794–1858), operatic singer (bass); b. Naples; sang in Paris; Queen Victoria among pupils.

LABOUR, work, hard work, more usually manual work, especially such as is done for an employer. Interference with the right of free contract between employer and labourer in the latter's interest is a mark of socialism to be found in most modern states, but particularly in Great Britain. The democracies of antiquity employing slave labour were not faced with the problem of the exploitation of the free human unit of the State; and Teutonic tribes who settled in the Rom. Empire had a fixed custom as to services both before and after the evolution of the feudal system. Mediæval towns set a precedent of future State regulation of labour; rich tradesmen and craftsmen of a borough purchased a charter from its owner, by virtue of which they regulated their own affairs; every detail of communal life was regulated by the burgesses as exactly as every detail of manorial life was regulated by the feudal system; at the same time, nearly every town was a scene of conflict between burgesses and the unenfranchised population, who met with varying success in protecting their own interests.

First great Eng. labour laws are the *Statutes of Labourers*, 1351. The Black Death, which wiped out nearly half the population, threw out of gear municipal and manorial systems. Labourers, in novel position of being able to command prohibitive wages, were forced by law to accept a definite sum. This fixed amount became a terrible injustice by Tudor times, when prices had gone up and the currency was usually debased. To further ensure supply of labour it was also enacted by these statutes that branding should be the punishment for breach of contract by labourers, and fines be imposed on towns harbouring runaways. Statute of 1465 contained a measure for protection of workers, ordaining that payment should be in money, not in kind. Tudor

legislation was extraordinarily harsh against vagrants. In 1563 Parliament again enacted fines for giving or receiving higher than legal wage, and for first time State imitated towns in interfering with hours of labour, twelve hours being fixed as minimum in summer. Justices of the peace were given power of fixing wages locally.

The *Poor Law* of 1601 (in force till 1814) regulated apprenticeship, hours of labour, wages, settlement of disputes, etc. Tyranny of justices of the peace remained a great feature of Eng. country life till XIX. cent. General effect of Elizabethan legislation was that labour regulations, previously local, became nationalised. National control of labour remained principle of government, but became difficult to enforce in altered commercial conditions of modern times. The idle poor formed a considerable and tolerably immune body in XVII. and XVIII. cent's, while the State permitted the grave scandal of child labour.

In XIX. cent. it has been deemed expedient to keep down idleness merely by restrictions on begging. Penalty of breach of contract is no longer flogging or penal servitude, but simply a matter of damages. Workers have become free to emigrate. Growth of democracy has brought principle of protection of worker into foreground. The movement started in great industrial towns of north. Manchester Board of Health (established, 1795) drew up resolutions as to employment of children; embodied in first *Factory Act*, 1802, which enforced maximum hours of labour, sanitary conditions of work, etc., and provided for education, etc., of child operative. Terrible poverty of weavers after cheapening of cloth by introduction of machinery caused them to petition for *minimum wage*, which they claimed by Act of 1563; Parliament, swayed by economical policy long known as *laissez-faire*, replied by repeal of said Act, 1813, and in 1814, through pressure of the manufacturers, repealed Elizabethan law as to apprenticeship on which weavers sought to insist. Government preferred pauperising population to artificial regulation of wages, while labouring population commenced agitation for minimum wage as keen as XIV.-cent. employers for maximum wage. *Strikes* (see below) became political factors. *Laissez-faire* went out of fashion through preaching of Carlyle, but already philanthropists, led by Robert Owen, had forced government's hand. The Factory Act of 1802 allowed evasions; a second Act of 1819 ameliorated conditions of child labour; commission of 1833 revealed serious evils in factory system, and new Act limited hours of infant labour and appointed for first time local inspectors under central board; the last Act was made applicable to women, 1844; *Ten Hours Bill* for women and children, 1847, was amended, to avoid abuse of relay system, 1850; commission, 1843, made favourable report on conditions of agricultural labour; factory regulations applied to mines, 1842; *Mines Acts*, 1872, 1886–87, 1903, 1906, 1908, protect as far as possible life and health of miners, and Act of 1912 ensures miners a minimum wage.

Other manufactures besides weaving had now passed from cottage to steam-factory, and, with co-operation of employers, who found that they gained in end, were brought under State control. Bleaching and dyeing works, lace factories, bakehouses, etc., were brought under factory law, 1860–63, pottery, etc., 1864; regulations to protect workers in industries dangerous to health, 1864; *Sanitary Act*, 1866, to apply to trades not regulated by previous Acts; *Factory Act Extension Act*, 1867; *Workshops Regulation Act*, 1867, establishing special supervision of employment of women and young persons, amended, 1870; *Factory Act*, 1874, made 10 years minimum age; commission, 1876, made report which resulted in consolidation and amendment of previous measures by *Factory and Workshop Act*, 1878. Act of 1878 and succeeding Acts apply to textile factories, the various factories which produce iron, paper, etc., and workshops (distinguished from factories by non-employment of mechanical motor force) of which three kinds are recognised: (1) the ordinary workshop; (2) workshops in which women (that is, females above 18) are engaged; (3) family workshops, the room in which a person plies his handicraft at home.

This Act, with considerable additions, remained in force till new Act of 1901. In interim a great attempt was made to deal with *sweated industries*, inspection of home industries, regulation of hours of labour, and reform of sanitary conditions. Acts of 1883, 1889, 1891, 1895, laid down rules as to destruction of poisonous waste products, temperature and humidity of workrooms, space requisite for worker, ventilation, precautions against accidents, etc.; women inspectors were introduced, 1893; Act of 1895 brought laundries, wharves, buildings in process of construction, etc., under Factory Acts, restricted employers' practice of putting out work by stricter inspection of domestic workshop, and abolished *overtime* for young persons.

Act of 1901 forbids employment of child under 12, codified, with amendments, previous laws, and put factories under control of local district council instead of continuing direct supervision of Home Office; *Employment of Children Act*, 1903; *Accidents Act*, 1906; further *Factory and Workshop Act*, 1907, touching laundries; *Employment of Women Act*, 1907 Latest legislation is extension of principle of employers' responsibility for accidents incurred while in their employ or while employee is coming to or going from work (see EMPLOYERS' LIABILITY). Acts, 1892–99, limit hours of shop assistants under 18 to maximum of 74 weekly, including hours of meals, and enforce provision of seats for female assistants; early closing order may be obtained by local authority. *Truck Acts* were passed, 1831, 1874, 1887, and 1896, to prevent employees being deprived of their wages by intrigues of employer; but large classes are still unprotected.

The U.S.A., like Great Britain, repressed the labourer till the introduction of the modern commercial system and rise of modern democracy. Legislation dates from 1836 in Massachusetts, which was followed by other states, but in none are there the minute regulations of Britain. Age limit varies between 10 and 14 in various states, and where hours are state restricted between 12 and 21. Many states probibit employment in factories and workshops of illiterate under (c.) 16; hours of women and children generally restricted to from 6 to 11 per day; Sunday labour almost universally prohibited and employment of women and children in mines and other dangerous places. Principle of employer's liability generally enforced, and hours and conditions of labour controlled. Germany's industrial enactments are very similar to Britain's. All European countries now regulate employment of women and children, and Austria, Russia, and Switzerland have followed France in enactment of maximum day's work for adults.

Labour Church, The, a Socialist religious organisation without theological basis, founded in Manchester, 1891.

Labour Colonies relieve workers in exchange for work. In Britain Salvation Army Colony at Hadleigh and Central Body for London at Hollesley Bay train men in agricultural work. Belgium and Switzerland force vagrants to enter l. c's; so also Holland, where provision is made for settling whole families. In Germany a non-compulsory system obtains.

Labour Day, LABOR DAY, legal holiday in U.S.A. and Canada (1st Monday in Sept.) and in Australian States (varying dates); observed on May 1 in Europe by Labour demonstrations.

Labour Disputes.—A Strike is the refusal of the labourer to continue at work, while a Lock-Out is the refusal of the employer to allow the labourer to remain at work. A strike often provokes a lock-out, which in turn provokes a still more extensive strike. For instance, on the strike of a body of workmen at a

particular factory, all the employers federated in that industry will frequently respond by announcing a general lock-out until the strikers return to work; and the strikers will answer this by calling out the workmen in kindred trades. With the creation of employers' federations and the organisation of trade unionists into federations, the tendency is on both sides to avoid strikes and lock-outs and to rely on arbitration for the settlement of disputes. On the other hand, these federations make all serious disputes a far more severe struggle when once the strike or lock-out has been declared.

Certain workmen, distrusting Parliament as an agency for the amelioration of the labourer's lot, believe in the *general strike*, i.e. a strike not confined to one trade but of all sorts and conditions of employees, for compelling attention, sympathy, and redress of grievance, and there are employers who at times, when stocks have accumulated, are glad of a stoppage of work and welcome an excuse for a lock-out. See SYNDICALISM.

In France, Russia, Finland, Austria, Sweden, Norway, and Italy, the 'general strike' has been adopted at various times, and with varying degrees of success, for some purely political purpose, commonly the granting of the franchise or other constitutional change. In Britain the political strike is unknown, and the 'general strike' has hitherto been a very limited affair confined to workmen of the carrying trades and miners. The *sympathetic strike* takes place when workmen, with no particular grievance of their own, cease work to support other workmen already on strike. Carters, for example, will strike on sympathy when dock labourers are on strike, rather than remove goods unloaded by non-union labour. To conduct a strike successfully the strikers' places must not be filled, and *picketing* is the chief means to prevent employers obtaining the services of other persons (*blacklegs* or strike-breakers) at such times. Picketing is permitted by law on certain conditions. So long as the pickets do not intimidate, annoy, or use any physical force, they are acting within their rights, and there are no grounds for a criminal prosecution. Intimidation in this connection, however, includes the threat of physical violence, and it rarely happens that a strike takes place without charges of intimidation being brought against strikers.

The strike itself—that is, the decision agreed upon by a united body of workmen to cease work—was treated as a criminal offence over and over again in Great Britain in the XIX. cent., and as late as 1867 Baron Bramwell laid down in *Regina* v. *Druitt*: 'An agreement for co-operation against liberty of mind and freedom of will, irrespective of any intimidation or physical coercion, is a criminal conspiracy.' This comprehensive dictum fairly summarised the legal opinion of the day, and led to the appointment of a Royal Commission. Following the report of this Commission, a change in the law took place, and the Conspiracy and Protection Act of 1875 declared that: 'An agreement or combination of two or more persons to do or procure to be done any act in contemplation or furtherance of a trade dispute between employers and workmen, shall not be indictable as a conspiracy if such an act by one person would not be punishable as a crime.'

Strikes and lock-outs have taken place from time immemorial, and for all manners of reasons. Nowadays the principal reasons for the strike are the desire for shorter hours and better wages, or the resolve to resist a reduction of wages and a longer working day. Other causes are the determination to obtain recognition of the trade union (so that employers shall bargain collectively with the workmen through the accredited representatives of the latter), to prevent the employment of non-unionists, to defend trade union rules and customs, and to obtain the dismissal of some unpopular foreman or official.

Since the general public, and large numbers of persons in no way responsible for the strike or lock-out, often suffer hardship by the stoppage of work, it is urged that strikes and lock-outs should be declared illegal, at least until both parties in dispute have carried the case before a Court of Arbitration. It is also urged that obedience should be compelled to the decisions of the Court of Arbitration. Compulsory arbitration is, in fact, the law in New Zealand and elsewhere, but in Great Britain there exists on the side of both employers and employed a strong feeling against State interference. See TRADE UNIONS, ARBITRATION.

Howell, *Conflicts of Capital and Labour* (1890); Webb, *History of Trade Unionism, Industrial Democracy.*

Labour Exchanges, State bureaus (established in Britain by Act of 1909) where unemployed persons can register their names and occupations, and to which employers in need of labour apply. Labourers are transferred by means of the Exchanges from districts where no labour is wanted to districts where there is a shortage.

LABRADOR (*c.* 55° N., 63° W.), great peninsula, N. America, between Hudson Bay and Strait and Gulf of St. Lawrence; narrow strip of coast from Cape Chudleigh to Strait of Belle Isle is under Newfoundland government; remainder assigned by Dominion of Canada to Quebec which incorporated Ungava (*c.* 450,000 sq. miles) in 1912. Surface is mainly a plateau, 2000 ft. above sea-level; area, *c.* 520,000, sq. miles; crossed b
Bay. Along Atlantic coast cod, salmon, and herring fishing and sealing are important industries in summer. Pop. *c.* 15,000. L. was acquired by Britain in 1763. Part controlled by Newfoundland has area of 120,000 sq. miles. Pop. (1910) 4076.

Gosling, *Labrador* (1910).

LABUAN (5° 25′ N., 115° 18′ E.), island and Brit. crown colony, off N.W. Borneo, Malay Archipelago; produces large quantities of sago; considerable transit trade between Borneo and Singapore; acquired by Britain, 1846; incorporated with Singapore, 1907. Pop. (1911) 6546.

LABURNUM (*Laburnum vulgare*), a small tree with tripartite leaves, frequently cultivated for drooping, showy inflorescence of bright yellow flowers; all parts poisonous.

LABYRINTH, a maze or series of intricate passages through which it is difficult to find one's way. The L. of Crete was said to have been built by Dædalus for King Minos. Here was kept the Minotaur (*q.v.*). The Egyptian L. was situated not far from Crocodilopolis, above Lake Moeris in the district of the Fayum. It contained about 3000 rooms, and was half under and half above the ground. It was visited by Herodotus and Strabo, and was mentioned as one of the wonders of the world. The Clusium L. in Italy was built by the Etruscans as a sepulchre for King Porsenna. L's were also in existence at Lemnos and Samos, but their sites have not been discovered. Other l's existed at Nauplia, Sypontium, Italy, and at Val d' Ispica, Sicily.

L's in gardens are known as mazes, and are generally constructed of privet hedges so arranged that it is difficult for the visitor to find his way to the centre, or out again. The most famous is the Maze at Hampton Court, London.

LABYRINTHULIDEA, a Protozoan consisting of a naked mass of living matter, containing many nuclei and giving rise to numerous fine anastomosing processes —pseudopodia.

LAC, resinous exudation produced by insect puncture from branches of certain East. Ind. trees; becomes *shellac* when purified by water.

LACAILLE, NICOLAS LOUIS DE (1713–62), Fr. astronomer; made catalogue of 10,000 stars of southern hemisphere; numerous works on geometry, astron., and optics.

LACAITA, SIR GIACOMO (1813–95), Ital. politician; Neapolitan scholar; friend of Gladstone; gave important aid in England to Ital. freedom.

LACCADIVE ISLANDS (11° 20′ N., 72° 30′ E.), group of 14 coral islands in Ind. Ocean, off W. coast of Madras; area, *c.* 78 sq. miles; discovered by Vasco da Gama, 1498; belong to Britain; produce cocoanuts, coir, bananas, tortoise-shell. Pop. 10,500.

LACCOLITE, name given by Gilbert to intrusive igneous rocks which cover only a comparatively small area, but are very thick, as in Henry Mts., Utah (area, 5 miles, and thickness, 5000 ft.); also applied to intrusive rocks like gabbro masses in Isle of Skye, and granite masses in Cornwall.

LACE is an ornamental design carried out in linen, silk, cotton, gold, silver, or composite thread. It is made by needle, pillow and bobbins, or machinery. The products of the two first methods, *i.e.* 'needle-point' and 'pillow-lace,' are known as 'real' lace. The art of l.-making seems to have been learned by Venice from the East, and was a natural development as a branch of embroidery. Point l., the first appearance, originated from (1) the darning of patterns on fine net. This was called by the Italians *punto a maglia*, by the Fr. *lacis*, whence our 'lace.' In both point and pillow lace many succeeding kinds have a net background, others, such as guipures, being without. The net background of l. is known as *réseau*, or, when spotted, *réseau rosacé*. The design is worked on the *réseau* with the needle or stitched on it (*appliqué*) after completion. Other sources of l. were (2) cut-work (Ital. *punto tagliato*) and drawn-thread work (Ital. *punto tirato*)—these, now more usually classified as embroidery, were then embellished with embroidery; and (3) simply twisted threads used for personal decoration and known as l's.

The most fashionable of l's at the present moment is Venetian point. Irish point is highly prized, and artificial efforts are being made to stimulate the general production of Irish l., and train the peasants in design. Pillow-l., invented in either Italy or Flanders, was produced in the early XVI. or possibly late XV. cent.; a Flemish painting of this date (variously ascribed to Quentin and Jean Matsys) has the added interest of showing this occupation. The pattern is placed on a pillow on the l.-maker's lap, and the l. is made by plaiting and twisting threads with the aid of bobbins and pins. The background of either kind is now always made with machinery. The reticulated l., so-named because its design was based on the square or oblong of the old drawn or cut work, characterised late XVI. and early XVII.-cent. l. It was only in the XVII. cent. that the worker's skill sufficed for the introduction of Renaissance ornament; the circle and classical scroll (particularly suitable for borders) with rosette and leafage almost entirely replaced the square as the foundation of the design. The garland, shell, and other devices, which afterwards became a matter of mechanical imitation, also appeared, while at the same time every delicate design of free foliage was evolved. Louis XIV. gave great encouragement to this industry, and in the second half of this cent. Alençon and other Fr. towns won their fame. Venice l. of the XVIII. cent. retained its excellency, but, like most Fr. ornament of this period, Fr. l. became both trivial and heavy, and the simple Valenciennes little made up for the lost glories of point d'Alençon or point d'Argentan. Brussels, Mechlin, and Honiton pillow-l's are famous varieties.

The growing dislike to mechanically wrought ornament is especially strong with regard to l., but as l. is worth more than its weight in gold, the manufacture of the spurious article has brought great wealth to towns like Nottingham in England and Calais in France. In the middle of the XVIII. cent. the stocking-frame was modified by a Nottingham knitter called Hammond for the manufacture of l. In 1809 Heathcote invented a bobbin-net machine which, with the subsequent improvements of Leavers and others, is still used. Samuel Hall introduced the 'gassing' process, by which cotton is made to resemble linen, in the middle of the XIX. cent.

Pollen, *Seven Centuries of Lace* (1908); A. M. S., *Point and Pillow L.* (1899); Channer and Roberts, *Lace-Making in the Midlands* (1900).

LACEDÆMON (37° 5′ N., 22° 30′ E.), department, S.E. Peloponnesus, Greece; formerly another name for Laconia. Pop. 90,000.

LACÉPÈDE, COMPTE DE, BERNARD GERMAIN ÉTIENNE DE LA VILLE (1756–1825), Fr. scientist, especially interested in various branches of zoology.

LACERTÆ, see LIZARDS.

LACE-WING FLIES, GOLDEN-EYE FLIES, STINK FLIES (*Chrysopidæ*), a family of Neuropterous insects with delicate bodies and shining golden eyes. The adults, which are probably protected by their unpleasant smell, are voracious, and, like the larvæ, render service by destroying large numbers of green fly and plant lice; common in Britain and widely distributed throughout the world.

LACHES, legal term for negligence or dilatoriness in the performance of an act which a man is bound by law to perform.

LACHINE (45° 28′ N., 73° 40′ W.), town, Quebec, Canada; connected with Montreal by L. Canal. Pop. 5600.

LACHISH (31° 34′ N., 34° 45′ W.), town, Palestine; remains of eight different cities have been excavated; ruined by Joshua in Old Testament times.

LACHMANN, KARL KONRAD, FRIEDRICH WILHELM (1793–1851), Ger. philologist; pub. an edit. of the *Nibelungenlied*; most famous work was an examination of the *Iliad*, which he divided into 16 independent lays.

LACINIUM (39° 4′ N., 17° 13′ E.), cape, Italy; site of celebrated temple of Hero Lacinia, of which one column remains; modern, Capo delle Colonne.

LACONIA (43° 25′ N., 71° 28′ W.), town, New Hampshire, U.S.A.; summer resort; manufactures hosiery. Pop. (1910) 10,183.

LACORDAIRE, JEAN BAPTISTE HENRI (1802–61), Fr. Dominican theologian; first trained for law, then entered the Church; joined Lamennais in democratic and Catholic propaganda, but met with censure of ecclesiastical authorities; renowned preacher in Paris.

LACQUER, LACKER.—(1) shellac varnish for metals; prevents tarnishing. (2) varnish of Jap. *lacquer-ware*; juice of l. tree. See JAPANNING.

LACRETELLE, PIERRE LOUIS DE (1751–1824), Fr. politician; wrote *Fragments politiques et littéraires.*—JEAN CHARLES DOMINIQUE (1766–1855), his bro., wrote histories of Revolution, etc.

LACROIX, PAUL (1806–84), Fr. writer, under pseudonym P. L. JACOB, BIBLIOPHILE, of many hist. romances, plays, histories, biographies, etc.; chief merit lies in his history of Fr. manners from Middle Ages onward.

LACROMA (42° 37′ N., 18° 7′ E.), island, Adriatic Sea, belonging to Austria.

LACROSSE, a Canadian ball-game; played with a long stick (5 to 6 ft.) looped at the end and strung, like a tennis-racquet, with deerskin. The ball is scooped up and carried on the stick and passed by tossing, but it must not be touched with the hand or foot.

LACTANTIUS FIRMIANUS (*c.* 260–*c.* 340), Christian apologist of IV. cent.; great work is the *Divinarum Institutionum libri vii.*; his pure style won him the title of *The Christian Cicero.*

LACTEALS, see LYMPHATIC SYSTEM.

LACTIC ACIDS, α-hydroxypropionic acid (ethylidene lactic acid)$=CH_3.CHOH.COOH$. Dextro form in sour milk, levo form in meat extract. β-hydroxypropionic acid (ethylene lactic acid)$=CH_2OH.CH_2.COOH$.

LACY, FRANZ MORITZ, COUNT (1725–1801), Austrian soldier; served in War of Austrian Succession and Seven Years War; distinguished at Breslau, 1757; associated with Daun, field-marshal, 1766; reformed army.

LADAKH AND BALTISTAN (32° 30′ to 36° N.,

75° 35′ to 80° 30′ E.), province, Kashmir, India. B., the northern part, lies between Karakoram and Himalayas, and is crossed by Indus and its tributaries; contains Mt. Godwin Austen and other high peaks; capital, Skardu. L., southern part, is also drained by Indus and is crossed by various ranges connecting Himalayas with Kuen-Lun; capital, Leh. Province produces fruits, cereals, gold; sheep and goats raised. Inhabitants are of Tibetan stock. Pop. 170,000.

LADISLAUS, see WLADISLAUS.

LADISLAUS I., ST. (1040–95), king of Hungary, 1077; greatly strengthened Hungarian monarchy.

LADISLAUS IV. (1262–90), king of Hungary; succ., 1272; reign marked by civil wars; defeated Rumanians, 1282, who subsequently murdered him.

LADO ENCLAVE (*c.* 5° N., 30° 15′ W.), province, Anglo-Egyptian Sudan, adjoining Albert Nyanza; area, *c.* 15,000 sq. miles; formerly leased by Leopold II. of Belgium, after whose death it was restored to Anglo-Egyptian Sudan; crossed by two ranges of *mts.* and by Nile, Yei, and other rivers. Pop. *c.* 250,000.

LADOGA (60° 45′ N., 31° 30′ E.), lake, N.E. Russia; largest in Europe; area, nearly 7000 sq. miles; receives surplus water of Lakes Onega, Ilmen, Saima; entered by over sixty rivers; discharges by Neva into Gulf of Finland.

LADRONES, MARIANNES (*q.v.*).

LADY-BIRDS, see under POLYMORPHA.

LADY CHAPEL, one built in Gothic cathedrals generally east of the choir, and dedicated to the Virgin.

LADYBANK (56° 17′ N., 3° 7′ W.), town, Fifeshire, Scotland; coal, linen.

LADYBRAND (29° 6′ S., 27° 30′ E.), town, Orange Free State Province, S. Africa. Pop. 4000.

LADY'S MANTLE (*Alchemilla*), plant of order Rosaceæ (*q.v.*). Common L. M. (*A. vulgaris*) is a Brit. wayside yellowish flower.

LADYSMITH (28° 18′ S., 29° 43′ E.), town, Natal, S. Africa; named after wife of Sir Harry Smith (*q.v.*); memorable for Brit. defence, under General White, against Boers, Nov. 1899 to Feb. 1900, when relieved by Buller. Pop. (1911) 5595.

LÆLIUS, name of plebeian Roman *gens*. CAIUS LÆLIUS (*c.* 235–170 B.C.) won victories over Carthaginians and Numidians. His son, CAIUS LÆLIUS SAPIENS, consul 140 B.C., is prominent figure in Cicero's writings.

LAFAYETTE (40° 22′ N., 86° 51′ W.), town, Indiana, U.S.A.; has univ.; manufactures machinery, beer, flour, soap. Pop. (1910) 20,081.

LAFFITTE, JACQUES (1767–1844), Fr. financier-statesman; gov. of Bank of France, 1814; trusted agent of both Napoleon and Louis XVIII.; aided Revolution and became Premier, 1830; bankrupt.

LAFONTAINE, SIR LOUIS HIPPOLYTE, Bart. (1807–64), Canadian statesman; led Fr. Canadians; twice Premier; Chief Justice, Lower Canada, 1853.

LAGASH, ruins near Shatra, Asiatic Turkey, where remains of fortress, temple, and other buildings have been excavated, and many inscriptions, statues, and miscellaneous objects found. L. was an important centre of Sumerian culture in very early times.

LAGHMAN (*c.* 34° N., 69′ E.), district, Afghanistan; produces rice, sugar.

LAGOMORPHA, a sub-order of RODENTS (*q.v.*).

LAGOS (*c.* 6° 57′ N., 4° 10′ E.), province, Brit. S. Nigeria, W. Africa, bordering on Bight of Benin, between Dahomey and the eastern and central provinces of S. Nigeria, and with N. Nigeria to N.E.; area, *c.* 28,600 sq. miles; coastal regions low-lying, interior hilly; crossed by no streams of importance; climate unhealthy; mean temperature, 82° Fahr.; rainfall, *c.* 74 inches.

L. was a separate Brit. crown colony, including island and protectorate of L. from 1886 till 1906, when it was united with S. Nigeria in one colony and protectorate. Largest towns are Ibadan, Abeokuta, and Lagos. L. produces palm oil and kernels, rubber, cotton, ivory, timber, cocoa, coffee, tobacco, hides; crossed by several railway lines; administered by Provincial Commissioner. Native inhabitants are of negro stock. Pop. (1911) 2,152,848. See NIGERIA.

LAGOS (6° 28′ N., 3° 38′ E.), port, capital of S. Nigeria, W. Africa, on L. island; only good harbour within 1000 miles; mole under construction. Pop. (1901) 41,847.

LAGOS (37° 10′ N., 8° 37′ W.), port, S. Portugal; fortified; fine harbour; British defeated Fr. fleet in L. Bay, 1759. Pop. 8500.

LAGRANGE, JOSEPH LOUIS, COMTE (1736–1813), famous mathematician; b. at Turin, but of Fr. extraction (grandson of Descartes); prof. of Geometry at Turin Royal Artillery School at age of eighteen; app. by Frederick the Great to succeed Euler as director of Berlin Academy, 1759; went to Paris, 1787, and stayed there throughout Revolution, though in danger; loaded with honours by Napoleon; buried in Panthéon. His work on the *Nature and Propagation of Sound*, and invention of the *Calculus of Variations*, when only twenty-four, proved his wonderful abilities of analysis, and placed him at a very early age in the front rank of mathematicians. On five occasions he was awarded the prize of the Paris Academy for treatises on astronomical problems. In his *Méchanique Analytique*, he reduced mechanics to mere math's, and in his treatise on the *Libration of the Moon* he was the first to show the great use to which the principle of virtual work could be put.

LAGUERRE, JEAN HENRI (1858–), Fr. statesman.

LAGUNA, LA LAGUNA (28° 33′ N., 16° 29′ W.), cathedral town, Teneriffe, Canary Islands. Pop. *c.* 13,500.

LAHN (50° 19′ N., 7° 55′ E.), river, Germany; unites with Rhine.

LAHORE (31° 33′ N., 74° 16′ E.), town, district, and division, Punjab, India. Town is railway centre; has ancient Hindu temple, Muhammadan mosques, Anglican cathedral; site of Punjab Univ.; encircled by walls; manufactures textiles, carpets; flourished under Moguls, especially under Akbar, XVI. cent.; taken by Sikhs, 1758; became capital of Brit. Punjab province, 1849. Pop. (1911) 228,687. L. district has area of 3700 sq. miles. Pop. 1,168,000. L. division has area *c.* 17,000 sq. miles. Pop. *c.* 5,600,000.

LAHR (48° 20′ N., 7° 52′ E.), town, Baden, Germany. Pop. (1910) 15,191.

LAIBACH (46° 3′ N., 14° 31′ E.), capital, Carniola, Austria; iron trade, bell foundries, textile manufactures; cathedral, episcopal see. Conference held here, 1821, to consider Ital. affairs resulted in Britain dissociating herself from Austria, Russia, and Prussia on question of right of Powers to interfere in case of revolutions. Pop. (1910) 41,727.

LAING, ALEXANDER GORDON (1793–1826), Scot. soldier and traveller; employed in African commercial expedition, 1822; sought source of Niger, and increased knowledge of its basin; slain by natives in second expedition.

LAING, DAVID (1793–1878), Scot. antiquary; sec. to Bannatyne Club; librarian, Edinburgh Signet Library; edit. poems of Dunbar, Henryson, Lyndesay, and works of Knox.

LAING, MALCOLM (1762–1818), wrote various works on history of Scotland.

LAING'S NEK (27° 25′ S., 29° 40′ E.), defile in Drakensberg Mountains, Natal, S. Africa, where Boers defeated British, 1881.

LAIRD, MACGREGOR (1808–61), b. Greenock; founder of Brit. commerce with Niger; pub., with Oldfield, *Narrative of Expedition into the Interior of Africa*; founded shipping line.

LAISANT, CHARLES ANNE (1841–), Fr. soldier, statesman, and scientist.

LAISSEZ-FAIRE, phrase in politics meaning policy of competition without State interference.

LAI-YANG (37° 5′ N., 120° 48′ E.), walled town, Shan-tung, China. Pop. *c.* 50,000.

LAKANAL, JOSEPH (1762–1845), Fr. politician; member of Committee of Public Instruction, 1793; subsequently pres. of Education Committee; advocated national education.

LAKE, portion of water surrounded by land. **Fresh-Water Lakes** may be formed by (1) volcanic action—*Crater l's*; (2) obstruction—landslips, glaciers, river débris, etc.; (3) sinks, where soluble rocks disappear beneath earth surface; (4) rivers which dissolve limestone in its bed; (5) glacial movement; (6) earth movement, where crust is warped. Largest l. is Superior, over 31,000 sq. miles; deepest mountain l. is Baikal, over 4000 ft. **Salt-Water Lakes**, *e.g.* Dead Sea and Great Salt Lake, owe excessive saltness to evaporation. Caspian Sea is largest inland sea in world.

Lake Dwellings were a feature of prehistoric life and have existed in hist. times. It was the custom to drive piles into the bed of a lake near the shore, and then to build huts or dwellings on the top. The object was perhaps security from invasion or against floods. Some of the most famous are those in Switzerland, particularly the Lake of Neuchatel. Archæologists conclude that the inhabitants were by no means simple savages. Some belong to the Stone and some to the Bronze Age. L. d. existed in ancient Ireland, where they were called *crannog*. They exist at the present day in S. America, among Borneo Dyaks, and elsewhere.

Munro, *The Lake-Dwellings of Europe*.

LAKE CHARLES (30° N., 93° 10′ W.), town, Louisiana, U.S.A.; rice mills, lumber trade. Pop. (1910) 11,449.

LAKE CITY (30° 18′ N., 82° 40′ W.), town, Florida, U.S.A.; lumber, cotton, turpentine. Pop. (1910) 5032.

LAKE DISTRICT (*c.* 54° 30′ N., 3° 12′ W.), district round Lakes Windermere, Ulleswater, and Derwentwater, on borders of Cumberland, Westmoreland, and Lancashire; famed for beautiful lake and mountain scenery; interesting associations with Wordsworth, Coleridge, and Southey, who are called the *Lake poets*, and with Shelley, Keats, Matthew Arnold, and Ruskin; visited annually by thousands of tourists; chief towns, Ambleside, Bowness, Coniston, Keswick; among mountain peaks are Scafell, Skiddaw, Helvellyn.

LAKE GENEVA (42° 50′ N., 59° 4′ W.), town, Wisconsin, U.S.A.; dairy-farming. Pop. (1910) 3079.

LAKE, GERARD, VISCOUNT LAKE OF DELHI (1744–1808), Brit. general; commander-in-chief (1800–5) in Mahratta War, winning battles of Delhi, Assaye, and Laswary, 1803; highly praised by Wellesley.

LAKE OF THE WOODS (49° 23′ N., 94° 30′ W.), lake, S.W. Ontario and S.E. Manitoba, Canada.

LAKE PLACID (44° 17° N., 74° W.), village and lake, New York, U.S.A.; in vicinity is John Brown's grave.

LAKEWOOD (40° 5′ N., 74° 12′ W.), village, New Jersey, U.S.A. Winter resort. Pop. (1910) 5149.

LAKHIMPUR (*c.* 27° 30′ N., 95° 30′ E.), district, Assam, India; area, *c.* 4500 sq. miles; drained by Brahmaputra and tributaries; produces tea, petroleum, coal. Pop. *c.* 375,000.

LALANDE, JOSEPH JÉRÔME LEFRANÇAIS DE (1732–1807), Fr. astronomer; prof. of Astron. in Collège de France, 1762–1807; chief works, *Treatise on Astronomy*; *Practice of Navigation*.

LALÍN (42° 38′ N., 8° 4′ W.), town, Pontevedra, N.W. Spain; paper. Pop. 16,500.

LALITPUR (24° 45′ N., 78° 26′ E.), town, Jhansi, United Provinces, India. Pop. 11,600.

LALLY, THOMAS ARTHUR, COMTE DE (1702–66), fought in India against Britain.

LAMA, LLAMA, see CAMEL FAMILY.

LAMAISM, the name given to the religious system of Tibet which is on a joint political and ecclesiastical basis and is a modified form of Buddhism (*q.v.*). In the II. cent. A.D., about 700 years after the life and teachings of Gotama, there arose the doctrine of the *Great Vehicle*, which, while it professed to continue, largely modified the ideas of the founder (it was so called in distinction to the *Little Vehicle*, that of Gotama). Belief arose in a number of powerful angelic beings. Thus, there was a drift away from the simplicity of early Buddhism. Primitive superstitions revived and the Tantra system arose, a form of religion so degraded that scholars have turned with disgust from its lit. This debased Buddhism was introduced into Tibet by Srong Tsan Gampo in 622 A.D., but his successors persecuted its adherents, and it was not firmly planted till the next cent. It declined again and was reintroduced in 971.

In the XIII. cent. the Mogul Emperor, Kublai Khan, granted to the abbots of the Sahya monastery the temporal sovereignty of the country, and this combined spiritual and temporal power—temporal over Tibet, spiritual (as head of the Buddhist Church) throughout China—still endures. A reformation took place under Tsonghapa about 1400. On the death of the Grand Lama another is elected from recently born children.

Franche, *History of Western Tibet*; Waddell, *The Buddhism of Tibet*.

LAMALON-LES-BAINS, spa, Hérault, S. France.

LAMA-MIAO, DOLON-NOR (42° 36′ N., 116° 10′ E.), town, Chihli, China; trading centre. Pop. *c.* 28,000.

LAMAR, LUCIUS QUINTUS CINCINNATUS (1825–93), Amer. politician; senator, 1877; Sec. of Interior, 1885; Justice, Supreme Court, 1888; helped reunite North and South.

LAMARCK, JEAN DE (1774–1829), eminent Fr. zoologist; b. Picardy; ed. Amiens; served in the army but always had a love for nature; occupied important scientific posts in Paris, where he died. He is best known as the founder of **Lamarckism**, which attempts to explain the mechanism of evolution by assuming that characters acquired by an individual are transmitted to its offspring. See EVOLUTION, HEREDITY.

LAMARTINE, ALPHONSE MARIE LOUIS DE PRAT DE (1790–1869), Fr. poet; one of pioneers of Romantic school; had deep religious feeling, with some of monotony of verse of preceding age; wrote with ever-increasing facility; travelled a great deal, and mixed in politics, especially in 1848, when he showed great gifts of eloquence and was member of Executive Committee; scanty means compelled him to subsist on proceeds of pen; romantic feelings depicted in the *Méditations* (1820), *Les Nouvelles Méditations* (1823), among which is his masterpiece; *Le Lac*. *Jocelyn* appeared 1836, journal of a heroic soul; attempted new line, 1835, with *Voyage en Orient* in prose, which is not quite accurate and too facile for pleasure of later age; best prose work, rhetorical *Histoire des Girondins* (1847).

Legouis, *Jocelyn* (with preface: 1906).

LAMB, CHARLES (1775–1834), Eng. essayist; b. London; ed. Christ's Hospital, where formed friendship with fellow-scholar, Coleridge; held clerkships in South Sea House and India House; never m., but devoted life to mad sister Mary; himself under restraint, 1795–96; dabbled in verse and journalism; with Mary wrote *Tales from Shakespeare* (1807); fascinated by Elizabethan and XVII.-cent. poets; pub. *Specimens of English Dramatic Poets* (1808); contributed essays on wide variety of subjects, under name *Elia*, to *London Magazine* (1820–22). L. is one of most lovable characters and writers in Eng. lit., his essays, written in a unique indescribable style, mingling quaintness and delicacy, humour and pathos. He ranks high as a literary critic.

Ainger, *Works*; Lucas, *Works* and *Life*; Masson, *Charles Lamb*.

LAMB, WILLIAM, see MELBOURNE, VISCOUNT.

LAMBALLE (48° 28′ N., 2° 31′ W.), town, Côtes-du-Nord, France; pottery. Pop. 4500.

LAMBAYEQUE (6° 48′ S., 79° 52′ W.), maritime

department (and town), Peru, S. America; area, 4614 sq. miles. Pop. c. 124,000.

LAMBERMONT, AUGUSTE, BARON (1819–1905), Belg. politician; served in foreign office from 1842; secured removal of tolls on Scheldt.

LAMBERT, FRANCIS (*c.* 1486–1530), Fr. Reformer; became Franciscan, 1501; converted to Protestantism, 1522; present at Marburg Conference, 1549; supported by Philip of Hesse.

LAMBERT, JOHANN HEINRICH (1728–77), Ger. physicist, philosopher, and mathematician; first to make photometric measurements of intensity of light.

LAMBERT, JOHN (1619–83), Eng. general; Roundhead in Civil War; distinguished at siege of Hull, 1643, *Dunbar*, *Worcester*, and other battles and sieges; member of Committee of Safety, 1659; crushed Royalist rising under Booth, 1659; major-gen. of forces in England and Scotland, 1659; sent against Monk, whose march he was unable to oppose, owing to dwindling of army; arrested at Restoration; banished to Guernsey.

LAMBESSA, LAMBÈSE (35° 28′ N., 6° 13′ E.), village, Algeria, Africa; interesting Rom. remains include so-called prætorium, baths, temples, aqueducts, and great number of inscriptions.

LAMBETH (51° 28′ N., 0° 3′ W.), metropolitan borough, S. London; contains L. Palace, seat of abp's of Canterbury, which has fine library and portraits of abp's. Pop. (1911) 298,126.

LAMBETH CONFERENCES, attended by all Anglican bp's, meet at Lambeth Palace to bring about closer union and discussion of common interests between Eng. and colonial churches. The first Conference was held in 1867, second, 1878, third, 1888, fourth, 1897, fifth, 1908. Unlike Convocation they possess no formal authority, but have considerable influence; various questions, doctrinal, disciplinary, social, and educational, are discussed.

LAMBOURN (51° 31′ N., 1° 32′ W.), town, Berkshire, England. Pop. (1911) 4527.

LAMB'S LETTUCE, CORN-SALAD (*q.v.*).

LAMECH, patriarch in *Genesis*; legendary f. of Noah; name may be derived from Babylonian myth.; possibly connected with an Arabic word for a young man.

LAMEGO (41° 9′ N., 7° 41′ W.), town, N. Portugal; Gothic cathedral. Pop. 8500.

LAMELLIBRANCHIATA or BIVALVES, PELECYPODA, ACEPHALA, LIPOCEPHALA; a large class of Mollusca, containing more than 5000 species scattered throughout the waters of the world. Its members are in almost all cases readily distinguished from other molluscs by the obvious presence of a shell composed of two strong limy valves within which the animal is sheltered. The Bivalve body, moreover, is less body-like than that of the Univalves or Gasteropods, for there is no head with tentacles, and the structures lie in bisymmetrical layers, the body proper and the foot being enclosed on both sides by the gills, and these again by the mantle folds, which are attached to the valves of the shell. There is no radula rasping apparatus in the mouth, and the foot is a more or less inactive lobe of muscle, by which the creatures often plough their way through sand or mud. Often the foot produces strands of brown silky material — *byssus* — by which the animal is anchored to neighbouring stones or rocks.

The senses of Bivalves are of comparatively low order. Their eyes, simple or highly developed, are many in number, set along the edges of the mantle, peeping out as it were from the gape of the shell, or placed at the end of the respiratory tube. They feel with the edges of the mantle, hear, or at least balance, by means of a pair of small sacs (*otocysts*) in the foot, and perhaps smell by small sensory patches near the base of the gills. At the hinder end of the body the mantle frequently forms a respiratory tube or siphon, of the utmost importance in their economy. It may be short in the forms which live at the surface of the sea, or long in burrowing or boring species, and has two apertures. Though one of these, the inhalent aperture, a current of life-bringing water is drawn, carrying the minute organisms upon which the creatures feed, and purifying the blood by washing the gills; and through the other (exhalent aperture) the water, having served its purpose, is ejected.

The limy shells vary much in shape and beauty. They may be almost hemispherical (*Cyclas*), or exceedingly elongated, as in the Razor Shell; smooth externally or covered with strong ribs often furnished with spines and projections (*Spondylus*). The inner surface, however, is smooth and shiny, with a layer of iridescent mother-of-pearl or nacre. The shells are hinged with an elastic ligament, and can be opened or closed tightly by means of two strong muscles, although in some forms (Oysters, etc.) one of the muscles has disappeared.

Almost all Bivalves live in the sea, but a few, such as the Fresh-Water Mussels, inhabit rivers or lakes. The majority burrow and plough their way in the sand or mud at the bottom, feeding and respiring through the breathing tubes which project above the surface of the silt. Some, however, such as the footless Oysters and their relatives, lie passively on the bottom, while others bore deeply into wood (the Ship 'Worm' — *Teredo*) or even into rocks and stones (*Pholas*, *Saxicava*, *Lithodomus*). Bivalves are less active than Gasteropods; many remain permanently anchored by their byssus (Edible Mussels, etc.), the majority plough laboriously, some jump or jerk by aid of their foot (Cockles), and a few swim through the water by flappings of their shell-valves (Scallops, and *Lima*).

Their breeding habits are often interesting. *Lima* builds nests of old shells and stones, and the young of Fresh-Water Mussels remain sheltered in the body of the parent until, at the proper time, a Stickleback or similar fish swims near. Then the minute larvæ (*Glochidia*) snap their valves with great energy, and so approaching the fish, attach themselves to fins or gills, sinking into these, and developing there for the succeeding two to five weeks of their existence.

Lamellibranchs, with one or two exceptions, feed on the microscopic organisms, Diatoms and minute Algæ, Protozoa, small Crustacea, and organic débris, which are borne to them in the water currents they create.

Many are the uses of Lamellibranchs to man. He relishes as food such forms as Oysters (*q.v.*), Cockles, Clams, and Scallops. Pearl buttons, and many ornaments of greater beauty, if of less use, are manufactured from the shells of Pearl Oysters, which, along with the Fresh-Water Mussel, *Margaritana*, furnish the world's supply of pearls. Many species are extensively used as bait for fishes; the giant *Tridacna* makes excellent fonts, and the semi-transparent shells of *Placuna* form window-panes in China and the Philippines.

The class Lamellibranchiata is divided into four orders, according to gill structures:—

I. PROTOBRANCHIA, with simple plate-like gill filaments, e.g. *Nucula*.

II. FILIBRANCHIA, with gill filaments folded back upon themselves, e.g. *Placuna*, *Lithodomus*, and the Edible Mussel, *Mytilus*.

III. PSEUDO-LAMELLIBRANCHIA, with gill filaments loosely connected to form gill-plates, e.g. *Pinna*, the true Oysters (*Ostraca*), the Pearl Oysters (*Meleagrina*), *Lima*, and the Scallops, *Pecten*.

IV. EULAMELLIBRANCHIA, with gill filaments intimately connected into double gill-plates, *e.g.* Fresh-Water Mussels (*Margaritana*, *Unio*), the Clams (*Mactra*), the Cockles (*Cardium*), Razor-Shell (*Solen*), *Tridacna*, the various Rock- and Wood-Borers, and the curious Watering-Pot Shell (*Aspergillum*).

LAMENNAIS, HUGUES FÉLICITÉ ROBERT DE (1782–1854), Fr. ecclesiastical and political contro-

versialist; ordained he became prof. of Math's, 1811; strong defender of Catholicism, and condemned 'Gallican' liberties (partial independence of Fr. Church from papal control); became increasingly democratic, denouncing all connection of Church with state and with monarchy. Although he believed himself a devoted Catholic, his views met with papal disapproval, and he left the Church, devoting himself entirely to political propaganda; imprisoned for a year in 1840 for his book *Le Pays et le Gouvernement*; wrote numerous works, and his correspondence (some of it important) is published.

LAMENTATIONS, BOOK OF, in Hebrew canon, together with the *Song of Songs, Ruth, Ecclesiastes,* and *Esther,* forms *Megilloth* (Rolls). L. is made up of five separate poems, dealing with the woes that have befallen the Hebrew nation by the taking of Jerusalem in 586. The poems are beautiful, but are conscious art rather than spontaneous outpourings. The author is not named, but early tradition to be found in the LXX makes him Jeremiah. In favour of this can be urged the conception of natural misfortune as the result of sin, certain emotional traits, and some usages of metaphor; against it, differences of standpoint as regards Egypt, and (as a whole) phraseology; and also the poetic arrangement has an artificiality which seems unlike Jeremiah. The balance of probability is thought by competent scholars (*e.g.* Driver) to be against Jeremiah's authorship, but quite possibly it is by one of his disciples, and dates from a period not long after him: it is possibly not all by one writer.

Peake, *Jeremiah and Lamentations* (Century Bible).

LAMESSAN, JEAN ANTOINE DE (1843–), Fr. sailor, scientist, and politician; author of several works.

LAMETTRIE, JULIEN OFFRAY DE (1709–51), Fr. physician and materialist; considered man a machine, the soul a function of the brain.

LAMMERGEIER, member of VULTURE FAMILY (*q.v.*).

LAMNA, see under SHARKS AND DOG FISHES.

LAMORICIÈRE, CHRISTOPHE JUCHAULT DE (1806–65), Fr. soldier; fought in Algeria, 1847, and against Italy, 1860.

LAMP, a device for producing artificial light by inflammable liquid, oil, gas, or electricity. No doubt the first lamps were animals' skulls and later baked earth and metal—bronze being generally used. In 1784 Argand at Geneva invented a lamp with circular wick and glass chimney, which was considerably improved by Franchot in 1837. Nowadays oil lamps consist of a reservoir, for the oil, below the wick (either flat or circular, single or multiple), which is sucked up the wick by capillary action. Safety lamps (*q.v.*) are used by miners and acetylene lamps (*q.v.*) by motorists. See also LIGHTING.

LAMP-BLACK, see under CARBON, PIGMENTS.

LAMPEDUSA (35° 30′ N., 12° 30′ E.), island, between Malta and Tunis, Mediterranean Sea; belongs to Italy; has Rom. and Carthaginian remains. Pop. c. 2000.

LAMPERTHEIM (49° 36′ N., 8° 28′ E.), town, Darmstadt, Germany. Pop. (1910) 10,335.

LAMPETER (52° 7′ N., 4° 5′ W.), town, Cardiganshire, Wales; seat of St. David's Coll. Pop. (1911) 3566.

LAMPOON, a virulent satire in prose or verse, usually a personal attack. The name comes from the old burden sung to these libels, 'Lampone, lampone, camerada lampone.'

LAMPREYS (*Petromyzontidæ*), eel-like primitive fishes with round, sucking mouth, and seven gill-slits. They are carnivorous and feed on fishes, worms, and insects; 3 species occur in Brit. waters, living in the sea and spawning in rivers; some are esteemed as food.

LAMPRIS, see OPAH.

LAMPROPHYRES, name given to a group of rocks containing bright crystals of biotite, hornblende, olivine, or augite. They generally occur in dikes or thin sills, and are of a dark colour. There are two distinct groups, the first of which is accompanied by intrusive granites, while the second is associated with nepheline syenites.

LAMPSACUS (40° 19′ N., 26° 39′ E.), ancient Hellenic town, Asia Minor.

LANAI, see HAWAIIAN ISLANDS.

LANARK (55° 40′ N., 3° 48′ W.), town, Lanarkshire, Scotland; associated with Wallace; formerly site of Franciscan monastery. Pop. (1901) c. 6500. New L., to S., has cotton mills.

LANARKSHIRE (55° 45′ N., 3° 55′ W.), county, S.W. Scotland; area, 879 sq. miles; surface rises from N. to Lowther Hills in S.; watered by Clyde and its tributaries. In S. are sheep farms, in centre market gardens and orchards, in N. important coal-fields. L. is most populous and busiest manufacturing county in Scotland; contains Glasgow, Hamilton, Airdrie, and other industrial centres. Manufactures iron goods, steel, machinery, textiles. Pop. (1911) 1,447,113.

LANCASHIRE (53° 45′ N., 2° 35′ W.), N.W. county palatine, England; area, *c.* 1890 sq. miles; low, flat coast is much indented, so that there are many good harbours; surface rugged and mountainous in N. and E., reaching an extreme height of 2633 ft. in Coniston Old Man in N.; drained by Duddon, Lune, Ribble, Mersey, Irwell, and other rivers. L. suffered from ravages of Danes in IX. cent., towards end of which it came under sway of Northumbria. County was granted by Henry III. to his s. Edmund, and from him descended to John of Gaunt, whose s. became king as Henry IV. in 1399, since when it has belonged to the Crown, though its estates are separately administered. In reign of James I. witchcraft was prevalent here, especially in district of Pendle Forest, Whalley; and in 1612 twenty witches were put to death. Various battles and sieges occurred during Civil Wars of XVII. cent.; and in 1658 the county had considerable part in Royalist rising, which, however, was put down; had some share in Jacobite risings of 1715 and 1745. During last two cent's chief events have been the growth of cotton trade, with which the inventions of Hargreaves, Arkwright, and others are associated; opening of first English railway in 1830; and the cutting of various canals, of which the Bridgewater was the first. L. is most populous and busiest manufacturing county in England; contains large coal-field, which has become seat of greatest cotton industry in world, with centre at Manchester, while Bolton, Preston, Oldham, Blackburn, Burnley, Rochdale, Bury, Ashton, and Middleton are also engaged in this trade. Copper, slate, earthenware clay, fireclay, are also found, and in the N. are large deposits of iron ore which have developed great iron and steel industries, as at Barrow-in-Furness. Liverpool is an important centre of shipping trade, accounting for one-fourth of imports and two-fifths of exports of United Kingdom. Manufacture of machinery is also important; other industries include shipbuilding, dye-works, manufacture of glass, soap, leather, silk and woollen textiles. County is crossed by numerous railways, and by several canals, including the Manchester Ship Canal between Liverpool and Manchester. There are univ's at Liverpool and Manchester, which, with Lancaster, the capital, are assize towns. There are remains of many monasteries, finest of which is Furness Abbey, a Cistercian foundation. Pop. (1911) 4,825,739.

Victoria County Histories, *Lancashire.*

LANCASTER.—(1) (54° 3′ N., 2° 48′ W.) town, Lancashire, England; castle, now used as county prison, was built on site of Rom. castle in Norman times, and restored by John of Gaunt; fine old church, dedicated to St. Mary; connected with Kendal and Preston by L. canal; cabinetmaking, upholstery, cottons. Pop. (1911) 41,414. (2) (40° 2′ N., 76 °23′ W.) town, Pennsylvania, U.S.A.; manufactures tobacco, cottons. Pop. (1910) 47,227. (3) (39° 41′ N., 82° 29′ W.) town, Ohio, U.S.A.; agricultural trade. Pop. (1910) 13,093.

LANCASTER, HENRY, EARL OF (*c.* 1281–1345),

joined queen against Edward II.—HENRY, DUKE OF L., s. (c. 1300–61), distinguished soldier.

LANCASTER, HOUSE OF, family descended from Edmund, s. of Henry III., Earl of L. in 1267, whose s. Thomas led nobles in Edward II.'s reign and was executed for treason. His nephew Henry became duke, and was succ. by dau., Blanche; she m. John of Gaunt, s. of Edward III., who became Duke of L. and immediate ancestor of Lancastrian kings; he was suspected of aiming at succession to throne, and sent on missions to France. His s. Henry deposed Richard II., becoming first Lancastrian king. House fell in Wars of Roses.

LANCASTER, SIR JAMES (d. 1618), Eng. navigator; commanded E. India Company's expedition to E. Indies; encouraged Hudson and Baffin in polar exploration; **Lancaster Sound** named after him by Baffin.

LANCASTER, JOHN OF GAUNT, DUKE OF (1340–99), s. of Edward III.; b. Ghent; served in Spain, 1367, France, 1369; after second marriage, with Blanche of Castile, assumed title, king of Castile; towards close of Edward III.'s reign, attained great power in England; supported Wycliffe; after Richard's accession, supported king; unsuccessfully invaded Castile, 1387; Duke of Aquitaine, 1390; governed Aquitaine, 1395.

LANCASTER, JOSEPH (1778–1838), Brit. educationist; b. at Southwark of poor parents; started a school for poor children, charging no fees. His system, which depended greatly on teaching by monitors and mechanical drill, was copied throughout the country, but the resultant fame and wealth ruined his character.

LANCASTER, THOMAS, EARL OF (1277–1322), grandson of Henry III.; led barons against Edward II.; defeated and captured at Boroughbridge; executed for treason.

LANCE, the long spear used by a certain class of cavalry called lancers. The pennon at the spear-point frightened the horses of opponents. When not in use the lance is attached by a sling to the soldier's elbow. In Germany the lance is made of hollow steel.

LANCELET, see AMPHIOXUS.

LANCELOT, hero of Arthurian legend. The story is best known through Malory's beautiful version and Tennyson's poetical rendering. The most famous incidents in his life are his appearance at Arthur's court, his infatuation for Arthur's wife, Guinevere, his rescue of the queen, his unsuccessful Grail quest, which terminated only in a fleeting vision of the sacred vessel, his subsequent unconsciousness, lasting for as many days as he had spent years in sin.

LANCET, term applied to a two-edged, lance-pointed surgical instrument, for opening abscesses, etc.; in architecture, one form of the pointed arch.

LAN-CHOW-FU (36° 5′ N., 103° 55′ E.), town, Kan-su, China. Pop. variously estimated at from 80,000 to 500,000.

LANCIANO (42° 14′ N., 14° 25′ E.), cathedral town, Italy; seat of bishopric. Pop. 18,500.

LAND occupies about two-sevenths of the earth's surface, with an estimated area of 55,100,000 sq. miles. In primitive times men disputed ownership of l. with wild beasts, and gradually formed themselves into communities for purposes of protection; during the Neolithic Age (see ARCHÆOLOGY) they began to employ agriculture as a means of supplying themselves with food, and thus l. acquired value. The tide of Aryan invasion from the East, and, later, the restless movements of Teutonic and Slavonic peoples, did much to change ownership of l. in Europe, but by the Middle Ages it was comparatively settled.

With increase of civilisation came regulations regarding l. tenure to replace those of Rome which had been swept away by barbarism; the most important was FEUDALISM (*q.v.*), which flourished in France till the Revolution of 1780, and in England till the agrarian revolutions of the XV. and XVI. cent's, which turned great tracts of country into pasturage and created the large farmer. The XVIII. and XIX. cent's saw a reversion to agriculture, and at present the small farmer is being encouraged as much as possible in order to repeople the land (see SMALL HOLDINGS). Of late years the question of State ownership has been raised, especially by Socialists, while the fact that much common l. was annexed by landowners from XV. to XVII. cent. gives historical ground for their claims.

Round the coasts of Britain and other countries there are considerable tracts of land only partially submerged by the sea, and the term **reclamation of land** is used to describe the process of permanently excluding the sea in order to render such land fit for agricultural purposes. In estuaries, *e.g.*, silt is constantly being deposited at a more or less rapid rate, but owing to the shifting of the channel and the scouring action of the tide little permanent accretion takes place. If, however, the channel is fixed by embankments reaching high above water-level, the deposit goes on steadily and the foreshore gradually rises. Finally, the water is shut out altogether by embankments, which must be higher than the level of highest tide. It is also possible further to increase the deposit by allowing water to enter at high tide through openings or sluices in the embankments, and permitting it to escape gently after its silt is deposited. Sea marshes also, which are only submerged at high tide, can be reclaimed by high embankments. Holland provides the best examples of land reclamation, a large part of it having been won from the sea. See Beazeley, *Reclamation of Land from Tidal Waters.*

Land Registration.—Leases of forty years and upwards require registration, and in the County of London must be entered at the Registry. The owner of property wishing to register his title to it should take his title-deeds (it is generally better to employ a solicitor for the purpose) to the Land Registry. Particulars of the property and the ownership of it will then be entered in the register, his deeds will be stamped with a record of the registration, and he will be given a *land certificate,* which is a copy of the entry in the register. When once the property has been registered, all subsequent dealings with it must be registered. Generally the person entitled to register the property is the person entitled to its possession, though he may not be the absolute owner, but only a tenant for life or mortgagee. Two kinds of title may be applied for at the registry—absolute and possessory. The Registrar will generally allow the latter on production by the owner of the conveyance or on a statutory declaration. But the former will not be granted until the Registrar has satisfied himself that the title is good, though he may allow a qualified title to be registered.

See also LANDLORD AND TENANT; IRELAND, HISTORY (for Irish L. Question); RENT, and similar articles.

LANDAU.—(1) (49° 11′ N., 8° 6′ E.) town, Bavaria, Germany; formerly fortified; site of Augustinian monastery. Pop. (1910) 17,761. (2) (48° 41′ N., 12° 43′ E.) town, Lower Bavaria. Pop. 3200.

LANDECK (50° 21′ N., 16° 53′ E.), town, Pruss. Silesia, Germany; thermal springs. Pop. (1905) 3481.

LANDEN (50° 46′ N., 5° 4′ E.), town, Liège, Belgium. Pop. 3100.

LANDER, RICHARD LEMON (1804–34), and **JOHN** (1807–39), his bro., Eng. explorers; sent by Britain to explore Niger; discovered (1830) that it terminates, in several offshoots, in Bight of Benin; pub. *Journal,* 1832.

LANDES.—(1) (44° N., 0° 50′ W.) S.W. department, France; area, 3604 sq. miles; watered by Adour; large forests; produces resin, charcoal, rock-salt, iron; horses bred. Pop. (1911) 288,902. (2) (44° 30′ N., 0° 55′ W.) district, S.W. France, occupying parts of dept's of L., Gironde, and Lot-et-Garonne. Mainly covered by pine forests and fields.

LANDESHUT (50° 46′ N., 16° 3′ E.), town, Pruss. Silesia, Germany. Pop. (1905) 13,125.

LANDLORD AND TENANT, the tenant holds a property of the landlord for a certain limited period, subject, *inter alia*, to the payment of rent. He (or she) may be a *tenant at will*, when the tenancy may be ended by landlord or tenant at any moment without notice; or a *tenant at sufferance*, remaining in possession after expiration of tenancy, and liable to be turned out at any moment; and yet not a trespasser. If a tenant retains possession after receiving or giving notice to quit he is liable to be sued for double the rent. A tenancy is commonly from year to year, and if it is to be for less than a year the agreement with the landlord should state this quite clearly. There are four 'usual covenants' in the ordinary tenancy: (1) Tenant to pay rent; (2) tenant to pay rates and taxes, except landlord's property tax and tithe rent charge; (3) tenant to allow landlord to enter premises from time to time to see that they are in proper state of repair; (4) tenant to keep premises in proper state of repair, and to leave them in such a state at end of tenancy.

When rent is in arrear the landlord has the right to distrain for distress—that is, to seize a sufficient quantity of the tenant's goods to satisfy the debt. He may not, however, seize: (1) things in actual use at the time; (2) all fixtures except growing crops ripe for reaping; (3) goods delivered to the tenant in the course of his trade, including agricultural machinery, and live stock not the property of the tenant; (4) wild animals; (5) loose coin of the realm; (6) perishable goods; (7) looms used in silk, cotton, and woollen manufacture; (8) gas meters; (9) goods of a lodger —where the lodger complies with the Lodgers' Goods Protection Act; (10) wearing apparel, bedding, and trade implements not exceeding £5 in value. When a tenancy has come to an end, the landlord has a right of entry, but should proceed by legal action and not by force if his right is contested.

LANDOR, WALTER SAVAGE (1775–1864), Eng. prose-writer and poet; b. Warwick; ed. Rugby (removed at request of headmaster) and Trinity Coll., Cambridge (rusticated); headed volunteer force, raised at his expense, in Peninsular, 1808; travelled in Europe for several years; finally settled at Florence; friend of Southey and Browning. His works are distinguished by purity of style and delicacy of diction; sometimes striving after beauty leads to obscurity; wrote fluently in Eng., Lat., and Ital. Best-known works are *Poems* (1795), *Gebir* (revised ed., 1803), *Count Julian* (1812), *Imaginary Conversations* (1824–26), *Pericles and Aspasia* (1836), *Poemata et Inscriptiones* (1847), *Hellenics* (1847).

Life, by Forster (1869), Colvin (E.M.L., 1884).

LANDOUR (30° 26′ N., 78° 5′ E.), sanatorium, United Provinces, India. Pop. (1901) 1720.

LAND-RAIL, see RAIL FAMILY.

LAND'S END (50° 4′ N., 5° 43′ W.), headland, Cornwall; most westerly point of England.

LANDSBERG AM LECH (48° 4′ N., 10° 51′ E.), town, Bavaria, Germany. Pop. (1910) 7293.

LANDSBERG-AN-DER-WARTHE (52° 46′ N., 15° 13′ E.), town, Pruss. Brandenburg, Germany. Pop. (1910) 39,332.

LANDSBERG BEI HALLE (51° 32′ N., 12° 9′ E.), town, Prussia, Germany.

LANDSEER, SIR EDWIN HENRY (1802–73), Eng. painter; b. London, s. of an engraver; early began to sketch animals from life, and exhibited at the Royal Academy when 13. In 1818 he attracted attention by his *Fighting Dogs getting Wind*. Dogs and deer were his favourite subjects; and the Scot. Highlands furnished the scenes of some of his best pictures, all of which are familiar from engravings. The bronze lions of the Nelson Monument, London, were of his modelling. He is buried in St. Paul's Cathedral.

Life, by Stephens (1883), Manson (1902).

LANDSHUT (48° 32′ N., 12° 9′ E.), town, Bavaria, Germany; interesting old churches. Austrians defeated by Napoleon, 1809. Pop. (1910) 25,137.

LANDSKNECHTE, Ger. mercenary foot-soldiers, first raised by Maximilian I.; prominent in Ital. wars.

LANDSKRONA (55° 52′ N., 12° 49′ E.), port, Sweden; industrial centre. Pop. (1910) 16,041.

LANDSLIP, fall of rocks or earth due to undermining action of sea, or removal of underlying strata by heavy rains or melting snow; common in Alps and tropical countries where rainfall is excessive during wet seasons; severe l. in Glencoe, Argyllshire, Scotland, 1913.

LANE, EDWARD WILLIAM (1801–76), Brit. Arabic scholar; went to Egypt on account of his health; pub. *Manners and Customs of the Modern Egyptians*, a translation of the *Arabian Nights*, and the famous *Arabic Lexicon*, a standard work.

LANE, JAMES HENRY (1814–66), Amer. politician and general; joined Federalists in Civil War; recruiting commissioner, Kansas, 1862; senator, 1865; committed suicide.

LANFRANC (d. 1089), abp. of Canterbury; b. at Pavia; became jurist; monk at Bec, 1142, subsequently prior; opened school in monastery; defended doctrine of transubstantiation against Berengar of Tours. Obtained favour of William the Conqueror; became abbot of St. Stephen's, Caen, 1066; abp. of Canterbury, 1067; reformed ecclesiastic organisation; separated ecclesiastical from other courts; discovered and defeated conspiracy of 1075. *Life*, by Crozals (1877).

LANFREY, PIERRE (1828–77), Fr. republican statesman; wrote history

LANG, ANDREW (1844–1912), Scot. scholar; b. Selkirk; was a dainty poet, admiring and practising Old Fr. forms; wrote a full *History of Scotland*; with Butcher translated the *Odyssey*, with Leaf and Myers the *Iliad*; authority on folk-lore and fairy stories.

LANG, KARL HEINRICH, RITTER VON (1764–1835), Ger. historian; archivist in Munich, 1810–17; wrote *Memoiren*.

LANGDON, JOHN (1741–1819), Amer. politician; senator, 1789–1801; gov. of New Hampshire, 1805–9, 1810–12.

LANGE, FRIEDRICH ALBERT (1828–75), Ger. economist and philosopher, schoolmaster and journalist; wrote works on philosophic and social questions.

LANGEAIS (47° 20′ N., 0° 30′ E.), town, Indre-et-Loire, Franco. Pop. 4000.

LANGEN, JOSEPH (1837–1901), Ger. Old Catholic divine.

LANGENBECK, BERNARD RUDOLF KONRAD VON (1810–87), Ger. surgeon; prof. of Surgery at Kiel, 1842; director of Clinical Institute for Surgery and Ophthalmology at Berlin, 1848; acted as military surgeon in several campaigns, including Franco-Pruss. War, 1870–71; authority on gunshot wounds, etc.

LANGENSALZA (51° 7′ N., 10° 40′ E.), town, Pruss. Saxony, Germany; ruined monastery. Prussians defeated Hanoverians, 1866. Pop. (1910) 12,667.

LANGHAM, SIMON (d. 1376), abp. of Canterbury, 1366–68; cardinal, 1368.

LANGHOLM (55° 9′ N., 3° W.), town, Dumfriesshire, Scotland; textiles, leather, distilling. Pop. (1911) 3302.

LANGIEWICZ, MARYAN (1827–87), Polish national leader in rebellion against Prussia, 1863.

LANGLAND, WILLIAM, LANGLEY (c. 1332–1400), reputed author of *Piers the Plowman*; antiquaries have pieced together the following biographical facts: b. in Shropshire c. 1332; received monastic education; destined for priesthood, but married; lived precariously by chanting psalms for souls of departed. The poem attributed to him is allegorical, the Plowman a personification of Christ; writer is in deadly earnest, flails contemporary abuses in Church and State, and knows the curse of poverty.

Poem is in three forms, possibly rewritten by poet;

in alliterative metre with variety and cadence; shows transition from O.E. to modern prosody.

LANGLEY, SAMUEL PIERPONT (1834–1906), Amer. physicist and astronomer; sec. of Smithsonian Institution, 1887; invented the *bolometer*; discovered and explored infra-red portion of spectrum; made important investigations and experiments in aeronautics.

LANGPORT (51° 3′ N., 2° 49′ W.), town, Somersetshire, England; Perpendicular church. Pop. reg. district (1911), 6723.

LANGREO (43° 17′ N., 5° 44′ W.), town, N. Spain. Pop. 19,000.

LANGRES (47° 53′ N., 5° 20′ E.), fortified town, E. France; episcopal see; XII.-cent. cathedral; Rom. gateway remains. Pop. 9000.

LANGTON, STEPHEN (d. 1228), Eng. ecclesiastic; studied at Paris, elected abp. of Canterbury by Canterbury monks, 1207, joined with barons against King John, but it is doubtful how far he was responsible for *Magna Carta*; after John's death supported Henry III.

LANGUAGE, see PHILOLOGY.

LANGUEDOC, former province of France. Its capital was Toulouse; boundaries—on the N., Auvergne, Rouergne, Quercy, Forez; on the E., the lower Rhone; on S., the Mediterranean and Roussillon; on W., Comminges, Rivière-Verdun, Foix. L. possessed an Assembly, three archbishoprics, etc. Differing in history and therefore race from N. France, it received above name at time of final union to Fr. Crown, 1271, when different pronunciation of *oui* was seized on, i.e. *oc* instead of *oïl* of N. Reformation won great hold here in XVI. cent.; from time of Richelieu to Revolution, when it was abolished, L. was administered by royal *intendant*; noted from Rom. times for wines; racial characteristics still strong. See FRENCH LANGUAGE, FRANCE (HISTORY).

LANGUET, HUBERT (1518–81), Fr. Huguenot statesman; friend of Melanchthon; entered service of Augustus I. of Saxony, 1559; ambassador to Fr. court, 1561–72, and pleaded for Protestants but was compelled to fly; sent to Vienna, but found position untenable; correspondence important hist. source.

LANGUR MONKEYS, see under CERCOPITHECIDÆ.

LANIER, SIDNEY (1842–81), Amer. poet and writer of boy-stories; wrote *Science of Eng. Verse*, *The Eng. Novel*.

LANIUS, see SHRIKES.

LANJUINAIS, JEAN DENIS, COMTE (1758–1827), Fr. writer and politician; opposed 'Mountain.' —VICTOR AMBROISE, Vicomte, s. (1802–69), Minister of Commerce, 1849.

LANKESTER, SIR EDWIN RAY (1847–), Brit. zoologist; prof. at London (1874–90), Oxford (1891–98), director of natural history section of Brit. Museum (1898–1906); pres., Brit. Association, 1906; works include *Extinct Animals* (1905); *Kingdom of Man* (1907).

LANNES, JEAN, DUKE OF MONTEBELLO (1769–1809), marshal of France; served under Napoleon; distinguished at Acre, Montebello, Marengo, Austerlitz, Jena; commanded in Spain, 1808; captured Saragossa; killed at Aspern-Essling.

LANNION (48° 44′ N., 3° 25′ W.) town, Côtes-du-Nord, town, France; ruined castle in neighbourhood; fishing carried on. Pop. 5800.

LANOLIN (*adeps lanæ hydrosus*), a mixture of 7 oz. neutral wool fat with 3 fl. oz. water, the wool fat being obtained by purification of the grease extracted in the preparation of sheep's wool. It is slightly antiseptic, and is a common basis for ointments.

LANSDOWNE, hill station, Garhwal, United Provinces, India. Pop. 4000.

LANSDOWNE, 1ST MARQUESS OF, WILLIAM PETTY FITZMAURICE (1737–1805), Eng. statesman; served in Seven Years War; distinguished at Minden; pres., Board of Trade, 1763; Sec. of State, 1766; dismissed for policy of conciliation towards America, 1768; Premier, 1782.—HENRY, 3RD MARQUESS (1780–1863), Chancellor of Exchequer, 1806; advocated R.C. emancipation, abolition of slavery; Home Sec., 1827. Subsequently Pres. of Council.

LANSDOWNE, HENRY CHARLES KEITH PETTY-FITZMAURICE, 5TH MARQUESS OF (1845–), Brit. statesman; Lord of the Treasury, 1869; Under-Secretary of State for War, 1872; gov.-gen. of Canada, 1883; Viceroy of India, 1888; split with Gladstone's party on Home Rule; Secretary of State for War, 1893–1900; Secretary of State for Foreign Affairs, 1900–5; leader of Unionist party in House of Lords.

LANSING (42° 45′ N., 84° 33′ W.), capital, Michigan, U.S.A.; agricultural coll. Pop. (1910) 31,229.

LANTERN, metal case with glass shutter to protect flame from wind. *Hanging l's* found in Pompeii and Herculaneum have body of bronze and horn plates. *Dark l.* has shutter or slide by which the light may be cut off.

MAGIC OR OPTICAL L., instrument for projecting views on a screen, was invented by Kircher c. 1646; consists of body, generally of Russian iron, and a system of lighting, of which the most common is limelight (lime is made white-hot by flame of coal-gas and oxygen), and arrangement for *projection*; a condenser is used for rendering the rays of light parallel, and transparent slides (photographic positives) are introduced between condenser and projector.

LANTERN-FLIES, prettily coloured Bugs (*Hemiptera*) with a huge proboscis projecting in front of the head, and for long supposed to be luminous—hence the misnomer. The best known is the Chin. Lantern Fly (*Hotinus candelarius*), found in many parts of Asia.

LANTERNS OF THE DEAD, erections in France and elsewhere for marking burial-grounds.

LANTHANUM, rare metal belonging to cerium group, discovered by Mosander in 1839. Found in gadolinite, samarskite, and fergusonite, but usually obtained by complex process from cerite, which is a hydrated silicate of cerium. H. forms only one series of compounds as oxide, chloride, and sulphide, and is of little chemical interest and no practical value.

LANUVIUM (41° 41′ N., 12° 42′ E.), ancient town, near Rome, Italy; had famous temple. Modern Civita Lavinia.

LANZAROTE (29° N., 13° 34′ W.), volcanic island, Canary Islands, Atlantic; chief town, Arrecife. Pop. c. 18,000.

LAOAG (18° 10′ N., 120° 35′ E.), town, Luzon, Philippine Islands; exports rice. Pop. c. 36,000.

LAOCOON, in Gk. mythology Trojan priest and patriot; slain with his two sons by twin snakes sent by Poseidon; statue, in late Gk. style, representing his death-struggle, is preserved in the Vatican.

LAODICEA.—(1) (37° 49′ N., 29° 2′ E.) town, Asia Minor; traditionally founded by Antiochus II., III. cent. B.C.; one of seven churches of St. John's Revelation. Modern Dinizli. (2) (35° 30′ N., 35° 44′ E.) town, Syria; built by Seleucus I.; modern Latakia. (3) (34° 33′ N., 36° 30′ E.) or Tell Neby Mindu, ruined town, Palestine.

LAON (49° 34′ N., 3° 36′ E.), town, Aisne, France; important fortress since Rom. times; fine cruciform cathedral, dating from XII. cent., and old episcopal palace, both injured during Franco-Ger. War, 1870. Pop. 15,500.

LAOS (c. 16° N., 105° E.), region, central Indo-China, partly under Fr. protection, partly subject to Siam; bounded by Yunnan, Tongking, Annam, Cambodia, Siam, Brit. Shan States. Produces rice, cotton, tobacco, sugar-cane, fruits, indigo. Fr. L., acquired 1892, has area c. 98,000 sq. miles. Pop. c. 670,000. Capital, Vien-tiane.

LAOS, or LAOTIONS, inhabitants of Indo-China, chiefly in Siam and Burma. An amiable and civil race, mostly Buddhists in religion. Conquered by the Siamese, 1828, but a few tribes are still practically independent. 'Lao' meant originally 'man.'

LAO-TSZE (b. 604 B.C.), Chinese philosopher; founder of Taoism; see CHINA (*Literature*).

LAPIS LAZULI, a metal, sometimes called 'azure stone,' composed of silica and alumina with traces of sulphuric acid, soda, and lime; generally of a rich blue colour, although some varieties are of tinted green, red, or violet; has vitreous lustre, is opaque, and easily broken; sometimes spotted, or banded with white. Found associated with crystalline limestone in schists or granites, in Persia, Siberia, Tibet, Chile (Andes), China, and Asia. Used by ancients for ornamental vases; now for mosaics and for manufacture of ultramarine pigment.

LAPLACE, PIERRE SIMON, MARQUIS DE (1749–1827), Fr. mathematician and astronomer; b. Beaumont-en-Auge; s. of farmer; at early age teacher of math's at military school of native town; when eighteen, went to Paris, where, through influence of D'Alembert, was app. prof. of Math's at École Militaire; entered politics; cr. count by Napoleon, and app. Minister of Interior, but dismissed for incapacity after six weeks; in spite of many favours, he voted for Napoleon's dethronement in 1814; cr. Marquis by Louis XVIII. in 1817. In friendly rivalry with Lagrange, L. devoted his remarkable analytical powers to astronomical problems. He was the first to firmly establish the stability of the solar system, and his *Mécanique Céleste* ranks only second in importance to Newton's *Principia*. Its publication gained him a world-wide reputation. In *Système du Monde* is to be found his famous 'nebular hypothesis.'

LAPLAND, LAPPLAND (*c.* 68° N., 27° E.), region in extreme N. of Scandinavia and extending eastward to White Sea; has no separate political existence; surface of Scandinavian L. is mountainous, with deeply indented coasts and large lakes between the mountain ridges; Russ. part is comparatively level, with greater number of lakes, while a considerable area is covered by marshes and forests; crossed by Tana, Kemi, and other rivers. Summer lasts for three months, during which there is perpetual daylight; and for two months in winter darkness prevails. Lapps are a race of short stature, but of great endurance; they are generally hospitable and quiet, but are addicted to drunkenness, and are uncleanly in their personal habits. Of their early history little is known; since IX. cent. they have been in subjection to Norway, Sweden, or Russia, and for several cent's they were regarded as slaves. They are generally classified as Mountain, Forest, Sea, and River Lapps. Mountain Lapps are virile and energetic; a nomadic race, their wants are almost entirely supplied by the reindeer. Forest Lapps lead a less nomadic existence—live by hunting and fishing, and keep reindeer. River Lapps are a settled people, who engage to slight extent in agriculture, and Sea Lapps are an impoverished race who live by fishing. Language resembles Finnish. Religions—Lutheran, Gk. Church. Total number of Lapps, *c.* 30,000.

LAPPA (22° N., 114° E.), island, near Macao, S. China.

LAPPENBERG, JOHANN MARTIN (1794–1865), Ger. historian; wrote numerous works on Ger. and Eng. history.

LAPRADE, PIERRE MARTIN VICTOR RICHARD DE (1812–84), Fr. poet; follower of Lamartine (*q.v.*), and, like him, dealt with themes of nature, religion, and philosophy; has resemblance to Wordsworth, and, like him, distinguished exponent of aims of Romantic school.

LAPWING, see under PLOVER FAMILY.

LAR (27° 33′ N., 54° 8′ E.), town, Persia; partly ruined; tobacco, cotton. Pop. *c.* 9000.

LARA (*c.* 10° N., 69° 30′ W.), state, N.W. Venezuela, S. America; silver mines; produces cereals, tobacco, coffee; chief town, Barquisimeto. Area, 9296 sq. miles. Pop. *c.* 275,000.

LARAISH (35° 14′ N., 6° 9′ W.), seaport, W. coast, Morocco, Africa; walled and fortified; exports cereals, wool, goatskins, slippers, eggs. Pop. *c.* 6500.

LARAMIE (41° 15′ N., 105° 39′ W.), town, Wyoming, U.S.A.; seat of univ.; manufactures flour, leather, glass. Pop. (1910) 8237.

LARBERT (56° 1′ N., 3° 51′ W.), town, Stirlingshire, Scotland; coal. Pop. of parish (1911), 12,984.

LARCENY, see THEFT.

LARCH (*Larix*), a genus of hardy coniferous trees which possess deciduous foliage. This develops in the early spring, the leaves arising in two rows of dense, bright green clusters on the lateral shoots, and giving the plant a graceful and dainty appearance. The male cones are small, short-lived, oval structures, whilst the female cones, which mature in one year, are much larger. They are readily recognised, when young, by their red colour. The common European species, *Larix europæa*, is extensively cultivated for its timber, which is used in shipbuilding, and for railway sleepers, etc., whilst the bark is employed in tanning. *L. americana* is the Amer. black L., a species commonly grown in the New World, whilst among other species are *L. Ledebourii* (Russia) and *L. leptilepis* (Japan).

LAREDO (27° 32′ N., 99° 26′ W.), town, Texas; U.S.A.; manufactures bricks. Pop. (1910) 14,855.

LARES, Rom. deities of the household and family and of roads and cross-roads. The Lares being guardians of the house, were intimately associated with the Penates, or guardians of the store.

LARGENTIÈRE (44° 32′ N., 4° 18′ E.), town, S.E. France.

LARGS (55° 48′ N., 4° 52′ W.), town, Ayrshire, Scotland. Alexander III. defeated Norwegians, 1263. Pop. of parish (1911), 6029.

LARGUS, SCRIBONIUS (fl. in I. cent. A.D.), physician to Emperor Claudius; collected a large number of his own and other medical prescriptions (*Compositiones*), a work still studied.

LARIDÆ, GULL FAMILY (*q.v.*).

LARINO (41° 48′ N., 15° 54′ E.), town, Italy; cathedral; seat of bishopric. Pop. 7100.

LARISSA (39° 36′ N., 22° 24′ E.), town, Thessaly; many mosques; manufactures silk, leather, cotton. Ceded to Greece by Turks, 1881. Pop. 18,200.

LARISTAN (27° 45′ N., 54° 30′ E.), division of Fars province, Persia; area, *c.* 20,000 sq. miles. Pop. *c.* 90,000.

LARKHALL (55° 45′ N., 3° 59′ W.), town, Lanarkshire, Scotland; coal mines. Pop. (1911) 14,202.

LARKHANA (27° 27′ N., 68° 8′ E.), town, Bombay, India. Pop. 15,500. L., district, pop. 656,083.

LARKS (*Alandidæ*), a family containing about 250 species of perching birds found almost all over the world. They are distinguished by their dull, earth-coloured plumage, and by the long straight claw of the first toe. The SKY-LARKS (*Alanda*), the beautiful song of which filters from the clouds, nest on the ground in open country and congregate in flocks during the winter; while the WOOD-LARKS (*Lullula*) prefer fields bordering woods. The Horned or Shore Lark (*Otocorys*), with ear-like tufts of feathers in the male, is a winter visitor to Britain, but the only common Brit. resident is the common skylark (*Alanda arvensis*).

LARNACA, LARNICA, LARNECA (34° 57′ N., 33° 39′ E.), port, Cyprus, Mediterranean Sea. Pop. 8500.

LARSA (31° 33′ N., 45° 53′ E.), ancient city of Babylonia; site marked by ruins of Senkera.

LARVAL FORMS, LARVÆ, young independent stages which differ in essential structure from their adult form. Some are well known, *e.g.* the caterpillar and chrysalis stages of the butterfly, and many insects exhibit this two-staged youth, while most show modifications of this cycle, a quiescent period, or at least a period of moulting, preceding the attainment of adult characters.

It is amongst aquatic and especially marine organisms, however, that larval forms are most common and most diverse. Amongst such groups as Cœlenterates, Echinoderms, Worms, Arthropods, Molluscs, and among the Vertebrates—Tunicates, Cyclostomes, and Amphibians—all or any of the members reach adult life by indirect routes through larval bypaths.

Larval forms show that the apparently radially symmetrical Echinoderms are really bilateral in symmetry, that the inactive, backboneless Tunicate is product of an active chordate youth, and that such cases of degeneracy are frequent. Frequently they reveal the relationship of animals, by recapitulating in themselves earlier stages in the development of the race. Thus the Nauplius, Zoëa, and Mysis stages of some Crustacea in all probability indicate lower steps of Crustacean development; while the larvæ of Annelid Worms, of Polyzoa, Brachiopods, and Molluscs point to a common origin for these groups. Owing to peculiar conditions some larvæ retain this form throughout life—the most striking example being that of the Axolotl larva of the Salamander, *Amblystoma*, which becomes mature, and breeds in larval form.

LARYNX, the organ of voice, is situated in the upper part of the neck, communicating below with the windpipe, above with the pharynx. It is a sort of box, formed by a framework of five large cartilages: (1) *thyroid* cartilage, whose apex forms the prominence, *Adam's apple*; (2) *cricoid* cartilage, a ring below; (3) the *epiglottis*, a thin plate projecting from the thyroid cartilage into the pharynx; (4) two *arytenoid* cartilages, joined to the back of the thyroid cartilage. On each inner side of the l. are two pairs of folds. The free borders of the upper pair cover delicate fibrous bands, the false vocal cords, while the strong bands in the lower folds are the true *vocal cords*. The air from the windpipe plays directly on the vocal cords, causing them to vibrate, thus causing a note. The tenseness of the cords and size of the opening are controlled by muscles.

Laryngitis, inflammation of the mucous membrane of the larynx, may be *acute* or *chronic*, the former being usually due to exposure to cold or over-use of the voice, characterised by swelling of the mucous membrane of the throat, with at first diminished and then increased secretion, cough, sore throat, and huskiness of voice—the treatment being rest in bed, warmth, inhalation of steam with benzoin, and a purge; while chronic l. may be due to a preceding acute attack, to persistent strain of the voice, and chronic irritation, such as tobacco-smoke, the symptoms being the same as in acute, but more persistent, and treatment rest, change of air, care of general health, and application of an astringent to the throat. *Œdema glottidis* is a serious condition due to extension of inflammation from neighbouring parts, to injury by a corrosive or boiling water, or to septic infection often associated with scarlatina or other fever. The mucous membrane is very swollen, there is breathlessness, and suffocation may occur. The patient in this case is ordered to suck ice, the affected part is scarified and sprayed with ether, and tracheotomy (an incision into the trachea) may be necessary. See CROUP.

LAS BELA, LUS BEYLA.—(1) (26° 10′ N., 66° 25′ E.) small state, S.E. Baluchistan; triangular alluvial land on delta of Purali; bounded by Khirthar range on E. and Hála Mts. on W.; area, 6357 sq. miles. Pop. (1910) 56,000. (2) capital of above; burial-place of Sir Robert Sandeman. Pop. *c.* 6000.

LAS CASAS, BARTOLOMÉ DE (1474–1566), Span. prelate; called 'The Apostle of the Indians'; endeavoured to secure better treatment of Indians by Spain; bp. of Chiapa (Mexico), 1544–47.

LAS CASES, EMMANUEL AUGUSTIN DIEUDONNÉ, COMTE DE (1766–1842), Fr. official; joined Napoleon, and accompanied him to St. Helena.

LAS PALMAS (28° N., 15° 41′ W.), capital, Grand Canary Island; episcopal see; seat of government cathedral. Pop. (1910) 53,824.

LAS VEGAS (35° 35′ N., 105° 20′ W.), town, New Mexico, U.S.A.; thermal springs in vicinity. Pop. (1910) 3179.

LASHIO (22° 54′ N., 97° 46′ E.), European station, Shan States, Burma, India. Pop. *c.* 3000.

LASKER, EDUARD (1829–84), Ger. politician and journalist; founded National Liberal party; successfully opposed Bismarck's autocratic measures; promoted judicial and economic reforms.

LASKI, HIERONYMUS (1496–1542), diplomat; entered John Zapolya's service, for whom he gained aid of Turks; established Zapolya's position on Hungarian throne.

LASKI, JAN (1456–1531), Polish abp. and politician; sent on diplomatic missions by Polish chancellor, Kurozwecki; sec. to King Alexander, 1501; Chancellor, 1503; abp. of Gnesen, 1511; excommunicated, 1531.

LASKI, JAN (1499–1560), nephew of preceding; bp. and reformer; embraced Augsburg Confession; wrote polemical works.

LASSALLE, FERDINAND (1825–64), Ger. socialist; b. Breslau; prosecuted Countess Hatzfeldt's suit against her husband; pub. work on Heraclitus, 1858; *System der erworbenen Rechte*, 1861; helped to found Social Democratic party in Germany, adopting career of agitator; chief aim was to improve conditions of working class; founded *Allgemeiner Deutscher Arbeiterverein*; wrote pamphlets and made speeches in large towns, attaining greatest success in Rhine country; involved in several state prosecutions; d. from result of duel. See Brandes, *Life* (1911).

LASSEN, CHRISTIAN (1800–76), Norweg. Orientalist; edited Sanskrit works, and wrote important books on Oriental languages and antiquities.

LASSOO, LARIAT, strip of plaited hide, used in America for purposes of capture; flung in noose over animal's head, end retained in hand.

LASSUS, ORLANDUS, ORLANDO DE LASSO (*c.* 1530–94), Belg. composer; b. Mons; chorister in the church of Nicholas; app. director of the choir of the Lateran, Rome, *c.* 1551; master of the court chapel, Munich, 1562–94; prolific composer (over 2000 works), and one of the greatest musicians of the XVI. cent.; masses, sacred motets, madrigals, chansons.

LASWARI, in Alwar, India; scene of Brit. victory over native forces, 1803.

LATACUNGA (0° 56′ S., 78° 26′ W.), town, Ecuador, S. America; subject to earthquakes. Pop. *c.* 10,000.

LATAKIA (35° 53′ N., 35° 46′ E.), port, Syria; produces tobacco of same name, which is extensively used in blending. Pop. *c.* 22,000. See also LAODICEA.

LATAX, Sea Otter, see WEASEL FAMILY.

LATEEN, triangular sail, used in Mediterranean.

LATERAN COUNCILS, held at Rome in the church of St. John Lateran. 1ST, in 1123, confirmed Concordat of Worms; 2ND, in 1139, settled papal schism; 3RD, in 1170, settled conflict between Empire and papacy; declared war against Cathari; 4TH, in 1215, formulated doctrine of transubstantiation. 5TH, in 1517, asserted superiority of pope over councils.

LATERITE, a red-brown earthy deposit occurring on various igneous and schistose rocks, caused by decomposition owing to exposure to natural forces. Most noticeable in tropics, probably owing to greater heat and tropical rains.

LATHE, contrivance by which various materials are 'turned' or polished; worked by means of foot-treadle or mechanical power.

LATIMER, HUGH (1490–1555), Eng. religious reformer; s. of Leicestershire yeoman; ed. at Cambridge; began to preach against ecclesiastical abuses; prohibited by bp. from preaching in diocese of Ely; made royal chaplain by Henry VIII.; became rector of West Kington, Wiltshire, 1531; tried for heresy and imprisoned, 1533, but on king's throwing off papal authority became his adviser; burned during Marian persecution.

LATIN LANGUAGE was the tongue spoken in Rome and in the plains watered by the Tiber in the VI. cent. B.C., but of whose previous existence we have no records. The Lat. language belongs to the so-called *Centum* group of the Indo-European languages. It has prominent features in common with Greek, and a still closer relationship with the Celtic group—viz. Gaelic (Irish and Scots), Manx, the language of ancient

Gaul, Welsh, Cornish, and Breton. Kindred dialects were spoken in the districts bordering on Latium, *e.g.* Umbrian, Oscan, and Sabellian. The Lat. language, like the other Indo-European languages, is synthetic and inflectional. The declensions of nouns in Lat. are 5 in number. There are 2 numbers—singular and plural. Unlike Greek, it has lost the dual, though *duo*, 'two,' and *ambo*,' both,' are relics of the dual number. The cases are nominative, vocative, accusative, genitive, dative, and ablative, with traces also of the old locative. There are 3 genders—masculine, feminine, and neuter. The verb has an active and a passive voice, but no middle, and thus is poorer than the Greek. In moods, too, Lat. is deficient, having no optative, though it retains the indicative, imperative, subjunctive, infinitive, and the participial (incomplete; in active, only present and future; in passive, only past). The present, future, perfect, imperfect, pluperfect, and future-perfect moods are preserved, but the aorist is wanting. Lat., however, has two unique developments of the verb, *i.e.* the gerund and gerundive.

The supremacy of Lat. over the other dialects of Italy was posterior by a considerable period in the supremacy of power. The remains at Pompeii show that the Oscan dialect was not dead there in 79 A.D., the date of the fatal eruption. The various dialects had great influence on the development of the language.

The development of Lat. is usually considered by dividing its history into 5 periods, viz.: (1) *c.* 500–240 B.C. To this period belong our earlier evidences of the written language—mainly inscriptions. Lat. has not yet taken literary form. (2) 240–70 B.C. The Lat. dialect is now becoming victorious over the neighbouring dialects. The Social War resulted in Lat. replacing many dialects. Gk. culture and learning has reached Rome, and its influence has re-shaped Lat. and made it a fit vehicle for literary expression. (3) 70 B.C.–14 A.D., **The Golden Age** of Lat. letters—the age in which prose reached its highest excellence in Cicero's writings, and verse its supreme beauty in Vergil. (4) 14 A.D.–180 A.D., **The Silver Age**, in which the language fast lost its purity. (5) 180 A.D. to the date of the disintegration of Lat. into the Romance languages. This period includes the development of ecclesiastical Lat.

Lat. possesses a lit. of high excellence. Its later development, ecclesiastical Lat., was a cosmopolitan medium in the Middle Ages. It became the parent of the languages of W. Europe. The relation between classical Lat. and the kindred dialects of Italy is important and must be kept in view, for the dialect forms appeared and reappeared in unexpected places. The point of divergence between the spoken form of the language and the literary form was the introduction of Greek models. When the Saturnian metre was superseded by the exotic hexameter the language underwent a corresponding change. Plautus's diction is nearer to the spoken idiom than the language of Ennius, as is natural in comedy. In Cicero the divergence is still more marked. Clause architecture has now reached a high degree of refinement, and the closing cadences have become subject to law. But the dialects and the spoken language counteracted on the literary language. Domestic life introduced words from the vulgar and servile vocabularies. As the area of spoken Lat. increased, the necessary accompaniments of colonisation, peregrine marriages, etc., had their influence. We find Vergil himself accused of making use of *peregrina verba*, and Livy of 'Patavinity.' But on the whole literary Lat. of the Classical Age maintained its independent course.

In the Silver Age the adulteration of the classical idiom by provincial influence is apparent. The percentage of non-classical words in the writings of Apuleius is alarmingly high. Still more apparent is the prevalence of provincial varieties in the writings of the Christian Fathers. But so long as the Empire held together, so long was the permanence of spoken Lat. secure. The fall of the Rom. Empire was accompanied by the disintegration of the language. The heralds of disintegration were the corruption of inflections, the usage of auxiliary verbs, and the appearance of definite and indefinite articles.

The replacement of spoken Lat. in the IX. cent. by Spanish, French, Italian, Rumanian, was almost complete. But though Lat. died as a spoken language, it long survived as a literary language. In the Middle Ages it was the universal language of scholars, and even Gk. thought and civilisation were only disseminated through a Lat. medium. The theology, philosophy, law, and science of the civilised world were expressed in Lat. Nor did the Renaissance with its revival of Gk. letters crush the marvellous vitality of the language. Till the reign of Louis XIV. it was the language of diplomacy, and Newton wrote his *Principia* in Lat. It still lingers in documents, mottoes, and inscriptions, and in the services of the Church of Rome.

Lat. cannot be compared in versatility with Greek. Its poverty in particles and verb forms makes it incapable of expressing the delicate shades of meaning so characteristic of the subtlety of Gk. thought. But it is a language of inimitable solemnity, lucidity, and precision, and, when its unpromising beginning is considered, its influence and development are marvellous.

LATIN LITERATURE developed on lines directly opposed to those along which the lit. of Greece evolved. Lat. lit. was shaped according to imported models; Gk. lit. was a spontaneous growth. The various species of Lat. composition arose according to no law; the various species of Gk. composition arose according to a natural order. The making of Lat. lit. was Gk. culture; the making of Gk. lit. was Gk. creative genius.

The capture of Tarentum (272 B.C.) is the great landmark in the history of Rom. letters. The imported Gk. slaves began to create a new lit. at Rome in imitation of the Gk. masterpieces. Previously, however, there had been the seeds of an indigenous lit. in the Lat. tongue. Inscriptions on busts and tombs were the beginnings of Lat. prose. The Songs of the Fratres Arvales and other land charms were a rude form of verse. Saturnian verse, a native metre, was employed in hymns to the gods and in the Fescennine verses sung at harvest festivals. Lastly, the dramatic *Saturæ*, a medley on all topics, with a strong vein of satire, were the origin of that purely Rom. product—Satire.

The history of Lat. lit. opens with the name of Livius Andronicus, a Gk. slave from Tarentum, brought to Rome, 275 B.C. He translated the *Odyssey* into Saturnian verse, and also translated some Gk. tragedies and comedies into Lat. But the father of native Rom. poetry was really Nævius. His *Bellum Punicum* paved the way for the great epics of Ennius and Vergil. The comedies of Plautus are vigorous performances based on the new comedy of Athens, but their originality in spirit and humour is undeniable. Ennius, the author of the epic called the *Annales*, took a great step in the history of Lat. prosodic development. His poem was written in Lat. hexameters and not in Saturnian metre, like the epic of Nævius. Vergil borrowed freely from the *Annales*. Cicero's poetry was Alexandrian in theme and treatment; it belongs to a school that preferred the recondite to the simple, the learned to the natural. The *De Rerum Natura* of Lucretius is difficult to classify. It is didactic and philosophical in theme, and shows the influence of the Alexandrian school, but it is fired by a genuine passion that lifts it far above all contemporary writing and places it among the masterpieces of the world.

Meantime Lat. prose has been advancing in the hands of Cæsar, Sallust, and Varro, but to Cicero belongs the crown of excellence. His prose is a model of style for all time and for writers in all languages. A poet contemporaneous with Lucretius, but of very different temperament, is Catullus. Catullus is essentially a lyric poet, and a lyric poet of the first order.

The influence of the Imperial policy of Augustus on Lat. letters is inestimable. As in the institutions of Rome so in other lit. the new era marked a complete

reversal of the old traditions. The imperial patronage fostered and directed the poet's talents. Thus the *Æneid* of Vergil set a halo upon the new administration and traced the new order to the inconvertible decrees of the gods. Horace did for Augustus in lyric what Vergil did in epic. The Augustan age is the golden age of Rom. lit., but in it lay the seeds of dissolution.

The age that followed produced great writers like Tibullus, Propertius, Ovid, and Livy, but style is becoming foremost and matter secondary—the age of rhetoric is at hand, the age that produced wooden poets like Statius, Lucan, and Seneca, and whose only possible greatness lay in satire such as Juvenal's and invective such as Tacitus's.

LATITUDE of a place is its angular distance from the equator, measured north or south along a meridian. It is found by an observation of altitude of sun at noon, and a reference to Nautical Almanac for sun's distance from celestial equator on that day. Length of degree of l. is a little greater at the poles than at equator; average value, nearly 69½ miles.

LATIUM, district round ancient Rome; bounded N. by Etruria, E. by Samnium, S. by the Liris, W. by the Tyrrhenian Sea; c. 370 B.C. 30 towns belonged to the LATIN LEAGUE, which was shortly afterwards dissolved by Rome (*q.v.*). The *Latini*, akin to the Romans racially, helped to form the *plebs* of Rome.

LATREILLE, PIERRE-ANDRÉ (1762–1833), Fr. zoologist; student, especially of Invertebrates.

LATS, see ARCHITECTURE, INDIAN.

LATTER-DAY SAINTS, see MORMONS.

LATUDE, JEAN HENRI (1725–1805), Fr. adventurer; imprisoned in Bastille on incurring disfavour of Mme de Pompadour.

LAUBAN (51° 7′ N., 15° 17′ E.), town, Pruss. Silesia, Germany; textiles, beer. Pop. 15,000.

LAUBE, HEINRICH (1806–84), Ger. dramatist; wrote *Das Neue Gahrhundert* (essays), *Das junge Europa* (novel), *Graf Essex* (drama), *Die Karlsschüler* (comedy), etc.

LAUCHSTÄDT (51° 24′ N., 11° 52′ E.), town, Pruss. Saxony, Germany. Pop. 3000.

LAUD, WILLIAM (1573–1645), Eng. abp.; ed. at Oxford; in 1611 made pres. of St. John's Coll. there, and dean of Gloucester, 1616, where he gave offence by removing the communion table to the east end; bp. of St. David's, 1621; and on accession of Charles I. did all in his power to crush the Puritan party; chancellor of Oxford Univ., 1629, where he did much good work for learning and discipline; abp. of Canterbury, 1633; supported absolutism of Charles I. in Church and State; impeached, 1640, and after being kept in prison executed. L. was a man with many good qualities, but narrow-minded and bent at all costs on maintaining outward uniformity (for pure theol. he cared not so much), and failed to understand the temper of his time.

Simpkinson, *Life and Times of Laud* (1894); Bell, *Laud and Priestly Government* (1907).

LAUDANUM (*Tinctura opii*), preparation of opium in equal parts of alcohol and water, the proportion of opium being 1 in 13½ or 1 gr. in 15 minims, the usual dose being 5 to 15 minims for repeated, 20 to 30 minims for single, dose; is a valuable method of giving OPIUM (*q.v.*).

LAUDER (55° 44′ N., 2° 46′ W.), town, Berwickshire, Scotland. James III.'s favourites executed here, 1483.

LAUDERDALE, JOHN MAITLAND, DUKE OF (1616–82); b. at Lethington; originally a Covenanter, subsequently became loyalist; taken prisoner at Worcester, 1651; app. Sec. of State by Charles II., 1660; maintained great influence over king; put down Covenanters; member of *Cabal* Ministry; duke, 1672; attacked by Commons and Scots, but retained position till 1680, when he resigned.

LAUENBURG (*c.* 53° 32′ N., 10° 40′ E.), duchy, Schleswig-Holstein, Germany. After various vicissitudes, L. was ceded to Prussia and Austria by Denmark in 1864, Prussia obtaining complete possession in 1865. Area, 455 sq. miles. Pop. *c.* 56,000.

LAUGHING GAS (N_2O), nitrous oxide; see NITROGEN.

LAUGHTER, complex bodily expression which generally accompanies joy, mirth, and consciousness of anything comic, but may accompany other emotions when there is a sudden release from severe tension, and may be produced by tickling.

LAUNCES, see SAND-EELS.

LAUNCESTON.—(1) (50° 48′ N., 4° 21′ W.) town, Cornwall, England; remains of old walls and Augustinian priory; ruined castle, scene of several sieges during Civil War; here George Fox was immured, 1656. Pop. (1911) 4117. (2) (41° 26′ S., 147° 7′ E.) town, Tasmania; commercial centre. Pop. 19,000.

LAUNDRY, place for washing and 'getting up' clothes; processes include washing, boiling, rinsing, blueing, drying by hydro-extractors and dry air, starching, and ironing.

LAURAHÜTTE (50° 18′ N., 19° E.), town, Pruss. Silesia, Germany. Pop. (1910) 16,118.

LAUREATE, a word used to signify eminent in one of the arts; the laurel in ancient times being associated with Apollo. Poet Laureate is the poet attached to the royal household.

LAUREL, or sweet bay (*Laurus nobilis*), an evergreen shrub indigenous to Mediterranean region, and commonly cultivated in Eng. gardens. The leaves, which are glossy, and leathery in texture, contain hydrocyanic acid, causing a characteristic smell of bitter almonds when crushed. The flowers are small and yellow, and produce purple berries which are used in veterinary med.

LAURENS, HENRY (1724–92), Amer. politician; pres. of Continental Congress, Philadelphia, 1777–78; imprisoned in England, 1780–81; peace commissioner, 1782.—JOHN L. (1754–82), his s.; on Washington's staff; distinguished at Germantown, Coosahatchie, Savannah, Charleston.

LAURENTIAN SYSTEM, ARCHÆAN SYSTEM; see GEOLOGY.

LAURIA, LORIA (40° 1′ N., 15° 48′ E.), walled town, Italy. Pop. 11,000.

LAURIA, ROGER DE, LURIA, or LORIA (d. 1305), Span. admiral; on outbreak of Sicilian Vespers went to Sicily with Peter III. of Aragon, who app. him commander of fleet; defeated Anjevines, 1283, 1284; gained brilliant victories off Catalonian coast, 1285, routing French near Hormigas and at Rosas.

LAURIER, SIR WILFRID (1841–), Canadian statesman of Fr. extraction; b. at St. Lin, Quebec; called to Bar, 1864; entered Quebec legislature, 1871; member of Dominion House of Commons, 1874; Inland Revenue Minister, 1877; represented Quebec from 1878; became leader of Liberal party, 1887; Prime Minister, 1896–1911. Administration marked by introduction of preferential tariff, 1897, in favour of Brit. goods; by Canadian support in South African War, 1899–1902; and by great advance in prosperity of Canada; opposed grant of three Dreadnoughts to Britain, 1913; fine bilingual orator. Willison, *Sir W. Laurier and the Liberal Party* (1903).

LAURIUM.—(1) (*c.* 37° 50′ N., 23° 50′ E.) town, Greece; silver mines. Pop. 10,500. (2) (47° 15′ N., 88° 8′ W.) town, Michigan, U.S.A.; copper mines. Pop. 7653.

LAURVIK (59° 4′ N., 10° 5′ E.), port, Norway; shipbuilding. Pop. (1910) 10,151.

LAUSANNE (46° 31′ N., 6° 38′ E.), town, Switzerland; capital of Vaud Canton, near Mont Jurat, 1690 ft. above sea-level, overlooking Lake of Geneva; fine cathedral (built 1235–75), library, art gallery, also supreme court of appeal for Swiss Federation; machinery, leather, chocolate; long the home of Gibbon; educational centre. Pop.—mostly French-speaking and Prot.—(1910) 63,926. Gribble, *Lausanne* (1909).

LAUSANNE, PEACE OF, see ITALY (HISTORY).

LAUZUN, DUC DE, ANTONIN NOMPAR DE CAU-

MONT, MARQUIS DE PUYGIULHEM (1632–1723), Fr. courtier and soldier; favourite of Louis XIV.; imprisoned, 1671–81; subsequently went to England; commanded Brest expedition, 1689.

LAVABO (Lat. 'I will wash'), used in Catholic Church of priest washing his hands at Mass.

LAVAGNA.—(1) (44° 18′ N., 9° 21′ E.) port, Liguria, Italy. Pop. 7400. (2) (45° 27′ N., 9° 26′ E.) town, Lombardy, Italy.

LAVAL (48° 4′ N., 0° 46′ W.), town, Mayenne, France; episcopal see; cathedral dates in part from XII. cent.; old ducal castle; formerly fortified. Manufactures textiles; marble quarries. Pop. (1911) 30,252.

LAVATER, JOHANN KASPAR (1741–1801), Ger. poet and writer on physiognomy; his great work on physiognomy (4 vols., 1775–78) occasioned much discussion, but was praised by Goethe.

LAVAUR (43° 43′ N., 1° 49′ E.), cathedral town, Tarn, France. Pop. 6500.

LAVELEYE, ÉMILE LOUIS VICTOR DE (1822–92), prof. of Political Economy at Liège, 1866; wrote works on economics and other subjects.

LAVENDER (*Lavandula vera*), a member of the Labiatæ; of shrubby habit, with pale, bluish flowers possessing a characteristic and exquisite odour, and prolific in honey; blooms, on distillation, yield oil of L., which is used in perfumery and in painting; often dried, and placed in packets for the linen press, or used in making potpourri.

LAVIGERIE, CHARLES MARTIAL ALLEMAND (1825–92), Catholic prelate; abp. of Algiers, 1866, devoting himself to work among Muhammadans; supported papal infallibility; latterly reconciled to Fr. Republic.

LAVINIUM (41° 40′ N., 12° 28′ E.), ancient town, Latium, Italy; traditionally founded by Æneas, near site of Laurentum, with which it was united as Lauro-Lavinium, under Trajan; remains include necropolis. On site is modern Pratica.

LAVISSE, ERNEST (1842–), Fr. historian; prof., Modern History, Sorbonne, 1888; Member of Academy; edit. and wrote part of *Histoire de France* (1901–); wrote *Trois Empereurs d'Allemagne.*

LAVOISIER, ANTOINE LAURENT (1743–94), Fr. chemist; laid the foundations of quantitative chem. by use of balance; proved indestructibility of matter, and that water is not turned into earth by heating, but that heated sulphur, phosphorus, and tin gain by absorption of air; employed Priestley's discovery of oxygen, and Cavendish's of the compound nature of water to overthrow phlogiston theory, and establish true theory of combustion; showed nature of diamond, introduced system of chemical classification and nomenclature; served Fr. State as *Fermier-général* (tax collector); commissioner for gunpowder, and for weights and measures, and on Committee of Agriculture; executed by Revolutionists.

Grimaux, *Life of L.* (1888).

LAW, see under ROME and various States.

LAW, JOHN (1671–1729), financier; b. Edinburgh; led a wild youth; imprisoned for slaying his antagonist in a duel; went to Holland, and became interested in finance; served in France under the Regent, 1715, and propounded a vast scheme to get the country out of financial difficulties. A bank was formed, of which L. became director, and company was formed to do trade with the Indies. A tremendous boom resulted, during which too many shares were issued, prices rose, and a crash came, 1720, when L., who had been popular, became detested. He left France, and d. in poverty. He had great financial ability, but one or two great mistakes brought about his failure.

Life, by Wiston-Glynn (1908).

LAW, WILLIAM (1686–1761), Eng. theologian; taught in Cambridge, but refused to take oath to George I., becoming a 'non-juror'; author of the *Serious Call,* and other works from High Church standpoint; a notable mystic. Whyte, *Characters and Characteristics of William Law* (1893).

LAWES, HENRY (1595–1662), Eng. musician; wrote music of Milton's *Comus.*

LAWES, SIR JOHN BENNET, Bart. (1814–1900); Eng. agriculturist; founder and endower of Rothamsted experimental farm.

LAWN-TENNIS, modern form of Tennis (*q.v.*), introduced *c.* 1875; played on grass or artificial courts, generally in open air, though play in winter is carried on in covered courts. Similar to tennis in mode of scoring, it is played with balls and racquets; balls must measure 2½ in. in diameter and weigh 1⅞ to 2 oz.; there are no standard measurements for racquets, which are oval in shape and vary from 13 to 17 oz. in weight according to wrist-strength of player. There are two varieties of the game, 'singles' for two, and 'doubles' for four players; in the first case the court is 78 ft. by 27 ft., with a serving-court 27 ft. in length on either side of the net; in the second the breadth is increased by 9 ft. while the serving-court remains the same. The net, which is stretched across the middle of the court, is 3 ft. 6 in. at supporting-posts, and 3 ft. at centre of court.

The 'server,' who opens play in each game, must deliver ball in opposite serving-court; two strokes are allowed; thereafter play within enclosing lines is open, and stroke is terminated when one side hits ball into net or outside the court. The service changes with every game. The fast overhand serve is nowadays the most popular form of service, and the higher the serve is, the faster the delivery. All England Champion, 1912, A. F. Wilding; Amer. Champion 1912, M. E. McLoughlin.

Vaile, *Modern Lawn-Tennis* (1907); Heathcote and others, *Tennis and Lawn-Tennis, etc.* (4th ed., 1897).

LAWRENCE.—(1) (39° N., 95° 14′ W.) town, Kansas, U.S.A.; site of state univ.; manufactures flour, machinery, furniture; an anti-slavery centre in Civil War. Pop. (1910) 12,374. (2) (42° 39′ N., 71° 10′ W.) town, Massachusetts, U.S.A.; manufactures cottons, woollens, paper, machinery, engines. Pop. (1910) 85,892.

LAWRENCE, ABBOTT (1792–1855), Amer. diplomatist; acquired great wealth in business with his bro. Amos; several years member of Congress; minister to England, 1849.

LAWRENCE, AMOS ADAMS (1814–86), Amer. financier; founder of L. Coll., Appleton, Wisconsin, and of L. City, Kansas; opposed revolt of South. His s., **William L.** (1850–), is Protestant Episcopal bp. of Massachusetts.

LAWRENCE, JOHN LAIRD MAIR, 1ST BARON L. (1811–79), Eng. administrator; younger s. of Lieut.-Col. Alexander L., who served in Mysore campaign, 1790, and capture of Seringapatam, 1799, and younger bro. of Sir Henry L. (*q.v.*), hero of Lucknow; on annexation of Punjab, 1849, became commissioner, and subsequently lieut.-gov., and won devotion of untamable Sikhs; loyalty of Punjab proved salvation of British at outbreak of Mutiny; troops sent by L. relieved important garrisons; received annual pension of £1000 as reward; baronet, 1858; P.C., 1859; Gov.-Gen. of India, 1863, and received annual pension of £2000 from East India Company; baron, 1869.

Life, by Smith (1883), Sir R. Temple (1889).

LAWRENCE, ST., river, see ST. LAWRENCE.

LAWRENCE, SIR HENRY MONTGOMERY (1806–57), Brit. soldier and politician; joined Bengal artillery, 1823; served in first Burmese War, 1824–26; first Afghan War, 1838; reduced Kaithal; established several military asylums in India; served in Sikh War, 1845–48; administrator in Punjab, 1849; fortified Lucknow in Mutiny; killed at beginning of siege.

Life, by Sir C. Aitchison (1892).

LAWRENCE, SIR THOMAS (1769–1830), Eng. painter; became famous in boyhood; succeeded Reynolds as limner to the king, and had a greater vogue than any portrait painter of his time; pres., Royal Academy, 1820; among his famous portraits is *Countess of Derby.*

LAWRENCE, STRINGER (1697–1775), Eng. general; served in India under Clive; called 'The father of the Indian Army.'

LAWRENCEBURG (39° 3′ N., 84° 52′ W.), town, Indiana, U.S.A. Pop. (1910) 3930.

LAWSON, SIR WILFRID, Bart. (1829–1906), Brit. politician; M.P., 1859; introduced Permissive Bill concerning sale of intoxicating liquors, 1864; opposed Boer War; pres. of United Kingdom Alliance; had reputation as wit.

G. W. E. Russell, *Memoir* (1909).

LAYAMON, Eng. poet of XII. cent., was a priest at Emley on the Severn. His *Brut* (British History), a work founded on the writings of Bede, 'St. Albin,' 'Austin,' and Wace, is of great importance prosodically as transition between O.E. and Eng. prosody; lines with O.E. alliteration and trochaic cadence alternate with iambic rhyming lines.

LAYARD, SIR AUSTEN HENRY (1817–94), Brit. archæologist and politician; b. Paris; conducted important excavations at Nimrud in 1845; pub. *Nineveh and its Remains* and *Monuments of Nineveh*. Became M.P. for Aylesbury (1852), and later Chief Commissioner of Works.

LAYMEN, HOUSES OF, Anglican assemblies in provinces of Canterbury and York.

LAZARISTS, VINCENTIANS, 'Congregation of Priests of the Mission,' R.C. Order, founded at St. Lazare, Paris, by St. Vincent de Paul for teaching of lower classes, 1624; now number *c.* 3000.

LAZARUS.—(1) In *John* 11^{12}, raised by Christ from the dead; (2) in *Luke* 16^{20}, in parable of Dives and Lazarus.

LAZARUS, MORITZ (1824–1903), Hebrew philosopher; prof., Berlin, 1873; emphasised importance of psychology and sociology.

LE BLANC (46° 38′ N., 1° 4′ E.), town, Indre, France. Pop. 5000.

LE BRUN, CHARLES (1619–90), Fr. painter; patronised by Louis XIV., who employed him for the decoration of the palace of Versailles.

LE CATEAU, CATEAU CAMBRÉSIS (50° 4′ N., 3° 22′ E.), town, Nord, France; peace concluded here between England, France, and Spain, 1559. Pop. 11,000.

LE CHAMBON, LE CHAMBON-FENGEROLLES (45° 23′ N., 4° 20′ E.), town, Loire, France; coal. Pop. 12,500.

LE CLERC, JEAN (1657–1736), Fr. Prot. theologian; preached at Saumur and London; prof. at Amsterdam, 1684–1712; wrote various works on Biblical criticism, in advance of his time.

LE CREUSOT (46° 48′ N., 4° 25′ E.), town, Saône-et-Loire, France; coal, iron. Pop. (1911) 35,587.

LE DAIM, OLIVIER, barber and confidant of Louis XI. of France; detested by populace; executed after Louis's death; appears in Sir W. Scott's *Quentin Durward*.

LE HAVRE, see HAVRE.

LE MANS (48° N., 0° 11′ E.), town, Sarthe, France; has remains of Rom. walls; episcopal see; fine cathedral dating in part from XI. cent., site of former abbey. Manufactures tobacco, machinery. Here Prussians defeated French in a two days' battle, 1871. Pop. (1911) 69,361.

LE MARCHANT, JOHN GASPARD (1766–1812), Eng. soldier; first lieut.-gov., Sandhurst; commanded cavalry brigade with distinction in Peninsular War; killed, Salamanca.

LE PELETIER, DE SAINT-FARGEAU LOUIS MICHEL (1760–93), Fr. revolutionary; murdered by a royalist for voting for execution of Louis XVI.

LE PUY, LE PUY EN VELAY (45° 2′ N., 3° 53′ E.), town, Haute-Loire, France; episcopal see; has XII.-cent. Romanesque cathedral and XI.-cent. baptistery; manufactures thread and guipure lace, textiles, chocolate, spirits; formerly fortified. Pop. 22,000.

LE SAGE, ALAIN RENÉ (1668–1747), Fr. author; b. in Brittany, and in youth employed on farm; for forty years fought against poverty, translating and doing other work, but, above all, making observations; published *Crispin rival de son maître*, a little play in prose, 1707; *Le Diable boiteux*, which won him fame, 1707; *Turcaret* (1709), a severe satire on financiers, who endeavoured to stop its production, but Le Sage was under protection of the Dauphin. His novel, *Gil Blas* (1715–35), great comic masterpiece, setting of which is in Spain, belongs to all times and all countries.

LE SUEUR, EUSTACHE (1617–55), one of the founders of the Fr. Academy of Painting; executed many religious and mythological pictures, of which the Louvre possesses 47 specimens.

LE TRÉPORT (50° 3′ N., 1° 22′ E.), town, Seine-Inférieure, N. France; shipbuilding, fisheries. Pop. 5000.

LEA, HENRY CHARLES (1825–1909), Amer. author; wrote several works on the history of the Inquisition and allied subjects.

LEAD (Pb=207), a metal of blue-grey colour having a strong metallic lustre when newly cut, which, however, soon dulls when exposed to the action of air; S.G. 11·38; M.P. 350° F. L. is one of the metals known in very early times; mention of it, for instance, is found in the *Book of Job* 19^{24}, while the Romans used it for water pipes, tanks, weights, and rings. L. is very soft—it can be scratched with the nail—flexible, ductile, and non-elastic. It is abundant and widely distributed, but is chiefly obtained from U.S.A. where the Colorado and Nevada l. mines find work for hundreds. Here it occurs in its virgin state. It is, however, often obtained from galena, or sulphide of l. found in veins on many parts of Europe. It is of great commercial value, being used for a variety of purposes, including gas and water pipes and roofing. Two parts l. and one part tin forms a soft solder, used by whitesmiths and others. Four parts tin and one part l. forms pewter, formerly used largely for making jugs, pint pots, etc. L. is also used for making type metal. L. has four oxides, viz. sub-oxide (Pb_2O), grey-blue colour; protoxide, or yellow oxide (PbO), also known as massicot; red oxide (Pb_3O_4), or red lead; dioxide (PbO_2), or brown oxide. Red l. and white l. are used by plumbers and painters, while sugar of l. is used medicinally and chemically. Protoxide is used for glazing earthenware and porcelain, and carbonate of l. is the foundation of white oil paint.

Lead-Poisoning, PLUMBISM, may be due to an occupation involving the handling of lead—white lead and red lead workers, lead smelters, painters, compositors, etc.—by drinking contaminated water or other beverages, or by women taking lead to procure abortion. There is anæmia, a dull tint of the skin, bad taste in the mouth with offensive breath and blue line on the gums, pains and tingling in the joints and muscles. *Lead colic* consists in sudden abdominal pain in the region of the umbilicus, slow pulse, and constipation. *Lead palsy* usually takes the form of *wrist-drop*, or there may be paralysis of the upper arm or leg, accompanied by wasting. The poisoning may produce brain disturbances, convulsions, delirium, and coma, death ensuing suddenly, or melancholia and delusions. The treatment is to remove the cause by removing the individual from his work, etc., and the various symptoms should be treated—morphia and fomentations for the colic, iron for anæmia, electricity and massage for the paralysis, and so on, and, on improvement, iodide of potassium to make the lead in the tissues soluble so that it may be gradually eliminated. Scrupulous cleanliness is the best preventive.

LEAD (44° 20′ N., 104° W.), town, S. Dakota, U.S.A.; gold mine. Pop. (1910) 8392.

LEADHILLS (55° 26′ N., 3° 45′ W.), village, Lanarkshire, Scotland; Allan Ramsay's birthplace. Mines yield *c.* 1000 tons of lead annually.

LEADVILLE (39° 12′ N., 106° 18′ W.), town, Colorado, U.S.A.; mining centre; smelting and refining

of lead and silver ore; gold, copper, manganese also found. Pop. (1910) 7508.

LEAF, typically a thin, green expanded structure, borne on the stem and performing three main functions, namely, transpiration, assimilation, and respiration. The first of these is the giving off as vapour of the surplus water absorbed by the roots, the second the absorption of carbon dioxide from the atmosphere, the oxygen being liberated and the carbon being utilised in the building up of organic materials (starch, oils, sugar), whilst the third is the absorption of oxygen and the liberation of carbon dioxide. The l. is bounded by an epidermis, usually cuticularised, and containing minute pores, or stomata, through which gaseous exchange with the atmosphere occurs. The internal tissues consist of a mass of green cells, the mesophyll, often differentiated into palisade and spongy parenchyma, the latter of which is provided with abundant air-spaces. This tissue is traversed and supported by veins, or conducting strands, which, in monocotyledons form a parallel, closed system, and in dicotyledons a reticulate open system. Although some leaves (*e.g.* grasses) are stalkless, the majority possess a definite petiole by means of which they are attached to the stem, the point of attachment being termed the node.

In many leaves the base of the petiole bears two expansions, the stipules, which may function as accessory leaves (hawthorn, viola, Leguminosæ), or be modified as spines (acacia, robinia), tendrils (smilax), or as bud-scales (lime, magnolia). Leaves are inserted on the stem in a definite and regular manner, some species possessing whorled leaves (balsam), others opposite (Labiatæ, sycamore), or alternate (lime, elm), and this arrangement is termed *phyllotaxy*. Where the leaves spring from a very short stem, forming a rosette, as in the daisy and plantain, they are said to be radical leaves. They are also grouped and folded in the leaf-bud in various characteristic ways, this being termed the *vernation* of the leaf. The shape of the blade in different plants is very variable as each may consist of a single coherent structure, when it is termed simple (oak, beech, lily), or may consist of two, three, or more separate leaflets arranged pinnately, as in the ash, or palmately, as in the horse-chestnut, when they are said to be *compound*. Although leaves have been given various names according to their shapes, they all conform ultimately to certain geometrical plans, a feature recognised as long ago as the XVII. cent., by Nehemiah Grew.

For modifications see under PITCHER-PLANTS, SUNDEW, VENUS' FLY-TRAP, etc. Lubbock's *Flowers, Fruits, and Leaves*.

LEAF-CUTTER BEES (*Megachile*), solitary bees which line their nests, in trees, walls, or in the ground, with discs cut from leaves, especially of rose bushes.

LEAF INSECTS AND STICK INSECTS (*Phasmidæ*), a family of Orthoptera, with about 600 species, which have bodies, limbs, and wing-covers (where present) resembling bare twigs or leaves. They subsist upon leaves and are nocturnal in habit. Tropical and subtropical, especially Australian, but four or five kinds have been found in Europe.

LEAF WORMS, see TURBELLARIAN WORMS.

LEAKE, WILLIAM MARTIN (1777–1860), Brit. antiquary; lieut.-colonel in the army; noted for topographical works on Greece and Levantine countries.

LEAMINGTON (52° 17′ N., 1° 31′ W.), town and health-resort, Warwickshire, England; mineral springs; manufactures cooking ranges. Pop. (1911) 26,717.

LEANDER, see HERO AND LEANDER.

LEAP YEAR, see CALENDAR.

LEAR, EDWARD (1812–88), Eng. artist and writer; exhibited at the Royal Academy from 1850 to 1873, and wrote several illustrated books; best known for his *Book of Nonsense*, 1846.

LEARNED SOCIETIES, see SOCIETIES, LEARNED.

LEATHER, tanned hides of animals. Skin is composed of two parts, the *epidermis* or upper skin (valueless in l. manufacture) and the *dermis* or *corium*, which is covered with gelatine. Hides are first scraped and then soaked for two weeks in lime-water; the loosened hair is removed by scraping. Hides for soft leathers are subsequently treated with fermented excrement of birds and dogs, or by 'erodin,' its chemical equivalent. **Tanning** is the next process. Tannin is a vegetable product, usually taken from oak bark or hemlock; in rough l. tanning oak bark, chestnut, and Valonia are used. The butts (hides with thin parts removed) are suspended in vats of weak solution, and progress gradually to vats containing stronger solutions. The butts are moved gently by machinery. After 8–10 days they are laid flat in 'handlers,' *i.e.* pits in which they are handled daily. In a few weeks they are 'dusted' with drying powder. Heavy l. is 'curried,' *i.e.* treated with fat and oil, and is used for belting, harness, etc. Sole l. is stretched and rolled. *Patent l.* is finished with linseed oil, umber, lamp-black, varnishing, and pumicing. Kid is made from lamb-skin, *chamois l.* from sheep-skin.

LEATHERHEAD (51° 18′ N., 0° 20′ W.), town, Surrey, England; beer, bricks. Pop. (1911) 5491.

LEATHER-JACKET, see TRIGGER-FISHES.

LEAVENWORTH (39° 24′ N., 95° W.), town, Kansas, U.S.A.; commercial and railway centre; manufactures machinery, iron goods, flour, furniture; has coal mines. R.C. episcopal see; has cathedral. To N. is Fort L., a military post constructed, 1827, by Col. Leavenworth. Pop. (1910) 19,363.

LEBANON (*c.* 33° 55′ N., 35° 50′ E.), two parallel mountain ranges in Syria, N. of Palestine; name is of Semitic derivation, and signifies white, in reference to the white rocks, of chalk and limestone formation, of which the mountains are principally composed. The two ranges are: Lebanon on the W., nearest the coast, which is the higher of the two, reaching an extreme elevation of 10,018 ft. in Zahr-el-Kazib; and Anti-Libanus on the E., of which the culminating point is Tal'at Musa (8720 ft.), unless the outlying Mt. Hermon (*q.v.*) be included, which reaches height of *c.* 9200 ft. Between the two ranges stretches the plain of Buka'a or Cœle-Syria, which is drained by the Litany and El-Asi (the ancient Leontes and Orontes) and other streams. The cedars of L., famous in Solomon's time, are now found only in certain districts. In alpine district are low bushes, junipers, etc.; forests of cypress, pine, oak occur on higher slopes, and rhododendrons abound; vines, olives, mulberries in lower regions. Produces cereals, tobacco, silk, honey, coal. Inhabitants include Maronites, Druses, Muhammadans, Christians. The vilayet of L. has area of 1190 sq. miles; administered by Christian governor, who is under protection of European powers and in service of Porte. Pop. *c.* 200,000.

LEBANON.—(1) (38° 35′ N., 89° 50′ W.) town, Illinois, U.S.A. Pop. (1910) 1907. (2) (40° 17′ N., 76° 30′ W.) town, Pennsylvania, U.S.A.; iron mines. Pop. (1910) 19,240.

LEBER, JEAN MICHEL CONSTANT (1780–1859), Fr. historian; wrote essays on economic history, and other treatises.

LEBRIJA, LEBRIXA (36° 55′ N., 6° 4′ W.), town, Seville, Spain; ruined castle. Pop. (1900) 10,500.

LECCE.—(1) (40° 22′ N., 18° 9′ E.) town, L. province, Apulia, Italy; seat of abp.; cathedral; formerly fortified. Pop. (1911) 36,310. (2) (41° 55′ N., 13° 41′ E.) town, Abruzzi, Italy.

LECCO (45° 51′ N., 9° 24′ E.), town, Lombardy, Italy; iron manufactures, copper and brass works. Pop. 10,500.

LECH (48° 10′ N., 10° 53′ E.), river, Bavaria, Germany; enters Danube.

LECKY, WILLIAM EDWARD HARTPOLE (1838–1903), Irish historical writer; b. near Dublin; M.P., 1895; P.C., 1897; wrote *A History of England in the Eighteenth Century*, *Democracy*, and other well-known hist. works.

LECONTE DE LISLE, CHARLES MARIE RENÉ (1823–93), Fr. poet; b. at St. Paul, Réunion; translated classical authors, and wrote poems in new style of the *Parnassiens*; fervour of generation of Victor Hugo replaced by great delicacy and effect of coldness of emotion.

LECOUVREUR, ADRIENNE (1692–1730), famous Fr. tragic actress.

LECTIONARY (Latin *lectio*, 'reading'), term applied to a volume, particularly of Scripture, arranged for reading selected passages; also to the list or system of passages to be read: thus the l. of Scripture for the Anglican Church is printed at the beginning of the Prayer Book.

LECTISTERNIUM, a very ancient ceremony of the Rom. people, and only celebrated at times of great danger, *e.g.* after the disaster at Cannæ couches were spread for the gods and goddesses in pairs, and near the couches feasts were spread.

LECTOURE (43° 56′ N., 0° 39′ E.), town, S.W. France; site of former monastery; interesting old church. Pop. 4500.

LEDBURY (52° 2′ N., 2° 25′ W.), town, Herefordshire, England; old hospital, established 1232. Pop. (1911) 3558.

LEDOCHOWSKI, MIECISLAUS JOHANN, COUNT (1822–1902), abp. of Gnesen, Posen, 1865; led anti-Pruss. movement, and imprisoned, 1874; left country, 1876; lived in Rome.

LEDRU-ROLLIN, ALEXANDRE AUGUSTE (1807–74), Fr. politician and writer; agitated for democratic revolution and became minister of Interior in provisional government, 1848; in exile, 1849–70; pub. *Décadence de l'Angleterre*, 1850.

LEDYARD, JOHN (1751–89), Amer. explorer; served under Captain Cook, 1776; walked across Europe and Asia, 1787.

LEE (42° 23′ N., 73° 16′ W.), town, Massachusetts, U.S.A.; manufactures paper; marble quarries. Pop. (1910) 4106.

LEE, ARTHUR (1740–92), Amer. diplomat; member of Commission to arrange treaty with France, 1776; Commissioner to Spain, 1777; opposed constitution.

LEE, FITZHUGH (1835–1905), Amer. Confederate general in Civil War; served in Virginia; gov. of Virginia, 1886; later served against Spain.

LEE, FRANCIS LIGHTFOOT (1734–97), Amer. politician; member of committee drafting Confederation Articles.

LEE, RICHARD HENRY (1732–94), Amer. politician; bro. of preceding; prominent in opposition to Britain; member of Congress, 1774–80, 1784–87; subsequently senator.

LEE, ROBERT EDWARD (1807–70), Amer. Confederate general in Civil War; commanded N. Virginian army, 1862; defeated Federals under Pope; invaded Maryland; won battles of Fredericksburg and Chancellorsville; defeated at Gettysburg; opposed to Grant, 1864; ultimately defeated.

Adam, *Life of General Robert E. Lee* (1905).

LEE, SIR SIDNEY (1859–), Eng. literary historian and critic; b. London; ed. Oxford; editor of *Dictionary of National Biography*, 1890–91; works include *Life of Shakespeare*, 1898; *Elizabethan Sonnets*, 1904; *Life of Queen Victoria*, 1902.

LEE, STEPHEN DILL (1833–1908), Amer. soldier and politician; fought for S. States in Civil War.

LEE, WILLIAM (1739–95), bro. of Richard Henry L.; planned commercial treaty with Netherlands.

LEECH, JOHN (1817–64), Eng. caricaturist; fellow-pupil with Thackeray at Charterhouse; studied med.; contributed to *Punch*, with which his name is inseparably connected.

Life, by Frith (2 vols., 1891), Brown (1882).

LEECHES, HIRUDINEA or DISCOPHORA, a class of segmented worms, with long flattened bodeis usually without setæ but bearing a sucker for adhesion at each end of the body. A few live in the sea, *e.g.* the Skate-Sucker or Rock-Leech (*Pontobdella*), but most in fresh water, as the Medicinal Leech (*Hirudo*) used in blood-letting, or on land, as the pestilent Land-Leeches (*Hæmadipsa*) of tropical countries.

LEEDS (53° 48′ N., 1° 32′ W.), town, Yorkshire, England; seat of univ. (founded, 1904); R.C. episcopal see; has annual musical festival; great centre of woollen manufacture in England, and probably greatest woollen cloth mart in world; other manufactures are leather, boots, engines, machinery, chemicals, paper, silk. Connected by canal with Liverpool. L. is parliamentary borough, returning five M.P.'s. In vicinity are remains of Kirkstall Abbey. Pop. (1911) 445,568.

LEEDS, THOMAS OSBORNE, 1ST DUKE OF (1631–1712), Brit. statesman; also known as EARL OF DANBY; M.P., 1665; supported Buckingham; became treasurer of navy, 1668; P.C. and Lord Treasurer, 1673; opposed to Roman Catholics, dissenters, and religious toleration; supported Test Act, 1673; cr. Earl of Danby, 1674; introduced Test Oath, 1675; ended war with Holland, 1674; arranged marriage of William of Orange and Mary, dau. of James II., 1677; opposed to Fr. influence in England; raised money for Fr. war, 1678; impeached, 1678, for intrigue and corruption; found guilty, but was pardoned; subsequently attainted, and imprisoned five years in Tower; released, 1684. Soon after accession of James II., joined opposition against king; was one of Revolution leaders; attached himself to William of Orange; became pres. of council, 1689; attained chief power when Halifax retired, 1690; again impeached for bribery, 1695, but proceedings fell through; subsequently retired, 1699.—*Life*, by Courtenay (1838).

LEEK (53° 7′ N., 2° 2′ W.), town, Staffordshire, England; remains of Cistercian abbey in neighbourhood. Manufactures silk. Pop. (1911) 16,665.

LEEK (*Allium porrum*), a bulbous, liliaceous plant with strap-shaped, strongly smelling leaves; used as flavouring in broth. The l., as the Welsh national emblem, is said to owe its origin to St. David, who caused the Britons to wear distinguishing l. leaves in their hats when fighting the Saxons; hence the custom of wearing l. on St. David's Day.

LEER (53° 13′ N., 7° 27′ E.), town, Hanover, Germany; textiles, paper, iron goods. Pop. (1910) 12,677.

LEEUWARDEN (53° 12′ N., 5° 47′ E.), town, Holland; commercial centre; shipbuilding, iron, copper and lead works; has royal palace and museum. Pop. (1910) 37,014.

LEEUWENHOEK, ANTON VAN, LEUWENHOEK (1632–1723), Dutch optician; at first a maker of lenses for microscopes, became microscopist and naturalist; discovered the capillary circulation of the blood, the finer structures of teeth, hair, and epidermis, and made many observations on the structures of insects, crustaceans, and plants.

LEEWARD ISLANDS (20° N., 75° W.), islands, W. Indies; Santa Cruz, St. John, and St. Thomas are Danish, the remaining islands British; they produce sugar, cotton, sulphur, cacao, lime citrate, and phosphates; area, 701 sq. miles. Pop. (1911) 127,189.

LEFEBVRE, PIERRE FRANÇOIS (1755–1820), Fr. marshal; fought in Revolutionary and Napoleonic Wars.

LEFEBVRE - DESNOËTTES, CHARLES, COMTE (1773–1822), Fr. soldier; served in Revolutionary and Napoleonic Wars.

LEG, the lower limb, or, more strictly anatomically, that part of the lower limb between the knee and the ankle. Its bony framework consists of two bones, the tibia and the fibula, the former of which may be felt immediately below the skin on the inner and anterior aspect of the l., while the latter is to the outer side of the tibia, articulating with it at its extremities. To the bones are attached numerous muscles, all of which are concerned in locomotion and the movements of the foot, the most prominent being those forming the projection of the calf. The anterior and posterior tibial arteries, the continuations of the

popliteal and femoral artery, nourish the anterior and posterior parts of the l., while the nerve supply comes from the branches of the great sciatic nerve. The common *Pott's fracture* consists of fracture of the fibula about 3 in. from the end, with outward displacement of the foot, while sometimes the tibia may also be broken, just above the ankle-joint. *Bow-leg*, with exaggeration of the curve of the tibia, is a condition due to rickets (*q.v.*). Ulceration of the l. is usually due to varicose veins diminishing the nutrition of the part.

Bow-Leg (*Genu varum*), a deformity in which there is bending outwards and somewhat forwards of the legs, so that the distance between the knees is abnormally great. Most frequently due to rickets, but may be owing to the bones bending in the direction in which they are habitually placed before the child is able to walk. Natural straightening often occurs in young growing children; otherwise the child should be kept off its feet and treated for rickets (*q.v.*). In older children an operation may be necessary to correct the deformity.

LEGACY, a personal gift by will, and as such it is not to be paid before the claims of creditors are satisfied. A legacy not exceeding £500 is recoverable in the county court if unpaid. In Rom. law a legacy was an injunction on the heir to disburse a certain sum to a third person.

LEGAS, a Galla folk settled in Abyssinia.

LEGATE (Lat. *legatus*, ambassador, etc.), name of representative of pope. Three ranks: (1) *legatus a latere* (*i.e.* from side of pope), usually cardinal; (2) *legatus natus*, whose position is inherent in archbishopric or other national ecclesiastical dignity; (3) *legatus missus* or apostolic *nuncio* or *internuncio*. *Ablegates* are sent abroad by pope on special missions. Power of local jurisdiction abolished by Council of Trent, 1545.

LEGENDRE, ADRIEN MARIE (1752–1833), Fr. mathematician; b. Paris; app. prof. of Math's at Paris Military School, 1774; helped to measure degree of latitude and introduce decimal system; made important researches on elliptic functions, and was first to suggest method of least squares for determination of orbits of comets, 1806; wrote *Exercices de Calcul Intégral*; *Théorie des Nombres*; *Eléments de Géométrie*; *Memoirs on Attractions of Ellipsoids*.

LEGGE, HENRY—afterwards Bilson L. (1708–64), Eng. politician; held various offices of state; three times Chancellor of Exchequer; dismissed, 1761.

LEGHORN (43° 33′ N., 10° 18′ E.), fortified seaport, Tuscany, Italy; fine harbour, extensive coasting and foreign trade; exports wine, oil, fruits, hides, straw hats. Episcopal see, fine cathedral. Owes importance to Medici family, under whom became free port, continuing such till 1868. Pop. (1910) 135,756.

LEGION, division of Rom. army; constitution under Republic; ten cohorts of infantry with 300 cavalry, comprising 4200 to 6000 men; cohorts arranged in two lines till time of Cæsar, who rearranged in three lines. See also Infantry.

LÉGION ÉTRANGÈRE, see Foreign Legion.

LEGION OF HONOUR, see Knighthood.

LEGITIMACY AND LEGITIMATION can only be acquired according to Eng. law by birth in lawful wedlock. It is presumed that the child of a married woman is legitimate unless rebutting evidence of fact is produced. In many countries the legitimation of a child born before wedlock is effected by subsequent marriage of parents, but Eng. law refuses to allow this.

LEGITIMISTS, party found in 1830 to further Bourbon cause; efforts hindered by the tactlessness of leader, Comte de Chambord (d. 1883); present head Duc d'Orleans.

LEGNAGO (45° 11′ N., 11° 27′ E.), fortified town, Venetia, Italy. Pop. (commune) 17,580.

LEGNANO (45° 36′ N., 8° 54′ E.), town, Lombardy, Italy. Pop. *c.* 19,000.

LEGOUVÉ, GABRIEL JEAN BAPTISTE ERNEST WILFRID (1807–1903), Fr. dramatist and social reformer; s. of poet Gabriel L. (1764–1812); assisted Scribe in compilation of *Adrienne Lecouvreur* (1849); obtained much success with *Médée* (1855).

LEGROS, ALPHONSE (1837–1911), Fr. painter and etcher; Slade prof. of Fine Arts at Univ. Coll., London, 1876–93; excelled in Fr. rural scenes and humble characters.

LEGUMINOSÆ, important family of dicotyledonous plants numbering over 12,000; has seed vessel of one carpel with seeds along one side and splitting open down the two edges; fruit known as *legume* is seen typically in common pea; has three suborders, two almost completely tropical, represented by Mimosa, Acacia, Tamarindus. The third sub-family is very common in Britain; includes Clover (*Trifolium*), Vetches (*Vicia*), Furzes (*Ulex*), Pea (*pisum*), Bean (*Vicia Faba*), Laburnum (*Cytisus laburnum*), and Broom (*Sarothamnus*).

LÈGYA (*c.* 21° N., 98° 10′ E.), one of Shan States, Burma, India. Pop. *c.* 27,500.

LEH (33° 52′ N., 77° 33′ E.), capital, Ladakh, Kashmir, India; trading centre. Pop. *c.* 4500.

LEHNIN (52° 19′ N., 12° 48′ E.), town, Brandenburg, Germany. Lehnin Prophesy, poem of 1690, professedly dating from *c.* 1300 and prophesying fate of Hohenzollerns; now considered a forgery.

LEIBNITZ, GOTTFRIED WILHELM (1646–1716), Ger. scholar and thinker; b. at Leipzig; entered univ. there, 1661. As a boy he had studied classics, as a student, philosophy, then math's and law, early showing his genius. He became acquainted with the Elector of Mainz and became interested in politics, suggesting a Fr. expedition to Egypt. Meanwhile he became busy with math's and mechanical science, and speculated in theol. and law. He invented a calculating machine and discovered the differential and integral calculus. In 1676 he entered the service of the Duke (afterwards Elector) of Hanover. L. formed schemes for uniting Catholicism and Protestantism, and this failing, tried to unite Lutherans and Calvinists. He continued his studies in many fields, especially economics, politics, and history. He collected hist. sources and began a history of Brunswick. Most of his philosophical work was done after 1690. In 1690 he pub. his *Essais de Theodicée sur la bonté de Dieu la liberté de l'homme et l'origine du mal*, the greatest of his philosophical works, and in 1714 *La Monadalogie* and *Principes de la nature et de la grâce*; latterly, he devoted much time to correspondence.

The central point of his philosophy is his doctrine of substance, which is not quite that of any other philosopher, though nearest Descartes. L. believed the Universe to be composed of centres of force (monads), without extension but with some of the attributes of spiritual being, such as feeling; space, matter, and motion have accordingly no ultimate existence. His theol. is theistic, and he believes in the goodness of God, who is the 'harmony' of all things; the problem of evil he strives in vain to solve. He influenced subsequent thinkers both in scientific method and the importance he attached to psychology.

Russell, *A Critical Exposition of the Philosophy of Leibnits* (1900).

LEICESTER (52° 39′ N., 1° 8′ W.), town, Leicestershire, England, on site of Rom. *Ratæ*, of which traces remain; castle dates from Norman times, Trinity and Wyggeston's Hospitals from 1330 and 1513 respectively; ruined abbey; several fine old churches. Returns two M.P's. Important hosiery, boot, and lace industries. Pop. (1911) 227,242.

LEICESTER, EARLDOM OF.—There was a Saxon earldom of Mercia, with which the connection of any post-Conquest earldom of L. is conjectural. Title was held by Beaumonts, 1130–1204, Montforts, 1207–65, Plantagenets from 1265 till 1399, when it was merged in Crown by accession of Henry IV.; it was granted to Dudley, courtier of Queen Elizabeth in 1564, but lapsed at his death without issue in 1588; held by Sydneys, 1618–1743, by Thomas Coke, 1744–59,

and by Townshends, 1784–1855. Another earldom, of L. of Holkham, has been held by Coke family since 1837.

LEICESTER, ROBERT DUDLEY, EARL OF (*c.* 1531–88), favourite of Queen Elizabeth. Early became courtier; Master of Horse on Elizabeth's accession; soon rose in her favour; m. Amy Robsart; suspected of compassing her death, 1560, so as to marry Elizabeth; cr. Earl of L., 1564; secretly m. Lady Essex; commanded expedition to Low Countries, 1585; became gov.; lieut.-gen. of forces to resist Spaniards, 1588. Bekker, *Elizabeth and Leicester* (1890).

LEICESTERSHIRE (52° 40′ N., 1° 10′ W.), inland county, England; area, *c.* 823 sq. miles. L. came under domination of the Danes in X. cent.; was held by Lancastrians during Wars of Roses; in Civil War of Charles I.'s reign most of county supported Roundheads; surface undulating, rising to *c.* 900 ft. in N.W.; drained by Soar, Wreak; produces coal, iron, limestone, fireclay, pipeclay; sheep and cattle raised; manufactures hosiery, boots, agricultural implements, Stilton cheese. Returns four M.P's. Pop. (1911) 481,115.

LEIDEN, LEYDEN (52° 10′ N., 4° 30′ E.), town, Holland; besieged by Spaniards, 1574; has famous univ., established 1575, and associated with Grotius, Descartes, Vossius, Arminius, Heinsius, and other scholars; magnificent library, museums of art, antiquities, natural history, and ethnography. Manufactures cloth, cotton; connected with Amsterdam and Rotterdam by canal. Pop. (1910) 59,114.

LEIDY, JOSEPH (1823–91), Amer. biologist and palæontologist.

LEIF ERICSSON, Greenland explorer; s. of Icelandic immigrant, Eric the Red; in return voyage from Norway to Greenland, in year 1000, cast on coast of N. America, which he named *Vinland* (q.v.).

LEIGH (53° 59′ N., 2° 31′ W.), town, Lancashire, England; silk, cotton. Pop. (1911) 44,109.

LEIGHTON, FREDERICK LEIGHTON, LORD (1830–96), Eng. painter; spent his early years in a series of extensive tours on the Continent, where he had instruction from some of the most distinguished artists. In 1855 he appeared at the Royal Academy with his famous picture, *Cimabue's Madonna carried in Procession through the Streets of Florence*, subsequently bought by Queen Victoria; elected Pres. of the Academy and knighted, 1878; sculptor also.

LEIGHTON, ROBERT (1611–84), Scot. scholar; studied at Edinburgh Univ.; spent some years abroad; principal of Edinburgh Univ., 1653; a learned, pious, and unworldly man, was chosen one of bp's by Charles II., 1661, and did all he could to check persecution and bring about religious union; app. abp. of Glasgow, 1670, but alienated extreme Episcopalians and Presbyterians alike, resigning in despair, 1674; lived happily in retirement until his death. Butler, *Life and Letters* (1903).

LEIGHTON BUZZARD (51° 56′ N., 0° 39′ W.), town, Bedfordshire, England; fine Early Eng. church. Pop. (1911) 6784.

LEININGEN, ancient Alsatian family dating certainly from XII. cent., still existing in several branches; Prince Emich of L. was the first husband of the Duchess of Kent, mother of Queen Victoria.

LEINSTER (*c.* 53° N., 7° W.), province, Ireland. Area, 7618 sq. miles. Pop. (1911) 1,160,328.

LEIPZIG (51° 20′ N., 12° 23′ E.), city, Saxony, Germany; on fertile plain at junction of Elster, Pleisse, and Parde. L. dates back to XI. cent.; Leipzig Conference, between Luther, Eck, and Carlstadt, 1519; suffered severely during Thirty and Seven Years Wars; at battle of L., 1631, Gustavus Adolphus defeated Tilly; Battle of the Nations, 1813, Allies defeated Napoleon; seat of Supreme Court of German Empire since 1879; birthplace of Wagner. The ancient town (now business section, with narrow crooked streets and quaint houses) is separated from extensive suburbs by fine promenades, built on site of old fortifications. Notable buildings include Nikolaikirche (1170), Thomaskirche (1213), celébrated univ. (founded 1409) with extensive library, splendid Imperial Supreme Court, museums, Municipal Theatre (1868), Auerbach's Keller (immortalised in Goethe's *Faust*), Gewandhaus (fine concert-hall), and famous Royal Conservatory of Music. L. ranks among first cities in the world in bookselling, publishing, type-founding, and music trades; seat of world-famous Teubner classical press; also metal and textile industries, chemicals, scientific instruments, leather, rubber, food-stuffs, etc.; famous fairs held Easter, Michaelmas, and New Year since Middle Ages. Pop. (1910) 587,635.

LEIRIA (39° 43′ N., 8° 47′ W.), cathedral town, Portugal; seat of bishopric. Pop. 5000. L. district has area of 1318 sq. miles. Pop. *c.* 240,000.

LEISLER, JACOB (*c.* 1635–91), Amer. political leader; led poorer classes, New York, during Eng. Revolution; lieut.-gov., New York, 1689–91; executed.

LEISNIG (51° 9′ N., 12° 55′ E.), town, Saxony, Germany. Pop. (1910) 7994.

LEITH (55° 58′ N., 3° 10′ W.), fortified port, Midlothian, Scotland; extensive harbour; important Baltic trade in grain and timber, large export trade in coal, cotton, iron; flour mills, shipbuilding yards, breweries, distilleries, engineering and chemical works. L. was pillaged by Eng. in 1544 and 1547. Citadel built by Cromwell, 1650, and taken by Jacobites, 1715. Pop. (1911) 80,489.

LEITMERITZ (50° 33′ N., 14° 9′ E.), town, Bohemia, Austria; seat of bishopric; bp.'s palace, cathedral; formerly fortified; breweries. Pop. (1911) 15,421.

LEITRIM.—(1) (54° 10′ N., 8° W.) county, Connaught, Ireland; area, *c.* 610 sq. miles; centre and N. wild and rugged; watered by Shannon; produces coal, linens, woollens; returns two M.P's. Pop. (1911) 63,557. (2) (53° 59′ N., 8° 4′ W.) village, L., Ireland.

LEIXOES (41° 9′ N., 8° 41′ W.), port, Portugal; exports wine.

LEJEUNE, LOUIS FRANÇOIS, BARON (1776–1848), Fr. soldier; fought in Napoleonic Wars, then became military artist.

LELAND, JOHN (*c.* 1506–52), Eng. antiquary; filled various church appointments, and is remembered for materials he collected, during a six years' tour, connected with the Eng. cathedrals, priories, and abbeys. Stow, Camden, and Dugdale benefited largely by his researches.

LELAND STANFORD JUNIOR UNIVERSITY, seat of learning at Palo Alto, California; founded in 1887 by Leland Stanford (1824–93), who endowed it; instruction in usual univ. subjects is given, but also, by condition of grant, business and technical training; opened, 1891.

LELEGES, name used by Greeks for ancient people of Caria; they became confounded with the Carians, and various regions of Greece were said to preserve traces of them.

LELEWEL, JOACHIM (1786–1861), Polish historian; History prof., Warsaw, 1818; prominent in revolution, 1829; banished.

LELY, SIR PETER (1617–80), Eng. artist of Dutch extraction; court-painter to Eng. Charles II.

LEMAÎTRE, FRÉDÉRICK (1800–76), Fr. actor; famous for character studies.

LEMAN LAKE, see GENEVA, LAKE OF.

LEMBERG.—(1) (49° 40′ N., 24° E.) town, Galicia, Austria; seat of R.C., Gk., and Armenian archbishoprics; has three cathedrals, univ., several monasteries; formerly fortified; commercial centre; machinery, beer. Pop. (1910) 206,113. (2) (46° 16′ N., 15° 34′ E.) town, Styria, Austria.

LEMERY (13° 50′ N., 120° 45′ E.), town, Luzon, Philippine Islands. Pop. *c.* 11,500.

LEMGO (52° 2′ N., 8° 55′ E.), town, Lippe, Germany. Pop. (1910) 9966.

LEMMING, a member of MOUSE FAMILY (*q.v.*).

LEMNISCATE, a curve of which the Cartesian equation is $(x^2+y^2)^2=a^2(x^2-y^2)$. From the polar equation $r^2=a^2\cos 2\theta$ it is easily seen that curve consists of two loops, and is symmetrical about x-axis.

LEMNOS (39° 53′ N., 25° 15′ E.), island in Ægean Sea, which, after belonging in turn to Greeks, Romans, and Venetians, was taken by Turks in 1657. Area, *c.* 160 sq. miles; surface generally hilly; chief town, Kastro, has good harbour and is fortified; produces cereals, fruit, tobacco; formerly celebrated for Lemnian earth, which has medicinal qualities. Pop. variously estimated at 15,000 to 30,000.

LEMON (*Citrus Medica*, var. *Limonum*), a member of the Rutaceæ, cultivated in Mediterranean countries for its fruit, which has a cool, acid flavour, due to presence of citric acid. The l. plant is a variety of the *citron*, which it resembles in general features, and is a large, freely branching shrub of thorny character, the thorns representing the modified leaves of auxiliary branches. The foliage leaves are oval in shape, and the inflorescence is corymbose, with pentamerous flowers. In addition to the juice obtained from the flesh, the fresh rind or peel is of economic importance, yielding on distillation an essential oil, termed 'essence' of l., which it stores in special superficial glands. The rind is also preserved as 'candied peel.'

LEMON, MARK (1809–70), Eng. writer; first editor of *Punch* (q.v.).

LEMONNIER, ANTOINE LOUIS CAMILLE (1844–), Belg. poet and novelist; his sympathies rest with the peasant classes and a life close to nature.

LEMONNIER, PIERRE CHARLES (1715–99), Fr. astronomer; contributed largely, by continued recommendation of Eng. methods and instruments, to reform of Fr. practical astronomy.

LEMUR or **TRUE LEMUR** (*Lemur*), a genus of Lemuroidea (*q.v.* under PRIMATES), long-tailed, non-web-footed, with long snouts and large ears; vegetarian and carnivorous; confined to Madagascar.

LEMUROIDEA, a sub-order of PRIMATES (*q.v.*).

LEMUS, LEMMING, see MOUSE FAMILY.

LENA (73° 25′ N., 126° E.), river, Siberia; rises near Lake Baikal, flows to Arctic Ocean.

LENAU, NICOLAUS (1802–50), Hungarian poet; his short lyric pieces are the best of his many miscellaneous works.

LENKORAN (38° 44′ N., 48° 52′ E.), town, Transcaucasia, Russia. Pop. *c.* 9000. L. district has area of 2115 sq. miles. Pop. *c.* 133,000.

LENNEP (51° 7′ N., 7° 15′ E.), town, Rhenish Prussia, Germany. Pop. (1910) 13,125.

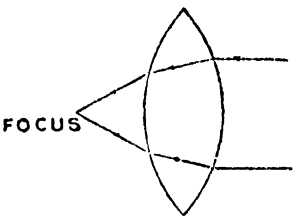
LENNOX (*c.* 56° N., 4° 30′ W.), region in Scotland, comprising Dumbartonshire, most of Stirlingshire, parts of Renfrewshire and Perthshire, which gave name at different periods to earldom and dukedom. First earl was one Alwyn, who received title from David I. *c.* 1192. Earldom eventually came to Stewarts of Darnley, Sir John Stewart, Lord Darnley, becoming Earl of L. in 1473, in right of his grandmother, Elizabeth, daughter of Duncan, 8th earl. Darnley's succession was unsuccessfully disputed by John of Haldane in right of his wife, a descendant of another daughter of Duncan. Henry, Lord Darnley, son of 4th Stewart earl, was second husband of Mary, Queen of Scots, and father of James VI. and I., with whom the title became an appanage of the Crown. It was granted to Charles Stuart, brother of Darnley, in 1572, and in 1579 to Esmé Stuart, who was afterwards raised to ducal rank. Dukedom was held by six of his descendants, and on death of Charles, 6th duke, in 1672, was merged in the Crown; and was granted three years later by Charles II. to Charles Lennox, Duke of Richmond, his natural son by Louise de Quérouaille, Duchess of Portsmouth. Of this line the 6th duke received additional title of Duke of Gordon, 1876.

LENNOX, MARGARET, COUNTESS OF (1515–78), was granddaughter of King Henry VII. and mother of Lord Darnley, husband of Mary, Queen of Scots.

LENOX (42° 26′ N., 73° 19′ W.), town, Massachusetts, U.S.A.; associated with Nathaniel Hawthorne and Henry Ward Beecher. Pop. (1910) 3060.

LENS (optics), a portion of a transparent substance which refracts light, having at least one surface curved.

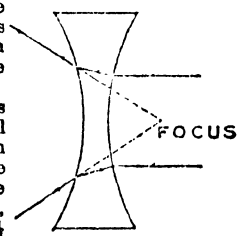
Principal types of spherical lenses are: bi-convex (A), bi-concave (B), plano-convex (C), plano-concave (D), convexo-concave (E). If placed in the path of a beam of light, a lens will bend the rays towards its thicker part. Hence lenses A, C, and E will cause light rays from a distant source to converge (convergent lenses) towards a point on the side farther from the source, while B and D will cause the rays to diverge (divergent lenses), apparently from a point on the side facing the source. Such a point is called the *focus* of the lens.



CONVERGENT LENS.

The *focal distance* or *focal length* is the distance of the focus from the lens, and depends on the material of which the lens is made and on the curvature of its faces. A small correction must be made in the case of thick lenses.

The *power* of a lens is the reciprocal of its focal length and is measured in *dioptres*, the unit being the power of a lens of one metre focal length. Thus, if the focal distance is ½ metre, the power is 2 dioptres.



DIVERGENT LENS.

A lens (particularly a thick lens) will break up the light into the primary colours of which it is composed. This effect is termed *chromatic aberration* and is a source of great difficulty in the construction of accurate optical instruments. By cementing, with Canada balsam, a convergent lens of crown glass with a divergent lens of flint glass, a combination is obtained which will focus the bright rays of the spectrum at, approximately, one point. (The crown glass side is turned towards the source of light.) Such a combination is said to be *achromatic*.

Lenses are used in various combinations in optical instruments, and singly to correct defective vision. Myopia (short sight) is corrected by a bi-concave and hypermetropia (long sight) by a bi-convex lens. For astigmatism (inability to see with equal clearness in different planes) a lens having a cylindrical outer surface is used, while, if the person is also suffering from myopia or hypermetropia, the second face of the lens is suitably spherical (either concave or convex). See also SPECTACLES.

LENS (50° 24′ N., 2° 49′ E.), town, Pas-de-Calais, N. France. Pop. 27,800.

LENT (A.-S. *Lencten*, spring), name given to Church fast before Easter; at first short, but very strict, then three weeks, sometimes six weeks or longer; now in West forty days; in Middle Ages very rigorous.

LENTHALL, WILLIAM (1591–1662), Eng. politician; b. Henley-on-Thames; Speaker of Long Parliament, 1640; supported Parliament in Civil War; Master of Rolls, 1643; Commissioner of Great Seal, 1648; continued as Speaker till 1653; re-elected, 1654, 1659; temporary Keeper of Great Seal, 1659; helped to bring about Restoration; excluded from act of Indemnity, 1660.

LENTIL (*Lens esculenta*), a member of the Leguminosæ (*q.v.*) which grows in the E. Mediterranean region. The seeds, which were the 'pulse' of the ancients, when ground produce a very nutritious flour, often used in patent invalid foods.

LENTINI, see LEONTINI.

LENTOSPORA, see SPOROZOA.

LENTULUS, name of Rom. family of patrician *gens* Cornelia. Distinguished members: (1) P. CORNELIUS LENTULUS SURA, implicated in Catiline conspiracy, 63 B.C. (2) P. CORNELIUS LENTULUS SPINTHER, politician who supported recall of Cicero from banishment. Noted for haughtiness; Cicero uses *lentulitas* to express pride.

LEO, fifth sign of the Zodiac (*q.v.*).

LEO, name of thirteen popes: **Leo I.** (pope, 440–61), called *the Great*; succ. Sixtus III.; his letter to Flavian expounds the doctrine of the two natures of Christ, and was accepted by the Council of Chalcedon; met Attila outside Rome, Attila consenting not to attack Rome. His sermons and letters survive. He did much for the prestige of the Papacy. —**Leo II.** (pope, 682–83), sanctioned condemnation of his predecessor, Honorius, for heresy.—**Leo III.** (pope, 795–816), famous for his coronation of Charles the Great as Rom. emperor, 800.—**Leo VIII.** (pope, 963–65), elected while a layman.—**Leo IX.** (pope, 1049–54), a relation of Emperor Conrad II.; held synod, 1049, which decreed celibacy of clergy; led expedition against Normans of Sicily, 1053.

Leo X., GIOVANNI DE' MEDICI (pope, 1513–21), b. 1475; s. of Lorenzo de' Medici; cr. cardinal deacon, 1489; exercised full rights as cardinal, 1492; lived in Florence, 1492–94; devoted himself to art, etc., 1500, living in Rome. He was elected pope on the death of Julius II. The history of the Papacy during his reign is an intricate struggle in which L. strove to preserve the papal power by keeping foreign powers out of Italy. The Turks menaced W. Europe, but a projected crusade came to nothing. His reign was marked by Luther's revolt from the Papacy, the significance of which L. failed to realise. He was greatest as a patron of art and lit.; he encouraged Raphael and reorganised the Univ. of Rome. An astute politician and man of the world, he lacked spirituality and moral zeal when the Church sorely needed reform.—**Leo XII.**, ANNIBALE DELLA GENGA (pope, 1823–29), b. 1760; held various diplomatic appointments from 1794; during his reign a careful administrator, but reactionary.

Leo XIII., GIOACCHINO PECCI (pope, 1878–1903), b. 1810; ed. at Viterbo and Rome; app. nuncio to Brussels, 1843; abp. of Perugia, 1846–78; cardinal, 1853; elected pope on the death of Pius IX. His reign was one of great activity, political, social, and religious. He firmly upheld the necessity for the restoration of temporal power to the Papacy, but did not needlessly quarrel with the Ital. government. He was energetic as a statesman and entered into relations with many sovereigns in Europe and Asia, securing liberty for Roman Catholics in Russia. He encouraged learning, and his encyclicals showed some sympathy with socialism. His policy sometimes seemed liberal, sometimes reactionary. He re-established the Scot. hierarchy, and was generally respected in England. He was a man of culture and had perfect command of Latin, Italian, and French.

LEO, six Byzantine emperors: **Leo I.** (400–74), defeated Huns in Dacia; sent fleet against Vandals. —**Leo III.** (680–740), conquered Saracens, 719; introduced religious and civil reforms; forbade image-worship; began separation of Gk. from Rom. Church. —**Leo V.**, emperor, 813–20; fought against Arabs; defeated Bulgarians; repressed image-worship; assassinated.—**Leo VI.**, emperor, 886–911; lost Thessalonica to Muhammadan pirates.

LEO, HEINRICH (1799–1878), Ger. historian; prof. at Halle; from revolutionary became Hegelian and finally mediævalist, and, it was suspected, Catholic; high in court favour for conservative influence; Italian, Dutch, and German histories and autobiography.

LEO, JOHANNES (*c.* 1494–1552), Cordovan Moor; travelled in Africa and Asia Minor and wrote the *Africæ Descriptio*, long the standard authority on Muhammadan Africa.

LEOBEN (47° 24′ N., 15° 5′ E.), town, Styria, Austria. Pop. (1911) 11,504.

LEOBSCHÜTZ (50° 13′ N., 17° 50′ E.), town, Pruss. Silesia, Germany. Pop. (1910) 13,083.

LEOFRIC (d. 1057), Earl of Mercia from about 1030; ruled over the Welsh Marches.

LEOMINSTER.—(1) (52° 13′ N., 2° 45′ W.) town, Herefordshire, England; site of former monastery and priory. Pop. (1911) 5737. (2) (42° 28′ N., 71° 49′ W.) town, Massachusetts, U.S.A.; manufactures celluloid and horn articles, paper, woollens, etc. Pop. (1906) c. 14,700.

LEON.—(1) (42° 33′ N., 5° 40′ W.) N.W. province, Spain; area, *c.* 5986 sq. miles; crossed by Douro and Minho; agriculture is principal industry; formerly part of independent kingdom of L.; for sovereigns, see under FERDINAND. Pop. (1910) 393,888. (2) (42° 37′ N., 5° 37′ W.) capital, L., Spain; seat of bishopric; XIII.-cent. cathedral, bp.'s palace; manufactures machinery, linen, leather. Remains of Rom. walls. Pop. 17,000. (3) (12° 32′ N., 86° 54′ W.) town, Nicaragua; seat of bishopric; has cathedral, univ., bp's palaces. Pop. (1910) 62,569.

LEÓN, LEÓN DE LAS ALDAMAS (21° 1′ N., 101° 15′ W.), cathedral town, Mexico; manufactures leather, textiles. Pop. (1910) 63,263.

LEONARDO DA VINCI (1452–1519), Ital. painter, sculptor, architect, and engineer. Showing precocity in drawing, he was sent to study at Florence with Andrea del Verrochio, having Perugino for a fellow-pupil. He began his professional career about 1472, when he received the patronage of Lorenzo de' Medici, and about 1480 proceeded to the East as engineer to the sultan of Cairo. Two years later he settled in Milan, where he presently painted his famous *Last Supper*, a masterpiece which had the distinction of an elaborate criticism and description from Goethe's pen. After painting other pictures in Milan, and, as an engineer, devising a system of irrigation of the plains of Lombardy, he removed to Florence, and in 1502 became architect and engineer to Cæsar Borgia, then Duke of Romagna. The next outstanding incident in his career was the contest with his young rival Michael Angelo, when both were commissioned to decorate the Sala del Consiglio in the Palazzo della Signoria with historical scenes. About 1504 was completed the most celebrated of his easel pictures, a half-length portrait of Mona Lisa, third wife of Zanobi del Giocondo; this was stolen from the Louvre, 1911. Leonardo's later years were given to the service of France, Francis I. having, in 1516, assigned him an annual allowance of 700 scudi and given him the use of the Château Cloux, near Amboise, where he died, not, as often erroneously stated, in the royal arms. Collections of his pictures, all emphasising his supreme position as an artist, are preserved at Milan, Florence, Paris, Vienna, Venice, the British Museum, and the Royal Library, Windsor. He wrote a *Trattato della Pittura*, dealing with the details of his art, published in 1651, and in an Eng. translation, 1721. A portrait of Leonardo from his own hand is in the Royal Library at Turin.

LEONARDO OF PISA, Ital. mathematician of XIII. cent.; nicknamed 'Dunce.' Published *Liber Abaci* (deals chiefly with commercial arithmetic), *De Practica Geometriæ*, and scientific papers.

LEONCAVALLO, RUGGIERO (1858–), Ital. composer; influenced by Wagner; well-known operas, *I Pagliacci* (1892), *La Bohème* (1897).

LEONIDAS (fl. 491–480 B.C.), king of Sparta; held *Thermopylæ* against Persians till taken by treachery; pattern of bravery.

LEONTIASIS OSSEA, a rare disease in which there is an overgrowth of bone over the forehead, jaws, and bones of the skull, leading to much disfigurement, while painful symptoms and even death may ensue from the pressure on the brain. In some cases

treatment by chiselling away masses of bone is possible.

LEONTINI (37° 16′ N., 14° 59′ E.), ancient town, Sicily, to S.E. of L. lake; founded by Gk. colonists, 730 B.C.; ruined by Saracens, 848 A.D. Some bronzes have been excavated. Site of modern *Lentini*, which has trade in oil, wine, cereals. Pop. 17,500.

LEOPARD, see under CAT FAMILY.

LEOPARDI, GIACOMO, COUNT (1798–1837), Ital. poet; after several minor pieces, he wrote the *Apprassamento alla Morte*, 1819, a long poem upon Death after the manner of Petrarch; edited Cicero and Petrarch, 1825–26; pub. (1827) *Operette Morali*, a witty and ironic series of dialogues, modelled on Lucian and faultless in style. His chief claim to greatness is as classic and stylist; other important works are *La Ginestra, Song of the Wandering Shepherd.*

LEOPOLD I. (1790–1865), king of Belgians; fought against Napoleon; declined Gk. crown, 1830; elected first king of Belgians, 1831.

LEOPOLD II. (1835–1909), king of Belgians; succ., 1865; founded Congo Free State, for administration of which he was much criticised; acquired vast wealth; greatly developed Belgium; a strong ruler, but loose living.

LEOPOLD I. (1640–1705), Holy Rom. emperor; king of Hungary, 1655; Bohemia, 1657; emperor, 1658. Reign marked by wars against Sweden, Turks, France; concluded peace with Sweden, 1660; made truce with Turks after latter's defeat by Monticucculi, 1664; waged three wars against Louis XIV. of France, against whom he formed Grand Alliance, 1689; persecuted Protestants in Hungary; insurrection followed, in which rebels were aided by Turks, but ultimately defeated.

LEOPOLD II. (1747–92), Holy Rom. emperor; Grand-Duke of Tuscany, 1765; reformed administration; emperor, 1790; negotiated with England to check power of Russia and Prussia, crowned king of Hungary, 1790, promising to observe constitution; made truce with Turks, 1790; concluded peace at Sistova, 1791; combined with king of Prussia to declare readiness for intervention in France during Revolution, 1791; formed alliance with Prussia, 1792.

LEOPOLD II. (1797–1870), Grand-Duke of Tuscany; succ., 1824; reformed administration; granted constitution, 1848; sent troops against Austria on outbreak of War of Ital. Independence; revolutionary agitations subsequently arose; republic proclaimed, Feb. 1849; L. went to Gæta; accepted invitation to return, April; made treaty with Austria, 1850; revoked constitution, 1852; abdicated, 1859.

LEOPOLD I., PRINCE OF ANHALT-DESSAU (1676–1747), b. Dessau; succ. as Prince of A.-D., 1693; fought in Netherlands, 1695, and in war of 1697; distinguished himself in Span. Succession War, became a general field-marshal, 1712; defeated Charles XII., 1715, and after winning victory of *Kesselsdorf*, 1745, he retired from active service. A devout Lutheran, a brilliant soldier, a stern disciplinarian, he helped to make the Pruss. army a great force.

LEOPOLD, PRINCE, see ALBANY, DUKEDOM OF.

LEOPOLD II. (2° S., 18° 9′ E.), lake, Belgian Congo, Africa.

LEOVIGILD, Visigothic king in Spain, 568–86; an Arian; his s. HERMENEGILD executed for rebellion and adherence to orthodoxy.

LEPAGE, see BASTIEN-LEPAGE, JULES.

LEPANTO, BATTLE OF, action fought between allied fleets of Spain and Ital. States, under Don John of Austria, and Turk. fleet under Ali Pasha, Oct. 7, 1571; Turks utterly defeated.

LEPCHA, primitive race in Sikkim; now numbering *c.* 20,000.

L'EPÉE, see EPÉE, CHARLES-MICHEL, ABBÉ DE L'.

LEPIDODENDRACEÆ, see PTERIDOPHYTA.

LEPIDODENDRON, see PALÆOBOTANY.

LEPIDOPTERA, BUTTERFLIES AND MOTHS (Gk. *lepis*, a scale; *pteron*, a wing).—Owing to their size and beauty, Butterflies and Moths are amongst the best known of insects, *c.* 50,000 species being scattered over all the world, 2000 being found in Britain alone. The name 'Lepidoptera' signifies the presence of scales exceedingly minute and dust-like, but often brilliantly coloured, which cover the four large, moderately veined wings. To actual pigment in the scales, which, as in *Morpho*, may number a million and a half, or to close ribbing on their upper surface, are due the beautiful colours and metallic sheen so familiar in the group. But other features are very characteristic. Adult L. feed on vegetable matter, sucking the juices from plants and flowers, and for this purpose some of the mouth parts (first maxillæ) form a long 'tongue' or proboscis, which in the Hawk Moths may be 10 in. in length, but which can be coiled up like a watch-spring when not in use. With this is associated a pumping apparatus in the head.

The changes which pass in the history of the individual are great and abrupt. The eggs, marvellous in variety of shape and sculpturing in different species, are laid singly or in batches either on a chance object or on the particular plant on which the larvæ are to feed—a complete brood numbering from a few dozens to many thousands. In a few days or months, as the case may be, the larva or caterpillar appears and sets about its life-work, which is simply to feed ravenously, to grow, rest, and moult. In shape it is worm-like, often hairy, with a large head and biting mouth parts, three thoracic segments, each with a pair of clawed limbs—corresponding to those of the adult—and ten abdominal segments with usually four or five pairs of clasping pro-legs. When the caterpillar has collected much reserve food material in its 'fatty body' it enters a trance, the pupal stage, the chrysalis of Butterflies being suspended from a leaf or branch, often by a silken girdle, the pupa of Moths lying generally concealed in the ground or under bark, or hidden in a cocoon, such as those of the large Bombycid Moths, which furnish the world's silk-supply. Within the hard pupal skin great changes foreshadow the limbs, wings, and organs of the adult, and finally the imago bursts forth, and after resting a few moments to dry its wings, soars into the air.

The length of the life-history is very variable, some species having only one generation in three years, while others have as many as five generations a year.

L. afford wonderful examples of protective and defensive colouring, and 'mimicry.' Most larvæ agree in colour with their food plants, but the 'looper' or geometer caterpillars of the Geometrid Moths, so called on account of their looping mode of progression, resemble twigs when at rest, and the Puss Moth caterpillar, with sting-like appendages and startling colour, strikes 'terrifying attitudes.' Many Adult Moths exactly match the colour of the lichen-covered bark upon which they rest, or resemble leaves, twigs, or flakes of white bird-droppings. The brightly coloured Leaf-Butterfly (*Kallima*) alights on a branch, closes its wings, and is lost to sight, for the under-surfaces of the wings are indistinguishable from a withered leaf, stalk, midrib, veins, and all. Other Butterflies, supposed to be sought by birds for food, closely resemble noxious species, so that they may escape destruction, and many L. bear an extraordinary likeness to dangerous insects, such as Bees and Ichneumons. Some tropical Butterflies have different colour varieties for the 'wet' and 'dry' seasons, one Amer. *Papilio* having as many as three distinct and definite forms.

The economic bearing of the group is very limited. The only group of direct value to man, as they are almost the only insects domesticated by him, are the Silk-Worm Moths, but many Adults are of indirect value in fertilising flowers. On the other hand, much damage to plants, crops, and fruits is caused by caterpillars, a plague of which is capable of stripping a garden or even forest of leaves in a short time; and some destroy clothes.

L. have been divided into *Macrolepidoptera*, the larger forms, and *Microlepidoptera*, comprising only the 'Clothes-Moth' family, Tineidæ and Tortricidæ, but the more natural division is that of Butterflies and Moths, which are distinguished as follows :—

Butterflies, RHOPALOCERA, mostly day-fliers; antennæ with a club-like or swollen tip; hind-wings with a shoulder which edges under the fore-wing, but without a bristle or 'frenulum' (see below). Of the 68 Brit. Butterflies examples are: the Purple Emperor (*Apatura iris*), the Tortoiseshells and the Peacock (*Vanessa*), the Fritillaries (*Argynnis, Melitæa*), the Blues (*Lycænidæ*), and the Cabbage Butterfly (*Pieris brassicæ*), whose caterpillars are so destructive in the garden. But none of these compare in brilliancy of colouring or size with the gigantic *Morphos* of tropical Asia and America, sometimes with a wing-span of close on 10 inches.

Moths, HETEROCERA, mostly night-fliers; antennæ very seldom club-like at the tip. Hind-wing without distinct shoulder, but with a bristle ('frenulum') which engages with a projection or tuft of scales on the fore-wing, for purposes of support. In some cases a frenulum is absent, but never where the antennæ are butterfly-like. Familiar examples are: the Hawk Moths (*Sphingidæ*), including the Death's Head, the Clear Wings (*Sesiidæ*), resembling Hymenoptera, the Owl Moths (*Noctuidæ*), and the Clothes Moths (*Tineidæ*). But those which most concern man are the large Silk Spinners (*Bombycidæ*), of which the true Silk-Worm Moth (*Bombyx mori*) has been introduced to Europe, its larval cocoons supplying the finest silk of commerce.

LEPIDOSTEIDÆ, see GAR PIKES.

LEPIDOSTEUS, see GAR PIKES.

LEPIDUS, Rom. family of *gens* Æmilia; famous III. cent. B.C. to I. cent. A.D.; among its consuls, *pontifices maximi*, etc., was Marcus Æmilius (d. 13 B.C.), of proberbial inferiority as 'the Lepidus of the Triumvirate.'

LEPISMA, see SILVER FISH.

LEPROSY, chronic infectious disease caused by a specific bacillus, *Bacillus lepræ*, characterised by the development of nodules or more diffuse growths of granulation tissue in the skin and mucous membranes, or in nerves, the former type being termed *tubercular* L., and the latter *anæsthetic* L. The disease existed in China and India in very ancient times; it is dealt with somewhat fully in the Book of Leviticus, and it is supposed to have been brought to Europe from the East by the Crusaders. Although common in the Middle Ages, it is now gradually disappearing, in Europe occurring practically only in Norway, Russia, and parts of the Mediterranean coast, but it is more common in Asia, on the coast of Africa, in some of the Pacific Islands, and in Central and South America.

For a considerable time, perhaps years, before the appearance of definite symptoms, an individual affected by L. may suffer from feverish attacks, weakness, and constitutional disturbances, and then, in the tubercular variety, brownish nodular spots appear on the skin, which are tender, the affected area gradually increasing in extent, while in the anæsthetic variety the superficial nerves are first thickened, symptoms of nerve irritation appear, and then of destruction of the nerves with gangrene of extremities, etc. The disease usually runs a chronic course of ten, or, in the anæsthetic variety, as much as fifteen or twenty, years, but may disappear entirely at practically any time. The treatment is to segregate lepers so as to prevent infection, or to remove a person affected to a different climate, while appropriate surgical measures relieve unnecessary pain. Chaulmugra and Gurgun oils, internally and externally, are often of benefit. See PARASITIC DISEASES.

LEPSIUS, KARL RICHARD (1810–84), Ger. Egyptologist; wrote many works in his special branch of study, which he conducted on scientific lines.

LEPTIS MAGNA (32° 38′ N., 14° 4′ E.), ancient Phœnician town, N. Africa; was commercial centre; ruins of fortifications, theatre, etc., remain. Site of modern Lebda.

LEPTIS PARVA (*c.* 35° 35′ N., 10° 55′ E.), ancient Phœnician town, N. Africa; fortified; ruins remain. Site of modern Lamta.

LEPTOMEDUSÆ, see under HYDROMEDUSÆ.

LEPTOPLANA, a TURBELLARIAN WORM (*q.v.*).

LEPTOSPERMUM, genus of evergreen trees and shrubs, order Myrtaceæ; native to Australasia; leaves formerly used as substitute for tea.

LEPTOSTRACA, see under MALACOSTRACA.

LEPUS, see RABBIT.

LERICI (44° 4′ N., 9° 55′ E.), village, Liguria, Italy. Pop. 9500.

LÉRIDA.—(1) (41° 52′ N., 1° 10′ E.) N. province, Spain; area, 4690 sq. miles; drained by affluents of Ebro; wine, oil, live stock. Pop. (1910) 283,486. (2) (41° 34′ N., 0° 20′ E.) town, capital of above; XVIII.-cent. cathedral; episcopal palace; old cathedral now used as barracks; former convent now used as hospital. Pop. (1910) 24,531.

LERMA, DUKE OF, FRANCISCO DE SANDOVAL Y ROJAS (1552–1625), Span. minister under Philip III.; continued war against England; incompetent.

LERMONTOV, MIKHAIL YUREVICH (1814–41), Russ. poet; wrote great lyrics; *Ismail-Bey*, *Walerik*, *A Hero of our Time* (novel); killed in duel.

LERO DE TEJADA, SEBASTIAN (1825–89), pres. of Mexico, 1872–77.

LEROUX, PIERRE (1798–1871), Fr. economist of extreme socialistic views; his philosophy was a mystical eclecticism, and his theories quite unpractical.

LEROY-BEAULIEU, HENRY JEAN BAPTISTE ANATOLE (1843–), Fr. author and historian; has written several works on contemporary politics.

LERWICK (60° 9′ N., 1° 8′ W.), town, Shetland, Scotland; fishing centre. Pop. (1911) 4654.

LES ANDELYS (49° 14′ N., 1° 24′ E.), town, Eure, France; includes Grand and Petit Andely; site of former fortress. Pop. 4000.

LES BAUX (44° 50′ N., 4° 40′ E.), village, Bouches-du-Rhône, France; ruined castle; formerly fortified.

LES SABLES D'OLONNE (46° 29′ N., 1° 47′ W.), town, Vendée, France; oyster and sardine fisheries. Pop. *c.* 12,000.

LES SAINTES-MARIES (43° 27′ N., 4° 25′ E.), village, Bouches-du-Rhône, France.

LESBOS, MYTILINE (39° 14′ N., 26° 20′ E.), Turkish island, in Ægean Sea; early settled by Æolian Gks.; became famous as school of Gk. lyrical poetry; has associations with Sappho, Theophrastus, Alcæus, Terpander, Arion, Pittacus. Belonged in turn to Persia, Athens, Macedonia, Rome, Byzantium; Turkish since 1462. Area, 675 sq. miles; surface hilly, rising to over 3000 ft.; upper districts wooded; lower ground produces olives, grapes, figs. Chief town, Mytiline, on Kastro, has shallow harbour, cathedral; formerly fortified. Pop. *c.* 130,000.

LESCURE, LOUIS MARIE JOSEPH, MARQUIS DE (1766–93), Fr. royalist; fought against Republic in Revolutionary Wars.

LESDIGUIÈRES, FRANÇOIS DE BONNE, DUC DE (1543–1626), Constable of France; joined Huguenots in Dauphiné; became commandant-gen.; fought for Henry IV., 1585–1601; subdued Dauphiné; defeated Savoyards and Spaniards.

LESINA.—(1) (43° 8′ N., 16° 40′ E.) island, off coast of Dalmatia, Adriatic Sea; area, *c.* 120 sq. miles; produces wine, fruit. Pop. *c.* 19,000. (2) (43° 10′ N., 16° 26′ E.) capital of above, episcopal see.

LESION, injury or damage; in pathology, a morbid change in an organ; in Scots law, loss from the other party's failure in a contract.

LESKOVATZ (43° 7′ N., 21° 54′ E.), town, Servia; hemp. Pop. (1911) 14,266.

LESLEY, JOHN (1527–96), Scot. historian; studied at Aberdeen and in France; Catholic leader during Reformation; bp. of Ross, 1565; loyal friend of

Mary, Queen of Scots; imprisoned in London, then banished; bp. of Coutances, 1593; wrote history of Scotland.

LESLIE (56° 12′ N., 3° 12′ W.), town, Fifeshire, Scotland; paper, linen. Pop. (1911) 2142.

LESLIE, CHARLES (1650–1722), Irish prelate; supporter of Stewarts, though foe of Rom. Catholicism.

LESLIE, CHARLES ROBERT (1794–1859), Eng. artist, of Amer. parentage; painted Queen Victoria's Coronation; prof. of Painting, Royal Academy, 1848.

LESLIE, SIR JOHN (1766–1832), Scot. mathematician and physicist; s. of a cabinetmaker; studied at St. Andrews; invented hygrometer and differential thermometer.

LESLIE, THOMAS EDWARD CLIFFE (1827–82), Irish economist; took high honours at Trinity Coll., Dublin; called to the Bar; prof. of Political Economy and Jurisprudence at Belfast, 1853; often visited Continent to study social and economic conditions; wrote *Land Systems* and *Essays in Political and Moral Philosophy*; urged the need for reform, and said that all economic questions should be treated in relation to history and social conditions.

LESPINASSE, JULIE JEANNE ÉLÉONORE DE (1731–76), Fr. author; most distinguished hostess of her time; D'Alembert was habitué of her *salon*; victim of successive unfortunate *affaires du cœur* which give poignancy to her famous *Lettres*, pub. posthumously.

Marquis de Ségur, *Life* (Eng. trans., 1906).

LESSE (49° 59′ N., 5° 10′ E.), river, Belgium; joins Meuse.

LESSEPS, FERDINAND DE (1805–94), Fr. diplomat; b. at Versailles; ed. at Paris; employed in consular service at Lisbon, 1825–27; Tunis, 1828; Alexandria, 1832; conceived project of making Suez Canal; consul, Cairo, 1833; subsequently consul-gen., Alexandria; distinguished for zeal during plague, 1834–35; consul at Rotterdam, 1839; Malaga, 1840; Barcelona, 1842; minister at Madrid, 1848; retired from diplomatic service, 1849. Introduced Suez Canal scheme, 1854; obtaining concession from Said Pasha, company organised, 1858; work began, 1859; canal opened, 1869; received Grand Cross of Legion of Honour. Undertook Panama Canal, 1881, on insufficient money; charged with fraud; sentence of imprisonment not carried out.

Smith, *Life and Enterprises of F. de Lesseps.*

LESSING, GOTTHOLD EPHRAIM (1729–81), Ger. critic and dramatist; b. Kamenz (Saxony); studied theol., med., and philology at Leipzig, 1746–48, and wrote *Der Junge Gelehrte*, *Der Freigeist*, *Der Misogyn* (plays). L. spent most of the years 1748–55 in Berlin as journalist and critic; to this period belong his critical writings, *Das Neuste aus dem Reiche des Witzes*, *Rettungen*, and *Miss Sara Sampson* (tragedy); lived in Leipzig, 1755–58; returned to Berlin and wrote *Fabeln* and *Philotas* (tragedy), 1759, and his share of the *Briefe die neuste Literatur betreffend* (1759–65). In Breslau (1760–65) L. wrote parts of his great critical work, *Laokoon* (pub. 1766), and his fine comedy, *Minna von Barnhelm* (pub. 1767); app. director of National Theatre, Hamburg, 1767; became court librarian at Wolfenbüttel, 1770, until his death. Three of his best works belong to these years, viz. *Wie die Alten den Tod-gebildet*, 1769, *Emilia Galotti* (tragedy), 1772, and the great drama, *Nathan der Weise*, 1779. L. founded modern drama and crowned the *Aufklärung* movement in Germany.

Life, by Sime (1879), Rolleston (1889).

L'ESTRANGE, SIR ROGER (1616–1704), Eng. writer; royalist, imprisoned, 1648–53; licenser of Press under Charles II. and James II.; attempted to muzzle free expression of thought; fell into disfavour, 1688; translated several classics.

LETHAL, mortal or deadly: l. chamber, a receptacle or apartment in which animals are killed by poisonous gases.

LETHARGY, drowsiness; in med., a condition of profound sleep or unconsciousness from which a person can be awakened only with great difficulty.

LETHINGTON, see MAITLAND OF LETHINGTON.

LETO, see APOLLO.

LETTERKENNY (54° 57′ N., 7° 44′ W.), cathedral town, Donegal, Ireland. Pop. 2400.

LETTERS, see ALPHABET, EPISTLE.

LETTERS PATENT, or LETTERS OVERT, writings sealed with the Great Seal of England, declaring from the sovereign that a person or public company may do certain acts or enjoy certain privileges, which could not be done or enjoyed otherwise; so called because they are *open* and ready to be shown.

LETTRE DE CACHET, see CACHET, LETTRE DE.

LETTS, see LITHUANIA.

LETTUCE (*Lactuca sativa*), a member of the *Compositæ*, the tender leaves of which are used in salads. The flowers, which are small, are borne in panicles, resembling those of the hawkweed.

LEUCADIA (38° 43′ N., 20° 40′ E.), former name of Santa Maura, one of Ionian Islands.

LEUCITE (Gk. *leukos*, white), a rock forming mineral composed of potassium and aluminium, occurring in volcanic rocks. Colour, white and shades of grey; was formerly called white garnet, owing to colour and form of crystals, which are dull and opaque though sometimes transparent. Leucite rocks contain L., and are rare, though widely distributed. They are mostly lavas belonging to Tertiary period, and are unknown in England.

LEUCOCYTHÆMIA, see BLOOD.

LEUCTRA (38° 17′ N., 23° 14′ E.), small town, Bœotia, Greece, where Thebans defeated Spartans in 371 B.C.

LEUK (47° 19′ N., 7° 38′ E.), town, Valais, Switzerland; thermal mineral springs.

LEUTHEN (51° 5′ N., 16° 48′ E.), village, Pruss. Silesia, Germany; where Frederick the Great defeated Austrians, 1757.

LEVALLOIS-PERRET (48° 51′ N., 2° 20′ E.), suburb, Paris, France. Pop. (1911) 68,703.

LEVANT (*c.* 34° N., 34° E.), eastern end and shores of Mediterranean.—**Levanter**, prevailing summer wind (easterly) off N. African coast.

LEVELLERS, Eng. political party during Great Rebellion; came into prominence, 1647; opposed monarchical government; dissatisfied with parliamentary government after king's death, broke into open revolt, 1649; repressed by Cromwell and Fairfax; gradually lost importance.

LEVEN (56° 12′ N., 3° W.), town, Fifeshire, Scotland; manufactures linen, paper, etc. Pop. (1911) 6559.

LEVEN, EARLDOM OF, Scot. honour; bestowed in 1641 on Sir Alexander Lesley; David Melville, 2nd Earl of Melville, succ. as 3rd Earl of L., 1681, since when the titles have been united.

LEVEN, ALEXANDER LESLIE, 1ST EARL OF (*c.* 1580–1661), Scot. soldier; distinguished in service of Charles IX. and Gustavus Adolphus of Sweden; commanded Scots army against Charles I., 1640; took Edinburgh Castle, defeated king at *Newburn*; in Civil War commanded Scots army against king at *Marston Moor*; took Newcastle, 1644; served against Cromwell at *Dunbar*, 1650.

LEVEN, LOCH (56° 12′ N., 3° 22′ W.), lake, Kinross-shire, Scotland; has seven islands, including Castle Island, on which is castle associated with Mary, Queen of Scots, and St. Serf's, which has ruined priory. Loch is famous for pink trout.

LEVER, CHARLES JAMES (1806–72), Irish novelist; ed. Trinity Coll., Dublin, where he was noted for his lawlessness and ingenuity; became physician and entered Consular service; d. while consul at Trieste; had a European reputation for generosity, extravagance, and eccentricity. Novels include *Charles O'Malley*, *Harry Lorrequer*, which are full of excellent fun; later he took continental scenes and topics and wrote more didactically, but not with much success.

LEVERETS, the young of the hare (*q.v.*).

LEVERRIER, URBAIN JEAN JOSEPH (1811–77), Fr. astronomer; known chiefly for brilliant investigation of perturbations of orbit of *Uranus* (1846). Adams independently treated same problem (1845) with same conclusion, which led to discovery of planet *Neptune* by Galle of Berlin.

LEVIATHAN, Hebrew term for sea monster; also applied to other big creatures.

LEVIRATE, custom (of uncertain origin) whereby a man must marry his bro.'s widow; very common in primitive times, and still existing to-day amongst certain savage tribes; permitted under certain conditions amongst the Jews.

LÉVIS.—(1) (46° 47′ N., 71° 10′ W.) town, Quebec, Canada. Pop. *c.* 7500. (2) (46° 38′ N., 71° 15′ W.) county, Quebec. Pop. *c.* 26,000.

LEVITES, name given to the body of men in ancient Jerusalem who presided over the Temple services. Traditionally they were descendants of LEVI. The derivation of their name and their origin are really quite uncertain; some think it connected with the name of the priests of an Arabian deity. In the earliest times there seems to have been no priestly clan in Israel, and it is at least a plausible conjecture that the L's were a southern tribe, which became incorporated. Various stages of development can be traced in the Old Testament. In the older books, which reflect the conditions of things under the monarchy, all L's were or could be priests. In the second stage, on the suppression of local shrines and the establishment of the law of the one sanctuary, the priests had to come to Jerusalem, but could not serve at the altar. In the fully developed ritual of post-Exilic times, only the 'sons of Aaron' are true priests, the L's as a whole being servants. The exact process by which these changes came about is unknown.

W. R. Smith, *Old Test. in Jew. Church*; various commentaries on *Hexateuch*.

LEVITICUS, BOOK OF, fourth of so-called Mosaic books, part of the Priestly Code, the latest of the elements which make up the *Pentateuch*. Chapters 17–26 stand somewhat apart. Chapters 1–6 deal with the different sorts of sacrifices—burnt-offering, meal-offering, peace-offering, sin-offering, and guilt-offering; then follow ritual directions for the priests; 8–10 describe the ceremonies of admission to the priesthood; 11–16 give the regulations about clean and unclean meats, which animals may be used for food and which may not; 12–15 deal with personal purity; and 16 the ritual for the Day of Atonement. Chapters 17–26 are sometimes called the Law of Holiness. They resemble P rather than the other sources of the Pentateuch, but have peculiarities of style, and show close resemblances to the Book of *Ezekiel*. They form an originally separate body of laws, which have probably been modified and inserted into the book. They provide interesting points of agreement and contract with 'the book of the Covenant,' *Exodus* 20–23. The Law of Holiness, sometimes symbolised by H, is less detailed. It is possible that fragments from the same source as H exist elsewhere. H was perhaps compiled as the result of the Law of the One Sanctuary, *i.e.* sacrifice was to be offered only in Jerusalem. It is both ritual and moral in scope. Chapter 27 deals with vows and tithes.

Leviticus and Numbers, Kennedy (*Century Bible*).

LEVULOSE, see SUGAR.

LEWANIKA (c. 1860–), S. African chief, who through the influence of the missionary François Coillard, became civilised, and, in 1890, placed Barotse territory under Brit. protection.

LEWES (50° 52′ N., 0° 1′ E.), town, Sussex, England; ruined priory, dating from 1078; remains of ancient castle, built by William de Warenne, XI. cent. Here Simon de Montfort defeated Henry III., 1264. Pop. (1911) 10,972.

LEWES (38° 40′ N., 75° 7′ W.), town, Delaware, U.S.A.; fine harbour; fruit trade. Pop. 2158.

LEWES, GEORGE HENRY (1817–78), Eng. journalist and philosopher; abandoned medicine and the stage for encyclopædic study; pub. *Biographical History of Philosophy*, 1845–46; *Life of Goethe*, 1855; his best philosophical work was *Problems of Life and Mind*; although married, lived with George Eliot, 1854 till death; founded and edited *Fortnightly Review*, 1865–66. L. was influenced by Positivism, but did not give it entire acceptance; able, too, as a psychologist, but rather unsystematic.

LEWIS, SIR GEORGE CORNEWALL, Bart. (1806–63), Eng. politician and writer; Poor Law commissioner, 1839; sec., Board of Control, 1847; Under-Sec., Home Office, 1848; Financial Sec., Treasury, 1850; Chancellor of Exchequer, 1855; Home Sec., 1859; War Sec., 1861; among other works, wrote *Government of Dependencies*.

LEWIS, IDA (1841–1912), Amer. lighthouse-keeper, noted for her courage in saving life.

LEWIS, MATTHEW GREGORY (1775–1818), Brit. dramatist and general writer, known as MONK LEWIS from his romance, *Ambroso, or the Monk*. Most of his work is now forgotten.

LEWIS, MERIWETHER (1774–1809), Amer. army officer; commanded exploring expedition to Missouri, 1803; sailed up Missouri, and crossed Rockies to Pacific, 1804–6, discovering hitherto closed-up country and unknown native tribes; gov. of N. Louisiana, 1807.

LEWISBURG (40° 57′ N., 77° 1′ W.), town, Pennsylvania, U.S.A. Pop. 3081.

LEWISHAM (51° 31′ N., 0° 4′ W.), borough, London, England. Pop. (1911) 160,843.

LEWISTON (44° 4′ N., 70° 13′ E.) town, Maine, U.S.A.; manufactures cottons, woollens; site of Bates Coll. Pop. (1910) 26,247.

LEWIS-WITH-HARRIS (58° 10′ N., 6° 35′ W.), northernmost island, Outer Hebrides, Scotland; area, *c.* 770 sq. miles. Lewis, or N. part, is included in Ross-shire; Harris, or S. part, in Inverness-shire; coast deeply indented; produces barley, potatoes, fish, tweeds; has some stone circles and other interesting remains; chief town, Stornoway (*q.v.*). Pop. *c.* 32,000.

LEXICON, see DICTIONARY.

LEXINGTON.—(1) (38° N., 84° 31′ W.) town, Kentucky, U.S.A.; lies in midst of blue grass district; site of State and Transylvania Univ's; important horse market; manufactures whisky, carriages, tobacco, hemp, etc. Pop. (1910) 35,099. (2) (42° 30′ N., 71° 14′ W.) town, Massachusetts, U.S.A.; chiefly famous as site of first engagement in War of Amer. Independence, 1775; principal industries, agriculture and dairy-farming. Pop. (1910) 4918. (3) (39° 10′ N., 93° 50′ W.) town, Missouri, U.S.A.; manufactures hemp, woollens, bricks; large coal trade; scene of hostilities in Civil War. Pop. (1910) 5242. (4) (37° 42′ N., 79° 20′ W. town, Virginia, U.S.A.; site of Virginia Military Institute and Washington and Lee Univ. Pop. (1910 2931.

LEYDEN, see LEIDEN.

LEYDEN JAR or CONDENSER, electrical appliance for storing electricity, invented at Leiden; consists of glass jar coated inside and outside with tin foil, and a metal knob connected by conductor with the inner coating; it is charged through the knob, and discharged by connecting the knob with outer coating; used in study of 'spark discharges' and 'electrical waves.'

LEYTON (51° 34′ N., 0° 1′ E.), town, Essex, England; suburb of London. Pop. (1911) 124,736.

LHASA, LHASSA (29° 39′ N., 91° 6′ E.), capital, Tibet; name means 'Abode of the Gods'; sacred city of Buddhists; situated on fertile plain about 11,900 ft. above sea-level; encircled by mountains. L. was visited by several R.C. missionaries in XVII. and XVIII. cent's; after 1760, Europeans were forbidden to enter city, but in 1904 it was occupied by force of Ind. army under General Macdonald and Colonel Younghusband, when a treaty establishing

friendly relations was arranged. Town is laid out with comparative regularity, but is exceedingly dirty; principal building is the Potala, residence of Dalai Lama, a huge building with gilded roof, which stands on a hill to W. of city. The great temple or Jokhang stands in centre of town and contains many sacred shrines, one of which holds life-size image of Buddha. The Ramo-Chhe is also a celebrated temple, where sorcery and magic are practised and taught. L. has many monasteries, including those of Moru, Sera, Debung, and Galdan, last three of which were established by Tsonhava, XIV. and XV. cent's. L. has important transit trade by meeting of caravans from India, China, and Turkestan; trades in tea, silk, carpets, gold, lace, gums, porcelain, musk, rice, tobacco. Pop. 15,000 to 20,000. See TIBET, LAMAISM.

Landon, *Lhasa* (1905).

L'HÔPITAL, MICHEL DE (*c.* 1505–73), Fr. politician; Chancellor of France, 1560; approved edict of Romorantin, 1560; opposed persecution of Protestants; helped to procure edict reforming administration of justice; discharged, 1568.

LI HUNG CHANG (1823–1901), Chin. politician; associated with Gordon in suppressing Taiping rebellion, 1863; subsequently gov. of Kiang-su; viceroy of Hukwang, 1867; Chihli, 1870; two Kwangs, 1900; conducted Chin. foreign affairs for many years.

LIA FAIL, see INISFAIL.

LIABILITY, see EMPLOYERS' LIABILITY ACTS; COMPANIES' LIABILITY.

LIAKOURA, see PARNASSUS.

LIAO-YANG (41° 18′ N., 123° 23′ E.), town, Shengking, China. Pop. *c.* 100,000.

LIAS, LYAS, LAYERS, lowest division Jurassic system; divided into three groups—(1) *upper* l., (2) *marlstone* l., (3) *lower* l.; consists of thin layers limestone embedded in blue argillaceous clay; contains numerous fossils, including insects, crinoids, ammonites, gryphites, fish, and plants. Remains of the pterodactyl and great reptiles such as ichthyosaurus, plesiosaurus, and enaliosaurus are found also. L. is exposed at Lyme Regis (900 ft. thick) and runs along Cotswolds to Bath (280 ft.), and is seen at Redcar, Yorks (500 ft.), and in N. Scotland, Ireland, and other localities.

LIBAU (56° 30′ N., 21° 1′ E.), port, Courland, Russia; fine harbour; exports grain, flax, hemp, linseed, etc.; iron foundries, shipbuilding yards. Pop. (1910) 85,000.

LIBEL AND SLANDER, defamation of character; libel—by writing, printing, or otherwise publishing in more or less permanent form; slander—by spoken word. Generally in case of s. special damage to person defamed must be proved, but not necessarily in case of l. Publication, that is, the communication to some other person than the plaintiff, must be proved in either case. Every person has a legal right to earn the goodwill and respect of his fellows, and therefore if some one publishes a defamatory statement concerning him, so that he is shunned by others, his legal right is invaded, and there is cause for action. The plaintiff must prove that the l. or s. was aimed at him personally, and a defamatory statement concerning any considerable class of persons can be uttered without let or hindrance. Disguise or omission of a name does not save the libeller if the plaintiff can satisfy a jury he is the person defamed.

LIBELLATICI, those who, during Decian persecution in 250, procured certificate stating they had sacrificed to the gods, to escape martyrdom.

LIBELLULA, genus of dragon-fly (*q.v.*).

LIBER PONTIFICALIS, work containing lives of popes from St. Peter; of composite authorship, probably begun in VI. cent.

LIBERAL PARTY, political party in Gt. Britain; successors of Whigs; name definitely adopted in Gladstone's time; original motto, 'Peace, Retrenchment, and Reform'; aims at social progress and at bettering condition of lower classes; supports Free Trade, Irish Home Rule, and Welsh Disestablishment.

LIBERIA (*c.* 4° 20′ to 9° 45° N., 7° to 11° 30′ W.), negro republic, W. Africa, extending S.E. of Sierra Leone for 350 miles along coast to Fr. colony of Ivory Coast, and claiming country for about 200 miles inland. L. was established as a home for freed slaves in 1822 by a number of Amer. and European philanthropical societies. Boundaries were defined by treaties with England, 1885, and France, 1892 and 1907–10, by last of which a strip of territory was transferred to France; and in 1911 the Kanre-Lahun district was ceded to Sierra Leone. L. has area of *c.* 40,000 sq. miles, of which only the coastal strip is under effective government administration. Coast is low and swampy; interior rises, and has excellent timber; watered by Cavalla and other streams; soil very fertile; produces coffee, palm oil and kernels, rubber, cocoa, ivory, sugar, arrowroot, piassava, hides, kola nuts. Capital is Monrovia. Constitution resembles that of U.S.A.; executive power held by pres., assisted by vice-pres. and cabinet of six ministers; legislature consists of two houses, Senate and House of Representatives. Owing to unsatisfactory financial position of L. an international loan of £500,000 was agreed to, 1911, secured by Customs, rubber and head taxes, under administration of an Amer. controller and Brit., Fr., and Ger. sub-controllers. The inhabitants are all of negro race, and most of them profess Prot. religion. Pop. 1,500,000 to 2,000,000.

Johnston, *Liberia* (1906).

LIBERTAD, LA LIBERTAD (*c.* 8° S., 78° 30′ W.), maritime department, Peru, S. America; area, 10,206 sq. miles; produces cereals, cotton, coffee, fruits, cocoa. Pop. (1906) 188,000.

LIBERTARIANISM, theory that the will is 'free.'

LIBERTINES, term of opprobrium, used specially by Calvin in reference to the Genevan Anabaptists; for origin of term, see *Acts* 6⁹.

LIBERTY PARTY, first Amer. anti-slavery political organisation; founded chiefly by James Birney, whom party nominated for presidency, 1840; thorough organisation attempted after 1840; attained its greatest development, 1846; subsequently lost influence except in New England; held last national convention at Buffalo, 1847; joined Free Soil Party, 1848, thus losing identity.

LIBMANAN (*c.* 14° 5′ N., 123° E.), town, Luzon, Philippine Islands. Pop. *c.* 18,500.

LIBOURNE (44° 55′ N., 0° 11′ W.), town, Gironde, France; manufactures woollens; wine trade. Pop. 20,000.

LIBRARIES are almost as ancient an institution as the invention of writing. The accumulation of written records is the nucleus of a l. The earliest memoranda would fall roughly into two groups—the civic documents kept in the archives and the religious documents kept in the temples. But such papers are not collected in order to promulgate culture; l's containing works of general reference belong to a much later period of civilisation. The earliest l's of general reference were collected in Egypt and Assyria, and date from the remote period of 4000 B.C. Thus Sargon I. instituted a collection of works on all known subjects of learning in the year 3800 B.C. in the city of Accad. Throughout Babylonia at this time similar collections had been made. These were aggregated by Assurbanipal to replenish the great library of Nineveh—a library stocked with works on all known departments of learning, and thrown open to public use. We have little authentic information regarding the institution of l's in Greece. The small collections of private persons were kept in cylindrical boxes labelled and numbered.

We have relics of a large library at Herculaneum, in which the rolls were stored on the shelves of presses. Peisistratus is not only credited with editing a standard edition of Homer, but with collecting a larger and varied l. Aristotle had a great collection of heterogeneous works corresponding to the versatility of his own genius, and he is said thus to have set the example to the kings of Egypt.

Our knowledge of Egyptian libraries is more detailed. Diodorus Siculus relates that the l. of King Osymandyas (said to have been Rameses I.) had inscribed over the portal, 'Dispensary of the Soul.' There were two l's at Alexandria—the 'Great,' in the Museum, and the 'Daughter,' in the Serapeum. Callimachus is said to have constructed *pinakes* (catalogues) for the 'Great' library. These l's contained an immense store of knowledge. When Cæsar fired the fleet in Alexandria, the 'Great' l. was destroyed, and to compensate for the loss Antony sent to Alexandria the l. of Pergamum. The 'Daughter' l. now became the chief l. of Alexandria, but Theodosius partially destroyed it. Possibly its contents were less valuable than is generally supposed when it was demolished by the Arabs under Amru. On that occasion the Caliph Omar is said to have stated that if the books of the l. agreed in doctrine with the Koran, they were superfluous, if they did not they were baneful, and in both cases they should be destroyed.

The first Rom. l. of noteworthy extent was that transferred to Rome as spoils of war by Æmilius Paulus in 168 B.C., and which had belonged to the kings of Macedonia. From Cicero's correspondence we can form some idea of the interest taken by the writer and his friend Atticus in book-collecting. To Pollio belongs the credit of establishing the first public l. at Rome. Cæsar had projected the institution of a public reference l., but his project was left to Augustus to realise. Augustus founded two l's known as the Palatine and the Octavian. The Rom. emperors continued to found l's, of which the most famous is the Ulpian, instituted by Trajan. Constantine founded a l. of Christian authorities at the new Rom. capital of Byzantium.

In the Middle Ages pagan lit. was for the most part suppressed, and l's were almost exclusively the property of the monasteries. Of the various orders that of St. Benedict was the most famous with regard to book-collecting. The unrest on the Continent during the VI. and VII. cent's brought the treasures of the continental monasteries over to England. Thus the collections at Canterbury (founded by St. Augustine), York, Durham, and Whitby were at one time the finest European l's. (These were eventually destroyed by the coming of the Northmen.) Alcuin, Charlemagne's librarian, advised the king to send to Britain for books to stock his new l. Among the many famous monastic collections of Europe were those of St. Gall in Germany, Monte Cassino in Italy, and Fleury in France.

The conquest by the Arabians, when once their position was secured, was not inimical to learning. The l's of Bagdad and Cordova were universally famous, and the reinstitution of the l. at Constantinople during the Gk. revival of the IX. cent. seems to have been inspired by Arab. activity.

But it was the Renaissance that gave the great incentive to the making of l's. Italy took the lead. Niccolo Nicoli in 1436 left his l. as a legacy to the public. Following this precedent, Lorenzo de' Medici instituted his famous l. England, however, was slow to imitate the continental movement. Abp. Parker tried in vain to persuade Queen Elizabeth to follow the example set by Germany, Italy, and France. In the XVII. cent. many local l's were founded, but no national institution was formed. Sir Thomas Bodley founded the Bodleian library at Oxford, and at the same time Abp. Usher started that of Trinity Coll., Dublin. In 1627 Drummond of Hawthornden presented Edinburgh Univ. with a fine collection of books, and in 1682 the Faculty of Advocates of the same city appointed Sir George Mackenzie to superintend the collecting of books for their l. Though the l. of the University of Cambridge had been founded in the XV. cent., it was comparatively insignificant till George I. replenished it with a valuable contribution. Lambeth L. was founded in 1610, Sion Coll. (a guild of London clergymen) in 1629, and about this period public l's were founded in Leicester, Norwich, Bristol, and Manchester.

In 1610 Sir Thomas Bodley elicited from Stationers' Hall a grant for the Oxford L. of a copy of every book entered there. In the reign of Anne this grant was extended, and applied also to the Royal L. of St. James's, Cambridge L., Advocates' L., Edinburgh, and Sion Coll. L., London. Subsequently the privilege was extended to Trinity Coll. L., Dublin, and King's Inn L., Dublin. These rights were, however, commuted in 1835, and a compensatory yearly grant was made to those deprived of the benefit, viz. Edinburgh Univ., £575, Glasgow, £707, St. Andrews, £630, Aberdeen, £320, King's Inn, Dublin, £435, and Sion Coll., £363. It was not till mid. XIX. cent. that circulating l's were established generally in the larger cities of England, and the statistics of the period show that in this respect Britain fell far behind continental countries. William Ewart, M.P. for Dumfries, was indefatigable in his efforts to ameliorate matters. In 1849, in response to a motion of his, a Committee was formed to inquire into the best methods for founding a more adequate number of public l's. Subsequently a motion of Ewart's gave power of taxation of the inhabitants to certain districts for the purpose of maintaining public libraries.

The Brit. Museum, the national l. of Britain, is now the finest public l. in the world. In 1753 Sir Hans Sloane offered his valuable collection of books and MSS. to the nation for the sum of £20,000. The conditions of the offer also stipulated that they should be kept in a special museum. Parliament accepted the offer, and also purchased a collection belonging to Robert Harley, Earl of Oxford. To house the collections, Montague House, Bloomsbury, was purchased, and in 1759 opened as the Brit. Museum. To these collections were added the Cotton Collection, and the Royal L. of the Sovereigns of England (presented by George II.), along with which went the copyright privilege. In 1823 the splendid library of George III. was added. Other important collections added were the Hamilton (1772), the Cracherode (1799), the Antiquities from Alexandria (1867), the Towneley Marbles, etc. (1805–14), the Lansdowne MSS. (1807), the Phigalian Marbles (1815), the Elgin Marbles (1816), and the Burney L. (1818). Anthony Panizzi was mainly responsible for the marvellous growth of the library; he secured from the Government the annual grant of £10,000; he won the bequest of the priceless Grenville Collection, and planned the magnificent reading-room.

Of the continental l.'s the most famous is the Bibliothèque Nationale of Paris, which contains the collections of many Fr. monarchs, and was enriched with spoils so lavishly after the Revolution. Other notable Fr. l's are those of Bordeaux, Grenoble, Aix, Nantes, Besançon, Rouen, and Troyes. In 1862 an important edict enforced the establishment of a l. in connection with all the primary schools of France. The Royal National L. of Germany is eclipsed in interest by the Royal L. of Munich. Other important Ger. l's are those of Dresden, of Stuttgart, of Darmstadt, and the various univ's. In Austria-Hungary famous l's are those of Cracow, Gratz, Budapest, and the Imperial L. of Vienna. Italy is noted for its ancient l's—the finest are at Florence, Milan, Venice, Parma, and those of the univ's of Bologna, Genoa, Naples, Pisa, and Turin. But the Vatican L. of Rome, the oldest in Europe, is unique—so rich is it in priceless MSS. and antique volumes. In Spain the chief national l. is at Madrid. In Belgium there is a magnificent Bibliothèque Royale at Brussels. The chief l's of Holland are at Amsterdam and The Hague. In Denmark the Royal L. of Copenhagen is open to the public. The best equipped l. of Sweden is at Stockholm. The fine Imperial Library of St. Petersburg is also open to the public. In U.S.A. the establishment of public l's was late. The oldest collections were at Harvard Univ. and at Yale Coll., New Haven. The largest Amer. l. is the Library of Congress at Washington, the third largest in the world.

Savage, *The Story of L's*; Ogle, *The Free L.*; Clark,

Medieval and Renaissance L's; Fletcher, *Public L's in America*.

LIBRIS, EX, see BOOK (*Bookplates*).

LIBYA, ancient Gk. name for N. Africa.

LICATA (37° 4′ N., 13° 57′ E.), port, Sicily; large export trade in sulphur; excellent harbour. Pop. 23,000.

LICE (Order *Anopleura*), small, wingless, externally parasitic insects, which infest mammals, piercing the skin by means of a hooked tube and sucking the blood. *Pediculus capitis*—the Head Louse—is found on the human head.

LICENSING LAWS.—The profits of the sale of ale, England's native liquor, were often a regality in England in the Middle Ages. The lord of the manor frequently ran the brewery and alehouse over which his arms are still sometimes to be seen. It was long, however, before the state adopted the idea of making revenue from liquor. Its first interference was in the consumer's interest. The Statute of bread and ale (*panis et cervisiæ*), 51 Hen. III., enforced standard of quality on same principle as state controlled manufacture of cloth, weights, and measures. A new development—still without idea of revenue—took place in Tudor times when the drunken man became as important a problem as the sturdy rogue and vagabond. Justices of peace were given powers of suppression of taverns, 1495, and one of reforms of Somerset's protectorate was first licensing Act of 1551, by which license to keep alehouses had to be obtained from justices of the peace; alehouses were compelled to close at 9 p.m., and already in XVI. cent. restrictions were placed on Sunday opening. Growing strength of Puritanism caused severe regulations in early XVII. cent.; by Act, 1618, licences had to be taken out annually; both victualler and consumer were fined for drunkenness under Act, 1625.

Previous regulations seem to have applied to beer and wine only; wine, by Act of 1552, might not be consumed on premises; consumption of spirits was rare till second half of XVII. cent.; selling of spirituous liquors brought under same conditions as that of ale, 1700–1, and attempt was made to restrict grants of licences. XVIII. cent. was the great age of drunkenness in England, but high duties imposed on intoxicating liquors were due to device of exchequer as well as to social reform. First excise (*q.v.*) duties were imposed in England, 1643, on ale, beer, wine, cider, perry, tobacco; duties on licences not imposed until Act, 1784; Gin Act, 1736, roused great anger in country and led to illicit distilling. Two great difficulties have always prevented excessive interference with liquor traffic: so important a source of revenue cannot lightly be tampered with; high licensing has always produced fraud; add that state interference as social reformer has always been unpopular with a large section of population. A beneficial Act, 1753, made debts incurred by tippling irrecoverable at law. Liquor traffic is now controlled by Intoxicating Liquor Licensing Act (Alehouse Act), 1828, subsequently amended, by which, besides excise licence, justices' licence or certificate has to be obtained by alehouse-keeper; this Act was made applicable to all establishments selling intoxicating liquors by Wine and Beerhouse Act, 1869, Wine and Beerhouse Amendment Act, 1870, and Licensing Act, 1872.

By Act, 1828, 'off' licence was granted for sale of beer in quantity not less than 4½-gallon cask or 2 dozen quart bottles, and which, by Act, 1834, is not retail sale; spirits by above Acts could not be purchased in quantities less than 2 gallons; spirit dealer need not have justices' licence if he sells nothing but intoxicating liquors; by above Acts he might sell by retail not less than a quart bottle of wine. Theatres, etc., may receive licence under Act 5 and 6 Will. IV.; 'grocers' licences' granted to refreshment houses, 1860. XVI. cent. regulations as to Sunday closing remained only as far as hours of service were concerned; by Police Act, 1839, public-houses were closed from midnight, Saturday, till midday, Sunday; Forbes Mackenzie Act, 1853, made weekday closing hour 11 p.m., and forbade sale to any but lodgers and travellers on Sundays; public-houses may now open 6 a.m. to 11 p.m., weekdays, 12.30 p.m. to 3 p.m. and 6 to 10 p.m. Sundays, and in London, 5 a.m. to 12.30 at night, except Saturdays, when they close at 12 p.m., and Sundays 1 to 3 and 6 to 11 p.m. Travellers must have come not less than 3 miles to be excepted during prohibited hours on Sunday. Scotland and Wales close all day Sunday, as does Ireland, except in chief towns; publicans pay smaller licence duties for shorter hours; methylated spirits may not be sold from 10 p.m. Saturday to 8 a.m. Monday. Licensing system almost confined to British dominions and colonies; each state of U.S.A. acts independently in matter; local prohibition, also allowed in England, is common. Scot. Temperance Bill, dealing with reduction of licensed premises, etc., drastically amended by Lords; Commons determined to reintroduce Bill, 1913.

LICHEN (*lichen ruber*), skin disease characterised by slight rise of temperature, with appearance of small red points close together, more or less all over the body.

LICHENS are, in reality, dual organisms resulting from the symbiotic union of one, or (rarely) more, species of green or blue-green alga, and certain species of the higher fungi (*q.v.*), which with the exception of the tropical form, *Cora pavonia*, are Ascomycetes. Very characteristic growths are thus produced, which form encrustations or tangled shaggy patches on rocks, trees, and similar substrata, and are extremely resistant. The fungal constituent derives its nourishment from the assimilatory products of the alga, supplying inorganic and possibly certain organic matter in return. In simplest cases the lichen thallus consists of a filamentous or gelatinous mass, which includes both symbionts (*e.g.* Ephebe, Collema), but the majority are more highly specialised, and, in these, the algæ (or *Gonidia*) occupy a definite layer enclosed and protected by a highly resistant cortical layer of closely interwoven fungal filaments. Such l's are said to be heteromerous, and fall into three series: (*a*) *Crustaceous* forms, in which the thallus is closely adpressed to the substratum, to which it is normally intimately attached; (*b*) *Foliaceous* forms, in which the main body of the lichen is lobate and free, being attached to the substratum ventrally by a mass of root-like growths termed rhizines; (*c*) *Fruticose* forms, in which the thallus is attached by the base only, and often branches freely, and possesses a ribbon or tree-like form.

There are, however, a number of intermediate connecting forms. The reproduction of the Gonidia is by simple fission, but the l. as a whole is multiplied, either by fragmentation of the thallus, or by shedding of small, powdery masses, termed 'soredia,' each of which consists of a small group of actively dividing algæ, enclosed by fungal filaments. The familiar disc-shaped fruit-bodies, or apothecia, are the product of a multicellular carpogonium (the female sexual organ), which bears apically a club-shaped trichogyne to which the male elements adhere. In some species, however (*e.g.* Parmelia), the production of the apothecia appears to be purely apogamous. Among the best-known forms are the 'Beard lichen,' *Usnea barbata*, which is fruticose, and *Xanthoria parietina*, a foliaceous species which forms conspicuous orange patches on rocks and walls, especially at the seaside. Others of considerable interest are the Reindeer moss of the tundras, *Oladonia rangiferina*, utilised by the Lapps as winter fodder, and *Sphærothallia esculenta*, which grows on the rocks of the Asiatic steppes. The latter breaks up into small rounded fragments, which are distributed by the wind, and are utilised by the Tartars as a constituent of their earth bread. The Iceland moss (*Cetraria islandica*) is used medicinally as a demulcent, whilst *Roccella tinctoria* is also of

commercial importance, yielding the dyes litmus and orseille.

LICHFIELD (52° 42′ N., 1° 50′ W.), town, Staffordshire, England; episcopal see, founded by St. Chad, VII. cent.; cathedral dates from XIII. cent., and was restored after Civil War; episcopal palace, grammar school; birthplace of Dr. Johnson; chief industry, brewing. Pop. (1911) 8617.

LICHTENBERG, former principality, Rhenish Prussia, Germany.

LICHTENBERG, GEORG CHRISTOPH (1742–99), Ger. physicist; studied Göttingen Univ.; made investigations in electricity.

LICINIUS (250–324), Rom. emperor, 307, jointly with Galerius; jointly with Maximinus, against whom he rebelled, 313, becoming master of the East; conquered and deposed by Constantine, 323.

LICODEA EUBEA (37° 8′ N., 14° 44′ E.), town, Sicily. Pop. 7033.

LICORICE, see LIQUORICE.

LICTORS, see CONSUL, FASCES.

LIDDESDALE (55° 15′ N., 2° 45′ W.), district drained by Liddel, Roxburghshire, Scotland; contains Hermitage Castle, which has associations with Mary Stuart and Bothwell.

LIDDON, HENRY PARRY (1829–90), Eng. theologian; Ireland prof. of Exegesis at Oxford, 1870–82, and from 1870 Canon of St. Paul's, where his sermons drew enormous congregations; follower of Pusey, and vigorously opposed liberalising tendencies.

LIE, JONAS LAURITZ EDEMIL (1833–1908), famous Norweg. novelist. His works are descriptive of the lower classes, and the finest are *The Family at Gilje* (1883) and *Married Life.*

LIEBER, FRANCIS (1800–72), Amer. author and historian of Ger. birth; fought at Waterloo; settled in U.S.A., 1827.

LIEBIG, JUSTUS VON, BARON (1803–73), Ger. chemist; prof. of Chem. at Giessen, 1824–52; at Munich, 1852–73; laid the foundations of ultimate organic analysis; invented potash bulbs and a condenser; showed fulminic acid isomeric with cyanic acid, 1823; pub., with Wöhler, *Researches on the Radicle of Benzoic Acid,* 1832, and with Dumas, a memoir on polybasic acids, 1838; made valuable contributions to the chem. of agriculture and physiology, and established by analysis the nutritive values of foods; a well-known extract of beef is prepared from his prescription. See *Life,* by Shenstone.

LIEBKNECHT, WILHELM (1826–1900), Ger. Socialist; led Baden rebellion, 1848; imprisoned; subsequently escaped to France; returned to Germany, 1862; founded *Demokratisches Wochenblatt*; imprisoned, 1872–74; entered Reichstag, 1874; edited *Vorwärts,* Socialist paper.

LIECHTENSTEIN (47° 7′ N., 9° 33′ E.), small independent principality, between Vorarlberg, Austria, and Swiss cantons of Graubünden and St. Gallen; area, 65 sq. miles. Chief town, Vaduz; produces wine, fruit, timber, corn. Pop. 9900.

LIÈGE.—(1) (50° 32′ N., 5° 30′ E.) province, Belgium; area, 1117 sq. miles. Pop. (1910) 888,340. (2) (50° 38′ N., 5° 34′ E.) town, Belgium; capital of above; episcopal see; cathedral dating from X. cent.; seat of famous univ.; strongly fortified; important manufacturing town; coal, iron, zinc mined; manufactures small-arms, machinery, woollens, leather, sugar. L. was long the scene of hostilities between burghers and bishop-princes; taken by Charles the Bold, 1467; by Marlborough, 1702; by French, 1691 and 1792. Pop. (1910) 174,768.

LIEGNITZ (51° 12′ N., 16° 9′ E.), town, Prass. Silesia, Germany; old ducal palace; manufactures machinery, textiles, etc. Here Frederick II. defeated Austrians, 1760. Pop. (1910) 66,620.

LIEN, the right to retain property belonging to another until certain demands of the person in possession of the property have been satisfied. A *particular* l. arises out of the actual property retained, and is caused either by a definite contract, or by an implied contract. A *general* l. is given by indebtedness on other accounts. As a l. is only valid when the person through whom it is acquired has the absolute right of ownership, so it can only be enforced by the person to whom it is due in his own right, and not by an agent. It may be waived or lost by an act of agreement between the parties, by which it is surrendered, or made inapplicable; and it has been held that it may be lost by the temporary relinquishing of possession. But it is not lost when the demand in respect of which it was acquired can no longer be enforced by an action by reason of the Statute of Limitations; for the Statute does not end the debt, but only the legal recovery by action. A l. may be enforced simply by retention of property, and the courts have from time to time decreed a sale for the satisfaction of an unpaid l. Property subject to a l. may be disposed of by its owner, and the purchaser will have a perfectly valid title, but he must discharge the l. By the Judicature Act, 1873, the Chancery Divison of the High Court must deal with cases concerning the sale and distribution of property subject to lien.

LIERRE (51° 8′ N., 4° 34′ E.), town, Belgium. Pop. 24,611.

LIESTAL (47° 29′ N., 7° 44′ E.), town, near Basel, Switzerland. Pop. (1910) 5930.

LIEUTENANT (Fr., from Lat. *locum tenens,* holder of place, substitute), representative; especially applied to officer below captain in rank in army and navy; l. in navy has rank of army captain; l.-general and l.-colonel are deputies of general and colonel; lord l. of a county, Crown gov.; Lord L. of Ireland, viceroy.

LIFE, see ANIMALS.

LIFE ASSURANCE, see INSURANCE.

LIFEBOAT, see LIFE-SAVING APPARATUS.

LIFE-SAVING APPARATUS, term including all appliances for saving life, but generally applied to life-belts, life-jackets, and boats by which one may escape from a ship at sea. Life-jackets and buoys are made of cork, sewn in canvas, and enable wearer to float with ease. Cargo steamers generally carry sufficient boats for all on board; but in large passenger vessels this is almost impossible. In passenger vessels the Welin davit, by which the boats are carried outboard into the lowering position by turning a handle, is now used. Davits sometimes hold two boats side by side, or three in a tier. All the boats have inclosed buoyancy either in form of airtight, watertight copper cylinders, or externally fitting cork fenders, or with the buoyancy carried under a deck. Each boat must be fully equipped with oars, rudder, etc. (and in certain cases with mast and sail), and with fresh water, while provisions and self-igniting lights are sometimes carried. Cork mattresses which support three or four men are other life-saving appliances.

For life-saving from shore the *rocket apparatus* is almost invaluable. A rocket is fired carrying a line over the vessel, and this enables those on shore to send out a hawser and then to work backwards and forwards a sling buoy, sufficient to carry a person to the shore.

Lifeboats are boats of great strength, made very stable by a heavy keel, buoyant by a watertight deck and air-chambers, self-emptying, and self-righting. Institutions either State supported or by voluntary subscription provide and maintain lifeboats round the coasts of Britain, U.S.A., France, and Germany.

LIFFORD (54° 50′ N., 7° 29′ W.), town, County Donegal, Ireland. Pop. 446.

LIFTS, see ELEVATORS.

LIGAMENT, anything which ties one thing to another; in anat., a band of tissue connecting the bones forming a joint, or holding an organ in place, usually composed of parallel or interlacing fibres of flexible, dense, white, fibrous tissue.

LIGAN or **LAGAN,** see FLOTSAM.

LIGAO (13° N., 123° 50′ E.), town, Luzon, Philippine Islands. Pop. 18,000.

LIGHT is that branch of science which deals with the external cause of our visual sensations. It is also

known as Optics, and is frequently divided into such sections as Geometrical Optics, Physical Optics, and (although beyond the present scope) Physiological Optics. The first of these deals with the transmission, reflection, and refraction of light-rays, without inquiring into their physical nature. The second explains all phenomena relating to l. on the theory that it is due to a periodic displacement or wave motion in a luminiferous medium. The third includes the study of the anatomy of the human eye and the physiological factors relating to human vision.

Previous to the beginning of the XIX. cent., several theories had been propounded to account for the nature of l. and its propagation, but the two principal explanations offered were those known as the Corpuscular Theory, and the Undulatory or Ether Wave Theory. According to the former, the sensation of l. was excited by the impact on the retina of a large number of minute particles, or corpuscles, emitted in large numbers by the source of l. and travelling through transparent substances, as well as vacuous space, with great speed. Apart from inherent improbabilities, there were fatal objections to this theory, *e.g.* the speed of l. should, according to it, be greater in a denser medium, whereas Foucault showed experimentally that the reverse is the case. It also encountered serious difficulties in attempting to explain interference, diffraction, and polarisation.

The Undulatory Theory supposes that all space, including intra-molecular space, is filled with a medium capable of transmitting vibrations; that a ray of l. consists of a wave motion in this medium; and that the direction of vibration or periodic displacement in the wave is perpendicular to the direction of the ray. The medium thus proposed must therefore have qualities analogous to density and elasticity. This theory has been successful in explaining practically all the known facts regarding l. The real difficulty which it has to overcome is to explain the nature of the interaction between matter and ether. Substantial advances have been made in this direction during recent years.

Accepting the undulatory theory, we may briefly summarise the leading points in the science by considering the essential characteristics of a ray of l., and, to begin with, we confine ourselves to monochromatic l. Any wave which is propagated in a medium has three principal features (see Wave). It must have (1) a certain *wave-length*, just as regular waves in the ocean have a length measured from crest to crest; (2) a certain *period*, i.e. the time taken by any portion of the medium affected by the wave to describe one complete vibration; (3) a certain *amplitude*, i.e. the distance on each side of the position of undisturbed rest through which the portion of the medium vibrates to and fro, and corresponding, in the case of ocean waves, to the height of the crest or the depth of the trough, measured from the ordinary undisturbed sea-level. Combining the first and second of these characteristics, it is seen that the velocity of propagation of the wave, as a whole, will be equal to the wave-length divided by the period. Applying these results to the case of a light wave, it is found that the wave length of light which is ordinarily appreciable by the human eye varies from $\frac{1}{2500}$ to $\frac{1}{1250}$ millimetre. The former (i.e. the shorter) waves give rise to violet-coloured light. As the wave-length increases we have, by indefinitely minute gradations, blue, green, and orange l., until for the longer wave-length mentioned we have red l. This range does not, however, exhaust all possible wave-lengths, for the existence of waves which are either too short or too long to affect the retina has been fully proved (see Photography, Radiation).

The different periods of l. waves can be deduced from the relation to the speed of l. The term *frequency* is used occasionally instead of period; it stands for the number of vibrations per second, and therefore is the reciprocal of the period. The amplitude of a l. wave is the factor which governs the intensity of the ray, for with light of a given wave-length the energy in the ray is proportional to the square of the amplitude. For the various methods of determining the intensity of a beam of l., see Photometry.

The speed of l. in air or a vacuum has been determined by different methods which show that its most probable value is about 300 million metres per second, and that it is the same for all wave-lengths. From the fact that l. consists of an undulatory motion in the ether, it is possible to explain the important phenomena which arise when rays from two separate sources meet at a point. Analogous cases are found in ocean waves and in the phenomena of the tides. If, owing to any cause, two series of waves from different sources affect the same water surface, there may occur the case where crests of waves in one series unite with crests of the other series. In this case the resultant wave has an amplitude equal to the sum of the component amplitudes. But in the case where the crests of one series meet the troughs of the other, the resultant amplitude is the difference of the component amplitudes, and if these are equal there is no disturbance of the sea-level. Similarly, it is possible to produce a combination of rays which will give either increased or diminished brightness. This is known as *interference* (see Interference and Diffraction below).

Another group of phenomena is due to the fact that the vibration of the ether, being perpendicular to the direction of the ray, may be confined to one particular plane. The l. is then said to be *polarised* in that plane. Further, since harmonic motions in directions inclined to each other can be combined so as to produce circular or elliptic motions, we can combine polarised rays in a similar manner (see Polarisation below). So long as a ray travels in the same homogeneous medium, it does so in a straight line. But when it arrives at the surface of separation between two media which are optically different, a change takes place. One portion of the ray may be thrown backwards into the medium in which it has been travelling, and is thereby *reflected* (see Reflection below). Another part may be reflected in a diffuse or irregular manner, and it is by this diffusive reflection that we see most objects which are not self-luminous. A third part may pass into the second medium, but in doing so its direction suffers an abrupt change, and is said to be *refracted* (see Refraction below). Lastly, a certain portion may be absorbed by the second medium and its energy transformed into heat. At present, the line of advance in physical optics is towards a satisfactory explanation as to how luminous matter transfers energy to the ether so as to produce vibratory motion. The most promising explanation is that, associated with each atom (or perhaps constituting each atom) there are electrically charged particles or electrons, whose mass is mostly, if not wholly, electromagnetic mass, and whose motions give rise to ether waves. In connection with this part of the subject the article on Matter should be studied for information on electrons, which are also discussed under Electricity.

See Achromatism, Eye, Fluorescence, Lens, Microscope, Mirror, Phosphorescence, Polarisation, Rainbow, Sextant, Shadow, Spectroscope, Telescope.

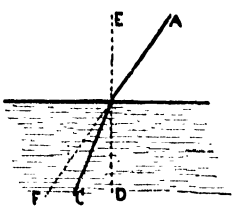
Interference.—The periodic displacements, due to light from two or more sources, may be compounded together into a resultant displacement. Suppose that light waves of equal wave-length arise from two sources, A and B, placed close together, and that they illumine a screen placed parallel to the line AB. Also let C be a point on the screen equidistant from A and B. At C, the ether is set into periodic vibration owing to the rays from A and B, and as the distances AC and BC are equal, the light waves arrive at C in the same phase (see Wave)—that is, at C the crest of a wave from A unites with the crest of a wave from B. The two effects reinforce one another, and hence at C there will be a bright band on the screen. Now take a line CP on the screen drawn parallel to AB, so that P is close to C, and consider the com-

bined effect at P of rays from A and B. The distances PA, PB are unequal. Let them differ by half a wave-length. Then the crest of a wave from A will, on arrival at P, unite with the trough of a wave from B; the two separate effects annul one another, the result is a zero displacement of the ether at P; and a dark band appears on the screen at that point. If the point P be now taken very slightly farther from C, so that the difference between PA and PB is equal to a whole wave-length, the waves from A and B meet each other at P in the same phase, and a bright band appears. Hence on either side of C there will be exhibited a series of alternating bright and dark bands. The former are due to the distances PA and PB differing by a whole wave-length or an integral multiple of whole wave-lengths, the latter being due to the difference being equal to a half wave-length or an integral multiple of half wave-lengths. These bands are said to be due to *interference*.

Phenomena due to this cause are noticed when a soap bubble, blown out until its film is extremely thin, is exposed to light from a large gas flame; also, when a few drops of paraffin oil are allowed to spread over the surface of a pool of water, and the light from a bright sky reflected by the thin film of oil is observed. They can be produced in a variety of other ways, but the general principle is that a ray of light from a single source is split up into two parts, one of which (by reflection at polished surfaces or by refraction through transparent substances) travels to a certain point by a path which differs in length from that of the other part of the ray. Such phenomena are of the greatest use in physical determinations, since by their means it is possible to measure distances so minute that no other method is practicable.

Reflection.—When a ray of l. falls obliquely on a plane polished surface, part of it is reflected back from the surface. The laws governing this phenomenon are: (i) The *incident* (or original) ray, the *normal* (or perpendicular) to the surface at the point of incidence, and the *reflected* ray, all lie in one plane; (ii) the incident and reflected rays are on opposite sides of the normal and are equally inclined to it. The best reflecting surface known is that of highly polished silver, which reflects about nine-tenths of the l. which falls upon it.

Refraction.—A ray of l. follows a rectilineal path so long as the medium through which it passes remains unchanged. But when it passes out of one medium into another, the path undergoes, at the surface of separation of the two, a sudden change in direction, and this change is known as *refraction*. For example, let AB represent a ray of l. travelling through air, and let it enter at B the surface of a mass of glass. Instead of continuing in the line BF, which is a continuation of AB, it takes the course BC. If we draw the normal DBE at the point of incidence, there ABE is termed the angle of incidence, and CBD the angle of refraction. The laws of refraction are as follows: (i) The incident ray (AB), the normal (DBE), and the refracted ray (BC) all lie in the same plane; (ii) the ratio of the sine of the angle of incidence to the sine of the angle of refraction is a constant ratio, which, if the ray be refracted from a vacuum (or air), is known as the *refractive index* of the refracting substance. It is obvious that if the direction of propagation of the ray be reversed, so that the l. travels in the second medium from C to B and then into a vacuum (or air) its subsequent path will be BA. This is usually stated in the form that the refractive index from one medium into a second is the reciprocal of the refractive index from the second into the first.

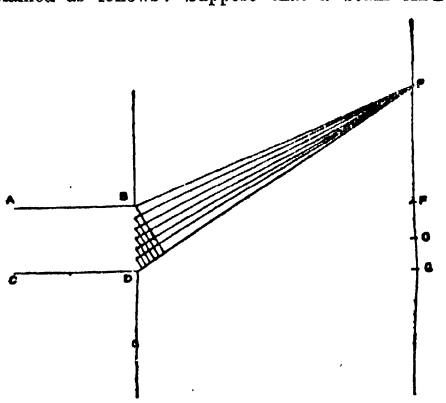


Hence a ray passing through a plate of glass, or other translucent material, whose faces are parallel, emerges with its direction unchanged, but with its path shifted parallel to its original path. The foregoing statements only apply to homogeneous l.—that is, to light of a single kind or wave-length. If we deal with composite l. (*e.g.* sunlight), it is found that there is a different refractive index for each wave-length. Hence a ray of sunlight in passing through a prism is refracted by different amounts, and is thus decomposed into its constituent colours. This phenomenon is known as the *dispersion of light*, and accounts for the formation of a spectrum. See SPECTROSCOPE.

Diffraction.—A sound can be perceived by the ear even when the source of the sound and the ear are not in an uninterrupted straight line—in short, sound can bend round a corner. Sound is propagated by a wave motion in air, hence it would appear probable in the analogous case of l., which is due to a wave motion in the luminiferous ether, that a ray of l. should be able to bend round a corner. But the fact that l. proceeds in straight lines appears to contradict this probability, and was held to be an objection to the undulatory theory of l. when it was first brought forward. The explanation depends on the circumstance that in the case of sound the wave-length is practically comparable with the dimensions of ordinary objects. For example, the sound wave which produces the middle C note on a pianoforte is about 4¼ ft. in length. On the other hand, the length of the l. wave which produces yellow (sodium) light is more than two million times smaller. It is difficult, therefore, to obtain a sound shadow, for the intervening object must be large compared with the length of the sound wave. It is, however, easy to obtain a l. shadow, for most objects placed in the path of a ray of l. are very much larger in dimension than the length of a l. wave. It follows that, in order to show any bending of a l. ray round a corner, the ray must pass through some aperture or round some object which is comparable in size with the wave-length of l.

Suppose that rays of homogeneous l. (*i.e.* l. which is all of one wave-length) from a distant source fall perpendicularly upon a screen—a thin metallic plate—in which there is a rectangular slit, and after passing through the slit be received on a second screen parallel to the first. If the breadth of the slit be considerable, its corresponding image on the second screen will be sharp and clear at its edges. But if the slit be narrow (such as might be produced by a cut with a sharp knife) the image is bordered by a series of alternately dark and bright bands, and these bands extend into the surrounding area, which, if the slit were wide, would ordinarily be unilluminated. This shows that l. has to some extent bent round the edge of the slit, and to this bending the term *diffraction* is applied.

The formation of these dark and bright bands is explained as follows: Suppose that a beam ABDC



of parallel rays of l. from a distant source fall perpendicularly upon a screen in which there is a slit

whose breadth is represented by the gap BD. Each l. wave, on arriving at BD, tends to initiate a secondary wave which spreads outwards in all directions towards the second screen. In ordinary circumstances, when the slit is wide, there is a 'geometrical' image between F and G, with its centre at O. Now consider all those secondary rays which travel to a point P on the second screen. BD is regarded as small compared with PB or PD, and we may therefore regard PB and PD as parallel to each other. Take P as centre and describe a circle whose radius is PB. It will pass through B. Again, with the same centre, describe a circle whose radius is PB+$\frac{l}{2}$, where l is the wave-length of the light. This second circle will cut BD in a point close to B. A third circle with radius PB+l, a fourth with radius PB+$\frac{3l}{2}$, a fifth with radius PB+2l, etc., may be drawn, and these will divide BD into a number of approximately equal lengths. Let these divisions be referred to as the 1st, 2nd, 3rd, etc., the last being the nth division. Taking a simple case, we may suppose that BD consists of an exact number of such divisions, *i.e.* that after the nth there are no fractional parts of a division. Now, the l. which reaches P from these different divisions has travelled different distances. For example, the l. from the second division has travelled a distance which is $\frac{l}{2}$ greater than that from the first division. Consequently, these two sets of waves will be in opposite phases; just as, when two waves in water meet each other so that the crest of the one coincides with the trough of the other. Hence, the effect at P of the first division will be annulled by the second; similarly, the effect of the third will be annulled by the fourth; and so on. If the number of divisions is an even number, there will be no illumination at P, but if there be an odd number of divisions, there will be some illumination at P due to the odd division. The same will be true for other positions of P, and it follows that as we travel outwards from O, the centre of the image, there will be a series of illuminated points. Between these there will be darkness. Hence the image on the screen will be bordered by alternating light and dark bands, and these are broader the narrower the slit. The foregoing explanation refers to homogeneous l. With composite l., such as sunlight or ordinary white l., the position of the dark lines will depend on the wave-length, and therefore the bands of l. will be variously coloured.

We may have diffraction bands at the edges of the shadow of a fine wire. A large number of such wires, parallel to each other, also produces similar phenomena, and such an arrangement is known as a *diffraction grating*. This effect can also be produced by ruling a large number of fine lines with a diamond point on a sheet of glass. L. reflected from such a grating ruled on a bright metallic surface also shows the effect, and such gratings are largely employed for the determinations of the wave-lengths of light. Diffraction effects can be seen on a large scale in the *coronæ* or coloured rings round the moon in hazy weather. These rings are produced by small water particles in the atmosphere, and it can be shown that when the particles are increasing in size the rings contract in diameter—a presage of rain to follow.

Preston, *The Theory of Light* (1912); Tait, *Light*; Edser, *Light*; Phillips, *Science of Light*.

Aberration of l.—In astron., the aberration of l., discovered by Bradley in 1729, is an apparent movement of every star arising from the earth's motion in its orbit and the velocity of l. The combined effect of these velocities is a displacement in the direction in which the earth is travelling at any moment, just as when rain falls vertically an umbrella has to be slanted in the direction of motion. The yearly displacement for a star 0° latitude is a straight line; for other latitudes up to 90° an ellipse, the greatest axis of which is constant and parallel to the plane of the ecliptic, the least axis varying from zero at 0° to a maximum at 90°. The half-major axis, the same for all stars, is the *aberration constant*, value 20″·445 (*Struve*). This figure is disputed. As the velocity of l. is known by experiment, this constant is used to determine the earth's velocity, and thence the sun's distance. On the corpuscular theory of l. the explanation of aberration is easy, but difficulties arise with the modern wave theory. There is also a daily aberration due to the earth's rotation, and planetary aberration due to the velocity of the planets themselves.

In optics, *spherical* aberration in mirrors and lenses is caused by the outer rays of l. coming to a focus nearer the mirror or lens than the central rays. The image is thus not completely in focus. In photography the defect is remedied by using only the central portion of the lens by insertion of a stop, or by a compound lens consisting of two lenses, a short distance apart. The intersection of reflected or refracted rays form *caustics*. *Chromatic* aberration is a more serious difficulty. The component colours of l. have different foci, and produce an image with coloured edges. For certain rays a correction can be made by combining two lenses of different curvatures—one of flint glass, the other of crown. The arrangement is called an *achromatic* lens. For optical instruments the blue and orange rays are thus corrected; for a photographic refracting telescope, on the other hand, the actinic rays.

LIGHTFOOT, JOHN (1602–75), Eng. theologian; ed. at Cambridge; member of Westminster Assembly, 1643–44; best known as a Hebrew and Rabbinical scholar; his greatest work was *Horæ Hebraicæ et Talmudicæ*.

LIGHTFOOT, JOSEPH BARBER (1828–89), Anglican divine; ed. at Cambridge, where he attained high honours; Hulsean prof. of Divinity, 1861; bp. of Durham, 1879; known best for his work on Early Christianity; a most scholarly critic.

LIGHTHOUSE, a building erected on some conspicuous part of the coast to warn and guide ships. The earliest form was a simple tower with a beacon fire. Amongst early l's the most famous was the Pharos of Alexandria, on the island of Pharos. It was erected by Sostratus of Cnidus in the reign of Ptolemy II., 283–247 B.C., and was destroyed in the XIII. cent. by an earthquake. The name Pharos came to be applied to all l's, and the term '*pharology*' has been used to describe the whole system of l. erection and maintenance.

L's may be situated on the land, or on rocks or shoals swept by the sea. Those on land are ordinary architectural buildings, and their construction does not call for special notice. There are various methods of constructing l's on rocks or shoals. If the rock affords a good foundation, a tower of masonry is usually the most convenient, such towers being constructed on the lines of Smeaton's Eddystone lighthouse, with certain modifications. The circular form is adopted as offering least resistance to wind and water, and the centre of gravity is kept low. The lowest parts of the structure, which have to withstand the full shock of the waves, are built with a vertical face. The height of the tower depends upon the work it has to do, but it always must be sufficient to keep the light unobscured by spray.

Where no solid foundation is available, as on sandbanks, shoals, or coral reefs, an open framework structure is frequently built upon piles driven well into the bottom. L's situated on land have buildings erected close to them for the accommodation of the keepers and the various stores and appliances, but where the lighthouse is on an isolated rock or shoal it is designed to provide this accommodation within itself. L's are fitted with lightning conductors carried down to an earth-plate buried in permanently moist ground, or to some point well below the lowest water level.

The lights may be divided into two classes, fixed and flashing. Fixed or continuous lights are falling into disuse, as they are very liable to be confused with shipping lights and various lights on shore. They are used for harbour lights, but seldom for other purposes. Flashing lights may show a single flash, or a group of two or more flashes, but in every case the periods of darkness are greater than those of the light. Fixed lights are often arranged so as to be entirely eclipsed at regular intervals, and they are then called occulting lights. Such lights may have groups of two or more occultations, and they are distinguished from flashing lights by having the light period greater than, or at least equal to, the period of darkness. There are also alternating lights, showing different colours with dark periods between, but these are not very satisfactory. White, green, and red are the colours generally used, and on account of the light absorption of coloured screens white is the most efficient.

Where a light is required to show the channel between sandbanks or other dangers, it is divided into sectors, white and coloured. White light is thrown on the fairway, and coloured light on the dangerous places. The apparatus employed in flashing and occulting lights is usually rotated by weight-driven clockwork mechanism, which automatically indicates when rewinding is required. Spring-driven clockwork is also used for occulting lights.

The earliest form of illuminant was a fire of wood or coal burning in some kind of brazier, and this was superseded by candles. Smeaton's Eddystone light consisted of twenty-four candles. Oil, coal or acetylene gas, and electricity are now used. The use of gas or electricity generally necessitates the construction of special generating plant, and on this account oil is much the simplest and most convenient illuminant, but its efficiency is lower than that of either electricity or gas.

The optical instruments used in l's may be divided into three classes—catoptric, dioptric, and catadioptric. In *catoptric* instruments the rays of light are reflected by plane, parabolic, spherical, or other mirrors. In the *dioptric* arrangement the rays are not reflected, but pass through the glass, being thus twice refracted. *Catadioptric* instruments combine both these methods. Besides the ordinary l. with keepers, there are numerous unattended lights and beacons. The source of light for these is often oil-gas, stored at a pressure of several atmospheres. Such beacons are capable of maintaining a light for periods of from two to three months, and they are frequently fitted with automatic occulting apparatus worked by the gas. Petroleum lamps burning ordinary l. oil are also used for beacons, and these will burn without attention for three or more months, and may be made flashing or occulting. Acetylene gas is also used to some extent.

Lightships are largely employed in places where it is not possible to construct a lighthouse. The lamps are carried upon the masts, and they may be fixed permanently or raised at night and lowered to the deck in the daytime. The lights may be fixed, flashing, or group-flashing, and the illuminant is usually oil, but oil-gas and electricity are also used. Lightships are provided with fog-signalling apparatus, in the shape of a siren worked by compressed air, or a steam whistle. There are also unattended lightships, using gas for the light and for working a fog-bell. Oil-gas is generally used for illuminated buoys, as it has proved more reliable than electricity, acetylene, or oil.

The English coast lights are under the control of the corporation of Trinity House, which has supervision over the various local lighting boards. The Northern Lighthouse Commissioners control the lights in Scotland and in the Isle of Man, and Irish lights are under the Irish Lights Commissioners. The Board of Trade has ruling powers over these three authorities in regard to financial and certain other matters. Amongst the more important local lighting authorities are the Mersey Docks and Harbour Board and the Clyde Lighthouse Trustees.

LIGHTING.—One of the earliest methods of obtaining artificial light was that of burning oil. The oils in use up to the mid.-XIX. cent. were principally of animal or vegetable origin, mineral oils being brought into use for lighting purposes about 1853. Early lamps, which consisted of a shallow containing-vessel and a short wick dipping into the oil, were very unsatisfactory, for they gave off unpleasant vapours, and the flame was smoky. The first real improvement in construction was made in 1784, when the *Argand lamp* was introduced. In this lamp a cylindrical wick was placed between two concentric metallic tubes, the combustion of the oil being made more complete by a constant stream of air passing through the inner tube to the flame, and by an additional draught, got by placing round the burner a glass chimney resting on a perforated base. The flame in this lamp varied with the level of the oil in the reservoir, and in the *Carcel* lamp, invented about 1800, this defect was remedied by a clockwork arrangement, which kept the burner supplied with an abundant supply of oil. The Carcel lamp is still used to a small extent in France. The *moderator lamp*, invented about 1836, is based upon the Carcel lamp, the oil being forced through a tube to the burner by the pressure of a spring upon a disc floating in the oil. In the tube is placed a tapering rod called the moderator, which regulates the flow of oil in accordance with the pressure of the spring. The above-mentioned lamps were only suitable for vegetable or animal oils, for the principle of forcing a superabundance of oil to the burner cannot be applied in the burning of petroleum, paraffin, or other mineral oils. In lamps intended for mineral oil, only as much oil as the wick is able to suck up reaches the burner, in order to prevent smoke, and a constant and abundant supply of air is provided. Petroleum may be burned in the ordinary way, or may be vaporised and used in conjunction with an incandescent mantle.

When *coal gas* was first tried as an illuminant it was burned as it issued from an open iron tube, but this was soon found to be unsatisfactory, as a large quantity of gas was consumed for a small amount of light. The end of the tube was then closed up, and three small holes bored in it, giving three small jets. Various arrangements of holes and saw-cuts followed, leading up to the fishtail burner, in which two holes are bored at such an angle as to give two jets impinging upon one another, and producing a flat flame. In the regenerative burner the heat of the flame is used to raise the temperature of the air supply.

Incandescent gas lighting rose from the fact that if certain incombustible substances were raised to a high temperature a brilliant light was produced. Platinum mantles were first tried, but their illuminating power decreased rapidly, owing to the erosive action of the gases in the flame. The discovery of the *Bunsen burner* about 1855, in which a non-luminous flame is obtained by mixing the coal gas, before combustion, with a certain proportion of air, paved the way to the modern incandescent burner. Welsbach hit upon the idea of a mantle consisting of a cotton fabric soaked in a solution of a metallic salt, and took out his first patent in 1805, but the *Welsbach mantle* was not perfected until 1893. Various methods of increasing the efficiency of the incandescent light have been introduced, such as supplying the gas or the air, or both, at a high pressure, or producing suction upon the gas and air by means of a special form of chimney used in combination with a burner adapted to utilise the augmented supply. The shape of the ordinary type of mantle is such that the light is given off at an angle above the horizontal, and this is a drawback for most domestic purposes, in which the light is required chiefly below the level of the mantle. This defect is remedied in the *inverted type* of mantle, which was introduced about 1900.

In 1801 Sir Humphry Davy discovered that if two carbon rods were connected with the terminals of a

powerful battery, and the points of these rods first brought into contact, and then slightly separated, the current did not cease, but continued to cross the gap, producing what is called the electric arc. This discovery led to the construction of the *arc lamp*, the first practical means of employing the electric current for purposes of illumination. The carbon points in the arc lamp become incandescent, and the intervening space is filled with incandescent particles of carbon. The temperature of the electric arc is very much higher than that of an ordinary flame, and therefore its light has a higher efficiency. The carbon points are gradually consumed, and there is also a transference of carbon from the positive rod to the negative rod, so that the positive rod wastes much the faster of the two. This wasting increases the length of the gap, and if the process were allowed to continue, the current would ultimately cease owing to the breaking of the arc. Arc lamps are therefore provided with an arrangement for automatically [illegible]g the rods closer together, in addition to a device for bringing them into contact and then separating them. The arc lamp may be open or enclosed, the consumption of the carbons in the enclosed type being about one-twentieth of that in the open arc.

When a conductor is traversed by an electric current it becomes heated, and if its resistance and its melting-point are sufficiently high it may be raised to a state of incandescence. This fact forms the principle of the *electric incandescent* or *glow lamp*. An incandescent lamp consists of the material to be heated, made in the form of a fine thread or filament, and enclosed in a glass globe from which the air is exhausted as far as possible, the current being led to and from the filament by wires fused into the glass. Carbon was first employed for the filament, and the carbon lamp was in general use until the desire for higher light efficiency led to the introduction of metallic filaments, which could be raised with safety to a higher temperature than the carbon filament. Metallic filament lamps are much more efficient than carbon lamps, and are more economical. Several metals are used for the filaments, amongst them being osmium, tungsten, zirconium, and tantalum. In the Osram lamp the filament is an alloy of osmium and tungsten. The incandescent lamp has a lower light efficiency than the arc lamp, but it gives a steadier and pleasanter light, and is much more suitable for interior lighting.

LIGHTNING, see METEOROLOGY (ATMOSPHERIC ELECTRICITY).

LIGHTNING CONDUCTOR, or LIGHTNING ROD, consists of a broad band of copper or iron, fixed to the outside of a building in the most direct manner possible. One end is buried in wet earth, and the other runs to a point (or set of points) projecting above the structure. Primarily it prevents accumulation of electricity in vicinity, but if this is very rapid, it offers an easy passage to the discharge, thus saving the building.

LIGHTS, CEREMONIAL USE OF, among Christians was partly taken over from Jewish and pagan antiquity, partly in the symbolism of light which inevitably grew up. Light has been sacred in many religions, but Christian services were often held at night, and lights were not used ceremonially till the III. cent. Tertullian and Lactantius denounce lights in the daytime as foolish. By the IV. cent., however, the custom was universal. But lights were not at first placed on or behind the high altar, but carried, as they are now in the Eastern Church. In the Rom. ritual, lights symbolise the presence of God, terrify the powers of darkness, or are votive offerings. The Sanctus candle symbolises the presence of Christ. In Passion Week 13 lights are gradually extinguished —the ceremony known as *Tenebræ*. New fire is made in Jerusalem at Easter Eve and also in the Rom. Church. Among Protestants lights have been abolished, except in Lutheran churches, where they are still retained. The Anglican Church has retained the use of lights intermittently; two candles on the altar were ordered by the First Prayer Book of Edward VI.; they were revived in the XVII. and again with the Oxford movement in the XVIII. cent.; the question of their legality is disputed.

LIGNE, CHARLES JOSEPH, PRINCE DE (1735–1814), Belg. soldier; fought in the Austrian interests at Kolin, Leuthen, etc.; favourite of Maria Theresa, and accompanied Catherine II. of Russia in the Crimea; his works on military affairs are numerous.

LIGONIER, JEAN LOUIS, EARL (1680–1770), Eng. field-marshal; distinguished at *Blenheim, Ramillies, Oudenarde, Malplaquet*; commanded at *Fontenoy*.

LIGONYI, see ELGON.

LIGUORI, ALFONSO MARIA DEI (1696–1787), Neapolitan R.C. theologian; founded order of Redemptorists; pub. *Glories of Mary*, 1750; *Homo Apostolicus*, 1755; of gentle and kindly disposition, he be- [illegible] referred to err on the side of leniency; canonised, 1839; declared 'Doctor of the Church,' 1871.

LIGURES BÆBIANI (c. 41° 20′ N., 14° 45′ E.), ancient town, central Italy; founded by Ligurians in II. cent. B.C.

LIGURIA (c. 43° 46′ to 44° 39′ N., 7° 30′ to 10° E.), division of N.W. Italy, bordering on Mediterranean; comprises Porto Maurizio and Genoa; area, 2037 sq. miles; surface generally mountainous; produces oranges, cereals, iron and copper pyrites, manganese; manufactures textiles, hardware. Largest towns are Genoa and Spezia. Coast is known as Riviera, famous winter resort. L. came under Rom. control in II. cent. B.C., and as Rom. province included much larger area than present division. Archæological remains are still matter of antiquarian dispute. Pop. (1911) 1,196,853.

LIGURIUS, greenfinch. See under FINCH FAMILY.

LILAC, common shrub of order *Oleaceæ*; flowers characterised by tubular corollas and bell-like calyxes; colours—pink, violet, blue, white.

LILBURNE, JOHN (c. 1614–57), Eng. agitator; pub. seditious pamphlets; frequently imprisoned under Charles I. and Cromwell; banished, 1652; on return, again engaged in agitation; imprisoned, 1653–55; afterwards became Quaker.

LILIACEÆ, monocotyledons, usually herbaceous, but containing two tree-like forms, *Dracæna* (the dragon tree) and *Yucca*. The plants are usually perennials, possessing either a rhizome (Solomon's seal), corm (autumn crocus), or bulb (tulip), and well-developed leaves. Ruscus and Asparagus are exceptional in having the leaves reduced to scales, in the axils of which the flattened assimilatory branches (cladodes) are borne. The flowers are perfectly trimerous, with six perianth leaves, six stamens, and a trilocular ovary.

LILLE (50° 38′ N., 3° 1′ E.), town, Nord, France; important centre of iron trade and of textile manufactures, which include linens, cottons, damask, tulle; also manufactures tobacco, spirits, sugar, machinery; seat of univ.; strongly fortified; contains Palais des Beaux Arts, law courts, several churches. L. was taken by Marlborough, 1708; unsuccessfully besieged by Austrians, 1792. Pop. (1911) 217,807.

LILLEBONNE (40° 30′ N., 0° 32′ E.), town, Seine-Inférieure, France; Rom. remains. Pop. 6220.

LILLO, GEORGE (1693–1739), Eng. dramatist; known chiefly by his frequently printed plays, *Fatal Curiosity* and *George Barnwell*.

LILLY, WILLIAM (1602–81), Eng. astrologer; issued almanacks and pub. *Merlinus Anglicus, Junior*, annually after 1644; generally set down as an impostor.

LILOAN (10° 20′ N., 124° E.), town, Cebu, Philippine Islands; fisheries. Pop. c. 16,000.

LILY (*Lilium*), genus of perennial, herbaceous monocotyledons, possessing a reserve of food stored in a scaly bulb; stem bears numerous decurrent, lanceolate leaves, and usually a racemose inflorescence; flowers are trimerous, with a petaloid perianth consisting of two whorls of three members, the edges of

the outer members dovetailing into the specially grooved midrib of the inner ones; fruit is a capsule.

LIMA, see under LAMELLIBRANCHIATA.

LIMA.—(1) (12°. 3′ S., 77° 8′ W.) capital, Peru, S. America; R.C. archiepiscopal see; cathedral was completely ruined by earthquake, 1746, but was afterwards rebuilt; seat of central univ., founded 1551; has school of mines and civil engineering, library, Mint, several convents; trading centre for W. coast of S. America; iron and copper works; manufactures gold lace, silver ware, stamped leather, glass, furniture. L. contains tomb of Francisco Pizarro, who founded city in 1535 and was murdered a few years later; held by Chileans, who sacked it thoroughly, 1881–83; frequently suffers from earthquakes. Pop. 140,884. (2) (12° 16′ S., 76° 30′ W.) maritime department, Peru, S. America; area, 13,310 sq. miles. Pop. 172,927. (3) (40° 46′ N., 84° 7′ W.) town, Ohio, U.S.A.; oil refineries. Pop. (1910) 30,508.

LIMASOL, LIMASSOL (34° 21′ N., 33° 4′ E.), port, Cyprus. Pop. (1911) 10,245.

LIMAX, Slug, see under GASTEROPODA.

LIMBACH (50° 53′ N., 12° 52′ E.), town, Saxony, Germany. Pop. (1905) 13,723.

LIMBURG (51° 15′ N., 5° 30′ E.), district now included in Dutch and Belg. provinces of L.; gave name to countship in IX. cent. and afterwards to duchy.

LIMBURG, LIMBOURG.—(1) (51° N., 5° 30′ E.) province, Belgium; area, *c.* 931 sq. miles. Pop. (1910) 275,691. (2) (51° 10′ N., 5° 55′ E.) province, Holland; area, 850 sq. miles. Pop. (1910) 340,053. (3) (50° 53′ N., 8° 3′ E.) cathedral town, on the Lahn, Hesse-Nassau, Germany; R.C. episcopal see. Pop. (1910) 10,965.

LIMBUS, LIMBO, the outskirts of hell, where infants dying unbaptized (*i.e.* in original, but without actual, sin) are believed by some sects to be; Old Testament saints, before Christ, were placed there (till liberated by Him) according to some theologians.

LIME, or LINDEN (*Tilia*), tree possessing horizontally spreading branches, and characterised by the inequality of the leaf lobes, which form a 'leaf mosaic.' The principal street in Berlin, *Unter den Linden*, is a magnificent avenue of l. trees. The wood is much used by carvers and turners—though soft it is tough. The fibre is used in making rope, etc. The sweet-smelling flowers yield much honey.

LIME, see CALCIUM.

LIMERICK.—(1) (52° 30′ N., 8° 45′ W.) county, Munster, Ireland; area, *c.* 1063 sq. miles; surface generally flat; hills on W. and S. borders; watered by Shannon; dairy-farming carried on, live stock raised; contains several ruined monasteries. Pop. (1911) 142,846. (2) (52° 39′ N., 8° 36′ W.) town, Ireland, on Shannon; R.C. and Anglican cathedrals; formerly fortified; important port; lace manufacture, bacon-curing, distilling. Pop. (1911) 46,725.

LIMES GERMANICUS, frontier lines which limited the Rom. provinces of Upper Germany and Rhætia; extended from Bonn to Regensburg.

LIMESTONE, a mineral of bluish-grey colour, existing in numerous varieties which differ in appearance, structure, and composition. L. may be composed of pure lime, carbonic acid, magnesia, alumina, silica, and iron. It is one of the most abundant of rocks, being commonest in the Secondary series; also found as the result of aqueous deposit. It has a granular structure. L. found in gneiss has large coarse grains; that found in mica-slate is fine-grained. The chief varieties of l. are Iceland spar, calcium spar, chalk, granular limestone, compact limestone, and oolite limestone.—CARBONIC l. is abundantly distributed, and stalactites (*q.v.*) and stalagmites (*q.v.*) are found in L. caverns. Petrifying wells, as at Knaresbro' (Yorks), cover objects placed under their dropping waters with l., and if left long enough will eventually solidify them. Marble (*q.v.*) possesses the same chemical composition as l., and is generally regarded as one of its varieties.

LIMITATION, STATUTES OF, Acts limiting right of action to fixed time after occurrence of events on which action is based. Most important Acts now in force are L. Act, 1623, and Real Property L. Act of 1874. Latter limits right of action for recovering property to 12 years; former limits actions for trespass, or debt, to 6 years; assault, battery, imprisonment, 4 years; slander, 2 years.

LIMITED LIABILITY, see COMPANIES.

LIMMAT, see LINTH.

LIMNÆA, Pond Snail, see under GASTEROPODA.

LIMNOCNIDA, see under HYDROMEDUSÆ.

LIMNOCODIUM, see under HYDROMEDUSÆ.

LIMOGES (45° 52′ N., 1° 17′ E.), town, Haute-Vienne, France; episcopal see; cathedral dates in part from XIII. cent.; manufactures fine china, textiles, paper; formerly fortified; various Rom. remains, including part of amphitheatre; captured by Black Prince, 1370; several times destroyed by fire. Pop. (1911) 92,181.

LIMON, PORT LIMON (10° N., 83° 15′ W.), seaport, Costa Rica, Central America; exports coffee, fruit. Pop. (1910) 5269.

LIMONENE, see TERPENES.

LIMONITE, important brown iron ore of fibrous structure, a natural hydrous ferric oxide, sometimes called brown hæmatite (*q.v.*); occurs in mammillated masses; found in England, Continent, and America.

LIMOUSIN (45° 30′ N., 1° 30′ E.), old province, France, now mainly included in Corrèze and Haute-Vienne; capital, Limoges.

LIMPET, see GASTEROPODA.

LIMPOPO, CROCODILE (25° 15′ S., 33° 28′ E.), river, S.E. Africa; rises in hills S.W. of Pretoria, and flows in semicircle between Transvaal and Rhodesia and then across Portug. E. Africa, discharging into Ind. Ocean.

LIMULUS, see KING-CRAB.

LINACRE, THOMAS, LYNAKER (*c.* 1460–1524), Eng. physician and scholar; studied in Italy; physician to Henry VII. and tutor to Prince Arthur; late in life entered the Church; one of the first to introduce the 'New Learning' into England; founder of the Royal Coll. of Physicians; trans. Galen, and was author of other scholarly works.

LINARES.—(1) (*c.* 35° 18′ S., 71° 48′ W.) province, Chile, S. America; area, 3941 sq. miles; vines, live stock. Pop. (1910) 111,864. (2) (38° 6′ N., 3° 42′ W.) town, S. Spain; silver-lead mining. Pop. (1910) 36,419.

LINCOLN.—(1) (53° 14′ N., 0° 33′ W.) county town, Lincolnshire, England, on Witham; important railway centre; has canal communication with Nottingham, the Humber, Boston, and the Wash; manufactures agricultural implements, flour; has trade in corn and wool; great horse fair annually in April. L. is an episcopal see; has magnificent cruciform cathedral, dating from Norman times, and episcopal palace; castle was built by William the Conqueror; formerly seat of various monastic establishments; L. was an important station of Romans, of whose occupation various traces remain, including parts of town wall, gateway (Newport Arch), and old road; scene of battle between Stephen and Matilda, 1141, and of another battle in 1218; besieged by Roundheads, 1644. Pop. (1911) 57,294. (2) (40° 6′ N., 89° 16′ W.) town, Illinois, U.S.A. Coal, grain. Pop. (1910) 10,892. (3) (40° 42′ N., 96° 40′ W.) town, Nebraska, U.S.A.; capital of state; R.C. episcopal see; three univ's; railway centre; salt works, meat-packing factories. Pop. (1910) 43,973

LINCOLN, ABRAHAM (1809–65), 16th pres. of U.S.A.; b. near Hodgenville, Kentucky; had little schooling; brought up on f.'s farm; journeyed to New Orleans as employé on flatboat, 1828; clerk of store at New Salem, 1831; went on with education in spare time; turned attention to law and politics; volunteered for service in Black Hawk Ind. War,

becoming militia captain, 1832; defeated in candidature for House of Representatives, Illinois, 1832; postmaster of New Salem, 1833; surveyor of Sangamon county, 1833. L. became member of Illinois legislature, 1834; re-elected, 1836, 1838, 1840; advocated internal improvements and convention system; admitted to Bar, 1836; member of Congress, 1846; introduced 'Spot Resolutions' concerning Mexican invasions, 1847; opposed slavery; retired from political affairs, 1852. On passing of Douglas's Kansas-Nebraska Act, 1854, when slavery question was reopened, L. again entered public life; became leader of opposition in Illinois; met Douglas in public discussions; nominated for presidency by Republicans, 1858; won fame by speeches during election campaign, but was not then elected; made famous speech against slavery in New York, 1860; elected pres., 1860.

Seven slave-owning states then seceded from Union, forming the Confederate States; civil war began by Confederate siege and capture of Fort Sumter, 1861. L. proclaimed blockade of southern ports; arranged for raising of large army and navy; approved passing of Act for emancipation of slaves in Columbia, 1862; but interfered to nullify Hunter's proclamation of freedom to slaves in Georgia, Florida, and South Carolina, 1862; proposed to give monetary compensation to states for gradual abolition of slavery, without result; saving of the Union, even more than destruction of slavery, was his aim. L. made introductory proclamation of emancipation, Sept. 1862; finally proclaimed freedom of slaves in rebel states, Jan. 1863; measure abolishing slavery in U.S.A. ultimately passed, 1865. During civil war L. preserved friendly relations with foreign states, thus preventing outside complications; made famous speech dedicating battlefield of Gettysburg as soldiers' cemetery, Nov. 1863; executed draft to enforce conscription, 1863; on suggestions regarding peace, announced willingness to stop war on submission of rebels to national authority of Union constitution. Re-elected president, 1864, L. held conference with Confederate Commissioners, Feb. 1865; adhered to conditions that national authority must be restored in all states, that government would not withdraw concerning slavery, that no truce was possible except as end of war; terms rejected; war ended, April 1865; entered Richmond after its surrender; shot at Washington, April 14; died next day. L. was simple and unaffected in manner; tolerant and honourable in character.

Nicolay and Hay, *Abraham Lincoln* (1890).

LINCOLN, EARLDOM OF.—Henry de Lacy, 3rd earl, fought for Edward I. in France, Scotland, Wales; title held by Clintons since 1572.

LINCOLN JUDGMENT, THE, ritual case, 1889. Dr. King, bp. of Lincoln, charged with ritual offences while administering Holy Communion; cited before Dr. Benson, abp. of Canterbury; charged with eight offences, of which three were pronounced illegal—mixing water with wine during service, performing manual acts of consecration unseen by congregation, making sign of cross during service; appeal against judgment failed.

LINCOLN'S INN, see INNS OF COURT.

LINCOLNSHIRE (*c.* 53° 15′ N., 0° 15′ W.), E. coast county, England; bounded N. by Humber, dividing it from Yorkshire; E. by North Sea, Wash, Norfolk; S. by Cambridgeshire, Northamptonshire, Rutland; W. by Leicestershire, Nottinghamshire, Yorkshire; area, 2646 sq. miles. Surface consists largely of low wolds and fens; drains to Trent, Witham, Welland; crossed by number of canals, largest of which, Foss-dyke and Car-dyke, have been attributed to Romans. County is divided for administrative purposes into three districts, called Parts of Holland, Parts of Kesteven, Parts of Lindsey. The county was occupied by the Romans, of whom traces remain; it was frequently invaded by Danes in VIII. and IX. cent's, and submitted to William the Conqueror in 1066; was scene of hostilities in Stephen's reign; rising known as Pilgrimage of Grace began here in 1536; supported Lancastrians in Wars of the Roses, Royalists in Civil Wars of Charles I.'s reign; was formerly the site of many monastic establishments, of some of which ruins remain. Soil is fertile, large area cultivated; produces barley, wheat, turnips, and other crops; horses, sheep, and cattle are raised in large numbers; iron ore occurs, as well as limestone, freestone, gypsum; there are important fisheries along coast; largest towns, Grimsby, Lincoln, (capital). Pop. (1911) 432,056.

LINCOLNSHIRE, 1ST MARQUIS OF (cr. 1912), CHARLES ROBERT WYNN-CARRINGTON (1843–), Eng. Liberal statesman; governor, New S. Wales, 1885–90; Pres. of Board of Agriculture, 1905–11; cr. Earl Carrington, 1895; Joint Hereditary Lord Great Chamberlain of England; advocate of small holdings.

LIND, JENNY (1820–87), Swed. singer (soprano); b. Stockholm; studied at Stockholm and Paris under Manuel Garcia; after great success on Continent, visited London, 1847; America, 1850; retired from operatic stage, and became concert singer, 1849; m. Otto Goldschmidt; teacher of singing, Royal Coll. of Music, London, 1883–86.

LINDAU (47° 34′ N., 9° 43′ E.), town, Bavaria, Germany, on islands in Lake Constance; good harbour, fisheries. Pop. (1910) 6620.

LINDAU, PAUL (1839–), Ger. dramatist and novelist; b. Magdeburg; wrote *Harmlose Briefe eines Deutschen Kleinstädters*, novels and plays.

LINDEN (52° 22′ N., 9° 42′ E.), town, Hanover, Germany. Pop. (1910) 73,352.

LINDEN, see LIME.

LINDISFARNE, see HOLY ISLAND.

LINDLEY, JOHN (1799–1865), Eng. botanist; voluminous writer on Brit. and general bot.

LINDLEY, WILLIAM (1808–1900), Eng. engineer; studied especially railway engineering; at Hamburg carried out various sewerage, waterworks and other engineering operations.

LINDSAY (40° 20′ N., 78° 50′ W.), port, Ontario, Canada. Pop. *c.* 7100.

LINDSEY, PARTS OF, see LINCOLNSHIRE.

LINDSEY, THEOPHILUS (1723–1808), Eng. theologian; took orders, but became Unitarian, one of first in England.

LINDUS (36° 23′ N., 28° 15′ E.), town, island of Rhodes, Gk. archipelago; now part of town of Rhodes.

LINE, may be straight or curved (see CURVE). Pieri defines the straight line joining two points as the class of points that are unchanged by a motion which leaves the two points fixed.

LINEN, cloth made from fibres of flax. Process of l. manufacture is shown on early Egyptian monuments; Jews took art to Canaan. L. was woven by Anglo-Saxons as early as VII. cent., and used in Europe for clothing in Middle Ages.

Fibres occurring in stem of flax are separated by soaking in water; next they are dried and combed into 'longs' and 'shorts.' Yarn is then spun and woven into cloth. Until comparatively recent times all spinning was done by spindle and distaff; in early machines spindle was rotated by hand; soon the treadle was introduced, and then the double spinning wheel, which was used until end of XVIII. cent. In modern l. manufacture the principal operations are *sorting* the fibres; *hackling*, combing, disentangling, and laying fibres parallel; *preparing*, drawing fibres into slivers, which is accomplished by series of operations similar to those described in cotton-spinning; *twisting* and winding on bobbins; *spinning*, of which there are two methods—the dry and the wet processes. Former is used for heavier yarns and the latter for fine yarns. Process resembles throstle-spinning as in cotton manufacture. Trade centres—*Heavy goods*: Dundee. *Damasks*: Belfast, Dunfermline, Perth. *Fine linen*: Belfast and N. Ireland. Centre of trade in England: Leeds and Barnsley.

LINEUS, see under NEMERTINE WORMS.

LING (*Molva molva*), a large, long-bodied, dark grey member of the Cod family, which may weigh 100 lb. and more. A common Brit. food-fish, found in deep water in the North Sea.

LING, see HEATH.

LING, PER HENRIK (1776–1839), Swed. inventor and instructor of gymnastic exercises without apparatus for the treatment of disease; founder and principal of the Royal Gymnastic Institute at Stockholm, 1813; his system, which is still taught and practised, is of great benefit under many conditions of ill-health.

LINGARD, JOHN (1771–1851), R.C. historian; wrote *History of England*, generally regarded as the ablest history written from the standpoint of his Church.

LINGAYEN (16° 3′ N., 119° 58′ E.), town, Luzon, Philippine Islands. Pop. c. 22,000.

LINGEN (52° 32′ N., 7° 19′ E.), town, Hanover, Germany; textiles, machinery, iron goods. Pop. (1905) 7004.

LINGEN, RALPH ROBERT WHEELER, BARON (1819–1905), brilliant Latin scholar at Oxford; permanent sec. at Education Office, 1849–69, and at Treasury, 1870–85; most efficient public servant. Cr. baron on retirement.

LINGUET, SIMON NICHOLAS HENRI (1739–94), Fr. journalist; admitted to the Bar, but subsequently interdicted from pleading; sent to the Bastille, 1780; released, exiled, but returned to Paris, 1791; guillotined, 1794; author of many hist. and satirical works.

LINGULA, see BRACHIOPODA.

LINGULA FLAGS, see CAMBRIAN SYSTEM.

LINKÖPING (58° 24′ N., 15° 35′ E.), town, Sweden; episcopal see; fine Romanesque cathedral. Pop. (1911) 23,020.

LINKS, see GOLF.

LINLEY, Eng. family of musicians; associated with Bath and Drury Lane Theatre. THOMAS (1732–95), composer; also a great teacher. Of his children, ELIZABETH (1754–92), beautiful singer, married R. B. Sheridan; son, THOMAS (1756–78), was friend of Mozart; early death cut short brilliant career; WILLIAM (1767–1837) composed songs.

LINLITHGOW (55° 58′ N., 3° 36′ W.), royal burgh, county town, Linlithgowshire, Scotland; ruined royal palace, birthplace of Mary, Queen of Scots; decorated parish church; famous for wells; manufactures paper, soap, spirits. Pop. (1901) 4279.

LINLITHGOW, 1ST MARQUESS OF, JOHN ADRIAN LOUIS HOPE (1860–1908), Brit. statesman; as Earl of Hopetoun, first Gov.-Gen. of Commonwealth of Australia, 1901; cr. Marquess of L., 1902; Sec. of State for Scotland, 1905.

LINLITHGOWSHIRE, WEST LOTHIAN (55° 55′ N., 3° 40′ W.), county, S.E. Scotland; area, 120 sq. miles; surface undulating, slopes downwards from hills in S. to Firth of Forth on N.; watered by Avon, Almond; chief industry, agriculture; cereals, dairy farming; coal, iron, paraffin-oil shale, fireclay; contains ruined preceptory of Knights Hospitallers at Torphichen. Pop. (1911) 79,456.

LINNÆUS, CARL (1707–78), Swed. botanist; b. Råshult; studied med., and acted as assistant in bot.; he travelled in Lapland, Holland, France, and England. After his return to Sweden he practised as a physician; became prof. of Med. and of Bot. at Upsala, where he died. His chief contribution to science was a remarkable artificial classification of plants founded on the characters of the stamens.

LINNET, see FINCH FAMILY.

LINOLEUM, see FLOORCLOTH.

LINSANG, a carnivore; see under CIVET FAMILY.

LINSEED (*Linum usitatissimum*), a plant introduced from Mediterranean, and extensively grown in Ireland for linen yielded by fibres; seed has a mucilaginous coat and yields l. oil, the refuse being utilised as oil cake for cattle.

LINTH, LIMMAT (46° 58′ N., 9° 2′ E.), river, Switzerland; unites with Aar.

LINTON, WILLIAM JAMES (1812–97), wood-engraver and author; long connected with the *Illustrated London News*. Mrs. Lynn L., the novelist, was his wife.

LINUS, ST., traditional first bp. of Rome and successor of St. Peter.

LINZ (48° 17′ N., 14° 18′ E.), town, Austria; capital of Upper Austria; episcopal see, two cathedrals; manufactures textiles, carpets, machinery, tobacco. Pop. (1910) 67,817.

LION, see under CAT FAMILY.

LIP, term applied to each of the two muscular folds, formed by the orbicularis oris muscle and covered with mucous membrane, surrounding the entrance to the mouth, and important in the production of certain sounds in speech.

LIPA (*c.* 13° 50′ N., 121° 15′ E.), town, Luzon, Philippine Islands. Pop. 37,934.

LIPARI ISLANDS, ÆOLIAN ISLANDS (38° 35′ N., 14° 50′ E.), volcanic islands, Sicily; most important are Lipari, Stromboli, Vulcano; chief town, Lipari; produce pumice stone, sulphur, wine, fruits, borax. Pop. 21,000.

LIPARITE, see RHYOLITE.

LIPETSK (52° 35′ N., 39° 37′ E.), town, Russia. Pop. 21,000.

LIPOCEPHALA, see LAMELLIBRANCHIATA.

LIPPE (52° N., 8° 50′ E.), principality, N.W. Germany, in basin of Weser; sometimes called LIPPE-DETMOLD; area, 469 sq. miles; surface generally mountainous; well wooded. Present dynasty was founded in XII. cent.; succession dispute was settled in favour of Lippe-Biesterfeld line by court at Leipzig, 1905. L. became member of N. German Confederation, 1866. Chief industry is agriculture; horses, cattle, and pigs reared; manufactures meerschaum pipes, tobacco; capital, Detmold. L. has Diet of 21 members, and is represented in Reichstag, as in Bundesrath, by one member. Pop. (1910) 150,937. See also SCHAUMBURG-LIPPE.

LIPPE (51° 40′ N., 6° 37′ E.), river, Germany; joins Rhine.

LIPPI, the name of two Florentine painters, father and son. The father, commonly known as **Lippo Lippi** (1412–69), painted chiefly religious subjects. His illustrations of the lives of Saints John the Baptist and Stephen on the choir walls of Prato Cathedral are regarded as his greatest work. He painted several Madonnas, and among his altar-pieces, one in the nunnery chapel of S. Ambrogio, Florence, is the subject of a poem by Browning. The son, **Filippino L.** (1460–1504), painted easel pictures, and executed some celebrated frescoes for churches in Florence and Rome.

LIPPSPRINGE (51° 47′ N., 8° 49′ E.), town, Westphalia, Prussia; saline springs. Pop. (1910) 4070.

LIPPSTADT (51° 40′ N., 8° 20′ E.), town, Westphalia, Prussia. Pop. (1910) 16,396.

LIPSIUS, JUSTUS (1547–1606), Belg. scholar; his *magnum opus* is his edition of Tacitus. He conformed to the Lutheran Church, but afterwards became reunited to the Catholic.

LIQUEFACTION OF GASES.—Just as steam can be condensed to water, so all known gases and vapours can be condensed to liquids. The condition necessary for the liquefaction of a gas is a low enough temperature accompanied by sufficient pressure. When the pressure on a gas is increased, the temperature of l. is raised, just as the b. p. of a liquid is raised under similar circumstances. The question, therefore, arises as to how far compression may take the place of cooling in the l. of gases and vapours. For a long time a distinction was drawn between gases, such as oxygen, which were regarded as permanent, and others, such as chlorine, which were condensible by compression when moderately cooled. In 1863, however, Andrews showed why some gases were 'permanent.' For every gas there exists a 'critical temperature,' above which it is im-

possible to liquefy it by compression; the pressure under which a gas is liquefied at its critical temperature is 'critical pressure.' When this principle was recognised, attempts were made to liquefy the 'permanent gases' under pressure by cooling them below their critical temperature. Thus, in 1877, Pictet and Cailletet independently liquefied oxygen in quite different ways. In Pictet's apparatus, carbon dioxide (critical temperature, 31·3° C.) was liquefied by compression, whilst it was cooled by being surrounded with liquid sulphur dioxide, boiling under reduced pressure at −65° C. This cooled liquefied carbon dioxide was conveyed to a cylinder surrounding a steel tube which contained oxygen compressed to 320 atmospheres; there it was made to evaporate so rapidly by pumping that its temperature fell to −140° C. Thus the oxygen was cooled below its critical temperature (−118·8° C.), and liquefied.

Cailletet liquefied oxygen by the further cooling caused by the sudden expansion of the compressed and already cooled gas. This cooling is due to the external work done by sudden expansion, the necessary mechanical energy being supplied from the heat energy of the gas itself.

Liquid Air.—Air is liquefied by the process known as 'self-intensive refrigeration.' When gases pass through a narrow orifice from a high to a lower pressure they are cooled in the process, not because of external work performed, but by reason of internal work done against cohesion, a certain amount of which exists between the molecules of all gases at high pressure. This cooling, called the Joule-Thomson effect, amounts for air to 0·2° to 0·25° C. per atmosphere.

The principle was applied by Linde and by Hampson in 1895. Air is compressed to 160–180 atmospheres in cylinders cooled by water, and, after being dried and freed from carbon dioxide, passes through a narrow spiral tube terminating at a regulated valve, through which it expands freely. The escaping air, cooled by its own expansion, passes over the coil through which the compressed air is being driven, cooling the latter before it expands. Thus the temperature of the issuing air is continuously lowered, until some of it liquefies as it escapes from the valve. Liquid air may drop from the orifice in about four minutes after the pumps have begun to work, and from 1 to 1½ litre of it be obtained per hour.

Liquid air, whose critical temperature is about −140° C. and critical pressure about 39 atmospheres, boils under 1 atmosphere at about 190° C. It generally contains more than twice as much oxygen as atmospheric air, because oxygen is more condensible than nitrogen. Oxygen is now obtained from liquid air by fractional evaporation of the more volatile nitrogen. The rare gases of the air—helium, neon, krypton, and xenon—are also separated from argon by fractional evaporation of the liquefied mixture. Liquid air evaporates rapidly in ordinary vessels, congealing the moisture in the adjacent air, which falls as heavy clouds. It possesses motive power analogous to that of boiling water, but an objection to its use is the formation of ice round the machinery containing it. Cotton wool, mixed with granulated charcoal, and soaked in liquid air, may be exploded by detonation, and has been used for blasting in coal mines. Liquefied gases are preserved in double-walled evacuated glass vessels, which may be silvered, and are known as Dewar flasks. Evacuation reduces thermal conduction to a minimum, and silvering hinders radiation. Thermos flasks are constructed on the same principle.

Liquefaction of Hydrogen.—Liquid hydrogen was first obtained in bulk by Dewar in 1898, by cooling the gas compressed to 150 atmospheres by means of liquid air boiling at −205° C., and then allowing it to expand. It is a clear, colourless liquid, having a density=0°·07, boiling under atmospheric pressure at −252·5° C., and becoming an ice-like solid at −257° C. Its critical temperature is about −238° C., and critical pressure about 15 atmospheres.

Liquefaction of Helium.—Helium was liquefied by Kamerlingh Onnes in 1908 by expansion from high pressure after cooling in liquid hydrogen. Its b. p. is −268·5° C., and density, 0·15.

LIQUEURS, strongly alcoholic beverages, flavoured aromatically and often sweetened. *Absinthe* is yellowish-green, contains over 50 % alcohol, and oil of wormwood, anise, cloves, angelica, and peppermint. Others are Chartreuse, Benedictine, Curaçoa, Ratafia, Vermuth.

LIQUOR LAWS, see Licensing Laws.

LIQUORICE, Licorice, root of European *Glycyrhiza glabra*; extract used medicinally as demulcent; also employed in confectionery.

LIRA (Lat. *libra*, pound), Ital. standard silver coin; equivalent (since 1862) of franc (*q.v.*); plural, *lire*; contains 100 *centesimi*. Turk. lira (or pound) is worth 18s.

LIRI (41° 51′ N., 13° 30′ E.), river, Italy; enters Tyrrhenian Sea.

LIRIOPE, see under Hydromedusæ.

LISBON, Lisboa (38° 41′ N., 9° 10′ W.), capital, Portugal, on Tagus. L. was an important city under Romans, from whom it passed to Visigoths early in V. cent.; held by Moors, VIII.–XII. cent's; taken by Portuguese, 1147; twice besieged by Castilians, 1373, 1384; captured by Spaniards under Alva, 1580; retaken by Duke of Braganza, 1640; almost entirely destroyed by earthquake, 1755, since when it has been practically rebuilt; scene of assassination of King Carlos, 1908; and Revolution, 1910. L. is an archiepiscopal see; has cathedral built originally *c.* 1150, but twice restored; several fine churches, two royal palaces, military arsenal, many educational and charitable institutions; fine aqueduct; near river is Hieronomyto monastery, containing tombs of Vasco da Gama, Camoens, Catharine of Braganza. City is strongly fortified; has one of finest harbours in Europe; centre of trade with Europe, W. and S. Africa, S. America; exports wines, fruits, corkwood, oil, salt, leather, wool, cattle, pit-props, tinned fish; imports cottons, woollens, silks, coal, iron, machinery, rubber, tea, coffee; manufactures gold and silver ware, tobacco, textiles, chemicals. Pop. 357,009. See Portugal.

LISBURN (54° 31′ N., 6° 3′ W.), town, Antrim, Ireland; XVII.-cent. cathedral; linen manufactures. Castle taken by Cromwell, 1650. Pop. (1911) 12,172.

LISIEUX (49° 8′ N., 0° 13′ E.), town, Calvados, France; has former cathedral, bp.'s palace; formerly fortified; textiles, dairy produce, machinery. Pop. (1906) 16,239.

LISKEARD (50° 27′ N., 4° 27′ W.), town, Cornwall, England; woollens, iron goods; formerly a stannary town. Pop. (1911) 4371.

LISMORE.—(1) (56° 30′ N., 5° 31′ W.) island, Loch Linnhe, Argyllshire, Scotland; choir of old cathedral remains; site of former monastery. Pop. 500. (2) (28° 47′ S., 153° 10′ E.) cathedral town, New South Wales, Australia; R.C. episcopal see. Pop. 5300. (3) (52° 8′ N., 7° 55′ W.) town, Waterford, Ireland; cathedral dates in part from XII. cent.; formerly seat of monastery and bishopric. Pop. 1600.

LISSA.—(1) (43° 4′ N., 16° 10′ E.) island, off coast of Dalmatia, Adriatic Sea; has belonged to Austria since 1815; area, 40 sq. miles; wine, sardines; chief town is fortified seaport of Lissa. Near here wore fought two naval engagements in XIX. cent.; British defeated Franco-Venetian force, 1811; Austrians defeated Italians, 1866. Pop. (1911) 10,110. (2) (51° 51′ N., 16° 33′ E.) town, Posen, Germany; formerly chief Polish settlement of Moravian Brethren; machinery, shoes, leather. Pop. (1910) 17,156.

LIST, FRIEDRICH (1789–1846), Ger. economist; prof. of Politics at Tübingen, 1817; owing to his reforming zeal compelled to resign; imprisoned and escaped; returned and released on condition he went to America; U.S. consul at Leipzig, 1832; known chiefly as economist; opposed free trade as universal rule; his principles largely followed in Germany.

LISTER, JOSEPH LISTER, BARON (1827–1912), Eng. surgeon; b. at Upton, Essex, April 5, 1827; s. of Joseph Jackson Lister, F.R.S., the scientist, and improver of the microscope; ed. at Quaker schools at Hitchin (Herts) and Tottenham, and at University Coll., London; B.A. (1847), M.B., and F.R.C.S. (1852). L. went to Edinburgh to become house-surgeon to Mr. Syme (whose dau. he married) (1856), then lectured on surgery in the Extra-Mural School. In 1860 he was appointed prof. of Surgery at Glasgow, and in 1869 prof. of Clinical Surgery at Edinburgh, at the same time carrying out important researches on blood coagulation, inflammation, etc. Following up the theories of Pasteur, to prevent suppuration in compound fractures he applied carbolic acid to the wounds with success, and revolutionised surgery by the introduction of carbolic acid as an antiseptic, purifying the surgeon's hands and instruments and the patient's skin with it, in addition to employing a spray of a watery solution of carbolic acid to destroy micro-organisms in the atmosphere and to irrigate the wound. L. also introduced carbolised catgut (a preparation of the intestine of the sheep steeped in carbolic acid), which is soon absorbed by the tissues, for sutures and ligatures, in place of silk, which caused irritation and suppuration. Eventually he discarded the spray and antiseptic washings of the wounds, and prevented the invasion of micro-organisms simply by aseptic measures. In 1877 he was appointed prof. of Clinical Surgery at King's Coll., London; was from 1895 to 1900 pres. of the Royal Soc., and retired from surgical practice in 1896. He was created a baronet in 1883, a baron in 1897, and nominated a member of the Order of Merit in 1902.

LISTON, ROBERT (1794–1847), Scot. surgeon; lectured in Edinburgh on surgery and anatomy; prof. of Clinical Surgery at University Coll., London (1835); a brilliant operator, and author of several works on surgery.

LISZT, FRANZ (1811–86), Hungarian composer and brilliant pianist; b. Raiding; studied with Czerny and Salieri, Vienna; settled in Paris as teacher, 1827; formed intimate relations with Countess D'Agoult, by whom he had three children; the youngest, Cosima, married von Bülow and afterwards Wagner. L. was greatly influenced by Chopin, Paganini, and Berlioz; app. conductor of Court Theatre, Weimar, 1847, and closed his career as virtuoso; took orders at Rome, 1865, and became Abbé; thereafter spent most of his time in Weimar, Rome, and Budapest. L. formed a deep and lasting friendship with Wagner, who owed much of his success to him during the Weimar period; a generous and fascinating nature; a remarkable teacher and original composer; an upholder of 'programme' music. Lyrical pianoforte pieces and songs are perhaps his best works. Orchestral compositions, *Dante* and *Faust* symphonies, *Les Préludes*, *Mazeppa*, etc.

A. C. Mackenzie, *Liszt*.

LITANY (Gk. *litaneia*), first denoted prayers of all kinds, then specially prayers of supplication and intercession. The R.C. Church has *Litaniæ majores* and *Litaniæ breves*; the Anglican l. follows the former, but without invocation of saints; in the Ambrosian rite the lesser l. appears in the Mass.

LITCHFIELD.—(1) (41° 44′ N., 73° 16′ W.) town, Connecticut, U.S.A.; dairy-farming. Harriet Beecher Stowe's birthplace. Pop. 3005. (2) (39° 12′ N., 89° 40′ W.) town, Illinois, U.S.A. Pop. (1910) 5971.

LITERATURE is the body of writings of a people preserved on account of its beauty of thought and style; lit. falls into two great classes—prose and poetry, and each of these is divisible into many species, according as the basis of division is form or matter. Gk. lit. developed spontaneously and without external influence; it perfected all the principal types, except prose fiction.

LITERNUM (c. 41° 55′ N., 14° E.), former town, Campania, Italy; no remains visible.

LITHGOW (33° 30′ S., 150° 14′ E.), town, New South Wales, Australia; government small arms factory; iron smelting, rolling-mills. Pop. 8700.

LITHIUM (Gk. *lithos*, 'a stone'), metallic base of alkali lithia, of silvery lustre; used in making of fireworks, causing beautiful red colour; carbonate dissolves uric acid and accordingly is used medicinally in treatment of gout and rheumatism.

LITHODOMUS, see under LAMELLIBRANCHIATA.

LITHO-FRACTEUR, see BLASTING.

LITHOGRAPHY, see PRINTING.

LITHOLOPAXY, see BLADDER.

LITHOTOMY, see BLADDER.

LITHUANIA, the name of a former grand-duchy, bounded on the S. by the Dniester, including the basin of the Dnieper, and reaching almost to the Black Sea and the Baltic. L. secured its independence from Russia in the XII. cent., became Christian under Grand-Duke Mindog, and became united to Poland in 1386. It was divided between Russia and Prussia in 1772 and 1797. The Lithuanian group includes the Old Prussians, whose language is extinct, *the Letts*, and the Lithuanians. The two last now inhabit the north-eastern parts of Poland and Prussia and certain western provinces of Russia, on the Baltic coast, and on the Niemen and the Duna; total population about 3,500,000, in addition to large colonies of emigrants in America. Both peoples still retain their own characteristics distinct from Russians and Poles. Agriculture is the chief industry; but the Letts also trade in the towns. In Courland the Letts are Lutheran in religion—only 50,000 being members of the Gk. Church. In Poland both races are chiefly Catholic. The language is akin to the Slavonic (the Lithuanians, however, speaking a tongue which has a closer affinity with Sanskrit), but is a recognised and separate tongue, known as the *Baltic*.

LITMUS, extract of lichens *Lecanora tartarea* or *Rocella tinctoria*, used for testing in acidimetry; acids turn l.-paper red, alkalies blue; prepared by adding potassium carbonate to lichen and mixing with gypsum.

LITOPTHERNA, sub-order of ungulate mammals from S. Amer. Tertiary; two families, *Proterotheriidæ* and *Macrauchenidæ*; typified by macrauchenia (*q.v.*).

LITTLE AUK, see GUILLEMOT AND AUK FAMILY.

LITTLE FALLS.—(1) (45° 58′ N., 94° 11′ W.) town, Minnesota, U.S.A. Pop. (1910) 6078. (2) (43° N., 74° 45′ W.) town, New York, U.S.A. Pop. (1910) 12,273.

LITTLE ROCK (34° 45′ N., 92° 13′ W.), capital, Arkansas, U.S.A.; R.C. and Anglican episcopal see; Univ.; manufactures machinery, cotton-seed cakes, and oil. Pop. (1910) 45,941.

LITTLEHAMPTON (50° 48′ N., 0° 32′ W.), town, Sussex, England. Pop. (1911) 8351.

LITTLETON, SIR THOMAS DE (c. 1402–81), Eng. jurist; student of the Inner Temple; sheriff of Worcestershire, 1447; serjeant-at-law, 1453; king's serjeant, 1455; justice of the Common Pleas, 1466; knighted, 1475; author of a legal treatise on 'Tenures' (written in Law-French), which, edit. by Sir Edward Coke (1628), was for long the standard and authoritative text-book on the law of Real Property in England; first pub. 1481; 90 editions subsequently issued. Throughout the Wars of the Roses L. was recognised equally by Henry VI. and Edward IV.

LITTORINA, a Mollusc. See under GASTEROPODA.

LITTRÉ, MAXIMILIEN PAUL ÉMILE (1801–81), Fr. philosopher and philologist; studied languages and med., then devoted himself to literary work; became follower of Comte, though he did not follow him entirely; his elaborate Fr. dictionary appeared, 1873, after many years' work; pub. *Auguste Comte et la philosophie positive*, 1863; edit. Hippocrates and Pliny; a convinced materialist.

LITURGY.—In ancient Athens a *Leitourgia* was a service rendered to the state; word came to be used in Christian Church of service rendered to God in public worship, and particularly of the Eucharist, which it signifies in the East. In present Eng. usage it means

any written or prescribed form of prayer or worship, as distinct from that which is extempore. The different forms of the Eucharist, specially called l's, are of considerable importance in the history of Christian worship. The main division is that into Eastern and Western The Rom. Rite is now used almost universally in the R.C. Church in the West, though it only gradually superseded various local rites, *e.g.* the Mozarabic in Spain and the Gallican in France; the Ambrosian is still used in Milan. The main Eastern Rites are the Syrian, Egyptian, Persian, and Byzantine, which exist both in obsolete and in still current forms.

In Britain there were various l's used in the ancient Celtic Church. In Norman times certain features were introduced from the Gallican l., and the *Sarum Missal* became regularly used in England. *The Book of Common Prayer* was composed of various elements. The Scot., Irish, and Amer. Churches use the Anglican l. with certain modifications. L's are used by Calvinists and Lutherans, but not by Presbyterians nor the majority of Eng. Nonconformists.

Brightman, *Liturgies Eastern and Western*; Warren, *Liturgy and Ritual of the Celtic Church.*

LIVE OAK (30° 23′ N., 83° W.), town, Florida, U.S.A. Pop. (1910) 3450.

LIVER, large vascular gland, of a reddish brown colour, situated in the upper right part of the cavity of the abdomen, behind the ribs, the largest gland in the human body, weighing about 3 lb. The upper and anterior surface is in contact with the diaphragm and the anterior abdominal wall, while the lower and posterior surface, to which the gall bladder is bound down by peritoneum, is divided into several lobes by fissures, and is in contact with the stomach, duodenum, colon, right kidney and suprarenal body, and other neighbouring structures, and is grooved by the œsophagus and vena cava. In regard to its minute structure, the l. is composed of a great number of lobules of distinctive polygonal hepatic cells, and the portal vein divides into minute branches which again ramify round each lobule, from which other venous capillaries run to a central vein in the middle of the lobule, which joins other similar veins, becomes the hepatic vein, and eventually enters the vena cava.

The functions of the l. include the breaking down of worn-out blood corpuscles, and the secretion and excretion of bile, which is a digestive fluid acting on fats and making them more easily absorbed, while the l. is also a great storehouse of nutriment for the body, carbohydrates and proteids absorbed after a meal in a soluble form in the blood being held up in liver-cells in the form of *glycogen*, which is set loose when the body requires it.

Congestion of the l. may occur as a result of backward pressure of the blood through heart or lung disease interfering with its return, or through inflammation, while *jaundice* (*q.v.*) may arise from congestion, from tumours of the liver or in its neighbourhood pressing on the bile ducts, or from poisons (in fevers, blood-poisoning, chloroform, phosphorus, and other poisoning) circulating in the blood and interfering with the normal secretion of bile. *Hepatic colic* (see COLIC) is due to gall-stones in the bile passages of the l. *Acute hepatitis* (inflammation of liver) and *abscess* of l. may ensue as a result of blood-poisoning, dysentery, and conditions with similar general effects, the symptoms being a rise of temperature, pain, and perhaps bulging of the organ. *Hydatids* (see PARASITIC DISEASES) are most frequently situated in the l. *Acute yellow atrophy* usually affects women, and is due to obscure toxins producing such an effect on the l. that it diminishes greatly in size, the secreting cells degenerating; *cirrhosis* of the l. is a chronic inflammatory condition, usually due to alcoholism, producing a great increase in fibrous tissue of the liver, and at first enlargement and, later, diminution in size. The l. is liable to *fatty* or *waxy degeneration*, the former due usually to general obesity or phthisis, the latter to chronic suppuration, *e.g.* syphilis or tuberculosis. Cancer, characterised by pain, jaundice, and continuous emaciation, may be either primary or secondary in the l. See also DIGESTION.

LIVER FLUKES, a kind of TREMATODE WORMS (*q.v.*).

LIVERMORE, MARY ASHTON, *née* RICE (1821–1905), Amer. temperance and woman's suffrage worker.

LIVERPOOL (53° 25′ N., 2° 59′ W.), town, Lancashire, England, on Mersey; greatest seaport on W. coast, with 19 public graving docks; served by 7 railway systems; a railway tunnel and ferry steamers cross Mersey to Birkenhead (*q.v.*); connected with Manchester by Ship Canal, with E. coast by Leeds and L. Canal; accounts for one-fourth of imports and two-fifths of exports of U.K., the total net tonnage of arriving and departing vessels, apart from coasting trade, totalling over 21,000,000 in 1910. Chief imports are raw cotton, wheat, live stock, wool, food stuffs; chief exports, iron and steel manufactures, textiles, chemicals, machinery, silk, woollen and linen yards. Principal industries are shipbuilding, with associated iron and brass industries, flour and rice milling, sugar-refining, manufacture of tobacco, glass, chemicals, chain cables, and anchors.

L. is episcopal see of R.C. and Anglican churches; foundation-stone of Prot. cathedral was laid in 1904 by Edward VII.; univ., formerly affiliated to Victoria Univ., Manchester, was incorporated in 1903. Public buildings include St. George's Hall, good example of XIX.-cent. Renaissance style, which contains assize court and great hall; Walker Art Gallery, built 1877, which has fine collection, including several old paintings by Dutch and Italian masters; Town Hall, Exchange, Public Library, Museums, many charitable establishments. L. received its first charter from King John in 1207, and obtained subsequent charters at various dates; was Parliamentary stronghold in Civil War; taken by Prince Rupert, 1644; corporation acquired Crown rights of manor of L. in 1672; centre of slave trade in XVIII. cent.; owes much of its importance to opening up of S. Lancashire coal-field and rise of cotton industry in XVIII. cent. Pop. (1911) 746,566.

LIVERPOOL, EARLDOM OF. — CHARLES JENKINSON, 1ST EARL (1729–1808), Sec. of Treasury, 1763; War Sec., 1778; Pres., Board of Trade, 1786. —ROBERT, 2ND EARL (1770–1828), Foreign Sec., 1801; Home Sec., 1804; War Sec., 1808; Premier, 1812.—ARTHUR FOLJAMBE, 5TH EARL (1870–), was cr. Earl of L., 1905; app. Gov. of New Zealand, 1912.

LIVERSEDGE (53° 45′ N., 1° 45′ W.), town, W. Yorkshire, England. Pop. (1911) 14,660.

LIVERWORTS, see BRYOPHYTA.

LIVERY, term descriptive of uniform worn in mediæval times by retainers of noblemen; custom abolished by Henry VII.

LIVERY COMPANIES, of which there are seventy-eight in London, consisted originally of the members of the various trades practised within the City of London. Formerly each trade had its distinctive dress or 'livery'— hence the term liveryman, meaning a member of one of the city trade guilds or companies. Admission to these companies is now a matter of inheritance or of payment, and all connection with actual trading has long ceased; but the Livery Companies own considerable property and administer many charities; and the liverymen are freemen of the city, with exclusive power to elect the lord mayor and sheriffs.

LIVIA DRUSILLA (55 B.C.–29 A.D.), wife of Emperor Augustus and mother (by former marriage) of Emperor Tiberius and of Drusus, father of Emperor Claudius.

LIVINGSTON, EDWARD (1764–1836), Amer. politician; entered Congress, 1795; opposed Jay's Treaty, Alien and Sedition Laws; district attorney, New York State, 1801; removed to Louisiana, 1804; drew up code of criminal law; member of commission

to draft civil code; senator, 1829; Sec. of State, 1831–33; ambassador to France, 1833–35.

LIVINGSTON, ROBERT R. (1746–1813), Amer. politician; Chancellor, New York state, 1777–1801; ambassador to France, 1801; negotiated Louisiana purchase.

LIVINGSTON, WILLIAM (1723–90), Amer. politician; attended first and second Continental Congresses, 1774, 1776; Gov., New Jersey, 1776. Bro's, Peter and Philip, Whig leaders; s., Henry Brockholst, officer, War of Independence.

LIVINGSTONE, DAVID (1813–73), Scot. missionary and African explorer; b. Blantyre, Lanarkshire; at ten years of age worked fourteen hours daily in factory, studying at night; took courses of med. and theol. at Glasgow Univ.; medical missionary to Africa, 1840–56; discovered Lake Ngami, 1849; traversed Africa from Zambesi to Congo, 1853–54, returning 1855–56; pub. *Missionary Travels and Researches in S. Africa*, 1857; Brit. consul to Portug. possessions in S. Africa, 1858; discovered Lakes Shirwa and Nyassa, 1859; commenced search for source of Nile, 1866; after terrible journey reached Zambesi, Jan. 1867; during 1867 discovered watershed between Loanga tributary of Zambesi and other rivers (the Chambeze most important) flowing N., and believed Chambeze to be source of Nile; explored until finally, broken down, took refuge at Ujiji; many search expeditions failed; found by Stanley, 1871; continued exploration of Chambeze till death at Itala; valuable journals; wonderful endurance, patient observer, and ardent, pious missionary.

LIVIUS ANDRONICUS (*c.* 284–204 B.C.), the founder of Rom. epic poetry and drama; translated the *Odyssey* into Lat. Saturnian verse.

LIVNO (43° 44′ N., 17° 7′ E.), fortified town, on Bistritza, Bosnia. Pop. 5400.

LIVONIA, province of Russia; named from early inhabitants, *Livs*; situated on shores of Baltic; area, over 18,000 sq. miles; first hist. mention XI. cent.; Christianised, XII. cent., and received bishopric; divided between Russia and Poland, 1561; completely annexed by Poland, 1582; seized by Sweden, 1621, in order to obtain access to ocean; acquired by Peter the Great, 1721.

LIVORNO, Ital. name for Leghorn (*q.v.*).

LIVY, TITUS LIVIUS (59 B.C. to 17 A.D.), Rom. historian; b. at Patavium (Padua), Italy; lived chiefly in Rome; well versed in Gk. lit., rhetoric, and philosophy; sympathised with Pompey in Civil War; visited Campania; befriended by Augustus, although republican in politics; gained fame by his great work, *History of Rome*, probably written, 27–20 B.C. On Tiberius becoming emperor, withdrew to Padua, where he died; had one s., one dau.

His great work, properly called *Ab urbe condita libri*, deals with history of Rome from landing of Æneas and founding of city to death of Drusus, 9 B.C.; written in 142 parts or *libri*, of which 35 are still extant, while epitomes of most of others also exist. First 15 *libri* narrate history down to beginning of war with Carthage; next 15 describe two Punic wars, conquest of Macedonia, Gracchus' administration, Sulla's dictatorship, death of Cæsar, civil wars, battles of *Philippi* and *Actium*, and twenty years of Augustus' reign are all subsequently described. L.'s object in writing it, as told in his preface, was to create monument to greatness of Rome, to show his readers how this was attained by virtues of Rom. citizens, and to point out the decline following their decay; not a critical study, but excellent as lit.; deals with foreign nations very slightly, and only as far as they are concerned with Rome. Enthusiasm for his country often leads L. to one-sided view of affairs; but he shows impartiality in recognising good qualities of such enemies of Rome as Hasdrubal and Hannibal; does not apply philosophy to history; adheres to old Rom. religion. Chief defect is his want of original research; took materials from traditions of earlier writers and from family legends, rather than from such original sources as inscriptions and monuments, although such are known to have existed; or, for later history, from laws, Senate's decrees, and official registers, which probably reached back several centuries.

Teuffel-Schwabe, *History of Roman Literature*.

LIZARD POINT, THE LIZARD (49° 57′ N., 5° 12′ W.), most southerly point in England, on S. Cornish coast.

LIZARDS (*Lacertilia*), one of the orders of the Reptilia, containing about 1700 species; usually four-limbed; either or both pairs of limbs may be absent, *e.g.* Glass Snake, Slow Worm, etc., but vestiges of the shoulder and hip girdles are always present. Unlike that of snakes, the lower jaw is rigid, the eyelids are generally movable, and external ear-openings are present. Regeneration of a lost limb or of the often very brittle tail is common. Though many bite severely, poison glands occur only in the Amer. Heloderms. The diet is usually of worms and insects, but the larger forms eat frogs, mice, and small birds; while other lizards are vegetarian. From 20 to 30 soft-shelled eggs are laid usually, but some forms are viviparous. The majority are terrestrial, though some are arboreal, and others semi-aquatic; one only is marine, the Galapagos Sea Lizard.

Hibernation occurs in the colder regions, in Europe lasting from 6 to 8 months, but many species in warmer regions pass the hottest season in a torpid state. These usually active, graceful and beautifully coloured animals are of world-wide distribution. They are most abundant in the tropics, but are absent from the polar regions.

According to Gadow there are three sub-orders: (1) Geckones (Geckos); (2) Lacertæ (typical Lizards); (3) Chamæleones (Chamæleons).

The GECKONES is the genus *Gecko*, with adhesive disc toes for climbing; though harmless, legend has it that venom is ejected from the toes. In LACERTÆ we note the following: Draco (Flying Dragon or Lizard of Malay), with a membrane extended on prolongations of the ribs, which acts as a parachute while the creature takes flying leaps; Moloch or Thorny Devil of Australia (*Moloch horridus*), which, though harmless, is protectively covered with conical spines and curved horns; Iguana, a genus of the *Iguanidæ* of S. America and the West Indies, active on land and in water, with much elongated tail and large throat appendage; Blind or Slow Worms (*Anguidæ*), limbless lizards of Europe and W. Asia, the Brit. species, *Anguis fragilis*, being neither blind nor poisonous; Monitor or Alligator Lizard (*Varanus niloticus* of Africa), 5 to 6 ft. long, which feeds on the eggs and young of crocodiles; Lacerta, a genus of 20 species, mostly in the Old World, distinguished by a collar of enlarged scales and more or less developed pads on the under side of the digits; Amphisbænidæ, a family with subterranean and usually limbless members, having degenerate eyes and ears, living like worms in galleried burrows.

LLAMA, see CAMEL FAMILY.

LLANBERIS (53° 6′ N., 4° 5′ W.), town, Carnarvonshire, N. Wales; slate quarries. Pop. 3015.

LLANDAFF (51° 29′ N., 3° 14′ W.), town, Glamorganshire, Wales; episcopal see; cathedral, ruined episcopal palace; practically a suburb of Cardiff. Pop. 6000.

LLANDILO, LLANDEILO (51° 53′ N., 3° 59′ W.), town, Carmarthenshire, Wales; in neighbourhood are ruins of Dynevor Castle. Pop. (1911) 1932.

LLANDOVERY (51° 59′ N., 3° 48′ W.), town, Carmarthenshire, Wales; ruined castle; manufactures beer. Pop. (1911) 1993.

LLANDOVERY GROUP, the lowest division of Silurian system in Britain; divided into Lower and Upper L. g.; formed of conglomerates, sandstones, etc. At Llandovery (*q.v.*) they rest unconformably in the ordovician rocks. The Lower group has many fossils, including graptolites, trilobites, brachiopods. L.

rocks used for building and flag-stones and slate-pencils.

LLANDRINDOD, Llandrindod Wells (52° 15′ N., 3° 22′ W.), town, Radnor, Wales; mineral springs. Pop. (1911) 2779.

LLANDUDNO (53° 20′ N., 3° 52′ W.), town, Carnarvonshire, N. Wales; summer resort. Pop. (1911) 10,469.

LLANELLY (51° 42′ N., 4° 9′ W.), port, Carmarthenshire, Wales; tinplate and copper works. Pop. (1911) 32,077.

LLANES (43° 26′ N., 4° 46′ W.), port, N. Spain. Pop. (1910) 21,779.

LLANGOLLEN (52° 58′ N., 3° 11′ W.), town, Denbighshire, Wales; has ruined fortress; bridge over Dee dates from 1345. Pop. (1911) 3250.

LLANQUIHUE (41° S., 72° 50′ W.), S. province, Chile, S. America; area, 45,513 sq. miles; contains Lake L.; surface mountainous, well forested; produces lumber, cereals. Pop. 113,300.

LLANTRISANT (51° 32′ N., 3° 23′ W.), town, Glamorganshire, Wales; ruined castle. Pop. *c.* 11,000.

LLANTWIT MAJOR (51° 24′ N., 3° 29′ W.), town, Glamorganshire, Wales; formerly site of monastic coll., founded VI. cent.; in neighbourhood are Rom. remains. Pop. 1200.

LLANWRTYD WELLS (52° 6′ N., 3° 40′ W.), town, Breconshire, Wales; mineral springs. Pop. (1911) 753.

LLORENTE, JUAN ANTONIO (1756–1823), Span. ecclesiastic; wrote history of Inquisition.

LLOYD GEORGE, DAVID (1863–), Brit. Liberal statesman; b. Manchester, of Welsh descent; solicitor, 1884; M.P. for Carnarvon district since 1890; led Welsh agitation against Education Act; in opposition and in office proved himself a brilliant speaker and bold fighter; Pres. of Board of Trade, 1905–8; Chancellor of Exchequer since 1908; the rejection of his Budget of 1909 by House of Lords led to General Election (1910) and passing of *Parliament Act*; mainly responsible for *Old Age Pensions Act* (1908) and *National Insurance Act* (1911); P.C., 1905.

LLOYD'S, an association of persons engaged in marine insurance. Took its name from the fact that the members formerly met at Lloyd's Coffee-House in Lombard Street, London; incorporated, 1871, with the object of marine insurance. Members are required to deposit securities for £5000.

LLYWARCH HEN, see Celts (*Welsh Lit.*).

LOACH, see under Carps.

LOAD-LINE, see Plimsoll.

LOAN, see Banks.

LOANDA, ST. PAUL DE (8° 49′ S., 13° 6′ E.), port, Angola, Portuguese W. Africa; exports rubber, ivory, palm oil, coffee; has observatory and episcopal palace. Pop. *c.* 20,000.

LOANGO (4° 30′ S., 12° E.), port and coast region, W. Africa; formerly centre of slave trade; exports rubber, palm oil.

LOBANOV-ROSTOVSKI, ALEXIS BORISOVICH, PRINCE (1824–96), Russ. politician; entered diplomatic service, 1844; ambassador to Constantinople, 1878, France, 1879, Vienna, 1882; foreign minister, 1895; revived Russian influence in Balkans.

LÖBAU.—(1) (51° 6′ N., 14° 40′ E.) town, Saxony, Germany; textiles, buttons. Pop. (1910) 11,256. (2) (53° 41′ N., 19° 45′ E.) town, Prussia, Germany. Pop. 5500.

LOBE, a rounded projection; in anatomy, a rounded division, marked off by fissures, of the liver or brain, also the lower part of the external ear; in botany, rounded division of a leaf, also the pod of a leguminous plant.

LOBELIA, a commonly cultivated genus of the Campanulaceæ, which differs from the majority in possession of a zygomorphic flower. One species, *L. dortmanna*, grows submerged in lakes (*e.g.* Windermere), only the flowering shoot appearing above water.

LOBENSTEIN (50° 27′ N., 11° 37′ E.), town, Reuss, Germany. Pop. 3000.

LOBO, JERONIMO (1593–1678), Portug. missionary in India.

LOBOSA, a group of Amœboid Rhizopods—minute Protozoa with a clear external coat of protoplasm and with body processes (*pseudopodia*) which do not branch, *e.g.* the naked Amœba, and freshwater Pelomyxa, and Difflugia, protected by a shell built up of foreign particles.

LOBSTERS, the true Lobsters and Crayfishes (*Nephropsidea*) are distinguished by their large pincer claws from their relations, the Rock or Spiny Lobsters (*Scyllaridea*). The Common L. frequents rocky portions of the coast, and is much esteemed as food, extensive 'fisheries' being prosecuted where it occurs in abundance.

LOCARNO (46° 10′ N., 8° 48′ E.), town, Switzerland. Pop. *c.* 4000.

LOCH, HENRY BROUGHAM, 1st Baron L. (1827–1900), Brit. administrator; served in Crimea, 1854; sec. of embassy to China, 1860; imprisoned for time in China; gov. of Isle of Man, 1863, Victoria, 1884, Cape, 1889.

LOCHABER (56° 57′ N., 4° 45′ W.), mountainous region, Inverness-shire, Scotland.

LOCHES (47° 7′ N., 0° 59′ E.), town, Indre-et-Loire, France; contains noted castle, in donjon of which Ludovico Sforza, Duke of Milan, was imprisoned in XVI. cent. Pop. 5150.

LOCHGELLY (56° 8′ N., 3° 18′ W.), town, Fifeshire, Scotland; coal, iron. Pop. (1911) 9076.

LOCHGILPHEAD (56° 2′ N., 5° 25′ W.), town, Argyll, Scotland; herring fisheries. Pop. (1911) 921.

LOCHMABEN (55° 8′ N., 3° 27′ W.), town, Dumfriesshire, Scotland; in neighbourhood are ruins of L. Castle. Pop. (1911) 1056.

LOCK, a construction whereby vessels can be transferred from one reach of a river or canal to another at a different level. It consists of a small dock connecting the two reaches by gates, each containing a sluice by means of which the water in the l. can be levelled to that of either reach. A boat, supposed in reach A, wishes to enter reach B, which is at a higher level. The water in the l. is first levelled to that of reach A and the communicating gate opened; the vessel enters and the gate is closed. Through the sluice in the second gate, the l. is now filled to the higher level, and the second gate opened; the boat can then pass into the upper reach. L's enable vessels to navigate far inland to parts considerably above sea-level.

LOCK HAVEN (41° 6′ N., 77° 34′ W.), town, Pennsylvania, U.S.A.; timber. Pop. (1910) 7772.

LOCKE, JOHN (1632–1704), Eng. philosopher; s. of a Puritan who fought in Civil War; ed. at Westminster School and Christ Church, Oxford, becoming tutor there, 1660. He was influenced by the philosophy of Descartes, became interested in theol., and then studied med. and politics. In 1666 he became sec. to Lord Ashley (later Earl of Shaftesbury), and remained so till Shaftesbury's imprisonment, 1681. He was in France, 1675–79. Suspected by the government, he fled to Holland, and returned to England in 1689. His *Essay Concerning Human Understanding*, which appeared in 1690, had been in his mind for years. His *Epistola de Tolerantia* was pub., 1689, likewise *Two Treatises on Government*. In 1691 he pub. *The Reasonableness of Christianity as Delivered in the Scriptures*. He was a commissioner on the Board of Trade, 1696–1700. In his later years he mostly studied theol., and wrote theological and other works.

L.'s writings cover a wide range of subjects, including Philosophy, Theol., Politics, Economics, Education, and Science. L.'s views may be described as 'liberal' in the widest sense; unlike most of his contemporaries, he believed in toleration, and preferred something simpler than ecclesiastical Christianity. His *Essay on Human Understanding* became famous during his lifetime, and by it he is mostly remembered. His main idea was that the human mind should be free to criticise everything, and that no limits should be

set to this process by arbitrary authority. This idea of liberty, which on its intellectual side is elaborated in the *Essay*, is illustrated in the sphere of religion in the *Essay on Toleration*, and of politics in the *Treatises on Government*.

He argues against the doctrine of innateness of our ideas, for we must go back to experience for everything. All things can be traced back to the senses, and reflection on what we have experienced through them. He continues the discussion into metaphysics, and shows that even ideas of space and time, infinity and personality, have their roots in experience. Despite this he does not entirely deny the existence of intuitive knowledge, where, unless we give way to utter scepticism, it is inevitable, in pure math's and religion. We must have here some fundamental ideas to which to appeal. In many things, therefore, we must remain quite uncertain, and in L.'s view, it has been said, probability is the guide of life. He has been described as typically English in his love of truth and reason, his distrust of mysticism and abstractions, and his love of religion and his moderation. In the history of thought he prepared the way for the rationalism of the XVIII. cent.

Lives, by Fowler, Fraser.

LOCKERBIE (55° 7′ N., 3° 21′ W.), town, Dumfriesshire, Scotland; annual lamb fair. Pop. (1911) 2455.

LOCKHART, GEORGE (1673–1731), Scot. politician and author; of distinguished Lanarkshire family; arrested for part in rising of 1715, but liberated; continued to intrigue with Pretender till death; *Memoirs*, etc., important sources of Scot. history.

LOCKHART, JOHN GIBSON (1794–1854), Scot. writer; b. Cambusnethan, near Wishaw; studied for the Bar; became one of the chief contributors to *Blackwood*. His *Lives* of Burns, Napoleon, and Scott are masterpieces.

A. Lang, *Life* (1897).

LOCKHART, SIR WILLIAM STEPHEN ALEXANDER (1841–1900), Brit. soldier; fought in Indian Mutiny, Burma, etc.

LOCKJAW, see PARASITIC DISEASES (*Tetanus*).

LOCKPORT.—(1) (41° 36′ N., 88° 2′ W.) town, Illinois, U.S.A.; grain. Pop. 2555. (2) (43° 7′ N., 78° 46′ W.) town, New York, U.S.A.; fruit, chalk, sandstone. Pop. (1910) 17,970.

LOCKROY, ÉDOUARD (1838–), Fr. journalist and politician; deputy, 1871; Minister of Commerce, 1886; Education, 1888; Marine, 1895–96, 1898–99.

LOCLE, LE (47° 4′ N., 6° 45′ E.), town, Switzerland; watch manufacture. Pop. (1910) 12,690.

LOCMARIAQUER (47° 35′ N., 2° 58′ W.), village, W. France, on Gulf of Morbihan. Pop. 770.

LOCOMOTIVE, see ENGINE.

LOCOMOTOR ATAXIA, TABES DORSALIS, disease associated with progressive degeneration of the posterior columns and nerve roots of the spinal cord. There are three stages: at first lightning pains in the legs, constricting pains round the body, loss of sensibility in the legs, etc.; then unsteadiness, loss of muscular tone, a distinctive stamping gait, eye disturbances, and derangements of internal organs; while in the most advanced stage there is paralysis, the patient being unable to walk. The causes are syphilis (most generally), and injury or exposure to extreme temperatures. The progress of the disease may be arrested at an early stage, even advanced cases may improve, but complete recovery is practically impossible. The treatment is to avoid over-exertion of every kind; antisyphilitic treatments, arsenic, strychnine, and silver nitrate are all of value, while severe symptoms as they arise are treated by appropriate remedies.

LÖCSE (49° 1′ N., 20° 35′ E.), town, Hungary; Gothic church. Pop. 8000.

LOCUST (*Pachytylus cinerascens, P. migratorius*, etc.), members of the Acridiidæ (*Orthoptera*) allied to the Grasshoppers (*Grillidæ—Locustidæ*), which are migratory in character, and voracious vegetable feeders. They migrate in vast numbers, removing every particle of plant tissue they encounter, with the result that they often produce famine, and, on the putrefaction of their bodies, disease. Various species are found in N. America, the Antipodes, S. Africa, and other regions of the world—the locust of the Biblical 'plagues' probably being *Schistocerca peregrina*, which ranges from N. Africa to Southern India.

LOCUSTIDÆ, see GRASSHOPPERS.

LODÈVE (43° 44′ N., 3° 11′ E.), town, Hérault, France; XIII.-cent. cathedral; episcopal see till 1790. Pop. 7500.

LODGE, HENRY CABOT (1850–), Amer. Republican politician; author of hist. and other works. His s. was GEORGE CABOT L. (1873–1909), the poet.

LODGE, SIR OLIVER JOSEPH (1851–), Eng. scientist; principal, Birmingham Univ.; has written much on pure science and psychical phenomena.

LODGE, THOMAS (*c.* 1558–1625), Eng. dramatist; a noted reprobate and wit at Lincoln's Inn; romance *Rosalynde* furnished Shakespeare with the plot for *As You Like It*; his dramas, *The Wounds of Civil War* and *A Looking-Glass for London and England*, are poor.

LODI (45° 18′ N., 9° 29′ E.), town, Piedmont, Italy; seat of bishopric; has Romanesque cathedral dating from 1158; dairy produce. Here Napoleon defeated Austrians, 1796. Pop. *c.* 28,000.

LODZ (51° 46′ N., 19° 33′ E.), town, Russ. Poland; cottons. Pop. (1910) 395,670.

LOESS, in geology, loamy deposit of fine sand occurring in alluvial deposits of Pleistocene system; found in valleys of Danube, Rhone, Rhine, and Missouri. Fossils found in it are land and fresh-water shells; Pleistocene mammals comprise mammoth, rhinoceros, and reindeer, and man.

LOFOTEN AND VESTERAALEN (*c.* 68° 40′ N., 15° 20′ E.), chain of islands belonging to Norway, stretching along N.W. coast; mountainous; sheep raised; great cod-fisheries; exports cod, cod-liver oil, roe, herring. Pop. *c.* 43,000.

LOFTUS, ADAM (*c.* 1533–1605), Irish prelate; went to Ireland, 1560; abp. of Armagh, 1563; of Dublin, 1567.

LOG, instrument for measuring a ship's speed; modern l., towed from stern, registers by means of fly-wheel. **Log-Book**, journal of occurrences on board ship; kept by navigating officer.

LOGAN (41° 38′ N., 112° W.), town, Utah, U.S.A.; Mormon temple; manufactures sugar. Pop. (1910) 7522.

LOGAN, JOHN (1748–88), Scot. minor poet; wrote, among other things, the beautiful lyric, *The Braes of Yarrow*. His claim to the *Ode to the Cuckoo*, as against that of Michael Bruce, is controverted.

LOGAN, JOHN ALEXANDER (1826–86), Amer. soldier and politician; fought for Union in Civil War; senator, 1871–77, 1879–86.

LOGAN-BERRY, a hybrid between raspberry and bramble, first produced by Judge Logan, an American, in 1881.

LOGANSPORT (40° 46′ N., 86° 17′ W.), town, Indiana, U.S.A.; iron foundries, automobile manufactures; grain trade. Pop. (1910) 19,050.

LOGAR (33° 55′ N., 68° 26′ E.), river, Afghanistan, tributary of Kabul R.

LOGARITHM.—If $a^a = N$, x is called the *logarithm* of N to the base a. This is written $x = \log_a N$. Hence, as logarithms are indices, they obey the laws of indices.

(i.) If $\log_a A = \alpha$, $\log_a B = \beta$, $\log_a C = \gamma$, . . then $A = a^\alpha$, $B = a^\beta$, $C = a^\gamma$, . . . and $\therefore ABC \ldots = a^{\alpha+\beta+\gamma+\ldots}$

$$\therefore \log_a (ABC \ldots) = \alpha + \beta + \gamma + \ldots = \log_a A + \log_a B + \log_a C + \ldots$$

i.e. *Log. of a product is sum of logs. of factors.*

(ii.) $\frac{A}{B} = a^{\alpha-\beta}$; $\therefore \log_a (A \div B) = \alpha - \beta = \log_a A - \log_a B$

i.e. *Log. of a quotient is log. dividend – log. divisor.*

(iii.) $\frac{A}{A} = a^{\alpha-\alpha} = a^0 = 1$; $\therefore$ *log.* $1 = 0$ *to any base.*

(iv.) $A^n = a^{n \log_a A}$; $\therefore \log_a(A^n) = n.a = n \times \log_a A$, where n may have any value whatever.

(v.) If $\log_a N = \alpha$, $\log_b N = \beta$, then $N = a^\alpha = b^\beta$; $\therefore a = b^{\frac{\beta}{\alpha}}$ and $a^{\frac{\alpha}{\beta}} = b$; whence $\frac{\beta}{\alpha} = \log_b a$, $\frac{\alpha}{\beta} = \log_a b$, and we have $\log_a b \times \log_b a = 1$. Also $\beta = \alpha \cdot \log_b a$; *i.e.* $\log_b N = \log_a N \times \log_b a$.

(vi.) Logarithms may be calculated from the *Logarithmic Series*—

$$\log_e(1+y) = y - \frac{y^2}{2} + \frac{y^3}{3} - \ldots + (-1)^{r-1}\frac{y^r}{r} + \ldots \quad (1)$$

where $e = 1 + 1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \ldots = 2{\cdot}71828\ldots$;

but in practice more rapidly converging series are used. Changing the sign of y in the above, and subtracting, we get

$$\log_e \frac{1+y}{1-y} = 2\left(y + \frac{y^3}{3} + \frac{y^5}{5} + \ldots\right) \quad (2)$$

and further, substituting $\frac{p-q}{p+q}$ for y, we obtain

$$\log_e \frac{p}{q} = 2\left\{\frac{p-q}{p+q} + \frac{1}{3}\left(\frac{p-q}{p+q}\right)^3 + \frac{1}{5}\left(\frac{p-q}{p+q}\right)^5 + \ldots\right\} \quad (3)$$

a series which converges rapidly, and from which logs. to the base e can be easily obtained.

Thus, putting $p=2$, $q=1$, we get

$$\log_e 2 = 2\left\{\frac{1}{3} + \frac{1}{3}\cdot\frac{1}{3^3} + \frac{1}{5}\cdot\frac{1}{3^5} + \ldots\right\} = {\cdot}693147\ldots$$

Hence, from (3),

$$\log_e 3 - \log_e 2 = 2\left\{\frac{1}{5} + \frac{1}{3}\cdot\frac{1}{5^3} + \frac{1}{5}\cdot\frac{1}{5^5} + \ldots\right\} = {\cdot}405465\ldots$$

$$\therefore \log_e 3 = 1{\cdot}098612.$$

Others may easily be obtained. These logarithms are known as *Napierian* or *natural logarithms*, and are used in all theoretical investigations. For purposes of computation, we require logs. to the base 10, which are known as *common logarithms*. Since we have $\log_{10} N = \log_e N \times \log_{10} e$ we can easily obtain common from natural logs. $\log_{10} e = {\cdot}43429\ldots$ It is usual to omit the base 10 in writing. In common logarithms it is convenient to keep the *decimal part always positive*. Thus log. 0·3 is written $\bar{1}{\cdot}4771213$ and not $-0{\cdot}5228787$. In this way the decimal part of the logarithms of all numbers consisting of the same digits in the same order is the same, and the logs. only differ in the integral part. When so written, the decimal part is called the *mantissa*, and may be obtained from tables; the integral part is called the *characteristic*, and may be written down by inspection by means of the following rules, decimal notation being used: (1) *The characteristic of the log. of any number greater than unity is one less than the number of figures to the left of the decimal point.* (2) *The characteristic of the log. of any number less than unity is negative and is one more than the number of ciphers immediately to the right of the decimal point.* Thus, the logs. of 1060, 1·060, 0·1060, 0·0001060 are respectively $3{\cdot}0253\ldots$, $0{\cdot}0253$, $\bar{1}{\cdot}0253$, $\bar{4}{\cdot}0253$, the minus sign in the latter two cases being placed over the characteristic to show that it alone is negative. The reason for the above rules is obvious, for (1) a number with n figures to the left of the decimal point is $< 10^n$ and not $< 10^{n-1}$. Its log. is therefore $(n-1)+$ a decimal. (2) A number with n ciphers just to the right of the decimal point is $> 10^{-n-1}$ and $< 10^{-n}$. Its log. is therefore $-(n+1)+$a decimal.

Log. tables are published giving to 7 or more places of decimals the mantissæ of the logarithms of all numbers from 1 to 99,999. For numbers of more than 5 significant figures interpolation (*q.v.*) is necessary, but for practical purposes it is sufficient to employ *simple proportion* in determining intermediate logarithms to those given in the tables.

LOGIA, name given to 'sayings' of Jesus unearthed at Oxyrhynchus in Egypt by Grenfell and Hunt. In 1897 a fragment was found, containing eight sayings; in 1903 some more were found, more mutilated, and in 1907 a fragment of a hitherto unknown Gospel, containing an account of a conversation on purification between Christ and a Pharisee in the Temple. The papyri are III. cent. and the sayings themselves probably II. cent.; most critics think they are not entirely dependent on the canonical gospels, but represent separate traditions; the 'sayings' are quite possibly genuine.

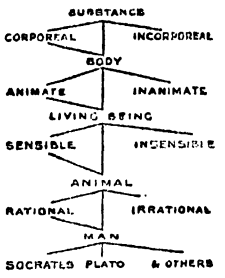
Grenfell and Hunt, *Oxyrhynchus Sayings of Jesus, New Sayings of Jesus and Fragment of a Lost Gospel.*

LOGIC, the science of reasoning, or of the necessary forms of thought as systematising the principles of correct thinking, has been regarded as an art for framing rules for detecting fallacious reasoning. The Laws of Thought, which regulate all valid thinking, are (1) Principle of Identity, 'Everything is what it is,' requiring the unvarying meaning of any term in the same argument, and implying the expression of identity amidst diversity; (2) Principle of Contradiction, 'Nothing can both be and not be,' denying the possession of contradictory attributes at the same time and place; (3) Principle of Excluded Middle, 'Everything must either be or not be,' denying any alternative between contradictories. Besides these is sometimes affirmed the Principle of Sufficient Reason, 'Whatever exists must have a reason for being as it is and not otherwise.'

Any simple argument, such as, Socrates is a man, all men are mortal beings, therefore Socrates is a mortal being, consists of three statements ('propositions'), each made up of two substantives ('terms') joined by the verb 'is.' Hence we may describe in order, terms, propositions, and arguments or syllogisms as a whole; these three parts of logic corresponding to the mental acts of apprehension, judgment, reasoning. We may distinguish between the matter of thought, the things thought about, the form, the manner in which the mind thinks of them; the former variable, while the latter remains the same. The validity of formal reasoning depends only on the form, whence terms may be expressed symbolically.

Terms may be 'subject' or 'predicate' of a logical proposition, *i.e.* may stand for what is thought of, or for the predication made of it. Terms are singular, denoting only one object, general, applicable to many, or collective, regarding a group as a unity; concrete, the name of a thing, or abstract, referring to a quality thought of apart from the object to which it belongs; positive or negative, implying the presence or absence of a certain attribute; absolute or relative, carrying or not carrying a reference to another object. A distinction is made between Connotation, qualities necessarily implied by a term, and Denotation, objects to which the term is applied. Only those terms implying attributes have connotation; proper names, which suggest attributes, are non-connotative. By adding to the connotation of any term, its denotation is decreased; not a mathematical variation, for the addition of an attribute common to a class, *e.g.* 'mortal' to 'man,' does not affect the denotation. The Predicables are a classification of the possible relations of the predicate to the subject of a proposition. Porphyry divided them into Genus, Species, Differentia, Proprium, and Accidens. A Genus is a wider class made up of narrower classes (species); any genus may be a species of a higher class, whence a series from a Summum Genus down to an Infima Species, divisible only into Individuals. According to Aristotle, there were ten Summa Genera ('Categories' or 'Predicaments') under which every term capable of use as a predicate is included. A species is wider in connotation than its genus; the additional attributes form the Differentia of the Species. A Proprium is an attribute not included in, but following from, the connotation, and therefore common to every member

of the class. An Accident has no known connection with the connotation; it is 'Separable' or 'Inseparable,' according as sometimes or never absent from the class. Of these Predicables, the Tree of Porphyry is an example.



Substance is Summum Genus, Man, infima species; Body, Living Being, Animal, genera in relation to those following, species of the preceding; the attributes Corporeal, Animate, etc., are the Differentiæ of each successive species.

Logical division is the process of distinguishing the species of a genus, in reference to a quality (*Fundamentum Divisionis*) common to some individuals, absent from others. Division must have only one basis, to avoid cross-division, must be exhaustive, and step by step. These conditions are ensured by Division by Dichotomy (*dicha*, in two, *temno*, to cut), at every step into corresponding positive and negative terms, as in the Tree of Porphyry. A cumbrous method, giving at each step a sub-class undefined in extent. Logical Division is to be distinguished from Metaphysical Analysis of the attributes of an object, and from Physical Partition of the whole into its parts; in neither of these can the whole be predicated of each of its members. A development on the material sides gives Material Division, or Classification. A Definition is a statement of the Connotation of a term; to contain only the essential attributes expressed clearly and not to be tautologous or negative. Definition *per genus et differentiam* shortly expresses the connotation by stating the next higher genus, and the species.

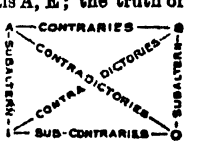
A Proposition is the statement of a truth or falsity; hence not every grammatical sentence is a logical proposition. Propositions are Categorical if the statement is unconditional; Hypothetical, conditional; or Disjunctive, expressing alternatives; in quality are affirmative or negative, expressing agreement and difference respectively between subject and predicate; or universal or particular, affirming the predicate of the whole or of part of the subject. These kinds may be shown with symbols and examples—

Universal	Affirmative	A. S a P.	All birds are feathered.
	Negative	E. S e P.	No reptiles are feathered.
Particular	Affirmative	I. S i P.	Some knowledge is useful.
	Negative	O. S o P.	Some knowledge is not useful.

A, I are the first two vowels of *affirmo*, I affirm; E, O, of *nego*, I deny; whence the two methods of symbolising propositions. The negation may be joined to the copula or placed before the subject. Many forms of expression are ambiguous. 'All the metals are not heavier than water,' is an O proposition, not an E, meaning 'Some metals are not heavier than water'; 'some' is perfectly indefinite, ranging from more than one up to all; 'any' = every; 'a few' = some.

Universal propositions, as asserting something of the whole of the subject, are said to distribute the subjects. Negative propositions distribute the predicate, the whole of which is cut off from the subject. Hence E distributes subject and predicate, A distributes subject only, O distributes predicate only, I distributes neither. From this follows the 'Opposition' of propositions, the relations between propositions differing in quality or quantity, but having identically the same subject and predicate; shown diagrammatically in the 'Square of opposition.'

Contradictories differ both in quality and quantity; no third alternative is possible, whence one must be true and the other false. Contraries are both universals, the extreme poles of divergence, allowing of intermediate alternatives; both may be false, but both cannot be true. Subalternates are the particulars corresponding to the universals A, E; the truth of the particulars follows from that of the universals, the falsity of the universals from that of the particulars. Subcontraries are perfectly compatible with each other; both may be true, both cannot be false.



From the proposition, 'All crows are black,' we may, by interchanging subject and predicate, infer that 'Some black (birds) are crows'—not a universal, but only a particular. This process is Conversion; the quality must remain unaltered, and no term undistributed in the original proposition can be distributed in the 'converse.' Applying these rules, it may be shown that A gives I, I gives I, and E gives E. These last two cases are 'Simple Conversion,' the first, where a universal has given a particular, conversion *per accidens*. An O proposition, before conversion is possible, must be changed into an equivalent affirmative proposition. Thus 'Some existing things are not material' = 'Some existing things are immaterial,' whence 'Some immaterial (things) are existing.' This is 'Conversion by Negation.'

Opposition of propositions and conversion of propositions are kinds of Immediate Inference, since the derivation of the second proposition from the first is direct. Mediate Inference, of which the Syllogism is the type, makes use of a middle term; by this two propositions or premises are so combined that we may reach a third proposition, the 'conclusion,' whose truth necessarily follows from that of the premises. One of the premises must be universal, and syllogistic reasoning is therefore deductive, arguing from the more general to the less. As propositions may be Categorical, Hypothetical, or Disjunctive, so syllogisms are of different kinds. The Categorical Syllogism must contain three terms (major, minor, middle) and three propositions (major and minor premises, conclusion); its middle term must be distributed at least once; no term can be distributed in the conclusion if undistributed in the premises; from two negatives nothing can be inferred; a negative premise necessitates a negative conclusion, and *vice versa*. The major term occurs in the major premise and as predicate of the conclusion; the minor, in the minor premise and as subject of the conclusion; the middle term occurs in each premise but not in the conclusion. From the position of the middle term are derived four forms or Figures of the syllogism, thus—

Fig. I.	Fig. II.	Fig. III.	Fig. IV.
M – P	P – M	M – P	P – M
S – M	S – M	M – S	M – S
∴ S – P	∴ S – P	∴ S – P	∴ S – P

Symbolising major, minor, and middle terms by P, S, M. Of these figures, the scholastics regarded the first as the perfect type, and tested the others by reduction to it. To it applies the dictum, *de Omni et Nullo*, 'Whatever is distributively affirmed or denied of any class may be affirmed or denied of everything included in the class,'—a rule itself based on the three Laws of Thought. In each figure, each proposition may be A, E, I, or O, whence sixty-four possible combinations; of these all but nineteen break one of the rules of the syllogism. These nineteen valid 'Moods' may be memorised by the old mnemonic lines—

Barbara, Celarent, Darii, Ferio-que, prioris;
Cesare, Camestres, Festino, Baroco, secundæ;
Tertia, *Darapti, Disamis, Datisi, Felapton,*
Bocardo, Ferison, habet; Quarta insuper addit
Bramantip, Camenes, Dimaris, Fesapo, Fresison.

The words in ordinary type are real Latin words, indicating the figure; the rest are artificial, showing by their vowels the nature of their propositions

Thus, *Celarent*, a mood of the first figure, major premise E, minor A, conclusion E. The lines also give directions for the 'reduction' of the other figures to the form of the first; thus *s* = convert preceding proposition simply, *p* = convert *per accidens*, *m* = transpose (*mutare*) premises; B, C, D, F indicate the mood of the first figure produced by reduction. *Baroco* and *Bocardo* cannot be reduced as above; their conclusion is proved by showing the falsity of its contradictory (*c* = indirect reduction).

In daily life, one of the propositions of an argument is often omitted; such a syllogism is an Enthymeme. Syllogisms may be connected with one another, the conclusion of the first (Prosyllogism) being a premise of the following (Episyllogism). A Sorites is a chain of enthymemes, omitting the conclusion of each prosyllogism. Thus, all A's are B's, all B's are C's, all C's are D's, all D's are E's; therefore all A's are E's. An Epicheirema omits a premise of each prosyllogism.

Syllogisms may contain hypothetical or disjunctive propositions. A Dilemma contains a hypothetical major, offering more than one alternative, and a disjunctive minor. Thus, if either A or B, then C; either A or B; ∴ C.

Induction is the process of the detection of general laws in particular facts. On an empirical view, it consists in the enumeration of instances, aiming at the 'Perfect' induction which has examined all possible cases, but most frequently reaching only the varying degree of probability of the 'Imperfect' induction. On the opposing view, true knowledge implies a connection of content of different elements of reality, which is not given even by a complete enumeration; every particular an expression of the universal, which is to be disentangled from irrelevant details by an analysis of the given; plurality of instances is valuable in sorting out unessential elements. The method of induction is to frame hypotheses to explain the given phenomena, to deduce from these hypotheses consequences which are to be carefully tested from experience. Hypotheses are frequently suggested by analogy, *e.g.* presence of striated rocks indicates glacial action; they are to be based on facts, and to be determined as accurately as possible, till at length they can be accepted as demonstrated theories, which alone explain the facts. A theory is established by analysis of phenomena, the isolation of the essential. Observation is difficult, requiring abundant knowledge, is liable to bias and non-observation, and cannot control all the operative conditions. In Experiment the conditions are determined by the observer, and unessential elements more easily eliminated. Both observation and experiment employ scientific instruments, the use of which does not constitute an experiment unless the observed object is modified.

Fallacies, violations of logical principles, may be divided into logical fallacies, occurring in the mere form of the statement, and material, the detection of which requires acquaintance with the subject. Logical are further subdivided into purely logical and semi-logicals. The first includes breaches of syllogistic rules, the use of four terms, undistributed middle, distribution in conclusion of term undistributed in premises (Illicit Process), inference from two negative premises. Semi-logical fallacies arise from ambiguity of grammatical construction (Amphiboly), of emphasis (Accent), of meaning of a term (Equivocation), and from confusion between the collective and distributive uses of a term (Composition and Division). Material fallacies include those of Accident, where accidental circumstances render a general rule inapplicable; Irrelevant Conclusion (*Ignoratio Elenchi*), proving the wrong point; *Petitio Principii*, assuming the proposition to be proved; False Cause, assuming a cause without sufficient grounds; Many Questions, so combined that a single true answer is impossible.

Jevons, *Lessons in Logic*.

LOGOGRAPHERS, Gr. historians who preceded Herodotus; works may be regarded as prose counterparts of epic poems, as sacred histories or pious myths.

LOGOS (Gk. *logos*, 'word,' 'reason'), a philosophical and theological term, found in Hellenic speculation from the time of Heraclitus, who postulated a divine 'logos' corresponding to the human reason, though somewhat material; it appears in Plato, Aristotle, and Stoicism. A similar concept had evolved in Judaism, where an increasing reverence had separated God from the world and an intermediate being was required; His was the divine Word (*Mêmra*). The greatest exponent of the idea of the L. was Philo, who combined Hellenic and Hebraic elements. In Christian theol. the L. doctrine appears in the Fourth Gospel (the parallel with Philo is important, but must not be pressed too close). Further developments came with Gnosticism.

Harnack, *History of Dogma*; Drummond, '*Philo Judæus*,' *a Fourth Gospel*.

LOGROÑO.—(1) (42° 15′ N., 2° 40′ W.) N. province, Spain; area, 1946 sq. miles; produces wine, oil, fruit, cereals. Pop. (1910) 188,235. (2) (42° 28′ N., 2° 33′ W.) capital of above; surrounded by walls; produces wine. Pop. (1910) 23,926.

LOGWOOD, heart-wood of l. tree (*Hæmatoxylon campechianum*) of Central America; cut in chips and fermented in heaps, it yields hæmatoxylin, the red colouring matter used in dyes and inks.

LOHARU.—(1) (28° 30′ N., 75° 45′ E.) native state, Punjab, India. Pop. *c.* 17,000. (2) (28° 23′ N., 75° 50′ E.) capital of state. Pop. 2700.

LOHENGRIN, the hero of an old Ger. poem of XIII. cent.; son of Parsifal, and a knight of the Grail; he was carried by a swan to Elsa of Mainz, and the revelation to her of his origin resulted in their separation; story is theme of Wagner's opera *Lohengrin*.

LOIRE (45° 50′ N., 4° E.), department, S.E. central France; area, 1852 sq. miles; mountainous; drained by Loire, Rhône; large deposits of coal; manufactures iron, steel, machinery, textiles, glass, paper. Pop. (1911) 640,549.

LOIRE (47° 13′ N., 2° 12′ W.), longest river of France; rises in Cevennes, and after flowing some distance N., bends to W. and enters Bay of Biscay; chief tributaries, Allier, Vienne, Sarthe; largest towns on banks, Orleans, Tours, Angers, Nantes.

LOIRE-INFÉRIEURE (47° 20′ N., 1° 45′ W.), coast department, W. France; area, 2693 sq. miles; surface generally low and flat; drained by Loire; produces flax, wine, cider; fishing; coal, iron, copper, machinery, shipbuilding. Dairy-farming and stock-raising carried on. Pop. (1911) 669,920.

LOIRET (48° N., 2° 20′ E.), inland department, France; area, 2629 sq. miles; surface rises from N.E. to S.E.; drained by Loire and tributaries of Seine; forests; produces great quantities of wheat and oats; live stock raised; manufactures woollens, leather, sugar, flour. Pop. (1911) 364,061.

LOIR-ET-CHER (47° 40′ N., 1° 20′ E.), inland department, France; area, 2478 sq. miles; watered by Loir, Cher; produces cereals, fruit, vegetables, timber, wine; horses and sheep bred; manufactures textiles, leather. Pop. (1911) 271,231.

LOISY, ALFRED FIRMIN (1857–), Fr. R.C. theologian; ordained priest, 1879; prof. of Oriental Languages and Biblical Exegesis at Catholic Institute of Paris, 1881–93; became influenced by modern critical views; lecturer at l'École des Hautes Études Pratiques, 1900; became famous on publication of *L'Évangile et l'Église*, 1902, in answer to Harnack's *What is Christianity?*; pub. *Autour d'un petit livre*, *Le Quatrième Évangile*, 1903; *Les Évangiles synoptiques*, 1908; after which he was excommunicated; prof. of History of Religions at Collège de France, 1909.

Lacey, *Harnack and Loisy*; and Loisy's works.

LOJA.—(1) (37° 11′ N., 4° 12′ W.), town, Spain; ruined Moorish castle; damaged by earthquake, 1885. Pop. 20,000. (2) (4° 10′ S., 79° 15′ W.) province, Ecuador, S. America. Pop. c. 66,000. (3) (4° S., 79° 16′ W.) town, Ecuador, S. America. Pop. *c.* 10,000.

LOKEREN (51° 6′ N., 3° 59′ E.), town, Belgium. Pop. 22,000.

LOKOJA (7° 50′ N., 6° 34′ E.), town, Nigeria, W. Africa.

LOLLARDS, a term used to describe the mediæval heretics of the XIV. cent., whose greatest leader was Wycliffe. Till then there had been little heresy in England, but grave abuses in the Church had brought about not only a widespread feeling that reform was needed, but a distrust of the entire sacerdotal and sacramental system of Catholic Christianity. The Act *De heretico comburendo* was passed by Parliament in 1401, and William Sawtre was burnt that year. Ineffectual efforts were made to put down Lollardy under Henry IV., and more stringently under Henry V., when Sir John Oldcastle (Lord Cobham) was burnt. Nevertheless Lollardy lingered on, and was finally absorbed into Protestantism, which was partially its offshoot.

Poole, *Wiclif and Movements for Reform*; Trevelyan, *England in the Age of Wycliffe*; Gairdner, *Lollardy and the Reformation.*

LOMBARDY (*c.* 45° 30′ N., 9° 30′ E.), division, N. Italy; area, *c.* 9297 sq. miles; includes provinces of Bergamo, Brescia, Como, Cremona, Mantova, Milano, Pavia, Sondrio; contains most of Ital. lakes; crossed by Po and its affluents; produces silk, cereals, wine; manufactures textiles, automobiles, paper; iron, zinc, marble worked. Pop. (1911) 4,786,907.

Lombard League, league of L. towns, especially that of 1167, when Cremona, Mantua, Brescia, Bergamo united against Emperor Frederick I., defeating him at Legnano.

Lombards, LONGOBARDI, in V. cent. a Teutonic tribe on the Danube; settled in the N. of Italy, A.D. 568, and became an independent kingdom; overthrown by Charles, the Frank king, 774 A.D., and annexed. By the XI. cent. Milan and other Lombard cities were self-governing 'communes'; they suffered the usual vicissitudes of Ital. cities, and in the XIX. cent. Lombardy was released from Austria to become part of the new united Italy of King Victor Emmanuel. In the XIII. and XIV. cent's the Lombard merchants were great bankers and moneylenders, and, though attacked for 'usury,' were safe under the protection of nobles and of Rome itself; since many Lombards acted as agents for the Papal Court. They did a very considerable business with English kings—Henry III., Edwards I., II., and III.—and with the Earls of Derby, Nottingham, Salisbury, and Suffolk. Then in 1345 the two great Lombard houses of the Bardi and Peruzzi became bankrupt—Edward III. owing the former 900,000 gold florins and the latter 600,000—and the Lombards ceased to be the principal bankers.

LOMBOK (8° 30′ S., 116° 25′ E.), one of Sunda Islands, Dutch E. Indies; area, *c.* 4000 sq. miles; mountainous, but fertile; produces cotton, indigo, tobacco, maize, sugar, coffee. Pop. *c.* 41,000 or, with Bali, *c.* 523,530.

LOMBROSO, CESARE (1836–1909), Ital. criminologist; prof. of Psychiatry at Pavia; head of lunatic asylum at Pesaro; prof. of Forensic Medicine and Psychiatry, and afterwards of Criminal Anthropology at Turin; propounded, after much research, the theories that the criminal was a special type of the human race, and also that the genius was a degenerate with a close relation to the insane, theories not altogether accepted. See CRIMINOLOGY.

LOMÉNIE DE BRIENNE, ÉTIENNE CHARLES DE (1727–94), Fr. ecclesiastic and politician; abp. of Toulouse, 1763; pres., Assembly of Notables, 1787; treasurer, 1787.

LOMOND, LOCH (56° 5′ N., 4° 35′ W.), lake, Dumbartonshire and Stirlingshire, Scotland; area, 27 sq. miles; many islands.

LOMZA, LOMZHA.—(1) (53° 5′ N., 22° 8′ E.) government, Russ. Poland; area, *c.* 4070 sq. miles; produces cereals, vegetables, flax, honey. Pop. (1910) 683,600. (2) (53° 9′ N., 22° 10′ E.) capital of above. Pop. 27,343.

LONAULI (18° 45′ N., 73° 28′ E.), town, Bombay, India. Pop. 7000.

LONDON (51° 32′ N., 0° 5′ W.), capital of United Kingdom, and largest city in the world. Modern city may be said to have been founded by Alfred on site of a place fortified by the Romans and destroyed successively by Saxons and Danes; strength of Alfred's fortifications is attested by the long and stout resistance offered by city to Canute's besieging force in 1016. Burghers received excellent terms from William the Conqueror, who built the Tower in 1078; and they obtained from Henry I., *c.* 1101, a charter which in later times was regarded as the foundation of their most important privileges; by this, L. was recognised as a corporation, and the citizens received the farm of Middlesex and the right to appoint their own portreeve. During struggles between Stephen and Matilda the latter alienated the citizens by depriving them of their ancient privileges and placing the city in demesne for first and only time; this resulted in their support of Stephen and his ultimate success. In 1136 greater part of city was destroyed by fire.

During Norman period guilds began to attain importance, and several monasteries were founded. Mayoralty was established before 1193, first mayor being Henry Fitz Ailwin, who held office till his death in 1212. During John's reign a number of foreign merchants settled in city; and the rebuilding of London Bridge, begun under Henry II., was completed in 1209. In Henry III.'s reign religious houses were established by Dominicans, Franciscans, Carmelites, and Friars Eremite; certain privileges were granted to Hanse traders in 1259; and the city fell into a defiant and lawless state, while trade suffered considerable decrease. In the following reign six members for L., including the mayor, sat for first time in Parliament in 1284; in 1285 Kirkeby, the treasurer, by a ruse took the mayoralty into hands of the king, Edward I., who eventually restored city to state of order. In this reign Jews were badly treated; many were hanged in 1279, and a decree of banishment was issued in 1290. In following reign, city supported the queen, Isabella, in deposing Edward II.

The XIII. and XIV. cent's were marked by number of processions, which occurred on occasions of national rejoicing, as on the triumphant return of king or prince after victories against the French. Richard II.'s reign was marked by Wat Tyler's rebellion here in 1381; that of Henry IV. by a visitation of plague in 1407; Jack Cade's rebellion occurred in 1450 when Henry VI. was king; and under Edward IV. the first printing-press was established by Caxton. Principal event affecting the city in Henry VII.'s reign was Perkin Warbeck's insurrection in 1497; under his successor, Henry VIII., the Act of Supremacy was followed by the Dissolution of the Monasteries, of which St. Thomas's and St. Bartholomew's afterwards became hospitals, in 1539, and the confiscation of Church property; this was succeeded in Edward VI.'s reign by the suppression of guilds, which for so long had been intimately bound up with the social life of the city. Mary's persecution of Protestants tended to strengthen cause of Reformed faith, which was firmly established under Elizabeth, in whose time there was a great increase of trade and prosperity, while lit. flourished and theatres became important.

During the Civil Wars of XVII. cent. L. espoused the cause of Parliament; but under the Commonwealth the city suffered considerably at the hands of Cromwell and was glad to welcome Charles II. at Restoration. In 1665 occurred the Great Plague, in 1666 the Great Fire, when, it is said, 13,200 houses, as well as St. Paul's and great number of churches, were burnt; after this the city was rebuilt chiefly in brick or stone, and St. Paul's and many other churches were constructed under direction of Wren. Charles II. ruined

great number of bankers and merchants by closing the Exchequer in 1672; and towards end of his reign he further alienated the citizens by taking away their charter and himself appointing a Lord Mayor. This policy was continued by James II. until landing of William of Orange, when too late he restored the charter; the citizens rejected his overtures and sent a formal petition begging William to mount the throne. In William's reign the court was removed to Kensington; and the bank of England was established in 1694.

In 1709 occurred the Sacheverell riots, and in 1720 the bursting of the South Sea Bubble involved countless families in ruin. The Bank of England was built in 1732–34, and in 1753 the British Museum was founded. The old wall and eight gates were taken down in 1760. In 1805 the docks were opened, and in 1807 gas was first used as means of lighting streets. Cabs came into use from 1823 onwards, omnibuses from 1829. Rebuilding of L. Bridge was completed in 1831; and in 1838 the Royal Exchange was burnt, a new building being opened in 1844, in which year also the old debtors' prison of the Fleet was destroyed.

Since middle of XIX. cent. L. has greatly increased in all directions, and great number of suburbs have sprung up. First underground railway was opened in 1863, since when subterranean means of communication have been greatly extended. Temple Bar was removed in 1878. Changes in administration resulted from the Local Government Acts of 1888 (when County of L. was formed) and 1894, and in 1900 the administrative county was divided into 28 municipal boroughs. Tower Bridge, of which the foundation stone was laid in 1886, was opened in 1894.

L. occupies parts of Middlesex, Surrey, and Kent, while the outer ring of suburban districts extend also over parts of Essex and Hertfordshire. Districts N. of Thames, next river, from W. to E., are Hammersmith, Fulham, Chelsea, Westminster, Strand, City, and Tower Hamlets; outside these, Kensington, Paddington, Marylebone, Hampstead, St. Pancras, Finsbury, Islington, Hackney, West Ham; and between Finsbury and the City and West Ham, partly through Tower Hamlets, the sub-districts of Whitechapel, Stepney, Limehouse, Poplar touching the river, and to N. of these Shoreditch, Bethnal Green, Mile-End. On S. side, next river, are Wandsworth, Battersea, Lambeth, Deptford, Greenwich, Woolwich; outside these, Clapham, Camberwell, Lewisham; across Lambeth and Southwark are minor sub-districts of Brixton, Kennington, Newington, Bermondsey. Leaving out Strand, Tower Hamlets, West Ham, Whitechapel, Limehouse, Mile-End, Clapham, Brixton, Kennington, and Newington, and adding Holborn (part of Finsbury) and Stoke Newington (N. Hackney), we have list of metropolitan boroughs making up administrative county.

City of L. has area 672 acres; administrative county, *c.* 117 sq. miles; Greater L., or Metropolitan Police area, *c.* 602 sq. miles. The Bank of England may be called the central point of the city, and from this streets radiate in all directions; of these one, as Poultry and Cheapside, leads westward to St. Paul's, whence two great roads lead towards the W.; of these the northern thoroughfare, known successively as Holborn Viaduct, Holborn, Oxford Street, and Bayswater Road, leads past Marble Arch and northern side of Hyde Park, and so to Hammersmith; while the southern, as Ludgate Hill, Fleet Street (where the Fleet once flowed to join Thames), and Strand (formerly the river bank), leads to Trafalgar Square, and as Pall Mall to Green Park. N.W. of Trafalgar Square is Piccadilly Circus, whence Regent Street curves northwestward to meet Oxford Street at Oxford Circus, while Piccadilly runs westward to Hyde Park Corner, and continues, as Knightsbridge, Kensington Gate, and Kensington High Street, past the S. side of Hyde Park and Kensington Gardens to the royal borough of Kensington, and W. to Hammersmith. Other important thoroughfares are the Edgeware Road, which represents the Rom. Watling Street and leads from Marble Arch towards N.W.; Victoria Embankment, on N. side of river, between Westminster and Blackfriars Bridges; Tottenham Court Road, continuing as Hampstead Road and leading from Oxford Street to N. Hampstead.

Among well-known squares are Belgrave, Eaton, Leicester, Parliament, Russell, and Soho Squares; Trafalgar Square and Charing Cross are western business centre; and finest shops are in Piccadilly, Regent Street, Oxford Street, Bond Street, and Kensington High Street. There is traffic across Thames by nineteen bridges as well as by steamers and five tunnels. Principal bridges, W. from Tower Bridge, are London Bridge, Blackfriars, Waterloo, Charing Cross, Westminster, Vauxhall, Chelsea, and Battersea Bridges; Waterloo is oldest of existing bridges, and was constructed, 1811–17, by John Rennie.

L. is full of interesting buildings. Most important churches are Westminster Abbey, oldest part of which dates from 1245, while greater part was built in 1483–1509, in Gothic style; St. Paul's Cathedral, built by Sir Christopher Wren in Classic style in 1675–97, is the third cathedral church on this site—the first was established in Saxon times, and was burnt towards close of XI. cent.; second was built between *c.* 1087 and 1283, and was destroyed by Great Fire of 1666, being replaced by present building. Examples of Norman architecture are St. Bartholomew's Church, in Smithfield, built in XII. cent., used for a long time as smithy; St. John's, in the Tower; the Temple Church, built by the Knights Templars *c.* 1185, in the churchyard of which is Oliver Goldsmith's tomb. The Church of St. Mary le Bow, or Bow Church, in Cheapside, has a Norman crypt, and was first London church built on stone arches, which were used by Wren as foundation for his own building. Other interesting churches are St. Saviour's Cathedral Church, at Southwark, where the poet Gower is buried, built in XIII. cent.; Church of Austin Friars, built *c.* 1354; All Hallows Church, Barking, which has a remarkable collection of brasses; St. Giles', Cripplegate, built 1545, which contains tomb of John Milton, and was the scene of Cromwell's marriage; St. Helen's, Bishopsgate, which dates from XIII. cent., and has many interesting monuments; St. Ethelreda, Ely Place, is a R.C. church containing ancient crypt and Saxon font; St. Katharine Cree, in Leadenhall Street, which is ascribed to Inigo Jones, and dates from 1631; St. Margaret's, close to Westminster Abbey; St. Andrew Undershaft, built XVI. cent., and containing Stow's monument; Ely Chapel, in Holborn. More modern churches are St. Martin's-in-the-Fields, Trafalgar Square, built in 1726; St. Pancras, in Euston Road, built 1822; and the new R.C. cathedral at Westminster, of Byzantine architecture, which is magnificently decorated inside.

Among important public buildings are: the Tower (covering about 13 acres) of London, which was built by William the Conqueror, was long used as a State prison, now an arsenal, and has museum with interesting collection of mediæval armour and weapons, and a room in which the Crown jewels and regalia are kept; the Houses of Parliament at Westminster, which were built of the sandstone of Aislaby in Whitby, by Barry, and are neo-Perpendicular in style; Guildhall, Mansion-House, Royal Exchange, and Bank of England, in the City; Somerset House and law courts, in the Strand; British Museum, in Bloomsbury, built 1828–52; Victoria and Albert and Natural History Museums, in South Kensington, and the Albert Hall close by; Soane's Museum, in Lincoln's Inn Fields, which contains Wren's plans for rebuilding of L. after Great Fire of 1666; the National Gallery and National Portrait Gallery, in Trafalgar Square and St. Martin's Lane. There are also fine art collections at Hertford House, where the Wallace Collection remains, and in the Tate Gallery, Vauxhall; and at Burlington House, in Piccadilly, is held the annual exhibition of the

Royal Academy. Royal palaces include Buckingham Palace, originally built in XVIII. cent.; Westminster Palace, used as royal residence until *c.* 1512; St. James's Palace, which was constructed as such under Henry VIII.; Marlborough House, built by Wren, 1709–10; Kensington Palace, first used as residence by William III., and now open to the public. The palace of the Archbishop of Canterbury at Lambeth is mainly modern. There are many beautiful parks, including Hyde Park and Kensington Gardens, between Bayswater Road on N. and Knightsbridge and Kensington on S.; Green Park, bordering on Piccadilly, and St. James's Park, adjoining it; Regent's Park, in Marylebone, which contains Zoological and Botanical Gardens; Battersea Park, in S.W. Hampstead Heath, in the N.W., is a favourite Bank Holiday resort.

L. is seat of University, which has eight faculties, and was organised in its present form in 1900; public schools include Westminster and St. Paul's. Charitable institutions include the London Hospital in Whitechapel, St. Bartholomew's Hospital in Smithfield, Guy's in Southwark, St. Thomas's in Lambeth, St. George's at Hyde Park Corner, and Queen Charlotte Hospital. There are numerous theatres, situated chiefly in the west end.

L. returns 61 members to the House of Commons. For municipal purposes it is divided into 27 boroughs, in addition to the Cities of London and Westminster. Affairs of City of London are managed by the City Corporation, and general local authority for the remainder of L. is the County Council. The Lord Mayor is elected by the former body. The L. County Council owns the tramways and passenger steamers, directs education (by Education Act, 1903), maintains bridges, tunnels, drainage, parks, etc., and supervises all building and sanitary arrangements.

The port of L. extends from London Bridge to Blackwall, and is one of largest and busiest in the world, having 30 % of total trade of United Kingdom; value of imports nearly double that of exports, owing to distance from coal and enormous population. L. is important distributing centre, and is meeting-place of all the great railway systems of kingdom, and has water communications inland up Thames valley. Has enormous amount of dock accommodation—London Docks, St. Katharine Dock, East and West India, Royal Victoria, Royal Albert, Millwall, Tilbury, and other docks; warehouses and stores for all kinds of goods, great cold storage buildings, enormous vaults for wines, oils, etc. Centre for great bulk of commerce with East Indies, China, and France. Industries include those connected with food supply, clothing, shipping appliances, house fittings and furnishings, textiles, etc. Total tonnage of arriving and departing vessels, apart from coasting trade, in 1910 was 24,596,746. There are many markets, most of which are under authority of City Corporation; these include Billingsgate fish market, Leadenhall meat market, the London Central Markets, in Smithfield, for fruit, meat, provisions, etc., the Metropolitan Cattle Market, in Islington. Covent Garden is a private market held by Dukes of Bedford. Pop. (1911) of City, 19,657; of 'Outer Ring,' 2,730,002; of Greater London, 7,252,963.

Besant, *Survey of London* (1902–8); Wheatley, *Story of London* (1904); Loftie, *London* (Historic Towns, 1887); Douglas-Irving, *History of London* (1912); Jesse, *Literary and Historical Memorials of London* (1847); publications of London Topographical Society.

LONDON (43° N., 81° 16′ W.), town, Ontario, Canada. Pop. (1911) 46,300.

LONDON CLAY, in geology, an important member of the Lower Eocene formations of Great Britain, best developed in Thames valley; colour, bluish and brownish; numerous fossil remains include fish, reptiles, birds, and plants.

LONDON PRIDE, see SAXIFRAGACEÆ.

LONDONDERRY.—(1) (54° 55′ N., 6° 55′ W.) coast county, Ulster, N. Ireland; area, *c.* 816 sq. miles; surface hilly in centre and S., elsewhere flat; drained by Foyle, Bann, Roe; linen manufactures, agricultural produce, fisheries. Formerly belonged to O'Neills. Pop. (1911) 140,621. (2) (55° N., 7° 20′ W.) town, L. County, Ireland, on Foyle; encircled by walls; R.C. and Anglican cathedrals; episcopal palace on site of former monastery; excellent harbour; salmon-fisheries, shipbuilding yards, linen manufactures, distilleries. Besieged by James II., 1688–89. Pop. (1911) 40,799.

LONDONDERRY, CHARLES WILLIAM STEWART VANE, 3RD MARQUESS OF (1778–1854), Brit. nobleman; fought in Napoleonic Wars; succ. to title, 1822; grandfather of present (1913) marquess.

LONDONDERRY, ROBERT STEWART, 2ND MARQUESS OF (1769–1822), Brit. statesman; member of Irish Parliament, 1790; Viscount Castlereagh, 1795; Keeper of Privy Seal, Ireland, and Chief Sec., 1797; put down Fitzgerald's conspiracy, and rebellion of 1798; after Union, 1800, M.P. for Down; pres., Board of Control, 1802; supported Wellesley's policy in India; advocated Catholic relief in Ireland; War and Colonial Sec., 1805; again War Minister, 1807. Took measures against Napoleon; succeeded in appointing Wellesley commander-in-chief in Portugal, 1809; quarrelled with Canning; planned Walcheren expedition, 1809; after failure of which found Canning and his colleagues had resolved on his removal from office. After duel with Canning, both resigned; Foreign Sec. and leader of House, 1812; for twelve years exercised great power and controlled Lower House; skilled in diplomacy; tried to keep together Grand Alliance: concluded treaty of Chaumont, 1814; represented United Kingdom at Congress at Vienna, 1814; concluded secret treaty between Britain, Austria, and France against Russ. and Pruss. projects in Poland and Saxony respectively; this was pub. after Napoleon's escape from Elba. On Napoleon's final defeat, arranged terms of peace; Home Sec., 1821; protested against Grand Alliance policy of intervention; should have represented Britain at Congress at Verona, 1822, but before this took place, committed suicide. A. Alison, *Biography*.

LONG BEACH, watering-place near Los Angeles, California. Pop. (1910) 17,809.

LONG BRANCH (40° 17′ N., 74° 2′ W.), town, New Jersey, U.S.A.; seaside resort; annual horse show. Pop. (1910) 13,298.

LONG EATON (52° 55′ N., 1° 17′ W.), town, Derbyshire, England; lace. Pop. (1911) 19,215.

LONG ISLAND (40° 50′ N., 73° W.), island of New York State, E. of New York Bay, and separated from New York by East River, across which are famous suspension bridges; to the N. is L. I. Sound, an important channel leading to Atlantic, area, 1681 sq. miles; surface undulating; considerable area is woodland and sandy waste, and there are a number of lakes; at W. end of island are Queens Borough (with Long Island City) and Brooklyn, now parts of New York City; Coney Island is popular resort. Game is abundant and there are excellent fisheries and oyster beds; market-gardening, oil-refining, carpet-weaving, and piano manufacture carried on; scene of battle in 1776, when Americans under Washington were defeated by English under Howe and Clinton. Pop. (1905) 1,718,056.

LONG ISLAND CITY (40° 45′ N., 74° W.), former city, now included in borough of Queens, New York City, U.S.A. Pop. (1900) 48,272.

LONG PARLIAMENT (1640–60), see ENGLAND (*History*); CROMWELL, OLIVER.

LONGCHAMP, WILLIAM (d. 1197), Eng. chancellor and bp. of Ely under Richard I.; opposed John; banished, 1191; undertook diplomatic missions for Richard.

LONGFELLOW, HENRY WADSWORTH (1807–

82), Amer. poet; b. Portland, Maine; ed. Bowdoin Coll., Brunswick; became prof. of Modern Languages at Bowdoin, 1829, after three years' travelling in Europe; prof. of Modern Languages at Harvard, 1835; was married twice—in 1831 to Miss Potter, who died in 1835, and in 1843 to Miss Appleton. He travelled to Europe several times, and was particularly popular in England. After his death a bust was placed in the 'Poets' Corner' of Westminster Abbey.

His earlier poems, before he became saturated with European mediævalism and mysticism, are treated naturalistically and with freshness. All through his works the religious element bulks large, but there is lacking that deep psychology which is to be found in Browning; as a translator he was faithful and spirited.

Chief works: *Voices of the Night*, a book of original poems (1839), *The Spanish Student*, a drama (1843), *The Poets and Poesy of Europe* (a collection containing many of his translations) (1845), *Evangeline* (1847), *The Golden Legend* (1851), *Tales of a Wayside Inn* (1863–74), translation of Dante's *Divina Comedia* (1867–70).

LONGFORD.—(1) (53° 40′ N., 7° 52′ W.) county, Leinster, Ireland; area, c. 421 sq. miles; surface generally flat; produces potatoes, oats; live stock raised; manufactures linen. Pop. (1911). (2) (53° 44′ N., 7° 43′ W.) county town of above; R.C. cathedral. Pop. 3747.

LONGINUS, CASSIUS (c. 213–73 A.D.), Gk. rhetorician and philosopher, taught for many years at Athens, where he had Porphyry for a pupil. Later he became adviser of Zenobia at Palmyra, whom he encouraged to resist Aurelian; the latter, when victorious, put him to death. Of his writings little has survived. The treatise, *On the Sublime*, formerly ascribed to him, probably belongs to the I. cent. A.D. Saintsbury, *History of Criticism* (1900–4).

LONGMANS, firm of London publishers of high standing; founder of firm was Thomas L. (1699–1755). In 1726 he bought a business in Paternoster Row, the present site of the firm.

LONGOBARDI, see LOMBARDS.

LONGSTREET, JAMES (1821–1904), Amer. general; served in Mexican War; distinguished on Confederate side in Civil War, especially at battle of Chickamauga.

LONGTON (52° 59′ N., 2° 8′ W.), town, Staffordshire, England; pottery. Pop. (1911) 37,481.

LONGUEVILLE, ANNE GENEVIÈVE, DUCHESSE DE (1619–79), dau. of Henri, Prince of Condé; m. Duc de Longueville, 1642; played important part in Fronde wars; subsequently embraced Jansenist opinions; renowned for piety.

LONGWY (47° 32′ N., 5° 45′ E.), town, Meurthe-et-Moselle, France; fortified; ironworks. Pop. 10,000.

LÖNNROT, ELIAS (1802–84), see FINLAND (*Language and Lit.*).

LONSDALE, EARLS OF.—JAMES LOWTHER, 1st earl (1736–1802), Eng. politician; M.P., 1757–84. WILLIAM, 3rd earl (1787–1872), held various minor offices of state; Pres. of Council, 1852.

LONS-LE-SAUNIER (46° 41′ N., 5° 33′ E.), town, Jura, France; salt springs; produces wine. Pop. 13,200.

LOO, card game; three cards dealt; trumps determined by turning up first card after dealing. An extra hand, 'missy,' or 'widow,' is dealt; may be exchanged for dealt hand.

LOOE (50° 22′ N., 4° 27′ W.), port, Cornwall, England; fisheries; exports grain, granite. Pop. (1911) 2718.

LOOKING-GLASS, see MIRROR.

LOOM, see WEAVING.

LOÓN (9° 50′ N., 123° 50′ E.), town, Bohol, Philippine Islands. Pop. c. 19,000.

LOPES, FERNÃO (c. 1380–1459), Portug. chronicler and archivist; keeper of royal archives, 1418; studied early records and produced first history of kings of Portugal; graphic style.

LOPEZ, CARLOS ANTONIO (1790–1862), Paraguayan despot; b. Asuncion. During the dictatorship of Francia he was obliged to live in concealment, but after his death he developed the resources of the country and expanded its powers.

LOP-NOR, LOB-NOR (39° 50′ N., 90° E.), lake, Desert of Gobi, Chinese Turkistan, Central Asia.

LORAIN (41° 24′ N., 82° 10′ W.), town, Ohio, U.S.A.; shipbuilding, coal trade. Pop. (1910) 28,883.

LORALAI (30° 22′ N., 68° 35′ W.), town and district, Baluchistan, India. Pop. of district, 67,864; town, 3561.

LORCA (37° 44′ N., 1° 43′ W.), town, E. Spain; wine, lead, textiles; scene of hostilities during wars with Moors. Pop. (1910) 72,795.

LORCH.—(1) (50° 2′ N., 7° 47′ E.) town, Hesse-Nassau, Germany; wine. Pop. 2269. (2) (48° 47′ N., 9° 42′ E.) town, Württemburg, Germany; cement. Pop. 3100.

LORD (O.E. 'bread-winner'), Brit. title; peers are lords temporal, bishops are lords spiritual; younger sons of dukes and marquises have courtesy title 'Lord'; as official title it is held by Lord Chancellor, Lord High Steward, etc., and by Scot. Court of Session judges. Cf. 'Lord Mayor,' 'Lord Provost.'

LORD ADVOCATE, see ADVOCATE.

LORD CHAMBERLAIN, see CHAMBERLAIN.

LORD CHIEF JUSTICE, Pres. of High Court (app. by the Crown) in absence of Lord Chancellor; ex-officio judge of Court of Appeal; presides at the King's Bench Division of the High Court. Salary, £8000.

LORD GREAT CHAMBERLAIN, see CHAMBERLAIN.

LORD HIGH CHANCELLOR, speaker or proloctor of House of Lords; not necessarily a peer, but, by established custom, on attainment of office he is raised to peerage. The Lord Chancellor is custodian of the Great Seal, and Presiding Lord of Appeal in cases before House of Lords; highest judicial officer in kingdom; appoints all County Court judges and J.P's; must be a member of Established Church; salary, £10,000 a year. See CHANCELLOR.

LORD HIGH STEWARD, Eng. chief state official; originally presided over Court of Claims; now only app. for special occasions, *e.g.* coronation or trial of peer.

LORD HOWE ISLANDS (31° 30′ S., 159° E.), Brit. group of islands, S. Pacific; 450 miles N.E. of Sydney; administered by New South Wales. Pop. c. 100.

LORD, JOHN (1810–94), Amer. historian; wrote *Beacon Lights of History*, etc.

LORD KEEPER OF THE GREAT SEAL, office important in mediæval England, which existed till XVIII. cent.; the Lord Keeper was often made Lord Chancellor.

LORD MAYOR'S DAY, Nov. 9, when the Lord Mayor's Show has been held in London since 1215.

LORD OF THE ISLES, title of chiefs of Scot. Western Isles; Somerled received a grant of Bute and Arran from David I., 1135; a descendant, after Haco of Norway's defeat, ceded Western Isles to Scotland, and henceforth Lords of the Isles were vassals. Notable Lords were Donald (d. c. 1420), who sought Eng. help to make Isles independent; John (d. c. 1498), last Lord, had his lands confiscated, but retained title.

LORD STEWARD, chief officer of Royal Household; a member of the Government and almost invariably a peer of the realm; presides over the *Board of Green Cloth*, which deals with accounts of the Household, appoints royal tradesmen, and selects officers and servants of the Household.

LORDS OF THE ADMIRALTY and TREASURY, see ADMIRALTY, TREASURY.

LORD'S SUPPER, see EUCHARIST.

LORELEI, Lurlei (50° 8′ N., 7° 45′ E.), rock, some 430 ft. high, on right bank of Rhine, a few miles below Bingen; legendary haunt of a siren. *Die L.* is a celebrated poem by Heine.

LORENZO MARQUES, see Lourenço Marques.

LORETO (3° 49′ S., 70° 9′ W.), department, N.E. Peru; a vast plain; thickly wooded; traversed by the Ucayali and Huallaga; chief export, rubber; capital, Iquitos. Pop. *c.* 110,000.

LORETO, Loretto (43° 27′ N., 13° 35′ E.), town, Ancona, Italy, on Musone. Its Santa Casa, reputed to have been the house of the Virgin Mary in Nazareth, has long been a famous pilgrimage shrine; rosaries, crucifixes manufactured.

LORIENT (47° 47′ N., 3° 21′ W.), fortified seaport and naval arsenal, Morbihan, France, at confluence of Scorff and Blavet; extensive docks and shipbuilding yards; iron-founding, engineering, and fishing industries; founded by Fr. East India Co., 1664; Brit. naval victory over French off L., June 1795. Pop. (1911) 49,039.

LORIES, see under Parrot Tribe.

LORIIDÆ, see under Parrot Tribe.

LORIQUETS, see under Parrot Tribe.

LORIS or Slow Lemurs (*Nycticebus* and *Loris*), two genera of Lemuroidea (*q.v.* under Primates); with short tail or none, index finger small and nailless, bases of toes webbed; nocturnal; vegetarian and carnivorous; found in tropical Asia.

LORIS-MELIKOV, MICHAEL TARIELOVICH, COUNT (*c.* 1825–88), Russ. politician; distinguished in Russo-Turk. War, 1877–78; Minister of Interior, 1880.

LORRACH (47° 36′ N., 7° 41′ E.), town, grand-duchy of Baden, Germany, on Wiese; textile industries.

LORRAINE, Lothringen, ancient province of France, situated between Champagne on W., Franche-Comté on S., Alsace on E., Germany and Netherlands on N.; formed from realm given by Emperor Lothair to his second s., Lothair, 855. Under Rom. occupation Trèves was capital of *Belgica Prima*, and Metz, Toul, and Verdun were important cities; Christianised in III. cent.; became centre of Frankish kingdom of Austrasia in V. cent. and scene of great monastic activity, especially at Metz; became in 916 a duchy over which both France and Germany claimed overlordship; declared independent of empire, 1542; henceforth under Fr. influence; Richelieu made pretext for governing the duchy in XVII. cent.; in 1662 Duke Charles was forced to bequeath it to France, but in 1670 Louis XIV. occupied it and retained it until forced to restitution by Treaty of Ryswick, 1697; on death of Duke Stanislas, 1766, France annexed the duchy; Prussia took small portion, 1815; Germany annexed entire northern portion, 1871. See Alsace-Lorraine.

LORRIS, GUILLAUME DE (d. *c.* 1230), Fr. poet; wrote first section of *Roman de la Rose*.

LOS ANDES (8° 40′ N., 71° W.), former state of Venezuela, now included in states Tachira, Trujillo, and Mérida.

LOS ANGELES (34° 3′ N., 118° 11′ W.), town, S. California, U.S.A.; business centre for S. California, Arizona, and New Mexico, with very large trade; crops and manufactured goods dealt with estimated at annual value of over £50,000,000; centre of fruit-producing district; industries include fruit-canning, meat-packing, lumbering, manufacture of flour, steel, cottons. L. A. is regularly laid out, and has beautiful parks and botanic gardens; seat of R.C. cathedral, Methodist-Episcopal Univ., observatory; has fine public buildings and many churches. Pop. (1910) 319,198.

LOS ISLANDS (9° 20′ N., 13° 40′ W.), group of volcanic islands, off coast of Fr. Guinea, W. Africa.

LOSSIEMOUTH (57° 43′ N., 3° 18′ W.), town, Elginshire, Scotland.

LÖSSNITZ (50° 37′ N., 12° 43′ E.), town, Saxony, Germany.

LOST PROPERTY.—Should be handed over to the police; if owner does not claim it within three months, it belongs to finder.

LOSTWITHIEL (50° 24′ N., 4° 41′ W.), market town, on Fowey, Cornwall, England.

LOT, in *Genesis*, traditional progenitor of Ammon and Moab.

LOT (44° 40′ N., 1° 40′ E.), department, S.W. France, formed chiefly from ancient province Quercy, in Guienne; hilly; chief rivers, Lot and Dordogne; principal products, wine, tobacco, cereals; capital, Cahors. Pop. (1911) 205,760.

LOT (44° 30′ N., 1° 4′ E.), river, S. France, joins Garonne near Aiguillon; length, 300 miles; 194 miles navigable; ancient *Oltis*.

LOT-ET-GARONNE (44° 20′ N., 0° 30′ E.), department, France, formed from part old provinces of Guienne and Gascony; watered by Garonne and affluents; chief occupation, agriculture; capital, Agen. Pop. (1911) 268,083.

LOTHAIR (825–69), king of Lorraine (Lotharingia); chiefly remarkable for attempts to divorce wife, Teutberga; supported by Louis the German.

LOTHAIR I. (795–855), Holy Rom. emperor; succ., 840; defeated by bro's at *Fontenoy*, 841; by Treaty of Verdun obtained imperial title and Italy.

LOTHAIR II. or **III.** (*c.* 1070–1137), Holy Rom. emperor; duke of Saxony, 1104; elected Ger. king, 1125; defeated Conrad of Hohenstaufen, his rival for imperial crown, 1129; captured Nuremberg and Spires; supported Innocent II. against Anacletus II., rival pope; reduced Bavaria to order; defeated Hohenstaufen; extended imperial power over S. Italy.

LOTHIAN, the three counties of Haddington, Edinburgh, and Linlithgow, in Scotland, are called the L's. For some cent's the whole district from Tweed to Forth was called L., and formed part of Anglian kingdom of Northumberland; but in 1018 it was taken by the Scots, and the name came to be restricted to the counties above mentioned.

LOTHIAN, EARLDOM AND MARQUESSATE OF, titles of Kerr family. Robert, 1st marquess, supported William III. William, 3rd marquess, present at *Culloden*.

LOTHIAN, EAST, see Haddingtonshire.

LOTHRINGEN, see Lorraine.

LOTI, PIERRE, pseudonym of Louis Marie Julien Viaud (1850–), Fr. naval officer and author; landscape painter or poet *manqué* rather than novelist; emotional, exotic, picturesque; principal stories include *Mon Frère Yves* (1883), *Pêcheur d'Islande* (1886), *Madame Chrysanthème* (1887), *Fantômes d'Orient* (1892), *Ramuntcho* (1897).

LÖTSCHEN PASS, Lötschberg (46° 28′ N., 7° 48′ E.), glacier pass, between Kandersteg, Bernese Oberland, and Lötschen valley, canton Valais, Switzerland.

LOTTERIES.—By Lotteries Act, 1823, selling of tickets or chances in a lottery (including Foreign State Lotteries) is illegal, and involves penalty of £50 and punishment as a rogue and vagabond. Raffles at bazaars are lotteries, and are consequently illegal; the fact that they are on behalf of charity makes no difference as far as law is concerned. Certain lotteries, however, are authorised by Act of Parliament, notably those carried on by Art Unions. A prize drawing, where every ticket carries a prize, is not a lottery.

Ashton, *History of English Lotteries*.

LOTTO, LORENZO (*c.* 1480–1556), Ital. painter; dealt chiefly with religious and allegorical subjects.

LOTUS, name applied to various plants, *e.g.* Water-Lily of Africa; root of *Nymphæa* L. of the Nile is edible; *Lotophagi*, a N. African people, according to Homer, gave Ulysses the fruit of the lotus-tree, and its influence made him forget his home and people. See Tennyson's *The Lotus-Eaters*.

LOTZE, RUDOLF HERMANN (1817–81), Ger. philosopher; ed. Leipzig univ.; as a boy studied classics; then devoted himself to science, philosophy, and med.; felt strongly the need of applying proper scientific methods to study of philosophical problems; had keen appreciation of art, and æsthetic apprecia-

tion of beauty united with strong ethical instincts. For some years he devoted himself to working out the relation of psychology and biology, and aimed at showing the reign of law here as elsewhere. In his *Metaphysik* he arrives at the conclusion that everything of which we are cognisant is under the realm of facts, laws, or ethical standards, though these are in essence one; there is a personal God, without whom the Universe would be incomprehensible. His place in history of philosophy is, as regards his method, in opposition to the idealism of Hegel, and on its constructive side akin to Leibnitz.

Jones, *Account of the Philosophy of Lotze.*

LOUBET, ÉMILE FRANÇOIS (1838–), Fr. pres.; deputy, 1876; Minister of Public Works, 1887; Premier, 1892; Pres. of Senate, 1896; Pres. of Republic, 1899–1906; administration marked by disestablishment of Church, and *entente cordiale* with Britain.

LOUDON, ERNST GIDEON, BARON VON, LAUDON (1717–90), field-marshal of Ger. empire; distinguished himself in Wars of Austrian Succession and Seven Years War, winning several brilliant victories over armies of Frederick the Great; ended Turk. peril by capture of Belgrade, 1789. His nephew, JOHANN LUDWIG ALEXIUS, BARON VON LOUDON (1762–1822), was imperial lieut.-field-marshal, and noted, like himself, for intrepidity and absence of self-seeking.

LOUDOUN, JOHN CAMPBELL, 1ST EARL OF (1598–1663), Scot. Covenanter; cr. earl, 1633; Lord Chancellor of Scotland, 1641; 'principal manager of the rebellion;' fought for Charles II. at *Dunbar*, etc.

LOUDUN (47° N., 0° 5′ E.), town, Vienne, France; lace.

LOUGHBOROUGH (52° 47′ N., 1° 12′ W.), town, Leicestershire, England; hosiery.

LOUGHREA (53° 12′ N., 8° 45′ W.), market-town, on Loughrea, Galway, Ireland.

LOUGHTON (51° 39′ N., 0° 4′ E.), town, Essex, England.

LOUHANS (46° 40′ N., 5° 15′ E.), town, Saône-et-Loire, France.

LOUIS I. and II., kings of Bavaria, see LUDWIG.

LOUIS, LUDWIG, Holy Rom. emperors: **Louis I., THE PIOUS,** *Le Débonnaire* (778–840), king of France; s. of Charlemagne; emperor, 814; reign marked by various revolts of his sons, who deposed him, 833; restored, 834.—**Louis II.** (825–75), succ., 855; reign marked by wars against Saracens whom L. defeated and expelled from Capua.—**Louis III.** (*c.* 880–928), succ., 901; called *The Blind*, because blinded by enemies, 905.—**Louis IV., THE BAVARIAN** (*c.* 1287–1347), king of Germany, 1314; defeated Frederick of Austria, rival claimant, at *Mühldorf*, 1322; subsequently warred against Pope John XXII., who refused to recognise him; took Pisa, 1327; crowned Rom. emperor, 1328; deposed pope; formed alliance with Edward III. of England; election as emperor declared valid by council of electors at Rheuse, 1338, although not recognised by pope.

LOUIS, kings of France: **Louis I.,** see LOUIS I., Rom. emperor.—**Louis II.** (846–79), succ., 877; called *Le Bègue* (stammerer).—**Louis III.** (*c.* 863–82), became joint-king with bro. Carloman (*q.v.*), 879; defeated invading Northmen, 881.—**Louis IV.** (921–54), crowned, 936; called *d'Outremer* because he spent childhood in England with his Eng. mother, wife of Charles the Simple.—**Louis V.** (967–87), succ., 986; called *Le Fainéant.*—**Louis VI., THE FAT** (1081–1137), succ., 1108; suppressed barons' depredations; warred against Henry I. of England 25 years, in Normandy; rallied France against threatened invasion of Emperor Henry V.; strengthened crown and encouraged emancipation of Communes.—**Louis VII.** (*c.* 1121–80), called *Le Jeune*; succ., 1137; defeated Theobald of Champagne, 1144; undertook Second Crusade, 1147, with humiliating results; warred against Henry II. of England, who m. L.'s divorced wife, Eleanor of Aquitaine, thus acquiring S.W. France.—**Louis VIII.** (1187–1226), succ., 1223; at behest of rebellious Eng. barons invaded England, 1216; defeated at *Fair of Lincoln*, 1217; recovered Poitou from Henry III. of England, 1224; led crusade against Albigenses, 1226; called *Le Lion.* See FRANCE (History).

LOUIS IX., ST. LOUIS (1214–70), king of France; succ., 1226; put down rising of nobles, 1242; vowed to undertake crusade, 1244; sailed for Egypt, 1248; defeated and taken at *Mansura*, 1250; four years captive in Syria; on return concluded treaties of Paris, 1259, and Corbeil, 1258, in which made settlements with England and Aragon respectively; sailed on Second Crusade, 1270; d. from plague in Tunis; canonised, 1297; a wise and just ruler; founded Sorbonne and introduced many administrative and judicial reforms.—**Louis X.** (1289–1316), succ., 1314; called *Le Querelleur.*

Life of Louis IX. in Joinville's contemporary *Memoirs*; Perry, *St. Louis* (1901).

LOUIS XI. (1423–83), king of France; twice rebelled against his f., Charles VII.; m. Margaret of Scotland; succ., 1461; tried to curb power of barons, who formed league with Charles the Bold, Duke of Burgundy, and declared war, 1465; yielded to nobles' demands; subdued Normandy, 1467; taken prisoner by Charles of Burgundy at Péronne, 1468; subsequently allied himself with Lancastrians against Edward IV. of England and Charles of Burgundy; made truce, 1471; Charles the Bold defeated and killed at *Nancy*, 1477. L. then warred against Maximilian of Austria, who m. Charles' dau.; by treaty of Arras, 1482, obtained Burgundy, Picardy, and other provinces; acquired Bar and Anjou, 1480, Maine and Provence, 1481; interference in Spain unsuccessful; attained great influence in Italy; united France and increased power of Fr. crown, by masterly but unscrupulous diplomacy.

C. Hare, *Life of Louis XI.* (1907).

LOUIS XII. (1462–1515), king of France; called *Le Père du Peuple*; succ., 1498; conducted wars in Italy, resisted Holy League, defeated at *Guinegatte*; m. (1514) Henry VIII.'s sister Mary. See FRANCE (History).

LOUIS XIII. (1601–43), king of France; s. of Henry IV.; succ. 1610. Queen-mother, Marie de' Medici, governed during minority; superseded by Richelieu, who became minister, 1624, henceforth ruling France. L. took little part in public affairs; supported Richelieu's policy. Reign marked by civil war, plots, struggle with Protestants. See FRANCE (History).

LOUIS XIV., LE GRAND (1638–1715), king of France; succ., 1643; Fronde War and Thirty Years War ended during minority; after Mazarin's death, 1661, L. assumed government; encouraged Colbert's financial schemes; gained prestige in War of Devolution, 1667–68; Dutch war, 1672–78; later years marked by influence of Mme de Maintenon, whom he secretly married; revocation of Edict of Nantes; Wars of Grand Alliance, 1688–70, and Span. Succession, 1670–1713. L. was a profound believer in divine right of kings, declaring *L'Etat, c'est moi*; his ostentatious despotism finally led to universal opprobrium. L.'s reign was Augustan age of Fr. lit. and fine arts. See FRANCE (History, Literature).

Hassall, *Louis XIV.*; Voltaire, *Siècle de Louis XIV.*; Saint-Simon, *Mémoires.*

LOUIS XV. (1710–74), king of France; succ. great-grandfather, Louis XIV., Duke of Orleans regent, 1714; Fleury subsequently became minister, ruling till 1743. Reign was marked by War of Austrian Succession (1741–48) and Seven Years War (1756–63); French defeated in latter, lost India and Canada. L. was infatuated by Mme de Pompadour and others. His reign weakened France at home and abroad, and, helped by the *philosophes* and *encyclopédistes*, prepared way for Fr. Revolution. See FRANCE (History, Literature).

LOUIS XVI. (1754–93), king of France; grandson of Louis XV.; succ., 1765; encouraged Turgot's reforms; later influenced by wife, Marie Antoinette (*q.v.*); Fr. Revolution of 1789 precipitated by extravagance of court and ministry; imprisoned by revolutionaries; deposed and executed (Jan. 21); well-intentioned, but weak, he reaped what others had sown. See FRANCE (History), FRENCH REVOLUTION.

LOUIS XVII. (1785–95 ?), titular king of France; s. of Louis XVI. and Marie Antoinette; never reigned; imprisoned in Temple, 1792; recognised as L. XVI.'s successor by Royalist party, 1793; formation of plots began for his release; under guardianship of cobbler named Simon and his wife, who left Temple, 1794; was subsequently kept in dark room like cage; said to have died, 1795. Ere long it was rumoured he had escaped; whether he died or escaped is still conjectural, probability seeming to point to latter alternative. At Restoration many pretenders, notably Naumdorff, appeared in his name.

C. Welch, *Little Dauphin* (1908).

LOUIS XVIII. (1755–1824), king of France; younger bro. of Louis XVI.; fled from France during Revolution, 1791; established headquarters at Coblenz, becoming leader of anti-revolutionary party; declared himself regent, 1793, king, 1795; life marked by travels and plots; served with Condé, 1796; subsequently lived at Blanckenberg, Mittau, Warsaw, and in England; refused to abdicate in Napoleon's favour. After latter's defeat, 1814, Bourbons were restored to throne of France, and L. returned to Paris as king; promised to grant constitution; fled on Napoleon's return; again restored, 1815; soon dismissed Talleyrand and Fouché; confided affairs to Decazes and Richelieu. See FRANCE (History).

E. Daudet, *Histoire de la restauration* (1882).

LOUIS I. (1326–82), king of Hungary and Poland; succ. to Hungarian throne, 1342; waged three wars against Venice, 1346, 1357–58, 1378–81; defeated in first, successful in others; succ. uncle as king of Poland, 1370; defeated Turks, 1372.

LOUIS II. (1506–26), king of Hungary and Bohemia, 1511; drowned after defeat at Mohács.

LOUIS I. (1339–84).—**Louis II.** (1377–1417).—**Louis III.** (1403–34), Dukes of Anjou; titular kings of Naples.

LOUIS, LUDWIG, Ger. kings of East Franks. **Louis the German** (804–76), succ. to kingdom of Bavaria, 817; after defeat of Lothair at *Fontenoy*, 841, received Carolingian territories east of Rhine; suppressed Saxon rising, 842; subdued Abotrites; failed to acquire Acquitaine; supported Lothair of Lorraine.—**Louis the Younger** (d. 882), succ., 876.—**Louis the Child** (893–911), succ., 899; last of Carolingian line in Germany; reckoned by some as Emperor Louis IV.

LOUIS OF NASSAU, LUDWIG (1538–74), s. of Count of Nassau; raised troops in aid of Dutch revolt against Spain; defeated Spaniards at *Heiligerlee*, 1568; defeated at *Jemmingen*, 1568; killed at *Mookerheide*.

LOUIS PHILIPPE I. (1773–1850) king of the French; s. of Philippe 'Egalité'; cousin of Louis XVI.; fought as Duc de Chartres in revolutionary army; left France, 1793; returned, 1814; became associated with Liberal party; lieut.-gen., 1830. On deposition of Charles X., L. P. was proclaimed 'king of the French,' 1830; crushed insurrections in Lyons and Paris, 1834; put down Louis Napoleon's rising at Boulogne, 1840; strengthened *entente* with England, 1843; subsequently broke it by transactions concerning the 'Span. marriages,' seeking to re-establish his family's influence in Spain. Extension of franchise was demanded by people, 1847; followed by revolution, 1848, when L. P. had to abdicate and flee to England. See FRANCE (History).

Guizot, *France under Louis Philippe* (1865).

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LOUISBURG (45° 56′ N., 60° W.), town and ruined fortress, Cape Breton, Nova Scotia, Canada; formerly important seaport.

LOUISE OF SAVOY (1476–1531), mother of Francis I.; ruled France from his accession (1515) till her death; greedy, passionate, corrupt; exercised fatal influence on France.

LOUISIADE ARCHIPELAGO (11° S., 152° 30′ E.), archipelago of small islands, Pacific Ocean, belonging to Britain.

LOUISIANA (29° to 33° N., 89° 5′ to 94′ W.), one of southern states of U.S.A.; bounded N. by Arkansas, E. by Mississippi and Gulf of Mexico, S. by Gulf of Mexico, W. by Texas; area, 48,720 sq. miles. Surface flat and marshy, especially towards the sea; L. has coast-line of over 1200 miles along Gulf of Mexico, and is drained by Mississippi, Red R., and Sabine; capital, Baton Rougo; largest towns, New Orleans, Shreveport.

History.—L. is said to have been visited by Ferdinand de Soto in 1541; partially explored in 1682 by de la Salle, who annexed it to France and named it after Louis XIV.; acquired in 1717 by John Law's Mississippi Co., which eventually came to grief, and in 1731 was again in hands of Crown; ceded to Spain in 1762, but restored to France in 1800. Three years later L. was acquired from Napoleon by U.S.A. by *Lousiana Purchase* (*q.v.*); admitted as state of Union, 1812; took part in war against British in 1812–15, during which battle of *New Orleans*, 1815, resulted in Brit. defeat; seceded from Union in 1861; during Civil War great number of engagements took place within its bounds, and New Orleans was in 1862 taken by Federals. After close of war L. was restored to Union, 1865; in 1868 franchise was extended to blacks, and for some time the state suffered from political disturbances, which in 1873 amounted to civil war. During last thirty-five years prosperity has greatly increased.

Government.—Executive power is vested in gov., who is assisted by various officers of state and holds office four years; legislative authority vested in Senate of 41 members and House of Representatives of 115 members, both elected for four years by popular vote. Supremacy of white population in political matters is secured by clauses requiring voter either to have certain property qualification, to be able to read and write, or to prove that his father or grandfather had vote on Jan. 1, 1867. State sends two Senators and seven Representatives to Federal Congress.

Resources.—L. is thickly wooded in parts, producing yellow pine, cypress, cotton-wood, oak, etc.; a great cotton, sugar-cane, and rice-producing region, these being grown in large quantities along coast and Mississippi valley; also produces corn, oats, potatoes, tobacco, fruits. Horses, cattle, sheep, and pigs are raised, and there are important fisheries. Industries include lumbering, sugar-refining, preparation of rice, manufactures of machinery, cotton-seed oil, tobacco, beer, confectionery. Minerals include rock-salt, sulphur, petroleum. Railway mileage in 1910 was 6521.

Population.—Principal religion is R.C.; other creeds in order of numerical importance are Baptist, Methodist, Episcopalian, Presbyterian. Education is free and is greatly improving; there is a univ. at Baton Rouge, and New Orleans is seat of Tulane Univ. and also of a univ. for negroes, and several colleges. Inhabitants include whites, negroes, Asiatics, Indians; whites of foreign birth include Italians, Germans, French, British. Pop. (1910) 1,656,388.

Phelps, *Louisiana* (Amer. Commonwealth Series, Boston, 1905); Louisiana Historical Society's Publications.

LOUISIANA (39° 25′ N., 91° 5′ W.), city, Missouri, U.S.A., on Mississippi; grain and fruit region; flour and lumber-mills; foundries. Pop. (1910) 4454.

LOUISIANA PURCHASE, large tract of country

in N. America, bought by U.S.A. Government from Napoleon in 1803; included whole of present states of Arkansas, Iowa, Louisiana, Missouri, Nebraska, N. Dakota, Oklahoma, S. Dakota, and most of Colorado, Kansas, Minnesota, Montana, Wyoming (*qq.v.*). All the Fr. territory W. of Mississippi R. had been transferred to Spain by treaty in 1762, the arrangement being kept secret until 1764, while Spaniards did not completely establish themselves until after 1769; their control ended in 1800, when country was retroceded to France; importance of subsequent purchase by U.S.A. can hardly be overestimated.

LOUISVILLE (38° 13′ N., 85° 41′ W.), town, Kentucky, U.S.A.; named after Louis XVI. of France, 1780; damaged by cyclone in 1890, by fires in 1891; chief trading city in state, and largest tobacco mart in world; other industries, leather, pork-packing, distilling, manufacture of ploughs, machinery, furniture, metal pipes, flour; great railway centre; important port on Ohio R., rapids of which are avoided by canal, opened 1830. L. has R.C. cathedral, univ., many educational and charitable establishments, and fine parks. Pop. (1910) 223,928.

LOULÉ (37° 4′ N., 7° 54′ W.), town, Faro, Portugal; basket-making; leather manufactures. Pop. 23,000.

LOURDES (43° 6′ N., 0° 1′ W.), town, Hautes-Pyrénées, France, on river Pau; contains an ancient castle; famous place of pilgrimage, on account of sacred spring, whose waters are credited with many wonderful cures of cripples and other invalids; marble quarries.

LOURENÇO MARQUES, Lorenzo Marques (25° 56′ S., 32° 27′ E.), capital, Portug. E. Africa, on Delagoa Bay; first founded as Portug. trading post in 1544; terminus of railway to Pretoria, by which large percentage of Rand imports and exports pass; has excellent harbour; coaling port. Pop. *c.* 10,000.

LOURIS, see Turacos.

LOUSE, see Lice.

LOUTH (53° 55′ N., 6° 30′ W.), county, Leinster, Ireland; extends from Carlingford Lough in N. to River Boyne in S.; smallest county in Ireland; hilly in N., flat elsewhere; rivers Dee and Glyde enter Dundalk Bay. Chief towns: Dundalk (county town), Louth, Drogheda, Ardee; chiefly agricultural; oysters are found in Carlingford Lough. Area, 316 sq. miles. Pop. (1911) 63,402.

LOUTH (53° 22′ N., 0°), town, Lincolnshire, England, on Lud; agricultural centre; iron foundries. Pop. (1911) 9883.

LOUVAIN (50° 53′ N., 4° 41′ E.), town, Brabant, Belgium, on Dyle; breweries, distilleries; seat of univ. (founded 1426). Chief buildings are the beautiful Gothic hôtel-de-ville and Church of St. Pierre. Pop. (1910) 42,123.

LOUVER, Louvre, Luffer, turret on roof; originally outlet for smoke from fire in centre of room; now an ornamental ventilator.

LOUVET DE COUVRAI, JEAN-BAPTISTE (1760–97), Fr. author and politician; achieved sudden fame (1787) by *risqué* book, *Aventures du chevalier de Faublas*; became Jacobin and subsequently Girondist; made famous Ciceronian attack on Robespierre; forced into exile by the Mountain; persecuted by mob as terrorist on return; wrote graphic *Mémoirs*.

LOUVIERS (49° 12′ N., 1° 11′ E.), town, Eure, France, on Eure; cloth manufactures. Pop. 10,400.

LOUVOIS, FRANÇOIS MICHEL LE TELLIER, MARQUIS DE (1639–91), Fr. statesman; app. Sec. of State for War, 1666; said to have restored to troops order and discipline that Colbert had given to finances.

LOVAT, SIMON FRASER, 12TH BARON (*c.* 1667–1747), Scot. intriguer; compelled Dowager Lady L. to marry him, for which was outlawed, 1701; went to France; planned Jacobite rising; suspected of treachery, imprisoned in Aquitaine for some years; escaped to England, 1714; engaged in Jacobite intrigue, playing traitor on various occasions; supported rising of 1745; taken prisoner after *Culloden*; executed for treason.

LOVE FEASTS, see Agape.

LOVE-BIRDS, see under Parrot Tribe.

LOVEDALE (32° 40′ S., 27° 2′ E.), educational and mission station, Cape Colony; founded by Scot. missionaries, 1841.

LOVELACE, RICHARD (1618–58), Eng. cavalier lyrist; b. at Woolwich; his lected poems were pub. in 1659 under the title of *Lucasta: Posthume Poems. To Althea from Prison* and *To Lucasta on going to the Wars* are among the best lyrics in the language.

LOVE-LIES-BLEEDING, see Amaranth.

LOVER, SAMUEL (1797–1868), Irish novelist; famous for *Rory O'More*, *Handy Andy*; wrote songs and plays; painter also.

LOVERE (45° 50′ N., 10° 4′ E.), town, on Lake Iseo, N. Italy; ironworks.

LOVETCH, Lovatz (43° 11′ N., 24° 34′ E.), town, Bulgaria. Pop. 7000.

LOW ARCHIPELAGO, see Paumotu Islands.

LOW CHURCHMAN, a member of the Anglican Church who adheres to definitely Prot. principles.

LOW COUNTRIES, see Netherlands, Belgium.

LOW, SETH (1850–), pres. (1890–1901) of Columbia Univ., New York, which he reorganised.

LOWE, SIR HUDSON (1769–1844), Brit. general; served against France, 1793; defended Capri, which he had to evacuate, 1808; distinguished in campaigns of 1813–14; gov. of St. Helena, 1815–21, during Napoleon's captivity; commanded in Ceylon, 1825–30.

LÖWE, JOHANN KARL GOTTFRIED (1796–1869), Ger. composer; many beautiful ballads and art-songs. See Song.

LOWE, ROBERT, see Sherbrooke.

LOWELL (42° 34′ N., 71° 23′ W.), town, Massachusetts, U.S.A., on Merrimac River, 25 miles N. of Boston; has great cotton factories, and also manufactures of woollens (carpets, hosiery, etc.), iron goods, machinery, chemicals, paper, leather. Native place of Whistler. Pop. (1910) 106,294.

LOWELL, CHARLES RUSSELL (1835–64), Amer. soldier; killed in Amer. Civil War, fighting for the North.

LOWELL, JAMES RUSSELL (1819–91), Amer. poet, journalist, essayist, diplomatist; s. of Unitarian minister of Boston, of Scot. descent; m. Maria White, 1844, and adopted her abolitionist and other political and social enthusiasms; pub. vol. of verse, 1841; joint-publisher of new magazine, *The Pioneer*, 1843; 1848 saw third vol. of poems, *Fable for Critics*, *Biglow Papers*, *Vision of Sir Launfal*, all showing combination of wit and sentiment which was his characteristic. Reforming zeal was the inspiration of much of his verse, which, however, contains some purely pastoral efforts. L. succeeded Longfellow at Harvard Coll., 1855, and subsequently wrote much criticism, his *My Study Windows* and *Among my Books* giving him high rank as literary essayist; editor of *Atlantic*, 1857; joint-editor of *North American Review*, 1863; pub. *Under the Willows*, 1869; *The Cathedral*, 1870; *Heartsease and Rue*, 1888; ambassador to Spain, 1877; to England, 1880–85.

E. E. Hale, *James Russell Lowell and His Friends* (Boston, 1899).

LOWELL, JOHN (1799–1836), member of noted Massachusetts family; founder of Lowell Institute at Boston, a public establishment for the provision of free lectures; endowment, 237,000 dollars. His s., **Francis Cabot**, (1775–1817), founded Lowell city, and introduced cotton manufacture into U.S.A.

LÖWENBERG (51° 6′ N., 15° 35′ E.), town, Silesia, Prussia, on Bober; textile industries. Pop. 9500.

LÖWENSTEIN (49° 5′ N., 9° 20′ E.), town, Württemberg, Germany; ancient ruined castle.

LOWESTOFT (52° 29′ N., 1° 44′ E.), seaport and seaside resort, Suffolk, England, on North Sea; old town stands on cliff forming part of Lowestoft Ness, most easterly cape in England. Pop. (1911) 33,780.

LOXIA, Crossbills, see under Finch Family.

LOYALISTS (in Amer. Revolution), colonists who remained in their allegiance to England during War of Independence; favourite subject of Amer. history and biography; formed about one-third of total population and probably represented element which had not inherited spirit of religious and political revolt. Their elimination by war, confiscation, and exile gave unity to heterogeneous Amer. character. Great Britain secured terms for them by treaty, 1815.

LOYALTY ISLANDS (21° 20′ S., 167° 25′ E.), group of islands in S. Pacific, belonging to France; dependency of New Caledonia.

LOYOLA, ST. IGNATIUS OF (1491–1556).—Inigo Lopez de Recalde, founder of the Society of Jesus, was of noble Span. birth, and went as a page-boy to the Span. court; and being courageous and energetic, became a soldier. While fighting in Navarre in 1521, he was injured at the siege of Pampeluna, and while recovering began to repent of his worldly ways. Entering the Abbey of Montserrat in 1522, he led a life of devotion; afterwards went to Rome, and then on pilgrimage to Jerusalem; coming back to Italy, was viewed as a heretic by the Inquisition; continued his wanderings in Spain and then in Paris and Italy; ordained priest, 1538. While in Rome in 1537 he saw vision of Christ which led him to found the Society of Jesus, which was sanctioned by Pope Pius III. in 1540, and of which he himself was elected general in 1541. L. drew up the *Constitutions* of the Order, and finished his *Spiritual Exercises*; devoted the rest of his life to the Society. He was beatified in 1609; canonized, 1629. A man of strong character who had had difficulty in conquering himself, and of intense spiritual fervour, he was, if sometimes stern, a born ruler of men. See JESUITS.

Joli, *St. Ignace de Loyola.*

LOZÈRE (44° 40′ N., 3° 30′ E.), department, S.E. France, formed from ancient Gevaudan in Languedoc; mountainous; rich in minerals; cattle and sheep rearing, silkworm breeding; manufactures cheese; capital, Mende. Pop. (1911) 122,738.

LUANG-PRABANG (19° 54′ N., 102° 10′ E.), chief town, Laos, Fr. Indo-China, on Mekong. Pop. *c.* 13,000.

LUBAO (15° N., 120° 30′ E.), town, Luzon, Philippine Islands. Pop. 20,000.

LÜBBEN (51° 56′ N., 13° 53′ E.), town, Brandenburg, Prussia, on Spree; sawmills. Pop. (1910) 7802.

LUBBOCK, JOHN, see AVEBURY.

LÜBECK (53° 51′ N., 10° 41′ E.), free city, capital of L. state, Germany, on Trave, about 12 miles from Baltic; once head of Hanseatic League; now prominent fort, trading chiefly with Baltic countries. L. was founded XII. cent.; became free city of the Empire, 1226; conquered by French, 1806; recovered independence, 1815. L. is a picturesque old town, with quaint gables and late Gothic and Renaissance architecture. Among striking buildings are Marienkirche, 1276–1310 (with fine paintings and sculptures), Domkirche (founded by Henry the Lion; XII.-XIV. cent. altarpiece by Memling); churches of St. Catherine and St. James (XIV. cent.); Rathaus (XIII.-XV. cent.), Gothic Holstentor (XV.-cent. gateway). Chief industries are shipbuilding, machinery, chemicals, breweries, brushes, soap, cigars, food-stuffs, etc. The STATE OF LÜBECK (area, 115 sq. miles) is a republic, governed by Senate and House of Burgesses; sends one member to Bundesrat, and one to Imperial Reichstag. The PRINCIPALITY OF LÜBECK (pop. 41,000), lying N. of L. State, forms part of Oldenburg (*q.v.*). Pop. (1910) city, 98,620; state, 116,500.

LÜBEN (51° 23′ N., 16° 11′ E.), town, Silesia, Prussia. Pop. (1910) 7818.

LUBLIN.—(1) (51° N., 23° E.) government, S.E. of Russian Poland, bordering Galicia. Pop. 1,437,000. (2) (51° 20′ N., 22° 35′ E.) capital of above; XIII.-cent. cathedral; linen and woollen manufactures. Pop. 62,000.

LUBRICATION, the science of correctly applying lubricants. When two working surfaces run in contact, friction is set up, the amount varying according to the surfaces and the material. In 1803 Beauchamp Tower discovered that, when a lubricant was applied, its effect was to separate the surfaces which were working against each other, by a thin film, and so hold them apart.

Light spindles, as in textile machinery, require a thin oil, while the heavy bearings of a steam engine require an oil which is about as viscous as treacle. As a rule, the greater the load the thicker the lubricant. Water- and air-cooled engines require different oils.

Lubricants may be solid, semi-solid, or liquid, and consist of animal or vegetable greases or oils and mineral oils. The chief l's are: *Solids*, soapstone, plumbago, and graphite. *Semi-solids*, tallow, lard, and other animal fats. *Liquid* (oils)—Animal—Sperm oil. Vegetable—Olive and rape oils. Mineral—Oils distilled from Russ. and Amer. petroleums. Mineral oils may be used simple or compounded. Plumbago and graphite are frequently mixed with oils or grease.

For heavy loads, vegetable and animal oils are better than mineral oils.

LUCA DELLA ROBBIA, see DELLA ROBBIA.

LUCAN, MARCUS ANNÆUS LUCANUS (A.D. 39–65), Rom. poet; b. Corduba, Spain. His success roused Nero's jealousy, and he was forbidden to recite in public; indignation prompted L. to join the Pisonian conspiracy; on the discovery of the plot he was compelled to end his life; great work is the *Pharsalia*, a rhetorical poem dealing with the conflict between Cæsar and Pompey.

LUCANIA, former name of region between Gulf of Tarentum and Tyrrhenian Sea, S. Italy; now included in provinces of Basilicata, Cosenza, and Salerno; surface mountainous; inhabited by Lucani from V. cent. B.C.; subdued by Rome in 272 B.C.; supported Carthage in Hannibalic War.

LUCARIS, CYRILLOS (1572–1637), patriarch of Constantinople; tried to make Eastern Church Calvinistic.

LUCAS, SIR CHARLES (d. 1648), Royalist soldier in Civil War; shot by Parliamentarians for breaking parole, 1648.

LUCAS, CHARLES (1713–71), Irish physician and politician; at first an apothecary in Dublin; compelled to flee abroad on account of his political opinions; studied med. in Paris and Leiden, and commenced practice as physician in London; pardoned and elected to Irish Parliament as member for Dublin; noted for defence of independence of Irish Parliament; wrote many political pamphlets.

LUCAS, JOHN SEYMOUR (1849–), Eng. artist; painted *The Armada in Sight, After Culloden.*

LUCAS, VAN LEYDEN (*c.* 1494–1533), Dutch painter and engraver; an intimate of Mabuse and Albrecht Dürer; dealt successfully with sacred history and contemporary manners and portraits.

LUCCA (43° 51′ N., 10° 31′ E.), town, Tuscany, Italy; was free city in XIV. cent.; became principality in 1805, when Napoleon gave it to his sister, Princess Bacciochi; afterwards became duchy, and was incorporated with Tuscany, 1847; annexed to Italy, 1860. L. is seat of archbishopric; has cathedral dating in part from XI. cent., and containing fine pictures; many old churches, palaces, educational establishments; old fortifications remain; manufactures silk. Pop. (1911) of town, 31,000; of commune, *c.* 76,037.

LUCCA, BAGNI DI (43° 51′ N., 10° 31′ E.), watering-place, on Lima, Lucca province, Italy.

LUCCHESINI, GIROLAMO (1751–1825), Prussian diplomat; ambassador to Poland, 1789; arranged Prusso-Polish alliance, 1790; ambassador to Vienna, 1793; Paris, 1802; tried to maintain friendly relations between France and Prussia.

LUCENA (37° 35′ N., 4° 32′ W.), town, Cordova, Spain, on Casajar; earthenware. Pop. (1910) 21,020.

LUCERA (41° 30′ N., 15° 21′ E.), town, Foggia, Italy; cathedral and castle; silk. Pop. 17,500.

LUCERNE, LUZERN.—(1) (47° 10′ N., 8° 10′ E.) canton, Switzerland; hilly and mountainous; chief stream, the Reuss; agriculture and dairy-farming; joined Swiss confederation, 1332. (2) (47° 3′ N., 8° 18′ E.) town, capital of above; beautifully situated on Lake of L.; popular tourist resort; old walls and watch-towers (erected, 1385), ancient town hall, Hofkirche, museum, arsenal (old armour), *Lion of Lucerne* monument, glacier garden, etc. Pop. (1912) 40,900.

LUCERNE, PURPLE MEDICK, or ALFALFA (*Medicago sativa*), a member of the *Leguminosæ* cultivated as a fodder crop. The fruits usually form a coiled mass.

LUCERNE, LAKE OF, VIERWALDSTÄTTERSEE (47° N., 8° 30′ E.), 'Lake of the Four Forest Cantons,' Switzerland; surrounded by cantons of Lucerne, Unterwalden, Schwyz, and Uri; area, 44 sq. miles; overlooked by Mount Pilatus and Rigi; traversed by the Reuss; beautiful scenery; associated with William Tell.

LUCHAIRE, DENIS JEAN ACHILLE (1846–1908), Fr. historian; prof. of History at the Sorbonne; wrote several works, particularly on Pope Innocent III.

LUCHU ISLANDS (24° to 30° N., 122° 30′ to 130° E.), group of some 50 volcanic and coralline islands belonging to Japan, half-way between Kiushiu and Formosa; total area, 930 sq. miles; largest islands, Okinawa and Amami; chief towns, Shuri (capital) and Nafa, most important seaport and trading centre; annexed by Japan despite China's threatening attitude in 1879; produce sugar, sago, dyewoods, aromatic oranges. Pop. 457,000.

LUCIAN (d. *c.* 200 A.D.), Silver-Age Gk. writer; b. Samosata, Syria; after unsuccessful apprenticeship to his uncle, a sculptor, turned his hand to oratory; seems to have prospered; eventually obtained a well-paid post in Egypt as recorder of legal actions and keeper of State documents. L. wrote a very large number of treatises and dialogues (in the Platonic style), mostly satires on current abuses and on philosophers. He believed little of what was taught either in philosophy or religion. His style is elegant and correct, although it naturally contains a few Silver-Age words and constructions (notably his use of *Kan*). Best-known work is his *True History*, a classical Baron Munchausen describing the exciting adventures of some voyagers to the moon; written to ridicule hist. poets and historians from Homer downwards. In *De morte peregrini* L. shows knowledge of Christianity, which he treats with scant respect. Other well-known dialogues include the *Piscator*, a conversation between Socrates, Plato, and others; *Hermotimus*, between a Stoic and Lycinus (Lucian).

Collins, *Lucian.*

LUCIFER ('Light-Bringer'), *Venus* (*q.v.*) as Morning Star; (myth.) son of Aurora (dawn); Satan, supposed to have fallen from heaven (cf. *Isaiah* 14^{12}; *Luke* 10^{18}; *Revelation* 9^{1} *sqq.*); friction match containing phosphorus, dating from *c.* 1830.

LUCIFER (d. *c.* 370), bp. of Cagliari; orthodox protagonist in Arian controversy.

LUCILIA, see under HOUSE FLY.

LUCILIUS, GAIUS (*c.* 180–103 B.C.), Rom. satirist; b. Suessa; served in the Numantine War under Scipio, and despite his humble origin lived on terms of the closest familiarity with Scipio and Lælius; regarded as the first great Rom. satirist. He wrote with great ease and variety, but his work lacks polish and finish. In his satire he is more personal than Horace.

LUCKENWALDE (52° 7′ N., 13° 9′ E.), town, Brandenburg, Prussia, on Nuthe; cloth. Pop. (1910) 23,475.

LUCKNOW (26° 52′ N., 80° 58′ E.), city, India, on Gumti; formerly capital of independent state of Oudh; chief building, the mausoleum Imambara; seat of Canning Coll. and La Martinière Coll.; noted for heroic defence and relief in Indian Mutiny, 1857–58; muslins, embroidery, brass-ware, pottery. See INDIA (*History*). Pop. (1911) 259,798.

LUÇON (46° 27′ N., 1° 9′ W.), town, Vendée, France; cathedral; bp.'s see. Pop. 6900.

LUCRETILIS (42° 10′ N., 12° 50′ E.), mountain, in the Sabine country, ancient Italy.

LUCRETIUS, TITUS CARUS (*c.* 98–55 B.C.), Rom. poet; according to tradition, was poisoned by love-potion, and wrote during intervals of sanity. His poem, *De Rerum Natura*, in six books of hexameters, treats of Epicurean philosophy, but is interspersed with many remarkably clever conjectures and theories regarding the atomic origin of the world, mankind, etc. He bears no great love to the Rom. pantheon, and condemns superstition as one of man's burdens. L. is one of the most characteristically Roman of all Lat. writers.

Mason, *Atomic Theory of Lucretius* (1884); Santayana, *Three Philosophical Poets* (1911).

LUCRINE LAKE, LUCRINUS LACUS (40° 51′ N., 14° 5′ E.), small lake, on coast of Campania, ancient Italy; oyster-beds.

LUCULLUS, LUCIUS LICINIUS (*c.* 109–56 B.C.), one of greatest orators, gov's, and generals of Rome; subject of one of Plutarch's *Lives*; consul, 74, and by death of pro-consul became leader of forces against Mithridates; rescued Rom. gov. of Bithynia and conquered Pontus, 74–2; overran large part of Armenia; recalled by enemies at home, abandoned ambition, and became famous as art amateur and voluptuary.

LUCY, SIR THOMAS (1532–1600), Lord of Charlecote, Warwickshire, England, in Shakespeare's early days; model for Justice Shallow; according to legend Shakespeare stole his deer.

LUDDITES, bands of workmen who smashed machinery in Eng. Midlands, 1812–18; named after Ned Lud, a Leicestershire lunatic, who, 30 years previous, smashed some stocking-frames.

LÜDENSCHEID (51° 13′ N., 7° 46′ E.), town, Westphalia, Prussia; metal goods. Pop. (1910) 32,297.

LUDHIANA (30° 52′ N., 75° 55′ E.), town and district, Jalundhar division, Punjab, India; shawls; trade in grain. Pop. *c.* 49,000.

LUDINGTON (39° N., 86° 30′ W.), city, summer resort, Michigan, U.S.A., on Lake Michigan; trade in grain. Pop. (1910) 9132.

LUDLOW (52° 22′ N., 2° 44′ W.), market town, Shropshire, England; at confluence of Corve and Teme; has a fine old church and grammar school, and remains of a XII.-cent. castle, formerly residence of the Lords Presidents of Wales. Pop. (1911) 5926.

LUDLOW, EDMUND (*c.* 1617–92), Eng. regicide; held commands for Parliament in Civil War; signed warrant for king's execution; brought to a close Cromwellian subjugation of Ireland, 1651–52; opposed protectorate; sentenced, 1660, but fled abroad.

LUDLOW GROUP, LUDLOVIAN ROCKS, part of Upper Silurian rocks in Great Britain; well developed at Ludlow (Salop); consists of shales at the top, which get more sandy in descent until the Old Red Sandstone is reached.

LUDWIG, see LOUIS.

LUDWIG I. (1786–1868), king of Bavaria; b. at Strassburg; led Bavarian opposition to France; had share in forming Bavarian constitution; succ., 1825; opposed Jesuits; improved financial affairs; encouraged learning and art; furthered economic improvements; promoted founding of Zoll-Verein, 1833; aided Greece in struggle for independence against Turkey, his son becoming king of Greece, 1832; gave largely to charitable objects; influenced in political matters by dancer, Lola Montez, which led to revolution, 1848, when L. had to abdicate; retired to private life.

LUDWIG II. (1845–86), king of Bavaria; succ.,

1864; opposed Prussia in Schleswig-Holstein affair; joined Austria against Prussia, 1866; defeated; subsequently reformed army; aided Prussia against France, 1870–71; offered imperial crown to William of Prussia, 1871. His friendship with Richard Wagner roused opposition in country; interested in art, lit., and philosophy; built many magnificent castles and Bayreuth theatre; suffered from mental weakness, which ultimately developed into incurable insanity; deposed, 1886; drowned himself in Starnberger See a week later.

LUDWIG, KARL FRIEDRICH WILHELM (1816–95), Ger. physiologist; prof. of Anat. and Physiology at Zürich, 1849, at the military medical school in Vienna, 1855; prof. of Physiology at Leipzig, 1865; investigated gland secretions and secretory nerves, blood pressure, the blood and lymph, and numerous other physiological subjects; greatly influenced modern development of physiology, introducing valuable new methods, in addition to making many important discoveries; author of *Textbook of Physiology*.

LUDWIGSBURG (38° 53′ N., 9° 12′ E.), town, Württemberg, Germany; important military dépôt. Pop. (1910) 24,926.

LUDWIGSHAFEN (49° 28′ N., 8° 27′ E.), town, Bavarian Palatinate, on Rhine; chemical works. Pop. (1910) 83,307.

LUDWIGSLUST (53° 19′ N., 11° 30′ E.), town, Mecklenburg-Schwerin, Germany; contains a grand-ducal residence. Pop. (1910) 6926.

LUGANO (46° N., 8° 56′ E.), chief town, Swiss canton of Ticino, on Lake Lugano; tourist centre. Pop. 13,000.

LUGANO, LAKE OF (46° N., 9° E.), lake of Switzerland and N. Italy; ancient *Ceresius Lacus*.

LUGANSK (48° 35′ N., 39° 10′ E.), town, Ekaterinoslav, Russia, on Lugan; coal-mining centre; iron manufactures. Pop. (1910) 32,260.

LUGARD, SIR FREDERICK DEALTRY (1858–), Eng. colonial gov.; served with distinction in Afghan War (1879–80), and in Sudan and Burma campaigns; administrator of Uganda (1889–92); high commissioner of N. Nigeria (1900–6); gov. of Hong-Kong (1907–11); app. gov. of both N. and S. Nigeria (1912) with a view to federating the Protectorates; author of *Our East African Empire* (1893). His wife, LADY LUGARD (*née* Flora Louise Shaw), is well known as traveller and writer.

LUGDUNUM, see LYONS.

LUGDUNUM BATAVORUM, Rom. name for Leiden (*q.v.*).

LUGGER, boat with one to three masts with square sail ('lugsail') on each.

LUGO.—(1) (43° N., 7° 30′ W.) maritime province, Galicia, Spain; mountainous. Pop. (1910) 477,239. (2) (43° N., 7° 31′ W.) capital of above, on Minho; textile industries; sulphur baths in vicinity. Pop. (1910) 28,174.

LUGOS (45° 41′ N., 21° 53′ E.), town, Hungary, on Temes; wine. Pop. 16,500.

LUG-WORM, see under CHÆTOPODA.

LUIK, Flemish name for Liége (*q.v.*).

LUINI, BERNARDINO (*c.* 1465–1540), Ital. painter, and pupil of Leonardo da Vinci (*q.v.*); executed frescoes at Milan and Lugano, and painted several easel works, including *The Daughter of Herodias*, now in the Louvre. Ruskin praises him.

Mason, *Luini* (Masterpieces in Colour).

LUKE, ST., a Gk. physician, friend and companion of St. Paul; probably wrote Third Gospel and *Acts*; said to have died in Bithynia, aged 74; probably collected traditions in Palestine and Asia Minor for his writings, into which he infused something of his own personality.

Luke, Gospel of St., third and longest of three Synoptic Gospels, based largely on *Mark* (*q.v.*), and, like *Matthew* (q.v.), on collection of sayings of Jesus, and material peculiar to itself (specially in chapters 1–3 and some of parables); traditionally work of St. Luke, physician and companion of St. Paul, and recent criticism has done much to support this; forms with *Acts* continuous hist. work; differs in several points from *Matthew* and *Mark*—*e.g.* in Passion narrative; tone of L.'s Gospel is Gentile, and shows special sympathy with women, sufferers and sinners; used by Justin Martyr (and in mutilated edition by Marcion, *c.* 150).

Adeney, *Luke* (Century Bible); Plummer, *St. Luke* (in Internat. Crit. Com.); Harnack, *Luke the Physician, Acts of the Apostles, Date of Gospels and Acts*.

LULEÅ (65° 35′ N., 22° 10′ E.), seaport, Sweden, on Gulf of Bothnia; trade in timber. Pop. (1911) 8960.

LULLY, RAIMON, RAYMOND LULL (*c.* 1235–1315), mediæval philosopher, known as 'the enlightened doctor'; b. Majorca; becoming a Christian, endeavoured to convert Moslems by appeal to their higher reason; founded college of missionaries in 1276; failed to interest the pope in his plans; martyred in Tunis.

LUMBAGO, rheumatism of muscles of the small of the back, probably an inflammation of the fibrous tissue of the muscles also affecting the nerves, characterised by intense pain on movement; treatment is rest, fomentations on affected part, and a saline laxative, while sodium salicylate, aspirin, counter-irritants, or electricity may be beneficial. See RHEUMATISM.

LUMBER, see TIMBER.

LUMBINI, a garden near Bhagwanpur, Nepal, India, the traditional birth-site of the Buddha. A pillar with an inscription was put up by the Emperor Asoka, 248 B.C. This was found in 1895.

LUMP-SUCKERS and **SEA-SNAILS** (*Cyclopteridæ*), carnivorous fishes with clumsy bodies and slow movements. The ventral fins are united to form a sucking disc by which they attach themselves to rocks. They occur in Antarctic, but chiefly in northern seas, being found sometimes at a depth of 1800 fathoms. The Brit. forms are 3 in number—the ugly, globular Lump-Sucker or Cock-Paidle (*Cyclopterus lumpus*), the Sea Snail, and Montagu's Sucker (*Liparis*), common coastal species.

LUNA (44° 5′ N., 10° E.), ancient city, Etruria, modern Luni, Italy, on Macra.

LUNA, ÁLVARO DE (d. 1453), courtier and friend of John II. of Castile; opposed to noble faction at court; Constable of Castile, 1423; executed owing to queen's influence.

LUNA, PEDRO DI (d. 1422 ?), Span. antipope, BENEDICT XIII.; supported Clement VII., and was himself elected pope by Fr. party at Avignon, 1394; refused to accept deposition by Council of Constance, 1417.

LUNACY, see INSANITY.

LUNARDI, VINCENZO (1759–1806), see under BALLOON.

LUNAWADA, LUNAWARA (22° N., 73° E.), native state, Gujarat division, Bombay, India. Pop. 10,000.

LUND (55° 39′ N., 13° 11′ E.), city, Swedon, on Höjea; bp.'s see; seat of univ. (founded, 1866). Pop. (1911) 20,139.

LUNDY (51° 11′ N., 4° 40′ W.), small island at entrance of Bristol Channel; interesting antiquities. Pop. 100.

LUNDY, ROBERT, gov. of Londonderry; declared for William III. and was besieged by Jacobite army, 1689; intrigues with assailants discovered; forced to fly from Londonderry, covered with ignominy.

LÜNEBURG (53° 15′ N., 10° 25′ E.), town, Hanover, Prussia, on Ilmenau; one of the ancient Hanse towns; has several old Gothic churches and some interesting mediæval buildings; manufactures cement and salt. Pop. (1910) 27,797. **Lüneburger Heide** (53° 3′ N., 10° 10′ E.), moorland district, Hanover, Prussia, between Aller and Elbe.

LUNETTE, see FORTIFICATION.

LUNÉVILLE (48° 35′ N., 6° 30′ E.), town, Meurthe-et-Moselle, France cotton and woollen industries; noted riding-school; birthplace of Emperor Francis I. Pop. 24,500.

LUNG-CHAU (22° 24′ N., 106° 42′ E.), treaty town, Kwangsi, China. Pop. *c.* 14,000.

LUNG-FISHES, see under FISHES.

LUNGS, the main organs of respiration, two in number, situated in cavity of the thorax, above, behind, on each side of, and, to a slight extent, in front of the heart. Each lung is cone-shaped, the apex reaching to root of the neck and the base resting on the diaphragm, while right lung, which is the larger, is composed of three lobes, and left of two lobes. See RESPIRATORY SYSTEM.

LUPERCALIA, an ancient Rom. festival, held on Feb. 15, in honour of Lupercus, god of fertility, and one of the oldest pastoral deities of Italy.

LUPUS, tuberculosis of the skin, running a prolonged and chronic course; most commonly affects persons under twenty, and generally attacks the nose and neighbouring part of the cheek, ulceration taking place; treatment is the injection of new tuberculin, or application of X-rays or Finsen light rays, and application of salicylic acid to destroy diseased tissue, along with plenty of fresh air and cod-liver oil. See TUBERCULOSIS.

LURAY CAVERN (38° 33′ N., 78° 22′ W.), cave near Luray village, Virginia, U.S.A.; discovered 1878, and noted for its remarkable stalactites and stalagmites; these include a number of columns over 50 ft. in height, the colours ranging from white to red, yellow, brown, and blue. There are many different chambers, which are lit by electricity. Traces of wild animals remain, and a human skeleton has been found.

LURCHERS, see DOG FAMILY.

LURGAN (54° 28′ N., 6° 20′ W.), market town, Armagh, Ireland; linens. Pop. (1911) 12,135.

LURIA, ISAAC BEN SOLOMON (1534–72), Jewish hermit; b. Jerusalem; led a hermit's life on the banks of the Nile, where he had visions and dreams; he transformed Judaism, but the chief beauty of his doctrine was his interpretation of the Sabbath.

LURISTAN (33° N., 48° E.), mountainous province, W. Persia, bordering on Turkey.

LURLEI, see LORELEI.

LUSATIA, district, Germany, between Oder and Elbe, N. of Bohemia; comprised Upper and Lower Lusatia; belonged to Saxony from 1635–1815, when Lower Lusatia and part of Upper Lusatia were ceded to Prussia.

LUSHAI HILLS (23° 20′ N., 93° E.), mountainous district, India, on frontier of Assam, Bengal, and Burma.

LUSIADS, THE, see under CAMOENS, LUIS DE.

LUSIGNAN (46° 27′ N., 0° 8′ E.), town, Vienne, France; XI.-cent. church.

LUSSIN, LOSSINI (44° 35′ N., 14° 25′ E.), island in Adriatic, belonging to crownland of Istria, Austria; ancient *Apsorus*. Pop. (1911) 12,947. Capital, LUSSINPICCOLO. Pop. 8340.

LUSTRATION (Lat. *lustro*, purify), ceremonial washing which occurs in many religions: thus contact with a corpse involves uncleanness which has to be washed away; at first there is no clear distinction between ritual and moral uncleanness.

LUTE (Arabic *Al'ud*, 'the wood'), an ancient stringed instrument, plucked by the fingers, similar to the guitar, mandoline, etc. L. has a pear-shaped body with neck attached to it; strings of catgut, but after XVII. cent. silver-spun bass strings were used. L. with large double-neck and two sets of tuning pegs was known as *Theorbo*. L. is of Oriental origin; in vogue between XV. and XVII. cent.

LUTETIA (PARISIORUM), ancient name of Paris (*q.v.*).

LUTHER LEAGUE, Amer. soc. for young Lutherans, founded 1888.

LUTHER, MARTIN (1483–1546), the greatest leader of the Prot. Reformation, was the s. of a miner and b. at Eisleben in Thuringia; he went to school at Mansfeld and Magdeburg, and entered Erfurt Univ. in 1501, studying scholastic philosophy and theol. In 1505, to the surprise of his friends, he entered the monastic life. His reasons for this he never fully explained, but it seems that from this time onwards he was tortured by the sense of sin, and the fear of Christ as Judge had haunted his childish mind. It was some time before L. could win the sense of pardon and forgiveness. At last he did, and was ordained. He went to Wittenberg and gave lectures in theol., which soon attracted attention for his power of reaching the hearts of his hearers. He began at length to mistrust the scholastic theol., and his feelings were particularly roused by the sale of Indulgences.

These, originally intended at first merely to remit the temporal penalty of sin, had been abused, and were now utilised as a source of revenue by the Papacy. In November 1517, L. nailed 95 *theses* to the church door at Wittenberg, following a regular precedent in academic disputes. L. engaged in controversy with John Maiyr of Eck, a Catholic controversialist, and soon had popular sympathies on his side. Meanwhile, Miltitz, a papal envoy, came to Germany and tried to win over L., but the Papacy would not compromise at all. In June 1519, L. engaged in public dispute with Eck, and saw that his breach with the Church was wider than he himself had at first imagined.

In 1520 he pub. his famous *Address to the Christian Nobility of the German Nation*, and when the papal bull directed against him arrived, burnt it. Rome then appealed to the Emperor to outlaw L. At length L. was summoned to appear at a diet at Worms, and in April 1521 given a safe conduct to last three weeks. L. hid in the Castle of Wartburg. But a national movement was now growing up in his favour. From 1521–25 L. led popular feeling, when the course of events was modified by the Peasants' Revolt. After this the cleavage between Protestants and Catholics became marked, and a third revolutionary party, the Anabaptists and kindred sects, came into being. A diet was held at Speyer, 1526, but the Catholic party refused to recognise Prot. liberty. L. became engaged in controversy about the Lord's Supper with the more radical Zwingli.

L. devoted the rest of his life to elaborating theological and Church reform, being less revolutionary than the rest of the reformers, and died worn out with his labours; many works (prose and hymns) in Latin and German.

Beard, *Martin Luther* (Lond., 1889), only up to 1522; Janssen, *History of the German People*, vol. ii.–iii. (St. Louis, 1896–); Lindsay, *Luther and the German Reformation*, should be read with Döllinger's *Die Reformation*.

LUTHERANS, body of Ger. Protestants founded by Luther (*q.v.*), called sometimes EVANGELICAL, as opposed to Reformed or Calvinistic Churches. Lutheranism is less rigid than Calvinism, various controversies showing that it was not always easy to discover Luther's belief on various points, and in ritual less break was made with the mediæval Church. The L. theory of consubstantiation approaches the Roman of transubstantiation. Ger. Protestantism would have been stronger but for the split between Calvinist and Lutheran. In the XIX. cent. some Ger. governments forced a union, and many Lutherans seceded, forming the Old L. Church. L. pastors are appointed by the State or local authorities. The Scandinavian Lutheran Church retains episcopal government. The funds are partly from the State, partly from endowments and subscriptions. Various liturgies are used.

Schaff, *History of the Creeds of Christendom*.

LUTON (51° 52′ N., 0° 26′ W.), town, Bedfordshire, England; chief seat of Eng. straw-plait manufacture. Pop. (1911) 50,000.

LUTRA, Otter, see WEASEL FAMILY.

LUTSK (50° 44′ N., 25° 22′ E.), town, Volhynia government, S. Russia. Pop. 17,500.

LUTTERWORTH (52° 28′ N., 1° 12′ W.), small town, Leicestershire, England.

LÜTTICH, Ger. name for Liège (*q.v.*).

LÜTTRINGHAUSEN (51° 7′ N., 7° 16′ E.), town, Rhine province, Prussia; textiles, iron goods. Pop. (1910) 13,559.

LÜTZEN (51° 16′ N., 12° 8′ E.), town, Prussian province of Saxony; here the imperialist forces under Wallenstein were defeated by Gustavus Adolphus of Sweden, who was killed in action, Nov. 16, 1632; and on May 2, 1813, the allied forces of Prussia and Russia under Wittgenstein were defeated by Napoleon. Pop. (1910) 4082.

LUXEMBURG.—(1) (49° 45′ N., 6° 8′ E.) grand-duchy, Europe, bordering on Belgium, Prussia, and France; area, 998 sq. miles; surface generally table-land; capital, L.; produces iron ore; manufactures hardware, leather, beer, paper. Declared neutral territory in 1867. Pop. (1910) 259,891. (2) (50° N., 5° 30′ E.) province, S.E. Belgium; area, 1706 sq. miles; produces marble, fruit, timber; capital, Arlon. Pop. (1910) 231,215. The Belgian province was included in grand-duchy till 1839.

LUXEMBURG, formerly LÜTZELBURG (49° 37′ N., 6° 7′ E.), capital, grand-duchy of Luxemburg, on Alzette; formerly strongly fortified; dismantled after the treaty of 1867. Pop. of state (1910), 259,891; of capital (1910), 20,848.

LUXEMBURG, FRANÇOIS HENRI DE MONTMORENCY-BOUTEVILLE, DUC DE (1628–95), Maréchal of France; distinguished himself under Condé and Turenne; famous retreat from Holland, 1672; brought France to height of military success, 1691–92, in war of League of Augsburg, twice defeating William III.; considered general of genius, but poor strategist.

LUXEUIL-LES-BAINS (47° 49′ N., 6° 23′ E.), town, Haute-Saône, France; mineral springs. Pop. 5500.

LUXOR (25° 39′ N., 32° 39′ E.), town, Upper Egypt, on Nile; contains magnificent ruins of Thebes (*q.v.*), occupying part of its site. Pop. *c.* 13,000.

LUYNES, name of Fr. family Albert (Alberti); of Florentine origin; acquired L. Important members are HONORÉ (*c.* 1540–92), his son CHARLES (1578–1621), Marquis d'Albert, Duc de L., and his descendants, distinguished generals.

LUZ (42° 50′ N., 0° 1′ W.), town, Hautes-Pyrénées, France; noted fortified church; thermal springs.

LUZERN, LUCERNE (*q.v.*).

LUZZATTI, LUIGI (1841–), Ital. economist and politician; prof. at Milan and Padua, then held various positions in Ital. government.

LYCÆUS (37° 22′ N., 21° 58′ E.), mountain, Arcadia; sacred to Zeus, surnamed Lycæus.

LYCANTHROPY, word used to express widespread primitive credence in metamorphosis of man, voluntarily or otherwise, into a lower animal; still believed among ignorant peasantry. Classical legends depict gods assuming animal shape for various purposes, or changing men into animals either as punishment (cf. Lycaon (*q.v.*)) or as means of protection (cf. Io (*q.v.*)). Mediæval lit. presents numerous accounts of such metamorphosis for beneficent or more frequently for evil ends. Trials for l. were common in France till beginning of XVII. cent.; l. is connected with totemism, *e.g.* a god was generally venerated in animal form, the tribal totem, in the district where the legend arose; and is distinct from metempsychosis. European legends associate the wolf with l.; Eng. *were-wolf*, Fr. *loup-garou*.

LYCAON (classical myth.), infamous king of Arcadia, who offered Zeus a feast of human flesh in order to test his divinity. Zeus slew L. and his 50 sons with a thunderbolt, or, according to another version, changed them into wolves.

LYCAON, see DOG FAMILY.

LYCAONIA, now part of Konia; ancient district, Asia Minor; capital was Iconium.

LYCIA, ancient region, S. Asia Minor; bounded N. by Phrygia and Pisidia, E. by Pamphylia, S. by Mediterranean Sea, W. by Caria; surface mountainous, crossed by Taurus ranges; drained by Limyrus, Xanthus, and other streams; among most important towns were Xanthus (capital), Myra, Olympus, Patara. There are interesting ruins of temples, and some fine rock tombs have been discovered. The country was conquered in turn by Persians, Syrians, and Romans.

LYCK, LYK (53° 50′ N., 22° 22′ E.), town, E. Prussia, Germany, on river and lake Lyck; iron manufactures. Pop. (1910) 13,427.

LYCOPODIACEÆ, see PTERIDOPHYTA.

LYCOPODIALES, see PALÆOBOTANY.

LYCOSURA (37° 20′ N., 22° E.), ancient city, Arcadia; said to have been founded by Lycaon, son of Pelasgus.

LYCURGUS (*c.* 396–325 B.C.), Attic orator; b. Athens; warm supporter of Demosthenes; only one of his speeches is extant.

LYCURGUS, Spartan lawgiver; nothing certain known concerning him; according to tradition, flourished in IX. cent.; was son of royal house; sometime regent for nephew; said to have travelled, and on returning, introduced reforms in constitution which raised Sparta from condition of anarchy to strong united state; also credited with important military and educational reforms.

LYDD (50° 57′ N., 0° 55′ E.), market town, Kent, England.

LYDENBURG (25° 10′ S., 30° 40′ E.), town and district, Transvaal, S. Africa; goldfields.

LYDFORD (51° 6′ N., 2° 37′ W.), village, on Lyd, Devonshire, England.

LYDGATE, JOHN (*c.* 1370–*c.* 1451), Eng. poet of Chaucerian school; chief works are the *Storie of Thebes*, drawn from Statius and Boccaccio, the *Troy Book*, *Temple of Glass*, *Fall of Princes*. Versification is bad; poems are an example of XV.-cent. vain attempts to follow Chaucer.

LYDIA, ancient region, Asia Minor; bounded N. by Mysia, E. by Phrygia, S. by Caria, W. by Ionia; surface generally consists of two fertile plains separated by the Tmolus Mountains; plains produced cereals, and gold was mined in the hills, while the inhabitants manufactured textiles and carried on considerable trade. L. was a powerful kingdom under Gyges in early VII. cent. B.C., and reached its apogee under one of his successors, Crœsus, whose name has become a synonym for wealth; Crœsus was defeated and killed by Cyrus in 546 B.C., when L. became Persian province; it subsequently belonged to Athenians, Macedonians, and Romans in turn.

LYELL, SIR CHARLES (1797–1875), Brit. geologist; b. Forfar; s. of Chas. Lyell, noted botanist. In his early days L. had a leaning to natural history; entered Exeter Coll., Oxford; B.A., 1819; M.A., 1821; called to Bar, 1825; commenced to study geol. as hobby; specialised in marine remains, Tertiary Period; pub. greatest work, *Principles of Geology* (3 vol's), 1830–33; became strong upholder of Darwin's theories; buried at Westminster; sometimes called 'father of modern geology.'

Bonney's *Charles Lyell and Modern Geology* (1895).

LYLY, JOHN, LILLY, LYLIE (1553–1606), Eng. writer; b. Kent; ed. Oxford. L. is famous as the inventor of EUPHUISM, a flowery, aureate, stilted prose diction receiving its name from his novels *Euphues, the Anatomy of Wit* (1579), and *Euphues and his England* (1580). The style is marked by peculiar similes drawn from the natural history of the day, excessive alliteration, vernacular touches, and classical references.

L.'s plays are important more for their fine lyrics and brilliant wit than for their stories; best known are *Endymion*, *Midas*, *Love's Metamorphosis*. He wrote for the court and his plays are related to the Masque. He undoubtedly had much influence on Shakespeare (cf. *As You Like It*, the dialogue of Beatrice and

Benedick in *Much Ado*). L. wrote in prose, and only in his later plays does blank verse appear.

Wilson, *John Lyly* (1905).

LYME REGIS (50° 43′ N., 2° 56′ W.), seaport, watering-place, Dorsetshire, England, on English Channel; stone quarries; landing-place of Monmouth in 1685. Pop. (1911) 2772.

LYMINGTON (50° 46′ N., 1° 33′ W.), seaport, watering-place, Hampshire, England, on English Channel. Pop. (1911) 4329.

LYMPH, a colourless, watery fluid, alkaline, but less so than blood plasma, and coagulable, but clotting less firmly than blood plasma; it contains white corpuscles, lymphocytes, which are derived mainly from the lymph glands, and after digestion fat globules and dissolved substances from the digested food are present in the l. coming from the intestines, giving it a milky appearance. It exudes from the blood in the various tissues and organs, and after laving and nourishing the tissue cells it is taken up by the lymphatic vessels, carrying with it any waste products of the tissues, and eventually is poured into the great veins of the neck by the *thoracic* and *right lymphatic ducts*, the two main lymphatic vessels. The flow of l. from the tissues depends partly on the amount of the tissue fluids and partly upon the power of the cells lining the l. capillaries to determine the amount of l. entering the capillaries, a power which is influenced by the activity of the tissues.

LYMPHATIC SYSTEM includes the *lymph capillaries* which lie in the intercellular spaces of the tissues, and receive the lymph after it has exuded from the blood capillaries and laved the tissue cells; these capillaries join together to form the *lymphatic vessels*, which are furnished with valves, and have an inner lining of endothelial cells, an outer coat of fibrous tissue, and, in the larger vessels, a middle coat of muscular tissue. The *lacteals* are those lymphatic vessels which convey the *chyle*, or digested food, from the intestine, and they converge to join the sac termed the *receptaculum chyli*, to which go also all the abdominal lymphatics. From the receptaculum chyli goes the largest lymphatic vessel, the *thoracic duct*, which runs up close to the aorta, and on its right side, is joined by the lymphatics of the left side of the neck and the left arm, and opens into the commencement of the left innominate vein. The *right lymphatic duct* is a short vessel which is joined by the lymphatics of the right side of the neck and thorax and the right arm, and opens into the right innominate vein. There are certain *lymph spaces* in communication with the lymph capillaries, some of them being merely spaces in the connective tissue with no special lining; others, such as the capsule of Tenon in the orbit, or the sub-epicranial space in the scalp, lined with endothelium; others, larger and more important serous cavities, such as the pleural and the peritoneal cavities. The *lymphatic glands* have fibrous capsules from which fibrous bands go into the substance of the gland, which is composed of lymphoid tissue; the glands are situated in different positions in the courses of the lymphatic vessels, and act as filters, while from their cells are to a large extent derived the white corpuscles of the lymph and of the blood.

The lymphatic glands, owing to their properties as filters, are particularly liable to attack in toxic conditions and infectious diseases. *Scrofula* (*q.v.*) is due to infection of the lymph glands of the neck by the tubercle bacillus, and is treated by improving the general health with plenty of fresh air and nourishing food, cod-liver oil, and tonics; the injection of tuberculin has proved beneficial, and, in more advanced cases, removal of the affected glands by operation is necessary. *Tabes mesenterica* is a condition, usually occurring in children, in which the lymph glands of the abdomen are infected by the tubercle bacillus, and is treated by making an incision into the abdomen, which, of itself, has a beneficial effect, or by more advanced surgical measures. *Lymphadenoma*, or *Hodgkin's Disease*, is a condition in which the lymph glands of the body, beginning usually with the glands of the neck, progressively become enlarged, followed by extreme general emaciation. The condition is treated by application of X-rays; arsenic is a drug which has proved of benefit; and removal of the enlarged glands by surgical operation has also been successful. *Status lymphaticus* is an obscure condition, occurring more commonly in children, in which the thymus gland and the lymphoid tissues all through the body are much enlarged; persons in this condition are very liable to sudden death through slight causes, *e.g.* an anæsthetic or a cold water spray; no treatment has yet proved of benefit.

LYNCH LAW (formerly 'Lynch's Law'), punishment in America without observance of legal forms. Origin of term is not certain; theories are—(1) That it is named after Charles Lynch, J.P., of Virginia, said to have dealt out irregular justice; (2) derived from Lynches' Creek, South Carolina, rendezvous of 'regulators,' *i.e.* self-constituted police of mid-XVIII. cent.; in common use when ordinary codes proved insufficient after liberation of negroes.

LYNCH, PATRICIO (1825–86), naval officer, at first in Brit. navy, then in that of Chile.

LYNCHBURG (37° 18′ N., 79° 1′ W.), city, Virginia, U.S.A., on James River; tobacco. Pop. (1910) 29,494.

LYNDHURST, JOHN SINGLETON COPLEY, BARON (1772–1863), Lord Chancellor of England; Solicitor-General, 1819–24; one of counsel at trial of Queen Caroline; Attorney-General, 1824–26; Master of Rolls, 1826–27; Lord Chancellor, 1827, 1834, 1841–46 (under Tory governments); noted for probity, ability, and polish.

LYNDSAY, SIR DAVID, OF THE MOUNT (*c.* 1490–*c.* 1555), Scot. poet; b. Cupar, Fife; Lyon King-of-arms; famous for *Satire of the Three Estates*, a 'morality' play satirising Church and State; other works—*History of Squire Meldrum*, a biography in verse; *Dialogue between Experience and a Courtier*, a history of the world; the *Dream*, a tiresome allegory; *Tragedy of the Cardinal*, an attack on Beaton.

LYNEDOCH OF BALGOWAN, THOMAS GRAHAM, 1ST BARON (1748–1843), Brit. soldier; lieut.-colonel of Perthshire volunteers, 1794; assisted in capturing Minorca, 1798; in retreat to Corunna, 1809; won battle of *Barossa*, 1811; eulogised by Napier; general, 1821.

LYNN (42° 25′ N., 71° 1′ W.), city, Essex County, Massachusetts, U.S.A., on Massachusetts Bay; boots and shoes; leather. Pop. (1910) 89,336.

LYNN REGIS, see KING'S LYNN.

LYNTON AND LYNMOUTH (51° 17′ N., 3° 50′ W.), two summer resorts, Devonshire, England, on Bristol Channel. Lynton stands on a cliff, 430 ft. high, with Lynmouth below.

LYNX, see under CAT FAMILY.

LYON, NATHANIEL (1818–61), Amer. soldier; fought in Mexican War, and in Civil War for North.

LYONS, LYON (45° 45′ N., 4° 49′ E.), third city of France; at confluence of Rhône and Saône; great commercial and industrial town—centre of silk-trade; first-class fortress; overlooked by two hills—Fourvières (*Forum Vetus*), crowned by sumptuous modern church, and Croix-Rousse, covered with silk-workers' houses; many fine bridges and quays. Other notable features are Rom. remains (aqueducts, etc.); mediæval churches, especially Cathedral of St. Jean (began *c.* 1110), Église d'Ainay (rebuilt X.-XI. cent.), St. Nizier, with ancient crypt; XVII.-cent. Hôtel-de-ville, Palais des Arts, Bourse, unique Musée des Tissus; Palais de Justice, Prefecture; Univ.; Hôtel-Dieu and Hospice de la Charité, first of their kind in France; beautiful Parc de la Tête d'Or, Place Bellecour, Rue de la République. L. (*Lugdunum*) was the chief town of ancient Gaul, and was a great ecclesiastical and commercial centre in Middle Ages; annexed to France, XIII. cent.; long a hotbed of religious, political, and industrial unrest;

Carnot (*q.v.*) assassinated here, 1894; birthplace of Germanicus, Claudius, Caracalla, Ampère, Puvis de Chavannes, etc.; silk fabrics, chemicals; printing, engineering, motor-cars, etc.; great banking centre (*Crédit Lyonnais*). Pop. (1911) 523,796.

Charléty, *Petite Histoire de Lyon* (1903).

LYONS, COUNCILS OF.—First Council, 1245, met to consider quarrel between pope and Emperor Frederick II.; resulted in excommunication and deposition of emperor. Second Council, 1274, passed regulations governing election of popes.

LYRE, an ancient Gk. stringed musical instrument of various patterns and sizes. The strings, at different periods numbering 4, 7, or 10, were stretched across a hollow body or sound chest, and played with a plectrum. The modern Gk. lyra is of the violin type, played with a bow; and several bowed instruments of this kind, differing greatly as to number of strings, were known as l's about the XIX. cent. Haydn alone among the classical composers wrote for the lyra.

LYRE-BIRDS (*Menura*), a genus of 3 large birds characterised by the peculiar lyre shape of the tail in the males. They form by themselves a family and order (*Menuriformes*) of birds. Lyre-birds live in the thick bush country of south-eastern Australia, where they feed upon insects. Their nests are large and tunnel-like, with the entrance in the side, and each bird seems to have a reserved beat of its own in the neighbourhood. They are excellent mimics of the songs of other birds.

LYRICAL POETRY, a species of verse originally accompanied by a lyre; in Gk. it is represented by such names as Sappho, Alcæus, and Mimnermus, and in Lat. by Catullus and Horace. A lyric is normally personal, passionate, brief, and usually commences abruptly, and has no fixed form or metre; sonnets are often lyrics. In English the great lyrical outbursts were those of the Elizabethan dramatists, the Caroline poets, and the song writers of the XIX.-cent. romanticists.

LYSANDER (d. 395 B.C.), Spartan general; ended Peloponnesian War, after defeating Athenian fleet at *Ægospotami*, by capture of Athens, 405; slain in attack on Thebes; despotic and wily.

LYSIAS (c. 380 B.C.), Attic orator; s. of Cephalus, wealthy Syracusan, friend of Socrates; went to Thurii from Athens when fifteen; was driven out after failure of Athenian expedition against Syracuse, 413; settled in Athens as shield-manufacturer; narrowly escaped death at the hands of the Thirty, 404; fled from Athens with loss of property; returned, 403; lived by writing speeches for litigants. Greatest exponent of 'plain' type of rhetoric as opposed to 'grand'; style is graceful and simple with homely illustrations. The most celebrated of his 34 extant speeches is *Against Eratosthenes*.

LYSIMACHUS (c. 355–281 B.C.), king of Thrace; on partition of realms of Alexander the Great, 323, received Thrace; helped to defeat Antigonus, 301: conquered Macedonia; slain by Seleucus at battle of *Cyropedion*.

LYTE, HENRY FRANCIS (1793–1847), Anglican clergyman and hymnologist.

LYTHAM (53° 44′ N., 2° 58′ W.), watering-place, Lancashire, England, on Irish Sea. Pop. (1911) 9464.

LYTHE, see Pollack.

LYTTELTON (43° 39′ S., 172° 32′ E.), seaport town, on inlet of Port Lyttelton, South Island, New Zealand; fine artificial harbour; extensive export trade.

LYTTELTON, GEORGE LYTTELTON, 1ST BARON (1709–73), Lord of Treasury, 1744–54; Chancellor of Exchequer, 1755–56; acceptance of office led to split with Pitt, and he was generally considered unequal to finance; praised by contemporaries for writings and character.

LYTTON, EDWARD GEORGE EARLE LYTTON, BULWER-LYTTON, 1ST BARON (1803–73), Eng. writer; youngest s. of General Bulwer; played prominent part in society; early writings in verse; *Pelham*, 1828, established his popularity as novelist; series of brilliant novels followed, of which taint is often emotional falsity, or exaggeration; three chief plays, *Lady of Lyons*, *Richelieu*, *Money*, had unprecedented success; command over motive of terror shown in short story, *The Haunted and the Haunters*. Prominent Liberal politician as well as writer; Sec. of State for Colonies, 1858–59; cr. baron, 1866.

LYTTON, EDWARD ROBERT BULWER-LYTTON, 1ST EARL OF (1831–91), Eng. poet and statesman; s. of 1st Baron L. of Knebworth; literary pseudonym, Owen Meredith; minor poet of considerable merit; held various posts as ambassador; Viceroy and Gov.-Gen. of India, 1876–80; started system of 'famine insurance'; satisfactorily conducted Afghan War, 1878–79, and pressed for annexation of Kandahar; introduced reforms in taxation and administration; severely criticised at time, but justified by results; cr. earl, 1880.

M, 13th letter of alphabet; originally picture of an owl; has affinity for letter *b*, hence numerous words in *mb*, e.g. *climb, dumb*.

MAAS, MEUSE (*q.v.*).

MAASIN (10° 15′ N., 125° E.), town, S. coast of Leyte, Philippine Islands. Pop. *c.* 18,000.

MAASLIUS (51° 55′ N., 4° 16′ E.), fishing town, Netherlands, on Maas. Pop. (1910) 9175.

MAASTRICHT, MAESTRICHT (50° 51′ N., 5° 42′ E.), town, Netherlands, on Maas; capital of province Limburg; ancient *Trajectum Superius*; taken by the French in 1673, 1748, and 1794; formerly important fortress; chief objects of interest are ancient Church of St. Servatius; St. Pietersburg sandstone quarries, first worked in Roman times; manufactures earthenware, glass, carpets. Pop. (1910) 37,483.

MAAT, see EGYPT (ANCIENT RELIGION).

MABUSE, JAN (*c.* 1470–1532), Flemish painter; studied at Antwerp, and began his professional career there with several altar-pieces; painted subjects religious and from Gk. mythology and portraits.

MACABEBE (15° N., 120° 40′ E.), town, Luzon, Philippine Islands. Pop. *c.* 15,000.

MACABRE, a species of composition where death and its accompaniments are treated with eerie humour. In English, John Webster and E. A. Poe are outstanding writers of this class. The origin of Macabre seems to be the mediæval representations of the *Dance of Death*.

MACACUS, see under CERCOPITHECIDÆ.

MACADAM, JOHN LOUDON (1756–1836), Scot. inventor of 'macadamised roads,' *i.e.* roads covered with crushed metal.

M'ALESTER (34° 55′ N., 95° 45′ W.), city, Oklahoma, U.S.A.; coal-fields. Pop. (1910) 12,954.

MACAO (22° 11′ N., 113° 30′ E.), Portug. settlement and city, on island of Hang-Shang, at mouth of Canton River, China; formerly an important seat of commerce; bp.'s see; chief export, tea; settled by Portug. in 1557. Pop. (1910) 74,866.

MACAQUE MONKEYS, see under CERCOPITHECIDÆ.

MACARONI, an Ital. foodstuff prepared from hard wheat, worked into a thick paste with water and moulded in various forms.

MACARONICS, a species of burlesque verse, in which, along with Lat., words from other languages are used with Lat. inflections and construction. The name was derived from the mixture of ingredients in the dish macaroni.

MACARSCA (43° 18′ N., 17° 1′ E.), seaport, Dalmatia, Austria, on Adriatic; wine. Pop. (1911) 12,155.

MACASSAR (5° 8′ S., 119° 21′ E.), seaport town, Celebes, Dutch East Indies; flourishing trade; exports coffee, spices, oil, timber. Pop. 18,500.

MACAULAY, THOMAS BABINGTON, BARON MACAULAY OF ROTHLEY (1800–59), Eng. historian and statesman; b. Rothley Temple, Leicestershire; s. of Zachary M., Whig and leader of slavery abolitionists; mother a Quaker; noted as precocious child; retained wonderful memory through life; twice won Chancellor's medal for poems at Cambridge; called to Bar, 1826; commenced connection with *Edinburgh Review*, 1825; sec. to Board of Control, 1832; legal adviser to Supreme Council in India, 1834–38; P.C., 1830; Sec. of War, 1839–41; *Lays of Ancient Rome* appeared, 1842, *Essays*, 1843; member of cabinet as paymaster-general of forces, 1846–48, after which he retired from active political life and devoted himself to compilation of well-known *History of England from the Accession of James II.*, never completed. The sale of M.'s writings was unique in annals of hist. lit. He had great power of giving personality to hist. characters, but lacked appreciation of shades and care for fairness. His power of felicitous epigram was marred by love of heavy rhetoric and trick of antithesis, which became a mannerism. The ardent Whig, whose eloquent speeches were of utmost use to his party, carried his principles back into history, and wrote as an avowed partisan. M. lived a steady life, had an amiable character and an unending flow of good conversation. In person he was short, stout, plain, ungraceful, fond of dress; he was a great reader and walker.

The Life and Letters of Lord Macaulay, Trevelyan (1876).

MACAW, see under PARROT TRIBE.

MACCABEES, Jewish family, who led patriotic revolt against Antiochus Epiphanes and his successors. Chief member, JUDAS (d. 160 B.C.), s. of the priest Mattathias, who slew an apostate Jew. Followers of Judas called themselves *Maccabeans*. He won great victories over Apollonius near Samaria, over Seron at *Bethoron*, and over Ptolemy, Nicanor, and Gorgias; entered Jerusalem, purified temple and restored religion, 164. His bro. JONATHAN, high priest, continued contest, expelling Syrians from Palestine, till death, 144. Remaining bro. SIMON, also high priest, with aid of his sons and Roman alliance, freed Judæa from Syria.

Maccabees, Books of.—*I. Maccabees* contains Jewish history, 175–135 B.C., *i.e.* from reign of Antiochus Epiphanes to death of Simon, main source for this period—the life and death struggle of Jewish nationalism against Hellenising tendencies; dates probably from 100–80 B.C. (possibly earlier), and is the work of a Palestinian Jew; original language Hebrew or Aramaic. *II. Maccabees* gives history from 176–161 B.C., thus covering some of the ground of *I. Maccabees*, but with additional matter. It is fuller of the supernatural and generally less hist. and more didactic; written probably I. cent. B.C. The name M. is also given to other apocryphal books not in our regular Apocrypha. *III. Maccabees*, an hist. remains of Jewish persecution dealing with III. cent. B.C., written I. cent. B.C. or 1 A.D. *IV. Maccabees*, religious work of no hist. value, written about time of Christ. *V. Maccabees*, an Arabic compilation.

Fairweather and Black in *Cambridge Bible*.

M'CARTHY, JUSTIN (1830–1912), Irish novelist and journalist; chief work, *A History of Our Own Times*.

MACCHIAVELLI, see MACHIAVELLI.

M'CLELLAN, GEORGE BRINTON (1826–85), Amer. general; b. in Philadelphia; distinguished in Mexican War; sent to study Crimean War, 1855; wrote *Armies of Europe*, 1861; commanded Union army early in Civil War; founded army of the Potomac; defeated Confederates at *Fair Oaks*; won battle of *Antietam*, 1862; delayed to pursue Confederates across Potomac; was relieved of chief command; resigned, 1864.

M'CLERNAND, JOHN ALEXANDER (1812–1900), Amer. general and politician; commanded in Federal army, 1861–64; blamed for conduct at *Champion's Hill*; forced to resign for disregard of orders. His s., EDWARD JOHN M'CLERNAND (b. 1848–), is distinguished army officer.

MACCLESFIELD (53° 16′ N., 2° 8′ W.), market town, Cheshire, England; chief buildings are old

church of St. Michael and town hall; silk manufactures; stone and slate quarries in vicinity. Pop. (1911) 34,804.

MACCLESFIELD, CHARLES GERARD, 1ST EARL OF (*c.* 1618–94), commander-in-chief for Charles I. in South Wales, 1644, and made royal cause supreme; baron, 1645; rode at head of Life Guards at Restoration, 1660; intrigued with Monmouth, and was forced to fly country on accession of James II.; cr. earl, 1679; returned at head of bodyguard of Prince of Orange, 1688.

M'CLINTOCK, JOHN (1814–70), Methodist divine; prof. at Pennsylvania University; worked in New York, Paris, and London; did much for education.

M'CLINTOCK, SIR FRANCIS LEOPOLD (1819–1907), Brit. sailor and Arctic explorer; discovered traces of Franklin, 1850; relieved M'Clure, 1852; found record of Franklin's death, 1857.

MACCOLL, MALCOLM (1838–1907), Anglican divine and controversialist; High Churchman and Liberal.

M'COOK, modern Amer. family known as 'the fighting M'Cooks.' Daniel (1798–1863), a major, served with his eight sons in Civil War; three of them were generals; nephew, Henry Christopher M'C. (b. 1837), noted etymologist.

MACCORMAC, SIR WILLIAM, Bart. (1836–1901), Irish surgeon; practised in Belfast and later in London; was through Franco-Prussian War of 1870 as head of Anglo-Amer. ambulance; surgeon to St. Thomas's Hospital, London; pres., Royal College of Surgeons (1896–1900); consulting surgeon to forces in S. African War (1899–1900); author of surgical works.

M'COSH, JAMES (1811–94), Scot. philosopher; President Princeton University, 1868–88.

M'CRIE, THOMAS (1772–1835), Scot. Presbyterian theologian; wrote *Life of John Knox.*

MACCULLOCH, JOHN (1773–1835), Scot. geologist; b. Guernsey; studied med. and practised, 1807–11; commenced to study geol., especially the structure of Channel Islands; wrote several books; accidentally killed in Cornwall.

M'CULLOCH, JOHN RAMSAY (1789–1864), Brit. economist; author of *Principles of Political Economy,* 1825; prof., London Univ., 1828–32; compiled large number of statistical and economic works.

M'CULLOCH, SIR JAMES (1819–93), Australian politician; b. in Glasgow; went to Melbourne, Australia; entered Legislative Council, Victoria, 1854; Premier, 1862; passed Land Bill; inaugurated system of Protection; again Premier, 1868, 1870, 1875; Agent-Gen. for Victoria, 1871; defeated at election, 1877; retired; returned to England.

MACCUNN, HAMISH (1868–), Scot. composer; Scot. songs, overtures, operas, etc.

MACDONALD, FLORA (1722–90), Scot. heroine of Jacobite revolt; aided Prince Charles Edward to escape from island in Hebrides after *Culloden,* taking him with her in guise of spinning maid.

MACDONALD, JACQUES ÉTIENNE JOSEPH ALEXANDRE (1765–1840), Duke of Taranto; Fr. marshal; captured Dutch fleet, 1794–95; served in Italy; opposed Suvarov at Trebbia; commanded in Switzerland, 1800–1; crossed Splügen Pass; commanded column at Wagram, 1809; defeated at Katzbach by Blücher, 1814.

MACDONALD, SIR JOHN ALEXANDER (1815–91), Canadian statesman; first premier of dominion of Canada; b. in Glasgow; family went to Canada, 1820; called to Bar, 1836; member of Canadian Assembly, 1844; Receiver-Gen., 1847; subsequently commissioner of Crown lands. Advocated federation of Brit. colonies in N. America; became leader of Liberal-Conservative party; Prime Minister, 1857; took chief part in carrying out Brit.-Amer. confederation scheme, resulting in creation of dominion of Canada, of which he became first premier, 1867; organised Dominion; established supreme court; again became premier, 1878; established system of protection; carried out construction of Canadian-Pacific Railway. Joseph Pope, *Life* (1894).

MACDONALD, SIR JOHN HAY ATHOLE, LORD KINGSBURGH (1836–), Lord Justice-Clerk of Scotland; inventor; author of military text-books.

MACDONNELL, ALASTAIR RUADH (1725–61), Highland chief; acted for Brit. Government as spy on Jacobites.

MACDONNELL, SORLEY BOY (*c.* 1505–90), Scots-Irish chieftain, constable of Dunluce Castle, and lord of the Route; waged war with the MacQuillim, Shane O'Neill, and the government of Elizabeth; finally submitted to Elizabeth, 1586, and received official recognition and grant of lands in Ulster.

MACDONOUGH, THOMAS (1786–1825), Amer. naval commander; fought in war of 1812 against Britain.

MACDUFF (57° 40′ N., 2° 30′ W.), seaport, Banffshire, Scotland, at mouth of Deveron; herring fishery.

MACE, official staff, usually of silver or gold, and richly ornamented. It is placed in legislative and municipal chambers and carried before certain public officers as an emblem of authority by an official m.-bearer. Originally a weapon of offence, about 5 ft. long, with a metal head heavily studded with spikes; it was adopted for the defence of princes and persons of authority against assassins, and retained as a symbol when the need had passed.

MACEDONIA (*c.* 41° 10′ N., 22° 55′ E.), part of Turk. province of Rumelia, to N. of Greece. After being controlled in turn by Athens, Thebes, and Sparta, M. became a powerful kingdom under Philip II. and attained its zenith under Alexander the Great, *c.* 330 B.C. (see MACEDONIAN EMPIRE). It was invaded by Gauls in III. cent. B.C.; conquered by Romans in 168 B.C., and became province of Rome; invaded by Goths in IV. cent. A.D., and overrun by Theodoric in 482; settled by hordes of Slavs between III. and VII. cent's; seized by Bulgars, 978; was under Byzantine control in XI. cent.; formed part of kingdom of Thessalonica in 1204, and was under sway of Servia, 1330–55; taken by Turks in 1430.

Turk. oppression of Christian inhabitants resulted in open rebellion in 1902 and 1903, and this was put down with terrible cruelty. In 1903 Austria and Russia intervened, suggesting various reforms, but without much result. Constant massacres took place, and the province, owing partly to religious differences, partly to Turk. misrule and Bulgarian intrigue, long remained on verge of revolt. During the Turko-Balkan War (*q.v.*) of 1912–13, M. formed the main Servian objective, while a Bulgarian force invaded it from N.E. Many towns fell to the Allies, including Kumanovo, Usküb, Kuprulu, Monastir, and Salonica. In the proposed partition of Jan. 1913, Servia and Bulgaria claimed the greater part of M.

M. is a mountainous district for most part, though there are several fertile plains; in N.W. are Shar Mountains, culminating in Mt. Liubotrn, which is variously estimated at from 8300 to over 10,000 ft. in height; in N.E. are Rhodope Mountains, and in the S. Mt. Olympus reaches height of nearly 9800 ft. Principal rivers are the Axius or Vardar, Haliacmon or Bistritza, Strymon or Struma, and Mesta, and there are many smaller streams. There are many lakes, of which Okhrida and Presba are most important. Province is divided into the vilayets of Kossovo, Monastir, and Salonica, and the largest towns are Salonica, Monastir, and Usküb. Climate subject to extremes of cold in winter. Inhabitants include Turks, Slavs, Greeks, Bulgars, Jews, Albanians, Gipsies, Vlachs, Circassians. Chief religions are Gk. Orthodox, Muhammadan, Jewish. M. was in ancient times famed for gold and silver mines, and produced quantities of oil and wine. Chief products at present time are tobacco, rice, fruits. Pop. *c.* 3,000,000. See BALKAN PENINSULA, TURKO-BALKAN WAR.

Brailsford, *M., its Races and their Future* (1906).

MACEDONIAN EMPIRE.—Macedonians were Pelasgians of same stock as Greeks, Thracians, and Illyrians, and their kings claimed descent from Heracles; monarchy dates from about 700 B.C. Perdiccas I. and shadowy successors ruled, 700–498. Amyntas I. was succ. by s., Alexander I. (489–54), who took part in Olympic Games of Greece; his s. Perdiccas II. (436–13) made war against Athens, which was extending its territory northwards and had founded Amphipolis; Archelaus (413–399) civilised his people, built up army, and established fortresses and military roads; civil strife ensued on his death until accession, 360, of Philip, who completed his work; he developed famous Macedonian phalanx, improving the form evolved by Epaminondas of Thebes, and established Macedonian supremacy over all surrounding states, including those of Greece; decisive battle of *Chæronea*, 338; his s., Alexander the Great (336–23), conquered Persian empire.

Alexander ruled at his death Macedonia and Thrace in Europe; Phrygia, Lydia, Caria, Lycia and Pamphylia, Great Phrygia, Paphlagonia, and Cappadocia in Asia Minor; Cilicia, Syria, Mesopotamia, Babylonia, Susiana, Persis, Media, Parthia, Hyrcania, Bactria, Arcia and Drangiana, Carmania, Sogdiana, Arachosia and Gedrosia, the Kabul valley and province on Indus in Asia; and Egypt. In conquered realms of Persia system of government by lieutenants called *satraps* was retained, though Macedonians were generally app. On Alexander's death the empire was partitioned; a series of murders exterminated royal family; Antipater, gov. of Macedonia, seized the crown of the kingdom, but his descendants were unable to retain it. It fell into hands of Demetrius, ruler of Thessaly, 294, was seized by Pyrrhus, king of Epirus, 287, and by Lysimachus, king of Thrace, 286.

Seleucus, ruler of Babylonia, displaced Lysimachus, 281, but was murdered by Ptolemy Ceraunos, 280; Ptolemy made himself master of Macedonia, but Babylonia was occupied by Antigonus, s. of Seleucus; Meleager, Ptolemy's bro., Sosthenus, Ptolemy II., and Pyrrhus enjoyed brief and troubled rule, till finally power fell into hands of s. of Demetrius, Antigonus Gonatas, 276. He drove back Gauls, whose incursions had become serious danger, and made Macedonia again a strong kingdom, but Asia, separated finally, had definitely become eastern empire under Seleucids, and Egypt formed brilliant kingdom of Ptolemies.

Antigonids resumed old Macedonian position of chief Gk. power, but future history hung on relations with new imperial power, Rome. Philip III. (220–179) was forced to make treaty, after defeat by Romans at *Cynoscephalæ*, 197, agreeing to confine his activity to Macedonia and make no war without permission of Rome; after battle of *Pydna*, 168, Macedonia was divided into four provinces with local autonomy, but dependent on Rome; revolt crushed by Metellus at second battle of *Pydna*, 148, after which Macedonia was formed into Rom. province, 146, with Illyria; ultimately proconsul resided at Thessalonica. Macedonian Seleucid empire gradually broke up; ended with Rom. annexation of Syria, 64. Egypt was conquered by Rome, 30.

MACEIO (9° 40′ S., 35° 51′ W.), seaport town, capital, Alagoas, Brazil; exports cotton, rum, sugar. Pop. 33,000.

MACERATA (43° 18′ N., 13° 26′ E.), town, capital, Macerata, Italy; has univ. and cathedral; various industries. Pop. (1911), town, 23,000; province, 25,091.

M'GEE, THOMAS D'ARCY (1825–68), Irish-Canadian politician and poet; emigrated, 1842, but returned and became associate of O'Connell in Young Ireland movement; edited *Amer. Celt*, 1850–57; retired to Montreal and became prominent member of Canadian Parliament; assassinated for denunciation of Fenians.

M'GIFFERT, ARTHUR CUSHMAN (1861–), Amer. Biblical scholar; prof. in Union Theological Seminary.

MACGILLIVRAY, WILLIAM (1796–1852), Scot. naturalist; especially devoted to zool., and author of a classic *History of British Birds*. His s. **John**, also a naturalist, was author of the account of the *Voyage Round the world of H.M.S. Rattlesnake*.

MACGREGOR, JOHN (1825–92), Scot. adventurer; travelled widely; called 'Rob Roy' from his canoe.

M'GREGOR, ROBERT, see ROB ROY.

MACHÆRODUS, see under CAT FAMILY.

MACHAULT D'ARNOUVILLE, JEAN BAPTISTE DE (1701–94), Fr. politician who endeavoured to introduce financial reforms before Revolution; his s., **Machault D'Arnouville, Louis Charles,** was bp. of Amiens.

MACHAUT, GUILLAUME DE (fl. 1350), Fr. poet and musician; wrote motets, chansons, ballads, etc.; besides poems.

MACHIAVELLI, NICCOLÒ (1469–1527), Florentine statesman and author; s. of a lawyer; became clerk in chancery of Florentine republic, 1494; second chancellor and sec., 1498–1512; his political experience among the subtle, worldly people who then led civilisation in Renaissance period, and the frequent opportunities afforded by foreign embassies, account for urbanity, cynicism, and wide knowledge of M.'s books; mind of widest scope which found its expression in political theorising; besides direct hist. value, his works are of greatest interest as interpretation of life by a son of the humanist movement. The Christian standard was entirely abandoned; hence *Machiavellianism* was synonymous in XVI. cent. with everything that was evil. Throughout his career, however, he showed himself a patriot; to impress on Florence the need for militia he wrote address to Gonfalonier Soderini, 1506, entitled *Discorso sulla provisione del danaro*, a scheme, subsequently adopted, for financing citizen army. He fell from office with return of Medici, 1512, when his reforms were undone and he was exiled; racked and imprisoned on suspicion of having conspired with Boscoli, 1513; released and wrote, in retirement at his country villa, works of political wisdom intended for his native city; *Il Principe*, finished 1513, and widely read in MS., was not pub. till after his death; it was dedicated to Lorenzo dei Medici, in whom M. hoped to find saviour of Florence; gained favour of Medici; commissioned to write the *Historie Fiorentine*, 1520, but never finished it; his famous comedy, the *Mandragola*, was pub., 1524; unsparing picture of life as he found it.

Macaulay, *Essay on M.*; Lord Morley, *Machiavelli* (Romanes Lecture, 1897).

MACHINE GUN, a piece of ordnance loaded and fired mechanically; delivers a large number of bullets or shells either simultaneously or in quick succession. The origin of the m. g. is to be found in the early custom of grouping together a number of guns in order to concentrate the fire. Two or more small guns or culverins were frequently mounted upon a waggon with blades fixed to the wheels, and used to break the enemy's ranks. In the XVI. cent. m. g's called 'organs,' from the fact that they contained several tubes, were used to a considerable extent, but they gradually fell into disuse on account of their lack of power and mobility. During the XVII. and XVIII. cent's many m. g's were invented, but they were mostly unsatisfactory, and comparatively little attention was given to them owing to the great improvement in infantry weapons. The French *canon à balles*, introduced about 1866, proved a disappointment, although it was capable of good work within a certain range. Its failure was partly due to the way in which it was handled, for authorities disagreed about its correct use, and it was employed sometimes as an infantry weapon and sometimes in place of artillery. The Gatling gun, used in the Amer. Civil War, was hand operated, and had ten barrels which were rotated round an axis and fired successively. It was fairly successful, and even as late as 1898 it was used in the

Span.-Amer. War. Another important hand-operated gun was the Nordenfelt, intended chiefly for naval use, to repel attack by torpedo boats. The barrels did not move, but were fixed horizontally and fired in rapid succession by moving the firing handle backward and forward. Modern m. g's perform automatically the operations of loading, firing, and ejecting. The first to make a really practical m. g. was Sir Hiram Maxim. The Maxim gun has a single barrel with an outer case round it, the intervening space containing water for cooling the barrel. The first shot is fired by hand, after which the gun goes on working by power obtained from the recoil at the explosion of the successive cartridges. The cartridges are attached to a broad belt, and the gun continues to fire as long as any remain. The gun is sighted to 2500 yards, weighs from 50 to 60 lb., and is capable of firing 450 rounds per minute. The Hotchkiss gun is actuated by a portion of the explosion gases. It weighs about 53 lb., is sighted to 2000 yards, and delivers 500 to 600 rounds a minute. Another gun utilising the explosion gases is the Colt automatic. It is sighted to 2000 yards or more, weighs about 40 lb., and fires 400 or more rounds a minute. Other m. g's worked by the gases of explosion are the Austrian Schwarzlose gun and the Skoda gun; while the Ital. Perino gun is recoil operated. One of the defects of single-barrel m. g's is overheating. The 7½ pints of water contained in the water-jacket of a Maxim are raised to boiling-point in about 1½ minutes of rapid firing, and of course the water-jacket has to be replenished frequently. The Schwarzlose gun has a large water-jacket, which does not require refilling until 3000 rounds have been fired. The disadvantage of guns cooled by water-jacket is the difficulty of always ensuring an adequate supply of water. In the Hotchkiss gun a radiator is used instead of a water-jacket, and in the Colt gun heating is guarded against by making the barrel exceptionally heavy. In the Maxim, Perino, and other guns of the same type the utilisation of the recoil obviates straining the gun or its mounting, but the construction is more complicated than that of most guns using the explosion gases. Besides rapid automatic firing, m. g's are capable of slow single shots, but slow firing is difficult to control. M. g's are painted a neutral colour, and almost always mounted upon a tripod, wheeled vehicles being used only for transport. Protecting shields were in use until fairly recently, but are now abandoned, as they afford the enemy an excellent target.

MACK, VON LEIBERICH, KARL, BARON (1752–1828), Austrian lieut. field-marshal; distinguished in Turk. War, 1788-91, and won glory in recapture of Belgium, 1790–91; commanded Neapolitan army, 1798, and was captured by Napoleon; quartermaster-gen. at headquarters, 1805, and imprisoned for disasters.

MACKAY (21° 10′ S., 149° 5′ E.), seaport, Queensland, Australia, on Pioneer River; outlet of several copper- and gold-fields. Pop. 4500.

MACKAY, HUGH (c. 1640–92), Scot. general; important influence in securing Scotland for William of Orange, 1688; defeated at *Killiecrankie*, 1689, but put down Highland revolt; not brilliant, but trustworthy.

M'KEES ROCKS (40° 30′ N., 80° 20′ W.), town, Allegheny County, Pennsylvania, U.S.A., on Ohio; iron and steel manufactures. Pop. (1910) 14,702.

M'KEESPORT (41° 19′ N., 79° 41′ W.), city, Allegheny County, Pennsylvania, U.S.A., at junction of Youghiogheny and Monongahela; iron and steel manufactures; bituminous coal and natural gas region. Pop. (1910) 42,694.

MACKENNEL, ALEXANDER (1835–1904), Eng. Congregationalist theologian; pastor at Bowdon, Cheshire; one of leaders of his denomination; wrote theological works.

MACKENZIE (65° N., 125° W.), river, N.W. Canada: falls into Arctic Ocean after a course of about 2500 miles.

MACKENZIE, HENRY (1745–1831), Scot. novelist; a leading figure in old Edinburgh literary life; one of the first to appreciate Burns in print. His *Man of Feeling*, pub. 1771, was popular.

MACKENZIE, SIR ALEXANDER (1755–1820), Canadian explorer; Mackenzie River is named after him.

MACKENZIE, SIR ALEXANDER CAMPBELL (1847–), composer; b. Edinburgh, where he first practised his profession; has written operas, oratorios, cantatas, and many orchestral and other works. Principal of the Royal Academy of Music since 1888.

MACKENZIE, SIR GEORGE (1636–91), Scot. lawyer; for prosecuting Covenanters earned title 'Bluidy Mackenzie.'

M'KENZIE, SIR JOHN (1838–1901), New Zealand statesman; Minister of Lands, Immigration, and Agriculture, 1891, and did much to develop resources of New Zealand and amend laws as to taking up land.

MACKENZIE, SIR MORELL (1837–92), Eng. physician; distinguished throat specialist, physician to Throat Hospital (London) and London Hospital; attended the Crown Prince (afterwards Frederick III.) of Germany (1887), diagnosing and treating an affection of his throat as a simple growth, in opposition to the Ger. physicians, who considered it to be malignant, which it proved later to be; M.'s diagnosis was of considerable political importance in regard to the succession to the Ger. throne, and after the death of Frederick III. (in 1888) he pub. account of the case, and was censured by the College of Surgeons.

MACKENZIE, WILLIAM LYON (1795–1861), Canadian politician and journalist; edit. of *Colonial Advocate*, 1824–33, and became leading demagogue; government attempted in vain to suppress paper; M.P. for York, 1828; several times expelled but re-elected until writ was suspended; organised rebellion of Upper Canada, 1837–38; wrote in exile for *New York Tribune* and edit. *Mackenzie's Magazine*.

MACKEREL (*Scombridæ*), a widely distributed family with fifty species, some of which are important food fishes. All are rapid swimmers and seek their food near the surface of the sea. The best-known form, the beautiful blue and silvery M. (*Scomber scombrus*), is an abundant food fish even more common on Amer. than on Brit. coasts. The Bonito (*Sarda*), a graceful blue-banded fish found throughout the Atlantic and Mediterranean, is also a fair food fish; largest of the M. family is important Mediterranean species, the Tunny.

MACKINAC, MACKINAW (45° 58′ N., 84° 35′ W.), city, summer resort, on M. island, at entrance of Straits of M., Michigan; near it is Fort Mackinac.

M'KINLEY, MOUNT (63° 30′ N., 151° W.), mountain, Alaska, highest in N. America (20,500 ft.); first scaled by Hudson Stuck, 1913.

M'KINLEY, WILLIAM (1843–1901), 25th Pres., U.S.A.; b. at Niles, Ohio; served in Civil War as volunteer; called to Bar, 1867; elected member of Congress, 1877; favoured protection; leader of Republican party in House of Representatives, 1889; introduced M'K. Bill, 1890, protective measure providing for higher duties on various imports, and treaties of reciprocity with European countries; gov. of Ohio, 1891, 1892–95; pres. of National Republican Convention at Minneapolis, 1892. As Republican he defeated Bryan of the Democrats in presidential election, 1896; declared war against Spain on Cuban question, 1898; crushed Filipinos' insurrection in Manila; annexed Hawaii, 1898; some of Samoan isles, 1899; and sent troops to join Powers' march on Pekin, 1900. Re-elected Pres., 1900; reorganised army and navy; shot at Buffalo by anarchist, Leon Czolgosz. *Life*, by Halstead and Manson (1902), Fallows (1902).

M'KINNEY (33° 10′ N., 96° 30′ W.), city, capital, Collin County, Texas, U.S.A.; cotton industries. Pop. (1910) 4714.

MACKINTOSH, SIR JAMES, Kt. (1765–1832), Scot. philosopher, historian, politician, and lawyer; wrote against Burke's *Reflections on the French Revolution*, *Vindiciæ Gallicæ*, best radical vindication of

Revolution, which M. ultimately came to condemn; eloquent, earnest reformer, centre of literary circle.

MACLAURIN, COLIN (1698–1746), Scot. mathematician; b. Kilmodan; ed. Glasgow Univ.; wrote *Geometrica Organica, A Treatise of Fluxions*; papers on the form of the earth, tides, action of wind on windmills and sails of ships, etc.

M'LENNAN, JOHN FERGUSON (1827–81), Scot. ethnologist; upheld matriarchal as against patriarchal theory of primitive society.

MACLEOD, NORMAN (1812–72), Presbyterian divine; upholder of Scot. establishment; liberal in theology; admired by Queen and Royal Family; opposed strict Sabbatarianism.

MACLISE, DANIEL (1806–70), Irish painter; made himself famous by his *All-Hallow Eve*, 1833. His best pictures are familiar by engravings.

MACMAHON, MARIE EDMÉ PATRICE MAURICE DE, DUKE OF MAGENTA (1808–93), Fr. Pres. and soldier; b. at Sully, near Autun; served repeatedly in Algeria, c. 1828–55; in Crimean War, 1855, he captured Malakoff works; crushed Kabyles in Algeria; won battle of Magenta, 1859; gov.-gen., Algeria, 1864–70; commanded in Alsace, 1870; capitulated at Sedan; Pres., 1873–79.

MACOMB (40° 27′ N., 90° 44′ W.), city, Illinois, U.S.A.; bricks, pottery. Pop. (1910) 5774.

MACOMER (40° 15′ N., 8° 45′ E.), village, Cagliari, Sardinia.

MACON (33° 46′ N., 83° 36′ W.) city, Georgia, U.S.A., on Ocmulgee River; important railway centre; seat of various educational institutions; iron foundries; manufactures machinery, cottons, woollens. Pop. (1910) 40,665.

MÂCON (46° 19′ N., 4° 50′ E.) town, Saône-et-Loire, France, on Saône; ancient *Matisco*; remains of ancient cathedral; brass foundries; wine. Pop. 19,500.

MACON, NATHANIEL (1758–1837), Amer. statesman; fought in War of Independence; strong democrat and upholder of states' rights; pres. of South Carolina State Convention, 1835.

MACPHERSON, JAMES (1736–96), Scot. 'translator' of Ossian; b. Ruthven, Inverness-shire. After travelling through the Highlands in search of Gaelic MSS. he pub. *Fingal* and *Temora*, supposed translations from original Gaelic of Ossian; generally considered a literary forger.

MACPHERSON, JAMES BIRDSEYE (1828–64), Amer. soldier; fought for North in Civil War.

MACQUARIE (53° 30′ S., 159° 30′ E.), island group, S. Pacific; dependency of New Zealand.

MACRAUCHENIA ('long-necked'), genus of extinct, long-necked, three-toed ungulates from later Tertiary of S. America, typifying sub-order Litopterna.

MACREADY, WILLIAM CHARLES (1793–1873), Eng. actor; first appearance was at Birmingham as Romeo; first London success was as Rob Roy; interpretations of Shakespeare's heroes were good.

MACROBIUS, AMBROSIUS THEODOSIUS, Rom. writer of early V. cent.; wrote *Saturnalia*, containing much information about history, myths, philosophy, science.

MACROCHEIRA, see under MALACOSTRACA.

MACROLEPIDOPTERA, see LEPIDOPTERA.

MACRONUCLEUS, see under NUCLEUS.

MACROOM (51° 54′ N., 8° 57′ W.), market town, Cork, on Sullane; corn-mills; leather-work. Pop. 3820.

MACRORHINUS, see under CARNIVORA.

MACROSOMATIA, see under TERATOLOGY.

MACTRA, Clams, see under LAMELLIBRANCHIATA.

MACUGNAGA (45° 57′ N., 7° 58′ E.), village, Novara, Piedmont, Italy.

MACVEAGH, WAYNE (1833–), Amer. Republican politician.

MACWHIRTER, JOHN (1839–1911), Scot. painter of Highland landscapes; celebrated for his 'Silver Birches.'

MADAGASCAR (12° to 25° 30′ S., 43° 12′ to 50° 30′ E.), large island off S.E. coast of Africa; is separated from Africa by the Mozambique Channel on the W.; area, c. 228,000 sq. miles; eastern part is of Archæan, western of Secondary formation; interior rugged with mountains and mountain chains rising to 3000–5000 ft., sloping down on both sides to low ground about 600 ft. above sea-level; between ranges are plateaux, and highest part of island is near centre, where Ankaratra, probably an extinct volcano, reaches height of 9000 ft.; drained by Onilahy, Mangoky, Tsiribihina, Betsiboka, and other streams; largest lake, Alaotra. Capital, Antananarivo; important towns are Diego Saurez, Fianarantsoa, Tamatave. Climate hot and unhealthy on coasts, more temperate and healthy in interior.

Modern European knowledge of M. dates from 1500, when it was sighted by Diogo Diaz and named São Laurenço; it is said to have been visited by Almeida in 1506. Early Portuguese and Dutch attempts at colonisation proved unsuccessful, and the first Portuguese settlement, established in 1548, was destroyed in following cent. by French, who for long time continued their attempts at establishing themselves here, and were constantly engaged in hostilities with native inhabitants. Their settlement at Fort Dauphin was seized by English in 1810–11, and the territory was in 1818 ceded to King Radama on his abolishing slave trade. Under Radama Christianity was introduced; but on his death power was seized by Queen Ranavalona I., who was opposed to Christianity, expelled missionaries, and persecuted native Christians. Under her successors, Radama II., Rasohérina, and Ranavalona II., Christianity was again encouraged, treaties were made with England, France, and America, and considerable progress was made.

In 1883 war with France broke out, and in this year also Ranavalona II. d. and was succ. by Ranavalona III. War continued for two years, and ended in 1885, when treaty was made whereby France obtained Diego Saurez and the right partially to control foreign affairs of island, while a Fr. Resident was to be sent to the capital. French increased their demands in 1894, and on these being rejected sent force against island in 1895. Fr. protectorate was established in same year, the queen being allowed to remain on throne; but in 1896 rebellion occurred, and M. was annexed to France, Ranavalona III. being banished to Algeria. After this several insurrections broke out, but by 1901 whole island had submitted to Fr. control. Trade and education have made rapid progress in recent years; and in 1907 a large number of gold-mining concessions were granted.

M. is administered by a gov.-gen., assisted by a consultative council; it is in part under military and in part under civil control. The Christian inhabitants belong to both R.C. and Prot. religions, but many tribes are still pagans, practising forms of fetishism. Education is free and obligatory, and the children are obliged to learn Fr. language. Inhabitants include Fr. and other Europeans, Asiatics, Africans; native inhabitants are Hovas, Betsileos, Betsimisarakas, and other Malagasy tribes, the Hovas being the most advanced and intelligent.

M. has luxuriant vegetation, most valuable trees being bananas, cocoa-nuts, orange and mulberry trees, areca palms, pandunas, acacias, ebony; also produces rubber, cotton, hemp, rice, manioc, coffee, cacao, vanilla, tobacco, sugar-cane. Maize, sweet potatoes, and other crops grown; cattle and sheep raised. Minerals include gold, copper, iron, lead, silver, antimony, sulphur, lignite, salt. Railway mileage, c. 190. Pop. (1911) 3,054,658.

Sibree, *M. and its People* (1870); Gravier, *Madagascar* (1904).

MADDALONI (41° 1′ N., 14° 23′ E.), town, Caserta, Italy. Pop. 21,000.

MADDER (*Rubia*), genus of plants, order Rubiaceæ: used in dyeing until superseded by alizarin (*q.v.*).

MADEIRA, THE MADEIRAS (c. 33° N., 16° 45′ W.), islands, Atlantic Ocean, about 700 miles W. of Lisbon,

M. was visited by Portug. explorers in 1820, when it was annexed to Portugal, remaining in possession of Portug. government almost without interruption until present time; first permanently settled, *c.* 1431; taken and held by British for short time in 1801 and in 1807–14. The group comprises M., Porto Santo, and three uninhabited Desertas; total area, 314 sq. miles. M. is an irregular oval in shape; area, *c.* 270 sq. miles; surface mountainous, rising to over 6000 ft. in Pico Ruivo; has fine climate and is favourite health-resort, especially for consumptive patients; chief town, Funchal, is port of call for Atlantic steamers; exports fruits, wines, vegetables, sugar, tobacco; Madeira wine is well known, and is made from mixed white and black grapes. Porto Santo is a hilly island, with practically no products; it was visited by Columbus. Whole group is part of submarine range of volcanic mountains. Flora includes large variety of flowering plants. M. is administered as a district of Portugal; education is nominally obligatory; chief religion, Rom. Catholicism. Inhabitants are of Portug. nationality with slight admixture of Moorish and negro blood. Pop. (1910) 176,500.

Biddle, *The M. Islands* (1891); Koebel, *M.: Old and New* (1909).

MADELENIAN, *La Madeleine,* name given to a period of prehistoric age characterised by use of bone implements.

MADELEY (53° N., 2° 21′ W.), town, Shropshire, England; ironworks; coal and iron mines.

MADISON.—(1) (43° 3′ N., 89° 18′ W.) capital, Wisconsin, U.S.A.; site of state univ. and state capitol; has important libraries, observatory, opera-house, various schools; fine system of parks. Manufactures flour, machinery; trades in tobacco, dairy produce. Pop. (1910) 25,531. (2) (45° 40′ N., 74° 25′ W.) town, New Jersey, U.S.A.; residential suburb of New York and Newark. Pop. (1910) 4658. (3) (38° 46′ N., 85° 20′ W.) city, Indiana, U.S.A., on Ohio; centre of fine grain and fruit region. Pop. (1910) 6934.

MADISON, JAMES (1751–1836), 4th Pres., U.S.A.; b. Port Conway, Virginia; prominent in Virginian affairs till 1779, when entered Congress; tried to establish right of Congress to tax imports; M. was member of House of Delegates, Virginia, 1784; had considerable share in drafting Virginian constitution and in inducing its acceptance by nation; in this connection he wrote *The Federalist,* with Hamilton and Jay. Again member of Congress, 1789; supported Jefferson, and opposed Hamilton's financial policy; advocated Amer. intervention in aid of France against Britain, 1793; retired from Congress, 1797. Sec. of State, 1801; Pres., 1808; tried to coerce Britain and France by commercial restrictions; subsequently declared war, 1812, ended by *Peace of Ghent,* 1814; retired, 1817.

Gaillard Hunt, *Life* (1902).

MADNESS, see INSANITY.

MADRAS (*c.* 8° 4′ to 20° 18′ N., 74° 30′ to 85° 30′ E.), presidency and administrative division of India. M. was colonised by English in 1639, when the East India Company established themselves there; held by French, 1746–48, when Brit. regained possession; further hostilities with French ended about 1761; war against Hyder Ali and Tippoo Sahib of Mysore ended in 1799, since when Brit. possession has been undisturbed except by occasional native risings. M. occupies whole width of Indian peninsula S. of river Kistna and its tributary Tungabhadra, and extends northward along E. coast as far as Lake Chilka; area, 141,726 sq. miles; low coastal strip on each side rises by E. and W. Ghats to great central tableland, sloping up from 1000 to 3000 ft.; drained by Godavery, Kistna, Cauvery, and other streams; chief towns, Madras, Malabar, Travancore, Kanara. Climate very variable.

M. is administered by governor, who is assisted by executive and legislative councils. There is univ. at M., and there are other educational establishments. Chief religions, Hindu, Muhammadan, Christian, Animist. Produces large crops of cotton and tobacco, also rice, millet, pulse, ground-nuts, oil seeds, sugar-cane, spices, indigo, cocoa-nuts, areca-nuts, dates; on hills, tea, coffee, cinchona, cardamoms are grown; valuable teak forests. Minerals include gold and iron, but await development. Exports raw cotton, seeds, rice, indigo. Pop. (1911) 41,405,404.

Ayyangar, *Forty Years' Progress in M.* (1893).

MADRAS (13° 4′ N., 80° 17′ E.), capital, M. Presidency; 9 miles long; as port M. is handicapped by surf; commercial part, the 'Black Town,' is on shore; Europeans live farthest inland; chief buildings: Government House, Senate House, St. George's Cathedral. Original settlement was Fort St. George. Chief exports: tea, coffee, cotton, sugar, dye-stuff, grain, hides, indigo. Pop. (1911) 518,660.

MADREPORARIA, see CORAL.

MADRID (40° 30′ N., 3° 40′ W.), province, New Castile, Spain; belongs to basin of Tagus; capital, Madrid (*q.v.*). Pop. (1910) 877,819.

MADRID (40° 25′ N., 3° 43′ W.), capital of Spain, on Manzanares, in centre of great sandy plateau over 2100 ft. above sea-level. Originally belonged to Moors, from whom it finally passed to Alphonso VI. of Castile, 1083; capital of Spain under Philip II., 1560; taken by French, 1808; occupied by Wellington, 1812; Ferdinand VII. restored, 1814; important recent event was marriage of King Alphonso with Princess Ena of Battenberg, 1906, when a bomb outrage occurred.

M. is archiepiscopal see, has cathedral and many churches and monasteries. Principal street, Calle de Alcala, is one of finest in Europe. Site of univ., founded 1590, with observatory and magnificent library; numerous educational and charitable establishments. Contains royal palace, CORTES, royal picture gallery with splendid collection of paintings by Velazquez, Titian, and other masters, museums, libraries. Manufactures leather goods, tobacco, furniture, tapestry, glass, porcelain, gold and silver work. Pop. (1910) 571,539.

A. F. Calvert, *Madrid* (1909).

MADRIGAL.—(1) a brief lyrical poem, usually amorous, irregular in construction, and of no specified formula, but normally about ten lines long and having the iambic foot dominant. Eng. madrigal writers are Drummond, Lodge, Carew, and Suckling. (2) in music usually a pastoral song sung by four or more voices and without musical accompaniment. Glee singing superseded madrigal singing in the XVIII. cent.

MADURA.—(1) (7° S., 113° 30′ E.) island, Dutch East Indies, N.E. of Java, from which it is separated by the Strait of Madura. Pop. 1,750,000. (2) (9° 55′ N., 78° 9′ E.) district, Madras, India; mountainous in N. and W., elsewhere level and fertile; capital, Madura, on Vaigai, is of great historic interest; it contains palace of the former rajahs, and one of the most remarkable temples in India; coffee industries. Pop. (town) 134,130; (district) 2,900,000.

MADURA FOOT, see PARASITIC DISEASES.

MÆCENAS, GAIUS CILNIUS (*c.* 73 B.C.–8 B.C.), Rom. patron of letters; chief administrator at Rome during the conflict between Octavian and Antony. About the year 16 B.C. he fell into disfavour with Augustus and retired from public life. To him both Horace and Vergil largely owed their fame and the privilege of imperial favour, hence M. has become name for patron.

MAETERLINCK, MAURICE (1862–), Belg. poet and writer; b. Ghent; writings are deeply imbued with symbolism and mysticism. *Pelléas et Mélisande* was his first great drama. Other notable works are *Le Trésor des humbles, Douze Chansons, La Vie des Abeilles, L'Oiseau bleu* (*The Blue Bird*).

MAFEKING (25° 52′ S., 25° 41′ E.), town, British Bechuanaland, S. Africa; noted for its spirited defence (Oct. 1899 to May 1900) by Baden-Powell (*q.v.*) in Boer War.

MAFIA, MAFFIA, supposed Sicilian secret society. Love of vendetta and scorn for those who have recourse to legal punishment is mark of Sicilian *mafiosi*; violence

and assassination common; no proof of existence of organised secret society.

MAFRA (38° 54′ N., 9° 20′ W.), town, Estremadura, Portugal, on Lisandra; has magnificent royal palace erected by John V., 1717. Pop. 4850.

MAGADHA, ancient kingdom, India; capital, Pataliputra, on Ganges; corresponded generally to modern Behar and Oudh.

MAGALLANES (50° S., 75° W.), territory, S. Chile, including the area S. of lat. 47° S., the W. portion of Tierra del Fuego, and the islands of the Straits of Magellan. Pop. (1910) 23,650.

MAGDALA (11° 15′ N., 39° 22′ E.), fortified town, Abyssinia; captured by the British under Napier, 1868.

MAGDEBURG (52° 9′ N., 11° 38′ E.), town, Prussian Saxony; strongly fortified; strategic importance due to command of road from Köln to Berlin. Taken by Elector of Saxony, 1551; besieged by Wallenstein, 1629; pillaged by Tilly, 1631; captured by French, 1806; restored to Prussia, 1813. Archiepiscopal see since 968; cruciform cathedral dates from XIV. cent. Great railway centre; enormous trade in sugar; also deals in grain, chemicals, iron manufactures, etc. Pop. (1910) 279,629.

MAGEE, WILLIAM (1766–1831), bp. of Raphoe, 1819; abp. of Dublin, 1822.

MAGEE, WILLIAM CONNOR (1821–91), bp. of Peterborough, 1869; active in defence of Irish Church; abp. of York, 1891, but died soon after.

MAGELLAN, FERDINAND, Magalhaens (*c.* 1470–1521), Portug. navigator; did good service to Portugal; ill-rewarded, and, with his friend Ruy Faleiro, entered into service of Charles V., and won his support for new attempt to reach Asia by West; sailed down E. coast of America, 1519; turned into strait afterwards called Magellan's, 1520; crossed Pacific, so named by M., as far as Philippines, 1521, undergoing terrible sufferings from scurvy and starvation; treacherously slain by native chief; of his fleet, *Vittoria* alone reached Spain, 1522, having circumnavigated globe; credit belongs to intrepid M.

MAGENTA (45° 28′ N., 8° 52′ E.), town, Lombardy, Italy; silk and matches; French and Sardinians defeated Austrians here, 1859. Pop. 8000.

MAGGIORE, LAGO, Roman *Lacus Verbanus* (46° N., 8° 30′ E.), lake, N. Italy, on border of Italy and Swiss canton Ticino; traversed by river Ticino; contains the Borromean Islands; length, 37 miles; greatest breadth, 5½ miles.

MAGIC, the working of marvels through supernatural power, has been believed in all through the world's history. Its relation to the primitive forms of religion has often been discussed, but both terms are used loosely, and it is difficult to determine. Various theories of m. have been propounded. Frazer's theory is that belief in m. is accounted for by a 'law of sympathy.' If two things have once been related to each other, there is a permanent bond of sympathy between them. Thus, if it be desired to injure an enemy, a wax figure of him is made, pins are stuck into it, or it is crushed or buried or roasted and magic formulæ are repeated. The enemy will feel the pain and injury which have been inflicted on his image; it would be made securer if his hair or parings of his nails were mixed with the waxen image.

It is extremely difficult to give a satisfactory definition of m. Amongst savage races by whom it is practised the term probably hardly occurs. M. is a loose term for a number of rites and customs which only have a unity to outside observers. One characteristic is that it is something private or illicit and existing side by side with established religious rites.

A conception which seems to underlie m. is that of *mana*, a force or energy which is present in things; the term is applied to people who use magical formulæ. The origin of m. is to be sought, probably, in the sense of mystery inspired by certain objects, *e.g.* a corpse. The primitive stages of religion were pre-animistic, but when religion became animistic, wizards pretended or believed themselves to be in communication with demons.

M. is sometimes divided into 'white,' that which is wrought with good purpose; 'black,' the converse with evil spirits and that which is essentially of malevolent intent. Though the belief in m. is generally confined to uncivilised and uneducated peoples, with the recent interest in Spiritualism and Psychical Research (*qq.v.*) there has been a revival of m. among educated Westerns. Those who practise it, though they may deceive themselves, often act in good faith. Extraordinary stories are still told of what is done in the East.

MAGIC SQUARE, one made of numbers so arranged that any line adds up to the same amount.

MAGISTRATE, Justice of the Peace for the county or the borough, app. by the Lord Chancellor. No salary is attached to the office, which is recognised as one of honour. All towns of importance now have a stipendiary magistrate, who must be a barrister of at least seven years' standing. Twenty-five stipendiary magistrates sit in London, and are known as Metropolitan Magistrates.

MAGNA CARTA, Great Charter granted by King John at Runnimede, 1215. General causes leading to it were king's oppression and heavy demands for *scutage*. In 1214 Northern barons refused to pay scutage and took arms against John; and, as the whole populace, for the first time, was united by common interest, the king had to give way to its demands. Conference took place at Runnimede, June 15 to 23. Document called *Articles of the Barons* was accepted and signed by John, June 15. Articles, numbering 48, were immediately converted into charter, of which several copies were made. Charter consists of preamble and 63 clauses. Principal provisions: declaration of freedom of Church of England; limitation of feudal obligations, *e.g.* relief, wardship, and marriage; establishment of fixed royal courts at Westminster, and of assize courts; regulation of fines; all accused persons to be tried by their peers; no taxes to be imposed without consent of Great Council of barons and tenants-in-chief; no imprisonment without lawful trial, and no delay or sale of justice; one standard of weights and measures. Sixty-first clause throws doubt on king's intention of keeping his word, and appoints committee of 25 to enforce his doing so. Four copies of charter still exist. M. C. was ratified and confirmed by different kings.

M'Kechnie, *Magna Carta* (1905).

MAGNA GRÆCIA, group of Gk. colonies, S. Italy; among leading cities were Cumæ, Sybaris, Crotona, Tarentum, Locri, Rhegium, Metapontum, Heraclea, and Neapolis; founded for the most part in VIII. cent. B.C.; conquered by Rome, III. cent. B.C.

MAGNESIA (39° 12′ N., 23° 12′ E.), an ancient district of E. Thessaly, bordering Ægean Sea.

MAGNESIA AD MEANDRUM (37° 40′ N., 27° 32′ E.), ancient city, Ionia, Asia Minor; celebrated for its magnificent temple of Artemis Leucophryne.

MAGNESIA AD SIPYLUM, modern Manissa (38° 36′ N., 27° 28′ E.), ancient city, Lydia, on Hermus; Antiochus the Great defeated here by Scipio, 190 B.C.

MAGNESIAN LIMESTONE, see Dolomite.

MAGNESIUM (Mg=24·32), metallic element related to zinc; occurs as magnesite $MgCO_3$, dolomite $(MgCa)CO_3$, Epsom salt $MgSO_4,7H_2O$, etc.; obtained by electrolysis of fused chloride. Silvery white, M.P. 632·7, may be made into wire, ribbon, or powder; *magnalium* (Mg+Al) is a light alloy giving good castings. M. tarnishes in moist air, forming MgO; burns with intensely white and *actinic* light; m. powder, mixed with potassium chlorate, is used for photographic flash-light; rapidly displaces hydrogen from dilute acids, even some from dilute nitric acid. *Magnesia*, MgO, forms salts, *e.g.* sulphate $MgSO_4,7H_2O$, basic carbonate $3MgCO_3$, $Mg(OH)_2$, $3H_2O$='magnesia alba.'

MAGNETISM.—From very early times it was known that a certain iron ore, originally found in

Magnesia, Asia Minor, and consisting chiefly of iron sesquioxide (Fe_3O_4), possessed the property of attracting iron. It was also known that if a bar of this ore were suspended so as to swing freely in a horizontal plane, it would come to rest in a direction approximately north and south. Later, it was found that iron and steel could by various means be temporarily or permanently endowed with the same properties, and such *artificial* magnets (as they have been termed) are now exclusively used in the study of magnetic phenomena. The chief elementary facts of the subject of magnetism may be summarised as follows: Tested by their property of being acted on by a magnet, a large number of substances exhibit magnetic properties, but only a comparatively small number show them to any marked degree. In one class may be placed such substances as iron, nickel, and cobalt, which can be attracted by either pole of a magnet, and are known as *paramagnetic* substances. Another class includes bismuth and antimony, which are repelled where those of the first class are attracted, and are known as *diamagnetic* substances.

Taking an ordinary steel magnet, it is found that its attractive power is situated at or near its ends, which are termed the *poles*. If it be free to swing horizontally, the end pointing northwards is termed the north pole, the other the south pole. If we bring near to such a suspended magnet another similar magnet, it will be found that similar poles repel and dissimilar poles attract one another. Assuming, meanwhile, some definite measure of the strength of a magnet pole, the law of magnetic attraction or repulsion may be stated in the same form as the laws of gravitation or electrostatics, viz. the force between two poles is proportional to the product of their strength, and inversely proportional to the square of the distance between them.

A magnet can *induce* magnetism in a piece of iron or steel to which it is brought near or in contact: in the case of soft iron the magnetic state ceases almost entirely on removal of the magnet: with steel, the magnetism is to a very large extent permanently retained. But there is an important difference, in that the soft iron is easily, while the steel is with difficulty, magnetised by this process of induction. A steel bar may be permanently magnetised by rubbing it from one end to the other, always in the same direction, with one and the same end of a magnet. The result of this is that that end of the steel bar which is last touched by the magnet is opposite in polarity to that end of the magnet used for the purpose. A steel bar may also be magnetised by placing it within a cylindrical coil of wire through which a powerful electric current is passed. The magnetism induced in steel or iron may be removed by heating the specimen to about 790° C., above which temperature iron or steel ceases to be magnetic. If a steel magnet be broken into two or more pieces, each part is still a magnet. Lastly, it may be mentioned that within recent years it has been found that certain alloys of manganese, aluminium, and copper have magnetic properties although each constituent is practically non-magnetic.

The space throughout which the magnetic force exerted by a magnet is appreciable is termed the *magnetic field* due to the magnet. Throughout any magnetic field, the intensity of the magnetic field may, and generally does, vary from point to point. In order to measure it in terms of definite quantities, we define *unit pole* as being a magnetic pole which, placed at unit distance from another similar unit pole, repels it with unit force, the medium between the two being air. Hence the intensity of a magnetic field at any point is known when we know the magnitude and direction of the force which would be exerted on a unit pole if placed at the point. We may obtain a general idea of the direction if we suspend a very short light magnet by a thread attached to its middle point and place it successively at different points in the field. At each point the magnet will assume a direction coincident with the direction of the field force at the point. We may further suppose that the whole field is mapped out by lines whose direction at any point is that of the magnetic force at the point. These are known as lines of magnetic force. Each will start from the north pole of the magnet to whose action the field is due, traverse the field until it reaches the south pole, and finally pass through the magnet to the north pole.

The study of the distribution of these lines of force is a convenient and suggestive method for ascertaining the character of a magnetic field. They can be given a material representation by placing above a bar magnet a sheet of thin cardboard on which iron filings have been uniformly sprinkled, and by gently tapping the cardboard. Each small particle of iron becomes, for the time being, a magnet, and consequently places itself in the direction of the magnetic force at the position it occupies. The particles therefore arrange themselves in more or less continuous lines which represent the lines of force in the field. Where the lines are closer together, the field is stronger; where they are parallel and equidistant, the field is said to be uniform. If a flat iron ring be placed on the cardboard so as to be in one of the stronger parts of the field, the filings within the ring are not affected by the field, owing to the neighbouring lines of force being drawn into the metal of the ring. This is an example of *magnetic shielding*, and also illustrates the fact that in any magnetic field the lines of force tend to crowd together where they pass through or near any mass of iron in the field, owing to the high magnetic permeability of soft iron. The question as to how far different kinds of iron and steel become magnetised when placed in a given magnetic field is one of very great practical importance.

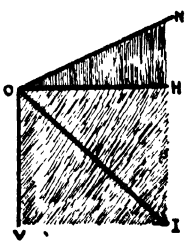
The details of the theory of magnetisation cannot be given here, but it may be sufficient to state that the chief magnetic characteristics of a substance are its *permeability* and *susceptibility*. The former is that property in virtue of which the substance, when placed in a magnetic field, gathers into itself the lines of force in its neighbourhood to a greater extent than would be the case if the substance were not present. The susceptibility measures the facility with which the substance will become magnetised when subjected to a given magnetising force. Suppose an iron rod is subjected to a magnetising force which is gradually increased. At first, the permeability is constant; when the force increases beyond $\frac{1}{10}$ of a C.G.S. unit (see UNITS) it increases rapidly; for high values it increases at a slower rate. On the other hand, the susceptibility passes through three stages. In the first it is small, and very little magnetism is permanently retained; in the second, the susceptibility is much greater, the magnetic condition is assumed with great ease, and much magnetism is retained; in the third, the susceptibility is small and very little additional magnetism is induced. In this condition the iron is said to be *saturated*. Soft iron can be much more readily saturated than steel.

The results vary considerably, however, with temperature and with varying physical states of the metal. The susceptibility vanishes somewhat abruptly when the temperature reaches 800°, which is known as the critical temperature. It is fairly certain that at this temperature some important molecular change takes place in iron, for its other physical properties undergo a marked change at or near this temperature. Similar phenomena are exhibited in nickel. The phenomena of magnetism, particularly those of magnetisation, lead to the supposition that in iron each molecule is a magnet; that in the unmagnetised state the axes of these molecular magnets point in all directions which are possible under their mutual influences; that in this condition the molecular arrangement is stable, but that it becomes unstable as soon as a magnetising force beyond a certain value begins to act; that the molecular magnets then begin to direct themselves in

obedience to the field force thus imposed; and that as the magnetising force increases, an increasing number of the molecular arrangements break down and rearrange themselves under the imposed field.

Higher Text-Book of Electricity and Magnetism, Stewart; *Elements of the Mathematical Theory of Electricity and Magnetism*, J. J. Thomson.

Terrestrial Magnetism.—The fact that a magnet suspended so as to be free to swing in a horizontal plane tends to come to rest in an approximately north and south direction (popularly known as the 'magnetic north') has been referred to above. Also, a magnet free to swing in a vertical plane, coinciding with the plane of magnetic north, comes to rest in a direction which dips towards the north in the northern, and towards the south in the southern, hemisphere. These two facts would make it appear as if the earth were a huge spherical magnet. It is necessary, however, to treat the matter in greater detail, and for this purpose we frame the following definitions. Assuming that at each point of the earth's surface a definite magnetic force acts, we can represent this force by a line whose length represents the magnitude of the force, and whose direction coincides with its direction. Now let the plane VOH be the vertical plane in which this representative force OI lies, O the point of observation, OH and OV being horizontal and vertical lines through O. Also let ON be the direction of the geographical meridian. Then we may resolve the magnetic force OI into two components OH and OV. These are known as the *horizontal intensity* and *vertical intensity* respectively. The angle HOI which the direction of the magnetic force makes with a horizontal line is termed the dip, or *inclination*. The angle HON, between the geographical meridian and the vertical plane in which OI lies, is termed the variation, or *declination*. The three quantities, declination, inclination, and horizontal intensity, are sufficient to specify fully the magnetic force at any place, and are termed the *terrestrial magnetic elements* of a place. The fourth quantity, vertical intensity, may be deduced from the inclination and the horizontal intensity.



The declination is observed by an instrument known as a declination magnetometer, which can measure the angle between the direction of the geographical meridian and that of a freely suspended magnet. The inclination is measured by the *dip needle*, which consists of a magnet, carefully pivoted about its centre, and capable of swinging in a vertical plane. Turning this plane to coincidence with the magnetic meridian, the angle which the needle makes with the horizon is measured on a graduated circle. The horizontal intensity is measured by a modified declination magnetometer. The deviation produced in the magnetometer magnet by another magnet of known strength at a known distance is first observed. Then the time of oscillation of the magnetometer magnet alone is observed. The first observation gives $\frac{M}{H}$ where M is the magnetic moment of the magnetometer magnet; the second gives MH. From these we can obtain H, the horizontal intensity. In fixed magnetic observatories, the instruments are arranged so that their indications may be continuously recorded by photography.

With regard to the value of the magnetic elements, we have, first, to consider their value at different places on the earth's surface at the same instant. A general view of such matters can be best obtained from maps of the world on which lines have been drawn through all places at which the magnetic element in question has the same value. Lines of this kind for declination are termed *isogonic* lines. Starting from the north magnetic pole (explained below) there will obviously be a line passing round the earth through the south magnetic pole along which the declination will be zero. On one side of this, the declination will vary from 0° to 180° westwards; on the other side, from 0° to 180° eastwards. For the inclination, *isoclinic* lines may be similarly drawn through all places having the same dip. At the north and south magnetic poles the inclination is 90°, while the line of zero dip, or magnetic equator, passes round the earth and is roughly coincident with the geographical equator. Maps showing the distribution of horizontal intensity are also used. The lines drawn on such maps are average results, in that they do not show local peculiarities, of which there are numerous examples, due, it is believed, to the presence of magnetic matter near the earth's surface. The maps also must refer to some particular year or epoch for which they are drawn. For example, for the year 1910, the magnetic elements at London were as follows: declination, 16° 16′ W.; inclination, 67°; horizontal intensity, 0·185 C.G.S. units.

The North Magnetic Pole was discovered by Ross in 1831 at a point 70° 5′ N. latitude, 96° 43′ W. longitude. The South Magnetic Pole was also located by Ross, but was more closely determined by Shackleton's expedition in 1909 at 72° 25′ S. latitude, 155° 16′ E. longitude.

In the second place, we have to consider the manner in which the magnetic elements at a given place vary from time to time, and this opens up what is perhaps the most interesting and important part of the subject.

To begin with, all three elements show a *diurnal change*. For example, the declination changes towards the east until about 8 a.m. each day; then moves westwards until about 2 p.m., after which it turns back towards the east. The extent of this diurnal oscillation is greatest in midsummer and least in midwinter, and it has opposite characteristics in the two hemispheres. There is also evidence of changes due to the varying position of the moon, and it has been asserted that even the planets have some influence owing to their varying distance. Lastly, there are *secular changes*, requiring long periods of time for their completion. Thus, the declination at London in 1580 was 11° 15′ E. The needle gradually moved towards the true geographical north until, in 1657, the declination was zero. It then moved westwards until in 1818 it had reached 24° 38′ W., from which it has receded gradually to the figure mentioned above. This is equivalent to a rotation of the earth's magnetic axis about its geographical axis once in about 1000 years. Changes also take place in the inclination and horizontal intensity.

Over and above these diurnal and secular changes there are, however, a large number of disturbances of a non-periodic character. Some of these take the form of pulsations lasting a few seconds or a few minutes, but the great majority are of an irregular type. Larger disturbances are termed Magnetic Storms. They are associated with displays of auroræ in the polar regions and with the occurrence of electric currents in the earth's crust which frequently interrupt telegraphic communications. It has been established that they are more frequent and more pronounced when there are a large number of spots on the surface of the sun. It is known that the number of such spots shows a cyclical variation, being at a maximum once in eleven or twelve years. In the years of sunspot maxima, the declination and inclination show decided change, but the effect on the horizontal intensity is uncertain. With regard to the origin of terrestrial magnetism and the causes of its variation, many theories have been advanced. Those which have sought for an explanation by referring the phenomena to the presence of magnetic matter within the earth have proved to be inadequate, and it is now held that the most probable explanation is that which represents the earth as an electromagnet, the magnetising currents being caused by streams of electrified particles circulating in the

upper regions of the atmosphere. The diurnal and semi-diurnal variations of the magnetic elements are caused by atmospheric oscillations of the same nature and type as those which give rise to the diurnal variations of atmospheric pressure. The exact nature of the sun's disturbing influence has not as yet been elucidated. But the probability is that either solar activity and magnetic storms are due to a common cause, or, that the solar influence is only indirect, providing conditions for starting a disturbance.

Studies in Terrestrial Magnetism, by C. Chree.

MAGNETITE, or LOADSTONE, a ferrous mineral forming a natural magnet; black, opaque, and of metallic lustre; widely distributed, occurring in grains in such volcanic rocks as granite and dolerite.

MAGNETO OPTICS, the relation between magnetism and light. Faraday discovered that the plane of polarisation of a plane polarised ray of light is rotated when the ray is passed through a substance placed in a magnetic field; and, later, Verdet found that the amount of rotation varies with different substances, but for any one, it is proportional to the strength of the magnetic field and the length of the material through which the ray passes. The angle of rotation divided by the potential difference between the points where the ray enters and leaves the field is termed the *magnetic rotatory power* of the substance.

Dr. Kerr discovered that glass, under an electrostatic stress (as is the case in a Leyden jar), is strained as if it had been subjected to a pull, and gives rise to double refraction like a crystal of Iceland spar. Maxwell deduced that the specific inductive capacity of a dielectric ought to be equal to the square of its refractive index; experimentally a close agreement between the two has been found.

MAGNETOGRAPH, an instrument for recording values of the magnetic elements. A small light mirror is attached to the magnet whose movements are to be recorded, and a spot of light reflected from it on to photographic paper moved by clockwork. A straight line is traced on the paper if the magnet is still, and a curved line if it moves. There are four magnetic elements to be recorded—the declination, the horizontal component, the vertical component, and the dip. Their values change daily and even hourly. To record the first, a magnet which can turn freely about a vertical axis is used; for the second element, a magnet is suspended by two threads, which are twisted until the magnet is set at right angles to the magnetic meridian, and for the third a magnet is balanced about a horizontal axis so that one end can rise and the other drop. The dip is easily calculated from a knowledge of the horizontal and vertical components.

MAGNIFICAT, see HYMN.

MAGNOLIA, a genus of plants of shrubby or tree-like habit, cultivated for their gorgeous flowers. These possess three trimerous whorls or perianth leaves, enclosing numerous spirally arranged stamens and carpels inserted on an elongated conical receptacle. The fruit consists of a group of follicles containing fleshy and brightly coloured seeds.

MAGNUS, HEINRICH GUSTAV (1802–70), Ger. teacher and chemist; discovered 'Magnus' green salt,' $[(NH_3)_4Pt][PtCl_4]$, ethionic acid, $HO.SO_2.H_2C.CH_2.O.SO_2.OH$, isethionic acid, $HO.SO_2.H_2C.CH_2.OH$, periodic acid, H_5IO_6.

MAGO (d. *c.* 203 B.C.), Carthaginian soldier; s. of Hamilcar Barca; fought under Hannibal.

MAGPIE, see CROW FAMILY.

MAGWE (20° 10′ N., 94° 59′ E.), town, on Irrawadi, Burma. Pop. 6500.

MAHABALESHWAR (17° 58′ N., 73° 42′ E.), hill-station in W. Ghats, Bombay, India. Pop. *c.* 5600.

MAHABHARATA, one of the two great epics of Sanskrit literature (*q.v.*); translated by M. N. Duff.

MAHALLAT (33° 50′ N., 50° 30′ E.), town, capital of Mahallat, Central Persia. Pop. 9000.

MAHAN, ALFRED THAYER (1840–), Amer. rear-admiral and historian; pres. of Naval War Coll., 1886–89, 1892–93; member of Naval War Board during war with Spain, 1898; author of important books on naval history; at once obtained renown with *Influence of Sea Power upon History*, 1890; famous studies of modern international politics; pres. of American Hist. Association, 1902–3.

MAHANADI (20° 17′ N., 86° 44′ E.), river, Brit. India; flows by numerous mouths into the Bay of Bengal; length, 500 miles.

MAHANOY CITY (40° 50′ N., 76° 7′ W.), town, Schuylkill County, Pennsylvania, U.S.A.; anthracite coal-fields. Pop. (1910) 15,936.

MAHARAJPUR (26° 29′ N., 78° 5′ E.), village, Gwalior, Central India; here British defeated Mahrattas, 1843.

MAHASEER, see under CARPS.

MAHAVAMSA, chronicle in verse relating history of Ceylon from incarnation of Buddha to 301 A.D.; written by Hindu in V. cent. from Ceylon chronicles.

MAHDIA, MAHEDIA, MEHDIA (35° 32′ N., 11° 5′ E.), town, Tunis, on Mediterranean; sardine fisheries; occupies site of an ancient Phœnician city.

MAHÉ (11° 42′ N., 75° 34′ E.), seaport and Fr. settlement, Malabar coast, at mouth of Mahé, India. Pop. 10,000.

MAHESHWAR (22° 11′ N., 75° 37′ E.), town, on Nerbudda, Indore, Central India.

MAHI (23° 15′ N., 73° 34′ E.), river, India, flows into Gulf of Cambay.

MAHI KANTHA (23° 40′ N., 73° 20′ E.), collection of native states, Gujerat, Bombay, India.

MAHMUD II. (1785–1839), Sultan of Turkey; succ., 1808; defeated Ali of Jannina, 1822; crushed Janissaries; reformed army, 1826; during Gk. struggle for independence, formed alliance with Mehemet Ali of Egypt; defeated by Powers at Navarino, compelled to recognise Gk. independence, 1829; rebelled against by Mehemet Ali, 1831, and lost Syria; compelled by France and Britain to recognise Mehemet Ali's claims, 1833; renewed war, 1839.

MAHMUD OF GHAZNI (971–1030), Afghan ruler and conqueror; gov. of Khorasan, 994; by defeating bro. Ismail, became sole ruler of Khorasan and Ghazni; reign marked by campaigns against India; defeated several rajas, pillaged towns, seized treasure from temples; most notable campaign, 1025, against Gujarat; took capital, pillaged temple of Somnath; career of conquest ended with expedition to Persia, 1029.

MAHOBA (25° 18′ N., 79° 55′ E.), town, Hamirpur, United Provinces, India. Pop. 10,000.

MAHOGANY, wood of *Swietenia mahagoni*, a tree of S. America and W. Indies; reddish-brown; takes an excellent polish; 'Spanish m.' (from Cuba) is most valuable.

MAHOMET, see MUHAMMAD.

MAHOMET, AHMED IBN SEYYID ABDULLAH, see MUHAMMAD, AHMED IBN SEYYID ABDULLAH.

MAHOMMEDAN INSTITUTIONS, see MUHAMMADAN INSTITUTIONS.

MAHOMMEDAN LAW, see MUHAMMADAN LAW.

MAHRATTAS, a warlike Hindu race inhabiting Maharashtra, the north-western district of the Deccan, a territory watered by the Nerbudda, Godavari, and Kistna. For a long time they kept up a struggle with Britain for the supremacy of India, but were finally defeated by Sir Arthur Wellesley at Assaye, in 1803, and the greater part of their lands became absorbed in British India. In 1901 more than 18,000,000 persons spoke Mahratti in India. While the Mahratta Brahmans are typical high caste men, the rest of the M. are now mostly industrious peasants, with a sprinkling of robbers only dangerous in times of war or political excitement; Hindu in religion, following either Vishnu or Siva. Sindhia and Holkar, the Mahratta chiefs, submitted to Britain in 1803, and their descendants have been conspicuously loyal to the empire.

MAHSEER, see under CARPS.

MAI, ANGELO (1782–1854), Ital. scholar and

ecclesiastic; Vatican librarian, 1819; cardinal, 1838; discovered and edited classical MSS.

MAIDA (38° 50′ N., 16° 25′ E.), town, Calabria, Italy; French defeated by British, July 4, 1806. Pop. 5000.

MAIDEN, MAID.—(1) unmarried girl (Lat. *virgo*); also used in such phrases as 'maiden speech,' which are traceable to original signification. (2) instrument similar to guillotine (*q.v.*); used in Scotland, XVI. and XVII. cent's.

MAIDENHAIR, see ADIANTUM.

MAIDENHEAD (51° 32′ N., 0° 42′ W.), market town, on Thames, Berkshire, England. Pop. (1911) 15,218.

MAIDSTONE (51° 17′ N., 0° 32′ E.), county town, Kent, on Medway, England; principal buildings are the church of All Saints; former coll. of All Saints and a XVI.-cent. manor house containing museum and library opened in 1858; breweries, paper- and oil-mills; Kentish Royalists defeated by Fairfax, 1648. Pop. (1911) 35,477.

MAIHAR (24° 16′ N., 80° 48′ E.), native state, Baghelkhand, Central India. Pop. *c.* 70,000.

MAIMANA (35° 49′ N., 64° 23′ E.), chief town, Maimana, Afghan Turkestan. Pop. *c.* 7000.

MAIMAND (29° N., 53° E.), town, Fars, Persia; rose-water. Pop. 5000.

MAIMON, SALOMON (1754–1800), Jewish philosopher; b. in Russia; work admired by Kant.

MAIMONIDES, RABBI MOSES BEN MAIMON (1135–1204), Jewish theologian; lived in Spain, Africa, and Egypt; wrote commentary on *Talmud* and other works; revered by Jews as one of their greatest teachers.

MAIN, ancient *Mœnus* (49° 50′ N., 8° 34′ E.), river, Germany; joins Rhine opposite Mainz; navigable to junction with Regnitz.

MAINA, or **MANI,** modern MOREA (37° 30′ N., 22° 10′ E.), mountainous peninsula in south part of the Peloponnesus, Greece, between Gulfs of Koron and Kolokythia; the inhabitants, called Mainotes, claim to be descendants of the Spartans.

MAINE (43° 5′ to 47° 28′ N., 66° 57′ to 71° 7′ W.), extreme N.E. state of Union and of New England states; is bounded N. and E. by New Brunswick, S. by Atlantic Ocean, W. by New Hampshire and Quebec; area, 33,040 sq. miles; coast much indented, giving coast-line of 2500 miles; surface generally undulating, rising, towards centre of state, to 5300 ft. in Mt. Katahdin, a peak of Appalachian system; drained by Saco, Androscoggin, Kennebec, Penobscot, St. Croix, St. John, and other streams; contains great number of large lakes, including Moosehead, Sebago, Chesuncook, Schoodic, Allagash, Milinoket, and others. Largest towns, Portland, Lewiston, Bangor, Biddeford; capital, Augusta. Climate severe in winter, cool in summer. M. was discovered by Cabot in 1497; various early attempts at settlement by Dutch, French, and English were without success, but by 1630 English had established a permanent colony here, part of which was under control of Sir Ferdinando Gorges. Western part of M. was from *c.* 1651 onwards a detached district of Massachusetts, who further acquired the Gorges territory by purchase in 1677; while the eastern part was for some time claimed by Acadia. Whole became incorporated with Massachusetts in 1691. M. became a separate state in 1820, when it was admitted as such to Union. A long-continued boundary dispute with Great Britain was settled by the Ashburton Treaty in 1842, whereby a compromise was arrived at. Recent history has been comparatively uneventful. Government is a republic; executive power is vested in governor, who is elected by popular vote for two years, and is assisted by an advisory council, the seven members of which include three state assessors, sec. of state, agriculture commissioner, attorney-general, and treasurer. Legislative power is vested in a Senate of 31 members and House of Representatives of 151 members, both elected for two years by popular vote; M. is divided into sixteen counties for purposes of local administration, and is represented in Congress by two Senators and four Representatives.

M. has large forests all over northern districts, producing timber, bark, maple sugar; agriculture is important industry, oats, maize, buckwheat, potatoes, and hay being grown, and horses, cattle, sheep, and pigs raised. There are excellent fisheries, and fish canning is an important industry. Manufactures cottons, woollens, paper, flour, clothing, boots, leather, etc. Minerals are little worked, but there are some mineral springs, and granite is largely quarried. Railway mileage in 1908 was 2585. Education is free and obligatory; there is a state univ. at Orono; colleges at Brunswick, Lewiston, and Waterville. Principal religions, in order of numerical importance, are Rom. Catholic, Baptist, Congregational, Methodist, Episcopalian. Inhabitants include whites, negroes, Asiatics; considerable French-speaking element, including descendants of Acadian French and immigrants from Canada. Pop. (1910) 742,371.

Macdonald, *Government of Maine* (1902).

MAINE (48° N., 0° 15′ W.), ancient province, France; capital, Le Mans; now included in modern departments Mayenne and Sarthe.

MAINE, ANNE LOUISE, DUCHESSE DE (1676–1753), dau. of Prince de Condé; m., 1692, duc de M., natural son of Louis XIV.

MAINE, SIR HENRY JAMES SUMNER (1822–88), Eng. lawyer and historian; pub. *Ancient Law*, 1861; legal adviser to Council in India, 1863, when he commenced codification of Anglo-Indian law; obtained new chair of Hist. and Comparative Jurisprudence at Oxford, 1869; member of council of Sec. of State for India, 1871; pub. *Village Communities*, 1871; *Early History of Institutions*, 1875; *Early Law and Custom*, 1883; *Popular Government*, 1885; app. Whewell prof. of International Law at Cambridge, 1887; performed brilliant service to comparative study of institutions.

MAINE DE BIRAN, FRANÇOIS PIERRE GONTHIER (1766–1824), Fr. philosopher; treasurer of chamber of deputies under Louis XVIII., but devoted himself largely to psychology; elaborated a theory of consciousness.

MAINE-ET-LOIRE (47° 25′ N., 0° 30′ W.), department, W. France; formed part of ancient Anjou; surface hilly; traversed by Loire and its tributary, the Maine; soil, generally fertile, produces grain, flax, hemp, wine, fruits; linen, cotton, and woollen manufactures; capital, Angers. Pop. (1911) 508,149.

MAINLAND, see POMONA.

MAINPURI (27° 14′ N., 79° 3′ E.), town, capital, Mainpuri, United Provinces, India. Pop. 20,000.

MAINTENON, FRANÇOISE D'AUBIGNÉ, MARQUISE DE (1635–1719), second wife of Louis XIV. of France; m. the poet Scarron (*q.v.*), 1651, and was head of literary *salon* till his death, 1660; became governess to children of king by Madame de Montespan; bought estate of M.; cr. marquise, 1678; m. king, 1685–86; founded St. Cyr; devout, she tried to restrain licence of court; great political influence; author of often-published letters.

MAINZ, MAYENCE (50° N., 8° 16′ E.), town and fortress, grand-duchy of Hesse, Germany, on Rhine, below influx of Main; busy river port; fine old cathedral, museums, Electoral Palace (with Rom. antiquities); conserves, machinery, furniture, leather, wine trades. M. was an imperial free city until 1462; birthplace of Gutenberg, who invented movable type. Pop. (1910) 110,634.

MAISTRE, JOSEPH DE (1754–1821), Fr. author and politician; b. Chambéry; went as envoy to St. Petersburg, 1802; wrote various political and ecclesiastical works, the most famous, *Du Pape*, pub. 1817; he was a great opponent of the Fr. Revolution, and a believer in papal absolutism in Church and State.

MAITLAND, EAST AND WEST (32° 45′ S., 151° 35′ E.), two adjoining towns, Northumberland

County, New South Wales, Australia, on Hunter River; agricultural district; collieries. Pop. 11,000.

MAITLAND, FREDERIC WILLIAM (1850–1906), Eng. historian; Downing prof. of Laws of England, Cambridge, from 1888; wrote numerous hist. and legal works; one of the ablest scholars of his time.

MAITLAND, SIR RICHARD, LORD LETHINGTON (1496–1586), Scot. lawyer, poet, antiquary, and historian; his poems were pub. by the Bannatyne Club, 1830. A *Historie and Cronicle of the Hous and Surename of Seytoun* is his chief hist. work.

MAITLAND OF LETHINGTON, WILLIAM (*c.* 1528–73), chief Scot. statesman of time of Mary, Queen of Scots; subtle in intellect and character; share in crimes of time morally certain but never proved.

MAITREYA, a Buddha who is to come.

MAIWAND (32° N., 65° E.), village, Afghanistan; scene of British defeat by Ajub Khan, 1880.

MAIZE (*Zea Mays*), a gramineous plant indigenous to Mexico, but now cultivated extensively, especially in America and S. Africa. The plant differs considerably from typical grasses in its inflorescence, the florets of which are unisexual. The staminate flowers are massed apically, whilst the pistillate ones form a dense aggregate known as a 'cob,' with the long filamentous stigmas hanging from the top. The whole cob is protected when young by large sheathing bracts. The fruits constitute the well-known 'Indian corn.'

MAJOR, see OFFICERS.

MAJOR, JOHN, MAIR (1470–1550), Scot. hist. writer; had John Knox, George Buchanan, and Patrick Hamilton for pupils while teaching; chiefly associated with a History of England and Scotland, written in mediæval Lat.

MAJORCA (39° 35′ N., 3° E.), largest of the Balearic Islands, Mediterranean Sea; mountainous in N.W.; soil very fertile; produces cereals, wine, olive oil, fruit; chief occupations, agriculture and cattle-rearing; cotton, woollen, and silk industries; capital, Palma. Pop. 250,000.

MAJUBA (27° 30′ S., 30° E.), hill, Drakensberg range, N. Natal; scene of British defeat by Boers, Feb. 27, 1881.

MAKART, HANS (1840–84), Austrian painter; prof. at Vienna Academy; produced chiefly spectacular and hist. genre pictures, highly coloured and of great size.

MAKÓ (46° 11′ N., 20° 28′ E.), town, Csanád, Hungary, on Maros; several mills. Pop. (1910) 34,918.

MAKRAN, see MEKRAN.

MALABAR (11° N., 76° E.), district, Madras Presidency, India, sloping from W. Ghats to Indian Ocean; has extensive forests of teak; produces rice, coffee, cocoa-nuts; chief towns, Calicut, Tellicheri, Cochin; name is applied to whole S.W. coast of S. India.

MALACCA (2° 14′ N., 102° 13′ E.), town, Malay Peninsula; has harbour and is free port; exports tapioca, rice, spices; settled by Portuguese in 1511, remaining in their possession till 1641, when taken by Dutch; occupied by Brit., 1795–1818, when Dutch regained possession; finally returned to Brit. in exchange for Benkulen, 1824. Pop. *c.* 100,000.

MALACCA, see MALAY PENINSULA.

MALACHI, Old Testament book, last of 'Minor Prophets'; no records exist of M. himself. The book was written about the time of the return from Exile, either about 458 B.C., when Ezra arrived, or 432, when Nehemiah came. The same abuses of intermarriage and general remissness of the people are denounced. Though the author believes in ritual observance he is none the less a prophet. The tone of the book is gloomy.

Driver, *Minor Prophets*, vol. ii. (*Century Bible*).

MALACHITE, carbonate of copper ore; of dark green colour; laminated, fibrous, and massive. The finest m. is found in Siberia and Russia; m. also found in Australia, in nearly all copper mines. Used for ornamental purposes, mosaic, cameos, and for making pigment.

MALACHY, ST. (1094–1148), Irish ecclesiastic; studied at Rome and worked for Romanisation of Celtic Church; abp. of Armagh, 1139; friend of St. Bernard; canonised, 1190. Some books are falsely ascribed to him.

MALACOBDELLA, see under NEMERTINE WORMS.

MALACODERMIDÆ, see under POLYMORPHA.

MALACOSTRACA (Gk. *malakos*, supple; *ostrakon*, a shell).—The largest and most familiar of Crustaceans, crabs, lobsters, prawns, etc., are grouped in this great class. They differ much in shape and size, from the tiny half-inch 'Sand-Hoppers' of the shore, and the pin-head *Nebalia*, to the Giant Crab of Japan (*Macrocheira*), with a span of sometimes more than 10 feet, yet they have this in common, that all possess a definite number (19 pairs) of appendages, definitely arranged—5 pairs on the head, 8 pairs on the thorax, and 6 pairs on the abdomen. In addition there is often a gizzard—the gastric mill.

The Malacostraca fall naturally into two great series, the first of which (*Leptostraca*), with 7 pairs of abdominal appendages, is important mainly because of the simplicity of its members (e.g. *Nebalia*) which are marine and form a link between the higher Crustacea and the lower (*Entomostracan*) forms.

The second series (*Eumalacostraca*) is sometimes known as Thoracostraca (Gk. *thorax*, a breastplate), because head and thorax are protected by a continuous shield (*cephalothorax*). This group, in which the eyes are generally borne at the end of stalks, sometimes a couple of inches long, includes many well-known Crustacea—the Australian fresh-water *Syncarida*; the marine Oppossum-Shrimps (*Mysidacea*), which bear their young in brood pouches; the pelagic and deep-sea Cumacea; the Tanaidacea, found burrowing in mud in the sea; the Isopods, including the land Woodlice (*q.v.*) or Slaters, and many marine representatives (Sea-Slaters); the Amphipoda, amongst which are reckoned the Freshwater Shrimp (*Gammarus*), the shore 'Sand-Hoppers,' the littoral 'No-body Crabs' (*Caprellidæ*), and the Whale Lice (*Cyamidæ*); the phosphorescent marine Euphausiacea; and the most familiar group of all, the Decapoda, with the Shrimps (*q.v.*) and Prawns (*q.v.*), the Lobsters (*q.v.*) and Crayfish (*q.v.*), the Hermit Crabs, the Land Robber-Crabs, the Edible and Common Shore Crabs, and the Giant Crab of Japan.

MALAGA.—(1) (37° N., 4° 40′ W.) province, S. Spain, on Mediterranean; mountainous; rich in minerals; fertile and well cultivated. Pop. (1910) 523,429. (2) (36° 45′ N., 4° 27′ W.) seaport town, capital of above; chief buildings are cathedral, episcopal palace, hospitals, theatre, bull-ring; exports iron, lead, wine, olive oil, fruit; manufactures cotton, linen, machinery, pottery; taken by the Moors in 711; besieged and taken by Ferdinand in 1487. Pop. (1910) 133,045.

MALAKAND PASS (34° 38′ N., 72° E.), mountain pass, N.W. province, India, between Peshawar and Swat.

MALAN, SOLOMON CÆSAR (1812–94), Anglican clergyman and philologist; knew many Asiatic languages.

MALAPROPISM (Fr. *mal à propos*, inappropriate), blunder in use of words, *e.g.* 'Comparisons are odorous'; so called from Mrs. Malaprop, a character in Sheridan's *The Rivals*.

MÄLAR (59° 30′ N., 17° E.), lake, Sweden, stretching inland from the Baltic at Stockholm; contains over 1200 islands; length, 80 miles.

MALARIA, disease characterised by intermittent fever, enlargement of the spleen, and anæmia, caused by a parasite, *Plasmodium malariæ*, introduced into man by one or other of the species of mosquitoes belonging to the family *Anophelinæ*. Marshy soil and high temperature favour the presence of the mosquito, and the disease is most common in tropical countries in the

wet season, occurring also in more temperate regions in summer and autumn. Three types of the parasite may attack man, causing respectively the *tertian*, *quartan*, and *æstivo-autumnal* types of fever; the type of fever depends on the period of sporulation of the parasite, the spore formation of tertian taking two days, that of quartan three days, and that of æstivo-autumnal two days, but the last may vary to some extent; the rises of temperature correspond with the completion of sporulation, so that in tertian the temperature rises every third day, in quartan every fourth day, but in æstivo-autumnal the fever may continue after the rise of temperature for a week or two.

Tertian fever is the most common type, and a paroxysm occurs in three more or less definite stages: first, the *cold stage*, when the patient may have a rigor, and feels cold, although the temperature has risen some degrees; then the *hot stage*, in which the temperature rises still farther, there is pain in the head and the back, and the face is flushed; this is followed after a few hours by the third, or *sweating stage*, in which there is profuse perspiration and a fall in temperature. During the paroxysm the spleen is enlarged, and if the disease is not treated anæmia develops, followed by general weakness and wasting, with a characteristic pigmentation of the skin.

The treatment of *m.* is the administration of quinine, at first in large (10 grs. or more), and then in diminishing doses, while quinine is also taken with good results in small doses three times a day as a preventive. Iron is valuable in the anæmia arising from malaria. Other methods for prevention of the disease include the use of mosquito nets over beds, windows, doors, and verandahs; marshy country should, if possible, be drained, petroleum poured to form a film over pools, where mosquitoes breed; and all streams should be kept clean, free from weeds, with solid banks. See PARASITIC DISEASES.

MALATIA (38° 27′ N., 38° 27′ E.), town, ancient *Melitene*, Asiatic Turkey, near Euphrates; chief industry, fruit culture; produces opium; has Prot. and R.C. missions. Pop. 61,000.

MALAY ARCHIPELAGO (20° N. to 10° S., 95° to 150° E.), islands between S.E. Asia and N. Australia. One of greatest strata of volcanic rocks in the world passes through the archipelago, which is crossed by two curving lines of active and extinct volcanoes, the region being subject to frequent earthquakes. The Western islands, Sumatra, Java, Borneo, and a number of groups of smaller islands, have a close physical resemblance to Asia, which points to the conclusion that at a comparatively recent geological period they formed part of that continent; while the Eastern islands, from Celebes outwards, exhibit an equally close resemblance to Australia. The contrast between Asiatic and Australian flora and fauna is nowhere so sudden as in the adjacent islands of Bali and Lombock, which are only 15 miles apart.

Dutch East Indies include Java and Madura, Sumatra, Celebes, parts of Borneo and New Guinea, Rian Linga Archipelago, Timor Archipelago, Moluccas, Banca, Billiton, Bali, and Lombock; total area, *c.* 736,400 sq. miles.

European knowledge of M. A. dates from 1509, when Sumatra was reached by Portuguese explorer, Lopez de Sequeira. During XVI. cent. Portugal and Spain established spheres of influence here; later on, Dutch and English also appeared upon the scene; former gradually extended their territories and became principal power in archipelago by 1674. For a few years in early XIX. cent. British seized several of the islands, but Dutch regained chief control in 1816, and now hold practically whole archipelago except Philippines, Brit. N. Borneo, and part of New Guinea and Timor (*qq.v.*).

Administration is conducted by governor-general, who is appointed by Crown, and assisted by an advisory and legislative council. There is complete religious liberty, and education is controlled by government. Principal products are rice, maize, cotton, arachis, sugar-cane, tobacco, indigo, coffee, tea, cinchona. Minerals found are coal, tin, petroleum. Inhabitants are of Malay and Papuan stocks; foreign inhabitants include Europeans, Chinese, Arabs, and other Orientals. Pop. *c.* 40,000,000.

Wallace, *The Malay Archipelago.*

MALAY PENINSULA (1° 15′ to 10° 5′ N., 98° 15′ to 104° 7′ E.), a long narrow projection extending from Indo-China southward towards Sumatra, and forming extreme S. of mainland of Asia. Properly it extends from head of Gulf of Siam, with length of *c.* 900 miles; width, 45 to 210; area, *c.* 75,000 sq. miles, of which over 35,000 are British. Whole peninsula is traversed by mountain chain, which reaches height of 7000 to 8000 ft.; watered by Perak, Pahang, Kelantan, and other rivers. Northern part belongs to Britain on W. coast, to Siam on E.; centre is Siamese as far S. as 4° on E. and 5° 30′ on W.; in S. are British territories and protected states. Inhabitants include Malays, Chinese, Siamese, Eurasians. Climate is hot and damp. Central mountains are one of great tin-producing districts of world; gold, silver, coal, iron also found. There are magnificent forests—ebony, camphor, teak, sandalwood, palms, bamboo; produces sago, tapioca, rubber, nutmegs, tea, coffee, pepper.

First Europeans to reach M. were Portuguese, who took Malacca on W. coast early in XVI. cent. and made it centre of spice trade; it was later taken in turn by Dutch and English, finally coming to British hands in 1824. See MALAY STATES.

Malays, race inhabiting the Malay Archipelago and Peninsula, Polynesia, Philippine Islands, and Madagascar. They are brown in colour, short of stature, and have high cheek-bones and obliquely set eyes. The pure Malays are a quiet race of traders and sailors, mostly Muhammadans in religion, who at one time attained a very high degree of civilisation, inventing gunpowder and the art of writing for themselves. The M. commonly live on the banks of rivers, in houses raised on piles some feet from the ground. Rice is the staple food and chief product of agriculture, but maize, tapioca, and sugar-cane are also cultivated. Cotton and silk cloths, mats, earthenware, and silver ware are the chief manufactures. Many of the M. were formerly pirates, hence their character for ferocity. To-day they are by no means warlike, but are strictly aristocratic—loyal to their chiefs—and a courteous people.

Skeat and Blogden, *Pagan Races of the Malay Peninsula* (1906); *XX.-Cent. Impressions of Brit. Malaya*, edit. by Wright (1908).

MALAY STATES (*c.* 1° 15′ to 7° 7′ N., 100° 28′ to 104° 25′ E.), under Brit. protection, include the federated states of Pahang, Perak, Selangor, and Negri Sembilan, and the non-federated states of Kedah, Kelantan, Perlis, and Trengganu; while Johor (*q.v.*), in extreme S. of peninsula, has its foreign relations controlled by Britain. Surface generally flat along coast, hilly inland, as the mountain range that traverses whole peninsula passes down to W. of centre. The federated states were united under federal administration by treaty with Great Britain in 1896; they have total area of 27,700 sq. miles, and the federal capital is Kuala Lumpor, in Selangor.

Pahang, situated in E., has area 14,000 sq. miles; drained by P. and other rivers; capital, Pekan; produces tin, gold, lead, fish; under Brit. protection since 1888. Pop. (1911) 117,595.

Perak, in N.W., has area 7900 sq. miles; drained by P. and other streams; capital, Taiping; produces tin, sugar, rice, rubber, copra, ramie; under Brit. protection since 1874. Pop. (1911) 494,123.

Selangor, to S. of Perak, has area 3200 sq. miles; drained by S. and other rivers; capital, Kuala Lumpor; produces tin, coffee, rice, pepper, rubber; under Brit. protection since 1874. Pop. (1911) 294,014.

Negri Sembilan, S.W. of Selangor, has area 2600 sq. miles; capital, Seremban; produces tin, gold, coffee, tapioca, rice, gambier; comprises number of native

states, confederated under present name in 1889; whole under Brit. protection since 1895. Pop. (1911) 130,201.

The non-federated states came under Brit. protection by treaty with Siam in 1909; total area, *c.* 15,000 sq. miles.

Kedah, in W., has area 3150 sq. miles; drained by K.; capital, Alor Star; produces rice, rubber, tapioca, tin. Pop. (1911) 245,986.

Kelantan, in E., has area *c.* 5000 sq. miles; drained by K.; capital, Kota Bharu; produces tin, gold, pyrites, galena, rice, cocoa-nuts, rubber, tapioca, sugar; live stock raised. Pop. (1911) 300,000.

Perlis, N. of Kedah, has area 300 sq. miles; drained by P.; capital, P.; produces rice, tin, guano. Pop. (1911) 32,746.

Trengganu, in E., has area *c.* 6000 sq. miles; drained by T. and other streams; capital, Kuala T.; produces fish, tin, pepper, copra. Pop. (1911) 146,920.

Bellfield, *Handbook of the Federated Malay States* (3rd ed., 1907).

MALAY STATES, SIAMESE (*c.* 5° 35′ to 7° 30′ N., 99° 30′ to 102° E.), native states of Malay Peninsula, under Siamese protection, but ruled by their own rajahs; include Patani on E., which consists of seven small states; Palean on W., and Setul, S. of Palean; area, *c.* 6900 sq. miles. Pop. *c.* 380,000.

MALAYIR (34° 30′ N., 48° 30′ E.), small fertile province, Persia; fruit and grain.

MALAYS, see RACES OF MANKIND.

MALCHIN (53° 45′ N., 12° 45′ E.), town, summer resort, on Peene, Mecklenburg-Schwerin, Germany. Pop. (1910) 7067.

MALCOLM III., CANMORE, Scot. king (1053–93); m. Margaret, sister of Edgar Atheling, on whose behalf he twice, 1070 and 1091, invaded England; became vassal to William Rufus; slain at Alnwick.

MALCOLM, SIR JOHN (1769–1833), Brit. soldier, ambassador, and author; distinguished at siege of Seringapatam, 1799; ambassador to Persia, 1800, 1807, 1810; gov. of Mysore Residency, 1803; gov. of Bombay, 1827–30.

MALDA (25° 3′ N., 89° 11′ E.), district, Bengal, India, on Mahanada, near Ganges; silk and indigo industries. Pop. 886,000.

MALDEN (42° 25′ N., 71° 5′ W.), town, on Malden, Massachusetts, U.S.A.; manufactures rubber goods. Pop. (1910) 44,404.

MALDIVE ISLANDS (4° N., 72° E.), chain of 17 coral islands in Indian Ocean, S.W. of Ceylon; chief products, coir, cowries, and cocoa-nuts; natives are Muhammadans; ruled by a sultan and tributary to the government of Ceylon; capital, Mali. Pop. 50,000.

MALDON (51° 44′ N., 0° 41′ E.), market town, ancient *Camalodunum*, river port, Essex, England, on Blackwater; iron foundries; oyster fisheries; scene of English defeat by Danes, 993. Pop. (1911) 6253.

MALEBRANCHE, NICOLAS (1638–1715), Fr. philosopher; at first studied theol., becoming a priest of the Oratory, then deeply affected by work of Descartes (*q.v.*). M. maintained that we see all things in God, in whom all beings and thoughts exist, just as material things exist in space; God is also the real direct cause of all changes. His system was attacked by Bossuet and Arnauld.

MALER KOTLA (30° 31′ N., 75° 59′ E.), native state, Punjab, India. Pop. 78,000.

MALESHERBES, CHRÉTIEN GUILLAUME DE LAMOIGNON DE (1721–94), Fr. statesman; minister of the *maison du roi*, 1775, and introduced reforms; encouraged lit. and science, and helped to establish the *Encyclopédie*; pleaded for king in Convention of 1792; guillotined.

MALEVOU, see PARNON.

MALHERBE, FRANÇOIS DE (1555–1628), Fr. poet and critic; wrote verses from about 1584, but is chiefly known for his reform of the Fr. language and versification; called 'The tyrant of words and syllables'; to him Romantic school of XIX. cent. ascribed arrest of poetic production, as he introduced correctness which marked Classical school of XVII. cent.

MALIBRAN, MME (1808–36), Span. contralto operatic singer; dau. of Manoel Garcia (*q.v.*); début (London, 1825) was extraordinary success.

MALINES, MECHLIN (51° 2′ N., 4° 28′ E.), city, Antwerp, Belgium, on Dyle; seat of the cardinal-primate of Belgium; has a XIV.-cent. cathedral; manufactures furniture, linen, and woollen goods; formerly famous for lace. Pop. (1910) 59,142.

MALLANWAN (27° 2′ N., 80° 11′ E.), town, Hardoi, United Provinces, India. Pop. 12,500.

MALLARD, or WILD DUCK, see DUCK FAMILY.

MALLECO (38° S., 72° 30′ W.), province, S. Chile, S. America; capital, Angol. Pop. (1910) 113,020.

MALLET, DAVID, MALLOCH (*c.* 1705–65), Scot. poet and dramatist; pub. much miscellaneous verse, including *William and Margaret*, an adaptation of two old ballads, and wrote several plays, one of which, *Alfred* (in collaboration with Thomson), contains *Rule Britannia*, which some have claimed for him.

MALLING, WEST (51° 19′ N., 0° 24′ E.), small town, on Medway, Kent, England.

MALLOTUS, see under SALMON FAMILY.

MALLOW (52° 8′ N., 8° 38′ W.), watering-place, on Blackwater, Cork, Ireland; warm mineral springs.

MALLOW (*Malva*), herb with pinnatifid hairy leaves and pentamerous flower, characterised by five much-divided stamens which cohere by filaments.

MALMEDY (50° 24′ N., 6° 5′ E.), town, Rhine province, Prussia; tanneries. Pop. (1910) 5007.

MALMESBURY (51° 35′ N., 2° 6′ W.) market town, on Avon, Wiltshire, England; has remains of a VII.-cent. Benedictine abbey; breweries; silk and pillow lace; birthplace of Thomas Hobbes.

MALMESBURY, JAMES HARRIS, 1ST EARL OF (1746–1820), Brit. diplomatist; successively ambassador to Spain, Prussia, Russia, Holland; carried through negotiations by which republican party in Holland, friends of France, were overthrown.

MALMESBURY, WILLIAM OF, see WILLIAM OF MALMESBURY.

MALMÖ (55° 35′ N., 13° 1′ E.), seaport, Malmöhus, Sweden, on the Sound; ironworks; cotton and woollen industries. Pop. (1911) 88,158.

MALMSEY, see MALVASIA.

MALOCELLO, LANCELOTO, XIII.-cent. Genoese explorer; sailed to Canary Isles.

MALOLOS (14° 50′ N., 121° E.), town, capital, Bulacon, Luzon, Philippine Islands; rice. Pop. 12,500.

MALONE (44° 51′ N., 74° 22′ W.), village, Franklin County, New York, U.S.A.; woollen and paper manufactures; ironworks. Pop. (1910) 6467.

MALONE, EDMUND (1741–1812), Irish Shakespearean scholar and edit.; his *Variorum Shakespeare*, ed. by James Boswell the younger, and pub. in 21 vol's, 1821, is valuable.

MALONIC ACID, $CH_2(COOH)_2$, M.P. 132; crystallises in plates; soluble in water and in alcohol; it occurs as $(CH_2COO)_2Ca,2H_2O$ in beetroot. First obtained by oxidising malic acid; whence name.

MALORY, SIR THOMAS (fl. 1470), Eng. translator; was, as we learn from Caxton's preface to his great work the *Morte d'Arthur*, a knight, translated his book from Fr. sources, and completed it in the 9th year of Edward IV.'s reign. The work is a magnificent prose epic of Fr. romance.

MALPIGHI, MARCELLO (1628–94), Ital. anatomist and physiologist, studied philosophy and med. at Bologna, and lectured on med. at Bologna (1656), Pisa (1656), Messina (1662), and again at Bologna (1666) for twenty-five years, retiring three years before his death to become private physician to Pope Innocent XII.; the founder of the science of histology, he was the first to observe the circulation of the blood in the capillaries, he demonstrated the structure of the lung, the structure of secreting glands, the minute anat. of the brain and spinal cord, and made many other valuable observations; author of scientific works.

MALPLAQUET (50° 20′ N., 3° 50′ E.), village, Nord, France, on Belgian border; here in 1709, during War of Span. Succession, French under Villars and Boufflers were defeated by combined Brit. and Ger. forces under Marlborough and Prince Eugene; 30,000 slain.

MALSTATT-BURBACH (49° 15′ N., 6° 59′ E.), town, Rhine province, Prussia, on Saar; ironworks; collieries; incorporated with Saarbrucken (*q.v.*).

MALT and **MALTING**, see BREWING.

MALTA (*c.* 35° 50′ N., 14° 27′ E.), island in Mediterranean, S. of Sicily; has an area of 95 sq. miles, or 117 if Gozo and Comino be included; it is about 58 miles from Sicily and 180 from nearest point of Africa. E. and N.E. coasts are broken, with good inlets; along S., cliffs are *c.* 400 ft. high, and highest point of island is *c.* 800 ft. It is principal British naval station in Mediterranean, and as such is strongly fortified; centre of trade and port of call is Valetta, the capital, which is an important coaling station and contains church of St. John and many splendid palaces of the Knights. Old capital, Citta Vecchia, has old cathedral and catacombs. Climate generally mild and healthy.

M. belonged in early times to Phœnicians, Greeks, Carthaginians, and Romans in succession, and formed part of Byzantine empire after separation of East and West; it was occupied by Vandals in V. and VI. cent's, and was taken in 870 by Arabs, who were eventually expelled by Count Roger, the Norman ruler of Sicily, in 1090; as part of Sicilian dominions M. was held in turn by Hohenstaufens, Angevines, and Aragonese, and, having come to hands of Charles V., was granted by him to the Knights Hospitallers in 1530. It was unsuccessfully attacked by Turks in 1551 and again in 1565, when it was besieged for nearly four months by a Turk. fleet sent by Suliman II.

In 1566 Valetta was founded, and in 1571 the Knights were present at battle of Lepanto. They held the island until 1798, when it was taken by Napoleon on his way to Egypt; Knights were banished and large number of captive Turks set free. Few months later, Maltese rose in rebellion against French; they were supported by England and Naples, and after two years compelled French to surrender to British under Pigot. By Treaty of Amiens in 1802 it was arranged that the Knights should be reinstated; but as Maltese objected to this, preferring British control, Britain retained possession, and in 1814 M. was recognised by Treaty of Paris as part of British Empire. Changes in constitution have taken place at various dates; present constitution was established in 1903 and amended in 1909.

M. is administered by governor, assisted by executive and legislative councils. Education is free and compulsory, and there is one univ.; majority of children learn English at school, by choice, but Italian is still official language of courts of law. Inhabitants include English, Italians, native Maltese. About half island is under cultivation; produces cotton, potatoes, fruits, onions, cereals, honey; cattle, sheep, and goats reared. Manufactures lace, filigree, pottery. Has eight miles of railway. Pop. (1911) 228,442.

Ballou, *Story of M.* (1893); Boron and Ryan, *Malta* (1910).

MALTA, KNIGHTS OF, see HOSPITALLERS.

MALTA, or MEDITERRANEAN, FEVER, infectious disease, due to a specific micrococcus, characterised by, at first, headache, insomnia, constipation, and profuse perspiration, with enlargement of the spleen. Later the acute symptoms pass off, but the disease follows a prolonged and irregular course, often with arthritis or other complications. It has been ascertained that infection is, in Malta, chiefly conveyed by goats' milk, but the disease is endemic in other parts of the Mediterranean coast, and infection is probably also conveyed by mosquitoes. The treatment is as in other fevers, and the strength must be kept up with nourishing foods because of the lengthy duration of the disease.

MALTESE CROSS, see CROSS.

MALTHUS, THOMAS ROBERT (1766–1834), Eng. economist; was ed. at Cambridge, becoming Fellow of Jesus College; ordained, 1797; famous for his *Essay on the Principle of Population* (1798). This work has often been regarded as one of the greatest contributions to economic science, though some have attacked it. Economists now regard M.'s chief proposition (that population tends to increase faster than the means of subsistence) as really original.

MALTON (54° 8′ N., 0° 48′ W.), town, Yorkshire, on Derwent; comprises New Malton, Old Malton, and Norton; has remains of a priory, founded 1150; corn-mills; foundries; breweries. Pop. (1911) 4822.

MALUS, see ARGO.

MALVACEÆ, plants with simple, lobed, palminerved leaves and well-marked stipules. Flowers perfect, actinomorphic, and possessing an epicalyx. Stamens much subdivided (e.g. *Malva*). The group also includes the cotton plant (*Gossypium*).

MALVASIA, MONEMVASIA (36° 41′ N., 23° 3′ E.), small town, E. coast Laconia, Greece; formerly strong fortress; gave name to Malmsey or Malvoisie wine; near site of ancient *Epidaurus Limera*.

MALVERN (52° 7′ N., 2° 19′ W.), watering-place, near Malvern Hills, Worcestershire, England; comprises town of Great M. and several villages; has a priory church, a coll., and several hydropathic establishments; mineral springs. Pop. of district (1911), 16,514.

MALWA (24° N., 75° E.), province of India, N. of the Vindhya Mountains; contains Bhopal, Indore, Dhar, and other native states; chief product, opium. Pop. *c.* 1,110,000.

MAMARONECK (41° N., 73° 40′ W.), town, on Long Island Sound, New York, U.S.A. Pop. 5699.

MAMMALS, MAMMALIA (Lat. *mammæ*, 'breasts'), the class of animals to which man himself belongs, and which, on account of the unified complexity of the structures of its members, stands, with Birds, at the top of the Vertebrate stock. The old name Quadrupeds as applied to Mammals, is insufficient, since Whales (which are Mammals) have no limbs at all, whereas many Reptiles are 'quadruped.'

The most characteristic feature of Mammals is that which gives them their name—the presence in the female of mammary glands which secrete milk for the nourishment of the young. These milk glands may open simply on a bare hollow patch of skin from which the young lick the milk, as in Echidna, or they may be associated with raised mammæ or teats, by which the offspring is suckled. Other characters are distinctive of Mammals. They of all animals alone possess hair, even if in some it be reduced to a few bristles on the lips (see HAIR). The brain is very highly organised; and the body is separated by the diaphragm or midriff into two distinct cavities, the upper containing heart and lungs, the lower the digestive apparatus. In the skeleton the lower jaw hinges directly on the skull, and each half is composed of only a single bone; the vertebral centra have flat or slightly rounded surfaces, and there are usually only seven vertebra in the neck.

Mammals are predominantly land animals, although Bats have conquered the air, and Whales and their relatives the sea. Their habits are exceedingly diverse: many are vegetarians, the diet of some is confined to insects and small life, but perhaps the majority are carnivorous. The first feed mainly by day, but the remainder are as a rule nocturnal prowlers, often living in clans and hunting in packs. The males of mammals woo characteristically by force, and accordingly adaptations for combat are plentifully diverse, but the care exercised over their offspring is an outstanding feature, and to this the success of the class may be in great part due.

Mammals are indispensable to man, for from them he obtains most of his food and raiment, and their adaptibility to domestication has lightened his labour through all the ages.

The Class **Mammalia** falls into three lines of evolution:—

Sub-Class I. **Prototheria**, ORNITHODELPHIA or MONOTREMATA.—Primitive Mammals which lay large eggs, from which the young hatch; in which there are no mammæ, the mammary pores simply opening on a bare patch of skin, and no placenta; with a common vestibule into which both rectum and urogenital canal open; testes in abdomen; having a fluctuating blood temperature of only from 25° to 28° C., and a comparatively poorly developed brain. Examples—*Echidna* and *Ornithorhynchus* (qq.v.).

Sub-Class II. **Metatheria**, DIDELPHIA or MARSUPALIA (*q.v.*).—Mammals in which the young are born prematurely, in imperfect condition, and are afterwards nurtured in an external abdominal pouch furnished with teats; vestigial allantoic placenta occasionally present; the rectum and urogenital canal open separately, but are surrounded by a common sphincter muscle; scrotum in front of penis; blood temperature varying from 32° to 36° C.; brain less developed than in Eutheria, with or without convolutions:—

Order 1. POLYPROTODONTIA—Opossums, Dasyure, Bandicoot; *Order* 2. DIPROTODONTIA—Selvas, Wombats, Phalangers, Kangaroos.

Sub-Class III. **Eutheria**, or MONODELPHIA.—Mammals in which the young are vitally connected with the mother by an allantoic placenta before birth, and after birth are able to suck; anus and urogenital openings quite distinct; scrotum when present behind penis; blood temperature varying from 35° to 40° C.; brain highly developed and convoluted. Nine orders, which see separately for details:—

Order 1. EDENTATA—Sloths, Ant-Eaters, etc.; *Order* 2. SIRENIA—Dugongs and Manatees; *Order* 3. CETACEA—Whales and Porpoises; *Order* 4. UNGULATA—Hoofed Mammals; *Order* 5. RODENTIA—Rodents; *Order* 6. CARNIVORA—Carnivores; *Order* 7. INSECTIVORA—Insectivores; *Order* 8. CHIROPTERA—Bats; *Order* 9. PRIMATES—Apes, Monkeys, etc.

MAMMARY GLAND, or BREAST, the organ characteristic of the animals belonging to the order of Mammalia; the gland in the female which secretes milk and by means of which the young are suckled; present in the male only in a rudimentary form. In the human female the m. g's are two in number, situated on the front of the chest, in the adult extending from about the third to the seventh ribs. In the centre of the surface is a darker patch of skin, the *areola*, from which arises a conical projection, the *nipple*. The gland itself is composed of about a score of lobes branching to form smaller lobules, bound together with connective tissue and embedded in fat; from each lobe a duct proceeds, to open on the apex of the nipple. The m. g's become considerably enlarged during pregnancy, and very shortly after the birth of the child milk begins to be secreted.

DISEASES OF MAMMARY GLAND.—Inflammation of the m. g., or *mastitis*, practically only occurs while a woman is suckling her child, due usually to the entrance of micro-organisms through an abrasion of the nipple. The breast is tender and painful, and the patient feels ill and feverish. It is treated by immediately weaning the child, and applying fomentations and belladonna and glycerine to the breast. If it goes on to the formation of pus an incision is made to let out the pus. Massage and the application of a firm binder are beneficial. *Chronic mastitis*, in which the breast is enlarged, hard, and somewhat tender, may simulate cancer, and in doubtful cases it is best to excise the breast and examine it microscopically. *Paget's disease* is a form of chronic eczema around the nipple, which has a tendency to develop into malignant disease, so that, if the condition is not improving under soothing applications, the breast should be removed. A *Cyst* is most commonly due to blocking up of milk in one of the ducts, which becomes much enlarged, this condition being treated by incision, while various simple tumours may be situated in the breast, which may give no trouble, but are best removed. *Cancer* of the breast most usually occurs in women between the ages of forty and fifty, and its chief characteristic is its hardness. The cancer may infiltrate a considerable area around the breast, and secondary growths are apt to occur in the lymph glands of the armpit and even in more distant situations, so that the operation for removal of the breast in cancer, which is the only method of treating the condition, must be an extended one, and must include removal of the glands of the armpit. The operation ought to be carried out at as early a stage of the condition as possible, and if cancerous nodules recur afterwards they must also be promptly removed.

MAMMOTH, see under ELEPHANTS.

MAMMOTH CAVE (37° 11′ N., 86° 3′ W.), large limestone cave, Edmondson County, Kentucky, U.S.A.; total length of its tunnels is estimated at about 150 miles, of which 10 miles have been explored; contains great number of chambers and rivers. Main cave is about 4 miles long, its largest chamber, known as Chief City, covering area of 2 acres. There are fine stalactites and stalagmites, and many of the passages are covered with crystals of great beauty. Two remarkable species of fish are found in the cave, both blind, and one without even rudimentary eyes.

MAMORÉ (13° S., 65° 25′ W.), river, Bolivia; one of the head streams of the Madeira.

MAMUN, ABDALLAH MAMUN (*c.* 786–833), caliph of Bagdad; founded the coll. of Khorasan, and promoted science, astronomy, and general learning; one of the best Arab. rulers.

MAN, see RACES OF MANKIND.

MAN, ISLE OF (*c.* 54° 15′ N., 4° 30′ W.), island in Irish Sea, 16 miles from Wigtownshire, 28 from Cumberland, 33 from Ireland; has area of 220 sq. miles; surface undulating, sloping up from rocky coast to central ridge, which reaches 2034 ft. in Snaefell. Chief towns are Douglas, Ramsay, Castletown, and Peel. There are many Runic crosses, stone circles, and other interesting remains.

Island is sometimes conjecturally identified with Rom. Mona, but its early history remains obscure, although it is known to have been inhabited by Celts. Suffered from Scandinavian invasions in IX. cent., towards end of which it was taken by Harold Haarfager. In 1098 it was conquered by Magnus of Norway, and remained under Norwegian control until 1266, when it was transferred to Alexander III. of Scotland. Alexander died in 1285, and the Manx appealed to Edward I., who occupied island in 1290; it was regained by Scots under Bruce in 1313, but ultimately came to possession of English king, *c.* 1346. It was granted at various dates to royal favourites, and in 1406 Henry IV. bestowed it on Sir John Stanley, whose descendants, earls of Derby and kings of Man, held it for many generations almost without interruption. Title of lord was substituted for king in 1651. Island came by inheritance to James, Duke of Atholl, in 1735, from whose successor it was bought by the government in 1765; the Atholls still retained some rights, which were bought by the government in 1829. Perhaps most outstanding event of recent years was the failure of Dumbell's Bank in 1900.

Administration is carried out by lieut.-gov., a Council, and the House of Keys, latter having 24 members elected by popular vote. Education is free and obligatory. The Manx language is dying out. M. is united with Sodor as an episcopal see of English Church. Chief industries are fishing, agriculture, mining; live stock is raised, and oats and turnips are important crops. There is considerable mineral wealth, lead, zinc, copper, and iron being mined. Pop. (1911) 52,034.

Moore, *History of Isle of Man* (2 vol's, 1900); Herbert & Maxwell, *The Isle of Man* (1909).

MANAAR, GULF OF (8° N., 79° E.), arm of Indian Ocean between India and Ceylon.

MANACOR (39° 34′ N., 3° 14′ E.), town, island Majorca, Spain. Pop. 12,600.

MANAGUA (12° 25′ N., 86° 15′ W.), capital, Nicaragua, on Lake M.; exports coffee. Pop. 40,000.

MANAKINS (*Pipridæ*), a family of about 100 small brightly coloured Perching Birds found living in societies in the dense undergrowth of Central and South Amer. forests.

MANAOAG, town, Luzon, Philippine Islands, on Angalacan. Pop. 17,000.

MANÁOS (35° 15′ S., 60° 55′ W.), city, port, on Rio Negro, Brazil; important centre of river trade; chief export, rubber. Pop. 66,000.

MANASSAS (38° 41′ N., 77° 33′ W.), village, Virginia, U.S.A.; battles of Bull Run fought in vicinity (1861 and 1862).

MANASSEH, tribe of Israel named after the elder son of Joseph; occupied a large tract of land on both banks of the Jordan.

MANASSES, PRAYER OF, apocryphal book, probably written in Greek (in which it is preserved), in II. cent. B.C.; in form of a psalm.

MANATEE, see under SIRENIA.

MANBHUM (23° N., 86° 30′ E.), hilly district, Bengal, India; capital, Purulia.

MANCHA, LA (38° 47′ N., 3° 40′ W.), former prov. of Spain, now chiefly included in Ciudad Real; the Don Quixote country.

MANCHE (49° N., 1° 20′ W.), maritime department, France, on Mediterranean; part of ancient Normandy; surface hilly; cereals, flax, hemp, fruit cultivated; horses reared; large quantities cider manufactured; capital, Saint-Lô; on N. coast is Cherbourg. Pop. (1911) 476,119.

MANCHESTER (53° 29′ N., 2° 14′ W.), city, S.E. Lancashire, England. M. is said to have been important station of Druids, and was Rom. colony with name *Manucium*; damaged during Danish invasions in IX. cent.; obtained rights of self-government, 1301; manufacturing importance probably began in XIV. cent., when some Flemish weavers are said to have settled here; 'Manchester cottons' first mentioned in 1352. Had privilege of sanctuary, 1540–41; was taken by Fairfax during Civil War, 1643; old fortifications destroyed, 1652; taken by Charles Edward Stuart in 1745. Manufactures greatly increased in XVII. and XVIII. cent's; Bridgewater Canal opened, 1761. Became parliamentary borough, 1832; episcopal see, 1847; city, 1853; Fenian outrage occurred in 1867; Manchester Ship Canal (see CANAL) opened, 1894.

M. is centre of great manufacturing district; great staple is cotton—spinning, weaving, bleaching, printing—M. being central market for cotton trade; there are also works that deal with silk and almost every description of fibre. Excellent communication in every direction by canal, road, and rail; has been port since opening of Ship Canal; total net tonnage of arriving and departing vessels, apart from coasting trade, was 3,309,628 in 1910. The collegiate church, now cathedral, and the Chetham Hospital represent mediæval architecture, the Warden's Room—now the Library—in the latter being widely noted. Modern buildings include—Town Hall, built by Waterhouse, and containing fine tempera paintings by Ford Madox Brown; Victoria Univ., formerly Owens Coll., which was incorporated in 1880; Royal Exchange, built 1869; new Royal Infirmary, opened 1909; Ryland's Library, opened 1897. The art gallery has a number of pre-Raphaelite paintings; fine public parks; grammar school, at which de Quincey was educated, dates from 1519. Pop. (1911) 714,427.

Saintsbury, *Manchester* (1887); Shaw, *M.: Old and New* (1896); Tait, *Mediæval M.* (1904).

MANCHESTER.—(1) (37° 27′ N., 77° 26′ W.) former city, Virginia, U.S.A.; since 1910 part of Richmond; flour, paper, cotton. (2) (42° 35′ N., 70° 45′ W.) watering-place, Massachusetts, U.S.A., on Massachusetts Bay. Pop. 2673. (3) (42° 57′ N., 71° 29′ W.) largest city in New Hampshire, U.S.A., on Merrimac; extensive manufactures of cotton and woollen goods, boots and shoes, machinery; seat of St. Anselm's R.C. Coll. Pop. (1910) 70,063. (4) (41° 46′ N., 72° 30′ W.) town, Connecticut, U.S.A.; silks, woollens. Pop. (1910) 13,641.

MANCHESTER, EARLDOM AND DUKEDOM OF.—The noted judge and statesman, Henry Baron Montagu of Kimbolton, was cr. Earl of M., 1626. His s. Edward was great Parliamentary general; 4th earl, Charles, warm supporter of Hanoverian line, was cr. duke, 1719; direct descent to present duke.

MANCHESTER SHIP CANAL, see CANAL.

MANCHURIA (*c.* 39° 5′ to 53° 20′ N., 115° 50′ to 135° E.), large district of N.E. China; gave China the Ching dynasty; came much under Russ. influence towards end of XIX. cent.; Russ. occupation in 1900 led to Russo-Jap. War (1904), at close of which treaty was arranged (1905) whereby both countries evacuated the district, which was then restored to China. M. is irregular in outline, and has area of 363,610 sq. miles; belongs almost entirely to basin of Sungari, and drains northward to Amur River, which forms N. and N.E. frontier; surface generally mountainous; contains three provinces, Heilung-Kiang, Kirin, Sheng-king; capital, Mukden; chief industries, agriculture, cattle-rearing; rich in minerals, including gold, iron, coal; valuable forests; traversed by branch of Trans-Continental Railway. Pop. *c.* 20,000,000.

Hosie, *M.: Its People, Resources, and Recent History.*

MANCINI, PASQUALE STANISLAO (1817–88), Ital. Liberal statesman, lawyer, and orator; Minister of Justice and Ecclesiastical Affairs, 1860; of Public Instruction, 1862; of Foreign Affairs, 1881–85.

MANDÆANS, name given to the survivors, now only about 1200, of an ancient Oriental religious system, the successor of Gnosticism, and compounded of Jewish, Christian, Babylonian, and Parsee elements. They live in South Babylonia, speaking Arabic and Persian. Their sacred books, in Aramaic, date from about the VIII. cent., though parts of them may be earlier.

Their theology is really a mythology. The source of all things is the Great Abyss, and from him emanates the First Life, from this the Second Life, and from which again the 'messenger of life,' who takes the place of Christ in the Mandæan system, and corresponds to the Babylonian Marduk. The lower world is divided into various regions, ruled by demonic powers. Judaism and Christianity have left distinct traces on Mandæan mythology, but both are much disliked. Jesus and the Old Testament prophets are false, but John the Baptist is admired. The Mandæans are ruled by a priesthood of three grades, and have baptism and a kind of eucharist.

Siouffi, *Études sur la religion des Soubbas.*

MANDALAY (21° 59′ N., 96° 8′ E.), town, Upper Burma, on Irrawadi; founded, 1856; was capital of former kingdom of Burma; contains the royal palace; silk-weaving. Pop. 185,000.

O'Connor, *Mandalay* (1907).

MANDARIN, Chin. civil official, so named by foreigners; nine grades, each with different insignia; they govern Chin. provinces; carefully controlled by central board.

MANDAUE, town, Cebu, Philippine Islands. Pop. 11,000.

MANDEVILLE, BERNARD DE (1670–1733), Dutch physician, who, coming to England, wrote *Fable of the Bees* (1723) and other works. He thought most 'virtues' hypocrisy, and that society was only advanced by selfish interest.

MANDEVILLE, JEHAN DE, SIR JOHN M., pseudonym of writer of amazing book of travel, now generally attributed to Jehan de Bourgogne, or Jehan à la Barbe, a XIV.-cent. Liège physician, who, if not the author, certainly assisted largely in compiling the book. It has been suggested that de Bourgogne wrote the book in conjunction with a certain John Mangevilayn, who with a Johan de Burgoyne are mentioned as having taken part in the revolt against the Despensers, 1321.

The book is a truly astounding collection of tra-

vellers' tales, culled from various sources and eclipsing even Herodotus in fantastic extravagance. 'Mandeville' journeyed to Constantinople, through Asia Minor to India, and finally across the continent to China, where he took service with the emperor and only returned (1357) because of ill-health; he served under the Sultan of Egypt and made the acquaintance of Prester John. Between fragments of historic narrative come fabulous accounts regarding monsters, cannibals, and men of wondrous shapes.

The narrative of Friar Odoric, a XIV.-cent. traveller in the East, has been freely used by the compiler, who has also taken passages from Hetoum's *Historia Orientis* (XII. cent.) and de Beauvais' *Speculum historiale*.

MANDHATA (22° 16′ N., 76° 10′ E.), pilgrims' resort, Nimar district, Central Provinces, India.

MANDI (31° 43′ N., 76° 58′ E.), native state, Punjab, India; chief town, MANDI, on Beas. Pop. 8500.

MANDINGO, Negro race, W. Africa; many and various tribes speak Mandingo; reside chiefly in S.W. Sahara, on Upper and Lower Niger, in Upper Senegal, S.W. Liberia, interior of Sierra Leone and Ivory Coast; original settlement in Western Nigeria, about A.D. 1000; largely a commercial people in Middle Ages; Muhammadan, with some degree of civilisation; each tribe has its totem, usually an animal or plant.

MANDLA (22° 35′ N., 80° 24′ E.), chief town, on Nerbudda, Mandla district, Central Provinces, India. Pop. 5600.

MANDORE, see PANDURA.

MANDRILL, see CERCOPITHECIDÆ.

MANDSAUR, MANDASOR (24° 3′ N., 75° 8′ E.), town, Gwalior, India; trade in opium. Pop. 21,000.

MANDU, MANDOGARH (22° 21′ N., 75° 56′ E.), ruined city, Dhar state, Central India; capital of ancient kingdom of Malwa.

MANDURIA (40° 25′ N., 17° 37′ E.), town, Apulia, Italy; Roman *Manduria*. Pop. 13,000.

MANDVI (22° 50′ N., 69° 31′ E.), seaport, Cutch, India, on Gulf of Cutch. Pop. 25,500.

MANET, EDOUARD (1832–83), Fr. painter; the founder of the modern school of impressionism.

MANETHO, Egyptian historian; fragments of work survive in Josephus, etc.

MANFRED (*c.* 1232–66), king of Sicily; natural s. of Emperor Frederick II.; as guardian of nephew, Conradin, drove papal forces from Sicily, and himself assumed Conradin's crown, 1258; successfully opposed pope in Italy, but finally slain.

MANFREDONIA (41° 35′ N., 15° 55′ E.), seaport town. Foggia, Italy, on Gulf of Manfredonia; founded by Manfred; near site of ancient *Sipontum*. Pop. 12,000.

MANGABEY MONKEYS, see under CERCOPITHECIDÆ.

MANGALIA (43° 48′ N., 28° 36′ E.), small seaport, on Black Sea, Rumania.

MANGALORE (12° 52′ N., 74° 52′ E.), seaport, capital of S. Kanara district, Madras, India; besieged and taken by Tippoo Sahib, 1784; exports coffee, timber. Pop. 45,500.

MANGAN, JAMES CLARENCE (1803–49), Irish poet; slaved for years in an attorney's office, and closed a tragic career in hospital; the recurrent refrains of his verse are said to have given hints to Poe.

MANGANESE (Mn = 54·93); metal occurring in pyrolusite MnO_2, etc.; obtained by reducing oxide with carbon in electric furnace, or with aluminium (Goldschmidt); greyish-white, hard, brittle; S.G. 8·0, M.P. 1245° C.; displaces hydrogen from dilute acids, used in preparation of hard steels; alloys with iron, forming ferro-manganese, used in preparation of mild steel; widely distributed and found generally with ores of iron, calcium, and aluminium.

OXIDES, AND THEIR DERIVATIVES.—MnO: basic, forming manganous salts, *e.g.* $MnSO_4+5H_2O$, pink, soluble in water; Mn_3O_4: saline, stable high temperature; Mn_2O_3: basic, forming unstable manganic salts; alum $=K_2SO_4+Mn_2(SO_4)_3+24H_2O$; MnO_2: feebly acidic, used to depolarise batteries and in preparation of chlorine; 'Weldon mud' contains $CaO,2MnO_2$; MnO_3: acidic, forms manganates, *e.g.* Na_2MnO_4, green; Mn_2O_7: acidic, forms permanganates, *e.g.* $KMnO_4$, crimson, powerful oxidiser (mineral chameleon), and Condy's Fluid, prepared from crude $NaMnO_4$.

MANGEL-WURZEL, more correctly, the 'mangold-wurzel,' is a cultivated variety of beet much grown as cattle food. The large tap-root stores its carbohydrate food reserves as sugar.

MANGO, tree of order Anacardiaceæ; grows in E. Indies, Australia, etc.; fruit, oval in shape, is edible.

MANGROVE (*Rhizophora*), tropical tree whose branches droop to earth.

MANI, see MAINA.

MANIA, see INSANITY.

MANICHÆISM, a religion founded by Mani, and of considerable importance as a rival to Christianity. Almost from the start Christianity had been threatened by confused Oriental speculations; it came into conflict with Gnosticism,—some forms of Gnosticism, indeed, took on a semi-Christian dress,—then with Mithraism, perhaps the most serious rival it has ever had, then with Manichæism. Mani was a Syrian born about 215–16, crucified 276 A.D. His object was to renovate the old Zoroastrian faith, though he mixed it up with various other elements, viewing himself as the successor of Zoroaster, Buddha, and Jesus. He started with Persian dualism—the existence of an original good and an original evil power. Another feature was the great prominence M. gave to light in his system. Sometimes his language has a Christian sound, but its spirit is that of pagan sun-worship.

He drew, too, on Babylonian mythology, for the stars play an important part in his elaborate cosmogony. Manichæism is important for its struggle with Christianity. St. Augustine was an adherent of it before his conversion to Christianity. It was very widespread. It filtered into Eastern Europe and was at the root of the mediæval heresy of the Cathari and others. It extended far eastwards too, and recently there has been an important find of Manichæan documents (many believed to have perished) in Turkestan. It existed for about 1000 years. Notices of it are scattered. Many Manichæan documents were destroyed, and the accounts in Christian writers are sometimes biased, but Western and Eastern writers notice it, and Muhammadan writers are the most trustworthy. It probably owed its success to its moral code and its idea of redemption, though Mani himself was not a redeemer. It was hostile to Christianity; resemblances are more superficial than real, and though the name Jesus occurs in Manichæan liturgies it does not mean the historic Jesus of Nazareth.

See Rochat, *Essai sur Mani et sa doctrine; Recherches sur le Manichéisme*.

MANIDÆ, Pangolins, see under EDENTATES.

MANIHIKI (10° S., 115° W.), archipelago, Central Pacific, between Marquesas and Union Islands; dependency of New Zealand.

MANIKIALA (32° 27′ N., 73° 17′ E.), village, Rawal-Pindi district, Punjab, India; famous ruins.

MANILA (14° 53′ N., 120° 52′ E.), capital, Philippine Islands, on S.W. coast of Luzon; founded by Spaniards in 1571, remaining in their possession until taken by Admiral Dewey after destruction of Span. fleet in Manila Bay during Span.-American War, 1898; has cathedral and abp.'s palace, many monasteries and churches; site of St. Thomas Univ. (founded 1857); numerous colleges, schools, and charitable institutions; contains gov.'s palace, Justice of the Peace courts, arsenal, observatory. Situated on a fine harbour, M. is an important commercial centre; exports M. hemp (much used for cordage), cigars, sugar, copra, coffee, indigo, dyewoods, mother-of-pearl, tortoiseshell; imports manufactured goods, provisions;

annual tonnage of ships entering and clearing about 1,500,000. Pop. (1910) 234,409.

MANILA HEMP, the fibrous product of the leaf-stalks of *Musa textilis*, a plantain-like form which is a native of the Philippine Islands; used for similar purposes to ordinary hemp. See ABACA.

MANIN, DANIELE (1804–57), Venetian patriot; roused Venice against Austria, and was imprisoned, 1848; released by Venetians and made pres. of republic; after failure of joint Ital. rising, Venice still held out; M. forced to capitulate, after heroic defence, 1849; d. in exile.

MANIPLE, a narrow band of material, sometimes embroidered, worn on the left arm by subdeacons and higher orders in Catholic Church, mostly at Mass; probably developed from handkerchief carried by ancient Rom. magistrates.

MANIPUR.—(1) (*c.* 24° 42′ N., 94° E.) native state, N.E. India, bordering on Assam and Burma; area, 8400 sq. miles; surface generally mountainous, extensive valley in centre; forested; produces rice, tea, cotton; scene of Brit. punitive expedition, 1891, to avenge murder of Brit. officials. Pop. (1910) *c.* 225,000. (2) (24° 48′ N., 94° E.) capital of above. Pop. *c.* 70,000.

MANISSA, MANISA (38° 36′ N., 27° 27′ E.), town, Asia Minor, on Gediz-chai, at foot of Mount Sipylus; ancient *Magnesia ad Sipylum*; contains palace of Kara Osman Oglu; cotton and silk manufactures; active trade.

MANISTEE (44° 15′ N., 86° 20′ W.), city, summer resort, on M. River, Michigan, U.S.A.; lumber and salt manufactures. Pop. (1910) 12,381.

MANITOBA, province, Canada; bounded N. by Keewatin, E. by Hudson Bay, Keewatin, Ontario, S. by U.S.A., W. by Saskatchewan; area, 251,832 sq. miles. M. was first settled by French, 1734; afterwards came under control of Hudson Bay Company; became province of Dominion of Canada, 1870; Riel Rebellion, 1869–70; large part of Keewatin joined to M., 1912. Surface is generally undulating; many large lakes, including Winnipeg, Winnepegosis, Manitoba, Island, South Indian, Granville, Etawnay; drained by Nelson, Hayes, Winnipeg, Red River, and other streams; chief towns, Winnipeg (capital), Brandon; Port Nelson and Port Churchill on Hudson Bay. M. is administered by a lieut.-gov. assisted by executive council and legislative assembly; education is free; there is a provincial univ. M. is a great wheat-growing province; other cereals produced; live stock raised, dairy-farming carried on. Valuable fisheries. Pop. (1911), exclusive of new territory, 455,000. See CANADA.

G. Bryce, *Manitoba: its Infancy, Growth, and Present Position* (1882).

MANITOBA (51° N., 98° 40′ W.), lake, Manitoba, S.W. of Lake Winnipeg; outlet, Little Saskatchewan.

MANITOWOC (44° 5′ N., 87° 38′ W.), city, Wisconsin, U.S.A., on Lake Michigan, at mouth of Manitowoc; shipbuilding yards; iron and lumber manufactures. Pop. (1910) 13,027.

MANIZALES (5° N., 76° W.), city, Colombia; exports gold. Pop. 34,918.

MANKATO (44° 12′ N., 93° 58′ W.), city, Minnesota, U.S.A., on Minnesota; agricultural implements; numerous mills. Pop. (1910) 10,365.

MANKIND, RACES OF, see RACES OF MANKIND.

MANLIUS, name of Rom. patrician *gens*; plebeian Manlii who appear are due, it is thought, to confusion with names Manilius and Mallius. Chief members, MARCUS MANLIUS CAPITOLINUS, who saved Capitol from Gauls, 390 B.C.; TITUS MANLIUS IMPERIOSUS TORQUATUS, dictator, 353, 349; consul, 347, 344, 340; won famous victories over Gauls and Latins.

MANN, HORACE (1796–1859), Amer. educationist; b. Franklin, Massachusetts; sec. to the Board of Education for 11 years, and renounced legal profession to further the cause of education.

MANNA, the exudations of various plants growing in the Mediterranean region. Among these may be mentioned the manna ash (*Fraxinus ornus*) and *Tamarix mannifera*. This last is probably the m. of the Bible, and consists of a white substance produced by the attacks of an insect.

MANNERS, CHARLES (1857–), Brit. opera-singer (bass); with Mme Moody, his wife, fosters opera in Britain.

MANNHEIM (49° 29′ N., 8° 28′ E.), town, grand-duchy of Baden, Germany, at confluence of Rhine and Neckar; chief building, grand-ducal palace containing picture-gallery, antiquarian collections, and public library; principal commercial centre of Baden; manufactures machinery, chemicals, carpets; destroyed in Thirty Years War, and again by French, 1689. Pop. (1910) 193,600.

MANNING, HENRY EDWARD (1808–92), Eng. cardinal (1875); s. of a merchant; ed. at Harrow and Oxford; Fellow of Merton Coll., and ordained, 1832; m. 1833; widower, 1837; a parish clergyman from 1833; supported Tractarian movement and won name for eloquence; resigned; was received into R.C. Church, 1851, soon after ordained, and spent some time in Rome. In 1857 he went to Bayswater and founded Congregation of Oblates of St. Charles Borromeo; made abp. of Westminster, 1865. M. now led the Ultramontanists in England, and urged on the definition of papal infallibility at the Vatican Council of 1870; wrote several devotional works. Though rigid within the Church, he freely mixed with others in secular work, and became specially interested in social questions.

Hughes, *Life of Cardinal Manning*.

MANNY, SIR WALTER DE MANNY, BARON DE (d. 1372), founder of the Charterhouse. In 1349 he had bought land at Smithfield used as a burying-ground during the scourge of the Black Death. Here he founded a Carthusian monastery called *La Salutation Mère Dieu*.

MANNYNG, ROBERT, ROBERT OF BRUNNE (*c.* 1264–1340 ?), Eng. poet; chiefly remembered for long poem, *Handlyng Synne*, consisting of metrical homilies enlivened by legends, romances, and anecdotes; also author of chronicle entitled *The Story of Inglande*.

MANOA, see EL DORADO.

MANŒUVRES.—This term is applied in strategy and tactics to the movement of bodies of troops in a theatre of operations for the purpose of bringing an enemy to battle or of defeating him in battle; but the term is also used to denote a form of military training in which modern armies engage in the summer months, when a force is divided and the two portions act against one another under rival leaders in accordance with a Scheme of Operations drawn up by the General Staff.

MANOMETER, contrivance for measuring gaseous pressures. The chief types are: 'open air,' 'compressed air,' and 'barometric.'

MANOR (Lat., *manerium*; Fr., *manior*, habitation), estate of land granted by sovereign to subject (usually some person of power and importance) in return for services to be performed. With the lordship of the m. were certain rights. The right to hold a court of one's tenants, and to exact fines by the judgment of such court, seem to be older than the charters of XI cent. Purely civil powers exclusively were at first exercised by the m., but later criminal and penal jurisdiction was allowed. The court was in some respects the meeting of the village community with the lord of the m., or his officer as presiding judge. The tenantry of the m. were of two classes, villeins and cottars, the former compelled to give a certain amount of work to the lord of the m., the latter freemen in law, though freedom in Saxon England and in feudal times was a very relative state. After the Norman Conquest the manorial system became more and more complex, and the groups of tenantry increased. The commutation of labour service began the break-up of earlier and closer connection between the m. and the tenantry. Then the enclosures and the destruction of the old open fields necessitated rearrangements, while the manorial courts

lost all real power when the king's courts took over their functions.

Vinogradoff, *English Manor*; Seebohm; *English Village Community*.

MANOR-HOUSE, the residence of the lord of the manor. The house was usually surrounded by a moat with a drawbridge as defence against disturbances on the estate.

MANRESA (44° 45′ N., 1° 47′ E.), town, on Cardoner, Barcelona, Spain; iron manufactures; textile industries. Pop. (1910) 22,036.

MANSEL, HENRY LONGUEVILLE (1820–71), Eng. philosopher; prof. at Oxford; wrote *Prolegomena logica, Limits of Religious Thought, Gnostic Heresies*, etc.

MANSFELD, ERNST, GRAF VON (*c.* 1580–1626), Ger. mercenary soldier; famous as mercenary commander in Thirty Years War; severely defeated by Wallenstein at *Dessau*, 1626.

MANSFIELD.—(1) (53° 9′ N., 1° 12′ W.) manufacturing town, Nottinghamshire, England; lace, machinery. Pop. (1911) 36,897. (2) (40° 46′ N., 82° 29′ W.) city, Ohio, U.S.A.; machinery; agricultural implements. Pop. (1910) 20,768.

MANSFIELD, WILLIAM MURRAY, 1ST EARL OF (1705–93), Eng. judge; called to Bar, 1730. K.C., 1742; solicitor-general, 1742; attorney-general, 1754; supported government against Amer. colonies; made P.C. and lord chief justice, and cr. Baron M. of M., 1756; Earl of M., 1776; house sacked and burned in Gordon riots, 1780; resigned office, 1788.

MANSURA (31° 4′ N., 31° 26′ E.), town, Lower Egypt, on Damietta, branch of Nile; cotton and linen fabrics. Pop. *c.* 40,000.

MANTEGAZZA, PAOLO (1831–1910), Ital. anthropologist and physiologist; practised med. for some time in S. America; afterwards became prof. of Pathology at Pavia, later prof. of Anthropology at Florence, where he founded the first Ital. anthropological museum; author of physiological and other scientific works.

MANTEGNA, ANDREA (1431–1506), Ital. painter; favourite pupil of Squarcione, the founder of the Paduan school, who adopted him. A precocious artist, he set up an atelier when only 17, and before leaving Padua about 1549 had executed several frescoes and altar-pieces for the churches there. The remainder of his life, excepting a two years' sojourn in Rome, when he was painting a series of frescoes for Innocent VIII., was spent at Mantua, where some of his greatest works were produced. He was known also as engraver, architect, sculptor, and poet.

Mrs. Bell, *Mantegna* (Masterpieces in Colour).

MANTES (48° 59′ N., 1° 42′ E.), town, Seine-et-Oise, France, on Seine; interesting XII.-cent. church. Pop. 8600.

MANTEUFFEL, EDWIN, FREIHERR VON (1809–85), Ger. general; app. gov. of Schleswig, 1864; occupied Holstein, 1866; commanded 'Army of the Main' in Seven Weeks War; field-marshal in Franco-Ger. War.

MANTIDÆ, Praying Insects (*q.v.*).

MANTINEIA, Mantinea (37° 37′ N., 22° 23′ E.), Arcadian city, ancient Greece; scene of two famous battles—in 418 B.C., when Agis II. of Sparta defeated Argives and Athenians; and in 362 B.C., when the Thebans under Epaminondas defeated the Spartans and their allies; site of temple built by Hadrian.

MANTIS, Praying Insects (*q.v.*).

MANTIS FLIES (*Mantispidæ*), a family of Neuropterous insects, resembling, on account of their large prey-seizing fore-legs, the true Praying Insects (*Mantis*), from which they may be distinguished by their four, almost equal, netted wings. Both larval and adult stages are carnivorous. Found in most tropical and subtropical lands.

MANTISPIDÆ, see Mantis Flies.

MAN-TRAP, obsolete instrument for catching trespassers, shaped like modern spring rabbit-trap; now illegal. See Trap.

MANTUA (45° 9′ N., 10° 47′ E.), Etruscan city, N. Italy; strongly fortified; contains beautiful church dedicated to St. Andrea, cathedral, several palaces; belonged to Gonzagas till 1708, when passed to Austria; taken by French, 1797; held by French, 1801–14, by Austrians, 1814–66, when finally ceded to Italy; Vergil's birthplace. Pop. (1911) *c.* 32,690.

MANUCODE, a general name for Birds of Paradise (*q.v.*).

MANUEL I., COMNENUS (*c.* 1120–80), Byzantine emperor; attempted to restore power of East Rom. empire in Asia Minor, Greece, Italy, and along Danube; won brilliant successes at first, with no permanent result.

MANUEL DE MELLO, DOM FRANCISCO (1611?–66), Portug. author; b. Lisbon; led an adventurous life in youth in active service; during a period of exile in Brazil wrote the greater part of his masterpiece, *Apologos dialogaes*. Other noted works are *Obras morales* and *Cartas familiares*.

MANURES.—From the earliest times it has been recognised that the addition to the soil of such substances as wood ashes, ground bones, and especially of farmyard manure exercises a beneficial influence on the crops, and is essential for continued fertility. Only in the middle of the XIX. cent., however, did the researches of the Ger. chemist von Liebig and of other scientists explain the meaning of this fact. It was then shown that plants require a certain supply of the elements nitrogen, potassium, phosphorus, magnesium, calcium, and iron, and that this supply can be utilised only in the form of mineral salts present in the soil. All these elements are normally present in the soil, and in the case of natural vegetation the supply is kept up by the plants dying and returning to the soil, and the mineral elements which they contain ultimately become available again for their successors. Nitrogen is an exception, because the decomposition of the plant compounds containing it gives rise to a number of volatile compounds, including gaseous nitrogen, which escape with the atmosphere, and thus form a source of waste. The supply of nitrogen is, however, replenished by the activities of a number of soil bacteria which assimilate atmospheric nitrogen and convert it into available compounds. In the course of agriculture, however, the harvest is generally removed completely, and thus the compounds which it has abstracted from the soil are permanently lost.

If, then, land is to remain permanently fertile the mineral substances carried away by the crops must be systematically replaced. Iron, magnesium, and very generally calcium, are so abundant in ordinary soils that it is not necessary to make special provision for their return. The addition of lime is frequently necessary, to correct acidity in the soil. The essential feature of all manuring is to secure an adequate supply of nitrogen, phosphorus, and potassium. The natural manures—dung, guano, bone-meal, etc.—do this, as they all contain these elements to a greater or less extent; also the organic matter they contain gives the soil a suitable texture. But they are not available in sufficient quantity for the needs of modern agriculture, and recourse is largely had to mineral compounds. Of these the most important are *kainite*, containing 23 % of sulphate of potassium; sodium nitrate, ammonium sulphate, and cyanamide supplying nitrogen; basic slag and superphosphate giving phosphate of lime. The particular fertiliser to be used must be determined by practical acquaintance with the needs of the soil and of the crops—for example, cereals require abundant nitrogen, potatoes potash, and turnips phosphate. Recent experiments have shown that mineral fertilisers neutralise the effect of certain poisonous substances which are always present in the soil.

MANUSCRIPTS, GREEK, LATIN, MEDIÆVAL, see Palæography.

MANUZIO, Manutius, Ital. family of scholars and printers. **Aldo** (1450–1515) founded *Aldine*

Press at Venice, 1490. He was a humanist, friend of Pico della Mirandola, and distinguished Gk. scholar, and his press (*Aldine Press*) was established for preservation and dissemination of classics; noted for beautiful type and accuracy. His s. **Paolo** (1512–74) was an infant at Aldo's death, and printing was carried on by Aldo's less competent f.-in-law and his sons; Paolo obtained his f.'s reputation and made a speciality of Latin classics; he established a press at Rome, 1561, and produced theological works. Paolo's s. **Aldo** the younger (1547–97) compiled books from childhood, and superintended Venice press; less brilliant than two first Aldi.

MANX, see MAN, ISLE OF.

MANYPLIES, see under PECORA.

MANYTCH (45° 30′ N., 44° E.), river and depression, Russia, extending from Don to Caspian; supposed geographically to be boundary between Europe and Asia.

MANZANARES (39° 3′ N., 3° 25′ W.), town, on Azuel, Ciudad Real, Spain; wine. Pop. 11,600.

MANZANILLO.—(1) (19° 3′ N., 104° 27′ W.) seaport town, Colima, Mexico; exports hides, coffee. (2) (20° 23′ N., 77° 3′ W.) seaport, Santiago, Cuba, on S. coast; exports tobacco, woods, sugar. Pop. c. 17,000.

MANZONI, ALESSANDRO FRANCESCO TOMMASO ANTONIO (1785–1873), Ital. poet and novelist; b. Milan; pub. his first tragedy, *Il Conte di Carmagnola*, 1819; his great novel, *I Promessi Sposi*, 1825.

MAORI, the aboriginal race of New Zealand; branch of the Malay family; vigorous and intelligent; brown in colour, with thick lips and straight black hair. They live chiefly in the North Island, and were numbered in 1911 at 49,844—26,475 males and 23,369 females. In the Cook and other Pacific islands 12,340 Maoris were residing in the same year.

MAP, the delineation on a plane surface of some portion of a terrestrial or celestial sphere. *Terrestrial maps* dealing with the land, or with the land and water as a whole, are termed *geographical maps*, and those referring to water areas and coastal outlines are called *hydrographical maps* or *charts*, the last name being given to maps specially prepared for navigators. An exact representation of the earth, with every detail in true relative position and proportion can be made only on a globe, for it is not possible by any process of development to make a portion of a sphere coincide with a plane surface. For this reason map-makers are obliged to resort to some method of projection or approximate development. The chief projections are five in number; the orthographic, the stereographic, the globular, the conical, and Mercator's or the cylindrical. There are also many modifications of the five, the results of efforts to eliminate difficulties and defects.

In the *orthographic projection* the eye is assumed to be at an infinite distance from the centre of the earth, so that the rays of light from all parts of the surface are parallel and perpendicular. This method gives an almost exactly accurate representation of the central portions of the hemisphere, but contracts the parts towards the circumference. While it is useful for astronomical purposes, being used for maps of the moon and the planets, this projection is of small geographical value. In the *stereographic* method the eye is conceived to be on the surface of the sphere, opposite the part to be delineated. This method gives a result opposite to that of the orthographic, the centre being contracted and the circumference enlarged. Its use is limited on account of the difficulty of finding true latitudes and longitudes, but it is sometimes employed for maps of the hemispheres in atlases, and for star maps. The *globular* projection is a modification of the orthographic and the stereographic, used to adjust and rectify the opposite defects of the two. In it the eye is supposed to be removed from the surface to a distance equal to the sine of 45° of the circumscribing circle. The equator and the central meridian are straight lines at right angles, the point at which they intersect being the centre of the boundary circle. The meridians are arcs of circles passing through the poles and through points obtained by dividing the equator into equal parts; and the parallels are arcs of circles dividing into equal parts the central and the extreme meridians. This method is excellent for giving a general idea of the form and position of the continents.

The foregoing projections are of considerable utility in conveying general impressions, but it is not possible by means of them to secure a perfect representation of any special region. This great defect has led to the adoption of the conical and the cylindrical projections. If a portion of the terrestrial sphere lying between two not very distant parallels is compared with a similar region of a cone, there is observed to be a close correspondence between the two. For this reason conical developments are the most suitable for maps of special regions. By means of certain modifications *conical* projection may be made to represent faithfully quite large portions of the globe, and in fact it meets almost all the ordinary requirements of map-makers. In the conical method the parallels are represented by concentric circles, and the meridians by equidistant radii.

The navigator requires a map which will enable him to steer by compass in straight lines only, and none of the previously described projections satisfies this condition, for in each the directions of the north, south, east, and west points are represented by curved lines. The requirement is met by *Mercator's projection*, in which the meridians are straight lines perpendicular to the equator, and the parallels straight lines parallel to the equator. This map is the only one which gives a continuous view of the whole surface of the earth, but of course it does not give an accurate representation of the whole. Within 30° of latitude of the equator it may be considered accurate, but passing further northward and southward the exaggeration of area becomes larger and larger. This distortion is rectified by making the degrees of latitude increase proportionately to those of longitude.

Geographical maps are properly maps of the world in general or of very large regions, as opposed to *topographical maps*, which show a small area in great detail and on a large scale.

Topographical maps are often made on a scale of one inch to a mile, or of one square inch to an acre, and the maps of the Ordnance Survey of Great Britain are amongst the best examples of this type. In such maps it is not possible to avoid all exaggeration, as for instance with roads, which in the British one-inch ordnance maps appear as though 130 feet in width.

A map is of little use unless we know what relation it bears to the actual size of the earth, and this relation is indicated by a graduated linear scale, showing by its divisions the number of miles, or other local measures of length, corresponding to any distance measured on the map. The relation to nature is also expressed in numbers. The *meridian* of Greenwich has been almost universally adopted as the initial meridian, but foreign countries still generally use a local meridian in topographical maps. The most notable of these foreign meridians are those of Paris, Pulkova, Stockholm, Rome, Brussels, Madrid, and Ferro.

In maps previous to the close of the XVIII. cent., the delineation of the ground was very poor, but the introduction of horizontal contours and hachures considerably improved matters. *Contoured maps* show the height of the land, and afford an indication of the comparative steepness of the mountain slopes. In *strata maps* the different layers are shown by colours, as, for instance, green for lowlands, brown for hills, and blue for the sea; and still further accuracy is obtained by the use of various shades of these colours. The desire to have an absolutely true representation

of nature has led to the construction of *relief maps*, and provided that the scale of the maps is sufficiently large, and that the horizontal and vertical scales are identical, the results are remarkably accurate. The chief use of such maps is in the teaching of geography, and for elementary work they are invaluable.

The *globe* is also a useful piece of apparatus for teaching, but its shape is inconvenient, and its scale is of necessity too small for most other purposes. A large globe is usually placed on a stand, and arranged to rotate inside a meridian of metal to which its axis is fixed. The top of the stand carries an artificial horizon, other fittings being an hour circle, round the north pole, a compass, and a quadrant for measuring distances.

Maps are now constructed for many other than purely geographical or topographical purposes. Among the most important of these are *geological maps*, which have been brought to a remarkable state of perfection during comparatively recent years. The large scale maps issued by the Geological Survey are scarcely to be surpassed for accuracy and general finish. Maps are also constructed to illustrate magnetic declination and dip, winds, ocean currents, rainfall, etc., and for historical, military, statistical, and other purposes.

Maps are of very ancient origin. There is evidence of their use amongst the Egyptians hundreds of years before Anaximander of Miletus, 610–547 B.C., whom the Greeks considered the originator of map-making, and who probably was the first to make a serious attempt to construct a map of the then known world. These early maps were made on the assumption that the earth was flat, the spherical theory not being adopted until after Aristotle. Pytheas of Massilia, a Greek navigator of the time of Alexander the Great, was the first to apply astronomical observations to geography, being able to determine latitudes by the sun; and the first attempts at projections are attributed to Dicæarchus of Messana, 310 B.C. Ptolemy, 126–61 A.D., made great advances in geography, and his teachings ultimately laid the foundation of modern map-making. In his great geographical work, which was the standard treatise until the discoveries of the XV. cent. showed its defects, he gives an estimate of the earth's size, fixes all places by latitude and longitude, and introduces an improved method of projection. There is little of interest in Roman map-making except the Peutingerian table, made about 230 A.D., showing the then known world from Britain to India, with the principal roads. During the Middle Ages no advance was made, and it was not until the XIV. and XV. cent's, when the rapidly increasing commerce of Italy made good maps a necessity, that serious attempts at scientific cartography were made. The impulse received from the geographical discoveries of the XV. and XVI. cent's, and from the introduction by Mercator of cylindrical projection, has led to the present perfection of the map. See GEOGRAPHY.

Reeves, *Maps and Map-Making* (1910).

MAP, WALTER (d. *c.* 1209), Eng. churchman and writer; clerk of royal household to Henry II., and held various ecclesiastical appointments. It is much disputed how far M. was concerned in the authorship of the Arthurian romances. Probably he was too much occupied to have written very much, but he wrote a poem about Lancelot which was a source of other romances.

MAPLE (*Acer campestris*), a small tree indigenous to Britain, which possesses opposite, palmately veined leaves, with blunted lobes. These often exhibit the sticky exudations known as honey dew, which are caused by the attacks of aphides. The fruit is winged and is known as a samare. The best-known Eng. varieties are the sycamore and plane. The sugar m. is found in Canada and the eastern states of America; the average yield of a tree is 5 lb. of sugar a year. M. wood is much used in cabinet-making, especially curly or bird's-eye m. The m. leaf is the national emblem of the Canadians.

MAR, EARLDOM OF, title drawn from ancient province of Mar, Aberdeenshire, Scotland; one of the seven earldoms of Scotland in XIII. cent.; title nearly always in dispute; two earldoms brought into existence, 1885, by recognition of title of John Francis Erskine, Goodeve Erskine, under an earlier creation than the then existing earldom of Mar.

MAR, JOHN ERSKINE, 6TH OR 11TH EARL OF (1675–1732), Scot. Jacobite; proclaimed Old Pretender king in 1715; commanded Jacobites in great defeat of *Sheriffmuir*, then fled to France; attainted, 1716; intrigued for Pretender abroad till 1724, but pensioned by George I. (called 'Bobbing John,' as turncoat).

MARABOUS, see under STORKS.

MARACAIBO.—(1) (9° 50′ N., 71° 30′ W.) lake, Western Venezuela, communicating with Gulf of Venezuela. (2) (10° 38′ N., 71° 42′ W.) city, seaport, Zulia, Venezuela, on Lake Maracaibo; important commercial centre; exports coffee, hides; shipbuilding yards; leather manufactures; seat of national coll.; formerly seat of Jesuits' coll. Pop. 50,000.

MARAGAH, MARAGHA (37° 21′ N., 46° 17′ E.), town, Azerbaijan, Persia; remains of a celebrated astronomical observatory. Pop. *c.* 15,500.

MARANHÃO (5° S., 45° W.), maritime state, Brazil, on Atlantic; mountainous in the S.; well-watered and fertile, yielding rice, cotton, sugar, tobacco; much of it occupied by forests; minerals include copper, gold. Pop. *c.* 565,000. Capital, MARANHÃO. Pop. 32,000.

MARAÑON, see AMAZON.

MARASH (37° 37′ N., 36° 45′ E.), town, vilayet Aleppo, Asiatic Turkey, at foot of Mount Taurus; trade in Kurd carpets, embroideries; supposed to occupy site of an ancient Hittite city. Pop. 50,000.

MARAT, JEAN PAUL (1743–93), Fr. revolutionist leader; b. at Boudry, Switzerland; became distinguished physician; wrote *Philosophical Essay on Man*, and various scientific works; during Revolution edited *L'Ami du peuple*, which attacked many powerful public bodies; much persecuted; caught skin disease while hiding in sewers; twice fled to London, 1790–92; sat in Commune, Aug. 1792; deputy for Paris in Convention; engaged in struggle with Girondins, 1793; tried at their instigation, but acquitted; his last triumph was overthrow of Girondins; M.'s career of blood ended in his assassination by Charlotte Corday (*q.v.*). See FRENCH REVOLUTION.

MARATHON (38° 5′ N., 23° 59′ E.), plain, N.E. Attica, Greece, between Mount Pentelicus and the sea; celebrated as scene of victory of Miltiades over Persians, 490 B.C.; on it stood the village of Marathon. A soldier, carrying the glorious news, ran post-haste to Athens, over 20 miles away; hence long-distance road-races of about 25 miles are often called M. races. See RUNNING, ATHLETICS.

MARAZION (50° 8′ N., 5° 28′ W.), watering-place, on Mounts Bay, Cornwall, England; chief industry, market-gardening.

MARBLE, certain varieties of limestone, which take a brilliant polish; of various tints, and also pure white and black, variegated, and spotted. Used for ornamental purposes, decorative and statuary work. Marble is pure calcium carbonate, and is generally divided into seven classes: m. of uniform colour, as white or black; variegated with spots or veins; shell m., partly made up of shells; lumachella, wholly made up of shells; cipolino m., veined with green talc; breccia m., angular fragments of m. united by cement of different colour to the fragments; pudding-stone m., same as above, but rounded fragments. Parian m., which has a waxy appearance, was used for most of the Grecian sculptures, as the Venus de Medici. The Parthenon was built of Pentelicus m., which was white and fine-grained. Carrara m. is generally used nowadays for fine sculpture work, and is obtained from quarries of that name in Italy. Coloured marbles were known to the ancients as Rosso antiquo, a deep

red stone with small white dots; Giallo antiquo, a m. of deep yellow; Nero antiquo, deep black m.

MARBLEHEAD (42° 28′ N., 70° 56′ W.), town, summer resort, on Massachusetts Bay, Massachusetts, U.S.A.; boots and shoes. Pop. 7338.

MARBLES, children's game played from time immemorial; Rom. and Egyptian m's in Brit. Museum; made first from marble chips, then of clay, glass, and agate; formerly played by all classes; usually played by placing several m's in ring, object being to shoot greatest number out; shooting m's known as 'alleys'; another game consists in tumbling m's into series of holes; most m's manufactured in Germany and U.S.A.

MARBURG.—(1) (50° 49′ N., 8° 46′ E.) town, on Lahn, Hesse-Nassau, Prussia; chief objects of interest are Gothic church of St. Elizabeth, and univ. (1527); pottery, leather, iron goods. Pop. (1910) 21,869.—**Colloquy of Marburg** took place in 1529, to heal divisions of Ger. Protestants which had arisen specially about the Lord's Supper. Articles were drawn up and signed, and though permanent union was not effected, certain common principles were defined. (2) (46° 34′ N., 15° 39′ E.) town, Styria, Austria, on Drave; cathedral; leather manufactures; wine. Pop. (1911) 27,974.

MARCA, PIERRE DE (1594–1662), abp. of Paris; pub. *De Concordia sacerdotii et imperii*, under patronage of Richelieu, 1641, setting forth liberties of Gallican Church; pope refused to send bulls for his appointment to see of Conserans till he retracted, 1648; historical and ecclesiastical writings highly estimated.

MARCANTONIO (*c.* 1489–1534), Ital. engraver; b. Bologna. His first notable engravings were from plates of Albrecht Dürer. Later, when working at Rome, he employed himself chiefly on Raphael's pictures, his copies of which are regarded as superior to all others. His engraved works were shown in London in 1868.

MARCASITE, an iron ore; variety of pyrites, which it resembles in appearance; pale yellow in colour with metallic lustre.

MARCEAU - DESGRAVIERS, FRANÇOIS SÉVERIN (1769–96), Fr. general; with Kléber won victories of *Le Mans* and *Savenay*; commanded in Belg. campaign, etc., 1794; campaign on Rhine and Lahn, 1795; slain during invasion of Germany, 1796; one of most famous of young commanders under Republic.

MARCELLUS, MARCUS CLAUDIUS (d. 208 B.C.), hero of Rom. history; consul, 222, 214, 201, and 208; defeated Insubrians; prætor, 216; defeated Hannibal at *Nola*; took Syracuse, 212.

MARCH.—The progress by a foot soldier at drill is known as marching in slow, quick, or double-quick time, whereby a certain number of paces of a certain length are taken in a minute. The word is also used to designate a day's journey made by troops with their impedimenta, and it is assumed that infantry move at the rate of 3 miles an hour including short halts, and that they will be quartered for the night after 6 hours' marching; when this cannot be done, and the march is continued for 12 or 18 hours, it is called a 'forced march.'

MARCH (52° 33′ N., 0° 4′ E.), market town, on Nen, Cambridgeshire, England. Pop. (1911) 8403.

MARCH, EARLDOM OF.—(1) Welsh earldom held by Mortimers (*q.v.*) from XIV. cent. Edward IV. (*q.v.*) was Earl of March before his accession.

(2) Scot. earldom held by Dunbars.—**Patrick, 1st earl**, claimed Scot. crown, 1291.—**Patrick, 2nd earl** (1285–1369), helped Edward II. to escape after *Bannockburn*.—**George, 3rd earl** (d. 1420), fought for Henry IV. at *Homildon Hill* and *Shrewsbury*.—**George, 4th earl**, arranged for James I.'s release from England, 1423. Family is now represented by Marquess of Bute. Other M. earldoms were held by Stuarts, Earls and Dukes of Lennox, XVI.-XVII. cent's; by Dukes of Richmond since 1675; and by Dukes of Queensberry since 1697.

MARCHE (50° 14′ N., 5° 21′ E.), town, prov. Luxemburg, Belgium. Pop. (commune) 3700.

MARCHE, LA MARCHE (46° 5′ N., 1° 40′ E.), ancient province, France; capital, Guéret; corresponded to modern department Creuse and parts of Haute-Vienne and Indre.

MARCHENA (37° 19′ N., 5° 25′ W.), town, Seville, Spain; sulphur springs. Pop. 12,600.

MARCHES, THE (43° 25′ N., 13° 10′ E.), district, Italy, comprising provinces of Ancona, Ascoli-Piceno, Macerata, and Pesaro-e-Urbino; produces wine, tobacco, maize; became part of kingdom of Italy in 1840. Pop. 1,100,000.

MARCHMONT, EARLDOM OF.—First earl (cr. 1697), Sir Patrick Hume, Bart., of Polwarth, opposed government of James II. and had great influence under William III.; 2nd earl, Alexander, promoted Union of England and Scotland; dormant, 1794, on death of 3rd earl.

MARCION AND MARCIONITES.—Marcion came to Rome about 140 A.D., and died about 20 years later, after establishing many churches. He thought the God of the Old Testament was stern and revengeful, and not the God of the New—a God of love. Christ was the Son of God who appeared in the form of man (His true humanity therefore rejected). Marcion is sometimes called a Gnostic, hardly accurately. He 'edited' St. Luke's Gospel, and thought Paul alone understood Christ, though M. misunderstood Paul. After about 300 the Marcionite churches were absorbed into Manichæism (*q.v.*).

Harnack, *History of Dogma* (passim).

MARCONI, GUGLIELMO (1874–), Ital. scientist; inventor of a system of wireless telegraphy (see **TELEGRAPHY**); ed. Bologna, where he experimented; established wireless communication between England and France, 1899; between Canada and England, 1902; Chevalier of Civil Order of Savoy, 1905; invented persistent wave-system, 1906; established public wireless service between Britain and America, 1907; received Nobel Physics Prize, 1909.

MARCUS AURELIUS ANTONINUS (121–180), Rom. emperor and Stoic; b. at Rome; original name, *Marcus Annius Verus*; adopted by his uncle, Antoninus Pius, emperor; ed. by Stoic teachers; consul, 140. On death of Antoninus, 161, he became emperor, with Verus as colleague; reign marked by various disasters—flood, famine, earthquakes, plagues, insurrections; Parthian War concluded, 165; waged war in person against barbarians in Aquileia, Pannonia, and Noricum; subdued Marcomanni tribe, 168, 169; defeated Quadi, 174, and other Ger. tribes; subsequently marched to Germany; put down insurrections in various provinces; pacified Syria; returned to Rome *via* Athens, 176; had *triumph* for Ger. victories; again warred against Ger. tribes, 178, but died during campaign either from illness or poison; has been blamed for share in persecution of Christians, 177; opposed to Christianity. He wrote celebrated *Reflections* (*Meditations*), work of Stoic philosophy; chief doctrines, life according to nature, self-mastery.

P. B. Watson, *Marcus Aurelius Antoninus* (1884).

MARCY, WILLIAM LEARNED (1786–1857), Amer. politician; comptroller of New York State, 1823; senator, 1831; gov. of New York, 1832–38; secured bank reforms; War Sec., 1845–49; Sec. of State, 1853–57; instrumental in forming Gadsden Treaty, 1853; settled Koszta affair, and Brit. fisheries question; arranged reciprocity treaty with Canada; retired, 1857.

MARDIN (37° 16′ N., 40° 44′ E.), town, Diarbekir, Asiatic Turkey. Pop. 26,000.

MARDUK, MERODACH, guardian deity of Babylon, was originally a sun-god; gradually he absorbed the attributes of the more ancient Babylonian deities Ea and Bel, and also assumed the powers of the minor gods of the Pantheon, till he practically became the only recognised deity, the minor gods being regarded as his manifestations.

MARE, see **HORSE FAMILY**.

MARECA, Widgeon, see under DUCK FAMILY.

MAREE, LOCH (57° 42′ N., 5° 25′ W.), loch, western Ross-shire, Scotland; outlet, the Ewe.

MAREMMA (42° 20′ N., 11° E.), marshy region, on coast of Tuscany, Italy, extending from Orbetello to mouth of Cecino.

MARENGO (44° 53′ N., 8° 39′ E.), village, N. Italy, near Alessandria; scene of strenuously contested battle on June 14, 1800, when the French under Napoleon and Desaix defeated Austrians under Melas.

MAREOTIS, BIRKET-EL-MARIUT (31° 5′ N., 30° E.), lake, Lower Egypt, S.E. of Alexandria.

MARET, HUGUES-BERNARD, DUC DE BASSANO (1763–1839), Fr. statesman; moderate under Republic; aided Napoleon in *coup d'état,* 1799, and became private sec. and Sec. of State; edited State journal, *Moniteur Universel,* 1800; noted for devotion to Napoleon; cr. peer under Louis Philippe.

MARGARET (1353–1412), queen of Denmark, Norway, and Sweden; dau. of Valdemar IV. of Denmark; m. Haakon VI. of Norway, 1363; app. regent of Denmark for her infant s., Olaf, 1375, and in 1380 regent of Norway on her husband's death; recovered overlordship of Schleswig, 1386; established overlordship over Sweden, 1388; nominated her young nephew Eric of Pomerania king of the three kingdoms (united by the Union of Kalmar, 1397), but herself wielded the power; called 'Semiramis of North.'

MARGARET (1489–1541), queen of Scotland; dau. of Henry VII. of England; m. James IV. of Scotland, 1503; James IV. was slain, 1513, and M. became sole guardian of their son, James V.; m. Earl of Angus, 1514, and lost regency; dau. by Angus was Darnley's mother.

MARGARET (1221–95), dau. of Raymond Berengar V. of Provence; m. Louis IX. of France, 1234.

MARGARET OF ANJOU (1430–82), queen of England; dau. of 'Good King René' of Anjou; m. Henry VI. of England, 1445; strove with Duke of York for chief power during Henry's madness, and led Lancastrians against Yorkists in Wars of Roses; courageous and indefatigable, but without statesmanship.

MARGARET OF AUSTRIA (1480–1530), dau. of Emperor Maximilian I.; m. (1) John of Castile, 1497; (2) Philibert II. of Savoy, 1501; she was regent of Netherlands from 1507.

MARGARET OF AUSTRIA (1522–86), illegitimate dau. of Emperor Charles V.; m. (1) Alexander de' Medici, Duke of Parma, 1533; (2) Ottavio Farnese, Duke of Parma, 1542. M. was regent of Netherlands, 1559–67.

MARGARET OF NAVARRE, MARGUERITE D'ANGOULÊME (1492–1549), m. Charles, Duc d'Alençon, and later Henri d'Albret, king of Navarre; encouraged lit.; wrote *Heptaméron* (tales modelled on Boccaccio), *Letters,* and *Marguerites* (poems).

MARGARET OF VALOIS (1553–1615), dau. of Henri II. and Catherine de Medici; m. Henry of Navarre; marriage dissolved after his accession to Fr. throne as Henri IV.; wrote *Mémoires.*

MARGARET, ST., according to tradition was dau. of pagan priest at Antioch; embraced Christianity; refused marriage with potentate, was tortured and martyred; in Gk. Church she is called MARINA, perhaps identical with St. Pelagia.

MARGARITA ISLAND (11° N., 64° W.), mountainous island, belonging to Venezuela, Caribbean Sea, N. of Cumana; length, 45 miles; capital, Asuncion; formerly important pearl fisheries; discovered by Columbus, 1498. Pop. 42,000.

MARGARITANA, Freshwater Mussel, see under LAMELLIBRANCHIATA.

MARGATE (51° 23′ N., 1° 23′ E.), seaport, watering-place, Isle of Thanet, Kent, England. Pop. (1911) 27,086.

MARGHILAN (40° 28′ N., 71° 43′ E.), town, Ferghana, Asiatic Russia; silk and woollen industries. Pop. 44,000.

MARGUERITE, see MARGARET OF NAVARRE.

MARGUERITTE, PAUL (b. 1860), Fr. novelist; s. of Fr. general M. (1823–70), killed in Franco-Prussian War; early attained prominence in lit.; collaborated with his bro. VICTOR (b. 1866).

MARIA STELLA (d. 1843), putative dau. of Philip, Duke of Orleans; supposed child of Chiappini, but claimed to have been substituted for son of Chiappini by her real f., the Duke of Orleans, on account of his desire for man child.

MARIA THERESA (1717–80), archduchess of Austria, queen of Hungary and Bohemia, empress of Holy Rom. Empire; dau. of Emperor Charles VI.; m. (1736) Francis of Lorraine (emperor, 1745); mother of Marie-Antoinette; succ. her f., 1740, by virtue of Pragmatic Sanction; attacked by Prussia, Spain, and Bavaria, but won recognition in War of Austrian Succession; sought in vain to recover Silesia from Prussia in Seven Years War; she restored unity to Austrian dominions, and introduced reforms. *Life,* by Bright (1897).

MARIANAO (22° 55′ N., 82° 10′ W.), city, summer resort, Havana, Cuba. Pop. 5700.

MARIANNES, LADRONES (16° N., 145° E.), archipelago, N.W. Pacific, belonging to Germany, with exception of Guam (pop. (1911) 12,240), which belongs to U.S.A.; comprises northern group of ten and southern group of five; discovered by Magellan in 1521; occupied by Spain in 1668; chief export, copra. Pop. (including Guam) 2700.

MARIAZELL (47° 46′ N., 15° 19′ E.), village, Styria, Austria-Hungary; place of pilgrimage.

MARIE AMÉLIE THÉRÈSE (1782–1866), dau. of Ferdinand IV. of Naples; m. Louis Philippe, Duke of Orleans, afterwards Fr. king, 1809.

MARIE DE FRANCE (fl. latter half of XII. cent.), Fr. poetess; lived in England under protection of William, Earl of Salisbury; took name 'de France'; wrote 103 *Fables,* called, from their father Æsop, '*Ysopets*'; wrote *lais* founded on Breton stories, which formed models of later *trouvères.*

MARIE DE' MEDICI (1573–1642), wife of Henry IV. of France; regent after his assassination; on her son Louis XIII.'s accession she was exiled, and her favourite Concini was murdered; she failed to stir up civil war against Louis, and went to live with Henrietta Maria, Charles I.'s queen.

MARIE LESZCZYNSKA (1703–68), dau. of Stanislas L., king of Poland; m. Louis XV. of France, 1725.

MARIE LOUISE (1791–1847), archduchess of Austria; second wife of Napoleon I.; dau. of Francis II., Emperor of Holy Rom. Empire (Francis I. of Austria); m. Napoleon, 1810, and app. regent by him, 1814; mother of Napoleon II.; fled to Austria on Napoleon's first abdication, and refused to return; awarded government of Parma, Piacenza, and Guastalla.

MARIE THÉRÈSE (1638–83), dau. of Philip IV. of Spain; m. Louis XIV. of France, 1660.

MARIE GALANTE (15° 55′ N., 61° 15′ W.), island, Fr. W. Indies, S.E. of Guadeloupe, of which it is dependency. Pop. 16,000.

MARIE-ANTOINETTE (1755–93), queen of France; youngest dau. of Francis I., Emperor of Holy Rom. Empire, and Maria Theresa; education neglected; m. Dauphin Louis, grandson of Louis XV., 1770, aged sixteen; marriage was unpopular in France; her lightness, extravagance, and unconventionality alienated people; said to have given a million yearly to favourites, chiefly Austrians; nicknamed 'The Austrian'; despised her husband; attacked by calumnies so widely believed that she was hissed at Opera; birth of Louis XVII., 1785; scandal of diamond necklace followed; led opposition to Revolution; sought to win Mirabeau and after his death determined to fly; led king to Varennes, 1791, when her hair turned white in one night; brought back and tried to bring about foreign invasion; after popular attack on Tuileries, imprisoned in the Temple, 1792; execution of king, Jan. 1793; imprisonment of

queen in Conciergerie; tried and guillotined (Oct. 16). Hilaire Belloc, *Marie Antoinette* (1909).

MARIENBAD (49° 58′ N., 12° 43′ E.), watering-place, Bohemia, Austria; saline springs. Pop. (1911) 6279.

MARIENBERG (50° 38′ N., 13° 12′ E.), town, Saxony, Germany. Pop. (1910) 7736.

MARIENBURG (54° 1′ N., 19° E.), town, W. Prussia, Germany; the castle (founded 1274) was seat of Teutonic Knights from 1309 to 1457, when M. became a Polish possession; passed to Prussia in 1772; manufactures machinery, cottons, woollens. Pop. (1910) 14,025.

MARIENWERDER (53° 44′ N., 18° 54′ E.), town, W. Prussia, Germany; XIII.-cent. cathedral; iron foundries; sawmills. Pop. (1910) 12,982.

MARIETTA.—(1) (33° 55′ N., 84° 35′ W.) city, Georgia, U.S.A.; furniture, paper, marble-works. Pop. (1910) 5949. (2) (39° 27′ N., 81° 26′ W.) city, Ohio, U.S.A., at junction of Muskingum with Ohio; petroleum, coal, and iron region; seat of Marietta College. Pop. (1910) 12,923.

MARIETTE, AUGUSTE FERDINAND FRANÇOIS (1821–81), Fr. Egyptologist; devoted most of his life to archæological exploration in the Nile valley, and wrote and illustrated several vol's dealing chiefly with his explorations.

MARIGNANO, BATTLE OF, won by Francis I. over Swiss, Sep. 13–14, 1515. Francis invaded Italy, evading Swiss and crossing Alps, but was overtaken between Piacenza and Milan by Swiss with reinforcement of Milanese cavalry; one of most obstinately contested battles of history; success gave French Milan.

MARIGNOLLI, GIOVANNI DE (b. *c.* 1291), Ital. traveller; envoy of Benedict XII. to emperor of Cathay, travelling across Asia; leaving Peking, travelled through China, then to Madras, Java, back to Ceylon, across Persia to Avignon. Notes of travels in vol. ii., *Monumenta historiæ bohemiæ* (1768).

MARIGNY, ENGUERRAND DE (1260–1315), Fr. chamberlain; became chief minister of Philip IV., 1304; heavy taxes and peace policy offended nobles, who had him hanged as sorcerer on accession of Louis X.

MARIGOLD, name of several plants; the ordinary Annual M., with orange flowers (*Calenda officinalis*), is double-flowered, or single and unisexual; the African M. (*Tagetes erecta*), with more deeply coloured flowers; Corn M. (*Chrysanthemum segetum*), of Brit. cornfields, flower-heads used in dyeing; all of *Compositæ* (q.v.) order. Marsh M., 'Kingcups,' and in U.S.A. 'Cowslip' (*Caltha palustris*), like large buttercup with glossy golden petals, of *Ranunculaceæ* order.

MARIINSK (56° 15′ N., 88° 5′ E.), town, on Kiya; Tomsk, Russia; centre for gold mines. Pop. 9000.

MARINES, see ROYAL MARINES.

MARINETTE (45° 3′ N., 87° 40′ W.), city (and county), Wisconsin, U.S.A., on Green Bay; lumber manufactures. Pop. (1910) 14,610.

MARINI, GIAMBATTISTA (1569–1625), Ital. poet; wrote epics and lyrics in a stilted, bombastic diction, hence term 'Marinism.' See ITALY (LITERATURE).

MARINO (41° 47′ N., 12° 39′ E.), town, Rome province, Italy; wine. Pop. 8000.

MARINUS I., Pope, 882–84.—**Marinus II.**, same as MARTIN III., Pope, 942–46.

MARION.—(1) (40° 32′ N., 85° 37′ W.) city, Indiana, U.S.A.; natural gas region; iron and steel manufactures; glass-works. Pop. (1910) 19,359. (2) (40° 36′ N., 83° 5′ W.) city (and county), Ohio, U.S.A.; machinery; agricultural implements. Pop. (1910) 18,232.

MARION, FRANCIS (1732–95), Amer. soldier; app. brigadier-general of troops of S. Carolina, 1780; his brigade for long defeated Loyalists; retired, 1782; became commander of Fort Johnson, 1784.

MARIONETTES, puppets representing characters and moved by means of cords and springs by a concealed player, who speaks all the parts. A survival of the entertainment is the Punch and Judy show.

MARISCHAL COLLEGE, see ABERDEEN.

MARITIME PROVINCE (54° N., 145° E.), province, Eastern Siberia, extending along Pacific from Korea to Arctic Ocean, and including Kamchatka and part of Sakhalin; area, 716,000 sq. miles; surface largely mountainous and forest-covered; chief rivers, Anadyr, Amur, and Usuri; climate severe; thinly populated, mainly by Russians, who fish, hunt, and trade in furs; coal and gold found. Pop. (1910) 1,547,330. Capital, Vladivostok.

MARITIME PROVINCES, east coast provinces of Canada, viz. Nova Scotia, New Brunswick, and Prince Edward Is. (*qq.v.*).

MARIUPOL (47° 6′ N., 37° 35′ E.), seaport, Ekaterinoslav, Russia, on Sea of Azov, at mouth of Kalmius; iron and leather goods. Pop. (1910) 48,500.

MARIUS, GAIUS (155–86 B.C.), Rom. general; plebeian; rose in army under Scipio Africanus, and married a patrician; distinguished in Jugurthine War, and became consul, 107; subdued Numidia as proconsul; consul, 104–101; crushed Teutones and Cimbri, 102–101; great Triumph, 101; obtained command, already given to Sulla, against Mithradates; defeated and condemned to death by Sulla, but spared, and escaped; recovered Rome in Sulla's absence, 86, but died soon afterwards.

MARIVAUX, PIERRE CARLET DE CHAMBLAIN DE (1688–1763), Fr. author; introduced special style, called *Marivaudage*; his comedies are the delight of actors as his novels have often been of literary men; characters introduced are, like their language, full of wit and slightly affected; his novels, especially *Marianne* (1731–41), prized above his plays.

MARK, Ger. standard weight and coin; coin contains 5 grammes of fine silver; worth 11¾d. (100 *pfennig*); old Eng. and Scot. marks were nominally worth 13s. 4d. (1200 onwards).

MARK, GOSPEL OF ST., in our canon, second of Gospels, but by almost universal consent of present-day scholars earliest written—probably about 70 A.D.; shortest of four Gospels, and simplest, giving story from preaching of Baptist till Resurrection; original end is lost, 16^{9-20} being later addition; mostly narrative, with few discourses; traditionally and probably actually the work of John Mark, who derived much information from St. Peter; some think it influenced by Pauline theol.; known to Justin Martyr, *c.* 150, and from *c.* 200 universally accepted in Christian Church; not always so much regarded as other Gospels, and its supreme importance only recently emphasised.

Salmond, *Mark* (Century Bible); Burkitt, *Earliest Sources for Life of Jesus*; Swete, *St. Mark*; J. A. Robinson, *Study of the Gospels*.

MARK, ST., called sometimes John Mark; to his mother Mary's house St. Peter came (*Acts* 12^{12}); accompanied St. Paul on his first missionary journey (12^{25}), but left him at Perga, to grief and indignation of Paul, who refused to take him with them on next mission; Barnabas, however, accompanied M. to Cyprus; when Paul wrote *2 Timothy*, M. was reconciled to him (4^{11}); traditional author of the Gospel; according to some, M. himself is young man of *Mark* 14^{51-52}.

MARKET, a place of sale. Every town of importance in the Middle Ages possessed its m., and the right to demand a toll was a valuable privilege. Although steadily losing their importance, and in many towns extinct, the ancient m's have endured despite modern conditions of commerce. The annual pleasure fair is, however, all that exists of the once famous m. in large numbers of places. Although London has such places as Covent Garden M. for fruit, flowers, and vegetables, Smithfield M. for flesh meats, and there are similar institutions in other cities, the big store and general emporium have largely become the m.-place of our times. The term 'market' also applies to 'any body

of persons who are in intimate business relations, and carry on extensive transactions in any commodity,' and 'these m's may or may not be localised' (Jevons). Hence the phrases, money m., corn m., cotton m., and, within the Stock Exchange, consol m., home railway m., American m., etc.—meaning the persons whose business it is to buy and sell consols, railway shares, American securities, etc.

For the former use of the word, see Mrs. J. R. Green's *Town Life* and the Royal Commission on Market Rights, vol. i. (1889).

MARKET BOSWORTH (52° 37′ N., 1° 25′ W.), market town, Leicestershire, England.

MARKET DRAYTON (52° 55′ N., 2° 30′ W.), market town, on Tern, Shropshire, England; iron foundries.

MARKET HARBOROUGH (52° 29′ N., 0° 56′ W.), town, Leicestershire, England; hunting centre. Pop. (1911) 8853.

MARKHAM, SIR CLEMENTS ROBERT (1830–), Eng. traveller and geographer; author of many antiquarian and genealogical works; took part in the search for Sir John Franklin; in the Abyssinian expedition of 1867–68; and in the storming of Magdala.

MARKHAM, WILLIAM (1719–1807), abp. of York, 1777.

MARKIRCH (48° 15′ N., 7° 10′ E.), town, on Leber, Alsace, Germany; cotton and woollen manufactures. Pop. (1910) 11,778.

MARKO KRALYEVICH (d. 1374), Servian hero; many legends have grown up about him.

MARL, a clay consisting mainly of mixture of carbonate of lime. The term is also applied to various rocks and soils. M. is used as a dressing for soils by farmers, and is generally of a soft, earthy nature, and white, grey, or brown in colour. The *Red m's* belong to the Keuper division of Triassic period, and are many thousands of feet thick.

MARLBOROUGH.—(1) (51° 25′ N., 1° 44′ W.) town, on Kennet, Wiltshire, England; M. College occupies site of ancient castle. In vicinity is Castle Mound, an early fortification; industries include rope-making and brewing. Pop. (1911) 4401. (2) (42° 20′ N., 71° 33′ W.) city, Massachusetts, U.S.A.; boots and shoes; machinery. Pop. (1910) 14,579.

MARLBOROUGH, JOHN CHURCHILL, 1ST DUKE OF (1650–1722), Eng. general; served with distinction under Turenne, 1672; m. Sarah Jennings, confidante of Princess Anne, 1678; gained victory for king at *Sedgemoor*, 1685; subsequently attached himself to William of Orange, who made him lieut.-gen., Earl of M., and P.C.; distinguished in wars in Ireland and Low Countries, 1689–92; imprisoned for treason, 1692; was in communication with banished king concerning Brest affair, 1694; held many responsible positions under William. On Anne's accession M. became captain-gen. of army; commanded Brit. and Dutch armies in War of Span. Succession; captured Kaiserswerth, Venlo, and Liège, 1702; Duke of M., 1702; during second campaign, 1703, captured Bonn, Huy, Lemburg; won brilliant victories at *Blenheim*, 1704, *Ramilies*, 1706, *Oudenarde*, 1708; captured Lille, 1708; battle of *Malplaquet* was less decisive, 1709; M. was deprived of his commands by Tory ministry, 1712.

Saintsbury, *Life* (1885); Lord Wolseley, *Life* (2 vols., 1894).

MARLOW, GREAT MARLOW (51° 34′ N., 0° 46′ W.), town, on Thames, Buckinghamshire, England; manufactures chairs. Pop. (1911) 4683.

MARLOWE, CHRISTOPHER (1564–93), Eng. dramatist; b. in humble circumstances, but became B.A. and M.A. of Cambridge; was possibly an actor, possibly a soldier; led a life of great irregularity and was killed in a brawl. He is the first great Eng. dramatist, and has been described as 'the matrix from which Shakespeare's plays evolved.' His best-known plays were *Tamburlaine the Great* (1590), *Dr. Faustus* (1604), which was greatly admired by and had no little influence on Goethe, *The Jew of Malta* (1588), and *Edward II.* (1590). With the exception of the last named, these plays are very unequal, passages of real strength being followed by bombastic declamations; but they show great vigour and freshness, imaginative power, and dramatic sense. *Edward II.* is a play of sustained power worthy to rank with the best of Shakespeare's hist. plays. In estimating M.'s work account must be taken of his tragically short career; what we possess of him is the 'wild untrained efforts of youth.' Yet it suffices to earn him the title of founder of the English drama.

Best edition is Dyce's in 1 vol. (Pickering, 1858); see also *Christopher Marlowe*, by J. H. Ingram (1904).

MARLY-LE-ROI (48° 51′ N., 2° 2′ E.), village, on Seine, Seine-et-Oise, France; formerly famous for royal castle built by Louis XIV.

MARMANDE (44° 30′ N., 0° 10′ E.), town, Lot-et-Garonne, France, on Garonne; woollen goods. Pop. 9700.

MARMONT, AUGUSTE FRÉDÉRIC LOUIS VIESSE DE (1774–1852), Fr. soldier; served under Napoleon in Peninsular War and later campaigns; betrayed Napoleon at Paris, 1814; cr. peer of France at Restoration; went into exile with Charles X.; an able general, but self-interested man.

MARMONTEL, JEAN FRANÇOIS (1723–99), Fr. author; protected by Voltaire; wrote several plays and novels, and contributed to the *Encyclopédie*; *Mémoires* useful for literary history of time; much thought of as stylist.

MARMORA (40° 38′ N., 27° 35′ E.), island of Turkey, in Sea of Marmora; ancient *Proconnesus*; famous marble quarries.

MARMORA, SEA OF (40° 40′ N., 28° E.), between Europe and Asiatic Turkey, communicating with Black Sea by the Bosporus and with Ægean by the Dardanelles; ancient *Propontis*.

MARMOSETS, a family of Primates (*q.v.*).

MARMOTS (*Marmota*), a genus of Rodents, the members of which are related to Squirrels, and are found in the colder portions of Old and New Worlds, where they live in large companies in underground burrows; hibernate in winter.

MARNE (49° 2′ N., 4° E.), river, France, joins Seine at Charenton, 2 miles S.E. of Paris; length, 320 miles; Rom. *Matrona*.

MARNE (49° N., 4° 10′ E.), department, France, formed from part of ancient province of Champagne; surface level, with low hills W. and E.; chief stream, the Marne; principal product, champagne; capital, Châlons-sur-Marne. Pop. (1911) 436,310.

MARNE, HAUTE-, see HAUTE-MARNE.

MAROCCO, see MOROCCO.

MARONITES, Oriental Christian Church, in communion with Rome, but retaining Syriac liturgy and married clergy (though they no longer marry after ordination); its early history is obscure, and in XII. cent. it was heretical; now being increasingly Romanised; M's exist mostly around Lebanon, Hermon, and Antioch, and number about 500,000.

MAROONS, fugitive slaves who took refuge in W. Indies; M's of Jamaica were not conquered by British until end of XVIII. cent.; negroes of Surinam are descendants of M's.

MAROS-VÁSÁRHELY (46° 28′ N., 24° 31′ E.), town, on Maros, Transylvania, Hungary; chief town of the Szeklers; tobacco; wine and fruit. Pop. (1910) 25,517.

MAROT, CLÉMENT (1497–1544), Fr. poet; s. of Norman poet, Jean Marot, sec. to Anne of Brittany, appreciated also in his time; obtained patronage of Marguerite d'Angoulême and good graces of François I., to whom he addressed his best *Épitres*, and with whom he was captured at Pavia, 1525. Suspected of Protestantism; twice imprisoned, and escaped with court aid; avenged himself by writing *L'Enfer* to describe prisons of the Châtelet; escaped to Italy, 1535, but returned, 1536; after his trans-

lation of *Psalms*, condemned by Sorbonne, fled to Geneva, 1543; driven forth by Calvinists, and died in Turin; left seventy *Epîtres* addressed to influential people and friends, elegies, ballads, *rondeaux*, songs, about 300 epigrams, translations in verse of Vergil, Ovid, Petrarch, Erasmus; his *Psalms* had vogue among Protestants; skilful employer of mediæval forms of verse, but later works show coming Renaissance; unsurpassed for lightness and grace.

H. Morley, *Clément Marot*.

MARPLE (53° 24′ N., 2° 4′ W.), town, Cheshire, England. Pop. (1911) 6484.

MARPRELATE CONTROVERSY, a pamphlet war waged from 1588 to 1590 by the Puritans against the Episcopacy. The Puritan papers, although by various authors, were signed Martin Marprelate. Bacon intervened with a pamphlet urging toleration.

MARQUESAS ISLANDS, Medaña (10° S., 140° W.), archipelago of volcanic islands in S. Pacific; annexed by France, 1842; mountainous; fertile; the more southerly group was discovered by Medaña in 1595, the more northerly by Ingraham in 1791; chief product, tropical fruits. Pop. 3424.

MARQUESS, Marquis (from O. Fr. *marchis*, a mark or frontier; elliptical form of *comes marchiæ*, count of the march), Eng. title of peer, below duke and above earl; formerly ruler of a 'march.'

MARQUETTE (46° 30′ N., 87° 20′ W.), city, summer resort, Michigan, U.S.A., on Lake Superior; exports iron ore. Pop. (1910) 11,503.

MARRAKESH, see Morocco.

MARRI, tribe in Baluchistan.

MARRIAGE.—Marriage according to the law of England means 'the voluntary union for life of one man and one woman to the exclusion of all others.' It is, therefore, in the eye of the law a civil contract, and the fact that it is also a religious ceremony, and, in the R.C. Church, a sacrament, is only partially recognised by the law. Here we are concerned with the legal view of m.

The common law of England relating to m. is derived from the old Canon Law of Western Christendom, and though m. is regarded as a civil contract, it differs from other contracts in that it is made for life, cannot be rescinded at the will of either party, and can only be legally dissolved under certain circumstances and formalities. To constitute a legal and valid m. in England it is necessary that the parties should not be related within the prohibited degrees of affinity, and should be of an age and a mental condition that enable them to enter into the contract. Persons who have been certified as lunatics cannot enter into the contract legally, but minors can—males at 14 and females at 12. The absence of the parents' consent does not make the m. void, though the parents, by forbidding the banns, can prevent the m. In the absence of parental prohibition assent may be presumed. M. can be solemnised in England in the following various ways:—

(1) According to the rites of the Church of England, either by special licence of the Abp. of Canterbury (average cost, £29, 8s.), available at any time or place, or by ordinary licence (£1, 15s. to £2, 12s. 6d.), to be obtained from a surrogate, or after banns. The m. in these two latter cases can only take place in a consecrated church or chapel, between the hours of 8 a.m. and 3 p.m., a duly ordained clergyman officiating.

(2) By the Registrar—after 21 days' notice—full particulars of age, name, condition, and rank being published; 7 days' residence within the district is required; fee, 7s.

(3) The Registrar having granted his certificate, the m. may be solemnised in any registered place of worship, either in the presence of the Registrar or in the presence of an 'authorised person' (Marriage Act, 1898).

The position of married women in England has been radically changed by the Married Women's Property Act, 1882, the practical effect of which has been to place a woman married after the passing of that Act in the position of a *femme sole* or unmarried woman in the matter of her own property. Any real or personal property belonging to a married woman on January 1, 1883, or acquired after that date, is her own to hold and dispose of in any manner she likes. All wages, earnings, money, and property gained by her in the course of trade or by the exercise of professional or artistic skill are included in these provisions. A wife can only pledge her husband's credit in so far as she is acting as his agent. The widow of a husband dying intestate can claim the whole estate if it does not exceed £500 net, and there is no issue. The share of the widow is reduced to one-third if there are children of the marriage, two-thirds being divided amongst the latter. A wife dying intestate, the husband can claim the whole of her estate. See Divorce.

MARROW, the soft substance in the interior of bones; red m. used medicinally in anæmia, especially pernicious anæmia. See also Bone.

MARRUVIUM (42° N., 13° 45′ E.), formerly chief town of the Marsi, on Lacus Fucinus, Italy.

MARRYAT, FREDERICK (1792–1848), Eng. novelist; b. Westminster; spent several adventurous years in service under Captain Cochrane; author of several well-known books of adventure, e.g. *Mr. Midshipman Easy*, *The Phantom Ship*, *Masterman Ready*, and *Children of the New Forest*.

MARS, fourth planet in order of distance from sun; mean distance, 141 million miles; period, 687 days; rotation period, 24 hours 37 minutes 22·67 seconds; two satellites, *Deimos* and *Phobos*, revolving in 7 hours 38 minutes and 30 hours 14 minutes respectively. Mars is the planet concerning which we know most, its orbit being outside that of the earth, so that its surface is fully illuminated when it is nearest us. In addition, its atmosphere is not too dense to hide materially its surface markings. Some of these markings are permanent features, others are variable. The planet's equator is inclined to its orbit at an angle of 24° 50′, and in consequence there are seasons, as on the earth. At the poles are white caps, which shrink in summer and grow again in winter, just as the earth's polar ice-caps shrink and grow. Evidences of the existence of cloud have been obtained, for at times portions of the disc are obscured. In 1877 Schiaparelli discovered a number of narrow straight dark lines on M., which have since been called 'canals.' Lowell, who has studied M. very thoroughly, believes these 'canals' to be of artificial origin, but it appears improbable that the planet is capable of supporting life. Its atmospheric pressure must be very small, for gravity is only 38 % that of the earth, and the surface is easily seen. Again, the seasons are nearly twice as long as ours, and the inequality in length is far greater. Hence the mean summer and winter temperatures must differ greatly, and it must be remembered that M. receives only three-sevenths the amount of heat the earth receives from the sun.

MARS, an ancient Ital. god of war and identified with the Gk. Ares. Mars seems originally to have been a god of agriculture, worshipped primarily in the spring, and to whom first-fruits were dedicated. Mars was also worshipped as a war-god, and dedicated to him were the Salii—dancing priests with clashing shields. In later times Mars was identified solely with war, and his associations with agriculture were forgotten.

MARSALA (37° 50′ N., 12° 25′ E.), seaport, Italy, on west coast of Sicily; exports Marsala wine; Garibaldi landed here, 1860. Pop. *c.* 60,000.

MARSEILLAISE, Fr. national anthem; composed by de Lisle, an officer, 1792; sung by Marseilles contingent when entering Paris, hence name.

MARSEILLES, Marseille (43° 17′ N., 5° 22′ E.), second city and chief commercial port, France, on Mediterranean; built on four hills with background of mountains; overlooked by *Notre Dame de la Garde* (1848–93); chief street, *La Cannebière*; interesting old harbour and spacious modern docks; cathedral, Longchamp Palace, museum, Faculty of Sciences, etc.;

fine coast scenery; famous Château d'If, neighbouring island. Gk. colony of *Massalia* was founded by Phocæans, c. 600 B.C.; assisted Rome against Gauls and Hannibal; seized by Cæsar, 49 B.C.; taken by Visigoths, Saracens, and Burgundians in turn; by Henry III. of France, 1575; free port abolished by Louis XIV.; terrible plague, 1720–21; violently stirred at Revolution and Commune; importance greatly enhanced by Suez Canal; extensive trade with Algeria, Mediterranean ports, East, etc.; chief manufactures—oil, soap, candles, etc.; ironworks, shipbuilding; exports include sugar, flour, wine; imports grain, flour, oil-seeds, silk. Pop. (1911) 550,619.

E. Caman, *Marseille au XXe Siècle* (Paris, 1905).

MARSH GAS, FIRE-DAMP, METHANE, or LIGHT CARBURETTED HYDROGEN, CH_4. Evolved from marshes and coal seams; flame slightly luminous; the simplest hydrocarbon.

MARSH, GEORGE PERKINS (1801–82), Amer. lawyer, linguist, and author.

MARSH, HERBERT (1757–1839), Eng. New Testament scholar; bp. of Llandaff, 1816, Peterborough, 1819.

MARSH MALLOW (*Althæa*), genus of plants, order Malvaceæ; *A. officinalis*, growing near Brit. coasts, has pale blue flowers.

MARSH MARIGOLD, see MARIGOLD.

MARSH, NARCISSUS (1638–1713), abp. of Cashel, 1691, Dublin, 1694, Armagh, 1703.

MARSH, OTHNIEL CHARLES (1831–99), Amer. palæontologist, whose discoveries of Amer. fossil vertebrates—pterodactyls, birds, and mammals—have done much to strengthen the theories of evolution and natural selection.

MARSHAL (from O. Fr. *mareschal*, farrier, marshal), one of general appellations which became appropriated to titular officers of mediæval royal and princely households, and have obtained various technical meanings since, *e.g.* officers of state, as Earl M. of England; army commanders, as in France, Germany, England, etc.

MARSHALL.—(1) (32° 31′ N., 94° 24′ W.) city, Texas, U.S.A.; foundries; cotton industries. Pop. (1910) 11,452. (2) (39° 10′ N., 93° 15′ W.) city, Missouri, U.S.A.; carriages. Pop. (1910) 4869.

MARSHALL, ALFRED (1842–), prof. of Political Economy at Cambridge, 1885–1908; author of several works on economics.

MARSHALL ISLANDS (10° N., 170° E.), archipelago, Pacific Ocean, comprising two groups—Ralik in W., Ratak in E.; came under Ger. protection in 1885; chief product, copra.

MARSHALL, JOHN (1755–1835), Amer. chief justice and statesman; commanded in War of Independence; counsel in great case, *Hite* v. *Fairfax*, 1786; one of commissioners to France, 1797–98, to settle questions in dispute; returned to national House of Representatives, 1799; Sec. of State, 1800–1; chief justice, 1801, and occupied important place in history of U.S.A. law and constitution. Of great learning and strong personality, he led Supreme Court and by many of his decisions strengthened Federalist cause; of great eloquence; author of *George Washington*, valuable biography; *Constitutional Decisions* was published, 1905.

MARSHALL, JOHN (1818–91), Eng. surgeon; prof. of Surgery at Univ. College, London; prof. of Anat. at Royal Academy; pres., Royal College of Surgeons, 1883; introduced operation of excision of varicose veins, and other new methods in surgery; author of *Textbook of Physiology*.

MARSHALLTOWN (42° 1′ N., 92° 57′ W.), city, Iowa, U.S.A., on Iowa; agricultural district; foundries; machine shops. Pop. (1910) 13,374.

MARSHFIELD (44° 5′ N., 91° 20′ W.), city, Wisconsin, U.S.A.; lumber industries. Pop. (1910) 5783.

MARSI, ancient Ital. people of Sabellian race, who dwelt near Lake Fucinus; chief movers of celebrated *Marsic* or *Social War*.

MARSIGLI, LUIGI FERDINANDO, COUNT (1658–1730), fought in Austrian army, then pub. scientific works.

MARSILIUS OF PADUA (1270–1342), Ital. scholar, who with the assistance of John of Jandun wrote the famous *Defensor Pacis*, a treatise in which the power of the people is defended against the supremacy of the Papacy—the work is, in fact, a precursor of the doctrines of the Fr. Revolution. The *Defensor Minor* was written by M. to explain some obscure points in his theory.

MARSIVAN, MERZIFUN (40° 50′ N., 35° 30′ E.), town, vilayet Sivas, Asia Minor; seat of Anatolia Coll.; cotton manufactures. Pop. 15,000.

MARS-LA-TOUR (49° 12′ N., 5° 53′ E.), village, Meurthe-et-Moselle, France. A great battle between French and Germans was fought in vicinity, Aug. 1870.

MARSTON, JOHN (c. 1575–1634), Eng. dramatist and satirist; ed. Oxford; gave up playwriting and entered the Church; works include *The Scourge of Villany, Antonio and Mellida, Antonio's Revenge, What You Will*, and *The Malcontent*, usually considered his masterpiece; plays have much passion but are full of horrors, blood, and bombast; satires, like his tragedies, are too extravagant.

MARSTON, PHILIP BOURKE (1850–87), Eng. poet; s. of Dr. Westland M., the dramatist; repute of his verse was largely due to compassion for his blindness.

MARSTON MOOR, BATTLE OF (1644), between Royal forces under Prince Rupert and forces of Parliament and Scotland under Manchester, Fairfax, and Leven; field 7 miles W. of York; decisive Parliamentary victory due to Cromwell.

MARSUPIALS.—The members of the Mammalian sub-class Marsupialia, known also as Didelphia and Metatheria, include the curious pouched mammals of Australia and the Opossums of America. Except in the case of some of the latter, they are characterised by the presence of a brood-pouch or *marsupium*, into which the delicate young are placed after a short gestation of five weeks in some kangaroos and a fortnight in the opossum, equivalent respectively to the gestation periods of the rabbit and the mouse. Within the pouch the young are fed from teats to which they are firmly attached, and as they are incapable of sucking or swallowing, the milk is forced down their throats by compression of the muscles covering the mammary gland of the mother, the pouch serving the while to protect and support them.

The various animals of this section present many distinctive anatomical peculiarities, the more essentially characteristic being shown in the reproductive organs. In the female there are two uteri and two vaginæ, and the scrotum of the male is suspended in front of the penis. The brain is poorly developed and small in proportion to the size of the animals, and the succession of teeth is peculiar in that the milk dentition is represented only by a single tooth on each side of upper and lower jaws. In some no milk teeth at all have been discovered.

The habits of Marsupials present great diherences; some, as the Kangaroos, are entirely terrestrial; others burrow in the soil, such as the BANDICOOT (*q.v.*) and MARSUPIAL MOLE; the WATER OPOSSUM is aquatic in its habits, while its closest relatives, the OPOSSUMS, are arboreal; and the FLYING PHALANGERS have made an attempt to conquer the air.

While opossums are mostly carnivorous or insectivorous, except the aquatic forms which live on small fish, crustacea, and water insects, the smaller Marsupials, such as the Bandicoot and Wombat, live on roots and vegetable substances, the KANGAROOS and WALLABIES are altogether vegetarians, the larger subsisting on grass and herbage, while the smaller species eat roots.

The Order MARSUPIALIA is divided into two Sub-orders, each containing two families. The Sub-order POLYPROTODONTIA includes the DIDELPHYIDÆ, a family of AMERICAN OPOSSUMS of arboreal habit, with

the exception of the aquatic YAPOCK or WATER OPOSSUM. The prehensile tail is very long, and the mother, in cases where the pouch is absent, carries the young on her back, their tails coiled round hers.

The South Australian MARSUPIAL MOLE (*Notoryctes*) of burrowing habit is the sole representative of the Family Notoryctidæ, which, with the civet-like Dasyure (*q.v.*) and Bandicoot Families (*q.v.*), are also included in this division.

The second Sub-order, DIPROTODONTIA, comprises the nocturnal, vegetarian WOMBATS (*Phascolomyidæ*) found in Tasmania and Australia. They are short-tailed terrestrial creatures, about the size of a Badger. The nocturnal, arboreal PHALANGERS (*Phalangeridæ*), popularly known as Cuscuses, or Australian Opossums, are represented by species varying greatly in outward characteristics, from small shrew-like creatures such as the LONG-SNOUTED PHALANGER of West Australia to the tailless KOALA or 'native Bear' (*Phascolarctos cinereus*) of Eastern Australia, the size of a large cat. One genus, the so-called FLYING PHALANGER (*Petaurus*), is provided with a flap of skin stretching between the limbs, which enables it to leap great distances from tree to tree.

Lastly the Family MACROPODIDÆ includes the KANGAROOS, with allied forms, the WALLABIES, and the RAT KANGAROO or POTEROO. The true KANGAROOS (*Macropus*) are confined to Australia, New Guinea, and Tasmania. The GREY KANGAROO or OLD MAN (*Macropus giganteus*), the largest living quadruped in the continent, has amazing powers of leaping; the hind-limbs, bearing four claws, are excessively long, and give the animal great advantage in bounding. Its long tail helps to preserve the balance of the Kangaroo, which preserves an erect pose while at rest, the short fore-limbs bearing five claws, which, however, possess great strength, rarely touching the ground except when the animal is feeding. The POTEROO or RAT KANGAROO (*Hypsiprimnus*), a native of N.S. Wales, is a small greyish-brown creature the size of a rabbit, with long tail and long, thin snout.

The Kangaroos browse on crops and herbage, and are hunted down with dogs on account of the damage they do to pastures.

MARSUPIUM, see MARSUPIALS.

MARTABAN (16° 30′ N., 97° 30′ E.), small town, Lower Burma, on Salwin; formerly capital of Pegu; taken by British in 1825 and in 1852.

MARTEL, see CHARLES MARTEL.

MARTELLO TOWER, a rounded, solidly built piece of masonry, about 40 ft. high, originally erected for defence of coast in south of England and Ireland during Napoleonic Wars.

MARTEN, see WEASEL FAMILY.

MARTEN, HENRY (1602–80), Eng. regicide; member of Committee of Public Safety, 1642; most energetic promoter of king's death; found guilty of regicide, 1660, but suffered captivity, not death penalty.

MARTENS, FRÉDÉRIC FROMMHOLD DE (1845–1909), Russ. jurist and diplomatist; important influence on development of international law; employed in various international cases and prominent at Hague Conferences; writings of world-wide renown.

MARTHA'S VINEYARD (*c.* 41° 23′ N., 70° 38′ W.), island, off S.E. coast of Massachusetts, separated from Elizabeth Islands by Vineyard Sound; area, *c.* 100 sq. miles; discovered by Gosnold in 1602; formed part of Massachusetts, 1644–54, after which it was for several years independent; permanently annexed to Massachusetts, 1691; invaded by British, 1778, 1812; surface generally level; contains number of villages, some of which are favourite summer resorts; formerly whaling centre; sheep bred; fisheries. Pop. *c.* 4500.

MARTIAL, MARCUS VALERIUS MARTIALIS (43–*c.* 104), Lat. epigrammatist; b. in Spain in reign of Claudius; came to Rome, 66 A.D., in Nero's reign. As panegyrist of the emperors he was rewarded lavishly, yet fulsome flattery of Domitian was turned into severest ridicule after his patron's death. Trajan, however, was proof against M.'s obsequious flattery, and the last few years of the poet's life were passed in comparative poverty. Pliny the Younger published in his letters the extent of his generosity to M. He returned to his birthplace *c.* 100 A.D. His collected epigrams consist of 14 books. His flattery is despicable, and his coarseness deplorable, but his work had wit, brilliancy, and originality.

MARTIAL LAW, government of country or army, during suspension of ordinary codes, by military commander with absolute power. Its establishment is royal prerogative in Great Britain, and right of government in emergencies in all countries. In Great Britain exercise of royal prerogative is limited by parliamentary statute (*Petition of Right* and subsequent *Army Acts*). Its purpose is to facilitate execution or imprisonment of persons dangerous to existence of State; ordinary forms are observed as far as possible; act of indemnity is granted to military commander who has judged civilians, after civil code has been restored.

MARTIGNAC, JEAN BAPTISTE, VICOMTE DE (1778–1832), Minister of Interior, France, 1828–30.

MARTIGUES (43° 24′ N., 5° 9′ E.), seaport, Bouches-du-Rhône, France. Pop. 6300.

MARTIN, name of several popes.—**Martin I.** became pope, 649; summoned first Lateran synod, 649, which condemned Monothelitism; consequently deposed by emperor.—MARTIN II. and MARTIN III., wrong appellations of Marinus I. and II.—**Martin IV.** (1281–85); supported French against Italians and Germans; deposed.—**Martin V.** (1417–31); declared popes above General Councils; ended Great Schism.

MARTIN, CLAUD (1735–1800), of Fr. birth, but became major-general in service of East India Company.

MARTIN, HOMER DODGE (1839–1897), distinguished Amer. landscape painter.

MARTIN, LUTHER (1748–1826), Amer. advocate.

MARTIN, ST. (316–400), bp. of Tours; forsook army for Church; famous for sanctity, charity, and moderation; suffered Arian persecution.

MARTIN, SIR THEODORE (1816–1909), Brit. author; b. Edinburgh; settled in London, and became famous by his *Bon Gaultier Ballads*, written in collaboration with Prof. Aytoun. His wife (*née* HELEN FAUCIT) was well known as an actress.

MARTIN, SIR WILLIAM FANSHAWE (1801–95), Brit. sailor; saw no active service, but did much for *morale* of navy.

MARTINEAU, HARRIET (1802–76), Eng. writer; b. Norwich. Her name was first made by her *Illustrations of Political Economy*. Among her other works are *Deerbrook*, *Eastern Life*, *Letters on the Laws of Man's Social Nature and Development*; became agnostic.

MARTINEAU, JAMES (1805–1900), Eng. theologian and philosopher; ed. at Norwich and York; ordained and entered Unitarian ministry, 1828; pastor at Liverpool, 1832; prof. at Manchester College, 1840–85; pastor at Little Portland Street Chapel, London, 1859–72; received honorary degrees from Oxford, Dublin, Edinburgh, Harvard, and Leiden; wrote large number of theological and philosophical works, including *Types of Ethical Theory*, *Study of Religion*, *Seat of Authority in Religion* (these three his greatest works), *Study of Spinoza*, *Endeavours after the Christian Life*, *Hours of Thought*, *Rationale of Religious Enquiry* (representing the early stage of his theol.), and several vol's of essays; edit., with Dr. Sadler, *Common Prayer*; edit. two vol's of hymns. His eminence as a philosopher is generally recognised; in theol. at first conservative, he represented latterly more advanced schools, though he never moved outside Christianity.

Drummond and Upton, *Life and Letters*; Carpenter, *James Martineau*.

MARTINET, a strict disciplinarian or drill master; said doubtfully to be derived from Martinet, a Fr. colonel in Louis XIV.'s army.

MARTINEZ DE LA ROSA, FRANCISCO DE

PAULA (1789–1862), Span. statesman and author; banished, 1814; Prime Minister, 1820; banished, 1823; Prime Minister, 1831–34; failed as politician; important as pioneer of Romantic movement in Spain.

MARTINI, GIOVANNI BATTISTA (1706–84), Ital. musician; litanies, antiphones, oratorios, etc.; *Storia della Musica*, *Saggio di Contrapunto*.

MARTINIQUE (14° 40′ N., 61° W.), Fr. W. Indian island, one of Lesser Antilles; first colonised by French, 1635; taken by British in 1762, 1794, and 1809; ultimately restored to France, 1815; the former capital, St. Pierre, was totally destroyed by eruption of Mt. Pelé in 1902. M. has area 381 sq. miles; chief town, Fort de France; produces sugar, cocoa, coffee, tobacco, cotton. Administered by governor. Pop. (1911) 184,084.

MARTINMAS, a term day in Scotland, Nov. 11; the day of St. Martin (*q.v.*).

MARTINS, see under SWALLOWS.

MARTIN'S FERRY (40° 5′ N., 80° 50′ W.), city, Ohio, U.S.A., on Ohio River; iron and steel manufactures; glass-works. Pop. (1910) 9133.

MARTINSBURG (39° 23′ N., 77° 58′ W.), town, W. Virginia, U.S.A.; woollens, furniture. Pop. (1910) 10,698.

MARTINUZZI, GEORGE (1482–1551), Hungarian statesman; took important part in recovering Buda-Pesth for John Zapolya, king of Hungary; won recognition of Austria for Zapolya dynasty by Treaty of Grosswardein, 1538; followed patriotic Hungarian policy; assassinated.

MARTIUS, CARL FRIEDRICH PHILIPP VON (1794–1868), Ger. traveller and botanist.

MARTOS (37° 44° N., 4° 1′ W.), town, Jaen, Spain; in vicinity are sulphur springs. Pop. 17,000.

MARTOS, CHRISTINO (1830–93), Span. liberal statesman.

MARTYN, HENRY (1781–1812), Eng. missionary; chaplain in India, 1805; translated New Testament into Hindustani and Persian; an able and zealous man.

MARTYN, JOHN (1699–1768), English botanist.

MARTYR (Gk. *martyr*, witness), term used to describe any one who suffers death for his religious beliefs, whatever they may be; by extension m. is applied to those who suffer from devotion to anything, *e.g.* science, fear, etc.

MARTYROLOGY, a calendar of saints or martyrs, either giving only names or with appended biographies. Several Christian martyrologies of IV. and following cent's exist.

MARULLUS, MICHAEL TARCHANIOTA (d. 1500), Renaissance classical student.

MARVELL, ANDREW (1621–78), Eng. poet; b. Winestead, Yorkshire; ed. Trinity Coll., Cambridge; travelled on the Continent for several years; tutor to daughter of Lord Fairfax, 1650; assistant to Milton, 1657; M.P. for Hull, 1659; sec. to Lord Carlisle during his diplomatic mission, 1663–65.

M. was a zealous patriot, and although a keen Royalist in his youth, as may be gathered by his scathing verses on May, the Long Parliament historian, he admired Cromwell; wrote *Poems* (1680–81), *Poems on Affairs of State* (1689), *The Rehearsal Transposed* (1672–73); a clever satirist and a writer of exquisite lyrics.

MARWAR, see JODHPUR.

MARX, HEINRICH KARL (1818–83), Ger. Socialist; the son of a Jewish lawyer, a convert to Protestantism, was born at Trèves; took the degree of Doctor of Philosophy at Berlin, 1841; met Friedrich Engels in Paris, 1844, with whom he was associated till his death; pub. the Communist Manifesto (*Manifest der Kommunisten*), 1847, and became chief editor of the *Neue Rheinische Zeitung* at Cologne in 1848; acquitted on the charge of high treason, Marx was expelled from Prussian territory, 1849, and shortly afterwards settled in London, where he remained for the rest of his life.

He was the moving spirit in the International Working Men's Association from 1864 to 1870; pub. his most important book, *Das Kapital*, 1867, which has been justly called the Bible of German Socialists. (Two later vol's were edited and published by Engels after Marx's death.) *Das Kapital* had the influence that Darwin's work had. It is a scientific study of industrial conditions, and from these investigations the theory is maintained that materialist conceptions have guided the history of man. The theory of surplus value is also deduced, *i.e.* that the workman's wages tend to fall to the minimum of subsistence, and that all profits, rent, and interest are part of the value which the labour of the workman has produced, and are, in fact, surplus value. The political theory led to the creation of a working-class Socialist party which was to take the place of all other political parties, and assume direction not only of government but of all industries, when the revolution would take place because the capitalists could extend their business no further and capital could find no further outlet.

In Germany the Social Democrats have in the main accepted the Marxian doctrine, and on the Continent generally there are Marxian Socialists in every country; but in Great Britain Marx has had little influence.

Spargo, *Life* (1911).

MARY, MOTHER OF JESUS, called the Virgin M., is mentioned in the accounts of the nativity in Matthew and Luke, concerning which it has been said that Matthew tells the story from the side of Joseph, Luke from that of M.; elsewhere in the Gospels she appears only a few times; in Mark only it is recorded that His mother and brethren thought Christ mad; in *John* 19^{25} her presence is mentioned at Cana, and, at the Crucifixion, her Son's entrusting her to the care of St. John. Outside the Gospels she is only mentioned in *Acts* 1^{14}. According to apocryphal writings, which give an elaborate account of her infancy, she was the child of Joachim and Anna. Many controversies have raged round the amount of reverence to be paid to her. Opposition to the place accorded her in Catholicism has been one of the features of Protestantism.

The doctrine of the IMMACULATE CONCEPTION of the Virgin (*i.e.* that she was conceived without original sin) was defined as of faith in 1854.

MARY I. (1516–58), queen of England and Ireland; dau. of Henry VIII. and Catharine of Aragon; b. at Greenwich; after mother's divorce treated as illegitimate; forced to become lady-in-waiting to half-sister Elizabeth; succ. bro., Edward VI., 1553; crushed Wyatt's rebellion with great severity; had Lady Jane Grey executed, 1554; influenced by Gardiner; m. Philip II. of Spain, 1554; quelled resulting insurrection; in war with France, lost Calais. In her reign England was absolved by Cardinal Pole and reconciled to the pope; heresy laws were revived, and Protestants were persecuted, nearly 300 being burnt at the stake; hence epithet ('Bloody Mary') attached to her name.

Strickland, *Lives of Queens of England*.

MARY (1631–60), dau. of Charles I. of England; m. William of Orange, 1641; mother of William III.

MARY II. (1662–94), queen of England; dau. of James II. by first wife; m. William of Orange, 1677, with whom she became joint sovereign of United Kingdom in 1689.

MARY OF LORRAINE, MARY OF GUISE (1515–60), wife of James V. of Scotland; regent during minority of her dau., Mary, Queen of Scots, whose marriage with dauphin of France she arranged; governed during Mary's absence in France; with Fr. assistance warred against Protestants; deposed by Lords of Congregation, 1559.

MARY, QUEEN OF SCOTS (1542–87), dau. of James V. and Mary of Guise; b. at Linlithgow Palace, Dec. 1542; succ. on her f.'s death few days later. Betrothed to Francis, dauphin of France, 1548; went to France, where she remained twelve years; m.

dauphin, 1558; after his death, 1560, returned to Scotland, 1561. Met John Knox soon after arriving; first acts conciliatory to Protestants; consented to endowment of Prot. Church; principal advisers, her half-brother, Lord James Stewart, and Maitland of Lethington; former crushed Huntly's insurrection; became Earl of Murray, 1562; queen's lover, Chastelard, put to death, 1562; m. Henry, Lord Darnley, 1564, on which Murray and others raised forces against her, but were dispersed, 1565; Darnley's subsequent behaviour alienated her affection; he opposed her policy, and further offended her by share in Rizzio's murder, although reconciliation apparently took place. Bothwell now began to influence her; he probably made arrangements for explosion of Darnley's lodging in Kirk o' Field, Edinburgh, which occurred Feb. 9, 1567; Darnley was found dead next day in adjoining garden, apparently strangled by Bothwell's fellow-conspirators while trying to escape. M.'s knowledge of, or share in, murder has long been matter of debate; Bothwell was acquitted through lack of witnesses; three months later M. m. Bothwell. Prot. leaders took up arms with purpose of freeing her from him; beleaguered them at Borthwick Castle, whence Bothwell escaped; subsequently joined by M., who fled with him to Dunbar. At Carberry Hill M. surrendered, and Bothwell was allowed to withdraw in safety; M. was taken to Holyrood, subsequently to Lochleven, where she abdicated, June 24, 1567. Escaping from Lochleven, May 1568, by aid of George and Willie Douglas, M. revoked abdication; her followers assembled an army, which was utterly defeated at Langside. M., fleeing to England, lived some time in Bolton Castle, Yorkshire; removed to Tutbury, 1569; various insurrections in her favour took place; plot for her marriage to Duke of Norfolk and for R.C. rising, resulted in duke's imprisonment and M.'s removal to Coventry; subsequently taken to Sheffield Castle; concerned in plot for Span. invasion of England; Norfolk executed for implication in conspiracy; M. more strictly confined, 1572; removed to Wingfield Manor, 1584; to Tutbury, 1585; subsequently to Chartley Castle and Texall. Almost certainly concerned in Babington's conspiracy against Elizabeth's life and crown; removed to Fotheringay Castle, Sept.; tried, Oct. 1586, first at Fotheringay Castle, subsequently in Star Chamber; found guilty of plotting against Elizabeth's life and sentenced to death; executed after some delay, due to Elizabeth's reluctance to sign warrant; met death with same courage by which whole life was marked. Remarkable for personal fascination.

The **Casket Letters**, which played such an important part in M.'s trial, were 8 letters and some verses alleged to have been written by M. to Bothwell between Jan. and April 1567. The most important is Letter II., apparently written from Glasgow, which, besides expressing M.'s passionate devotion to Bothwell, hints at Darnley's murder. The Letters have been a subject of great controversy, but the balance of authority now falls on the side of their authenticity.

E. O'Neill, *Mary, Queen of Scots* (1912); D. H. Fleming, *Mary Stuart* (1898); Skelton, *Mary Stuart* (1893).

MARY (1496–1533), queen of France; dau. of Henry VII. of England; m. Louis XII., 1514; subsequently m. Duke of Suffolk.

MARY OF MODENA (1658–1718), second wife of James II. of England; supported Jesuits; escaped to France at Revolution, 1688.

MARY (1457–82), Duchess of Burgundy, 1477; m. Emperor Maximilian I.

MARY MAGDALENE, disciple of Jesus who had cast out of her 'seven devils'; first witness of His resurrection; type of repentant sinner (see also *Luke* 8^{2}, 7^{37}).

MARYBOROUGH.—(1) (25° 35′ S., 152° 43′ E.) seaport, Queensland, Australia, on Mary River; foundries, flour-mills, sugar-mills. Pop. (1911) 11,626. (2) (53° 2′ N., 7° 18′ W.) market town, capital, Queen's County, Ireland. Pop. 3000. (3) (37° 3′ S., 143° 44′ E.) town, Victoria, Australia; centre gold-mining district. Pop. (1911) 5675.

MARYLAND (37° 54′ to 39° 43′ N., 75° 5′ to 79° 30′ W.), state near centre of E. coast of U.S.A.; bounded N. by Pennsylvania, E. by Delaware, Atlantic, S. and S.W. by Virginia and W. Virginia, W. by W. Virginia; area, 12,210 sq. miles; has only about 35 miles of coast on Atlantic, but Chesapeake Bay, the Susquehanna, Patapsco, and Potomac Rivers provide harbours; surface rises to Blue Ridge district of Appalachians (*q.v.*), eastern half of state being low and the western mountains reaching height of 3500 ft. Capital, Annapolis; largest towns, Baltimore, Cumberland, Hagerstown, Frederick.

M. is named after Henrietta Maria, queen of Charles I., who in 1632 granted the district to Cecil, Lord Baltimore; a number of English Rom. Catholics led by Leonard Calvert, Lord Baltimore's bro., settled here in 1634, establishing amicable relations with the native inhabitants. Original grant had included portions of Pennsylvania and Delaware, the subsequent grant of which to William Penn resulted in long dispute. M. played an important part in War of American Independence, at close of which it became one of original 13 states of Union; had share in war of 1812–15 against Britain, and in Civil War remained loyal to Union, the battle of Antietam taking place within its bounds. Recent history is uneventful.

Executive power is held by governor, who remains in office four years; legislative authority vested in General Assembly consisting of Senate of 27 members and House of Delegates of 101 members, elected by popular vote for four and two years respectively. M. sends 2 Senators and 6 Representatives to Congress. Principal religious denominations in order of numerical importance are R.C., Methodist, Episcopalian, Lutheran, Baptist. Education is free and obligatory; most important univ. is the Johns Hopkins (*q.v.*) in Baltimore, which is also seat of M. Univ. and several coll's. Annapolis, Ellicot City, Chestertown, Emmittsburg, New Windsor, and Westminster are also seats of important coll's. Inhabitants are whites, negroes, and Asiatics; whites of foreign birth include Germans, Irish, Russians, English.

Excellent coal is mined in extreme W.; iron, chrome, copper, brick-clay, marble, soap-stone also worked; there are pine, chestnut, oak, hickory, and walnut trees, and lumbering is important industry. M. produces tobacco, fruits, vegetables, cereals; large trade in tinned fruit and vegetables. Live stock raised, dairy-farming carried on. Manufactures cottons, woollens, iron and steel, tin wares, flour, artificial manures. Railway mileage, c. 2660. Pop. (1910) 1,295,346.

Brown, *Maryland*.

MARYPORT (54° 38′ N., 3° 29′ W.), seaport, Cumberland, England, on Irish Sea; shipyards; iron foundries; in vicinity are collieries. Pop. (1911) 11,423.

MARZABOTTO, village, Italy, on Reno, 15 miles S.W. of Bologna; Etruscan remains.

MASAI, African people; originally inhabited the country between the Nile and the Karamojo; now consist of two tribes mostly residing in the Brit. East Africa Protectorate. Of fine physique, slender and tall, the M. are not given to hunting or industry, the women doing all necessary work.

MASANIELLO, TOMMASO ANIELLO (1622–47), Neapolitan fisherman who headed insurrection of Naples against the Spanish in 1647; assassinated.

MASANOBU, KANO (1453–90), Jap. artist; famous landscape painter of the Kano school.

MASAYA (12° 2′ N., 86° W.), town, Nicaragua, at foot of volcano M.; tobacco. Pop. 15,000.

MASCAGNI, PIETRO (1863–), Ital. composer; best-known opera, *Cavalleria Rusticana* (1890).

MASCARA (35° 22′ N., 0° 7′ E.), fortified town,

Algeria; burned by the French in 1835; occupied by them in 1841; wine. Pop. (1911) 24,254.

MASCARENE ISLANDS (20° S., 57° E.), group, Indian Ocean, viz. Mauritius, Réunion, and Rodriguez collectively.

MASDEN, JUAN FRANCISCO (1744–1817), Span. historian; wrote *Critical History of Spain.*

MASERU (29° 21′ S., 27° 31′ E.), chief town, Basutoland, S. Africa, on Caledon River.

MASHAM, ABIGAIL, LADY (d. 1734), favourite of Queen Anne; her cousin, Duchess of Marlborough, secured her a post as bedchamber-woman; superseded duchess in queen's favour.

MASHAM, SAMUEL CUNLIFFE LISTER, 1ST BARON (1815–1906), Eng. inventor of machines for wool- and silk-combing; peer, 1891.

MASHONALAND, see RHODESIA.

MASINISSA (c. 238–149 B.C.), king of E. Numidians; introduced civilisation into Numidia; deserted Carthaginian for Rom. alliance; commanded for Rome at battle of Zama, 202, and received western Numidia as reward; strove to annex Carthage, and stirred up third Punic War.

MASK, see MASQUE.

MASKELYNE, NEVIL (1732–1811), Eng. astronomer-royal; commenced publication of *Nautical Almanac,* 1767; determined gravitational attraction of mountain Schiehallion, 1774.

MASON AND DIXON LINE (39° 43′ N.), boundary line between Maryland and Pennsylvania; line, surveyed 1763–67, ran 244 miles W. of the Delaware; formed the general boundary between the free states (N.) and the former slave states (S.); derives name from two Eng. astronomers, Charles Mason and Jeremiah Dixon.

MASON CITY (43° 10′ N., 93° 10′ W.), city, on Lime Creek, Iowa, U.S.A.; manufactures bricks, tiles; stone quarries. Pop. (1910) 11,230.

MASON, FRANCIS (1799–1874), Baptist missionary in England, America, and India.

MASON, GEORGE (1725–92), Amer. politician; drafted Bill of Rights and Constitution of Virginia, 1776.

MASON, GEORGE HEMMING (1818–72), Eng. painter; studied on the Continent, and produced several pictures showing rich effects of colour. A collection was exhibited by the Burlington Club after his death.

MASON, JAMES MURRAY (1798–1871), Amer. politician; Confederate Commissioner to Britain, 1861; taken on steamer *Trent*; imprisoned till 1862.

MASON, JOHN (1586–1635), Eng. colonial gov. and vice-admiral; explored and made map of Newfoundland; founded New Hampshire, 1629, and tried to establish Anglican religion and social customs.

MASON, JOHN YOUNG (1799–1859), Amer. diplomatist; sec. of navy (1844–45) and (1846–49); attorney-general (1845–46); U.S. minister to France (1853–59); assisted in composing Ostend Manifesto.

MASON, SIR JOHN (1503–66), Eng. diplomatist; helped to arrange treaty restoring Boulogne to France, 1550; ambassador to Imperial Court, 1553.

MASON, SIR JOSIAH (1795–1881), Eng. pen-maker and philanthropist; founded Erdington Orphanage and Mason College (since 1900 part of Birmingham Univ.).

MASON, WILLIAM (1725–97), Eng. minor poet; wrote tragedies and miscellaneous verse, but is remembered as the literary executor of Gray, whose *Memoirs* he pub. in 1775.

MASONRY, the earliest remaining examples of m. are found in ruins of ancient Egyptian and Ind. temples. The most striking feature about these buildings is the great size of the stones, and it is difficult to understand how the ancients quarried and manipulated them with the machinery at their disposal. In structures such as the Egyptian Pyramids no mortar was used, and the joints were polished and fitted with minute accuracy. In some of the oldest remains in Greece and Italy irregular blocks of great size were used, the intervening spaces being filled up with small stones. Gk. and Rom. m. bears considerable resemblance to that of to-day. Buildings of the early Middle Ages consisted of rough rubble work, and though the Normans made considerable improvements their workmanship was generally poor. During the development of Gothic arch. m. advanced steadily, and ashlar walling, consisting of carefully dressed blocks of from 12 to 18 in. deep, with mortar joints up to ½ in. thick, took the place of rubble. Ashlar work was used by the Renaissance masons, and a later development is the employment of hammer-dressed m. The tools used consist of different kinds of hammers, mallets, saws, and chisels; rules, set-squares, spirit-levels, plumb-lines, mortar trowels, etc. Hoisting apparatus and scaffolding are also required.

MASPERO, GASTON CAMILLE CHARLES (1846–), Fr. Egyptologist and explorer; has written largely on his special study, his most notable work being perhaps the *Histoire Ancienne des Peuples de l'Orient* (*Dawn of Civilisation,* Eng. trans.).

MASQUE, MASK, drama in which spectacular effect, music, dancing, etc., are prominent and characterisation and plot subsidiary; originally a performance of 'masked' revellers. The m. flourished in England during early XVII. cent.; Ben Jonson wrote nearly 40; Inigo Jones as decorator and Henry Lawes as musician were usually employed. Milton's *Comus* is a typical m.; its subject is pastoral and allegorical. Other m. writers were Campion, Daniel, Carew, Browne, Shirley, Davenant.

The *Antimasque,* practised by Jonson, introduced grotesque characters as a foil to others. See also PAGEANT.

MASS (Fr. and Ger. *messe,* Ital. *messa,* from Lat. *missa*), first clear use of word for service of Eucharist (*q.v.*) by St. Ambrose (*q.v.*), and it came to denote the service from the formal dismissal (*missa*) of the congregation at the end *ite missa est*; language at first Gk. had become by V. cent. Lat.; present Rom. m., a service of gradual growth, has following order: preparatory prayers (foot of altar), introit, *Kyrie Eleison* (Lord have mercy upon us), *Gloria in excelsis* (Glory be to God on high), collects, epistle, gospel, offertory and *Lavabo,* preface, Canon (centring in the consecration and ending with *Amen* before saying the *Our Father*), Communion, prayers after Communion, dismissal (*ite missa est*), blessing of the congregation, Gospel of St. John. See also EUCHARIST.

MASS, see GRAVITATION, MATTER.

MASSA (45° 1′ N., 11° 18′ E.), town, capital of Massa-e-Carrara, Tuscany, Italy; marble quarries. Pop. (1911) 30,895. The province of **Massa-e-Carrara** has area of 687 sq. miles. Pop. (1911) 212,398.

MASSA MARITTIMA (43° 5′ N., 10° 55′ E.), town, Grosseto, Tuscany; bp.'s see; iron mines, mineral springs. Pop. 10,000.

MASSACHUSETTS (41° 16′ to 42° 50′ N., 69° 56′ to 73° 30′ W.), one of New England states of United States; bounded N. by Vermont and New Hampshire, E. by Atlantic, S. by Atlantic, Rhode Island, Connecticut, W. by New York State; area, 8267 sq. miles; off coast are Martha's Vineyard and Nantucket Islands; surface flat along coast, elsewhere undulating, reaching height of over 3500 ft. in W., which is occupied by Berkshire Hills, part of Appalachians (*q.v.*); highest peak, Mt. Greylock (3530 ft.). Drained by Housatonic, Connecticut, Millers, Merrimac, and Chicopee. Capital, Boston; other large towns are Worcester, Fall River, Lowell, Cambridge.

It is thought by some writers that M. was reached by Norsemen in XI. cent., but no proof of this exists; the first permanent settlement was made by the Pilgrim Fathers, a body of separatists (numbering over 100 men, women, and children) from Eng. Church, who sailed from England in the *Mayflower,* and landed at site of present town of Plymouth in

1620, forming what is known as the Plymouth colony. Another Puritan colony settled at Salem in 1628, and became the M. Bay colony. In 1629 the province of New England was created, and the government was divided between these two colonies, which were united in 1692.

Early history is marked by struggles with Indians; by rigorous enforcement of Puritan religion, nonconformity to which was punishable by death; and by continuous struggle against mother country. M. took leading part in War of Amer. Independence, which broke out soon after the throwing overboard of several cargoes of tea in the harbour of Boston by the citizens of that town as a protest against imposition of taxes by Brit. government; and battles of Lexington and Bunker's Hill were fought in this state, which after end of war became one of the original thirteen states of the Union, and as such took part in war of 1812–15 against Britain. During Civil War M. sent exceptionally large proportion of men to the field on Federalist side, besides considerably augmenting the Union navy.

Executive power is held by governor, assisted by lieut.-gov. and by an executive council of 8 members; the governor and council may apply to the supreme court for advice on legal matters; legislature is called the General Court of M. and consists of Senate of 40 members and House of Representatives of 240 members. M. is divided for purposes of local administration into 14 counties; in towns having population under 12,000 municipal administration is carried out by board of select men, chosen annually by popular vote. State is represented at Washington by 2 Senators and 16 Representatives.

Principal religion is R.C.; other denominations in order of numerical importance are Congregational, Baptist, Methodist, Episcopal, Prot. Episcopal, Christian Scientist, Unitarian, Universalist. The predominance of Rom. Catholicism in an originally Puritan state is attributed to continuous foreign immigration. Education is free and obligatory; state has seventeen univ's and coll's, of which most celebrated is Harvard Univ., Cambridge, founded in 1636; other towns containing coll's are Amherst, Boston, Medford, Northampton, South Hadley, Wellesley, Williamstown, Worcester. Boston (*q.v.*) has long been famed as centre of Amer. culture, and has associations with most of the great names of Amer. lit.

M. is densely populated; inhabitants include whites, coloured persons, Chinese, Indians, Japanese. Whites of foreign birth include Irish, Fr., and Eng. Canadians, British, Russians, Italians, Scandinavians, Germans. During last decade great numbers of Russ. and Ital. immigrants have settled here. M. is pre-eminently a manufacturing state at present time, although until middle of last cent. it was almost entirely agricultural. A considerable area is wooded, and the valleys are fertile, tobacco being grown; and it is centre of U.S. whale, deep-sea, and coast fishing; important centre also of commerce and export. Manufactures boots and shoes, cottons, woollens, iron and steel goods, machinery, leather, paper, rubber goods; shipbuilding, meat-packing, ice trade also carried on. Coal and iron pyrites occur, but mining is unimportant. Railway mileage in 1910, 2110. Pop. (1910) 3,366,416.

Barry, *History of Massachusetts* (1857); Palfrey, *History of New England*; Griffis, *Massachusetts* (1893).

MASSAFRA (40° 37′ N., 17° 7′ E.), town, Lecce, Italy; fruit, wine, olives. Pop. 11,200.

MASSAGE, term applied to a method of treatment of disease, consisting of the manipulation and movement of the patient's muscles and joints by the hands of the operator or masseur. It includes stroking, kneading, rubbing, and tapping the skin and deeper tissues; in the more advanced stages, moving and bending the limbs by the masseur while the patient remains passive; and, still more advanced, the patient offering resistance to the movement of his limbs by the masseur, thus leading up to ordinary exercise of the body. The effect of m. is to improve nutrition and to aid the elimination of waste products in the tissues, by hastening tissue metabolism and facilitating and increasing the flow of blood and lymph. The conditions for which the treatment is beneficial include such nervous derangements as hysteria, neurasthenia, neuralgia, sciatica, insomnia, melancholia and other forms of insanity, paralysis, chronic joint affections, rheumatism, anæmia, obesity, congestions, sprains, fractures, to break down adhesions, as a substitute for active movement, where that is impossible, to prevent the wasting of muscles. The treatment must be carried out under the supervision of a medical man, as there are many conditions in which it would do considerable harm instead of good.

MASSAWA, see MASSOWAH.

MASSÉNA, ANDRÉ (1758–1817), duke of Rivoli, marshal of France; won battle of Saorgio, 1795; commanded army in Switzerland, 1799; victorious at Zürich; defended Genoa, 1800; became marshal, 1804; defeated Archduke Charles at Caldiero, 1805; served against Austria, 1809; won victory at Aspern-Essling; commanded in Spain, 1809–12; defeated by British; subsequently commanded at Marseilles.

MASSENBACH, CHRISTIAN KARL AUGUST LUDWIG VON (1758–1827), Pruss. soldier; opposed to war against Napoleon; chief of staff to Prince Hohenlohe, 1805.

MASSENET, JULES ÉMILE FRÉDÉRIC (1842–1912), Fr. composer; best-known opera, *Manon* (1884); others, *Roi de Lahore* (1877), *Cid* (1885), *Werther* (1892), *Thaïs* (1894), *Sapho* (1897), *Grisélidis* (1901), *Le Jongleur de Notre Dame* (1902), *Don Quichotte* (1910); also orchestral works.

MASSEREENE, JOHN CLOTWORTHY, 1ST VISCOUNT (d. 1665), Irish Presbyterian leader; created viscount, 1660.

MASSEY, SIR EDWARD (*c.* 1619–*c.* 1674), Eng. soldier; successful Parliamentary general in first Civil War; impeached as Presbyterian agitator, 1647; fled, and took active part in invasion of 1651 and Restoration.

MASSICUS MONS, modern MONTE MASSICO (41° 12′ N., 13° 54′ E.), mountain, on border of Campania and Latium, Italy; wines.

MASSILLON (40° 48′ N., 81° 30′ W.), city, on Tuscarawas, Ohio, U.S.A.; coal mines; sandstone quarries. Pop. (1910) 13,879.

MASSILLON, JEAN BAPTISTE (1663–1742), Fr. ecclesiastic; famous preacher in Paris; bp. of Clermont, 1817; a tolerant and intellectual man, laying stress on morals rather than dogma.

MASSIMO, Rom. noble house claiming descent from Maximi, but cannot be traced earlier than XI. cent.

MASSINGER, PHILIP (1583–1640), Eng. dramatist; s. of a retainer in Pembroke family; ed. Oxford; collaborated with Fletcher, Dekker, and Tourneur in playwriting. Chief plays, *The Virgin Martyr* (1622) with Dekker, *The Duke of Milan* (1623), *The Great Duke of Florence* (1627), *The City Madam* (1632), *A New Way to pay Old Debts* (1633). Coming at end of great Elizabethan dramatic period he shows decadence, but he never descends to 'blood and thunder' as Ford does.

MASSINISSA (238 ?–*c.* 149 B.C.), king of Numidia; fought for Carthage against Rome till latter's victory in 206; then ally of Rome, from whom he received increased territory; disciplined army and civilised his kingdom.

MASSON, DAVID (1822–1907), Scot. man of letters; b. Aberdeen; prof. of Eng. Lit. at Univ. Coll., London, 1852, Edinburgh Univ., 1865–95; chief work, *Life of Milton*; wrote *De Quincey* (E.M.L.); edit. *Macmillan's Magazine*, 1858–65.

MASSON, LOUIS CLAUDE FRÉDÉRIC (1847–), Fr. historian; has written several works on Napoleon.

MASSOWAH, MASSAWA (15° 40′ N., 39° 30′ E.), fortified seaport, W. coast, Red Sea, Eritrea, on a small coral island; chief port for Abyssinia and Egyptian Sudan; exports hides, coffee, gold, ivory; hot and

unhealthy; became an Ital. possession in 1885. Pop. 7800.

MAST, upright pole composed of single tree or number of planks upon which spars and sails are hung; ordinary ships have three—fore, main, and mizen—generally divided into main, top, and top-gallant m's; nowadays frequently metal cylinders.

MASTER, a person qualified to be in authority. Hence m. of a British ship, an officer certified by the Board of Trade; M. of the Horse, third great officer of Royal Household, and superintendent of royal stables, rides next to the sovereign on State occasions. So of Arts, Surgery, Theology.

MASTER AND SERVANT.—Generally, if the master is liable for provision of food, clothing, or lodging for the servant, neglect of these things, resulting in illness, is punishable by law. Servants must obey all lawful orders, but not orders involving unlawful acts. Contract of service, as a rule, can only be rightfully terminated by death, by mutual consent, or by completion. Dismissal without notice is quite lawful under certain circumstances; but a servant leaving without notice except for grave reasons will most probably forfeit wages, or be compelled to pay damages.

MASTER OF THE ROLLS, the judge ranking next after the Lord Chief Justice in England; usually presides over the Court of Appeal; he is Keeper of the Public Records; salary, £6000.

MASTIC, MASTICH, resin exuded from *Pistacia lentiscus*, an evergreen shrub growing on Mediterranean shores; found as yellow 'tears'; M.P *c.* 108° C. Alcohol separates two resins.

MASTIFFS, see DOG FAMILY.

MASTODON, see under ELEPHANT.

MASUDI (X. cent.), Arabian author; his hist. work has mostly been edited with Fr. translation.

MASULIPATAM (16° 9′ N., 81° 11′ E.), seaport, capital of Kistna, Madras, India, on Coromandel coast; cotton manufactures. Pop. 40,000.

MASURI, see MUSSOORIE.

MATABEI, IWASA (1578–1650), Jap. artist; founder of the Ukioyé school, the members of which commonly used subjects drawn from the daily life of the people, and only occasionally birds, flowers, and landscapes. Morrison, *The Painters of Japan* (1912).

MATABELE, Zulu race in Rhodesia (*q.v.*).

MATADOR, see BULL-FIGHTING.

MATAMOROS (18° 23′ N., 98° 40′ W.), city, port on Rio Grande, Tamaulipas, Mexico; exports hides, wool; taken by Americans, 1846. Pop. 9000.

MATANZAS (23° 3′ N., 81° 37′ W.), city, capital of Matanzas, Cuba, on N. coast; exports sugar, molasses; after Havana, chief commercial port of the island. Pop. 36,000. Matanzas province has area of 3700 sq. miles. Pop. 260,000.

MATARÓ (41° 33′ N., 2° 24′ E.), seaport, Barcelona, Spain, on Mediterranean; textiles. Pop. 20,000.

MATCH replaced tinder-box *c.* 1820; at first mixture of potassium chlorate and sugar fired by sulphuric acid; friction-matches used *c.* 1835; now made of potassium chlorate and phosphorus on pine chip, which react on friction; in safety matches red phosphorus is placed on striking surface, match consisting of antimony sulphide and potassium chlorate; chiefly made in Sweden and Belgium; government monopoly in France.

MATCH-LOCK, see GUN.

MATE.—(1) nautical term; officers of merchant vessels next in rank to captain; (2) naval; m. signifies subordinate to warrant officer, *e.g.* boatswain's mate.

MATÉ, PARAGUAY TEA, is the product of *Ilex paraguayensis*, a S. Amer. tree, allied to the holly, *Ilex aquifolium* (*Aquifoliaceæ*). The leaves contain caffeine, an alkaloid also contained in the berries of the coffee plant. They are carefully prepared, and are broken up and used like tea. The flowers are unisexual.

MATERA (40° 40′ N., 16° 36′ E.), town, Potenza, Italy; seat of abp. Pop. 17,000.

MATERIALISM, explains universe on assumption of matter, extended, eternal, impenetrable, capable of movement; mind explained as dependent on matter.

MATHEMATICAL TABLE, a time- and labour-saving device by which calculations are expedited and results obtained with a definite accuracy. They range from simple factor tables to tables of all the functions met with in higher math's, such as Bessel and Gamma functions, integrals, *ber* and *bei* functions, etc. *Factor tables* give usually the least factor of numbers which are not divisible by 2, 3, or 5. Chernac's *Cribrum Arithmeticum* (1811) gives all the prime divisors of such numbers up to 1,020,000. It contains a few inaccuracies. Lehmer's *Factor Table* (1909) gives the least factor of all numbers not divisible by 2, 3, 5, or 7 up to 10 millions. The best *multiplication table* is Crelle's *Rechentafeln* (1857), giving all products up to 1000×1000. It is arranged to give all the multiples of any one number on a single page.

For *Powers and Roots* of numbers the best for general use is Barlow's *Tables* (1840), giving cubes, squares, square and cube roots, and reciprocals of numbers up to 10,000. Errata in these and other power tables are given by Cunningham (*Messenger of Math.*, vii. p. 87, and Appendix, p. 23, 1878). For *reciprocals* Barlow's tables extend to 10,000, while those of Oakes (1865) give to 7 figures reciprocals to 100,000.

Trigonometrical tables and *tables of logarithms* are usually published together, and since the invention of logarithms the logarithms of the various trigonometrical functions have been given in preference to the natural functions. Ten-figure logarithms of numbers to 100,009 are given in Report of U.S. Coast and Geodetic Survey, 1895–96, Appendix 12. Babbage's seven-figure logarithm tables extend to 108,000; Sang's tables are from 20,000 to 200,000. For general purposes Schrön's *Seven-Figure Logarithms*, or Bruhns' *New Manual of Logarithms* are both good. Besides the logarithms, they give log-sines, cosines, etc., for every 10″. Bruhns' manual also contains log-sines, etc., for every second to 6°. Another useful collection of tables is Chambers's *Mathematical Tables*, with logarithms to 100,000, log-sines, tangents, etc., and natural sines to 7 places, besides other tables. Among smaller works, that of Dale, *Five-Figure Tables* (1903), is good; various functions, *e.g.* elliptic functions, functions of Legendre and Bessel, etc., are included. *Hyperbolic logarithms* are included in the tables of Barlow, Hutton, and others, and in various four- and five-figure tables. Tables of values of e^x and e^{-x} are given in *Camb. Phil. Trans.*, xiii. p. 243 (Glaisher). The tables also include $\log_{10} e^x$ and $\log_{10} e^{-x}$, and extend from 0·001 to 0·1 (interval 0·001), from 0·01 to 2 (interval ·01), from 0·1 to 10 (interval 0·1), from 1 to 500 interval (1·0). *Bernoulli's numbers* (first 250) to 9 figures and their ordinary logarithms to 10 places are given in *Camb. Phil. Trans.*, xii. p. 384 (Glaisher). Legendre's table of the *Gamma Function* is given in his *Traité des fonctions elliptiques*. Seven-figure values are given in Bertrand's *Calcul Integral*, and six-figure values in Williamson's *Integral Calculus*. *Bessel's functions* are tabulated in Rayleigh's *Theory of Sound*; the table is taken from that of Lommel (Leipzig, 1868). Others are to be found in various Brit. Assoc. Reports. The Brit. Assoc. Report for 1912 contains four sheets of new tables of elliptic functions for four modular angles, also some tables of *ber* and *bei* functions.

MATHEMATICS is the science which deals with the laws and properties of plane and solid figures, numbers, and quantities. PURE MATHEMATICS includes the following branches:—

Arithmetic, which deals with numbers only; *Algebra*, wherein arithmetical laws are developed and extended to general quantities which are expressed by symbols (usually letters of the alphabet); *Geometry*, dealing with the properties of plane and solid figures, was developed to a high stage by the Greeks over 2200 years ago, and greatly advanced in the XVII. cent. by

Descartes, who introduced a general method—now called *Analytical Geometry*—of attacking geometrical problems; *Trigonometry*, which deals chiefly with angles and lengths of sides of triangles, and is essential to land-surveying; the *Differential Calculus*, invented independently by both Newton and Leibnitz, treats of the rates of increase of functions by infinitely small steps (as a simple example, if $y=3x$, y is said to be a function of x; now, if x is increased by an amount, however small, y will evidently also be increased by three times that amount, and the rate of increase of y with respect to x will be 3); the *Integral Calculus*, in which the Differential Calculus is utilised in summing up infinitely small quantities.

Some subjects which specially require mathematical treatment, such as Astronomy, Optics, Statics, Dynamics, Hydrostatics, etc., come under the heading of APPLIED MATHEMATICS. There is no branch of natural philosophy which can be satisfactorily developed without an application of mathematics; very recently solutions to some of the problems in Mendelism and Heredity have been found by mathematical methods.

Russell, *Principles of M.* (1903); Jourdain, *The Nature of M.* (1912).

MATHER, COTTON (1663–1728), Amer. Congregationalist divine; ed. at Harvard; pastor at Boston, 1681; prominent in prosecutions for witchcraft, in which he firmly believed; helped to found University of Yale, 1718, intensely disliking the liberal tendencies of Harvard; aroused great opposition by favouring vaccination; a learned and able, if narrow, man; wrote several works.—SAMUEL MATHER (1706–85), his s., minister at Boston.

MATHER, INCREASE (1639–1723), Amer. divine; ed. at Harvard and Trinity Coll., Dublin; went to Boston, 1661; became a religious leader in New England; came to England in 1683, and made the acquaintance of Eng. theologians; on his return to America continued preaching in Boston while pres. of Harvard Univ., but the liberal school to which he was opposed came into power there. M. was an orthodox Congregationalist, but hardly so narrow as he is sometimes represented.

MATHER, RICHARD (1596–1669), Eng. Congregational divine; refused to conform to ritual law of Anglican Church, and went to America, 1635; became preacher at Dorchester; wrote theological tracts.

MATHERAN (18° 59′ N., 73° 18′ E.), hill sanatorium, on W. Ghats, Kolaba district, Bombay, India.

MATHESON, GEORGE (1842–1906), Scot. Presbyterian divine.

MATTHEW, THEOBALD (1790–1856), Irish Capuchin priest, famous for vigorous advocacy of total abstinence.

MATHEWS, CHARLES (1776–1835), Eng. actor; b. London; played at the Haymarket, Drury Lane, Covent Garden, and the Lyceum, but found the work cramped his individuality; subsequently became an 'entertainer,' and as such made his fame.

MATHEWS, THOMAS (1676–1751), Brit. admiral; app. commander of Brit. Mediterranean fleet, 1741; attacked Span. fleet leaving Toulon, 1744; disorderly and disgraceful engagement ensued; Lestock, second in command, held aloof, and Mathews allowed foe to escape; parliamentary inquiry followed, and M. was condemned to dismissal by court-martial.

MATHY, KARL (1807–68), politician in Baden.

MATILDA (1046–1115), Countess of Tuscany, supported popes against emperors in Investiture contest; learned and pious; gave her large estates to Papacy. *Life*, by Mary E. Huddy (1905), Nora Duff (1909).

MATINS, in Catholic Church, first of the seven canonical hours.

MATLOCK (53° 8′ N., 1° 34′ W.), watering-place, on Derwent, Derbyshire, England; hot springs; adjoins Matlock Bath. Pop. (1911) 6746.

MATSUKATA, MARQUIS (1835–), Jap. statesman; became Minister of Finance, 1881; reformed currency, established Bank of Japan; regulated taxation, introducing European methods; Prime Minister, 1891–92, 1896–98; Minister of Finance, 1898–1900.

MATSUMOTO (36° 15′ N., 137° 58′ E.), town, Hondo, Japan; baskets, silk, preserved fruit. Pop. 35,000.

MATSUYE (35° 33′ N., 133° 3′ E.), town, Hondo, Japan; paper. Pop. *c.* 36,000.

MATSYS, QUENTIN, MASSYS (1466–1530), Flemish artist; studied at Antwerp; best known by his religious pictures, but he also ranks high for his genre pieces and portraits.

MATTEAWAN (41° 30′ N., 73° 55′ W.), former village, New York, U.S.A.; 1913, joined with Fishkill Landing to form city of Beacon; first city in N.Y. State to adopt comm. form of government; hats, rubber. Pop. (1910) 6727.

MATTER is most frequently defined as 'that which occupies space,' and is classified into three groups—solid, liquid, and gaseous. The definition immediately suggests the possession of *mass*. Other general properties of m. are *attraction, inertia, elasticity, indestructibility*. At present the study of m. proceeds from three standpoints—the mathematician's, who investigates its behaviour under the action of forces; the physicist's, who seeks to discover its properties; and the chemist's, who inquires into its constitution and the results of combinations of various forms.

The constitution of m. has long engaged the attention of scientists. The *atomic* theory has been the most fruitful one—modern chemistry has been built up on it. It assumes that m. cannot be subdivided without end. The ultimate indivisible particle, named the *atom*, is supposed to be of a simple structure, and of it there are in the known Universe only about eighty different kinds, called *elements*. All forms of m. are either elements or constituted of various combinations of these elements.

This theory has had to be modified since the discovery of *radium* in 1900. According to the present *electron* theory, the atom is not a simple structure, but consists of a vortex of corpuscles or electrons in rapid motion, half of them being charged with positive and half with negative electricity. Under certain conditions one or more negative electrons may be discharged from the atom with the velocity of light. When a large number of them are so discharged, the equilibrium of the atom may break down and a rearrangement of the corpuscles take place with a consequent change into another element.

MATTERHORN, MONT CERVIN (45° 58′ N., 7° 40′ E.), peak of the Alps, on border between Valais, Switzerland, and Piedmont, Italy; height, 14,780 ft.; first ascended, 1865, by Whymper.

MATTHEW, CANTACUZENUS (fl. 1353–57), Byzantine emperor; s. of John. VI., whom he assisted against Thracians; warred against Servians; forced to abdicate.

MATTHEW, GOSPEL OF ST., first in our canon, but later than *Mark* and probably than *Luke*; written perhaps *c.* 100 A.D., possibly twenty or thirty years earlier; based largely on St. Mark; also (with *Luke*) on another lost document or documents, for discourses, etc., and with some peculiar matter, *e.g.* story of the Nativity; distinctly Jewish in colouring, it contains some very early elements (specially, teaching of Jesus) and some late ones (*e.g.* sayings reflecting existence of Church organisation); the editor has somewhat modified and rearranged his materials in incorporating them; traditionally work of Apostle St. Matthew, who was more probably author of *Logia* (sayings)—one of sources.—Slater, *Matthew* (Century Bible).

MATTHEW OF PARIS, monastic writer of Eng. birth; monk of St. Albans, 1217; wrote *Chronica Majora*, continuing chronicle of Roger of Wendover from 1235–59, and also *Historia Anglorum*; M. is one of chief authorities for reign of Henry III.

MATTHEW, ST., one of twelve apostles, and tradi-

tionally author of Gospel of M., and identical with Levi the toll gatherer, son of Alphæus (*Matthew* 9⁹; *Mark* 2¹⁴).

MATTHEW, TOBIAS (1546–1628), abp. of York (1606); wrote against Campion and sought to stamp out Rom. Catholicism in north; his s., Sir Tobias (1577–1655), was exiled as R.C.

MATTHEWS, STANLEY (1824–89), Amer. lawyer and Republican politician.

MATTHIAS (1557–1619), Holy Rom. emperor; superseded his bro., Emperor Rudolph II., as king of Hungary, Austria, and Moravia, 1608; wrested Bohemia from Rudolph, 1611; emperor, 1612; tried policy of religious toleration, but was opposed by his bro., Maximilian, and Ferdinand, Archduke of Styria, ardent Catholics; lost all influence over empire.

MATTHIAS (*Acts* 1), new apostle chosen in place of Judas Iscariot.

MATTHIAS I., HUNYADI, CORVINUS (1440–90), king of Hungary; b. Kolozsvár; became king by election, 1458; defeated Emperor Frederick, his rival for Hungarian crown, 1462; defeated Turks; invaded Bosnia; captured Jajce, 1463; crushed revolt in Hungary, 1471; defeated Poles, 1474; claimed Bohemian crown, and after war with Bohemia acquired Silesia, Moravia, and Lausitz, 1479; defeated Turks at Szászváros, 1479; recaptured Jajce; expelled Turks from Servia. Again warred against emperor, 1481; took Vienna, 1485; subsequently reduced Styria, Carinthia, Carniola, becoming most powerful ruler in Central Europe; distinguished as soldier, politician, and administrator.

MATTO GROSSO (12° 30′ S., 55° W.), a western state of Brazil, bordering Bolivia; forms part of the Brazilian plateau; traversed by several low mountain chains; much of it occupied by dense forests; rich in minerals; chief industry, cattle-raising; capital, Cuyaba. Area, 532,680 sq. miles. Pop. 142,000.

MATTOON (39° 27′ N., 88° 22′ W.), city, Illinois, U.S.A.; foundries, machine-shops. Pop. (1910) 11,456.

MATVYEEV, ARTAMON SERGYEEVICH (d. 1682), Russ. statesman; important under Tsar Alexius, introducing Western reforms; failed in attempted revolution, 1682. His s., ANDREAS (1666–1728), was distinguished diplomatist and author.

MAU RANIPUR (25° 14′ N., 79° 10′ E.), town, Jhansi, United Provinces, India; cotton cloth.

MAUBEUGE (50° 17′ N., 4° 1′ E.), town, Nord, France; metal goods; machine tools. Pop. 21,500.

MAUCH CHUNK (40° 52′ N., 75° 52′ W.), town, on Lehigh, Pennsylvania, U.S.A.; anthracite coal mines. Pop. (1910) 3952.

MAUCHLINE (55° 31′ N., 4° 23′ W.), town, on Ayr, Ayrshire, Scotland; associated with poet Burns; snuff-boxes.

MAULE (35° 20′ S., 72° 20′ W.), maritime province, Chile, S. America; agriculture and stock-raising industries; capital, Cauquenes. Area, 2474 sq. miles. Pop. 115,000.

MAULMAIN, MOULMEIN (16° 26′ N., 97° 45′ E.), capital of district Amherst, and of Tenasserim division, Lower Burma, on Salwin; exports timber, rice. Pop. 60,000.

MAUNDY THURSDAY, in Holy Week precedes Good Friday. In Middle Ages custom grew up among rich to wash feet of poor (hence derivation from *mandatum*, i.e. the divine commandment given by Christ when He washed the disciples' feet). In England the sovereign used to wash paupers' feet on M. T. till the time of James II.; a relic of the custom still exists in the practice of distributing 'Maundy Money,' for which purpose special coins were minted; M. T. is also held in all R.C. countries.

MAUPASSANT, HENRI RENÉ ALBERT GUY DE (1850–93), Fr. author; enjoyed private fortune; employed under Ministry of Marine and subsequently that of Public Instruction, but chief interests were sports and lit.; disciple of Flaubert, to whose Norman types he owed much; drew towards Zola's school, and contributed to the *Soirées de Médan* (see FR. LITERATURE), *Boule de Suif*, an episode of the Prussian occupation of Normandy, a bold and original story; he continued to be a member of the Naturalistic school, but stood alone in grace, wit, and epigram; so Rabelaisian in matter and frankness that sale of the *Une Vie* (1883) was forbidden on railway book-stalls, and caused a sensation at the time. In 1880 he had published *Les Vers*, but abandoned verse for the short story, of which he became a master; his cynicism, habit of jesting at all things, art, and imagination, find typical expression in the most malicious of tales, *L'Héritage*. *Life*, by his valet (1912).

MAUPEOU, RENÉ NICOLAS CHARLES AUGUSTIN (1714–92), Chancellor of France (1768); supported Crown against Parlement; Parlement crushed by *édit de réglement et de discipline*, 1770.

MAURER, GEORG LUDWIG VON (1790–1872), Ger. statesman; member of Gk. council of regency, 1832–34; founded judicial system of new state; wrote important works on Ger. and Gk. history.

MAURETANIA (34° N., 4° W.), an ancient country, N.W. Africa; corresponded to the modern Morocco and Western Algeria; was made a Rom. province by Claudius in 42 A.D.; invaded by the Vandals in 429 A.D. Modern M. is a protectorate in Fr. West Africa, N. of Senegal. Area, 345,000 sq. miles. Pop. (1911) 225,000.

MAURIAC (45° 13′ N., 2° 20′ E.), town, Cantal, France; marble quarries. Pop. 3600.

MAURICE (1521–53), Elector of Saxony. Elector John Frederick was defeated by Charles V. and M. at Mühlberg, 1547, and compelled to resign electorate to latter; M. refused to recognise *Interim*, 1548, and gathered troops against emperor; emperor driven to flight, 1552, and Treaty of Passau obtained; defeated Prince of Bayreuth at Sievershausen, 1553; ambitious, able ruler.

MAURICE, JOHN FREDERICK DENISON (1805–72), Anglican clergyman; s. of Unitarian minister; ed. Trinity Hall, Cambridge, and Exeter Coll., Oxford; ordained, 1834; prof. at King's Coll., London, 1840, and of Moral Philosophy at Cambridge, 1866; worked largely in London, a leader in religious educational and social movements; wrote many books.

Masterman, *Life* (1907).

MAURICE OF NASSAU (1567–1625), prince of Orange; Stadtholder of Holland and Zeeland, 1584; distinguished in war with Spain; secured Oldenbarneveldt's execution.

MAURICE, ST., traditional general who with his legion refused to persecute Christians at instigation of Maximinian; martyred with his soldiers, c. 286.

MAURIER, see DU MAURIER.

MAURISTS, see BENEDICTINES.

MAURITIUS (20° 10′ S., 57° 35′ E.), island, belonging to Britain, in Indian Ocean; has area c. 720 sq. miles; it is volcanic, and surrounded by coral reefs; surface consists of tableland, with mountains some 2000 ft. high in centre N., centre E., and S.W.; highest point, Rivière Noire (2710 ft.) There are several volcanic lakes, of which Grand Bassin is largest. Temperature ranges from 60° to 100° Fahr., and hurricanes frequently occur between Dec. and April. Chief towns, Port Louis (capital), Curepipe, Mahébourg. Dependencies of M. are Rodriguez, and the Cargados, Chagos, and Eagle Islands.

M. was first discovered by Portuguese in 1505; earliest settlements made in 1598 by Dutch, who remained till 1710, when they left the island; colonised by French in 1715, remaining in their possession till 1810, when it was taken by British, to whom it was formally ceded by *Treaty of Paris*, 1814; became episcopal see, 1854; suffered from hurricanes, 1868, 1892, 1894; plague, 1899–1903; floods, 1904.

Administered by governor, who is aided by executive and legislative councils. Principal religion, R.C.; other religions, Anglican, Presbyterian, Hindu, Muhammadan. Education is free, but not obligatory. Inhabitants

include French, British, Creoles, Indians, Chinese, half-breeds. M. produces sugar, spice, vanilla, fibres, rice, cocoa-nut oil, ebony, ironwood, bamboo, aloes, benzoin. Railway mileage, c. 140. Pop. (1911) 370,393.

Keller, *Madagascar, Mauritius, and other E. African Islands* (1900).

MAURY, JEAN SIFFREIN (1746–1817), Fr. cleric; eloquent writer, witty, profligate, ardent royalist; emigrated, 1792; abp. *in partibus*, 1792; cardinal, 1794; submitted to Napoleon, 1806; abp. of Paris, 1810; exiled at Restoration.

MAURY, MATTHEW FONTAINE (1806–73), Amer. scientist; naval officer until lamed by an accident, 1839; devoted attention to conditions of navigation, and greatly contributed to knowledge of meteorology, etc. *Life*, by his dau. (1888).

MAUSOLUS, Pers. gov. of Caria (377–353 B.C.).

MAVROCORDATO, MAVROCORDAT, MAUROGORDATO, Italo-Gk. family residing in Gk. quarter of Constantinople. Alexander (c. 1636–1709) was chief dragoman of sultan; his descendants held important offices under Porte; greatest was ALEXANDER (1791–1865), hero of War of Independence and Gk. statesman.

MAW-WORM, see under NEMATODA.

MAXENTIUS, MARCUS AURELIUS VALERIUS, Rom. emperor, 306–12 A.D.

MAXILLARY, see NERVOUS SYSTEM.

MAXIM, SIR HIRAM STEVENS (1840–), Amer. inventor; settled in London, 1883; invented *Maxim gun* (see MACHINE GUN), the *pom-pom gun*, and a smokeless powder; greatly interested in aerial flight.

MAXIMA AND MINIMA (mathematical terms).—A function of a variable is said to be a maximum or minimum when it is the greatest or smallest value in a *series* immediately preceding and following that value. Thus *sine* x is a maximum when $x=\frac{\pi}{2}$, since if x be slightly smaller or greater than $\frac{\pi}{2}$, the function becomes smaller than when $x=\frac{\pi}{2}$; similarly *sine* x is a minimum when $x=\pi$. From geometrical considerations it follows that a function may have a number of maxima and minima. For a proper investigation of the subject an application of the Differential Calculus is necessary.

MAXIMILIAN I. (1459–1519), Holy Rom. emperor; b. at Vienna; m. Mary of Burgundy, 1477; warred intermittently against France for possession of Burgundy and Netherlands; Ger. king, 1486; defeated Hungarians, 1491; regained Artois and Franche-Comté from Charles of France, 1492; emperor, 1493; suppressed rebellion in Netherlands, 1494; waged war against Swiss without success, 1499; concluded League of Cambray against Venice, 1508; subsequently joined Holy League; again took field against Fr. king in Italy, 1516; compelled to cede Milan to France by Treaty of Brussels, 1516; carried out reforms in administration.

Seton-Watson, *Maximilian I.* (1901).

MAXIMILIAN II. (1527–76), Holy Rom. emperor; b. at Vienna; Ger. king, 1562; king of Hungary, 1563; emperor, 1564; wished to reform Church; granted religious freedom to Lutherans in Austria; waged war against Turks, whom he kept in check; established friendly relations with Spain; tried to obtain Polish crown for himself or son.

Holtzmann, *Life* (1903).

MAXIMILIAN I. (1573–1651), 'The Great,' Duke of Bavaria; occupied Prot. city of Donauwörth for emperor, 1607, and helped to form Catholic league which fought with Prot. Union in Thirty Years War; important party to Treaty of Westphalia, 1648; ablest Catholic ruler.

MAXIMILIAN I. (1756–1825), king of Bavaria; elector of Bavaria, 1799; encouraged trade and education, and reformed administration; helped Napoleon, and was constituted king as reward, 1806; kingship recognised by Allies on his desertion of Napoleon, 1813; opposed Ger. federation.

MAXIMILIAN II. (1811–64), king of Bavaria; succ., 1848; opposed new Ger. constitution, excluding Austria; supported Austria in restoring old diet.

MAXIMILIAN, EMPEROR OF MEXICO (1832–67), see MEXICO (HISTORY).

MAXIMINUS, GAIUS JULIUS VERUS, Rom. emperor, 235–38 A.D.

MAXIMINUS, GALERIUS VALERIUS, Rom. emperor, 308–14.

MAXIMS, LEGAL, various axioms, general principles, or leading truths in law. Lord Esher declared them to be 'almost invariably misleading,' and said that 'they always include something which really is not intended to be included in them'; 1500 are published in Bouvier's Law Dictionary. 'Caveat emptor' and 'Qui facit per alium facit per se' are two of the most familiar of these maxims.

MAXIMUS, name of four Rom. emperors: M. Clodius Pupienus Maximus, 238 A.D.; murdered. Magnus M., commander in Britain, 368; joint emperor with Valentinian II., 384–388. M. Tyrannus, erected by rebel army, 408; slain, 422. Petronius M., emperor 455, on murder of Valentinian III.

MAXIMUS, ST. (580–662), Gk. theologian; became monk at Chrysopolis on orthodox side in Monothelite controversy; mutilated for his belief.

MAX-MÜLLER, FRIEDRICH (1823–1900), Anglo-Ger. Orientalist; b. Dessau; d. Oxford; made a special study of Sanskrit, and, coming to England, where he permanently settled, was commissioned by the East India Company to edit the *Rig-Veda*. He was first Taylorian prof. of Modern Languages at Oxford, and later prof. of Comparative Philology. He wrote or edited several works on different philological subjects.

MAXWELL, family name of Scot. barons of M., Roxburgh; 7th baron, JOHN, held earldom of Morton, 1581–86. ROBERT was cr. earl of Nithsdale, 1620.

MAXWELL, JAMES CLERK (1831–79), Scot. physicist; b. and ed., Edinburgh; second wrangler; fellow of Trinity, Cambridge; prof. at Aberdeen, King's Coll. (London), and ultimately Cambridge, where he d.; elected Fellow, Royal Soc. (1864); developed Faraday's ideas in mathematical form; wrote: *Electricity and Magnetism* (considered *Principia* of subject), *Theory of Heat, Matter and Motion*, and important papers in philosophical publications.

Campbell and Garnet, *Life* (1882); Glazebrook, *James Clerk Maxwell and Modern Physics* (1896).

MAXWELL, MRS. JOHN, see BRADDON.

MAXWELLTOWN (55° 4′ N., 3° 37′ W.), small town, Kirkcudbrightshire, Scotland, on Nith, opposite Dumfries; woollens. Pop. (1911) 6200.

MAY, 5th month of year, is associated with rejoicing; cf. 'bringing home the May,' 'Queen of the May.' **The Maypole**, a tall mast round which children dance.

MAY, ISLE OF (56° 11′ N., 2° 33′ W.), island at entrance to Firth of Forth.

MAY, PHIL (1864–1903), Eng. black-and-white artist; great humorist in sketches of London East End types; excellence of drawings lies in economy of pen lines.

MAY, THOMAS (1595–1650), Eng. dramatist, poet, and historian; app. during Civil War historiographer to Parliament; he produced a *History of the Parliament of England, 1640–43*, frequently reprinted.

MAYA, Amer. Indian race in Mexico and Yucatan.

MAYAGUEZ (18° 13′ N., 67° 4′ W.), seaport, Porto Rico, on W. coast; exports sugar, tobacco, coffee. Pop. (1910) 16,591.

MAYAVARAM (11° 6′ N., 79° 42′ E.), town, on Cauvery, Tanjore, Madras, India; fine cloth manufactures. Pop. 24,000.

MAYBOLE (55° 21′ N., 4° 40′ W.), town, Ayrshire, Scotland; boots and shoes. Pop. (1911) 4889.

MAYEN (50° 20′ N., 7° 11′ E.), town, Rhineland, Prussia; textile industries. Pop. (1910) 14,423.

MAYENCE, see MAINZ.

MAYENNE (48° 19′ N., 0° 39′ W.), department, France, formed from parts of ancient provinces, Maine and Anjou; surface varied and well wooded; chief stream, the Mayenne; principal industries, agriculture, stone-quarrying, manufacture of coarse textiles; capital, Laval. Pop. (1911) 297,732.

MAYENNE (48° 19′ N., 0° 39′ W.), town, Mayenne, France; cloth manufactures. Pop. 10,000.

MAYENNE, CHARLES OF LORRAINE, DUKE OF (1554–1611), of family of Guise; became head of anti-Huguenot League; made lieut.-gen. of kingdom, and prevented capture of Paris by Henry IV.; on death of Charles X. agreed to accession of Henry IV., but stipulated his conversion to Catholicism.

MAYER, JOHANN TOBIAS (1723–62), Ger. astronomer; superintendent of Göttingen observatory, 1754; famed chiefly for lunar tables, giving longitude at sea to about 0·5°.

MAY-FLIES, DAY-FLIES (*Ephemeridæ*), a group of familiar neuropterous insects to be seen near water, rising and falling in a fairy dance on warm evenings. The adult insect lives only a few days or even a few hours, and never feeds. Its mouth-parts are poorly developed and its empty food canal serves only as a balloon. May-flies spend most of their lives as larvæ under water, in a state very different from that finally assumed. Many moults take place before the adult insect emerges in the air to take part in the marriage dance, to lay its eggs in the water near by, and then to die. The flies are favourite food of fishes, and are much used by anglers.

MAYFLOWER, see MASSACHUSETTS.

MAYHEW, JONATHAN (1720–66), Amer. Congregationalist divine, of unorthodox tendency.

MAYMYO (22° N., 96° 30′ E.), hill sanatorium, Mandalay, Upper Burma.

MAYNOOTH (53° 24′ N., 6° 33′ W.), town, Kildare, Ireland; seat of R.C. coll. for education of priests, founded 1795.

MAYO (*c.* 53° 50′ N., 9° W.), county of Connaught, N.W. coast, Ireland; was practically independent under de Burgh family till Elizabeth's reign. Bounded by Sligo, Roscommon, Galway, Atlantic; area, 2156 sq. miles; mountainous in W., flat in E.; coast much indented; drained by Moy; contains Lough Conn and other lakes; chief towns, Castlebar, Ballina; cattle-rearing, salmon and other fisheries, linen-weaving; small deposits of coal, slate. Pop. (1911) 191,969.

Knox, *History of M.* (1908).

MAYO, RICHARD SOUTHWELL BOURKE, 6TH EARL OF (1822–72), Sec. for Ireland, 1852, etc.; Viceroy of India, 1869, where he was murdered.

MAYOR, in England, the chairman of the borough or city council; elected annually by the aldermen and councillors, he may receive such remuneration as the council thinks reasonable; the chief magistrate of the town or borough. In all the chief cities of England and Ireland he is styled Lord Mayor; in Scotland chief magistrate is called provost (*q.v.*). In U.S.A. m. is elected directly by city voters for term of years; is chief executive officer, has important administrative powers, appoints heads of departments, etc.

MAYOR OF THE PALACE, great official among the Franks of the Merovingian era. He was chief administrator of the king's household and adviser to the court.

MAYOTTE (12° 52′ S., 45° 13′ E.), one of the Comóro Islands, in Mozambique Channel; since 1843 Fr. possession. Area, 140 sq. miles. Pop. 10,000.

MAYOW, JOHN (1643–79), Eng. physiologist; studied law and med. at Oxford, and practised med. at Bath and London; M. recognised the presence of a constituent which he termed *spiritus nitro-æreus*, now known as oxygen, necessary for combustion and for life, believing it to be separated from the air by the lungs and then passing into the blood; he was thus the first both practically to recognise the presence of oxygen and also to understand the mechanism of respiration.

MAYSVILLE (38° 35′ N., 83° 35′ W.), city, Kentucky U.S.A., on Ohio; tobacco, flour-mills, whisky distilleries. Pop. (1910) 6141.

MAZAGAN (33° 17′ N., 8° 20′ W.), fortified sea port, W. coast Morocco; exports cereals, wool, hides.

MAZAMET (43° 39′ N., 2′ 19′ E.), town, Tarn, France; cloth manufactures. Pop. 14,000.

MAZANDARAN (36° 30′ N., 53° E.), province, N. Persia, between Caspian Sea on N. and Elburz Mts. on S.; mostly level; partly jungle and partly under cultivation; unhealthy climate; yields rice, cotton, sugar, fruits; administered by a governor; capital, Sari. Area, 10,460 sq. miles. Pop. 200,000.

MAZARIN, JULES (1602–61), cardinal; an Italian by birth; ed. in Rome and Spain and fought in war of Valtelline; showing capacity for diplomacy, entered service of Louis XIII., 1639, as Richelieu's *protégé*; cardinal, 1641; on Louis' death, minister of the queen (Anne of Austria); became chief statesman of France; suspected, not without cause, of double dealing; the troubles of the Fronde were partly due to him; greatly increased the power of France in Europe, and himself left a large fortune, but did little for the internal condition of the country; one of the cleverest statesmen of the XVII. cent.

Hassall, *Mazarin.*

MAZAR-I-SHARIF (36° 45′ N., 67° 9′ E.), town, Afghan Turkestan, with fortress of Takhtapul. Pop. 23,000.

MAZARRON (37° 35′ N., 1° 20′ W.), town, Murcia, Spain; iron and lead mines. Pop. (1910) 22,878.

MAZATLAN (23° 11′ N., 106° 23′ W.), seaport, Sinaloa, Mexico, on Pacific; exports hides, gold, silver. Pop. 19,000.

MAZEPPA, MAZEPA-KOLEDINSKY, IVAN STEPHANOVICH (*c.* 1644–1709), hetman of the Cossacks; was page to John Casimir, king of Poland. As punishment for a court intrigue he was bound naked to a wild horse, but escaped death. His plot against Peter the Great failed.

MAZURKA, dance popular in Poland and Germany; four or eight couples participate. The music is noticeable because of its uncommon rhythm.

MAZZARA DEL VALLO (37° 42′ N., 12° 34′ E.), walled city, Trapani, Sicily; sulphur springs; oil, linseed. Pop. 20,000.

MAZZARINO (37° 17′ N., 14° 15′ E.), town, Caltanissetta, Sicily; sulphur springs, wine. Pop. 16,000.

MAZZINI, GIUSEPPE (1805–72), Ital. patriot of Genoese family; devoted to the cause from childhood; founded *Indicatore Genovese*, 1828; imprisoned, 1830; exiled and, settling in Marseilles, turned Carbonarist party into secret soc. of Young Italy with organ, *La Giovine Italia*; motto, *Dio e Popolo*; religious element alienated many, and M. was dreamer, not organiser; condemned to an ignominious death by Piedmontese government; invasion of Savoy failed, 1834; M. fled to Switzerland, and in 1836 to London; watched with great suspicion by Brit. government; returned to Italy, 1848, and became dictator at Rome as one of triumvirs, 1849; vainly opposed surrender of Rome to French; returned to England, 1850, and became heart of conspiracies against Austria; responsible for Quixotic outburst at Milan, 1853, and attack on Genoa, 1857; opposed action of Garibaldi and Cavour, 1859–60; refused to acknowledge monarchy by becoming member of Ital. parliament; remained conspirator till death.

Bolton King, *Life of M.* (1903).

MEAD, liquor made by fermentation of honey; very popular in Europe, especially among Anglo-Saxons, till displaced by wine.

MEAD, RICHARD (1673–1754), Eng. physician; studied med. abroad; practised in London; physician to St. Thomas's Hospital; after 1714 the recognised head of his profession in England; author of various medical works.

MEADE, GEORGE GORDON (1815–72), Amer. general; commanded army of the Potomac in Civil War; won battle of Gettysburg.

MEADE, WILLIAM (1789–1862), Amer. Episcopal divine; bp. of Virginia, 1841; of Evangelical sympathies and against High Church movement.

MEADVILLE (41° 38′ N., 80° 13′ W.), city, Pennsylvania, U.S.A., on French Creek; machine shop; iron and woollen manufactures. Pop. (1910) 12,780.

MEAGHER, THOMAS FRANCIS (1823–67), Irish revolutionary; imprisoned and escaped to U.S.A., where, as Federal general, he fought in Civil War.

'MEAL-WORM,' see under HETEROMERA.

MEALY BUGS, see HEMIPTERA.

MEAN, in math., used to denote a term intermediate in value between two terms of a series. The chief kinds of means are the Geometrical, the Arithmetical, and the Harmonical.

MEARNS, THE, see KINCARDINESHIRE.

MEASLES, an infectious fever, characterised by catarrh of the respiratory passages and by the appearance on the skin of a red eruption. The disease is in all probability caused by a specific micro-organism which has not yet been discovered, and infection is conveyed by the breath, secretion of the nasal passages, and by articles which have been in contact with an affected individual. The incubation period is about ten to fourteen days, and fever comes on suddenly, accompanied by running at the nose and eyes, while characteristic whitish spots, *Koplik's spots,* are found on the mucous membrane just inside the angle of the mouth; the eruption appears on the fourth day as raised, red spots, running together in irregular crescentic patches, usually appearing first on the face and neck, spreading downwards over the whole body, and disappearing gradually by the seventh day, the temperature also falling.

The treatment is to keep the patient in bed on a light diet; a cough mixture containing ipecacuanha is usually given to relieve the bronchitis. A hot bath is of benefit at the commencement, to bring out the rash. As the complications of measles are its greatest danger, the mortality otherwise not being high except in very young children, great care is taken during convalescence to avoid chill, which has a tendency to develop into broncho-pneumonia, pneumonia, or even eventually phthisis; and tonics and cod-liver oil are given.

'MEASLY' BEEF, see under TAPEWORMS.

MEASURES, see WEIGHTS AND MEASURES.

MEAT, see DIETETICS, FOOD.

MEATH (53° 40′ N., 6° 40′ W.), maritime county, Leinster, Ireland, on Irish Sea; area, 906 sq. miles; surface level and undulating; traversed S.W. to N.E. by the Boyne; fertile, but almost entirely under pasture; abounds in relics of Irish antiquity; capital, Trim. Pop. (1911) 64,920.

MEAUX (48° 57′ N., 2° 52′ E.), town, Seine-et-Marne, France, on Marne; XII.-cent. cathedral; manufactures flour, textiles, machinery; trade in grain and cheese. Pop. 14,000.

MECAPTERA, see SCORPION FLIES.

MECCA (21° 21′ N., 40° 11′ E.), nominal capital of Arabia, sacred city of Muhammadans; is mentioned by Ptolemy as Makoraba, and before the time of the Prophet was held by the Kosaites and Koreish in succession; Muhammad was born here about 571; he was compelled to flee in 622, but returned and captured the city in 627. M. was besieged by Hosein in 682, and fell to Abdul Melek in 692; remained for many years in hands of caliphs; pillaged by Karmathians in 930, when the black stone was removed by the invaders, who retained it until 952. M. was under sway of Fatimites, Ayyubites, and Mamelukes in succession, and came eventually to the sultans of Turkey by conquest in 1517. Captured in 1803 by Wahhabis, who were driven out by Mehemet Ali, pasha of Egypt, in 1818, since when Turk. authority has at least nominally endured. Most important event of recent years is construction of Hedjaz railway, which will unite M. and Damascus. Burckhardt and Burton are among the few Christian Europeans who have succeeded in entering Mecca.

Principal building is the Great Mosque, in the centre of which is the Caaba, or Ka'ba, a small oblong building containing the sacred black stone towards which all Moslems turn in worship, and to which all are expected to make at least one pilgrimage. According to Muhammadan tradition this stone was originally white, its present black colour being due to the tears shed for sin by the vast crowds of pilgrims who visit it annually. The Caaba is regarded with great reverence; it is usually covered by a black curtain, and is opened for worship on three occasions only during the year. The Great Mosque also contains univ. hall and library, and has seven minarets. M. was a religious city long before time of Muhammad. Pop. *c.* 60,000.

Wavell, *A Modern Pilgrim in Mecca* (1912).

MECHANICAL TRANSMISSION, see POWER TRANSMISSION.

MECHANICS.—Mechanical science originated in the efforts of man to understand the tools and instruments for his needs, and the natural phenomena of motion. The lever, the inclined plane, and the wedge are pictured in the carved stone records of Egypt and Assyria, while their practical use was known before the dawn of history. Scientific explanations of the principles of their application were first attempted by Archimedes of Syracuse (287–212 B.C.). To him also are due the first clear ideas on the phenomena of floating bodies and the determination of weight in relation to volumes or the conceptions of specific gravity or density. Very little advance was made until Leonardo da Vinci (1452–1519), and then Simon Stevin of Bruges (1548–1620) again took up the problems of the lever, the inclined plane, and the general conditions of equilibrium of three forces acting in one plane. Galileo-Galilei (1564–1642), breaking away from Aristotelean logic and scientific explanation, saw the value of experimental examination. His experiments on falling bodies shattered pre-existing theories, and determined the laws that govern these phenomena. In mechanical science he was the first of the moderns; his methods are a model of scientific investigation for all time. Contemporary with Galileo was Lord Bacon (1561–1626). Isaac Newton (1642–1727) applied Galileo's dynamic principles to astronomy. Besides the creation of gravitational astronomy, he placed the science of dynamics firm on the basis prepared by Galileo, and collected the principles of mechanics and embodied them in three laws, known as 'Newton's Laws.'

The term mechanics, by a gradual development of the science, is now better applied to the theory of mechanisms. The science which treats of force and its action upon bodies is called dynamics (*q.v.*); and, since force may be considered as acting in one or other of two distinct ways, there is a corresponding division of the science into branches.

The science of mechanics may be divided broadly according to the following scheme:—

- Mechanics
  - Rigid Bodies
    - Kinematics.
    - Statics.
    - Dynamics.
  - Fluid Bodies
    - Hydro-mechanics.

Dynamics.—The principles of this subject have been dealt with more theoretically under DYNAMICS (*q.v.*). It were better here to mention only a few of the more important definitions and units which apply more to the practice of mechanics. In watching any motion we are conscious of two main perceptions, space and time. A moving body describes a certain length of path in a certain time. The *velocity* (V) of the moving body is measured by the length (L) moved over in a given time (T), divided by the time; or by writing the result in symbols—

$$V = \frac{L}{T}$$

Again, if velocity vary from instant to instant, its change in unit time gives the *acceleration* (a) of the moving body.

$$a = \frac{V}{T} = \frac{L}{T \times T} = \frac{L}{T^2}.$$

As the sense of sight gives us an idea of motion, so the sense of touch supplies a perception of force, of which the muscular senses give a rough measure. The conception of mass can be derived from that of force. The mass of a body is defined by the force required to produce a given acceleration, and so *force* (F) is measured by the product of the acceleration (a) and the mass (M) of the body on which it acts, or

$$F = Ma.$$

Work or *energy* is defined as the product of a force into the distance (L) the force moves its point of application, so that, in terms of fundamental units,

$$\text{work or energy} = FL = MaL = \frac{ML^2}{T^2}.$$

Momentum is the product of the mass of a body into its velocity.

Inertia, the most important conception of kinematics, is that property of a body which tends to resist motion when at rest, and, when in motion, to resist to the action of external implied forces.

Statics.—Statics is that branch of m. which investigates the conditions of equilibrium of bodies. It is based on the principle of the balancing of forces. Since forces possess both magnitude and direction, they can be represented by straight lines. The *moment of a force* is the product of the force into the perpendicular distance of the line of action of the force from any given point of reference. This product is called the moment of the force about that point. To ensure equilibrium, the moments of the forces about each and every axis must be zero. The fundamental theorem in statics is the parallelogram law of forces. If two forces be represented by two straight lines, they can be replaced by a resultant force, represented by the diagonal of the parallelogram determined by the two lines.

This fundamental theorem is amplified and applied to systems of bodies and forces, so that the statical solution of a problem deals with the resultant of systems of forces, or conversely when necessary the resolution of a force into components or subsidiary forces.

The statical definition of a moment leads to the explanation of the *moment of inertia* of a body. Conceiving a body to consist of a large number of particles, the moment of inertia is the product of the mass of each into the perpendicular distance from a given axis. The sum of all these products is the moment of inertia about that axis. From the definition of the moment of inertia it is evident that there is a distance (K), such that

$I = MK^2$, where I = the moment of inertia, and
M = mass of body.

The distance or line K is called the *radius of gyration* with respect to that axis, and may be defined as the distance from that axis at which the whole mass of a body can be concentrated without any change in the moment of inertia. Thus the moment of inertia is a mechanical quantity, while the radius of gyration is a distance.

The modern vector theory, or graphic statics, and its representation of forces by straight lines, reduces the mathematical calculation of stresses and forces acting upon a structure to a more mechanical and rapid solution by geometrical drawing with accurate results. Graphic statics is indispensable to the modern engineer.

Applied Mechanics.—The application of mechanics can be divided into two classes :—

(*a*) **Fixed machines or structures ;**
(*b*) **Moving machines or mechanisms.**

THEORY OF STRUCTURES.—The whole theory of structures is an application of the principles of mechanics, especially statics, to the considerations of equilibrium resulting from the resistance of structures to external applied forces. The various parts which go to form a structure are called pieces or members; such are the stones in an arch or the girders of a bridge.

There are two types of structures :—

i. Framed structures, the members or pieces of which are subject to direct compression and tension only ;
ii. Structures, the members of which are subject to bending as well.

Speaking broadly, the theory of structures may be divided into three distinct operations :—

(*a*) A calculation of the stability of a structure ;
(*b*) A determination of the stresses upon and in the materials of the structure ;
(*c*) A design of the member according to scientific principles.

The last does not come under the category of mechanics. The first and the second involve a practical use of the principles of statics and dynamics.

THEORY OF MACHINES.—The parts of a machine are of two kinds :—(*a*) The fixed parts, or frame ; (*b*) the moving parts, or mechanism.

The design of the frame depends on the size and formation of the moving parts or mechanism. In a machine, energy is communicated to the moving parts by prime movers, or mechanism, and thence to the working parts. For the purposes of scientific design, the usual method is to consider first the force and the variation of force required ; to proceed then to a solution of the motion to be given by the machinery; and, lastly, to design the machine for that particular motion.

All varieties of machinery are based upon the three simple mechanical powers :—(i.) The lever ; (ii.) the pulley ; (iii.) the inclined plane.

A lever is the name given to any rod (taken as absolutely rigid and inflexible) capable of motion about a fixed point or support (*fulcrum*), and under the influence of two forces and the reaction at the fulcrum. Since the purpose of machines is to overcome resistance or weight, one force resists motion and the other produces it. Levers may be straight or bent, but in either case the power, P (the force exerted), the weight, W (the force overcome), and the fulcrum, F, may be arranged in three different ways, whence the usual division of levers into the first, second, and third orders. The arrangement may be represented thus :—

(1)	P	F	W
(2)	P	W	F
(3)	W	P	F

In all, however, the general principle of the lever is satisfied, viz. that the power and weight vary inversely to their shortest distances from the fulcrum. This may be expressed for equilibrium, thus :—

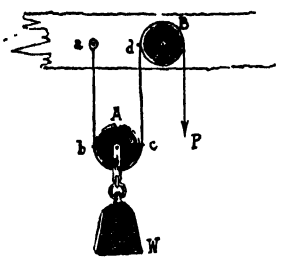
$$P \times FW = W \times FP.$$

Generally, therefore, the inference holds good that the smaller the power the greater the distance it must move through, and that a gain in power is, hence, a loss in speed. In the second and third orders it is always speed which is gained, power being lost, *i.e.* at a disadvantage.

The first order of levers includes balances, see-saws, scissors, and spades in the act of raising earth ; the second, crowbars and wheelbarrows ; and the third, sugar-tongs and fishing-rods.

A pulley (which, like the *wheel and axle*, is equivalent to a continuous lever) is simply a cylinder with a groove cut on its circumference to carry a rope ; it is capable of rotation about an axis carried in a piece called a block. The figure illustrates a movable pulley A, and a fixed pulley B. Suppose a weight carried at *b*. Then the whole weight (W) is carried by the portions

of the cord *ab* and *cd*, the tension in each being $=\frac{W}{2}$. If the cords are not parallel the forces must be resolved, and the tension in the cord being greater, there is a loss of power.



A movable pulley comprises a number of wheels in a block; this apparatus is called a block and fall. A combination of pulleys in one machine is called a system. The most common combination is a block and tackle, consisting of two blocks containing pulleys. The upper is fixed, the lower carries the weight. The rope is fastened to one or other of the blocks, and passes round the sheaves or wheels.

The inclined plane is a device for the lifting of weights. If a body rest on a horizontal plane, the plane sustains the whole weight. If the plane be inclined, however, only a part of the weight is carried by the plane; hence the use of this device for lifting weights.

The wheel and axle is a wheel provided with a cylindrical axle, both wheel and axle being fitted to take a rope round the circumference. When it is required to lift a weight, this is attached to the axle rope, and the power is then applied to the wheel rope, the power supporting a larger weight in proportion to the diameters of the wheel and axle.

Loney, *Statics and Dynamics*; P. G. Tait, *Dynamics*: Kelvin, *Natural Philosophy*; Morley, *Mechanics for Engineers*; Thornton, *Mechanics*; Bow, *Graphic Statics*; Cremona, *Graphic Statics*; Dunkerley, *Mechanisms*

MECHANICVILLE (41° 50′ N., 73° 40′ W.), village, New York, U.S.A., on Hudson River; paper, sash, and blinds. Pop. (1910) 6634.

MECHLIN, see MALINES.

MECKLENBURG (53° 5′ to 54° 23′ N., 10° 31′ to 13° 52′ E.), two grand-duchies, N. Germany (M.-Schwerin and M.-Strelitz), at W. end of Baltic, along which there is coast-line of *c.* 66 miles; surface flat, with low ridge in centre; area, 6199 sq. miles; produces cereals, amber; manufactures beet-sugar, beer, spirits, leather; famous for merino sheep, cattle, pigs, horses. M. was conquered by Wallenstein in 1628; after various changes the two existing duchies were established in 1701, while grand-ducal title dates from 1815. **M.-Schwerin** has area 5068 sq. miles; capital, Wismar; largest towns, Rostock, Schwerin; sends two representatives to Bundesrath, six to Reichstag. Pop. (1910) 639,958.

M.-Strelitz has area 1151 sq. miles; capital, New Strelitz; sends one representative to Bundesrath, and one to Reichstag. Pop. (1910) 106,442.

MEDAL (French, *médaille*; Lat. *metallum*), a piece of metal, shaped more or less like a coin, stamped with image and inscription, and struck to commemorate some event or to honour some person, but not for circulation as money. Coins struck for particular occasions are not to be counted as medals, because intended for use as money, and many so-called *medallions* of the Rom. emperors must for the same reason be excluded.

Three classes of m's are notable: (1) The religious m. of Christian devotion—perhaps the earliest of all; (2) the commemorative m., struck particularly at commencement of new reigns, and dating from the Renaissance; (3) the decorative m., awarded for eminent services, not brought into general use before the end of the XVIII. cent., and now of wide popularity.

(1) The *religious* m. worn by Catholics recalls mysteries of faith, and inculcates lessons of piety, and serves either as the badge of a guild or for the consecration and protection of the wearer. The small pectoral crosses, worn by early Christians in place of the pagan amulets, were not m's; but moulds and m's have been found with Christian devices dated as far back as the III. and IV. cent's (see de Rossi, in the *Bullettino di Archeologia Cristiana*, 1869, and *Catholic Encyclopædia*). In the Middle Ages the pilgrim's metal token and the *jeton* (a counter, frequently stamped with a religious device) were akin to m's, but not till the XV. cent. was the religious m. fashioned with any real beauty. From that time forward m's have been struck in large numbers, and blessed, to be worn as a protection against pestilence, to commemorate some miracle of the Holy Eucharist, in honour of a saint, as a private memorial of baptism, marriage, or first communion, and as the badge of membership in some religious society.

(2) The *commemorative* m. had its first great artist in Vittore Pisano (1380–1456), the painter of Verona. The beauty of his work, signed '*Opus Pisani Pictoris*,' done by casting, the *cire perdue* process, has never been surpassed. In the XVI. cent. the best m's were those struck by Benvenuto Cellini, from the designs of Raphael and Giulio Romano. Dies for medal-striking were then introduced, and gem-engravers and jewellers, with their own methods and excellences of *repoussé* work, became the chief exponents of the art in Germany and Italy. Albrecht Dürer was a distinguished medallist, and Nuremberg was a famous centre of the art. In France, Jacques Primavera and Germain Pilon in the XVI. cent., and Briot and Dupré in the XVII. cent. were great artists at m. work. In England not until Elizabeth's reign were m's the work of native artists, and even then the best examples were fashioned by continental artists. During the Commonwealth and Charles II.'s reign Rawlins and the brothers Simon were the best Eng. medallists; in the XVIII. cent. the names of Croker, Richard Yeo, and Thomas Pingo may be recalled; and the Wyons similarly in the XIX. cent.

At first the subjects to be represented were almost exclusively classical, but with the XV. cent. the custom began of sovereigns inaugurating their reign and celebrating its chief events by the issue of m's (hence the important historic value of m's). Pope Paul II. (1464–71) was the first of the Rom. pontiffs to have m's struck in commemoration of his reign, and each pope has continued the practice till the present day without a break—a mint for the striking of these m's being established at the Vatican. The Dutch m's were noted for the elaborate views, maps, and plans engraved upon them. In England the unbroken series of coronation m's commences with Henry VIII., while America begins its portrait m's of the Presidents of the U.S.A. with Washington. The commemorative m's of Napoleon I. were so numerous that more than one treatise has been written upon them. Now, no longer do kings and rulers and the great naval and military events of their reigns form the exclusive subjects of historic m's, but events of general interest in science, art, or literature are also widely commemorated in similar fashion.

(3) The *decorative* m. is conferred by the sovereign as a mark of distinction, particularly for military or naval services. The decoration commonly has a ribbon attached with clasps or small bars bearing the name of a battle, and is to be worn on the breast. Charles I. presented the first Eng. military m. in 1643, and in 1650 an oval m. was executed by order of Parliament for distribution amongst the officers and soldiers of Cromwell's army who had fought at *Dunbar*. Then a long blank ensued, and only since 1793 have m's again been awarded to Brit. troops. The *Waterloo* m., issued by the Prince Regent's orders in 1816, and conferred on every Brit. officer and soldier present at the battle, was of silver. On the obverse was the head of the Prince Regent, on the reverse a figure of Victory, seated on a pedestal, inscribed 'Waterloo,' with beneath the date, June 18, 1815, and above, 'Wellington.' The *Peninsular* m., for military services in the war with France, 1793–1814, was not issued till 1847, when Queen

Victoria conferred it upon every surviving officer and private who had been present at any battle and siege during those years. It has no less than 28 separate clasps for different engagements. The *long service* and *good conduct* m's were first awarded to soldiers and sailors in 1830 and 1831. On the edge of each of these m's is engraved the name, rank, and regiment (or ship) of the man to whom it has been awarded. The governments of all civilised nations now issue m's for the decoration of their soldiers and sailors. The *Victoria Cross* in Britain, the *Iron Cross* of Germany, the *Medal of Honor* in U.S.A., are bestowed on officers and privates alike for some special deed of valour.

Other m's to be mentioned are the *Edward Medal*, 1907, for the saving of life in industrial perils; the m's of the Royal Humane and other societies, for saving life; the *Kaiser-i-Hind*, for public services in India; the m's awarded by geographical and other learned societies, and to students at schools, colleges, univ's; and the trade m's, awarded at industrial exhibitions.

D. Hastings Irwin, *Brit. War Medals and Decorations*; Long, *Brit. Navy Medals.*

MEDEA (classical myth.), famous sorceress, who helped Jason to obtain the Golden Fleece. Euripides made a tragedy and Cherubini an opera out of her story.

MEDELLIN (6° 2′ N., 75° 49′ W.), city, Colombia; bp.'s see; educational and commercial centre; gold-mining industries. Pop. 70,000. Department of Medellin has area of 12,137 sq. miles. Pop. 275,000.

MEDEMBLIK (52° 17′ N., 5° 7′ E.), seaport town, on Zuider Zee, Netherlands.

MEDFORD (42° 23′ N., 71° 5′ W.), town, Massachusetts, U.S.A.; contains Tuft's Coll., established 1852; armoury, opera-house, libraries, museums; manufactures chemicals, bricks, machinery, woollens; shipbuilding formerly important. Pop. (1910) 23,150.

MEDIA (*c.* 35° N., 48° E.), ancient country, Asia, between Caspian Sea and Parthia on E., and Armenia and Assyria on W., and now included in Persian province of Iran (*q.v.*). M. was subject to Assyria in early times; said to have attained separate existence under Deioces, *c.* 710 B.C.; became powerful kingdom under Phraortes, who conquered Armenia and Persia, and Cyaxares, who took Nineveh and destroyed Assyrian empire *c.* 606 B.C. In next reign Persia rose in revolt, and King Astyages was deposed by Cyrus, who founded Persian empire, of which M. remained part until whole was conquered by Alexander of Macedon, *c.* 330 B.C. After Alexander's death, greater part was included in Syrian kingdom, subsequently M. formed part of Parthian empire, and was eventually united to Persia under the Sassanids, *c.* 226 A.D. The northern part of M., known as *Atropatene*, became an independent kingdom after death of Alexander; after various changes became part of second Persian empire, *c.* 226 A.D.

Rawlinson, *Five Great Monarchies* (1879); Ragozin, *Media, Babylon, and Persia* (1889).

MEDICAL JURISPRUDENCE, etc., see MEDICINE.

MEDICI FAMILY, Ital. house, to which belonged many great Renaissance statesmen, ecclesiastics, and patrons of culture. Origin of family is unknown; appears in Florentine history in XII. cent.; first important member SALVESTRO, who started Medicean opposition to great family of Albizzi by aiding revolt of populace against greater gilds, 1378. GIOVANNI (1360–1429) founded the family wealth by establishing banks in numerous cities, and won popularity as defender of poor against the Albizzi, etc.

His son **Cosimo** (1389–1464) started the literary tradition of his house and heaped up wealth, but Albizzi secured his banishment, 1433; war with Milan and low finances made Cosimo's recall necessary; Albizzi and most of great families were permanently expelled, and Medici were henceforth supreme in Florence. Cosimo managed to control all elections of magistrates, became universal banker, built palaces, employed Brunelleschi, Donatello, Ghiberti, etc., collected MSS., and established public libraries; of great importance in history of Renaissance.

His son and successor, **PIERO** (d. 1469), crushed plot against family; terribly afflicted by gout and rheumatism; left son, **Lorenzo** (1449–92), most famous of house, known as *The Magnificent*. Lorenzo is one of most brilliant and mild of despots of history; universally gifted (except as to good looks) and of lordly generosity, won enthusiastic affection of Florence, but had to face republican plot; assassins slew his bro., 1478, but failed to kill Lorenzo; Pazzi family were hanged or exiled; republican institutions retained, but Lorenzo became virtual tyrant and sole conductor of foreign policy; maintained peace of Italy by negotiations.

Successor, PIETRO (1471–1503), was deposed for submission to French, 1494. Lorenzo's second s., **Giovanni** (1475–1521), became pope, 1513, as LEO X.; patron of letters and art, employing Raphael to decorate Vatican, but unwisely assisted Emperor Charles V. against France, and prepared way for Papacy to become tool of empire. Pietro's son, LORENZO (1492–1519), re-established Medici rule in Florence, but was not absolute like his grandfather; his dau. **Catherine** (1519–89) m., 1533, Duke of Orleans, afterwards Henry II. of France (see CATHERINE DE' MEDICI). On Lorenzo's death, 1519, Cardinal **Giulio** de' M., an illegitimate son of the house, assumed government of Florence; he became pope as CLEMENT VII., 1523, suffered sack of Rome by imperial troops, 1527, and fell into emperor's power. Medici were expelled from Florence, 1527, but restored by papal and imperial forces, 1530. Illegitimate **Alessandro** de' M., vicious and cruel, was appointed by emperor duke-in-fee, 1531, and established new constitution, 1532; plots to restore republic led by another bastard Medici, Cardinal IPPOLITO, poisoned probably by Alessandro, 1535; Alessandro, last of elder branch, was murdered by his boon-companion, LORENZINO de' M., a literary man, 1537.

Cosimo, descendant of younger branch, succeeded, and started rule by stamping out revolt with great cruelty; ruled as able but terrible despot; conquered Lucca, Siena, and Montalcino, and became first grand-duke of new state, Tuscany, 1567, by creation of pope; Tuscany was ruined by his taxation. He was succeeded, 1574, by son, FRANCESCO I., who won imperial recognition for his archduchy, continued ruin of country by taxation, and neglected government, while dabbling in lit. and science; founded Uffizi Gallery, etc.; constant poisonings, murders, and intrigues. His dau. Maria married Henry IV. of France (see MARIE DE' MEDICI). His bro. and successor, FERDINAND I., founded Villa Medici at Rome, and presented art treasures to Florence, drained marshes and improved communications, and greatly developed Tuscany. Son, COSIMO II. (duke, 1609–21), died at age of thirty; young son, FERDINAND II. (1621–70), was a weak ruler, tyrannised over by Church, but patron of science and lit.; succ. by son, COSIMO III. (1670–1723), even feebler and devoted to pleasure; surviving son, GIOVAN GASTONE, was childless, and Powers refused to allow Cosimo either to bequeath succession to sister, or to restore Florentine republic; Giovan Gastone (1723–27) a hopeless invalid; general corruption; persuaded to acknowledge Infante of Spain as successor, but an agreement, 1735, was made between Spain and Austria, by which Duke of Lorraine succeeded. M. rule was fatal to Tuscany. See FLORENCE, TUSCANY.

Young, *The Medici* (1909).

MEDICINE, the science which deals with the treatment of disease; may be subdivided more particularly into *internal m.*, the province of the physician; *surgery*, or the treatment of wounds and deformities, and of conditions requiring operative interference generally; *obstetrics* or *midwifery*, which treats of pregnancy and the bringing of a child into the world; *forensic m.*, treating of the relations of m. with civil and criminal law; and *state m.*, dealing with the

prevention of disease and the preservation of the public health.

Ancient History.—The art of healing is as old as the human race itself, and the most primitive peoples have always had remedies of some sort for injuries and for disease. In ancient Egypt the practice of m. was subordinate to religion and was carried out by the priests, and was specialised in that different priests attached to a temple applied themselves to the treatment of different diseases. A great part of the revenue of the temples consisted in gifts offered as fees for the cure of diseases. The earliest extant medical work is an Egyptian papyrus, dating from about 3500 B.C., describing diseases and prescriptions for their cure. Mention of the art of healing is found in various parts of the sacred Vedas of the Indians, which date from about 1500 B.C., and with them, as with the Egyptians, the art was in the hands of the priestcraft. From the records of ancient Israel and Persia we find also that m. was closely bound up with religion. In ancient Greece, in Homeric times, m. was, however, no longer subordinate to religion: physicians ranked as members of a distinct profession, and received fees for their services. The worship of ÆSCULAPIUS, the god of healing, had no connection with the practice of m. by the physicians, who were quite distinct from the priests of Æsculapius, and the theory, held by authorities of some note, that Gk. m. was a development from the cult of Æsculapius, must be rejected. In Hippocrates' days this worship still existed widely, but was looked upon as a superstition of the ignorant.

M. was thus already a definite science of reputation by the time of HIPPOCRATES (c. 460 B.C.), who gathered together its traditions, developed the science in the light of his own experience, and formed and handed on in his writings the highest conceptions of it. The chief features of Hippocrates' teaching were his high ideals of the physician's duty, as embodied in the well-known 'oath of Hippocrates,' his insistence that disease was not of supernatural origin but was a process governed by the laws of the nature, and his method of basing a diagnosis on the patient's previous history, and on accurate observation and comprehension of the meaning of symptoms. *Percussion* and *succussion* (shaking the patient to elicit internal noises) were employed as aids to diagnosis by Hippocrates and his followers, and, although their knowledge of m. was very incomplete and inaccurate, without any scientific foundation, the Hippocratic physicians have been famed for their accuracy of *prognosis*, or the art of forecasting the course and termination of a disease. In regard to treatment, much stress was laid by Hippocrates upon dietary treatment, drugs being regarded as of secondary importance. For a cent. after Hippocrates no progress was made in m., the explanation no doubt being the general decline of science and art during the Macedonian ascendancy in Greece. On the break-up of the Macedonian empire, however, various centres of learning sprang up, and, in regard to m., the school of Alexandria was the most important. The leaders of this school were the contemporaries and rivals, HEROPHILUS and ERASISTRATUS. The former followed the teaching of Hippocrates, paying great attention to symptoms, and, in treatment, employing chiefly drugs and bleeding: the latter condemned the doctrines of Hippocrates, was less attentive to anat., and found an explanation for inflammation and fever in excess of nutrition. The school of Herophilus produced some distinguished anatomists, while that of Erasistratus, which lasted a hundred years longer than the other, became famous from the study of special diseases. From the Erasistrateans developed the school of the EMPIRICS, whose chief features were the importance attached to the previous history of the patient, observation, and inference by analogy, while they discarded the study of anat. as useless; but it must be noted that the Empirics studied carefully the works of Hippocrates, and they had much success in practical matters, such as surgery and obstetrics.

With the subjection of the Gk. world by the Romans many Gk. physicians proceeded to Rome to practise their profession there. The Romans themselves, although they had a system of collected superstitions regarding the treatment of disease, developed no native school of m., and before 200 B.C. Gk. physicians had already come to practise among them. The most prominent of the early Gk. physicians was ASCLEPIADES, a native of Bithynia, whose theory of disease was that the body was composed of innumerable atoms, the arrangement and movement of which controlled health and disease. In regard to treatment he relied chiefly on diet, exercise, cold baths, and massage. A pupil of Asclepiades, Themison, developed his theories, treating disease by inducing a condition opposite to that in which the patient was found (*e.g.* administered a purgative in constipation), and founded the school of the METHODICS, the greatest of whom was Soranus of Ephesus, who flourished in Rome in the reigns of Trajan and Hadrian. The Methodic school endured for several cent's, and had even considerable influence upon the mediæval revival of m.

The most eminent name in Rom. medicine, from the hist. point of view, is that of a man who was not a physician by profession—AULUS CORNELIUS CELSUS, whose *De medicina* formed part of a series of works dealing with all branches of human knowledge. The *De medicina* is mainly derived from older medical writers; it summarises the medical knowledge of Hippocratic and Alexandrian times, and gives an account of the science of m. up to the time of the writer. The influence of Celsus was not, however, felt in his own time, but dates from the XV. cent., when his works were re-discovered, to become, from that time onwards, the most widely read of medical classics.

In the I. cent. A.D. arose the PNEUMATIC SCHOOL, which attempted to combine the doctrines of the Methodics with the Hippocratic school, and about the same period the ECLECTIC SCHOOL appeared, the chief followers of which were Rufus of Ephesus and Arctæus of Cappadocia, who tried to select and reconcile what was of value in the different contending schools of m. At this period, then, comes GALEN (b. at Pergamus in 131 A.D.), who practised m. with great success in Rome from about 170 A.D. to the end of the II. cent. He based diagnosis upon a knowledge of anat. and physiology—obtained by the dissection of animals and necessarily inexact—and placed great importance on the state of the pulse. He was guided, however, too much by the Hippocratic elements (hot, cold, wet, and dry), tried to cure diseases supposedly due to mixture of the elements by drugs of opposite qualities, and combined with scientific m. a system of philosophy, finding an answer for every question. It was this last feature that made the great reputation Galen had later, chiefly through the advocacy of his doctrines by the Arabian physicians, and his name dominated m. up to the XVII. and XVIII. cent's.

Middle Ages.—The BYZANTINE SCHOOL followed in the footsteps of Galen, and its most eminent teachers were Oribasius and Ætius, whose works were compiled from Hippocrates, Galen, and other older writers, Alexander of Tralles, of more original achievements, and Paul of Ægina, who was the author of valuable treatises on surgery and obstetrics. With the establishment of Muhammadan rule in the Hellenic cities of the Levant a school of Arabian m., deriving its knowledge mainly from Galen, Aristotle, and other Gk. medical writers, arose in the IX. and X. cent's. Among the more notable names in this school are Mesua and Joannitius of Bagdad, Rhases, who also practised in Bagdad and was the first to describe accurately smallpox and measles, Hali, author of an important work on m., Mesua of Damascus, whose work on materia medica was used in the compilation of a pharmacopœia by the College of Physicians in the reign of James I., and

AVICENNA, the most eminent of the Arabian medical writers, author of an encyclopædic work on m., which shows, however, but little practical experience. There is no real break with Rom. m. and the m. of the Middle Ages, the tradition, degenerate though it was, being carried on by the religious orders.

In the early Middle Ages arose the famous medical SCHOOL OF SALERNO, the origin of which is not known and which was a secular, not a religious, institution. Its fame attracted many persons in search of health, among them William the Conqueror, in addition to numerous students of m. None of the works emanating from Salerno were much more than compilations, one well-known work being the *Regimen Sanitatis Salerni*, written in rhyme for the king of England. The school of Salerno, although it actually existed up to the time of Napoleon, declined with the introduction of Arabian m. to western Europe through the medium of Latin translations, Cornelius Africanus (*c.* 1050) being the first of such translators. At this period were founded the medical schools of Montpellier, Bologna, and Padua, basing their teaching on the Arabian medical works derived from those of the Gk. physicians.

Modern Times.—With the fall of Constantinople and the Revival of Learning the science of m. received a fresh impulse, and, in place of Latin translations of Arabian versions and compilations from the Gk., Hippocrates, Galen, and the forgotten Celsus became known in the original, interest in anat. and physiology awoke, and, in this period of exploration and discovery, new plants and new remedies for disease became known. Gradually the teaching of Galen took the place of the doctrines of Avicenna and the other Arabian physicians, and, although the latter long prevailed in the schools of m., by the middle of the XVI. cent. Galenism was supreme. About this time there appeared a figure not in accordance with the spirit of reverence for Galen, in the person of PARACELSUS (*c.* 1490–1541), who defied tradition, lectured in his native German in place of Latin, publicly condemned Galen and Avicenna, advocated personal experience and research in place of academic theorising, and introduced some new substances, the chief of which were antimony and laudanum, for the treatment of disease. Except, however, for his additions in materia medica, and the value of his example in independence, the influence of Paracelsus was but slight outside his own country.

In addition to the revival of the study of the classical medical writers the XV. and XVI. cent's are notable for the outbreaks of epidemics in forms unknown to the ancients, chief among them 'sweating sickness' in England and syphilis on the continent of Europe. This period is also memorable by the introduction of clinical teaching in the hospitals, first of all in connection with the medical school of Padua. New discoveries in physics and other sciences stimulated research in m., especially in regard to physiology and therapeutics.

In 1628 WILLIAM HARVEY made public his discovery of the circulation of the blood, which gave an explanation of many obscure phenomena in health and disease; clinical teaching in the hospitals became more general, to be followed by a rise in estimation of the works of Hippocrates and a proportionate fall in those of Galen. Various systems of m. were promulgated, including that of Van Helmont, who believed that the symptoms of disease were due to the disturbance of a central *archæus* controlling the body and soul; the *Iatro-physical* school explained the functions and diseases of the body on mechanical grounds, the most prominent members of this school being Borelli and the Scotsman, Pitcairne; the *Iatro-chemical* school tried to reconcile m. with the new discoveries in chem. and physiology, and explained the physiological and pathological processes in the body as chemical phenomena, its chief advocate being Sylvius, prof. of m. at Leiden. Willis, the Eng. physician, agreed with many doctrines of this last school, and in addition to applying chemical methods to the examination of the bodily secretions, he is notable as having first described diabetes and certain nervous diseases. Thomas Sydenham followed none of the systematic schools, but took nature as his guide, regarding it as the duty of the physician in disease to assist nature in the restoration of a normal condition. He placed much faith in bleeding, while his description of gout is classic.

Coming to the XVIII. cent. the next great name is that of BOERHAAVE of Leiden, who, in addition to being a great anatomist, was the founder of the modern method of clinical instruction, founding his teaching upon the doctrines of Hippocrates and of Sydenham; his chief work, embodying the experience of a lifetime, was his systematic *Institutiones*, which was long a standard work. The tendency to establish a system of m. is found also in Hoffmann, who explained life and disease by the existence of a universal ether, which accumulated in the brain and generated a 'nervous fluid,' while Stahl attributed the symptoms of disease to the efforts of the soul in getting rid of morbid influences.

Apart from theoretical systems were HALLER, who investigated practically the effects of drugs in health, and also laid the foundations of modern physiology, and Morgagni, who marks the beginning of the study of morbid anatomy. Following Haller and Morgagni came William Cullen of Edinburgh, who drew up a classification of diseases according to the new ideas regarding physiology and pathology, and also John Brown, founder of the *Brunonian* system, who explained all the phenomena of life and disease as due to stimulus, his treatment of practically all diseases being a 'stimulating' one. Hahnemann, who founded the homœopathic school, and who belongs to this period, had a considerable influence upon therapeutics, his main theory being that a disease is cured by a drug which, in a normal person, would produce similar symptoms. In this cent. must also be noted Valsalva, who made important researches on heart disease and aneurism; Auenbrugger, who introduced direct percussion as an aid to diagnosis; John Fothergill, who described 'putrid sore throat,' now termed diphtheria, as well as the condition of the douloureux; John Huxham, who investigated epidemic fevers; and, most famous of all, EDWARD JENNER, who introduced vaccination as a preventive against smallpox, which marks the beginning of the science of *preventive* m.

The first half of the XIX. cent. showed the triumph of research and experiment over theorising and generalisation, influenced by the work of WILLIAM and JOHN HUNTER, both of whom died just before the commencement of that cent., the latter particularly leaving behind him a valuable legacy in anatomical and pathological research, as well as in the stimulus he gave to such pupils as Edward Jenner and Matthew Baillie. The method of percussion of Auenbrugger was improved by Corvisart and Piorry, and Laenneo introduced a more valuable aid to diagnosis in the *stethoscope*. At this time the PARIS SCHOOL was supreme in clinical teaching, and attracted students from all parts to study under Bretonneau, Rostau, D'Alibert, Rayer, Trousseau, and others.

Great progress was also being made in m. in Britain, Willan laying the basis for all subsequent work on diseases of the skin, Bright making the important discoveries in regard to diseases of the kidneys associated with his name, and, somewhat later, Addison investigating the obscure disease of the suprarenal capsules called after him. The researches of Sir Charles Bell and of Marshall Hall concerning the physiology of the nervous system are also noteworthy. The reputation of the EDINBURGH SCHOOL of m. was sustained by Gregory, Alison, and Abercrombie, and that of DUBLIN by Graves and Stokes. In Germany, again, Skoda improved the art of auscultation, Rokitansky made discoveries of note in morbid anatomy, Romberg in nervous diseases, and Schönlein, by his efforts in many

different directions, increased the fame of the Ger. school.

In more recent times progress in other departments of thought and science has exercised great influence upon m. With the appearance of Darwin's epoch-making *Origin of Species* the classification of diseases into isolated types, without relation one to another, was seen to be wrong, and the changing of form, with the development and relation of processes, began more clearly to be observed. A morbid process was seen no longer to be limited by the individual, and the possibility of inheritance of disease, such as various nervous disorders, or of susceptibility to disease, such as to tuberculosis, assumed an aspect of much greater importance.

The teaching of Schönlein, who discovered, in the first half of the cent., that the disease termed favus was due to a parasitic fungus, led to the development of the science of *bacteriology*, which, receiving its most important impulse from the work of PASTEUR, and of KOCH, who discovered the bacilli of anthrax and of tuberculosis, has been able to assign both a cause and a cure to many of the most obscure and most fatal diseases, and is daily becoming more complete and more exact. The development of preventive m. has accompanied that of bacteriology, infant mortality has been enormously lessened, the ravages of the population by infectious diseases have been substantially decreased, housing is improved, food and water supplies rendered purer and more healthy, sanitary science is becoming more exact, and the physical conditions of life, especially in towns, have been rendered very much cleaner and more pleasant. In the tropics, as well as in temperate climates, disease is being checked; the parasite of malaria was discovered two years before the tubercle bacillus, and preventive methods are successfully employed to prevent the propagation of the infecting mosquito, with the result that the disease is being stamped out in districts where it was endemic, while cholera, enteric fever, and yellow fever are beginning to be controlled.

While perhaps most general attention has of recent years been paid to infectious diseases, the progress made regarding other conditions must not escape consideration. The development of the microscope and of microscopic methods in the XIX. cent. had the greatest possible influence on the development of physiology and anat., and therefore on the development of m. In the history of the investigation of nervous diseases the names of Lockhart Clarke, Cajal, Golgi, Brown-Séquard, Gowers, Duchenne, Charcot, and Romberg are prominent, Sir Charles Bell discovered the paths of sensory and motor impulses, followed by Marshall Hall's discovery of the laws of reflex action, and Waller, Sherrington, and others have done valuable work; while in regard to research on the physiology of the brain, and, in consequence, the wonderful achievements in cerebral surgery, Broca, Hitzig, and Ferrier are noteworthy. At present considerable attention is being devoted to the investigation of mental diseases, and, although up to the present the results have been comparatively small, the patient work now proceeding is bound to bear valuable fruit in the near future. The treatment of the insane has not developed to any great extent beyond the non-restraint methods of the first half of the XIX. cent.

Diseases of the lungs and heart were investigated in such a way by Laennec that his successors in the XIX. cent. have simply added additional details to his broad outline; pneumonia has become recognised as an infection, and the treatment of tuberculosis of the lungs and pleura has undergone a drastic change from protection from the outside air and close confinement to placing the patient as constantly outside as possible, and feeding him on nutritious diet. In abdominal conditions great progress has been made in accuracy of diagnosis as well as in the enormous increase in successful treatment through the introduction of the antiseptic and aseptic methods of surgery by LISTER, and such conditions as stone in the kidney or gall-bladder, gastric ulcer, peritonitis, ovarian disease, and even cancer of the stomach or intestine, which formerly practically invariably ended fatally, are treated to-day with every prospect of cure. Examination of stomach contents, the application of *X-rays*, and improved methods of examining the urine have been of great assistance in the diagnosis of abdominal disease. Great progress was made in the XIX. cent. in regard to the diseases of women, the name of Matthews Duncan of Edinburgh being notable in this regard, and the possibility of successful operative interference has given wonderful results in this department of m.

Knowledge concerning the circulation has been greatly augmented by the physiological researches of Morey, Ludwig, Leonard Hill, and others; the diseases of blood-vessels, such as the degeneration of the walls of blood-vessels from such reasons as old age, lead-poisoning, syphilis, persistent high blood-pressure, are better understood, and specific treatment is applied with much success. The phenomena of embolism and thrombosis have been investigated by Kirkes and VIRCHOW, and are guarded against and treated successfully; while the causes of the more obscure anæmias are being gradually evolved. Dietetic diseases, as, in children, rickets, scurvy, and marasmus, are now being more exactly comprehended, and are successfully cured or prevented.

In regard to diagnosis, in addition to such aids as examination of stomach contents, and the X-rays, many improvements have been made; the ophthalmoscope has made diseases of the eye more clear; the sphygmograph is of value in investigating changes of blood-pressure; the *thermometer* has become an exact instrument, and is invaluable as a recorder of the temperature; the application of the galvanic and faradic currents is of great assistance in various nervous conditions; instruments have been devised for different purposes in the examination of the blood; the laryngoscope throws light on the condition of the throat. In regard to therapeutics, less reliance is being placed in drugs, and other remedies are being widely employed, such as diet, change of climate, physical exercises, baths, mineral waters, massage, electricity, hypnotism, while the discoveries in bacteriology are providing a host of specific remedies in antitoxins, vaccines, and similar preparations. Hypodermic injection has been added to the other methods of the administration of drugs, saline injections are employed for various conditions, and transfusion is being carried out more scientifically and more successfully.

Medical Education.—Until 1858 the different licensing authorities in Great Britain and Ireland granted degrees or licences in medicine and surgery without supervision by the State, but by the Medical Act of that year the *General Medical Council* was established, now composed, by the later amended Act, of twenty members elected by the licensing bodies, three elected by medical practitioners, and six app. by the Crown. The General Medical Council supervises the courses of study and examinations of the licensing bodies, and may report any body which does not meet its requirements to the Privy Council, which can deprive such body of its power to grant licences. It requires that before commencing medical study candidates should be sixteen years of age and should pass an examination in general knowledge in (*a*) English, (*b*) Latin, (*c*) math's, (*d*) any one of Greek, French, German, Italian, or another modern language, but the entrance examination certificates of the Brit., Ind., and colonial univ's, and examination certificates of certain government and chartered bodies' examinations, are accepted in lieu of this examination. After having fulfilled the above requirements, a candidate must register as a medical student and carry out the approved course of five years' study. The subjects of this course must include physics, chem., elementary biology, anat., physiology, materia medica, and pharmacy, pathology, therapeutics, medicine and clinical med., surgery and clinical surgery, midwifery with diseases peculiar to

women, vaccination, forensic med., public health, mental diseases. A candidate cannot be licensed and admitted to the Medical Register before he is twenty-one years of age.

In the U.S.A. the different states regulate the practice of med. within their own borders, and candidates must satisfy the supervising board that they have graduated from a reputable medical school and are twenty-one years of age. In the medical schools the course of study lasts four years, and a certain standard of general knowledge, in some cases graduation in arts or science, is demanded before entrance.

Medical Jurisprudence, or FORENSIC MEDICINE, is that branch of med. which deals with the application of medical science to questions of law, chiefly in regard to civil rights and to injuries to the person. Although we find traces in ancient times among the Greeks and Romans of the application of certain principles of m. j., more especially in regard to questions of legitimacy, the development of the subject is of recent date. In the XVI. cent., in Germany under the Emperor Charles V., magistrates were ordered to take medical evidence in doubtful cases of personal injury, poisoning, pretended diseases, and the like, while the first work dealing with the subject, *Constitutis Criminalis Carolina*, appeared in 1553. As knowledge of anat., physiology, and other branches of med. became more exact, so their application to legal matters developed, and we find the first course of lectures on m. j. given by Michaelis in the Univ. of Leipzig in the middle of the XVII. cent., while at the commencement of the same cent. Henry IV. of France had appointed physicians and surgeons to make medico-legal reports in the different cities of his kingdom. Several professorships of the subject were instituted in the univ's of Germany in the XVIII. cent., and many works dealing with medico-legal subjects were published. The first work on m. j. produced in Britain was the *Elements*, by Samuel Farr, which appeared in 1788, and the first lectures in the country were given by Duncan, in the Univ. of Edinburgh, in 1801.

The different subjects connected with m. j. are dealt with under such articles as MURDER, DROWNING, RAPE, INSANITY, POISON.

Taylor, *Principles and Practice of Medical Jurisprudence*; Osler, *Principles and Practice of Med.* (1909); Taylor, *The Practice of Med.* (1911).

MEDICK, see LUCERNE.

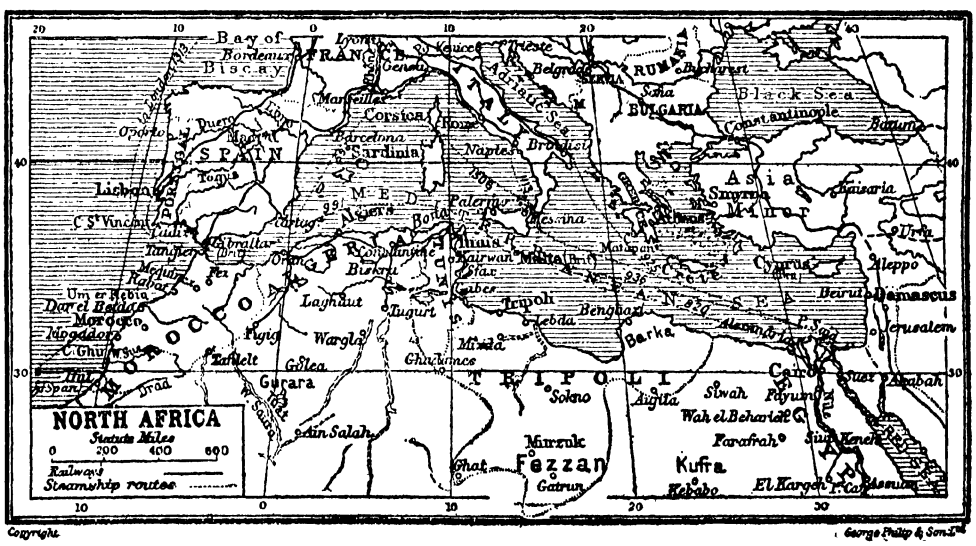
MEDINA.—(1) (24° 58′ N., 39° 58′ E.) small town, Hejaz, Arabia; second great holy city of Muhammadans; contains tomb of Muhammad, who took refuge here after his flight from Mecca in 622 A.D.; was Muslim capital until superseded by Damascus in time of Moawija; came under control of Turkey in XVI. cent.; captured by Wahhabis, 1804; retaken by Tusun, s. of Mehemet Ali, pasha of Egypt, in 1812; most important recent event, opening of railway to Damascus, 1908. M. is strongly fortified and encircled by walls; principal building is mosque, which contains Prophet's tomb, and has lofty cupola and four towers; present building is result of frequent reconstruction. Pop. c. 18,000. (2) (43° 15′ N., 78° 20′ W.) town, New York State, U.S.A., on Oak Orchard Creek; iron manufactures; sandstone quarries. Pop. (1910) 5683.

MEDINA SIDONIA (36° 27′ N., 5° 53′ W.), town, on Sequillo, Cadiz, Spain; ancestral seat of dukes of M. S. Pop. 11,000.

MEDINA SIDONIA, DON ALONSO PEREZ DE GUZMAN EL BUENO, 7TH DUKE OF (1550–1615), commander-in-chief of Span. Armada; descendant of noble family of Guzman, richest and most powerful of Spain; incapable, and promoted by favour; app. captain-general of Lombardy, 1581; commander of Armada, 1588; responsible for Eng. success at Cadiz, 1596.

MEDIOLANUM, name of several Rom. cities; that in Cisalpine Gaul, founded by Insubres (according to Livy), was taken from that people by Romans, 222 B.C.; chief city of Western Empire when captured by Goths, 569.

MEDITERRANEAN SEA (*c.* 30° 30′ to 44° 10′ N.,



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5° to 35° E.), great inland sea, with Europe on N., Asia on E., Africa on S.; communicating with Atlantic by Strait of Gibraltar, with Black Sea by Dardanelles, Sea of Marmora, and Bosporus, with Red Sea by Suez Canal; area over 1,000,000 sq. miles; practically uninfluenced by oceanic tidal wave. M. S. has great depth, three basins being revealed by soundings; these are: western basin, W. of Corsica and Sardinia; Tyrrhenian depression, between Corsica and Sardinia, Sicily and Italy; eastern basin, between S. Italy and coast of Palestine. Submerged mountains connect Sicily with Tunis.

MEDIUM, term used in spiritualism for person through whom messages are believed to be conveyed from the other world; such messages are not necessarily genuine, as the medium may be deliberately deceiving, or may unconsciously deliver ideas not derived from any extraneous source.

MÉDOC (45° 9′ N., 0° 42′ W.), district, Gironde, France, stretching along Gironde; famous wines.

MEDULLA, see BONE.

MEDULLA OBLONGATA, see BRAIN.

MEDUSA, see GORGONS, THE.

MEDUSA, general name for a jelly-fish, either the large floating mass belonging to the Scyphomedusæ (*q.v.*) or the small swimming-bell of the Hydromedusæ (*q.v.*).

MEDUSOID, see under HYDROMEDUSÆ.

MEDWAY (51° 27′ N., 0° 43′ E.), river, S.E. England; joins Thames at Sheerness; length, 60 miles, of which over 40 are navigable.

MEEANEE, see MIANI.

MEENIN, see MENIN.

MEERANE (50° 51′ N., 12° 28′ E.), town, Saxony, Germany; woollen cloth. Pop. (1910) 25,406.

MEERSCHAUM, hydrated silicate of magnesium occurring as fine white clay in Austria, Turkey, Spain, and other places in Europe; used for making tobacco pipes.

MEERUT.—(1) (28° 55′ N., 77° 30′ E.) district, United Provinces, India; area, 2360 sq. miles; produces cereals, cotton, sugar-cane. Pop. 1,540,175. (2) (29° N., 77° 41′ E.) town, United Provinces; trades in cotton; here Mutiny first broke out, 1857. Pop. (1911) 116,227. M. division has area 11,310 sq. miles. Pop. *c.* 6,000,000.

MEGACHILE, see LEAF-CUTTER BEES.

MEGALOPOLIS, magnificent city of ancient Greece, built by Arcadians under direction of Epaminondas, near junction of Alphæus and Helisson, 370 B.C.; idea was to collect forces against Spartan inroads as Argives had done in Argos; sacked by Spartans, 222; speedily fell into decay; now deserted ruins; famous inhabitants were Philopœmen and historian Polybius; excavations by Brit. school at Athens, 1892.

MEGANUCLEUS, see under NUCLEUS.

MEGAPODES, MEGAPODIDÆ, family of seven species of Rail-like birds found in Australia and many S. Pacific islands; most interesting on account of their nesting habits; eggs are simply laid in sand or dead leaves, where they are hatched by heat of sun or decaying vegetation.

MEGARA, town of ancient Greece; capital of the Megarid district; Dorian, but dependent on Athens until time of Codrus; being on route from Athens to Peloponnesus, and possessing excellent ports, became great mart and was mother of colonies in Sicily, Asia Minor, Black Sea, Sea of Marmora, etc.; nearly ruined by Delian League.

Megarian School, a Gk. school of philosophy founded in Megara, his native city, by Euclid (not the geometer), a friend of Socrates. The school seems to have asserted the unity of Being or the Good to the point of denying all reality to changeable and imperfect things.

MEGATHERIUM, Ground Sloths, see under EDENTATES.

MEGHNA, MEGNA (23° 15′ N., 90° 45′ E.), the delta estuary of Ganges and Brahmaputra, India; noted 'bore.'

MEHADIA (44° 55′ N., 22° 22′ E.), town, Krassó-Szörény, Hungary; in neighbourhood are sulphur 'Hercules Baths,' known in Rom. times.

MEHALLA EL KOBRA, town, EGYPT (*q.v.*).

MEHDIA, see MAHDIA.

MEHEMET ALI (1769–1849), viceroy of Egypt. As pasha of Egypt, M. A., an illiterate peasant of genius, and his s. IBRAHIM played an important part in the Gk. War of Independence (1827), and won some support from Gt. Britain and France in their revolt against M. A.'s suzerain, the Sultan of Turkey. Finally the Powers agreed by the Convention of London to force terms on M. A., who had assumed the title of viceroy of Egypt in 1834. France held out and aided him, but Napier forced him to return the Turk. fleet, captured by Ibrahim, and he made submission, France consenting on Turkey's agreeing to make the pashalik hereditary.

MEHIDPUR (23° 29′ N., 75° 42′ E.), town, on Sipra, Indore, India; scene of victory of Sir John Malcolm over army of Holkar, 1817.

MEIDERICH (51° 30′ N., 6° 45′ E.), town, Rhine province, Prussia; iron and steel manufactures; incorporated with Duisburg, 1905.

MEIKTILA (*c.* 20° 52′ N., 96° 10′ E.), district and division of Upper Burma. District (2178 sq. miles) consists of an undulating plain; chief occupation, cattle-breeding and agriculture. Pop. 250,000. Division includes districts of Meiktila, Kyaukse, Yamethin, and Myingyan; area, 10,854 sq. miles. Pop. 1,000,000; town, 6000.

MEINBERG (51° 45′ N., 9° E.), watering-place, Lippe, Germany; sulphur springs.

MEININGEN (50° 34′ N., 10° 25′ E.), capital, Saxe-Meiningen, Germany, on Werra; contains theatre and ducal palace, with collections. Pop. (1910) 17,182.

MEÏR (fl. II. cent. B.C.), Jewish philosopher; noted for fables and epigrams, as was his wife Beruriah for her godliness.

MEIRINGEN (46° 42′ N., 8° 12′ E.), tourist centre, canton Berne, Switzerland, in valley of Aare. Pop. 3000.

MEISSEN (51° 10′ N., 13° 28′ E.), town, Saxony, Germany; famous for Dresden china; has beautiful Gothic cathedral dating from XIII. cent. Pop. (1910) 33,884.

MEISSEN (51° 10′ N., 13° 28′ E.), district, Saxony; gave name to margraviate in X. cent.; in 1423 the Margrave, Frederick the Warlike, who succ. his uncle, 1407, was cr. elector of Saxe-Wittenberg; and henceforth M. was included in duchy, afterwards kingdom of Saxony.

MEISSONIER, JEAN LOUIS ERNEST (1815–91), Fr. painter; first distinguished himself as book-illustrator, later for his elaborate genre pictures, including several celebrated military scenes; executed some striking portraits, one being of Dumas *fils*. Many of his pictures are known by engravings.

MEISTERSINGERS, see MINNESINGERS.

MEKINEZ, see MEQUINEZ.

MEKONG (9° 55′ N., 106° 38′ E.), river, Indo-China; rises in Tibet, separates Annam from Siam; enters China Sea; length, over 2700 miles; basin, 400,000 sq. miles.

MEKRAN, MAKRAN (26° N., 61° E.), district in S.W. Baluchistan and S.E. Persia, bordering Arabian Sea; corresponds to ancient *Gedrosia*; is an arid and barren plateau region; divided into petty districts under separate chiefs.

MELA, POMPONIUS (fl. *c.* A.D. 43), earliest Rom. geographer; a native of Spain. His geography, called *De Situ Orbis*, is in three parts.

MELANCHOLIA, see INSANITY.

MELANCHTHON, PHILIPP (1497–1560), Ger. Reformer; original name, SCHWARZERD; ed. at Heidelberg and Tübingen; prof. of Greek at Wittenberg, 1518. In 1519 he began to play his part in the Reformation struggles at the Leipzig disputation. When Luther was in the Wartburg M. led the Protestants in Wittenberg. He disputed with Zwingli at Marburg, 1529, over the Eucharist. He was one of the more moderate of the Reformers, and as such had intercourse with Catholics when compromise was attempted. He tried to shelve difficulties by using vague language; his theology was really Lutheran. He wrote *Loci Communes Rerum Theologicarum* and other works.

Richard, *Life* (1898).

MELANESIA (10° S., 155° E.), collective name for island groups in Pacific, comprising Bismarck, Solomon, Santa Cruz, New Hebrides, New Caledonia, Loyalty, and other archipelagoes.

MELBA, *née* NELLIE MITCHELL (1859–), famous Brit. singer (soprano); b. Melbourne.

MELBOURNE.—(1) (37° 49′ S., 144° 59′ E.) capital, Victoria, Australia; founded, 1835; episcopal see, 1847; made capital of Victoria, 1851; suffered from financial depression, 1892–93. M. is temporary seat of Commonwealth government; contains Houses of Parliament, Government House, Anglican and

R.C. cathedrals, observatory, mint, various museums, libraries, and charitable establishments; seat of univ., founded 1855; has fine parks and public gardens; great gold, wool, and farm-produce centre; has fine harbour; exports frozen meat, wool, dairy produce, fruit, wine, grain. Pop. (1911) 591,830. (2) (52° 51′ N., 1° 27′ W.) small town, Derbyshire, England; market gardens.

MELBOURNE, WILLIAM LAMB, 2ND VISCOUNT (1779–1848), Brit. statesman; Prime Minister, 1834 and 1835–41; polished dilettante; trained young queen, Victoria, as constitutional ruler.

MELCHIADES, pope, 310–14.

MELCHITES, Christian sect, founded V. cent.; with Eastern rites, but under authority of R.C. Church; consist of 90,000 Syrians and Egyptians.

MELCHIZEDEK, in *Genesis* 14, priest-king of Salem, who blesses Abraham, and is taken as the type of Jesus Christ in the *Epistle to the Hebrews*.

MELEAGER (classical myth.), king of Calydon; slew wild boar sent by Artemis, and gave skin to Atalanta; brothers of Althæa, M.'s mother, robbed Atalanta, and were slain by M., whereupon his mother cursed him; later tradition states that Althæa slew him by burning a mystic log.

MELEAGRINA, see under LAMELLIBRANCHIATA.

MELEDA (42° 45′N., 17° 30′ E.), island, in Adriatic, Dalmatia, Austria-Hungary; ancient *Melita*.

MELEGNANO (45° 21′ N., 9° 19′ E.), town, Lombardy, Italy; formerly *Marignano*; scene of Fr. victories in 1515 and 1859. Pop. 7000.

MELES, Badger, see WEASEL FAMILY.

MELETIUS, bp. of Lycopolis; his followers formed *Meletian sect.*

MELETIUS OF ANTIOCH (d. 381), bp. of Antioch, 360; obliged to go into exile owing to Christological disputes, but returned later. M. at first held to the *Homoean* view, but gradually became orthodox.

MELFI (41° N., 15° 38′ E.), town, Potenza, Italy; was Norman capital of Apulia (XI. cent.); fruit, grain. Pop. *c.* 15,000.

MELILLA (35° 16′ N., 2° 58′ W.), fortified seaport and Span. penal settlement, Morocco. Pop. 10,000.

MELIPHAGIDÆ, see HONEY-EATERS.

MELKSHAM (51° 23′ N., 2° 8′ W.), market town, on Avon, Wiltshire, England; cloth manufactures. Pop. (1911) 3102.

MELLE (46° 13′ N., 0° 8′ W.), town, Deux-Sèvres, France; trade in agricultural produce.

MELLITUS (d. 624), bp. of London; then abp. of Canterbury, 619.

MELLIVORA, Ratels, see WEASEL FAMILY.

MELODY, in music, may be defined as a well-ordered and pleasing succession of sounds intended for voice or instrument; less strictly, the air, or tune, or leading theme in a composition.

MELOLONTHA, see CHAFERS.

MELON (*Cucumis melo*), member of the Cucurbitaceæ; climbs by means of leaf tendrils. Fruit (a berry) is very large for the size of the plant. The plant requires plenty of light and moisture, and should be grown in a frame, with an average temperature of 70° F. Judicious pinching back produces advantageous results, especially during fruit formation.

MELOPSITTACUS, see under PARROT TRIBE.

MELORIA (*c.* 43° 35′ N., 10° 15′ E.), island, off Leghorn, Italy; here Genoese were defeated by Frederick II., 1241; Genoese defeated Pisans, 1284.

MELOS, MILO (36° 42′ N., 24° 25′ E.), one of Cyclades Islands, Ægean Sea; settled by Dorians at an early date; taken by Athenians, 416 B.C. Here the Venus of Milo (now in Louvre) was found in 1820. Pop. 6000.

MELROSE (42° 27′ N., 71° 0′ W.), city, Massachusetts, U.S.A.; shoes and rubber goods. Pop. (1910) 15,715.

MELROSE (55° 37′ N., 2° 44′ W.), small town, Roxburghshire, Scotland; contains ruins of Cistercian abbey, said to be finest in Scotland, and described in Scott's *Lay of the Last Minstrel*.

MELTON MOWBRAY (52° 47′ N., 0° 53′ W.), town, Leicestershire, England; hunting centre; pork pies. Pop. (1911) 9203.

MELUN (48° 32′ N., 2° 39′ E.), chief town, Seine-et-Marne, France; ancient *Melodunum*; taken by Labienus, 52 B.C.; agricultural implements; active trade. Pop. 14,000.

MELUSINE, MELUSINA, lady in Fr. romance *Melusine*; married Raymond on condition that he should not see her on a certain day of each week. One day he broke his oath, sought her out in her seclusion, and found her bathing; her lower body was that of a serpent. She erected by magic the castle of Lusignan.

MELVILLE, ANDREW (1545–1622), Scot. scholar and theologian; b. near Montrose; was reckoned finest scholar of his day; champion of Scot. Presbyterianism, his vehemence and zeal roused the hatred of James VI. and I., who had him imprisoned in the Tower of London for four years.

MELVILLE, EARLDOM OF, see LEVEN, EARLDOM OF.

MELVILLE, JAMES (1556–1614), Scot. reformer; one of leaders of Presbyterian party against James VI.; letters and diary important hist. source, and of literary value.

MEMBRANELLE, a delicate flat membrane, often with frayed edge, resulting from the fusion of cilia; frequently found in neighbourhood of mouth of Infusorian Protozoa, such as *Stentor*.

MEMEL (55° 42′ N., 21° 10′ E.), seaport town, on Kurisches Haff, E. Prussia, Germany; ships timber; iron foundries, shipbuilding yards. Pop. (1910) 21,470.

MEMEL, NIEMEN (55° 4′ N., 22° 15′ E.), river, Russia and Prussia; rises in government of Minsk; falls by several mouths into Kurisches Haff; length, 500 miles; navigable from Grodno.

MEMLINC, HANS (*c.* 1430–94), Flemish painter; pictures, including fourteen adorning the shrine of St. Ursula at Cologne, are mostly religious, with a few portraits.

MEMMINGEN (47° 58′ N., 10° 11′ E.), town, Swabia, Bavaria; manufactures iron, leather, textiles. Pop. (1910) 12,362.

MEMNON (classical myth.), s. of Eōs (Dawn) and Tithonus; slain by Achilles at siege of Troy. Name M. was given to one of the two colossal statues of Amenoph III. at Thebes; it emitted a musical sound at dawn and was one of the Seven Wonders.

MEMORY, see PSYCHOLOGY.

MEMPHIS.—(1) (29° 51′ N., 31° 21′ E.) ancient town of Egypt, once capital, now in ruins; probably established by Menes, founder of first dynasty; contained Serapeum, temple of Ptah, various palaces and pyramids. (2) (35° 9′ N., 90° W.) town, on Mississippi, Tennessee, U.S.A.; enormous export of cotton; railway centre; episcopal see. Public buildings include cotton exchange, government building, various charitable and educational establishments; fine system of parks. M. was taken by Federals after severe naval engagement, 1862. Pop. (1910) 131,105.

MENABREA, LUIGI FEDERICO, MARQUIS OF VALDORA (1809–96), Ital. soldier and statesman; conducted military operations in war of Ital. liberation; tried to establish peace between papacy and nation; condemned Garibaldi's invasion.

MENAI STRAITS (53° 12′ N., 4° 13′ W.), channel, separating island of Anglesey from Carnarvonshire, Wales; from ¼ to 2 miles wide; crossed by suspension bridge, built by Telford (1825), and Britannia Tubular Bridge, constructed by Robert Stephenson, (1850). See BRIDGES.

MENAM (15° N., 100° 30′ E.), river, Siam; flows by several mouths into Gulf of Siam.

MENANDER (II. cent. B.C.), Gk. king of Bactria; said to have been greater conqueror than Alexander the Great; Strabo preserves statement that he conquered India as far as mouth of Indus; coins remain, and he appears as 'Milinda' in Indian legend.

MENANDER (342–291 B.C.), Gk. dramatist of the new comedy; important fragments of his comedies have recently been discovered; excelled in delineation of intrigue and in subtle character-drawing. His style and plots were closely imitated by Terence (*q.v.*).

MENASHA (44° 14′ N., 88° 28′ W.), city, Wisconsin, U.S.A., on Lake Winnebago; paper, woodenware. Pop. (1910) 6801.

MENASSEH BEN ISRAEL (*c.* 1604–57), Portug. rabbi; established Hebrew printing press in Holland; obtained toleration for Jews from Commonwealth in England; wrote *Vindiciæ Judæorum* against Prynne, 1656; revered by Jews as great patriot; great influence on Spinoza.

MENCIUS, MANG-TSE (*c.* 372–289 B.C.), Chin. philosopher; ed. carefully by his mother, who has been made the ideal of motherhood amongst the Chinese; like his pattern, Confucius, he founded a school of thought; endeavoured, when well advanced in years, to find a prince who would put into execution his social and political ideals. His sayings were collected by his disciples into the *Book of Mang-tse*, upon which modern Chin. ethics are largely founded.

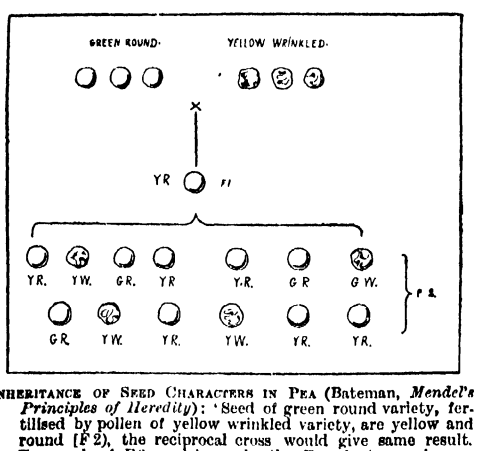
MENDAÑA, see MARQUESAS ISLANDS.

MENDE (44° 31′ N., 3° 30′ E.), chief town, Lozère, France, on Lot; XIV.-cent. cathedral; serges and shalloons. Pop. 7500.

MENDELÉEFF, DMITRI IVANOVITSCH (1834–1907), Russ. chemist; worked on solutions and petroleum; chief founder of periodic law (see ELEMENT); author of *Principles of Chemistry*.

MENDELISM, a branch of the study of HEREDITY, concerned with the facts and theories centred upon the discoveries made by GREGOR MENDEL from his experiments in plant hybridisation, and announced in 1865; of great importance on account of its bearing on stock-breeding, and of its possible bearing on the development of humanity.

The essence of the Mendelian hypothesis is that certain characters in plant or animal remain by themselves (*unit characters*) and will not blend with other unit characters when the two are brought into juxtaposition in breeding. In the common pea, tallness and dwarfness are unit characters. A tall pea bred with a dwarf pea gives a generation of tall peas—there are no dwarf or intermediate individuals; and tallness being apparent is called the *dominant* character. But when those tall peas are interbred the offspring is not uniform, but possesses characteristic individuals, dwarf and talls, in definite ratios; for every dwarf pea (and this, self-fertilised or interbred, remains dwarf to



INHERITANCE OF SEED CHARACTERS IN PEA (Bateman, *Mendel's Principles of Heredity*): 'Seed of green round variety, fertilised by pollen of yellow wrinkled variety, are yellow and round (F 2), the reciprocal cross would give same result. Two pods of F 2 seed borne by the F 1 plant are shown: there were 6 yellow round, 3 green round, 3 yellow wrinkled, 1 green wrinkled.'

all generations) there are three tall peas, but only one is pure and when self-fertilised shows always pure tall progeny. The other two are impure, and when interbred yield mixed generations of talls and dwarfs in the proportions just stated—3–1, or 1 pure tall, 2 impure tall, 1 pure dwarf. Dwarfness has been latent or implicit even in the first (tall) hybrid generation—it is a *recessive* character. Throughout, the unit characters remain by themselves, and finally appear in their purity in definite proportions.

These definite proportions are explained by the hypothesis of segregation: that the unit characters are kept apart in different groups of the germ cells of the hybrids, and that fertilisation by a hybrid with similar groups gives a rearrangement of the unit characters according to the laws of chance grouping.

The unit character may be obvious, such as size, texture, colour, or less apparent, as qualities of resistance to disease in wheat, or broodiness in poultry. But the Mendelian law has not been shown to be universal in its application, though it has been exhibited in peas, beans, wheat, maize, barley, and a few other plants, and in mice, rats, guinea-pigs and rabbits, farmyard fowls and canaries, snails, silkworms, beetles, and some other animals.

MENDELSSOHN, MOSES (1729–86), Jewish philosopher; b. Dessau; s. of Jewish schoolmaster; head of mercantile house, but principally occupied in philosophical pursuits; writings marked by beauty and lucidity of style; laboured for emancipation of Jews, and sought to remedy their neglect of secular studies; first known to public through Lessing; claimed complete freedom for thought; plurality of truths possible, each suited to needs of the time and place; upheld ontological argument for God's existence; argued for immortality of the soul.

MENDELSSOHN-BARTHOLDY, FELIX (1809–47), Ger. composer; b. Hamburg; came of wealthy Jewish family, which finally adopted Christianity, his grandfather being the famous Moses M., the philosopher and historian; before he was ten M. played in public, and at twelve was already a composer; professional training, completed at Berlin and Paris, was supplemented by a liberal general education, and rounded off by extensive tours on Continent and in England, a visit to Scotland resulting in the *Scotch Symphony* and the *Hebrides Overture*, while Italy produced the *Italian Symphony*. Before this, at age of seventeen, he had written his great orchestral work, the *Midsummer Night's Dream* overture. Settling in Leipzig, he directed the famous Gewandhaus concerts there and founded the Conservatoire. His activity was incessant, and directly led to his early death. His works range over almost the entire field of musical form, from song to symphony and oratorio. Himself a skilled pianist and organist, he wrote some splendid works for both instruments, including *Songs without Words*, a form of his own creation; but his genius is best exhibited in his symphonies and two oratorios, *St. Paul* and *Elijah*. M. falls short of the grandeur and dramatic force of the greatest composers, but atones by fine blending of the classic with the romantic.

Cowen, *Mendelssohn* (1912).

MENDÈS, CATULLE (1841–1909), Fr. poet, novelist, dramatic and musical critic; started Parnassian movement; wrote poetry, novels, plays, but greater as critic than stylist; much of his vogue *succès de scandale*.

MENDICANT FRIARS, non-cloistral religious orders formed in XIII. cent.; chief—Franciscans, Dominicans, Claresses, Tertiaries, Carmelites, Austin, Servites; 2nd Council of Lyons, 1274, recognised four orders, Franciscans, Dominicans, Carmelites, and Austin friars, and forbade further orders; root idea absence of property; hence, when engaged in preaching, etc., necessity for mendicancy.

MENDIP HILLS (51° 18′ N., 2° 42′ W.), range of hills, Somersetshire, England; highest point, Blackdown (1067 ft.).

MENDOZA.—(1) (*c.* 33° 20′ S., 68° 20′ W.) province,

Argentina, S. America; area, 56,502 sq. miles; mountainous in W.; drained by M. and other rivers; coal, petroleum; cereals, tobacco, wine. Pop. (1910) 225,246. (2) (32° 52′ S., 68° 48′ W.) town, Argentina, S. America; ruined by earthquake, 1861, since rebuilt; produces wine, fruit. Pop. (1911) 42,496.

MENDOZA, DIEGO HURTADO DE (1503–75), Span. novelist and statesman; represented Charles X. at the Council of Trent, and wrote *The War of Granada*, dealing with the revolt of the Moriscoes against the tyranny of Philip II.

MENDOZA, PEDRO GONZALEZ DE (1428–95), Span. cardinal and statesman; fought for Henry IV.; helped to establish Isabella on throne and capture Granada from Moors; made abp. of Toledo, 1492.

MENELIK II. (1844–), emperor of Abyssinia; succ., 1889; owing to illness, duties entrusted to regent, 1909; gave French and British trading facilities and aided British in Sudan War. See ABYSSINIA.

MENENIUS AGRIPPA, see AGRIPPA, MENENIUS.

MENEVIAN, see CAMBRIAN SYSTEM.

MENGTSZE (23° 24′ N., 103° 20′ E.), city, treaty-port, Yunnan, China. Pop. 20,000.

MENHADEN, see under HERRING FAMILY.

MENIÈRE'S DISEASE, an affection characterised by sudden dizziness, noises in the ear, deafness in one or both ears, intense nausea and vomiting—and the individual may stagger and fall down unconscious. The symptoms arise from disturbance of the internal ear caused by hæmorrhage or inflammation, due, for example, to intense heat, rheumatism, influenza, syphilis, anæmia. The treatment is to remove the cause if possible, treat any primary cause, such as the diseases noted above; remove wax which may be pressing on the drum of the ear, and, in an attack, apply cold compresses to the head, keep the patient quiet in a darkened room; bromide and iodide of potassium have both proved valuable internally.

MENIN, MEENEN (50° 47′ N., 3° 6′ E.), town, on Lys, W. Flanders, Belgium; textiles, tobacco. Pop. 20,000.

MENINGITIS, inflammation of the membranes enveloping the brain (cerebral m.) or the spinal cord (spinal m.), or both. *Simple acute m.* is caused by injury, by extension of inflammation from neighbouring parts, *e.g.* middle ear, or as a complication of various fevers, the upper surface of the brain being the usual site of the inflammation. The symptoms are at first headache and restlessness, then fever, irritation, and convulsions, with retraction of the head, the patient lying in a distinctive position, and then stupor and paralysis ensue, accompanied by the characteristic cry and difficulty in breathing, and death may soon take place. The treatment is to remove any cause, if possible, keep the patient quiet in a darkened room, ice to the head, a purge of calomel, bromides, and keep up the strength by nourishing fluids.

Tubercular m. is usually part of a general tuberculosis, the site of the inflammation generally being the base of the brain, and the symptoms resemble those of simple acute m., the head, however, being usually more retracted and the neck more rigid. The treatment is also the same, but in the early stages the inflammation should if possible be modified by the treatment of the general tuberculosis by cod-liver oil, fresh air, and careful general hygiene. *Epidemic cerebro-spinal m.* is an acute infectious disease due to a bacterium, the *diplococcus intracellularis*, an attack coming on suddenly, with nervous shock, extreme pain at the back of the head and neck, dizziness, rise of temperature, delirium, and perhaps coma, the head being strongly retracted and the limbs and body rigid, and there may be paralysis of one or other of the limbs. Cutaneous eruptions are usually present, in the form of herpes, on the face or on the body, or as a purpuric rash, generally commencing on the legs. The treatment in the early stages is warmth and stimulants to prevent collapse, and later to relieve pain by opium, with bromides for the spinal irritation, but serum treatment is now being introduced with success, the serum being administered as early as possible in the attack.

Spinal m. may be acute or chronic, the symptoms in the former being pain in the back, cutaneous pains, then anæsthesia and paralysis, first of the legs; and the treatment is if possible to remove the cause, as the disease is generally due to extension of disease in the neighbourhood, *e.g.* caries of the spine, extension of other forms of m., with rest, counter-irritation, while bromides and morphine may be given, but drugs are of little use. The chronic form may be the sequel of the acute, or it may be chronic from the beginning, and after symptoms of irritation, on the spinal cord being affected symptoms of local myelitis develop, with hyperæsthesia above the lesion, reflexes lost and muscles atrophied at it, and paralysis below it. The treatment is the same as in the acute form.

MENIUS, JUSTUS (1499–1558), Lutheran divine; at first humanist, then disciple of Luther; wrote various works, one against the bigamy of Philip of Hesse.

MENNO SIMONS (1492–1559), Dutch theologian and founder of sect bearing his name. Influenced by Luther, M. left R.C. Church, 1536. His theology was mostly orthodox, rather puritan in tone. He went from place to place in Holland preaching.

MENNONITES, religious sect called after Menno. They were anti-sacerdotalist, and persecuted by Catholics and Protestants alike, as they disapproved of civil authority although willing to submit to it. They now exist on the Continent and in U.S.A., about 250,000 altogether.

MENOMINEE (45° 3′ N., 87° 36′ W.), city (and county), Michigan, U.S.A., on Green Bay; ships' lumber. Pop. (1910) 10,507.

MENOMINIE (44° 50′ N., 91° 55′ W.), city, Wisconsin, U.S.A., on Red Cedar River; lumber mills, foundries; trade in grain. Pop. (1910) 5036.

MENORRHAGIA, see GYNECOLOGY.

MENSHIKOV, ALEXANDER DANILOVICH, PRINCE (*c.* 1663–1729), Russ. soldier and statesman; of lowly origin and upbringing; became favourite of Peter the Great; won fame as commander-in-chief of army and as agent of Peter's reforms, but extravagantly corrupt; helped to place Catherine on throne, 1725, and Peter II., 1727; overthrown, 1727.

MENSTRUATION, see GYNECOLOGY.

MENSURATION gives the rules for the measurement of length, areas, and volumes, and shows their practical application. It is based on geometry and trigonometry. In the case of a curve which can be expressed by an equation, the formulæ are best obtained by the integral calculus methods. The commonest rules are :—

Lengths.—Circumference of a circle $= \pi \times$ diameter. $\pi = 3{\cdot}1416$ to four decimal places. Arc of circle = circumference × angle at centre in degrees ÷ 360. Cycloid $= 4 \times$ diameter of generating circle.

Plane Areas. — Triangle $= \frac{1}{2}$ base × height $= \sqrt{s(s-a)(s-b)(s-c)}$, where a, b, c are the side and $s = \frac{1}{2}(a+b+c)$. Other formulæ for area : $\frac{1}{2}\, bc \sin A$; $\frac{a^2 \sin B \sin C}{2 \sin A}$. Rectangle = length × breadth. Parallelogram = base × perpendicular height $= ab \sin A$, where AB $= a$, BC $= b$, and angle DAB $=$ A. Quadrilateral, trapezium, rhombus, or irregular polygons are divisible into triangles. Thus, quadrilateral $= \frac{1}{2}$ diagonal × sum of perpendiculars on it. Rhombus $= \frac{1}{2}$ product of diagonals. Trapezoid $= \frac{1}{2}$ sum of parallel sides × perpendicular height. For regular polygons, multiply (side)^2 by the numbers which follow : pentagon, 1·7205; hexagon, 2·5981; heptagon, 3·6339; octagon, 4·8284; nonagon, 6·1818; decagon, 7·6942. Circle, radius r, $= \pi r^2$. Circular ring $= \pi \times$ sum of radii × difference of radii.

Sector = area of circle × angle of sector in degrees ÷ 360 = ½ radius × arc = ½ (radius)² × angle in radians. Segment less than semicircle = corresponding sector − triangle formed by chord and radii. Ellipse = ·7854 × major × minor axis. Cycloid = 3 × generating circle. Parabola = ⅔ base × height. Some irregular areas can be found by *Simpson's rule*: approximately by the use of paper ruled in known squares. The quickest method is to apply the planimeter or integraph. Similar areas vary as the squares on corresponding sides.

Surfaces.—Sphere = 4 (radius)² × π. Curved surface of zone or segment = height × circumference of sphere. Lune = angle in degrees × area of sphere ÷ 360. Spherical triangle = spherical excess × area of sphere ÷ 720. Cone = base × ½ circumference of base × slant height. Right cylinder = ends × circumference × height. Pyramid = base + sides. Prism = ends + sides. Frustrum of cone = ½ sum of circumferences at ends × slant height.

Volumes. — Rectangular parallelepiped = length × breadth × height. Cube = (edge)³. Parallelepiped, prism or cylinder = area of base × perpendicular height. Sphere = (diam.)³ × ·5236 = ⅙ circum − cylinder. Segment = ·5236 $h(3R^2+h^2)$, where R = radius of base, h = height. Pyramid and cone = ⅓ area of base × height; frustra = ⅓ height × (areas of ends + $\sqrt{\text{product of areas}}$). In gauging, the volume of a cask occupied by liquid is the wet ullage, the remaining volume the dry ullage. For a standing cask less than half-full the mean diameter is estimated as the bung diameter—(dry inches)² × difference of bung and end diameters ÷ (length)²; whence the volume is obtainable. No exact rule can be given for a lying cask. An irregular volume may be determined by finding the amount of water displaced by the body, or by dividing its weight by the weight of a cubic inch of the same substance. For the displacement of a ship or for earthwork the procedure is according to Simpson's rule, where areas of cross sections take the place of ordinates. Volumes of similar bodies vary as the cubes of corresponding dimensions.

MENTANA, see NOMENTUM.

MENTAWEI (2° S., 98° E.), group of islands, off W. coast of Sumatra.

MENTEITH (c. 56° 9′ N., 4° 15′ W.), district, S. Perthshire, Scotland, between Teith and Forth.

MENTHOL, camphor made from oil of peppermint; chief source is *Mentha arvensis*; m. cones produce coldness by evaporation when rubbed on skin, hence use for neuralgia, etc. See TERPENES.

MENTONE (43° 49′ N., 7° 29′ E.), town, France, on Mediterranean; sold to France by Prince of Monaco, 1861; favourite winter resort; produces oranges, lemons, olive oil. Pop. 11,000.

MENTZ, see MAINZ.

MENURA, LYRE-BIRDS (*q.v.*).

MENZEL, ADOLPH FRIEDRICH ERMANN VON (1815–1905), Ger. artist; illustrated *History of Frederick the Great*; brought Realism into Germany.

MENZELINSK (55° 45′ N., 53° 8′ E.), town, Ufa, Russia; large annual fair. Pop. 8000.

MEPHISTOPHELES (Gk. 'he who loves not light') is name given to incarnation of evil. In *Faust* M. is not Satan himself, but his chief minister.

MEPHITIS, Skunk, see WEASEL FAMILY.

MEPPEL (52° 42′ N., 6° 11′ E.), town, Drenthe, Netherlands; dairy produce. Pop. (1910) 11,000.

MEQUINEZ, MEKINEZ (33° 55′ N., 5° 30′ W.), city, Morocco, N. Africa; one of the royal residences; royal burying-place. Pop. 25,000.

MERAN (46° 41′ N., 11° 8′ E.), health-resort, Tyrol, Austria. Pop. (1911) 11,570.

MERCANTILE SYSTEM, the regulation and control by the government of all international commerce. It lasted in England from the reign of Elizabeth to the acceptance of *laissez-faire* in the beginning of the XIX. cent., and its revival is now sought under the name of Tariff Reform. According to the principles of the system, commerce must be conducted as a branch of statesmanship.

MERCATOR, GERARDUS (1512–94), Flemish mathematician; original name, KREMER; studied at Louvain; became lecturer on geography and astronomy; entered service of Charles V. of France; cosmographer to Duke of Juliers, 1559; author of method of projection known by his name, in which meridians and lines of latitude are straight and cut at right angles.

MERCERISING, method of treating cotton so as to give silky appearance; cotton is steeped in solution of caustic soda, and at the same time stretched; soda shrinks material, stretching gives wrinkled silky appearance; discovered by Mercer, and patented, 1850.

MERCHANDISE MARKS, see TRADE MARK.

MERCIA, central kingdom or division of England in olden times, so called because it lay between the remaining Saxon lands and Celtic Wales. Mercians are first mentioned in early VII. cent., when they had already a king. Penda (626–55) established Mercian supremacy, which, after lapses, was restored by Wulfhere (659–75), Ethelbald (716–57), and the great Offa (757–96); culmination under Offa, called *rex Anglorum* by Pope Hadrian I. M. came under Dan. overlordship, 874. Last independent ruler was Ethelfled, 'lady of the Mercians,' who died 918.

MERCIER, HONORÉ (1840–94), Fr.-Canadian statesman; editor of *Courier de St. Hyacinthe*; Solicitor-General in Quebec, 1879; leader of Liberal opposition, 1883; Prime Minister and Attorney-General, 1887–91.

MERCURY, see HERMES.

MERCURY, smallest planet; nearest to sun—mean distance being about 36 million miles; completes a revolution of its orbit in 88 days, and is about 3000 miles in diameter. Professor Newcomb places its mass at $\frac{1}{17}$th that of earth, and density the same as earth's. M. is difficult to see with naked eye owing to proximity to sun; telescopically is of little interest. Faint markings can indeed be seen, but all are indefinite.

MERCURY, QUICKSILVER (Hg = 200·6), liquid metal, occurs native and as *cinnabar*, HgS, at Idria (Austria), Almaden (Spain), California, etc.; obtained by roasting ore ($HgS + O_2 = Hg + SO_2$) and condensing vapour; silvery white, forming spherical globules; 'tails' when impure; purified by dilute nitric acid or distillation; S.G. 13·59, M.P. −38·8°, B.P. 357·2°; slowly vaporises at atmospheric temperature, vapour monatomic; very slowly oxidised to HgO by heating in air; used for thermometers, barometers, etc., for collecting soluble gases, for mirrors and amalgams, and in electrolytic production of caustic soda; forms two series of compounds: mercurous and mercuric; probably divalent in each.

Mercurous oxide, Hg_2O, black powder.

Mercurous chloride, Hg_2Cl_2, *calomel*, prepared by sublimation: $HgCl_2 + Hg = Hg_2Cl_2$, white, tasteless, insoluble in water; dissociates when vaporised ($Hg_2Cl_2 = Hg + HgCl_2$) unless absolutely dry; used in med.

Mercurous nitrate, $Hg_2(NO_3)_2 + 2H_2O$, from cold, dilute nitric acid and mercury.

Mercuric oxide, HgO (Hg = O), 'mercurius calcinatus,' red precipitate; brick-red scales by ignition of nitrate, yellow by precipitation; decomposed by heat: $2HgO = 2Hg + O_2$.

Mercuric chloride, $HgCl_2$, *corrosive sublimate*; from common salt and mercuric sulphate ($HgSO_4 + 2NaCl = HgCl_2 + Na_2SO_4$).

'White precipitate,' from mercuric chloride and ammonia, is $NHgH_2Cl$.

Mercuric iodide, HgI_2, scarlet precipitate.

Mercuric sulphide, HgS, cinnabar, vermilion; black when precipitated.

Mercuric sulphate, $HgSO_4$, white powder.

MERCURY, DOG'S (*Mercurialis*), genus of plants, order Euphorbiaceæ; *M. perennis* or Common Dog's Mercury, a greenish flower, is poisonous.

MERCY, FRANZ, FREIHERR VON (d. 1645), Ger. general in Thirty Years War; defeated French at *Tuttlingen* and made general field-marshal, 1643; defeated at *Freiburg*, 1644; great victory of *Marienthal*, 1645; slain at *Nördlingen*, 1645. Nephew, CLAUDIUS FLORIMOND, COUNT MERCY DE VILLETS (1666–1734), distinguished field-marshal.

MEREDITH, GEORGE (1828–1909), Eng. novelist and poet; b. Hampshire; issued *Poems*, 1851, and *The Shaving of Shagpat*, a burlesque tale, 1855. The first of his great novels, *The Ordeal of Richard Feverel*, appeared, 1859; then followed *Evan Harrington* (1861), *Adventures of Harry Richmond* (1871), *Beauchamp's Career* (1875), *The Egoist* (1879), *Diana of the Crossways* (1885), *One of our Conquerors* (1891), *The Amazing Marriage* (1895).

M. is an acknowledged master of fiction; his psychological studies are great; his fiction is philosophy made readable.

MEREDITH, OWEN, *nom de plume* of 1st Earl Lytton (*q.v.*).

MERGANSER, see under DUCK FAMILY.

MERGENTHEIM (49° 29′ N., 9° 46′ E.), town on Tauber, Württemberg, Germany; mineral springs; seat of grand master of Teutonic Order, 1525–1809. Pop. 4500.

MERGUI.—(1) (12° 29′ N., 98° 31′ E.) town, Tenasserim, S. Burma; pearl trade. Pop. 14,000. (2) district, has area of 9790 sq. miles; forested; produces rice, tin. Pop. 95,000.

MERGUI ARCHIPELAGO (12° 26′ N., 98° 35′ E.), group of islands, in Bay of Bengal, Lower Burma. Pop. 12,000.

MERGULUS, Little Auk, see under GUILLEMOT AND AUK FAMILY.

MERIDA.—(1) (20° 50′ N., 89° 35′ W.) city, capital of state Yucatan, Mexico; cathedral; several educational institutions; exports sisal fibre; manufactures straw hats, hammocks, cigars. Pop. (1910) 62,000. (2) (38° 52′ N., 6° 22′ W.) town, Spain; chiefly famous for fine Rom. remains, which include large bridge, triumphal arch, theatre, and temple. Pop. 11,168.

MERIDEN (41° 32′ N., 72° 46′ W.), city, Connecticut, U.S.A.; plated ware; cutlery. Pop. (1910) 27,265.

MERIDIAN (32° 15′ N., 88° 26′ W.), city, Mississippi, U.S.A.; extensive cotton manufactures. Pop. (1910) 23,285.

MÉRIMÉE, PROSPER (1803–70), Fr. novelist; fought against sentimentalism of other members of early Romantic movement; chief productions short stories, full of imagination, wit, and art, which place his works among chief masterpieces of his cent. Among his chief novels are *Colomba* (1840), *Carmen* (1847), *Chronique du Règne de Charles IX.* (1829), *Matteo Falcone* (1829); characterised by elaborate simplicity, frankness, and cynicism, shown by Maupassant and Anatole France later; chief Romantic effect that of horror, exemplified in *Lokis*; as Inspector of Historical Monuments of France pub. *Voyages Archéologiques*; posthumous *Lettres à une Inconnue*, a lady who has been identified, produced great sensation and curiosity.

MERINO, breed of sheep originally introduced from Africa into Spain; now found in Australasia, Cape of Good Hope, etc.; has short wool; ewes usually hornless; frequently cross-bred with other varieties.

MERIONETH (*c.* 52° 50′ N., 3° 50′ W.), coast county, N. Wales; area, *c.* 668 sq. miles; surface rugged, reaching heights of over 2900 ft.; among highest peaks is Cader Idris; drained by Dee, Dovey, and other streams; capital, Dolgelly. M. has an excellent breed of ponies; sheep reared; has slate and limestone quarries, manganese ore; manufactures woollens. Pop. (1911) 45,573.

MERIVALE, CHARLES (1808–93), Eng. historian; Dean of Ely, 1869; pub. *History of Romans under the Empire*, 1850–62; valued for its style; little contribution to research; member of Apostles' Club.

MERKARA (12° 26′ N., 75° 47′ E.), capital of Coorg, Brit. India.

MERLE D'AUBIGNÉ, see AUBIGNÉ.

MERLIN, bard of Welsh legend; was a son of the devil and an unwilling human mother, and was intended by the infernal powers to be the great Antichrist. The mother, however, had him baptized, and he became a Christian, but retained his magical powers. His prophetic gifts were soon enlisted in the favour of the kings of Britain; through him Uther-Pendragon won his bride, the mother of Arthur, and M. until he finally disappeared from the earth is Arthur's counsellor.

MERLIN, a member of HAWK FAMILY (*q.v.*).

MERLIN 'OF DOUAI,' PHILIPPE-ANTOINE, COUNT (1754–1838), Fr. statesman and jurisconsult; pres. of Convention and member of Committee of Public Safety, 1793; one of Directory; used influence on side of moderation when safe to do so.

MERMAIDS AND MERMEN, in folk-lore sea-dwelling beings, half human, half fish. The mermaid is usually represented as a beautiful woman to the waist, but having a fish tail; she has exceptionally fine hair, which she combs with a golden comb and studies in a golden mirror. Mermaids were sometimes supposed to wed mortal men, and mortal maids were sometimes enticed to the sea by mermen.

MERODACH, see MARDUK.

MEROË, 'ISLE' OF (15° 30′ N., 34° E.), district, S. Nubia, almost surrounded by Nile, Blue Nile, and Atbara; contains ruins of Meroë, capital of ancient Ethiopia.

MEROVINGIANS, first Frank dynasty; named from ancestor Merovech, almost mythical ruler of V. cent.; ruled until 751, when throne was seized by Pippin, founder of Carolingian dynasty. See FRANCE (*History*).

MERRILL (45° 12′ N., 89° 40′ W.), city, Wisconsin, U.S.A., on Wisconsin; trade in lumber. Pop. (1910) 8689.

MERRIMAC (43° N., 71° 30′ W.), river, New Hampshire and Massachusetts, U.S.A., formed by union of two streams at Franklin, New Hampshire; falls into Atlantic at Newburyport.

MERRIMAN, HENRY SETON, pseudonym of HUGH STOWELL SCOTT (1863–1903), Eng. novelist; among novels are *The Last Hope* and *Barlasch of the Guard*.

MERSEBURG (51° 21′ N., 12° E.), town, on Saale, Prussian Saxony, Germany; cathedral and castle; machinery and leather. Pop. (1910) 21,231.

MERSEY (53° 20′ N., 2° 55′ W.), Eng. river; rises in N.W. Derbyshire, flows westward, and falls by an estuary into Irish Sea; length, 70 miles; navigable to mouth of Irwell.

MERSINA (36° 45′ N., 34° 30′ E.), seaport, vilayet Adana, Asia Minor. Pop. 10,000.

MERTHYR TYDFIL (51° 45′ N., 3° 22′ W.), town, Glamorgan, S. Wales; great coal, iron, and steel centre; one of most important iron-smelting towns in country. Pop. (1911) 80,999.

MERV (37° 32′ N., 62° 21′ E.), oasis, Asiatic Russia; taken by Russia, 1884; produces cereals, fruit; live stock raised. Pop. 175,000. Ancient town of MERV dates back to time of Alexander the Great; it belonged successively to Parthians, Arabs, Seljuks, Mongols, Uzbegs, Persians, Bokharians, Turkomans, Russians; new town has pop. 9000.

MÉRYON, CHARLES (1821–68), etcher; b. Paris; s. of an Eng. doctor; died insane; excelled in etchings of Parisian street scenes and buildings.

MESHED (36° 15′ N., 59° 41′ E.), walled town, Khorasan, Persia; has magnificent mosque, which contains sacred shrine of Imam Reza, annually visited by many pilgrims of Shiite sect; manufactures carpets, shawls; formerly an important trade centre. Pop. *c.* 60,000.

MESHED ALI, see NEJEF.

MESMER, FRIEDRICH ANTON (1733–1815), Austrian physician; interested first in astrology and magnetism; promulgated his theory of animal magnetism, believing in the existence of a force in the atmosphere and in himself, with a strong influence on other persons, through which he professed to cure disease; posing as a magician, had great success in Paris, but his theories were eventually discredited. See HYPNOTISM.

MESOPOTAMIA (*c.* 35° 30′ N., 41° 30′ E.), region, Asia. M. is so called from its situation between the two great rivers, Tigris and Euphrates, and in prehistoric times was a centre of radiation of population, racial traits and traces of its religious cults being found in the early races of Egypt, as represented in the inscriptions of the Great Pyramids. In historic times it was divided into the great kingdoms of Babylonia and Assyria (*q.v.*). It was thus an early centre of Sumerian civilisation at the time when it was invaded by the Semites; formed part of empire of Sargon of Akkad, who died *c.* 3800 B.C., and was included in dominions of Babylon under king of first dynasty in III. millennium B.C.; was among dominions of second Assyrian empire in XIII. cent. B.C., and in VII. cent. was again held by Babylonians, from whom it was subsequently taken by the Medes; conquered by Cyrus of Persia *c.* 538 B.C., and was included in conquests of Alexander the Great *c.* 330 B.C.; was among dominions of Parthia under the Arsacid king, Mithridates the Great, II. and I. cent's B.C.; taken by Romans under Trajan, 115 A.D.; conquered by Sapor of Persia, 258; by Emperor Galerius, 298; was part of Arabian empire in VII. cent., and was included in dominions of the caliphs; overrun by Mongols in XIII. cent.; taken by Turks, 1516.

M. has area *c.* 55,000 sq. miles; surface generally level, most of it of extraordinary fertility when under good cultivation; drained by Khabur, Belikh, and other tributaries of Euphrates. Historic towns are Edessa, Nisibus, Harran, Mosul, Diarbekr. M. produces cereals, fruits, cotton, tobacco; live stock raised; climate is very hot in summer.

Baedeker, *Palestine and Syria* (1906); Le Strange, *Lands of Eastern Caliphate* (1905).

MESOZOA, small group containing a few simple and minute animals, which consist of an outer layer of ciliated cells surrounding a varying internal mass. The majority are parasitic in the bodies of Cephalopods, Turbellarian and Nemertean worms, and Brittle-stars. Most authors regard them as lowly Metazoa, linking these to Protozoa, but some consider their relationship to be with Trematode worms.

MESSALLA CORVINUS, MARCUS VALERIUS (64 B.C.–A.D. 8), Rom. general; took republican part against Cæsar; deserted it after *Philippi*, 42; consul, 31; suppressed Aquitanians and enjoyed triumph, 27; distinguished patron of letters; writings lost.

MESSAPII, tribe of ancient Italy; dwelt originally in Calabria, which was also called *Messapia*. All that is known of their language is found in a certain number of inscriptions which were collected by Mommsen. According to Herodotus they defeated the Greeks of *Tarentum*, 473 B.C., and were traditionally subjects of Minos, king of Crete.

MESSENE, a strongly fortified city of ancient Messenia, founded by Epaminondas, 369 B.C., and situated at foot of hill of Ithome.

MESSENIA (*c.* 37° 10′ N., 21° 55′ E.), nomarchy, Greece; settled by Dorians in early times; conquered by Sparta, VIII. cent. B.C.; Messenians rose in rebellion in VII. cent. and again in 464, after which most of them were exiled; returned in 371 B.C., and remained an independent community till coming of Romans, 146 B.C. Pop. 127,991.

MESSIAH (in New Testament, *Messias*) is from the Gk. form of the Hebrew—'the anointed one.' From early times anointing has been thought to convey a sacred character (compare the anointing at the coronation of Eng. kings), and priesthood and kingship were at first intertwined. The idea of Messiahship among the ancient Hebrews only appears after the exile, when the monarchy was no longer and a national redeemer was looked for. It grew in intensity under foreign domination, and in the two cent's before the birth of Christ the expectation of a Messiah-King was part of the circle of eschatological ideas. A suffering Messiah was not expected, hence the difficulty for Jews in accepting Christianity. The belief in the future coming of a Messiah is still part of the creed of every orthodox Jew. The Messianic expectations are shown specially in the *Psalms of Solomon*. Belief in a Messiah has existed far outside Judaism. It appears in the ancient Indian Scriptures, and the Babylonian god, Marduk, has Messianic attributes. Parallels likewise exist elsewhere—even among the North Americans.

Drummond, *Jewish Messiah*; Stanton, *Jewish and Christian Messiah*; Oesterley, *Evolution of the Messianic Idea*.

MESSINA (38° 12′ N., 15° 33′ E.), fortified seaport, Sicily, Italy; capital of province M.; on Strait of M.; had several fine churches, Villa Rocca Guelfonia, museum, univ. (1549), excellent harbour, etc. Ancient *Zancle* (the Sickle), was founded *c.* 732 B.C.; successively conquered by Carthaginians, Romans, Saracens, Normans, Spaniards (1282), and Italians (1860); destroyed by earthquake, 1783; and again, Dec. 28, 1908; chief industries—muslin, silk, linen, coral ornaments, essences; exports oranges, lemons, citrons, wine, almonds, walnuts, pumice-stone, etc. Pop. (1911) 126,172. Province of MESSINA has area of 1245 sq. miles. Pop. (1911) 514,851.

METABOLIC DISEASES is a general term including such functional disturbances as affect the general nutrition of the body. See CRETINISM, DIABETES, GOITRE, GOUT, MYXŒDEMA, RICKETS, RHEUMATISM.

METABOLISM, term applied to the chemical changes which take place in living cells, by which energy is provided for vital activity. See PHYSIOLOGY, ANIMALS.

METAL (Lat. *metallum*, a mine or quarry), from a chemical point of view, an element which can be replaced by hydrogen in an acid and thus form a salt. The chief characteristics of m's are that they are heavy, opaque, insoluble in water, solid (except mercury), fusible by heat or electricity (of which they are good conductors), and capable of uniting with acids and forming salts. Many m's are malleable, some ductile. Some are found in their virgin state, and pure, but they are more generally combined with oxygen sulphur, and are then known as *ores*. The under-mentioned are generally regarded as the chief m's: aluminium, antimony, barium, bismuth, cadmium, calcium, chromium, cobalt, copper, gold, iron, lead, lithium, magnesium, manganese, mercury, nickel, palladium, platinum, potassium, silver, sodium, strontium, thorium, tin, uranium, zinc. The most malleable are gold, silver, copper, tin, lead, zinc, platinum, and iron.

Metallic oxides are solid bodies,—white, black, or coloured,—and oxides of the m's with which their name is associated, as iron-oxide.

Metallography is the study of the internal structure of metals and alloys in relation to the composition and properties. The methods are twofold—thermal and microscopic. The *thermal* method consists in observing and mapping curves of the rate of cooling of the fused material, to discover changes of state, and interpret the phenomena by the phase rule. The *microscopic* method consists in the examination of the illuminated surfaces of prepared slabs of metal by microphotography; characteristic crystalline markings are thus recorded. The results are of much scientific and technical value.

Metallurgy is the science of the properties of metals and the means by which they are extracted from their ores. These properties are: density, fusibility,

tenacity, elasticity, ductility, malleability, conductivity. Metals may occur native (uncombined), or as oxides, sulphides, carbonates, etc. The processes of extraction generally include crushing the ore, roasting to oxide, if possible, and smelting in a furnace with fuel to reduce oxide to metal. Fluxes remove gangue as slag; lastly, the metal is refined. Practical details include the construction of furnaces, lined with suitable refractory materials, and the preparation and valuation of the solid or gaseous fuels to be employed. See ELECTRO-METALLURGY.

METAL-WORK.—The metals mostly used for art metal-work are gold, silver, bronze, iron, and lead. Copper and tin have been employed alone, but their great use has been in forming bronze. The adaptability of gold and silver for almost any treatment has led to their use for the finest work, bronze being used chiefly for casting. The main use of iron is in large work requiring strength along with lightness. Metals are worked principally by casting or by hammering and punching. More metal is used in casting than in hammering, and therefore casting has been employed more for bronze than for the costlier metals.

The earliest *castings* were made by pouring fluid metal into moulds of clay, sand, or stone, and were therefore solid. This involved an unnecessary expenditure of metal, and later a saving was effected by using an iron core. Finally, castings became little more than a thin layer of metal round a clay core. In early *hammer-work* a block of wood was cut roughly into the desired shape, and the metal was hammered over it. A later and more satisfactory method was that of laying the metal upon an elastic mixture of pitch and pounded brick, and beating it from the back. This method was employed with bronze by the Greeks and the Assyrians, and with precious metals by the workers of the Middle Ages. Little is definitely known of the earliest Gk. work, but according to Homer the ancient Greeks had great skill in working bronze and the precious metals. Hammer-work appears to have been used first, but later it became chiefly confined to gold and silver. The Greeks frequently ornamented their bronzes with inlays of gold, silver, or precious stones. The Romans were skilful workers, but largely imitated the Greeks. After the fall of the Rom. Empire, Byzantium became the centre of the art, and Byzantine artists executed the gold and silver work for St. Peter's, Rome, during the VI.–VIII. cent's, and the wonderful gold and enamel work on the altar front in St. Mark's, Venice. XI.-cent. Byzantine workers also produced fine bronze work, especially cathedral doors. Ital. artists gradually learnt Byzantine methods, and their work became celebrated. The magnificent gilt-bronze candelabrum in Milan Cathedral dates from the XIII. cent., and every description of metal-work was produced by the Florentine artists of the XV. cent.—notable examples being Ghiberti's doors in the Baptistery, Florence.

In England, fine ecclesiastical work in precious metals was done in Saxon times, and XIII. cent. wrought-iron work was specially good. Amongst Ger. work the cast-bronze doors of the X. and XI. cent's, and the bronzes of the XV.-cent. Augsburg and Nuremberg workers are famous. In France the Limoges artists were remarkably expert in all kinds of metal work, particularly enamel-ornamented brass, and Fr. designs for decorative doors became celebrated. In the time of Shah Abbas the Great, 1585–1628, Pers. work reached a high standard, especially gilt brass work with inlays of gold and silver. During early Victorian times metal work in England fell to a low level. The foundation of a revival was laid largely by the efforts of the Prince Consort, and the publication of a treatise by Digby Wyatt, but it is only during comparatively recent years that a modern school of art metal-work has come into being, producing work in new combinations of metals, with coloured wax, stained ivory, enamel, etc. Modern Fr. work is distinguished by its great refinement, and Jap. and Chin. work still maintains its excellence, but is in danger of losing something of its unique individuality through Western influences.

METAMERES, see under METAMERISM.

METAMERISM.—The body of some bilaterally symmetrical animals is divided into successive segments, *i.e.* divided into segments or *metameres*, similar chambers of the body cavity in which organs are repeated. This is most noticeable in the Annelid Worms, *e.g.* Lobworm and Earthworm, where the body is marked off into rings, five of which typically form a segment or *arthromere*, the beginning of which is indicated by the presence of appendages, gills, or sense organs. In each segment is a section of the alimentary tract, and often a pair of nephridia or testes, accompanied by a repetition of the nervous and blood-vascular systems. M. in the Vertebrate body is more obscure, each segment being known as a *diarthromere*.

METAMORPHISM, a name used to describe the change which takes place in certain rocks when subjected to subterranean heat, extreme pressure, or to chemical action. Both their structure and mineral character are altered, and they lose their original sedimentary nature and become hard, shining, and crystalline, being, in fact, transformed into entirely new types. Thus limestone may be changed into marble, granite into gneiss, coal into graphite, etc. Such rocks (metamorphic) occur on the Azoic strata and contain neither animal nor vegetable remains, and are therefore sometimes called the non-fossiliferous rocks. Percolating water is another agent by which rocks may be changed, as is the weathering of exposed rocks. All these changes take place gradually, and although a large number of metamorphic rocks are sedimentary, yet there is almost an equal number which are of igneous origin.

The term *Metamorphic* was introduced by Sir Charles Lyell, and is now generally adopted by geologists, to describe the deepest system of rocks composing the earth's crust and consisting of crystalline schists, and including granitoids, gneiss, quartz, mica-schist, and clay-slate, etc. M. rocks have a well-defined character, are of great thickness, and cover large areas in many parts of the globe.

METAMORPHOSIS.—Though formerly more generally used in treating of development, this term is now restricted to a series of changes from egg to adult, where, to meet a special environment, the introduction of an intermediate or larval stage is necessary in the life-history of a species. The occurrence of a *larva* is general in aquatic forms, especially when marine, but is rarer in terrestrial animals, insects being the most specialised in the last group. Among aquatic larvæ we find the Pilidium of Nemerteans, the Bipinnaria of Starfishes, the Pluteus of Sea-Urchins and Ophiurids, the Auricularia of Sea-Cucumbers, the Trochosphere of Worms and Molluscs, the Cipris, Mysis, Nauplius, Zoëa, and Megalopa of Crustacea. The Tadpole larva of Frog is of interest, as pointing to the transition from aquatic to aerial respiration as a step in Vertebrate evolution. The development of the Ascidian larva is an interesting case of retrogressive m., the highly organised Tadpole degenerating into a simple adult. M. is carried to its highest point among insects, where such a complete reconstruction of the wormlike larva is necessary before reaching the imago or perfect insect, that a quiescent or *pupal* stage is required. When an insect has no m. it is *ametabolic*, when it has an incomplete m. with larval but no pupal stage, it is *hemimetabolic*, when it has a full m. with larva and pupa, it is *holometabolic*. See also LARVAL FORMS.

METAPHOR, figure of speech in which one thing replaces another resembling it, *e.g.* 'He was a lion in the fight.' A SIMILE introduces a comparison, *e.g.* 'He fought like a lion.' In a *mixed metaphor* the images are confused, *e.g.* 'To take arms against a sea of troubles.'

METAPHYSICAL POETS, term applied by Dr. Johnson to the Donne school of poets, who strove to catch a meaning 'after the physical': Crashaw, the

worst offender, shows the school's fanciful conceits at their worst when he writes of a lady's eyes as 'Walking baths, compendious oceans.' Cowley was one of them.

METAPHYSICS, the inquiry into the nature of Being and of the fundamental ideas connected with it. In its widest usage M. includes *Ontology* and *Epistemology*. Kant limits it to the latter. Wolff divides m. into ontology, dealing with existence in general, and rational psychology, cosmology, and theology, the sciences respectively of the nature of the soul, the world as a whole, and of God. The term itself is taken from the position after the Physics of Aristotle (*meta ta physika*), of a treatise dealing with 'being as being,' i.e. ontology. This ontological inquiry into the nature of the unity behind the multiplicity of phenomena was the main pursuit of the Gk. metaphysicians. Later thinkers have inquired into the process of knowing. Nevertheless, modern m. tends to return to the Gk. inquiry into being as being, for the theory of knowledge of the epistemologist must at the same time also be a theory about things as being.

Gk. speculation, in the pre-Socratic period, belongs to the Ionic, the Eleatic, and the Pythagorean schools. The earliest, the IONIANS, natives of Gk. colonies on the Ægean Sea, sought a physical unity underlying the universe, basing their conception on an examination of facts of the world. Thus Thales (VI. cent. B.C.) finds the origin of all things in Water, Anaximander in the 'Infinite,' Anaximenes in Air, Heraclites (fl. 500 B.C.) in a universal cycle to and from 'Cosmic Fire.' The PYTHAGOREANS, following Pythagoras of Samos (575–500 B.C.), found the key to the universe in number and proportion, which determine the nature of each thing whatever we take as its original matter. The ELEATICS, of Elea in S. Italy, unlike the Ionians, sought a notional principle of unity, which they derived from religious reflections on the nature of God. Its founder, Xenophanes (b. 570), affirms the government of all things by an effortless exercise of God's thought; Parmenides, in opposition to Heraclitus, denies change and variety and maintains the indestructibility of matter. This divergence between the Ionian and the Eleatic views of nature influenced the philosophers who followed. Empedocles of Agrigentum (*c.* 500 B.C.), Anaxagoras (500–428 B.C.), and the Atomists, Leucippus and Democritus (b. 460 B.C.), accepted the Eleatic immutability of matter, but not its absolute oneness; the Ionic 'becoming' is explained as due to the mixture of a number of unchangeable substances. Empedocles affirms four elements—Air, Earth, Fire, Water, united under the influence of Love and Strife. Anaxagoras conceives a number of 'seeds' of different kinds of matter, with 'Nous,' or Intelligence, as the combining principle. This leads to the *atomic theory* of Democritus, according to whom, bodies are composed of indivisible, unchangeable atoms, solid, incompressible, having no secondary qualities, differing only in figure, position, arrangement, and weight. After the Atomists. Gk. thought becomes sceptical of our ability to determine the existence or attributes of God and nature. The PRE-SOCRATICS, however they differ in their metaphysical views of being, agree in their epistemology; they are all SENSATIONALISTS, taking account only of sensation, which they take to proceed in us in a material fashion. The SOPHISTS, Protagoras (490–415 B.C.), and Gorgias (480–375 B.C.), keep so closely to the subjective standpoint of individual experiences that physical science having objective validity seems impossible; hence they devote themselves to practical affairs.

SOCRATES (469–399 B.C.) holds that knowledge is possible, but only of men as a moral agent; in this sphere, he aims at concepts scientifically true, definitions reached by generalisations from particulars. PLATO (427–347 B.C.) unites the Heraclitean 'becoming' with the Eleatic being and the Socratic 'Definition.' The senses are unreal, yet participate in being, since the sensible objects are copies of eternal ideal bodies. With these archetypes, the soul was familiar in a previous existence, learning being thus merely a process of remipiscence. God is the highest Idea, and forms the universe by impressing the ideas on to the formless matter. According to ARISTOTLE (384–322 B.C.) matter is mere potentiality, a capacity for existence, to which actuality is given by 'form,' or the essence of things. In Plato and Aristotle are found the highest development of Gk. m. After them, speculation forms part of the general thought of civilisation due to the fusion of the Mediterranean peoples under the Rom. power. The materialism of Democritus is revived by the EPICUREANS and STOICS, though the former grant to the atoms, in order to explain the formation of the world, power to swerve from the straight line. The NEO-PLATONISTS of Alexandria attempt to combine Platonism with Christianity. Gk. thought reaches Arabia (see ARABIAN PHILOSOPHY) through the expulsion of the Nestorians from Syria in the V. cent. The speculations of the PATRISTICS and of SCHOLASTICISM (*q.v.*) are an attempt to unite the thought of Plato and Aristotle with Christianity.

Modern Metaphysics approaches the problem in a different way from the ancient. Aristotle inquired the nature of being as being, not always making clear whether we can really know the things whose existence he affirmed. Modern metaphysicians, on the other hand, ask rather what are the things we know, and thus treat ontology in close connection with epistemology, the theory of knowledge.

According to the importance placed on matter and mind, modern metaphysical systems may be classed as *Materialistic* or *Idealistic*, with *Realism* as an intermediate doctrine. MATERIALISM, in its modern sense, holds that all we can know is body, of which mind is a function. Its development in the middle of the XIX. cent. is due to the rapid advances in science, under Lavoisier, Lamarck, Laplace, and Lyell, in commerce, manufactures, and industrialism. Its leading exponents of this period are Moleschott, Vogt (who taught that thought is related to the brain in the same way as the bile to the liver), and Büchner, with his doctrine of life as due to the spontaneous generation of certain combinations of matter under favourable circumstances. More recently, Haeckel has identified substance with body, of which mind is an attribute, and has traced the evolution of all organisms from a single cell originated by spontaneous generation from inorganic carbonates. Conscious soul is a mere function of brain; soul is a function of all substances; God is the force or energy of nature. Tendencies towards materialism are found in Comte's denial of God and the soul, in Spencer's definition of evolution, and in the writings of Huxley and Tyndall.

Metaphysical IDEALISM, which affirms that objects of knowledge are mental, develops, from Descartes to Fichte, out of the psychological idealism according to which we perceive only mental objects. The *dualism* of Descartes (*q.v.*) tends to idealism through the emphasis placed on the will of God; Spinoza's *pantheism* does not reduce extension to thought, but only affirms the same substance as at once extended and thinking; Leibnitz comes nearer metaphysical idealism with his doctrines of monads, simple, indivisible, unextended substances, capable of perception and appetite. In England, Locke's reference of primary qualities to external things is followed by Berkeley's doctrine of ideas as the objects both of perception and of knowledge, and by Hume's denial of substantial souls. Kant teaches the combination by the synthetic understanding of a world of sensation into phenomenal objects of experience (*Transcendental Idealism*). Fichte takes the final step by denying things in themselves and making the not-self the product of the Ego. This is *Noumenal Idealism*; the mental things we know are not mere phenomena of sense, but noumena. After Fichte are various forms of Idealism, varying in their definitions of what the noumenal mental world consists of. Schelling identifies the noumenal

Subject and Object; these are products of the Absolute which is known by an intellectual intuition; Hegel affirms the differentiation of Absolute Reason into Subject and Object, and the identity of both; according to Schopenhauer, the world as phenomenal is idea, as noumenal, will; with von Hartmann, the world as noumenal is both unconscious intelligence and unconscious will; Lotze regards nature, or bodies moving in time and space, as a system of phenomena caused in us by the activity of God, but as in itself the system of the universal actions of God's infinite spirit aiming at a supreme Good; Fechner sees in the universe a communion of spirits; the souls of plants, animals, men, are different members of the soul of the world (*Panpsychism*). Later Germans, Lange and Mach, returning respectively to Kant and Hume, hold that we perceive at first and know finally only phenomena of sense (*Phenomenal Idealism*). In England, Hume's phenomenalism has influenced the Mills, Bain, and Spencer; Kant and Hegel have found interpreters in Caird, Green, Bradley, Laurie, and Martineau. Recently, a school of Personal Idealists (Pringle-Pattison, Schiller, Hastings Rashdall), protest against all Idealist systems which merge all minds in one, and thus exclude personality and responsibility; we have in consciousness a sure proof of a real and indivisible self (see *Personal Idealism*, Oxford, 1902).

Metaphysical REALISM regards both mind and body as substances. Descartes and Locke are Psychological Idealists, but Metaphysical Realists. In Germany the leading Realists are Trendelenburg (1802–72), Dühring, Günther (1783–1863), and von Kirchmann (1802–84). In France, the *Spiritualistic Realism* of Cousin (*q.v.*) lays stress on spirit rather than on body. Brit. Realism is represented by the Scot. philosophers, Reid, Stewart, Hamilton, and more recently by Mansel, Veitch, and Calderwood; an immediate perception is affirmed of an external world, taken to consist of matter, not of ideas. The *Hypothetical Realism* of Shadworth Hodgson (1832–1912), Martineau, and A. J. Balfour supposes that we infer a material something on perceiving a mental something.

Metaphysical systems may also be classified as *monistic* or *dualistic*, according as they affirm one or two forms of reality. Those who believe only in mind and those who believe only in body are equally monists; thus Spinoza is a materialistic monist, Hegel an intellectualistic. Monism and dualism are not really opposed, since conceivably one kind of reality may be neither body nor soul entirely, *e.g.* the Realism of Aristotle is a monism of substance and a dualism of body and soul. Dualism may affirm either that mind and matter are absolutely heterogeneous, with no causal relation between them, or that mind cannot know matter in itself, though compelled by its own laws of cause and effect to assume matter as the origin of sensations. A third term, *pluralism*, assumes more than one principle of being.

Ladd, *Introduction to Philosophy*.

METAPONTUM, colony in Italy, founded by Achæans, *c.* 700 B.C.; inhabitants aided Hannibal and fled with him, 207 B.C. Pythagoras taught here.

METASOMATISM, a process in which the chemical composition of rocks is altered or modified; generally caused by water or steam; often forms new minerals, or changes rocks of igneous character into massive quartz. Of all rocks perhaps limestones are most subject to m., owing to their solubility in water.

METASTASIO, PIETRO, TRAPASSI (1698–1782), Ital. poet; b. Rome; protégé of Rom. lawyer, who left him his wealth; 'discovered' by La Romanina, the great singer, he became world-famous as writer of librettos, his plays being set to music; app. Court Poet at Vienna, 1729, where he died. His plays, all written on classical themes, have been translated into English.

Life, by Fanny Burney (3 vols., 1796).

METATHERIA, see MARSUPIALS.

METAURUS (43° 47′ N., 13° E.), small river, Umbria, flowing into Adriatic; modern Metauro; on its banks Romans defeated Carthaginians, 207 B.C., Hasdrubal being killed.

MÉTAYAGE SYSTEM, the payment by the farmer of a fixed proportion of the crop as rental instead of money; still very common in Italy, Austria, Portugal, and Russia.

METELLUS, name of Rom. family of *gens Cæcilia*. Chief members: (1) LUCIUS CÆCILIUS METELLUS, who distinguished himself in first Punic War, 251 B.C., and rescued Palladium from flames in temple of Vesta.—(2) QUINTUS CÆCILIUS METELLUS MACEDONICUS (d. 115 B.C.), who made Macedonia a Rom. province; one of first two plebeian censors, 131.—(3) QUINTUS CÆCILIUS METELLUS NUMIDICUS, consul, 109, defeated Jugurtha in Numidia.—(4) QUINTUS CÆCILIUS METELLUS PIUS, consul, 80.—(5) QUINTUS CÆCILIUS METELLUS PIUS (Scipio), s. of Scipio Nasica; adopted by (4); Pompey's f.-in-law.

METEMPSYCHOSIS, called popularly **Transmigration of Souls**, the belief that our life here is only one of a series of incarnations in the past and future. A human soul can so inhabit the body of another human being or an animal. It is very prominent in Hinduism, whence it has been taken over by Western theosophists, but it is generally regarded as unscientific and as unchristian.

Bertholet, *Transmigration of Souls*.

METEOR.—Meteors, commonly known as 'shooting stars,' are dark bodies, revolving around the sun, or drawn to solar system from outer space, which happen to meet the earth. Their rate of travel is so great that the friction caused by their passage through our atmosphere renders them incandescent, and we on earth, below, see a streak of light in heavens. It is supposed that they commence to glow at a height of about 80 or 90 miles, and move at a speed of anything up to 20 miles a second. They seldom get nearer than 10 or 15 miles from earth's surface, and are very small bodies, as a rule not weighing more than a few ounces, if so much. See METEORITES.

Meteoric Showers.—On certain nights a greater number of meteors are seen than at ordinary times, and these are known as meteoric showers. While meteors are solitary stray bodies, meteoric showers are caused by swarms of meteors moving in orbits round the sun, which orbits intersect that of the earth, and when the earth happens to be at the point of intersection at the same time as the meteor swarm, a meteoric shower is seen. Connection has been established between certain swarms and comets, and it is believed they are really the débris of disintegrated comets.

The principal meteoric showers, with the constellations from which they radiate, are as follows:—

Quadrantids	Jan. 2, 3.	from Corona Borealis.
Ursids .	Mar. 24.	Ursa Major.
Lyrids .	Apr. 20–23.	Lyra.
Perseids .	Aug. 10–14.	Perseus.
Leonids .	Nov. 13–15.	Leo.
Andromedids	,, 17–23.	Andromeda.
Germinids	Dec. 10–12.	Gemini.

METEORITES (Gk. *meteoros*, 'raised up on high'), masses of mineral matter which sometimes fall to earth from the sky. M's are divided into three classes: (1) *Siderolites*, composed of iron and stone; (2) *siderites*, composed chiefly of iron; and (3) *aërolites*, composed entirely of stone. Some of these bodies weigh many pounds, whilst others have been found (but none actually seen to fall) weighing tons; from the composition of these latter there is no room for doubt that they have an origin of this nature. A curious fact is that no fossil meteorites have ever been discovered. Many m's may be seen in our museums, and perhaps the best known of all is the Rowton siderite, which weighs 7¾ lb. This specimen is now in the Natural History Museum, South Kensington. It fell to earth some 10 miles N. of the Wrekin, Shropshire, on April 20, 1876.

Fletcher, *Introduction to Study of Meteorites*.

METEOROLOGY is the science which deals with the physics of the atmosphere, particularly in its relation to weather and climate. The meteorological elements whose study is thus included are the temperature, pressure, and humidity of the air; the direction and speed of the wind; the amount of rainfall, including snow and hail; the duration of bright sunshine; the nature, amount, and motion of the clouds; the occurrence of such phenomena as thunderstorms, aurora, etc. Now the *atmosphere* is a gaseous envelope, subject to gravity, lying on a spheroidal surface, of which three-fourths is water and one-fourth is land, and on which the distribution of water and land is unsymmetrical. Further, this surface is in rotation on its axis at a comparatively high speed. Lastly, the atmosphere is affected directly and indirectly by solar radiation. This brief statement will show that the elucidation of the physics of the atmosphere, so that the diurnal and annual march of phenomena may receive particular explanation, and so that the occurrence of non-periodic phenomena may be predicted, is a problem of an exceedingly complex kind. All that is possible here is to indicate the methods by which it has been attacked.

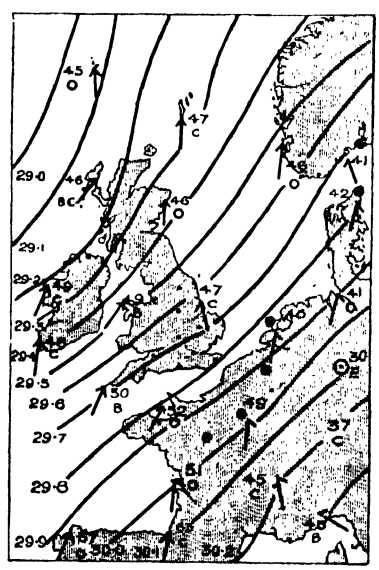
In a few places there are fully equipped weather *observatories*, at which, either by self-recording instruments or by hourly readings taken day and night, a continuous record of the values of the meteorological elements is obtained. At a large number of stations one or more of the elements is observed at a fixed time or times daily. The data so obtained may be utilised in different ways, the chief of which are (1) the preparation of climatological data, (2) weather forecasting, and (3) the investigation of special problems.

Before dealing with these, it has to be mentioned that the meteorological elements undergo variations of three kinds. The first is the change due to the axial rotation of the earth, which at any instant brings one-half of the earth and its overlying atmosphere under the influence of solar radiation. In consequence there is a diurnal variation of temperature, pressure, humidity, etc., at each point of the earth's surface. Secondly, owing to the obliquity of the ecliptic and the consequent changing declination of the sun throughout the year, there is an annual variation which marks the seasons. Thirdly, over and above these periodic changes, there are aperiodic or irregular fluctuations frequently large enough to mask the diurnal change and to reverse, for the time being, the effects of the annual change. Roughly speaking, the combination of the average value of the meteorological elements at a place with the diurnal and annual variations locally, constitutes the *climate* of the place. The combination of the average value with the aperiodic fluctuations constitutes the *weather* experienced at the place.

Treating meteorological observations from the climatological point of view, the object, therefore, is to obtain in the first place the average value of each element at the locality of observation. As an example, we may take the temperature of the air. If observations of temperature be made at each hour on a particular day, the average of these twenty-four readings will give a fairly accurate estimate of the mean temperature of that day. Doing this for a month, adding together the mean daily temperatures and dividing the sum by the number of days in the month, we obtain the mean temperature for that month. Similarly, the average of twelve successive mean monthly temperatures will give the mean annual temperature of the place. It should be mentioned here that the average of all observations taken at a particular hour of the day over a sufficiently long period gives the mean temperature for that hour. Similarly, we can obtain the mean temperature for each hour of the day, and the figures so obtained will represent the diurnal variation of temperature. Mean monthly temperatures may be grouped in the same way to give the annual variation of temperature.

Suppose now that observations of this kind have been taken at a large number of places on the earth's surface, and that we take the mean temperature for January at each. Marking these on a map of the earth, we can draw a line through all places where the mean temperature at that season is, say, 50° Fahr. We should find it to be a line which, in the northern hemisphere, passes from Amoy, through Tibet, Afghanistan, northern Persia, Asia Minor, southern Greece, southern Italy, Corsica, central Spain, Cape Finisterre, then northwards to the west of Land's End, across the Atlantic to Charlestown, and after crossing the U.S.A. and through Brit. Columbia, it traverses the Pacific. In the southern hemisphere it is a line passing round the globe in an average latitude of about 48° S., and only approaching land in the vicinity of Cape Horn. These, then, are the *isothermals* (*i.e.* lines of equal temperature) of 50° Fahr. for January. Similar lines can be drawn for other temperatures and the whole series gives a map from which important conclusions can be drawn, especially when compared with a similar isothermal map for July, the opposite season of the year. Again, with atmospheric pressure we may draw *isobars*, or lines of equal pressure, on a map; and so on for any other meteorological element whose distribution has to be studied.

Turning now to the second purpose for which meteorological observations may be made, we have to consider the *forecasting* of weather. In many countries arrangements are made whereby observations made at a certain hour at a number of stations are telegraphed to a central office where they can be compiled into a *synoptic chart* showing for the area under consideration the principal meteorological elements. In the case of the U.K. the area dealt with is a rectangle lying in latitude between the Arctic Circle and the southern shore of the Mediterranean, and in longitude between Constantinople and the middle of the Atlantic. The data are received from 29 Brit. stations, 31 on the Continent, and 7 in the Atlantic islands. Information is also received by wireless telegraphy from ships at sea.

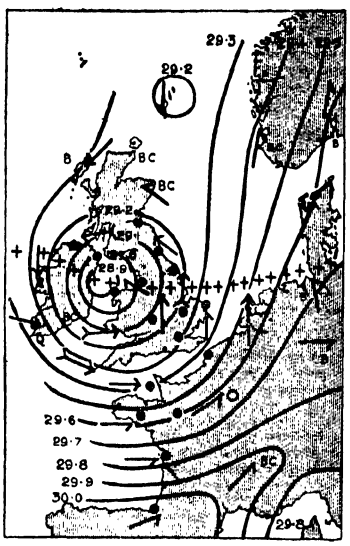


SYNOPTIC CHART SHOWING SOUTH-WESTERLY TYPE OF WEATHER, DECEMBER 19, 1911, 7 A.M. The lines are isobars, numbers at the ends showing pressure; other numbers show temperature; arrows show the direction of the wind and the force by the number of barbs; black dots, places where rain fell; three parallel lines indicate fog; O, overcast; B, blue sky; C, cloudy; BC, blue sky with broken clouds.

With regard to the methods adopted in forecasting weather, 'the fundamental principle is that weather travels, and that if we can find out what weather there is within range and in what direction it is travelling, we can warn one part of our area of changes that have already shown signs of their appearance in some other part.' Accumulated experience in the compilation of weather charts has led to the recognition of certain fairly well-defined types of disturbance or change, to a knowledge of the direction in which, and the speed with which, these generally travel; and of the results they produce in the several parts of the areas they

affect. The chief are the cyclone, anticyclone, V-shaped depression, and secondary depression. With the experience referred to it is possible to predict with tolerable certainty what will happen in the area through which the disturbance travels.

For example, take the case of a cyclonic storm from the Atlantic, whose centre travels in a straight line from Valentia to Dover — a fairly common track for such disturbances. Its appearance at Valentia is heralded by a fall in the barometer and by a shift of wind towards the south. As it crosses the Brit. Islands, the weather is characterised by easterly winds in the northern half of its front, southerly winds in the southern half, and also by cloud, rain, and squalls. The wind tends to circulate round the storm centre in a direction (in the northern hemisphere) opposite to that of the hands of a watch held horizontally and with face upwards. At the storm centre there is a comparative calm (although this is not so pronounced as it is in the case of tropical cyclones), but after it passes a given point the wind changes rapidly in direction (*veering* and *backing* of wind) and again increases in velocity. But this passes off, the barometer rises, and the skies clear. Where the indraught to the cyclone is from the north, lower temperatures are experienced. If the track of a cyclonic storm were known beforehand, or if it could be predicted with certainty, the work of forecasting the weather in its track would be comparatively simple. This, however, is not the case. In an anticyclone we have an area of high pressure in which the wind circulation is in a direction opposite to that in a cyclone. Further, it is an area where the wind velocity is low, the skies are clear, and (in summer) the temperature higher than usual.



Cyclone of March 24, 1902, 6 P.M.: Lines are isobars, the numbers at the ends showing pressure; B, blue sky; BC, blue sky with broken clouds; O, overcast; Q, squalls; black dots, places where rain fell; crosses show path of cyclone; arrows show direction and force of wind.

The third use to which meteorological observations may be put is the investigation of special problems. Of these there are, of course, a very large number. The following may be mentioned as typical instances: (1) The diurnal variation of pressure and temperature, a matter of some importance in connection with the diurnal changes in magnetic declination. (2) The law of diminution of temperature with increasing height above sea-level. This has been investigated in recent years chiefly by the aid of sounding balloons, and has resulted in the discovery of the *isothermal layer* of air which (in temperate latitudes) occupies a stratum about six miles above sea-level. (3) The relation of wind velocity to barometric gradient. (4) The inclination of wind direction to a given system of isobars. (5) The oscillations of the atmosphere on a large scale, a matter of some importance in the forecasting of Indian monsoons. (6) The detection of periodicity in annual mean values of a given meteorological element; and the companion of seasonal changes at one place with others at another place at a subsequent date.

Bartholomew and Herbertson, *Physical Atlas*; Mill, *Realm of Nature*, *Annual Reports of the Chief Signal Officer* (Washington, U.S.), *Indian Meteorological Memoirs*, *Daily Weather Reports* (London); Lempfert's *Weather Science*; Shaw's *Forecasting Weather*; and the treatises on Meteorology by Dickson, Davis, Russell, Scott, Cleveland Abbe.

Electricity, Atmospheric.—The phenomena of thunderstorms show that the atmosphere is capable of being charged in different parts to different electric potentials. This state of electrification is usually investigated by means of Kelvin's water-dropping collector. This consists of a metallic vessel containing water, insulated from the earth, and from which the water issues through a stopcock to a long tube whose end is at the point whose electric potential is required, and at which the water falls in drops. Each drop as it leaves the tube is charged oppositely to the electrification of the air in its immediate vicinity. Consequently, if an electrometer be connected by a wire to the metallic vessel, the electrification of the electrometer is similar to that of the atmosphere. The indications of the electrometer may be recorded continuously by a photographic process, and such records are of value in showing the diurnal and seasonal variations of atmospheric potential. They show that the atmosphere is practically always in a state of electrification, positive or negative; that it is generally positive in fine clear weather, and negative in wet weather; that a change from positive to negative often precedes or is accompanied by rain; that the difference of potential between earth and air increases with the height, averaging about 200 volts per metre, being greatest at those hours of the day when the temperature is increasing most quickly, and being generally greater in winter than in summer.

The origin of atmospheric electricity may be traced to the ionised state of the air, which state is produced either by radio-active elements in the earth's crust, by the action of ultra-violet light from the sun, or by the emission of streams of charged particles from the sun's surface. At all events, the air is in that state, and in consequence there are contained in it positively and negatively charged particles. According to the condensation hypothesis put forward by Gerdien and others, expansion of the air due to local heating produces ascending currents of air, and, subsequently, condensation of water vapour contained in these currents. To effect this condensation, some nucleus is necessary, and the negative electrons act as nuclei to begin with, because condensation will take place upon them at a lower degree of supersaturation. Being loaded in this way, they will tend to sink in the air, and thus there is caused a separation of the two charges, positive and negative. This may go on until the difference of potential becomes so great that a disruptive discharge (flash of *lightning*) passes between oppositely electrified masses of air. This discharge tends to produce further ionisation of the air, and the process goes on until the air is largely cleared of moisture by the water vapour being precipitated in the form of rain.

This hypothesis is sufficient to explain the ordinary phenomena accompanying a thunderstorm. Lightning, as is well known, is simply an electric spark on a colossal scale passing from one mass of electrified air to another at a greatly different potential. Its passage through the air is greatly facilitated by the ionised state of the air. In its path the air is suddenly heated and expanded, and this sudden expansion causes the noise we know as *thunder*. Sheet lightning is simply the illumination of clouds by lightning flashes so far distant that the thunder produced by them is not audible, and this takes place when the observer is about 10 or 12 miles from the flash. Globe lightning, consisting of a luminous ball travelling

slowly and afterwards exploding violently, has been described, but its occurrence is not clearly authenticated.

METER, ELECTRIC.—The Board of Trade unit of electric energy supplied to the public is the *Kilowatt-hour*; that is equivalent to a current of 1000 amperes at 1 volt running for 1 hour, or a current for which the product of amperes, volts, and hours is 1000. In order to assess the current supplied to a consumer an electric meter which will register the amount supplied is placed at the point where the supply enters the consumer's premises. If, as is usual, the voltage of the supply is fixed and steady, the only factors which have to be determined are the amperes and hours. Meters generally act by employing some measurable effect of the current (or part of the current), *e.g.* electro-deposition of a metal from a solution, acceleration of a clock by attraction of a coil on the pendulum, motion of a train of wheelwork actuated by a small motor.

See Fleming's *Handbook to the Electrical Testing Laboratory.*

METHANE, see MARSH GAS.

METHODICS, see MEDICINE.

METHODISM, see FREE CHURCHES.

METHODIST NEW CONNEXION, religious community split off from Wesleyans in 1797; together with *Bible Christians* and *United Methodist Free Churches* formed **United Methodist Church** in 1907.

METHODIUS (825–85), 'Apostle of the Slavs'; with his bro. Cyril (*q.v.*) made it his life's work to evangelise the Slavs; laboured mostly in Moravia; translated the Scriptures and liturgy into Slavonic.

METHUSELAH, character in Old Testament; f. of Lamech; lived, according to Hebrew tradition, 969 years. See *Genesis* 5^{21}.

METHVEN (56° 25′ N., 3° 35′ W.), village, Perthshire, Scotland.

METHYL ALCOHOL, wood spirit (CH_3OH); distilled from wood; B.P. 66°; intoxicating; used for making dyes and varnishes and for 'methylating' spirit.

METHYLATED SPIRIT, see SPIRITS.

METRE, see PROSODY.

METRIC SYSTEM, see WEIGHTS AND MEASURES.

METRODORUS.—(1) Of Lampsacus, disciple of Anaxagoras, interpreted the Homeric poems allegorically; (2) of Chios, disciple of Democritus; (3) the Epicurean (*c.* 330–277 B.C.), intimate friend of Epicurus.

METRONOME, an instrument indicating the exact speed at which a composition should be played; invented by Winkel about 1812, but patented in Paris, 1816, by Maelzel, to whom the invention is generally attributed.

METRORRHAGIA, see GYNECOLOGY.

METTERNICH-WINNEBURG, CLEMENS WENZEL LOTHAR, PRINCE (1773–1859), Austrian statesman; of ancient noble Ger. family; handsome and tactful; representative of Westphalian nobility at Congress of Rastadt, 1797–99, in which he took prominent part; envoy to Saxony, 1801; ambassador to Berlin, 1803–5, when alliance was formed between Britain, Prussia, Russia, and Austria against France; ambassador to France, 1806; became great favourite of Napoleon, but intrigued against him; arrested at outbreak of Franco-Austrian War, 1809, but released; Minister of Foreign Affairs, 1809, and advised peace with France; Treaty of Schönbrunn, 1809, not due to M., fatally weakened Austria, and M. set himself to recover lost territory; insisted on acceptance of Napoleon's offer for hand of Marie Louise of Austria, conducted her to Paris, 1810, and obtained relaxation of Treaty of Schönbrunn; returned and advocated aiding neither France nor Russia, but playing them off against each other, fearing Russ. designs on Turkey should Russia win; induced emperor to offer support to Napoleon, but assure Russia of non-intervention; Treaty of Vienna, 1811.

After retreat from Moscow, 1812, M. became European mediator; he resolved on reducing power of Napoleon, but skilfully persuaded him of his friendship; rejection of M.'s demands formed a pretext for Austria's declaring war against France, 1813; made treaty with Russia, 1813, but had little common interest with Allies, fearing Russia; was party to Treaty of Chaumont, 1813, to restore Bourbons and old territorial arrangement of Europe; made prince of empire, 1813; prominent at Congress of Vienna, secured domination of Austria in Ger. Confederation and at Congress of Aix-la-Chapelle, 1818. M.'s attitude towards Italy was determined by terror of popular insurrections, and he obtained consent of international congresses to suppress new movements; opposed Gk. independence on principle, and also for fear of weakening Turkey against Russia; Berlin Convention, 1833, recognised right of Powers to intervene to prevent revolutions; called by Palmerston 'Holy Alliance of East,' and M. was its soul.

An excellent administrator, M. was blind to need for reform, and opposed to changes; 1848 was a year of revolutions, and M. fell from power before clamour of Viennese populace; fled to England; returned, 1851, and assisted ministry by advice. Caution and diplomacy, M.'s greatest gifts, were of little use amid general convulsions of his later career. He failed to stem rising tide of Liberalism.

Malleson, *Metternich* (1888); Strobl von Ravensberg, *M. und seine Zeit* (1906).

METZ (49° 7′ N., 6° 11′ E.), town, Lothringen, Germany. M. was Rom. fortress named Divodurum, and was known as Mettis in the V. cent., when it was taken by the Franks, under whom it became capital of Austrasia; passed to the empire in 870, and subsequently became free city of empire; invested by Charles VII. of France, 1444; taken by Henry II., 1552; unsuccessfully besieged by Emperor Charles V. in 1552–53; came into possession of France by Treaty of Westphalia, 1648; fortifications reconstructed by Vauban and Belleisle, 1674; scene of various battles during Franco-German War of 1870, in which year French under Bazaine were shut up in M. and besieged by Germans, who eventually captured the town, which was formally annexed to Germany by Treaty of Frankfort, 1871; has since remained a German possession. M. is a fortress of first class; it is seat of bishopric, and has fine Gothic cathedral dating from XIII. cent. Important public buildings are the town hall, library, museum. Pop. (1910) 68,598.

MEUDON (48° 48′ N., 2° 14′ E.), town, Seine-et-Oise, France; glassworks. Rabelias was Curé de Meudon. Pop. 10,500.

MEURTHE-ET-MOSELLE (*c.* 48° 40′ N., 6° 30′ E.), frontier department, N.E. France; area, 2036 sq. miles; forests, vines, sugar-beet, hops; iron, rock salt; chief town, Nancy. Pop. (1911) 564,730.

MEUSE.—(1) (49° 10′ N., 4° 52′ E.) river, rises Haute-Marne, France, flows through a great part of Belgium and Holland, joins the Waal and enters North Sea; length, 570 miles, of which 400 are navigable. (2) (*c.* 49° N., 5° 25′ E.) department, N.E. France; area, 2408 sq. miles; surface undulating; drained by M.; forests; hemp, iron, wine. Pop. (1911) 277,955.

MEW, a sea-gull. See GULL FAMILY.

MEWS, PETER (1619–1706), bp. of Bath and Wells, 1672, Winchester, 1684.

MEXBOROUGH (53° 30′ N., 1° 20′ W., town, Yorkshire, England; ironworks, potteries. Pop. (1911) 14,398.

MEXICO (14½° to 32½° N., 86½° to 118° W.), a federal republic in the S.W. of N. America, has an extreme length of some 2000 miles, a breadth varying from 1000 to 130 miles (Isthmus of Tehuantepec), and an area of 767,005 miles. It is bounded on the N. by U.S.A., E. by the Gulf of Mexico and the Caribbean Sea, S.E. by Brit. Honduras and Guatemala, S. and W. by the Pacific. The Rio Grande forms 1136 miles of the 1833 miles of the N. boundary. The peninsula of Yucatan forms one of the arms of the Bay of Campeachy, S.W. of the Gulf of Mexico; on the W. coast the long, narrow

Gulf of California runs up between the peninsula of Lower California and the mainland; and S. of the Isthmus of Tehuantepec is the minor inlet of the Gulf of Tehuantepec. The soils are metamorphic, and igneous rocks with sandstone and limestone are found in the north. The greater part of the surface is plateau, along each side of which is a coastal strip of an average width of 60 miles; its border is composed of mountain ranges, from which the height drops to the plateau. The lowest line along the Isthmus of Tehuantepec has a height of less than 400 ft., and the low ground extends along the peninsula of Yucatan, the centre of which has an average height of *c.* 800 ft.

To the S. of the Isthmus begin the Cordilleras of Central America. To the N. two lines of mountains commence—the Sierra Madre range (9000 ft.) on the W. coast, and on the E. the line of heights (16,000 ft.) that pass N. into the Rocky Mts. (sometimes spoken of as the Sierra Madre Oriental). The centre of Lower California is occupied by a range with a height of 7000 to 10,000 ft. In the extreme S., farther inland, a connecting chain with peaks from 12,000 to 19,500 ft. runs parallel to the Sierra Madre. Hence stretches northward the great central plateau, flat, or undulating in surface, with height varying from 6000 to over 8000 ft. There are many dormant or extinct volcanoes, and in the S. a few still in action, but there have been no violent outbursts for a long time, and earthquake shocks, though frequent, are never severe. The N. of the plateau is drained by the Rio Grande and its tributaries; in the interior many of the streams are lost in salt lakes, or are used up for irrigation, and the streams of the coast slopes are mostly short and too rapid to be of use for communication. The coastal strips and low ground are hot and unhealthy, with a maximum temperature of over 100° Fahr., and a rainfall ranging in places up to 130 in. Along the plateau the maximum temperature in summer is about 88°, and in winter the minimum may fall to 30°, falls of snow, though very rare, occasionally taking place. The line of perpetual snow is 15,000 to 16,000 ft. In the extreme N. there is the European succession of seasons, but farther S. there is a rainy season from the end of May to the end of October. Along most of the plateau the rainfall averages 25 in. Members of the extensive fauna are the monkey, wolf, bear, musk rat, raccoon, opossum, armadillo, alligator, vampire, turtle, and pearl oyster.

HISTORY.

It is believed that the ancient inhabitants were, like those of America generally, of the Mongolian race, and that as the Eskimos show resemblances to the Japanese, so the old civilisation of M. was established by people related to the Chinese. When Cortes and his Spaniards landed in 1519 they named the natives *Mexica* (since called Azteca), and their capital and country Mexico. They possessed evidences of a civilisation superior to that of Europe, palaces so extensive that they wearied the sight-seer, forts proving great engineering knowledge, and an elaborate legal code, besides having evolved picture-writing apparently independently. It is probable that they derived their arts from the Toltecs, a kindred Amer. people who, according to the Aztec traditions, settled in M. in the VIII. cent., and became almost extinct in the XI. cent. The peaceful Toltecs contrast (if the legends be true) with the Aztecs, who were, at the coming of the Spaniards, the most bloodthirsty of all Red Indian peoples, sacrificing human victims to their deities, feeding on the victims' corpses, and dressing on State occasions in their skins. Cortes was at first welcomed by the Aztec emperor Montezuma, but as the Span. purpose of annexation became clear there were risings which the conquerors found great difficulty in crushing. Mexico was captured in 1521; Cortes, governor in 1522, was soon recalled, and Mendoza became viceroy of the new Span. kingdom. Armies of Span. Jesuits aided the soldiery in building a European civilisation in place of the Amer. one which was destroyed. Spain obtained vast wealth from this colony, the centre of New Spain, and it was not until the XIX. cent. that successful revolt was made.

The rising of the priest Hidalgo in 1810 ended in his execution; and the attempts of Morelos in 1815, and of General Iturbide, proclaimed emperor of a native state in 1822, failed, but after the deposition of Iturbide, the Span. viceroy O'Donoju (of Irish descent) was forced to recognise the republic of M. (1823). Spain refused to confirm the viceroy's action, and, in 1829, made an attack on M. from Cuba, but was defeated by Santa Anna (*q.v.*), a statesman who now becomes prominent. He profited by the civil strife which broke out between the Conservatives (*Escoceses*) and Liberals (*Yorkinos*), and, in 1833, became dictator. He established a highly centralised government. After his retirement Congress drew up a constitution, 1836, on the lines which he had laid down. In 1836 Spain recognised the independence of M.

Under President Bustamante war with France broke out; San Juan de Ulua was seized, 1838, but restored and disputes settled in 1839. U.S.A. declared war in 1845 as M. refused to acknowledge the independence of Texas; Mexican defeats ended in 1847 with the capture of M. city by General Scott, and M. was forced to agree to a treaty (1848) surrendering Texas in return for 15 million dollars. Santa Anna was again made dictator (1853), but retired in 1855. Civil war speedily followed between the Church party and the Liberals. Church lands were confiscated in 1856, and in return the clerical party overthrew the new Liberal constitution of 1857. The war, which broke out in 1858, ended in the triumph of the Liberals, 1860, and Radical measures followed.

To guard the rights of their subjects who had suffered injury under the new régime, Britain, Spain, and France sent warships to make a demonstration in Mexican waters in 1859, and in 1861 Spain captured Vera Cruz. Juarez, made dictator in 1861, negotiated a peace with England and Spain in 1862, but Napoleon III. sent a strong force under Forey, who in 1863 occupied the capital. He summoned a council of Mexicans and it was decided to establish a monarchy. The Archduke Maximilian of Austria, who accepted the new throne (1864) landed and allowed freedom of the press (1864) and a new constitution (1865), but was not strong enough to keep the warring parties in check, and both Mexicans and U.S.A. complained of the Fr. army which remained in M. The Republican party increased in power; in 1867 the emperor was tried by court-martial and shot, and 2 days later the capital surrendered after 9 weeks' siege. Juarez, president until his death in 1872, showed himself a merciless but skilful ruler, crushing rebels, but his successor, Lerdo de Tejada, speedily fell before the revived party strife; in 1876 Porfirio Diaz headed an armed rising, became president in 1877, and continued the policy of Juarez until 1911, when he resigned. Madero succeeded him, and civil strife led to his being shot dead, along with Vice-Pres. Suarez, two days after their resignation of posts, Feb. 22, 1913.

General Huerta was elected Provisional President of Mexico, Feb. 20, 1913.

M. has also been extremely unfortunate with regard to great natural disasters (earthquakes, floods, etc.).

Government is on the lines of the constitution, amended in some particulars, of 1857. The federal republic is composed of 27 states, 1 federal district, and 3 territories, with a good deal of autonomy. The central government is composed of elected president, appointed for 6 years, Senate, and House of Representatives, the members of each of which are elected for 2 years by universal male suffrage; the separate states have a governor and local congress. The three territories, Tepic, Lower California, and Quintana Rio, are more under control of the central government than the rest. There is a supreme law-court with

various circuit and district courts. Both revenue and expenditure are about £10,000,000. From the nominally universal service in the army exemption is easily obtained by the propertied classes. There is a small, fairly well-equipped fleet. The services budget amounts to over £2,000,000.

The towns with over 30,000 inhabitants are Mexico (470,659), the capital, Guadalajara, Puebla, Luis Potosi, Monterey, Leon, Mérida, Aguascalientes, Morelia, Chihuahua, Pachuca, Oaxaca, Guanajuato, Queretaro, Saltillo, Durango, Orizaba, Toluca. Vera Cruz and Tampico, on the Gulf of Mexico, are the chief ports. They are connected by rail with Mexico; from this line railways northwards form junctions at various points with U.S.A. systems. Across the Isthmus of Tehuantepec a line (200 miles) connects the port of Salina Cruz on the Pacific with Coatzocoalcas on the Gulf of Mexico; should a ship railway ever be constructed, as is often proposed, it will form a route between E. and W. coasts of America shorter by 700 miles than the Nicaragua Canal, and by 1000 miles than the Panama Canal. The total railway mileage is about 10,000.

The soil is fertile, and where irrigation is good two crops can be got in one year, but many of the coast districts are useless as no white man can stand the climate, and much of the plateau is desert from want of water. In the N. great herds of horses, cattle, sheep, and pigs are reared, largely for the U.S. market. Mahogany and dye-woods, wheat, maize, rice, beans, bananas, sugar, molasses, coffee, cotton, henequen (agave, sisal-hemp), cacao, oranges, cocoa-nuts, vanilla, mulberry, cochineal, cinchona, and rubber are obtained, and efforts are being made to introduce vines, olives, and European fruits.

M. is one of the richest mineral countries in the world. Coal is said to exist; silver and gold, which seem to have been worked from the earliest times, are still very productive; the output of silver being estimated at £19,000,000 yearly, that of gold at £1,500,000; copper, iron, lead, tin, platinum, mercury, cobalt, antimony, bismuth, manganese, zinc, petroleum, salt, sulphur, amber, and onyx are obtained. The manufactures, chiefly rum, various spirits, cottons, woollens, cigars, cigarettes, and pipe tobacco, paper, leather, and earthenware, are increasing. The imports are valued at over £13,000,000, the exports at about £30,000,000, chiefly from minerals. An excellent system of national compulsory education has been organised in the last two decades. There is no State Church, but the large majority of the population is R.C. There are about 15 million inhabitants, of whom about 40 % are Indians, a slightly larger proportion mulatto and half-caste Indian.

Prescott, *Conquest of M.*; Bancroft, *Popular Hist. of the Mexican People* (1888), *Resources and Development of M.* (1894); Gooch, *Face to Face with the Mexicans* (1890); Terry, *M.* (1911).

MEXICO.—(1) (*c.* 20° N., 99° W.) state, Mexican Republic; area, 9247 sq. miles; mountainous in S.; gold, silver, cereals, tobacco, coffee; live stock raised. Pop. (1910) 975,019. (2) (39° 10′ N., 91° 55′ W.) city, Missouri, U.S.A.; seat of Hardin Coll. (for women); flour-mills. Pop. (1910) 5939.

MEXICO CITY (19° 25′ N., 99° 5′ W.), capital, Mexican Republic; founded by Aztecs, *c.* 1326; taken by Cortes, 1521, under whom new city was founded; scene of hostilities during war between Mexico and U.S., 1847; held by Americans, 1847–48; headquarters of Maximilian of Austria, emperor of Mexico, 1864–67, when it was successfully besieged by republicans under Diaz. More recent events include riots in 1884, earthquakes in 1908 and 1909, revolution in 1913. M. C. is great railway transit and distributing centre; connected by railway with Vera Cruz, El Paso, Manzanillo, Laredo, and other important towns; manufactures include textiles, clothing, tobacco, paper, firearms. Town is regularly laid out, and has many fine squares and streets; important public buildings are the national palace, containing government offices, observatory, and national museum; municipal palace, national art galleries and library, mint. There is a magnificent cathedral, built 1573–1811; great number of churches, many educational and philanthropic establishments. M. was seat of a univ., 1551–1865, and formerly contained many religious houses. Pop. (1910) 470,659.

MEXICO, FEDERAL DISTRICT OF (*c.* 19° N., 99° 25′ W.), district in S.E. of M. state; area, 463 sq. miles; includes M. City and other towns, and belongs entirely to Federal government of Mexican Republic; administered by governor and other officials nominated by national executive. Pop. (1910) 719,052.

MEXICO, GULF OF (25° N., 90° W.), inland sea, S. of N. America, along coasts of U.S. and Mexico; area, *c.* 1,716,000 sq. miles.

MEYERBEER, GIACOMO, Jakob Liebmann Beer (1791–1864), Ger. composer and pianist; b. Berlin; studied under Clementi and Vogler; visited Italy, 1815; London, 1826; a transition composer, regarded by some as Wagner's forerunner; among his operas are *Robert le Diable, Les Huguenots, Le Prophète, L'Étoile du Nord, Dinorah, L'Africaine,* etc.

MÉZIÈRES (49° 45′ N., 4° 43′ E.), capital of Ardennes, France, on Meuse; leather manufactures; taken by the Germans in 1815 and 1871. Pop. 8500.

MÉZIÈRES, PHILIPPE DE (*c.* 1327–1405), Fr. soldier and scholar; born in Picardy; served in Italy, and in the Fr. Crusade, 1345–46; planned a religious order of Knights of the Passion; chancellor of Cyprus, 1362–72; in Paris, 1373–1405; tutor of Charles VI.

MEZŐTÚR (47° 1′ N., 20° 39′ E.), town, Hungary, on Beretyo; potteries. Pop. (1910) 25,835.

MFUMBIRO, Kirunga (1° 30′ S., 29° 50′ E.), chain of volcanic mountains, E. Central Africa.

MHOW (22° 33′ N., 75° 46′ E.), town, Indore, Central India; military station. Pop. 30,000.

MIAGAO (10° 40′ N., 122° 10′ E.), town, Iloilo, Panay, Philippine Islands; manufactures hemp. Pop. 21,000.

MIAMI (25° 45′ N., 80° 15′ W.), city, Florida, U.S.A., at mouth of Miami; agricultural and fruit-growing centre. Pop. (1910) 5471.

MIANI, Meeanee (25° 27′ N., 68° 22′ E.), village, Sind, India; scene of Napier's victory over army of Sind, 1843.

MIANWALI (32° 35′ N., 71° 33′ E.), chief town, Mianwali district, Multan, Punjab, India, on Indus.

MIAOULIS, ANDREAS VOKOS, or **BOKOS** (1768–1835), Gk. admiral; commander of national fleet in Gk. War of Independence, 1822–27, assisting in relief of Missolonghi, 1823, the fighting at Navarino, 1824, and second siege of Missolonghi, 1825.

MICA (Lat. *micare,* to glitter), a mineral of foliated structure, consisting of thin scales; composed of alumina silicate and containing potash, soda, lithia, and magnesia; of shining, pearly lustre; sometimes m. scales are over 20 in. in diameter and only $\frac{1}{300,000}$ in. thick; it is found in Sweden, Norway, Siberia, Peru, China; varieties are biotite, lepidolite, sericite, damourite, zinnwaldite, iron m., black m. Muscovite, or potash m., is a silicate of alumina and potash, and occurs in granite, gneiss, mica-schist, and other plutonic rocks.

M. is used as window-panes in some countries (as Russia), for lamp chimneys, and stove doors, because of heat-resisting power.

MICAH, BOOK OF, in Old Testament, one of 'Minor Prophets.' M. wrote about the time of Isaiah and before the fall of Samaria in 722. Chapters 1–3 are a denunciation of the sinfulness of the two kingdoms, particularly of the rulers, and prophesy destruction; 4 contains a prophecy of future peace and bliss; 6 describes the wickedness of the people, but 7 ends with a note of hope. Some would make 6 and 7 a later addition.

Horton, *Minor Prophets,* vol. i. (Century Bible); Cheyne (Cambridge Bible).

MICA-ROCKS, an important group of rock-

forming minerals, entering into the composition of crystalline, sedimentary, volcanic, and plutonic rocks, such as talcose rock, granite, gneiss, etc., and

Mica-Schist, a very abundant mineral, and one of the crystalline schists; often contains other minerals, *e.g.* garnet, hornblende, beryl; is often of wavy structure, and may have alternate layers of mica and quartz, or only small shiny scales of mica.

MICHAEL, one of the archangels (*q.v.*).

MICHAEL, name of nine Byzantine emperors.—M. I. persecuted iconoclasts; defeated by Bulgarians, 813, and deposed.—M. II. was condemned to death for conspiracy, but seized throne, 820.—M. VII. lost wide dominions, and resigned, 1078, and retired to a monastery.—M. VIII., founder of Palæologus dynasty; conquered Constantinople, 1261; accepted papal supremacy at Council of Lyons, 1274; won victories in Greece and Italy.

MICHAEL OBRENOVICH III. (1823–68), Prince of Servia; organised Servian resistance to Turkey; sought to expel Turk. garrisons; made defensive alliance with Greece, Bulgaria, and obtained neutrality of Austria and France; Turk. troops withdrawn, 1867; reformed army and civil service; assassinated.

MICHAELIS, JOHANN DAVID (1717–91), Ger. scholar; b. Halle; s. of a noted theologian; prof. of Philosophy at Göttingen, 1746; treated the Bible narratives as valuable documents of Oriental history.

MICHAELMAS DAISY, see ASTER.

MICHAUD, JOSEPH FRANÇOIS (1767–1839), Fr. historian and editor of *La Quotidienne*, but escaped death in Revolution; compiled earliest biographical dictionary, 1789; made hist. collections.

MICHAUX, ANDRÉ (1746–1802), Fr. traveller and botanist; author of two well-known works on N. Amer. plants.

MICHELANGELO, MICHAEL ANGELO (1475–1564), Ital. artist of Florentine school; b. Caprese, s. of Ludovico Buonarroti, who accepted minor duties of State to eke out his income. M. early showed aptitude for art, and in 1488 succeeded in getting himself apprenticed to Domenico Ghirlandajo (*q.v.*); secured the patronage of Lorenzo de Medici, in whose school of sculpture he studied and imbibed much of the Platonic doctrines that had been newly reintroduced into Italy. After Lorenzo's death he went to Bologna, where he executed some commissions for the Aldovrandi, but soon returned to Florence, and fell under the influence of Savonarola. On the advice of the Cardinal di San Georgio, M. journeyed to Rome (1496). To this period belong his *Bacchus* and *Pietà*, but the troublous times in Florence had impoverished his father, and M. returned in 1501. Three years later he finished a colossal statue of *David* (now in the Academy of Fine Arts, Florence), *The Holy Family* (Uffizi Gallery), and was in the midst of several other works when he suddenly returned to Rome (1505), where, at the request of Julius II., he commenced a magnificent monument, but as the pope grew tired of the idea, M. fled to Florence, where he continued his interrupted companion-piece to da Vinci's *Battle of Anghiari*. Reconciliation between the artist and Julius took place after the latter's capture of Bologna (1506). M. was commissioned to cast a colossal bronze statue of the pope, and after great difficulty, as he had no knowledge of metal-casting, finished the work in 1508. He now devoted himself to painting the frescoes in the Sixtine Chapel at Rome, a task which he performed practically unaided, owing to the insubordination of his assistants. The magnificent work took four and a half years to complete, and was delayed by the many difficulties placed in the artist's way by his enemies. After the death of Julius (1513) M. continued his work on the sepulchral monument, which was again interrupted, owing to an offer from Pope Leo to execute a façade in the Church of San Lorenzo (Florence), a scheme which he abandoned owing to difficulties regarding the marble-supply. M. continued in Florence, doing little good work till 1529, when he was appointed chief military engineer to defend the city from the expelled Medici and their allies. After the fall of the city, M. resumed several unfinished commissions, including the Laurentian library and the Medici chapel. He left Florence again in 1534, and journeyed to Rome, in order to complete the Julian monument, but was ordered by Clement to add to his Sixtine frescoes another picture, to replace a painting of Perugino. This task he completed in 1541, and the fresco, known as *The Last Judgment*, is one of the most magnificent pictures, both in conception and execution, that the world has ever seen.

During the later years of his life, M. wrote many sonnets, principally to his friend Vittoria Colonna. These express the artist's emotions and feelings all the stronger because they had been pent up for well-nigh sixty years. His poetry is, like his painting, impetuous, accurate, and compressed. In his old age he became chief architect of St. Peter's, Rome, and to him is due the present design of the great dome. He was busy with other schemes for decorating the city till his death.

In character, M. was proud, somewhat scornful and intolerant, impetuous and violent; he was amazingly versatile and productive, while his devotion to his art and his unsparing labour are fit models for artists of a later age. The more generous qualities came with the advent of old age. His art reflects the qualities of the man. See also PAINTING, SCULPTURE.

Berenson, *The Drawings of Florentine Painters* (1903); Holroyd, *Michelangelo* (1911); J. A. Symonds, *Sonnets of Michelangelo and Campanella* (translations) (1878).

MICHELET, JULES (1798–1874), Fr. historian; prof. of History at Collège Rollin, 1821–26; after Revolution, 1830, app. head of hist. section of *Archives*, and lecturer under Guizot at Sorbonne; became prof. at Collège de France, 1838, and gave celebrated lectures; wrote *Des jésuites*, 1843; *Du prêtre, de la femme et de la famille*, 1844; *Du peuple*, 1845; incurring enmity of Church and suspension of lectures; *Histoire de la Révolution*, 1847–53; monumental work, *Histoire de France*, pub. 1833–67; classic prose, picturesque and eloquent, but strongly partisan treatment.

MICHIGAN (41° 45′ to 47° 28′ N., 82° 24′ to 90° 26′ W.), state in N.E. of U.S.A.; consists of two detached portions, one a peninsula between Lake Superior and N. end of Lake M., the other a larger peninsula between Lake M. on W. and Lake Huron, Lake Erie, and province of Ontario on the E.; area, 58,915 sq. miles; surface of northern peninsula hilly; of the other, hilly in N. and flat in S. M. is drained by Muskegon, Grand, Kalamazoo, Saginaw, and many smaller streams. Capital, Lansing; largest towns, Detroit, Grand Rapids, Saginaw.

M. was first permanently settled by French in 1668, when Marquette established a Jesuit Mission at Sault de Ste Marie; and in 1701 a Fr. fur-trading station was founded at Detroit by colonists under Cadillac. M. remained under Fr. control until 1760–61, when it came to hands of the British, from whom it was transferred to the U.S. after the War of Amer. Independence. After forming part of N.W. territory and Indiana territory in succession, it was organised as separate territory in 1805; temporarily occupied by British during war of 1812–15; admitted as state to Union, 1837.

Executive power is vested in governor, who holds office for two years and is assisted by lieut.-gov.; legislative authority vested in Senate of 32 members and House of Representatives of 100 members, elected for two years by popular vote. M. is divided for local administrative purposes into 83 counties, and is represented at Washington by 2 Senators and 13 Representatives. Religious denominations, in order of numerical importance, are R.C., Methodist, Lutheran,

Baptist, Presbyterian. Education is free and obligatory; there is a state univ. at Ann Arbor, besides a number of important coll's at Detroit, Albion, etc. The **University of Michigan** is an important seat of learning. Charters were granted by governor and judges of territory of Michigan, 1817, 1821, and 1837; opened, 1841; endowed by state, 1867; thoroughly well equipped departments of science, med., law, arts, pedagogy; fine libraries and museums; open to women from 1870.

M. has extensive forests, and lumbering is important industry. Agriculture is also important; M. produces cereals, fruits, vegetables, peppermint; sheep and cattle raised; fresh-water fishing and large shipping trade on lakes. Minerals include iron, copper, coal, salt, gypsum. Manufactures—furniture, flour, beer, leather, paper. Railway mileage, *c.* 10,000. Inhabitants include whites, negroes, Indians, Asiatics; whites of foreign birth include Canadians, Germans, Scandinavians, British, Dutch. Pop. (1910) 2,810,173.

Cook, *M.: its History and Government* (1905).

MICHIGAN CITY (41° 40′ N., 86° 52′ W.), city, Indiana, U.S.A., on Lake Michigan; railroad cars, furniture; trade in lumber. Pop. (1910) 19,027.

MICHIGAN, LAKE (43° 30′ N., 87° W.), one of chain of great lakes of N. America; area, *c.* 22,500 sq. miles; bounded N. and E. by Michigan state, S. by Indiana, W. by Illinois, Wisconsin; connects with Lake Huron by Strait of Mackinac. Chief port, Chicago. Fisheries are important.

MICHMASH (32° 19′ N., 34° 52′ E.), ancient place, Palestine; the modern Mukhmas.

MICHOACÁN (*c.* 19° N., 101° 30′ W.), state on Pacific coast of Mexico; area, 22,874 sq. miles; surface mountainous; rich deposits of gold and silver. Pop. (1910) 991,049.

MICKIEWIEZ, ADAM (1798–1855), Polish poet; b. Lithuania; banished to mid-Russia as being a student agitator, 1824; visited the Crimea in 1825 and described the country in a series of sonnets; pub. four fine epics—*Dziady, Konrad Wallenrod, Grazyna,* and *Pan Tadeusz*; for three years he was prof. of Slavonic at Paris.

MICROBE, see BACTERIOLOGY.

MICROCEPHALIA, see under TERATOLOGY.

MICROCOCCI, see PARASITIC DISEASES.

MICROLEPIDOPTERA, see LEPIDOPTERA.

MICROMETER (Gk. *mikros,* small; *metron,* a measure), an instrument for measuring small things, the name, however, being reserved for those mechanical attachments to microscope or telescope with which minute objects under the former, or diameters and distances through the latter, are gauged.

The simplest microscope micrometer consists of a glass disc marked with a network of fine lines forming squares, or with a series of equidistant lines. The disc is slipped within the eye-piece, and rests upon a diaphragm at the focal plane of the image, the lines or squares thus dividing the image into equal parts. With the aid of a stage-micrometer, with lines 1/100 mm. apart, which is put in place of the object, the value of the divisions of the eye-piece micrometer can be discovered, and the dimensions of the original or any other object read off.

Much more complicated than this simple type are the micrometers used with telescopes for measuring the heavenly bodies or the apparent distances separating them. Those most commonly in use depend for the accuracy of their readings upon spider threads placed in parallel strands, and all lying in the plane of the lenses. One or both of the webs, which are placed in the focal plane of the telescope, can be adjusted by an arrangement of exceedingly finely threaded screws, so that each web touches one boundary of the distance to be measured. The heads of the screws are graduated, so that the movement of the screw, which indicates in definite proportion the separation of the webs, can be read on a Vernier scale to the smallest detail. The many varieties of micrometers which utilise spider threads or fine wires, set in parallels or interscoting, as means of measuring are known as FILAR MICROMETERS, and complicated arrangements of lights and mirrors are adopted for lighting the web during nocturnal observations.

Another common form of micrometer is known as the DOUBLE IMAGE M., used for measuring the apparent diameter of the sun, and hence also called a HELIOMETER. In essence this consists of an object-glass cut centrally into two segments which slide along each other. The sliding is regulated and measured by graduated screws, and as each half objective forms a separate image so soon as the optical centres of the segments fail to coincide, the diameter of the object can be converted into the known movement of the optical centres.

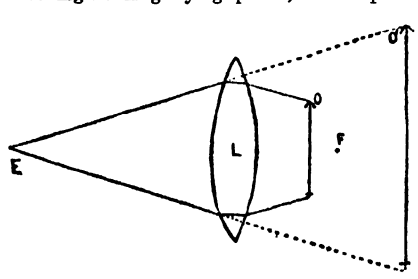
Some other types of micrometer are Rochon's DOUBLE-REFRACTION M., utilising the divergence of ordinary and extraordinary light rays in passing through a prism of rock crystal; the LINEAR M., a graduated scale intersected by perpendicular lines marked upon glass or mica, and placed in the field of the telescope; and the RING MICROMETER, a ring of steel placed in a disc of glass, and inserted in the focus of the telescope. In the two latter cases, the daily motion of the earth was employed as a distance measurer, for from it together with the time occupied by any two objects in passing over a known chord of the ring or along the scale, and with the approximate position of one of the objects in the heavens, the differences between the right ascensions and declinations of the two objects on their relative positions could be computed.

MICRONESIA (*c.* 3° S. to 14° N., 138° to 178° E.), group of small islands, Pacific, Oceania; includes the Caroline, Gilbert, Ladrone or Marianne, Marshall, and Pelew Islands (*qq.v.*); Gilbert Is. belong to Britain; Marshall Is. annexed by Germany, 1886; Caroline, Pelew, and Mariana Islands belonged to Spain till 1899, when they were sold to Germany. Natives are of Polynesian stock, with admixture of Malayan and Mongolian blood.

MICRONUCLEUS, see under NUCLEUS.

MICROPEGMATITE, a felspar of quartz and alkali, occurring in granite and porphyry; generally fine grained and thread-like in appearance.

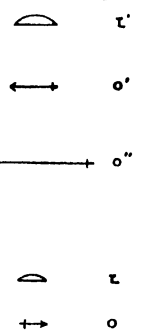
MICROSCOPE, an optical instrument used for rendering visible objects which cannot be distinguished by unaided vision. In its *simple* form, it consists of a single lens, or of two lenses placed close together. The object, O, under examination is placed between the lens L and the principal focus F. Rays from O are refracted by the lens to a focus at E, and if the eye be placed there, a virtual image of the object will be seen as if proceeding from a similar but magnified object at O′. By means of this simple microscope, an object may be magnified 10 to 20 times, and in this form it is used as a reading-glass, as a magnifier to help in dissecting minute animal or vegetable tissues, and for other such simple requirements. It is conceivable, of course, that lenses of this kind could be made of higher magnifying power, even up to 80,



but this would necessitate the object being placed very close to one side of the glass and the eye equally close to the other side. Apart from this serious difficulty,

there are others. Owing to the difference in the refrangibility of different kinds of light, rays from any object produce, after passing through a simple lens, a series of differently coloured images of the object. This is termed *chromatic aberration*. Also, the rays passing through the peripheral part of the lens are refracted in a different manner from those passing through the parts nearer the centre, and this results in a line of foci being formed instead of a single focus. This defect is known as *spherical aberration*. Owing to the difficulty and defects mentioned, the *compound* microscope has been introduced.

The essential features of the optical system of this instrument are shown in the accompanying figure. Rays of light from the object O pass through a compound system L of lenses (known as the *objective*), and form a real inverted image O′. Above this real image there is placed another compound lens L′ (known



as the *eye-lens*), through which the rays from O′ pass and, reaching the eye above, give a virtual and further magnified image O″. The arrangement should be such that the image O″ is at a distance from L′ slightly greater than that of normal vision, *i.e.* about 10 inches. In order that this may be the case, the real image O′ must be between the eye-lens L′ and the principal focus of the objective L. The chief point of interest in the optical system of a compound microscope is in the objective, for it is here that the elimination of aberration—chromatic and spherical—has been effected in a surprisingly complete manner. In chromatic aberration the less refrangible red rays are brought to a focus farthest from the lens, while the violet rays, being more refrangible, are nearer the lens. If, however, the lens is made up of two parts, one consisting of a convex lens of crown glass, the other of a concave lens of flint glass, the greater dispersive power of the latter allows two colours to combine into light which is approximately white. Thus we may have a combination of yellow and green rays at one point. Such a combination cannot do more, however, in the way of bringing the colours together, and the remaining uncorrected colours form what is known to microscopists as the *secondary spectrum*. The task of the optician is to find other combinations of lenses which will remove this spectrum. Hitherto this was a matter of great difficulty, because the variety of refractive index in different glasses was limited. Owing to the researches of Abbe and Schott at Jena, these difficulties have been overcome, and the optician has now at his command a large variety of optical glass for different purposes. Combinations of lenses which remove the secondary spectrum and correct the spherical aberration are termed *apochromatic* objectives. There are also *semi-apochromatic* objectives in which the secondary spectrum is not entirely eliminated.

The mechanical part of a compound microscope takes many forms, but the following principal parts are found in all. The eye-lens and objective are placed at opposite ends of a brass tube, termed the *draw-tube*, and by means of a screw or toothed wheel this tube can be raised or lowered so that the objective may be brought to any convenient distance from the object under examination. The draw-tube is attached to a stand which supports a *stage* on which the object may be placed. The object is generally mounted on a slip (or *slide*) of glass, and is covered with a disc of thin glass. The stage has a slot or hole over which the slip is placed. Beneath the stage the stand also supports a *substage condenser* which concentrates on the object examined the light reflected from a mirror. Another device used in order to increase the illumination, and to concentrate the rays of light from an object so that they can enter the objective, is to place a drop of oil between the objective and object. The oil has the same refractive index as the glass used. Microscopes of special design are used for the examination of thin sections of rocks by means of polarised light transmitted through them, and for metallurgical purposes to study the microstructure of metals.

For an elementary explanation of the optical systems of simple and compound microscopes, see *The Illustrated Annual of Microscopy* (1898), pp. 99–104. For full description of different forms of microscopes and accessories, and for hints in the use of the instrument, consult Cross and Cole, *Modern Microscopy*, and Spitta, *Microscopy*.

MICROSOME, one of the minute granules embedded in protoplasm; m's seem to vary in nature and function, but it is thought they are produced by the living substance and share in its activities.

MICROSPORIDIA, a sub-class of Sporozoa (*q.v.*).

MICROTOMY (Gk. *mikros*, small; *tome*, a cutting), the finer investigations of morphology have necessitated examination of exceedingly minute structures, and this can often be accomplished only by cutting exceedingly thin sections of the tissues in question. M. is the art of preparing such thin sections, sometimes only 0·015 mm. in thickness. The tissue to be cut is prepared by embedding it in some substance which permeates the cells and, hardening, offers sufficient resistance to the knife, the most common agents being paraffin or celloidin; but the preparation may be simply frozen. The hardened block of tissue is then sliced by a microtome, the cutting edge of which may be a razor worked by hand, or a razor or heavy blade which automatically slices off successive sections of known thinness, such as the automatic and rocking microtomes.

MICROTUS AMPHIBIUS, section of genus Vole (*Microtus* or *Arvicola*), Water-Rat or Water-Vole; well-known Brit. rodent of Mouse family (*q.v.*), found also throughout N. Europe and Asia, except Ireland; frequents banks of rivers and streams; chiefly vegetarian, but at times eats young birds or mice.

MIDAS (classical myth.), king of Phrygia, given, by Dionysus, the power of turning everything he touched into gold; another legend gave him ass's ears, which he tried vainly to conceal.

MIDDELBURG.—(1) (51° 30′ N., 3° 39′ E.) town, Walcheren Island, Zeeland, Holland; has former monastery; XVI.-cent. town hall. Formerly commercial centre. Pop. (1910) 19,564. (2) (31° 43′ S., 24° 59′ E.) town, Middelburg, Transvaal; trading centre; coal-fields. Pop. 4000. Middelburg division has pop. (1911) 63,277.

MIDDLE TEMPLE, see INNS OF COURT.

MIDDLEBOROUGH (41° 53′ N., 70° 55′ W.), town, Massachusetts, U.S.A.; boots and shoes, woollens. Pop. (1910) 8214.

MIDDLEBURY (44° N., 73° 10′ W.), village, on Otter Creek, Vermont, U.S.A.; seat of Middlebury Coll. (Congregational); marble works; iron foundries. Pop. (1910) 2848.

MIDDLESBROUGH (54° 35′ N., 1° 14′ W.), port, Yorkshire, England; iron and steel manufactures; R.C. episcopal see; has R.C. cathedral. Pop. (1911) 104,787.

MIDDLESEX (*c.* 51° 30′ N., 0° 15′ W.), county, S. England, to N. of Thames. M. was invaded by Danes in X. and XI. cent's; battles fought at Barnet during Wars of Roses, and at Brentford during Great Civil War. M. is second smallest county of England;

area, 233 sq. miles, or, including county of London, 283; bounded by Hertford, Essex, Kent, Surrey, Berkshire, Buckingham; surface flat or undulating, nowhere above 450 ft.; drained by Thames; dairy produce, market gardens, orchards. Pop. (1911) 1,126,694.

Middlesex, in Victoria County Histories.

MIDDLETON (53° 33′ N., 2° 12′ W.), town, Lancashire, England; textiles, chemicals. Pop. (1911) 27,983.

MIDDLETON, CONYERS (1683–1750), Anglican divine; aroused great opposition by giving up nearly everything held essential in Christianity; wrote *Life of Cicero*; an able thinker on rationalistic lines; a good stylist.

MIDDLETON, THOMAS (c. 1570–1627), Eng. dramatist; pub. *The Honest Whore* (1604); *A Chaste Maid in Cheapside* is a broad but clever comedy; *The Witch* in some scenes resembles Shakespeare's *Macbeth*, and probably was written before it. *The Mayor of Quinborough* is a tragi-comedy, and contains some of his best work. His most famous dramas are *The Changeling* (his masterpiece), *The Spanish Gypsy* (a romantic comedy), and *Women beware Women*. M. is never sublime, but he never sinks to bathos.

MIDDLETOWN.—(1) (41° 30′ N., 72° 40′ W.) city, Connecticut, U.S.A.; site of Wesleyan Univ., founded 1831; Episcopal see; trades in rubber, cotton. Pop. (1910) 11,851. (2) (40° 12′ N., 76° 45′ W.) city, Pennsylvania, U.S.A., on Susquehanna; ironworks, machine shops. Pop. (1910) 5374. (3) (39° 30′ N., 84° 25′ W.) city, on Miami, Ohio, U.S.A.; tobacco; agricultural implements. Pop. (1910) 13,152. (4) (41° 27′ N., 74° 32′ W.) city, on Wallkill, New York, U.S.A.; ironworks, car-shops. Pop. (1910) 15,313.

MIDDLEWICH (53° 12′ N., 2° 27′ W.), market town, Cheshire, England; salt-works. Pop. (1911) 4910.

MIDGES, see FUNGUS-GNATS.

MIDHAT PASHA (1822–84), Turk. statesman; Grand Vizier, 1871; helped to organise reforming party which deposed Abdul-Aziz and Murad V., 1876, and again became Grand Vizier; failure of reforming party was followed by his exile.

MIDHURST (50° 59′ N., 0° 44′ W.), market town, Sussex, England.

MIDI, south of France; said to begin at Valence.

MIDIAN, N. Arab. tribe in Old Testament; traditionally descendants of Abraham; name applied in Middle Ages to district near Gulf of Akabah.

MIDLETON, MIDDLETON (51° 54′ N., 8° 10′ W.), market town, Cork, Ireland; whisky distilleries. Pop. 4000.

MIDLOTHIAN, EDINBURGHSHIRE (55° 40′ to 56° N., 2° 50′ to 3° 40′ W.), county, Scotland, bordering S. shore of Firth of Forth; crescent-shaped; area, 367 sq. miles; pleasing and varied scenery; towards S. rise Moorfoot (2136 ft.) and Pentland Hills (1898 ft.); chief streams, Esk and Water of Leith; several small lakes and reservoirs among hills; interesting geological structure. There are extensive coal-fields in E., rich oil-shale beds in W., plentiful building-stone, excellent limestone; other industries, paper-making, brewing and distilling, flour-milling, fisheries, shipping, carpets, tweeds, gunpowder, potteries, rope-making, etc. Since Union of 1707, M. has become important agricultural county; soil fertile; much good pasture-land. Lothians were definitely won for Scotland by defeat of Northumbrians at *Carham*, 1018; frequently invaded by Eng. forces, XIV.–XVII. cent's; many battlefields and hist. castles. Pop. (1911) 507,662. See EDINBURGH and LEITH. M'Callum, *Midlothian* (1912).

MIDNAPORE (22° 25′ N., 87° 21′ E.), town, capital of Midnapore district, Bardwan, Bengal, India; copper and brass manufactures. Pop. 33,000.

MIDRASH (Hebrew for 'interpretation'), name given to a body of Jewish writings on the Old Testament. After the final codification of the law under Ezra exposition was still necessary. These expositions and adaptations were called Halacha and Haggada (the Halacha is the legal part of Midrashic lit., the Haggada a miscellaneous collection of material and general exposition), and were for long handed down orally, being only written down in III. cent. A.D. The Halakic M. contains the *Mekilta* ('measure') on Exodus, and the *Sifra* ('book') on Leviticus and Numbers—these go back to about the time of Christ; their exposition is in parts very similar to that of the Fourth Gospel. They are Halacha mingled with Haggada. Of the Haggadic M. there is the *Bereshith Rabbah* on Genesis and on the Megilloth, *i.e.* Lamentations, Canticles, Ruth, Ecclesiastes, and Esther. There are also Haggadic M. on the prophets and later collections. The M. contains parables which supply parallels to those of the New Testament.

Abraham, *Short History of Jewish Lit.*

MIDRIFF, see DIAPHRAGM.

MIDSHIPMAN, naval cadet in process of training; known familiarly as 'snottie' from tradition dating back to Nelson, never called 'middie.'

MIDSOMER NORTON (51° 18′ N., 2° 27′ W.), town, Somersetshire, England; coal-fields. Pop. (1911) 7300.

MIDWIFE, a woman who attends other women in childbirth; in England, by the Midwives Act (1902), no woman may act as a midwife for gain without a certificate, a Central Midwives' Board being created to regulate the issue of certificates and the condition of admission to the roll of midwives, to supervise the training, examinations, and practice of midwives; local authorities exercise supervision over midwives in their district, investigate misconduct, and supply the Central Board with names and addresses of midwives practising in their area. This Act does not, however, apply to Scotland or Ireland.

MIDWIFERY, see OBSTETRICS.

MIERES (43° 15′ N., 5° 48′ W.), town, Oviedo, Spain; coal and iron mines. Pop. 18,000.

MIERIS, FRANS VAN (1635–81), Dutch artist; painted genre pictures and portraits, mostly of small size. His son WILLEM (1662–1747) and his grandson FRANS (1689–1763) were also painters.

MIFFLIN, THOMAS (1744–1800), Amer. soldier and politician; leader of Conway Cabal to substitute Gates for Washington as commander-in-chief, 1777; governor of Pennsylvania, 1790–99; put down Whisky Insurrection.

MIGNET, FRANÇOIS AUGUSTE ALEXIS (1796–1884), Fr. political writer, archivist, and historian; associated as journalist with Adolphe Thiers; his hist. works and editions of MSS. are important contributions to research.

MIGNONETTE (*Reseda odorata*), a plant largely grown in gardens for its exquisitely fragrant flowers. These are zygomorphic and possess a large posterior honey disc. The plant was originally introduced from Egypt.

MIGRATION (Lat. *migrāre*, to wander), the wanderings of animals, of mankind, or even of plants, from one area to another. The most extensive, most thoroughly studied, and most purposeful of such wanderings are the annual migrations of **Birds**; for almost all birds which live outside tropical regions make an autumn retreat from, and a spring advance to, their breeding quarters. But the m's vary greatly in range, and this range in no wise depends upon the apparent capabilities of flight of the species concerned. Some movements are merely parochial, but the extent of others is almost beyond belief; the frail Goldcrest braves the passage of the North Sea, a small New Zealand Cuckoo (*Chalcococcyx*) crosses a 1200-miles stretch of ocean to winter in Australia, and several migrants travel from the Arctic regions to the southern limits of America and Africa, of Australia, and even of New Zealand. During their m's the great streams of birds keep to fairly well-defined routes, following, where possible, a coast-line, or the trend of valleys or

great rivers. Usually they move during the night, and, when the weather is favourable, they pass overhead at great altitudes, sometimes of 20,000 feet, attaining on occasion a speed of 100 miles an hour.

The primary cause of bird m. appears to lie in the necessity of finding more abundant food when cold weather cuts off the supply of insects, or shortening days curtail the feeding hours. But the real journeying has become instinctive, and the causes which drive birds to warmer climes in autumn, the growth of reproductive organs which seems to offer a stimulus to the spring return to breeding haunts, are only the means of setting instinct free. No sufficient reason has ever been advanced to explain the pathless and guideless wanderings of young, untravelled birds, which cross countless miles of land and sea alone, direct to their winter haunts, or the extraordinary accuracy which lands an individual year after year in the very wood it had frequented in preceding summers. To speak of a special sense of direction or an inherited tradition based on experience illumines the mystery only for a moment. See BIRDS, ORNITHOLOGY.

M. among **Mammals** is a rare phenomenon, but two examples may be noted. Most remarkable are the periodic seaward movements of the small vole-like Lemmings, which at uncertain times leave the highlands of Scandinavia, and march in vast hordes, by night, towards the lowlands. During their march, lasting from one to three years, they hold tenaciously to the general direction in which they set out, ceasing not until they reach the sea, and are buried beneath its waves. The European Reindeer, too, though it winters on the highlands of Scandinavia, migrates in summer to the seacoast, as also does the American Caribou, which in warmer weather moves northwards to the shores of the Arctic Ocean.

Many **Insects**, such as the larval 'Army-Worms,' Ants, Locusts, a few Dragon Flies, and several Butterflies, 'migrate,' but the movements are generally uncertain and desultory, although a few of the last-named group, such as the Amer. Monarch (*Anosia plexippus*), have regular seasonal to-and-fro m's along more or less definite courses.

The m's of **Mankind** form a subject too extensive for more than mention. In ancient times they were regulated by the necessity of finding fresh pasture for flocks; this by gradual stages led to the peopling of the habitable earth. Later m's, such as those of the Spaniards to America, or of the Crusaders to Palestine, were dominated by motives varying from the desire for gain to religious fervour, although the former is clearly the predominant influence in most human movements. In our own day over-crowding and its evils accounts mainly for the extraordinary tide of m. which has set in from the older countries to newer, less-congested lands.

MIKADO, see JAPAN, MUTSU HITO.

MIKULOV, see NICOLSBURG.

MILAN, MILANO (45° 28′ N., 9° 11′ E.), city, N. Italy (Lombardy); capital of M. province on Olona, in fertile plain; important industrial, commercial, and railway centre, and chief financial city of Italy. M. is partly enclosed by walls and entered by several gates. Notable features are magnificent Gothic cathedral of white marble (founded, 1386; completed, 1805–13), accommodating 40,000 people; exterior with innumerable pinnacles and statues; San Lorenzo, the oldest church. Sant' Ambrogio, Sant' Eustorgio (founded IV. cent.), Santa Maria delle Grazie (refectory with Leonardo da Vinci's *Last Supper*), San Satiro, Santa Maria della Passione, etc.; Reale, Archiepiscopal, Marino (now Municipio), Ragione (now Corn Exchange), Borromeo, and other palaces; Brera contains picture gallery (with paintings by Raphael, Luini, da Vinci, Mantegna, etc.), library, and museum; Castello Sforzesco (with municipal art collection); Museo Poldi-Pezzoli, and other museums, Ambrosian library, La Scala (famous opera-house), conservatoire of music, Arch of Peace, etc. M. is a centre of silk industry; also makes velvets, woollens, cotton goods, ironware, carriages, motor-cars, jewellery, glass, paper, porcelain, etc.

M. (*Mediolanum*) was conquered by Romans, 222 B.C.; sacked by Huns and Goths; passed to Longobards, Franks, and Holy Rom. Empire. In VII. cent. M. became leader of the federated Lombard cities against Frederick Barbarossa and the Ghibellines; ruled by Visconti (*q.v.*) family (dukes of M.) from 1277–1450; followed by the Sforzas till 1535; annexed to Spain, 1540; ceded to Austria, 1714; capital of Kingdom of Italy, established by Napoleon, 1805–14; united to modern Italy, 1859. Pop. (1911) 599,200.

Ady, *Milan under the Sforza*; Baedeker, *N. Italy*.

MILAN OBRENOVICH (1854–1901), king of Servia; succeeded, 1868; obtained Turk. recognition of Servian independence, and assumed title of king, 1882; defeated in wars, and resigned, 1869; returned, 1894, and controlled government of his son, King Alexander, who banished him, 1900; able general, liberal ruler, immoral privately.

MILAZZO, ancient *Mylæ* (38° 16′ N., 15° 14′ E.), seaport, Messina, Sicily; wine, fruit. Pop. 16,000.

MILDENHALL (52° 21′ N., 0° 31′ E.), market town, on Lark, Suffolk, England.

MILDEW, fungi forming white patches on plants. See FUNGI.

MILE, see WEIGHTS AND MEASURES.

MILES, NELSON APPLETON (1839–), Amer. soldier; general-in-chief of army, 1895–1903.

MILETUS, city of ancient Asia Minor; situated in Caria on W. coast near mouth of Meander; passed successively under names of LELEGIS, PITYUSSA, and ANACTORIA; colonised by Cretans under prehistoric leader M. in Minoan age; birthplace of Thales, Anaximander, Timotheus, Aspasia.

MILFOIL, plant of order Compositæ; used instead of hops in Sweden.

MILFORD.—(1) (41° 11′ N., 73° 7′ W.) town, Connecticut, U.S.A.; first settled in 1639; incorporated in Connecticut, 1664. Pop. 4366. (2) (42° 8′ N., 71° 31′ W.) town, Massachusetts, U.S.A.; boots and shoes. Pop. (1910) 13,055.

MILFORD (51° 42′ N., 5° 7 W.), port, Pembrokeshire, Wales; fish trade; situated on Milford Haven; excellent harbour. Pop. (1911) 6399.

MILIARY FEVER, see SWEATING SICKNESS.

MILICZ (d. 1374), Bohemian preacher.

MILITARY FRONTIER, name formerly applied to a strip of territory extending along the borders of Turkey, from Adriatic to Transylvania.

MILITARY LAW.—Special code by which army and navy are governed, in accordance with Army Act, 1881, Articles of War, King's Regulations and Army Orders, by virtue of annual Army Act. Crown control of army, disputed under Charles I., was established at Restoration; by Statute 13, Chas. II.; old custom was confirmed of king, advised by army officials, issuing orders to be observed during actual war; Mutiny Act, 1689, authorised courts-martial to pass death-sentence in cases of mutiny, desertion, and sedition; Mutiny Act, 1715, granted to Crown power of making Articles of War for army at home and abroad; these Acts had time-limit, and were re-enacted annually; Mutiny Act and Articles of War were consolidated into military code by Army Discipline and Regulation Act, 1879, superseded by Army Act, 1881, which is re-enacted, with any necessary amendments, annually; Army Act, 1906, substitutes 'detention' for 'imprisonment' for slight offences. Reserve Forces are subject to code during training and service.

Navy is governed by Navy Discipline Acts, 1866 and 1884. King's Regulations and Orders for the army are delivered to commander-in-chief, and have force of law if they come into conflict with no right or liberty. King's Regulations for the navy are issued by Order in Council to lords of admiralty. Military law does not supersede ordinary codes, except that a soldier cannot be charged with desertion or non-maintenance of his family, and has certain exemptions as

to arrest for debt, service on juries, etc. Offences under common law are not tried by courts-martial when civil court is at hand, and this rule obtains in U.S.A., France, Italy, Sweden. In Britain and U.S.A. court-martial sentences are reviewed by the officer commanding and by the judge advocate-general. Ger. soldiers and sailors have no appeal.

MILITIA, part of 'auxiliary forces' of Brit. regular army until conversion into Special Reserve, 1908. Its descent can be traced back to Saxon *fyrd* or national army of non-professional soldiers, forced to appear in arms when summoned by lord; military service after Conquest depended on terms of tenure of fief until abolition of feudal services at Restoration, 1660; but ancient system by which every man served in home service had never been abandoned, and is still an obligation. National force was collected in Middle Ages by commissioners of array, superseded in early XVI. cent. by lord-lieutenants, who exercised military authority of Crown in each shire until *Army Regulation Act*, 1871. Name 'militia' first appears in disputes of Charles I. and Parliament as to control of trained bands; Acts 13 & 14 Chas. II. regulated m. system; *Militia Act*, 1882, which abolished power of compulsory enlistment, contained clause authorising its revival after issue of Order in Council. In 1908, the m. was changed into a Special Reserve for service abroad.

MILK, an emulsion of fatty globules (cream) in an aqueous, slightly alkaline solution of casein, albumin, and milk sugar (lactose), secreted by the mammary glands of mammals. Described as a perfect food, because it contains all essential food constituents:—

	Cow's.	*Human.*
Water	86·9	88·0
Fat	3·5	2·9
Casein and albumin	4·8	1·6
Lactose	4·0	7·0
Ash	0·7	0·3
S.G.	1·032	1·029

See DAIRYING.

MILKWORT, plant of order Polygalaceæ; Common M. (*Polygala vulgaris*) grows in pasture, has blue, pink, or white flowers growing in a raceme; a tonic medicinally.

MILKY WAY, see GALAXY.

MILL, apparatus for grinding substances like corn; simplest form, two stones, one hollowed; later, two heavy circular stones; discarded for modern machinery, *c.* 1790.

MILL, JAMES (1773–1836), Scot. philosopher; b. Forfarshire; ed. Edinburgh; held important post under East India Co.; a political writer, whose 'philosophic radicalism' led to demand for security for good government through extension of franchise (Reform Bill); attempted to analyse complex affections, æsthetic emotions, moral sentiments into simple, pleasurable, and painful sensations, from which they are derived by repeated association (Associationism).

Stephen, *English Utilitarians.*

MILL, JOHN (1645–1707), Anglican divine; pub. Gk. New Testament, 1707 (important for textual criticism).

MILL, JOHN STUART (1806–73), philosopher and political economist; b. London; son of James Mill (*q.v.*), who directed his education; served East India Co., 1823–58; chief conductor, *Westminster Review*, 1835–40; M.P., 1865; author of *Logic* (1843), *Principles of Political Economy* (1848), *Liberty* (1859), *Representative Government* (1860), *Utilitarianism* (1863), *Examination of Hamilton's Philosophy* (1865).

M. is influenced by Hume and Comte. Knowledge is derived from experience, and deals with facts and their relations. Our belief in an external world is an illusion due to laws of association; his 'mental chemistry' seeks to explain problems unsolved by previous Associationists. Mind is 'a series of feelings with a background of possibilities of feeling'; matter, permanent possibilities of sensation. 'Intuitions' are wholly due to frequent impressions made on us in childhood, and come to seem innate. Even mathematics, excepted by Hume, is a generalisation from experience; its propositions are not necessary truths arising from *a priori* intuitions, but are true only by association. All inference is from particular to particular, and the major premise of the syllogism is a summary of such particulars. Causation derives its apparent necessity from frequent association of phenomena. The uniformity of nature is not certain, but only extremely probable.

He lays down four 'Canons of Induction.' In economics Mill affirms that the conditions of production are subject to physical law; yet the distribution of products among the different classes is under human control, governed by customs and institutions. In ethics M. holds that judgments must be passed only on the effects of actions; these are good as producing pleasure. Man by nature seeks his own pleasure, whence Mill's proof that general happiness is desirable. The moral feeling is compounded of sympathy, fear, self-esteem, experienced effects of action, and religious feelings, unified by association. A difference also is admitted in the quality of pleasures.

Life, by Bain (1882), Courtney (1889); Douglas, *J. S. Mill: A Study of his Philosophy* (1895).

MILLAIS, SIR JOHN EVERETT (1829–96), Eng. painter; b. Southampton; studied at the Academy schools and at seventeen exhibited his first picture. Joining the Pre-Raphaelites, he was influenced towards imagination and symbolism, and for many years painted under the Brotherhood's methods. With *The Gambler's Wife* of 1869 he broke into a more original style, and his later pictures are remarkable for their technical qualities. The finest specimen of his landscapes is *Chill October*, and as a figure-piece *The North-West Passage* is well known. He was elected Pres. of the Royal Academy, 1896.

Life and Letters, by his son, J. G. M. (1905).

MILLAU (44° 7′ N., 3° 6′ E.), town, ancient *Æmilianum*, on Tarn, Aveyron, France; kid gloves. Pop. 19,000.

MILLBURY (42° 13′ N., 71° 50′ W.), town, on Blackstone, Massachusetts, U.S.A.; cotton and woollen goods. Pop. (1910) 4740.

MILLEDGEVILLE (33° 3′ N., 84° 13′ W.), city, on Oconee, Georgia, U.S.A.; seat of Georgia Military Coll.; cotton industries. Pop. (1910) 4385.

MILLENNIUM (Lat. 'a thousand years'), the name given to the Christian belief that Christ would return to reign for a thousand years (used more loosely, besides, to express the coming of the Kingdom of God on earth when all evil will be done away). The belief is part of early Christian eschatology, but it was for ever, not only for a thousand years, that Christ was expected to reign. In *Revelation* 20, however, Christ reigns for a thousand years before the resurrection of the dead and the last judgment. These millennarial ideas had great hold in the early Church. But a reaction against them came, especially in the East. Speculations as to an impending reign of Christ and his saints on earth have appeared at various times, among the heretical mystics of the Middle Ages, the Anabaptists at Münster, the Pietistic movement in Germany, and among individual zealots.

See Charles, *Doctrine of a Future Life.*

MILLEPORA and **MILLEPORINA**, see under HYDROMEDUSÆ.

MILLEPORE, see CORAL.

MILLER, HUGH (1802–56), Scot. geologist; b. Cromarty; from 1820–22 apprenticed to a stonemason; wrote verses in spare time and pub. some poems in 1829; accountant in Bank of Scotland, 1834; editor of *Witness*, 1839, in which paper appeared his famous articles on 'The Old Red Sandstone,' 1840, reprinted in book form, 1841; wrote *My Schools and Schoolmasters* (1852); committed suicide at Portobello.

Mackenzie, *Hugh Miller: A Critical Study* (1905).

MILLER'S THUMB, see BULLHEADS.

MILLET includes two species of gramineous plant, *Sorghum vulgare*, and *Panicum miliaceum*, both cultivated in Mediterranean countries, India, etc., as cereals.

MILLET, JEAN FRANÇOIS (1814–75), Fr. painter; studied in Paris, executed signboards in his early struggles, settled at Barbizon, and there painted the rustic life of France as no other has done. His most famous picture is *The Angelus*, sold in Paris in 1889 for £23,226.

MILLIGAN, WILLIAM (1821–92), Scot. Presbyterian divine; wrote several works.

MILLIPEDE, see MYRIAPODA.

MILLOM (54° 13′ N., 3° 16′ W.), town, Cumberland, England; iron-mines and ironworks. Pop. (1911) 8612.

MILLPORT, see CUMBRAES, THE.

MILLSTONE GRIT, in geology a series of sandstone grits, conglomerates, and shales, which rest on the Carboniferous deposits; used for building purposes and also as grindstones.

MILLVILLE (39° 24′ N., 75° W.), city, on Maurice, New Jersey, U.S.A.; manufactures glass, iron, cotton. Pop. (1910) 12,451.

MILMAN, HENRY HART (1791–1868), Eng. historian; dean of St. Paul's; chief works, *History of Christianity* (1840) and its continuation, *History of Latin Christianity* (1855); important as leader of Latitudinarian movement.

A. Milman, *Life* (1900).

MILNE-EDWARDS, HENRI (1800–85), Fr. zoologist, student of invertebrates, and of comparative anatomy and physiology.

MILNER, ALFRED MILNER, VISCOUNT (1854–), Brit. colonial gov.; under-sec. of finance in Egypt, 1889–92; wrote *England in Egypt*, pub. 1892; chairman of Board of Inland Revenue, 1892–97; gov. of Cape of Good Hope, 1897–1901; High Commissioner for S. Africa, 1897–1905; opposed Kruger's treatment of Uitlanders in Transvaal; at conference of Bloemfontein, 1899, insisted on enfranchisement of British; gov. of Transvaal and Orange River Colony, 1901–5; cr. baron, 1901, on short visit to England where before and during the South African War he had raised greatest enthusiasm among imperialists on the one hand and violent opposition from Liberal left; viscount, 1902; showed good qualities as administrator, settling country after war and reorganising agricultural and other departments, but roused storm at home by consenting to importation of Chin. coolies for work in mines, 1904; faithfully supported by Brit. Government; retired, 1905.

Luke, *Lord Milner* (1901); Müller, *Lord Milner and South Africa* (1902).

MILNES, RICHARD MONCKTON, see HOUGHTON, LORD.

MILNGAVIE (55° 55′ N., 4° 19′ W.), town, Dumbartonshire, Scotland; bleach-fields, dye-works. Pop. (1911) 4530.

MILO, see MELOS.

MILOSH OBRENOVICH I. (1780–1860), prince of Servia; founder of house of Obrenovich; rose from herdsman to be ruler of his district; opposed Turk. occupation, obtained home rule, and was elected prince, 1817; recognised by Turkey as hereditary ruler, 1829–30.

MILTIADES (d. c. 488 B.C.), Athenian general; ruler of Chersonese; fled to Athens on approach of Persians, but later advised marching to Marathon where he defeated Persians, 490.

MILTON.—(1) (41° N., 76° 50′ W.) town, on Susquehanna, Pennsylvania, U.S.A.; ironworks. Pop. (1910) 7400. (2) (42° 15′ N., 71° 5′ W.) town, Massachusetts, U.S.A.; has meteorological station and observatory; granite is quarried. Pop. (1910) 7924.

MILTON, JOHN (1608–74), Eng. poet; b. Bread Street, Cheapside, London; s. of a scrivener; ed. St. Paul's School, 1620–25, Christ's Coll., Cambridge (from which he was rusticated for insubordination), 1625–32; M.A., 1632; lived and studied at Horton, Bucks, 1632–38; went to Italy, 1638, and remained for 2 years, and while there visited Galileo; returning, he resided in St. Bride's Churchyard, Fleet Street, and then in Aldersgate Street, where he acted as tutor to his nephews Edward and John Phillips; m. Mary Powell, of Royalist family, 1643; she was only 17 and after a few weeks she returned to her parents. She returned, 1645, and, mother of three daughters, d. the year in which M. became blind, 1652. M.'s *Tenure of Kings and Magistrates* (1649) brought him into prominence, and he was app. Sec. of Foreign Tongues to the Commonwealth; m. Catherine Woodcock, dau. of a Puritan officer, 1656; she died in childbirth, 1658. Catherine is the 'late espoused saint' of his great sonnet. When the Restoration was approaching, M. wrote *The Ready and Easy Way to Establish a Free Commonwealth*, advocating republic without established Church. Arrested, 1660, he was released possibly through Marvell's influence; his *Eikonoklastes* and *Defensio* were burnt by the common hangman. Disappointed in his dau's, who seem to have neglected him, he m. Elizabeth Minshull, a lady of 25, in 1663. He d. and was buried at St. Giles's, Cripplegate, Bucks.

In character M. was highly moral, but intolerant and arrogant. He had no humour; his nearest approach to humour in *Paradise Lost* are harsh and unlovely jibes. Religion to him was real and sincere, but it did not prevent his becoming bitter in pamphlet controversies.

His Poetry.—Eng. poetry of the period had spent itself. The great Elizabethan outburst was over, and there remained a few writers of exquisite lyric and those dramatists who had allowed blank verse to become decadent. M. with his great themes rescued lyric poetry from mere prettiness, with his cultured ear for music he rescued dramatic poetry from unrhythmical hobbling.

His early poems, e.g. *Ode on the Nativity* (1629), show Spenserian influence, but the new Miltonic music is there. *L'Allegro* and *Il Penseroso* show his thorough command of measure. *Comus* (1634), a masque, is full of beautiful poetry, but only in parts does it show the great organ music of *Paradise Lost*. *Lycidas*, an elegy on the death of Edward King, who was drowned in the Irish Sea, is one of the greatest elegies ever written in any tongue. During the years 1640–60 M. wrote no verse except sonnets; well-known ones are those to Cromwell, to Vane, to Fairfax, On his Blindness, On Chapman's Homer; some are frankly bad.

His greatest poem is the epic *Paradise Lost*, which deals with the Fall of Man, while *Paradise Regained* treats of Man's Redemption. The latter is less great than the former. In *Paradise Lost* can be seen all that is best in his poetry—the beautiful word music, the gorgeous imagery, the magnificent pageantry. The vehicle of both poems is blank verse, the greatest non-dramatic blank verse ever written. In a preface M. condemns rhyme as a medium, but in his last great work, *Samson Agonistes*, he occasionally seeks the aid of rhyme. This poem is in imitation of Gk. tragedy. These last three works were written after M.'s blindness.

His Prose.—M.'s prose was mainly controversial; he wrote polemical tirades against Episcopacy, 1641 and 1642. In 1643, incensed at his first wife's leaving him, he wrote the *Doctrine and Discipline of Divorce*, and, while teaching his nephews, the *Tractate of Education*, 1644. In the same year he wrote *Areopagitica*, a plea for the freedom of the press, the Presbyterians having objected to his heretical views on divorce. In his *Tenure of Kings and Magistrates* he defended the right to kill a 'wicked king.' *Eikonoklastes* (1649) and *Defensio Populi Anglicani* (1651) were bitter replies to Royalist pamphlets—the latter being directed against Salmasius.

His prose is great in parts. He wrote musically, but his sentences do not hang together. He had no idea of structure of prose paragraph; and the result is that his sentences ramble on for great lengths, making an ugly jumble. Much of the matter of the pamphlets

is worthless; they are full of ill-nature and vulgar abuse.

Life of M., by Masson, Johnson, Firth, Mark Pattison (Eng. Men of Letters), Sir Walter Raleigh; Bridges and Stone, *M.'s Prosody*.

MILVUS, Kites, see HAWK FAMILY.

MILWAUKEE (43° 2′ N., 87° 51′ W.), town, Wisconsin, U.S.A.; founded, 1835; became city, 1846; greatly increased towards close of XIX. cent.; suffered from great fire originating at oil-works, 1892. M. stands on W. shore of Lake Michigan, at mouth of M. River; great centre of railways and lake shipping; largest ships navigating in lakes can enter quays in centre of town; exports oats and other cereals, flour; manufactures machinery, brass and iron ware, agricultural implements; has flour-mills, breweries, meat-packing and sausage establishments, railway works. Archiepiscopal see of R.C. Church, episcopal see of Prot. Episcopal Church. M. has two cathedrals. Public buildings include government building, city hall, public museum and library, art gallery, Marquette Univ., many educational establishments. Fine system of parks. Pop., largely of German origin (1910), 373,857.

MIMICRY, the resemblance in shape, coloration, or both, between two species not closely allied, with the object of protecting one or both. The phenomenon is best known amongst Butterflies, where it has been observed that in an area where certain distasteful or protected species occur, there are also found species, lacking the protective qualities, but resembling the distasteful species in shape and colour. It has been assumed that the unprotected Butterflies, by flaunting the colours of their distasteful neighbours, escaped the persecution to which they would naturally have been subjected by birds. But many difficulties stand in the way of the whole-hearted acceptation of this theory of *Batesian Mimicry*, chief being that birds seldom eat even unprotected butterflies, and that they were unlikely to have exercised the minute discrimination in the early stages of the mimic variation, which the theory demands. It has been discovered also that two or more specially protected species of different families of Butterflies sometimes resemble each other closely, and this *Müllerian Mimicry* is said to be advantageous to all the parties concerned, since it makes easier the general recognition of distasteful forms, and so limits the necessity of indiscriminate experimental tasting on the part of young uneducated birds.

In groups other than Butterflies, resemblances occur, the model generally being some species of Hymenoptera, characterised by its powers of defence, such as a sting, while the mimics may belong to groups as different as Flies and Moths. Thus Humble-Bees are closely imitated by the two-winged *Volucella*, as well as by the Bee Hawk Moths; Ichneumons by the Diptera *Conops* and *Ceria*.

Other resemblances, sometimes accounted mimetic, are probably due to the influence of the same habits of life or the same environment, or simply to accident. Examples of such are the likeness in shape between limbless Lizards, *e.g.* the Blind or Slow-Worm, and Snakes; and the resemblance of an Assam caterpillar, when irritated, to a Shrew.

MIMULUS, genus of plants, order Scrophulariaceæ; has bell-shaped corolla; Musk Plant (*M. moschatus*), a small yellow flower, is a common Brit. garden flower.

MIMUS, MOCKING-BIRD (*q.v.*).

MINA, FRANCISCO ESPOZ Y (1781–1836), Span. general and politician; rose from ranks in Fr. war against Spain, 1808–12, to be commander-in-chief; afterwards, as politician, led Liberals.

MINARET, see under ARCHITECTURE.

MINAS GERAES (*c.* 18° 50′ S., 46° W.), one of interior states, Brazil; first settled by Portuguese in XV. cent.; threw off Portug. yoke with rest of Brazil in 1889, and became member of Brazilian republic. M. G. has area 221,951 sq. miles; surface consists of plateau in W., elsewhere mountainous, reaching height of *c.* 5900 ft.; watered by São Francisco, Grande, Parana; capital, Minas (Bello Horizonte). State has valuable mineral deposits and many mines; gold, diamonds, iron, lead. Coffee and sugar-cane are cultivated and cattle raised. Pop. 4,000,000.

MINBU (20° 10′ N., 95° E.), town, capital of Minbu district, Upper Burma, on Irrawadi. Pop. 6000; district, 235,000; division, 1,100,000.

MINCHINHAMPTON (51° 42′ N., 2° 12′ W.), town, Gloucestershire, England; woollens. Pop. (1911) 3702.

MIND, see PSYCHOLOGY.

MINDEN (52° 17′ N., 8° 55′ E.), town, Westphalia, Prussia; cathedral dates in part from XI. cent.; formerly fortified. Here Ger. and Brit. allies defeated French, 1759. Pop. (1910) 26,455.

MINE, see MINING.

MINEHEAD (51° 12′ N., 3° 29′ W.), town, Somersetshire, England; summer resort; parliamentary borough from XVI. cent. to 1832. Pop. (1911) 3459.

MINEO (37° 14′ N., 14° 43′ E.), town, ancient *Menænum*, Catania, Sicily, Italy. Pop. 10,000.

MINERAL.—Any homogeneous inorganic substance, whether element or compound, forming part of the earth's crust, is termed a m. Two m's only—water and mercury—are liquid at the ordinary temperature and pressure. M's occur as deposits of virgin or unpolluted m., such as coal, gold, lead, or far more commonly as deposits of m. ores—m's associated with other substances, called *gangue*. M. ore deposits are generally divided into three kinds—metalliferous, non-metalliferous, and earthy. Metalliferous ores are supposed to have two origins—igneous outbursts and accumulations of m. particles by water. In the case of igneous ores, quantities of molten rock would be forced through other rock in a state of solidity. No doubt certain metals, *e.g.* iron, aluminium, etc., were carried in vapour to pockets or crevices, where, owing to the lowered temperature, they solidified, all taking place at vast depths below the earth's surface.

Non-metalliferous deposits afford stones used and quarried for building purposes, as the granites and syenites, which occur in intrusive masses. Other m. deposits—the earthy—no doubt would be precipitated from solution, *e.g.* bog-ore, which is rich in iron, but mixed with sand and clay. If buried at great depth below the surface, bog-ore becomes changed to red hæmatite (*q.v.*). Non-metalliferous deposits from solution are the salines, *e.g.* rock-salt, gypsum. Some m. deposits are the result of vegetation existing on the earth ages ago—coal, peat, etc., while others may be due to metamorphic action on existing deposits, as in graphite.

Mineralogy, the science of m's, differentiating and classifying them according to their properties. Mineralogy includes the study of all inorganic substances, and while geology (*q.v.*) studies m's in their massive state, mineralogy deals with them as separate substances and individual components of the earth's crust.

The history of mineralogy is of little importance. Beautiful m's were used and described by the ancients. No serious attempt at a study of mineralogy as a science was made until the XVI. cent., when George Agricola took it up. Wallerius and Cronstedt commenced a classification of m's, and their work was continued by Werner. Hauy investigated crystallography (*q.v.*), and the great advances in chemical knowledge soon obtained mineralogy a secure footing as a science.

Minerals are classified according to their chemical composition and physical properties. Of these the chief headings are: specific gravity and action of moderate and blowpipe heat upon them; their crystalline forms, measurements of angles of crystals, and their cleavage; peculiarities of touch, taste, and smell; fracture, the character of their newly broken surface, as even, conchoidal, and splintery; lustre, as metallic, semi-metallic, pearly, vitreous, adamantine, greasy, and silky; appearance, as opaque, trans-

parent, and translucent; structure, as laminated, fibrous, and granular; streak, the appearance of a cut in the mineral by a knife. Hardness is determined by Mohs' table, which is: (1) talc, (2) gypsum, (3) calcite, (4) fluorspar, (5) apatite, (6) potash-felspar, (7) quartz, (8) topaz, (9) corundum, (10) diamond. No. 1 is the softest, and No. 10 the hardest, mineral in this table. Hardness of a mineral is tested by scratching; a hard mineral scratches, but cannot be scratched by a softer mineral. If a mineral will scratch (3) calcite, but will not scratch (4) fluorspar, though (4) fluorspar will scratch it, then its hardness is 3/4.

Hatch, *Petrology* (1909); Iddings, *Rock Minerals* (1906).

MINERAL OILS, see OILS.

MINERAL WATERS are spring waters possessing characteristic or medicinal properties. They are widely diffused, chiefly in mountainous and volcanic districts. They may be cold or hot. Boiling springs, found in Iceland, etc., are called *geysers*. Many mineral springs were known to, and used by, the Romans. Rom. work remains, *e.g.* at Bath. The waters may be used externally or internally; they are valued for their cleansing power upon the system (see BATHS, HYDROPATHY). Where these springs exist, health-resorts have been established, and are visited during the summer months by those seeking a 'cure.'

The therapeutic value of the waters depends chiefly upon the presence in solution of salts of sodium, magnesium and iron, and carbon dioxide and hydrogen sulphide gases. Mineral waters may be classified as thermal, carbonated, alkaline, saline, chalybeate, sulphuretted, siliceous.

Thermal springs occur at Buxton (82° F.), Vichy (113° F.), Bath (117° F.), Leuk (124° F.), Wiesbaden (150° F.). *Carbonated waters* (Seltzer, Apollinaris) are aerated by carbon dioxide, besides containing alkaline carbonates, chlorides, etc. *Alkaline waters* (Vichy, Ems) contain much sodium bicarbonate and chloride. *Saline waters* contain Glauber's salt, Na_2SO_4 (Carlsbad, Marienbad), Epsom salt, $MgSO_4$ (Epsom, Friedrichshall, Seidlitz, Hunyadi Janos), common salt (Droitwich, Woodhall). *Chalybeate waters* contain ferrous bicarbonate, and become rusty on exposure to air (Spa, Tunbridge Wells). *Sulphuretted waters* contain hydrogen and other sulphides, and have an offensive smell (Aachen, Harrogate, Llandrindod). *Siliceous springs* contain much silicic acid, which they deposit round their mouths.

In Dürkheim mineral water Bunsen discovered the alkali metals rubidium and casium. Other mineral waters, *e.g.* those at Bath and Buxton, are radioactive; the Bath water contains dissolved helium. Artificial imitations of natural mineral waters are manufactured, or the solid salts, *e.g.* Carlsbad salt, from which the waters can be made. Certain effervescing drinks are called 'mineral waters.' They should be made from distilled water, and are saturated with carbon dioxide under pressure. Salts, and flavouring essences, sugar and colouring are added, and the water is impregnated with the purified gas in special forms of apparatus. The necessary pressure—about 5 atmospheres—may be produced by pumping, by the evaporation of liquid carbon dioxide, or by the generation of the gas from chalk or marble within a confined space.

MINES, *Military Mines* are underground passages made by besiegers; the defenders sink *counter-mines*, which the attacking force tries to destroy by explosives.

Submarine Mines explode (1) when fired from a control station by electricity (*Observation Mines*); (2) when struck by a vessel (*Contact* or *Uncontrolled Mines*). See COAST DEFENCE, FORTIFICATIONS.

MINERVA, see ATHENA.

MINGHETTI, MARCO (1818–86), Ital. statesman; premier, 1863; resigned, 1864, because of attacks on his compromise with France; premier, 1873–76; his policy was opposition to France.

MINGRELIA (42° 30′ N., 42° 10′ E.), ancient *Colchis*, former principality of Transcaucasia; now included in Kutais.

MINIATURE (Lat. *minium*, red lead), small painting, generally a portrait; originally signified picture on manuscript, many examples of which have been preserved in Byzantine and mediæval MSS. The modern form of m. dates from the XIII. cent., as may be seen from the minuteness of drawings in illuminated MSS.; attained independence in XIV. cent. The Eng. and Flemish schools produced painters like Holbein, Schute, Oliver, and Betts, who, while generally executing large canvases, also painted m's. Nicolas Hilliard (1547–1619) is first famous painter of m's. During the XVII. and XVIII. cent's England produced many famous miniaturists, including Alexander and Samuel Cooper, Crosse, Spencer, Hone, Meyer, Cosway, Engleheart, and John Smart, while Lawrence, Raeburn, and Landseer occasionally executed m's. France contributed many m. artists, many of whom worked in enamel, as well as on vellum or ivory.

Though m. painting declined in the XIX. cent., it has of late years received a marked stimulus. Famous collections of m's are to be seen in the Pierpont Morgan Collection, Oxford, Wallace Collection, Louvre, and St. Petersburg.

MINING, engineering processes by means of which minerals are extracted from below the ground and raised to the surface. Mining was known to the ancients, and is referred to in the Book of Job. It is mentioned on an Egyptian papyrus dated 1400 B.C.

In England the tin mines of the Scilly Isles were worked by the Phœnicians, but the m. was not very important until coal came to be used for fuel. In 1259 a charter was granted by Henry III. to the freemen of Newcastle-on-Tyne to 'dig for coals,' while others were granted by Henry VII. and Elizabeth. Before the invention of gunpowder in 1620 m. on a large scale was unknown; it was impossible to sink shafts to any depth, owing to the inrush of water and also the difficulties of haulage and ventilation. The use of explosives overcame the difficulty of sinking through obstacles such as solid rock, which previously could only be negotiated by pick and crowbar. The invention of the steam-engine furthered the advance of m., and overcame not only the difficulty of haulage, but also the inrush of water.

Mineral deposits are of two classes: **Beds or seams**, as iron ore, coal, or salt. These may be of either mineral or vegetable origin, but are generally of the former. **Veins or lodes** (see ORE), where the mineral fills what was formerly a fissure in the earth's surface. In the Colonies lodes are called reefs, a misleading term.

Before the sinking of a shaft is commenced, the locality has to be *prospected* by men who study the geological conditions under which minerals occur; a surface exploration is carried out, and boring is resorted to. If minerals exist in a bed or seam below the surface, shafts are sunk; this operation may cost anything from £10,000 to £50,000. Two shafts are generally used, one for haulage purposes and the other for ventilation. From the shafts numerous galleries are driven. The mineral, after having been dug out, is hoisted to the surface by mechanical devices which derive their power from a steam-engine on the surface at the mouth of the shaft. The miners descend in a cage, also driven by the steam-engine.

When the mineral exists in veins or lodes, shafts are sunk similar to those above mentioned, the operations being practically identical. In the diamond mines of Kimberley, South Africa, the earth is dug out and sent to the surface, where it is exposed to the elements for some weeks. This causes disintegration, which is furthered by its being stirred into vats of water. The remaining débris is sorted and passed over a greased surface which, while allowing stones and rubble to pass, retains the diamonds.

In gold-mining the sand and earth is shovelled into a trough or pan and sluiced with water. The metal,

being heavy, sinks to the bottom of the pan, while the earth is carried off.

Sometimes mines of mineral wealth are discovered accidentally, as in the case of the Potosi silver mines, found by an Indian clutching at a bush to save himself from falling down a hillside. Marshall discovered gold in California in 1848 while making a race for the waterwheel of his mill. See COAL, *Coal-mining*.

MINISTER.—(1) In ecclesiastical usage, originally signified a deacon, whose duties included attendance on priest; now more loosely used, especially in Presbyterian and Free Churches, to mean officiating person. (2) In parliamentary language, the chief servants of the State, *e.g.* Prime Minister. See also CABINET, PARLIAMENT, etc.

MINISTRY, in theological sense, the Christian m., the Church as a calling, ministers of religion as a body; in political sense in Britain, the Prime Minister and the colleagues he chooses to act along with him as responsible executive of the country. The m. includes not only members of the Cabinet (*q.v.*), but other officers, such as Parliamentary Under-Sec's, Sea Lords, Junior Lords of the Treasury, military members of Army Council, Solicitors-Gen., Lord-Advocate of Scotland, Lord-Lieut. of Ireland, etc. The m. numbers about sixty members in all.

The 'era of m's,' says Macaulay, 'may most properly be reckoned from the day of the meeting of the Parliament after the General Election of 1698.' Originally the king appointed and dismissed ministers as he chose; out of Privy Council (*q.v.*), king's body of advisers, grew 'Cabinet' in Stewart times, and after Restoration and Revolution, power passed from Crown to Parliament; not till XIX. cent. did corporate unanimity replace former independence and disagreement of individual members of m. Two main principles of Brit. Constitution are irresponsibility of king and responsibility of m. as a body.

MINK, see WEASEL FAMILY.

MINNEAPOLIS (45° 3′ N., 93° 11′ W.), town, Minnesota, U.S.A.; lies on both sides of Mississippi River, at falls of St. Anthony, water-power of which has enabled town, situated in midst of great wheat and timber-producing region, to become centre of immense trade in flour and lumber products; has great number of flour- and saw-mills; manufactures machinery, iron goods, furniture. M. is seat of State Univ., founded 1868, and has many other educational institutions; public buildings include city hall and court-house, lumber exchange; many beautiful parks, including Minnehaha Park. M. is episcopal see of Prot. Episcopal Church. Damaged by fire in 1889, 1893, 1904. Pop. (1910) 301,408.

MINNESINGERS (fl. XII. and XIII. cent's), Ger. lyric poets; were mostly of aristocratic descent. They sang of love (*Minne*) and their language was Middle High German. Originally they surpassed the Troubadours; they had high ideals and sang of higher, more noble, love; they sang of nature, of joy, of sorrow. Sometimes their songs were didactic. Each poet composed his own verses and set them to music, thus great variety of poetical style arose. Contests were frequent; Walther von der Vogelweide outsung Heinrich von Ofterdingen, Wolfram von Eschenbach outsung Klingsor of Hungary (cf. also the contest in Wagner's *Tannhäuser*). In time the M. degenerated and their subjects became gross. The knights ceased to write, and the **Meistersingers**, singers drawn from the craftsmen, flourished — the greatest being Hans Sachs of Nuremburg. They codified rules, and spontaneity was lost. Wagner in his opera *The Meistersingers* pours ridicule upon their 'rule-of-thumb' methods.

Lyon, *Minne- und Meister-sang* (1882); Bithell, *Minnesingers* (1909).

MINNESOTA (43° 30′ to 49° 22′ N., 89° 30′ to 97° 15′ W.), state of U.S.A. in centre of N. border; is bounded on N. by Manitoba, Ontario; E. by Lake Superior, Wisconsin; S. by Iowa; W. by S. and N. Dakota; area, 83,365 sq. miles; surface flat or undulating, rising from 650 ft. on S. to *c.* 2200 ft. on N.E.; drained by Mississippi, Minnesota, Red R., and other streams; many large lakes, including Mille Lacs, Red Lake, Lake Winnibigashiah. Capital, St. Paul; large towns, Minneapolis, Duluth, Winona, Stillwater.

European knowledge of M. dates from 1659, when it was reached by Fr. explorers; others followed, and in 1688 the district was annexed to France. Eastern part passed from France to Britain in 1763, and after War of Amer. Independence was transferred to U.S. Western part was ceded to Spain in 1762, but was restored to France in 1803, from whom it was bought in same year by U.S., as part of Louisiana Purchase. M. formed part of Wisconsin Territory for a time, and in 1838 part of it was incorporated with Iowa Territory; organised as separate territory, 1849; admitted as state to Union, 1858; sent large force to field on Federal side during Civil War. In 1862 there was a rising among Indians, who massacred great number of whites; they were eventually defeated, and a number were put to death. A financial crisis occurred in 1873.

Executive power is vested in governor, assisted by lieut.-gov. and other officials; legislative authority held by Senate of 63 members and House of Representatives of 119 members, elected for four and two years respectively. Principal religious denominations, R.C., Lutheran, Methodist. Education is free and obligatory; state univ. at Minneapolis. Inhabitants include whites, negroes, Indians.

Agriculture is chief industry; M. produces large quantities of wheat and other cereals; great pine forests in N., maple, oak, ash farther S.; lumbering important; large quantities of iron produced; manufactures flour, leather, boots, etc. Railway mileage is over 9000. Pop. (1910) 2,075,708.

Folwill, *Minnesota* (1907); Neill, *History of M.*

MINNOW, see under CARPS.

MINORCA (39° 56′ N., 4° 5′ E.), one of Balearic Islands, Mediterranean; held by Britain, 1713–56, and again in 1763–82, when restored to Spain. Pop. 40,000.

MINORITES, see FRANCISCANS.

MINOS, a semi-legendary king of Crete; the celebrated laws of Minos are attributed to him.

MINOTAUR (classical myth.), a monster, partly man, partly bull, with a bull's head. He was ultimately slain by Theseus and Ariadne.

MINSK.—(1) (*c.* 53° N., 28° E.) government, W. Russia; area, 35,220 sq. miles; much of surface occupied by forests and swamps; capital, M.; principal industries, shipping, timber trade, fishing, distilling, agriculture. Pop. (1910) 2,813,400. (2) (53° 53′ N., 27° 33′ E.) town, capital of above, on Svisloch; seat of Gk. Orthodox and R.C. bp's; tobacco and leather manufactures. Pop. (1910) 109,300.

MINSTER-IN-SHEPPEY (51° 25′ N., 0° 52′ E.), village, Kent, England.

MINSTER-IN-THANET (51° 20′ N., 1° 19′ E.), village, Kent, England.

MINSTREL (Lat. *minister*, a servant), a wandering singer who was held in high honour during the Middle Ages; also known as *minnesinger* (*q.v.*) and *jongleur*; in the XIII. cent. the m. became the household entertainer.

MINT, the factory of a nation's currency. Barter was employed during early periods of Egyptian, Assyrian, and Chaldean civilisations, and in prehistoric Greece; there are traces, however, in all of different commodities forming standard of value. Fines in Sparta at close of VII. cent. were made payable in cattle, and earliest Gk. coins were traced with head of cattle and called oxen; so in Italy, where *pecus* gave *pecunia*, and among Germanic races. Cattle, etc., were replaced everywhere by metal, often open rings; shekels appear in *Genesis*, talents in Homer; earliest coins had marks of private merchants who issued them.

Private money always disappeared before spread of social order. Lydians of Asia Minor were, according to Herodotus, first persons to strike gold and silver coins;

their tyrant Crœsus (561–546 B.C.) abolished electrum as medium of exchange; this seems to have been beginning of state control of coinage; multitude of Gk. m's sprang up.

Ancient coins fill almost same place towards study of ancient history as heraldry does towards study of mediæval history. Servius Tullius (VI. cent. B.C.) is said to have established Rom. state m., abolishing other standards; Pippin the Short and Charlemagne in Capitularies ordered that no coin should be struck except at royal court, and that the *denarius palatinus* should be legal tender. Right of keeping private m. was, however, occasionally granted and often usurped by subjects throughout Middle Ages. Romans cast their copper coins, but method of striking is alone used in modern coinage. It is curious that ancient Britons had acquired art of coining before arrival of Romans, as is proved both by Cæsar's testimony and survival of coins; character of these coins points to trade connection with Greece; A.-S. England had many m's with, until c. 1000, independent dies; m. was established in Tower of London by 1329, and probably much earlier; private money was gradually driven out by royal money, and by middle of XVI. cent. the m. in Tower was the sole one, as it ultimately remained. Scotland ceased to issue money 1709, Ireland at about same time.

MINT (*Mentha viridis*), a Labiate commonly cultivated for table purposes; propagates freely by means of suckers and from cuttings.

MINTO, SIR GILBERT ELLIOT, 1ST EARL (1751–1814), b. Edinburgh; ed. Edinburgh and Oxford; viceroy at Corsica, 1794–96; cr. Baron Minto, 1797; app. Gov.-Gen. of India, 1807, and made notable frontier treaties; cr. Earl of M. and Viscount Melgund, 1813. Countess of Minto, *Life and Letters of Earl Minto* (4 vols., 1874–80).

MINTO, GILBERT JOHN MURRAY KYNYNMOND ELLIOT, 4TH EARL (1847–), ed. Eton and Cambridge; served as soldier in Turk. army, 1877; in Afghan War, 1879; as volunteer in Egypt, 1882; military sec. to Gov.-Gen. of Canada (Lord Lansdowne), 1883–85; chief of staff in N.W. Canadian rebellion; Gov.-Gen. of Canada, 1898–1904; Viceroy of India, 1905–10.

MINTURNÆ, modern MINTURNO, ancient city, on Liris, Latium.

MINUCIUS FELIX, MARCUS (fl. III. cent.), Christian apologist, traditionally a brilliant Rom. pleader; wrote earliest known Lat. apology, *Octavius*, a dialogue between Christian and heathen, modelled on Cicero.

MINUSCULES, see PALÆOGRAPHY.

MINUSINSK (53° 42′ N., 91° 30′ E.), town, on Yenisei, Yeniseisk, Russia-in-Asia; in vicinity are coal- and iron-fields. Pop. 10,000.

MIOCENE (in geology), name proposed by Sir Charles Lyell for a subdivison for the Tertiary strata; no examples are found in Britain; it is best developed in Vienna basin; rich in fossils, including dinotherium, mastodon, deer, monkeys; remains of such plants as palms and conifers show that the conditions then existing were tropical.

MIQUEL, JOHANN VON (1829–1901), Ger. statesman; helped to found *Nationalverein*; aided reorganisation of National Liberal party, 1887; Minister of Finance, 1890–1900; attempted social and financial reforms.

MIRABEAU, HONORÉ GABRIEL RIQUETI, COMTE DE (1749–91), Fr. statesman; descendant of bourgeois family who bought lordship of M., 1570, and attained rank of marquis, 1685; had several notorious *liaisons*, one of which led to imprisonment in isle of Ré by his f.'s procurement; imprisoned for rape, 1777–82, and condemned to death; pub. *Lettres de cachet*, 1782, protesting against usage to which he owed his confinements, *Considérations sur l'ordre de Cincinnatus*, 1785, and other political pamphlets; employed by government on mission to Prussia, 1786–87, but failed, and alienated ministry by attack on corruptions; returned to states-general, 1789, took foremost place, and sought to establish constitutional monarchy; thorough knowledge of history, and study of constitutional development in England and America, united with statesmanlike instincts which now showed themselves; till his death prevented Assembly breaking with foreign powers, insisted on Crown retaining veto, and generally sought to mould constitution on known and tried models, but met with growing opposition of *doctrinaire* and fanatical politicians; Assembly decreed, 1789, that none of its members could become minister, thus defeating scheme of M.'s for introducing this characteristic of Brit. constitution; d. prematurely worn out. Without common share of prudence in conduct of private life, but uncommonly well fitted to guide others, of uncompromising honesty and striking eloquence, he inspired tremendous loyalty.

Warwick, *M. and the Fr. Revolution* (1905); Trowbridge, *M., the Demigod* (1907).

MIRABEAU, VICTOR RIQUETI, MARQUIS DE (1715–89), Fr. author and father of the famous statesman of the Revolution; b. Provence; tyrant at home, but a philanthropist abroad; wrote *Ami des Hommes* and *La Philosophie Rurale*.

MIRACLE is generally held to be the violation of the law of nature by the intervention of a higher power. Christianity makes the miracles in the life of Christ fundamental in Christian theology, *e.g.* the Virgin Birth and the Resurrection. Miracles are often regarded as a proof of Christianity; but this method of apologetic is not now so much relied on. Some critics would deny all New Testament miracles except the cures which are put down to the undeniable fact of faith-healing.

Trench, *Miracles of Our Lord*; Thompson, *Miracles in the New Testament*.

MIRACLE PLAYS, see DRAMA.

MIRAGE, an optical illusion seen in hot climates. Images of distant objects appear inverted either below the ground or in the atmosphere. The phenomenon is due to variations in density of successive layers of air.

MIRAJ (16° 50′ N., 74° 41′ E.), native state, Deccan, Bombay, India; area, 564 sq. miles. Pop. 125,000. **Miraj**, capital of state. Pop. 20,000.

MIRANDA, FRANCESCO (*c.* 1754–1816), Span.-Amer. soldier; sought to liberate S. America from Spain; fought for Fr. Revolution; with Brit. aid established Colombian republic, 1806; Venezuelan republic established, 1810; captured, he died in prison.

MIRANDE (43° 32′ N., 0° 23′ E.), town, on Grande Baise, Gers, France. Pop. 4000.

MIRANDOLA (44° 53′ N., 11° 3′ E.), town, Emilia, Italy; cathedral and ducal palace. Pop. 20,000.

MIRANZAI (HANGU) VALLEY (33° 32′ N., 71° 6′ E.), mountain valley, N.W. Frontier, India.

MIRFIELD (53° 40′ N., 1° 43′ W.), town, on Calder, Yorkshire, England; woollen and cotton industries, collieries. Pop. (1911) 11,712.

MIRKHOND (1433–98), Afghan-Turkestan writer and scholar; b. Balkh; great work was a universal history—*The Garden of Purity*, on the biography of prophets, kings, and caliphs.

MIRROR, a glass or polished surface which shows images of objects by reflection. The Etruscans had m's of decorated thin metal discs, generally bronze; small metal m's were used by the Greeks and Romans, and such have been found in Cornwall. Glass m's coated with tin also appear to have been known to the Romans. Glass m's silvered with amalgam, mercury, and tin were made by the Venetians, and in 1665 twenty m. makers were sent from Venice to Paris. In 1835 J. von Liebig discovered a method of silvering glass by heating aldehyde in a glass vessel with an ammoniacal solution of nitre of silver.

Distorting (or comical) m's are concave or convex, and reflect a person as a short stout figure or a long thin one.

MIRZAPUR (25° 10′ N., 82° 38′ E.), town, on

Ganges, Mirzapur, United Provinces, India; carpets, brassware. Pop. 50,000. District has area of 5223 sq. miles. Pop. 1,100,000.

MISCARRIAGE, see ABORTION.

MISDEMEANOUR (law term), a crime which is not a felony and which did not carry the penalty attached to felony before 1870 of loss or forfeiture of goods. Private persons may arrest for felony but not for misdemeanour.

MISHAWAKA (41° 40′ N., 86° 10′ W.), city, Indiana, U.S.A., on St. Joseph River; flour, machinery. Pop. (1910) 11,886.

MISHNA, see HEBREW LITERATURE.

MISIONES (c. 27° S., 55° W.), territory, N. Argentina, between rivers Paraná and Uruguay, S. America; surface uneven and forest-covered; chief production, Paraguay tea; capital, Posadas. Area, 11,282 sq. miles. Pop. 45,000.

MISKOLCZ (48° 6′ N., 20° 49′ E.), town, Borsod, Hungary; flour, porcelain. Pop. (1910) 51,459.

MISPRISION, in law, the knowledge that some other person has committed treason or felony, and the wilful concealment of the fact, or the refraining from giving information to the law.

MISSAL, the Mass book of the Rom. Church, until about 750 A.D. generally called *Sacramentary*. The m. now in use is that ordered to be compiled by the *Council of Trent*, and officially declared the only one lawful by Pius V. in 1570. It superseded in some places older local rites (where the Rom. liturgy had not already superseded them) except in a few cases (see LITURGY). The present Rom. m. gives first a calendar, with all the feasts, etc., in the ecclesiastical year, then full directions as to times of celebration, vestments. This is followed by devotional exercises and then the 'proper of the season,' that is, the parts of Mass, collect, epistle, gospel, etc., which are different for each Sunday; then information as to special Masses, etc. 'High Mass' differs from 'Low Mass' in being celebrated with more pomp and at least three priests.

A priest must not celebrate alone; he must have a server. Different liturgical colours are used for the vestments, according to the season.

MISSEL THRUSH, see under THRUSH FAMILY.

MISSI DOMINICI, the special representatives of Charles the Great, sent every year into the various districts of the empire to administer justice and report to the emperor.

MISSIONS have been an integral part of Christian activity from the beginnings of the Church. Until the conquest of the Rom. Empire the Church could be hardly other than missionary, and the overthrow of that Empire by barbarians brought her face to face with new problems. The conquest of Europe by Christianity was gradual, though it became the official religion under Constantine the Great more than a thousand years before the conquest of Europe was even nominally achieved.

The conversion of the countries on the outskirts of the Empire was largely due to a few great individuals. Thus Ireland greatly owes her conversion to St. Patrick, Scotland to St. Columba, Scandinavia to Olaf Tryggvessön, and Germany to the English Boniface, while the Slavonic Churches look back to Cyril and Methodius as their fathers; Russia, however, was Christianised from Constantinople. On the shores of the Baltic paganism lingered long; the great heathen idol in the isle of Rügen was not demolished till the XII. cent., while Lithuania was only just becoming Christian at the Reformation. But the Eastern Churches had not been idle. Recent research has made manifest the triumphs of missionary zeal in the Nestorian Church (see NESTORIANS), but its work was swept away by Mongol hordes of Central Asia. They had, however, established churches as far as Siberia in the N. and India in the S.

Modern missionary activity begins some time after the Reformation, for the internecine struggles in W. Europe absorbed for the time all the energy of the churches, though something was done by R.C. missionaries under the influence of the Jesuit, Francis Xavier, in India and Japan. On the Eng. conquest of N. America something was done to Christianise the natives by Sir Walter Raleigh, but there was a tendency there and elsewhere not to make much serious effort. The Society for the Propagation of the Gospel was founded in 1701. About 1731, however, the Moravian Church, then exiled from its Austrian birthplace, though numerically quite small, took up missionary work, and within a few years established churches in the far north of America, in Africa, and in Ceylon. About 1792 William Carey, a Baptist, became active, and in 1795 the London Missionary Soc. (interdenominational) was established. Numerous other societies followed: the Church Missionary Soc. and the Religious Tract Soc., 1799; the Brit. and Foreign Bible Soc., 1804; the Brit. Soc. for the Propagation of the Gospel among the Jews, 1843; the Central Africa Mission of the Eng. Univ's, 1860.

A great revival of interest in missions took place in England about 1880, particularly among Univ. men. The 'Student Volunteer Missionary Movement' was started in America in 1886, and in England in 1892. Medical missions are very important and there are now nearly one thousand doctors in the mission field. Missionary activity is more developed among Nonconformists than in the Anglican Church. Canadian and Australian missionary work is very important, indeed, in Canada, in remoter districts, there can hardly as yet be said to be regularly established churches. There are several societies in U.S.A., and one of the most important of recent developments is that of the World's Student Christian Movement. The number of converted Jews both in England and elsewhere is larger than is often supposed. The R.C. Church has been active in missionary work, and is remarkable for the number of Women's Orders which it employs. The Russ. Church carries on work in Siberia, Alaska, China, and Japan, and is helped by the Brit. and Foreign Bible Soc. in the distribution of copies of the Scriptures.

Missionary activity has made great strides during the XIX. cent., but certain generalisations can fairly be made about the mission field at the present time. The outstanding factor is the power of Muhammadanism, hence in many countries, particularly parts of Africa, the whole question resolves itself into a battle between Christianity and Islam.

While African missions have made great strides, special difficulties are felt most. The natives, often owing to European ill-treatment, are far from friendly, and are both morally and intellectually at a low level, possessing, with the minds of children, an ability to copy the worst vices of their conquerors. Christian missions exist in almost every part of the continent. The work of the Univ.'s Mission to Central Africa deserves special mention.

In India, ancient civilisation and religions present their own difficulties. Hinduism, though noble, is often unable to free itself from idolatry and immorality; the tendency of the Hindu mind is meditative rather than practical, and incapable of response in the same way as the Western. There have, however, been certain tendencies in India towards theism (partly owing to Muhammadan influence). The rigid family system forbids initiative, and the caste system is strict to a degree far exceeding class distinctions in Europe. To better the position of women and combine educational and philanthropic with religious work is part of the missionary's task. Here, as in Africa, native civilisation tends to pick up Western vices.

Chin. Christianity did not progress much for long, but since the Boxer massacres it has made great strides. A strong native church flourishes in Korea, but so far Christianity is not very strong in Japan. In other parts of the world, especially in the Pacific islands, where noble work has been done, m's are developing, but the missionaries are coming to realise

that the main work is the building up of strong native churches.

Smith, *Short History of Christian Missions* (1890); Dennis, *Christian Missions and Social Progress* (1897); Speers, *Missions and Modern History* (1905).

MISSISSIPPI (29° N., 89° 7′ W.), great river of N. America; second largest river in world; rises in Lake Itasca, in Minnesota, some 1560 ft. above sea-level, and flows southward over 2600 miles to Gulf of Mexico, roughly parallel to Alleghanies on E. and Rookies on W. Divides Minnesota from Wisconsin, Iowa from Wisconsin and Illinois, Missouri from Illinois and Kentucky, Arkansas from Tennessee and Mississippi, Louisiana from Mississippi; has drainage basin of nearly 1,240,000 sq. miles, or over 40% of whole area of U.S. Its distance from Rookies is considerably greater than that from Alleghanies, which accounts for greater size of western affluents, among which Missouri (*q.v.*) is a much larger stream than the M. itself when they unite at St. Louis; other western affluents are Minnesota, Des Moines, St. Francis, White, Arkansas, and Red Rivers. Eastern tributaries are Wisconsin, Illinois, Ohio (with tributaries Cumberland and Tennessee), Yazoo.

On either side of river are rich alluvial bottoms of large extent, at many points underlying ordinary level of stream, which is prevented from overflowing them by strong embankments; at mouth is large delta with many passages; river valley suffers from frequent floods, to prevent which government is extending and improving system of levées on embankments. There is great river traffic carried on by specially constructed steamers; chief trading towns, Minneapolis, St. Paul, St. Louis, Memphis, New Orleans. M. was explored by de Soto, 1541, and by Fr. travellers, 1673; source discovered by Glazier, 1884.

Spears and Clark, *History of the M. Valley* (1903); Chambers, *The M. River and its Wonderful Valley* (1910).

MISSISSIPPI (30° 14′ to 35° N., 88° 7′ to 91° 40′ W.), one of southern states of U.S.A.; is bounded N. by Tennessee, E. by Alabama, S. by M. Sound, Louisiana, W. by Louisiana and Arkansas; area, 46,810 sq. miles; surface flat along coast, rising to low hills never over 800 ft. in height; drained by Mississippi, Yazoo, Big Black, Pearl, Pascagoula, Tombigbee, Tennessee, and other streams. Capital, Jackson; large towns, Meridian, Vicksburg, Natchez.

M. was visited by Span. explorers in XVI. cent., but was first permanently settled by French early in XVIII. cent., first Fr. colony being founded by Iberville at Biloxi; remained under Fr. control till 1763, when it was transferred to Britain, from whom it passed to U.S. at close of War of Independence. Organised as territory, 1798, M. was admitted as state to Union, 1817; seceded from Union, 1861, and was scene of various battles during Civil War; submitted to Federal government, 1865, and was readmitted to Union, 1870. M. has several times suffered from devastating floods.

Government executive: power is vested in governor, assisted by lieut.-gov. and other officials; legislative authority vested in Senate of 45 members and House of Representatives of 145 members, elected for four years by popular vote; M. is divided for purposes of local administration into 79 counties, and is represented in Congress by two Senators and eight Representatives. Principal religious denominations are Baptist, Methodist, R.C., Presbyterian. Education is free, but is not compulsory; there are six univ's and coll's within the state, including M. Univ. at Oxford. Inhabitants include whites, negroes, Indians, Asiatics; whites of foreign birth are chiefly German and Irish. Climate is semi-tropical; soil fertile; chief industry is agriculture; produces great quantities of rice, maize, wheat, and other cereals; cattle, horses, sheep, and pigs raised; great crops of cotton grown. Lumbering is important industry. Manufactures include cottons, cotton-seed oil, etc. Railway mileage exceeds 4500. Pop. (1910) 1,797,114.

Encyclopædia of Mississippi History, edit. by Rowland (1907).

MISSOLONGHI, MESOLONGHI (38° 21′ N., 21° 25′ E.), fortified town, Acarnania and Ætolia, Greece, on Gulf of Patras; Byron died here in 1824. Pop. 8600.

MISSOULA (47° N., 114° W.), city, on Missoula, Montana, U.S.A.; seat of state univ.; agricultural and fruit-growing region. Pop. (1910) 12,869.

MISSOURI (38° 50′ N., 90° 7′ W.), river, U.S.; chief tributary of Mississippi; rises in Rockies; formed by union of Jefferson, Gallatin, Madison; receives Dakota from N., Yellowstone, Little M., Cheyenne, White, Platte, Kansas, Osage from S.; length, *c.* 3000 miles; navigation difficult; joins Mississippi near St. Louis; discovered by Fr. explorers, 1673.

MISSOURI (36° to 40° 35′ N., 89° 6′ to 95° 43′ W.), one of E. central states of U.S.A.; is bounded N. by Iowa, E. by Illinois, Kentucky, Tennessee, S. by Arkansas, W. by Oklahoma, Kansas, Nebraska; area, 69,415 sq. miles; surface flat or undulating in N., with wide stretches of prairie in N.W.; to S. of M. River the Ozark Mountains reach height of *c.* 3000 ft. Rivers are the Mississippi, which has course of over 550 miles along E. border; Missouri, which divides state a little to N. of centre; Grand, Chariton, Osage, Meramec, and other streams. Capital, Jefferson; large towns, St. Louis, Kansas City, St. Joseph, Joplin.

M. was visited by de Soto in 1542, but was not permanently settled until XVIII. cent., Ste Geneviève being founded in 1755, St. Louis in 1764; in 1762 it was ceded by France to Spain as part of 'Louisiana'; and was included in the Louisiana Purchase of 1803, thus coming into possession of U.S.A. Its admission to the Union was subject of long and acrimonious dispute, which resulted in the MISSOURI COMPROMISE of 1820, whereby slavery was forbidden north of lat. 36° 30′. Admitted as state to Union, 1821, in Civil War M. was divided, providing forces for both sides, and was scene of great number of engagements. Since conclusion of war, history of M. has been one of increasing prosperity.

Government executive: power is held by governor, who is assisted by other state officials; legislative authority vested in Senate of 34 members and House of Representatives of 142 members, elected respectively for four and two years by popular vote. State is subdivided for purposes of local administration into 115 counties, and is represented in Federal Congress by 2 Senators and 16 Representatives. Principal religion is R.C.; other creeds, in order of numerical strength, are Baptist, Methodist, Disciples of Christ, Presbyterian, Lutheran, Episcopal, Congregational. Education is free and obligatory; there are many univ's and coll's, state univ. being at Columbia, while other towns containing important coll's are St. Louis, Liberty, Cameron, Springfield. Inhabitants include whites, negroes, Indians, Asiatics; whites of foreign birth include Germans, British, Canadians, Swiss, Russians, Scandinavians.

Principal industry is agriculture; M. produces heavy crops of maize, wheat, oats, hemp, flax, cotton, tobacco, fruit; cattle, pigs, and sheep reared; minerals include coal, zinc, lead, petroleum, copper. Important industries are meat-packing, flour-milling, lumbering, brewing, printing, iron-founding. Railway mileage exceeds 9000. Pop. (1910) 3,293,335.

Carr, *Missouri*.

MIST, transparent fog (*q.v.*).

MISTLETOE (*Viscum album*), a semiparasite growing on apple, oak, and other trees, from which it absorbs nutriment by means of suckers. M. had an important place in the religious ceremonies of the Druids, to whom it was sacred, especially when found on the oak.

MISTRAL, see WIND.

MISTRAL, FRÉDÉRIC (1830–), Provençal poet; of peasant origin; started with six other *Provençal* poets the *Félibrige* movement (*q.v.*), 1854; pub. *Mirèio* (1859), which won him fame and has been

set to music, many other poems, a Provençal dictionary of about ten thousand words (1886), *Mémoires et Récits* (1906)—all translated into Fr., some of them by Alphonse Daudet; awarded Nobel prize (Literature), 1904.

MISTRETTA (37° 56′ N., 14° 22′ E.), town, Messina, Sicily. Pop. 1400.

MITAU (56° 39′ N., 23° 42′ E.), town, Courland, Russia, on Aa; residence of Dukes of Courland in XVI. cent.; trade in grain and timber. Pop. (1910) 38,840.

MITCHAM (51° 23′ N., 0° 12′ W.), suburb of London, in Surrey; market gardens. Pop. (1911) 63,218 (reg. dist.).

MITCHELL (43° 52′ N., 98° W.), city, S. Dakota, U.S.A.; seat of Dakota Univ.; machine shops; brickyards. Pop. (1910) 6515.

MITCHELL, SILAS WEIR (1829–), Amer. physician and author; served as medical officer in Civil War, afterwards becoming specialist in nervous diseases; commenced to write fiction in 1863, his historical novels, including *Hugh Wynn* and *The Red City*, being held in high esteem; also produced several volumes of verse, in addition to many works on medical subjects.

MITCHELSTOWN (52° 16′ N., 8° 16′ W.), market town, Cork, Ireland; in vicinity are limestone caverns.

MITES AND TICKS (*Acarina*, an order of *Arachnida*), small Arachnids, mostly degenerate and mostly parasitic, living on plants or animals or even on decaying organic matter. The body is fused to the thorax, and is often round, though in a few it is cylindrical; and there are usually present biting or piercing mouth-parts, and four legs armed with hairs or claws for attachment.

Examples of mites, which are usually very minute, are the Cheese-Mite (*Tyroglyphus*); the Follicle-Mite (*Demodex folliculorum*), in hair-follicles; the human Itch-Mite (*Sarcoptes scabiei*); and the minute so-called 'Red Spider' (*Tetranychus*), common on garden bushes.

Ticks, which are larger, and pea- or bean-like when swollen with blood, occur especially on birds and mammals, and even on snakes. They are often disease-carriers and dangerous pests. *Rhipicephalus* distributes the parasite of Red Water or Texas Fever amongst cattle; *Ornithodorus* spreads human 'tick-fever' in Central Africa; *Ixodes* is common on sheep and dogs in Britain.

MITFORD, MARY RUSSELL (1787–1855), Eng. novelist; wrote plays and verse and much miscellaneous prose, but had her greatest success with the sketches of homely life pub. under the title of *Our Village*.

MITFORD, WILLIAM (1744–1827), Eng. historian; pub. *History of Greece*, 1784–1810, marred by political bias and lacking style, for long a text-book, but now superseded.

MITHAN or **GAYAL**, see Ox Group.

MITHILA, ancient kingdom of India; greater part now included in Bihar.

MITHRADATES, name of several Oriental kings; Persian appellation signifying 'given by Mithras,' *i.e.* the sun god; most famous bearers, kings of Arsacid dynasty of Parthia and kings of Pontus.—**M. I.** (Arsaces VI.) conquered Media, Assyria, and several Gk. cities; defeated Demetrius II., Nicator, 138 B.C.; first great Parthian monarch.—**M. II.**, king of Parthia (c. 120–88 B.C.); called 'king of kings'; first to establish communications with Rome.—**M. VI.**, Eupator, king of Pontus (131–64 B.C.); dangerous enemy of Rome, with whom he waged two wars; hero of eastern romance.

MITHRAS, an Oriental deity regarding whom we know little, owing to the religious zeal of Muhammad and his followers. From monumental and scant documentary evidence, the following story is constructed: after a miraculous birth from a rock, witnessed only by some herdsmen, M. asserted dominion over the sun, and by its aid slew a bull sacred to Ormazd (god of light); and in spite of efforts to prevent it on the part of Ahriman (god of darkness), sacrificed it, thus creating the human race. He finally left the earth and became an immortal.

Mithraism was known both to Hindus and to Persians; spread rapidly, receiving additions from Chaldea and the various minor religions scattered over W. Asia; became exceedingly popular in Rome, especially among legionaries, towards end of I. cent.; thus coming into conflict with Christianity, which it withstood till V. cent., though broken in power by Constantine and Theodosius.

Mithraism was essentially mystic and occult. Its votaries, after passing through stages of initiation, met in grottos and partook of communion. Several marked resemblances to Christianity have been observed, but this is due to the Eastern origin of both and the fact that both were essentially moral religions.

MITRAL VALVE, see under Heart.

MITRE, a high, pointed cap with a cleft in the middle, worn as ecclesiastical head-dress by bp's and certain abbots. Until the X. cent. it was only a papal cap, worn out of doors, but later it became a regular ecclesiastical vestment. It was soon regarded as one of the special insignia of a bp., but the popes granted permission to wear it to important abbots. In the R.C. Church m's are often very tall, though originally shorter. They are of varying degree of richness of material and decoration according to the occasion when they are worn. Since the Oxford Movement m's have been worn (with copes) in the Anglican Church, though they had practically gone out with the Reformation. M's of different shape are worn by Gk. ecclesiastics. Lutheran bishops wear them, but not any other Protestants.

MITROVITZ, Mitrovitza (44° 59′ N., 19° 36′ E.), town, on Save, Croatia-Slavonia, Hungary; occupies site of ancient Sirmium. Pop. 11,600.

MITSCHERLICH, EILHARDT (1794–1863), Ger. chemist; prof. at Berlin; established law of Isomorphism connecting crystalline form with molecular structure and chemical composition (cf. the isomorphous salts $Na_2HPO_4+12H_2O$: $Na_2HAsO_4+12H_2O$), as a method for adjusting atomic weights.

MITTWEIDA (50° 58′ N., 12° 58′ E.), town, on Zschopau, Saxony; textile industries. Pop. (1910) 17,795.

MITYLENE, see Lesbos.

MIVART, ST. GEORGE (1827–1900), Eng. medical practitioner and biologist.

MIZRAIM, Old Testament name for Egypt; according to some the term is used of a district outside Egypt proper, near Gulf of Akaba; a Musri, which may have been in Arabia, is mentioned in Assyrian chronicles.

MNEMONICS.—(1) Art of aiding the memory; (2) devices for aiding the memory, *e.g.* mnemonic verses. The principle of these devices is to associate what is not easily remembered with the thought of something else which is easily learned and remembered, *e.g.* with verses which, even if nonsensical, are rhythmical, like the 'Barbara, Celarent,' etc., of formal logic, and which may have sense, rhythm, and rhyme, like 'Thirty days hath September,' etc. The composition of mnemonic devices was popular in ancient Greece and Rome, and in the XV. to XVII. cent's of our era.

MO'ALLAKAT, Al-Mo'allaqat, a collection of ancient Arabic poems written between 520 and 660 A.D., and compiled, probably by Hammād the Rhapsodist, during VIII. cent. The name signifies 'hung up,' and is explained by the legend that they were thus placed on the Ka'ba (shrine) at Mecca; simpler explanation is that they were a 'string' of poems. They are pre-Islamic in time, and only one of the writers, Labīd, became a follower of Muhammad. The collection consists of seven long poems by as many different writers, whose names and life-histories have been preserved. The poems, with the exception of that of 'Abīd, exhibit a strong metrical uniformity,

and give pictures of contemporary life. Most have lengthy preambles sometimes by another hand.

The poems have suffered slightly in their compilation, for Hammād (his title ar-Rāwiya shows him to be similar to the ancient Gk. rhapsodists) has, as the Gk. rhapsodists did with Homer, changed the order of several verses and occasionally interpolated.

MOA, see under RUNNING BIRDS.

MOABITES, a pastoral, Semitic race, formerly dwelling to the E. of the lower Jordan and the Dead Sea, but now extinct or merged with the Arabs. According to the Old Testament, they were the descendants of Lot, and were made tributary by Saul and David. Solomon married women of Moab. Mesha, king of Moab, subsequently revolted against Israel, recovered territories, and fortified cities, and regained independence, defeating Jehoram, king of Judah. Its later history is obscure. But in the IX. cent. B.C. Moab had a definite civilisation, with a similar language and culture to that of the Israelites. Its national god was Chemosh.

MOAWIYA, see CALIPH.

MOBERLY (39° 22′ N., 92° 29′ W.), city, Missouri, U.S.A.; machine and car shops. Pop. (1910) 10,923.

MOBERLY, GEORGE (1803–85), Anglican clergyman; headmaster of Winchester, 1835–66; bp. of Salisbury, 1869.

MOBERLY, ROBERT CAMPBELL (1845–1903), Anglican divine; author of *Atonement and Personality*.

MOBILE (30° 43′ N., 88° 3′ W.), town, Alabama, U.S.A.; colonised by French, 1702; Span. town from 1783 to 1813, when taken by U.S.A.; captured by Federals, 1865. M. is chief seaport of state; exports cotton, lumber, timber, meat products, live stock, maize, flour, vegetables; has R.C. episcopal see and cathedral; public buildings include custom-house, city hall. Pop. (1910) 51,521.

MOBILIER, CRÉDIT, see CRÉDIT MOBILIER.

MOÇAMBIQUE, see MOZAMBIQUE.

MOCHA, see MOKHA.

MOCKING-BIRD (*Mimus polyglottus*), an Amer. Perching Bird related to the Wrens; famous for its powers of song and imitation.

MODELS used for making metal casts are generally worked in wood, and from them a plaster or clay cast is made to form the mould into which the molten metal is poured. Before beginning to work in stone the sculptor makes a m. in wax or clay, and m's of various organs are used in teaching anatomy and physiology. M's are of great value in math's, particularly in the representation of geometrical figures, and in the teaching of physics m's assist the mind to grasp conditions which scarcely can be expressed in words. There are also working m's for demonstrating physical laws, the working of machinery, the inter-relation of geometrical figures, etc. Experimental m's are constructed by inventors in order to study the action of machines afterwards to be built on a large scale.

MODEL-YACHTING, regattas of miniature sailing-vessels up to *c.* 5 ft. 6 in. long; popular in Britain and U.S.A.; races are conducted under fixed rules; usual means of steering is weighted rudder which counteracts force of wind, but Americans prefer device by which tiller is connected with main-sail.

MODENA (44° 38′ N., 10° 55′ E.), town, N. Italy; belonged in turn to Etruscans, Romans, Goths, Lombards; held by Este family, with interruptions, from 1288 till 1860, when it was incorporated in Italy. M. is archiepiscopal see, has XII. cent. Romanesque cathedral; univ. dates from 1683; fine ducal palace, museums, art-galleries, observatory; formerly strongly fortified; has citadel. Manufactures include woollen and hemp fabrics, leather, silk, glass. Pop. (1911) 70,267.

MODICA (36° 52′ N., 14° 46′ E.), town, ancient *Mutica*, Syracuse, Sicily. Pop. (1911) 49,951.

MODJESKA, HELENA (1840–1909), Polish actress; real name Modrzejewski; famous in tragic and comedy rôles; settled in U.S.A.

MODLIN, see NOVOGEORGIEVSK.

MÖDLING (48° 6′ N., 16° 17′ E.), town, summer resort, Austria; iron manufactures. Pop. (1911) 18,067.

MODULATION, see HARMONY.

MOERIS, LAKE OF, old name of expanse of water, Fayum, Egypt; now a small lake named Birket el Kerūn.

MOESIA (*c.* 43° N., 22° E.), old Rom. province, S.E. Europe; now included in Servia and Bulgaria; settled by Goths in III. cent., subsequently by Slavs.

MOFAḌḌALĪYĀT, MUFAḌḌALĪYĀT, collection of ancient Arabic poems compiled during later part of VIII. cent., by al-Mufaḍḍal, a native of Kūfa who, pardoned by Caliph al-Mansūr for revolt, in 762, was appointed tutor to son of caliph, at whose suggestion he made his anthology. The poems are pre-Islamic and number 126; they are the work of 68 poets and show every phase of Arabian contemporary life; they contain little spirituality, but extol the virtues of hospitality and faithfulness to the tribe. The elegy of Abū Dhu'aib on the death of his sons is beautiful both in sentiment and in execution. Al-Mufaḍḍal has treated his collection with much greater care than Hammād has the *Mo'allakat* (q.v.).

Huart, *History of Arabic Literature* (1903).

MOFFAT (55° 21′ N., 3° 27′ W.), watering-place, Dumfriesshire, Scotland; mineral springs.

MOFFAT, ROBERT (1795–1883), Brit. missionary; sent to Africa, 1816; worked in Bechuanaland and Namaqualand; colleague of Livingstone (*q.v.*); translated Bible.

MOGADOR (31° 30′ N., 9° 15′ W.), seaport town, Morocco, on Atlantic; exports goat-skins, almonds, olive oil. Pop. 25,000.

MOGILEV, MOHILEV (*c.* 53° 30′ N., 31° E.), government, W. Russia; area, 18,514 sq. miles; cereals, honey, potatoes, hemp. Pop. (1910) 2,214,900.

MOGILEV, MOHILEV (53° 53′ N., 30° 22′ E.), town, on Dnieper; capital of Mogilev; manufactures leather, tobacco; seat of Gk. and R.C. abps. Pop. (1910) 51,040.

MOGILEV, MOHILEV (48° 30′ N., 27° 50′ E.), town; on Dniester; Podolia, Russia; distilleries, breweries, active trade. Pop. 23,000.

MOGUL, GREAT, title of emperor of Delhi; first was Baber. See INDIA (HISTORY).

MOHÁCS (45° 58′ N., 18° 37′ E.), town, on Danube, Baranya, Hungary; busy trade; noted in Hungarian history. Pop. 16,500.

MOHAIR, wool of Angora goat. See GOAT.

MOHAMMED, see MUHAMMAD.

MOHAMMERAH, see MUHAMRAH.

MOHAWKS, see INDIANS, *Red*; IROQUOIS.

MOHILEV, see MOGILEV.

MOHL, HUGO VON (1805–72), Ger. botanist; b. Stuttgart; ed. Tübingen; took medical degree; app. prof. of Bot. at Tübingen, 1832; author of several treatises, notably regarding palms and tree-ferns.

MOHL, JULIUS VON (1800–76), Ger. Orientalist; lived in Paris, where he was prof. of Persian at Collège de France; noted for monumental edition of *Shāh Nāmeh*.

MÖHLER, JOHANN ADAM (1796–1838), Ger. Catholic theologian; prof. at Tübingen.

MOHMAND, Pathan tribe, inhabiting hilly country North-West Frontier Province of India; Afghans by descent, and formerly under allegiance of Afghanistan, but placed under Brit. Government by agreement of 1893. The clans number about 65,000, with 18,000 fighting men, and were among the strongest and most troublesome frontier tribes before their outbreak and complete defeat in 1897.

MOHONK LAKE (41° 50′ N., 74° 10′ W.), summer resort, on Lake Mohonk, Shawangunk Mountains, New York, U.S.A.

MOHUN, CHARLES MOHUN, 5TH BARON (*c.* 1675–1712), Eng. duellist; at age of seventeen was tried for murder and acquitted; tried as accessory to murder of Mountjoy, the actor, by Captain Hill, and found not guilty (1693); fought duel with 4th Duke

of Hamilton, and both were killed. See Thackeray's *Esmond*.

MOIR, DAVID MACBETH (1798–1851), Scot. physician and author; practised med. at Musselburgh; author of the well-known story of Scottish life, *Mansie Waugh*, of works on the history of med., literary, and other subjects, of verses, and of many contributions (under name of *Delta*) to *Blackwood's* and other magazines.

MOISSAC (44° 7′ N., 1° 7′ E.), town, on Tarn, Tarn-et-Garonne, France; has an interesting abbey church. Pop. 8300.

MOJI (33° 55′ N., 131° E.), seaport town, N. of Kiushiu, Japan; coalfields. Pop. (1910) 55,682.

MOKHA, MOCHA (13° 20′ N., 43° 10′ E.), seaport town, Arabia, on Red Sea; formerly large trade in 'Mocha coffee.' Pop. 5200.

MOKSHANY, MOKSHANSK (53° 30′ N., 44° 30′ E.), town, Penza, Russia; flour, potash. Pop. 10,000.

MOLA DI BARI (41° 3′ N., 17° 6′ E.), town, Apulia, Italy; exports grain, fruit, wine. Pop. 15,000.

MOLA DI GAETA, see FORMIA.

MOLASSES, see SUGAR.

MOLAY, JACQUES DE (d. 1314), last of the Masters of the Templars; summoned by Pope Clement V. to undergo trial at Paris, and was sentenced to death by burning.

MOLD (53° 10′ N., 3° 9′ W.), town, Flint, N. Wales; centre of coal, lead, lime, and earthenware clay district; Rom. fort. Pop. (1911) 4875.

MOLDAVIA (46° 30′ N., 27° E.), a former principality of S.E. Europe; now the N.E. portion of Rumania.

MOLDE (62° 45′ N., 7° 9′ E.), seaport town, Romsdal, Norway; tourist centre.

MOLE FAMILY, TALPIDÆ, family of Insectivora containing about 35 species, all confined to northern hemisphere. Most have small eyes and ears, long skulls, and short limbs with flattened spade-like hands and feet for digging. The tunnels and 'mole-hills' of the common MOLE (*Talpa*) are familiar throughout Europe and most of Asia, but the creature is absent from Ireland. It feeds upon insects, larvæ, and earth-worms, as also do the STAR-NOSED MOLE (*Condylura*) of N. America, and the true MOLE SHREWS (*Urotrichus*) of N. America and Japan, all of which resemble the common Mole in their burrowing habits.

MOLÉ, LOUIS MATHIEU, COMTE (1781–1855), Fr. statesman; held office under Napoleon and at restoration; Prime Minister, 1836; a moderate Liberal, he was supported by the king against Guizot and Thiers.

MOLÉ, MATHIEU (1584–1656), Fr. statesman; pres. of *parlement*, 1641; and sought to reconcile Anne of Austria to its privileges; obtained Peace of Ruel, 1651.

MOLE RATS (*Spalax*), a genus of peculiar Rodents, the eyes of which are covered by skin. They live in underground tunnels like those of Moles, in a limited area about the Black Sea, Caspian, and Western Mediterranean.

MOLE SHREWS, see MOLE FAMILY.

MOLECH, see MOLOCH.

MOLECULE.—A molecule is the smallest particle of a substance that can exist alone. It is the unit of physical as distinguished from chemical phenomena. That matter is ultimately discontinuous has long been held, and the properties of thin films support this belief; nevertheless, the nature and behaviour of gases furnish the most convincing evidence of molecular structure. The simple volume proportions in which gases combine (Gay-Lussac's law), and consequently the simple relations between the densities and combining weights of gases led to Avogadro's hypothesis that equal volumes of all gases at equal temperatures and pressures contain the same number of molecules. This hypothesis has been confirmed by the kinetic theory of gases which gives a satisfactory account of such phenomena as gaseous pressure, expansion, and diffusion. Thus the physical condition of a gas is referred to the mass and velocity of its individual molecules, and the study of its behaviour becomes a problem in dynamics.

The sizes of m's have been estimated in various ways, with fairly concordant results. An idea of their size may be gained from the statement that if a single drop of water were magnified to the size of the earth, the size of the m's within it would be between that of small shot and cricket balls. The following mean values for molecular diameters have been calculated:—

Hydrogen .	$2{\cdot}03\times10^{-8}$	centimetres.
Nitrogen .	$2{\cdot}92\times10^{-8}$	,,
Oxygen .	$2{\cdot}70\times10^{-8}$	,,
Carbon dioxide .	$3{\cdot}33\times10^{-8}$	,,

More complex m's are larger, though equal numbers always occupy the same volume in the gaseous state, owing to the large interspaces. The properties of gases, liquids, and solids depend upon the freedom of their m's. The m's of a perfect gas are free to move, but constantly collide with other m's or the walls of the containing vessel. On account of this molecular freedom, gases are capable of indefinite expansion. The m's of a liquid, whilst free to move about within its mass, must keep the same mean distance from each other. Consequently, a liquid has a volume, but not a shape of its own. The m's of a solid possess vibratory power only, and keep the same mean position, so that a solid retains its own shape. The force that holds m's together is called Cohesion.

MOLESKIN, a twilled FUSTIAN (*q.v.*).

MOLFETTA (41° 12′ N., 16° 36′ E.), seaport, Bari, Italy; cathedral; active trade. Pop. (1911) 40,641.

MOLGE, see NEWTS.

MOLIDÆ, see SUN-FISHES.

MOLIÈRE, pseudonym of JEAN-BAPTISTE POQUELIN (1622 (?)–73), Fr. dramatist; b. in Paris, s. of upholsterer to Louis XIII., and himself inherited that post; well educated, first at *Collège de Clermont*, afterwards at Orleans, where he studied law and was called to Bar; studied philosophy under Gassendi; at twenty-three joined troupe of actors and soon took lead; acted for twelve years, first in Paris with indifferent success and more successfully in provinces, changing his name from Poquelin to M.; began to write his own plays, and initiated modern comedy with his first studies of manners, *l'Étourdi*, his *essais d'écrire*, acted in Lyons (1653), and epoch-making *Le Dépit Amoureux* (Béziers, 1656). In 1658 he returned to Paris, and under protection of king began literary campaign against extravagances, vices, and foibles of his time, brought from Italy and Spain.

Boileau described M. as a contemplator; his excellence consists in detached observation of manners and passions, a terrible power of mockery beneath an assumed air of moral tolerance, and in serious moments the classical faculty of 'understatement': the Misanthrope in his masterpiece thus declares his devotion:—

'Je fais de vous, madame, un cas extrême.'

Monotony of heroic couplet as used by M. is scarcely felt when play is seen, not read; and it is the form *par excellence* for the epigram, in which M. excelled. Another complaint of the reader—that M.'s characters are types, not people—is again not felt when plays are represented on stage, where exaggeration is necessary. In the provinces, M. used to sit in the market-place listening and noting; in Paris, he studied the court, the court tailors' and hairdressers' shops, etc., and found there his *Bourgeois Gentilhomme* (1670) and many other of his types. During first night of the *Précieuses Ridicules* (1659) a voice called out from the pit: 'Courage, Molière; that is true comedy!' *L'École des Maris* (1661), *L'École des Femmes* (1663), *Le Mariage forcé* (1664), *Don Juan* (1665), were comedies of his first manner. He borrowed some subjects from Terence and other classical writers; this borrowing, as in the *Fourberies de Scapin* (1671)—from Terence—was more than adaptation, but

the original element was never overpowered. The *Femmes Savantes* (1672) continued the attack commenced in *Les Précieuses*; *Le Misanthrope* (1666) is the most perfect of comedies of the classical school, and perhaps the best picture of its author's philosophy of life. *Tartuffe* (1667) is satire against hypocrisy, especially in its religious form, on which ground it could not be played for four years and a half. *L'Avare* (1668) was taken from Plautus's *Aulularia*. Whilst acting the 'Malade' in the *Malade imaginaire*, a piece of pure and broad humour, in 1673, M. was taken ill and carried away from the stage dying.

His contemporaries did not place M. as high as do later critics; the *Gazette* of the time never mentioned his name in descriptions of court entertainments; he was praised as actor, not as writer; Academicians and *salons* reproached him with buffoonery and exaggeration, and even with the immoderate laughter that his plays called forth. His life was darkened by domestic troubles; he is supposed to have pictured himself in the character of his 'Misanthrope,' and he bitterly remarks in *Critique de l'École des Femmes* that it is easier to express your own noble sentiments than to upbraid other men's folly. His numerous works were produced in fifteen years, during which he had to be at once author, actor, and stage manager; yet he will always rank among the world's very greatest of writers.

Life, by Hatton (1905), Trollope (1906), Brander Matthews (1910).

MOLINA, LUIS (1535–1600), Jesuit theologian; prof. at Evora and Madrid; tried to modify Augustinian doctrine of grace.

MOLINA, TIRSO DE, see TIRSO DE MOLINA.

MOLINE (41° 30′ N., 90° 30′ W.), city, on Mississippi, Illinois, U.S.A.; agricultural implements, carriages. Pop. (1910) 24,199.

MOLINIER, AUGUSTE (1851–1904), distinguished Fr. hist. scholar; author of *Bibliographie du Languedoc*, *Sources de l'histoire de France au moyen âge*, and editor of many hist. texts.

MOLINOS, MIGUEL DE (1640–97), Span. theologian; exponent of 'Quietism,' *i.e.* the direct communion of the soul with God, dispensing first with the Church, then with Jesus; imprisoned for heresy by the Inquisition, 1687.

MOLISE, ancient name for CAMPOBASSO (*q.v.*).

MOLLIEN, NICOLAS-FRANÇOIS, COUNT (1758–1850), Fr. statesman; Minister of the Treasury under Napoleon, 1806, and mitigated huge deficit left by Barbé-Marbois; prominent figure in the Hundred Days.

MOLLUSCS, MOLLUSCA, 'SHELL-FISH,' a phylum or subkingdom of the Animal Kingdom. The popular name 'shell-fish' indicates one of the most salient features of this great phylum—the presence of a limy shell. But a shell is not always present, and even when present is sometimes concealed within the body, so that we must look for other features common to the group. M's are unsegmented animals with bilateral symmetry (which, however, is lost in adult Gasteropods); they have no jointed appendages, but possess a locomotory muscular 'foot' on the under surface; they generally breathe by gills as well as through the skin, have a simple nervous system, often tentacles which have the power of smell, simple auditory or balancing organs, a rasping 'radula' within the mouth, and complicated eyes. The body is usually soft and slimy, owing to secretions from numerous gland cells.

M's are usually sluggish creatures, although such forms as Cuttle-Fishes occasionally show considerable activity. They are especially fitted for aquatic life, are common in many freshwater ponds and abundant in the sea; but some (such as Slugs and Snails) live in moist places on land. Their habits are as varied as their structures; most are free-living, but some are fixed, and a few are parasitic on Echinoderms. The 25,000 molluscan species which have been recognised are scattered over all the world except on the shores of arctic and antarctic seas. To man they are of some value, for many are used as food, others are of ornamental value, furnishing the beautifully iridescent mother-of-pearl; from a few shell-cameos are made; and they supply the world with pearls.

M's fall into five great classes exceedingly different from each other, and these readers should consult for more detailed information:—

Class I. LAMELLIBRANCHIATA or BIVALVES—*e.g.* Oyster.

Class II. SCAPHOPODA—a small class, e.g. *Dentalium*.

Class III. SOLENOGASTRES—a small class of worm-like forms.

Class IV. GASTEROPODA or UNIVALVES—*e.g.* Whelks, Snails.

Class V. CEPHALOPODA—Cuttle-Fishes and Octopus.

MOLLUSCOIDEA, old term which included the Brachiopoda, Polyzoa or Bryozoa, and the Phoronoidea.

MOLLY MAGUIRES, Irish secret soc. founded (1843) to resist rent collectors; spread to Irish districts of Pennsylvania, where, however, it was suppressed, 1876, after commission of startling crimes.

MOLOCH, MOLECH, an ancient Canaanite deity worshipped by human sacrifice in Old Testament times. Children were slain and then offered as a burnt sacrifice in the Valley of Hinnom. This practice, probably a return to an ancient custom in times of special difficulty, was sternly denounced by Jeremiah and Ezekiel. The idea was to sacrifice what was dearest.

MOLOCH, see under LIZARDS.

MOLOKAI, see HAWAIIAN ISLANDS.

MOLSHEIM (48° 32′ N., 7° 30′ E.), town, Alsace-Lorraine, Germany; iron and steel manufactures. Pop. 3700.

MOLTKE, ADAM GOTTLOB, COUNT (1710–92), Dan. courtier; loaded with favours by Frederick V., who was entirely guided by him; privy councillor; supported policy of Schulin and Bernstorff.

MOLTKE, HELMUTH CARL BERNHARD, COUNT VON (1800–91), Ger. field-marshal; First Lieut. on general staff at Berlin, 1833; wrote on history and politics, 1831–32; served Turkey against Mehemet Ali, 1838–39, exploring Far East and writing acute and graphic account of Turkey; pub. maps and surveys of Asia Minor, etc., and account of Russo-Turk. campaign, 1845, map of Rome, 1852; chief of general staff, 1858; commenced publication of military books which revolutionised art of war; wrote history of Ital. campaign, 1862; furnished plan for Dan. campaign, 1864, and rescued it from failure by personal intervention. M. was sole controller of war against Austria, 1866, and so brought about great Pruss. victory of *Königgrätz* and supersession of Austrian by Ger. pre-eminence; edited history of the campaign, 1867; success largely helped by great railway system organised by M. He was chief of general staff in Franco-Ger. War, 1870–71, and again organised opposition to invasion; led advance on Paris, won battle of *Sedan*, and besieged Paris, 1870; capitulation of Paris, 1871; cr. field-marshal, 1871; edited history of Franco-Ger. War; member of Reichstag, 1871. Tall, slight, stern-featured, M. was noted for taciturnity, tact, and prudence.

Morris, *Life* (1903).

MOLUCCAS (*c.* 0° N., 127° 30′ E.), islands, E. Indies; belong to Holland; area, 43,864 sq. miles; capital, Amboyna, was destroyed by earthquake, 1898. Pop. 415,000.

MOLYBDENUM (Mo=96·0), metal reduced from ores electrolytically, or by aluminium; S.G. 9·01; used in making special steels. Oxides: Mo_2O_3, MoO_2, MoO_3. Molybdates, from MoO_3, are often complex, *e.g.* ammonium molybdate (test for phosphate) is $(NH_4)_6Mo_7O_{24}+4H_2O$.

MOMBASA (4° 3′ S., 39° 39′ E.), chief port, Brit. E. Africa; taken in 1505 by Portuguese, who held it intermittently till 1698; under Brit. protection since 1887. M. is seat of High Court; contains large fort, government school, various churches and temples;

excellent harbour; exports rubber, ivory, hides; M. is connected with Uganda by railway. Pop. 31,000.

MOMEIN (25° N., 98° 30′ E.), town, Yunnan, China. Pop. 6200.

MOMENT, in mechanics, signifies the tendency to movement about an axis or point. Is gauged by product of mass, etc., into perpendicular distance to axis. *M. of inertia* about a given axis is the sum of products of each minute portion of mass into square of distance from axis. *M. of momentum* about an axis or plane is the product of mass into m. of velocity respecting axis or plane. *M. of resistance* is the sum of all moments in minute layers of a mass under strain or stress taken from neutral axis; counterbalances bending movement. Most m's may be solved by Graphic Statics.

MOMMSEN, THEODOR (1817–1903), Ger. historian and politician; leader of modern school of research; spent early years in study of Ital. antiquities, and acquired enormous scholarship and political approval of Cæsarism. *Roman History* appeared, 1854–56; graphic in style, but disfigured by special pleading of a kind opposed to modern hist. spirit; through it he won a great following and imperial favour; author of many works on Rom. subjects; editor of great *Corpus inscriptionum*.

Bardt, *Life* (1903).

MOMOTIDÆ, see MOTMOTS.

MONA, Rom. name for Anglesey (*q.v.*).

MONA MONKEY, see under CERCOPITHECIDÆ.

MONACHANTHIDÆ, see FILE-FISHES.

MONACHISM, see MONASTICISM.

MONACO (43° 45′ N., 7° 24′ E.), smallest independent state in Europe, on Fr. Mediterranean coast; belonged to Grimaldi family till 1861, when Charles III. ceded greater part to France. M. has area 8 sq. miles; towns are M., Condamine, and Monte Carlo, famous for Casino; R.C. episcopal see. M. is ruled by hereditary sovereign princes under Fr. protection; has small Council of State and Governor-General. Pop. (1910) 19,121.

Mayne, *M. and its Rulers* (1910).

Albert, Prince of M. (1848–), succ. his father, Charles III., 1889; gave State a constitution, 1910; a noted scientist, he has done much oceanographical research.

MONAD, a being developed according to inward law, in pre-established harmony with others. See LEIBNITZ.

MONAGHAN.—(1) (*c.* 54° 12′ N., 7° W.) county, Ulster, Ireland; area, *c.* 495 sq. miles; surface hilly; crossed by Slievebeagh Mountains; trades in linen and agricultural produce. Pop. (1911) 71,395. (2) (54° 15′ N., 6° 58′ W.) town, capital of above; agricultural produce. Pop. 3000.

MONARCHIANISM, name given to faith of Christians in Early Church, who believed in a God in one person, either, therefore, denying (1) the Deity of Christ or (2) His distinction from the Father.

MONARCHY, etymologically the supreme sovereignty vested in a single person, but the term 'monarch' is applied loosely to sovereigns of kingdoms as opposed to presidents of republics.

MONASTERY is the generic name for all religious houses canonically erected. If governed by an abbot or an abbess, it was called an abbey; if by a prior or prioress, a priory. The primitive monks chose as the sites of their dwellings high hills or desolate valleys, though even in quite early times, cities like Alexandria, Carthage, Rome, Hippo had their monasteries. In many places, however, a town gradually grew up under the shadow of an abbey, as at Westminster and Bury St. Edmunds, and in this fashion transformed the nature of the site. But the friars in founding their convents chose deliberately the busy centres of trade, and built homes, as at Oxford, Bristol, etc., amid the poverty-stricken quarters of the growing cities.

In England the main object towards which building was directed (in opposition to the customs of S. Europe) was shelter from the storms and cold. Consequently the architects here, taking over the quadrangular form of edifice, usually (as at Westminster) placed the church on the north to meet the force of the gales. Of the other three sides, the refectory lay to the south, while the dormitory might communicate east or west with the church, so that for the midnight offices the monks might not have far to go. Then the other buildings, kitchen, parlour, guest-house, offices, library, calefactory, or common-room, sprang up at haphazard as convenience of site and expense demanded. The *Carthusian monastery* alone differed, for on the north lay church and refectory, and then rows of little houses, in each of which dwelt a hermit monk, made up the rest of the square. Outside the strict circuit of the buildings ran an outer wall, beyond which none might pass without permission, and within which might no woman come. Sometimes even the church was open only to men; or, as at Durham, the part provided for the women was of the smallest extent.

One peculiar feature of certain religious orders was the existence of *double monasteries*, i.e. for men and women, side by side, governed by a single superior. In Ireland we know of one only, at Kildare; but in England, Whitby, Ely, Barking, etc., were famous, and here, curiously, it was the abbess who ruled over both. In the English order of Sempringham, founded by St. Gilbert, double monasteries were part of its organisation, but the prior was to be the superior. Judging from excavations made at Watton Priory, Yorkshire, one would say that the church separated the two monasteries, and down its centre ran a high wall. So that even here, in their common place of worship, the two were kept apart.

The government, of course, depended on the religious rule of the community. Among the *Benedictines* the abbot held office for life and ruled practically as absolute monarch, while under him the cantor or precentor, sacrist, cellarer, guest-master, and novice-master saw to the various departments of the monastery. Among the *Dominicans*, however, the form of government was different. Superiors and officials were all elected, usually for a term of three years. Even when in office, they were simply an executive, and had no legislative powers, for these were reserved to the national and international chapters. The Monkish chapters, however, had no jurisdiction over the abbot, and could only appeal to the Holy See, if they found his laws or administration unbearable. As landowners and guardians of the poor their influence was the staying power of England; when this was suppressed, the breakdown of the Eng. economic system was rapid.

Gasquet, *English Monastic Life* (1904); Thompson, *Customary of Canterbury and Westminster* (1902–4); Gasquet, *Ancren Riwle* (1903); Bateson, *Origin and Early History of Double Monasteries*.

MONASTICISM is the general name given to an organised life of asceticism. It includes the further idea of a withdrawal from the world and a 'dwelling-apart.' The interruptions and distractions of social life are universally regarded as prejudicial to the spirit of contemplation, and numerous attempts have been made in every age and by almost every religious body to escape from them. The purpose is generally union with God by intelligence and will; the means, self-denial.

The practice of such a life has been very widely spread. Among the Aztecs, Incas, and in the sects of Pythagoreans, Essenes, etc., there is abundant evidence of its existence. But the chief religions in which it has flourished are Buddhism and Catholic Christianity. From the doctrine of Gotama Buddha, that salvation can only come by a complete separation from attachment to conscious existence, it is easy to see how Buddhism became essentially monastic. When carried over to Tibet and mixed with Siva-worship, it was incarnated in the great lamaseries,

which, with the famous monastery of Lhasa at their head, are the most perfectly organised form of Buddhistic monasticism.

In Christianity, Eastern and Western, the expression of this ideal, as a counsel of perfection, has been more varied and healthier. Its two forms have been either the solitary life of the hermit, expressed in the N. Egypt establishments, or the more social existence of the monastery, as in the abbeys under St. Benedict's rule. The main purpose has always been the love of God and desire to serve Him as perfectly as this life permits by leaving all things to follow Christ. But manual labour was enjoined as a necessary corrective to the over-development of spiritual meditation, and other results in architecture, agriculture, history, missionary work, etc., have followed. These, however, are not essential, for the life itself of contemplation and the direct results of contemplation are alone the proper concern of the monk.

Hannay, *Spirit and Origin of Christian M.* (1903); Borlage, *The Age of the Saints* (1893).

MONASTIR, Bitolia (41° 1′ N., 21° 18′ E.), city, Macedonia, European Turkey; gold and silver filigree; near ruins of ancient Heraklea. Captured by Servians and Greeks, Nov. 18, 1912. Pop. 62,000.

MONAZITE, anhydrous phosphate of cerium, widely distributed, small amounts being found in gneisses and granites; obtained chiefly from N. Carolina and Brazil; used in making thoria for manufacture of incandescent gas mantles.

MONCEY, BON ADRIEN JEANNOT DE (1754–1842), marshal of France, 1801; Duke of Conegliano, 1808; fought in wars of Fr. Revolution, rising to be commander-in-chief in Spain, 1793–94; commanded in Peninsular War and invasion of France, 1814.

MONCHIQUE (37° 19′ N., 8° 32′ W.), town, Fars, Portugal; hot sulphur springs. Pop. 7600.

MONCK, see Albemarle.

MONCTON (46° 5′ N., 64° 10′ W.), city, on Petitcodiac, New Brunswick, Canada; stoves, cotton and woollen goods. Pop. (1911) 12,260.

MONDOÑEDO (43° 25′ N., 7° 25′ W.), town, Lugo, Spain; cathedral; linen goods. Pop. 11,100.

MONDOVI (44° 22′ N., 7° 48′ E.), town, Cuneo, Italy; bp.'s see and cathedral; silk, pottery. Pop. 20,000.

MONEMVASIA, see Malvasia.

MONET, CLAUDE (1840–), Fr. impressionistic painter.

MONETARY CONFERENCES, see under Currency Conferences.

MONEY, commodity used by the sanction of law or custom in any community as the medium of exchange. Only tribes in a very primitive state of existence engage in barter; with civilisation comes in the need of some product that will serve as a common instrument of exchange. Cattle and sheep were quite early used as money by Greeks and Romans. Corn and other cereals have been widely employed. Shells, oil, rock-salt, and a host of articles could be named which have at various times and places proved acceptable as money. But metals have long and most widely been recognised as the most satisfactory medium of exchange. Iron, copper, tin, and lead have been thus used, and copper, though it is now in civilised countries only 'token-money,' was in general use in Europe in the Middle Ages. Silver and gold, commonly called the Precious Metals, have won the first place in the world as money, chiefly through their many properties—their highly concentrated value, their durability, and their numerous uses in art and industry.

It is of the essence of money that it should be accepted by buyers and sellers without doubt or hesitation. If there is uncertainty as to disposing of it freely for goods or services, man returns to barter. Money is taken by the seller in the knowledge that it will at once be accepted when he becomes a purchaser. And this confidence that it is acceptable by all constitutes any article in use as money. The fact that cheques and postal orders cannot always be so accepted prevents their inclusion as money. Bank notes, on the other hand, are included as long as there is confidence in the government or bank which issues them.

If the first and most important function of money is to be a common medium of exchange, its second use is to furnish a price list of all commodities for sale, and its use in this way depends on its acceptance as the medium of exchange.

The value of money depends, as in the case of other commodities, on the law of supply and demand—for gold and silver as mediums of exchange and as common denominators of value are themselves commodities of intrinsic value. When gold is plentiful the prices of other goods are high, and when gold is scarce, prices are low—that is, in countries where gold is in constant demand as a medium of exchange.

With the introduction of credit, money also becomes the standard of deferred payments. It has been maintained by certain economists that bills of exchange are money, but the objection still holds, as in the case of cheques, that such instruments cannot find general acceptance, and it would, perhaps, be truer to say that bank drafts and bills of exchange limit the operation of money, and partake, by the mutual cancelling of debt they accomplish, of barter. (See F. A. Walker in *Dictionary of Political Economy* for a full examination of this point.)

As its common acceptance is essential, the coining of money is always kept in the hands of the government in civilised countries, and the manufacture of coins by private persons is a criminal offence that only in comparatively recent years has ceased to be punished by death. The gravity of coining can easily be understood. Not only is it an infringement of the rights of government, injurious to the revenue, but when once any serious number of bad coins are in current use, confidence is shaken. Possession of such coins inflicts serious harm on innocent persons who have taken them without detecting the alloy and cannot dispose of them, and the knowledge that bad money is in circulation breeds mutual suspicion, destroys freedom in exchange, and sheds uncertainty on the prices of all commodities. When credit is general it is of utmost importance that money should have a stable value, and though gold and silver may escape the operations of the coiner, there is a danger that government itself may work mischief by the issue of paper money, as in the case of the 'greenbacks' of the American government from 1863 to 1879. These 'greenbacks' were readily accepted as a medium of exchange, they furnished a price list, and were the standard of deferred payments. But they were issued in excess, and prices were forced up, with the result that wealth passed from the industrial classes to speculators—to the lasting injury of the country. As gold and silver are each under their own laws of supply and demand, it has been proposed that they shall have a fixed ratio to one another. Bimetallism is the name given to this proposal for fixing the gold-price of silver and the silver-price of gold.

Jevons, *M. and the Mechanism of Exchange*; J. S. Nicholson, *Money and Monetary Problems.*

BRITISH IMPERIAL COINAGE.

In the Middle Ages in England, the standard measure of value was the pound-weight of silver, but the actual medium of exchange consisted of silver pennies. Since the primary object of coinage was to affix a stamp to certify a certain weight and fineness, all metallic money was at first what it professed to be. Thus a pound of silver was coined into 240 pennies, whose aggregate weight, accordingly, was actually a pound. This fact is preserved in the table of Troy Weight: 20 pennyweights (*i.e.* the weight of 20 pennies = 1 oz.; 12 oz. = 1 pound). Hence originally 240 silver pennies weighed one pound, and from this fact has arisen

the present relation between a penny and a pound sterling.

The following table gives the weights of the coins when issued, the amount of variation allowed to the Mint (called the 'Remedy'), and the least a gold coin can weigh without being withdrawn from circulation:—

Coin.	Standard Weight.	Least Current Weight.	Remedy.
	Grains.	Grains.	Grains.
GOLD—			
Sovereign	123·27447	122·50000	0·20000
Half-Sovereign	61·63723	61·12500	0·10000
SILVER—			
Crown	436·36363	..	2·000
Half-Crown	218·18181	..	1·264
Florin	174·54545	..	0·997
Shilling	87·27272	..	0·578
Sixpence	43·63636	..	0·346
Threepence	21·81818	..	0·212
BRONZE—			
Penny	145·83333	..	2·91666
Halfpenny	87·50000	..	1·75000
Farthing	43·75000	..	0·87500

There are also two gold coins, of the value of 5 sovereigns (£5) and 2 sovereigns (£2) respectively, issued on special occasions, *e.g.* coronations.

The gold coins are made of metal composed of $\frac{11}{12}$ths pure gold and $\frac{1}{12}$th alloy.

The silver coins are made of metal composed of $\frac{37}{40}$ths of fine metal and $\frac{3}{40}$ths of alloy.

The bronze coins are made of metal composed of 95 % of copper, 4 % of tin, and 1 % of zinc.

Bank of England notes are issued for £5, £10, £20, £50, £100, £200, £500, and £1000, and can be exchanged for gold at the Bank of England at any time during the legal banking hours. They are legal tender in England and Wales.

Old English coins—

Joannes (gold)	36s. 0d.	Half-guinea (gold)	10s. 6d.
Moidore ,,	27s. 0d.	Angel ,,	10s. 0d.
Jacobus ,,	25s. 0d.	Noble ,,	6s. 8d.
Carolus ,,	23s. 0d.	Dollar ,,	4s. 6d.
Guinea ,,	21s. 0d.	Tester (silver) ..	.. 6d.
Mark ,,	13s. 4d.	Groat ,, ..	.. 4d.

Old Scots coins—

	Scots.	Sterling.
Bodle	= 2 pennies	$\frac{1}{6}$th penny
Plack or groat	= 2 bodles	$\frac{1}{3}$rd penny
Bawbee	= 6 pennies	1 penny
Shilling	= 12 pennies	1 penny
Pound	= 20 shillings	1s. 8d.
Merk	= 13s. 4d.	1s. 1$\frac{1}{2}$d.

FOREIGN AND COLONIAL MONEY.

From the following table it will be seen that many colonies and dependencies of the Empire have their own system of coinage, although British money is current in most of them. In Hong-Kong and Labuan, the Mexican, British, and Hong-Kong silver dollars (2s. 0$\frac{1}{2}$d.) are current. In the Straits Settlements the Straits Settlements silver dollar (2s. 4d.) is the standard coin of the colony. Since August 31, 1904, the Mexican and British silver dollars have ceased to be legal tender there.

In countries where silver is legal tender to any amount the exchange varies greatly, as in Central America, where the 'peso,' about 1s. 5d. at the present date (1913), is the standard coin. In China, the only coins in use are a British, Hong-Kong, or Mexican silver dollar, and a native coin called 'cash' (made of copper, iron, and tin), about twenty-five of which are only worth a penny. In the Exchange Rates relating to China the value of the tael is quoted. The 'tael' is a weight of silver, 2s. 10$\frac{3}{4}$d. in value, and it is equivalent to 10 'mace' or 100 'candareens.' In Persia, the standard coin is a 'kran,' the intrinsic value of which, at the average price of silver, is only 4d.

Countries.	Chief Coins.	Approximate Value in British Money.
		s. d.
Argentina	Peso (paper)* = 100 centisimos	1 9
,,	(gold)	4 0
Austria-Hungary	Krone or crown = 100 heller	0 10
Belgium	Franc = 100 centimes	0 9$\frac{1}{2}$
Brazil	Milreis (paper)* = 1000 reis	1 4$\frac{3}{4}$
Brit. Honduras	Dollar (gold) = 100 cents	4 1
Bulgaria	Leva = franc = 100 stotinkis	0 9$\frac{1}{2}$
Canada	Dollar (gold) = 100 cents	4 1
Ceylon	Rupee = 16 annas	1 4$\frac{1}{16}$
Chile	Peso (paper)* = 100 centavos	0 9$\frac{1}{2}$
,,	(gold)	1 6
China	See above.	
Cuba	Dollar (gold) = 100 cents	4 1
Denmark	Krone = 100 öre	1 1$\frac{1}{2}$
Egypt	Egyptian £ = 100 piastres	20 6
Finland	Markka = 100 penni	0 9$\frac{1}{2}$
France	Franc = 100 centimes	0 9$\frac{1}{2}$
Germany	Mark = 100 pfennige	0 11$\frac{3}{4}$
Greece	Drachmè (paper)* = 100 lepta	0 9$\frac{1}{2}$
Holland	Florin or gulden = 100 cents	1 8
India	Rupee = 16 annas	1 4$\frac{1}{16}$
Italy	Lira = franc = 100 centesimi	0 9$\frac{1}{2}$
Japan	Yen = 100 sens	2 0$\frac{1}{2}$
Mauritius	Rupee = 16 annas	1 4
Mexico	Dollar (gold) = 100 centavos	2 0
Newfoundland	Dollar (gold) = 100 cents	4 1
Norway	Krone = 100 ore	1 1$\frac{1}{2}$
Peru	Sol = 100 centisimos	2 0
Portugal	Milreis = 1000 reis	3 10$\frac{1}{2}$
Rumania	Ley = franc = 100 banis	0 9$\frac{1}{2}$
Russia	Rouble = 100 copeks	2 1$\frac{1}{2}$
Servia	Dinar = franc = 100 paras	0 9$\frac{1}{2}$
Spain	Peseta = franc = 100 centimos	0 8$\frac{3}{4}$
Straits Settlements	See above.	
Sweden	Krone = 100 öre	1 1$\frac{1}{2}$
Switzerland	Franc = 100 centimes	0 9$\frac{1}{2}$
Turkey	Turkish £ = 100 piastres	18 0
United States	Dollar (gold) = 100 cents	4 1
Uruguay	Peso (gold) = 100 centimos	4 2

* The exchange value of paper money fluctuates considerably in countries where it is not readily convertible, at its face value, into gold.

MONEY-LENDING, under the Act of 1900, is a recognised business in Britain, and the money-lender is required to register his trading name at an Inland Revenue office every three years. When proceedings are taken by money-lenders for the recovery of money lent, if the judge is satisfied that the rate of interest is excessive, or that the office charges are too high, he can relieve the debtor. No money lent to infants, *i.e.* persons under twenty-one years of age, can be recovered at law unless the infant has represented himself falsely to be of age.

MONFORTE (42° 35′ N., 7° 27′ W.), town, Lugo, Spain. Pop. 13,200.

MONGE, GASPARD (1746–1818), Fr. mathematician; b. Beaune; ed. there, and at Lyons; invented descriptive geometry, dealing with the representation of 3-dimensional objects by drawings in one plane; prof. of Math's (1768) and of Physics (1771) at Mézières; prof. of Hydraulics (1780) at the Lyceum in Paris; held several important government posts.

MONGHYR.—(1) (*c.* 25° N., 86° 15′ E.) district, Bihar and Orissa, India; area, 3920 sq. miles. Pop. 2,075,000. (2) (25° 22′ N., 86° 30′ E.) town, capital of above; manufactures iron goods. Pop. 36,000.

MONGOLIA (*c.* 37° 30′ to 53° 30′ N., 82° 30′ to 126° 30′ E.), region, Central Asia, nominally subject to China; bounded N. by Siberia, E. by Manchuria, S.E. and S.W. by China proper, N.W. by Siberia; area, *c.* 1,250,000 sq. miles; surface generally consists of vast plateau, with Desert of Gobi occupying much of southern half; in W. are various mountain ranges, including Tannu, Khanghai, and Great Altai Mountains, while the Khinghan range runs across the eastern portion; principal rivers are Black Irtish, Yenesei, Selenga, Orkhon, Kerulan, all in northern half;

Hwang-ho drains a corner of S. Lakes include Kossogul, Ubsa Nor, Durga Nor. Live stock is raised. M. produces salt, graphite, silver lead, sulphates. M. is inhabited chiefly by Mongols, who for most part profess Buddhist religion. Pop. *c.* 5,000,000.

Gilmour, *Among the Mongols* (1883), *More about the Mongols* (1893).

MONGOLS, a great division of mankind, which, from its original home in Asia, has spread into Europe, Africa, and the Pacific Islands. Straight, coarse hair (plentiful on the head and scanty on the body), yellowish skin, brachycephalous headform, prominent cheek-bones, roundish face, and small black eyes are characteristic of the Mongolian. The stature is medium, and in the matter of intellectual development there is as much variety as amongst the white peoples; on the one hand there are the lowest tribes of Siberia and the semi-civilised inhabitants of Central Asia, and on the other the great and ancient civilisation of China.

The word Mongol is now by general consent derived from *mong*, meaning 'brave' or 'bold.' All the early history of the race is at present hopelessly mixed up with myth. But we know that in the plains watered by the Kerulon, the Argun, and the Upper Nonni, the M. merge into history as strenuous and intrepid fighters, and that Jenghiz Khan was born and made his capital at Karakorum in that region. In the XII. cent. A.D. a confederacy of Mongol tribes, ruled by an ancestor of Jenghiz, existed, but it was Jenghiz Khan who established the supremacy of the M. in Central Asia. Then came the conquest of China by his sons, 1234 A.D., and the overrunning of Russia, Hungary, and Armenia by grandsons. But the M. had no capacity for settlement or colonisation, and their conquests were conspicuous for savage atrocities. Kublai Khan established a dynasty in China, which ruled from 1294 to 1368 A.D., and then the M. were expelled from China and crushed by the Chinese, and their country was absorbed. At the same time, in the west of Asia and Eastern Europe the M. formed the Kipchak states, whose chief was Toktamish. He in his turn was overthrown by a greater Tartar chief, Tamerlane, and in 1550 the Russians conquered their Mongol enemies.

The Mogul (or Mongol) Empire in India was founded *c.* 1520 by Baber, a descendant of Jenghiz Khan. Another large area of Mongol conquest—Persia, Georgia, Armenia, and much of Asia Minor—was ruled by the descendants of Jenghiz Khan, from 1253 till 1335 A.D., when the Mongol monarchy in Persia passed away with the death of Abu Said. Some of these Persian monarchs were friendly to Christianity, anxious for European culture, and gave considerable encouragement to learning and to the arts.

The total population of M. under Chin. rule is now estimated at 2,000,000, and is divided into tribes governed by military chieftains. Buddhism, introduced by Kublai Khan, is the common religion, and the *Kutuktu*, or Living Buddha of Mongolia, ranks next in importance to the Grand Lama of Tibet. The language of the M., first reduced to writing by Jenghiz Khan, belongs to the Ural-Altaic family, and is akin to the Manchu and Korean tongues. Horse-breeding and cattle-raising are the chief industries of the people, and hunting produces furs, skins, and deer horns for trading purposes. There are no manufactures, but the large transit trade from Peking to Siberia gives considerable employment, for the caravans have to be conducted and the roads maintained. The M. possess few towns or cities, for they are still in the main a race of tent-dwellers. Travellers find them a cheerful, good-natured, and hospitable people.

Sir H. Howorth, *History of the Mongols*; Gilmour, *Among the Mongols*.

MONGOOSE, a carnivore; see under CIVET FAMILY.

MONGREL, properly a hybrid between two varieties of a species.

MONGREL SKATE, see ANGEL-FISH.

MONICA, see under AUGUSTINE, ST., OF HIPPO.

MONIER-WILLIAMS, SIR MONIER (1819–99), Sanskrit scholar; b. Bombay; Boden prof. of Sanskrit at Oxford; wrote several notable works.

MONISM, strictly, any system which regards the universe as the expression of a single principle (cf. Pluralism); but recently applied to the doctrine of the material interaction between brain and nervous system as the outer expression of an inner unity of consciousness. See METAPHYSICS.

MONITOR, see under LIZARDS.

MONK, see MONASTICISM.

MONK, or **MONCK, GENERAL**, see ALBEMARLE.

MONKEYS, see under PRIMATES.

MONK-FISH, see ANGEL-FISH.

MONK'S HOOD, see ACONITE.

MONMOUTH.—(1) (51° 49′ N., 2° 43′ W.) town, Monmouthshire, England; has smelting and tinplate works; contains ruined castle, birthplace of Henry V., 1388. Pop. (1911) 5269. (2) (40° 52′ N., 90° 42′ W.) city, Illinois, U.S.A.; agricultural implements, earthenware. Pop. (1910) 9128.

MONMOUTH, JAMES SCOTT, DUKE OF (1649–85), putative s. of Charles II.; or. duke, 1663; m. heiress of Buccleuchs, and became Duke of Buccleuch, 1665; already noted *roué*; began to claim succession as Prot. heir in opposition to James, Duke of York, but king always firmly denied his legitimacy; antipopery agitation became so strong that York secured M.'s exile, 1679; he returned and refused to quit England, 1679; openly supported by exclusionists headed by Shaftesbury; imprisoned, 1682; released, took part in Rye House Plot, and escaped to Holland, 1683; invaded England, 1685, conjointly with Argyll's invasion of Scotland; defeated at *Sedgemoor*, and executed by James II.

Fea, *King Monmouth* (1901).

MONMOUTH, ROBERT CAREY, EARL OF (*c.* 1560–1639), s. of Lord Hunsdon and kinsman of Queen Elizabeth; Warden of the Marches towards Scotland, and wrote valuable *Memoirs*; or. earl, 1625.

MONMOUTHSHIRE (51° 43′ N., 3° W.), small county, S.W. England; suffered from Danish invasions, IX.–X. cent's; included in Wales till 1536; during Great Civil War Raglan Castle was successfully besieged by Roundheads. M. has area *c.* 600 sq. miles; surface flat along coast, elsewhere hilly, rising in N. and N.W. to heights of nearly 2000 ft.; drained by Usk, Wye, and other streams; county town, Monmouth. Rich deposits of coal and iron are found about Newport, Pontypool, Nantyglo, Tredegar, and Ebbw Vale; grazing, wheat, orchards. M. contains ruins of many Norman castles, and of Tintern and Llanthony Abbeys. Pop. of administrative county (1911), 312,078.

Bradney, *History of M.* (1911).

MONNIKENDAM (52° 27′ N., 5° 2′ E.), village, on Zuider Zee, N. Holland, Netherlands.

MONOCOTYLEDONS, see BOTANY.

MONODELPHIA, see under MAMMALS.

MONODON, the Narwhal, see DOLPHIN FAMILY.

MONOGENEA, a group of TREMATODE WORMS (*q.v.*).

MONOGENESIS, the direct development of an embryo similar to the adult; descent from a single (hermaphrodite) parent; the theory of the origin of all organisms from a single cell.

MONOGENIST, in anthropology, opposed to *polygenist*, indicates a believer in the theory of *monogeny*—that all races of mankind have arisen from one primitive stock, and primarily from a single pair; or in a general way, one who holds the theory of *monogenesis* (*q.v.*).

MONOGRAM, a device by which two or more alphabet letters are interlaced, usually for the abbreviation of a name.

MONOLATRY, see RELIGION.

MONOLITH, see STANDING STONES.

MONOMANIA, see under INSANITY.

MONOMETALLISM, see BIMETALLISM.

MONOMOTAPA, title of independent potentates of S.E. Africa in early times; sole accounts of these rulers given by Dutch and Portuguese traders; disputes as to extent of territory and race, but probably negroes; their capital in XVII. cent. was near Masapa, south of Zambesi. See also ZIMBABWE.

MONONGAHELA (40° 14′ N., 79° 57′ W.), city, on Monongahela, Pennsylvania, U.S.A.; coal-fields. Pop. (1910) 7598.

MONOPHYSITES (Gk. 'one nature'), term applied to those who believed that because Christ was one person He must therefore have had only one nature, though a composite one. The M. sect arose after the Council of Chalcedon, 451, and played an important part in the ecclesiastical, and even the political, struggles of the time.

MONOPLANE, see FLIGHT.

MONOPOLI (40° 57′ N., 17° 18′ E.), seaport town, on Adriatic, Bari, Italy; exports wine, fruits. Pop. 23,500.

MONOPOLY, the exclusive privilege granted or guarded by the Crown of selling any commodity, or making, using, or working anything; granted frequently by Elizabeth and found very injurious; abolished, 1623, by Statute of Monopolies; exists now by Letters Patent.

The modern form of m. is the *Trust* system, in which a group of capitalists contrive to acquire partial or complete control of an industry. The U.S.A. Congress has attempted to check the movement by Anti-Trust legislation (see also Roosevelt). There are a few foreign government m's, such as the tobacco and match industry in France.

Modern Socialists affirm that by creating government m's out of all the leading industries profits would be increased, a great amount of waste obviated, and a surplus thus produced which might be devoted to social amelioration.

MONO-RAIL, see RAILWAYS.

MONOTHEISM, see THEISM.

MONOTHELITES, term given in theology to those who held that Christ had one will, in distinction to the orthodox position that He had two. The controversy arose in the VII. cent. after that of the Monophysites (*q.v.*).

MONOTREMATA, see under MAMMALS.

MONREALE (38° 5′ N., 13° 17′ E.), town, Palermo, Sicily; near M. occurred the great massacre of Fr. settlers, the Sicilian Vespers, 1282. Chiefly famous for wonderful Norman cruciform cathedral, dating from 1170; has remains of Benedictine monastery. Archiepiscopal see. Pop. 24,500.

MONROE.—(1) (32° 30′ N., 92° 29′ W.) city, on Ouachita, Louisiana, U.S.A.; cotton and lumber industries. Pop. (1910) 10,209. (2) (41° 52′ N., 83° 26′ W.) city, on Raisin, Michigan, U.S.A.; flour-mills, foundries. Pop. (1910) 6893.

MONROE, JAMES (1758–1831), fifth Pres. of U.S.A.; b. in Virginia; officer in War of Independence; Virginian councillor, 1782; member of U.S.A. Congress, 1783–86, and influenced foreign policy; U.S.A. senator, 1790; minister to France, 1794–96; wrote pamphlet criticising Washington, 1797; gov. of Virginia, 1799–1802, 1810–11; carried out purchase of Louisiana from France, 1803; failed in missions to England and Spain, 1804–6; Sec. of State, 1811–17; of War, 1814–15; Pres., 1816 and 1820, and pursued path of successful compromise as to burning questions, *e.g.* states' rights, slavery; promulgated 'Monroe Doctrine' (*q.v.*), 1823.

Gilman, *Life* (1883).

Monroe Doctrine, enunciated by Pres. Monroe, had as its principle to prevent European interference or future colonisation in America; called forth by fear of European aid to Spain for recovery of South American colonies; by Clayton-Bulwer Treaty, 1850, Great Britain and U.S.A. agreed not to colonise Central America; doctrine several times applied in South America.

Book on M. D. by Sir F. Pollock (1903).

MONS (50° 27′ N., 3° 56′ E.), town, Hainault, Belgium; formerly fortified; Gothic cathedral; often taken by French; manufactures textiles. Pop. (1910) 27,828.

MONSON, SIR WILLIAM (*c.* 1569–1643), Eng. admiral; served against Spain under Elizabeth; admiral of Narrow Seas, 1604; vice-admiral, 1635; author of *Tracts*; historically important. Elder bro., Sir Thomas (1564–1641), prominent under James I., and ancestor of viscounts and barons Monson.

MONSTER, see under TERATOLOGY.

MONSTRANCE, a kind of glass and metal frame, used in R.C. Church for displaying the Host.

MONT BLANC, see BLANC, MONT.

MONT CENIS, see CENIS, MT.

MONT GENÈVRE (44° 55′ N., 6° 50′ E.), pass, Cottian Alps, between Italy and France.

MONT ST. MICHEL (48° 40′ N., 1° 30′ W.), granite island off coast of Normandy, in Bay of St. Michel; rises 240 ft. above surrounding sands, and is reached by causeway; summit crowned by old town and Benedictine monastery, originally founded, 966. Pop. 240.

MONTAGU, CHARLES, see HALIFAX, 1ST EARL OF.

MONTAGU, EDWARD, see MANCHESTER, EARLDOM AND DUKEDOM OF.

MONTAGU, EDWARD, see SANDWICH, EARL OF.

MONTAGU FAMILY, ancestors of earls of Salisbury; Dru de Montaigu (Montacute) was tenant in Somersetshire at time of Domesday Book; probably from Montaigu in Normandy; barons by writ from 1299 onwards. William M., cr. Earl of Salisbury, 1337; marshal, 1338; conquered Man, 1340–42. William, 2nd earl, fought at Crécy and Poitiers; Thomas, 4th earl, distinguished at Agincourt.

MONTAGU, LADY MARY WORTLEY (1689–1762), Eng. letter-writer; pioneer advocate of inoculation for smallpox; b. Thoresby, Nottinghamshire; e. dau. of Earl of Kingston, who introduced her at a very early age into the best literary circles; m. Edward Wortley Montagu, and accompanied him on an embassy to Constantinople. During her travels Lady Mary wrote her celebrated *Letters* descriptive of Eastern life. See Paston's *Life and Times* (1907).

MONTAGU, RALPH, 1ST DUKE OF (*c.* 1638–1709), Eng. diplomatist; s. of Baron M. of Boughton; promoted Revolution, 1688; cr. earl, 1689, Marquess of Monthermer and Duke of Montagu, 1705. These honours became extinct on his son's death, 1749.

MONTAGU, RICHARD (1577–1641), bp. of Chichester, 1628, Norwich, 1638.

MONTAGU'S SUCKER, see LUMPSUCKERS.

MONTAIGNE, MICHEL DE (1533–92), Fr. essayist; b. in castle of Montaigne between Castillon and Bergerac; eccentric education; as a child, wakened by sound of music to make his life happy and easy; all his attendants learned Latin to speak it with him until he was seven, so that he should learn it naturally; after schooling at Bordeaux studied law, and in 1554 was made Councillor in Parliament of Bordeaux, where he made the acquaintance of La Boétie (*q.v.*), who contributed greatly towards forming M.'s mind; model friendship only ended when La Boétie died, 1563; M. never forgot loss; resigned his post *c.* 1572, and retired to Montaigne, where he began to write his *Essais*; travelled through Switzerland, Germany, Italy, whence he was recalled to be Mayor of Bordeaux (1582–86); received much attention on visit to court. He was quite adequate as municipal official, and although a Protestant, just to both parties; perhaps for that reason he was blamed by both.

The *Essais* are a fine piece of moral philosophy, which showed new spaciousness of mental outlook. '*Que sais-je?*' was motto assigned after his death to M. Essays take form of jottings in diary of thoughts and feelings, often without order or plan, as fancy or

circumstances moved him; titles of chapters do not even always correspond to contents; style characterised by freedom and ease of the Renaissance.

Dowden, *Montaigne* (1905); Norton, *Studies in M.* (1905); Sichel, *Montaigne* (1911).

MONTALEMBERT, CHARLES FORBES RENÉ DE (1810–70), Fr. orator and historian; b. in London during Fr. Revolution; ed. in Eng. Liberal ideas by maternal grandfather, Lord Forbes, but remained Catholic; commenced to contribute to *l'Avenir*, 1830, but ceased in obedience to Rome; sought to unite Liberalism and Catholicism until 1857, when he retired from politics; his *St. Elizabeth of Hungary* (1836) and *Monks of the West* (1860–67) did great service to Church.

MONTALEMBERT, MARC RENÉ, MARQUIS DE (1714–1800), Fr. military engineer and author; b. Angoulême; served in campaigns in Germany, Italy, and Bohemia; wrote on fortifications, and elected to Academy of Sciences. See FORTIFICATION.

MONTANA (44° 20′ to 49° N., 104° 17′ to 115° 53′ W.), one of N.W. states of U.S.A.; bounded N. by Canada, E. by N. and S. Dakota, S. by Wyoming, W. by Idaho; area, 146,752 sq. miles; surface generally consists of undulating prairie, rising westward to Rocky Mts., main ridge of which reaches nearly 12,000 ft.; drained by Columbia and its tributaries in W., Missouri and its affluents, most important of which are Milk and Yellowstone, in E. Capital is Helena; large towns, Butte, Great Falls, Missoula, Anaconda.

M. was visited by Fr. explorers in 1742, and by the Americans Lewis and Clark in 1804–6, after which trading stations and missions were established; western portion was at different dates included in Oregon, Washington, and Idaho; eastern portion was part of Louisiana Purchase (*q.v.*), and was subsequently included in Missouri, Nebraska, Dakota, and Idaho in succession. In 1861 discovery of gold led to great influx of miners, and M. was organised as separate territory in 1864; early years marked by frequent hostilities with Indians, who were ultimately subdued in 1877; admitted as state to Union, 1889.

Executive power is vested in gov., assisted by six state officials; legislative authority vested in Senate of 31 members and House of Representatives of 85 members, elected by popular vote. M. is divided for local administrative purposes into 31 counties, and is represented in Federal Congress by two Senators and two Representatives.

Agriculture is rendered possible by means of irrigation; live stock raised; cereals grown. R. has important deposits of copper, gold, silver, lead—output of copper especially being very large; coal, iron, antimony also found. Slopes of Rockies yield timber. Chief industries are flour-milling, lumbering, copper-smelting. Railway mileage is nearly 5000.

Principal religion is Roman Catholicism; other denominations, in order of numerical importance, are Methodist, Presbyterian, Episcopalian, Lutheran. Education is free and obligatory; state has a univ. at Missoula, and technical colleges. Inhabitants include whites, Indians, Asiatics, negroes; whites of foreign birth are Canadians, British, Germans. Pop. (1910) 376,053.

Miller, *Illustrated History of State of Montana* (1894).

MONTANISM, the name given to a religious movement of the second Christian cent., after its founder, **Montanus**. The centre of his activity was Phrygia, in Asia Minor, and he believed himself to have a prophetic calling. The cause of the movement was the secularism of the Church and the laxity, in some places, of Church discipline. A violent dispute arose over the new movement, and it met with strong opposition from the bishops. Some Montanists were excommunicated, others voluntarily separated from the Church. Among converts was Tertullian, before his change one of the staunchest defenders of Catholic Christianity. Church government, however, in Rome and Carthage had reached a more developed phase, and M. could not face such a powerful organisation. M. became narrow and bitter, and lost influence. In Phrygia it lasted till after 300 A.D. The main authority for M. is Tertullian, but allowance must always be made for his violence.

Cunningham, *Churches of Asia*.

MONTARGIS (48° N., 2° 43′ E.), town, Loiret, France, at junction of Loing and Vernisson; ruined castle. In Charles VI.'s reign, the 'dog of M.' picked out and overcame in combat Macaire, its master's assassin. Pop. 13,500.

MONTAUBAN (44° 1′ N., 1° 22′ E.), town, Tarn-et-Garonne, France; Prot. stronghold; Huguenots were besieged here in 1562 and 1621; possesses Prot. Theological Coll.; formerly fortified; episcopal see, fine cathedral; manufactures woollens. Pop. 28,900.

MONTAUSIER, CHARLES DE SAINT-MAURE, DUC DE (1610–90), Fr. soldier; general in Thirty Years War; m. Julie, dau. of Mme de Rambouillet, 1645; in her honour the greatest writers of the day contributed to the *Guirlande de Julie*.

MONTBÉLIARD (47° 21′ N., 6° 46′ E.), town, Doubs, France; has belonged to France since 1801; strongly fortified; contains old castle. Pop. 10,600.

MONTBRISON (45° 35′ N., 4° 5′ E.), town, Loire, France; manufactures flour, silk. Pop. 7700.

MONTCALM, LOUIS JOSEPH, MARQUIS DE (1712–59), Fr. soldier; commander in Canada, 1756; captured Fort William Henry; held Ticonderoga against General Abercrombie's siege; commander at Quebec, he fell fighting against Wolfe on the Plains of Abraham.

MONTCEAU-LES-MINES (46° 38′ N., 4° 20′ E.), town, Saône-et-Loire, France; coal mines, ironworks. Pop. 27,000.

MONTCLAIR (40° 50′ N., 74° 18′ W.), residential town, on Orange Mts., New Jersey, U.S.A. Pop. (1910) 21,550.

MONT-DE-MARSAN (43° 56′ N., 0° 29′ W.), town, Landes, France, at confluence of Midou and Douze; resin, oil. Pop. 12,200.

MONTDIDIER (49° 39′ N., 2° 33′ E.), town, on Don, Somme, France.

MONT-DORE-LES-BAINS (45° 34′ N., 2° 48′ E.), watering-place, on Dordogne, Puy-de-Dôme, France; mineral springs.

MONTE CARLO, see under MONACO.

MONTE CASSINO (41° 31′ N., 13° 48′ E.), monastery, on hill near Cassinum, Italy; founded by St. Benedict in VI. cent.

MONTE CORVINO, GIOVANNI DI (1247–1328), R.C. abp. of Peking, 1307; a Franciscan, he did much missionary work in India and China.

MONTE CRISTO (42° 21′ N., 10° 17′ E.), small island of Italy in Mediterranean; ancient *Oglasa*. See also DUMAS, ALEXANDRE.

MONTE SAN SAVINO (43° 18′ N., 11° 46′ E.), small town, Arezzo, Tuscany, Italy. Pop. (commune) 8500.

MONTE SANT' ANGELO (41° 43′ N., 15° 57′ E.), town, Foggia, Italy; place of pilgrimage. Pop. 23,000.

MONTE VULTURE (41° N., 15° 43′ E.), extinct volcano, Potenza, Italy; ancient *Vulture Mons*.

MONTECATINI, MONTECATINI DI VAL DI CECINA (43° 20′ N., 10° 45′ E.), watering-place, Pisa, Italy. Pop. 5100.

MONTECATINI, MONTECATINI DI VAL DI NIEVOLE (43° 54′ N., 10° 48′ E.), watering-place, Lucca, Italy; hot springs. Pop. 9200.

MONTECUCCOLI, RAIMONDO, COUNT OF (1609–80), Austrian soldier; brilliant commander in Thirty Years War; shared in protection of Poland and obtained Treaty of Oliva, 1660; inflicted great defeat on Turks at *St. Gotthard*, 1664; defeated Turenne, 1673; great general and author of important works on military history, tactics, etc.

MONTEFALCO (42° 53′ N., 12° 40′ E.), town, Perugia, Italy. Pop. 3400.

MONTEFIASCONE (42° 32′ N., 12° 3′ E.),

town, Rome province, Italy; muscat wine. Pop. 9600.

MONTEFIORE, SIR MOSES HAIM (1784–1885), Jewish philanthropist; made fortune on Stock Exchange; sheriff of London, 1837; baronet, 1846; secured better treatment for Jews in Turkey, Russia, Moldavia, and Morocco, and raised various funds for Jewish refugees.

MONTEFRIO (37° 17′ N., 4° W.), town, on Bilana, Granada, Spain; Moorish relics; cotton goods. Pop. 11,500.

MONTELEONE CALABRO (38° 43′ N., 16° 8′ E.), town, Catanzaro, Italy; ancient *Hipponium*; old castle.

MONTÉLIMAR (44° 35′ N., 4° 45′ E.), town, Drôme, France, near Rhône; silk industries. Pop. 13,700.

MONTENEGRO, kingdom, Balkan Peninsula, between Herzegovina and Albania; almost entirely cut off from Adriatic by Dalmatia; bounded on N.E. by Servia. M. is smallest independent kingdom in Europe; greatest length, *c.* 100 miles; width, 78 miles; area, 3630 sq. miles. Surface is mountainous, rising in centre, W., and N. to barren stony plateau, 5000 ft. above sea-level, and reaching greatest elevation in peaks Durmitor (*c.* 8150 ft.) and Kom Kuchi (*c.* 8030 ft.). Average elevation is lower on E., and there is a narrow coastal strip with valleys opening off it. M. is drained by Zeta, Moratcha, Lim, and other streams; in S. is Lake Scutari, of which eastern half is in Albania. Largest towns are Podgoritza, Niksic; Dulcigno and Antivari (ports); and Cettinjé (capital). Antivari is a free port and (like the river Boyana) may not be fortified under Treaty of Berlin (1878). Climate varies with elevation—warm on coast, cold in mountainous districts.

M. was dependent on Servia from middle of XIII. cent. till defeat of that country by Turkey at *Kossovo*, 1389; henceforth carried on long struggle against Turks, until reign of Danilo Petrović, who became prince-bp. in 1697, freed his realm from the aggressors, and formed alliance with Russia; several of his descendants supported Russia against Turks, on whom both Peter I. and Danilo II. inflicted defeat; Danilo II. was succeeded in 1860 by Nicholas I. (b. 1841), present ruler, whose reign also was marked by wars which ended in 1878 in defeat of Turkey and recognition by the powers of Montenegrin independence. Nicholas adopted kingly title in 1910; declared war on Turkey, 1912, and invaded Albania. See TURCO-BALKAN WAR.

Government is a limited monarchy; legislative powers vested in national assembly, called *Skupshtina* (instituted 1905); members elected by manhood suffrage; also several *ex officio* members. M. receives an annual subsidy from Russia (for military, educational, and other purposes), also a contribution from Austria. Elementary education is free and obligatory, but ignorance is still widespread. There is no State religion; great majority of population belong to Gk. Church; some Roman Catholics and Muhammadans. Inhabitants are warlike race of Slavonic origin. Their occupations are chiefly pastoral and agricultural. The men are tall and of great strength; all liable to military service; women are downtrodden.

Large tracts are uncultivable. In E. are extensive forests of beech, oak, pine; sheltered valleys produce tobacco, maize, apples, and other fruits; while along coastal strip and adjoining valleys, grain, grapes, olives, figs, mulberries are grown. Large numbers of sheep, goats, cattle, swine, and horses are raised. Petroleum occurs; minerals little developed. Exports include live stock, sumach, cheese, wool, tobacco, hides, olive oil, wine, honey. Railway from Antivari to Lake Scutari was opened in 1908; few roads, and civilisation generally is in backward condition. Pop. 285,000. See BALKAN PENINSULA.

Wyon and Prance, *The Land of the Black Mountain* (1903).

MONTEPULCIANO (43° 5′ N., 11° 47′ E.), city, Siena, Italy; wine. Pop. 6500.

MONTEREAU (48° 23′ N., 2° 57′ E.), town, Seine-et-Marne, France, at confluence of Yonne and Seine; here Napoleon defeated Allies, 1814; porcelain; machinery. Pop. 8300.

MONTEREY (36° 35′ N., 121° 51′ W.), town, California, U.S.A.; formerly capital of state; seaside resort; trades in fish, exports oil. Pop. (1910) 4923.

MONTERREY (25° 34′ N., 100° 20′ W.), town, Mexico; taken by Americans, 1846; episcopal see, has cathedral and episcopal palace; silver mines. Pop. (1910) 81,006.

MONTE-SAN-GIULIANO (38° 3′ N., 12° 35′ E.), town, Trapani, Sicily; cathedral; ancient *Eryx*. Pop. 3600.

MONTESPAN, FRANÇOISE-ATHÉNAÏS DE PARDAILLAN, MARQUISE DE (1641–1707), mistress of Louis XIV.; dau. of Duc de Mortemart; m. Montespan, 1663; had seven children by king, legitimatised in 1673; soon after lost affection of king; suspected of poisoning rivals; beautiful, witty, patron of letters.

MONTESQUIEU, CHARLES LOUIS DE SECONDAT, BARON DE LA BRÈDE ET DE (1689–1755), Fr. jurisconsult, historian, philosopher; by birth member of *noblesse de la robe*; succ. uncle as *président à mortier* at Bordeaux, 1716; timid, retiring character; belonged to no school; uneventful life. The *Lettres persanes* (1721), audacious, shocking, and amusing, went like wildfire. After M. had consented to publish expurgated edition, he was admitted to Academy, 1728. The *Grandeur et décadence des Romains* (1734) contained brilliant generalisations on Roman character, but famous *Esprit des lois* (1748), besides showing maturity brought by years, was marked by deep studies and wide travelling, which M. had undertaken since earlier work. Twenty-two editions were published in eighteen months, but M. was fiercely attacked by Church; hence his *Défense* (1750). M. was blamed by Voltaire and later critics for lack of order and sacrifices to the *bon mot*, but acclaimed as 'a profound and felicitous genius.'

Ilbert, *Montesquieu* (Romanes Lecture, 1904).

MONTESSORI SYSTEM, see EDUCATION: *Infant Schools*.

MONTEVIDEO, SAN FELIPE Y SANTIAGO DE (34° 53′ S., 56° 10′ W.), capital, Uruguay; settled by Spaniards, 1726; seized by Britain, 1807, but evacuated same year; transferred to Uruguay, 1828, becoming capital of republic; unsuccessfully besieged by Argentines, 1843. Public buildings include Senate House, Exchange, town hall, opera-house, univ., various philanthropic establishments. M. is archiepiscopal see, and has a modern cathedral. M. is outlet for all chief productions of Uruguay, and main inlet for imported goods; harbour has exposed and somewhat dangerous roadstead; exports jerked beef, wool, skins, grease, horns, cereals; beef-salting an important industry. Pop. 308,710.

MONTEZ, LOLA, see GILBERT, MARIE.

MONTEZUMA, name of two Mexican emperors: **Montezuma I.** (1390–1471) ruled from Atlantic to Pacific. **Montezuma II.** (1466–1520), the last emperor, by heavy taxation alienated his subjects; tried to buy off Cortes, and became a Span. prisoner; the capital rebelled, Cortes brought out M. to pacify the citizens; a stone wounded the emperor, and soon afterwards he died broken-hearted. See MEXICO.

MONTFERRAT, family of Lombardy; renowned in Middle Ages. William III., Marquis of M., went on Second Crusade, 1147; five sons prominent figures in Holy Land; rivals of Visconti and house of Savoy in Italy.

MONTFORT, SIMON DE, EARL OF LEICESTER (d. 1265), statesman and soldier; a Fr. noble; came to England, 1230, becoming Earl of Leicester, and receiving Eng. lands of his f.'s first wife, co-heir of Earl of Leicester; m. Eleanor, sister of Henry III., 1238; had several quarrels with king; opposed demand for subsidy, 1254; joined baronial opposition at Parlia-

ment of Oxford, 1258; went to war with Henry, 1263; won battle of *Lewes*, 1264, and established baronial control; slain at *Evesham*.

Life, by Prothero.

MONTGAILLARD, JEAN GABRIEL MAURICE ROQUES, COMTE DE (1761–1841), Fr. political agent; spy of first rank, employed by Louis XVIII., the Directory, and Napoleon; showed great ability in unravelling Pichegru's plot.

MONTGELAS, MAXIMILIAN JOSEF GARNERIN, COUNT VON (1759–1838), Bavarian statesman; chief adviser of Maximilian Joseph, elector of Bavaria; co-operated in Napoleonic reorganisation of Germany; enemy to Ger. unity, but Bavarian patriot.

MONTGOLFIER, JOSEPH (1740–1810) and **ETIENNE** (1745–1799), inventors of the balloon (*q.v.*).

MONTGOMERIE, ALEXANDER (*c.* 1550–*c.* 1610), Scot. poet; related to the house of Eglinton; wrote much miscellaneous verse, but is remembered only for *The Cherrie and the Slae*.

MONTGOMERY.—(1) (52° 34′ N., 3° 10′ W.) county town, near Severn, Montgomeryshire, Wales; ruined fortress. (2) (32° 21′ N., 86° 23′ W.) capital, Alabama, U.S.A.; founded, 1817; here Confederate states were inaugurated, 1861; railway centre; manufactures cottons, flour, hardware. Pop. (1910) 38,136. (3) (30° 42′ N., 73° 11′ E.) town and district, Lahore division, Punjab, India. Area of district *c.* 4800 sq. miles; pop. *c.* 464,000. Pop. of town *c.* 6700. (4) (30° 22′ N., 95° 36′ W.), post village, Texas, U.S.A.

MONTGOMERY, ROBERT (1807–55), Eng. poet and cleric; minister of Percy Street Chapel, London, 1843–55; immortalised by Macaulay's *Edinburgh Review* criticism of his poems.

MONTGOMERYSHIRE (52° 8′ N., 3° 30′ W.), county, N. Wales; area, 797 sq. miles; hilly on borders, rising to nearly 2500 ft.; produces lead, zinc, slate; manufactures woollens; sheep-grazing on higher ground. Pop. (1911) 53,147.

MONTH, see CALENDAR, CHRONOLOGY.

MONTHOLON, CHARLES TRISTAN, MARQUIS DE (1782–1853), Fr. commander; b. Paris; served with Napoleon and accompanied him to St. Helena; subsequently imprisoned with Louis Napoleon at Ham; wrote *Récits de la Captivité de Napoléon*.

MONTILLA (37° 45′ N., 4° 46′ W.), town, Cordova, Spain; wine. Pop. 14,000.

MONTLUÇON (46° 19′ N., 2° 37′ E.), town, on Cher, Allier, France; manufactures glass, iron, chemicals. Pop. (1911) 33,799.

MONTMARTRE, hill, church, and bohemian quarter in north of Paris (*q.v.*).

MONTMORENCY (48° 59′ N., 2° 18′ E.), town, Seine-et-Oise, France; seat of Montmorency family. Pop. (commune) 6100.

MONTMORENCY, famous Fr. family.—**Anne** (1493–1567), 1st Duc de M., Marshal and Constable of France; taken prisoner at *Pavia*, 1525, *St. Quentin*, 1557; put down Huguenots. Grandson, **Henri** (1595–1632), Duc de M.; Fr. general; captured Ré from Huguenots and defeated Spaniards; executed for supporting Orleans.

MONTMORILLON (46° 25′ N., 0° 52′ E.), town, on Gartempe, Vienne, France. Pop. (commune) 5100.

MONTMORIN DE SAINT HÉREM, ARMAND MARC, COMTE DE (1745–92), Fr. statesman; Minister of Foreign Affairs, 1787; forced to resign, 1791; proscribed; killed in Sept. massacres, 1792; loyal royalist, but weak and incapable.

MONTONE, ANDREA DA (1368–1424), called BRACCIO, or FORTEBRACCIO; Ital. mercenary leader; important in Neapolitan history.

MONTORO (38° 1′ N., 4° 26′ W.), town, Cordova, Spain; olive oil. Pop, 15,500.

MONTPELIER (44° 15′ N., 72° 35′ W.), city, capital of Vermont, U.S.A.; marble and granite works; flour-mills. Pop. (1910) 7856.

MONTPELLIER (43° 36′ N., 3° 54′ E.), town, S. France; belonged in turn to Aragon, Majorca, France, Navarre; French since 1392; episcopal see; has XIV.-cent. cathedral, famous univ. (dating from 1289), old botanic gardens. Pop. (1911) 80,230.

MONTPENSIER, DUCHESSE DE, ANNE MARIE LOUISE D'ORLÉANS (1627–93), Fr. memoir-writer; actively supported Frondeurs; interesting *Mémoires* were pub., 1729.

MONTREAL (45° 31′ N., 73° 35′ W.), town, Quebec, Canada; situated on E. side of M. island, at junction of Ottawa River and St. Lawrence; has many old Fr. buildings, giving picturesque appearance; seat of M'Gill Univ. (founded, 1821); has also branch of Laval Univ. of Quebec, fine libraries, many educational and charitable establishments; great Victoria Railway Bridge across St. Lawrence. M. is episcopal see, has R.C. and Anglican cathedrals and many churches. M. was founded by French, 1642; taken by British, 1760; held by Americans, 1775–76, when recaptured by British; has suffered from fire in 1852, 1901, 1906, 1907. M. is chief port and largest town in Canada; good harbour open to largest steamers; extensive canal communication with principal towns of Great Lakes; headquarters of all important railways; railway works, manufactures of boots, clothing, textiles, tobacco, rubber goods, hardware. Pop. (1911) 470,480.

MONTREUIL-SOUS-BOIS (48° 50′ N., 2° 25′ E.), town, Seine, France; peach orchards. Pop. (1911) 43,217.

MONTREUIL-SUR-MER (50° 24′ N., 1° 43′ E.), town, Pas-de-Calais, France. Pop. 4000.

MONTREUX (46° 26′ N., 6° 55′ E.), health-resort, canton Vaud, Switzerland; includes Clarens, Vernex, Glion, Veytaux, and other villages. Pop. (1912) 19,500.

MONTROSE (56° 42′ N., 2° 28′ W.), royal burgh and port, Forfarshire, Scotland, at mouth of South Esk; fine harbour; trades in timber, fish; flax-spinning, rope-making. Pop. (1911) 10,973.

MONTROSE, MARQUESSATE AND DUKEDOM OF.—David, Earl of Crawford, was cr. duke, 1488–89; the Grahams of Kincardine and Old Montrose obtained earldom, 1505, marquessate, 1644.

MONTROSE, JAMES GRAHAM, MARQUESS OF (1612–50), Scot. Jacobite leader; signed Solemn League and Covenant, but believed in subordination of Church to State; joined Royalists, 1640; cr. marquess, 1644 (previously earl by creation, 1505); won many victories as commander against Covenanters, 1644–45; defeated at *Philiphaugh*, 1645, and retired abroad; invaded Scotland, 1650; defeated at *Invercarron*, betrayed, and hanged.

MONTSERRAT (16° 42′ N., 62° 13′ W.), one of Leeward Islands, Brit. W. Indies; volcanic; discovered by Columbus, 1493; settled by British, 1632; chief products, sugar and lime juice. Pop. (1911) 5562.

MONTSERRAT, mountain, Catalonia, Spain, on side of which is Benedictine monastery dating from IX. cent., and containing wooden image of Virgin, to which miraculous powers are ascribed. There are also remains of several hermitages.

MONTYON, ANTOINE JEAN BAPTISTE ROBERT AUGET, BARON DE (1733–1820), Fr. philanthropist; chancellor of Comte d'Artois (later Charles X.), 1780–91; founded various prizes for virtue and for literary and scientific work, to be awarded by Fr. Academy; lived in England from Revolution till 1814.

MONUMENT, anything erected as a reminder of persons and events, standing as a survival of the work of man in an earlier age. The Commissioners of Works were made the guardians of sixty-eight prehistoric m's in Great Britain and Ireland by the Ancient Monuments Protection Act, 1882, and were empowered to purchase and take over the care of others from time to time. The owners still retain all rights of possession, but may not injure or deface the m's so protected, and must allow full access to the

inspector and officials app. by the Commissioners. The penalty for wilfully damaging a protected m. is £5 fine or a month's imprisonment. Amongst these national m's in the care of the Commissioners are Stonehenge, Kit's Coty House, Hadrian's Wall, Offa's Dyke, and certain barrows, cairns, ancient ruins, and round towers. Further Acts were passed in 1892, 1900, and 1910, extending the authority of the Commissioners over buildings of national and artistic interest. The Society for the Preservation of Ancient Buildings (founded, 1877) and the National Trust (1894) also exist to save m's from destruction.

In France the *Commission des monuments historiques* (established, 1837) is responsible, under the Minister of Public Instruction, for deciding what m's, ancient buildings, or portions of the same, are to be safeguarded against defacement, and by an Act of 1887 has legal powers to enforce its decisions. In Germany conservators, state decrees, and administrative orders are the chief instruments of protection. Italy for the past five hundred years has had in different places rules for the preservation of its m's, but not till 1902 was an Act passed for the whole of Italy. The later and more stringent Acts, 1907 and 1909, and the Regulations of 1910 cover every kind of antiquity.

MONUMENTAL BRASSES, see BRASSES, MONUMENTAL.

MONZA (45° 34′ N., 9° 17′ E.), town, Italy; former capital of Lombardy; often besieged; has cathedral, dating in part from VI. cent. Pop. 45,000.

MONZONITE, group of rocks well seen at Monzoni, Tyrol; dark grey; fine and coarse grained; contain plagioclase, orthoclase, felspar, augite, biotite, hypersthene, olivine, or bronzite.

MOODKEE, MUDKI (30° 47′ N., 74° 55′ E.), town, Punjab, India; Sikhs defeated here by British, Dec. 1845. Pop. 3300.

MOODY, DWIGHT LYMAN (1837–99), Amer. preacher; associated with Ira D. Sankey in evangelistic work; also social and educational work.

MOOLTAN, see MULTAN.

MOON (Anglo-Saxon, *mona*, from root *ma*, 'to measure'), the measurer of time, the earth's satellite, and the nearest of all the heavenly bodies; diameter, 2·163 miles; shines by reflected light of the sun; revolves around the earth in 27⅓ days (*i.e.* a lunar mo(o)n-th); mean distance from earth, about 238,817 miles, though this constantly varies owing to ellipticity of m.'s orbit (inclined to plane of ecliptic at angle of 5°). The m. is supposed to have been thrown off by the earth from where the Pacific Ocean now is, far back in earth's history—according to Prof. Pickering, 50 to 500 million years ago. To the naked eye, dusky markings are visible on m.'s surface; with the telescope these are seen to be high mountain ranges, craters, walled plains, and dried-up seas. The heights of the lunar mts. have been ascertained by measuring the length of their shadow, and finding the sun's altitude as seen from the m. at that particular time. Some of the mts. are 25,000 ft., while one peak in the Dörfel range is over 5 miles in height. The m.'s surface has been accurately surveyed by telescopists, and each mountain is named, some after famous astronomers (*e.g.* Gassendi, Copernicus), mythological characters (*e.g.* Atlas, Hercules), and terrestrial mts. (*e.g.* Alps, Apennines). The m.'s day and night are each a fortnight in duration. It always presents the same side to the earth.

Harvest Moon.—On Sept. 22 the sun crosses the celestial equator, and the moon (if full) rises exactly at sunset and sets at sunrise. See ECLIPSE, TIDES.

MOON-FISH, see OPAH.

MOOR- or WATER-HEN, see RAIL FAMILY.

MOORE, GEORGE (1853–), Irish novelist, dramatist, and art critic; novels marked by realism.

MOORE, JOHN (1729–1802), Scot. physician and author; wrote interesting sketches of contemporary life in England and on the Continent, giving, among other things, an account of scenes in the Fr. Revolution; author of novel, *Zeluco*, on which Byron's *Childe Harold* was based.

MOORE, SIR JOHN (1761–1809), Brit. general; b. Glasgow; officer in American War, 1778–83; M.P., 1784; wounded in Corsican campaign, 1792; served in W. Indies and Ireland, Holland campaign, and Egypt; noted military trainer; commander-in-chief in Mediterranean; famous conduct of Span. resistance to France; march of Light Brigade and battle of *Corunna*, 1809; slain and buried, by dying wish, in ramparts of Corunna; verses, *Burial of Sir John Moore*, are by Rev. Charles Wolfe (*q.v.*).

MOORE, THOMAS (1779–1852), Irish poet; b. Dublin; ed. Dublin Univ., and went to London to study law. App. Admiralty registrar at Bermudas, M. tired of the work, left a substitute, and came home; substitute embezzled £6000, M. was held responsible, and to avoid arrest lived abroad; cleared off debt in time; was pensioned and d. insane. Chief poetical works—*Irish Melodies* (1807), *Lalla Rookh* (1817); prose works are *The Epicurean* (1827), a romance, *History of Ireland* (1834–46), *Life of Sheridan* (1825), and his great *Life of Byron* (1830). As a song-writer M. is of the greatest; no one approaches him in light music; he is excellent alike in verse, romance, and satire.

S. Gynn, *Life of M.* (1905).

MOORHEAD (46° 48′ N., 96° 50′ W.), city, Minnesota, U.S.A., on Red River; flour-mills, machine shops. Pop. (1910) 4840.

MOORS (from Lat. *Mauri*, dark men), natives of Morocco; an independent people till conquered by Augustus, 25 B.C., and made part of the kingdom of Numidia; became Muhammadan after the Arab invasion in VII. cent., and now are more Arab than African; term applied to N. African invaders and conquerors of Spain, VIII.–XV. cent. (see SPAIN: History); a *white* race, though sunburnt.

MOORSHEDABAD, see MURSHIDABAD.

MOOSE, see under DEER FAMILY.

MOPLAH, Malabar Muhammadan community.

MOQUEGUA (17° 10′ S., 70° 53′ W.), maritime province, Southern Peru; capital, MOQUEGUA; subject to earthquakes. Pop. 40,000; (town) 7000.

MORACEÆ, trees or shrubs, possessing latex and mostly tropical in distribution; includes mulberry, fig, hemp, hop, and other economically important plants.

MORADABAD (28° 51′ N., 78° 49′ E.), city (and district), United Provinces, India; on Ramganga; trading centre; brassware. Pop. (1911) 81,168; (dist.) 1,200,000.

MORAL PHILOSOPHY, see ETHICS.

MORALITY PLAYS, see DRAMA.

MORAR (26° 14′ N., 78° 17′ E.), town, Gwalior, Central India. Pop. 21,000.

MORAT, MURTEN (46° 55′ N., 7° 5′ E.), small town, canton Fribourg, Switzerland, on Lake Morat; scene of defeat of Charles the Bold by Swiss, 1476.

MORATALLA (38° 19′ N., 1° 49′ W.), town, Murcia, Spain; wine, soap. Pop. 13,500.

MORATIN, LEANDRO ANTONIO EULOGIO MELITON FERNANDEZ DE (1760–1828), Span. poet and dramatist; chief librarian to Joseph Bonaparte, and enjoyed several ecclesiastical benefices.

MORAVIA, MÄHREN (49° 20′ N., 16° 30′ E.), crownland, Austria; between Bohemia and Hungary; area, 8583 sq. miles; surface generally mountainous; capital, Brünn. M. came into possession of Austria, 1526; constituted a separate province, 1849; overrun by Prussians, 1866; sends 49 representatives to Reichsrath; has provincial Diet of 151 members. M. has extensive forests; produces cereals, coal, iron, graphite; manufactures textiles. Pop. (1911) 2,620,914.

MORAVIAN BRETHREN, HERRENHUTERS, religious society, *Unitas Fratrum*; founded in Moravia in XV. cent.; in 1467 they chose by lot their first bp.; Lucas of Prague increased their numbers, and by 1500 there were 400 churches; persecution almost destroyed them, 1600–27. In 1722 Christian David led a small

band to Silesia, where Count Zinzendorf gave them a settlement—Herrnhut ('The Lord's Watch'); in 1727 their first church was founded. To-day the society flourishes in Germany, Britain, America; it was the pioneer of, and is zealous in, missionary work; it is Protestant, believes greatly in hymn praise, discipline, and education.

Hutton, *History of Moravian Church* (1909).

MORAY, 1ST EARL OF, see RANDOLPH, THOMAS.

MORAY EEL, see under EELS.

MORAY, JAMES STEWART, EARL OF, see MURRAY.

MORAYSHIRE, MORAY, see ELGINSHIRE.

MORBHANJ (22° N., 86° 30′ E.), native state, Bihar and Orissa, India. Pop. 625,000.

MORBIHAN (47° 50′ N., 2° 40′ W.), coast department, N.W. France; area, 2738 sq. miles; coast much indented; surface generally undulating plateau; chief towns—Vannes (capital), Lorient. M. produces apples, cereals, honey, salt; important fisheries; manufactures cider. Pop. (1911) 578,400.

MORDANT, see DYEING.

MORE, HANNAH (1745–1833), Eng. author; first pub. plays in 1762, and soon became friend of Johnson and Garrick; gradually she became more religious and wrote moral books. In *Village Politics* she opposed revolutionary tendencies. Her later life was largely devoted to philanthropy and the encouragement of popular education.

MORE, HENRY (1614–87), Eng. philosopher and divine; spent most of his life in Cambridge, firmly declining all preferment; next to Cudworth, the most important of the Cambridge Platonists. His early philosophical writings were poetical. His most important works are *The Immortality of the Soul* (1659), *Enchiridion Ethicum* (1667), *Divine Dialogues* (1668), and *Enchiridion Metaphysicum* (1671), a criticism of Cartesianism.

MORE, SIR THOMAS (1478–1535), Eng. writer and statesman; b. London; s. of Justice of King's Bench, who placed him as page in household of Archbishop Morton; ed. at Oxford under John Colet and Linacre; became M.P.; Speaker of Commons, 1523. After Wolsey's disgrace, M., much against his will, was made Lord Chancellor of England in 1529; he filled this office admirably. In 1532 M. resigned, because of Henry VIII.'s breach with Rome; refused to acknowledge Henry's claim to title of head of Church, and was imprisoned; tried for high treason and executed, 1535.

M.'s chief work was *Utopia* (1516), a XVI.-cent. picture of an ideal country governed by perfect laws; written in Latin, it met with the instant approval of continental humanists. His *History of King Richard III.* is an excellent example of XVI.-cent. 'classical' prose. M. was a friend of Erasmus, from whose letters we glean many details concerning M.'s life; married twice; beatified by R.C. Church, 1886.

Life, by Roper, his son-in-law, 1626 (ed. 1902); by Father Bridgett (1891); by Hutton (1895).

MOREA, see under GREECE.

MOREAU, JEAN VICTOR MARIE (1763–1813), Fr. general; won distinction at *Tourcoing*, 1795, under Pichegru; led invasion of Germany, 1795, and skilful retreat; implicated in Pichegru's plot though innocent, and displaced; reinstated, 1799, and commanded in Italy; assisted Napoleon in revolution of 1799; app. commander of Army of the Rhine; won battle of *Hohenlinden*, 1800; intrigued against Napoleon; banished.

MORECAMBE (54° 5′ N., 2° 52′ W.), watering-place, on Morecambe Bay, Lancashire, England. Pop. (1911) 12,133.

MORELIA (19° 40′ N., 100° 55′ W.), chief town, Michoacán, Mexico; centre of sugar-producing district; manufactures textiles; has cathedral. Pop. (1910) 39,116.

MORELLI, GIOVANNI (1816–91), Ital. patriot and art critic; b. Verona; studied science at Munich; joined patriotic movement against Austria, 1840, in Florence, and took part in war of 1848; elected deputy for Bergamo, in first free Ital. Parliament, 1860; pres. of Government Commission concerning all works of art in the country, and responsible for law prohibiting sale of works of art from public and religious institutions; Senator, 1873; pub. criticisms on art—*Critical Studies* (two vols., Eng. trans.).

MORELOS (18° 35′ N., 99° 6′ W.), inland state, Mexico; area, 2773 sq. miles; surface generally mountainous; chief town, Cuernavaca; produces cereals, fruit, sugar, coffee. Pop. (1910) 179,814.

MORESNET (50° 43′ N., 5° 59′ E.), small neutral territory on borders of Prussia and Belgium; formed in 1816; governed by a burgomaster; zinc mines. Pop. 3700.

MORGAGNI, GIOVANNI BATTISTA (1682–1771), Ital. anatomist; a careful observer, who from being a general student of chem., of pharmacy, and of the structures of man and of fishes, became prof. of Anat. in Padua. His work on the characteristics of diseased organs, *De Sedibus et Causis Morborum per Anatomem indagatis*, fixed attention on local symptoms rather than on general indications of disease, and laid the foundations of the study of pathological anatomy.

MORGAN, AUGUSTUS DE, see DE MORGAN.

MORGAN, JOHN H. (1826–64), Amer. confederate soldier; led series of cavalry raids, destroying Union military stores, bridges, railways, etc.; captured in daring attack, 1863; killed in raid, 1864.

MORGAN, JOHN PIERPONT (1837–1913), Amer. millionaire financier; organised Steel Trust and Atlantic Shipping Trust; his banks financed many national enterprises; well known as art collector.

MORGAN, LADY, *née* SYDNEY OWENSON (c. 1780–1859), Irish authoress; m. Dr. Morgan, knighted by the Lord-Lieutenant. She wrote novels, verse, books of travel, and two vol's of *Memoirs*.

MORGAN, MOUNT, see MOUNT MORGAN.

MORGAN, SIR HENRY (c. 1635–88), Welsh buccaneer; b. in Glamorganshire. In 1666 he became leader of the West Ind. buccaneers, sacked Porto Bello, and put the inhabitants to atrocious torture. He was subsequently sent to England in chains, but was pardoned by Charles II.

MORGANA, FATA, see FATA MORGANA.

MORGANATIC MARRIAGE, marriage which does not involve the children's succession to the property or rank of the father; many instances of such marriages occur in history of royal families.

MORGANTOWN (39° 40′ N., 79° 57′ W.), city, on Monongahela, W. Virginia, U.S.A.; glass-works; seat of W. Virginia Univ. Pop. (1910) 9150.

MORGARTEN (47° 6′ N., 8° 40′ E.), mountain, Switzerland; scene of Swiss victory over Austrians, 1315.

MORIER, SIR ROBERT BURNETT DAVID (1826–93), Brit. diplomatist; entered Ger. service; opposed Bismarck with success; Brit. ambassador to Russia, 1884; popular, but blamed by Bismarck; cleared from suspicion of treachery.

MORIN, JEAN, MORINUS (1591–1659), Catholic theologian; convert from Protestantism; wrote on ecclesiastical history, but his most important work is on the Hebrew text of the Old Testament.

MORION, see HELMET.

MORISCOS, Span. name for converts from Islam to Christianity. After Span. conquest of Granada, Muhammadanism was gradually crushed out about 1525. The M's were expelled from Spain, 1609.

MORLAIX (48° 36′ N., 3° 49′ W.), town, on Eng. Channel, Finistère, France. Pop. 16,200.

MORLAND, GEORGE (1763–1804), Eng. painter; led an irregular life, and d. in a London spunging-house. He turned out a vast number of paintings and drawings; many of his canvases deal with the sea, but he excelled in rural subjects.

MORLANWELZ (50° 27′ N., 4° 13′ E.), town, Hainault, Belgium; coal mines; ironworks. Pop. 8600.

MORLEY (53° 45′ N., 1° 38′ W.), town, Yorkshire, England; woollen mills. Pop. (1911) 24,285.

MORLEY, GEORGE (1597–1684), bp. of Worcester, 1660, Winchester, 1662.

MORLEY, HENRY (1822–94), Brit. author; for many years prof. of Eng. Language and Lit. at Univ. Coll., London. His numerous works include the well-known *First Sketch of Eng. Lit.*

MORLEY OF BLACKBURN, 1ST VISCOUNT, JOHN MORLEY (1838–), Eng. Liberal statesman and littérateur; ed. Cheltenham and Oxford; called to Bar, 1873; edit. *Fortnightly Review*, 1867–83; subsequently *Pall Mall Gazette* (1880–83) and *Macmillan's Magazine* (1883–85); Sec. for Ireland, 1886, and again, 1892; Sec. for India, 1905–10; cr. Viscount M., 1908; Lord-Pres. of Council, 1910; an honest and fearless politician; consistent upholder of Home Rule; often regarded as doctrinaire. His *Life of Gladstone* (1903) was a masterpiece of biography; other works include able studies of Burke, Voltaire, Rousseau, Diderot, Cobden, Walpole, Cromwell, and brilliant essay, *On Compromise*. He presented Acton Library (a gift from Mr. Carnegie) to Cambridge Univ.; O.M. (1902).

MORLEY, THOMAS (1557–1604), Eng. composer; celebrated for his canzonets and madrigals, and for *A Plaine and Easie Introduction to Practicall Musike* (1597).

MORMONS, 'The Church of Jesus Christ of **Latter-Day Saints,**' an Amer. sect known chiefly for their polygamy; owe their origin to Joseph Smith (1805–44), a religious fanatic of immoral character and unbalanced mind. An angel, so he believed, appeared to him in a vision, telling him that he would find a sacred book written on gold plates buried in a certain spot. What exactly happened is obscure, but he seems to have possessed gold plates with mysterious writing. These formed the *Book of Mormon*, giving the history of America. There was then a certain amount of religious ferment in America, of which Smith took advantage, and a church was founded in 1830. His immorality gave rise to various scandals, and a secret society was founded by the M's to assassinate their opponents. Smith and others were imprisoned in 1838. In 1843 he had a 'revelation' which definitely enjoined polygamy, and on this becoming known the popular fury was aroused and Smith and his bro. were killed in an armed revolt against them in the M. city of Nauvoo where they then lived.

In 1846 the M's had to leave Nauvoo, and emigrated to the Great Salt Lake Valley in Utah, where they founded *Salt Lake City*. In 1850 Utah became a 'territory' of the U.S.A., with Young, Smith's successor, as gov. The M's made continued attacks on the Gentiles, and there was much violent feeling against them. In 1852 a 'Reorganised Church of Latter-Day Saints' was founded, which rejected polygamy. Young, an extremely able, but unscrupulous man, died in 1877, leaving many wives and numerous children. Utah became a state in 1896, polygamy being legally abolished. M's still flourish in the U.S.A., where there are more than 300,000 now. They have also made some efforts to evangelise other countries, notably Britain. They have an elaborate system of Church government, with a large number of different offices, a pres., councillors, patriarchs, apostles, elders, priests, teachers, deacons, etc. Their theology is polytheism, Adam being their chief deity; Christ, Muhammad, and their own founder they also invest with divine attributes.

Linn, *Story of the Mormons* (1902).

MORMYR (*Mormyrus*), or AFRICAN BEAKED FISHES (*Mormyridæ*), longish, compressed, primitive bony fishes, with scaleless skin enveloping the head. Live amongst mud only in the fresh waters of Africa, mainly within the tropics.

MORNAY, PHILIPPE DE, SEIGNEUR DU PLESSIS (1549–1623), Fr. Huguenot leader; a profound scholar; won renown by Lat. treatise, 1571, on *The Visible Church*; Henry of Navarre's chief councillor.

MORNY, CHARLES AUGUSTE LOUIS JOSEPH, DUC DE (1811–65), Fr. statesman; illegitimate; half-bro. of Napoleon III.; obtained important position in financial world; became Minister of Interior on revolution, 1851; pres. of *Corps législatif*, 1854; held Liberal views; exercised great influence over Napoleon.

MOROCCO, MAROCCO (*c.* 28° to 35° 55′ N., 1° to 11° W.), empire in N.W. corner of Africa. M. is bounded N. by Atlantic and Mediterranean, N.E., S.E., and S. by Algeria and Fr. Africa, N.W. by Atlantic, and is separated from Europe by Strait of Gibraltar; area, *c.* 219,000 sq. miles. Country is traversed from N.E. to S.W. by Atlas Mountains (*q.v.*), which reach an extreme height of from 13,000 to 15,000 ft.; parallel chains of these with their foothills and offshoots spread out so widely as to render surface hilly almost everywhere, but especially so in N. Climate in districts N.W. of Atlas is healthy and pleasant; to S.E. of Atlas there is little rain and sometimes long-continued drought. M. is drained by Muluya and many smaller streams flowing to Mediterranean; and by Sebu, Bu Regreg, Um er Rebia, Tensift, Sus, and other streams flowing to Atlantic. Rivers flowing S. from Atlas are lost in marshes in desert.

History.—In ancient times M. was a Rom. province; it was invaded and conquered by Arabs in VII. cent., and from late VIII. cent. onwards held an independent position under various native dynasties. First of these was Edrisite dynasty founded by a descendant of the Prophet, *c.* 789, which endured until late X. cent. and was followed by many others, among which Zeirides, Almoravidis, Almohadis, Beni Marinis, and Watasi may be mentioned. The present dynasty, Alides, was established in 1649 by Muhammad XIV., whose bro., Mulai Ismail (1672–1727), after a career of conquest, made himself master of whole country. Under one of his successors, Mulai Sidi Muhammad (Muhammad XVI.), who reigned 1757–90, an attempt was made to introduce European civilisation in M. His death was signal for struggle between several of his sons, three of whom reigned in turn. War with France twice occurred in reign of Abd-er-Rahman II., 1822–59; and in following reign Muhammad XVII. was defeated by Spain, 1859–60. He was succeeded in 1873 by his s. Mulai-el-Hassan III., in whose reign occurred the Conference of Madrid (1880), when regulations were made concerning protective rights of various European powers in M. Hassan's son and successor, Abd-el-Aziz IV., reigned 1894–1907; in his reign occurred rebellion caused by his introduction of foreign customs. In 1904 an Anglo-French agreement was made whereby France and Britain recognised each other's interests in Morocco and Egypt. Germany being dissatisfied, an international conference was held at Algeçiras in 1906, all members of which signed agreement, *inter alia* entrusting policing of M. to France and Spain jointly. Abd-el-Aziz was deposed in 1907 by his bro., Mulai Hafid, who abdicated (1912) in favour of his bro., Mulai Yusef. Internal disorder necessitated constant Fr. operations. Spain sent expeditions to Melilla, 1909, and to Laraish, 1911; and claimed regions opposite Span. coast and adjoining Span. colony, Rio de Oro. In 1908 and 1911 occurred Franco-Ger. crises, marked by incidents at Casablanca and Agadir. Eventually by Agreement (1911) Germany practically recognised Fr. protectorate in M., in return for section of Fr. Congo; the sultan accepted Fr. protectorate, 1912.

GOVERNMENT, before Fr. régime began, was despotism, sultan being both temporal and spiritual head of State. There were six Ministers, whose functions were purely advisory. Fr. Government is now represented by Resident-General. Muhammadanism prevails, but freedom of religion has been proclaimed. Army

system is at present being reformed under Fr. supervision. Several ports and *presidios* on Mediterranean coast are under Span. Government—Melilla, Chaffarinas Is., Alhucemas; Ceuta, etc.; as also Ifni and Rio de Oro on Atlantic coast. French and Span. spheres of influence are being determined (1913).

RESOURCES.—Between northern hill-region, along Mediterranean and Atlas and extending westward to Atlantic, is the fertile Tell region, covering one-third of whole area and producing heavy crops of wheat, barley, maize, cotton, hemp, olives, dates, and other fruits. Pasture land covers about one-eighth of whole area, where numbers of cattle, sheep, goats, horses, and mules are raised. Minerals include gold, silver, manganese, copper, antimony, but these have not been fully developed. Industries are carpet, slipper, and leather manufactures. Chief exports are wool, hides, cereals, fruit, eggs, esparto, olive oil. There are no railways as yet (1913).

M. has three capitals—Fez, Morocco, and Mequinez. Coast towns open to foreign trade are Casablanca, Laraish, Mazagan, Mogador, Rabat, Saffi, Tangier, Tetuan. Certain other closed ports are to be opened. Inhabitants are Berbers, Arabs, Tuaregs, Jews, negroes, and half-breeds. Pop. (estimated) 5,000,000.

Kerr, *Morocco after Twenty-Five Years* (1912); Morel, *Morocco in Diplomacy* (1912).

MOROCCO, MARRAKESH (31° 30′ N., 7° 30′ W.), one of capitals of Sultanate of Morocco; founded, 1073; manufactures morocco leather. Pop. 60,034.

MORÓN, MORÓN DE LA FRONTERA (37° 7′ N., 5° 27′ W.), town, Seville, Spain; marble and chalk quarries. Pop. 15,500.

MORONOBU, HISHIGAWA (1625–62), Jap. artist; distinguished painter of the Ukioye, or popular, school. See JAPANESE ART.

MOROSINI, old patrician family of Venice which produced doges, diplomatists, soldiers, and writers. Chief members: DOMINIC (1080–1156), MARINO (d. 1252), ANDREA (1558–1618), and FRANCESCO (1618–94).

MORPETH (55° 11′ N., 1° 40′ W.), town, Northumberland, England; iron foundries, collieries. Pop. (1911) 7436.

MORPHEUS (classical myth.), son of Sleep; god of dreams.

MORPHINE, MORPHIA, $C_{17}H_{17}NO(OH)_2+H_2O$; chief alkaloid in opium (about 10 %); crystallises from alcohol in small prisms; a monacid, tertiary base, forming salts; *e.g.* hydrochloride; soporific; to relieve pain a solution of the acetate is injected hypodermically. See OPIUM.

MORPHOLOGY, the science of form, dealing with the structures of animals and plants, their arrangements, and the laws of their formation and grouping. In dealing with *animal structure*, two branches of m. are involved: (1) the study of the exterior of the organism, and (2) its internal construction. Under the first head comes symmetry, of which there are three kinds: (*a*) *Centro-symmetric*, when the parts are arranged round a *point* in the centre of the body, causing the latter to be spherical or stellate—*e.g.* Radiolaria; (*b*) *Axo-symmetric*, when the organs are grouped about a central *axis*, causing the body to be cylindric—*e.g.* Porifera, Cœlenterata; (*c*) *Plano-symmetric* (bilaterally symmetrical), when the organs are arranged round a longitudinal central *plane*, giving the animal dorsal and ventral surfaces, and right and left sides—*e.g.* nearly all animals above Cœlenterates.

The second branch of m. is the study of the morphological unit, the CELL (*q.v.*), and the combinations it forms. This is a definite mass of protoplasm, limited usually by a cell membrane and containing a nucleus. One group of animals only is unicellular, viz. Protozoa; all others are multicellular. Among the latter we find monoblastic or single-cell-layered animals, *e.g.* Volvox; diploblastic or two-cell-layered animals, *e.g.* Cœlenterates; and triploblastic, or three-cell-layered animals, *e.g.* all the higher animals. We find in general that these three types correspond with the three forms of symmetry. Form is in part dependent on function; therefore, according as function is growing, completed, or degenerating, the organ concerned is rudimentary, well-developed, or vestigial. But it must not be forgotten that form is also an essential of life, the expression in matter of an undefined vital force which aims at a sort of completion. The ascending grades of structure in the animal and vegetable kingdoms are due to the specialisation of parts arising from greater and greater division of labour in organs, and since these gradations are not continuous as we see them at present, the breaks in sequence permit of separation into groups, and make classification into species, genera, families, etc., a possibility.

Apart from its study of the cell as a cell, and of the cell combinations which form working units, i.e. organs, m. also investigates the minute structures of the cell combinations which go to the making of organs—the tissues. For organs altogether unlike in appearance and function may, nevertheless, be composed of similar tissues. The main tissue types are the surface epithelial tissue, the supporting connective tissue, the contractile muscular tissue, and the highly specialised sensitive nervous tissue. See ANIMALS; PLANTS (*Morphology*).

MORRILL, JUSTIN SMITH (1810–98), Amer. statesman; leader of republicans; brought in educational bill, 1857 and 1861, which became Land Grant Act of 1862; author of Tariff Act of 1861.

MORRIS (41° 20′ N., 88° 27′ W.), city, Illinois, U.S.A., on Illinois; various manufactures. Pop. (1910) 4563.

MORRIS, GOUVERNEUR (1752–1816), Amer. statesman; member of New York Provincial Congress (afterwards Convention), 1776–77; helped to draft constitution of U.S.A.; chairman of committee which refused negotiations till recognition of independence, 1778; wrote pamphlets on currency and taxation, advocating decimal system and 'dollar' and 'cent' as names for units; ambassador to France, 1792–94; advised separation of northern and southern States; *Life*, by Roosevelt.

MORRIS, ROBERT (1734–1806), Amer. financier and statesman; leader in movement against Britain; War of Independence and subsequent settlement owed much to his practical talents; founded Bank of N. America in Philadelphia, 1781.

MORRIS, THOMAS, 'OLD TOM' (1821–1908), Scot. golfer and club-maker; green-keeper at St. Andrews for many years; his skill and character made his name familiar wherever golf was played. His son, 'Young Tom,' was also a golf champion.

MORRIS TUBE, see RIFLE.

MORRIS, WILLIAM (1834–96), Eng. poet, artist, and Socialist; b. Walthamstow, Essex; ed. Oxford; became architect, painter, then partner in house-decoration firm, Morris, Marshall, Faulkner, & Co., 1861; associated in art with Burne-Jones, Ford Madox Brown, Rossetti. His first book, *The Defence of Guinevere* (1858), showed imagination and romance, and *The Life and Death of Jason* (1867) and *The Earthly Paradise* (1868–70) confirmed his greatness as poet. Other poetical works were *The Æneid of Vergil* (1876), *Sigurd the Volsung* (1876), *The Fall of the Niblungs* (1877), and, with E. Magnusson, many translations of Icelandic Sagas. M. excels as a writer of story-poetry; his lines go with a breezy swing, and there is the charm of mediævalism of spirit in them.

In prose M. wrote much; latterly his one essay in poetry was *Poems by the Way* (1891). He founded the Kelmscott Press, and pub. beautifully decorated translations of Sagas, Fr. Romances, editions of Shakespeare, Shelley, etc. His own work includes *The Story of Grettir the Strong*, *The Volsunga Saga*. During years 1889–96 he wrote some beautiful romances—*The House of the Wolfings*, etc. His style is archaic, almost XV. cent. in style. He was a dreamer; he turned from industrialism to the romantic past. His

Socialism was æsthetic; poverty to him meant lack of pictures and artistic joys, hence his anger against a system that allowed poverty.

Life, by Mackail (1899); Noyes (1908); Drinkwater, *William Morris: A Critical Study* (1912).

MORRISON, ROBERT (1782–1834), Brit. missionary; translator to E. India Company at Canton (1809); established college at Malacca, 1818; wrote various etymological works on Chin. language.

MORRISTOWN (40° 48′ N., 74° 32′ W.), residential town on Whippany, New Jersey, U.S.A. Pop. (1910) 12,507.

MORSE, see WALRUSES.

MORSE, SAMUEL FINLEY BREESE (1791–1872), Amer. artist and inventor; devoting his leisure to electrical and galvanic experiments, he devised the **Morse System** of magnetic telegraph. See TELEGRAPH.

MORSHANSK (53° 27′ N., 41° 53′ E.), town, on Tsna, Tambov, Russia; manufactures flour, tallow. Pop. (1910) 30,200.

MORTAGNE (48° 30′ N., 0° 32′ E.), town, Orne, France; noted horse market. Pop. 4200.

MORTAIN (48° 37′ N., 0° 50′ W.), town, Manche, France.

MORTAR, a vessel in which substances are pounded or triturated by a *pestle*, used in preparing drugs. The piece of ordnance formerly used in sieges, etc., was called a m. from its resemblance to the druggist's m. Howitzers superseded m's. Building m. ordinarily consists of a mixture of slaked lime and sand; hardening is due principally to absorption of atmospheric carbonic acid, and the formation of silicate of lime. There are also hydraulic m's which set under water, and various cement m's. The adhesion becomes less as the proportion of sand increases. Portland cement m. is the strongest and most durable. See CEMENT.

MORTARA (45° 15′ N., 8° 44′ E.), town, Pavia, Italy; scene of victory of Austrians over Sardinians, 1849; ironworks.

MORTGAGE.—A mortgage arises when a person transfers the general property in his land or goods to another as security for a loan. As a rule, the *mortgagor*—the borrower—does not hand over possession of the land to the lender—the *mortgagee*—but remains in possession himself. Hence the distinction between a m. and a pledge. Failure to make the necessary payments of interest in return for the loan results in the mortgagee *foreclosing* on the property and taking possession.

MORTIFICATION, loss of vitality in a part of the body. See NECROSIS, GANGRENE.

MORTIMER, old Eng. family. Norman house was founded by ROGER, second s. of Hugh, bp. of Coutances in late X. cent.; Roger was lord of Mortemer-en-Brai until dispossessed by William the Conqueror; his sons fought at *Hastings*, and the youngest, Ralph, settled in the Welsh Marches, obtaining Wigmore. EDMUND de M. of Wigmore was summoned to Parliament as baron by writ, 1295; **Roger**, 2nd baron, was cr. Earl of March, 1328; paramour of Queen Isabella, Edward II.'s wife; rebelled and forced Edward to abdicate; attainted and executed, 1330. Honours were restored to his grandson, Roger, 1354; merged in Crown on accession of Edward IV., after victory of *Mortimer's Cross*, 1461.

MORTLAKE (51° 28′ N., 0° 16′ W.), village on Thames, Surrey, England; terminus of Oxford-Cambridge boat-race.

MORTON, JAMES DOUGLAS, 4TH EARL OF (*c.* 1525–81), Lord Chancellor of Scotland, 1562–72; one of Lords of the Congregation, but always willing to temper religion with policy; chief agent in murder of Rizzio; implicated in murder of Darnley; commanded at *Langside* against queen, 1568; regent, 1572–78, and was considered ablest man in Scotland; admiral, 1578–81; executed.

MORTON, JOHN (*c.* 1420–1500), abp. of Canterbury (1486); advanced to great honours by Henry VII.; cardinal, 1493; remembered for *Morton's Dyke*, in Fens, *Morton's Fork* (infallible means of exacting money for king's use), and as patron of Sir Thomas More.

MORTON, OLIVER PERRY (1823–77), Amer. politician; gov. of Indiana, 1861, and vigorously upheld national cause in war; U.S. Senator, 1867, and took part in impeaching Pres. Johnson.

MORTON, THOMAS (*c.* 1590–1646), Eng. adventurer and self-elected gov. of a settlement in Massachusetts; wrote the *New English Canaan*.

MORVAN (*c.* 47° N., 4° E.), mountainous region, Yonne and Nièvre, France.

MORVI (22° 49′ N., 70° 54′ E.), native state, Kathiawar, Bombay, India. Pop. 110,000. Capital, **Morvi**. Pop. 19,000.

MOSAIC THEORY of organic development, see under EMBRYOLOGY.

MOSCHELES, IGNAZ (1794–1870), Bohemian composer and pianist; settled in London, 1826; teacher at Leipzig Conservatoire, 1846; studies, sonatas, concertos, etc.

MOSCHUS, a genus of DEER (*q.v.*).

MOSCOW (56° N., 37° E.), government, Russia; surface undulating; belongs to basin of Volga; chief manufacturing province of Russia. Pop. (1910) 3,215,400.

MOSCOW (55° 42′ N., 37° 39′ E.), town, former capital of Russia, and second city of empire. M. was inhabited at an early date by Finnish peoples, and was settled by Great Russians in XII. cent.; became seat of metropolitan of Central Russia, 1325; capital of united principality of M. and Vladimir, 1328; pillaged by Mongols, 1382; by Tartars twice in XV. cent.; became capital of all Russia under Ivan III. in 1480; superseded as capital by St. Petersburg, 1711; several times damaged by fire in XVIII. cent.; occupied by French under Napoleon, Sep. 15, 1812; burned down by inhabitants, Sep. 16–19; evacuated by French, who began 'retreat from Moscow,' Oct. 19; recent events include riots among students on various occasions. In middle of city is the *Kremlin* or citadel, which is surrounded by walls and is most sacred spot in country to a Russian; it contains old and new imperial palaces, arsenal, monasteries, famous Tsar Kolokol bell (see BELL), and three cathedrals, of which the Cathedral of the Assumption (rebuilt XV. cent.) is most important. Other public buildings include univ., founded by Catharine in 1755, observatory, museum, St. Basil's Cathedral; seat of metropolitan of M. M. has great transit trade and is important industrial centre; manufactures cotton, woollens, silks, leather, machinery, tobacco, etc. Pop. (1910) 1,481,240.

Gerrare, *Moscow*.

MOSELLE, MOSEL (50° 10′ N., 7° 12′ E.), river, which, rising in Vosges mts., France, flows northward through France, Luxemburg, and Prussian Rhineland, and joins Rhine at Coblenz; length, 314 miles; valley noted for wines.

MOSES, Old Testament character; leader of the Hebrews out of Egypt, and legislator; traditionally the author of first five books of Bible, but many parts of these must be much later. The narratives have been much modified by tradition, and it is impossible to say what is known for certain about him, though it cannot be doubted that he exercised considerable influence.

MOSES, ASSUMPTION OF, apocalyptic and pseudonymous book, rediscovered in 1861, perhaps identical with lost 'Testament of Moses'; probably written by a Pharisee about the time of Christ. It exists in Greek, which is perhaps translated from a Hebrew original.

MOSES OF CHORENE (fl. V. or VIII. cent. A.D.), Armenian historian; author of *Genealogical Account of Great Armenia*, down to 440—valuable as preserving ballads or traditions, but otherwise inaccurate; probably wrote the *Geography*, valuable for ancient Eastern names, etc., *Rhetoric*, and religious treatises.

MOSHEIM, JOHANN LORENZ VON (1694–1755), Ger. Lutheran historian.

MOSLEM, see MUHAMMADAN RELIGION.

MOSQUE (word ultimately of Arabic derivation), term for a Muhammadan place of worship. A m. generally has an open space surrounded by colonnades. In the middle is a fountain, for Muslims must always pray ceremonially clean. There is likewise a niche to point the direction to Mecca, for thither a Muslim faces while praying. Though there is no sacerdotal caste in Islam, certain officials are appointed to supervise the m's. There are many famous m's now in existence, some built of the materials of ruined Christian Churches. An Indian m. always has a dome.

MOSQUITOES, flies grouped with Gnats in family Culicidæ, having complex mouth parts for piercing and sucking blood in female, and thickly plumed antennæ in male. The larvæ are aquatic. Found over all the world except in polar regions; m's are of interest to man because some species are known to spread disease, *e.g.* the common Brit. form (*Anopheles maculipennis*) may carry the organism of malaria.

MOSQUITO COAST AND RESERVE (*c.* 13° N., 83° 50′ W.), district, Nicaragua, Central America; formerly a separate state under Brit. protection; now a department of Nicaragua, named ZELAYA; surface mountainous in interior, low-lying near coast; capital, Bluefields. Pop. *c.* 15,000.

MOSS (59° 26′ N., 10° 45′ E.), seaport, Norway, on Christiania Fjord; exports timber. Pop. 9200.

MOSSAMEDES (15° 7′ S., 12° 15′ E.), seaport, chief town, Mossamedes district, Portug. W. Africa, on Little Fish (Mossamedes) Bay; exports cured fish. Pop. 5100; (dist.) 185,000.

MOSSEL BAY (34° 3′ S., 22° 15′ E.), seaport, bay, and division on S. coast, Cape Province, S. Africa. Pop. 4900.

MOSSES, see BRYOPHYTA.

MOSSLEY (53° 31′ N., 2° 3′ W.), market town, Lancashire, England; cotton-mills, iron foundries. Pop. (1911) 13,205.

MOSTAGANEM (35° 56′ N., 0° 10′ E.), seaport, Oran, Algeria, Africa, near Mediterranean; trade in horses, cereals. Pop. 22,000.

MOSTAR (43° 25′ N., 17° 58′ E.), chief town, Herzegovina, Austria-Hungary, on Narenta; seat of Gk. and R.C. bishopric; tobacco. Pop. (1910) 16,392.

MOSUL (36° 19′ N., 43° 9′ E.), town, Turkey-in-Asia; flourished under caliphs; held in turn by Hamdanids, Okailids, Seljuks, Persians, Turks; encircled by partly ruined walls; contains great mosque; formerly noted for manufacture of muslin; exports gall-nuts. Pop. *c.* 85,000. M. vilayet has area of 35,130 sq. miles. Pop. *c.* 500,000.

MOTALA (58° 30′ N., 15° E.), town, Ostergötland, Sweden, on Lake Vetter; ironworks.

MOTET, a term long applied to a composition, usually of a sacred character, for several voices. The form is now obsolete.

MOTHER CAREY'S CHICKEN, sailors' name for Stormy Petrel.

MOTHER OF PEARL, nacreous deposit with which molluscs coat interior of their shells; obtained by splitting shells into layers; largely used for inlaying, making buttons, pen-knife handles, etc.

MOTHERWELL (55° 48′ N., 4° W.), town, Scotland; iron- and steel-works; collieries. Pop. (1911) 40,378.

MOTHS, see LEPIDOPTERA.

MOTION, LAWS OF, see DYNAMICS.

MOTION, PERPETUAL, see PERPETUAL MOTION.

MOTIVE, any feeling or thought which helps to determine volition; sometimes, more particularly, the aim or end of action as determining volition. Thus fear may be called the m. which impels a man to run away, or his m. may be said to be to save his life.

MOTLEY, JOHN LOTHROP (1814–77), Amer. historian; best-known book, *Rise of the Dutch Republic,* 1856, has Prot. bias, but based on original sources.

MOTMOTS (*Momotidæ*), **beautiful Picarian Birds** with saw-edged bills found near the rivers and streams of Central and S. America, in the banks of which they excavate tunnels for their nests.

MOTONOBU, KANO (1476–1559), Jap. artist s. of Masanobu (*q.v.*); amongst the foremost artists of his country; painted everything superbly; excelled in landscape; esteemed for his universality.

MOTOR AREA, see MUSCLE.

MOTOR-CARS, mechanically propelled vehicles carrying their own power unit; carriages which run on the high road without rails. The term is generally applied to private automobiles as distinct from motor-buses or motor-cabs. Petrol-driven cars are commonest; steam m.-c's require special knowledge of engineering, and electric m.-c's are restricted to short runs owing to difficulty in carrying stored electricity.

History. — Early experiments were directed to applying the steam-engine to road traction. The first steam car was probably that made by Argnot, a Frenchman, in 1769. The first practical vehicle was Trevethick's steam car (1802). In 1824 several m.-c's were constructed similar to stage coaches and weighing 3 or 4 tons. A regular passenger service ran between Cheltenham and Gloucester, and the average speed was 10 miles per hour. Further development in m.-c's was arrested in Britain by the passing of a bill in 1865 requiring three drivers to be on each car, and for a man with a red flag to walk in front of each vehicle, while a speed limit of 4 miles per hour was imposed and no blowing off of steam was allowed.

Motor-Cycles.—The introduction of the internal combustion engine awakened new interest, and in 1885 Butler constructed a *motor-tricycle*; he was soon followed by Roots and Knight in the application of the idea to road work. In 1885 Daimler invented an engine using petrol as a fuel, and fitted one to a *motor-bicycle.* No commercial prospects occurred until about 1901, and even then the motor-bicycle trade was in an unsatisfactory condition. This was mainly due to the unreliability of the machines, and to the fact that they were fitted with surface carburettors, a contrivance by which petrol vapour was drawn from a wick which hung in a tank containing the supply. This arrangement, together with accumulator ignition, proved unsatisfactory; the jolting of the machine caused the plates of the accumulator to snap, often leaving the motorist stranded by the roadside. The introduction of the float-feed carburettor and the high-tension magneto (1906) revolutionised the industry.

The standard motor-cycle of 1913 has air-cooled cylinders, although a few makers have adopted water-cooling. Cylinders are one, two, or four in number, developing from 1 to 8 h.p. Ignition is by high-tension magneto; float-feed carburettor, chain, shaft, or india-rubber and canvas belt drive. *Side-cars* are used when it is desired to carry a second person.

Later Developments.—At the Paris Exhibition of 1887 *motor-boats* were running on the Seine. Levassor and Panhard added improvements, and in 1894 a trial run of motor-cars (using the internal combustion engine), between Paris and Rouen, was organised. The following year the trial was from Paris to Bordeaux and back, a distance of 744 miles; the winner's average speed was 15 miles per hour. In 1895 the clauses of the 1865 Bill were repealed, and Brit. firms again commenced to give close attention to the development of the new industry. Rapid strides were made in the attainment of speed, efficiency, and reliability, and in July 1902 the Paris-Vienna trial was won by S. F. Edge on a 50 h.p. Napier. He won the Gordon-Bennett Cup, an important trophy in the history of the m.-c. In 1903 trials were run in Ireland and won by a Mercédès car, made by the Ger. firm of Daimler. Greater attention was now paid to a study of steel and its alloys, while both the reciprocating parts of engines and integral parts of the chassis were made much lighter and of improved design.

As an example of the efficiency of these improvements, the case of a 4-cylinder engine may be quoted.

In 1899 such an engine, the cylinders of which were each 4" bore, developed 20 h.p. or less, while the same sized engine of 1910 developed something over 60 h.p. Such inventions as the multiple-disc clutch, detachable wheels, and the 6-cylinder engine, brought out by Eng. firms, as well as improvements in the silencing of cars, added greatly to the popularity of the automobile, which now began to displace horse-drawn vehicles. The first taxi-cabs appeared in London in 1903, but were not a commercial success. It was not until 1906 that the Renault Co. placed successful cabs on the streets. The number of motor-cabs registered in London increased from 19 in 1905 to 4941 in 1910. The chief advantages of motor-cabs are the increased speed and comfort of travel, while a device called a *taximeter* registers the correct fare.

In 1903 the speed-limit in Great Britain was raised to 20 miles per hour, but Local Government Boards were given authority to close roads to motor traffic, or to fix 10 miles per hour or lower speed-limits in dangerous places. Police traps were instituted to prevent motorists exceeding the limit, and as a result of these measures (and of the increase in efficiency of low horse-powered cars) high horse-powered cars decreased in number.

In the early days of the internal combustion engine the charge was ignited by the heating of a tube connected with the cylinder, and later by electricity, an accumulator and sparking coil being used, in conjunction with a contact-breaker, to give the spark at the correct instant. On modern cars the ignition system is by high-tension magneto, invented by F. R. Simms and Herr Bosch, with accumulator ignition for easy starting.

Water-cooling is standard, and various types of radiators are in use, each having its peculiar claims. Starting up is by handle at the front of the car, although some 1912–13 cars are fitted with self-starters. Improvements in the design of clutches allow the car to start without jerking. Gears have been improved and strengthened, and shaft drive is standard. Wire wheels save weight, and detachable (*Stepney*) wheels and rims render the incapacity of the car through tyre troubles a matter of moments only.

Heavy commercial vehicles may be propelled either by steam or petrol. Steam is particularly suitable for heavy lorries, trucks, etc. In some steam wagons vertical compound engines are used, fixed behind the driver; with others, the position is with the boiler in front of the driver. Steam tractors are generally used by showmen and builders.

Internal combustion petrol engines have been applied to mechanical traction with great success. The engines are of the same type as that described under Oil Engine, except that they are of a heavier build in order to withstand rough usage (see ENGINES). Two of the best-known vehicles of this type are the Leyland petrol wagon and the 70-h.p. 6-cylinder Dennis delivery wagon. **Motor fire-engines** are now common; an engine such as 60-h.p. 6-cylinder Halley can transport a far greater amount of tackle than a horse-drawn vehicle. Motor-cars, cycles, and wagons are now extensively employed in military manœuvres and operations.

Licences and Regulations.—In the U.K. motor-car licences are as follows:—

Motor-bicycles and tricycles, £1; motor-cars under 6½ h.p., £2 2s.; under 12 h.p., £3 3s.; under 16 h.p., £4 4s.; under 26 h.p., £6 6s.; under 33 h.p., £8 8s.; under 40 h.p., £10 10s.; under 60 h.p., £21; over 60 h.p., £42. Doctors pay half-duty.

The advent of the motor-car has put an enormous extra strain upon roads. In order to maintain and improve these, a grant is made each year out of the Consolidated Fund equal to the proceeds of the duties imposed upon motor-cars and motor-spirit (c. £1,000,000 in 1911–12).

A motor-car or cycle must not be driven on a public highway at a speed exceeding 20 miles per hour. No person must drive a motor who is not licensed to do so; and no one may be licensed to drive a motor-car under 17 years of age, or a motor-cycle under 14. Licence to drive a motor-car, 5s. A car can be *registered* under any authority, but a *Driver's Licence* must be taken in the district in which the driver resides; registration fee for a car, £1; for a motor-cycle, 5s. Lamps must be alight from one hour after sunset until one hour before sunrise.

Each car must exhibit the distinguishing letters of the authority registered under and the number allotted to the car by the authority on both the front and rear of the car.

The **Registration Letters** are: a., London; a.a., Hampshire; a.b., Worcestershire; a.c., Warwickshire; a.d., Gloucestershire; a.e., Bristol; a.f., Cornwall; a.h., Norfolk; a.i., Meath; a.j., Yorkshire (N. Riding); a.k., Bradford; a.l., Nottinghamshire; a.m., Wiltshire; a.n., West Ham; a.o., Cumberland; a.p., East Sussex; a.r., Hertfordshire; a.s., Nairnshire; a.t., Kingston-upon-Hull; a.u., Nottingham; a.w., Shropshire; a.x., Monmouthshire; a.y., Leicestershire; b., Lancashire; b.a., Salford; b.b., Newcastle-on-Tyne; b.c., Leicester; b.d., Northamptonshire; b.e., Lincolnshire (Lindsey); b.h., Buckinghamshire; b.i., Co. Monaghan; b.j., East Suffolk; b.k., Portsmouth; b.l., Berkshire; b.m., Bedfordshire; b.n., Bolton; b.o., Cardiff; b.p., West Sussex; b.r., Sunderland; b.s., Orkney; b.t., Yorkshire (E. Riding); b.u., Oldham; b.w., Oxfordshire; b.x., Carmarthenshire; b.y., Croydon; c., Yorkshire (W. Riding); c.a., Denbighshire; c.b., Blackburn; c.c., Carnarvonshire; c.d., Brighton; c.e., Cambridgeshire; c.f., West Suffolk; c.h., Derby; c.i., Queen's County; c.j., Herefordshire; c.k., Preston; c.l., Norwich; c.m., Birkenhead; c.n., Gateshead; c.o., Plymouth; c.p., Halifax; c.r., Southampton; c.t., Lincolnshire (Kesteven); c.u., South Shields; c.w., Burnley; c.x., Huddersfield; c.y., Swansea; d., Kent; d.a., Wolverhampton; d.b., Stockport; d.c., Middlesborough; d.e., Pembrokeshire; d.h., Walsall; d.i., Co. Roscommon; d.j., St. Helens; d.k., Rochdale; d.l., Isle of Wight; d.m., Flintshire; d.n., York; d.o., Lincolnshire (Holland); d.p., Reading; d.r., Devonport; d.s., Peebles; d.u., Coventry; d.w., Newport (Mon.); d.x., Ipswich; d.y., Hastings; e., Staffordshire; e.a., West Bromwich; e.b., Isle of Ely; e.c., Westmoreland; e.d., Warrington; e.e., Grimsby; e.f., West Hartlepool; e.h., Hanley; e.i., Co. Sligo; e.j., Cardiganshire; e.k., Wigan; e.l., Bournemouth; e.m., Bootle; e.n., Bury; e.o., Barrow-in-Furness; e.p., Montgomeryshire; e.s., Perthshire; e.t., Rotherham; e.u., Brecknockshire; e.w., Huntingdonshire; e.x., Great Yarmouth; e.y., Anglesey; f., Essex; f.a., Burton-upon-Trent; f.b., Bath; f.c., Oxford; f.d., Dudley; f.e., Lincoln; f.f., Merionethshire; f.h., Gloucester; f.i., Tipperary (N. Riding); f.j., Exeter; f.k., Worcester; f.l., Soke of Peterboro'; f.m., Chester; f.n., Canterbury; f.o., Radnorshire; f.p., Rutland; f.r., Blackpool; f.t., Tynemouth; f.x., Dorsetshire; f.y., Southport; g., Glasgow; h., Middlesex; h.i., Tipperary (S. Riding); h.s., Renfrewshire; i.a., Co. Antrim; i.b., Co. Armagh; i.c., Co. Carlow; i.d., Co. Cavan; i.e., Co. Clare; i.f., Co. Cork; i.h., Co. Donegal; i.j., Co. Down; i.k., Co. Dublin; i.l., Co. Fermanagh; i.m., Co. Galway; i.n., Co. Kerry; i.o., Co. Kildare; i.p., Co. Kilkenny; i.r., King's County; i.t., Co. Leitrim; i.u., Co. Limerick; i.w., Co. Londonderry; i.x., Co. Longford; i.y., Co. Louth; i.z., Co. Mayo; j. Durham; j.i., Co. Tyrone; j.s., Ross and Cromarty; k., Liverpool; k.i., Co. Waterford; k.s., Roxburgh; l., Glamorganshire; l.a., l.b., l.c., l.d., l.e., l.f., London; l.i., Westmeath; l.m., London; l.s., Solkirkshire; m., Cheshire; m.i., Co. Wexford; m.s., Stirlingshire; m.x., Middlesex; n., Manchester; n.h., Northampton; n.i., Co. Wicklow; n.s., Sutherland; o., Birmingham; o.i., Belfast; o.s., Wigtownshire; p., Surrey; p.i.,

Cork; **p.s.**, Shetland; **r.**, Derbyshire; **r.i.**, Dublin; **r.s.**, Aberdeen; **s.**, Edinburgh; **s.a.**, Aberdeenshire; **s.b.**, Argyllshire; **s.d.**, Ayrshire; **s.e.**, Banffshire; **s.h.**, Berwickshire; **s.j.**, Bute; **s.k.**, Caithness; **s.l.**, Clackmannanshire; **s.m.**, Dumfriesshire; **s.n.**, Dumbartonshire; **s.o.**, Elginshire; **s.p.**, Fifeshire; **s.r.**, Forfarshire; **s.s.**, Haddingtonshire; **s.t.**, Inverness-shire; **s.u.**, Kincardine; **s.v.**, Kinross-shire; **s.w.**, Kirkcudbrightshire; **s.x.**, Linlithgowshire; **s.y.**, Midlothian; **t.**, Devonshire; **t.i.**, Limerick; **t.s.**, Dundee; **u.**, Leeds; **u.i.**, Londonderry; **u.s.**, Govan; **v.**, Lanarkshire; **v.s.**, Greenock; **w.**, Sheffield; **w.i.**, Waterford; **w.s.**, Leith; **x.**, Northumberland; **x.s.**, Paisley; **y.**, Somersetshire; **y.s.**, Partick.

Motor Sign-Posts.—(1) A white circle—speed-limit given on plate below; (2) a red circle means road closed to motorists; (3) a red triangle means caution; (4) a diamond-shaped board for any other notice.

Spooner, *Motors and Motoring* (1912).

MOTORS.—In a dynamo (*q.v.*) a coil of wire rotates between the poles of an electromagnet so that the number of lines of magnetic force (see MAGNETISM) passing through the coil is continually changing. In consequence, an electric current is produced in the coil. Conversely, if a current be sent round the coil from an external source, the coil will rotate, and this arrangement is termed an **electromotor**. Mechanically, the design of an electromotor is almost exactly similar to that of a dynamo. Electrically, the difference is that in the dynamo mechanical energy is supplied to the machine and produces energy in the form of an electric current, which may be employed for lighting or power; whereas, in the electromotor, energy is supplied to the machine in the form of an electric current, which produces mechanical energy capable of doing work. This current is generally obtained from the public supply, and is therefore at a nearly constant electromotive force. Let this be E. When the motor begins to revolve it acts like a dynamo and produces a reverse, or *back* electromotive force. Let this be *e*. If R is the resistance of the whole circuit, then the current C supplied by the mains is equal to $(E-e)\div R$. At starting, the back electromotive force *e* is zero, and hence the current from the mains tends to be large. In order to avoid this heavy current, which might damage the machine, an extra resistance is inserted into the circuit by means of a starting switch, and after the speed of the motor has risen sufficiently to develop the back electromotive force, this resistance is cut out.

Motors, like dynamos, may be *series*, *shunt*, or *compound* wound, according to the purpose for which they are used. Series wound motors are employed where great starting power is required, but develop very high speed with light loads. Shunt wound motors may, within certain limits, adjust their speed according to the work imposed on them. Compound wound motors may be constructed to run at constant speeds with all loads. The *electrical efficiency* of a motor is the ratio of the energy output of the machine to the total energy supplied to it, and is represented by $\frac{e}{E}$. The *mechanical efficiency* is the ratio $\frac{H}{eC}$ where H is the brake horse-power of the motor.

Water-Motors are instruments for the application of water-power to machinery. This is done by means of water-wheels and turbines. Water-wheels are adapted so as to utilise either the weight of water (*e.g.* a fall) or its momentum (*e.g.* a swift stream). In either case the wheel is rotated and the power transmitted by shafts and driving-belts. The turbine is practically a horizontal water-wheel.

MOTOR-CAR ENGINE, see ENGINE.

MOTRIL (36° 53′ N., 3° 37′ W.), town, Granada, Spain, near Mediterranean; sugar. Pop. 20,000.

MOTT, LUCRETIA (1793–1880), Amer. Quaker reformer; preached as member of Society of Friends, denouncing slavery and urging peace; took an active part in anti-slavery and women's suffrage conventions.

MOTT, VALENTINE (1785–1865), Amer. surgeon; prof. of Surgery at Columbia Coll., 1809; after seven years in Europe founded Univ. Medical College of New York, 1841; famed as a brilliant operator.

MOTTO, see under HERALDRY.

MOUFLON, MUFLON (*Ovis musimon*), wild sheep of Central Asia; in Europe found only in Corsica and Sardinia.

MOUKDEN, see MUKDEN.

MOULDING, see FOUNDING.

MOULINS (46° 33′ N., 3° 20′ E.), town, Allier, France, on Allier; cathedral; bp.'s see; machinery, furniture; was ancient capital of Bourbonnais. Pop. 23,000.

MOULMEIN, see MAULMAIN.

MOULT, the casting of an external coat; most often used of the shedding of feathers, but also of hair, or scales, of the Carapace in crustacea, or of various cuticles in other Arthropods.

MOULTAN, see MULTAN.

MOUND-BUILDERS, primitive inhabitants of N. America. Among remains of Neolithic Age in N. America there are found, south of Canada, barrows, some of which are grave-mounds, some apparently not so, containing skeletons, implements, rude sculptures, ashes, charcoal.

MOUNDSVILLE (39° 55′ N., 80° 45′ W.), city, W. Virginia, U.S.A., on Ohio; prehistoric mounds in vicinity; glass-works. Pop. (1910) 8918.

MOUNT BARKER (35° 5′ S., 138° 58′ E.), town, S. Australia, at foot of Mount Barker; agricultural and fruit-growing district.

MOUNT CARMEL (40° 48′ N., 76° 25′ W.), town, Pennsylvania, U.S.A., on Shamokin Creek; anthracite coal-fields. Pop. (1910) 17,532.

MOUNT CLEMENS (42° 35′ N., 82° 55′ W.), city, health-resort, Michigan, U.S.A., on Clinton; mineral springs. Pop. (1910) 7707.

MOUNT DESERT (44° 20′ N., 68° 20′ W.), island, Maine, U.S.A.; area, *c.* 110 sq. miles; surface mountainous; summer resort; largest village, Bar Harbor. Pop. 8100.

MOUNT GAMBIER (37° 50′ S., 140° 50′ E.), town, S. Australia; agricultural centre.

MOUNT MORGAN (23° 45′ S., 150° 30′ E.), town, Queensland, Australia; gold mines. Pop. 6500.

MOUNT SORREL (52° 44′ N., 1° 9′ W.), market town, on Soar, Leicestershire, England.

MOUNT VERNON.—(1) (40° 52′ N., 73° 50′ W.) residential city, on Bronx River, New York State, U.S.A. Pop. (1910) 30,919. (2) (41° 55′ N., 91° 28′ W.) town, Iowa, U.S.A.; seat of Cornell Coll. (Methodist Episcopal). Pop. (1910) 1532. (3) (38° 20′ N., 88° 55′ W.) city, Illinois, U.S.A.; trade in lumber and flour. Pop. (1910) 8007. (4) (40° 20′ N., 82° 30′ W.) city, Ohio, U.S.A., on Koko-sing; engine-works; flour-mills. Pop. (1910) 9087. (5) (37° 55′ N., 88° W.) town, Indiana, U.S.A., on Ohio; flour- and saw-mills. Pop. (1910) 5503. (6) (38° 44′ N., 77° 13′ W.) home and burial-place of George Washington, Virginia, U.S.A.; estate was presented to the nation in 1856.

MOUNTAIN ASH (51° 40′ N., 3° 28′ W.), town, Glamorganshire, Wales; collieries; ironworks. Pop. (1911) 42,256.

MOUNTAINEERING is a comparatively modern sport, although celebrated climbs have been recorded since the XIII. cent., and Gesner and Simler (XVI. cent.) showed that there were some who took keen pleasure in climbing. It did not become popular till about 1750; Mont Blanc was first ascended by Balmat, 1786, who guided De Saussure on his famous ascent in the following year. Colonel Beaufoy was the first Englishman to achieve this feat, 1787. In 1800 some peasants climbed Gross-Glockner. The Alpine Club was formed in 1857 and the *Alpine Journal* first published, 1863. Among famous climbers may be mentioned, Whymper, who climbed the Matterhorn

(1865) and various peaks of the Andes, Mackinder, who scaled Mt. Kenya (1899), and the Duke of Abruzzi, who has made several celebrated climbs in E. Africa. M. is practised to a limited extent in Britain, but Switzerland is by far the most popular country for mountaineers. It is a sport that involves considerable risk, *e.g.* from falling rocks or snow, from sudden storms, from falling down a crevasse, but the majority of accidents are due to foolhardiness or lack of due precaution.

Dent and others, *Mountaineering* (1901); C. E. Benson, *British Mountaineering* (1909); Abraham, *British Mountain Climbs* (1909); and the *Publications of the Alpine Club.*

MOUNTAINS.—The following are the chief mountains, with heights in feet: *Europe*, Mont Blanc (15,732); *Asia*, EVEREST, Himalayas (29,002), Dapsang, Karakorum Mts. (28,700); Tagarma, Pamir (25,800); *Africa*, Kilima-Njaro (19,680), Kenya (19,000), Ruwenzori (18,000); *America*—(1) N., Mt. M'Kinley (20,464), Mt. Logan (19,500), Origaba (18,205); (2) S., Aconcagua (22,427), Mercedario (22,302), Gualtieri, (22,000); *Oceania*, Mt. Charles-Louis, New Guinea (20,000), Mauna Kea, Hawaii (13,805), Mt. Cook, New Zealand (12,349), Mt. Townsend, New South Wales (7350); *Antarctic Regions*, Mt. Erebus (15,000).

MOUNTED INFANTRY, see INFANTRY.

MOUNTJOY, BARONY AND VISCOUNTCY.—Sir Walter Blount of Elvaston, Derbyshire, fought for Edward IV. at *Towton*; received forfeited estates of Lancastrians, and, 1465, was created Baron M. from surname of maternal ancestor. Barony was held by Blounts until 1681; by Viscounts Windsor, descended from Blounts, 1712–58; viscountcy held by Earls and Marquesses of Bute, similarly descended, 1796 to present time. Stewarts of Ramalton were Viscounts M., 1683–1769; descendants, Gardiners of Dublin, Barons M., 1789–1820.

MOUNTMELLICK (53° 7′ N., 7° 20′ W.), market town, Queen's County, Ireland; woollen manufactures, foundries.

MOURNE MOUNTAINS, see DOWN.

MOUSE FAMILY, MURIDÆ, a vast assemblage of Rodents comprising almost 1500 species, recorded from practically all parts of the world. They have slender skeletons, four and five toes on the fore and hind feet respectively, sharp flattened lower incisors, and a long scaly tail generally almost devoid of hairs. Most familiar are Rats and Mice (*Mus*), five of which occur in Britain, leading nocturnal lives and sheltering in holes; the disappearing BLACK RAT or RATTON (*M. rattus*), almost exterminated by the spread of the larger and fiercer BROWN RAT (*M. decumanus*); the common HOUSE-MOUSE (*M. musculus*) and its country relatives, the HARVEST-MOUSE and LONG-TAILED FIELD-MOUSE (*M. minutus* and *sylvaticus*), the former of which builds a nest amongst corn stalks. The VOLES (*Arvicola*) are more clumsy than Rats and Mice, have shorter tails and ears, are entirely vegetarian, and are even more destructive to crops; although five species are found in Britain, Ireland has none. Non-Brit. representatives of the Mouse Family are the vole-like LEMMINGS (*Lemmus*), found burrowing in the mts. of northern Europe, Asia, and America. The disastrous migrations of the Norwegian Lemming are referred to in the article on MIGRATION. The MUSK-RAT or MUSQUASH (*Fiber*) is an aquatic inhabitant of N. America, with a musky odour, and fur of commercial value; while the graceful, bushy-tailed GERBILS live in burrows on the sandy deserts of Europe, Asia, and Africa, resembling in habit the Old World cheek-pouched HAMSTERS (*Cricetus*).

MOUSE HARES, see PICAS.

MOUTH (including salivary glands), see DIGESTION.

MOUTHPIECE, that part of a wind instrument which the player puts into his mouth or against his lips. To the first class belong the single reed of the clarinet and the double reeds of the oboe and bassoon; to the second, the cupped m's of such instruments as the horn and trombone. Individual instruments of the latter class have slightly different forms of cup, and in some cases a different material is used from that of the instrument itself. Instruments like the flute cannot strictly be said to have a m.

MOVABLES, see under INHERITANCE.

MOWBRAY, name of Eng. baronial family. Roger de M., descendant of lords of Montbray, Normandy, and his descendants were summoned to Parliament as barons from 1283 or 1295. Sixth baron was Earl Marshal and Duke of Norfolk, 1397, a title which descended to the Howards.

MOZAMBIQUE, MOÇAMBIQUE (15° 2′ S., 40° 48′ E.), seaport, Portug. E. Africa, on island in Mossoril Bay; exports ground-nuts, rubber. Pop. 5000. The name is also given to a district of Portug. E. Africa and to Portug. E. Africa itself. See PORTUGUESE EAST AFRICA.

MOZART, WOLFGANG AMADEUS (1756–91), Austrian composer; b. at Salzburg; d. in Vienna. His musical precocity was phenomenal, and when, at the age of six, he started on a three years' artistic tour with his sister, he excited astonishment everywhere as the 'wonder-child.' At Paris, in 1763, during this tour, his first compositions were published. Returning to Salzburg he wrote, when only ten, an oratorio, and soon after an opera, performed in 1769. A brilliant Ital. tour, again as a prodigy, followed; and after various wanderings, and an engagement with the abp. of Salzburg, which ultimately proved untenable, he settled in Vienna. There he wrote, among others, the three great operas by which he will always be remembered, *The Marriage of Figaro* (1786), *Don Giovanni* (1787), and *The Magic Flute* (1791). In 1789 he was appointed imperial private composer, but he failed to obtain any of the more lucrative posts, and as only small sums were paid for his works, he was in constant pecuniary straits. This was tragically emphasised at his death when, just after finishing his famous *Requiem*, he was carried to a pauper's grave. During his brief life M. wrote no fewer than 769 compositions, ranging from the very largest to the simplest forms. His genius might be described as universal, for he shone alike in opera, in orchestral and chamber music, and in sacred composition. His style has been aptly characterised as a happy mixture of Ital. joyfulness of melody, with Ger. thoroughness and depth.

Cowen, *Mozart* (Masterpieces of Music Series, 1912).

MOZDOK (43° 45′ N., 44° 30′ E.), town, Terek, Russia, on Terek. Pop. 15,500.

MOZLEY, JAMES BOWLING (1813–78), Anglican clergyman; wrote in defence of Oxford movement.

MOZLEY, THOMAS (1806–93), Anglican clergyman; upholder of Oxford movement.

MOZUFFERNUGGER, see MUZAFFARNAGAR.

MTZENSK, MZENSK (53° 17′ N., 36° 30′ E.), town, on Zusha, Orel, Russia; tallow, soap; active trade. Pop. 10,500.

MTZKHET (41° 50′ N., 44° 45′ E.), decayed town, Russ. Transcaucasia; ancient capital of Georgia.

MUCH WENLOCK (52° 37′ N., 2° 34′ W.), market town, Shropshire, England.

MUCKERS, a nickname for the sect which followed the dualistic views of John Henry Schönherr (1771–1826). Schönherr regarded the universe as a combination of spiritual and sensual elements.

MUDANIA (40° 20′ N., 28° 55′ E.), town, Asia Minor, on Sea of Marmora. Pop. 6000.

MUD-FISHES, see under FISHES.

MUDHOL (16° 20′ N., 75° 20′ E.), native state, S. Mahratta agency, Bombay, India. Pop. 70,000.

MUDKI, see MOODKEE.

MUEZZIN, see MUHAMMADANISM (INSTITUTIONS).

MUFFINS, see BREAD.

MUFFLING, FRIEDRICH KARL FERDINAND VON, WEISS (1775–1851), Pruss. field-marshal; chief of staff of Tolly and Nollendorf in invasion of France, 1814; chief of general staff at Berlin, 1821; reorganised staff and wrote important military works.

MUGGLETONIANS, Eng. religious sect, founded, 1652, by Lodowick Muggleton (1609–98) and John

Reeve; preached damnation of all outside the sect.

MUHAMMAD, MOHAMMED, MAHOMET (c. 575–632), the prophet and founder of Muhammadan religion, was born at Mecca. He belonged to the tribe Koreish, and was of good family. Arabia in his time was pagan, but various religions had exerted some influence. M. was married about 595, and his 'Call' took place about 610. He seems to have projected preaching against idolatry, restoring Judaism to its patriarchal purity by combining Jewish and Christian elements. He recognised the Old Testament prophets and Christ, and regarded himself as the last and greatest prophet. Only by degrees did he assert his claim. The Koran, of which the author, according to Muslim orthodoxy, was not M. but God, was delivered to the prophet in *Suras* (chapters), and written down by his followers. These were afterwards collected into the Koran as we have it. Meanwhile, M. was gathering round him a band of followers, including his wife, his cousin, and his successor as head of the new religion—Abû Bekr.

When M. began his public ministry he had a firm nucleus of supporters who may have urged him to keep in retirement no longer. The exact sequence of events from this time (about 613) to the Flight, in 622, is uncertain, but something may be gathered. He seems to have been involved in controversy about the Koran, in which he claims to have described events of which he had no ordinary means of knowledge, though his enemies said they knew a man who was his source of information. Although it became the standard for Arabia, some scholars think they can detect Ethiopic idioms in it. Meanwhile, M. had to face opposition in Mecca, and, while personally safe, was obliged to secure a refuge for some of his followers in Axum, in Abyssinia, making an alliance with the Abyssinian king. M. received an invitation from Yathrib (afterwards called Medina) to come to the assistance of one tribe which was at war with another. The Meccans were naturally roused against M., and the safe execution of his plan of escape taxed all his ability. He concealed himself in a cave south of Mecca, and finally arrived at Yathrib, Sep. 20, 622. From this time onwards M. wielded greater and greater power. He failed to bring about any understanding with the Jews in Yathrib, and he crushed them by force of arms. He forbade the drinking of wine by his followers—perhaps because of its associations with the Christian Eucharist.

The new faith spread beyond Medina, and all that was required of converts was to declare belief in God and in M. as His prophet, and to pay a certain sum as tribute. M. was naturally on bad terms with the Meccans, and he started making attacks on their caravans. A battle was fought at Badr, in which M. was victorious. This greatly increased his reputation throughout Arabia. Another battle, however, was fought, in which he was defeated. In the year 5 A.H. (of the new era, reckoning from the Flight), Mecca was invaded, a truce was made next year, and in 6 A.H. it was captured. Little change, however, was made in its internal government. The next step was the subjugation of Arabia. None but converts were allowed in his army. He sent messages to all monarchs he knew, urging them to embrace the new faith. In 9 A.H. the encroachment of Islam on the Byzantine Empire had begun, and before his death he had planned the reduction of Syria.

His career was certainly one of the most remarkable of history. His ability was enormous; his sincerity is questioned by some.

Margoliouth, *M. and the Rise of Islam*.

MUHAMMAD AHMED IBN SEYYID ABDULLAH (1848–85), Egyptian pretender; claimed to be the *Mahdi*, who was to free Egypt from foreign rule; organised revolt of Sudan against British and Turks; Sudan declared independent by Gordon, 1884, but Mahdists besieged and captured Khartum, 1885.

MUHAMMADANISM. — Religion. — The faith founded by Muhammad is often described as Islam, but is more familiar as Muhammadanism. It is a Christian heresy rather than like Buddhism or Confucianism, an entirely non-Christian or 'heathen' religion. It is the latest in time of the three great monotheistic faiths, the other two being Judaism and Christianity, and to them Muhammadanism owes its birth. The founder's idea seems to have been to revive early Judaism (see MUHAMMAD), but it owes no less to the special conditions of the land of its origin, Arabia, which, with its great deserts, was the source of successive waves of Semitic migration. Its social condition was tribal, and a fairly primitive Semitic paganism prevailed. There were a number of local deities and sacred spots, such as the black stone of Mecca. Reverence for these was sometimes so firmly rooted in the Arab mind that it was impossible to dislodge it, and certain heathen ideas were therefore taken over by Islam.

Muhammad belonged to the tribe Koreish, whose god was Allah, who accordingly became the god of the new religion. Though the Jews lived an isolated life, Judaism can fairly be called one of Muhammad's sources. Christianity existed in Arabia besides, but Muhammad derived most of his information of it from uncanonical sources. In addition, Zoroastrianism had some influence on the Persian frontier. But Islam had a simpler theology than Catholic Christianity. To the pious Muhammadan or *Muslim* the Koran is the source of revelation, and every word of it is absolute truth. There is, besides, a body of tradition, or *hadith*. What was not contained directly in either Koran or tradition could be inferred by analogy—*qiyas*. Much importance, too, was attached to the common belief of all believers. The devotional exercises of a Muslim consisted of saying the Creed, and certain other appointed prayers, and giving some amount in charity. Besides this, he had to fast between sunrise and sunset for one month, and (if possible) once in his life go on a pilgrimage to Mecca.

Moses and Jesus (according to Islam) were prophets, but Muhammad was the best and greatest. Various sects and religious movements arose, but there has been little theological development. The course of conquest can be followed in the history of various countries. See KORAN.

M. has been widely spread, almost entirely by conquest, over N. Africa, India, E. and S.E. Asia, and Turkey-in-Europe. In 1911 there were 66,623,000 Muslims in India, while the total number in the world is estimated (1913) at 180,000,000.

Arnold, *The Preaching of Islam* (1896); Sell, *Essays on Muhammadanism* (1901); Margoliouth, *Muhammad and the Rise of Islam* (1905).

Institutions.—Founded on ordinances of Muhammad, they have developed with expansion of Muslim Empire, chiefly under Omar I. Political and social life are inseparable from religious.

RELIGIOUS INSTITUTIONS.—(*a*) Prayer, five times daily, may be said anywhere, but on Friday every believer must pray in mosque. *Muezzin's* cry from minaret of mosque announces hours of prayer. Ablution is essential before prayers. (*b*) Fasting obligatory during month of Ramadan. (*c*) Alms-giving. (*d*) *Hajj*, pilgrimage to Mecca, to be made by Muslims at least once in lifetime.

POLITICAL AND ADMINISTRATIVE.—(*a*) *Khalîfa*, Caliph or 'successor' of Muhammad, originally elected by whole Muslim community and uniting temporal and spiritual powers; but after eventful history Caliphate became vested in Turk. Sultan, who is supreme religious head of Islam. (*b*) *Vazirs* or ministers. (*c*) *Qâdis*, judges appointed by Caliph or Vazir; women eligible. (*d*) *Imâms*, religious officials; duty to recite prayers in mosque; choose their own *muezzins*. (*e*) *Amir-al-Hajj*, Leader of Pilgrimage, generally held by Caliph himself, or near relative.

Law.—Muhammadan Law is part of Muhammadan religion. It arose from Arab customs and usages

as reformed and extended by Prophet Muhammad. History of Islamic legal system is divisible into four distinct periods: (1) Legislative, commencing with *Hijrat* or Prophet's Flight to Medina, 622 A.D., and with his death, 632 A.D.; laws divinely revealed, and promulgated in sacred book *Qurán* (Koran), and in *Hadíth* or Traditions, inspired precepts of Muhammad. (2) From 632 A.D. to VIII. cent. A.D.; period of collection and interpretation. (3) From VIII. to X. cent. A.D.; foundation of the four Sunni schools of jurisprudence, Hanifi, Máliki, Shafi'i, Hanbali, differing chiefly in details. (4) From X. cent. A.D. to present time; development of previous work. SOURCES: (*a*) *Qurán*; (*b*) *Hadíth*; (*c*) *Ijma'*, consensus of opinion of *Mujtahids*, jurists; (*d*) customs and usages; (*e*) juristic deduction. Islamic law regulates entire public and private relations of Muslims mutually and with non-Muslims. Among more interesting legal institutions are *waqf*, transference of usufructuary rights without property vesting in any individual; *jehád*, religious war declarable against hostile non-Muslim state; inheritance laws, highly scientific and equitable; marriage laws, permitting four wives, but entitling each to equal treatment, to separate property, to *mahr* or dower from husband on marriage, to paternity of all children born in wedlock, and to divorce.

Syed Amir Ali, *Muhammadan Law.*

MUHAMRAH, MOHAMMERAH (30° 30′ N., 48° 15′ E.), town, Persia, on canal between Shat-el-Arab and Karun; exports dates, opium, wheat. Pop. 10,500.

MUHLENBERG, JOHN PETER GABRIEL (1746–1807), Amer. preacher, general, and politician; b. at Trappe, Pennsylvania; in War of Independence served with distinction at *Charleston*, *Brandywine*, and *Yorktown*.

MUHLENBERG, WILLIAM AUGUSTUS (1796–1877), Amer. Episcopal clergyman and philanthropist; b. Philadelphia; founded many church schools and charity institutions, *e.g.* St. Luke's Hospital, N.Y., and the Church Industrial Community of St. Johnland.

MÜHLHAUSEN (51° 12′ N., 10° 30′ E.), town, on the Unstrut, Prussian Saxony; imperial free city and of great commercial importance in XIV. cent.; woollens, cotton, hosiery, beer, cycles, chemicals. Pop. (1900) 35,091.

MUIR, JOHN (1838–), Amer. naturalist and writer.

MUKDEN, MOUKDEN (41° 54′ N., 123° 58′ E.), capital Manchuria, on Hun-ho; scene of Jap. victory over Russians, 1905; commercial centre; furs. Pop. 165,000.

MUKDISHU, MAGADOXA (2° N., 45° 25′ E.), seaport town, Ital. Somaliland, E. Africa, on Ind. Ocean. Pop, 10,500.

MULA (38° N., 1° 30′ W.), town, Murcia, Spain; sulphur baths. Pop. 13,500.

MULBERRY (*Morus alba* and *M. nigra*), shrubs introduced from Asia and extensively cultivated in Southern Europe. The black m. is grown mostly for its fruit, the white m. for its leaves, which are used as food for silkworms (*q.v.*).

MULDE (51° N., 12° 38′ E.), river of Saxony, Prussia, and Anhalt; joins Elbe at Dessau.

MULE, see HYBRIDS.

MÜLHAUSEN, MULHOUSE (47° 40′ N., 7° 19′ E.), town, Alsace, Germany; belonged to France, 1797–1871, when transferred to Germany; industrial centre; manufactures woollens, cottons Pop. (1910) 95,041.

MÜLHEIM-AM-RHEIN (50° 57′ N., 7° E.), town, Rhine province, Prussia; velvet, silk, chemicals. Pop. (1910) 53,355.

MÜLHEIM-AN-DER-RUHR (51° 22′ N., 6° 10′ E.), town, Rhine province, Prussia; ironworks. Pop. (1910) 112,580.

MULL (56° 25′ N., 6° W.), island, Hebrides, Argyll, W. Scotland; area, *c.* 360 sq. miles; mountainous; town, Tobermory; cattle and sheep. Pop. 4350.

MÜLLER, FRIEDRICH MAX, see MAX MÜLLER.

MÜLLER, FRITZ (1822–97), Ger. botanist and explorer; spent greater part of his life studying habits and interrelations of animals and plants in Brazil; made many contributions to Darwinism, and was dubbed by Darwin the 'prince of observers.'

MÜLLER, JOHANNES (1801–58), distinguished Ger. physiologist, whose work added to our knowledge of the mechanism of the sense-organs and the physical and chemical properties of the body fluids; prof. of Physiology at Berlin, he exercised great influence on modern physiologists.

MÜLLER, JOHANNES VON (1752–1809), Swiss historian; pub. *Geschichte der Schweizer*, 1780–1808, long since superseded, but stimulus to study of Swiss history; met with a good deal of religious persecution, but received patronage of Austria and Napoleon.

MÜLLER, KARL OTFRIED (1797–1840), Ger. archæologist; devoted himself mainly to Gk. antiquities, and wrote many important works in connection therewith.

MULLETS.—This name has been applied to two very distinct types of fishes: (*a*) RED MULLETS, GOAT-FISHES, or SARMULLETS (*Mullidæ*), brightly coloured red or golden bony fishes distinguished by the presence of two long barbels at the chin; carnivorous fishes, esteemed as food; found on shores of tropical and temperate seas.

(*b*) GREY MULLETS (*Mugilidæ*), long, large-scaled, bony fishes which feed on the organic matter in mud, and have a muscular gizzard-like stomach; excellent food fishes; some inhabit fresh water, but most temperate and tropical seas.

MUL-LIL, see BABYLONIA (Religion).

MULLINGAR (53° 32′ N., 7° 19′ W.), county town, Westmeath, Ireland. Pop. 4500.

MULREADY, WILLIAM (1786–1863), Irish subject painter; designed the famous *Mulready Envelope* for Sir Rowland Hill.

MULTAN, MOOLTAN.—(1) (*c.* 30° 56′ N., 72° 50′ E.) district, Punjab, India; area, 6080 sq. miles. Pop. 715,000. (2) (30° 13′ N., 71° 26′ E.) town, Punjab; besieged and captured by British, 1848–49, during second Sikh War; manufactures carpets, textiles, pottery, enamel work. Pop. (1911) 99,243.

MUMBLES, THE, see OYSTERMOUTH.

MUMMY, an embalmed dead body. Embalming was practised by Persians, Assyrians, Hebrews, Romans, and Mexicans, but the Egyptians were most expert, and m's are found in their tombs in great numbers. These include human beings, bulls, apes, ibises, crocodiles, and fish. Corpses of poor people were dried with salt or natron, and wrapped in coarse cloth and placed in the catacombs. Those of the rich underwent a series of complicated preparations, after which the body was enclosed in a wooden or stone shell, often ornamented with a series of pictures and hieroglyphics. See EMBALMING.

MUMPS, acute infectious disease characterised by inflammation of the salivary glands, especially the parotid, with pain and swelling, and a rise of temperature, and with a tendency, in convalescence, to pain and swelling in the testes in the male, and in the breasts and ovaries in the female. Children above the age of four and young adults are most commonly attacked; the disease is infectious before the glands begin to swell. The treatment is simply a saline purge, hot fomentations to the affected part, and rest.

MÜNCHAUSEN, HIERONIMUS KARL FRIEDRICH, BARON VON (1720–97), Ger. noble, who suggested to Rudolf Erich Raspe the character in *Adventures of Baron Münchausen*; now proverbial braggart.

MUNCIE (40° 10′ N., 85° 19′ W.), city, Indiana, U.S.A.; iron and glass manufactures. Pop. (1910) 24,005.

MUNDÁ, speech of India; name given by Max Müller to Turanian dialects spoken in jungles of Central Provinces and Madras and by inhabitants of neighbouring hills; considered speech of extinct people. Modern Mundás are Dravidian race who adopted M. speech and were afterwards driven into

wilds by Aryan invaders; it comprises these dialects: Asurī, Bhumij, Birhar, Gadabā, Hō, Juāng, Khariā, Kōdā, Korkū, Korwā, Mundari, Santālī, Savara.

MUNDAY, ANTHONY, MONDAY (*c.* 1553–1633), Eng. dramatist and writer; b. in London; visited Rome (1578) and on his return pub. anti-popery pamphlets. His plays are *Death of Robert, Earl of Huntingdon*, *Downfall of Robert, Earl of Huntingdon*, *Two Italian Gentlemen*, and *Sir John Oldcastle* (in collaboration).

MUNDELLA, ANTHONY JOHN (1825–97), Eng. Liberal politician; introduced Bill to make school attendance compulsory in England and Wales, 1881; Pres. of Board of Trade, 1886, and 1892–95; reformer of conditions of labour.

MÜNDEN (51° 25′ N., 9° 39′ E.), town, Hanover, Prussia, at confluence of Fulda and Werra; chemicals; trade in timber. Pop. (1910) 11,455.

MUNGO, ST., see KENTIGERN.

MUNGOOSE, a carnivore; see under CIVET FAMILY.

MUNI RIVER SETTLEMENT, RIO MUNI, SPAN. GUINEA (*c.* 1° 40′ N., 10° E.), Span. colonial possession, W. Africa; area, *c.* 10,000 sq. miles; enclosed since 1912 in S.W. corner of Ger. Kamerun; stretches along Bight of Biafra from Campo River to Muni River; much of surface covered by forests and marshes; produces rubber, timber, palm oil, coffee. Spanish since 1900. Pop. *c.* 200,000.

MUNICH, MÜNCHEN (48° 8′ N., 11° 36′ E.), capital of Bavaria, on Isar, near Alps; one of finest and most interesting cities in Europe, with handsome streets and striking architecture; greatly beautified by Ludwig I. Among notable features are Royal Palace, National Theatre, Old Rathaus, Ruhmeshalle (with busts of celebrities), colossal statue of Bavaria, Maximilianeum (civil service college), Isartor and Karlstor (gateways), museums, rich libraries, distinguished univ.; many fine churches: St. Peter's (XII. cent.), Theatiner (with royal burial vault), St. Boniface, St. Michael's Cathedral (1468), Frauenkirche, etc. M. is a famous art centre; celebrated school of painting; Old and New Pinakothek, Schack, and other picture galleries and Glyptothek (sculptures). Chief industries are noted breweries, scientific instruments, lithography and allied trades, leather, paper, rubber goods, furniture, machinery, etc. History dates from XII. cent.; great fire, 1372; taken by Austrians, 1742. Pop. (1910) 608,375.

Wadleigh, *M.: History, Monuments, and Art* (1910).

MUNICIPAL TRADING, many undertakings, formerly in the hands of private individuals, are now conducted by municipal and other local authorities, *e.g.* tramways, waterworks, electrical supply, etc. Capital for these is supplied from the public funds, and while every endeavour is made to provide any cheap and efficient service or supply, an effort is also made to run the concern in question at a profit for the public benefit (reduction of rates, etc.). While little exception is taken to the principle in so far as such matters as water supply and lighting are concerned, objection is often raised to municipalities entering the field in competition with private enterprise, and running, with public money (at the risk of loss), such concerns as working-class houses or places of entertainment. Continental towns enjoy and exercise far greater freedom in m. t. than Brit. municipalities, and Collectivist experiments of greater or less success have been carried out on an extensive scale by towns in Germany and other parts of Europe.

Darwin, *Municipal Trade*; Shaw, *Common Sense of Municipal Trading*.

MUNICIPIUM, town of which citizens, while self-governing, had privileges and duties of Rom. citizens. Rome was obliged, as she extended her rule, to allow increasing amount of autonomy; instead of annexing Tusculum, 381, or incorporating it in Lat. confederation, it was made first of new order of *municipia*, its inhabitants receiving civil, but not political, rights of Romans, and having no Rom. prefect placed over them; by *lex Julia*, 90 B.C., the municipals received full rights of Rom. citizens; system spread throughout empire; relation of m. to Rome was fixed by charter. M. was composed of citizens (similar to burgesses of borough) and mere inhabitants (*incolæ*); constitutions copied Rome; relationship to mediæval communes much disputed.

MUNKACS (48° 26′ N., 22° 41′ E.), town, on Latorcza, Hungary; noted in Hungarian history. Pop. 16,000.

MUNKACSY, MICHAEL VON (1844–1900), Hungarian painter; settled in Paris and produced chiefly genre-pictures; insane from 1898.

MUNNIPORE, see MANIPUR.

MUNRO, ROBERT, MONRO, MONROE (d. *c.* 1680), Scot. general; became parliamentary general in Ireland, 1644; defeated by Owen Roe O'Neill at Blackwater, 1646; refused to be superseded by Monk, 1647; captured, 1648.

MUNSTER (*c.* 52° 18′ N., 8° 30′ W.) province, S.W. Ireland, containing counties Tipperary, Clare, Limerick, Kerry, Cork, and Waterford. Pop. (1911) 1,033,085.

MÜNSTER.—(1) (51° 57′ N., 7° 37′ E.) town, Prussia; capital of Westphalia; with cathedral (XII. cent.) and other fine churches; castle, univ., etc.; Peace of Westphalia signed here, 1648; manufactures cotton, linen, machinery, leather. Pop. (1910) 90,283. (2) (48° 3′ N., 7° 10′ E.) town, Alsace, Germany; textiles. Pop. (1910) 5975.

MÜNSTER AM STEIN (49° 50′ N., 7° 50′ E.), watering-place, Rhineland, Prussia; mineral springs.

MÜNSTERBERG (50° 37′ N., 17° 3′ E.), town, on Ohlau, Silesia, Prussia; brick-works. Pop. (1910) 8640.

MUNTJAC, see under DEER FAMILY.

MÜNZER, THOMAS (1489–1525), Ger. religious teacher; held extreme views, religious and political, advocating communism; caught and executed by Philip of Hesse.

MURAD, AMURATH, see TURKEY.

MURÆNA, see EELS.

MURAL DECORATION.—The oldest form of m. d. known is to be found in the caves of prehistoric man, and consists of rude outlines of men, beasts, and episodes of the chase drawn or scratched on the rock. This is curious, because in the early historic ages m. d. took an entirely different form, that of sculptured bas-reliefs. The tombs and other monuments of Egypt, Nineveh, and Babylon abound in these, and show that the practice was a popular one for a period of 4000 or 5000 years. The wall slabs were usually of marble or sandstone, the outlines touched with red, and the whole relief painted. This kind of d., found also among certain peoples of South and Central America, has now almost completely lapsed, though the figureless d's of even modern Muslim buildings exhibit traces of similar methods. The usual d. of Muslim mosques is on somewhat different lines, being stone panels of elaborate tracery, usually of geometrical patterns. In Western European work of the XV. cent. similar decorative methods were frequently used.

Glazed bricks or tiles, and slabs of thin coloured marbles, form another important group, favoured particularly by Muslims and architects under their influence—Byzantine and Spanish; the method is of Assyrian origin and was adopted by the Romans. Closely akin to this is the mosaic d., which reached its highest degree of perfection in the later Rom. Empire, and is still the favourite method in Eastern churches.

Stucco coverings and borders, moulded in relief, were in use among the Greeks and have endured to the present day, sometimes with, sometimes without, colour scheme. This is mainly used for interior d., but the Alcazar at Seville, for instance, is a brilliant example of the successful use of stucco for the external walls. There are many variations of this kind of work, such as the *Sgraffito*, a black-and-white effect which

was started in Italy in the XVI. cent., being conspicuous for its effectiveness, especially at a distance. Stucco work was in high favour during the Rococo period in architecture.

Hangings of stamped leather, tapestry, embossed paper, or *papier maché* began to come into use in the XVI. cent., the idea being probably imported by merchants from the Far East, as the Chinese are known to have used wallpapers long before that. The first papers used were imitations either of leather, stucco, or tapestry. In France the tapestry hangings, fostered by such artists as the Gobelins, made great strides, but modern ideas of hygiene appear to militate against their frequent use. Modern Eng. wallpapers owe much to the efforts of William Morris and his followers in the second half of last cent.

Wood-carving and oak panels more or less elaborately carved were in great vogue in the Stewart period, in England and throughout Europe. Some of these panels from Malines are among the finest m. d's known, and fine specimens abound in old Eng. country houses.

The most decorative method, however, is undoubtedly that which uses colour. Fresco- and panel-painting were popular from the earliest times, though in our own day they are generally restricted to public and ecclesiastical buildings. The advent of Christianity appears to have given a notable impetus to decorative painting of this kind, which indeed formed the great bulk of mediæval pictorial art. The Renaissance led to the finest fresco and decorative painting known. The names of almost every great artist of the Renaissance is associated with this kind of work. After them it largely fell into disuse, though in most European countries an attempt has been noticeable of late to revive the art of fresco-painting.

MURANO (45° 27′ N., 12° 20′ E.), town, on island of Venetian lagoon; long noted for manufacture of Venetian glass; has fine cathedral. Pop. 5600.

MURAT, JOACHIM (1767–1815), king of Naples; b. La Bastide; s. of innkeeper; rose in army, and became one of constitutional guard of Louis XVI., 1791; lost command, 1795, on fall of Jacobins; aided Napoleon to subdue revolts against Convention, became his first *aide-de-camp*, and won fame as commander in Italy and Egypt; general of division, 1799; commander of consular guard, 1799; m. Caroline, Napoleon's sister, 1800; led cavalry at battle of *Marengo*, 1800, and compelled Naples to agree to *Treaty of Florence*, 1801; gov. of Paris, marshal of empire, prince, and grand admiral, 1805. M. commanded cavalry at *Austerlitz*, 1805 (receiving as reward grand-duchy of Berg and Cloves), at *Jena*, *Eylau*, and *Friedland*; suppressed Span. insurrection, 1808; became king of Naples by Napoleon's grant, 1808; tried to make Naples strong modern independent state, and incurred Napoleon's anger; led cavalry in invasion of Russia, 1812, and subsequent invasion of Germany, and then deserted Napoleon. Austria guaranteed his possession of Naples, 1814, in return for alliance against Napoleon, but allowed his claims to be neglected at Treaty of Vienna. M. thereupon re-established relations with Napoleon, and there seemed prospect of Ital. rising in his favour, but he was defeated by Austrians, who replaced Bourbon sovereign. He was executed at Pizzo after an attempt to recover his kingdom. A dashing cavalry officer, M. was of inordinate ambition and unstatesmanlike.

A. H. Atteridge, *Life*.

MURATORI, LUDOVICO ANTONIO (1672–1750), Ital. historian; b. Vignola, Modena; librarian of the Ambrosian Library, Milan, 1695; of the D'Este Library at Modena, 1700; wrote the *Rerum Italicarum Scriptores*; also a history of Italy.

MURCHISON, SIR RODERICK IMPEY (1792–1871), Brit. geologist; b. Tarradale, Ross-shire, Scotland; ed. Durham Grammar School, then Military Coll., Gt. Marlow; gazetted ensign, 1807; studied art and antiquities and later took up geol., specialising in continental geol. In 1831 he studied rocks underlying Old Red Sandstone in Wales and established Silurian system; later carried on researches in Scot. Highlands.

Sir Archibald Geikie, *Life of M.* (1875).

MURCIA.—(1) (37° 55′ N., 1° 30′ W.) S.E. coast province, and former kingdom, Spain; area, 4453 sq. miles; produces esparto grass, cereals, fruit; lead, zinc, coal, sulphur, copper. Pop. (1910) 600,744. (2) (37° 59′ N., 1° 10′ W.) capital of above; seat of bishopric; has cathedral; manufactures silk, gunpowder, saltpetre, glass; produces olive-oil. M. passed into Moorish possession VIII. cent; taken by Alphonso X. of Castile, 1263; assaulted by French, 1810, 1812. Pop. (1910) 124,985.

MURDER is the killing of a human being by another human being either by violence or by an omission, and with *malice aforethought*. The absence of malice reduces the crime to *manslaughter*, and if the killing is done in self-defence then it is *homicide* and may be *justifiable homicide*. Every person who kills another is presumed to have committed wilful murder, unless the circumstances are such as to raise another presumption. Capital punishment is now observed only for those convicted of wilful murder, though the capital sentence is still read out against those convicted of high treason.

The attempt to commit murder is a felony, and on conviction the offender is liable to penal servitude for life. Administering poison, or any other destructive matter; wounding, or causing serious bodily harm; shooting at any person; attempting to drown, strangle, or suffocate any person; destroying or damaging any building by means of explosive substances—are all regarded as attempts to commit murder and may bring upon the offender a life-sentence.

MUREX, a Mollusc, see under GASTEROPODA.

MURFREESBORO (35° 51′ N., 86° 25′ W.), city, Tennessee, U.S.A.; several mills; scene of Federalist victory over Confederates, 1862–63. Pop. (1910) 4679.

MURGHAB (36° 30′ N., 62° 28′ E.), river, rises in Afghanistan, and after a N.W. course of over 400 miles is lost in the desert of Merv.

MURI (10° 17′ N., 11° 40′ W.), province, N. Nigeria; area, *c.* 25,850 miles; produces timber, cotton; silver occurs in galena reefs. Pop. *c.* 828,000.

MURIATIC ACID, HYDROCHLORIC ACID (*q.v.*).

MURIDÆ, see MOUSE FAMILY.

MURILLO, BARTHOLOMÉ ESTEBAN (1617–82), Span. painter; studied first with Juan del Castillo; went in 1641 to Madrid, and there received encouragement and practical help from Velazquez. Returning in 1645 to his native Seville, he soon became famous and had numerous important commissions. He founded the Academy of Seville in 1660. His pictures fall into two distinct classes—scenes from low life, and Biblical and religious subjects. Experts distinguish three styles in his work—the 'cold,' the 'warm,' and the 'vaporous.' One of his favourite subjects was the Immaculate Conception of the Virgin, and the famous *Conception*, now in the Louvre, was sold in 1852 for £24,000.

Bonsusan, *Murillo* (Masterpieces in Colour).

MUROM (55° 38′ N., 42° 6′ E.), town, on Oka, Vladimir, Russia; flour-mills, distilleries. Pop. 13,700.

MURPHYSBORO (37° 37′ N., 89° 20′ W.), city, on Big Muddy, Illinois, U.S.A.; flour-mills, foundries. Pop. (1910) 7485.

MURRAIN, general term for various infective diseases of cattle; hence used as a curse. See ANTHRAX, FOOT-AND-MOUTH DISEASE, PLEURO-PNEUMONIA, RINDERPEST, also VETERINARY SCIENCE.

MURRAY (34° 10′ S., 140° E.), largest river, Australia; rises in the Australian Alps; flows into Encounter Bay by Lake Alexandrina; length, 1300 miles.

MURRAY COD, see under BASSES.

MURRAY, JOHN, the name of four generations of London publishers, who, from the founder (1745–93) onwards, have been associated with some of the greatest names in contemporaneous Eng. lit.

MURRAY, LORD GEORGE (1694–1760), Scot. Jacobite; fought for Pretender, 1715 and 1719; pardoned 1725; joined Charles Edward, 1745, and showed skilful leadership at *Prestonpans* and siege of Carlisle; resigned because badly treated, but consented to conduct forces southwards, though he considered policy unwise; insisted on retreat at Derby and conducted it skilfully; advice rejected as to position at *Culloden*, 1746; unjustly suspected of treachery and dismissed.

MURRAY, or MORAY, JAMES STEWART, EARL OF (c. 1531–70), Regent of Scotland; illegitimate s. of James V.; joined Lords of Congregation, 1559; cr. earl, 1562; opposed Darnley marriage; became regent on Mary's abdication, 1567; defeated her army at *Langside*, 1568, and produced *Casket Letters*; murdered; political rather than ardent Protestant.

MURRAY, WILLIAM, see MANSFIELD.

MURREE (33° 50′ N., 73° 20′ E.), town, sanatorium, Rawal Pindi, Punjab, India.

MURRY EEL, see under EELS.

MURSHIDABAD, MOORSHEEDABAD (24° 11′ N., 88° 19′ E.), chief town, district of M., Bengal, India; ivory-carving and silk-weaving industries; capital of Bengal in XVIII. cent. Pop. (with Azimganj) 30,000; (dist.) 1,345,000.

MURTEN, see MORAT.

MURVIEDRO, see SAGUNTUM.

MURZUK (25° 49′ N., 14° 12′ E.), capital, Fezzan (*q.v.*); hottest town in the world.

MUS, see MOUSE FAMILY.

MUSCAT, MASKAT, MUSKAT (23° 29′ N., 58° 33′ E.), town, Oman, Arabia; important seaport; centre of trade between India, Persia, Arabia, and African coast; surrounded by wall. Pop. 20,000.

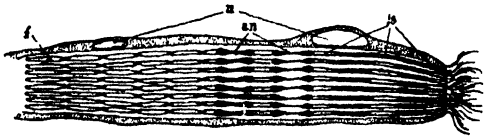
MUSCATINE (41° 24′ N., 91° 5′ W.), city, Iowa, U.S.A., on Mississippi; lumber manufactures. Pop. (1910) 16,178.

MUSCHELKALK, the middle member of Triassic system in Germany; no examples in Britain; consists of grey limestones 500–1000 ft. thick.

MUSCI, see BRYOPHYTA.

MUSCIDÆ, see HOUSE FLY.

MUSCLE, tissue composed of elongated cells, or m. fibres, and consisting of three kinds: striated or voluntary m., non-striated or involuntary m., and heart m. The fibres in *striated* or *voluntary m.* are arranged in bundles enclosed in delicate membranous sheaths, and each fibre has alternately layers of dark and light material, giving it a transversely striated appearance. M. of this type constitutes the fleshy part of the body, its principal functions being movement and the exertion of force, both of which are under the control of the mind. The fibres of *non-striated* or *involuntary m.* have fine longitudinal but no transverse markings, and they are extremely long and narrow; non-striated m. constitutes a great part of the walls of the alimentary canal, blood-vessels, uterus, bladder, and is also found in the skin; m. of this type is not under the control of the mind. *Heart m.* also is independent of the control



PART OF A CROSS-STRIPED MUSCLE FIBRE. *an*, anisotropic substance; *is*, isotropic substance in a single fibril; *f*, a fibril; *n*, nuclei.

of the mind, and is composed of somewhat rectangular cells, branching at the ends, with transverse markings hardly so distinct as those of voluntary m. fibres. A voluntary m. is usually made up of a central fleshy part with a tendinous part, of fibrous tissue, at each extremity, by which it is attached at each end to a bone, or, less commonly, to cartilage, fascia, or skin. Each m. is supplied by one or more nerves through which it is controlled by the brain, and by blood-vessels and lymphatics, while it is enveloped by a fine membrane, offshoots from which separate the smaller muscular bundles composing the body of the muscle. The number of m's in each side of the body is about 400, so that it is impossible to describe them here; they are named in various ways: from their position, e.g. *temporal*; from their direction, e.g. *external oblique*; from their attachments, e.g. *sterno-cleido-mastoid*; from their shape, e.g. *deltoid* (*i.e.* from the Gk. letter *delta*, Δ); or from their uses, e.g. *extensor longus digitorum*.

The most characteristic property of m. is its power of shortening when stimulated, or its contractibility. When a m. is stimulated there is a change in the elasticity in the component m. cells, and the points of attachment of each cell to its neighbouring tissue elements yield to the strain put upon them, the diameter of the cell between these points diminishing while the other diameter is increased, the volume of the cell thus remaining the same. There is also a chemical change in the m., marked chiefly by the production of sarcolactic acid, while carbon dioxide is also produced. The exhaustion which follows prolonged activity on the part of a m. is due to the accumulation of these waste products, which are eventually removed by the lymph. The stimulus which causes muscular contraction may be mechanical, chemical, or electrical, but normally contraction is due to the influence of the nerves which are distributed to the m's and which are controlled by the brain.

Movements of the voluntary m's may be made involuntarily when certain impressions are made either internally or externally on the surface of the body, as, for instance, when the foot is moved involuntarily in response to the stimulus of tickling the sole. The stimulus given by the impression travels up the afferent nerve fibres to their nerve cells in the anterior horn of grey matter in the spinal cord, and they in return transmit an impulse along the efferent nerve fibres to the m's, which then contract. This process is termed *reflex action*. In voluntary action the stimulus comes from the nerve cells of the brain which control the action of the m's, and is sent down their nerve fibres to the nerve cells in the spinal cord, whence the impulse is transmitted to the m's. The spinal *nerves* are attached to the spinal cord by two roots, of which the anterior contains the nerve fibres which convey impulses to the m's, termed the motor nerve fibres, while the posterior contains the nerve fibres which carry the stimuli of impressions upon the sense-organs, termed the sensory nerve fibres. The nerve cells controlling the m's are situated in a particular area of the grey matter in the external layer, or cortex, of the brain, termed the *motor area*. This motor area occupies practically the præcentral convolution of the brain, which lies immediately in front of the fissure of Rolando. Its position can be gauged by mapping out the fissure of Rolando on the head, a point being taken half an inch behind the mid-point between the root of the nose (nasion) and the occipital protuberance at the back of the skull (inion), and drawing from it a line at an angle of 67½° (¾ of a right angle) to the mid-line of the skull towards the front of the ear. The leg area is at the upper end of the præcentral convolution, then comes the trunk area, the arm area lower, but still above the middle, then the neck area, the face area lower still, and the tongue area lowest. Disease of any part of the motor area causes paralysis of the corresponding m's.

See BRAIN, NERVOUS SYSTEM, SPINAL CORD.

MUSCOVITE, a rock-forming mineral belonging to same group as mica; widely distributed; occurring in igneous rocks, but never in volcanic rocks. See also MICA.

MUSCULAR ATROPHY, PROGRESSIVE, see PARALYSIS.

MUSES (classical myth.), nymphs, children of Zeus and Mnemosyne or of Ouranos and Gaia; nine in number; patronesses of art. Their names and attri-

butes are as follows: Calliope (epic poetry), Erato (erotic poetry), Euterpe (lyric poetry), Melpomene (tragedy), Thalia (comedy), Polyhymnia (sacred music), Terpsichore (dance and choral ode), Clio (history), and Urania (astronomy). The Romans confused them with the *Camenæ*. Their haunts in Greece were Pieria, Thespiæ, and Mt. Helicon.

MUSEUMS (Gk. *Mouseion*, Temple of the Muses), buildings consecrated to the preservation and exhibition of valuable and interesting objects of art (in its widest sense) and science. M's may be very comprehensive in their contents, embracing practically every branch of study, or they may be highly specialised, such as the Shakespeare M. at Stratford or the M. of Paris Opera-House. The finest example of a purely *civic* m. is the Musée Carnavalet of Paris. *National* and *Provincial* m's each serve different ends. In itself a *National* m. has two very distinct objects in view. Its galleries and public exhibits are for the general education of the people; but in its storerooms are to be found valuable collections of, say, animals or plants, brought together from all parts of the world, awaiting the scrutiny and determination of the scientist. Such a m., too, provides a safe place of refuge for unique specimens, the disappearance of which would hamper scientific progress. Typical national m's are the British M. in London, the National M. in Washington, or the great Natural History M's of Berlin and Vienna. On the other hand, the function of the *Provincial* m. is rather to supply local wants, to illustrate in a general way the various types of, let us say, animals, but more particularly to exhibit the fauna, flora, historical and other objects of the particular area in which it is stationed. See also ART: *Art Galleries*.

Flower, *Essays on Museums* (1898); Murray, *Museums* (3 vols., 1904).

MUSH (38° 47′ N., 40° 29′ E.), town, Armenia, Asiatic Turkey. Pop. 30,000.

MUSHROOM (*Agaricus* or *Psalliota campestris*), a basidiomycetous fungus, commonly found on fields which have been grazed over, and thus contain organic food material. The edible portion represents the fructification only of the plant, the vegetative parts consisting of a tangled web of whitish strands, or hyphæ, termed the mycelium. The spores are chocolate brown and are borne on gills, which radiate from the central stalk. They are protected by an umbrella-shapod upper portion. When immature, the gills are covered in by a veil-like flap—the plant being termed a 'button.' The veil is ruptured at maturity by the expansion of the upper parts. The m. is usually cultivated from spawn,—that is, soil containing mycelium,—plentiful manure and a warm situation being essential.

MUSIC, as we understand it, has a comparatively short history. M. of a kind must have existed from the earliest ages, and we know that it was practised in the days of the Egyptian, Grecian, and Rom. empires. The musical scales of the Greeks have formed a theme for learned discussion among the experts, and it is generally agreed that no melody or harmony in the least resembling modern types could have been produced from these scales. References to m. by ancient writers are numerous, but it is impossible, in the absence of specimens, to form any exact idea of what this m. was like. 'There can be no history of m. as an art where no musical works of art exist,' is the obvious remark of a historian. The first works of art date from long after the beginning of the Christian era. It could not be otherwise. As yet, melody was only a sort of extemporaneous product which could not be set down for want of a musical notation or system of writing; and harmony (*q.v.*), the ordered combination of sounds, had not been invented.

It was not until about the year A.D. 330, when Pope Sylvester instituted a singing school at Rome, that m. began to assume something of a definite shape. Later in the same cent., St. Ambrose, abp. of Milan, did much for its reform in the Church; and further advance was made by Gregory the Great (590–604), whose system of musical scales is known as *Gregorian modes*. *Gregorians*, so called, are still in ecclesiastical use where purity of tradition is sought to be preserved. About this time a primitive kind of harmony began to be employed, although even as late as the end of the IX. cent. the single part which Hucbald added to his melodies consisted chiefly of bare fourths and fifths.

Guido of Arezzo (990–1050) and Franco of Cologne (*c.* 1200) between them laid the foundations of musical notation. Guido (*q.v.*) may fairly be called the inventor of Sol-fa, being the first to employ the syllables *ut* (now *doh*), *re*, *mi*, *fa*, *sol*, *la*: the syllable *si*, for the seventh of the scale, was not introduced till the XVII. cent. Franco's part in the advance lay mainly in the devising of differently shaped notes to express different time lengths. He also invented 'rests,' and was the first to divide time into 'dual' and 'triple.'

Still, there had been, so far, no composers, strictly so called. It was not until the rise of the Netherlands school in the XIV. cent. that m. as an art had its real beginning. Josquin des Prés (1440–1521) is described by some historians as 'the first composer of modern m.' He was certainly a pioneer, and greatly influenced the trend and history of the art. One or two of his pupils became leading figures in musical history, notably Adrian Willaert (1490–1563), who is credited with the invention of the madrigal. A distinguished contemporary of Willaert was Orlando Lasso (1520–94), b. at Mons, in Belgium. He was named the 'Prince of M.,' and was celebrated all over Europe, employed and honoured by kings and nobles. But the real glory of that early period was Palestrina (1514–94), who was born to effect a complete revolution in the style of Church m. Palestrina (*q.v.*) is the first composer who is treated seriously by musical historians, though he is rather a herald of the really great composers than one of the greatest in his own person. Though perhaps not actively and directly, Palestrina continues to influence and correct the art of all serious-minded Church composers.

Following him there were no masters of the first rank until the advent of Händel (*q.v.*) and Bach (*q.v.*), both born in 1685, though it was within this period that the great forms of opera and oratorio came into being. The first opera ever written was, in fact, produced on the day of Palestrina's death. About this time England had a number of more or less talented composers, including John Bull, reputed by some the composer of 'God save the King'; John Dowland, subject of a Shakespearean sonnet; and Henry Lawes, celebrated by Milton. The one really great name in Eng. m. was, however, that of Henry Purcell (*q.v.*), who died ten years after Händel and Bach were born. With these outstanding names, musical history and composition started on a course which has gradually led on, by devious and varied evolutionary processes, to the modern school of Wagner (*q.v.*) and his successors. Haydn, Mozart, Beethoven, Schubert, Schumann, Mendelssohn, Chopin, Brahms, Tschaikowsky (see separate articles)—these are among the immortal names in the history of the art. With the XX. cent. came developments in the impressionist manner, of. the compositions of Richard Strauss, Debussy, Max Reger, Maurice Ravel.

The Oxford History of Music (1901–5); Walker, *History of Music in England* (1907); Grove, *Dictionary of Music and Musicians* (new ed., 1909).

MUSIC HALLS, houses of amusement where the programme consists of separate 'variety turns'; a development of 'salon theatres,' in which the audience smoked and drank while listening to the performance. Legitimate drama was restricted to theatres such as Covent Garden and Drury Lane, which possessed 'patent' rights, and as late as 1834 the whole staff of a saloon theatre in Shoreditch was locked up for the night because it attempted to play *Othello*. The *Theatres Act*, 1843, distinguished between theatres proper and saloon theatres, placing latter under local authority. Gounod's *Faust* was first

sung (not produced in costume and with scenery) at the Canterbury; prosecutions under *Stage-Play Act* were common till after 1866, when they lapsed. To meet with increasing demand for 'sketches' on music-hall stage, the Lord Chamberlain in January 1912 licensed stage-plays for music halls.

Titterton, *From Theatre to Music Hall* (1912).

MUSICAL BOX.—A small instrument which renders tunes automatically when wound up; the sounds are produced by vibrating steel teeth, cut in a comb or flat steel plate.

MUSICAL GLASSES, see HARMONICA.

MUSICAL NOTATION is the expression of sounds by writing. It has long been fixed by the use of the five-line staves, with their treble and bass-clef signs, sharps and flats, and varying time-length, note forms—semibreves, minims, crotchets, quavers, etc. This modern notation is the result of a combination of a letter-notation of the early Middle Ages.

C. F. Abdy Williams, *The Story of Notation*, 1903.

MUSICAL PITCH, see PITCH.

MUSK SHREW, see SHREW FAMILY.

MUSK DEER, see DEER FAMILY.

MUSK OX, see SHEEP GROUP.

MUSK RAT, see under MOUSE FAMILY.

MUSKEGON (43° 12′ N., 86° 17′ W.), city, on Muskegon Lake, Michigan, U.S.A.; lumber trade and manufactures. Pop. (1910) 24,062.

MUSKET, the 'smoothbore' firearm used by infantry before the introduction of the 'rifle.' In the Brit. army it was dubbed 'Brown Bess,' and discharged a bullet weighing 1 oz. The earliest type of musket (XV. cent.) took 15 minutes to charge and fire. See also GUN.

MUSKHOGEANS, see INDIANS, RED.

MUSKOGEE (35° 45′ N., 95° 25′ W.), city, Oklahoma, U.S.A.; cotton gins and compresses. Pop. (1910) 25,278.

MUSLIM, see MUHAMMADAN RELIGION.

MUSOPHAGIDÆ, see TURACOS.

MUSPRATT, JAMES (1793–1886), Irish chemist; applied scientific principles to chemical manufacture (at Dublin, Liverpool, St. Helens), especially alkalis and sulphuric acid. His s., **James Sheridan M.** (1821–71), was a pupil of Graham and Liebig; prepared toluidine and nitroaniline with Hofmann; founder and director of Liverpool College of Chemistry.

MUSQUASH, see under MOUSE FAMILY.

MUSSEL, see under LAMELLIBRANCHIATA.

MUSSELBURGH (55° 57′ N., 3° 3′ W.), town, Midlothian, Scotland; at mouth of Esk; Loretto School is built on site of famous shrine; race-meetings held annually. Pop. (1911) 15,938.

MUSSET, LOUIS CHARLES ALFRED DE (1810–57), Fr. poet; youngest and most poetical personality of first Romantic movement; acclaimed by Sainte-Beuve as a genius in 1828, but a few years passed before he obtained general recognition; wrote melodious poems, small, exquisite dramatic pieces, some of them amusing comedies, and polished harmonious prose; brought to perfection the *Proverbe*, a short play with few characters illustrating some maxim, as, for instance, his own famous *Il faut qu'une porte soit ouverte ou fermée*, and *On ne badine pas avec l'amour*; light, witty, graceful, piquant, both in verse and prose; excesses hastened his death; *Confessions d'un enfant du siècle* is subtle autobiographical analysis of *mal du siècle*; character and style also to be studied in *Espoir en Dieu, Stances à la Malibran, Le Treize Juillet, La Lettre à Lamartine*, and several poems called *La Nuit*, etc.

Oliphant, *Life* (1890).

MUSSOORIE, MASURI (30° 27′ N., 78° 6′ E.), town, sanatorium, Dehra Dun district, United Provinces, India, on lower Himalayas. Pop. 5600.

MUSTANG, wild horse of Amer. prairies. See HORSE FAMILY.

MUSTARD, a term which includes two species of Brassica—*B. alba*, the seedlings of which are used in salads, and *B. nigra*, the black m., the seeds of which, when ground, yield the well-known condiment. The seeds of this species also yield m. oil on distillation with water—a glucoside, allyl isothiocyanate, of pungent and irritant character.

MUSTELA, MARTEN, see WEASEL FAMILY.

MUSTELIDÆ, see WEASEL FAMILY.

MUTATIONS, see under EVOLUTION.

MUTILATION, the practice, widespread among savage and to some extent among civilised races, of inflicting injury (or ornamentation) on the human body for religious or other purposes. It has taken many different forms: thus the Chinese bind their girls' feet, some Amer. Indians flatten their children's skulls, savages knock teeth out, and tattooing is very largely practised even among civilised peoples. Many m's are inflicted in initiatory rites at puberty; others simply from fashion or custom.

MUTINY ACT, see under MILITARY LAW.

MUTSUHITO, known henceforth as MEIJI TENNO (1852–1912), Emperor (Mikado) of Japan; succ., 1867, and proceeded to abolish feudalism and establish strong central government; tremendous changes in Japan under his rule, heralded by transference of capital from Kioto to Yedo, henceforth called Tōkyō ('the eastern capital'); modern civilisation introduced; wonderful success of army and navy. See JAPAN.

MUTTRA, MUTHARA.—(1) (27° 30′ N., 77° 50′ E.) district, United Provinces, Brit. India; area, 1443 sq. miles. Pop. 770,000. (2) (27° 28′ N., 77° 41′ E.) capital of above; Hindu religious centre, has many mosques and temples. Pop. 62,000.

MUZAFFAR-ED-DIN (1853–1907), shah of Persia; succ., 1896; established great friendship with Russia and raised large loans there; revolution, 1906, on account of misgovernment; monarchy made constitutional.

MUZAFFARGARH (30° 5′ N., 71° 14′ E.), district, Punjab, India; chief town, M., on Chenab. Pop. of district, 410,000.

MUZAFFARNAGAR (29° 28′ N., 77° 44′ E.), district, Meerut, United Provinces, India; capital, M. Pop. of district, 890,000; of town, 25,000.

MUZAFFARPUR (26° 7′ N., 85° 27′ E.), district, Tirhut Division, Bihar and Orissa, India; chief town, M. Pop. of district, 2,755,000; of town, 48,000.

MWERU (9° S., 29° E.), lake, Central Africa, between N. Rhodesia and Belg. Congo; traversed by Luapula.

MYAUNGMYA (16° 40′ N., 94° 50′ E.), town, M. district, on Irawadi, Lower Burma. Pop. 5500.

MYCENÆ, ancient city of Greece, situated on a hill in Argolis; of great importance till its destruction by inhabitants of Argos in 468 B.C. Among remarkable ruins still to be seen are Lion Gate and Treasury of Atreus; important discoveries made by Schliemann. For prehistoric *Mycenæan civilisation*, see GREECE (*History*).

MYCENÆAN CIVILISATION, see GREECE (ANCIENT HISTORY).

MYCETOPHILIDÆ, see FUNGUS GNATS.

MYCETOZOA, MYXOMYCETES, an order of the simplest class (Sarcodina) of Protozoa. For long regarded as plants and placed among the Fungi, these simple Protozoa are distinguished by their plant-like mode of reproduction—by the formation of spores, and by the occurrence in their life-history of temporary or permanent colonies, known as plasmodia, which represent a vegetative stage in development. An individual mycetozoon is an exceedingly small amœboid body, but numbers unite to form a large aggregate which spreads over damp surfaces of wood, leaves, etc., to the extent sometimes of several square inches. This plasmodium may move slowly with a steady creeping motion, but it is less evident than the spore clusters to which it gives rise—small balls of bright colour, yellow, red, brown, or grey, often set on short stalks, upon damp bark, stems of corn, or indeed almost any decaying vegetable matter. Sometimes instead of

the globular 'fruits,' pincushion-shaped aggregates are formed, but in all cases those fruits or sporangia contain reproductive spores intermingled with a network of fine supporting threads—the capillitium. The spores resist drought for a considerable time, but when placed in water germinate and pass through a flagellate stage before degenerating into the plasmodium-forming amœbula.

A few Mycetozoa occur in fresh water or in the sea, and these, like the flagellate stages, feed upon bacteria. The majority, however, are found on dead wood or amongst rotting vegetable matter, and make use of the substances found in decaying vegetation as food.

The group is of some special interest to man, for one form (*Plasmodiophora*) attacks cells in the roots of turnips, cabbages, etc., causing the disease, characterised by split and knotty roots, which is known as 'Fingers and Toes.' Another and large form (*Fuligo*) is the tan-pit pest known as 'flowers of tan'; and *Acrasis* is found in beer yeast.

MYCONIUS, FRIEDRICH (1490–1546), Franciscan priest; became Prot., 1524; warm supporter of Reformation, of which he wrote the history.

MYCONIUS, OSWALD (1488–1552), Swiss Prot. theologian.

MYDDLETON, SIR HUGH, MIDDLETON (c. 1560–1631), Eng. contractor; executed the scheme for supplying London with water from Ware, Hertfordshire, by a canal opening into New River Head, Islington.

MYELAT (20° 30′ N., 96° 30′ E.), division, Southern Shan States, Burma, India.

MYELIN, see NERVOUS SYSTEM.

MYELITIS, inflammation of the substance—either the grey matter or white and grey matter—of the spinal cord, which may be *acute*, in which the nerve substance is softened, but repair may take place; or *chronic*, in which the change is slower and more in the nature of a degeneration, the nerve substance being replaced by connective tissue. The condition may follow exposure, may be caused by the organisms or toxins of various infectious diseases, or may arise after injury or disease of the spine and its membranes, and it may affect any part of the spinal cord. The symptoms will naturally vary with the different positions; but most commonly the lower part of the cord is affected, the condition being manifested by loss of muscular power, the gradual oncoming of paralysis in the lower limbs, and bladder and bowel derangements. Bed-sores, owing to interference with the nervous supply of the skin, are apt to form and are often very troublesome. Recovery sometimes takes place, quickly or slowly; many cases become chronic, the strength after a time fails, and death ensues from exhaustion or from some complication. Careful nursing, avoidance of fatigue, tonics, massage, electricity, if the muscles are wasted, hot douches to the back, are the modes of treatment.

MYERS, FREDERICK WILLIAM HENRY (1843–1901), Eng. scholar and thinker; known for his work in psychical research; wrote *Human Personality and its Survival of Bodily Death*.

MYGALE, see SPIDERS.

MYINGYAN (21° 30′ N., 95° 25′ E.), town, on Irrawadi, capital of Myingyan district, Upper Burma; area, 3140 sq. miles. Pop. 18,000; (dist.) 365,000.

MYITKYINA (25° 25′ N., 97° 25′ E.), district and town, Mandalay division, Upper Burma; area, 10,650 sq. miles. Pop. 75,000.

MYLIOBATIS, see under RAYS.

MYLODON, see under EDENTATES.

MYLONITE, a rock found in metamorphoric regions; fine grained and generally quartzose; consists of powdered rocks crushed by earth movements.

MYMENSINGH, MAIMANSINGH (24° 45′ N., 90° 30′ E.), district, Dacca division, Bengal, India. Pop. 4,000,000.

MYOMORPHA, a sub-order of RODENTS (*q.v.*).

MYOPIA, see EYE.

MYOSOTIS, see BORAGINACEÆ.

MYRA (36° 12′ N., 30° 1′ E.), ancient Lycian town, Asia Minor; declined after capture by Harun er Raschid, 808; has interesting remains, including rock tombs.

MYRIAPODA (Gk. *myria*, ten thousand; *pous, podos*, a foot), the class of Jointed Animals (*Arthropoda*) which includes the *Centipedes* and *Millipedes* and three less familiar orders. Its members are land animals, found almost all over the world, but owing to their shy habits and love of darkness they are comparatively little known. They possess many pairs of legs, a distinct head, and long bodies divided into many similar segments. The head bears one pair of jointed antennæ, eyes formed of groups of simple eye-spots, and two or three pairs of jaws. Myriapods occur as fossils as far back as in the Old Red Sandstone of Scotland, belonging to the Devonian age.

Centipedes (Lat. *centum*, a hundred; *pes, pedis*, a foot), order CHILOPODA; familiar worm-like creatures which lurk beneath stones and, when disturbed, glide along the ground with rapid motion by means of many pairs of feet. The body is flattened, and is divided into from fifteen to over a hundred segments, each of which evidently bears only one pair of legs. The antennæ are long and have many joints, and the animal, being carnivorous and poisonous, has the first pair of legs modified as poison claws. The habits vary considerably in different groups. The long-legged Centipedes (*Scutigera*) of tropical and subtropical regions are small (only a few inches in length) and feed on insects which they capture by chase, even in bright sunshine. The common Eng. Centipedes (*Lithobius*) and their allies live under stones and loose wood, and are found in temperate and tropical lands. By means of their poison claws they kill insects and worms as food. Most to be dreaded, however, are the *Scolopendra* and its kind, some forms of which, from the East Indies and S. America, reach a length of 1 foot. This group inhabits warmer climates, sheltering under stones and logs, in bedding and clothes, and although its members feed chiefly on insects and worms, their bite is fatal to many small animals and is very painful and even dangerous to man. Lastly, *Geophilus* and its allies, found all the world over, burrow under ground, where they capture and feed chiefly upon worms. Some emit a phosphorescent fluid at certain seasons. The carnivorous habits of Centipedes render them of value to agriculturists, for they rid cultivated land of many injurious insects.

Millipedes (Lat. *mille*, a thousand; *pes, pedis*, a foot), order DIPLOPODA (Gk. *diploos*, double; *pous, podos*, a foot), are distinguished from Centipedes in certain respects. The body is cylindrical and is divided into many segments, each of which, behind the third, apparently bears two pairs of legs inserted close together. The antennæ are comparatively short, and are divided into only seven or eight joints. The creatures are vegetarian and have no poison claws, but many defend themselves by the emission of a poisonous and unpleasant-smelling fluid, which contains prussic acid.

There are eight families, the representatives of some of which are well known. The Bristly Millipede (*Polyxenus*) and its relatives are minute and are defended by many stiff projecting bristles. The Pill-Millipedes (*Glomeris, Sphærotherium*, etc.) can, at will, roll their short, broad bodies into a ball, the upper convex surface, protected by horny plates, remaining outermost. The smaller forms (*Glomeridæ*) are common in Europe and range into India and the W. Indies; while the large forms (*Sphærotheridæ*) occur in the tropical regions of the Old World and Australasia. The Slug-like Millipedes and the more familiar Worm-like Millipedes, to which the common *Julus* belongs, roll themselves into a watch-spring spiral when danger threatens. The former are tropical, but the worm-like forms are cosmopolitan.

Millipedes are to be found under stones, logs of wood, or under damp bark. They feed chiefly on vegetable

matter and decaying wood and plants, the larvæ of some species, known as 'Wire-Worms' (*q.v.*), doing much damage to crops by devouring the growing roots. Unlike Centipedes, Millipedes are perfectly harmless creatures, and, apart from the destructive 'Wire-Worms' or 'Galley-Worms,' act as allies of the farmer and gardener.

MYRISTICACEÆ, see NUTMEG.

MYRMECOPHAGA, see ANT-EATER.

MYRON (V. cent. B.C.), Gk. sculptor; fellow-pupil with Phidias; worked chiefly in bronze, and chose for subjects athletes, animals, and figures in motion.

MYRRH, gum-resin from *Balsamodendron myrrha*, tree of order Amyridaceæ; occurs chiefly in Arabia; used as tonic in medicine, and by ancient Egyptians for embalming.

MYRTLE (*Myrtus communis*), a shrub commonly cultivated in Europe for its fragrant, evergreen foliage; a native of Western Asia.

MYSIA, ancient district, N.W. Asia Minor; belonged in turn to Lydia, Persia, Syria, Pergamum, Rome; traversed by Temnus and Olympus mountains.

MYSIDACEA, see under MALACOSTRACA.

MYSLOWITZ (50° 15′ N., 19° 8′ E.), town, Silesia, on Przemsa, Prussia; collieries; flax-mills. Pop. (1910) 17,838.

MYSORE (13° N., 76° 40′ E.), native state in Southern India, almost entirely enclosed by Madras Presidency; area, 29,444 sq. miles; capital, Mysore. Region consists of tableland broken by hill ranges and valleys; chief rivers, Kistna and Cauvery. State is healthy and prosperous and possesses extensive irrigation system; administration taken over by Brit. Government in 1831, but native dynasty restored, 1881; inhabitants, Hindus; productions include coffee, cotton, rice, silk, sandal-wood, and ivory; gold is mined at Kolar. Pop. (1911) 5,806,193.

MYSORE (12° 18′ N., 76° 40′ E.), capital, Mysore, India; contains the maharajah's palace and the residency; carpet-weaving. Pop. (1911) 71,306.

MYSTACOCETI, a sub-order of WHALES (*q.v.*).

MYSTERIES, and MIRACLE PLAYS, see DRAMA.

MYSTERIES, ELEUSINIAN, a secret worship of highest antiquity, celebrated annually at Eleusis, a small town 14 miles N.W. of Athens. They were connected with the legends of Demeter and Persephone (always styled *Kore* at this festival), Pluto and Dionysus, while less important characters played accessory parts; the abduction of Kore by Pluto and the sorrow of the mother were specially emphasised.

The celebrations at Eleusis were held independently till the V. cent. B.C., when Athens undertook their conduct, and, on the site, Periclean buildings and inscriptions have been unearthed.

Pagan writers are naturally silent regarding the mysteries, and early Christian authorities are of much greater value, although their testimony is frequently coloured by bigotry and intolerance. From this insufficient data we gather the following facts: there were four degrees — a preliminary purification, a communion followed by the exhibition of certain sacred objects, and the crowning of the initiated. The festival took place in Sept. (the 13th of Bœdromion), when a procession of young men (Ephebi) marched to Eleusis along the Sacred Road and brought back to Athens the 'holy things,' which appear to have been ancient images or symbols. The ceremony took place in the Eleusinion. We know nothing for certain, but it is probable that some mystic pageant was celebrated and a solemn communion indulged in by the initiate. The introduction of Dionysus may have been of later origin; he is called Iacchus, 'the son of Semele, the wealth-giver.'

Although the mysteries did not inculcate any higher moral teaching than the ordinary religions of the time, it is probable that by their nature they had an influence for good upon the initiate. Other mysteries were celebrated in various parts of Greece, notably at Athens and Ægina. The later mysteries of Samothrace are not Hellenic in spirit.

Jevons, *Introduction to the Study of Religion*; Dyer, *The Gods of Greece* (1891); Lang, *Myth, Ritual, and Religion* (1887).

MYSTICISM.—A mystic is best defined as one who has intimate spiritual experience of God, so that spiritual realities are so intense that he cannot describe them to others. The two enemies of m. are, it has been said, selfishness and sensuality. Some of the great mystics have been mediæval saints, *e.g.* St. Thomas à Kempis, St. Catherine of Siena, some modern, *e.g.* St. Theresa, some among Protestants. Sometimes mystics see visions and fall into trances, and the mystical temperament is one that is likely to be also emotional.

M. often goes with intellectual ability and with great practical or administrative power, cf. St. Theresa. Mystics have often been mistrusted and despised as deluded visionaries by 'practical' people, but the evidence seems to show that m. is only religion intensified, and the mystics have been the real leaders of religion. It is possible that m. has occasionally degenerated into neurotic emotionalism, but its loftiest forms show that the mystics have been the noblest and the best people. The term m. is used too loosely as the opposite of rationalism, of the symbolic and supernatural, but its use is better restricted.

Inge, *Christian Mysticism, Studies in the English Mystics*; Baron von Hügel, *Studies in Mystical Religion*.

MYTHOLOGY is a science which investigates the myths or legends of races. The myth proper belongs to a stage in human history when the language is without abstractions, when the mind turns rarely on itself, and outside phenomena are regarded sympathetically and subjectively. In such a stage of development external nature is conceived as endowed with human passions—joys and sorrows, pleasures and pains. Thus the sun would be regarded as issuing from the womb of night, as being bathed in the eastern ocean, as ascending the ladder of heaven, as loosening his golden hair down the sky, as hurling arrows of death, as subduing great cloud-monsters, as sinking in bloody death in the distant west. The wind is a fleet-footed messenger of the gods, a subtle thief, or a moaning spirit in pain. So rains and storms, thunder and lightning, drought and dew, famine and plague, mist and shadow were endowed with all the diverse human attributes and pictured with a wealth of image to which was no limit. According to the character of the people and according to climatic conditions such attributes and such images would vary in beauty and terror, in refinement and crudity, in gladness and sorrow. The insight, therefore, to be derived from the study of a people's myths is great. But *comparative m.* is a recent branch of investigation, the study being previously restricted almost exclusively to the myths of Greece and Rome.

The resemblance in the main body of mythological material of all intelligent peoples is striking in spite of local and tribal diversity of expression and development. Moreover, the m. of most peoples is complex and consists of several strata which mark the progress of migration and conquest. The conquering peoples seldom sweep away the entire body of the aboriginal beliefs, but adopt them as a new inheritance or else transform them to correspond with existing legends. Thus Rome, which was intellectually conquered by Greece, accepted Apollo as a new deity, while other gods of the Gk. pantheon, such as Zeus and Hera, she identified with the native deities Jupiter and Juno, though in character and attributes they were in reality widely dissimilar.

Of myths the SOURCES are various. The most fertile source of myth is natural phenomena, and of natural phenomena the most conspicuous and impressive is the sun. The chief characteristics of the hero of the *solar myths* are benevolence amid severity of

fate, and a life spent in great service and toil; the sun being the great day-labourer. But the simplicity of reduction to solar myth has itself been fruitful of error, and whole legends have been classed as purely solar which recent investigation has proved to be quite erroneous. Thus Orpheus was regarded as nothing but a solar hero, though there is good reason to believe that he was a hist. person, a Thracian religious reformer. An extreme example of the solar interpretation was the theory formulated that Christ and His twelve apostles were the characters of a solar myth. History frequently does degenerate into myth. Euhemerus in the latter half of the IV. cent. B.C. carried the reduction of myths to a hist. basis to an extreme. Zeus, he thus tried to prove, was a historical personage whose tomb was still extant in Crete. But the hist. source of some myths is undoubted. Thus in Gk. legend the myth of the daughters of Danaus and the sons of Ægyptus and the legend of the rape of Europa are the fanciful interpretations of traditional migrations. Myths, too, are apt to cluster round ceremonies and ritual whose true significance has become lost. Thus taboos are usually given a mythical foundation, though their origin was originally utilitarian and not sentimental. Allegory is a fertile source of myth, especially where culture has reached some degree of advancement. But though the complex allegorical myth belongs to the literary age the simple allegory is common stock among all peoples. Thus Sleep, Dreams, and Death appear as mythological personages in the legends of all peoples, though their characters and manner of portrayal may be vastly different.

Cosmologies, or the ideas of peoples with regard to the origin and nature of the universe, and theogonies, or ideas of peoples with regard to the origin and functions of the gods, are an interesting body of legend to the comparative mythologist. A seated idea among most peoples is the birth of the world out of original chaos. Of primitive cosmologies the ancient Hebrew is the most simple and the most impressive. The Gk. cosmologies were more complex. The first steps of creation are thus related by Hesiod (*Theogony*, 120 f.): 'First, indeed, was created Chaos and then the wide-bosomed Earth, which the deathless gods dwelling on the peaks of snowy Olympus inhabit unshaken for ever, and misty Tartarus beneath the broad-wayed Earth, and Love which is the fairest among the deathless gods: which looseth the limbs and overcometh the heart's thought and wise counsel of all gods and men.' Then the phenomenon of the rain falling on the earth has suggested to almost every people that Heaven descends in showers to the bosom of the earth, and from such wedlock comes her increase.

Again, the myth of the Deluge is almost universal. According to the Gk. myth Deukalion and his wife Pyrrha escaped the flood in an ark, and on the ninth day the waters abated and the ark rested on Mount Parnassus. From the stones of the earth these two survivors created a new race of men and women. The Macusi Indians of S. America have a similar legend, but only one man survives the flood and repeoples the earth with men from stones; while according to the Tamanaks of Orinoko a man and woman surviving the flood repeople the world from the kernels of a certain palm. The flood of Xisuthrus in the Babylonian m. spares all the righteous. In the Hindu version the deluge is universal, but Manu, accompanied by the seven sages, enters the ark and lands on the Mount Naubandhana (the place of the ship's binding).

The resemblances between these stories and the account of the Noachian deluge in the Pentateuch are obvious. Thus m. is no longer regarded by the learned as a treasure-house of profitless delights for poets and children, but as a serious field for science and the indisputable handmaiden to the study of Religion, Philosophy, History, Archæology, and Philology. See also FOLKLORE.

Keightley, *Mythology*; Frazer, *Golden Bough*; Sonnenschein, *Mythology and Folklore*; *Dictionary of Mythology* (Whittaker); Baring Gould, *Curious Myths of Middle Ages*.

MYTILINE, see LESBOS.

MYTILUS, MUSSEL, see under LAMELLIBRANCHIATA.

MYXŒDEMA, constitutional affection due to fibrous degeneration and loss of function of the thyroid gland, affecting women six or seven times as often as men. The onset of the condition is gradual, and the body is increased in bulk; the skin has a swollen and translucent appearance and usually contains an increased quantity of mucin, the cheeks are flushed and the features coarsened, the hair becomes scanty. In addition, there are mental changes: the intellect is slow, speech and action sluggish, the memory defective, and more serious mental symptoms may ensue. The treatment is the administration of thyroid extract, continued for some time after the symptoms of the condition have disappeared, and this usually prevents their recurrence.

MYXOMYCETES, see MYCETOZOA.

MYZOSTOMIDA, see under CHÆTOPODA.

MZENSK, see MTZENSK.

N, the 14th letter of the Eng. alphabet; in sound a nasal dental, produced by holding the mouth in a position required for a dental and forcing the breath to the nose.

NAAS (53° 13′ N., 6° 39′ W.), market town, Kildare, Ireland; formerly capital of kings of Leinster. Pop. 3850.

NABATÆANS, ancient race inhabiting Syrian-Arabian borderland from Euphrates to Red Sea, *c.* 300 B.C.; migrated to south Judea and Edom, and ruled Damascus; vassals and allies of Rome, 85 B.C.–105 A.D., when their nationality was destroyed by Trajan.

NABHA (30° 25′ N., 76° 9′ E.), native state, Punjab, India; capital, NABHA. Pop. of state, 310,000; of town, 19,000.

NABUA (13° 25′ N., 123° 30′ E.), town, Ambos Camarines, Luzon, Philippine Islands. Pop. 20,000.

NÁCHOD (50° 25′ N., 16° 5′ E.), town, on Metau, Bohemia; scene of Austrian defeat by Prussians in 1866. Pop. (1911) 11,812.

NADAILLAC, JEAN FRANÇOIS ALBERT DU POUGET, MARQUIS DE (1818–1904), Fr. archæologist.

NADIA, NADIYA, NUDDEA (23° 30′ N., 89° E.), district, Bengal, India. Pop. 1,710,000. Capital, Krishnagar.

NAEGELI, KARL WILHELM (1817–91), Ger.-Swiss botanist; b. in Zürich; prof. of Bot. in Zürich, Freiburg, and Munich; wrote valuable works on fungi, algæ, and microscopical research.

NÆSTVED (55° 14′ N., 11° 37′ E.), town, Præstö, on coast of Zealand, Denmark. Pop. (1911) 8326.

NÆVIUS, GNÆUS (*c.* 264–194 B.C.), Lat. poet; probably a native of Campania. In his plays he attacked the powerful Metelli, for which he was imprisoned. His great poem was an epic called *The Punic War*, written in Saturnian metre.

NÆVUS, tumour composed of dilated capillaries, usually congenital, most common in the skin, often disappearing spontaneously as the child grows up, or treated by electrolysis or application of radium or of carbon dioxide snow.

NAGA HILLS (26° N., 93° 50′ E.), district, Assam, India. Pop. 110,000.

NAGAR, BEDNUR (13° 50′ N., 75° 6′ E.), village, Mysore, India; formerly prosperous city.

NAGASAKI (32° 48′ N., 129° 57′ E.), seaport, W. coast Kiusiu, Japan; important shipbuilding centre and naval station; exports coal, rice. Pop. 178,000.

NAGAUR (27° 11′ N., 73° 46′ E.), town, Jodhpur state, Rajputana, India. Pop. 14,000.

NAGINA (29° 27′ N., 78° 29′ E.), town, Bijnaur, N.W. Province, Brit. India. Pop. 23,000.

NAGODE (24° 33′ N., 80° 37′ E.), native state, Baghelkhand, Central India. Pop. 77,000. Capital, Nagode. Pop. 6500.

NAGOYA (35° 7′ N., 136° 56′ E.), city, capital of Owari, on Owari Bay, Japan; XVII.-cent. castle; porcelain. Pop. 378,231.

NAGPUR.—(1) (20° 35′ N., 80° E.) district, Central Provinces, Brit. India; area, 3843 sq. miles; produces cereals, cotton. Pop. 760,000. (2) (21° 8′ N., 79° 5′ E.) chief town, has trade in grain, salt; manufactures cloth. Pop. (1911) 101,415. Division of N. has area 23,520 sq. miles. Pop. *c.* 3,728,000.

NAGYKANIZSA (46° 28′ N., 17° E.), town, Zala, Hungary; brick-works; formerly important fortress. Pop. (1910) 26,524.

NAGYKIKINDA (45° 50′ N., 20° 30′ E.), town, Torontal, Hungary; agricultural centre; flour. Pop. (1910) 26,795.

NAGY-SZEBEN, German **HERMANNSTADT** (45° 48′ N., 24° 8′ E.), town, capital Nagy-Szeben, Transylvania, Hungary; seat of Gk. abp.; cloth and leather manufactures. Pop. (1910) 33,489.

NAGY-SZOMBAT, German **TYRNAU** (48° 22′ N., 17° 36′ E.), town, on Trnava, Pozsony, Hungary; R.C. centre; trade in grain. Pop. 13,500.

NAGY-VARAD, German **GROSSWARDEIN** (47° 3′ N., 21° 53′ E.), town, on Swift Körös, capital of Bihar, Hungary; seat of R.C. and Gk. bp's; pottery. Pop. (1910) 64,169.

NAHE (49° 55′ N., 7° 52′ E.), river, Germany; joins Rhine at Bingen; length, 70 miles.

NAHUM, Old Testament prophet: his book describes judgment on Nineveh for her wickedness; N. is a stern prophet; exact date uncertain, probably *c.* 623 or 608 B.C.

Driver, *Minor Prophets* (Century Bible).

NAHR-EL-ASI, see ORONTES.

NAIAD(E)S, see NYMPHS.

NAIL, hand-made till beginning of XIX. cent.; iron, brass, zinc, etc., used; sometimes tinplate scrap utilised; Birmingham is Brit. centre of manufacture.

NAIL, see under SKIN.

NAINI TAL (29° 22′ N., 79° 29′ E.), town, sanatorium, Kumaon, United Provinces, Brit. India. Pop. 8500.

NAIRN (57° 36′ N., 3° 52′ W.), seaport, summer resort, Nairnshire, Scotland, on Moray Firth; fisheries. Pop. (1911) 4661.

NAIRNE, CAROLINE, BARONESS (1766–1845), Scot. poet; wrote *The Land o' the Leal* and other Scot., especially Jacobite, songs.

NAIRNSHIRE (57° 30′ N., 3° 50′ W.), small county, N. of Scotland, bounded by Moray Firth, Elginshire, and Inverness-shire; near coast fertile and well-wooded, other parts principally moorland; chief town, Nairn; largest rivers, Findhorn and Nairn; only industries besides agriculture and fishing, sandstone and granite quarries. Pop. (1911) 9319.

NAIROBI (1° 20′ S., 37° E.), capital of Ukamba Province, and Government headquarters, Brit. East Africa. Pop. 14,700.

NAIVASHA (0° 40′ S., 36° 24′ E.), lake, Brit. East Africa; no outlet.

NAJIBABAD (29° 36′ N., 78° 23′ E.), town, Bijnor, United Provinces, India; metal-ware. Pop 21,000.

NAKHICHEVAN, NAKHJEVAN (39° 12′ N., 45° 25′ E.), town, Erivan, Russ. Transcaucasia; an ancient Armenian city. Pop. 9500.

NAKHICHEVAN-ON-THE-DON (47° 12′ N., 39° 42′ E.), town, Don Cossacks, Russia, on Don; tobacco, tallow. Pop. 29,500.

NAKHON SRI TAMMARAT, LAKHON, LAGONG (8° 20′ N., 100° 10′ E.), town, capital of Nakhon, S. Siam. Pop. 7500.

NAKSKOV (54° 50′ N., 11° 8′ E.), seaport, island of Laaland, Denmark; sugar factory. Pop. 8500.

NALAGARH, see HINDUR.

NAMAQUALAND, GREAT (25° S., 17° E.), region, Africa, comprising S. parts of Ger. S.W. Africa, N. of Orange River.

NAMAQUALAND, LITTLE (30° S., 18° E.), division, N.W. part of Cape Province, S. Africa. Pop. 20,000.

NAMES, designations bestowed for convenience upon persons or localities. **Personal.**—A primitive tribe generally takes as its emblem some animal or bird to distinguish it from other clans, hence the members of the tribe which has for its *totem* a beaver

are known as *Beavers* or *Beavermen* (see also TOTEMISM). Within the tribe itself some appellation is necessary to distinguish each individual member. This leads to the personal name, which may be taken from some natural object, *e.g.* 'Daughter of the Sun,' some deed of prowess, *e.g.* 'The Elephant-Slayer,' or personal attribute, *e.g.* 'The Lame One.' In course of time these epithets grew specialised from their original significance into ordinary names, *e.g.* Demosthenes and many other classical names.

An ancient Greek was distinguished from his fellows by his ordinary name, the name of his father and of his *deme*, and sometimes of his country, *e.g.* Demosthenes, the son of Demosthenes, the Pæanian, the Athenian. Roman nomenclature was more rigid, generally consisting of the *prænomen* (the predecessor of the 'Christian' name), the *nomen gentile* (which indicated the *gens*), the *cognomen* (which designated the family); sometimes a *cognomen secundum* was added in commemoration of some event or in the case of adoption, *e.g.* Publius Cornelius Scipio *Africanus*.

Modern *surnames* are frequently derived from the occupations or personal descriptions of remote ancestors, *e.g.* Smith, Brown; or are patronymics, Johnson, MacBeth, O'Neill, Fitzgerald. The *Christian name* grew out of the Jewish practice of giving a personal name to a child on circumcision.

Place Names frequently arose from the nature of the locality, *e.g.* Big Water, Black Mountain, Springsure. In Britain they are frequently Celtic or translations of the Celtic. In modern times place names have often been taken from names of persons, *e.g.* Pennsylvania, Brisbane, Port Arthur. There still remains a large number of local names, many of them monosyllabic, for which no satisfactory derivation has yet been found.

Rhys, *Lectures on Celtic Philology*; Wagner, *Names and their Meaning* (1892); Dudgeon, *Origin of Surnames* (1890).

NAMTAR, see BABYLONIA (Religion).

NAMUR.—(1) (50° 28′ N., 5° E.) hilly and fertile province, Belgium; rich in minerals. Pop. (1910) 362,846. (2) (50° 28′ N., 4° 27′ E.) capital of above; strongly fortified; has XVIII.-cent. cathedral; manufactures iron and steel, cutlery, firearms. Taken by French, 1692 and 1702. Pop. (1910) 32,362.

NANA SAHIB (c. 1820–1859 ?), stirred up feeling in India against British *raj*; perpetrated Cawnpore massacre in Mutiny; took refuge in Nepal, 1859, where he was probably killed.

NANAIMO (49° 30′ N., 124° W.), city, E. coast of Vancouver Island, Brit. Columbia; exports coal. Pop. 7300.

NANCY (48° 41′ N., 6° 11′ E.), town, on Meurthe, France; capital of Meurthe-et-Moselle; with fine churches, old gateways, ducal palace, picture-gallery, univ., etc.; capital of duchy of Lorraine from XII. cent.; Charles the Bold killed during siege, 1477; taken by France, 1766; chief manufactures, cottons, woollens, paper, iron, chemicals, musical and physical instruments; famed for embroidery. Pop. (1911) 119,949.

NANDAIR (19° 9′ N., 77° 23′ E.), town, on Godavari, Hyderabad, India. Pop. 14,500.

NANDGAON (20° 39′ N., 77° 51′ E.), state, Chhattisgarh, Central Provinces, India; capital, RAJ-NANDGAON. Pop. of state, 130,000.

NANDI, an East African negro tribe of Uganda. A Brit. expedition was dispatched in 1905 to put down their disturbances.

NANDIDRUG (13° 22′ N., 77° 43′ E.), hill fortress, Mysore, India. Pop. 3000.

NANKING (32° 3′ N., 118° 53′ E.), formerly capital of China, now of province of Kiang-su and S. China; situated on right bank of Yangtsze River; once famous for great walls and magnificent buildings destroyed by Taiping Rebels (1853–64); notably the Porcelain Tower, c. 260 feet high. Although recaptured by Imperialists, little progress has been made since; gave its name to *Nankeen* cotton stuffs and Nankeen porcelain; silk manufactures. Pop. (estimated in 1911) 267,000.

NANNING (22° 43′ N., 108° 3′ E.), city, treaty port, on Yu-kiang, Kwangsi, China. Pop. (estimated in 1911) 37,000.

NANSEN, FRIDTJOF (1861–), Norwegian scientist, statesman, and explorer; b. Fröen; ed. Christiania; organised first expedition to cross and explore Greenland (1888); Polar expedition (1893) in specially built ship (*Fram*), which reached latitude 86° 14′; in 1906 appointed minister to England by newly formed Norwegian government; professor of Oceanography at Christiania, 1908.

NANSEN, HANS (1598–1667), Dan. statesman; organised defence of Copenhagen against Swedes, 1658; inspired revolution of 1660 by which monarchy became hereditary and burgesses won equal rights with nobles.

NANTERRE (48° 55′ N., 2° 8′ E.), town, Seine, France; chemicals. Pop. 14,000.

NANTES (47° 13′ N., 1° 33′ W.), city, on Loire, France; capital of Loire-Inférieure, with unfinished cathedral (XV. cent. onwards), St. Jacques (XII cent.), St. Nicholas (1844), ducal castle (1466), Palais de Justice, Dobrée and other museums, etc.; Rom. *Portus Namnetum*; capital of Brittany in Middle Ages; Edict of Nantes signed here, 1598; scene of 'Noyades,' 1793; chief industries—machinery, leather, nets, hardware, sardines, sugar-refining, soap. Pop. (1911) 170,535.

NANTES, EDICT OF, proclamation of Henry IV. of France granting toleration to Huguenots; signed at Nantes, 1598. It removed all civil and political disabilities from Protestants, allowed Prot. services to be held under certain regulations, and provided for payment of pastors. Revoked, 1685. See HUGUENOTS.

NANTICOKE (41° 14′ N., 76° 4′ W.), town, on Susquehanna, Pennsylvania, U.S.A.; anthracite coal mines. Pop. (1910) 18,877.

NANTUCKET.—(1) (41° 14′ N., 70° 7′ W.) county, Massachusetts, U.S.A., consisting of several islands 20 miles from coast; largest, 15 miles long, contains towns of Nantucket on N. and Siasconset on S. coast; island is traversed by railway. Pop. (1910) 2962. (2) capital of county, is picturesque town with excellent harbour; once noted for whale fisheries, now known chiefly as popular summer resort.

NANTWICH (53° 4′ N., 2° 31′ W.), town, Cheshire, England; boot and shoe manufactures; brine baths; has cruciform church and old grammar school. Pop. (1911) 7816.

NAPHTHA, term applied to a group of hydrocarbons, obtained by distillation of shale oil, coal-tar, or petroleum; these differ in composition but are similar in properties; inflammable, volatile liquids used for illumination and as solvents for fats and oils. Wood n., or wood spirit, is methyl alcohol; the other n's are mixtures of benzene, toluene, naphthene, etc.

NAPHTHALENE ($C_{10}H_8$), a colourless, volatile substance, which crystallises in plates and has a peculiar tarry smell; obtained from coal-tar; M.P. 79° C., B.P. 218° C.; cause of stoppage of gas-pipes in cold weather; used as disinfectant and in manufacture of artificial indigo; yields α and β derivatives. Two mono-derivatives are the α and β **Naphthols** ($C_{10}H_7OH$), prepared from corresponding naphthylamines: $C_{10}H_7NH_2 \rightarrow C_{10}H_7N_2Cl \rightarrow C_{10}H_7OH$, or sulphonates; $C_{10}H_7SO_3Na + NaOH = C_{10}H_7OH + Na_2SO_3$ (soda fusion). α-N. is crystalline, volatile; soluble with difficulty; has S.G. 1·22, B.P. 279° C., M.P. 95° C.; and β-N., crystalline, volatile, freely soluble, antiseptic; with S.G. 1·217, B.P. 285° C., and M.P. 122° C. Used in colour industry. Two other derivatives are the **Naphthylamines** (α and β): α-naphthylamine, colourless, insoluble crystals, turning red in air; disagreeable smell; M.P. 50° C.—β-naphthylamine, colourless, soluble, odourless; M.P. 112° C. Both are used in dyeing.

NAPIER (39° 29′ S., 176° 55′ E.), seaport, N. Island,

New Zealand; exports tinned and frozen meat. Pop. 10,500.

NAPIER AND ETTRICK, FRANCIS NAPIER, BARON (1819–98), Brit. diplomatist; ambassador to Austria, Turkey, Italy, U.S.A., Holland, Russia, and Germany successively; gov. of Madras, 1866; viceroy of India, 1872.

NAPIER, JOHN (1550–1617), Scot. mathematician; b. Merchiston, Edinburgh; ed. St. Andrews; afterwards travelled on the Continent, probably studying at Paris; then settled down at Merchiston and Gartness, where he devoted himself to study. In 1614 he published *Mirifici Logarithmorum Canonis Descriptio*, which made him famous all over Europe. In this work he gave, among other things, a table of the logarithms of the sines of angles for every minute to 7 figures, but gave no account of how the logarithms were calculated. This was done in *Mirifici Logarithmorum Canonis Constructio*, pub. in 1619 by his s. Robert. In 1617 N. wrote a small treatise describing a method of performing multiplication and division by means of a number of small rods, which came to be known as *N.'s Bones*. The change to common logarithms appears to have been effected by both N. and Briggs. N. was probably the first to use the decimal point instead of the cumbersome decimal notation previously employed. He is also known for his work on spherical trigonometry, given in his work of 1614. For a right-angled spherical triangle ABC, omitting the right angle C, we have 5 circular parts, a, b, $\frac{\pi}{2}-A$, $\frac{\pi}{2}-c$, $\frac{\pi}{2}-B$. Suppose these ranged round a circle; then any one may be called the *middle part*; the two next it are called *adjacent parts*, and the other two the *opposite parts*. *Napier's Rules* then give—

Sine of middle part
= Product of tangents of adjacent parts.
= Product of cosines of opposite parts.

Napier's Analogies were also given in his *Mir. Log. Can. Descriptio*. See LOGARITHM.

Life, by Earl of Buchan (1787), Mark Napier (1834).

NAPIER OF MAGDALA AND OF CARYNTON, ROBERT CORNELIS NAPIER, 1ST BARON (1810–90), Brit. soldier; served in Sutlej campaigns, 1845–46, and at *Gujrat*, 1849; lieut.-col. of engineers at siege of Lucknow, and won victory at *Powre*, 1858; directed siege of Peking, 1860; commander-in-chief of Ind. forces, 1870–76; gov. of Gibraltar, 1876–82; field-marshal, 1882.

Maclagan, *Memoir*.

NAPIER, SIR CHARLES (1786–1860), Brit. admiral; became admiral of fleet of Portug. constitutionalists, 1829, and placed Donna Maria on throne; brilliant defeat of Ibrahim Pasha, 1840; his conduct of Baltic fleet in Crimean War was wise, but unpopular.

E. Napier, *Life* (1862).

NAPIER, SIR CHARLES JAMES (1782–1853), Brit. soldier and administrator; grandson of 6th baron N. of Merchiston; commanded in Irish rebellion and at retreat to Corunna; captured at battle of *Corunna*, 1809, but released; won fame in Peninsula, in Amer. War and storming of Cambrai; app. 1841 to command army of Bombay against Ameers of Sind; performed feat of destroying Emaun Ghur, 1843; won battle of *Meeanee* against fearful odds and decisive battle of *Hyderabad*, 1843, after which Sind was annexed and N. made gov.; remarkable personality; dashing, inspiring general.

Life, by Bruce (1885), Butler (1890).

NAPIER, SIR WILLIAM FRANCIS PATRICK (1785–1860), Brit. soldier and historian; took part in famous retreat to Corunna and march of Light Brigade to Talavera, 1809; distinguished himself throughout Peninsular War, and wrote its history, pub. 1828–40; greatest military historian of England; accurate descriptions and characterisation, clear, easy style, and great eloquence; wrote *History of the Conquest of Scinde*, 1845, *History of the Administration of Scinde*, 1851, etc. His bro., SIR GEORGE THOMAS N., was a distinguished general and colonial governor.

Lord Aberdare, *Life* (1864).

NAPLES, NAPOLI (40° 50′ N., 14° 15′ E.), city, southern Italy; largest town in kingdom; capital of province of Naples; beautifully situated on N. shore of Bay of Naples, at base of Vesuvius; claims to possess the finest site in Europe—witness proverb, 'See Naples and die.' Naples consists of old and new town, with numerous churches and palaces with paintings and sculptures, old gateways, handsome streets, and beautiful parks. Outstanding features are Cathedral of San Gennaro (1272), San Giovanni a Carbonara (1343), San Domenico Maggiore (XIII. cent.), Santa Chiara (XIV. cent), Santa Maria del Carmine, Monte Oliveto (XV. cent.), S. Severino, S. Angelo a Nilo (XV. cent.); Castel dell' Ovo, Castel Sant' Elmo (1343), Castel Nuova, Castel Capuano, Castel Carmine; royal palace, Gravino (now post office), Caracciolo, Santangelo, and other fine palaces; national museum, with good art collection; univ. (1224), national library, famous Teatro San Carlo; Porta Nolana, Porta Capuana, and other old gateways; Carthusian convent of San Martino (art museum), celebrated Campo Santo, and Catacombs of San Gennaro. The surroundings include Pompeii, Herculaneum, Sorrento, and the islands of Capri and Ischia.

Naples was founded by Gk. emigrants from Cumæ (*q.v.*) as *Parthenope*; taken by Romans, 328 B.C., and flourished under Rom. Empire; conquered by Normans, XI. cent.; long capital of the kingdom of Naples (*q.v.*) and of the Two Sicilies; leading seaport of Italy and great trading centre; chief industries—macaroni and vermicelli, wine, olive oil, chemicals, textiles, lace, leather, paper, furniture, majolica wares, musical instruments, shipbuilding, perfumery. Pop. (1911) 723,208. The province of Naples has area of 350 sq. miles. Pop. (1911) 1,364,896.

Arthur Norway, *Naples Past and Present* (1901).

NAPLES, KINGDOM OF.—After fall of Rom. Empire of West, 476, Naples ('Continental Sicily') was successively member of Ital. kingdom of Ostrogoths, Byzantine Empire, and exarchate of Ravenna; during Arab invasions she became independent republic; conquered, 1130, by Roger II., grandson of Norman, Tancred de Hauteville, already Count of Sicily; thus was formed future realm of N. or **The Two Sicilies**, Roger becoming King Roger I. by coronation of pope, 1130–54. This Norman kingdom prospered, its rulers showed characteristic Norman gifts of pliability and tact, and won loyalty of Ital. and Arab subjects.

In 1177 Constance, sister and heir of William II. (1166–89), married Henry VI., s. of Emperor Frederick I., and became mother of the Emperor Frederick II. Henry VI., first Hohenstaufen ruler, was succeeded, 1197, by this s., who made Palermo his residence and centre of most brilliant court in Europe, restored ruined city of Lucera, and with support of devoted Muhammadans turned feudal realm of Normans into strong monarchy. He destroyed nobles' castles, and promulgated new constitution and legal code. On death of his s., Conrad I., 1254, an illegitimate s. of Frederick II. seized crown from infant nephew Conradin; the pope took opportunity to bestow crown on Charles of Anjou, who slew both Manfred and Conradin, but failed to hold Sicily.

The massacre of the French at *Sicilian Vespers*, 1282, was followed by election of Peter III. of Aragon, son-in-law of Manfred, as king of Sicily; Sicily and Naples remained separate kingdoms under houses of Aragon and Anjou until 1442, when, after many wars, Alfonso V. of Castile overthrew René of Anjou and reunited the realms. On his death his s., Ferdinand I. (1458–94), succeeded to Naples, but John, bro. of Alfonso, received Aragon and Sicily. Charles VIII. of France revived claim of house of Anjou, invaded Naples, and was crowned king, 1495, but Ferdinand II. reconquered realm as soon as he retired. Ferdinand

of Aragon and Sicily then took Naples from younger branch of Span. house, and reunited realms, 1503.

Austria obtained Naples from Spain by Treaty of Utrecht, 1713, when Sicily was annexed to Savoy; Savoy gave Sicily in 1718 to Spain, who surrendered it to Austria, 1720; Austria granted Naples and Sicily in 1735 to Don Carlos on condition of his renouncing claim to Spain; Bourbons ruled till 1799, when Naples was conquered by Championnet, who set up the *Parthenopæan republic*. Bourbons were restored by revolt, 1799, but expelled and Joseph Bonaparte made king of Naples, 1806. He was succeeded by Murat, 1808. French were expelled by Ferdinand IV., 1815, who as Ferdinand I. again united Naples and Sicily; insurrections took place, 1848; conquest by Garibaldi, 1860. Naples was annexed to Piedmont, 1861. See SICILY.

NAPOLEON I. (1769–1821), Emperor of the French; b. of patrician family BONAPARTE (*q.v.*) of Ital. origin, at Ajaccio, Corsica; trained at military school, Brienne, he held aloof from schoolfellows and shone in history, geography, and math's, but not in *belles lettres*. He became lieut. in artillery regiment, 1785, and lived in great poverty, helping to maintain family on his pay. At outbreak of Revolution he showed republican but anti-democratic opinions. Sent as officer to Corsica, 1792, he unsuccessfully supported Revolution against General Paoli; as lieut.-colonel of artillery he brought about fall of Toulon, 1793, and became brigadier-general and head of artillery of southern army, 1794. As commander of troops for defence of Convention, 1795, he scattered National Guard of 30,000 men and became commander of Army of Interior, thus emerging from obscurity as hero of the hour; m. Joséphine (*q.v.*) de Beauharnais, 1796. As commander-in-chief in Italy he defeated Austrians at *Montenotte*, April 11, 1796; won battles of *Millesimo*, April 14, *Mondovi*, April 22, *Lodi*, May 10. Austrians retreated and chief cities of Lombardy submitted; he pillaged north and central Italy. Second Austrian army drove N. from Mantua, but was routed at battles of *Castiglione*, Aug. 5, and *Bassano*, Sept. 8. Third Austrian army found Napoleonic forces exhausted, and won some successes, but were decisively defeated at *Arcola*, Nov. 17. Fourth Austrian force was conquered at *Rivoli*, Jan. 14, 1797, and Mantua surrendered. Archduke Charles at head of fifth army retreated, followed by N.; alarmed by N.'s approach towards Vienna, Austria made Treaty of Campo-Formio, granting Lombardy, Netherlands, etc., to France, and receiving Venice; in these campaigns Napoleonic genius had at once appeared at its height, to terror of Europe.

Egyptian Campaign.—N. returned to Paris covered with glory, Dec. 1797, and was appointed commander-in-chief for invasion of England; Brit. Government imagined that descent would be made on Ireland, but real plan of Directory was to attack outlying possessions. N. sailed from Toulon, May 19, 1798, evaded Nelson, and although at peace with Turkey, landed in Egypt, captured Alexandria, and, after battle of the *Pyramids*, July 21, entered Cairo. Egypt was reorganised as Fr. province, but victory of Nelson in *Aboukir Bay*, Aug. 2, destroyed fleet and cut off oceanic communications. Cairo seethed with revolt and Turkey declared war, and it was necessary for N. to return to Europe through hostile territory. He led army of 10,000 men S. through desert, laid Jaffa low, March 7, 1799, but was turned back at *Acre*, where Brit. force under Sir Sidney Smith aided valiant Turk. pasha Djezzar. N. was back in Cairo, June 14, and repelled invasion by Sultan with great slaughter, July 25. At last he managed to escape by sea and arrived in France, Oct. 9. Fr. scholars made important discoveries of papyri during Napoleonic occupation of Egypt.

Consul and Emperor.—N. now came to front in politics; misrule of Directory proved fatal to republic, and Abbé Sieyès organised plan for establishing military dictatorship. *Coup d'état of 18 Brumaire* (Nov. 9) overthrew Directory and made N. First Consul for ten years, with appointment to all State offices, initiation of legislation, and supreme military command. He was established in Tuileries, Jan. 1800. His consulate was important as period of organisation of existing scheme of local government; Fr. democracy had shown no talent for self-government; local councils elected by universal suffrage had failed, and N. made prefects who had replaced old *intendants* supreme locally, thus restoring order. Religion was reinstated and finances repaired before N. returned to his great passion, war.

N. stole across the Alps, May 1800, took Austrians unawares, won battle of *Marengo*, June 12, recovered Lombardy, and acquired Piedmont. Moreau won victories in Germany, and Austria again submitted by Treaty of Lunéville, Feb. 1801; Britain also made peace. A Cisalpine republic was established, and N. became its pres., Jan. 1802; app. Consul for life, Aug. 2, he reorganised Fr. institutions.

He had restored the Church, but secured Gallican liberties by *Concordat*, 1801, with Pius VII. Trade regulations, military, criminal, and civil laws were codified by *Code Napoléon* (the *Code civil* still remains in force); technical education was promoted, and an attempt made to stamp out the philosophical school which had produced the Revolution. Republicanism lingered, and Pichegru's plot (1804) aimed at assassination of new Cæsar; conspirators were ruthlessly punished, and N. seized pretext for execution of Duc d'Enghien, his political rival. He was crowned emperor, May 18, 1804, the pope assisting, but N. himself assuming crown; and was crowned king of Italy, May 26. He had little access of power, but position became hereditary, and N. established splendid court and grand dignitaries; senate was retained, but of little importance; tribunate was reduced, and abolished, 1807; able ministers were employed.

Execution of Enghien and Ital. encroachments led to formation of Third Coalition against Napoleon by Britain, Russia, Austria, Sweden, Naples, and Sardinia.

Austrian Campaign commenced with Austrian invasion of Bavaria, Ulm being occupied by General Mack, and of Italy under Archduke Charles. N. at once set out for Danube and placed himself between Mack and Vienna. Battle of *Elchingen* preceded surrender of Ney, Oct. 20; Mack surrendered Ulm, key to Vienna, Oct. 22, and N. occupied Vienna. He crossed Danube and, with Murat at head of cavalry, defeated allied Austrians and Russians at *Austerlitz*, Dec. 2; 20,000 prisoners and 189 guns were taken by French, 15,000 were killed and wounded. Army of archduke was meanwhile annihilated by Eugène de Beauharnais, N.'s deeply loved stepson, and Masséna. On Oct. 21 Villeneuve was defeated by Nelson at *Trafalgar*, and Fr. and Span. fleets were destroyed. Peace of Pressburg was made between Austria and France, Dec. 26, by which Austria lost considerable territory and Germany was reorganised under Fr. influence. France conquered Naples, Feb. 1806; N. made his bro. Joseph king; Holland was formed into kingdom for youngest bro., Louis, in June.

Prussian and Polish Campaigns, 1806–7.—Prussia hung aloof from Coalition, and on news of *Austerlitz* made Treaty of Schönbrunn with N., receiving Hanover from him. Shortly afterwards N. offered Hanover as bribe to Britain, and Frederick William III. declared war with the object of driving French from Germany. He was defeated by N. at *Jena* and by Davout at *Auerstädt*, Oct. 1806. Berlin was occupied by French, Oct. 26, and the cowardly and unpatriotic behaviour of Pruss. civilians facilitated almost complete conquest of Prussia. The BERLIN DECREES made opposition to N. a life-and-death struggle for every European country.

N. then turned towards Russia, occupying Warsaw, Dec. 15; received with enthusiasm by Poles, and took up winter quarters on Polo-Russian frontiers. Russ. army went into winter quarters near, and suspecting Fr. surprise General Benningsen attacked

scattered division under Bernadotte; N. instantly brought up main army and besieged Russ. forces in *Eylau*, Feb. 1807. N. won, but there were enormous losses on both sides. Dantzig fell, May 1807, and after decisive defeat at *Friedland*, June 14, Tsar made Treaty of Tilsit, July 7, 1807, abandoning Allies. Prussian territories were formed by N. into kingdom of Westphalia, and Prussian Poland became his grand-duchy of Warsaw. These two campaigns involved marches unparalleled in modern history, and seriously weakened the marvellous Grand Army, which was never the same army again, but N. was at height of power. Pruss. Poland was formed into kingdom of Westphalia for Jerome Bonaparte; abolition of tribunate in France removed nominal limitation on N.'s power at home. N. was always unfortunate when he crossed swords with Britain; Nelson, victor of *Aboukir Bay* and of *Trafalgar*, now successfully opposed N. in Portugal, which had refused to recognise Continental Blockade. N. overthrew Span. throne and made his bro. Joseph king, replacing Joseph by Murat as king of Naples; Britain successfully defended Portugal, and Sir John Moore was sent to aid of Spain; N. paid a hurried visit to Peninsula and captured Madrid, Dec. 4, 1808, but was called away by attack of Austria in early 1809.

Second Austrian Campaign, 1809.—Austria had revived since 1805; people were angered by dismemberment of empire, and new chancellor, Stadion, encouraged patriotic outburst, while Archduke Charles, commander-in-chief, reorganised army. Russia had fallen away, but Britain promised large reinforcements for Austrian attack. Archduke Charles led army of 170,000 men into Bavaria, while Archduke John invaded Italy, 1809, but N. flew with picked troops from Spain, won battle of *Abensberg*, April 20, and battle of *Eckmühl*, April 22, captured Vienna, May 12, hamlets of Aspern and Essling, May 22; Eugène de Beauharnais hastened from Italy to his assistance, driving back John and defeating Hungarians, June 14. The joint army inflicted on Archduke Charles the crushing defeat of *Wagram*, July 6; N. was unable to follow up victory, but obtained large cession of Austrian territory at Treaty of Vienna, Oct. 14, 1809. N., ambitious of founding dynasty, divorced Joséphine, Dec. 16; Joséphine, to whom he had been deeply attached, had treated him with cruel coldness in early days of union, but for some years bitterly felt his indifference. His marriage in early 1810 with Marie Louise (*q.v.*), Archduchess of Austria, distasteful to Austria but recommended by Metternich, was important to N. as reception into historic ruling houses of Europe. N. in 1812 encroached still farther on European territory, blind to strong national feeling rising everywhere against his empire, and ruled France as benevolent despot. The beginning of the end came with the great misfortunes of 1812.

Russian Campaign, 1812.—N.'s power declined after Pruss. and Polish campaign, despite subsequent increase of territory; by his destruction of feudal principalities he made Ger. national feeling possible, and a great national movement took place in Prussia. The physique of Grand Army was destroyed; Russia disliked grand-duchy of Warsaw, Continental Blockade, N.'s Span. policy, and omission to enrich herself. Britain urged Russia to declare war, and aided in reorganisation of Russ. army on modern plan; N. determined to crush Russia and even expel Russians from Europe; large Fr. army, no longer a force of heroes, but over half foreign mercenaries, made long terrible march across Europe under N., occupied Lithuania, and captured Smolensk, August 18. Russians under Tolly and Bagration adopted skilful policy of retreat, luring enemy on into devastated country. At the battle of *Borodino*, Sept. 7, 50,000 Russians (including Bagration) and 30,000 French were slain. French captured *Moscow*, Sept. 14; and two days later it was destroyed by fire. N., in hope of submission of Tsar Alexander, delayed till Oct. 15, then was forced to commence retreat; a bitter march in snow, without supplies, exposed him to attacks of enemy. N. was forced to leave army and return speedily by sleigh to Paris; the survivors were led home by Murat. Contemporaneously France suffered great reverses in Peninsula.

German War of Liberation, 1813.—Prussia on news of retreat from Moscow at once declared war, March 16, 1813, having made Treaty of Kalisch with Russia, February 27. French were driven from Berlin by Russians; two Prussian armies were formed, under Bülow and Blücher, the first to co-operate with Swedes, second with Russians under Tolly. N. marched at head of 300,000 men to restore Fr. power; won battle of *Lutzen*, May 2, reoccupied Saxony, and won battle of *Bautzen*, May 20, while Vandamme seized Hamburg. The armistice of Pleswitz was made, June 3, until attitude of Austria could be discovered; Metternich, now supreme in Austria, held Austria aloof and posed as mediator, fearing too great success of Russia, but ultimately nominally joined Allies, August 12. Moreau and General Jomini sketched plan of new campaign for Allies, but N. anticipated attack; his general, Oudinot, was defeated at *Gross Beeren* by Bernadotte, Macdonald at *Katzbach* by Blücher, August 23 and 25; destructive battle of *Dresden*, August 26 and 27, was won by French; Vandamme capitulated to Tolly at *Kulm*, after loss of 10,000 men; Ney was defeated by Bernadotte and Bülow at *Dennewitz*, Sept. 6. The Fr. army was decimated by fighting and desertion; and the Allies won the *Battle of the Nations*, at Leipzig, Oct. 16–19, destroying N.'s army; French secured retreat by victory of *Hanau* over Bavarians. Allies, by vote of Britain, Russia, and Prussia, pursued N.; Fr. armies scattered in foreign countries and engaged on southern frontier by Wellington; Blücher crossed Rhine, Dec. 31, 1813, with Prussian main army, Russians and Austrians entered from Switzerland. N. brilliantly repulsed each separately and almost completely annihilated Prussians. Britain, however, kept Coalition together and made new alliance by Treaty of Chaumont, March 1814; Blücher, reinforced by Swedes and Russians, and Austrian army, acting separately, again made for Paris; N. fought Blücher without success at *Craonne* and *Laon*, March 7 and 9, and Austrians won at *Arcis-sur-Aube*, March 20; while N. attempted to cut off their communications.

Napoleon's Downfall.—Paris at last was captured, March 30, by Russians and Prussians; N. abdicated, April 4, and was forced to retire to island of Elba, but allowed to rule it and retain title of emperor. He escaped, returned to France, March 1, 1815, and was welcomed by army, but not by majority of people. He established *Hundred Days* rule; marched into Belgium and defeated Blücher at *Ligny*; was completely conquered at *Waterloo* (q.v.), June 18; fled to Paris, abdicated in favour of son Napoleon, sought to escape to U.S.A., but surrendered to Capt. Maitland of *Bellerophon*, July 15, and was confined till death at St. Helena, a lonely rock in the Atlantic, under charge of Sir Hudson Lowe. His remains were removed to the *Invalides*, 1840.

N. was of spare form, massive head, high cheekbones, prominent jaw, large eyes with two deep lines between, piercing gaze, straight hair sweeping over brow; he spoke in abrupt, imperious tones. He was strikingly thin and pale in youth; loyal and self-sacrificing to ungrateful family, and constant in personal relationships. Among his mistresses, none of whom attained power in state, was faithful Mme Walewska, who, unlike the Empress Marie Louise, followed him to Elba. He was maligned in every way after his fall, but idolised at height of his fortune. There is a modern reaction against blackening of his character.

Lord Rosebery, *N. : The Last Phase* (1900); Browning, *N. : The First Phase* (1905); Holland Rose, *Life of N. I.* (4th ed., 1904); Hassall, *Napoleon* (1911); H. A. L. Fisher, *Bonapartism, and Napoleonic Statesmanship*; Kircheisen, *Bibliography of N.*

NAPOLEON II., Napoléon François Charles Joseph (1811–32), titular emperor of French; s. of N. I. by second wife, Marie Louise, Archduchess of Austria; called 'King of Rome' at birth; N. I. abdicated in his favour, 1814 and 1815; not allowed by Powers to possess even Parma; withdrew to Austrian court and lived as Duke of Reichstadt; feeble in health.

NAPOLEON III., Charles Louis Napoléon Bonaparte (1808–73), last emperor of the French; second surviving s. of Louis Bonaparte, bro. of N. I.; joined Carbonari movement in Papal States, 1831. On his bro.'s death shortly afterwards, although his father and uncle still lived, N. assumed headship of family, and sought Bonaparte restoration; failure of conspiracy, 1837; pub. *Des idées Napoléoniennes*, 1839; captured in attempted invasion of France, 1840, and condemned to perpetual captivity. He escaped, 1846, and lived a gay society life in London.

N. returned to France at revolution of 1848, became Pres. of republic, and set himself to revive empire. Freedom of speech and press was put down, and aid of Church was invoked to discredit republican teaching, while masses were gained over by *largesses*; the Ministry was composed of his creatures. Assembly refused to allow his re-election as Pres. as contrary to constitution, and angered populace by throwing out universal suffrage bill; Assembly was broken up, 1851, and France governed by proclamations.

N. was declared emperor, 1852. All threads of administration were collected in his hands, and popularity was obtained by showy court, handsome public works, lowering of price of food and hours of labour. N. married Eugénie (*q.v.*) de Montijo, 1853. His career was crowned by Franco-Brit. victories in Crimea. He supported Italy in its War of Liberation, and a successful campaign was waged against Austria in 1859, but the united influence of the empress and the Roman Catholics compelled N. to sign the armistice of Villafranca. By the Treaty of Turin, 1860, France gained Savoy and Nice, in return for her assistance. Russia was offended by N.'s Polish policy, 1863; failure of Mexican expeditions, 1863–67, brought further loss of prestige, and all hope of reviving glory of France was lost by Prussian defeat of Austria, 1866. The growing strength of republican and constitutional party at home extorted concessions. N.'s foreign policy, a fruitless attempt to endear his dynasty to the people by foreign conquest, brought on Franco-German War (*q.v.*), 1870. N. surrendered at Sedan, and was deposed, 1870. He lived in England till his death. His only son, the Prince Imperial, was killed in the Zulu War, 1879. Of indestructible, fixed ambition, but lacking firmness in policy, N.'s ideal was to make France the centre of a revived Rom. Empire. He wrote a brilliant *Histoire de Jules César*, etc.

Jerrold, *N. III.* (1874–82); Forbes, *N. III.* (1898); Victor Hugo, *Histoire d'un crime* (1877).

NAPOLEON FAMILY, see Bonapartes.

NAPOLEONITE, a stone sometimes called Corsite, because found in island of Corsica; a variety of dolerite (*q.v.*); often cut and polished for ornamental purposes.

NARA (34° 45′ N., 135° 45′ E.), town, Yamato, Japan; contains gigantic statue of Buddha, and many beautiful temples; formerly capital of Japan. Pop. 32,732.

NARA, Eastern and Western (*c.* 27° 20′ N., 68° E.), two water channels, Sind, Brit. India.

NARAINGANJ (23° 37′ N., 90° 32′ E.), town, Dacca, Bengal, India; entrepôt for jute. Pop. 26,000.

NARBADA, see Nerbudda.

NARBONNE (43° 11′ N., 3° E.), town, Aude, France; with cathedral, Church of St. Paul, and abp.'s palace; Rom. *Narbo Martius*; united to France, 1507; famous for white heather, honey, and red wine. Pop. *c.* 29,000.

NARBUDDA, see Nerbudda.

NARCISSUS (*Narcissus poeticus*), a favourite garden flower. The plant is bulbous, and the blooms resemble those of the *Liliaceæ*, except that the ovary is inferior, and that a portion of the perianth is modified to form a discoid corona. The fruit is a trilocular capsule.

NARCISSUS (classical myth.), beautiful youth, s. of Cephissus and Leiriope; fell in love with his own reflection and pined away; changed into flower bearing his name.

NARCOMEDUSÆ, see under Hydromedusæ.

NARCOTICS, drugs which, when administered in sufficient quantity, produce stupor which may go on to profound coma, paralysis, or convulsions, and even eventually death. In small doses, various n's act in different ways, some being stimulants, some producing delirium, some acting as intoxicants, some producing sleep, while the most evident property in some is their power to relieve pain. The chief n's are *opium* (and the most important alkaloid it contains, *morphine*), *cannabis indica*, *belladonna* (and its alkaloid, *atropine*), *stramonium*, *hyoscyamus*, *chloral hydrate*, and *alcohol*. See separate articles on those drugs.

NARCOTINE, see Opium.

NARNI (42° 32′ N., 12° 30′ E.), town, ancient *Narnia*, Perugia, Italy; bp.'s see; cathedral. Pop. 12,500.

NARRAGANSETT PIER (41° 25′ N., 71° 23′ W.), town, on N. Bay, Rhode Island, U.S.A.; favourite summer resort.

NARSES (*c.* 475–573), statesman and general of Byzantine Empire; native of Persarmenia; brought up in imperial household, a eunuch, and rose to be important official; in 'Nika' revolt, 532, N. saved Justinian by lavish distribution of bribes; sent to aid Belisarius in Italy, 538, and purposely hampered him; defeated Goths of Italy, 552, and Alamanni and Franks at great battle of *Capua*, 554; captured and hanged king of the Heruli, 565; made prefect of Italy, and rebuilt cities destroyed by barbarians, but was recalled on charge of extortion, 567, and in revenge delivered over Italy to Lombards of Pannonia.

NARSINGHGARH (23° 42′ N., 77° 5′ E.), native state, Bhopal Agency, India; capital, Narsinghgarh. Pop. of state, 120,000; of town, 9000.

NARSINGHPUR (23° N., 79° E.), district, Nerbudda, Central Province, Brit. India; capital, Narsinghpur. Pop. of district, 320,000; of town, 13,000.

NARVA, Narova (59° 22′ N., 28° 6′ E.), seaport, on Narva, St. Petersburg, Russia; cottons, woollens. Pop. 17,500.

NARVACAN (17° 30′ N., 120° 30′ E.), town, Ilocos Sur, Luzon, Philippine Islands. Pop. 17,000.

NARVIK, Victoriahavn (68° 30′ N., 17° 20′ E.), seaport, Nordland, Norway.

NARWHAL, see Dolphin Family.

NASALIS, see under Cercopithecidæ.

NASCIMENTO, FRANCISCO MANOEL DE (1734–1819), Portug. poet, commonly called Filinto Elysio, was the precursor of the Portug. Romantic movement; his friendship for Maria de Almeida inspired him to write his finest lyrics. His last days were darkened by exile, but his muse gained rather than lost thereby.

NASEBY (52° 24′ N., 0° 59′ W.), village, Northamptonshire, England, near which Roundheads under Cromwell and Fairfax gained decisive victory over Royalists in 1645.

NASH, RICHARD (fl. 1700), see Beau.

NASHE, THOMAS, Nash (1567–1601), Eng. writer; b. Lowestoft; extraordinary good-nature in face of misfortune made him universally beloved; wrote poetry, plays, and pamphlets; a pioneer novelist; works include *Anatomie of Absurditie*, *Pierce Penilesse*, and *The Unfortunate Traveller*.

NASHUA (42° 45′ N., 71° 53′ W.), city, on Merrimac, New Hampshire, U.S.A.; ironworks. Pop. (1910) 26,005.

NASHVILLE (36° 8′ N., 86° 47′ W.), city, capital of Tennessee, U.S.A., on Cumberland River; well-

laid-out city; most notable buildings, State Capitol, Court-House, Custom-House, and Federal Buildings; important educational centre; containing Nashville Univ., Vanderbilt Univ., Central Tennessee Coll., Fisk Univ., and Roger William Univ.; has extensive trade; manufactures include flour, cotton, saddlery, furniture, and timber produce; railway centre; founded 1780; scene of Confederate defeat, 1864. Pop. (1910) 110,364.

NASIK (20° N., 73° 49′ E.), town, on Godavari, Bombay, India; brassware. Pop. 23,000.

NĀSIR KHOSRAU (1004–88), first Persian poet; spent studious youth enlivened by much wine-drinking and revelry; converted *c.* 1050, and went on pilgrimage to Mecca; the journey he described in *Safarnama*. Later his energies were employed in propagating Shi'a doctrines.

NASIRABAD, MYMENSINGH (24° 45′ N., 90° 26′ E.), town, Mymensingh, Bengal, India. Pop. 16,000.

NASMYTH, JAMES (1808–90), Scot. engineer; b. Edinburgh; s. of Alexander N.; invented steam-hammer, 1839.

NASO, see OVID.

NASSARAWA (*c.* 8° E., 8° 40′ N.), province, Brit. N. Nigeria; area, *c.* 18,000 sq. miles; native insurrection in 1900 subdued by Brit. force; produces cotton, rubber. Pop. 1,400,000.

NASSAU (50° 30′ N., 9° E.), district in Pruss. province of Hesse-Nassau, Germany; bounded S. and W. by Rhine and Main, N. by Westphalia, E. by Hesse; area, 1830 sq. miles; surface mountainous; capital, Weisbaden. An independent duchy from 1806, N. was incorporated with Prussia, 1866; younger branch of N. family founded House of Orange-Nassau. N. has numerous mineral springs; famous wines.

NASTURTIUM, INDIAN CRESS, hardy annual, originally native of Peru; climbs by leaf-stalk; possesses five sepals and eight unequal stamens, while the flowers are yellow, with characteristic smell. Besides various varieties of *Tropæolum magnus*, there is the Watercress, *N. officinale*, which is used as a salad preparation.

NATAL (26° 30′ to 31° S., 29° to 33° E.), an original province of the Union of South Africa, on S.E. coast of Africa; bounded on S.W. by Cape of Good Hope Province (Pondoland and Griqualand East), W. by Basutoland and Orange Free State, N. by Transvaal and Portug. East Africa; area (including Zululand and Amatongaland), 35,371 sq. miles; seaboard (washed by Indian Ocean) over 350 miles. Zulu Coast has shallow lagoons; Durban, N.'s only important port. From coast, surface rises over 5000 ft. in series of ledges with many hills and valleys to lofty Drakensberg Mts. on western border; numerous rivers and streams (chief, Tugela), but not navigable. Climate is healthy; coast districts semi-tropical, but practically fever-free; more bracing farther north (during night temperature sometimes falls to freezing-point); heavy summer rains, Sept. to March; frequent thunderstorms; dry, sunny winter.

History.—N. was discovered, Christmas Day, 1497, by Portug. mariner, Vasco da Gama (*q.v.*), and accordingly christened by him *Terra Natalis* (land of the Nativity). European settlement, however, dates only from 1823–24, when Eng. explorers landed and obtained land-grant (where Durban now stands) from Zulu king Tchaka, whose military genius had made him master of all S.E. Africa, and whose relentless cruelty had transformed a once populous land into a desolate waste. This Eng. settlement protected tribes which fled from Tchaka's ruthless sway. In 1838 a body of Boers (under Retief) who had trekked inland from the Cape, entered Natal from the N., and were treacherously massacred at Weenen (*i.e.* 'weeping'), by Dingaan, Tchaka's bro., assassin, and successor. A punitive expedition from Durban was wiped out, but on Dec. 16 ('Dingaan's Day') the Zulu was routed by Dutch under Pretorius. A Dutch republic, 'Natalia,' was proclaimed, 1840; hostilities broke out between British and Boers; Natal was declared a British Colony, 1843, and Boers withdrew to north; Natal annexed to Cape, 1845, made separate colony, 1856. Cetewayo succeeded as Zulu king, 1872; on his refusal to disband forces, war declared, 1879. British were defeated at *Isandhlwana*, but gallantly held *Rorke's Drift* (Jan. 22, 1879), averting invasion of Natal; Brit. reinforcements crushed Zulu *impis* at *Ulundi* (July 4), and Cetewayo was captured and exiled. In Boer War (1880–81) fighting took place on Natal border. Native troubles continuing, Cetewayo was restored, 1883 (d. 1884); Zululand annexed as Crown Colony, 1887; Dinizulu, Cetewayo's son and successor, rebelled, but was exiled to St. Helena, 1889; responsible government granted, 1893; Ingwavuma between Swaziland and Amatongaland incorporated in Zululand, 1895; Zululand made part of Natal, 1897; Natal invaded by Boers during South African War, 1899–1900; portion of South African Republic south of Pongola River added to Natal, 1902; rising under Bambata and Siganandi, 1906, suppressed by Colonists; Natal merged in Union of South Africa, 1910. See SOUTH AFRICA, *History*.

Natal is divided into ten counties and Zululand; purely provincial affairs managed by Administrator and Provincial Council; provincial capital, Pietermaritzburg (*q.v.*); largest town and port, Durban (*q.v.*). Railways (mileage, *c.* 1100 miles) run along coast and inland across Drakensbergs to Johannesburg and Bloemfontein. N. long competed with Cape Ports and Lourenzo Marques for Rand carrying-trade; traffic finally apportioned by agreement, N. getting 25–30 %.

Resources.—N.'s most important industry is sheep-farming, in midland and upland districts. Cattle are reared everywhere, but have suffered badly from East Coast fever and lung-sickness. Angora goats and horses thrive in higher regions. Agricultural products vary according to situation; about 1,000,000 acres are cultivated, half by natives and Indians. On coastal belt (25 to 30 miles wide) sugar is chief product, plantations being worked by Indian coolies; tea is also extensively cultivated and exported; likewise coffee and cotton. Wattle-bark is grown largely in midlands. Maize grows everywhere, and is N.'s chief grain-crop, exports increasing rapidly. Nearly every fruit flourishes; orchards mostly on coast, where bananas, pine-apples, etc., grow; citrus fruits from coast and midlands are exported; other products include tobacco, Kaffir corn, lucerne, sweet potatoes, and vegetables. Forests are small, some blue-gum plantations. Locusts are troublesome, but active measures are being taken to exterminate them. Irrigation is easy and most profitable. There are several government and other irrigation settlements. Chief mineral is coal—principal mines at Dundee; a most promising industry; output 2–3 million tons; mostly exported and used for bunkers. Building-stone, marble (near Umzimkulu mouth), asbestos (Eshowe), and manganese ore are also worked. Manufactures are few and small (fruit-canning, sugar, tea factories, etc.). Fish abound in coastal waters; Durban has whaling-station.

Education is under provincial control till 1915; Government and Government-aided schools; separate schools for natives, Indians, and coloured children; Natal Univ. Coll., Maritzburg, under Union Gov. Natives outnumber Europeans by ten to one; many Indians, constituting serious economic problem (see ASIATIC QUESTION). Pop. (1904) 1,108,000; (1911) 1,192,000 (including Zululand, 219,000); white pop. (1904) 97,107; (1911) 98,582.

See also SOUTH AFRICA, ZULULAND.

Bird, *Annals of Natal, 1495–1845* (1888); Russell, *The Garden Colony: The Story of Natal* (1910); Tatlow, *N. Province* (1912).

NATAL (5° 48′ S., 35° 13′ W.), city, capital, Rio Grande do Norte, at mouth of Rio Grande, Brazil; exports cotton, sugar. Pop. 13,000.

NATCHEZ (31° 34′ N., 91° 20′ W.), town, Mississippi; busy river trade; exports cotton; has R.C.

cathedral, various educational and charitable institutions. Pop. (1910) 11,791.

NATENZ, NATANZ (33° 30′ N., 51° 50′ E.), province, Persia. Pop. *c.* 23,000. Chief town, **Natenz.** Pop. *c.* 3000.

NATICK (42° 25′ N., 71° 20′ W.), town, on Lake Cochituate, Massachusetts, U.S.A.; boots and shoes. Pop. (1910) 9866.

NATIONAL ANTHEMS.—The growth of patriotic songs or hymns, which have been specialised as the national tune of various nations, dates from the XVIII. cent. Chief among n. a's is *God Save the King* (*c.* 1745, attributed to John Bull and various other composers from 1620 to 1750), sung wherever Brit. subjects are gathered together. Other famous n. a's include *Hail, Columbia!* (1798) and the *Star-Spangled Banner* (1814) (U.S.A.); the *Marseillaise* (France); *Heil dir im Siegeskranz* (Germany). The tune of 'God Save the King' has been taken by several foreign countries for their n. a.

NATIONAL COVENANT, see COVENANTS, SCOTTISH.

NATIONAL DEBT OF BRITAIN, total debt of State to various lenders; originated under William III.; Revolution government was called upon to meet heavy war expenses and could not resort to financial expedients which had proved fatal to Stewarts. In Committee of Ways and Means, 1692, the skilful financier Montague proposed public loan; by Act of 1693 duties were appropriated to repayment of £1,000,000, to be raised by loan, in terminable annuities. Practice increased, repayment at fixed periods was largely abandoned, and in 1702 debt amounted to over 16 millions; steadily grew, and in 1815 amounted to 840 millions; in 1902, 780 millions.

It is chiefly repaid by life annuities, or annuities for term of years, but sometimes by instalments, or *in toto* at fixed date; investors can at any time sell out; tontine annuities (a method of repayment named after Ital. financier Tonti and abandoned in England, 1789) were settled on survivor among subscribers; they are still issued in U.S.A. Exchequer bills and treasury bills are loans raised for short period at low interest; exchequer bonds are form of usual loan. Loans are usually negotiated through bankers, who find great profit in transaction. Great differences of opinion exist among political economists as to advisability of N. D.; in time of war it is generally inevitable, and is by many considered smaller evil than increased taxation; treasury system of the ancients, to which Germany clings, considered wasteful, as money lies idle, and many modern economists approve of retention of system; when loans were first contracted, however, governments aimed at paying them off as quickly as possible, and great efforts at sinking were made in XVIII. cent.; Walpole reduced rate of interest from 6 % to 5 %, 1714, and made regulations for applying surplus income to reduction of principal; Act 1749 for reduction of interest to 3 %; variations in XIX. cent. caused by government's temporary needs; important reductions of interest by Goulburn, 1844, and Goschen, 1888. Brit. N. D. is managed by the Banks of England and Ireland, the Treasury, and the Commission for Reduction of N. D.

The following list shows the National Debt of the principal countries: United Kingdom (1912), £718,406,428; United States (1911), after deducting cash in treasury, $1,105,784,338; France (1911), £1,301,718,300; German Empire (1911), £269,844,390; Austria (1911), £510,418,000; Hungary (1910), £221,555,333; Italy (1911), £553,315,604; Russia (1909), £975,000,000.

NATIONAL INSURANCE, see INSURANCE (NATIONAL).

NATIONAL WORKSHOPS, see ATELIERS NATIONAUX.

NATURAL BRIDGE (37° 40′ N., 79° 35′ W.), village, Virginia, U.S.A.; remarkable natural arch of rock.

NATURAL SELECTION, see EVOLUTION.

NATURALISATION.—Persons of foreign nationality resident in Britain and desiring to become Brit. subjects must fulfil the following conditions: (1) residence in the United Kingdom or service under the Crown for not less than five years; (2) furnish evidence of intention to reside in the United Kingdom or to serve under the Crown; (3) pay a fee of £5 on the grant of certificate of naturalisation.

In the Brit. overseas dominions conditions of n. vary, but are generally less stringent than in the mother-country. A person naturalised in the U.K. does not require to be naturalised again in the Brit. Colonies; but one naturalised in a Brit. colony might find on removing to the U.K. that his n. was not recognised as applying to the mother-country as well. The subject has been discussed at several Colonial Conferences, and an effort is being made to secure uniformity and reciprocity in the law of n. in the different parts of the Empire.

In foreign countries, among other conditions, periods of residence ranging from 1 year upwards are required for n. In the U.S.A., 5 years' residence is necessary; applicants must renounce any claim to nobility and allegiance to any other land.

NATURALISM.—One form opposes the natural, as the essential, to the acquired or artificial; with Locke, sensations are real, relations are the work of the mind, therefore unreal. This form, which identifies the natural and the non-rational, finally becomes Sensationalism or Associationism. The rational, taken as the natural, may be opposed to what is above or contrary to reason, as by Eng. Deists.

NAUCRARY, a division of the people of Attica, based, most probably, on the provision of a ship by each. The Ionian tribes were divided into 48 n's.

NAUCRATIS, ruined Gk. town, at Canopic mouth of Nile, Egypt; had pottery factory and various temples; re-discovered by Flinders Petrie in 1884, and subsequently excavated.

NAUDÉ, GABRIEL (1600–53), Fr. scholar; physician to Louis XIII.; formed Mazarin's library (1642) and preserved it from destruction during the Fronde; wrote *Advis pour dresser une bibliothèque*, *Jugement de tout ce qui a été imprimé contre le Cardinal Mazarin* (1649), etc., all now rare.

NAUGATUCK (41° 28′ N., 73° 2′ W.), town on Naugatuck, Connecticut, U.S.A.; rubber goods. Pop. (1910) 12,722.

NAUHEIM, BAD NAUHEIM (50° 20′ N., 8° 42′ E.), watering-place, Hesse, Germany; salt springs. Pop. (1910) 5700.

NAUMBURG (51° 10′ N., 11° 44′ E.), town, on Saale, Saxony, Prussia; cathedral; woollens. Pop. (1910) 27,047.

NAUPACTUS (38° 23′ N., 21° 50′ E.), ancient city, now LEPANTO, on N. shore of entrance to Gulf of Corinth or Lepanto; near site of battle of Lepanto (*q.v.*).

NAUPLIA (37° 33′ N., 22° 48′ E.), fortified town, capital of Argolis, Greece; on Gulf of Nauplia. Pop. 10,700.

NAUPLIUS, unsegmented larval form of lower Crustaceans, with 3 pairs of appendages. See CRUSTACEA.

NAUSEA, feeling of inclination to vomit.

NAUSHAHR, town, India. See AJAIGARH.

NAUTCHIS, see BAYADERES.

NAUTILUS, a genus of Cephalopoda (*q.v.*).

NAUVOO (40° 35′ N., 91° 20′ W.), town, Illinois, U.S.A.; for some time a centre of Mormon religion; afterwards settled by Fr. Socialists. Pop. (1910) 1020.

NAVAN (53° 38′ N., 6° 42′ W.), market town, at junction of Blackwater and Boyne, Meath, Ireland; woollens.

NAVANAGAR, see NAWANAGAR.

NAVARINO, see PYLOS.

NAVARINO, BATTLE OF, naval battle, 1827, which secured independence of Greece. Brit., Fr., and Russ. fleets, under Sir Edward Codrington, engaged against Turk. and Egyptian fleets to almost total destruction of latter; results: Turks

obliged to abandon Greece; Turk. power fatally weakened.

NAVARRE, Navarra (42° 40′ N., 1° 50′ W.), province, Spain; bounded by France, Aragon, Castile, Alava, and Guipuzcoa; area, 4055 sq. miles; traversed by Pyrenees; chief rivers, Ebro, Arga, Ega, Aragon; capital, Pamplona. N. was an independent kingdom, X. cent.; joined to Aragon, 1076; Champagne, 1234; Spain, 1512; Fr. Navarre (part of Basses-Pyrénées) passed to France with Henry IV. (Henry of Navarre), 1589. Chief products, grain, olives, fruits, red wine; cattle-rearing; silver-lead and copper mines; iron-ore and salt found. Pop. (1910) 312,020.

NAVARRETE, MARTIN FERNANDEZ DE (1765–1844), Span. historian; wrote on discovery of America; author of *Life of Cervantes.*

NAVARRO, PEDRO (*c.* 1460–1528), Span. military engineer and general. Distinguished in defence of Canosa and Taranto, 1502–3; taken prisoner by French, and after three years' imprisonment joined Fr. army.

NAVE, that part between the side aisles of a cathedral or church, extending from western entrance to transept, on to choir or chancel, according to nature and extent of the building. See Architecture (*Gothic*).

NAVEL, Umbilicus, the depression on the front of the abdomen marking the point of attachment of the umbilical cord, by which the *fœtus* obtains nourishment from the mother.

NAVIES AND NAVAL POWER.—From the earliest historical times it has been recognised that a State which possesses any seaboard, must have, in addition to an adequate land-force, a fleet to protect its commerce and its colonies, to defend its coasts, and, should occasion arise, to carry war into hostile waters. As early civilisation centred round the Mediterranean, it is to that part of the world that one looks for the beginnings of sea-power.

Sea-Power.—The Phœnicians were probably the first rulers of the Eastern Mediterranean, and by their enterprise and maritime skill they dominated commerce in the Levant and established cities and trading posts in Sicily and along the African coast as far as the Pillars of Hercules (Gibraltar). Meanwhile the Greek States were increasing their mercantile marine and also planting colonies in Asia Minor, Magna Græcia, and Sicily, where they came into conflict with the Phœnicians, who, together with the Etruscans, a nation which possessed a considerable fleet, drove back in 537 B.C. a flotilla of Phocæan Greeks who were attempting to establish themselves in Corsica.

The rise of Persia reduced Phœnicia to a tributary state, and the 'Great King' frequently employed Phœnician ships in his military enterprises. Thus, when Xerxes planned his invasion of Greece, he collected an enormous fleet, largely composed of Phœnician and Ionian vessels. The victory of *Salamis* (480 B.C.) won for Greece (and particularly for Athens) not only freedom from Persia, but also the suzerainty of the Eastern and Central Mediterranean, while Phœnicia as a great factor in naval warfare did not reappear till mediæval times.

The downfall of Athens as a sea-power was due to the mismanagement of the ill-starred *Syracusan expedition* (415–413 B.C.), when the flower of the Athenian navy perished. The marvellous recuperative power which enabled her to conduct the subsequent Peloponnesian War was but a last effort, and upon the appearance of a fleet superior both in *morale* and tactics, Athens was finally crushed at *Ægospotami* (405 B.C.). Her victors were too short-sighted to make much use of their triumph.

Although Phœnicia's power had declined, her colony, Carthage, was in the Western and Central Mediterranean what Phœnicia had been in the Levant. Rome was excluded from maritime commerce, and her development was consequently hindered. She had no fleet to defeat her rivals, but with characteristic enterprise set about building one. Her naval tactics were original: by the *corvus* she succeeded in turning a naval engagement into something approaching a land-battle. The Punic Wars were won, not on land—Rome could produce no general equal to Hannibal—but by sea, for the Roman fleet could intercept reinforcements and supplies, and eventually was able to land troops on Carthaginian soil. From this period dates Rome's colonial expansion, which, had it not been for her sea-power, would never have been.

Mediæval Period.—On the decline of the Rom. Empire the next power on the Mediterranean was Muhammadan. The Saracens drew largely on the Phœnicians for their fleet, and twice subjected Constantinople to serious attacks (668–716). Their retiral and the change of capital from Damascus to Bagdad again left Greece a naval power, which proved of great value during the Crusades when combined with fleets from Italian cities.

During the later part of the X. cent. three powers appeared which were almost exclusively maritime, Venice, Genoa, and Pisa. They were constantly at war with each other till in the XV. cent. Venice was acknowledged victor, and as such remained till after the fall of Constantinople (1453), when the Turks began to threaten her. The decay of the Venetian sea-power dates from her defeat in 1470 by the Turks, who, till their defeat at *Lepanto*, 1571, seriously menaced Europe, while the Barbary corsairs constantly inflicted losses upon shipping till a much later date.

Modern Times.—The discovery of the compass and the introduction of gunpowder revolutionised naval warfare; above all, they did away with the galley. The *periplous, diecplous,* and other tactics which had existed since classical times were no longer possible under these new conditions, while by the compass longer voyages were rendered possible. To this period belong the rise of Portugal, the exploits of Prince Henry the Navigator, the discovery of the New World, and the growth of Spanish naval power.

England had before this time utilised naval force to a certain extent, as may be seen from her frequent inroads on France and the battles of *Sluys* and *Dover,* but it was in the XVI. cent. that her sea-power developed to an astonishing degree. The exploits of Hawkins, Drake, and others on the Spanish Main were a fitting prelude to the defeat of the *Armada* in 1588, when England, crushing Spain's fleet, took her place as the first sea-power in Europe. The almost inevitable tendency to presume on this new strength led to the mismanaged expedition to the *Ile de Ré,* 1627, and other failures, while the Dutch for a time seriously disputed Eng. sovereignty of the seas, and more than once defeated Eng. admirals and inflicted great havoc on Eng. merchant shipping (see Holland).

The disputes with Holland were largely due to England's claim to the command of the sea. The rapid rise of Holland as a sea-power was the direct outcome of the successful revolt of the United Provinces from Spain; some of her admirals, like many Elizabethan seamen, began their career as privateers.

During the Seven Years War Britain increased her territory at the expense of France, because the latter's fleet was not sufficiently developed, but, again presuming upon her prestige, Britain was worsted at sea in the Amer. War of Independence, and this, even more than the land disasters, lost for her most of her American possessions.

In the wars with France which terminated in *Waterloo,* the Brit. navy showed unquestionably its superiority in *morale* and in its admirals, though in organisation it was admittedly inferior. The wider experience of the British commanders was one of the chief factors in the defeats of the French. Indeed, experience is one of the most potent forces in naval warfare, as was admirably shown in the Crimean War (1854–56). Since the death of Peter the Great (q.v.),

Russia's navy had become disorganised and had but little work to do, hence it did not even attempt to engage her enemies' fleets, which were enabled to secure adequate communication for their land force.

Japan as a sea-power came into prominence with the Chinese War (1894–95), and her navy secured her ultimate victory. The series of defeats inflicted on the Russian fleet by Japanese commanders in the Russo-Japanese War (1904–5), culminating in the great Japanese victory of *Tsushima*, won for Japan her place as one of the Great Powers.

By its superior navy the United States were able to strip Spain of Cuba and the Philippines, 1898, and the Spanish fleet was destroyed.

German Expansion.—The most striking event in the history of sea-power in the XX. cent. is Germany's sudden rise to second place among the navies of the world. In 1898 the Ger. fleet consisted of 9 battleships (excluding coast-defence vessels), 3 large cruisers, 28 small cruisers, 113 torpedo-boats, and 25,000 men, maintained at an annual cost of £6,000,000. The Navy Act of 1900, amended in subsequent years, laid down a regular building programme for a period of years on so extensive a scale that in 1920 the Ger. fleet will comprise at least 41 battleships, 20 large cruisers, 40 small cruisers, 144 torpedo-boats, 72 submarines, and 101,500 men; estimated annual cost, £23,000,000. The number, power, and newness of these ships and the systematic policy of 'scrapping' and replacing older and smaller ships by powerful modern vessels, and of maintaining about ⅘ths of the entire navy in full permanent commission (*i.e.* instantly and constantly ready for war) in Ger. home waters—all these recent developments have had a most important bearing on Brit. naval affairs. Britain was forced to withdraw many ships from distant stations and concentrate her fleet in home waters. Even the Mediterranean had in some measure (1912) to be entrusted to the friendly care of France; and whereas in 1900 'the Brit. navy and Brit. flag were predominant in every ocean of the world and along the shores of every continent, to-day they are predominant nowhere except in the North Sea' (Prime Minister of Canada, Dec. 5, 1912). Disarmament overtures of the Brit. Government meeting with no response, great additions to the Brit. navy were rendered necessary in order to maintain the *Two-Power Standard*, long regarded as essential to Brit. naval supremacy and security. This standard has been subject to various interpretations, but generally demands that Britain should possess at least two ships for every one possessed by any combination of two Powers that might possibly be arrayed against it. Germany's extraordinary expansion as a naval Power led in 1912 to a modification of this standard by which Britain set herself to maintain a 60 % margin over the Ger. fleet, *i.e.* 16 Brit. battleships to every 10 Ger. battleships. This proportion Germany in 1913 gave indications of accepting.

Meanwhile the Brit. overseas dominions had awakened to the necessity of sharing the burden of imperial naval defence (*vide infra*), and other nations had also engaged in the naval armament race. The international situation was complicated by large increases in the naval programmes of Austria and Italy, the two powers who, with Germany, form the Triple Alliance. At the same time France undertook a reorganisation of her navy, which, owing to various causes—political, administrative, and a series of disastrous accidents—had fallen sadly from the proud position of second naval power, which she held till the end of the XIX. cent.; while the other member of the Triple Entente, Russia, began to build up a new navy to replace that destroyed in the war with Japan.

Japan, again, proceeded to enhance her naval prestige by still further improving the navy she had so rapidly and so efficiently equipped; while by the Anglo-Japanese Agreement of 1902 Britain was to a large extent able to leave to her ally the guarding of Far Eastern waters. In the U.S.A. Jap. naval development is watched with keener interest than European expansion; and although the Amer. building programme is now small in comparison with certain other Powers, the U.S. navy is a very formidable factor in naval affairs, and only Germany's extraordinary spirit has robbed it of the second place which for a time it held among naval Powers at the beginning of the XX. cent.

Expenditure.—Some idea of the scale and cost of the naval rivalry which has marked the *Dreadnought* era may be gathered from the naval expenditure of the leading powers of Europe and the U.S.A. for 1900–1 and 1912–13 respectively:—

	1900-1.	1912-13.
Britain	£29,998,529	£45,616,540
U.S.A.	13,385,574	26,540,019
Germany	7,643,781	22,609 540
France	12,511,053	18,090,758
Russia	8,662,801	17,681,207
Italy	4,903,129	8,566,505
Austria	1,821,284	6,400,000

Fleets of the World.—The following table, based on a Brit. Parliamentary White Paper (issued March 1913), shows the fleets of the world (omitting battleships and armoured cruisers over 20 years old) as on Jan. 1, 1913 (B.=Britain; F.=France; R.=Russia; G.=Germany; I.=Italy; A.=Austria; U.=United States; J.=Japan):—

	B.	F.	R.	G.	I.	A.	U.	J.
Ships Built—								
Battleships	55	21	9	33	9	13	33	17
Battle Cruisers	7	—	—	3	—	—	—	—
Armoured Coast Defence Ships	—	6	1	—	—	—	9	—
Armoured Cruisers	34	20	6	9	9	3	14	13
1st-Class Protected Cruisers	17	5	6	—	—	—	3	2
2nd-Class Protected Cruisers	40	4	—	30	2	3	15	13
3rd-Class Protected Cruisers	16	5	2	11	11	3	—	4
Unprotected Cruisers	5	—	—	4	—	3	3	4
Scouts	8	—	—	—	1	—	3	—
Torpedo Vessels	28	4	3	—	3	11	2	3
Torpedo-boat Destroyers	191	73	96	125	23	12	46	59
Torpedo-Boats	109	106	26	80	77	60	22	50
Submarines	64	61	29	18	12	6	14	13
Ships Building—								
Battleships	11	7	7	7	5	2	4	1
Battle Cruisers	3	—	4	3	—	—	—	—
Light Armoured Cruisers	8	—	—	—	—	—	—	—
1st-Class Protected Cruisers	—	—	6	—	—	—	—	—
2nd-Class Protected Cruisers	7	—	2	4	1	3	—	—
3rd-Class Protected Cruisers	—	—	—	—	2	—	—	—
Unprotected Cruisers	2	—	—	—	—	—	—	—
Scouts	—	—	—	—	2	—	—	—
Torpedo Vessels	1	—	—	—	24	8	—	—
Torpedo-boat Destroyers	38	11	45	9	10	6	14	—
Submarines	22	8	19	14	8	—	22	2

THE BRITISH NAVY.

History.—Alfred the Great's galleys, launched to repel the Dan. invaders, are generally held to be the forerunners of the Brit. Navy. Edward I., Edward III., and Henry V. made important advances in the organisation of fleets, and Henry VII. built the *Royal Harry*, the most notable ship-of-war up to that period. But it was not until the time of Henry VIII. that the navy began to assume the form of a permanent and organised unit of national defence. It was during his reign that an Admiralty Office was founded and dockyards established at Portsmouth, Deptford, and Woolwich. When Henry VIII. died the Navy con-

sisted of 50 ships, with a total tonnage of 12,000. That figure was increased to 17,000 tons in the reign of Elizabeth, and further growth was witnessed during the reigns of the Stewarts, who increased the tonnage to 100,000, with 7000 guns and 42,000 seamen. Queen Anne's fleet had a tonnage of 167,000. Thus when George I. came to the throne, his navy included 178 ships, the largest of which carried 100 guns. Additions were made by George II., and George III. brought the tonnage up to nearly half a million. During all these years Britain had waged many wars on land and sea, and her ships had been sailed to victory by gallant admirals whose names are household words. The repulse of the Armada and Nelson's crowning victory at *Trafalgar* are the outstanding events in cent's of stress and strain.

From Sail to Steam.—Before the advent of steam propulsion and armour-plating, the navies of Great Britain and other countries comprised two main types of ships. The most important were *Ships of the Line*, marked by great armaments of 100 guns or more, arranged on three decks, and capable of discharging devastating broadsides. Upon these ships fell the brunt of the fighting. The other chief type was the *frigate*, which was built and equipped for speed, handiness of manœuvring, and for scouring the seas on special missions. In the earlier portion of the XIX. cent. the Brit. fleet numbered about 100 first-class war vessels and 150 frigates.

The twenty years subsequent to 1841 saw the gradual abandonment of sailing warships and the substitution of steam-propelled vessels. This great change was followed by another important development. For cent's fighting seamen had sought a means of protecting ships' hulls from the fire of the enemy. In very early times both leather and lead were tried. The invention of the explosive shell, first used in 1854 in the action off *Sinope* between the Russ. and Turk. fleets, made the problem more urgent. France took the lead in 1858 by building *La Gloire*, a wooden ship whose sides were sheathed from end to end by iron plating 4½ in. thick. Great Britain replied by launching the *Warrior*, which, in addition to a sheathing of 4½-in. iron armour, had 18 in. of timber backing. While in the feverish competition which followed, France continued for some years to build ships of iron and wood, Great Britain adopted iron only for the hulls, and thereby obtained equal strength with less weight.

Guns and Armour.—This was the beginning of the contest between guns and armour, the end of which is not yet. As the ship designers adopted thicker and tougher plating, the gunmakers responded by producing guns of greater calibre and projectiles of higher velocity and greater penetration. So far, the advantage lies with the gunmakers, who have designed weapons that can pierce the strongest plating yet adopted.

The earlier ironclads were constructed on the broadside principle, but subsequently barbottes and turrets were adopted to protect the guns and their crew. Captain Coles of the Brit. Navy designed a turret ship in 1860, and about the same time Ericsson evolved a similar vessel in the U.S.A.

Size and Power.—In recent years, under the stimulus of foreign competition, particularly on the part of Germany, great developments have taken place in the size and power of warships. This may be illustrated by comparing the ships of to-day with the best that existed as recently as 1902. In that year the *London* was regarded as typical of a Brit. battleship of the highest class. She was 420 ft. in length, 75 ft. broad, 15,000 tonnage, had a speed of 18 knots, and was armed with four 12-in. and numerous smaller guns. The four vessels of the *George V.* class completed in 1913 are 596 ft. in length, 89 ft. beam, 23,000 tonnage, speed 21 knots, and are armed with ten 13·5-in. and twenty-four 4·7-in. guns. Four battleships to be completed for the Brit. Navy in 1914 will have the enormous tonnage of 26,000. Yet further advances will be made in four ships expected to be completed in the years 1914 and 1915. These latter vessels—the *Barham*, the *Queen Elizabeth*, the *Warspite*, and the *Valiant*—will be 620 ft. in length, 92 ft. beam, 29,000 tonnage, 60,000 horse-power, with a speed of 25 knots. The armament, it is stated unofficially, will be eight 15-in. guns, sixteen 6-in. guns, and five torpedo tubes.

The completion of the battleship *Dreadnought* in 1906 represented a new departure in the race for naval supremacy. Prior to the appearance of that epoch-making vessel, only four of the 12-in. guns were mounted in any battleship; the *Dreadnought* has ten of these powerful weapons besides smaller guns. The 12-in. gun remained the largest type of Brit. naval armament until 1912, when the four ships of the *Orion* class were equipped each with ten of the new 13·5-in. weapons. But even larger guns are in contemplation. The Vickers firm catalogues 14-in. and 15-in. guns, the latter weighing 96 tons and firing a projectile weighing 1950 lb. Krupp of Germany manufactures similar monsters.

Of the various types of 12-in. guns, the most powerful is that which weighs 69 tons, fires a 850-lb. shell at a muzzle velocity of 2960 ft. per second, can perforate 47 in. of wrought iron at a range of 2000 yds., and 20 in. of Krupp steel at a range of 3000 yds. The 13·5-in. gun weighs 76 tons, fires a projectile weighing 1250 lb., has a muzzle velocity of 2821 ft., and can perforate 51 in. of wrought iron at a range of 2000 yds. and 25½ in. of Krupp steel at a range of 3000 yds. There have been guns in the ships of the Brit. Navy larger and heavier than those now in use, but they were much less powerful. The old *Benbow* and *Sanspareil* each mounted two 16½-in. breech-loading guns, and the old *Inflexible* had 16-in. guns which represented the last of the now obsolete muzzle-loaders.

The armour plating in use varies with the class and in the various sections of each ship. In the vulnerable portions, such as the belt, gun stations, and conning tower, 12-in. steel is employed in the latest vessels. See ARMAMENT.

Types of Vessels.—A modern navy includes at least six types of vessels, viz. battleships, armoured cruisers, protected cruisers, unarmoured cruisers, torpedo craft, and submarines. In February 1913 it was announced that in future all cruisers would be officially classified as 'battle cruisers,' 'cruisers,' and 'light cruisers.'

There are about 80 submarines (built or building) in the Brit. Navy. The latest development is represented by submarine *E4*, which is described as a submarine cruiser. She is 176 feet in length, mounts two 12-pounder disappearing guns, and has a speed of 16 knots on the surface and 10 knots submerged. The Brit. Navy possesses about 190 torpedo-destroyers and about 100 torpedo boats. These vessels vary in speed from about 34 knots to 25 knots.

A new auxiliary to the warships is the *hydroplane*, a flying-machine fitted with 'floats' which enable the aeroplane to rest on the water when a descent is necessary. During the year 1912 Commander Sampson made several sensational and successful flights from a starting platform rigged up on the deck of H.M.S. *Hibernia*. The whole question of aeroplanes and airships for the navy is still in the experimental stage. By some it is claimed that such machines will render submarines obsolete, since by the fact that submarines can be seen from a height, they thereby lose the qualification of secrecy of movement, which is the chief reason of their existence.

Engines and Fuel.—By the adoption in recent years of the turbine engine instead of the ordinary piston-and-cylinder engine, greater efficiency and economy has been attained in propulsion. Experts, who are studying the question, expect further improvements from the use of oil fuel. The type of oil engine invented by Dr. Diesel of Munich has been adopted for

submarines and other small craft, and there have been suggestions that the Admiralty should apply the system to some of the larger. The *Hardy*, a torpedo-destroyer, the first of the Brit. ships to be equipped with Diesel engines, was completed in 1912. Should the system be found practicable, the appearance of all ships of war will be revolutionised, and their area of operations greatly enlarged. See ENGINES, FUEL.

Administration and Personnel.—The Brit. Navy is controlled by the Board of ADMIRALTY (*q.v.*).

The personnel of the Brit. Navy in the year 1912–13 was 137,500 officers and men, including 17,063 Royal Marines. If the reserves are needed, the grand total is 196,291.

The following are the principal *officers* of the fleet with their full pay per annum: Admiral of the Fleet, £2190; Admiral, £1825; Vice-Admiral, £1460; Rear-Admiral, £1095; Commodore (1st class), £1095; Captain of the Fleet, £1095; Captain, £410 12s. 6d., rising to £602 5s.; Staff-Captain, £511; Commander, £401 10s.; Lieutenant, £182 10s., rising to £292; Sub-Lieutenant, £91 5s.; Midshipman, £31 18s. 9d.; Cadet, £18 5s.; Chaplain, £219, rising to £401 10s.; Naval Instructor, £219, rising to £401 10s.; Engineer Rear-Admiral, £1095; Engineer Captain, £638 15s., rising to £730; Engineer Commander, £438, rising to £602 5s.; Engineer Lieutenant, £182 10s., rising to £365; Engineer Sub-Lieutenant, £136 17s. 6d.; Secretary, £273 15s., rising to £547 10s.; Paymaster-in-Chief, £693 10s.; Fleet Paymaster, £383 5s., rising to £602 5s.; Staff-Paymaster, £328 10s., rising to £346 15s.; Paymaster, £273 15s., rising to £310 5s.; Inspector-General of Hospitals, £1300; Deputy-Inspector-General of Hospitals, £766 10s.; Fleet Surgeon, £492 15s., rising to £657; Staff-Surgeon, £365, rising to £438; Surgeon, £255 10s., rising to £310 5s.; Royal Marines (Artillery)—Colonel Commandant, £730; Lieut.-Colonel, £383 5s., rising to £410 12s. 6d.; Major, £293 10s. 5d., rising to £337 12s. 6d.; Captain, £220 10s. 5d, rising to £266 2s. 11d.; Lieutenant, £115 11s. 8d., rising to £135 7s. 1d.; 2nd Lieutenant, £115 11s. 8d.; Royal Marines (Light Infantry)—Colonel Commandant, £702 12s. 6d.; Lieut.-Colonel, £383 5s., rising to £410 12s. 6d.; Major, £284 7s. 11d., rising to £337 12s. 6d.; Captain, £211 7s. 11d., rising to £257 0s. 5d.; Lieutenant, £107 10s. 7d., rising to £127 15s.; 2nd Lieutenant, £95 16s. 3d. By a recent memorandum a considerable improvement was made in rates of pay for men of non-commissioned rank.

The Naval Estimates.—In the years between 1870 and 1885 the estimates varied from £10,000,000 to £12,000,000; in 1890 they reached £14,500,000; in 1900, £30,000,000; in 1905, £35,000,000. The Estimates for 1913–14 total £46,309,000, being an increase of £1,233,900 on the previous year's Estimates (including supplementary Estimates). The new programme provides for the laying down of 5 battleships, 8 light cruisers, and 16 destroyers; cost of new programme, £15,958,525, an increase of £2,944,525 on the corresponding figure for 1912–13.

Colonies and Naval Defence.—In estimating the Brit. naval strength there must be added the ships owned by the Australian Commonwealth and contributed by New Zealand. Australia had at the end of 1912 the following ships in commission: the *Encounter*, cruiser; *Gayundah*, gunboat; *Paluma*, gunboat; *Protector*, cruiser; and *Tingira*, all employed in the training service. There are also three destroyers and two torpedo boats in active service. Ships in course of building for the AUSTRALIAN ROYAL NAVY are the *Australia*, a battle cruiser, and three second-class cruisers, three destroyers, and two submarines. The armoured cruiser *New Zealand*, presented to the Home Government by New Zealand, has been completed, and in Feb. 1913 started on a voyage to the Dominion. She will return to augment the cruiser squadron in home waters. The Malay Federated States in November 1912 offered to present a first-class armoured ship to the Home Government, and the offer was accepted. In regard to Canada, Mr. Borden's government proposed to contribute three first-class warships (to cost £7,000,000) towards Imperial defence; the motion was defeated in Canadian Parliament (June 1913). The first monetary contributions by a Brit. colony to Imperial naval defence came from South Africa; the Union of South Africa, like New Zealand and Newfoundland, continues to grant annual subsidies, pending the adoption of a definite colonial naval policy. India also makes annual appropriations in aid.

SHIPS OF THE NAVY.

With the completion of the *Dreadnought* in 1906, there commenced a new era in battleship construction. The phase, 'All big-gun ships,' describes the principal feature which distinguishes the modern battleship from her predecessors. The following is a list of the larger vessels in the Brit. Navy, including (with estimated date of completion) those now building or authorised. The armour given refers to the belt, but heavier plating is used for turrets and barbettes. Only the guns of the main armament are noted; each vessel is equipped with numerous smaller guns.

Battleships are easily recognised by their huge bulk. In common with all the larger vessels, they have two masts—one much shorter than the other—used for signalling, for observing and directing gun-fire, and for accommodating the wireless telegraphy installation. Two funnels are the rule. As battleships at a distance resemble each other, identification of individual ships is attained by bands painted round the funnels near the top. For example, the *King George* has a white band on each funnel, the *Orion* has two white bands on each funnel, and the *Conqueror* has two bands on the after funnel. A variation of these funnel-markings—white or red—distinguishes all the ships of the navy.

Dreadnought.—Completed, 1906; length, 490 feet; speed, 21 knots; armour, 11-inch; guns, ten 12-inch; cost, £1,813,100; crew, 800.

Bellerophon.—Completed, 1909; length, 490 feet; speed, 21 knots; armour, 11-inch; guns, ten 12-inch; cost, £1,765,342; crew, 870.

Téméraire.—Completed, 1909; length, 490 feet; speed, 21 knots; armour, 11-inch; guns, ten 12-inch; cost, £1,743,955; crew, 870.

Superb.—Completed, 1909; length, 490 feet; speed, 21 knots; armour, 11-inch; guns, ten 12-inch; cost, £1,660,446; crew, 870.

St. Vincent.—Completed, 1910; length, 500 feet; speed, 21 knots; armour, 9¾-inch; guns, ten 12-inch; cost, £1,754,615; crew, 724.

Collingwood.—Completed, 1910; length, 500 feet; speed, 21 knots; armour, 9¾-inch; guns, 9¾-inch; cost, £1,731,640; crew, 724.

Vanguard.—Completed, 1910; length, 500 feet; speed, 21 knots; armour, 9¾-inch; guns, ten 12-inch; cost, £1,607,781; crew, 724.

Neptune.—Completed, 1911; length, 570 feet; speed, 21 knots; armour, 10-inch; guns, ten 12-inch; cost, £1,715,258; crew, 800.

Colossus.—Completed, 1911; length, 510 feet; speed, 21 knots; armour, 10-inch; guns, ten 12-inch; cost, £1,540,963; crew, 800.

Hercules.—Completed, 1911; length, 510 feet; speed, 21 knots; armour, 10-inch; guns, ten 12-inch; cost, £1,529,250; crew, 800.

Orion.—Completed, 1912; length, 545 feet; speed, 21 knots; armour, 12-inch; guns, ten 13·5-inch; cost, £1,705,410; crew, 800.

Monarch.—Completed, 1912; length, 545 feet; speed, 21 knots; armour, 12-inch; guns, ten 13·5-inch; cost, £1,740,012; crew, 800.

Conqueror.—Completed, 1912; length, 545 feet; speed, 21 knots; armour, 12-inch; guns, ten 13·5-inch; cost, £1,713,748; crew, 800.

Thunderer.—Completed, 1912; length, 545 feet; speed, 21 knots; armour, 12-inch; guns, ten 13·5-inch; cost, £1,738,245; crew, 800.

King George V.—Completed, 1913; length, 555 feet; speed, 21 knots; armour, 12-inch; guns, ten 13·5-inch; cost, £1,816,796; crew, 900.

Centurion.—Completed, 1913; length, 555 feet; speed, 21 knots; armour, 12-inch; guns, ten 13·5-inch; cost, £1,806,371; crew, 900.

Ajax.—Completed, 1913; length, 555 feet; speed, 21 knots; armour, 12-inch; guns, ten 13·5-inch; cost, £1,745,087; crew, 900.

Audacious.—Completed, 1913; length, 555 feet; speed, 21 knots; armour, 12-inch; guns, ten 13·5-inch; cost, £1,774,513; crew, 900.

Iron Duke.—Completed, 1914, length, 580 feet; speed, 22·5 knots; armour, 12-inch; guns, ten 13·5-inch; cost (up to March 31, 1913), £1,224,181.

Marlborough.—Completed, 1914; length, 580 feet; speed, 22·5 knots; armour, 12-inch; guns, ten 13·5-inch; cost (up to March 31, 1913), £1,160,399.

Benbow.—Completed, 1914; length, 580 feet; speed, 22·5 knots; armour, 12-inch; guns, ten 13·5-inch; cost (up to March 31, 1913), £1,039,099.

Delhi.—Completed, 1914; length, 580 feet; speed, 22·5 knots; armour, 12-inch; guns, ten 13·5-inch; cost (up to March 31, 1913), £1,038,103.

Barham, Queen Elizabeth, Warspite, and *Valiant.*—The two first-named vessels are expected to be completed in 1914, the second two in 1915. It is understood that the *Queen Elizabeth* will be 620 feet in length, will be driven by oil, and attain 25 knots speed, and be armed with eight 16·25-inch guns as main armament.

Battle Cruisers.—It is the function of battle cruisers to search for the enemy's fleet, and hold it until the battleships come up. They may be distinguished from battleships by slightly greater length in some cases, finer lines, and their three funnels. The *Princess Royal,* an example of the latest type, has two funnels—one thick, the other thin—placed amidships, with a third funnel at some distance apart from the other two.

Inflexible.—Completed, 1908; length, 530 feet; speed, 25 knots; armour, 7-inch; guns, eight 12-inch; cost, £1,728,229; crew, 750.

Indomitable.—Completed, 1908; length, 530 feet; speed, 25 knots; armour, 7-inch; guns, eight 12-inch; cost, £1,761,080; crew, 750.

Invincible.—Completed, 1909; length, 530 feet; speed, 25 knots; armour, 7-inch; guns, eight 12-inch; cost, £1,768,995; crew, 750.

Indefatigable.—Completed, 1911; length, 555 feet; speed, 26 knots; armour, 7-inch; guns, eight 12-inch; cost, £1,536,769; crew, 800.

Lion.—Completed, 1912; length, 660 feet; speed, 31 knots; armour, 9¼-inch; guns, eight 13·5 inch; cost, £1,939,408.

Princess Royal.—Completed, 1912; length, 660 feet; speed, 31 knots; armour, 9¼-inch; guns, eight 13·5-inch; cost, £1,893,586.

Queen Mary.—Completed, 1913; length, 670 feet; speed, 31 knots; armour, 9¼-inch; guns, eight 13·5-inch; cost, £1,940,764.

Tiger.—Completed, 1914; length, 670 feet; speed, 31 knots; armour, 9¼-inch; guns, eight 13·5-inch; cost (up to March 31, 1913), £1,023,539.

New Zealand.—Completed, 1913; length, 567 feet; speed of 26 knots, and is armed with eight 12-inch guns; constructed at New Zealand's expense; crew, 750.

Australia.—Completed, 1913; length, 567 feet; speed, 26 knots; armour, 8-inch; guns, eight 12-inch. This vessel is built to the order of the Australian Government; crew, 750.

Second-Class Battleships.—Battleships built prior to the *Dreadnought* era may be identified by the disposition of the big guns, two of which are placed in a turret forward and two in a turret aft.

Lord Nelson and *Agamemnon.*—Completed, 1907; length, 420 feet; speed, 18 knots; armour, 12-inch; guns, four 12-inch, ten 9·2-inch; crew, 747.

King Edward (1904), *Zealandia* (1905), *Hindustan* (1905), *Commonwealth* (1905), *Dominion* (1905), *Africa* (1906), *Britannia* (1906), and *Hibernia* (1906).—Each 453 feet in length; speed, 18 knots; armour, 9-inch; guns, four 12-inch, four 9·2-inch, and ten 6-inch; crew, 780.

Third-Class Battleships.—*Formidable* (1901), *Implacable* (1901), *Bulwark* (1902), *Irresistible* (1902), *London* (1902), *Venerable* (1902), *Prince of Wales* (1904), *Queen* (1904), *Swiftsure* (1904), *Triumph* (1904), *Duncan* (1903), *Albemarle* (1903), *Exmouth* (1903), *Russell* (1903), *Cornwallis* (1904), *Canopus* (1899), *Glory* (1900), *Goliath* (1900), *Ocean* (1900).

Armoured Cruisers.—Owing to the immense boiler capacity necessary to secure high speed, most of the armoured and protected cruisers possess four funnels—the *Monmouth* with three, and the *Edgar* and *Blake* classes with two, are among the exceptions.

Minotaur (1908), *Defence* (1908), *Shannon* (1908).—Length, 520 feet; speed, 23 knots; armour, 6-inch; guns, four 9·2-inch, ten 7·5-inch; crew, 755.

Warrior (1906), *Achilles* (1907), *Cochrane* (1907), *Natal* (1907).—Length, 480 feet; speed, 23 knots; armour, 6-inch; guns, six 9·2, four 7·5; crew, 720.

Protected Cruisers.—*Powerful* (1898) and *Terrible* (1898).—Length, 520 feet; speed, 22 knots; armour, 6-inch; guns, two 9·2-inch, sixteen 6-inch; crew, 900.

The 'protected cruiser' class includes seven vessels of the *Diadem* class (21 knots), nine vessels of the *Edgar* class (19 knots), and two vessels of the *Challenger* class (21 knots). Smaller cruisers number about seventy. The *Boadicea* class, of seven vessels, all built since 1910, has a speed of 27 knots.

Destroyers and Torpedo-Boats cannot be mistaken for any other craft. They lie low in the water, are narrow compared with their length, and have a platform near the centre for the navigation of the vessel. The different classes have two, three, or four funnels, with one mast each for signalling. Twenty destroyers are being added to the navy every year; there are at present about 190 of them. Torpedo-boats proper number about 100.

The **Submarines,** numbering about 60, are easily recognisable; only a small portion of the hull, the conning tower, and the periscope are visible when the vessels are on the surface. The periscope, remaining out of the water when the vessel is submerged, is a contrivance which gives a view of the surface of the sea and enables the crew to navigate the vessel and locate the target.

Sloops and *Gunboats* were largely 'scrapped' some years ago, and such of them as were retained are employed chiefly for police work.

The U.S. Navy is controlled by a Secretary of the Navy, and an Assistant-Secretary appointed by the President; these supervise the eight departments, similar to those of the Brit. Admiralty, which are directed by naval officers. The officers are the same as in the Brit. Navy, except that two grades, Lieutenant (junior grade), and Ensign, correspond to the Brit. Sub-Lieutenant. Pay is as follows: Admiral, $13,500; Rear-Admiral, $8000; Commodore, $6000; Captain, $4000; Commander, $3500; Lieutenant-Commander, (Brit. Navy Lieutenant Commanding), $3000; Lieutenant, $2400; Lieutenant (junior grade), $2000; Ensign, $1700; Midshipman, $600. All staff-officers, such as doctors, paymasters, and chaplains, receive the pay of their class.

Mahan, *Influence of Sea Power on History* (1890); Brassey, *Naval Annual*; Laird Clowes, *The Royal Navy* (1903); and Navy League Publications.

NAVIGATION, the art of directing a ship along any desired course, and of accurately determining its position at any time. The actual management of a vessel comes under *seamanship* (*q.v.* under SHIPS). In the early days of ships, mariners were mostly obliged to keep within sight of land, for otherwise their only guides were the sun and the stars, which could only avail them in clear weather. In Eastern waters, such as the Indian Ocean and the China Sea, the monsoons provided a means of guidance, their constant uniformity of direction enabling vessels running directly before them to keep a steady course.

The application of the magnetic compass to navigation opened up a new era. Given a chart to indicate the relative positions of places, the navigator could now direct his course. But a chart would be comparatively useless without some means of ascertaining exactly the position of the ship at any moment. On a spherical body the position of any point is determined by two co-ordinates, and on the surface of the earth these co-ordinates are called meridians and parallels. The *meridians* are circles passing through the poles, and the *parallels* are circles parallel to the equator, and each meridian intersects each parallel. The angular distance of any meridian from a fixed meridian gives the longitude of all points upon it, the parallels similarly giving the latitude, and if the latitude and longitude of any point are known the position of that point is definitely fixed. The navigator therefore requires a method of determining these co-ordinates, in order that he may direct his course by chart and compass.

In whichever hemisphere an observer may be, the *latitude* equals the altitude of the celestial pole above the horizon. If the distance of any celestial body from the pole is known, the meridian altitude of that body gives, by a simple calculation, the latitude. The altitudes are taken by means of the *sextant*, and the required polar distances are given in the *Nautical Almanac*. In the northern hemisphere the Pole star is very close to the pole, and an observation of it gives from a table in the Nautical Almanac the altitude of the pole itself, and hence the required latitude. The *longitude* is determined by comparison of the local time with the corresponding Greenwich time. At sea, the observatory method of ascertaining local time, by noting the exact moment when some known celestial body crosses the meridian, is impracticable, and the local time must be obtained by calculation. The altitude of a known celestial body is taken when that body is out of the meridian, and from the already determined latitude the greatest altitude of the body is calculated. The local time may then be ascertained from the difference between the greatest and the observed altitudes. Greenwich time is usually taken from a chronometer, but also may be obtained by 'lunars.' In the Nautical Almanac are given the positions of the moon amongst the stars for every third hour of Greenwich time, and from comparison of these with the observed positions Greenwich time is obtained.

Latitude and longitude both may be found at once by *Sumner's method*. This method is based upon the fact that at any particular moment every celestial body is in the zenith of, or directly over, some part of the earth. Given the Nautical Almanac and the correct Greenwich time, the position of any known heavenly body—sun, moon, or star—at the moment of observation is known. If we take as centre the point in the zenith of which the observed body is at the moment of observation, and the difference between the zenith altitude, 90°, and the observed altitude as radius, and describe a circle on the globe, the vessel must lie somewhere on that circle. If, now, a similar circle is described for another celestial body, or for the same body after an interval of time, the ship's position will be at one of the points of intersection of the circles, and dead reckoning will indicate which is the required point. In practice, all that is necessary is a small portion of each of these circles drawn upon Mercator's projection. This method and a more recent modification of it are superseding all other methods of finding latitude and longitude.

Dead reckoning is the calculation of the ship's position without recourse to astronomical observations. The principal data are the latitude and longitude of the place of departure, or, as last determined, the course followed, the rate of sailing, and the time which has elapsed. Owing to its great liability to serious errors due to various causes dead reckoning is not to be depended upon unless frequently checked by astronomical observations, and it is chiefly used when weather conditions make such observations impossible.

Hall, *Navigation* (1912).

Navigation Acts, laws regulating n. and shipping. Principle of early statutes was protection: Acts of Richard II. (1381 and 1390) forbade exportation of goods except in Eng. ships; Acts of 1650–51 and 1660 to confine import trade of England and its possessions to Eng. bottoms were directed against Dutch, provoked Dutch wars, struck at attempted commercial independence of colonies, and played important rôle in negotiations for Union of Scotland and England, 1707; Act of 1660 was repealed, under influence of Free Trade ideas, 1826; foreigners admitted to coasting trade, 1854; merchant service is regulated by 'Sailing Acts.'

NAVIGATOR'S ISLANDS, see SAMOA.

NAVSARI, see NOSARI.

NAVY DISCIPLINE ACT, see MILITARY LAW.

NAWABGANJ.—(1) (26° 55′ N., 81° 14′ E.) town, Bara Banki, United Provinces, India; exports sugar, cotton. Pop. 7500. (2) town, Rajshahi Division, Bengal, India. Pop. 17,000.

NAWANAGAR (22° 26′ N., 70° 16′ E.), native state, Kathiawar, Bombay, India; capital, N.; silk and gold embroidery. Pop. 340,000; town, 53,000.

NAXOS.—(1) (37° 5′ N., 25° 30′ E.) island, Grecian Archipelago; largest of the Cyclades; wine, fruits. Pop. 2000. (2) (37° 3′ N., 25° 25′ E.) ancient seaport, Sicily; earliest Gk. colony in the island; destroyed by Dionysius, 403 B.C.

NAYAGARH (20° N., 85° E.), native state, Bihar and Orissa, India. Pop. 145,000.

NAZARETH (32° 42′ N., 35° 20′ E.), town, Galilee; in ancient times residence of Joseph and Mary. Pop. 10,500.

NAZARITES, NAZIRITES, Old Testament ascetics, who abstained from certain things for a time, under vows, *e.g.* Samuel and Samson; unshorn hair was one characteristic.

NAZIANZEN, see GREGORY, ST., OF NAZIANZUS.

NEAGH, LOUGH (54° 50′ N., 6° 25′ W.), lake, Ulster, Ireland; largest in Brit. Isles; 17 by 11 miles; area, 153 sq. miles.

NEALE, EDWARD VANSITTART (1810–92), Eng. Socialist; M.A., Oxford, and barrister; assisted formation of various co-operative productive societies and Fund of Co-operative Congress; sec. of Co-operative Congress, 1875–91.

NEAMTZU, NEAMTU (47° 17′ N., 26° 20′ E.), town, Moldavia, Rumania. Pop. 8500.

NEANDER, JOHANN AUGUST WILHELM (1789–1850), Ger. ecclesiastical historian; of Jewish origin; called before baptism, 1806, DAVID MENDEL; prof. of Ecclesiastical History at Heidelberg, 1812, at Berlin, 1813; pub. numerous widely read theological books, but great work, *Allgemeine Geschichte der christlichen Religion und Kirche*, was not finished; united great scholarship with popular style.

NEANDERTHAL (51° 15′ N., 7° E.), valley, Rhine province, Prussia; prehistoric skeleton discovered (1856).

NEAPOLIS, ancient name for NAPLES (*q.v.*).

NEARCTIC, see ANIMALS (DISTRIBUTION).

NEATH (51° 39′ N., 3° 48′ W.), port, Glamorganshire, Wales; has copper, tin-plate, engineering, chemical, and ironfounding works; site of ruined abbey and castle. Pop. (1911) 17,590.

NEAT'S-FOOT OIL, see under OIL.

NEBALIA, see under MALACOSTRACA.

NEBO, NABU ('The Proclaimer'), a Babylonian deity inferior in power only to Marduk, his reputed father; essentially a god of wisdom, the inventor of writing and protector of astrology; his wife was Tashmit, but she had no independent attributes or worship.

NEBRASKA (44° N., 106° W.), N. central state of U.S.A.; bounded N. by South Dakota, N.W. by Wyoming, S.W. by Colorado, S. by Kansas, E. by Iowa; length, 420 miles; breadth, 210 miles; area of

land surface, 76,808 sq. miles; area of water surface, 712 sq. miles.

Surface is generally undulating, and consists chiefly of extensive plains. Mountains belong to Rocky Mountain system in W., viz. Wild Cat Mountains (with Hogback Mountain, 5082 ft.; Wild Cat Mountain, 5038 ft.); large stretch of sand-hills in N. central region covering *c.* 20,000 sq. miles; extensive prairies in E. and S.; swamps in S.E. Principal rivers are Missouri (on eastern border), Platte, Republican, Niobrara, Snake, White River, Big Blue; numerous salt and freshwater lakes, springs, and a large supply of ground water. Climate is healthy, with dry fine atmosphere; mean annual temperature *c.* 48° F.; average annual rainfall *c.* 23 in., greatest in E. Fauna includes fox, coyote, black bear, mink, raccoon; numerous birds and insects; great variety of butterflies. N. has been visited by several locust plagues. N. has immense tracts of grass, but practically no forests.

N. passed to the U.S.A. as part of Louisiana Purchase (*q.v.*) from French, 1803; explored by several Americans, including Major Stephen Long, 1819; missions established among Indians, 1830 onwards; temporary settlements of Mormons, 1845–57; constituted a territory, 1854; boundaries fixed, 1861, 1863; admitted as a state, 1867. N. took an active part in the Civil War, 1861–65. N. is administered by Governor, Senate (33 members, elected for 2 years), and House of Representatives (100 members); has 2 Senators and 6 Representatives in Congress, and is divided into 92 counties. Principal towns are Omaha, Lincoln (capital), South Omaha. Rom. Catholics predominate; then Methodists, Lutherans, Disciples, Presbyterians, Baptists. Elementary education is compulsory. N. has several univ's, coll's, and other institutions, viz. State Univ. of Nebraska (Lincoln), with medical school at Omaha, Creighton Univ. (Omaha), Cotner Univ. (the Nebraska Christian Univ.), at Bethany, Lincoln; Hastings Coll. (Hastings), Doane Coll. (Crete), York Coll. (York), etc.

Total railway mileage is over 6000 miles. N. is an important agricultural state; chief products are maize, wheat, oats, hay, potatoes, fruit, sugar-beet, live stock, wool; chief industries are slaughtering and meat-packing, flour-milling, brewing, printing and publishing, dairying; limestone and sandstone are quarried. Irrigation is carried on extensively, also tree-planting. N. has many springs, and celebrated saline wells at Lincoln, Beatrice, etc. Pop. (1910) 1,192,214, of whom 7689 are negro.

Morton and others, *History of N.* (3 vols., 1905); Stevens, *Surface Water-Supply of N.* (1909).

NEBRASKA CITY (40° 40′ N., 95° 95′ W.), city, on Missouri, Nebraska, U.S.A.; canneries, flour-mills. Pop. (1910) 5488.

NEBUCHADNEZZAR, see CHRONOLOGY; BABYLONIA.

NEBULA (Lat. *nebula*, a cloud), cloudy objects visible in heavens by telescope; many thousands of most diverse shapes, but at least 120,000 are of spiral nature. Some seem merely clouds of gas, but others more condensed. No doubt n. are clouds of gaseous matter contracting into solid bodies, which eventually form stars and systems of stars.

N. are grouped into classes, *Annular*, or ring-shaped, *Elliptical*, *Irregular*, *Planetary*, and *Spiral*. As no n. has ever given a parallax, their distance must be enormous. True nature was discovered in 1864, when Huggins studied them by spectroscope.

Nebular Hypothesis.—Kant suggested that the solar system had been evolved from a huge nebula, which, in process of gradual cooling, had thrown off rings of matter, and that these in time contracted down, forming the planets, and that some of these rings had in their turn thrown off still smaller rings, which formed their satellites. The theory was also held by Laplace, but recent discoveries and researches suggest that the solar system was formed from a small spiral nebula, itself the result of a collision between two bodies.

NECESSITY, the principle by which the universe, in whole or part, is rendered inevitable.

NECK, the narrow part of the body which unites the head and the trunk. Where a 'neck' is present in invertebrate animals it is altogether indefinite, but in vertebrates it becomes increasingly definite, its character depending chiefly upon the number and shape of the cervical vertebræ, until in all mammals (with four exceptions) a constant number of vertebræ (9) is present. In osteology the neck of a bone is the narrow portion beneath the head.

NECKAR, Rom. NICER (49° 18′ N., 9° 14′ E.), river, Germany, joins Rhine at Mannheim; length, 247 miles.

NECKARGEMÜND (49° 25′ N., 8° 48′ E.), health-resort, on Neckar, Baden, Germany.

NECKER, JACQUES (1732–1804), Fr. statesman; established Paris and London banking firm of Thellusson and N.; director-gen. of finances, 1777; introduced important reforms of details; dismissed, 1781; recalled in desperate condition of exchequer, 1788; advised summoning of estates-gen.; again dismissed by king; Estates insisted on recall; failed to provide funds, and resigned, 1790. Mme N., *née* Curchod (1739–94), had a brilliant *salon*.

NECKLACE, DIAMOND, see ROHAN.

NECROPHORUS, see under POLYMORPHA.

NECROSIS, death of part of the tissues, caused most commonly by a bacterial poison or toxin, in an infective condition; term used especially of bone. See GANGRENE.

NECTARINE, variety of PEACH (*q.v.*).

NECTARINIIDÆ, see SUN-BIRDS.

NECTARY, see under FLOWER, HONEY.

NEEDLES of steel were first made, 1370. By modern method, wire is cut to double length of needle; eyes made in middle; then filed; chief Eng. centre, Redditch. N's have been discovered in prehistoric cave-dwellings and Egyptian tombs, of bone or metal.

NEEDLEWORK, see EMBROIDERY.

NEEMUCH, NIMACH (24° 27′ N., 74° 49′ E.), town, Gwalior, Central India. Pop. 22,000.

NEENAH (44° 10′ N., 88° 30′ W.), city, on Lake Winnebago, Wisconsin, U.S.A.; flour and lumber-mills. Pop. (1910) 5730.

NEER, VAN DER, name of two Dutch painters: (1) AERNOUT (1603–77), contemporary of Hobbema, excelled in landscape painting, but during his lifetime his genius excited no response; (2) EGLON (1643–1703), his son, was an eminent portrait painter.

NEERWINDEN (50° 47′ N., 5° 3′ E.), village, in province of Liège, Belgium, not far from Tirlemont; celebrated for battle in 1693, when French under Luxembourg defeated William III., and for victory of Austrians over French under Dumouriez in 1793.

NEES VON ESENBECK, CHRISTIAN GOTTFRIED (1776–1858), Ger. naturalist; author of many botanical and entomological papers.

NEGAPATAM (10° 46′ N., 79° 53′ E.), seaport, Tanjore, Madras, India; railway workshops; manufactures oil. Pop. 58,000.

NEGAUNEE (46° 30′ N., 87° 38′ W.), city, Michigan, U.S.A.; iron mines. Pop. (1910) 8460.

NEGLIGENCE, see under EMPLOYERS' LIABILITY ACTS.

NEGRI SEMBILAN, see MALAY STATES.

NEGRITOS, see RACES OF MANKIND.

NEGRO, a sub-species of mankind, whose characteristics are chiefly woolly or frizzly hair, dark skin, and dolichocephalic skull; found in largest numbers and truest state in Africa, the home of the negroid type, but now very widely dispersed. The negroes of the Sudan, with their dark brown skin, black, crisp hair, long head, broad, flat nose, and thick lips are generally held to be the best representatives of their kind. The Bantu tribes to the south, the Bushmen and Hottentots and dwarf races are all varieties of negroid types. A similar variety exists in the intellectual progress—the Hausa, a tribe of the central Sudan, being far in advance, in civilisation, of other

Sudanese, Bantu, and dwarf tribes. Generalisations on the mental capacity of the negro have mostly been made on insufficient data, and are therefore of little value.

In 1619 the first cargo of negro slaves was landed in America from West Africa, and the scarcity of labour made this diabolical traffic so profitable that by 1790, when the first census of the United States was taken, the negroes stood in number at 757,208, mainly in Georgia, Mississippi, Alabama, South and North Carolina, Virginia, Louisiana, and Texas. Importation was prohibited in 1808, and slavery abolished, 1863. As a labourer, especially as an agricultural labourer in the Southern States, and as a domestic servant, the negro has proved himself extremely useful to Americans. As a mechanic or a factory employee he has shown less willingness for useful service. Previous to emancipation several of the plantations were really training-grounds in industry and civilisation, while the Civil War afforded valuable discipline to thousands of negroes in the army of the north and on the southern farms where negroes were left in charge.

Negro education in public schools, high schools, and colleges dates from 1870, and is a thing apart in America from the education of the whites. The extension of education and the development of land ownership are regarded as the most favourable of improving the condition of the negro. Several states, notably Mississippi, North and South Carolina, Louisiana, Virginia, and Alabama, have since 1890 excluded the negro from political enfranchisement.

Du Bois, *The Negroes of the Black Belt*; Booker Washington, *Future of the American Negro*; Tillinghast, *The Negro in Africa and America*.

NEHAVEND (30° 40′ N., 48° 20′ E.), town, province of Nehavend, Persia; scene of Persian defeat by Saracens, 641 A.D.

NEHEMIAH (fl. 450 B.C.), Jewish patriot; obtained permission from Artaxerxes to rebuild Jerusalem; put down abuses; see Books of *Ezra* and *Nehemiah* in Bible.

NEILE, RICHARD (1562–1640), dean of Westminster; then bp. of Rochester, Lichfield, Lincoln, Durham, Winchester; abp. of York, 1631.

NEILGHERRIES, see NILGIRIS.

NEILL, JAMES GEORGE SMITH (1810–57), Brit. soldier; crushed rising in Benares at commencement of Ind. Mutiny, 1857; relieved Allahabad; slain at moment of forcing way into Lucknow.

NEISSE (50° 30′ N., 17° 20′ E.), town, on Neisse, Silesia, Prussia; furniture, machinery. Pop. (1910) 25,937.

NEISSE.—(1) LAUSITZER or GÖRLITZER NEISSE (51° 30′ N., 15° E.), river, Silesia and Brandenburg, Prussia; joins the Oder. (2) GLATZER NEISSE (50° 30′ N., 17° E.), river, Silesia, Prussia; joins Oder.

NEITH, NEIT, goddess in Egyptian mythology; equivalent to Minerva.

NEJD (28° N., 45° E.), central province of Arabia, bounded by Nafud Desert, El Hasa, Dahna Desert, Asir, and Hejaz; surface, more elevated than other provinces of Arabia, consists mostly of sandy desert with occasional valleys, ravines, and oases where soil is fertile and cultivated; horses, camels, and sheep reared; chief river basins are Wadi Rumma and Wadi Dawasir; capital, Hail; Wahabi capital, Riad. Wahabis, who were overcome by Mehemet Ali in 1818, still retain considerable power in vicinity of Riad. Pop. *c.* 1,000,000.

NEJEF, MESHED-ALI (32° N., 44° 28′ E.), town, on Lake Nejef, Asiatic Turkey; place of pilgrimage.

NEKTON, the group of animals, such as whales and fishes, which are capable of swimming freely and roaming at will over large tracts of ocean.

NELLORE (14° 26′ N., 80° E.), chief town of Nellore district, Madras, India; on Pennar. Pop. 33,000; (dist.) 1,500,000.

NELSON.—(1) (53° 50′ N., 2° 12′ W.) town, Lancashire, England; cotton-mills. Pop. (1911) 39,485. (2) (41° 17′ S., 173° 19′ E.) seaport, Nelson, New Zealand; bp.'s see. Pop. 10,000. (3) (49° 33′ N., 117° 20′ W.) mining town, Brit. Columbia, on Lake Kootenay. Pop. 6700. (4) (56° 35′ N., 95° W.) river, Canada; outlet of Lake Winnipeg into Hudson Bay.

NELSON, HORATIO NELSON, VISCOUNT (1758–1805), Brit. admiral; s. of Rev. Edmund N., rector of Burnham Thorpe, Norfolk; b. Sept. 29; delicate, ailing child of poor physique; entered navy, 1771, under his uncle, Capt. Suckling, on *Raisonable*, and rose speedily by Suckling's influence. Dissatisfied by promotions over his head he uttered bold prophecy that one day he should have a gazette of his own; came to front in wars against French; in *Agamemnon* took part in sieges of *Bastia* and *Calvi*, in Corsica, 1793, losing one eye before Calvi. By disobedience of orders N. won for Sir John Jervis brilliant victory off *Cape St. Vincent* against Spain, 1797; received Order of Bath and annual pension of £1000; lost right arm in hopeless attack on *Teneriffe*; sent to intercept Napoleon's proposed invasion of England, 1798, discovered entire Fr. fleet in ABOUKIR BAY, surrounded and destroyed it in *Battle of the Nile*, Aug. 1; cr. Baron N. of the Nile with £2000 yearly; aided in driving French from Naples, receiving dukedom of Bronte and Neapolitan fief. Denmark was chief sea-power on which Napoleon relied, and in 1801 Britain dealt heavy blow to Napoleonic plans by great victory of *Copenhagen*, by which six Dan. ships were seized, and Baltic reopened to Britain; in this desperate battle Sir Hyde Parker, the admiral, gave signal for retreat, but N. characteristically cried, 'Damn the signal! Keep mine for closer battle flying. That's the way I answer such signals: nail mine to the mast!'

In 1805 he prevented junction of Fr. and Span. fleets in Channel and engaged enemy off *Cape Trafalgar*, Oct. 21, where he gave well-known signal, 'England expects that every man will do his duty.' Though slain in fight, he inspired victory. United fleets of France and Spain (under Villeneuve and two Span. admirals) counted 33 sail of the line, 5 frigates, 2 brigs, and had great superiority in artillery, British only 27 sail of the line, 4 frigates, 1 schooner. N is greatest Brit. naval hero; displayed swiftness, intuition of genius, thorough knowledge of war; simple, quiet character; unfortunate attachment to beautiful Lady Hamilton; blamed for treatment of faithful wife; public career only adversely criticised for intrigues in Naples.

Life, by Southey, Beresford (1898), Laughton (1899), Mahan (1897); White and Muirhouse, *N. and the XX. Cent.* (1905).

NELSONVILLE (39° 30′ N., 82° 15′ W.), city, on Hocking, Ohio, U.S.A.; coal mines. Pop. (1910) 6082.

NELUMBIUM, genus of aquatic Nymphæaceæ, characterised by pinnate leaves and cup-like flowers.

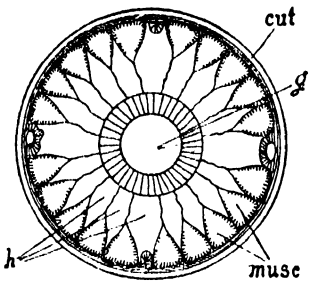
NEMATHELMINTHES, ROUND-WORMS, a phylum of round-bodied, unsegmented worms, most of which are parasitic in other animals. They have a thick external cuticle or skin, and, except perhaps in Acanthocephala, cilia are altogether absent. The group comprises the three classes—Nematodes, Nematomorpha, and Acanthocephala (*qq.v.*).

NEMATODA, Round-Worms, Thread-Worms, Hair-Worms, etc.; the largest and most important class of Nemathelminth or Round-Worms. Many are parasitic, and as such are harmful even to man, but they occur also in the earth and in both fresh and salt water. Nematodes are ivory white or transparent creatures, with a thick protecting cuticle, and groups of longitudinal muscles only, intervals between which are indicated by two 'lateral lines.' There is a well-developed food canal, a mouth and anus, and a peculiar excretory apparatus which opens to the exterior by an anterior pore. The life-history is sometimes a direct development from a free embryo to a free adult, but sometimes the larvæ are free-living and the adults parasitic, or the larvæ are parasitic and the adults free, or, lastly, both stages may be parasitic but in different hosts. Their abundance as parasites may be judged

from the fact that from a single horse many millions have been taken. In man the MAW-WORM (*Ascaris lumbricoides*) and the WHIP-WORM (*Trichocephalus*



A NEMATODE WORM. *o*, position of mouth.



DIAGRAMMATIC CROSS-SECTION OF A NEMATODE WORM. *cut*, cuticle; *g*, gut; *h*, hæmocœle or primary body-cavity; *musc*, muscle cells.

dispar) are common parasites, causing intestinal discomfort; the GUINEA-WORM (*Filaria medinensis*) causes painful abscesses in tropical regions; and *Trichina spiralis*, got from the consumption of an infected pig, gives rise to the occasionally fatal disease, Trichinosis.

NEMATOMORPHA, HAIR-WORMS, long, unsegmented, hair-like worms, which when adult live, with one marine exception, in ponds and ditches. Popularly supposed to originate from immersed horse-hairs, the Hair-Worm really develops after a complex larval existence in the bodies of aquatic insects—example, *Gordius*. They comprise a group of Round-Worms. See NEMATHELMINTHES.

NEMERTINE WORMS, NEMERTEANS, phylum NEMERTINEA or NEMERTEA (Ribbon Worms, Sea Snakes, Bootlace Worms, etc.), round, soft-bodied worms of exceedingly diverse and beautiful colours, which are found most often on the seashore, lurking under stones or in shells near low-tide mark, though some inhabit fresh water (*Tetrastemma*), a few live on land (*Geonemertes*), and one marine genus (*Malacobdella*) lives attached to the bivalve *Cyprina islandica*. The body may be shorter than an inch, or more than 30 yds. long, as in the Common Sea Bootlace or Sea Snake of Brit. coasts (*Lineus marinus*); but a casual estimate is generally deceptive, for Nemertines possess an extraordinary power of contracting and extending their bodies. The majority of Ribbon Worms are brightly coloured, from translucent greys and greens, through all shades of yellows, orange, reds, and browns, to the inky purple of the Common Bootlace.



A NEMERTINE WORM. *pr*, proboscis; *sh*, sheath of proboscis.

The most characteristic features of Nemerteans are the coat of fine vibratile cilia which covers their skin, and which enables them to glide with great ease and rapidity, and the long proboscis, which lies above the food canal and can be shot out with force or retracted with great rapidity. It is probably an organ of sense, but the fact that when ejected its tip is armed with spines and stylets would indicate that it could be utilised also in attack and defence. There are present simple sense-organs, frequently several groups of eyes, a food canal open at both ends, a blood system, sometimes with red-blood corpuscles, and a brain from which run two lateral nerve cords.

Nemertines are carnivorous, feeding ravenously upon animal matter whether living or dead, although polychæte worms and molluscs probably form the staple food supply.

NEMESIS, Gk. goddess, personification of heavenly retribution, akin to the Furies, sometimes confused with other cults; punished those who gained overmuch or who were arrogant.

NEMI, ancient *Nemorensis Lacus* (41° 43′ N., 12° 42′ E.), lake, Italy, occupying extinct crater in Alban Mountains; on shore are remains of ancient Rom. temple to Diana.

NEMOURS (48° 14′ N., 2° 42′ E.), town, Seine-et-Marne, France; sand quarries. Pop. 5200.

NEMOURS, title of famous Fr. family; duchy (cr. 1404) was granted to Jean d'Armagnac, 1452, Gaston de Foix, 1506, house of Savoy, 1528–1659, and then to house of Orleans, in junior branch of which it remains. Among its distinguished members is Marie, Duchesse de N. (1625–1707), whose *Mémoires* were pub. 1709.—LOUIS CHARLES PHILIPPE RAPHAEL, DUC DE N. (1814–96), s. of Louis Philippe; b. Paris; refused crown of Belgium, 1831, of Greece, 1832.

NENAGH (52° 52′ N., 8° 12′ W.), market town, Tipperary, Ireland; remains of ancient castle. Pop. 4700.

NEOCOMIAN, see CRETACEOUS SYSTEM.

NEOLITHIC, see ANCIENT HISTORY.

NEOPHRON, genus of vultures with horizontal nostrils; found in Egypt and India.

NEO-PLATONISM, see PLATO.

NEO-PYTHAGOREANISM, see PYTHAGORAS.

NEORNITHES, see under ORNITHOLOGY.

NEPAL, NEPAUL, NIPAL (28° N., 84′ E.), independent state in N.E. of India; bounded N. by Tibet, W. by Kumaon, S. by United Provinces, Bihar and Orissa, and Bengal, and E. by Sikkim and Bengal; area, *c.* 54,000 sq. miles. Northern portion is lofty and mountainous region, containing part of Himalaya range with some of highest summits in the world; besides Mount Everest (29,000 ft.), Kinchinjunga (*c.* 28,000 ft.), and Dhaulagiri (26,000 ft.), there are many other peaks over 20,000 ft. high. In S. are stretches of fertile and cultivated country, called *Tarai*. State is watered principally by Gogra, Gandak, Sun Kosi, and their tributaries; chief towns, Katmandu (capital), Patan, and Bhatgaon. Owing to differences in altitude there is great variety of flora and fauna; cotton, rice, maize, wheat, barley, oats, pulse, hemp, sugar-cane, tobacco, dyes, drugs, vegetables, fruits, and flowers cultivated; forests produce fine timber. Among wild animals are tiger, leopard, wolf, hyena, rhinoceros, and elephant. N. supplies marble, iron, limestone, zinc, lead, copper, and sulphur; mineral springs numerous; chief occupation is agriculture, many of the inhabitants being engaged in terracing and irrigating land. Manufactures include metallic wares, pottery, paper, and textiles. State is inhabited by several different tribes, most important being warlike Gurkhas, who came originally from Rajputana and took possession of country; war broke out between them and British in 1814, and concluded with Peace of Segowlie in 1815, after which Gurkhas became friendly and allowed Brit. resident to live in capital; later assisted British in Mutiny. Government is in hands of a Prime Minister, who represents the Maharajahdhiraja. Pop. 4,000,000.

Digby, *Nepal and India* (1890).

NEPENTHE, term applied to anything causing oblivion of pain or grief, from an Egyptian drug mentioned in *Odyssey*.

NEPENTHES, genus of climbing plants ('pitcher-plants'), of order *Sarraceniales*, found in the East Indies, the ends of the leaves expanding into pitchers which secrete a digestive fluid.

NEPHELINE, white or yellowish mineral occurring in volcanic rocks; consists of sodium, potassium, and aluminium silicate.

Nephelinites, a group of colourless and transparent rocks containing nepheline; found in Staffordshire, John o' Groat's, Canary Islands, Azores; one of the lavas of Tertiary period.

NEPHELINE-SYENITE, ELÆOLITE-SYENITE, a white or grey holocrystalline rock, rich in alkalis and alumina, and found in volcanic and plutonic rocks in small masses or veins; resembles granite in appearance, and of rare occurrence; numerous varieties.

NEPHROPSIDEA, see LOBSTERS.

NEPI (42° 15′ N., 12° 22′ E.), town, ancient *Nepete*, Rome, Italy. Pop. 3000.

NEPIGON, see NIPIGON.

NEPOMUK, JOHN OF (fl. XIV. cent.), patron saint of Bohemia; tortured and killed in ecclesiastical dispute by Wenceslaus IV., 1393; subject of many legends; canonised, 1729.

NEPOS, CORNELIUS (*c.* 99–24 B.C.), Rom. historiographer; works include *Chronica* (compressed history of world), *De viris illustribus* (lives of famous men); diverting but not altogether reliable.

NEPTUNE, the farthermost known planet of the solar system, its distance from the sun being approximately 2800 million miles or thirty times that of the earth. Owing to its great distance it is invisible in all but the largest telescopes.

The discovery of N. ranks as one of the greatest triumphs of mathematics. J. C. Adams and Le Verrier independently discovered the planet theoretically in 1846 from computations based upon certain observed irregularities in the movements of Uranus, at that time the outermost planet of solar system.

The diameter of N. is about 37,000 miles, and no less than 164 years is required for it to complete one revolution of its huge orbit around the sun. It has at least one satellite.

NEPTUNE, Rom. god; see POSEIDON.

NEPTUNE'S CUP, see under SPONGES.

NÉRAC (44° 9′ N., 0° 21′ E.), town, Lot-et-Garonne, France; the old castle associated with Henry IV. and Marguerite de Valois; beer. Pop. 6600.

NERBUDDA, NARBADA (21° 36′ N., 72° 36′ E.), river, India; flows into Gulf of Cambay; length, 750 miles.

NERCHINSK (52° 5′ N., 117° E.), town, on Nercha, Transbaikalia, E. Siberia; tobacco; trade in furs. Pop. 7500.

NERCHINSKIY-ZAVOD (51° 20′ N., 119° E.), town, Transbaikalia, E. Siberia; silver. Pop. 4000.

NEREÏDS, see NYMPHS.

NERI, FILIPPO DE' (1515–95), Ital. priest; did much by charity to alleviate poverty in Rome; founded the Congregation of the Oratory, which Cardinal Newman introduced into England; canonised, 1622.

NERITIC, see under PLANKTON.

NERO (37–68), Rom. emperor, 54–68; s. of Gnæus Domitius Ahenobarbus; adopted by Emperor Claudius, 50, his mother, Agrippina, having become empress, 49; m. Octavia, dau. of Claudius, 53; on death of Claudius, 54, poisoned by Agrippina, latter secured throne for Nero. Five years of benevolent rule by Seneca and Burrus ensued; they were opposed by Agrippina, whom Nero, however, imprisoned and caused to be murdered. Nero's mistress, Poppæa Sabina, obtained chief power; secured murder of his wife and her own marriage to him, 62; Burrus and others murdered, 62; revolt of Boadicea in Britain put down, 61, but considered disgrace to Rome; Armenia established independence, 63; great fire, 64, nearly destroyed Rome; said to have been planned by Nero; Rome splendidly rebuilt, but the cost raised revolts; conspiracy, 65, in which prætorians were implicated, led to reign of terror; revolt of Vindex in Gaul and Galba in Spain, 68; Galba declared emperor, and Nero escaped execution by suicide. Last of first imperial line, N. was noted for persecution of Christians; ranks in history as supreme type of vice and frivolity; musician and actor.

Henderson, *Nero* (1904).

NERTHUS, see HERTHA.

NERUDA, MADAME, see HALLÉ, SIR CHARLES.

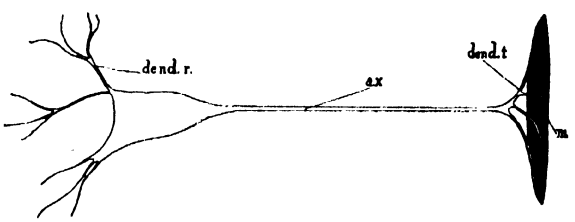
NERVA, MARCUS COCCEIUS, Rom. emperor, 96–98 A.D.; elected, when over 60 years of age, by Senate on murder of Domitian; exiles recalled, system of informers abolished, and republican machinery employed in governing; *lex agraria* provided lands for poor citizens; measures for supporting poor children in Ital. towns; taxation reduced; won victory against Suebi; became too feeble for rule; adopted Trajan as successor and colleague, 97.

NERVAL, GÉRARD DE, GÉRARD LABRUNIE (1808–55), Fr. author; wrote *Chansons et Ballades populaires du Valois, Émilie, Souvenirs de la Revolution,* translation of Goethe's *Faust, Filles du Feu,* etc.; highly praised by Gautier; unhappy life ended in suicide.

NERVES, see MUSCLE, NERVOUS SYSTEM.

NERVI (44° 22′ N., 9° 4′ E.), town, winter resort, on Gulf of Genoa, Genoa, Italy. Pop. 7500.

NERVOUS SYSTEM includes the *central* n. s., comprising the brain and spinal cord; the *peripheral* n. s., comprising the cranial nerves, the spinal nerves, and the sense organs, eye, ear, organ of smell, organ of taste, touch corpuscles; and the *sympathetic* n. s. Of these the brain, spinal cord, and the various sense organs are treated in separate articles elsewhere. The tissue of the n. s. is composed of nerve cells, nerve fibres, and a connective tissue termed neuroglia. The *nerve cells* vary from practically the smallest to much the largest size of cell in the body, and they have numerous branches. One of these branches, termed the *axon,* or *axis cylinder,* is a nerve fibre, while the others break up into finer branches and come into relation with similar branches of neighbouring nerve cells. The nerve cells are situated mainly in the brain and spinal cord, and their function consists in receiving, sending out, or in taking part in transmitting nervous impulses. The *nerve fibres* are the main processes, or axons, of the nerve cells, only one axon coming from each cell, and they may be either *non-medullated,* i.e. without any covering, or with only a fine membranous sheath, the *neurilemma,* or *medullated,* i.e. enclosed in a sheath of fatty substance termed *myelin,* which is usually covered by the neurilemma. At regular intervals of about $\frac{1}{75}$ of an inch the myelin is interrupted by constrictions, termed the *nodes of Ranvier,* which are characterised by staining deeply with silver nitrate in microscopic preparations. The axon runs without interruption from a nerve cell to a sense organ. The *neuroglia* is of two types, that lining the ventricles of the brain and the central canal of the spinal cord consisting of columnar cells, while elsewhere it is formed of small branching cells, the processes of which, except in the grey matter of the brain, interlace with the processes of the nerve cells.



DIAGRAMMATIC FIGURE OF A NEURON OR NERVE CELL IN CONNECTION WITH A SIMPLE MUSCLE CELL. *ax,* axon; *dend. r,* receptive dendrites; *dend. t,* terminal dendrite; *m,* muscle cells.

The **cranial nerves,** arising directly from the brain, are arranged in twelve pairs. The *first,* or *olfactory,* nerve is the nerve of smell, and is situated on each side, close beneath the frontal lobe of the brain, ending in a bulb, the olfactory bulb from which nerve filaments are given off to the nose. The *second,* or *optic,* nerve is the nerve of sight, and arises on each side of the brain from the optic thalamus and corpora quadrigemina, coming round in front to meet its fellow to the opposite side at the optic chiasma, where half the fibres of each side cross to the other; from here the optic nerve proper passes to the orbit and is distributed to the retina. The *third,* or *oculomotor,* nerve supplies four of the muscles which move the eyeball, the superior, inferior, and internal rectus, and inferior oblique, and also the *levator palpebræ superioris,* which lifts the upper eyelid; it leaves the brain immediately in front of the *pons Varolii.* The *fourth,*

or trochlear, nerve supplies the superior oblique muscle of the eyeball, and winds round the pons Varolii as it leaves the brain.

The *fifth*, or *trigeminal*, nerve leaves the brain by a broad root at the side of the pons Varolii and proceeds forwards to the apex of the petrous portion of the temporal bone, near the centre of the base of the skull, where it expands into a broad ganglion, the *Gasserian ganglion*. From this three divisions of the nerve go forwards, the *ophthalmic*, the *maxillary*, and the *mandibular*, which are sensory nerves, and with the last is associated a motor nerve to the muscles of mastication. The ophthalmic division of the fifth nerve breaks up into the *frontal* nerve, which supplies the upper part of the scalp, the forehead, and the inner part of the eyelids, the *lachrymal* nerve, which supplies the lachrymal gland and the outer part of the eyelids, and the *nasal* nerve, which supplies the nasal cavity and the surface of the nose. The maxillary division of the fifth nerve breaks up into the posterior, middle, and anterior dental branches, to the teeth of the upper jaw, and palpebral, nasal, and labial branches, to the lower eyelid, side of the nose, and upper lip respectively. The mandibular division of the fifth nerve, in addition to the motor branch, breaks up into the lingual nerve, which supplies the anterior part of the tongue, the inferior dental nerve, supplying the teeth of the lower jaw and giving a terminal branch to the surface of the chin, and the auriculo-temporal nerve, going backwards to supply the parotid gland, the skin on the outer side of the ear, and the side of the scalp.

The *sixth*, or *abducent*, nerve supplies the external rectus muscle of the eyeball, and leaves the brain immediately below the pons Varolii. The *seventh*, or *facial*, nerve supplies by its branches all the muscles of the face except the muscles of mastication, and in addition supplies the occipitalis, retrahens aurem, stylo-hyoid, and posterior belly of the digastric; it leaves the brain between the pons Varolii and the cerebellum. The *eighth*, or *auditory*, nerve is in two parts, one of them, the nerve of hearing proper, supplying the cochlea, and the other supplying the semicircular canals, which are concerned in maintaining the equilibrium of the body; it leaves the brain between the pons Varolii and the cerebellum, external to the seventh nerve. The *ninth*, or *glosso-pharyngeal*, nerve is the nerve of taste, supplying the back of the tongue, giving also branches to the tonsil and epiglottis; it leaves the medulla oblongata between the olive and restiform body. The *tenth*, or *vagus*, nerve is partly motor and partly sensory, and gives branches to the pharynx, larynx, œsophagus and stomach, respiratory tract and lungs, while the left vagus is connected with the hepatic nerve plexus, and the right with the cœliac, splenic, and renal plexuses; it leaves the medulla oblongata between the olive and restiform body immediately below the root of the ninth. The *eleventh*, or *spinal accessory*, nerve is composed of one part which leaves the medulla oblongata immediately below the root of the vagus, eventually joining the vagus lower down and supplying the larynx, and another part which arises by several roots from the spinal cord and supplies the sterno-mastoid and trapezius muscles. The *twelfth*, or *hypoglossal*, nerve is the motor nerve which supplies the tongue, giving also branches to the larynx, and the thyro-hyoid and genio-hyoid muscles; it leaves the medulla oblongata between the anterior pyramid and the olive.

The **spinal nerves** arise in pairs, thirty-one in number, from each side of the spinal cord. Each nerve is attached to the spinal cord by two roots, an anterior and a posterior, the former containing motor fibres and the latter sensory fibres, the two roots joining together before leaving the spinal canal. The posterior root has on it, just before it joins the anterior root, an oval swelling or *ganglion*, containing the nerve cells of the sensory nerve fibres. The united nerve leaves the spinal canal through a space between two adjacent vertebræ, and divides into a posterior and an anterior division, each of which contains both sensory and motor fibres. The posterior division divides again into branches supplying the muscles and skin of the back. The anterior division first gives off a branch to, and receives fibres in return from, the sympathetic system, and then proceeds round the trunk, giving off a lateral branch to the muscles and skin of the trunk, and ending in front of the body in a cutaneous branch. The nerves in the dorsal region preserve this simple arrangement, but in the cervical, lumbar, and sacral regions, through the development of the limbs, the symmetry is altered. In these regions the nerves divide and join with one another to form plexuses from which proceed branches for the nervous supply of the limbs; the fourth to the eighth cervical and the first and second thoracic spinal nerves are involved in the brachial plexus, the last thoracic and the first four lumbar spinal nerves in the lumbar plexus, and the fifth lumbar and first four sacral nerves in the sacral plexus.

The **sympathetic system** is composed of a series of ganglia united with one another by nerve cords running on each side of the vertebral column; the ganglia are three in number in the cervical region, and in number corresponding to the vertebræ in the dorsal, lumbar, and sacral regions. From each ganglion a nerve of grey fibres goes to the corresponding cranial or spinal nerve, and from it a branch is received in return. Branches also go from the ganglia to the blood-vessels and to the internal organs, uniting with each other to form intricate plexuses in some of which are found ganglia. The chief of these plexuses are: that situated behind the pharynx; that on the œsophagus; that in the arch of the aorta; that in front of the bifurcation of the aorta; the *solar plexus*, behind the stomach and around the cœliac axis of the aorta, with which are associated the two *semilunar ganglia*; the *hypogastric plexus*, below the bifurcation of the aorta; while plexuses are also formed around the rectum, bladder, prostate, uterus, and vagina. From these different plexuses branches go to the alimentary canal, its glands and blood-vessels, to the generative organs, to the skin, its glands, blood-vessels, and muscles, and to the iris muscle and blood-vessels of the eyeball. The sympathetic fibres which supply the muscular walls of the blood-vessels regulate their contraction and dilatation, and are termed *vaso-motor* fibres; while the movements of the alimentary canal, the secretions of the secretory glands of the body, and the dilatation of the pupil of the eye are all controlled by the sympathetic system.

Pathology.—The path of motor impulses from the brain is in two segments, the upper extending from the cortex of the brain to the anterior horn of grey matter in the spinal cord, while the lower extends from the anterior horn of grey matter to the termination of the motor nerve fibres in the muscles. The symptoms caused by a *lesion* of the motor path depend on whether it is in the upper or lower segment; if it is in the upper there is muscular weakness without muscular wasting, without changes in the electrical reactions, while if it is in the lower there is weakness and wasting and change in the electrical reactions. The path of sensory impulses is in three segments, of which the lowest has its nerve cells in the ganglia of the posterior roots of the spinal nerves, from which one process goes to the muscles and skin, etc., and another to the spinal cord, while the upper two segments serve as links in the chain to the brain. According to the segment of the path affected, the symptoms of a lesion of the sensory path differ, and different kinds of sensation may be deranged separately from one another, such as the sense of touch, pain, heat and cold, muscular sense, the sense of vibration.

When a nerve has been *divided*, the part which is

farther from its nerve cells of origin undergoes degeneration, the myelin sheath and axis cylinder breaking up and disappearing, the neurilemma remaining, its nuclei multiplying. From the central part of the divided nerve the axis cylinder elongates and grows out to the sheath of the farther part, which it penetrates, and grows along inside it to its termination, the myelin sheath then also regenerating.

Inflammation may involve either chiefly the sheath of the nerve, the interstitial tissue, or the nerve fibres themselves. When the interstitial tissue is the subject of inflammation the nerve is swollen, red in colour, and infiltrated with round cells, while the nerve fibres are not affected to any extent. When the nerve fibres are primarily affected the changes resemble those in degeneration after division of a nerve, the myelin and axis cylinders breaking down and disappearing, and the nuclei of the neurilemma multiplying.

The causes of inflammation of the nerves are various, and include over-indulgence in alcohol, cocaine, opium, morphia, tobacco, the poisonous effects of arsenic, carbon monoxide, lead, mercury, toxins in such diseases as beri-beri, diphtheria, influenza, measles. See APHASIA, APOPLEXY, BRAIN, CHOREA, CRETINISM, EPILEPSY, HYSTERIA, INSANITY, LOCOMOTOR ATAXY, NEURALGIA, NEURASTHENIA, SCIATICA, SPINAL CORD, and similar articles.

Lickley, *The Nervous System* (1912); Turner and Grainger Stewart, *Text-Book of Nervous Diseases*.

NESS, LOCH (57° 15′ N., 4° 30′ W.), lake, Inverness, Scotland; length, 22 miles; Oich River joins it to Caledonian Canal on S., the Ness and Canal link it with Moray Firth on N.; celebrated for scenery.

NESSELRODE, KARL ROBERT, COUNT (1780–1862), Russ. diplomatist and statesman; representative of Russia in councils of Allies, 1813–14; helped to draw up Treaties of Paris and to form Holy Alliance; supported war policy against pagan Turkey and revolutionary Hungary, but opposed war with Prussia.

NEST, a structure built by various kinds of animals to protect their eggs or young during immaturity. Amongst birds, with whom nest-building, or *nidification*, is most common, the n. may vary from a simple hollow in sand lined with a few leaves or grasses, and the careless platform of the rook, the beautifully woven grass, lichen, or mossy n's of Thrushes, Finches, Wrens, and the like, the mud n's of Swallows and Oven-Birds, to the elaborate structures of the tropical Weaver- and Tailor-Birds. Claws and beak are used in building, and often salivary juices supply a medium of adhesion. (The *edible bird's nest* of China is made by Swifts with a glutinous salivary fluid which becomes hard.) But, apart from birds, nidification is practised in several other groups: typical nest-builders amongst mammals are Squirrels and Field-Mice; some fishes, such as Sticklebacks, weave masses of seaweed; even the mollusc *Lima* cements shell-fragments and débris; while amongst insects, especially the Hymenopterous Ants, Bees, and Wasps, nest-building of earth, mud, or wood-pulp is common.

NESTOR (classical myth.), s. of Neleus and Chloris; in Homer's epics represents wisdom of old age.

NESTOR (*c.* 1056–*c.* 1114), Russ. monk of Pechersky cloister, Kiev, to whom are attributed earliest Russ. chronicles.

NESTOR, a genus of PARROTS (*q.v.*).

NESTORIANS, followers of Nestorius (*q.v.*), who tended to make Christ two persons. Nestorianism soon became extinct in the Rom. Empire, but it had a great career in the Middle Ages, extending at one time over nearly the whole of Asia. From VII. to XIV. cent. it was very strong in Persia, but was overthrown by Mongolian invasion. Nestorian Christians evangelised India and probably founded the Syrian Church of Malabar (traditionally ascribed to St. Thomas). Churches existed in China, and the discovery of a MS. in a hitherto unknown Aryan language, Sogdianese, witnesses activity in Siberia. Various and partially successful attempts have been made by the R.C. Church to win the Syrian Churches. Nestorians still survive in Kurdistan, and are helped by the 'Archbishop of Canterbury Mission to the Assyrian Christians.'

NESTORIUS (d. *c.* 450), patriarch of Constantinople, 428–31; was earnest in defence of orthodoxy against Arians, Novatians, and Quartodecimans; refused to give the title 'Mother of God' to the Virgin Mary. N. represented the more practical Antiochene school as against the more mystical Alexandrian, Cyril, the bp. of Alexandria, being his enemy. N. was excommunicated, but replied with counter-anathemas. At the Council of Ephesus, in 431, he was deposed; his friends pronounced depositions against the Alexandrian party, but the Ephesian decision was confirmed at Chalcedon. The discovery of N.'s own 'Bazaar of Heraclides' shows that he was not Nestorian in the later sense. He lived some years in exile.

Bethune Baker, *Nestorius and his Teaching*.

NET, meshwork of knotted cord made of flax, hemp, cotton, etc.; used from earliest times in fishing industry and for snaring animals; lace and silk net as ornamentation; hand-made, with wooden needle and oval stick to make mesh; generally machine-made. Fishing nets are tarred to withstand action of water. Fragments of nets have been found among prehistoric remains in Switzerland.

NETHERLANDS, see HOLLAND.

NETHINIM, 'those given to the sanctuary,' mentioned in *Ezra* and *Nehemiah* as a distinct but inferior class of Temple ministers; said to have been first app. by David.

NETLEY (50° 53′ N., 1° 22′ W.), village, Hampshire, England; military hospital; ruined abbey.

NETTING, see FISHES: *Fisheries*.

NETTIUM, TEAL, see under DUCK FAMILY.

NETTLE, herbaceous plant of order *Urticaceæ*; two varieties in Britain, *Urtica dioica* and *U. urens*. Former large with heart-like foliage and clustered green flowers, latter small with elliptical flowers. The usual remedy for a n. sting is to apply to the part affected a crushed dock-leaf, which is usually to be found in the vicinity. Dead Nettle (*Lamium*) has white or purple flower and square stem.

NETTLERASH, URTICARIA, skin disease characterised by the appearance of wheals, accompanied by stinging sensation; may be due to external irritation, to certain articles of food, *e.g.* shellfish, or certain drugs, *e.g.* copaiba, to digestive or genito-urinary disturbances, or other causes; the treatment is first a purge to clear away any irritation in alimentary canal; a light diet, bismuth, strychnine, and ichthyol are beneficial, and a change of air and tonics in chronic cases; an application of a weak solution of carbolic acid, and alkaline baths, relieve itching.

NETTUNO (41° 27′ N., 12° 40′ E.), fishing village, Rome, Italy. Pop. 5600.

NETZE (53° 5′ N., 16° 56′ E.), river, Posen and Brandenburg, Prussia; joins Warthe.

NEU MECKLENBURG (3° S., 152° E.), island, Bismarck Archipelago, W. Pacific.

NEU-BRANDENBURG (53° 32′ N., 13° 15′ E.), town, on Lake Tolensesee, Mecklenburg-Strelitz, Germany, iron foundries. Pop. (1910) 12,344.

NEUBREISACH (48° 3′ N., 7° 28′ E.), fortified town, Alsace, Germany, near Rhine. Pop. 3500.

NEUBURG (48° 43′ N., 11° 11′ E.), town, on Danube, Swabia, Bavaria; capital of former principality of N. Pop. (1910) 9056.

NEUCHÂTEL (47° N., 6° 45′ E.), western canton of Switzerland, bounded by France, cantons of Vaud and Berne and Lake Neuchâtel; area, *c.* 312 sq. miles. Surface is chiefly mountainous, Jura range crossing canton from S.W. to N.E.; highest peak Mont Racine (*c.* 4730 ft.); chief rivers, Doubs and Thièle; leading towns, Neuchâtel (capital), La-Chaux-de-Fonds, and Le Locle. Neuchâtel was for long connected with Prussia,

but in 1857 became canton of Swiss Confederation. Manufactures include watches, wine, and chocolate. Pop. (1910) 133,061.

NEUCHÂTEL (47° N., 6° 55′ E.), capital of Neuchâtel Canton, Switzerland; ancient castle and cathedral; watches, jewellery. Pop. (1910) 23,505; (canton) 132,184.

NEUCHÂTEL, LAKE OF, ancient *Lacus Eburonensis* (46° 55′ N., 6° 50′ E.), lake, Switzerland; outlet by Thièle into Aar.

NEUENAHR (50° 32′ N., 7° 5′ E.), watering-place on Ahr, Rhine province, Prussia; mineral springs.

NEUENDORF (52° 24′ N., 13° 4′ E.), village, Brandenburg, Prussia; textiles.

NEUFCHÂTEAU (48° 20′ N., 5° 40′ E.), town, Vosges, France, at junction of Mouzon and Meuse; woollen industry. Pop. (comm.) 4000.

NEUHALDENSLEBEN (52° 15′ N., 11° 25′ E.), town, on Ohr, Prussian Saxony; pottery. Pop. (1910) 10,774.

NEUILLY-SUR-SEINE, W. suburb, Paris; favourite residence of Orleans family. Pop. (1911) 44,616.

NEUMÜNSTER (54° 4′ N., 9° 59′ E.), town, on Schwale, Schleswig-Holstein, Prussia; cloth. Pop. (1910) 3467.

NEUNKIRCHEN, Ober-Neunkirchen (49° 20′ N., 7° 9′ E.), town, Rhine province, Prussia; ironworks and collieries. Pop. (1910) 34,532.

NEU-POMMERN, formerly New Britain (6° S., 150° E.), island, Bismarck archipelago, W. Pacific.

NEUQUEN (39° S., 69° W.), territory, Western Argentina, S. America; mountainous; capital, Chosmalal. Pop. 30,000.

NEURALGIA, term applied to pain in a nerve unaccounted for by any organic affection, predisposed to by a tendency to nervous affections, by anæmia and other debilitated states, by gout, rheumatism, and other conditions in which the state of the blood is affected. The chief symptoms are paroxysmal, sharp pains, with a dull aching between the paroxysms, or the pain may be continuous, boring, or aching; tender spots can usually be found along the course of the nerve; the skin may be flushed, pale, or perspiring. The local causes of n. may include pressure on the nerve by a tumour, or through disease of bone or other tissue; exposure of the nerve is an important cause; the cause may be reflex, such as irritation of the teeth, or of the stomach by certain foods.

The treatment consists of removing, if possible, any exciting cause, and of treating anæmia, rheumatism, and similar predisposing causes; internally, quinine with perchloride of iron is valuable, as are phenacetin or antipyrin with caffein, also nitroglycerine and arsenic; warmth should be applied to the affected part by poultices or hot-water fomentations, and irritant liniments or even the actual cautery have proved beneficial. Electricity is also valuable, while in extremely obstinate cases the nerve may be cut down upon and stretched. Rest, change of air, and a nutritious diet are important in the treatment of the condition.

See Sciatica, Neuritis.

NEURASTHENIA is a general term applied to weakness or exhaustion of the nervous system, and may be due to overwork, anxiety, and other mental disturbances, a neurotic tendency, over-indulgence in alcohol or other stimulants, and in tobacco, and mistakes in dietary. It is more common in men than in women, and the symptoms may include general malaise, with depression or excitement, headache, insomnia or disturbed sleep, noises in the ears, disturbances of vision, of sensibility, and of the stomach and other organs, while there is usually muscular weakness and wasting. The condition is easily amenable to treatment, which consists of complete rest, change of air, attention to diet, with plenty of nourishing food, and tonics. *Traumatic n.*, or 'railway spine,' is the neurasthenic condition due to injury following railway accidents; the subjective symptoms may be many and various, while objective signs may be few or absent, as in other conditions of n., and it is usually found that when the patient's claim for damages has been settled, either favourably or adversely, the condition improves.

NEURITIS, inflammation of one or more nerves, affecting either the sheath of the nerve, its interstitial tissue, or the nerve fibres themselves. Acute n. affecting a single nerve may be due to prolonged pressure, to extension of inflammation from a neighbouring part, or to an unhealthy condition of the blood, *e.g.* in gout. The nerve is usually red and swollen, there is severe pain in the nerve and around it, and when the nerve is stretched the pain is increased. The skin is very tender, and the muscles supplied become flabby and wasted. A slight attack may pass off in a few days, but a more acute attack may last several weeks. The treatment is, first, a mercurial purge (*e.g.* calomel) followed by a dose of salts; the affected part must have complete rest and fomentations applied to it, while, if pain is intense, cocaine may be injected over the nerve; in chronic cases, counter-irritants and electricity are valuable.

In multiple n. the nerve fibres are generally affected, the causes of the condition including poisons, such as lead and arsenic, alcohol and carbon monoxide, the toxins of such diseases as diphtheria, influenza, measles, and unhealthy conditions of the blood, as in diabetes or general debility. The onset of an attack is usually gradual, there are pains in the legs, a high-stepping gait may be present, and walking gradually becomes impossible through loss of co-ordination and tenderness of the nerves of the legs and feet. The skin of the lower limbs is flushed and tender, reflexes are diminished, and the muscles become wasted. The upper limbs are similarly affected, and there may be mental symptoms, delirium, loss of memory, hallucinations. The treatment includes careful dieting (no alcohol being allowed), rest, and nutritious food. Fomentations and injections of cocaine are employed to relieve the pain, electricity to prevent the wasting of the muscles, and in the more convalescent stages strychnine, iron, and other tonics.

NEUROGLIA, see Nervous System.

NEUROPTERA (Gk. *neuron*, nerve; *pteron*, wing), an order of Insects which used to include termites, dragon-flies, caddis-flies, may-flies, bird-lice, scorpion-flies, alder-flies, snake-flies, mantis-flies, and lace-wing flies, but which has recently been restricted to the last four and a few less-known groups. These possess as common characters four almost similar glassy membraneous wings which, in early development, are tucked in the body, and which bear a close network of nervures. They are carnivorous insects with biting jaws and large antennæ, and there is complete metamorphosis—the larva being entirely different from the adult. N. are widely distributed, especially in tropical and subtropical countries. Most are terrestrial, but a few spend their larval stages in fresh-water ponds or streams. They do little harm, and occasionally do much good by the destruction of injurious insects. See Insecta.

NEUSALZ (51° 48′ N., 15° 42′ E.), town, on Oder, Silesia, Prussia; flax-mills. Pop. (1910) 13,485.

NEUSS (51° 12′ N., 6° 41′ E.), town, ancient *Novesium*, Rhine province, Prussia, near Rhine; textiles. Pop. (1910) 37,224.

NEUSTADT, Polish Prudnik (50° 20′ N., 17° 34′ E.), town, on Prudnik, Silesia, Prussia; tanneries. Pop. (1910) 18,857.

NEUSTADT-AN-DER-HAARDT (49° 20′ N., 8° 10′ E.), town, Bavarian Palatinate, Germany; wine. Pop. (1910) 19,288.

NEU-STETTIN (53° 42′ N., 16° 43′ E.), town, Pomerania, Prussia; iron foundries. Pop. (1910) 11,833.

NEU-STRELITZ (53° 20′ N., 13° 3′ E.), town, capital, Mecklenburg-Strelitz, Germany; iron manufactures. Pop. (1910) 11,978.

NEUTITSCHEIN (49° 40′ N., 18′ E.), town, Moravia, Austria; woollens. Pop. (1911) 13,756.

NEUTRALITY is the attitude of impartiality adopted towards a state at war with another by states not involved in the war. This attitude has its rights and duties. A neutral state must refrain officially, and must compel its subjects to refrain, from giving any help to either of the belligerent states. It should grant impartially to the belligerents any rights, advantages, or privileges which, according to international usage, are not regarded as an intervention in the war. In particular, strict neutrality requires that there must be no supplying either belligerent with troops, arms, ships, munitions of war, money, or anything which may assist materially in the conduct of the war. The question of the justice or injustice of the war does not affect the fulfilment of this neutrality. Matters which do not directly assist the prosecution of war, as, for instance, the drawing up of commercial treaties, may be carried out between neutral states and states at war without any violation of neutrality.

The neutrality of several states has been guaranteed by the principal European powers, and certain international waterways have also been neutralised by the powers. Switzerland was thus permanently neutralised in 1815, when Great Britain, Austria, France, Portugal, Prussia, Spain, and Russia jointly recognised and guaranteed that Switzerland must neither be invaded nor take any part in European hostilities except for the sole purpose of self-defence. The permanent neutrality of Belgium was guaranteed in similar fashion by Great Britain, Austria, France, Prussia, and Russia by the Treaty of London, 1831.

The Suez Canal was permanently neutralised in 1888 by the Convention between Great Britain, Germany, Austria-Hungary, Spain, France, Italy, the Netherlands, Russia, and Turkey. Under the terms of that Convention the Suez Canal shall always be free and open in war and peace alike to every vessel of commerce or of war, without distinction of flag, and shall never be subjected to the exercise of the rights of blockade. And at the same time, under the Convention no act of war must take place within the Suez Canal, or within a radius of three miles from the ports of access to the canal, even though the Ottoman Empire itself should be at war.

The neutralisation of the Panama Canal was guaranteed on the basis of the Suez Canal Convention by the Treaty of 1901 between Great Britain and the United States.

The Hague Convention of 1907 drew up a long list of 'Rights and Duties of Neutral Powers.' By the articles of this Convention—the territory of neutral powers was declared inviolable, and belligerents were forbidden to move troops or convoys of either munitions of war or supplies across neutral territories, or to erect wireless telegraphy stations on such territories; troops of the belligerent armies received on the territory of a neutral power were to be taken inland as far as possible from the seat of war, and supplied with 'the food, clothing, and relief required by humanity.' The recognition of neutrality has slowly grown up, and, as it is known to-day, is comparatively modern. But the beginnings of the principle may be seen in the treaty between Henry VIII. and Francis I. of France, 1515, and the treaty (of Münster) between France and the emperor, 1648. See INTERNATIONAL LAW.

NEUWIED (50° 26′ N., 7° 29′ E.), town, Rhine province, Prussia, on Rhine; tobacco, sugar. Pop. (1910) 19,107.

NEUWEILER (48° 50′ N., 7° 5′ E.), town, Alsace-Lorraine, Germany; wine.

NEVA (59° 48′ N., 30° 45′ E.), river, N. Russia, flows from Lake Ladogo into Gulf of Finland.

NEVADA (40° N., 118° W.), western state of U.S.A., bounded N. by Idaho, Oregon, W. and S. by California, E. by Arizona and Utah; area, c. 110,700 sq. miles. Except portions in N.E. and S.E., state lies wholly in Great Basin, which consists of elevated plateau, broken by rugged and lofty mountains, and intersected by ravines and wild valleys; principal ranges are E. Humboldt Mts., in E. (containing some of highest peaks), Washoe Mts. (branch from Sierra Nevada), Toyabe Mts., Humboldt Mts., and White Pine Mts.; highest point is Wheeler Peak (over 13,000 ft.), near E. boundary. Lakes are numerous and generally salt; largest, Pyramid Lake, near W. boundary; other notable lakes are Winnemucca, Carson, and Walker; hot and cold springs are frequent; sometimes valleys are watered by streams, but more often they are wide deserts with no vegetation. In S.E. are Virgin and Colorado Rivers, and in extreme N. are several streams which reach ocean; rivers belonging to Great Basin never reach sea, but lose themselves in lakes or sink occasionally, to reappear farther on; longest and most important river is Humboldt, flowing into Humboldt Lake; Carson and Walker Rivers enter lakes of same name. Truckee River is connected with Carson by canal.

Region was explored by Fremont 1843–45; passed into hands of U.S.A. at Guadalupe-Hidalgo Purchase; Nevada formed part of Utah under name of Washoe Country until 1861, when organised as a territory; in 1864, admitted as a state. Chief feature in history of state is development of mines.

On account of dryness of climate and aridity of soil, agriculture depends largely on irrigation; grain, hay, butter, vegetables, and fruits produced; stock-raising is a rising industry. Nevada is, above all, a mining state, being one of richest states in mineral wealth; gold and silver principal productions, but copper, lead, zinc, iron, graphite, sulphur, gypsum, borax, and other minerals, also worked; manufactures almost all in connection with mines. Nevada is one of most thinly populated states; chief towns, Carson City (capital), Reno, and Sparks. State is represented in Congress by two Senators and one Representative. Pop. (1910) 81,875.

NEVADA (37° 50′ N., 94° 20′ W.), city, Missouri, U.S.A.; lumber-mills. Pop. (1910) 7176.

NEVADA CITY (39° 20′ N., 121° W.), town, health-resort, California, U.S.A.; fruit-growing and gold-mining. Pop. (1910) 2689.

NEVERS (47° N., 3° 9′ E.), town, Nièvre, France; gave name to counts of N. from X. cent. onwards; episcopal see, has cathedral dating in part from XI. cent.; manufactures iron goods, china, and earthenware. Pop. 28,000.

NEVILLE, NEVILL, Eng. noble house; descended on female side from Saxon Dolfin, s. of Uchtred; branches settled in Yorkshire at Hornby and Middleham; Middleham was centre of large honour of N's of Raby, who acquired earldom of Westmorland, 1397; Warwick, the 'king-maker,' was of this line. Other families, some of them branches, were N's of Bergavenny, Birling, Essex, Fauconberg, Hallamshire, Montagu. See WARWICK, EARLDOM OF.

NEVILLE, GEORGE (1432–76), bro. of Warwick the 'king-maker'; bp. of Exeter, 1458; abp. of York, 1464; alternately supported Henry VI. and Edward IV.

NEVILLE, RALPH (d. 1244), bp. of Chichester, 1224; Chancellor, 1226.

NEVIN, JOHN WILLIAMSON (1803–86), Amer. divine; Presbyterian, then joined Ger. Reformed Church—aroused opposition by showing sympathy with Catholicism.

NEVIS (17° 8′ N., 62° 35′ W.), island, Leeward group, Brit. W. Indies; mountainous; exports sugar. Pop. 15,500. Capital, Charlestown.

NEVIS, BEN, see BEN NEVIS.

NEVYANSKIY ZAVOD (57° 30′ N., 60° 31′ E.), town, Perm, Russia; iron- and steel-works. Pop. 16,500.

NEW ABBEY (54° 59′ N., 3° 37′ W.), village, Kirkcudbrightshire, Scotland; ruins of Sweetheart Abbey.

NEW ALBANY (38° 18′ N., 85° 46′ W.), city, on Ohio, Indiana, U.S.A.; cottons, machinery. Pop. (1910) 20,629.

NEW AMSTERDAM (6° 8′ N., 57° 24′ W.), town, near mouth of Berbice, Brit. Guiana, S. America. Pop. 9300.

NEW BEDFORD (41° 38′ N., 70° 59′ W.), city, port of entry, Massachusetts, U.S.A., on Acushnet estuary. Among public buildings are city-hall, custom-house, county court-house, public library, and post-office. Chartered as city 1847. N. B. was attacked and almost destroyed during War of Independence. City is of considerable commercial importance, and has extensive trade, formerly chief port of whale-fisheries; manufactures include cotton, lubricating oils, cordage, shoes, glass, paints. Pop. (1910) 96,652.

NEW BRIGHTON.—(1) (40° 40′ N., 80° 16′ W.) town, at confluence of Beaver and Ohio, Pennsylvania, U.S.A.; bricks and machinery. Pop. (1910) 8320. (2) (40° 34′ N., 74° 10′ W.) town in Richmond Borough, New York City, on Staten Island; has institution for sailors, named 'Sailors' Snug Harbor'; paper.

NEW BRITAIN (41° 40′ N., 72° 46′ W.), city, Connecticut, U.S.A.; hardware, hosiery. Pop. (1910) 43,916.

NEW BRITAIN, see NEU-POMMERN.

NEW BRUNSWICK (46° 20′ N., 66° W.), maritime province of Dominion of Canada; bounded by Quebec, Gulf of St. Lawrence (N.), Maine and Quebec (W.), Bay of Fundy (S.), Nova Scotia, Gulf of St. Lawrence (E.); area, 27,985 sq. miles. N. B. is connected with Nova Scotia by narrow isthmus; seaboard (about 600 miles); has excellent harbours; extensive forests; St. John and other navigable rivers; numerous lakes; principal towns, Fredericton (capital), St. John, Moncton. French settlement began, 1604; first Brit. settlement, 1764; region ceded to Britain as part of Acadia, 1713; became separate colony, 1784; great influx of Amer. Loyalists; joined Dominion, 1867.

N. B. has a lieut.-gov., executive council, and legislative chamber; Provincial Univ. at Fredericton; R.C's predominate, then Baptists Methodists, Anglicans, Presbyterians. Coal is mined; limestone and gypsum quarried; rich in minerals and natural gas; valuable fisheries; timber exported. Pop. (1911) 351,889.

NEW BRUNSWICK (40° 32′ N., 74° 57′ W.), town, New Jersey, U.S.A.; contains Rutgers Coll.; has R.C. cathedral; manufactures rubber goods, hardware, hosiery. Pop. (1910) 23,388.

NEW CALEDONIA, LA NOUVELLE CALÉDONIE (21° S., 165° E.), island belonging to France, in South Pacific; length, 250 miles; breadth about 25 miles; area, 7650 sq. miles; surface mountainous; Nouméa, capital. N. C. was discovered by Cook, 1774; annexed by France, 1853; used as penal settlement. Dependencies of N. C. are Isle of Pines, Wallis Archipelago, Loyalty Islands, Huon Islands; Futuna and Alafi annexed by France, 1888. Chief products and exports are coffee, sugar, nickel, and chrome ores, tobacco, vanilla, cotton, fruits; rich in other minerals. Pop. (1911) 50,680, including some 29,000 blacks, several thousand convict settlers.

NEW CASTLE (39° 54′ N., 85° 20′ W.), town, Indiana, U.S.A.; iron, pianos. Pop. (1910) 9446.

NEW ENGLAND, name given to six states in N.E. of U.S.A., consisting of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut; area, *c.* 66,000 sq. miles; region mountainous in parts—White Mts. in New Hampshire, Green Mts. in Vermont, and Berkshire Hills in Massachusetts, all forming part of Appalachian mountain system. Soil is fertile in valleys, chief productions being hemp, jute, and flax; climate healthy. Region was named New England by Captain Smith, *c.* 1607; first successful settlement made at Plymouth, 1620; colonised by Puritans from England; supported Federal cause during Amer. Civil War. See UNITED STATES.

James, *Colonization of New England* (1904).

NEW FOREST (*c.* 50° 50′ N., 1° 38′ W.), district, Hampshire, England, W. of Southampton Water; well wooded, beautiful scenery; greater part is Crown property; chief village is Lyndhurst, near the centre.

NEW GLARUS (42° 50′ N., 89° 40′ W.), town, Wisconsin, U.S.A.

NEW GLASGOW (45° 36′ N., 62° 40′ W.), seaport, on East River, Nova Scotia, Canada; iron- and steel-works, collieries. Pop. 5500.

NEW GRANADA, see COLOMBIA.

NEW GUINEA (6° S., 141° E.), second largest island in world, north of Australia in West Pacific; separated from Queensland by Torres Strait; Arafura Sea in S.W.; length about 1500 miles; breadth, 480 miles: area, *c.* 312,000 sq. miles. West part belongs to Holland, N.E. to Germany, S.E. to Britain. Northern part is almost separated from mainland by MacClure Inlet; western half and interior still mostly unexplored. N. G. is traversed by high mountain ranges (Owen Stanley, with Mt. Victoria, 13,000 ft., in S.E.; Charles-Louis, in central region, over 14,000 ft.; Finisterre, 11,000 ft., in N.); extensive forests. Climate is unhealthy. There are numerous beautiful birds (*e.g.* Bird of Paradise); mammals scanty. Chief rivers are Amberno, Fly, Kaiserin Augusta, Mambare. Island is inhabited by Papuans mixed with Malays and Polynesians; notorious for head-hunting and savage tribes. N. G. was sighted by d'Abreu, 1511; name given by Retez, 1546; settlement made by East India Co., 1793; Dutch annexed western half, 1828; remainder divided between Britain and Germany, 1884; explored by Wallace, Meyer, De Clercq, Blackwood, Stanley, Staniforth Smith, Wollaston, and many others in recent years. Pop. *c.* 750,000.

British New Guinea, named TERRITORY OF PAPUA, 1906; includes D'Entrecasteaux, Louisade, and other small islands; area, *c.* 90,500 sq. miles; Commonwealth of Australia assumed control, 1901; administered by lieut.-gov. and legislative council; capital, Port Moresby; chief exports—timber, gold, pearls, rubber, bêche-de-mer, copra, and various tropical products. Pop. 350,000.

German New Guinea includes KAISER WILHELM'S LAND (area, 70,000 sq. miles), Bismarck Archipelago, Marshall, Solomon, and other islands; capital, Herbertshöhe; administered by imperial gov.; chief products—copra, gold, timber, mother-of-pearl, coffee, sandal-wood, tortoise-shell. Pop. 360,000.

Dutch New Guinea.—Area, 151,789 sq. miles; with a few trading and mission stations. Pop. 220,000.

Grimshaw, *The New New Guinea* (1911); Pratt, *Two Years among New Guinea Cannibals* (1903); Krieger, *New Guinea* (Berlin, 1899).

NEW HAMPSHIRE (44° N., 72° W.), north Atlantic state of U.S.A.; one of the New England States; bounded N. by Quebec, W. by Vermont, S. by Massachusetts, E. by Maine and Atlantic Ocean; length, 178 miles; breadth, 88 miles; area of land surface, 9040 sq. miles; water surface, 275 sq. miles.

Surface is mountainous, except in S.E.; White Mts. in N. consist of several ranges, viz. Presidential, with Mount Washington (6293 ft.), Adams (5805 ft.), Jefferson (5725 ft.), Clay (5554 ft.), Madison (5380 ft.), etc.; Franconia range, with Mt. Lafayette (5028 ft.); Carter Moriah range, with Carter Dome (4860 ft.), etc.; country is flat in S.E. Principal rivers are Connecticut, Piscataqua, Merrimac, Androscoggin, Ossipee, Mascoma, Pemigewasset; many fine waterfalls; numerous lakes with fine scenery (Winnepesaukee, New Found, Sunapee, Umbagog, Squam, Massabesic, etc.). Climate is healthy, with severe winters; coldest in N.; mean annual temperature from *c.* 42° to 47° F.; average January temperature is *c.* 20° to 25° F.; mean annual rainfall, *c.* 40 in. Fauna includes wolf, lynx, raccoon, squirrel, deer, fox, sable, mink, porcupine, numerous song-birds (wren, hermit-thrush, bunting, etc.). There are extensive forests of beech, oak, yellow birch, sugar-maple, etc.

History.—N. H. was visited by Martin Pring, 1603; Samuel de Champlain, 1605; Captain John Smith, 1614. All the territory between 40° and 48° N. lat. was

granted to Council for New England by James I., 1620; first settlement made by John Mason, 1623, followed by various others up to 1635. N. H. was annexed by Massachusetts, *c.* 1641; constituted a separate province, 1679; formed part of the Dominion of New England from 1686 to 1689; again united to Massachusetts, 1689; royal government established, *c.* 1692; boundaries definitely fixed, 1737, 1741, 1764. N. H. took an active part in the War of Independence; one of original 13 states of the Union. See UNITED STATES.

N. H. has a gov., Senate (24 members, elected for 2 years), and House of Representatives (390–400 members); 2 Senators and 2 Representatives in Federal Congress. The state is divided into 10 counties. Principal towns are Manchester, Nashua, Concord (capital), Dover, Portsmouth, Berlin, Keene. Roman Catholics predominate; then Baptists, Methodists, and Prot. Episcopalians. Elementary education is compulsory; St. Anselm's College (Manchester), Dartmouth College (Hanover), New Hampshire College of Agriculture and Mechanic Arts (Durham), besides other colleges. Total railway mileage exceeds 1300 miles. Principal products are hay, corn, potatoes, oats, fruit (especially apples), tobacco, timber; important industries are cotton and woollen goods, boots and shoes, lumber, machinery, flour, malt liquors, paper; granite and mica are quarried. Pop. (1910) 430,572.

M'Clintock, *History of New Hampshire*; Fry, *New Hampshire as Royal Province* (1908).

NEW HARMONY (38° 30′ N., 87° 45′ W.), small town, Indiana, U.S.A.; founded by Ger. Socialists called Harmonists, 1805; afterwards settled by Owen's followers. Pop. (1910) 1229.

NEW HAVEN (41° 18′ N., 72° 57′ W.), city, seaport, capital of N. H. County, Connecticut, U.S.A.; situated on N. H. Bay; founded by Puritans in XVII. cent.; one of finest cities in America, with wide streets and avenues, spacious parks and squares and handsome buildings; seat of Yale Univ. (*q.v.*), which was removed here from Saybrook, *c.* 1716; has many other educational establishments, libraries, churches, hospitals, etc. N. H. has extensive trade and important manufactures, including firearms, tools, clocks, carriages, and paper; meat-packing an important industry. Pop. (1910) 133,605.

NEW HEBRIDES, chain of islands in Western Pacific Ocean, largest being Espiritu Santo, Mallicolo, Erromango, Efaté or Sandwich, Ambrym, Tanna, and Aneiteum; islands are mostly lofty and volcanic, with luxuriant vegetation; jointly administered (since 1906) by Brit. and Fr. High Commissioners; seat of government at Port Vila in Efaté Island; inhabited by native Melanesians, British, and French; sighted *c.* 1606; explored and named by Cook in 1774. Leading exports are coffee, copra, maize, bananas, and timber. Pop. *c.* 50,000.

NEW HOLLAND, former name of AUSTRALIA.

NEW IBERIA (30° N., 91° 50′ W.), city, Louisiana, U.S.A.; foundries, mills. Pop. (1910) 7499.

NEW JERSEY (40° N., 74° 30′ W.), north-eastern state of U.S.A.; bounded N. by New York, W. by Pennsylvania and Delaware River, S. by Delaware Bay, and E. by Atlantic; length, 166 miles; breadth, 57 miles; area of land surface, 7525 sq. miles; area of water surface, 710 sq. miles. Coast-line is about 120 miles, fringed with sand-bars; numerous large indentations—Wreck Pond, Shark River, Egg Harbor, Manasquan, New Brigantine, etc.

Surface is mountainous in N.; Blue or Kittatinny Mts. (with High Point, 1803 ft., Mount Tammany, 1480 ft.). S.E. of Blue Mts. is large plateau with average elevation, *c.* 1000 ft. Coastal region is marshy; in certain districts large swamps. Among rivers are Hudson, Delaware, Raritan, Passaic, Wallkill, Hackensack, Great and Little Egg Harbor Rivers, Shark, Metedeconk; many navigable; numerous lakes in N. surrounded by fine scenery. Climate generally is healthy, especially in highlands, where there are many summer resorts; average summer temperature, *c.* 67° in N. and 75° in S.; mean annual rainfall, *c.* 40 to 50 in. Fauna is akin to that of other Middle Atlantic states, and includes grey fox, deer, raccoon, opossum, chipmunk; extensive forests (chiefly pine) in S. region; large oak and chestnut forests in N.

History.—N. J. was first visited by Florentine navigator, Giovanni da Verrazano, 1524; Sandy Hook and Raritan Bay explored by Henry Hudson, 1609; Delaware River explored by Cornelis Jacobsen, 1614, and Cornelis Hendrieksen, 1616. First settlement was made by Dutch at Bergen, 1617; followed by Swed. settlement, 1638, which was taken by Dutch, 1655; several attempts made by English to plant colonies were prevented by Dutch. Charles II. granted the territory between Connecticut and Delaware Rivers, and islands between Cape Cod and Hudson River to Duke of York, 1664, which he transferred to Lord John Berkeley and Sir George Carteret; first gov. arrived, 1665. Serious disputes arose between gov. and Quakers, which resulted in the divisions East Jersey (Carteret property) and West Jersey (Quaker property); reunited, 1702, when proprietary government ceased, and N. J. was claimed by the Crown. Until 1738 New York and N. J. had the same gov. The state took a leading part in the War of Independence and Civil War; one of the 13 original states of the Union.

N. J. is administered by gov., Senate (21 members, elected for 3 years), and General Assembly (60 members); the state has 2 Senators and 10 Representatives in the Federal Congress, and is divided into 21 counties. Principal towns are Newark, Jersey City, Paterson, Trenton (capital), Camden, Hoboken, Elizabeth, Bayonne, Passaic; numerous fine seaside resorts. Roman Catholics predominate; then Methodists, Presbyterians, Baptists, Prot. Episcopalians. Primary education is free and compulsory; there are Princeton Univ. (*q.v.*), Stevens Institute of Technology at Hoboken, Rutgers Coll. at New Brunswick. Total mileage of railway exceeds 2400 miles. New Jersey is an important manufacturing and commercial state; chief products—maize, wheat, oats, potatoes, fruit, timber; main industries are textiles, machinery, iron and steel, leather, petroleum-refining, brewing, chemicals, pottery; also bricks, cement, and tiles; iron ore, pig ore, and zinc are mined; valuable fisheries (trout, sturgeon, black bass, oyster, perch, etc.). Pop. (1910) 2,537,167.

Scott, *New Jersey* in 'American Commonwealths' (Boston, 1907).

NEW JERUSALEM CHURCH, that founded by Swedenborgians; John Clowes (d. 1831) and Thomas Hartley (d. 1784) were the two chief workers in England; there are churches in several parts of England, especially in Lancashire, and the Swedenborgians in England have about 7000 members. They have churches on the Continent, America, Australia. See SWEDENBORG, EMMANUEL.

NEW KENSINGTON (40° 35′ N., 79° 45′ W.), town, on Allegheny, Pennsylvania, U.S.A.; aluminium goods. Pop. (1910) 7707.

NEW LONDON (40° 21′ N., 72° 10′ W.), town, on Thames, Connecticut, U.S.A.; has good harbour; manufactures woollens, agricultural machinery, hardware, silk thread; fruit-canning and fishing carried on; has naval arsenal. Pop. (1910) 19,650.

NEW MADRID (36° 34′ N., 89° 26′ W.), town, on Mississippi, Missouri, U.S.A.; exports lumber.

NEW MEXICO (35° 30′ N., 109° W.), S.W. state, U.S.A.; bounded N. by Colorado, W. by Arizona, S. by Mexico and Texas; E. by Texas and Oklahoma; area, *c.* 122,000 sq. miles. Region consists of high tablelands broken by lofty mt. ranges with general southern inclination; highest peaks (some over 12,000 ft.) belong to main chain of Rocky Mt. system in N. central portion of state; other ranges are Zufii Mts. in N.W., Mimbres Mts. in W., and Guadalupe Mts. in S. Characteristic feature of state is flat-topped

mt. or *Mesa*. In E. is vast extent of waste land known as Staked Plains or Llano Estacado. River valleys are generally level; most important rivers are: Rio Grande, which crosses state from N. to S.; Canadian River and Pecos in E.; Puerco, San Juan, Little Colorado, and Gila in W.

After Mexican War, N. M. was included in country ceded to U.S.A. by treaty of Guadalupe-Hidalgo, 1848; portions added by cession from Texas and Gadsden Purchase; organised as territory in 1850, and included parts of Arizona, Nevada, and Colorado; portion annexed to Colorado, 1861, and Arizona disjoined, 1863; N. M. admitted as state in 1911.

Valleys are productive, and other regions rendered fertile by irrigation; chief crops are wheat, Indian corn, oats; cotton, vegetables, and fruits also cultivated; leading industry stock-raising, grasses on hills and plains being particularly fine for grazing purposes; sheep are raised for wool. N. M. is rich in minerals; gold, silver, copper, coal, iron, and zinc worked; marble and sandstone quarried; turquoises and other precious stones found; mineral springs numerous. Other industries are flour and grist milling, printing, publishing, manufacture of cars, lumber and timber products, and blankets. There are *c.* 3000 miles of railway in state. Chief towns are Santa Fé (capital), Albuquerque, Las Vegas, Silver City, and Roswell; there are Pueblo Indian villages at Taos, Zuñi, Acoma, and elsewhere; many ruins of pueblos may be found. Inhabitants are chiefly Mexicans, Americans, and Indians. Gov. is elected for four years. Senate has 24, House of Representatives 49, members. Pop. (1910) 327,301.

NEW MILLS (53° 22′ N., 2° 2′ W.), town, Derbyshire, England; print-works. Pop. (1911) 8999.

NEW MODEL, Eng. parliamentary army as reorganised, 1645, by Cromwell (*q.v.*); commanded by Fairfax.

NEW ORLEANS (30° N., 90° W.), city, port of entry, Louisiana, U.S.A., on Mississippi River, larger portion being built on E. bank. Owing to extreme lowness of situation city is badly drained, and dykes or embankments, wide enough to form promenades, have been constructed along river-banks and round shores of Lake Pontchartrain, to prevent inundation. For miles river is lined with docks and piers; at suburb of Algiers are floating dry-dock, railway terminals, and repair shops. City is connected by rail and steamship with nearly all important centres. In Amer. parts of city are wide and spacious streets and some handsome buildings; principal thoroughfares, Canal Street, St. Charles Avenue, and Prytania Street. Fr. and Span. quarters, with narrow streets, picturesque houses, balconies, and gardens, afford striking contrast to more modern parts of city; most noteworthy street here is Esplanade Avenue. Most important parks and squares in city are: Jackson Square (still known as Place d'Armes), Lafayette Square, and Lee Circle; City Park (between city and Lake Pontchartrain) and Audubon Park. N. O. contains Tulane Univ. of Louisiana, Coll. of Immaculate Conception, N. O. Univ., Southern Univ., Straight Univ., and many other educational establishments; among prominent structures are city hall, Oddfellows' Hall, custom-house, cotton exchange, St. Charles Hotel, St. Patrick's Church, St. Louis Cathedral, Cabilda (old Span. city hall), archiepiscopal palace, and Howard Memorial Library, besides many other libraries, churches, charitable institutions, monuments, and statues.

N. O. was founded by Sieur de Bienville in 1718, and named Orleans in honour of Fr. regent; some years later became capital of colony of Louisiana; passed into hands of U.S.A. at Purchase of Louisiana in 1803; incorporated as city shortly after; British attacked city in 1815 under Pakenham, but were defeated with great loss of life by Americans under Jackson; during Civil War Federal fleet passed Mississippi forts and forced city to surrender in 1862; capital removed from N. O. to Baton Rouge in 1880.

City is one of chief cotton markets in world; extensive export trade in cotton, tobacco, lumber, sugar, rice, grain, and hides; manufactures include molasses, malt liquors, rice, cotton goods, and machinery; has one of largest sugar refineries in America. Pop. (1910) 339,075.

King, *New Orleans* (1896).

NEW PHILADELPHIA (40° 31′ N., 81° 30′ W.), city, on Tuscarawas, Ohio, U.S.A.; iron and steel manufactures. Pop. (1910) 8542.

NEW PLYMOUTH (39° 5′ S., 174° 5′ E.), seaport, W. coast, N. island of New Zealand; exports dairy produce. Pop. 5500.

NEW POMERANIA, see NEU-POMMERN.

NEW ROCHELLE (40° 56′ N., 73° 45′ W.), town, suburb of New York City, U.S.A.; has fine public buildings. Pop. (1910) 28,807.

NEW ROSS (52° 23′ N., 6° 56′ W.), town, river-port, on Barrow, Wexford, Ireland; agricultural produce. Pop. 5800.

NEW SIBERIA ARCHIPELAGO (75° N., 140° E.), group of islands (discovered 1770) in Arctic Ocean, north of Siberian coast; consisting of Kotelnoi, Byelkovskiy, Thaddeus or Fadievskoi, New Siberia, and Lyakhov Islands; area, 9650 sq. miles; highly interesting fossil flora and fauna (mammoth, rhinoceros, etc.); uninhabited.

NEW SOUTH WALES (28° to 37° 30′ S., 141° to 153° E.), oldest state of the Australian Commonwealth in S.E. of the continent; bounded N. by Queensland, W. by South Australia, S. by Victoria, E. by Pacific Ocean; coast-line from Cape Howe to Point Danger *c.* 700 miles; breadth, 800 miles; area, 310,700 sq. miles; many excellent harbours—Port Jackson, Jervis Bay, Broken Bay, Port Stephens, Port Hocking, Wollongong, Shoalhaven, Bateman's Bay, etc. State is traversed from N. to S. by mountain ranges belonging to the Great Dividing Range or Cordillera of Australia; New England and Liverpool ranges in N., 5000 ft.; Blue Mts. W. of Sydney, 4100 ft.; Cullarin, Monaro, and Muniong ranges (with highest peak, Mount Kosciusko, 7308 ft.) in S. Western part consists of extensive plains with fine pasture lands; climate healthy. Northern coastal districts are dry and sub-tropical; interior and western plains hotter than coast; extensive forests; chief tree, eucalyptus; great variety of birds with gorgeous plumage. Chief rivers are Murray, Murrumbidgee, Darling, Lachlan, Hunter, Richmond, Clarence, Hastings, Macleay, etc. (many navigable); some unimportant lakes. Principal towns are Sydney (capital), Newcastle, Bathurst, Goulburn, Broken Hill, Maitland, Parramatta, Lithgow, Grafton, Bourke, Deniliquin; Yass-Canberra is site of Federal capital.

Coast was probably sighted by Span. vessels, XVI. cent.; visited and named N. S. W. by Cook, 1770; founded as a penal settlement, 1788 (see BOTANY BAY); prospered under gov., Lachlan Macquarie; transportation ceased, 1839; south districts severed, 1851, as Victoria, and Moreton Bay district as Queensland, 1859; responsible government granted, 1859; gold discovered near Bathurst, 1851; joined Commonwealth of Australia, 1901. State was explored by Wentworth, Blaxton, and Lawson, 1813, Evan and Oxley, 1815, Hume and Hovell, 1824, Cunningham, 1827, Mitchell, 1831–36, Sturt, 1844, etc.

N. S. W. has a gov. app. by Crown, and state parliament consisting of Legislative Council and Legislative Assembly; women hold franchise. Church of England is predominant. Education is compulsory between ages of six and fourteen; univ. and Technical College at Sydney. There are over 3600 miles of state railways. Irrigation is rapidly extending; enormous herds of sheep and cattle; fish abound; chief exports, frozen and preserved meat, wool, gold, silver, tin, copper, lead, coal, wheat, fruit, timber,

hides and skins, butter, tallow, leather, cocoa-nut oil; manufactures not extensive, but increasing rapidly.

Dependencies of N. S. W. are Norfolk Island situated in 29° S. lat., 163° E. long.; area, 10 sq. miles; and Lord Howe Island, 31° 30′ S., 159° E. Pop. (1911) 648,212.

Official Year-Book of N. S. W.; Coghlan, *Wealth and Progress of N. S. W.* (annual); Hutchinson, *N. S. W.* (1896).

NEW STYLE, see CALENDAR.

NEW ULM (44° 20′ N., 94° 30′ W.), city, Minnesota, U.S.A., on Minnesota. Pop. (1910) 5648.

NEW WASHINGTON, town, on N. coast of Panay, Philippine Islands.

NEW WESTMINSTER (49° 15′ N., 122° 45′ W.), city, on Fraser, Brit. Columbia, Canada; salmon-canneries; sawmills. Pop. (1911) 13,394.

NEW YEAR'S DAY, the first day of the year and, according to their respective reckonings, celebrated by most peoples. The Christian fathers abolished its veneration as a religious festival owing to its pagan associations.

NEW YORK (STATE) (43° N., 75° W.), north-eastern state of U.S.A.; bounded N. by Quebec, N.W. and W. by Ontario, Lake Ontario, Lake Erie, and Pennsylvania, S. by Pennsylvania, New Jersey, and Atlantic, E. by Connecticut, Massachusetts, and Vermont; length from N. to S., *c.* 300 miles; breadth, *c.* 346 miles; area of land surface, 47,620 sq. miles; area of water surface, 1550 sq. miles. New York includes Long Island and Staten Island on Atlantic coast, besides numerous other islands, viz. Manhattan, Randall's, Hart's, Faulkner's, The Thimbles, Plum, Fire, Fisher's, etc. The state has a coast-line of *c.* 275 miles on Lakes Erie and Ontario, with several good harbours—Buffalo, Dunkirk, Fairhaven, Oswego, etc.; the ocean seaboard is small, but important, containing the harbour of New York City.

Surface is mountainous in N.E., E., and S.E.; Adirondack Mts. in N.E., with highest peaks, Mt. Marcy (5344 ft.), M'Intyre (5112 ft.), Skylight (4920 ft.), etc.; Catskill Mountains in S.E., with Slide Mt. (4205 ft.), Hunter Mt. (4025 ft.); Shawangunk Mts. (with Sam's Point, *c.* 2000 ft.) also in S.E.; extensive tableland in central and western regions; coastal districts level. Geologically N. Y. belongs mainly to the Archæan and Palæozoic periods; almost the whole surface is covered with glacial drifts. Principal rivers are Hudson, St. Lawrence, Oswego, Delaware, Susquehanna, Niagara, Mohawk, Allegheny, Genesee, Charlotte, Chenango, Raquette, Wallkill, Grass; there are many fine falls and rapids—Niagara, Trenton, Taughannock, Genesee, etc. N. Y. has hundreds of lakes throughout the country, parts of Lakes Ontario, Erie, and Champlain, Lakes George, Keuka, Seneca, Cross, Canandaigua, Cayuga, Skaneateles, Owasco, Otisco, Oneida, Otsego, Hemlock, Upper and Lower Ausable, Honeoye, Chautauqua, etc.; many rivers and lakes are navigable. Climate generally is healthy, with hot summers and severe winters; mean annual temperature, 46° F.; coldest in Adirondack region; average rainfall from 40–45 in.; greatest in Adirondack Mts. Fauna includes deer, beaver, elk, moose, red fox, black bear, skunk, porcupine, raccoon, mink, weasel; birds include plover, snipe, tern, grouse, woodcock, thrush, warbler, wren, chikadee, orioles. Immense forests stretch in Adirondack region (mainly spruce, hemlock, pine, maple, beech, yellow birch) and in Catstail region (mainly oak, hickory, chestnut); large pasture and arable land in plateau regions.

History.—Territory was first occupied by Iroquois Indians. New York Bay and Hudson River were discovered by Giovanni de Verrazano, 1524; explored by Henry Hudson (who was in service of Dutch East India Co.), and named New Netherland, 1609; Champlain Lake was discovered by Samuel de Champlain, 1609; Block Island discovered by Adriaen Block, 1614; Dutch trading posts established 1614 onwards. First permanent settlement was made, 1624, under gov. Cornelis Jacobsen Mey; New Netherland declared a province, 1643. Charles II. granted the territory to Duke of York, and in 1664 the English took possession of it and named it N. Y.; retaken by Dutch, 1673; finally taken by English, 1674; became a royal province, 1686; severe conflicts with Indians ensued, also various boundary disputes. N. Y. took a prominent part in the War of Independence and the Civil War, and in the latter was loyal to the Unionists. N. Y. is one of the original 13 states of the Union.

Government.—The state is administered by gov., Senate (51 members, elected for 2 years), and an Assembly (150 members, elected for 1 year). N. Y. has 2 Senators and 43 Representatives in Congress, and is divided into 61 counties. Principal cities are New York, Buffalo, Rochester, Syracuse, Albany (capital), Troy, Yonkers, Utica, Schenectady, Binghamton, Elmira, Auburn, Jamestown.

Roman Catholics predominate, then Methodists, Presbyterians, Prot. Episcopalians. Elementary education is compulsory and maintained chiefly by local taxation. New York has many univ's, colleges, and other institutions, including Columbia Univ. (Manhattan), Cornell Univ. (Ithaca), New York Univ. (New York), Syracuse Univ. (Syracuse), Union Univ. (Schenectady), City of N. Y. College (New York), Barnard College (Manhattan), Polytechnic Institute (Brooklyn), Adelphi College (Brooklyn), U.S. Military Academy (West Point). The Univ. of the State of N. Y. is non-teaching and purely administrative, supervising higher education in the state.

Products and Industries.—Total railway mileage is 8000–9000 miles. Principal products are maize, wheat, oats, potatoes, hay, tobacco, fruit, sugar-beet, timber, live stock, wool. Important industries are manufacturing of clothing, machinery, printing and publishing, sugar- and molasses-refining, dairy produce, liquors, flour, paper, cement, and extensive clay products. N. Y. has numerous mineral springs, viz. Onondaga, Ballston, Saratoga, Avon, New Lebanon, Sharon, etc.; minerals include magnetic iron ore, copper, zinc, lead, talc; salt, petroleum, marble, graphite, limestone, etc., are quarried; valuable fisheries (oysters), etc. Pop. 9,113,614.

Murlin, *New York Red Book* (1910); Wilson, *New York, Old and New* (1907).

NEW YORK (41° 6′ N., 74° W.), largest city of U.S.A., in New York State, and second largest city in world; situated on Hudson (North) River at its confluence with East River. N. Y. comprises Manhattan Island, separated from mainland by Harlem River and Spuyten Duyvil Creek, Long Island, Staten Island, Blackwell's, Randall's, Ward's, Governor's, and other small islands; also some former villages—Washington Heights, Harlem, Port Morris, Inwood, Tremont, Fordham, Riverdale, etc. N. Y. is divided into five boroughs—Manhattan on Manhattan Island, Richmond on Staten Island, Brooklyn on western part, Queens on northern part of Long Island, Bronx on mainland. Length from N. to S. is *c.* 35 miles; breadth (E. to W.), 16 miles; area, *c.* 325 sq. miles.

The harbour, one of the finest in the world, consists of outer harbour or Lower Bay (area, 88 sq. miles), separated from Atlantic Ocean by Sandy Hook bar, and inner harbour or Upper Bay (14 sq. miles), connected with former by the Narrows, a strait, 1 mile wide, between Long and Staten Islands; another channel, Kill van Kull, for smaller vessels runs around Long Island. The approach has several fortifications, viz. Fort-Tompkins, Hamilton, Wadsworth, Totten, Hancock, etc. The Statue of Liberty stands in Upper Bay.

The larger part of the city is laid out very regularly; long wide parallel avenues (First to Eleventh Avenue) run N. and S., crossed at fixed intervals by scores of streets, numbered First, Second, Third, etc. After

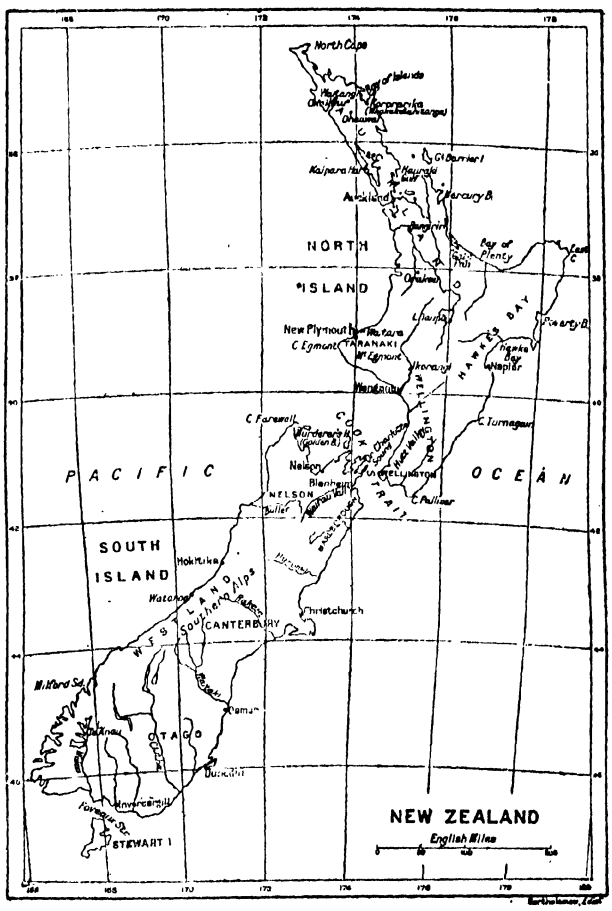
59th Street they are broken by Central Park. The so-called lower East Side is one of the tenement districts, consisting of narrow, irregular, densely populated streets. Principal business thoroughfares are Broadway, Wall, 23rd, 34th, 42nd Streets, etc.; handsome residential streets—Fifth Avenue, Madison Avenue, etc. A striking feature are the sky-scrapers, immense buildings of 20 to over 30 storeys, such as the Woolworth Building (750 ft. high, 51 storeys), Metropolitan Life Insurance (693 ft. high), City Investing Buildings (32 storeys), Singer Sewing-Machine Co. (612 ft. high, 41 storeys), Trust Co. of America (23 storeys), Board Exchange, Commercial Buildings, etc. Prominent public edifices are City Hall, in Ital. Renaissance style (1803–12), Appellate Court-House, Tombs (city prison), U.S. Sub-Treasury, Post Office, Metropolitan Museum of Art, Amer. Museum of Natural History, National Academy of Design, Public Library (1911), Metropolitan Opera-House, Manhattan Opera-House, Carnegie Music Hall, Madison Square Garden, Columbia Univ., N. Y. Univ., St. John's College, Academy of Medicine, Trinity Church (1839–46), St. Patrick's R.C. Cathedral (1850–79), St. John's Cathedral, and numerous other churches and synagogues. N. Y. has several fine parks—Central, Battery, Mount Morris, in Manhattan; Van Cortlandt, Pelham, Bronx (with fine botanical and zoological gardens), in Bronx; Prospect Park (Brooklyn), etc.; Statue of *Liberty* (Bartholdi), of *Columbus*, and many other monuments. The 3 suspension bridges, Manhattan, 6855 ft. long (1910), Williamsburg, 7200 ft. long (1904), and Brooklyn, 5990 ft. long (1870–1883), are specially noteworthy (see BRIDGES). Celebrated clubs include Knickerbocker, Manhattan, Union.

Government.—City is governed by Mayor (elected for 4 years), Pres. of the Board of Aldermen (elected by the city), 5 borough pres's (each elected for 4 years), and 73 aldermen (elected for 2 years). The Mayor appoints all heads of departments except finance, which is under a Controller elected by the city. Under Tammany (*q.v.*) numerous scandals arose; Police scandal, 1912. Communication is afforded by electric tramways, elevated railways, ferries, and extensive electric underground trains, connected with Brooklyn by tunnel under East River.

History.—Hudson Bay was discovered by Florentine navigator Verrazano, 1525; Hudson River ascended by Henry Hudson, 1609; first permanent settlement made by Dutch and named *Nieu Amsterdam*, 1623; taken by English and renamed New York, 1664; retaken by Dutch, 1673, but finally annexed by England, 1674; first N. Y. Assembly met, 1683; infested by pirates, *c.* 1700; negro slaves imported, 1725; first newspaper, *New York Gazette*, pub. 1725. During War of Independence N. Y. was in hands of British until 1783; Americans defeated at battles of *Long Island* (1776) and *Harlem Heights*. On establishment of Republic N. Y. was the Federal capital from 1789–90; Erie Canal, opened 1825, was of great commercial importance to N. Y. Great fire destroyed 'East Side,' 1835; Croton Aqueduct completed, 1842; anti-conscription disturbances, 1863. In 1897–98 N. Y., Brooklyn, Long Island City, Staten Island, part of Queens and W. Chester counties, etc., were amalgamated.

New York is the most important seaport and greatest manufacturing centre of U.S.A.; it receives 60 % of the total imports, and sends out over 45 % of total exports of the country. Chief industries are manufacturing of clothing, textiles, printing and publishing, machinery, iron and steel goods, scientific and musical instruments, sugar- and molasses-refining, packing and preserving of meat, distilling and brewing; principal exports—raw cotton, bacon, hams and lard, wheat, maize, oats, copper ore, machinery, agricultural implements, sewing-machines, locomotives, musical and scientific instruments, furniture, carriages, iron and steel goods, cattle and horses, tobacco, leather, paraffin, cotton-seed oil, meat products. N. Y. is perhaps the most cosmopolitan city in the world, and has numerous foreign colonies, such as the German Colony, Greek Colony, Little Italy, Chinatown, Hebrew, Russian, and Negro quarters, etc. Pop. (1900) 3,437,202; (1910) 4,766,883.

Van Dyke, *The New New York* (1909); Martin, *The Wayfarer in N. Y.* (1909).



NEW ZEALAND (34° 30′ to 47° 30′ S., 166° 35′ to 178° 35′ E.), Brit. dominion, S. Pacific Ocean; comprises the three islands known as North, South, and Stewart, and outlying Kermadecs, Chatham, Auckland, Campbell, Bounty, Cook, Savage, and Penrhyn Islands. Area, 104,751 sq. miles. Between North and South Islands is Cook Strait, between South and Stewart is Foveaux Strait. Coast-line is generally broken.

NORTH ISLAND has area 44,468 sq. miles; volcanic mountain ranges run throughout island—highest peaks, Ruapehu (*c.* 9150 ft.), Egmont (*c.* 8350 ft.); drained by Waikato, Thames, Wairoa, North, Wanganui, Hutt, and other streams.

SOUTH ISLAND has area 58,525 sq. miles; traversed

by mountains known as Southern Alps and other ranges; highest peak, Mt. Cook or Aorangi (12,350 ft.); drained by Clutha, Molyneux, Waitaki, Mataura, Grey, and other streams.

STEWART ISLAND has area 665 sq. miles; mountainous, suffers from earthquakes and volcanic eruptions.

Largest towns, Wellington (capital), Christchurch, Dunedin, Auckland. Climate varies, generally much warmer than that of United Kingdom.

History.—Dutch explorer Tasman discovered islands in 1642; they were circumnavigated by Captain Cook, *c.* 1769, who made chart of coast and took formal possession for Britain, which, however, government did not confirm. In 1814 settlements were made by Brit. missionaries, whose efforts at civilising natives met with some success. In 1840 Maoris acknowledged Brit. sovereignty, and islands were once more annexed to Britain by Captain Hobson. N. Z. became autonomous in 1852. Until 1864 seat of government was at Auckland, but in that year it was removed to Wellington. Various wars between colonists and Maoris took place, but these ended by *c.* 1870, since when peace has reigned. Changes in system of government were introduced in 1875. During Boer War N. Z. sent troops to S. Africa in aid of Britain. N. Z. refused to join Commonwealth of Australia in 1900; became Dominion of N. Z. by Order in Council in 1907.

Until now (1913) N. Z. has contributed to the Brit. Navy, and has not attempted to build up a navy for its own defence (cf. its building of the warship *New Zealand* for the Admiralty to use as it thinks fit, 1911).

By Defence Act, 1909, military service is compulsory; after Lord Kitchener's visit the new Defence Act, 1910, greatly improved the organisation.

N. Z. is administered by a governor assisted by nine ministers; there is Parliament of two houses—Legislative Council of 38 members (1911), and House of Representatives of 80 members (including several Maoris); former are appointed, latter elected on adult suffrage. Labour legislation is far advanced; there is a Conciliation and Arbitration Act for settling disputes, and an eight-hours day is universal; most public works are nationalised or municipalised.

Principal wealth lies in vast numbers of sheep and cattle raised; great quantities of wool, frozen meat, and dairy produce exported. Horses and pigs are also bred, and wheat, oats, and other crops widely cultivated. Oranges, lemons, peaches, olives, and other fruits abound. Indigenous products include wild flax, toitoi, raupo, kauri pine, and many valuable timber trees; forest area estimated at 17,000,000 acres. Minerals include gold, silver, copper, antimony; gold to value of over £1,800,000 was exported in 1911. Exports also cereals, hides, gums, fibre, tallow, etc. Imports clothing, machinery, tea, sugar, wines, etc. Railway (state) mileage about 3000.

There is no state religion. Education is free and obligatory. There is a Univ. of N. Z. (Examining), and affiliated Colleges at Dunedin, Auckland, Wellington, and Christchurch. Population consists chiefly of persons of Brit. descent, but there are about 50,000 Maoris and about 2000 Chinese. Pop. excluding aborigines (1901) 772,719; (1911) 1,008,468; total *c.* 1,072,000.

Stout and Stout Logan, *New Zealand* (1911); Loyd, *Newest England* (1901).

NEWARK (40° 4′ N., 82° 23′ W.), city, Ohio, U.S.A.; cars, glassware; iron foundries. Pop. 25,404.

NEWARK (40° 45′ N., 74° 12′ W.), city, port of entry, New Jersey, U.S.A., on Passaic River, *c.* 9 miles from New York; founded 1666 by Company from Connecticut; handsomely built city with fine streets, squares, and parks; chief thoroughfares, Broad Street and Market Street; contains city hall, court-house, public library, and many notable churches. Among educational establishments are Newark Academy, Seminary and Technical School, St. Benedict's Coll., and St. Elizabeth's Academy. N. has many important manufactures, including chemicals, leather, hardware, machinery, paper, trunks, saddlery, boots, shoes, and clothing. Pop. (1910) 347,469.

NEWARK, DAVID LESLIE, LORD (1601–82), Scot. general; commanded for Parliament at *Marston Moor*, 1644; defeated Montrose at *Philiphaugh*, 1645; clung to Presbyterianism, and supported Charles II.; captured at *Worcester*; baron, 1661.

NEWARK-UPON-TRENT (53° 4′ N., 0° 49′ W.), town, Nottinghamshire, England; has ruined castle, which stood three sieges during Civil War; important agricultural centre; manufactures iron and brass goods, beer, flour. Pop. (1911) 16,412.

NEWBERN (35° 4′ N., 77° 13′ W.), town, N. Carolina, U.S.A.; manufactures cotton-seed oil, railway cars; exports lumber, turpentine, vegetables. Pop. (1910) 9961.

NEWBURGH, NEWBURG (41° 29′ N., 74° 3′ W.), town, on Hudson, New York, U.S.A.; manufactures carpets, woollen goods, cottons, leather. Pop. (1910) 27,805.

NEWBURGH (56° 22′ N., 3° 14′ W.), seaport, Fifeshire, Scotland, on Firth of Tay; linens.

NEWBURN (54° 58′ N., 1° 44′ W.), town, Northumberland, England. Pop. (1910) 17,155.

NEWBURY (51° 55′ N., 1° 20′ W.), market town and municipal borough, Berkshire, England, on river Kennet; contains fine Perpendicular church and other interesting buildings; site of two battles during Civil War; large agricultural trade; breweries and flour-mills. Pop. (1911) 12,108.

NEWBURYPORT (42° 46′ N., 70° 58′ W.), city, Massachusetts, U.S.A., on S. bank of Merrimac River; contains city hall, public library, Marine Museum, and some interesting XVII.-cent. houses; manufactures electrical supplies, silverware, combs, shoes, and cottons. Pop. (1910) 14,949.

NEWCASTLE.—(1) (54° 12′ N., 5° 54′ W.) watering-place, on Dundrum Bay, County Down, Ireland. (2) (41° 2′ N., 80° 24′ W.) city, on Shenango, Pennsylvania, U.S.A.; coal and iron region; tinplate works. Pop. (1910) 36,280. (3) (39° 40′ N., 75° 33′ W.) city, Delaware, U.S.A., on Delaware; steel-works, fisheries. Pop. (1910) 3351. (4) (32° 57′ S., 151° 44′ E.) port, N. S. Wales, Australia; great centre of coal trade; shipbuilding, foundries, copper-works, manufacture of boots and shoes; has cathedral. Pop. (1910) 55,630.

NEWCASTLE-UNDER-LYME (53° 2′ N., 2° 14′ W.), town, Staffordshire, England; centre of coal mines and potteries; manufactures paper, army clothing. Pop. (1911) 20,204.

NEWCASTLE-UNDER-LYME, DUKEDOM OF, was cr. for Duke of N.-on-Tyne, 1756; and in 1768 for his nephew, Henry Fiennes-Clinton, whose descendants still hold it.

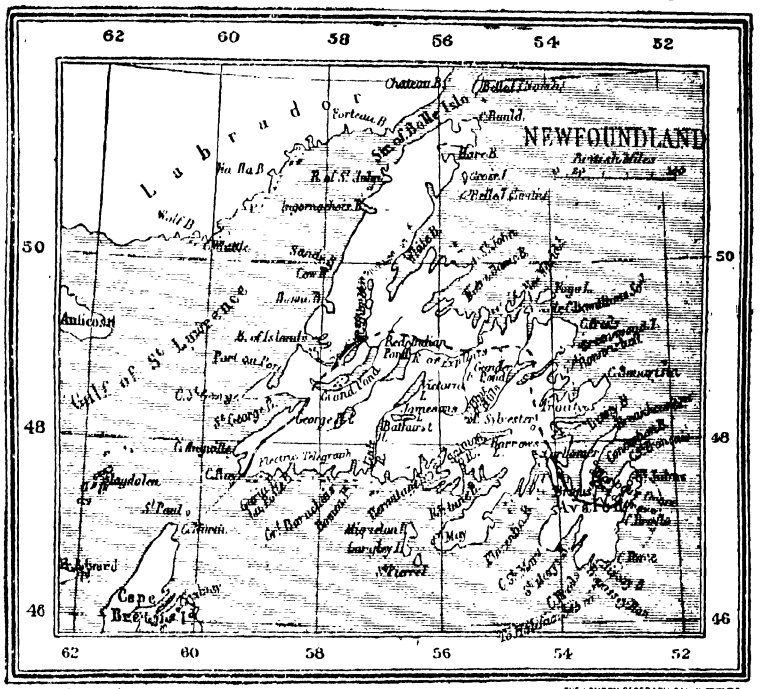
NEWCASTLE-UPON-TYNE (54° 58′ N., 1° 37′ W.), city, county of a city, municipal and parliamentary borough and port, Northumberland, England, on N. bank of Tyne; ancient and historic town, now one of chief commercial centres in England, owing to mineral products in vicinity and great industrial activity; connected by bridges with Gateshead on opposite bank of river. Among places of interest are: castle erected XII. cent.; many fine churches, including St. Nicholas Cathedral, and some Elizabethan houses; other notable buildings are Guildhall, Corporation Buildings, Wood Memorial Hall, colleges of med. and science, art gallery, and museum. Shipbuilding is main industry; important trade, coal being chief export; manufactures include iron, steel, machinery, glass, earthenware, chemicals, etc. N. was scene of many struggles with Scots. Pop. (1911) 266,671.

NEWCASTLE(-UPON-TYNE), DUKEDOM OF.—Lodovick Stuart, Duke of Lennox, was in 1623 cr. Earl of N. and Duke of Richmond; these honours became extinct on his death, 1624. Sir William Cavendish of Welbeck Abbey was cr. Baron Cavendish and Earl of N., 1628; aided king in Civil War; was cr. Marquess of N., 1643; duke, 1665. On death of his s. Henry, 2nd duke, 1691, titles became extinct. John Holles, Earl of Clare,

was cr. duke, 1694; his grandson, Thomas Pelham-Holles, cr. duke, 1715; d. childless, 1768.

NEWCOMB, SIMON (1835–1909), Amer. astronomer; prof. of Math's for U.S. navy; determined motion of travel of solar system in direction of Vega, chief star in constellation of Lyra, the Harp; he concluded from observations that stars less than 11th magnitude decrease in number, and suggested therefore that the Universe is finite. N. recalculated velocity of light; and observed Zodiacal Light in north, thus connecting it with sun's equatorial plane; wrote several astronomical works.

NEWFOUNDLAND (46° 37′ to 51° 40′ N., 52° 37′ to 59° 25′ W.), island and Brit. colony, N. America, which has so far refused to join Dominion of Canada; lies off mouth of the St. Lawrence, and is separated from Labrador by narrow strait of Belle Isle, while distance to Cape Breton Island on S.W. is little over 50 miles. Its shape is roughly triangular; area, 42,734 sq. miles. Coast-line is much broken and surface is rugged. Chief towns, St. John's, Harbour Grace. There are innumerable lakes, about one-third of surface being water; largest lakes, Grand and Red Indian. Spruce and pine forests are found in various parts; seaboard and river valleys are under cultivation, but over 90 % of adult population are engaged in fishing, fisheries being staple resource of colony. Of these, most important is cod-fishing, season of which is from May till November; seal, lobster, salmon, and herring fishing are also important. There is considerable lumber trade. Minerals include copper, iron, asbestos, lead, coal, silver, gold. Railway mileage, over 700. Climate milder than that of Canada.



History of N. dates from its discovery in 1497 by Cabot; it was subsequently visited by Gaspar Cortereal, a Portuguese explorer, and soon afterwards became known as a great fishing place, expeditions being sent annually by Portugal, France, and Britain in search of fish. In 1583 a colonising expedition to N. was led by Sir Humphrey Gilbert, who definitely annexed the island for England. Other expeditions were undertaken during reign of James I., and a settlement called Avalon was founded by Lord Baltimore in the S.E., which he afterwards withdrew owing to Fr. interference.

For considerable time disputes between French and English for the ownership of N. and its invaluable fisheries were carried on, but eventually these were ended by the Treaty of Utrecht, 1713, whereby Britain obtained exclusive possession of the island, while the French were granted certain fishery rights along the N. and W. coasts. Britain's exclusive sovereignty was confirmed by subsequent treaties in 1763 and 1783. In XIX. cent. further disputes arose, and in 1898 a Royal Commission was appointed to investigate the matter. In 1904 the whole question was finally settled by a convention of both nations, the French keeping the right to fish equally with the British, but renouncing all claim to exclusive rights. A dispute with America on the fishing question was settled in 1910.

N., the smallest of the self-governing Dominions of the Brit. Empire, is administered by a governor, assisted by executive council; legislative power vested in two houses—Assembly of 36 members elected by popular vote, and Legislative Council app. by governor. Rom. Catholicism, Church of England, and Methodism are chief religious denominations. Education is free and compulsory. Pop. (1911) 242,619.

Harvey, *N., England's Oldest Colony* (1897); Prowse, *History of N.* (2nd ed., 1897); Willson, *The Truth about N.*

NEWFOUNDLAND DOGS, see Dog Family.

NEWHAVEN (50° 47′ N., 0° 2′ E.), seaport, Sussex, England, on Eng. Channel; terminus of Newhaven-Dieppe channel route; coasting trade. Pop. (1911) 6665.

NEWLYN (50° 6′ N., 5° 33′ W.), fishing village, Cornwall, England. Pop. 4500.

NEWMAN, FRANCIS WILLIAM (1805–97), Eng. scholar; his religious views were antithetical to his bro's (Cardinal N.), being rationalistic and eclectic. His best-known work is *Phases of Faith.*

NEWMAN, JOHN HENRY (1801–90), Eng. cardinal; s. of a banker; ed. at private school and Trinity Coll., Oxford, 1821; elected fellow of Oriel, 1822, and tutor, 1826, but lost his position owing to ecclesiastical disputes, 1830. He travelled abroad in 1833, visiting Rome, and on his return became the leader of the new Oxford Movement (*q.v.*), writing in *Tracts for the Times*, and having enormous influence in Oxford in the later thirties. But he had doubts about the position of the Anglican Church, and joined the Rom. communion, 1845. He was ordained priest in Rome, and held various positions in England. From 1854–58 he was rector of the Catholic Univ. in Dublin. He engaged in controversy and wrote various works, and was created cardinal, 1879. He described his religious life's work as fighting against 'liberalism in religion.'

Life, by Wilfrid Ward, and by Barry, Waller, Burrow, Hutton, and Meynell.

NEWMARKET (52° 14′ N., 0° 24′ E.), town, Cambridge and Suffolk, England; horse-racing centre. Pop. (1911) 10,483.

NEWMILNS (55° 37′ N., 4° 19′ W.), town, on Irvine, Ayrshire, Scotland; muslins, laces. Pop. (1911) 4806.

NEWPORT.—(1) (51° 35′ N., 3° W.) town, Monmouthshire, England; has important iron and chemical manufactures, and exports large quantities of coal and iron; has ruined castle and fine old church; R.C. episcopal see. Pop. (1911) 83,700. (2) (50° 42′ N., 1° 18′ W.) town, Isle of Wight, England; in neighbourhood are remains of Carisbrooke Castle; XVII.-cent. school. Pop. (1911) 11,155. (3) (52° 47′ N., 2° 23′ W.) town, Shropshire, England; in neighbourhood are remains of Lilleshall Abbey; XVII.-cent. school. Pop. (1911) 3250.

NEWPORT (41° 27′ N., 71° 19′ W.), city and port of entry, Rhode Island, U.S.A., situated on Narragansett Bay; has excellent harbour well protected by forts and torpedo station; founded XVII. cent., and became of considerable importance, but trade was ruined by Amer. War of Independence. Principal buildings are state house, city hall, custom-house, Redwood Library, and Round Tower in Touro Park. Newport is a fashionable watering-place and contains many magnificent estates and houses; fishing chief industry. Pop. (1910) 21,149.

NEWPORT NEWS (36° 57′ N., 76° 30′ W.), city, port of entry, Virginia, U.S.A., on James River; excellent harbour; shipbuilding. Pop. (1910) 20,205.

NEWPORT PAGNELL (52° 6′ N., 0° 43′ W.), market town, on Ouse, Buckinghamshire, England. Pop. (1911) 4239.

NEWQUAY (50° 25′ N., 5° 5′ W.), seaport, watering-place, Cornwall, England. Pop. (1911) 4415.

NEWRY (54° 11′ N., 6° 20′ W.), seaport, on Carlingford Lough, County Down, Ireland; flax-spinning and flour-mills. Pop. (1911) 11,956.

NEWSPAPERS.—The modern newspaper is one of the marvels of civilisation. It is a triumph of organisation, enterprise, and mechanical ingenuity. As indispensable as almost anything of the kind can be, it stands as eyes and ears to its readers, and keeps them in constant touch with all the world's happenings.

History.—Ancient Rome is known to have possessed a kind of official gazette (*Acta Diurna*), while in China, where printing from movable types was practised many years before the system was reinvented in Europe, it is claimed that a n. was in circulation in the early cent's of the Christian era. But the beginning of n's as publications intended for general perusal must be placed at a much later period. The earliest known specimen was printed at Frankfurt in 1615. In England no trace has been preserved of any n. earlier than the *Courant* of 1622. Its subtitle was *The Weekly News from Foreign Parts*, and it professed to do no more than give news that had already been published abroad.

It was soon recognised that the function of a n. could not be confined to the purveying of foreign information. One of the earliest indications of the spread of the n. idea was witnessed in the printing of *Diurnal Occurrences*, which in 1641 included reports of the proceedings in Parliament. This publicity was little to the liking of the members, who then, and for many years afterwards, proved highly sensitive to any unauthorised references to the business of either House. The Long Parliament appointed authorities for the licensing of papers and pamphlets, and forbade the publication of others not so licensed. Similarly, Cromwell declared that no one might print any news or intelligence without the permission of the Sec. of State, and from 1662 to 1695 a vigorous Licensing Act continued in operation. Two papers during that period secured official sanction, but others, representing the dawning independence of the Press, defied the edict, and one printer, as an example to the others, was hung, drawn, and quartered.

In this period was established the still-existing *London Gazette*, which was first issued on November 7, 1665. The first daily n., the *Daily Courant*, began publication in the early years of the XVIII. cent., but its career was short. By 1709 the number of n's in London had increased to eighteen, including Steele's *Tatler*. The *Edinburgh Courant*, founded in 1705, continued publication until 1886, when it was amalgamated with the *Glasgow News*. Among the men of literary eminence who engaged in n. writing in these early days were Defoe, Swift, Addison, Steele, Fielding, Smollett, and Johnson. It was the latter who, referring to his parliamentary reports, declared with satisfaction that he took good care the Whig dogs did not get the best of it. There was in these days no pretence of impartial comment or even impartial reporting, and n. utterances were characterised by venom and ill-feeling.

To this latter aspect of the Press was probably due a renewed effort on the part of the authorities to control the new factor in public life. They, in 1712, imposed a stamp duty of a halfpenny on every half-sheet, and a penny on every whole sheet, with the addition of a tax of a shilling on each advertisement (*q.v.*). These rates were doubled in 1776, and subsequent increases raised the advertisement tax to 3s. 6d. and the stamp duty to 4d. There was also a duty on paper, imposed in the reign of Queen Anne, and remaining in force until 1861. It was not until 1853 that the advertisement tax was abolished, and two years later the stamp duty was also removed. The abolition of the paper duty was the occasion of a strenuous constitutional issue between the House of Lords and the Commons. The latter, on the initiative of W. E. Gladstone, in half-hearted fashion approved, but the Lords rejected, the proposal, and thus asserted a right to refuse assent to the repeal of taxation. On the reintroduction of the measure, the Lords withdrew their opposition.

Apart from the financial hampering of early n. enterprise, the proprietors were subjected to frequent prosecution, fine, and imprisonment. Many of the prosecutions now appear vindictive, but, on the other hand, the n's were scurrilous and vituperative in the highest degree. But with increase of power came a greater sense of responsibility, and while strenuous and combative partisanship are still common, it is marked by more decorum.

Modern Developments.—While the stamp, advertisement, and paper duties were in operation, and before the machinery of production and facilities for distribution were improved, n's were something of a luxury. Sevenpence was the common price for much less value than is now offered for a halfpenny. Working people clubbed together for the purchase of a paper, which was read in turn by the subscribers. After the removal of the financial and other handicaps, there was a vast expansion of n. enterprise. The railways, the invention of the telegraph, and later, the coming of the telephone, facilitated the transmission of news and the distribution of the printed papers. A great concession is that by which a telegraphic message of a hundred words may be sent at night for one shilling, and a message of seventy-five words for the same fee, during the day. The press telegram rates result in a loss to the Post Office, but the deficit is generally regarded as of small moment compared with the advantages of a cheap n. press. Great reductions have also been made in recent years in press cable rates.

N's have within the last generation greatly increased their efforts to obtain news as promptly after the event as possible. While reporting the proceedings of all kinds of public bodies—and sometimes the proceedings of bodies that are not public — from Parliament to parish councils, they attempt to produce a daily or weekly record of every interesting phase of public life. In particular, and in the evening n's specially, there has been a great and not wholly admirable development on the side of sport. But in this respect the n's reflect the public taste. Since Dr. Howard Russell's graphic descriptions of the Crimean campaign in the columns of *The Times*, every important n. has its special correspondent (and

sometimes numbers of them) at every war, and as near every battlefield as he is allowed to penetrate. Of late years, however, the necessity for secrecy in military movements has led to a restriction in the operations of war correspondents.

Staff.—The Editorial Staff of a n. consists of an *Editor-in-Chief* (who directs the policy of the paper, etc.), one or more *Assistant Editors*, including, it may be, a Foreign Editor, Sports Editor, and other Specialists; *Sub-editors* who arrange and prepare for publication the news collected by the n's *reporters* (see REPORTING), sent in by local, foreign, and special *Correspondents*, or received from some *News Agency*. In addition there is the staff engaged in the counting-house, advertisement, and other business departments of the n.; and the compositors, printers, and machine-room hands who turn out the finished n. in accordance with the instructions of the editorial and business staffs.

Printing.—A great advance in n.-printing was made when the steam press was introduced in 1814 by John Walter of *The Times*. This was followed by the rotary printing machine by means of which n's, folded and complete, are produced at the rate of 20,000 or more copies per hour. Before the introduction of the Linotype, a comparatively recent invention, numerous more or less successful attempts were made to improve on the system of hand setting of type by compositors. The *Linotype* has revolutionised methods in the composing room. It is a highly ingenious machine, which, by the manipulation of a keyboard, arranges in proper order matrices from which a complete line of type is cast in one piece. A still later and equally ingenious machine, the *Monotype*, casts each letter separately, and thus enables errors to be corrected without the necessity of setting up the whole line anew. These and other improvements enable n's to meet the enormous demand which has been steadily growing since the Education Act of 1870.

British Newspapers have been greatly influenced by the methods of America. The result is that while the more reputable organs have declined to subordinate facts to picturesque, and often wholly inaccurate, detail, news is now presented in a more popular fashion, and an effort is made to infuse interest into even formal subjects. Although it is sometimes asserted that readers no longer take their opinions from n's, the chief organs retain their leading articles, and there can be little doubt that on many occasions and on many subjects they offer guidance which is willingly accepted. Some of the morning and most of the evening n's supplement the printed text by illustrations, in line drawing or half-tone.

In places where the n's are not specially represented, news is obtained through various **News Agencies**, the chief of which are *Reuter's Telegram Company* (founded 1865), the *Press Association* (1868), the *Central News* (1870), and the *Exchange Telegraph Company* (1870). Dalziel and Laffan are news organisations which deal chiefly in foreign intelligence.

It is estimated that there are 60,000 daily and weekly n's in the world, more than half of which are printed in English.

There are (1913) in Great Britain 2406 newspapers. Of these (including 15 daily papers in London and 135 in the Eng. provinces) there are 464 papers of all kinds published in London, and 1359 in the provinces. Wales has 129 papers, including 8 dailies; Scotland 247 papers, including 18 dailies; and Ireland 191 papers, including 18 dailies.

English Newspapers.—The chief London daily n's are *The Times* (founded in 1788); *The Daily Telegraph* (1855); *The Standard* (1857); *The Morning Post* (1772); *The Daily News and Leader* (founded as *Daily News* in 1846); *The Daily Chronicle* (1876); *The Daily Express* (1900); *The Daily Citizen* (1912), a Labour paper; and the *Daily Mail*. The last, established in 1896, and now having a circulation of almost exactly a million copies—the largest of (at least) British n's—was the first of the successful halfpenny morning n's; others subsequently reduced their prices to a halfpenny also. The evening papers published in London are *The Globe* (founded in 1803), the *Evening Standard* (1827), and *St. James' Gazette* (1880), amalgamated in 1905, the *Pall Mall Gazette* (1865), the *Westminster Gazette* (1893), the *Star* (1888), and the *Evening News* (1881). Illustrated daily papers in London are the *Daily Graphic* (1890), the *Daily Mirror* (1903), and *Daily Sketch* (1909). The *Observer*, *Lloyd's Weekly News*, and other papers are published on Sundays. There are numerous daily and weekly papers devoted to trade, labour, and technical interests, medicine, science, education, the churches, the stage, sport, society, and fashion topics (see PERIODICALS).

Among outstanding n's published in the Eng. provinces are the *Manchester Guardian*, *Birmingham Daily Post*, *Yorkshire Post*, *Sheffield Daily Telegraph*, *Liverpool Daily Post*, and *Mercury*.

The chief **Scottish Newspapers** are *The Scotsman*, founded in 1817 (became a daily n. in 1855); the *Glasgow Herald* (1805); *Dundee Advertiser* (1801); *Dundee Courier* (1816); *Glasgow Daily Mail* (with which was incorporated in 1901 the *Record* and the *North British Daily Mail*, founded in 1847); the *Aberdeen Journal* (1748); the *Aberdeen Free Press* (1853). Evening n's include the Edinburgh *Dispatch* (1886) and *News* (1873), the Glasgow *Citizen* (1864), *Times* (1876), and *News* (1905, founded as *Glasgow Evening News* in 1876).

Irish Newspapers.—The *Dublin News-Letter* was started 1685; the *Dublin Gazette* in 1705. The oldest existing Irish n. is the *Belfast News-Letter*, established 1737. *Freeman's Journal* was founded in Dublin c. 1763 as the *Public Register*. The leading Unionist paper in Ireland is the *Irish Times*.

Colonial Newspapers.—There are about 1200 n's published in Australia, at least 800 in Canada, about 150 in New Zealand, about 160 in South Africa, and 1062 periodicals in India. The oldest existing n. in Australia is the *Sydney Morning Herald* (1831); other leading Australian papers are the *Sydney Daily Telegraph*, the *Melbourne Age* and *Argus*, and the clever Sydney *Bulletin* (weekly). The *New Zealand Times* dates from 1846. The earliest Canadian papers date from the middle of the XVIII. cent. The *Quebec Chronicle* appeared 1764, the *Montreal Gazette*, 1778; the *Montreal Herald* was founded 1808, the *Toronto Globe*, 1844. Many Canadian papers are in French. The leading South African paper is the *Cape Times*, Cape Town (1876); the *Cape Argus* (evening) dates from 1857. The Johannesburg *Star* is the oldest in the Transvaal. The chief Dutch papers are *Ons Land* and the *Volkstem*. Among notable n's in India are the *Pioneer* (Allahabad), *Civil and Military Gazette* (Lahore), *Statesman* (Calcutta), *Times of India* (Bombay), *Madras Times* (Madras).

United States Newspapers.—The total number of n's and periodicals published in U.S.A. is 22,806. The *Boston News-Letter* (1704) was the first Amer. journal. Of the dailies, among the best known are the *New York Herald*, the *New York Tribune*, the *New York Times*; the *Record Herald*, the *Inter-Ocean*, and the *Examiner* (Chicago); the *San Francisco Examiner* and the *San Francisco Bulletin*.

Foreign Newspapers.—In FRANCE the first n. published was the *Gazette de France*, founded in 1631. There is now a large number of journals in the country. Paris alone has about 100. Perhaps the best known to Eng. readers are the *Figaro*, the *Gaulois*, the *Intransigeant*, the *Journal*, the *Journal des Débats*, the *Patrie*, the *Petit Journal*, the *Matin*, the *République Française*, the *Siècle*, the *Soleil*, and the *Temps*.

RUSSIAN dailies include the *St. Petersburgskya Viedomosti*, the *Journal de St. Pétersbourg*, the *Novoya Vremja*, and the *Moscovskya Viedomosti*.

Of the 1050 n's in GERMANY, about 60 are published

in Berlin, including 29 dailies. Among those frequently quoted in Britain are the *Lokal Anzeiger*, *Berliner Tageblatt*, *Vossische Zeitung*, the *Cologne Gazette*, the *Kölnische Volkszeitung*, and the *Vorwärts* (Social-Democratic organ).

The first n. in Italy was the *Diario di Roma* (1716). Celebrated Ital. n's are the *Fanfulla*, the *Tribuna*, *L'Osservatore Romano* (papal), and *Messaggiero* (Rome); *Il Secolo* and *Corrière della Sera* (Milan).

Published lists show that Austria and Hungary have about 100 important n's (notably the Vienna *Neue Freie Presse*), Belgium 70, Denmark about 80, Greece 24, Holland 90, Italy 180, Norway 45, Russia 80, Spain 75, Sweden 70, Switzerland 118, and Turkey about 20.

A feature of many continental countries is 'inspired news,' i.e. official information conveyed by government authorities to certain papers which are regarded as semi-official organs. While Eng. n's favour anonymous leading articles, continental 'leaders' are generally signed or initialed. Most European n's appear on Sundays as on week-days.

Dibblee, *Newspapers* (1913).

NEWTON.—(1) (38° 2′ N., 97° 20′ W.) city, Kansas, U.S.A.; flour-mills. Pop. (1910) 7862. (2) (42° 21′ N., 71° 9′ W.) residential city, on Charles River, Massachusetts, U.S.A. Pop. (1910) 39,806.

NEWTON, ALFRED (1829–1907), Eng. zoologist; eminent student of ornithology and zoogeography.

NEWTON, SIR ISAAC (1642–1727), Eng. natural philosopher; b. Woolsthorpe, Lincolnshire; inventor of the binomial theorem, method of tangents, and fluxional calculus. Tradition has it that the sight of a falling apple in his garden first influenced him towards research concerning the attraction of the earth, which culminated in his discovery of gravity, 1665. In immediate sequence followed a deduction of the law of inverse squares from Kepler's third law, but not until 1685, following on experiments by Picard, which furnished a reliable value for the terrestrial radius, was he able to prove its exactness.

The first volume of his *Philosophiæ Naturalis Principia Mathematica* (1687) was an exposition of the dynamic results of the law of inverse squares; the second, a treatise on motion in resisting mediums, hydrostatics, hydrodynamics, and tides; the third dealt with planetary motion and comets. In 1666 he turned to optical research, and resolved white light into its constituent colours; in 1668 he invented the reflecting telescope, and, lecturing before the Royal Soc. in 1672 and 1675, read papers on prismatic experiments and the phenomena due to interference of light rays known as *Newton's Rings*. Subsequently he published a volume, *Optics*, favouring the emission of light theory, and embodying the results of his papers. In 1669 he was appointed to the chair of Math's at Cambridge Univ., representing the univ. in Parliament in 1689 and in 1701 as a Whig, being defeated at the polls in 1705; app. Warden of the Mint, 1696, Master in 1699, knighted in 1705; he was Pres. of the Royal Soc. from 1703 till his death.

In 1692 he drew up a treatise on the calculus for math's. A controversy with Leibnitz started in 1705, and, lasting 20 years, finally vindicated his own claims of priority in the discovery of the calculus theory. While engaged in the completion of his lunar theory (1694–95) he was embroiled in a protracted dispute with Flamsteed, whose observations were essential for the success of his work. N. was buried in Westminster Abbey.

Sir David Brewster, *Life of N.*

NEWTON, JOHN (1725–1807), Anglican divine; sailor, 1737–55; ordained, 1764; with William Cowper pub. *Olney Hymns*.

NEWTON ABBOT (50° 32′ N., 3° 36′ W.), town, Devonshire, England, on Teign estuary; railway workshops; exports potter's clay. Pop. (1911) 13,712.

NEWTON-IN-MAKERFIELD, NEWTON-LE-WILLOWS (53° 28′ N., 2° 37′ W.), town, Lancashire, England; printing-works and paper-mills. Pop. (1911) 18,462.

NEWTOWN.—(1) (52° 31′ N., 3° 20′ W.) town, on Severn, Montgomeryshire, England; flannel. Pop. (1911) 6068. (2) S.W. suburb, Sydney, New South Wales. Pop. 24,000.

NEWTOWNARDS (54° 36′ N., 5° 41′ W.), seaport, County Down, Ireland, on Lough Strangford; muslin embroidery; linens. Pop. 9200.

NEWTS, EFTS, members of the amphibian genus *Molge*, found in both Old and New Worlds; small, long-tailed, cylindrical animals, some 5 or 6 inches in length. The tail is sometimes surmounted by a crest or fin. Their food consists of worms and aquatic insects, for they are predominantly aquatic creatures; but the Land and Cave Newts of America live almost entirely on land.

NEY, MICHEL (1769–1815), Fr. general; Duke of Elchingen, 1808; prince of the Moskowa, 1812. N. rose from ranks; lieut. in army of North, 1792; general of division, 1799; marshal of France, 1804; won battle of *Elchingen*, which secured capitulation of Ulm, 1805; after *Friedland*, 1808, received from Napoleon description '*brave des braves*'; won battle of *Borodino* and led retreat from Russia, 1812; shot as traitor at Restoration; statue erected on spot, 1853. *Life*, by Bonnal.

NGAMI (20° 28′ S., 22° 50′ E.), formerly a large lake in N. of Kalahari Desert, S. Africa; now almost dry; its principal feeder was the Okavango or Kubango.

NGAN-HUI, NGAN-HWEI (32° N., 117° E.), fertile inland province, China; traversed by Yang-tze-kiang and Hwai-ho; tea; capital, Ngan-king. Pop. 20,500,000.

NIAGARA (43° 15′ N., 79° 8′ W.), river, N. America, forming boundary between Ontario and New York; rises in Lake Erie and flows into Lake Ontario (c. 35 miles). At famous **Falls** river is divided by Goat Island, larger volume of water falling 158 ft. on Canadian side (*Horseshoe Fall*: breadth, 2640 ft.); Amer. Fall, much narrower, is 162 ft. high. Below falls river enters chasm, and farther on are whirlpool and rapids.

Gilbert, *Niagara Falls and their History* (1893).

NIAGARA FALLS.—(1) (43° 6′ N., 79° 4′ W.) town, New York, U.S.A.; seat of R.C. univ.; manufacturing centre; derives water-power from Falls. Pop. (1910) 30,445. (2) (43° 14′ N., 79° 9′ W.) town, port of entry, on Niagara, Ontario; carborundum, paper. Pop. 10,900.

NIAGARA FORT (43° 17′ N., 79° 6′ W.), fortress, near estuary of Niagara R., on Lake Ontario, N. America; occupied by British, 1813–15.

NIALL, see O'NEILL.

NIAM-NIAM, African people of mixed descent, dwelling from the White Nile and the Shari nearly to the equator; estimated at 2,000,000, and including several quite distinct tribes. Courageous, faithful to their wives, skilful in many arts and industries, and intelligent. Earthenware, metal-work, and wood-carving are the chief industries. The men are hunters, the women agriculturists, the soil being fruitful of cereals, yams, and tobacco.

NIAS (1° N., 97° 30′ W.), island, Dutch E. Indies, W. of Sumatra. Pop. 320,000.

NIBELUNGENLIED, High German heroic epic around the following tradition: King Gunter of Burgundy weds Queen Brunhilde with the help of Siegfried; Siegfried in turn weds Kriemhilde, Gunter's sister. The two queens quarrel and Kriemhilde insults her rival. Hagen, a vassal of Gunter, avenges the insult by murdering Siegfried. Kriemhilde marries Etzel, king of the Huns, and with his aid treacherously annihilates the rest of her family (the *Nibelungen*), but is herself killed by Hagen, who in turn succumbs to Hildebrand. Although of popular Ger. origin, the epic was preserved through Scandinavian channels, and has been coloured by them, acquiring a definite form about 1200 under Kaiser Frederic I. It was lost after the XV. cent., but was

rediscovered by Obereit and Bodmer in the XVIII. cent., and reconstituted from later discoveries. It has formed the inspiration of several modern Ger. masterpieces, notably Hebbel's *Die Nibelungen* and Wagner's great series of musical dramas, *Der Ring der Nibelungen*.

NICÆA, modern ISNIK (40° 30′ N., 29° 50′ E.), ancient city on Lake Ascania, Bithynia, Asia Minor.

NICÆA, COUNCIL OF (325 A.D.), the first Œcumenical Council; the persecutions were over and Christianity was now state-established. The immediate object of the Council was to settle the Arian controversy. The bp's were mostly from the Eastern provinces. The Council refused to accept an Arian creed; a creed was brought forward by Eusebius of Cæsarea and in a modified form accepted by the Council. The majority were unwilling to see phrases formulated which were not in Scripture. Athanasius took a leading part and the Emperor Constantine presided.

NICARAGUA (11° to 15° N., 83° to 87° 30′ W.), republic, Central America; is bounded N.W. by Honduras, E. by Caribbean Sea, S. by Costa Rica, S.W. by Pacific; area, *c.* 49,200 sq. miles; Cordillera runs along S.W. side, 15 to 30 miles from coast; between mountains and sea is depression containing Lakes Managua and Nicaragua; to E. between base of hills and sea is extensive plain. Nicaragua is drained by Coco, Sistin, Grande, San Juan. A canal from Atlantic to Pacific, *via* the San Juan Valley and Lake Nicaragua, was early projected and operations actually begun (1889), but the Panama route has prevailed. Chief towns, Managua (capital), Leon, Granada, Matagalpa. Subject to earthquakes; climate varies with elevation, hot and damp near coast.

Nicaragua was sighted by Columbus, 1502; overrun by Gonzalez Davilo, 1522, and annexed by Spain, under whom it became province of Guatemala; rose against mother country and proclaimed independence, 1821; united with Central Amer. Republic from 1823 to 1838, when it became separate state; warred against Britain, 1848, from whom it acquired Mosquito Coast (*q.v.*,), 1860; warred against Honduras, 1907. Dispute with U.S. occurred, 1909.

Administered by pres., aided by council of five ministers; legislature consists of house of 36 members elected by popular vote. Principal religion, Rom. Catholicism. Primary education is free and obligatory. Nicaragua produces mahogany and other valuable timbers, coffee, rubber, sugar-cane, fruit, gold, silver; stock-raising and dairying important. Railway mileage, *c.* 170. Inhabitants include Europeans (very few), Indians, half-breeds. Pop. (1910) 600,000.

Niederlein, *The State of N.* (1898); Walker, *Ocean to Ocean, an Account of N. and its People* (1902).

NICASTRO (39° N., 16° 22′ E.), town, Catanzaro, Calabria, Italy. Pop. 18,500.

NICE, NIZZA (43° 44′ N., 7° 14′ E.), chief town in Alpes-Maritimes, France; beautifully situated on Mediterranean. Built by Phocæans from Marseilles, *Nicæa* was bought by Romans; in Saracen hands, X. cent.; taken by French, 1543, but restored to Savoy; joined to France, 1859, in return for Fr. support against Austria. A fashionable Riviera winter resort, N. is famed for its Promenade des Anglais, Casino, Battles of Flowers, etc.; has cathedral, fort, and harbour; exports flowers, perfumes, fruits, olive oil, pottery, and carved olive-wood. Pop. (1911) 142,949.

NICEPHORUS I., Byzantine emperor, 802–11, after successful revolution against Irene.

NICEPHORUS II., PHOCAS, Byzantine emperor, 963–69; famous conqueror; assassinated by wife in conjunction with his nephew, John Zimisces.

NICEPHORUS III., BOTANIATES, Byzantine emperor, 1078–81; with Turk. help deposed predecessor Michael VII.; deposed by Alexius Comnenus.

NICHOLAS (1841–), king of Montenegro, etc.; succ., 1860, as hereditary prince; developed Montenegro, extended boundaries; fought against Turkey, 1862, 1876, 1877–78, 1912–13; obtained subsidies from Russia; assumed title king, 1910; distinguished general, statesman, and poet. See MONTENEGRO.

NICHOLAS I. (1796–1855), Tsar of Russia; m. Charlotte Louise, dau. of Emperor Frederick William III., 1817; declared heir of his bro., Alexander I., 1823, Constantine being passed over at his own request; succ., 1825, after dangerous revolt in army stirred up by princes, as tyrannical character of N. was deeply feared; at once established iron despotism and elaborate spy system; assisted Greeks against Turkey in their War of Independence from hatred of infidel; western policy to uphold existing governments by armed intervention of powers. N. made Holy Alliance with Austria and Prussia, 1833, of which secret purpose was crusade against revolutions; it became Quadruple Alliance by accession of Britain, 1840, Russia temporarily abandoning Turk. aims; visited England, 1844; aided Austria to suppress Hungarian revolution, 1849, and to maintain preponderance in Germany against Prussia, 1850; refused to acknowledge Napoleon III., and alienated remaining powers by attack on Turkey; as pretext for war demanded recognition of right, claimed by France, to protection of Holy Places at Jerusalem, and to protectorate of all Christian subjects of sultan; sustained crowning disaster in Crimean War (*q.v.*); rigid, narrow, upright character; handsome and striking appearance.

NICHOLAS II. (1868–), Tsar of Russia; succ. his f., Alexander III., 1894; strongly desirous of peace; originated Peace Conference at Hague; made alliance with France; forced to grant Constitution, 1905; unwisely roused Japan by Eastern policy and sustained humiliating defeat. See RUSSIA.

NICHOLAS I., THE GREAT, pope, 858–67; greatly increased prestige of papacy; reduced archbishopric of Ravenna, 861–64; by Lateran Council, 864, ordered Lothair II. of Lorraine to take back his wife, and deposed abp's who had allowed his divorce; victorious over their attempted resistance; recognised False Decretals and used their power in summoning Hincmar and Rothade to Rome, 863, and denying independent action to councils; quarrelled with Gk. Church.

NICHOLAS II., pope, 1058–64; Lateran Council, 1059, settled mode of electing popes; made alliance with Normans of Apulia.

NICHOLAS III., pope, 1277–80; successfully opposed house of Anjou; bull, 1279, settled disputed points in rule of St. Francis.

NICHOLAS IV., pope, 1288–92; pious Franciscan, unequal to secular government.

NICHOLAS V., antipope, 1328–30.

NICHOLAS V., pope, 1447–55; humanist and statesman; pope at time of Turk. capture of Constantinople.

NICHOLAS, HENRY (*c.* 1501–*c.* 1580), founder of the religious sect called the Family of Love; b. in Münster. The sect was Anabaptist, and tended towards rationalism.

NICHOLAS OF BASEL (d. 1397), Ger. heretic; taught Quietism; akin to mystics of Beghard brotherhood; Schmidt's identification of N. with Merswin's 'God's friend in the Oberland' now rejected; burned to death.

NICHOLAS OF CUSA, see CUSA, NICHOLAS OF.

NICHOLAS, ST., famous saint believed to have lived under Constantine; bp. of Myra, Syria; his feast-day is Dec. 6; as *Santa Claus* became identified with Christmas festivities; patron of Russia, of children, and of seafarers; subject of many legends in many lands. See BOY BISHOPS.

Littlewood, *Story of Santa Claus* (1912).

NICHOLAS, SIR EDWARD (1593–1669), Eng. statesman; foremost adviser of Charles I. in Civil War, arranging treaty of Uxbridge, surrender of king to Scots, surrender of Oxford.

NICHOLSON, JOHN (1822–57), Brit. general and administrator; served in Sikh Wars; deputy-commissioner of Bannu on annexation of Punjáb, 1849;

crushed attempted mutiny of Punjab; insisted on, and carried out, attack on Delhi; slain after entry; brilliant ruler, despotic but just; called by Lord Roberts '*beau idéal* of a soldier and a gentleman.'

NICIAS (V. cent. B.C.), Athenian statesman and soldier; succ. Pericles as leader of aristocratic faction; opposed Cleon; helped to arrange *Peace of Nicias*, 421 B.C.; app. general in Syracusan expedition, 415 B.C.; proved himself incompetent, over-cautious, and superstitious; killed, 414; a man of no genius, popularised by minor successes and lavish distribution of wealth.

NICKEL (Ni = 58·68), metallic element in iron group; occurs as kupfernickel (NiAs), n. glance (NiAsS), and frequently with iron and cobalt. Obtained by roasting sulphide to oxide, and reducing with charcoal. Purified by forming n. carbonyl ($Ni(CO)_4$), a volatile, easily decomposable liquid. Silvery white, hard, may be rolled and polished; difficult to oxidise; S.G. 8·9; M.P. 1484°; used for plating (electrolysis of $NiSO_4.(NH_4)_2SO_4.6H_2O$ solution), for alloys (German silver, coinage), and for nickel steel (armour plates, guns). Oxides NiO, Ni_2O_3; salts from NiO only, green hydrated, yellow anhydrous. $Ni(OH)_2$, pale green, does not oxidise in air. $NiSO_4.7H_2O$, and $NiSO_4.(NH_4)_2SO_4.6H_2O$, isomorphous with corresponding iron salts. $Ni(OH)_3$, from $Ni(OH)_2$ and NaOCl, black precipitate.

NICKEL-PLATING, see ELECTRICITY (Electroplating).

NICOBAR ISLANDS (8° N., 93° E.), group of 19 islands in Ind. Ocean, belonging to Great Britain. Chief islands are Great and Little Nicobar, Camorta, Nancowry, and Car Nicobar; total area, 635 sq. miles; large forests; climate unhealthy; administered by the Chief Commissioner of the Andamans; first taken by Danes, 1756; Austrians, 1778; British, 1869; chief exports—cocoa-nuts, edible birds' nests. Natives are of Malay type. Pop. *c.* 7000.

NICOLE, PIERRE (1625–95), Fr. theologian; one of most illustrious prof's at Port Royal; trans. *Provinciales* into Latin, but became estranged from Jansenists; wrote *Essais de morale*.

NICOLL, SIR WILLIAM ROBERTSON (1851–), Brit. journalist, editor, and theologian; knighted, 1909.

NICOLSBURG, Bohemian MIKULOV (48° 49′ N., 16° 38′ E.), town, Moravia, Austria; vineyards.

NICOMEDIA, modern ISMID (40° 45′ N., 30° E.), ancient city, Bithynia, Asia Minor; founded in 264 by Nicodemes I., king of Bithynia; residence of several Rom. emperors; scene of Hannibal's death.

NICOPOLIS, ACTIA NICOPOLIS, ancient city, Epirus, Greece; founded by Octavian in commemoration of his victory at Actium, 31 B.C.

NICOSIA.—(1) (35° 12′ N., 33° 10′ E.) capital of Cyprus, on Pedius; seat of Gk. abp.; manufactures leather, textiles. Pop. 17,000. (2) (37° 42′ N., 14° 25′ E.) town, Catania, Sicily. Pop. 16,500.

NICOTINE ($C_{10}H_{14}N_2$), colourless alkaloid oil in tobacco; B.P. 241° C., pungent smell, soluble in water and alcohol, very poisonous. Diacid base forming crystalline salts, *e.g.* $C_{10}H_{14}N_2.2HCl$.

NICTHEROY, NITEROY (23° 52′ S., 42° 52′ W.), town, Rio de Janeiro, Brazil, S. America; manufactures textiles, soap, tobacco. Pop. 37,000.

NIDIFICATION, see under NEST.

NIEBUHR, BARTHOLD GEORG (1776–1831), Ger. historian; b. Copenhagen; held several public posts, but chiefly important as author of *Roman History* (*Römische Geschichte*); first two vol's pub. 1812, third vol. after death. N. originated new theory of early Rom. history, emphasised laws which control development of civilisation, and founded new hist. school.

NIEBUHR, KARSTEN (1733–1815), Ger. geographer to Dan. Arab. Exploration Soc.; his fellow-travellers died, and N. continued expedition alone; returned, 1767, and wrote valuable accounts of travels; widely read biography by s., Barthold (*q.v.*).

NIEDERBRONN (48° 56′ N., 7° 40′ E.), town, Alsace-Lorraine, Germany; mineral springs. Pop. 3300.

NIEDERLAHNSTEIN (50° 20′ N., 7° 36′ E.), town, Hesse-Nassau, Prussia, at junction of Lahn and Rhine; manufactures machinery. Pop. 4000.

NIEDER-SELTERS (50° 18′ N., 8° 15′ E.), village, Hesse-Nassau, Prussia; 'Seltzer-water' springs.

NIEDERWALD (49° 59′ N., 7° 54′ E.), mountain-ridge, near Rhine, Germany; site of a national monument to commemorate Ger. victory over France in 1870–71.

NIEM, DIETRICH OF (*c.* 1345–1418), Ger. chronicler; abbreviator in papal chancery; advocated general council to end great schism and uphold Empire against Papacy; works important for ecclesiastical history.

NIEMBSCH VON STREHLENAU, Austrian poet, known by pseudonym Nicolaus Lenau (*q.v.*).

NIEMEN, see MEMEL.

NIENBURG-ON-THE-SAALE (51° 50′ N., 11° 45′ E.), town, on Saale, duchy Anhalt, Germany; iron foundries. Pop. (1910) 5573.

NIENBURG-ON-THE-WESER (52° 38′ N., 9° 15′ E.), town, on Weser, Hanover, Prussia; glass-works. Pop. (1910) 10,295.

NIERSTEIN (49° 52′ N., 8° 20′ E.), town, on Rhine, Hesse-Darmstadt, Germany; wines. Pop. (1910) 4600.

NIETZSCHE, FRIEDRICH WILHELM (1844–1900), Ger. philosopher; believer in Darwinism; brute strength, cunning, etc., are exalted as leading to success in the struggle for existence; the Christian virtues should be superseded, as tending to the prolonged existence of less vigorous types; apostle of gospel of Superman. Chief work, *Thus Spake Zarathustra*.

Nietzsche (People's Books, 1912); Orage, *N. in Outline and Aphorism*; Mügge, *N., His Life and Works*.

NIEUPORT, Flemish NIEUWPOORT (51° 8′ N., 2° 44′ E.), small town, on Yser, West Flanders, Belgium. Pop. 3600.

NIÈVRE (47° 10′ N., 3° 30′ E.), central department, France; area, 2658 sq. miles; mountainous in E.; drained by Allier, Loire, Yonne; large forest area; live stock raised; coal, iron and steel manufactures. Pop. (1911) 299,312.

NIGDEH, NIGDE (37° 58′ N., 34° 40′ E.), town, Konieh vilayet, Asia Minor. Pop. 21,000.

NIGEL (d. 1169), bp. of Ely, 1130; prominent for work in Exchequer under Henry II.

NIGER (4° 25′ N., 6° E.), large river of West Africa; rises in plateau of Futa Jallon in Fr. Guinea; flows N. and N.E. through Fr. Sudan, turning S.E. at Barka, flows through Nigeria and enters Gulf of Guinea by numerous mouths, Rio Nun at Akassa being the chief one; total length, 2600 miles, of which over 1050 are navigable; area of basin, 584,000 sq. miles. Swampy delta extends about 120 miles along coast, and covers an area of 14,000 sq. miles. Chief tributaries are Benue, Sokota or Rima, and Kaduna; principal towns, Bammako, Sasandig, Timbuktu, Ansango, Ilo, Gambo, Busa, Lokojo, Asaba, Abo, Rabba, Egga; N. is known under various names (Goliba, Isa, Quorra, etc.); first discovered and explored by Mungo Park, 1795; followed by Clapperton, 1826, R. and J. Lander, 1830, Richardson, Barth, 1851–54, Flegel, 1880–81, Gallieni, Caillié, Boyd Alexander, etc.

Mungo Park, *Travel in the Interior of Africa in the Years 1795, 1796, 1797*; Lenfant, *Le Niger* (1903); Boyd Alexander, *From the Niger to the Nile* (1908).

NIGERIA (10° N., 5° E.), Brit. protectorate, West Africa; consists of **Northern Nigeria** and **Southern Nigeria** (including LAGOS Protectorate). Nigeria is bounded on N. by Fr. Sudan, W. by Dahomey, E. by Lake Chad and Ger. Kamerun, and S. by Gulf of Guinea; total area about 400,000 sq. miles. Boundary between Northern and Southern Nigeria runs from 9° N. in West to 7° N. in East. Coast region is flat and

swampy, with hot and unhealthy climate, malaria being very prevalent; northern part fertile, with healthier climate; interior traversed by mts.; highest ranges, 6000–7000 ft.; immense valuable forests. Chief rivers are Niger, Benue, Sokoto, Kaduna, Waube or Yo, Cross, Katsena, Gongola; principal towns, Lagos (capital and seaport), Kano, Sokoto, Asaba, Onitsha, Benin, Abo, Zungeru (chief town in Northern Nigeria). Maifoni, Abeokuta, Ibadan, Illorin, Gebba, Bussa, Gando; Akassa, Brass, Bonny, Warri, Barutu, Calabar, Sapela, Opobo, Forcados, on or near coast. Fauna consists mainly of elephants, lions, giraffes, hyenas, monkeys, and many species of antelope; rivers infested by crocodiles, hippopotami, and rhinoceri. Native tribes are mostly negroes—Ibo, Idzo, Aros, Efiks, Borgus, Jukos, Garubas, Fulas, Hausas, etc. Muhammadanism is widely spread, especially in north, but cannibalism still prevails in some parts, and human sacrifices are quite common.

Region was discovered by Portuguese, XV. cent.; Brit. traders gradually acquired predominating share of trade; United African Co. established, 1879; acquired rights over Nigeria, and in 1886 obtained royal charter as *Royal Niger Co.*; Benin (*q.v.*) massacre and expedition, 1897. Niger Co. surrendered political administrative rights, 1900, and Protectorate (under High Commissioner) was formed; Lagos (*q.v.*) made Western province of Southern Nigeria, 1906—other provinces, Eastern (headquarters, Calabar) and Central (headquarters, Warri); Sir Frederick Lugard app. High Commissioner of both Northern and Southern Nigeria with a view to their federation, 1912. All children born after April 1, 1901, were declared free. Nigeria was explored by Mungo Park, Major Denham and Clapperton, R. and J. Lander, Richardson, Dr. Barth, etc. Local administration is conducted by Brit. Residents, native kings and chiefs. River is chief means of communication; railway from Lagos to Baro, Rahama, and Kano. Principal products are palm oil, kernels, rubber, timber, ivory, cotton, kolanuts, indigo, coffee, cocoa, tobacco, ostrich feathers, shea-butter, gums, live stock; silver, manganese ore, tin, lignite, iron, lead ore, salt, and soda are found. Pop. *c.* 6,720,000.

Lady Lugard, *A Tropical Dependency* (1905); Mockler-Ferryman, *Brit. Nigeria* (1902); Leanard, *Lower N. and its Tribes* (1906); Morel, *Nigeria: its Peoples and Problems* (1911).

NIGHTHAWK, a Nightjar, see GOATSUCKER.

NIGHTINGALE, see under THRUSH FAMILY.

NIGHTINGALE, FLORENCE (1820–1910), Eng. philanthropist; showed strange power over animals as child; hospital training; took out staff of nurses to Crimea, 1854, and performed heroic services; revolutionised hospital nursing (*q.v.*) at home, founded N. Home, and spread knowledge of hygiene; of good social position and exercised enormous influence. *Life*, by Tooley (1904).

NIGHTJAR, see GOATSUCKER.

NIGHTSHADE, a term comprising two species, included in the *Solanaceæ—Atropa belladonna*, the deadly n., from which belladonna (*q.v.*) is obtained, and *Solanum dulcamara*, the bittersweet, which is only slightly poisonous.

NIHILISM, name of species of revolutionary propaganda in Russia. Word first appears in Turgueniev's *Fathers and Sons* (1862), for spirit which turns critical eye on all human institutions; later appropriated to political destructiveness of physically violent kind. Disappointed by reign of Alexander II., Russ. Liberals began in 1871 to organise revolts against government; the literary movement had been confined to prosperous classes, who now began to preach to people with *Subterranean Russia* for organ; procession at Moscow, 1877; persecuted, imprisoned, or sent to Siberia; 1878–80 were years of Nihilist Terror, and after two vain attempts Alexander II. was slain by bomb, 1881; prominent place taken by women in these attempts; Alexander III. nearly stamped out movement by secret police system and severe punishments.

Stepniak, *Underground Russia* (1883); Stepniak and others, *N. as it was* (1895).

NIIGATA (37° 57′ N., 139° 3′ E.), seaport, Echijo, Japan, on W. coast; lacquer-ware. Pop. 63,000.

NIIHAU, see HAWAIIAN ISLANDS.

NIJAR (36° 54′ N., 2° 15′ W.), town, Almeria, Spain. Pop. 15,500.

NIJMEGEN, NIJMWEGEN, NIMEGUEN (51° 51′ N., 5° 33′ E.), city, on Waal, Gelderland, Netherlands; Roman *Noviomagus*; contains Church of St. Stephen (1272), Renaissance town hall, and ruined Carolingian palace; tobacco, metal-work. Pop. (1911) 57,116.

NIJNI-NOVGOROD, see NIZHNIG-NOVGOROD.

NIJNI-TAGILSK, see NIZHNE-TAGILSK.

NIKAYA, group of Buddhist canonical lit.; *Sutta Pisaka* is composed of four chief N's, mainly dialogues.

NIKKO (*c.* 37° N., 137° 30′ W.), district, Japan; an important religious centre and place of pilgrimage; many Shinto and Buddhist shrines and temples.

NIKOLAYEV (47° 7′ N., 30° 31′ E.), town, Kherson, Russia; important naval station; fortified; has Gk. cathedral, observatory, naval arsenal; manufactures flour, iron goods, etc. Pop. (1910) 95,400.

NIKOLAYEVSK.—(1) (52° N., 48° 40′ E.) town, on Irgiz, Samara, Russia. Pop. 13,600. (2) (52° 53′ N., 140° 22′ E.) fortified town, on Amur, former capital, E. Siberia. Pop. 5500.

NIKOLAYEVSKAYA SLOBODA (50° 5′ N., 45° 30′ E.), town, on Volga, Astrakhan, Russia; trading centre. Pop. 19,000.

NIKOLSBURG, see NICOLSBURG.

NIKON (1605–81), Russ. patriarch, 1653; revised Slavonic service-books.

NIKOPOL (47° 32′ N., 34° 40′ E.), town, Ekaterinoslav, Russia. Pop. 8000.

NIKOPOLI, NICOPOLIS (43° 42′ N., 24° 53′ E.), town, on Danube, Bulgaria; defeat of Sigismund of Hungary by Turks, 1396. Pop. 6200.

NIKOSIA, see NICOSIA.

NIKSHICH, NIKSHITCH, NIKSIC (42° 45′ N., 18° 57′ E.), fortified town, Montenegro; taken from Turks by Montenegrins in 1877. Pop. 5300.

NILE, longest river of Africa; rises between 2° and 3° S. as KAGERA (*Alexandra Nile*), in N.W. of Ger. East Africa; general course from S. to N.; passes through Victoria Nyanza, and enters north part of Albert Nyanza as *Somerset Nile* or *Victoria Nile*; flows through Sudan as *Bahr-el-Gebel*; below Fashoda it takes the name of *Bahr-el-Abiad* or *White Nile*. After Berber the Nile flows northwards for about 1800 miles through north Sudan and Egypt without receiving a single tributary, and enters the Mediterranean by two principal branches, the *Rosetta* and *Damietta*. The delta, 150 miles in length, with numerous canals in every direction, is the most fertile part of North Africa. Chief tributaries are Bahr-el-Ghazal, Sobat, Bahr-el-Azrak, or *Blue Nile*, and Atbara. Principal towns are Cairo, Assiut, Assuan, Kena, Naghamadi, Wadi Halfa, Akasha, Dongolo, Berber, Abu Hamed, Khartum, Fashoda, Lado, Wadela, Fajao. Total length is 3600 miles; navigable throughout (*c.* 3000 miles), except at the six cataracts between Khartum and Assuan, and after leaving Albert Nyanza. Steamers ascend as far as Gondokoro; sudd (floating vegetation) hinders navigation on Upper Nile. Area of drainage basin is estimated from 1,000,000 to 1,500,000 sq. miles. Nile is subject to regular floods, between June and Oct.; maximum elevation is *c.* 41 ft. above the normal level. The fertility of the Nile country depends on these inundations. Irrigation has been improved by the building of the immense Assuan dam (*q.v.*), Assiut dam, Zifta and other barrages.

Nile is intimately associated with ancient and modern history of Egypt (*q.v.*); many famous antiquities on banks. From earliest times the situation of the Nile's sources formed a fascinating geographical problem; source of Blue Nile explored by Bruce,

1770–72; Ismail Pasha expedition ascended White Nile to junction with Blue Nile, and discovered Khartum, 1820–22; explored by three Egyptian expeditions as far as Gondokoro, 1839–42; Speke reached Victoria Nyanza, 1858, and discovered Ripon Falls, 1862; Albert Nyanza discovered by Sir Samuel Baker, 1864; Stanley explored Kagera, and named it Alexandra Nile, 1875; Anglo-Ger. Commission surveyed Kagera from 30° E. to mouth, 1903; other important explorers were Schweinfurth, 1868–71, Colonel Chaillé-Long, 1874, Gordon, 1876, Baumann, Kandt, Lionel Décle, 1891 onwards.

Sir Harry Johnston, *The Nile Quest* (1903); Kandt, *Caput Nile* (Berlin, 1904); Blue Book of Egypt No. 2, 1904 (report by Sir W. Garstein); and works by Bruce, Baker, Speke, etc.

NILE, BATTLE OF THE (1798), fight between Brit. and Fr. fleets in Bay of Aboukir. Hearing of Fr. appearance at Malta, Nelson rightly judged Egypt to be its secret destination, but, arriving at Alexandria before the Fr. fleet, supposed he had made error, and sailed away; returned to find French in possession, but surrounded Fr. fleet in Aboukir Bay at mouth of Nile, and destroyed it. Napoleon for months was thus cut off from France.

NILES (41° 10′ N., 81° 53′ W.), city, on Mahoning, Ohio, U.S.A.; ironworks, coal and iron mines. Pop. (1910) 8361.

NILGHAI (*Bosclaphus tragocamelus*), an Ind. antelope, with maned neck, and fore limbs longer than hind; only the male with horns.

NILGIRIS, THE, NEILGHERRIES (11° 25′ N., 76° 45′ E.), plateau, Deccan, India; highest point, Mt. Dodabetta, 8760 ft. The district has area 956 sq. miles. Pop. 115,000.

NIMACH, see NEEMUCH.

NIMAR (21° 45′ N., 76° 30′ E.), district, Nerbudda, Central Provinces, India. Pop. 335,000.

NIMBUS, in art, a halo (*q.v.*).

NIMEGUEN, see NIJMEGEN.

NÎMES (43° 51′ N., 4° 21′ E.), town, Gard, France; magnificent Rom. remains; *Maison Carrée*, finest extant example of Græco-Rom. architecture; huge amphitheatre, *Tour Magne*, Temple of Diana; Rom. baths once supplied by superb *Pont du Gard* (see AQUEDUCTS). Augustus founded *Nemausus* on site of former Volscian capital; greatly favoured by Agrippa, Antoninus Pius, and other emperors; taken by Vandals, Visigoths, Saracens, and Franks; long under Dukes of Toulouse; restored to France, 1259; Camisard stronghold; birthplace of Guizot, Daudet; silk, cotton, carpets, wine trade. Pop. (1911) 80,400.

NIMROD, in *Genesis* 10 a 'mighty hunter,' and builder of Assyria. The etymology is uncertain, and various unsuccessful attempts at identification have been made.

NINEVEH, celebrated ancient city, capital of Assyrian Empire, situated on Tigris, opposite modern town of Mosul. Practically nothing was known of the city till discoveries made by Layard, Rawlinson, Smith, Rassam, and others in mounds of Kuoyunjik, Nebi Yunus, Khorsabad, and Nineveh. In Kuoyunjik and Nebi Yunus (mounds believed to contain ruins of Nineveh) have been discovered vast palaces with inscriptions, sculptured figures, monuments, etc., which have thrown much light on Assyrian history; exact date of foundation unknown; Sennacherib made many additions to Nineveh, and under him city rose to great power and splendour; ruins of his palace and that of Assur-bani-pal contained in Kuoyunjik; traces of Esar-haddon's palace to be found in Nebi Yunus. Nineveh was captured by Medes and Babylonians, *c.* 606 B.C.

Ferguson, *Palaces of Nineveh and Persepolis Restored.*

NING-PO (29° 42′ N., 121° 21′ E.), walled town, Cheh-kiang, China; one of Treaty ports, opened 1824; exports tea, silks, cotton; many monasteries and temples. Pop. (1910) 400,000.

NINKIGAT, see BABYLONIA (Religion).

NIOBE (classical myth.), dau. of Tantalus and Dione. Her pride in the number and beauty of her children gave offence to Leto, who caused Apollo and Artemis to slay the children.

NIORT (46° 19′ N., 0° 27′ W.), capital, Deux-Sèvres, France, on Sèvre-Niortaise; gloves. Pop. 23,500

NIPIGON, NEPIGON (50° N., 87° 30′ W.), lake, Ontario, Canada; discharges by Nipigon River into Lake Superior.

NIPISSING (46° 16′ N., 80° W.), lake, Ontario, Canada; discharges into Lake Huron by French River.

NIPPON, see JAPAN.

NIPPUR, one of most ancient cities in Babylonia, was situated between Tigris and Euphrates; site identified as Nippur by Layard's excavations in 1851. In 1889 extensive excavations were carried on by Univ. of Pennsylvania, when thousands of tablets and fragments, besides remains of buildings, were unearthed; these inscriptions give excellent account of history of city, and in particular of temple. Nippur was evidently a sacred city, centre of worship of Sumerian god En-lil; temple improved and completely rebuilt often; Arabs name site *Nuffar*.

NIRIS, NIRIZ (29° 10′ N., 54° 15′ E.), town, Fars, Persia. Pop. *c.* 10,000.

NIRVANA, see BUDDHISM.

NISH (43° 27′ N., 21° 59′ E.), town, Servia; Gk. episcopal see; taken in 1456 by Turks, who held it till 1878, when restored to Servia. Pop. (1911) 24,949.

NISHAPUR (36° 8′ N., 58° 40′ E.), town, capital of Nishapur province, Persia; turquoise mines; birthplace of Omar Khayyám (*q.v.*). Pop. *c.* 16,000.

NISIBIS (37° N., 41° 10′ E.), ancient city and fortress, Mesopotamia; scene of repeated conflicts between Romans, Parthians, and Persians; modern Nisibin.

NITEROY, see NICTHEROY.

NITRIC ACID, AQUA FORTIS, HNO_3, colourless fuming liquid; B.P. 86° C.; prepared from Chile saltpetre ($NaNO_3 + H_2SO_4 = NaHSO_4 + HNO_3$); commercial acid (S.G. 1·42) contains about 70 %; corrosive, dissolves metals, powerful oxidising agent, 'nitrates' benzene, etc.; stains skin yellow. Salts are nitrates, soluble in water; KNO_3 is nitre.

Nitro compounds are derived from nitric acid, NO_2OH, by replacement of the OH group by another radicle; their generic formula is therefore $R.NO_2$. They are prepared by 'nitration' thus: $RH + HO.NO_2 = R.NO_2 + H_2O$, and may be reduced by nascent hydrogen thus: $RNO_2 + 6H = RNH_2 + 2H_2O$.

Nitrobenzene ($C_6H_5NO_2$), a pale yellow oil, B.P. 205° C., is prepared by nitrating benzene ($C_6H_6 + NO_2.OH = C_6H_5NO_2 + H_2O$); used for making *aniline*, by reduction with tin and hydrochloric acid: $C_6H_5NO_2 + 6H = C_6H_5NH_2 + 2H_2O$. So-called nitroglycerin ($C_3H_5(NO_3)_3$) and nitrocellulose ($C_{12}H_{16}O_6(NO_3)_4 + C_{12}H_{15}O_5(NO_3)_5$) are nitrates.

NITROGEN (N = 14·01), gaseous element, molecule $= N_2$; occurs chiefly in the air (78 % by volume, 75·5 % by weight), and in combination as ammonia, nitrates, etc.—**Preparation**: (i.) by heating a concentrated solution of sodium nitrite and ammonium chloride, *e.g.* $NaNO_2 + NH_4Cl = NaCl + 2H_2O + N_2$; (ii.) by oxidation of ammonia, *e.g.* $2NH_3 + 3NaOBr = 3NaBr + 3H_2O + N_2$; (iii.) by reduction of an oxide, *e.g.* $N_2O + Cu = CuO + N_2$.

Properties: colourless, tasteless, odourless, does not burn or support combustion; 1 part water dissolves 0·023 part N_2 at N.T.P.; 1 litre at N.T.P. weighs 1·25107 grain; critical temperature, −149° C.; critical pressure, 27·5 atmospheres; B.P. (atm. press.), −195·5° C.; M.P. −210·5° C. Combines with heated lithium, calcium, barium, magnesium, forming nitrides, and with oxygen, by sparking, forming nitric oxide, NO. Hydrides: NH_3, N_2H_4, N_3H; hydroxylamine: NH_2OH; oxides: N_2O, NO, $N_4O_6(N_2O_3)$, $N_2O_4(NO_2)$, N_2O_5; oxyacids: $H_2N_2O_2$, HNO_2, HNO_3.

Organic nitrogen compounds are numerous and complex. Nitrogen is a constituent of proteid matter,

NITROGLYCERIN ($C_3H_5(ONO_2)_3$), glyceryl trinitrate; prepared by slowly adding glycerin to a cold mixture of concentrated sulphuric (4 parts) and nitric (1 part) acids. N. is an oil, Sp. Gr. 1·6; very explosive, especially when impure; mixed with **kieselguhr**, a siliceous earth, to make dynamite; a constituent of cordite (smokeless powder).

NITZSCH, KARL IMMANUEL (1787–1868), Ger. Lutheran theologian; s. of K. L. Nitzsch (*q.v.*); prof. at Wittenberg (1817), Bonn (1822), Berlin (1847).

NITZSCH, KARL LUDWIG (1751–1831), Ger. Prot. theologian; f. of above; prof. at Wittenberg, 1790; opposed rationalism.

NIU-CHWANG (40° 52′ N., 122° 5′ E.), town, Manchuria, China; one of Treaty ports, opened 1858; exports beans, silk, skins, etc. Pop. (1910) 61,000.

NIUÉ (19° 10′ S., 169° 50′ W.), coral island, S. Pacific.

NIVELLES (50° 36′ N., 4° 19′ E.), town, on Thines, Brabant, Belgium; carriages, paper. Pop. 12,500.

NIZAMI, Nizȃ-muddîn Abu Muhammad Ilyȃs bin Yûsuf (1141–1203), Pers. poet; of a very religious temperament, he spent the greater portion of his life in solitude and meditation. His first poem, *Makhzanul Asrâr*, was speculative and didactic, but his poetic genius was best adapted to epic, as the publication of his great poem, *Khosrau and Shirin*, proved. This was followed by the epics *Laila and Majnûn*, and *Iskandarnâma* (an epic on the career of Alexander the Great). His last work, *Hâft Paikar*, or *Seven Beauties*, is a romance.

NIZAM'S DOMINIONS, Hyderabad (*q.v.*).

NIZHNE-TAGILSK (58° N., 60° 20′ E.), town, Perm, Russia; steel- and iron-works. Pop. (1910) 33,000.

NIZHNE-UDINSK (55° 50′ N., 99° 18′ E.), town, Irkutsk, Russia; centre for gold mines. Pop. 6500.

NIZHNIG-NOVGOROD, Nijni-Novgorod (*c.* 56° N., 44° E.), government, European Russia; area, 19,789 sq. miles; large area forested; watered by Volga and other rivers; produces timber, fruits, cereals; manufactures iron goods, etc. Pop. (1910) 1,999,300.

NIZHNIY-NOVGOROD (56° 18′ N., 44° 2′ E.), town, Russia; important commercial centre; capital of government of same name, and seat of celebrated fairs; situated at junction of Oka and Volga Rivers. City consists of Upper Town, with *Kremlin* (begun XIV. cent.), situated on hills; Lower Town, along banks of Oka and Volga; and Fair Town, between two rivers. N.-N. possesses many ecclesiastical buildings and several educational institutions. City owes its importance to growth of manufactures and traffic along rivers, and fairs, which attract merchants from all parts; chief industries — flour-mills, distilleries, potteries, machinery-works, and shipbuilding. Pop. (1910) 103,860.

NOAH, in *Genesis*, patriarch who survived Flood, and from whom, according to Biblical account, the human race descends. (Etymology uncertain.)

NOAILLES, Fr. noble family, drawing title from lordship of N., near Beauvais. With Antoine, noted admiral of XVI. cent., and his bro's François and Gilles, ambassadors, family attained prominence; great generals of XVII. and XVIII. cent's.

NOAKHALI (22° 48′ N., 91° 8′ E.), district, Bengal, India. Pop. 1,155,000. Chief town, Noakhali. Pop. 7200.

NOBEL, ALFRED BERNHARD (1833–96), Swed. chemist; invented dynamite, blasting gelatine, and smokeless powders; established international prizes (value *c.* £8000 each) for those distinguished in science, lit., and peace, awarded annually since 1901 by Swed. Academy of Science, Stockholm Faculty of Medicine, Swed. Academy of Literature, and Committee of Norweg. Storthing.

NOBILITY, see under Classes of Society.

NOBLE, gold coin of value 6s. 8d., issued by Edward III.; rose to value 10s. in Edward IV.'s reign, and was superseded by the *Angel* (*q.v.*).

NOBLE, SIR ANDREW (1832–), Scot. physicist; b. Greenock; ed. Edinburgh and Woolwich; carried out important researches which revolutionised artillery armaments; cr. bart., 1902.

NOBLESVILLE (40° N., 86° W.), city, Indiana, on White River; natural gas region; iron foundries. Pop. (1910) 5073.

NO-BODY CRABS, see under Malacostraca.

NOCERA INFERIORE (40° 45′ N., 14° 38′ E.), town, ancient *Nuceria Alfaterna*, on Sarno, Salerno, Italy; bp.'s see; textiles. Pop. 29,000.

NOCERA UMBRA (43° N., 12° 46′ E.), town, ancient *Nuceria Camellaria*, Perugia, Italy; cathedral. Pop. 8500.

NOCTILUCA, see under Flagellata.

NODDIES, see under Gull Family.

NODIER, CHARLES (1780–1844), Fr. author, writer of novels, tales, history, poetry, criticism, and philology, but more important as influence on the Romantics than for personal output; pioneer in study of Romantic subjects.

NOÉ, AMÉDÉE DE (1819–84), Fr. caricaturist, under pseudonym 'Cham.'

NOETUS (III. cent.), Christian priest of Smyrna; held Patripassian views of person of Christ.

NOGARET, GUILLAUME DE (d. 1313), Fr. statesman; advised, organised, and carried out capture of Pope Boniface VIII., 1303; pope liberated by Romans, but successor forced to absolve N.; active in securing suppression of Templars, 1307, and trial of bp. of Troyes, 1308-13.

NOGENT-LE-ROTROU (48° 19′ N., 0° 48′ E.), town, on Huisne, Eure-et-Loir, France; castle which belonged to Sully. Pop. 8500.

NOGENT-SUR-MARNE (48° 45′ N., 2° 25′ E.), town, on Marne, Seine, France. Pop. 12,100.

NOGENT-SUR-SEINE (48° 29′ N., 3° 30′ E.), town, on Seine, Aube, France. Pop. 4000.

NOIRMOUTIER (47° N., 2° 15′ W.), island, in Bay of Biscay, belonging to Vendée, France. Pop. 6500.

NOLA (40° 54′ N., 14° 32′ E.), town, Caserta, Italy; seat of bishopric, has Gothic cathedral; captured by Romans during Samnite Wars, 313 B.C. Pop. 15,000.

NOLI (44° 13′ N., 8° 20′ E.), small town, Genoa, Italy, on Gulf of Genoa.

NOMARTHRA, sub-order of Edentates (*q.v.*).

NOME (64° 30′ N., 166° W.), town, on Seward Peninsula, Alaska; goldfields. Pop. (1910) 2600.

NOMENTUM, modern Mentana (42° 3′ N., 12° 38′ E.), ancient town, Italy.

NOMINALISM, theory that universal terms such as *man, town, plant* are mere names, and that the things they denote have no real existence; in scholastic philosophy of Middle Ages opposed to Realism (*q.v.*).

NONCONFORMIST, 'one who does not conform'; generally used in England of those Protestants who do not conform to the Church of England. See Free Churches.

NONCONFORMITY, LAW RELATING TO, differs from that of Church of England, *e.g.* the marriage law; Nonconformist ministers share with Anglicans certain exemptions, *e.g.* serving on juries; cannot take Oxford or Cambridge divinity degree.

NON-COMMISSIONED OFFICERS, see Officers.

NON-JURORS, holders of public offices—mostly Church of England clergymen—who declined to take the oath of allegiance to William and Mary in 1688, because they held that James II. was king by lawful and divine right.

Overton, *The Non-Jurors* (1902).

NORA (39° N., 9° E.), ancient town, Sardinia.

NORBA, Norma (41° 40′ N., 13° E.), ancient town, Latium, Italy; modern Norma.

NORBERTINES, see Premonstratensians.

NORCIA (42° 48′ N., 13° 4′ E.), town, Perugia, Italy; ancient *Nursia*; woollens; birthplace of St. Benedict. Pop. 10,000.

NORD (50° 30′ N., 3° 20′ E.), department, northern

France; between Belgium and North Sea; area, 2193 sq. miles; chief rivers, Scheldt, Scarpe, Oise, Sambre, Lys; capital, Lille; soil fertile; extensive coal mines; iron, steel, and other manufactures. Pop. (1911) 1,961,780.

NORDAU, MAX SIMON (1849-), Ger. physician and critic; famous for theory of decadence of modern art.

NORDEN (53° 36′ N., 7° 13′ E.), town, Hanover, Prussia; sugar, tobacco. Pop. (1910) 6891.

NORDEN, JOHN (1548–1625), Eng. topographer; originator of county guides. His first work, *Speculum Britanniæ: Middlesex*, was followed by other parts.

NORDENSKIÖLD, NILS ADOLF ERIK, BARON (1832–1901), Swed. geographer and Arctic explorer; b. at Helsingfors, Finland. In the *Vega* he achieved the navigation of the North-East Passage.

NORDERNEY (53° 43′ N., 7° 11′ E.), small island, North Sea, off coast of E. Friesland; belongs to Hanover, Prussia; sea-bathing resort. Pop. (1910) 4261.

NORDFJORD (61° 58′ N., 6° E.), inlet, western coast, Norway.

NORDHAUSEN (51° 30′ N., 10° 48′ E.), town, Prussian Saxony; has R.C. cathedral; manufactures beer, spirits, tobacco, leather, etc. Pop. (1910) 32,564.

NORDICA, MADAME, LILIAN DÖME (1859-), Amer. soprano operatic singer; notable success in Europe as well as U.S.A.

NORDIN, CARL GUSTAF (1749–1812), Swed. statesman, bp., and historian; principal adviser of Gustavus III.; collection of MSS. nucleus of *Scriptores rerum Suecicarum medii ævi*.

NÖRDLINGEN (48° 51′ N., 10° 29′ E.), town, Germany; here Imperialists defeated Swedes, 1634, and French defeated Imperialists, 1645. Pop. (1910) 8706.

NORE, THE (51° 28′ N., 0° 48′ E.), sandbank, in estuary of Thames, England; marked by lightship; a Brit. fleet mutinied here, May–June 1797.

NORFOLK (52° 12′ N., 1° E.), county, E. England; bounded on N. and E. by North Sea, S. by Suffolk, W. by Cambridge and Lincoln; area, 2044 sq. miles. Coast is mostly low and flat, with few indentations. Inland are undulating plains, valleys, and woods. In W. is Fen district. *Broads*, lying in E. part of county, are series of lakes joining various rivers. Principal streams are Great and Little Ouse, Yare, Bure, Wensum, Waveney. Soil is fertile; good crops raised; cattle-rearing, fruit-growing, malting, brewing, tanning, and brick-making carried on. Manufactures include boots, shoes, silk, wool, flour, mustard, and agricultural implements. Chief towns are Norwich (county town), Yarmouth, Lynn, Cromer, Wells, and Thetford. There are some interesting old town and village churches; a fine cathedral at Norwich; monastic remains at Walsingham, Bromholm, Binham, and Carrow; notable castles at Castle Rising, Castle Acre, and Norwich; some beautiful houses, Sandringham being among the more modern mansions. Pop. (1911) 321,748.

Norfolk, in Victoria County Histories.

NORFOLK (42° N., 97° 10′ W.), city, Nebraska, U.S.A.; flour-mills. Pop. (1910) 6025.

NORFOLK (36° 50′ N., 76° 23′ W.), town, Virginia, U.S.A.; important railway and canal centre; large fortified harbour; fine public buildings; seat of Prot. bp.; flour, cotton, pea-nuts, etc. Pop. (1910) 67,452.

NORFOLK, EARLDOM AND DUKEDOM OF.—The county of N. was granted by the Conqueror to Ralph de Gael, who was in 1071 termed Earl of Norwich; forfeited, 1074. HUGH LE BIGOD was created Earl of N. by Stephen in or before 1141; his descendant ROGER surrendered remainder of his titles and estates to crown, 1302, and died, 1306. Edward II. granted the earldom in 1312 to his bro. THOMAS, whose granddau. Margaret inherited the earldom, 1375, and was created duchess, 1397, when her grandson and heir, THOMAS MOWBRAY, was created duke. The Mowbrays held earldom and dukedom till death of infant Anne, *c.* 1481; her husband, Richard, Duke of York, was created Duke of N., 1477. Dukedom was revived for John, Lord Howard, grandson of 3rd duke, 1483; his descendant forfeited, 1572, but his heir again received earldom, 1644, and the dukedom was restored to the Howards, 1660.

NORFOLK ISLAND (29° S., 167° 56′ E.), Brit. island, S. Pacific; dependency of New South Wales; formerly a penal settlement; colonised by Pitcairn islanders, 1856.

NORICUM, an ancient province of Rome, lying to S. of Danube; now included in Austria, Carinthia, Styria, and Salzburg.

NORMA, see NORBA.

NORMAL SCHOOLS, training colleges for teachers. See EDUCATION.

NORMAN (35° 10′ N., 97° 30′ W.), city, Oklahoma, U.S.A.; seat of state univ.; flour and cotton-seed oil. Pop. (1910) 3724.

NORMAN CONQUEST, see ENGLAND (History).

NORMAN, SIR HENRY WYLIE (1826–1904), Anglo-Indian field-marshal; performed brave rescue in second Sikh War, 1844; distinguished in Mutiny; gov. of Jamaica, 1883; Queensland, 1888; field-marshal, 1902.

NORMANDY (49° N., 0°), old province of France, between Brittany and Fr. Flanders; N. and W. coasts washed by Eng. Channel; now comprises the five departments, Seine-Inférieure, Eure, Calvados, Manche, and Orne; total area, 10,500 sq. miles. Normandy has fine pasture-land and orchards, picturesque and varied coast scenery; chief river, Seine; principal towns, Rouen (capital), Evreux, Caen, Alençon, Le Havre, Dieppe, Honfleur, Harfleur, Cherbourg on coast; numerous bathing resorts. Country was invaded and conquered by Northmen, IX. cent., who definitely settled, 911, when Fr. king, Charles the Simple, granted the land thereafter called N., Rollo the viking chief doing homage as first Duke of N.; united with England after Norman Conquest, 1066; passed to France, 1204; retaken by England, 1346, 1417; English finally defeated, 1450. Normandy has given France many of her greatest men. Chief industries are lace, textiles, carpets, machinery, ship-building, leather goods, hardware, stained glass, cider-making; famous liqueur Benedictine made at Fécamp; agriculture, cattle- and horse-rearing. See NORMANS, VIKINGS.

Palgrave, *History of N.* (4 vols., 1878); Scudamore, *Normandy* (1906); Macquoid, *Through Normandy*.

NORMANS, Scandinavians who emigrated in X. cent. from Norway, etc., to Gaul, and became absorbed in Romano-Gallic population of N.E. France, forming duchy of *Normandy* in Fr. kingdom. This branch of 'Northmen' also colonised Britain, Sicily, and S. Italy in XI. cent. Their first recorded appearance on Fr. coast was in V. cent. Invasions increased in number, but remained mere piratical attacks. Defeated by the Frankish ruler, Théodebert, 530, the Northmen for a time came more rarely. The pirate Adroald marked the coming era of settlement by establishing himself at Saint-Omer. Charlemagne kept them in awe, but after his death they appeared in the Seine and made a settlement in Île de Noirmoutier. Yearly invasions and pillagings followed, Paris being terrorised, 845 and 885, and numerous towns burned and battles fought. Although bribed to depart, they soon returned in larger numbers. Charles the Simple granted part of Neustria, the subsequent NORMANDY, to the viking, Rolf the Ganger, 911, on condition that he became Christian and prevented any further invasions by the Seine. Rouen became capital of the new fief, now a settled colony.

The Normans adopted Fr. tongue and customs, became the foremost people of France and pioneers in all new movements, religious or artistic—witness their famous arch. and *chansons de geste*, and Bec Abbey, the great centre of civilisation. They showed themselves the most energetic people of Europe, and made many conquests outside France. Ralph de Toni assisted the Italians against the Byzantine emperor, 1017, and other Norman nobles began to settle in Italy. Apulia was conquered, 1041–42. Celebrated Robert Guiscard (*q.v.*)

became Duke of Apulia and Calabria, 1059. His bro. Roger conquered Sicily, 1060–1101. Roger's son united Sicily and Apulia in Norman kingdom of Naples or Sicily. England was conquered by William, Duke of Normandy, 1066. See ENGLAND (History), NORMANDY, NAPLES, SICILY, VIKINGS.

Johnson, *The Normans in Europe*; Jewett, *The Normans*.

NORMANTON.—(1) (53° 42′ N., 1° 25′ W.) town, on Calder, Yorkshire, England; coal mines. Pop. (1911) 15,033. (2) (17° 38′ S., 141° 25′ E.) town, river port, on Norman, Queensland, Australia.

NORONHA, FERNANDO DE, see FERNANDO DE NORONHA.

NORRIS, JOHN (1657–1711), Eng. philosopher and divine. Educated at Winchester and Oxford, he was nevertheless closely related to the Cambridge Platonists, especially to Henry More. He was much influenced also by Malebranche.

NORRISTOWN (40° 6′ N., 75° 23′ W.), town, on Schuylkill, Pennsylvania, U.S.A.; cottons, woollens. Pop. (1910) 27,875.

NORRKÖPING (58° 35′ N., 16° 10′ E.), city, on Motala, Östergötland, Sweden; cotton goods; burned by Russians, 1819. Pop. (1911) 46,629.

NORTH ADAMS (42° 41′ N., 73° 8′ W.), city, on Hoosac, Massachusetts, U.S.A.; boots and shoes. Pop. (1910) 22,109.

NORTH AMERICA, see AMERICA, UNITED STATES, CANADA, NEWFOUNDLAND, ALASKA.

NORTH BERWICK (56° 3′ N., 2° 43′ W.), watering-place, Haddingtonshire, Scotland, on Firth of Forth; well-known golf-links; near it are Berwick Law (612 ft.), Tantallon Castle, and Bass Rock. Pop. (1911) 3247.

NORTH BRABANT, see BRABANT.

NORTH CAPE (71° 10′ N., 25° 45′ E.), promontory, Norway, on island of Magerö; most northerly point of Europe.

NORTH CAROLINA, see CAROLINA.

NORTH, CHRISTOPHER, see WILSON, JOHN.

NORTH DAKOTA, see DAKOTA.

NORTH HOLLAND (52° 35′ N., 4° 50′ E.), province of Netherlands between North Sea and Zuider Zee; area, 1070 sq. miles; it includes the islands Texel, Vlieland, Terschelling, Marken, Wieringen, and Urk; chief towns, Amsterdam and Haarlem; cattle-rearing, cheese-making, chief industries. Pop. 1,140,000.

NORTH ISLAND, see NEW ZEALAND.

NORTH, MARIANNE (1830–90), Eng. botanist; travelled all round the world painting flora.

NORTH SEA, GERMAN OCEAN (56° 30′ N., 3° E.), part of Atlantic between Great Britain, Belgium, Holland, Germany, Denmark, and Norway; length, 700 miles; breadth, 420 miles; area, 190,000 sq. miles; greatest depth off Norwegian coast, 440 fathoms; bed crossed by large banks (Dogger, Jutland, etc.); communicates with Baltic through Skager Rack and Cattegat; with Atlantic through Strait of Dover, Eng. Channel, etc.; receives Rhine, Elbe, Thames, Forth, Tay, Tweed, etc.; extensive fisheries. See OCEANOGRAPHY.

NORTH SEA CONVENTION, 1882, agreement between Britain, Belgium, Denmark, France, Germany, and Holland for allocating respective rights of fishery in North Sea, and also for establishing police regulations.

NORTH SHIELDS (55° N., 1° 26′ W.), seaport, on Tyne, Northumberland, England; ironworks; shipbuilding yards; incorporated with TYNEMOUTH (*q.v.*).

NORTH, SIR DUDLEY (1641–91), Eng. financier; made large fortune; commissioner for customs, 1683; removed to treasury and managed finances with great ability till Revolution.

NORTH SYDNEY, residential suburb, Sydney, New South Wales, on N. shore of Port Jackson. Pop. 23,000.

NORTH TONAWANDA (43° N., 78° 50′ W.), city, on Niagara River, New York State, U.S.A.; lumber-mills. Pop. (1910) 11,955.

NORTH WALSHAM (52° 19′ N., 1° 23′ E.), market town, Norfolk, England. Pop. (1911) 4254.

NORTHALLERTON (54° 21′ N., 1° 26′ W.), town, Yorkshire, England; centre of bp. of Durham's liberty in N. Riding from Domesday times; near by was fought *Battle of the Standard*, 1138. Pop. (1911) 4806.

NORTHAMPTON (42° 14′ N., 72° 39′ W.), town, Massachusetts, U.S.A.; manufactures paper, silks, cottons, woollens, sewing machines, cutlery; many educational and philanthropic establishments. Pop. (1910) 19,431.

NORTHAMPTON (52° 15′ N., 0° 54′ W.), municipal, parliamentary, and county borough in Northamptonshire, England, on river Nene; of great historic interest; contains All Saints' and St. Sepulchre's Churches and an Eleanor cross; seat of leather manufactures; other industries—tanning, brewing, and iron-founding. Pop. (1911) 90,076.

NORTHAMPTON, EARLDOM AND MARQUESSATE OF.—Saxon Waltheof was created, or confirmed as, earl, 1072, his son-in-law, Simon Senlis, *c.* 1080. The SENLISES held earldom till 1184, the BOHUNS, 1337–73. WILLIAM PARR, bro. of last queen of Henry VIII., was created Marquess of N., 1547, attainted, 1553, but again created marquess, 1559; d. childless. HENRY HOWARD, cr. earl, 1604; d. childless, 1614. WILLIAM, LORD COMPTON, was created earl, 1618, and title has since descended in that family, together with marquessate granted to Charles, 16th earl, 1812.

NORTHAMPTONSHIRE (52° 15′ N., 1° W.), midland county, England; bounded by Lincoln, Rutland, Leicester, Warwick, Oxford, Bucks, Bedford, Huntingdon, and Cambridge; area, 909 sq. miles. Surface is undulating; highest ground near Daventry; some parts richly wooded and well cultivated, finest scenery being in W. and S.W. N.E. forms part of Fen district. Chief rivers are Nene, Welland, Avon, Cherwell, Leam, and Ouse. Wheat and barley are principal crops raised; good pasturage where stock-raising is carried on. Iron is found; main industry, manufacture of boots and shoes. Chief towns are Northampton (county town), Peterborough, Kettering, and Wellingborough. At Peterborough is fine cathedral; interesting churches to be found at Earls Barton, Brigstock, Brixworth, Irthlingborough, and elsewhere; remains of several castles, including those of Fotheringay and Barnwell; some beautiful mansions and ancient crosses. Pop. (1911) 213,754.

Northamptonshire, in Victoria County Histories.

NORTHBROOK, THOMAS GEORGE BARING, 1ST EARL OF (1826–1904), Brit. statesman; held various offices under Liberal governments, 1857–72; gov.-gen. of India, 1872–76; first lord of Admiralty, 1880–85; commissioner to Egypt, 1884.

NORTHCLIFFE, ALFRED CHARLES WILLIAM HARMSWORTH, 1ST BARON (1865–), newspaper proprietor; founded *Answers* (1888), *Daily Mail* (1906); chief proprietor of numerous daily and weekly newspapers; has encouraged aviation by offering enormous prizes.

NORTHCOTE, SIR STAFFORD, see IDLESLEIGH, EARL OF.

NORTHEIM (51° 45′ N., 10° 4′ E.), town, on Ruhme, Hanover, Prussia: tobacco. Pop. (1910) 8625.

NORTHFIELD.—(1) (44° 28 N., 93° 7′ W.) city, Minnesota, U.S.A., on Cannon: manufactures lumber. Pop. (1910) 3265. (2) (44° 10′ N., 72° 38′ W.) town, Vermont, U.S.A.; seat Norwich Univ.; furniture; woollens. Pop. (1910) 1918.

NORTHFLEET (51° 26′ N., 0° 21′ E.), urban district, Kent, England; chemical works. Pop. (1911) 14,184.

NORTHINGTON, ROBERT HENLEY, 1ST EARL OF (*c.* 1708–72), Lord Keeper (last so designated), 1757–61; Lord Chancellor, 1761–66; cr. earl, 1764; pres. of Council, 1766–67.

NORTHMEN, see VIKINGS.

NORTHUMBERLAND (55° 15′ N., 2° W.), northernmost county, England; bounded on N. by

Berwick and Roxburgh, W. by Cumberland, S. by Durham, and E. by North Sea; area, 2000 sq. miles. Shores are generally low; off coast lie Holy Isle or Lindisfarne, Farne Islands, and Coquet Island. Inland surface is mostly rugged and broken, with undulating hills and moors, rising highest on borders of Scotland and Cumberland; highest point, Choviot (2676 ft.). County is well watered by Tweed, Till, Aln, Coquet, Wansbeck, Blyth, and Tyne; valleys fertile and well wooded. Northumberland is one of chief sheep-rearing counties in England; cattle-raising also carried on; chief crops, barley and wheat; important coast and river fisheries; of great industrial importance, coal being chief product. Tyne is centre of manufactures and has enormous shipping trade; principal industries along its banks are shipbuilding, iron-works, alkali-works, manufacture of machines, tools, glass, and pottery; in other parts of county are brick- and tile-works, potteries, and cloth-mills. Chief towns are Newcastle, Tynemouth, N. Shields, Alnwick, Hexham, and Morpeth.

In VI. cent. Northumberland formed part of Bernicia; later joined with Deira and called *Northumbria*; from Norman Conquest to XVII. cent. scene of many struggles with Scots; contains battlefields of *Otterburn, Homildon Hill,* and *Flodden.* There are imposing castles at Bamborough, Alnwick, Norham, Dunstanburgh, and Warkworth; fine ecclesiastical remains at Lindisfarne, Hexham, Alnwick, and Newminster. Pop. (1911) 371,521.

Northumberland, in Victoria County Histories.

NORTHUMBERLAND, EARLDOM AND DUKEDOM OF.—*Comes Northumbrensis* occurs, 1100, and various people were called earls in XII. cent.; but there seems to have been no earldom in modern sense till 1377. Earldom was held by great house of Percy (*q.v.*), 1377 till (with exception of periods of attainder) 1670, and by descendants on female side since; dukedom created for 2nd house of Percy (Smithson), 1766.

NORTHUMBERLAND, DUKE OF, JOHN DUDLEY, VISCOUNT LISLE, EARL OF WARWICK (*c.* 1502–53), Eng. statesman; member of council of regency for Edward VI.; cr. Earl of Warwick, 1547; overthrew protectorate of Somerset, 1549; became chief power in realm and obtained dukedom of N. 1551; misgoverned; married his son, Lord Guilford Dudley, to Lady Jane Grey and induced king to settle crown on latter; defeated by Mary, and executed.

NORTHUMBRIA, most northerly and one of most important of Old English kingdoms, stretching from Humber on S. to Firth of Forth on N., and bounded on W. by Cumbria and Strathclyde; consisted of former kingdoms of Bernicia and Deira; Bernicia said to have been founded by Ida, *c.* 547; first known king of Deira, Ella; two kingdoms united under Ethelfrith, end of VI. and beginning of VII. cent's; Christianised under Edwin in VII. cent. Northumbria declined through internal troubles and invasions, and in 827 became tributary to Egbert, king of Wessex.

NORTH-WEST FRONTIER PROVINCE (33° N., 72° E.), province in Brit. India, constituted in 1901; consists of districts of Peshawar, Kohat, Bannu, and Dera Ismail Khan, formerly comprised in Punjab; Hazara district; agencies of Malakand (Dir, Swat, Chitral), Khyber, Kurram, Tochi, and Wana; area, *c.* 38,700 sq. miles; capital, Peshawar. Region is mostly mountainous, Hindu Kush forming northern boundary; highest summits are Tirach Mir (25,400 ft.) and Kachan (22,600 ft.). River valleys and district of Peshawar are most fertile and cultivated parts. Principal rivers are Indus, Kabul, Kurram, and Kunhar. Administration is in hands of commissioner and agent to Gov.-Gen. Leading occupation is agriculture; chief crops—maize, rice, wheat, barley, sugar-cane, grain, tobacco, and cotton. Inhabitants, *c.* 2,250,000, are mostly Pathans.

NORTH-WEST PASSAGE, see POLAR REGIONS, GEOGRAPHY.

NORTH-WEST TERRITORIES, division of Canada; area, *c.* 1,200,000 sq. miles; long administered by Hudson's Bay Co. (*q.v.*); bought by Dominion, 1869; out of it were carved provinces of Manitoba (1870), Alberta (1905), Saskatchewan (1905); part of Keewatin district divided between Ontario and Manitoba, and Ungava incorporated in Quebec (1912). N.W. Territories now comprise undeveloped regions of Canada north of 60° N. (except Yukon), viz. Mackenzie, Franklin, and remnant of Keewatin; governed by commissioner and council of four; inhabited by Indians, Eskimos, and a few white fur-traders.

NORTH-WESTERN PROVINCES, see UNITED PROVINCES OF AGRA AND OUDH.

NORTHWICH (53° 16′ N., 2° 31′ W.), market town, Cheshire, England, at junction of Weaver and Dane; salt-mines, chemical works. Pop. (1911) 18,151.

NORTON, THE HON. MRS. CAROLINE SHERIDAN (1808–77), Eng. writer; granddaughter of R. B. Sheridan; prototype of *Diana of the Crossways*; married unhappily to Hon. G. C. Norton (1827), from whom she separated; married Sir W. Stirling-Maxwell, 1877. Her best novels are *Stuart of Dunleath* (1847), *Old Sir Douglas* (1868); poems include *The Sorrows of Rosalie* (1829), *The Child of the Islands* (1845), *The Lady of La Garaye* (1862).

NORWALK.—(1) 41° 6′ N., 73° 26′ W.) city, on Norwalk, Connecticut, U.S.A.; woollen goods. Pop. (1910) 6954. (2) (41° 15′ N., 82° 40′ W.) city, Ohio, U.S.A.; iron and steel manufactures; pianos. Pop. (1910) 7858.

NORWAY (58° to 71° 11′ N., 5° to 31° E.), kingdom situated in extreme N.W. of Europe; bounded N. by Arctic Ocean, N.E. by Russ. Lapland and Sweden, S. by North Sea, Skager Rack, and Cattegat, and N.W. by Arctic and Atlantic Oceans; extreme length, *c.* 1150 miles; width varies from 20 to 260 miles; area, 124,445 miles.

Physical Features.—The seaboard is fringed by chains of islands which render it, in many cases, dangerous of access, though they give continuous lines of smooth-water channel inside. It is everywhere indented by the long, narrow, winding inlets, often with sides rising sheer from the sea, known as *fjords*; this broken character gives the country a long coast-line of over 3000 miles, and the deep fjords furnish many convenient harbours. The islands — Kvalö, Tromsö, the Lofodens, and the Vigtens—contain about 7 % of the total area. The chief fjords, the Varangen, Alten, Trondhjem (80 miles), Molde, Sogne (106), Hardanger (66), Stavanger (50), and Christiania (90), vary in depth from 220 to over 660 fathoms. Except in the S. and S.E., the coast rises steeply from the sea, and the interior plateau slopes up to the mountains that form the boundary all along the S.E., the Kjolens in the N., with a mean height of from 4000 to 6000 ft., and the lower but more widely spread Dovrefjeld in the S., with a mean height of 2000–4000 ft. Several peaks attain to over 7000 ft.; the highest is about 8400. A large number of long, narrow lakes lie in ice-scooped hollows, and there are numerous short, rapid rivers, the longest being the Glommen (350 miles), flowing S. to Christiania Fjord, and the Tanna (175), flowing N. to the Arctic Ocean.

The northerly climate is modified by the Gulf Stream, which washes the whole of the N.W., and the hills afford considerable protection from the N.E. winds; but the cold is severe in the interior, and as the fjords allow the damp winds of the Atlantic to reach the plateau, the snowfall there is greater than it would otherwise be. The rainfall on the coast varies from 40 to 75 in., and in the interior from 12 to 16; the temperature ranges from a winter mean of about 2° in the extreme N. to a summer mean of 63° in the S. Justedal in the S. (4600–5400 ft.) and Svartisen (3600 ft.) in the N. are the largest glaciers; the limit of perpetual snow varies from 3000 to 5000 ft.; nowhere is the coast icebound in winter; the N. part is the 'land of the midnight sun.' Norway is chiefly

composed of Plutonic and Metamorphic rocks, granite being the principal soil; everywhere are marks of the Ice Age. The fauna includes elk, red-deer, wolf, glutton, sheep, grouse of largest varieties, wild-fowl and sea-birds of many kinds, salmon, herring, cod. The fir, oak, ash, birch, elm, hazel, and lime grow in great abundance; hardy fruits, vegetables, and the usual cereals are grown.

History.—Many of the Viking pirates of the VIII. cent. sailed from Norway, which was at that time ruled by many chiefs or kings and divided into several states each with its separate parliament or *Storthing*. HARALD HAARFAGER (860–930) united Norway under his own rule, driving his rivals to carve out new principalities for themselves in the Orkneys, Hebrides, Man, etc. The great OLAF TRYGGVESSON (995–1000) introduced Christianity into Norway, and under OLAF II., 'king and saint' (1016–28), the Norwegians were thoroughly Christianised. Olaf II. was forced to fly before Canute in 1028. His s. MAGNUS was restored in 1035, but reigned only by aid of his uncle HARALD HAARDRAADA (*q.v.*), who succeeded him in 1047 and was slain at *Stamford Bridge* in 1066. His successors were engaged in conflicts with the Church and nobles, until in 1240 HAAKON THE OLD (1217–63) firmly established the power of the Crown. He also conquered Iceland and Greenland. His s. MAGNUS (1263–80), however, surrendered the Hebrides and Isle of Man to Scotland. HAAKON V. (1299–1319), the last male descendant of Harald Haarfager, was succeeded by MAGNUS ERIKSON (1319–43) of Sweden, of the *Folkunger* line, but Norway and Sweden were separated by Magnus's abdication from Norway in favour of his s., HAAKON VI. (1343–80).

The minority of his s., OLAF V. (1380–87), was marked by the rule of Margaret of Denmark, who after Olaf's death made the *Union of Kalmar* (1397), uniting the three kingdoms of Norway, Denmark (*q.v.*), and Sweden. After a vain attempt to throw off the yoke, Norway was forced in 1450 to make a treaty of perpetual union. CHRISTIAN III. (1534–59) made a revolt against his rule the pretext for treating Norway as a subject state, and Dan. language and law gradually superseded Norwegian.

Norway exchanged Denmark for Sweden as a ruler in 1814, when by the Treaty of Kiel Sweden (*q.v.*) received Norway as reward for joining the coalition against Napoleon. A Swed. army terrorised the Storthing into accepting CHARLES XIII. (king, 1814–18), he, however, accepting the new constitution. Throughout the century Norway clamoured for independence, and a strong republican party opposed the autocracy of the king of Sweden. At last the successive efforts of the radical premiers Sverdrup, Steen, and Michelsen resulted in 1905 in the establishing of Norway as a separate kingdom under Prince Charles of Denmark, who became HAAKON VII. In 1907 Britain, Germany, France, and Russia guaranteed the integrity of Norway.



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Literature.—Norwegian is a Scandanavian tongue closely akin to Danish. From the days of the sagas until the XIX. cent. Norweg. literary men wrote in Danish. Wergeland (1808–45) was inspired by the

new patriotism originating in 1814; Welhaven (1807–73) set up a standard of form; Lunstad (1802–80), Asbjörnsen (1812–85), Moe (1813–82), Aasen (1813–96), Janson (1841–), and Garborg (1851–) have done much for the revival of national lit., and other authors of note are the brothers Vrag, Vogt, and Obstfelder (symbolist poets), Hamsun, Kinck, and Bojer; while of European renown are Ibsen (1828–1906), Kjelland (1849–), and Björnson (1832–1910). Norway has produced some distinguished scientists, and the noted polar explorers Nansen and Amundsen.

Government.—The monarchy is constitutional and hereditary in the male line; if the king has no male heir he may suggest a successor, but the decision rests ultimately with the Storthing. The constitution dates from 1814; by it the Crown has the right to veto a bill twice, an appeal to the country being made on each occasion, and if the third Storthing again passes the bill it becomes law. There is a royal Council. All males of 25 and over elect the members, and since 1907 women with certain qualifications of income may vote. The *Storthing* is composed of two houses, the *Lagthing* (upper) and *Odelsthing* (lower). The 20 local districts or *Amts* are governed by an *Amtmand* and have an *Amtsthing*; the *Amts* consist of towns and rural communes. The *Amts* are Akershus, Bergen (town), Bergenhus Nordre, Bergenhus Söndre, Bratsberg, Buskerud, Christiania (town), Christians, Finmarken, Hedemarken, Jarlsberg and Larvik, Lister and Mandal, Nedenes, Nordland, Romsdal, Smaalenene, Stavanger, Tromsö, Trondhjem Nordre, Trondhjem Söndre. The supreme law-court is the *Höiesteret*; in each legal district (*Herred*), of which there are 104, there is a court of first instance, the *Forligelses-kommission*; criminals whose offences involve serious punishment are tried by jury (*Lagmandsret*). Men between 18 and 25 are liable to serve in the army; sailors between 22 and 41 are liable to service in the navy. Education is compulsory from 6 or 7 to 14 years of age. Christiania has a univ. The Established Church is Lutheran. The capital is Christiania; the other important towns are Bergen, Trondhjem, Stavanger, Drammen, Kristiansand, Fredrikstad, Kristiansund, Fredrikshald, Aalesund, Skien, Arendal, and Larvik. There are some 2000 miles of railway, of which over four-fifths belong to the State.

Products and Industries.—The small proportion of the country (3 %) fit for cultivation is along the coasts, especially the south, and in occasional depressions along the fjords or lakes; 75 % is of no value, the rest is under forest. Timber and fisheries constitute the wealth of Norway; 90 % of the farms are under 50 acres. Cattle number over 1,000,000; sheep nearly 1,500,000. Of the forest trees nearly three-quarters are pines; the annual value of the timber export is about £4,500,000—unwrought and sawn timber, wood-pulp, matches, etc. The fisheries are very valuable, the chief being cod and ling; whales, walrus, seals, and sharks are taken in the N. Cod-liver oil is made and exported in large quantities. The minerals—copper, silver, pyrites, felspar, etc.—are not very important. Norway is one of the great carrying countries of Europe. Exports (1911) were over £18,000,000. Imports (1911) exceeded £27,000,000, the chief being, in order of importance, comestibles (including spirits), coal, minerals, manufactured metals and minerals, textiles, yarn, ropes, hair, skins, tallow, furniture, dye-stuffs, and paper. Pop. (1900) 2,240,032; (1910) 2,391,782.

Bain, *Scandinavia* (1905); Boyesen, *Norway* (Story of the Nations, 1900); Daniels, *Home Life in Norway* (1911); Baedeker, *Norway and Sweden*.

NORWEGIAN SEA, part of North Atlantic Ocean between Norway and Greenland, and between Arctic Ocean and about lat. 61° N.

NORWICH.—(1) (52° 38′ N., 1° 15′ E.) city, county, parliamentary and municipal borough and county of itself, in Norfolk, England; beautifully situated on Wensum River; contains fine Norman cathedral, founded 1096; castle, in centre of city, has Norman keep, now used as museum; other interesting buildings are Ethelbert, Erpingham, and Bp. Salmon's Gateways. N. has over forty churches, finest being St. Peter Mancroft's, St. Andrew's, and St. Giles'; chief industries —engineering-works, breweries, tanneries, and brick-works; manufactures include chemicals, starch, and mustard. Pop. (1911) 121,493. (2) (41° 32′ N., 72° 6′ W.) city, Connecticut, U.S.A., on Thames River, at head of navigation; founded 1659, and chartered as city, 1784. Manufactures machinery, firearms, paper, textiles, and cutlery. Pop. (1910) 20,367. (3) (42° 30′ N., 75° 30′ W.) town, New York, U.S.A., on Chenango; ironworks. Pop. (1910) 7422.

NORWOOD.—(1) (39° 10′ N., 84° 25′ W.) residential city, Ohio, U.S.A. Pop. (1910) 16,185. (2) (42° 11′ N., 71° 12′ W.) town, Massachusetts, U.S.A.; printing-works; tanneries. Pop. (1910) 8014. (3) suburb of London, in Surrey; 5½ miles S. of St. Paul's. Pop. 37,000.

NORZAGARAY (14° 40′ N., 125° E.), town, Luzon, Philippine Islands.

NOSAIRIS, people who preserved their independence in the mountains of N. Syria for 500 years; found also in Antioch, Tarsus, and Adana; estimated at from 120,000 to 150,000. Though under Turk. rule since 1832, they have never accepted Islamism (or Christianity), but retain a mystic and mysterious faith.

NOSARI, NAVSARI (20° 54′ N., 73° E.), town, state of Baroda, Bombay, India; cotton-weaving. Pop. 17,000.

NOSE, see OLFACTORY SYSTEM.

NOSOLOGY, the branch of medicine that treats of the classification of diseases.

NOSSEN (51° 5′ N., 13° 18′ E.), town, on Mulde, Saxony, Germany. Pop. (1910) 5104.

NOSSI-BÉ (13° S., 48° E.), island, off N.W. coast of Madagascar, of which it is a dependency; coffee, sugar-cane; capital, Hellville. Pop. 11,000.

NOSTALGIA, home-sickness, particularly so great as to cause melancholia.

NOTARY, NOTARY PUBLIC, official whose business it is to take notes of matters affecting the public; acts chiefly in commercial transactions, attesting deeds and other documents to make them authentic in foreign countries. In London he must belong to the Scriveners' Co.

NOTO (36° 54′ N., 15° 4′ E.), town, Syracuse, Sicily; trade in oil, wine. Pop. 24,000.

NOTTINGHAM (52° 57′ N., 1° 8′ W.), city, county of city, municipal, parliamentary, county borough, on Trent, Nottinghamshire, England; well-built town with wide streets, large market-place, and some fine buildings, most notable being St. Mary's and St. Peter's Churches, R.C. Cathedral, Univ. Coll., town hall, and exchange; Castle now used as art museum; manufactures hosiery, lace, cotton, wool, machinery, and chemicals. Nottingham played a prominent part in Civil War. Pop. (1911) 259,942.

NOTTINGHAM, EARLDOM OF, first held by Mowbrays and descendants (Berkeley, Howards), 1377–1681; by Finch family, 1681 onwards.

NOTTINGHAMSHIRE, NOTTS (*c.* 53° 5′ N., 1° W.), midland county, in Trent basin, England; area, 843 sq. miles; surface level along Trent, elsewhere undulating, rising to *c.* 600 ft.; drained by Trent and its tributaries; crossed by several canals and by leading northern railways; contains Sherwood Forest, traditionally associated with Robin Hood; county town, Nottingham. N. was part of Mercia in Saxon times, and was frequently overrun by Danes; sided with York in Wars of Roses, and with Charles I. in Civil War, which first broke out in this county. N. produces coal, iron, gypsum, limestone; manufactures lace, hosiery. Pop. (1911) 344,135.

Nottinghamshire (Victoria County Histories).

NOÛMENON, the reality underlying phenomena; the thing-in-itself.

NOVA SCOTIA (45° N., 64° W.), maritime province, Canada; most easterly of dominion; connected with New Brunswick by narrow isthmus at end of Bay of Fundy; consists of Nova Scotia proper and Cape Breton Island, separated by Gut of Canso; length, 300 miles, breadth, about 100 miles; area, 21,068 sq. miles. There are numerous excellent harbours; coasts subject to fogs; many rivers and lakes. Surface is hilly, soil fertile. Principal towns are Halifax (capital), Sydney, Glace Bay, Amherst, Yarmouth, Pictou. N. S. was discovered by John Cabot, 1497; named *Acadia* by first Fr. settlers, 1604; claimed by English and renamed Nova Scotia, 1621; finally ceded to Britain, 1713; Cape Breton annexed, 1763; joined the Dominion of Canada, 1867. N. S. has a lieut.-gov., executive council, legislative assembly, and council; Dalhousie and several sectarian univ's; extensive coal mines; iron mined and smelted; gold found; valuable fisheries; timber, fruit, agricultural produce exported. Pop. (1911) 492,338.

Willson, *Nova Scotia* (1911).

NOVALIS, FRIEDRICH VON HARDENBERG (1772–1801), Ger. poet and dramatist; wrote *Heinrich von Ofterdingen* (prose romance), *Geistliche Lieder* (spiritual poetry), etc.

NOVATIAN (III. cent.), Rom. priest; chosen by minority as bp. of Rome, 250; his followers called *Novatians*.

NOVARA (45° 30′ N., 8° 35′ E.), town, N. Italy; seat of bishopric, has cathedral dating in part from V. cent.; here Austrians defeated Sardinians, 1849. Pop. (1911) *c.* 54,600.

NOVAYA ZEMLYA, NOVA ZEMBLA (71° N., 55° E.), two Russ. islands in Arctic Ocean; divided by the narrow channel Matochkin Shar, and separated from Waigatz Island by Kara Strait; length about 600 miles, breadth, 80 miles; area, 35,000 sq. miles. Surface is mountainous; coast-line broken by fjords; flora and fauna arctic; whale, walrus, and seal fisheries; discovered by Willoughby, 1553; explored by Barents, Borough, Count Lütke, Von Baer, Grinevetskiy, Ekstam, etc.

NOVEL, in its modern signification, is a prose narrative of considerable length, having a well-defined plot and showing intimate observation of character and custom. The history of the novel commences in Greece with the name of Xenophon, whose *Cyropædia* is a fictitious narrative of the boyhood of Cyrus, and of which the true motif is an exposition of the author's own views on education. In this little narrative there is also to be found the earliest prose love-story in Greek—the story of the love of Abradates and Pantheia. The Greek romance writers of the Græco-Roman period show considerable dexterity in plot-construction and variety of incident. Characteristic of the school are *The Marvels beyond Thule* of Antonius Diogenes, which relates how the hero, Deinias, met the heroine, Dercyllis, in Thule; and the *Æthiopica* of Heliodorus, in which the priestess Charicleia flies to Egypt with her lover Theagenes. The Latin romance writers borrowed and transcribed from the Greek school. The best Latin romances are the *Golden Ass* of Apuleius and the *Satyricon* of Petronius Arbiter.

During the Middle Ages the romance writers drew their material chiefly from Eastern sources, e.g. *Kalilah and Dimnah*, the *Seven Wise Masters*, and the *Gesta Romanorum*. Among mediæval story-tellers Boccaccio ranks highest; his *Fiammetta*, *Ameto*, and *Decameron* are admirably told. In the XV. cent. the romance cycles, notably the *Arthurian Legends* and the *Chansons de Geste*, opened new vistas to narrative writers. Sir Thomas Malory's *Morte d'Arthur* drew from these sources and is the forerunner of the English novel. In Spain at this time the chivalric romances achieved widespread popularity, till Cervantes' *Don Quixote* ridiculed them out of the field. The pastoral romance also had numerous devotees in Spain and France. In England this type is represented by the *Arcadia* of Sir Philip Sidney. The Spanish 'picaresque' or 'rogue' n. inspired in France Le Sage's *Gil Blas*, and in England Nash's *Unfortunate Traveller*. The type survived in the works of Defoe and Smollett. The domestic n. owes its origin to the epistolary narratives of Samuel Richardson, whose *Pamela* is the true prototype of modern fiction. Richardson's contemporary, Fielding, also contributed much to establish the English novel.

At the beginning of the XIX. cent. Sir Walter Scott introduced the historical n., which has ever since proved irresistible. Mention must also be made of Jane Austen, whose quiet studies of provincial life are inimitable. George Eliot is the inventor of the psychological n., if not of the problem n. Thackeray, Dickens, Kingsley, Hardy, and Meredith are bright stars in the galaxy of XIX. cent. novelists. To-day fiction is the most fertile department of literature, and in theme its resources seem inexhaustible.

NOVELDA (38° 27′ N., 0° 45′ W.), town, Spain.

NOVELLÆ, see JUSTINIAN I.

NOVEMBER (from Lat. *novem*, 'nine,' because ninth month of Rom. year), eleventh month; contains 30 days, one was temporarily added in the Julian era.

NOVGOROD.—(1) (59° N., 34° 30′ E.) government, European Russia; area, 45,770 sq. miles; drained by upper waters of Volga; crossed by several canals; mountainous in S. Pop. (1910) 1,638,500. (2) capital of above, situated on Volkhov River, near Lake Ilmen. On left bank of river is ancient Kremlin, walls of which at one time enclosed many churches and other buildings. Other interesting features are Cathedral of St. Sophia, and many ecclesiastical buildings. N. was formerly independent and of great importance, but in 1570 almost destroyed by Ivan IV. of Moscow and never recovered. Pop. 28,000.

NOVI LIGURE (44° 45′ N., 8° 46′ E.), town, Piedmont, Italy.

NOVIBAZAR, YENIPAZAR (43° 4′ N., 20° 35′ E.), chief town of Sanjak (district) of Novibazar, strip of Turkish territory between Servia and Montenegro; high strategical importance; under Austrian military occupation, 1879-1908; taken by Montenegrins and Servians, 1912. See TURKO-BALKAN WAR. Pop. 10,000; (Sanjak) 170,000.

NOVO-BAYAZET (40° N., 45° E.), town, Erivan, Russian Transcaucasia. Pop. 9000.

NOVOCHERKASSK (47° 27′ N., 40° E.), town, on Don, Russia; cereals, wine. Pop. (1910) 76,480.

NOVOGEORGIEVSK, KRYLOV (49° N., 33° E.), town, Kherson, Russia. Pop. 12,500.

NOVOGEORGIEVSK, MODLIN (52° 26′ N., 20° 47′ E.), first-class fortress, Russian Poland.

NOVOMOSKOVSK (48° 40′ N., 35° 10′ E.), town, on Samara, Ekaterinoslav, Russia. Pop. 14,000.

NOVO-RADOMSK, RADOMSK (51° N., 19° 20′ E.), town, gov. Piotrkov, Russia. Pop. 13,000.

NOVOROSSIYSK (44° 43′ N., 37° 46′ E.), seaport, capital of Chernomorskiy Territory, Russia, on Black Sea; exports cereals. Pop. (1910) 44,230.

NOWANUGGER, NAWANAGAR (*q.v.*).

NOWELL, ALEXANDER (1507–1602), dean of St. Paul's from 1560.

NOWGONG.—(1) (25° N., 79° 30′ E.) town, cantonment, Bundelkhand, Central India. Pop. 12,600 (2) (26° 16′ N., 92° 42′ E.) town, capital of N. district, Assam, India. Pop. 5500; (dist.) 265,000.

NOWSHERA, NAUSHARA (34° N., 72° E.), town, cantonment, N.W. Frontier Province, India. Pop. 10,000.

NOYON (49° 33′ N., 2° 56′ E.), town, Oise, France; has fine Transitional cathedral, dating from XII. cent.; old episcopal palace; Calvin's birthplace. Pop. 7500.

NUBAR PASHA (1825–99), Egyptian statesman; successively sec. to Boghos, Mehemet Ali, Ibrahim Pasha, Abbas Pasha, and Said; organised railway communication between Cairo and Suez; on Said's death, 1863, sent by Ismail Pasha to obtain permission from sultan for completion of Suez Canal and to settle differences with France; Minister of Foreign Affairs, 1866,

abolished separate courts of foreign nations in Egypt for civil actions.

NUBIA, region in N.E. Africa, stretching roughly from Red Sea to Libyan Desert and southward from Egypt, but has no definite limits. Greater part of surface consists of sandy deserts and steppes; productive districts lie mostly in valley of Nile; chief towns, Khartum, Omdurman, Wadi Halfa, and Dongola. Inhabitants are Hamitic people and Arabs. Nubia is included politically in Egypt or Anglo-Egyptian Sudan.

NUBLE (37° S., 72° W.), inland province, Chile, bordering Argentine Republic. Pop. 175,000. Capital, Chillan.

NUCERIA ALFATERNA, see NOCERA INFERIORE.

NUCIFRAGA, a Nutcracker; see under CROW FAMILY.

NUCLEUS, a small central nodule present in each plant and animal cell, and intimately concerned with the phenomena of growth and reproduction. It is composed of many chromatin elements. In some single-celled animals—Protozoa—there are two nuclei: a larger elongated *macro-* or *mega-nucleus*, which stains deeply, and a smaller *micronucleus*, difficult to stain. The latter is more intimately concerned in sexual reproduction than the former. See OVUM.

NUCULA, see under LAMELLIBRANCHIATA.

NUDDEA, see NADIA.

NUDIBRANCH, see under GASTEROPODA.

NUEVA SAN SALVADOR, SANTA TECLA (13° 40′ N., 89° 20′ W.), town, Salvador. Pop. 20,000.

NUEVO LÉON (25° 30′ N., 99° 40′ W.), state, Mexico, on E. slopes of Sierra Madre; chief product, sugar. Pop. (1910) 368,929. Capital, Monterrey.

NUGGINA, NAGINA (*q.v.*).

NUISANCE, in legal parlance, that which is harmful or discomforting to one's neighbours. The Public Health Act (1875) embraced all measures for the removal of n's, and appointed sanitary inspectors. By-laws are made by local authorities. N. may be private, as the presence of anything which would make a neighbour's house unhygienic; or public, as the presence of anything (insanitary sewers, cellars, etc.) dangerous to the community at large. Immoral houses are in the eyes of the law a n. See DISORDERLY HOUSE.

NUJIBABAD, NAJIBABAD (*q.v.*).

NUKHA (41° 10′ N., 47° 10′ E.), town, Elizavetpol, Russian Transcaucasia; silk industries. Pop. 26,000.

NUMA POMPILIUS (715–672 B.C.), traditional second Rom. king; reputed author of innumerable religious institutions and legal reforms.

NUMANTIA (*c.* 41° 45′ N., 2° 30′ W.), ancient town, on Douro, Spain; taken by Romans, 133 B.C., after long heroic defence.

NUMBER.—Starting with the *natural* numbers 1, 2, 3, etc., we can extend our ideas to other kinds of n's. If the process of subtraction is to have unique significance, *i.e.* if $a-b$ is always to have the same meaning, when b is greater than a it becomes necessary to introduce *negative* n's, which may, if integers, be regarded as a continuation of the natural scale backwards through *zero*. Similarly, division of a by b when b is not a factor of a, leads to *fractional* n's; and the process of finding the root of a number leads to *irrational* n's, such as $\sqrt{7}$ or $\sqrt[3]{5}$, which cannot be expressed exactly, but may be obtained to any required degree of accuracy. Again, since all squares, whether of positive or negative n's, are positive, $\sqrt{-a}$ cannot denote any positive or negative quantity; hence it is called *imaginary*. Expressions of the form $a+b\sqrt{-1}$, where a and b are real, are called *complex* quantities.

Theory of numbers is concerned with positive integers, which may be divided into two classes—*prime numbers* and *composite numbers*. A prime can only be divided (without remainder) by itself and unity. Two numbers not both divisible by any number other than unity are said to be prime to one another. The different primes can be found by the 'Sieve of Eratosthenes.' The natural n's from 1 onwards being written in order, take the first prime, 2, and cross out every second number from 2. Next, leaving 3, cross out every third number from 3. The next number left is 5, and leaving this, cross out every fifth number from 5, and so on. The numbers left will all be primes. The number of such primes is infinite, and it can be proved that no rational integral algebraic expression can represent prime numbers only. Several properties of *factors* depend on the theorem that if a number a divides a product bc and is prime to one factor b, it must divide the other factor c. For since a divides bc, every factor of a is found in bc; but since a is prime to b, no factor of a is found in b; therefore all the factors of a are found in c; *i.e.* a is a factor of c. Every composite number can be resolved into prime factors, and this can only be done in one way.

The product of any r consecutive integers is divisible by $\lfloor r$ (see ALGEBRA). Let n be the first of the r numbers; then we have to show that

$$\frac{n(n+1)(n+2)\ \ldots\ (n+r-1)}{\lfloor r}, \text{ or } \frac{\lfloor n+r-1}{\lfloor r \cdot \lfloor n-1}$$

is an integer. The second of these expressions is the number of combinations of $n+r-1$ things r together, and hence must be integral for all values of n and r. Thus the theorem follows: If n is a prime number, the coefficient of every term in the expansion of $(a+b)^n$, except the first and last terms, is divisible by n. This follows from the form of the coefficient and from the last theorem.

FERMAT'S THEOREM.—If n be a prime number, and m any number prime to n, then $m^{n-1}-1$ is divisible by n. For if n is a prime, the coefficient of every term in the expansion of $(a_1+a_2+\ \ldots\ +a_m)^n$, which contains more than one of the letters, is divisible by n. There are m terms each containing only one letter, and the coefficient of each of these terms is 1. Hence, putting $a_1=a_2=\ \ldots\ =1$, we have, if $\mathrm{M}(n)$ denotes a multiple of n—

$$m^n=m+\mathrm{M}(n);\ \text{and}\ \therefore\ m(m^{n-1}-1)=\mathrm{M}(n).$$

Hence, if m is prime to n, $(m^{n-1}-1)$ is a multiple of n.

The number of positive numbers less than a given number N and prime to it may be shown to equal

$$\mathrm{N}\left(1-\frac{a}{1}\right)\left(1-\frac{1}{b}\right)\left(1-\frac{1}{c}\right)\ \ldots,\ \text{where}\ \mathrm{N}=a^{\alpha}.b^{\beta}.c^{\gamma}\ \ldots,$$

and a, b, c . . . are the different prime factors of N.

If, when two numbers a and b are divided by a third number c, they leave the same remainder, they are said to be *congruent* with respect to the *modulus* c; this is expressed by $a\equiv b\ (\mathrm{mod.}\ c)$, which is called a *congruence*.

Congruences have many properties analogous to equations. Thus, if a congruence of the nth degree in x be satisfied by more than n values of x, which are such that the difference between any two is unity or is prime to the modulus, then the congruence will be satisfied for all integral values of x, and the coefficients of all the different powers of x will be multiples of the modulus. If a and b are prime to one another, the numbers a, $2a$, $3a$, . . . $(b-1)a$ all leave different remainders when divided by b. From this a simple proof of Fermat's theorem follows.

WILSON'S THEOREM.—If n be a prime number, $1+\lfloor n-1$ will be divisible by n. This can be deduced from the previous theorem, and is important, since it expresses a distinctive property of prime numbers. *Lagrange's theorem*, that if p be a prime number, the sum of all the products r together of the numbers 1, 2, 3 . . . $(p-1)$, is divisible by p, r being any integer not greater than $(p-2)$, may be proved by the congruence theorem previously stated.

P. Bachmann, *Zahlentheorie*; H. J. S. Smith, *Brit. Ass. Report on Theory of Numbers*, 1859–63, 1865.

NUMBERS, Book of, in Old Testament, fourth of the Mosaic books; like *Exodus*, is compounded of the combined Jahvistic and Elohistic narrative, JE, with the Priestly Code P, and contains the story of the Israelites from the second to the fortieth years of the Exodus. Chaps. 1–10[28] are all from P, and describe the camp and the functions of the Levites. The dual structure of N. is shown in 13–14, where there is plainly a twofold story of the spies, and again in 16–17—Korah's revolt—the combination is obvious; 26–36 are all from P, except part of 32.

See Gray, in 'International Critical Commentary.'

NUMBERS, PARTITION OF, theory originated by Euler. In it we regard numbers as made up by addition of parts. Thus partitions of 4 are 31, 22, 211, 1111. *Classes of Partitions*: (i) into given number of parts, or (ii.) not more than given number of parts; (iii.) into given parts, with or without repetitions. Partitions are obtained from 'partition functions.'

NUMENIUS, see under Plover Family.

NUMERAL, symbol or figure used to represent number. Earliest n's appear to have been hieroglyphical, as with the Egyptians, but were of little arithmetical value. Chaldeans, Hebrews, and Greeks used letters of alphabet for figures, first 9 letters denoting units, second 9 tens, 4 others with 5 accented ones hundreds, and so on. Greeks continued this notation to tens of thousands, and taking M as 10,000, by combinations with other numerals could reach 100,000,000. Roman numerals (still used) were I, II, III, IIII, V (5), X (10), L (50), C, later C (100), Io later D (500), M or cIo (1000), and so on. Some of these are derived from others; thus V is half of X, L half of C. N's used now are of Indian origin, and it was not until adoption of this decimal system that arithmetic made any great progress.

NUMIDIA, ancient North African state, between Rom. province of Africa and north-west state of Mauretania, where modern Algeria lies; named after its nomad population; divided into tribes of Massyli (Eastern) and Massæsyli (Western); cavalry important in Punic Wars; became Roman province, 46. See Algeria.

NUMISMATICS is the science which deals with coins and medals. The most rudimentary system of exchange is the barter system, by which any kind of property is used for the purchase of the required commodity. At a later stage a fixed metallic weight becomes the unit of exchange. Thus Abraham gave to Ephron four hundred pieces of silver, 'current with the merchant.' The use of metals as weights, however, is to be distinguished carefully from the coinage system, by which the pieces of metal are stamped with an official impress guaranteeing just weight and value. The invention of such a stamp is attributed to the Lydians. The gold used by the Lydians was derived from Mt. Tmolus and the Sands of Pactolus. It was not pure, but an alloy of gold and silver known as *electrum*. The early Lydian coins were bean-shaped ingots; the obverse was plain, while the reverse bore incuse sinkings. The earliest Lydian coins have been attributed to Gyges, who flourished in the VIII. cent. B.C., but probably the coinage was invented at a much earlier date. Later Lydian coins show on the obverse a lion's head, and on the reverse incuse depressions.

Croesus (568–554 B.C.) substituted a currency of pure gold and pure silver for the primitive electrum. His 'stater' bears on the obverse the fore-quarters of a bull and a lion, and on the reverse a double incuse. Darius (522–485 B.C.) founded the Persian coinage. His gold stater, called the Daric, was current in the Ionian states and the Ægean Islands; it shows on the obverse the figure of the king kneeling, and holding in his right hand a spear and in his left hand a bow. Trade between Greece and Asia Minor made the Lydian coinage familiar on the mainland. The introduction of the coinage system into Greece is assigned to Pheidon, tyrant of Argos, who flourished about 750 B.C. His coins bear the impress of a tortoise, an animal sacred to Aphrodite, in whose temple at Ægina the coins were issued. In 590 B.C. Solon first introduced the silver tetradrachm at Athens; on the obverse of the coin is the head of Athena, patron goddess of the city, and on the reverse the owl, a bird associated with the goddess. Towards the close of the Persian wars the Greek coins exhibit great beauty in conception and execution. From 480 B.C. the names of cities and their chief magistrates begin to occur on Greek coins. About this time the Athenian stater was the chief unit of exchange in Greece, but the Corinthian stater, with the figures of Pegasus on the obverse, had a wide circulation.

About 400 B.C. numismatic art in Greece attained its highest excellence. The most general type has the head of a divinity on the obverse, while the reverse has a mythological or agonistic subject. Of this type is the famous Syracusan medallion, which is judged to be the finest example of numismatic art in the world. All the large cities of Greece had at this time independent mints, but the conquests of Philip of Macedon imposed the Macedonian stater on the states of Greece, and the independent mints ceased to coin their individual types. From the time of Alexander the Great the head of the reigning monarch began to take the place of the ideal head of the divinity on the obverse, and the portraiture is distinguished by its uncompromising realism. As historical sidelights, the series of numismatic portraits of the kings of Syria, Macedonia, Egypt, Pontus, Bithynia, and Pergamum are invaluable.

The first Jewish shekel was struck by Simon Maccabæus *c.* 140 B.C. During the Græco-Roman period the Greek states issued bronze coins with representations of various local cults and institutions. Roman coinage never attained to the excellence of the Greek coins issued during the period of the Athenian and Spartan supremacy. About 350 B.C. circular pieces of bronze, a Roman pound in weight, were stamped with the head of Janus on the obverse, and the prow of a ship on the reverse. The Republican silver money bears representations of events connected with the family history of the *Triumviri Monetales*. In the year 2 B.C. Augustus assumed the control of the gold and silver coinage, and during the Empire Roman coins bore on the obverse the head of the emperor or a member of his family, and on the reverse allegorical, historical, or architectural subjects.

Before the coming of the Anglo-Saxons, the Britons had an independent coinage modelled after Phœnician coins introduced by traders. The chief Anglo-Saxon coins are *sceattas*, *styeas*, *heptarchial pennies*, and *ecclesiastical pennies*; but English coins are not characterised by any remarkable artistic merit prior to the currency during the reign of Edward III. The coins of this sovereign first bear the inscription 'Dei Gratia' and the title 'Rex Franciæ.' The gold coins of this period were called *nobles* and *angels*. Henry VII. first coined the sovereign. The coins issued by Cromwell during the Protectorate are exceptionally fine; the obverse bears the laureated bust of the protector, while the reverse bears a crowned shield with the harp and crosses of St. George and St. Andrew. Later British coins exhibit no remarkable artistic merit.

The historical evidence afforded by numismatic research is mainly corroborative, as the information to be derived from the inscriptions is necessarily scant, giving principally the names of cities, sovereigns, and magistrates, and the date of the currency. Greek and Roman coins throw light on obscure mythological problems. From the time of Alexander the Great the numismatic portrait-gallery is of the greatest importance, as there are few extant picture portraits belonging to any period prior to the latter half of the Middle Ages. But it is perhaps to the glyphic art that numis-

matic art is most closely akin, and on which numismatic evidence is most invaluable.

NUMMULITES, a genus of mostly extinct gigantic Foraminifera, found as far back as Carboniferous times; disc-like, and sometimes as large as a half-crown.

NUNCIO, see LEGATE.

NUNCOMAR, see under HASTINGS, WARREN.

NUNDIDROOG, NANDIDRUG (*q.v.*).

NUNEATON (52° 32′ N., 1° 28′ W.), town, Warwickshire, England; ribbons; ironworks. Pop. (1911) 37,083.

NUORO (40° 19′ N., 9° 21′ E.), town, Sassari, Sardinia. Pop. 7300.

NUPE (9° 20′ N., 5° E.), province, Northern Nigeria, formerly a native kingdom. Pop. 155,000. Capital, Bida.

NUREMBERG (49° 27′ N., 11° 5′ E.), city, on Pegnitz, Bavaria (middle Franconia); presents mediæval appearance, with turreted walls, moat, gateways, quaint gabled houses, and narrow streets. Chief features are Lorenzkirche (XIII. cent.), with fine wood-carvings and stained-glass windows, Seebalduskirche (XIV. cent.), Frauenkirche; Kaiserburg (royal palace), Renaissance town-hall, Germanic and other museums; houses of Dürer and Hans Sachs, and numerous artistic fountains. Nuremberg was an imperial free city, XIII. cent.; prominent in lit., art, and commerce in Middle Ages; adopted Protestantism, 1528; annexed to Bavaria, 1806. Chief industries are machinery, chemicals, toys, gold- and silver-leaf, lead pencils, paints, lithography, hardware, motors; important trading centre and large hop-market. Pop. (1910) 333,142.

NURSE, see under SHARKS AND DOG FISHES.

NURSIA, see NORCIA.

NURSING.—In early times, and in the Middle Ages, nursing, like hospitals, was in the hands of the religious orders, and under the management of the clergy; but after the Reformation it became, in Prot. countries, dissociated from religion, and thus declined in esteem, and fell into the hands of menials. The modern development of n. began, again under a religious influence, with the foundation of the *Kaiserwerth Institute* in Prussia in 1836, which was soon followed by similar institutions, not only in Germany, but in England, U.S.A., and other countries, the first in England being the *Institution of Nursing Sisters*, founded in London in 1840 by Mrs. Fry. The organisation of a service of nurses to care for the wounded in the Crimean War by Miss FLORENCE NIGHTINGALE (1820–1910), who was trained at the Kaiserwerth Institute, gave a great impetus to n., and the first training-school for nurses on the lines in vogue to-day was founded with the money subscribed as a national recognition to Miss Nightingale in connection with St. Thomas's Hospital, London, in 1860.

The requisite professional training for n. may be obtained in almost any of the general or special hospitals or the more important poor-law infirmaries, the methods of training being similar in regard to the principles although they differ in detail. *Probationers* entering the hospital must be between 21 (in many hospitals, 23 or 25) and 35 (sometimes 30) years of age, must pass a medical examination, and show that they have reached a sufficient standard of education. The usual salary is £8 to £10 the first year, £15 the second, £20 the third, rising to £30 as *staff* nurse, £40 to £60 as *sister* or head nurse, and from about £100 to £250 as *matron*, in addition, in most cases, to uniform, board, and laundry. There is, however, usually a long waiting list at all the large hospitals of persons desiring to enter as probationers, who may have to wait months or even a year or two to begin their training.

Trained nurses in Britain usually belong to a private society or institution, or to such an association as *Queen Victoria's Jubilee Institute for Nurses*, which provides trained nurses (receiving a salary of £30 to £35 per annum, with uniform, board, and laundry) for the sick poor in their own homes. A nurse in a private institution may receive all the fees she earns, paying a certain sum for the upkeep of the institution, or she may receive a fixed salary of about £20 and a percentage of the fees she earns in addition. The fees charged by private institutions to patients are usually from £2, 2s. to £3, 3s. per week.

NURSINGPUR, NARSINGHPUR (*q.v.*).

NUSHKI (29° 40′ N., 66° E.), chief town, N. district, Baluchistan.

NUT (Bot.), a one-celled fruit with a woody pericarp, the shell, and often partially or wholly enveloped in a cupule formed by the more or less complete fusion of the floral bracts, as in the oak and hazel. Many so-called n's are of considerable commercial importance, but these do not always come within the strict definition given above. Some are the source of oils, *e.g.* palm n. and candle n., whilst others, *e.g.* almond and walnut (both really drupaccous), are edible.

NUTCRACKERS, see under CROW FAMILY.

NUTHATCHES, SITTIDÆ, a family of small tree-climbing passerine birds, with 60 species; found in almost every part of the world, except S. America and the greater part of Africa.

NUTMEG, seed of *Myristica fragrans*, a tree indigenous to Moluccas; fruit, a berry which splits and exposes the central seed, enclosed by a red aril, the 'mace' of commerce. N. is strongly aromatic and used as spice; it yields n. butter and n. oil.

NUTRITION, see PLANTS (PHYSIOLOGY).

NUTTALL, THOMAS (1786–1859), Amer. botanist and ornithologist.

NUWARA ELIYA (6° 59′ N., 80° 47′ E.), town, sanatorium, Ceylon.

NUX VOMICA, drug consisting of the seed of a tree, *Strychnos Nux Vomica*, growing chiefly in India and Farther India; seed is disc-shaped, depressed in centre, grey in colour, and of somewhat silky appearance, and its chief constituents are the alkaloids strychnine (*q.v.*) and brucine; tincture and extracts are used medicinally, chiefly as tonics in dyspepsia and other gastro-intestinal conditions, *e.g.* Nux Vomica Compound.

NYACK (41° 5′ N., 73° 55′ W.), village, on Hudson River, New York State, U.S.A. Pop. (1910) 4619.

NYASA (12° S., 34° 40′ E.), lake, East Central Africa; enclosed by German East Africa, British Central Africa, and Portuguese East Africa; length, 340 miles; breadth, 40 miles; greatest depth, 2315 ft.; area, 10,200 sq. miles; known to Portuguese as *Moravia* in XVII. cent.; first explored by Livingstone, 1859; navigated by steamers and sailing vessels.

NYASALAND, see BRITISH CENTRAL AFRICA.

NYBORG (55° 19′ N., 10° 47′ E.), seaport, island of Fünen, Denmark, on Great Belt; formerly important fortress; Swedes defeated here, 1659. Pop. 8300.

NYCTICEBUS, see LORIS, POTTOS.

NYCTIPITHECUS, see DOUROUCOLIS.

NYEZHIN (51° 8′ N., 32° E.), town, on Oster, Chernigov, Russia. Pop. (1910) 48,500.

NYIREGYHÁZA (47° 58′ N., 21° 40′ E.), town, Hungary; extensive vineyards in vicinity. Pop. (1910) 38,198.

NYKJÖBING (54° 46′ N., 11° 52′ E.), seaport, on island of Falster, Denmark. Pop. 7800.

NYKÖPING (58° 45′ N., 17° 1′ E.), seaport, Södermanland, Sweden, on Baltic; steam-engines, cloth. Pop. 9700.

NYLSTROOM (24° 42′ S., 28° 33′ E.), town, on Nylstroom, Transvaal; gold deposits.

NYMPHÆACEÆ, order of aquatic plants with large floating leaves; examples are Lotus, Water-Lily.

NYMPHS (classical myth.), minor goddesses of nature; associated with streams, mountains, etc.; principal divisions were *Nereïds* (sea n's), *Æseïdes* (grove n's), *Dryades* (forest n's), *Oreades* (mountain n's); frequently confused with ancient Ital. local deities of wood and stream.

O, 15th letter of alphabet; appears in Egyptian hieroglyphics; in classical Greek represented by O (*omicron*=small *o*) and Ω (*omega*=great *o*), which are short and long respectively. In English *o* has several sounds—*ŏ* (as in *not*), *ō* (*note, for*), *ŭ* (*love*), *oo* (*Scone*).

OAHU, see HAWAIIAN ISLANDS.

OAJACA, see OAXACA.

OAK (Quercus), a dicotyledonous genus of trees included in the Cupuliferæ; widely distributed; stem stout and covered with rugged bark; leaves oval, with bluntly sinuate or serrate margins. The male flowers are borne in lax, pendulous inflorescences; female flowers borne in axils of upper leaves, and each surrounded by a cupule, which is usually regarded as having arisen by fusion of the bracteoles. The fruit, or *acorn*, is at first completely enclosed by the cupule, but when mature is only protected by it basally. The Brit. oak, *Quercus robur*, includes two forms: *Quercus sessiliflora*, with stalkless female flowers and growing typically on dry, sandy soils (*e.g.* Sherwood Forest on the bunter sandstone), and *Quercus pedunculata*, with stalked flowers, characterising the clays and loams. Oak wood is still largely used for purposes which require a durable timber, and was formerly extensively used in shipbuilding, whilst the bark is valuable for tanning. Other well-known species of economic value are *Q. suber*, the cork oak, *Q. cerris*, the Turkey oak, *Q. ilex*, the evergreen oak, and *Q. alba*, the Amer. white oak. Oaks attain a great age.

OAKHAM (52° 42′ N., 0° 44′ W.), county town, Rutland, England; remains of ancient castle; boots and shoes. Pop. (1911) 3668.

OAKLAND (37° 50′ N., 122° 15′ W.), city, California, U.S.A., on San Francisco Bay; seat of various collegiate institutions; shipbuilding yards; ironworks; canneries. Pop. (1910) 150,174.

OAMARU (45° 6′ S., 171° 1′ E.), town, S. Island, New Zealand; exports grain, frozen meat. Pop. 5300.

OAR FISHES, see RIBBON FISHES.

OARS differ from paddles in that they are passed through thongs or rowlocks; used as auxiliary to sails or as sole mode of propulsion in classical and mediæval times. Ancient battleships generally possessed three banks of oars or even more; sometimes 40 feet long; replaced by sails, XV. cent., largely owing to introduction of artillery. In the Brit. Navy they vary from 8 to 17 feet, and are made of ash or fir. Wooden thole-pins to secure leverage for oars were replaced by iron rowlocks. Oars are made in various shapes, generally lighter for fresh-water rowing. Tubular oars for racing have been introduced, but are still being experimented with; used by Belgians at Henley, 1906. See ROWING.

OASIS, fertile part in a desert, due to springs, *e.g.* Sahara O.; or artificial artesian wells, *e.g.* in Algeria.

OATES, TITUS (1649-1705), spread abroad tale of Catholic plot to murder Charles II. and massacre Protestants, 1678. O. was pensioned; Catholics executed and queen implicated. On James II.'s accession he was sentenced to flogging and life-imprisonment; released, 1688, and led disreputable life till end.

OATH, solemn declaration invoking the witness of God that the truth shall be spoken. The general legal rule is that evidence in a court of law is not admissible unless it is given on o., or by some form of *affirmation* which the law regards as equivalent to an o. Should a person object to taking the o. on the ground that he has no religious belief, or that the taking of an o. is contrary to his religious belief, he may make a solemn affirmation which has in law the same effect as an o. No particular form of the o. is compulsory. The witness may adopt any form which is binding on his conscience or employ any ceremonies required by his religion. Those professing Christianity usually hold a copy of the New Testament or of the Gospels in the naked right hand, while the following o. is read aloud by the officer of the court: 'The evidence which you shall give between the parties shall be the truth, the whole truth, and nothing but the truth, so help you God.' The old custom of kissing the book has now been abolished. Scot. witnesses usually swear with uplifted hand. Jews are sworn on the Pentateuch with heads covered; Muhammadans on the Koran. Besides the o. of a witness, there is the o. of allegiance to the crown, taken by peers, members of Parliament, soldiers and sailors, and other persons in the service of the crown.

OATS (*Avena sativa*) a gramineous plant much cultivated in Scotland and N. Europe generally for food, being hardier than wheat. The inflorescence is paniculate, with two to six flowered spikelets. O. form an invaluable food for horses, and yield the well-known oatmeal.

OAXACA, OAJACA.—(1) (17° N., 96° 30′ W.) state, S. Mexico; area, 35,382 sq. miles; surface generally mountainous; produces cereals, rubber, coffee, sugar, etc. Pop. (1910) 1,041,035. (2) town, capital of above, on Rio Verde; sugar, cochineal. Pop. (1910) 37,469.

OB, OBI (66° 30′ N., 67° E.), navigable river, W. Siberia, flowing into Gulf of Ob.

OBADIAH, Old Testament book and one of minor prophets. The writer speaks mostly of Edom, and prophesies their destruction at an impending 'day of the Lord,' when they and other nations shall be requited according to their works. The destruction of Jerusalem referred to is that probably of 586 B.C. There are close parallels between O. and *Jeremiah* 49^{7-22}, and probably both drew from a common source.

OBAN (56° 24′ N., 5° 27′ W.), town, Argyllshire, Scotland; noted summer resort and yachting centre; stands on beautiful bay. Pop. (1911) 6567.

OBEID, EL, see EL OBEID.

OBELISK, four-sided tapering stone monument, especially common in Egypt; placed in front of gateways of temples and halls or in isolated positions; sides generally covered with hieroglyphics; good example, Cleopatra's Needle, brought from Alexandria to London, 1878, and set up on Thames Embankment.

OBERAMMERGAU (47° 35′ N., 11° 4′ E.), village, on Ammer, Bavaria; wood and ivory carving. Noted Passion Play has been performed here every ten years, since passing of plague, 1634; next representation, 1920.

OBERHAUSEN (51° 30′ N., 6° 50′ W.), town, Rhine province, Prussia; ironworks. Pop. (1910) 89,897.

OBERLAHNSTEIN (50° 20′ N., 7° 40′ E.), town, Hesse-Nassau, Prussia, at junction of Lahn and Rhine. Pop. (1910) 8925.

OBERLAND, see BERNESE OBERLAND.

OBERLIN (41° 16′ N., 82° 13′ W.), village, Ohio, U.S.A.; head of O. Coll., which includes Academy, Coll., Theological Seminary, and public library; founded, 1833. Pop. (1910) 4365.

OBER-NEUNKIRCHEN, see NEUNKIRCHEN.

OBERON, king of the fairies and husband of Titania; familiar figure in mediæval tales; appears in

A Midsummer Night's Dream and in Weber's opera *Oberon* (1826), words by Wieland.

OBERSALZBRUNN, see SALZBRUNN.

OBERSTEIN (49° 42′ N., 7° 20′ E.), town, Birkenfeld, Oldenburg, Germany; agate-cutting and polishing. Pop. (1910) 9669.

OBESITY, see CORPULENCE.

OBI, see OB.

OBJECT GLASS, large glass at end of a refracting telescope at opposite end to eyepiece. The o. g. receives the rays of light from a star or other object, and collects them to a focus, where is placed the eyepiece, which magnifies the image there formed. A telescope's quality and power depend on its o. g. The modern o. g. consists of two pieces, an outer convex lens of crown glass and an inner concave lens of flint glass, this combination greatly reducing the effects of chromatic aberration. See TELESCOPE.

OBJECTIVE, see SUBJECTIVE.

OBJECTIVISM, theory that we can attain real truth, through objective validity of our ideas.

OBOE, HAUTBOY, important wood-wind instrument played by a double reed; evolved from primitive *schalmei*, now obsolete, and in its present form about 200 years old; has a peculiar nasal tone, piercing, yet expressive. Essentially a lyric instrument, music of a tender, pastoral character suits it best, but in skilful hands it is also useful for the expression of melancholy and gaiety. 'It is less voluptuous than the clarinet,' says an authority; 'in sustained cantilena it assumes a character of *naïveté*, modesty, and for this reason, in operatic and in programme music, it plays an important rôle as representative of maidenliness.' To the o. is assigned the province of 'sounding the A' to which the rest of the orchestra tunes, a practice dating from Händel's time, when it was the principal wind instrument. An imitative o. stop is included in most organs.

OBOK (12° N., 43° 30′ E.), decayed seaport, on Tajura Bay, Fr. Somaliland.

OBRA (52° 25′ N., 15° 50′ E.), small river, Posen, Prussia; joins Warthe.

O'BRIEN, WILLIAM (1852–), Irish politician; founded the paper, *United Ireland*, 1880; the United Irish League, 1898, and its paper, *The Irish People*; has been often imprisoned; now (1913) leader of Independent Nationalists in Parliament.

OBSERVANTISTS, see FRANCISCANS.

OBSERVATORY, a building devoted to the observation of natural phenomena in connection with such sciences as astronomy, meteorology, and for the study of magnetic phenomena. The most interesting o's are generally astronomical, housing instruments for the observation of the heavenly bodies.

Astronomical o's date from early times in China, while the Pyramids of Egypt played a great part in stellar observation (see Lockyer's *Dawn of Modern Astronomy*). An o. was founded at Alexandria in 300 B.C., whilst others were built at Cairo in 1000 A.D. and Maragha (Persia) 1260 A.D. The first European o., however, was built at Nuremberg by Walther in 1472, while Tycho Brahe founded his world-famous o. at Hveen, an island near Copenhagen, in 1580. Other o's were built as follows: Royal Observatory, France (Paris), 1667; Royal Observatory, England (Greenwich), 1675; Vienna, 1756; Dublin, 1785; Cape of Good Hope (Cape Town), 1820; Sydney, Australia, 1820; Royal Observatory, Scotland (Edinburgh), 1825; Pulkova, Russia, 1839; Melbourne (Australia), 1853; Lick, California, 1888; Flagstaff (Arizona), 1894; Yerkes, Wisconsin, U.S.A., 1897; and Carnegie Solar Observatory, Mount Wilson, U.S.A., 1904.

An o. consists chiefly of the dome or cupola for housing the telescope. This dome rests on a substructure, and generally runs on roller bearings. A sliding shutter is so arranged that it gives an opening allowing the telescope to be pointed from horizon to zenith. This opening may be directed to any point of the sky by rotating the cupola. Telescopes are generally mounted equatorially; by clockwork the instrument automatically follows a celestial object from its rising to its setting. In o's where very large instruments are used, rising floors, worked by hydraulic power, are installed to accommodate the observer to the alteration in the instrument's height. A transit instrument and sidereal clock are also necessary for the carrying on of astronomical work. The former is so arranged as to move only up and down, like a cannon. It points due south and is generally accommodated in a separate building or room. The time a star crosses the line of the transit instrument is taken, and compared with the star's known time of transit, and the sidereal clock is regulated thereby. The clock, a very evenly balanced instrument, involving the highest art of clockmaking, is used in connection with the locating of heavenly bodies with the large telescope.

Owing to the impurities of the atmosphere, caused by factory chimneys, etc., it has been found advisable to build o's on the summit of mts. California, U.S.A., is specially noted for its clear atmosphere. Perhaps the most famous observatory of the present day is the Lick. James Lick, an American millionaire, left a sum of money to build an o. and to erect a telescope the object glass of which was to be 36 inches in diameter. The Trustees, in searching for a suitable spot to erect this huge instrument, decided at last on Mount Hamilton, in California, some 4250 feet high, and here in 1888 the Lick Telescope was erected. Numerous double stars and a new satellite to Jupiter have been discovered, while thousands of measurements of double stars have been taken at the Lick O. Observations of nebulæ have been carried on with other instruments.

Stroobant, *Les Observatoires astronomiques* (1907).

OBSIDIAN, volcanic rock (vitreous lava) of acid composition and of glassy appearance; composition resembles granite, and it is classed with felspars; found in Europe, Iceland, Siberia, S. America, Mexico, Peru; hard and brittle; sometimes used for ornamental purposes. Incas and Yucatans of Peru and Mexico used o. for weapons, spear- and arrow-heads, cutting knives, etc.

OBSTETRICS, MIDWIFERY, is the science which deals with the case of a pregnant woman, the bringing of her child into the world, and the care of the woman and the newborn child in the puerperium, or lying-in period immediately following labour, in which the organs of generation of the woman return to their normal, non-pregnant condition. The most distinctive part of the science of o. is the process of labour, which takes place in three stages: first, the dilatation of the uterus to allow the escape of the child; second, the expulsion of the child; and third, the expulsion of the *placenta*, or after-birth. A natural labour is one in which the head of the child is presented, and which begins and ends within the space of twenty-four hours. Pregnancy, labour, and the puerperium must not be regarded as pathological but as perfectly normal and physiological processes which require little or no assistance under natural conditions, but upon which civilisation has had the effect of increasing the difficulties and dangers.

Pregnancy extends for nine calendar months, and the date of confinement may be reckoned as falling within the fortnight which has as its central date the 280th day after the beginning of the last menstrual period. The earliest sign of pregnancy is the cessation of the monthly menstrual flow. During the second, third, and fourth months a certain amount of sickness is experienced, most commonly on rising. From the third month the breasts become enlarged and the superficial veins more prominent: there is a feeling of fulness, associated at times with pain. The pink areola surrounding the nipple becomes darker and wider. The glands surrounding the nipple become enlarged and form prominent papillæ. After the fourth month the abdomen enlarges. Quickening, the first indication of an independent life,

is usually experienced during the fifth month, and varies from a slight fluttering to severe sickness and fainting. Towards the end of pregnancy the discomfort to breathing caused by the enlarged uterus becomes less; walking becomes more difficult, and there is usually an increased tendency to pass water at short intervals.

While a pregnant woman is not an invalid she should take especial care of her health at this time. Walking is the best exercise; dancing, tennis, hockey, golf, cycling, etc., should be avoided. Crowded places of entertainment, where the atmosphere is close and there is excitement, should be shunned. The clothing should be warm, loose, and comfortable. When the abdomen becomes enlarged, an obstetric belt or flannel binder gives adequate support. The ordinary diet should be maintained unless sickness or indigestion supervene. The bowels have a tendency towards constipation, and should be attended to; the daily warm or tepid bath should be strictly adhered to. If the heaviness of the breasts causes discomfort, bandages or binders may be applied; and during the last two months the nipples should be hardened by bathing twice a day with eau-de-Cologne or weak spirits.

While most pregnancies are normal there are complications which may appear. The morning sickness may become excessive; but it yields to treatment. Sleeplessness should be carefully treated. Attention to diet, especially in the evening, may be all that is required. Owing to the pressure of the uterus there is a special tendency to varicose veins and swelling of the legs. Rest in bed, with bandages if necessary to the affected parts, is all that is needed. Jaundice occasionally occurs. There may be a discharge from the vagina which causes itching and is accompanied by pains in the back; antiseptic and astringent douches will remedy it.

Eclampsia (convulsions closely resembling those of epilepsy) is fortunately of comparatively rare occurrence. Even if threatened it can often be prevented. Warning is given in the state of the urine, and every pregnant woman should have her urine examined by her doctor once a month during the first six months, and fortnightly till the end of pregnancy. An impending fit is usually preceded by disturbance of the sight and hearing, and there are severe headaches.

In the time of Hippocrates (400 B.C.), as, indeed, for many hundreds of years later, the conduct of labour was in the hands of skilled women. Although we find accounts of disorders of the generative system of women in his writings, and in the works of his followers the possibility of changing the presentation of the child is spoken of, and the mutilation and extraction of the dead child described, yet the process and conduct of a normal labour is not mentioned. With the advance in the knowledge of anatomy the art of o. became more exact, and Soranus (98–137 A.D.), who wrote a valuable work for the instruction of midwives, Galen (131–201 A.D.), and Moschion (c. IV. cent. A.D.) had by their writings a great share in its development. After this period little advance was made until the XVI. cent., when the influence of the Renaissance and the Reformation began to make itself felt on this as on other arts and sciences, although the practice of o. still remained in the hands of women. Ambroise Paré (*q.v.*), in 1550, revived the operation of turning, which had been known to Soranus and forgotten later, and the method of Paré, by which many children, who must otherwise have died, have been delivered alive, is used at the present day.

In the XVII. cent. surgeons began to conduct labours, Jules Clément, a famous Fr. surgeon, acting as accoucheur to Madame de la Vallière, to the dauphiness of France, and to many other ladies of the Fr. court, since when many eminent surgeons and physicians have refused to consider o. subsidiary to the other branches of med., and have devoted their attention entirely to that subject. At the end of the XVI. cent. the forceps was invented by Peter Chamberlen, son of a Huguenot who had fled to England, and the invention was kept a secret of the Chamberlen family for over a cent., becoming known to the medical profession generally by about 1730. During the XVIII. cent. the science of o. made great strides, chairs in the subject being established in different univ's, the first being the chair of Midwifery in Edinburgh Univ., founded in 1726, while new operations were devised and instruments and methods were improved. Progress continued to be made in the XIX. cent., made memorable in the history of o. by the application of anæsthetics in labour—Sir J. Y. Simpson (*q.v.*), in 1847, first employing ether, and, later in the same year, chloroform to relieve the pains of labour, the latter becoming afterwards very generally employed in surgery; and second, by the abolition of so-called puerperal fever, really a septicæmia, from the maternity wards, by causing the students taking part in the conduct of labour to first disinfect their hands in chloride of lime, a method introduced by J. P. Semmelweiss (*q.v.*) and later amplified and perfected independently by the discoveries and antiseptic applications of Lister (*q.v.*).

OCALA (29° 13′ N., 82° 10′ W.), city, Florida, U.S.A. Pop. (1910) 4370.

OCAÑA (39° 56′ N., 3° 29′ W.), town, Toledo, Spain. Pop. 7200.

OCCAM, WILLIAM OF (d. 1347), Eng. philosopher; b. Ockham; ed. Oxford and Paris under Duns Scotus; revived Nominalism of Roscellin; the same thing cannot exist in several different objects, whence universal a mere sign to designate different things; opposed Pope's claim to political power; fled to Bavaria, and never recanted.

OCCASIONALISM, doctrine that mind and matter do not interact, and that on any change in one, God intervenes to produce a change in the other. See DESCARTES.

OCCLEVE, THOMAS, HOCCLEVE (1368–c. 1450), Eng. minor poet of Chaucerian school. His longest work is *The Regement of Princes*, or *De Regimine Principum*, a metrical homily on conduct. He also wrote *Jeraslaus' Wife*, *Jonathas*, and *Learn to Die*.

OCEAN CITY (39° 18′ N., 74° 35′ W.), city, seaside resort, New Jersey, U.S.A.

OCEAN GROVE (40° 15′ N., 74° W.), seaside resort, New Jersey, U.S.A.

OCEANIA, OCEANICA (35° N. to 55° S., 100° W. to 130′ E.), division of globe comprising islands in Pacific Ocean; divided into various groups, viz. Melanesia (with Australasia), Polynesia, Malaysia (excluded by some geographers), and Micronesia. These islands are divided among Britain, U.S.A., Holland, Germany, France, Japan, and Chile, and are involved in the important problem of the mastery of the Pacific.

Alexander, *The Islands of the Pacific* (1895); Russier, *Le Partage de l'Océanie* (1905); Colquhoun, *The Mastery of the Pacific* (1902).

OCEANOGRAPHY, the comprehensive science which deals with the ocean in all its aspects—its tides and currents, its varying composition and temperatures, its vegetation, and its animal inhabitants. Apart from its purely scientific aspect, o. is of immense importance to navigators and especially to fishermen, for on a knowledge of the habits of fishes, which in turn depend in great part on oceanic conditions, the progressive and scientific advance of fisheries depends.

O. cannot be called a single or pure science, for it includes many branches and takes toll of many sciences. Physics measures and interprets tides and currents, chemistry tells of the composition of sea water and its content, botany and zoology are laid in tribute; but o. has a distinct function in correlating and uniting the isolated items of information into a single compact science of the sea. Owing to the difficulty of observing directly any but the surface layers of the ocean, the progress of o. has been very gradual until recent years, and has kept step only with the perfecting of instruments for making records in the unseen depths.

The early observers were content with measuring the depth of the ocean, from Magellan, who, in 1521, on the first voyage round the world, failed to reach the bottom of the Pacific with a 200-fathom line, to Sir John Ross, who, in 1817–18, touched the bottom of the Arctic Ocean in 1050 fathoms and brought up on his sounding-line a live starfish, a hint that even at great depths living things existed.

Sporadic observations of ocean phenomena have been made since the earliest times, but the main development of knowledge has lain with expeditions specially fitted for the purpose. Thus Edmund, in 1699, and Halley, the Astronomer-Royal, endeavoured to gain information concerning the longitude and the variation of the compass, whilst among many more purely oceanographical expeditions stand out pre-eminently those of Captain James Cook in 1772–73, the Antarctic expeditions of Sir James Clark Ross from 1839 to 1843, the U.S. Exploring Expedition of Captain Wilkes and Professor Dana from 1839 to 1842, the U.S. Coast Survey from 1844, with which Maury, Pourtalés, and Louis Agassiz were associated, and the North Atlantic cruises of the *Lightning* (1868) and *Porcupine* (1869) under the leadership of Sir Wyville Thomson and W. B. Carpenter. But overshadowing all others in the comprehensiveness and scientific value of its work was the great expedition of H.M.S. *Challenger*, under Sir Wyville Thomson, which from 1872 to 1876 circumnavigated the world, crossing and recrossing the great oceans, observing and collecting everywhere. The magnitude of its labours may be judged from the fact that the scientific results were published in 50 quarto vol's, and these form the bed-rock upon which modern o. has been founded.

Since the *Challenger* voyage scarcely a year has passed without the accomplishment of important scientific work by one expedition after another. Researches have concentrated more particularly in the North Atlantic, in the North Sea, and in the Antarctic Ocean. Outstanding efforts have been made in the first by the Prince of Monaco on his yachts, *L'Hirondelle* and *Princesse Alice*, in the second by the International Commission for the Scientific Investigation of the North Sea, participated in by Great Britain, Sweden and Norway, Russia, Germany, Denmark, Holland and Belgium, and in the last by a series of well-equipped expeditions dispatched by Belgium (1897–99); Great Britain (Scott, 1901–3 and 1911–13); Bruce, 1902–4, Shackleton, 1907–9; Germany (1901–3 and 1911); Sweden (1901–3); and France (1903–5 and 1908–10).

It is impossible to describe all the complicated apparatus used in vessels fitted for oceanographical research, but mention may be made of the automatic sounding machines, such as that invented by Lucas, which records mechanically the depth at which bottom has been touched; of reversing thermometers which from the deck can be made to register the temperature at given depths, and with which is associated a water-bottle which brings to the surface a sample of water from the same depth for examination as to salinity, etc.; current-meters, which, lowered and kept as stationary as possible at a definite position, record the direction and speed of tidal and other currents; and the apparatus for collecting the organic content of the sea. This last consists of dredges to be dragged along the bottom, and of many types of net—the otter-trawl, and pelagic trawls for catching the larger animals, the former at the sea-bottom and the latter at any desired depth; vertical nets drawn directly upwards so that the content of a column of sea water of known length and area can be estimated; and tow-nets, several of which, at the surface and known depths, are generally employed at one time.

The result of innumerable sounding observations has been to show that the bottom of the ocean more or less resembles the surface of the land: in places marked by deep depressions, which as in the greatest abysses known —the Aldrich Deep and Challenger Deep, in the west of the South and North Pacific Ocean respectively—may reach a depth of over 5000 fathoms (roughly, 5½ miles); or rising here and there in great elevations which sometimes reach the surface and project as islands, but more frequently form great submarine ridges far underneath the surface, such as the Mid-Atlantic ridge, which runs down the centre of the Atlantic Ocean from the Arctic Ocean to the latitude of Cape Horn. But the sea-bottom is more uniform than the surface of the land. Vegetation, as we know it on the seashore, almost ceases at a depth of 10 to 15 fathoms. Round the continental areas, and exending from the shore to varying distances, down sometimes to 1000 or rarely to 2000 fathoms below sea-level, are deposits formed mainly from the neighbouring land—coral sands and muds, green, red, and blue muds, and volcanic sands and muds. In deeper water the deposits are even more uniform, extending sometimes over many thousands of square miles. There they are formed of the skeletons of minute organisms which have sunk to the bottom, and after which they are named. In the shallower waters far from land, the sea-floor is covered with Pteropod ooze, formed of the empty shells of the pelagic molluscs, Pteropods. Characteristic of depths between 1000 and 2000 fathoms, the commonest deposit, found over hundreds of thousands of square miles, is Globigerina ooze formed of foraminiferal shells; still deeper in colder regions are Diatom oozes of microscopical plant skeletons, and in the tropical Pacific and Indian Oceans Radiolarian oozes, while in the abysses there occurs a red clay derived mainly from volcanic products.

However uniform the sea-floor may be, the ocean itself presents great variety, and its depths, tides, currents, varying temperatures, and varying salinities are more or less reflected in the organisms which live in it. The inhabitants of coastal waters are mainly brightly and variously coloured, and are furnished with comparatively heavy bodies and strongly developed protective devices. In the open sea blue colours are prevalent, and the bodies of many pelagic creatures are delicate, transparent, and almost invisible, with adaptations to a floating habit. With increasing depths, colours become more uniform, dark browns, blues, violet, and black being commonest amongst fishes, and reds amongst invertebrate animals, at and beyond 300–400 fathoms, at which depth most of the sun's rays are absorbed. Other interesting developments appear to be due to phenomena of light, for while all the sun's rays penetrate to 55 fathoms, and light is still strong at 275 fathoms, and can be detected even at 550 fathoms, no trace of sunlight affects photographic plates in 930 fathoms. In those depths many invertebrates and fishes are furnished with luminous organs, eyes become larger, to catch every faint gleam of light, or disappear altogether in the darkness, and tactile organs or feelers take their place or act as subsidiaries. Pressure increases at the rate of one atmosphere for every 5½ fathoms, which represents a pressure of about 2½ tons per square inch at a depth of 2000 fathoms, and to withstand this the bones and flesh of deep-sea animals are soft and porous. Many bottom animals too are furnished with long legs and long stalks to raise them above the suffocating ooze on the sea-floor.

The study of ocean currents and drifts in the Atlantic and North Sea has shown that upon them depends the distribution of the minute organisms which constitute the food of many fishes, and therefore to a great extent the distribution and migration of fishes themselves.

To the investigations of oceanographers mariners owe their invaluable charts of soundings and their knowledge of tides, oceanic currents, and drifts, information which also places in the hands of the meteorologist the key to many of the climatic conditions and fluctuations on sea and land. Further, although as regards fisheries it is only in recent years that efforts have been made to interpret the complicated phenomena in terms of physical o., yet already many problems seem on the verge of solution.

Consult the 'Scientific Results' of Expeditions mentioned; or for comprehensive summaries, Murray

and Hjort, *The Depths of the Ocean* (1912); *Science of the Sea*, edit. by G. Herbert Fowler (1912); Wyville Thomson, *The Depths of the Sea* (1873); or from the biological aspect, Johnstone's *Life in the Sea* (1908).

OCELOT, see under CAT FAMILY.

OCHAKOV, OTCHAKOV (46° 40′ N., 31° 30′ E.), fortified seaport, Kherson, Russia, on Black Sea; taken by Russians, 1737 and 1788; fisheries. Pop. 11,500.

OCHINO, BERNARDINO (1487–1564), Ital. theologian; confessor of Pope Paul III. and general of Capucin order; wonderful powers as preacher; charged with heresy, and fled to Geneva, 1542; subsequent life as fugitive and heretical preacher and writer.

OCHOTONA, Picas (*q.v.*).

OCHRIDA (41° 11′ N., 20° 43′ E.), town, Albania, on Lake Ochrida. Pop. *c.* 17,000.

OCHSENFURT (49° 35′ N., 10° E.), town, on Main, Lower Franconia, Bavaria; trade in wine. Pop. 3200.

O'CONNELL, DANIEL (1775–1847), Irish statesman; famous barrister, nicknamed 'the counsellor'; became head of anti-Union party; formed Catholic Association, 1823, of great power, dissolved, 1825, to anticipate suppression; established society, 'Friends of Ireland,' 1829, and various successors, in their turn suppressed; M.P. for Dublin, 1832, and fought Coercion Act of 1833; introduced subject of Repeal, 1834; founded Repeal Association, 1840, held meetings, and set up huge organisation to agitate; imprisoned for conspiracy to raise sedition, 1844; opposed to militancy, and broke with young Irish party; revered in Ireland as *the Liberator*. See Dunlop, *Life* (1900).

OCONOMOWOC (43° 5′ N., 88° 48′ W.), city, summer resort, Wisconsin, U.S.A. Pop. (1910) 3054.

OCONTO (44° 50′ N., 87° 50′ W.), city, Wisconsin, U.S.A.; lumber and fishing industries. Pop. 5629.

OCRICULUM, ancient town, Umbria, Italy, on Via Flaminia.

OCTAVIA, sister of Rom. emperor, Augustus; on her husband Marcellus' death, m. Mark Antony, only to be forsaken for Cleopatra. See AUGUSTUS CÆSAR.

OCTAVIANUS, afterwards Emperor Augustus. See AUGUSTUS CÆSAR.

OCTOPODA, see under CEPHALOPODA.

OCTOPUS, a genus of Cephalopoda (*q.v.*).

OCTROI (Lat. *auctoritas*), name given in France to duties levied by local authorities on certain articles (wines, foodstuffs, etc.) entering towns or communes; original meaning, royal permission to levy tax on articles of consumption entering a town; abolished, 1791, but restored, 1798; not imposed by all towns or municipal councils (*e.g.* Lyons has no *octroi*, while Paris has). A similar system exists in other Romance countries.

OCULOMOTOR, see NERVOUS SYSTEM.

OCYDROME, a rare, flightless New Zealand bird, of dull plumage, related to the Rallidæ; interesting on account of its affinities with extinct species of Carinatæ.

ODÆNATHUS, ODENATUS (2nd half of III. cent. A.D.), prince of Palmyra; repelled Persians, who were conquering eastern provinces from Roman empire; received title of 'independent lieutenant of the Emperor of the East,' 262.

ODDE, ODDA (60° 8′ N., 6° 35′ E.), tourist centre, Norway.

ODDFELLOWS, ORDER OF, a friendly society. The various lodges of the Independent Order of Oddfellows, Manchester Unity, were formally united in 1813. Present membership, including U.S.A. and Brit. Colonies, exceeds 1,050,000, and the funds in hand are over £15,000,000. The Independent O.O.F. (now affiliated with Manchester Unity), with Sovereign Grand Lodge, U.S.A., and Grand Lodges in several European countries, has membership of over 1,700,000 (over 1½ millions in U.S.A.).

ODE, Gk. word meaning song with musical accompaniment; came to denote lyrical poetry of length and complexity, *e.g.* the *Carmen* of Alcman, the *Horatian Ode* of Sappho, Alcæus, and Anacreon. Pindar perfected the ode. Horace's odes are more regular, and inspired such odes as Spenser's *Epithalamion*, Collins' *To Evening*, Shelley's *To a Skylark* and *To the West Wind*, Keats' *To a Nightingale*. 'Pindaric' odes are Dryden's *Alexander's Feast*, Wordsworth's *Intimations of Immortality*, Tennyson's *Duke of Wellington*.

ODENKIRCHEN (51° 10′ N., 6° 30′ E.), town, on Niers, Rhine province, Prussia; silks, velvets. Pop. (1910) 20,049.

ODENSE (55° 23′ N., 10° 22′ E.), city, island of Fünen, Denmark, on Odense; tanneries; iron foundries; cathedral contains tombs of King Canute and other kings. Pop. (1911) 42,237.

ODENWALD (49° 40′ N., 8° 48′ E.), mountainous region, Hesse, Germany; noted for its legends.

ODER (53° 20′ N., 14° 30′ E.), river, Germany; rises in Odergebirge (Moravia); flows N.W. through Germany and enters Baltic by three arms—Swine, Peene, Dievenow; chief tributaries, Bartsch, Neisse, Warthe; principal towns, Breslau, Stettin, Frankfort; length, 550 miles; navigable for about 470.

ODERBERG (52° 50′ N., 14° 5′ E.), town, on Oder, Brandenburg, Prussia; dépôt for timber from Russia. Pop. 4500.

ODESSA (46° 28′ N., 30° 43′ E.), important seaport, on Black Sea, Southern Russia, near mouth of Dniester; with fine cathedral (XIX. cent.), gov.'s palace, theatre, univ. (1865), Nikolai Boulevard, etc.; originally a Turk. fortress; taken by Russians, 1789; town founded, 1794; free port, 1811–57; serious revolts and riots, 1905–6. Odessa has oil-mills, sugar-refineries, tanneries, ironworks, chemicals, soap, leather, tobacco; principal export is grain. Pop. (1910) 478,900.

ODILIENBERG (48° 20′ N., 7° 10′ E.), mountain, tourist-resort, Alsace, Germany; noted Convent of St. Odile (founded VII. cent.).

ODIN, see WODIN.

ODO (1036–97), half-bro. of William I. of England; bp. of Bayeux, 1049; Earl of Kent, 1067.

ODOACER, FLAVIUS (*c.* 434–93), Ger. king (probably Scyrrian by birth), who overthrew Romulus, last Rom. emperor of West, 476, and became practically sovereign of Italy. O. retained Rom. senate and government of Italy. Attacked and defeated by Theodoric king of Ostrogoths, 489 (on Byzantine emperor's commission), he held out till 493.

ODOBENIDÆ, see WALRUSES.

ODOBENUS, see WALRUSES.

O'DONNELL, Irish family; descended from Conall Gulban, s. of V.-cent. Irish king, Niall; rulers of Tyrconnel and rivals of O'Neills of Tyrone. Chief members: (1) **Manus** (d. 1564), succ. his f. as The O'D., 1537; adopted cause of Gerald Fitzgerald and invaded Pale, 1539–40. (2) His s. and heir, **Calvagh** (d. 1566), deposed him, 1555, but was captured by Shane O'Neill, 1561; restored by England, 1566. (3) His grandson, **Hugh Roe** (1572–1602), is famous in Irish history and legend; became The O'D., 1592, and led opposition to England.

ODONTOCETI, a sub-order of whales (*q.v.*).

ODONTOLCÆ, Fossil Birds, see under ODONTORNITHES.

ODONTORNITHES, sub-class of Fossil Birds having jaws furnished with sharp teeth. Two divisions are distinguished, the *Odontolcæ* represented by N. Amer. *Hesperornis*, with teeth sunk in a groove, somewhat resembling an ostrich, but with legs adapted for swimming, and the ODONTOTORMÆ, containing *Ichthyornis*, with teeth sunk in distinct sockets and well-developed wings.

ODONTOTORMÆ, Fossil Birds, see under ODONTORNITHES.

ODORIC, ST. (*c.* 1286–1331), Ital. missionary; Franciscan friar; set out with Irish minorite, James, *c.* 1316, and was absent about 12 years, passing through Persia and India and across China. O.'s journey added to information acquired by Marco Polo nearly all that was known in Middle Ages. His narrative was freely used in Sir John Mandeville's *Travels*.

ODYLIC FORCE, supposed all-pervading force, at

one time held to explain 'mesmerism' and 'animal magnetism.' See HYPNOTISM.

ODYSSEUS, ULYSSES, in Gk. legend the son of Laërtes. The chief events of his life were his long service in the Trojan War, his protracted homeward voyage so full of adventure, his return to his faithful wife Penelope, and his vengeance on her suitors. See HOMER.

ŒCOLAMPADIUS, JOHN HUSSGEN (1482–1531), Ger. reformer; Gk. and Hebrew scholar; friend of Erasmus; adopted Zwingli's view of Eucharist; organised Reformed Church at Basel, 1529; contributed to *Bible* commentary.

ŒCUMENICAL, ECUMENICAL (Gk. *Oikoumenē*, inhabited world), universal; applied to General Councils of whole Church. See COUNCIL.

ŒDEMIA, COMMON SCOTER, see under DUCK FAMILY.

OEDENBURG, see SOPRON.

ŒDIPUS (classical myth.), Theban king; exposed in infancy because of prophecy; found by shepherd and adopted by king of Corinth; journeyed to Thebes, unwittingly slaying on the road his father Laius; delivered land from Sphinx (*q.v.*), and married his mother Jocasta, ignorant of her identity. A plague consequently fell on the land, and when the incest was discovered, Jocasta committed suicide, and Œ., self-blinded, wandered forth a beggar.

The Œ. myth appears in Homer, but is best read in the *Œdipus Tyrannus* of Sophocles (*q.v.*), one of the most magnificent tragedies ever written. It has several times been attempted on the modern stage, notably by Martin Harvey, under the direction of Prof. Max Reinhardt (1912).

OEHRINGEN (29° 10′ N., 9° 30′ E.), town, Württemberg, Germany. Pop. 3600.

OELAND, see ÖLAND.

OELS, ÖLS (51° 12′ N., 17° 21′ E.), town, on Oels, Silesia, Prussia. Pop. (1910) 11,719.

OELSCHLÄGER, ADAM (1600–71), Ger. traveller; b. at Aschersleben. His greatest works are a narrative of the Russ. and Persian legation, and a history of Holstein.

OELSNITZ (50° 27′ N., 12° 10′ E.), town, on Weisse Elster, Saxony, Germany; carpets. Pop. (1910) 13,952.

OELWEIN (42° 40′ N., 91° 57′ W.), city, Iowa, U.S.A.; machine shops. Pop. (1910) 6028.

OEREBRO, see ÖREBRO.

OESEL, ÖSEL (58° 20′ N., 22° 30′ E.), Russ. island, Baltic Sea. Pop. 61,000. Chief town, Arsenburg.

ŒSOPHAGUS, the gullet; that portion of the food canal which leads from the mouth to the stomach.

ŒSTRIDÆ and **ŒSTRUS**, see BOT FLIES.

OETA (38° 48′ N., 22° 14′ E.), mountain, ancient Greece; modern Katavothra.

OEYNHAUSEN (52° 10′ N., 8° 30′ E.), watering-place, Westphalia, Prussia; saline springs. Pop. 3500.

OFEN, Ger. name for Buda, Hungary. See BUDA-PESTH.

OFFA (d. 796), king of the Mercians (from 757); defeated Wessex at *Bensington*, 779; created Mercian archbishopric at Lichfield, 787; boundary (*Offa's Dyke*) made between Mercia and Wales.

OFFENBACH (50° 7′ N., 8° 45′ E.), town, on Main, Hesse, Germany. Pop. (1910) 75,593.

OFFENBACH, JACQUES (1819–80), operetta composer; b. Cologne; lived in Paris; best works include *Orphée aux Enfers*, *La Belle Hélène*, *Madame Favart*, and *Contes d'Hoffmann* (1881).

OFFENBURG (48° 27′ N., 7° 56′ E.), town, on Kinzig, Baden, Germany; textiles. Pop. (1910) 16,840.

OFFICERS.—Leadership in war is a form of employment not unlike the control of workmen in building a railway or a cathedral; and as late as the XVIII. cent. officers were commissioned as much to raise troops as to lead them. To this day the theory is maintained that the paymaster of a company of Brit. infantry is its captain, and not long since the colonel of a regiment was remunerated by the profit he obtained on clothing the rank and file. These appointments were bought and sold just as commercial partnerships are bought and sold to-day, and the price of an ensign's commission was £400, further sums being paid on promotion; so that ultimately a lieutenant-colonel could dispose of his official position for £3500. In the Guards and the Cavalry these sums were doubled. The purchase system was abolished in 1873 in Britain.

In the Brit. Army at present *commissions* are granted to serve as second-lieutenant, and promotion follows by seniority in the corps to lieutenant, captain, major, and lieutenant-colonel. O's who are not then retired may receive 'extra regimental' employment as colonels, and from the colonels are selected brigadier-generals, who in turn may be chosen for promotion to the rank of major-general, lieutenant-general, general, and field-marshal. In the Brit. Navy the corresponding ranks are Admiral of the Fleet (field-marshal), admiral (general), vice-admiral (lieutenant-general), rear-admiral (major-general), and commodore (brigadier-general). Regimental o's of the army rank as follows with naval officers: Colonel and lieutenant-colonel as captain or commander, majors and captains as lieutenants; a lieutenant in the army is of equal standing with a sub-lieutenant in the navy; the second-lieutenant ranks with a chief gunner or chief boatswain.

British officers are drawn from several sources, viz. State Training Schools at Woolwich and Sandhurst, the Univ's, the Special Reserve, and the Territorial Force. There is also the power to grant commissions to selected non-commissioned o's. The training received by candidates for commissions thus varies considerably. The ex-corporal will have had at least two years' experience of soldiering in the Regular Army, whereas an ex-Territorial o. will possess but a very rudimentary knowledge of military life. The latter would, however, have been instructed in the theory of war so far as to emerge with credit from a competitive examination. The Special Reserve o. would have to pass the competitive examination in addition to serving on probation as an o. with a regular unit for six months (one year in the artillery). The Univ. candidate is expected to have made up for his deficiencies in military knowledge (acquired in the O.T.C.—Officers' Training Corps) by taking a degree in Arts or Science.

The payment of o's, as of the rank and file in the Brit. Army, is relatively high as compared with foreign armies, but it is largely payment in kind. On appointment, an o. in the infantry receives 5s. 3d. per day, in addition to lodging, fuel, and light, and the services of a soldier as his personal attendant; but from the day he joins a sum of money begins to accrue out of which he will eventually after 8 years' service receive a pension for life. The rates of pension are: infantry, £120–200 per annum after 15 years' service, rising in the case of higher officers to £1000; artillery and engineers, £300 after 21 years' service, rising in proportion to rank. In the Navy, retirement at the age of 45 brings with it a pension varying from £200–500. An admiral's maximum retired pay is £850.

United States.—Officers are trained for the army at West Point, and there are also four service schools; engineers and medical service, Washington; about sixty cadets pass out annually, after a severe course of training lasting four years. Commissions from the ranks are not uncommon. The ranks are similar to those of the British Army.

Foreign Countries.—**FRANCE** resembles Britain in its training of officers. The great *écoles militaires* are St. Cyr and L'École Polytechnique; about one-third of French officers rise from the ranks. **GERMANY.**—The German officer is trained to a more implicit obedience of instructions and regulations than either the British or the French, hence the position of the superior officers is correspondingly more responsible. Special attention is bestowed upon artillery-training. In the **ITALIAN** Army horsemanship and training for mountain-warfare are given most prominence.

OFFICINAL, term applied to those drugs kept in stock by chemists and druggists.

OGDEN (41° 13′ N., 111° 59′ W.), city, on Weber, Utah, U.S.A.; woollen mills; canneries. Pop. (1910) 25,580.

OGDENSBURG (44° 39′ N., 75° 30′ W.), city, port of entry, on St. Lawrence, New York State, U.S.A.; lumber manufactures. Pop. (1910) 15,933.

OGIER THE DANE, a hero who, according to the Carolingian romances, had a feud with Charlemagne and was imprisoned by him. The valour he subsequently showed against Charlemagne's enemies, the Saracens, brought about a reconciliation.

OGILVY OF AIRLIE, JAMES, LORD (*c.* 1549–1606), Scot. noble; supporter of Queen of Scots; ancestor of Earls of Airlie (*q.v.*).

OGILVY, DAVID (1725–1803), Scot. claimant of ancestral earldom of Airlie; raised regiment of 300 clansmen for Pretender, 1745.

OGLETHORPE, JAMES EDWARD (1696–1785), Eng. soldier; securing parliamentary grant of £10,000, sailed with a contingent of debtors and founded Georgia (named after George II.); tried for failing to overtake Prince Charles's army in '45 rebellion, but acquitted.

OGOWÉ (3° S., 14° 30′ E.), river, Fr. Equatorial Africa, flowing by delta into Atlantic; length, 700 miles.

O'HIGGINS, BERNARDO (1778-1842), Chilean patriot; fought for revolution and commanded against Spain, 1813; fought under San Martin, 1817–18; administrator of Chile, 1817–23; overthrown by democratic rising.

OHIO (40° N., 83° W.), north-eastern inland state, U.S.A.; bounded on N. by Michigan and Lake Erie, E. by Pennsylvania and (separated by Ohio River) West Virginia, S. by Kentucky and (separated by Ohio River) West Virginia, and W. by Indiana; capital, Columbus; area, *c.* 41,060 sq. miles, 300 being water.

O., lying on the borderland of Alleghany Plateau and Prairie Plains, is, in general, a vast undulating plain, with average elevation of *c.* 850 ft. above sea-level, the extremes being 425 ft. and 1540 ft. (Hogues Hill). The central part is flat; a low ridge stretches S.W. across the state, and N. of this the country slopes gently to Lake Erie, the southern portion being rather hilly. This divide also separates the waters of Lake Erie—with its principal rivers, the Tuscarawas, Cuyahoga, Sandusky, Huron, and (only partly in the state) the Maumee—from the waters of the Ohio, whose chief tributaries are the Muskingum, Scioto, Great Miami, and Little Miami.

O. is part of original New York territory; scene of frequent disputes and struggles between British and French, British and Americans, Americans and Americans, white settlers and Indians. Eng. traders appeared early in XVIII. cent.; colonised by Ohio County; Brit. claim challenged by French till 1763; won for Amer. Republic by War of Independence, 1783; developed as part of North-West Territory by New England settlers; admitted as state of Union, 1803; devastated by floods, March 1913. O. has a Gov., Senate (34 members), and House of Representatives (119). Education is compulsory from 6 to 14. There are from 30 to 40 univ's and colleges, notably State Univ., Columbus; Ohio Univ. (State), Athens; Cincinnati Univ. (city); Western Reserve Univ.; Wesleyan Univ., Delaware; and Oberlin Coll. (non-sectarian). Roman Catholic, Methodist, Presbyterian, and Lutheran are chief religious denominations. Pop. (1910) 4,767,121.

O. is extensively devoted to agriculture, the chief crops being cereals (maize, wheat, oats), hay, potatoes, fruits, and vegetables as well as tobacco. Horse- and cattle-breeding and dairy-farming are important. Other industries include foundries and machine-shops; iron and steel working; manufacture of carriages and wagons; clay products; boots and shoes; clothing; lumber and timber working, planing, etc.; printing and publishing; rubber goods; liquors; flour and grist working; and slaughtering. The mineral resources are considerable, chiefly coal and also petroleum and natural gas; sandstone and limestone are quarried and Portland cement manufactured; salt is produced and mineral waters found. The most important cities are Cleveland on the edge of Lake Erie, Cincinnati, Toledo, Columbus, Dayton, Youngstown, Akron. There are six ports on Lake Erie. O. is divided into 88 counties and has almost 10,000 miles of railways.

Taylor, *O. and its People*; Thomson, *Bibliography of O.*

OHIO RIVER (37° 16′ N., 88° 20′ W.), tributary of Mississippi, formed by junction of Monongahela and Alleghany Rivers at Pittsburgh, Pennsylvania, U.S.A.; *c.* 970 miles long; separates states of Ohio, Indiana, and Illinois from W. Virginia and Kentucky; chief tributaries, Muskingum, Scioto, Wabash, Big Sandy, Great Kanawha, Kentucky, Green, Cumberland, and Tennessee; most important towns on banks, Pittsburgh, Cincinnati, Louisville, and Portsmouth; a great highway of commerce; subject to floods; disastrous inundations, March 1913.

OHLAU (50° 56′ N., 17° 18′ E.), town, on Oder, Silesia, Prussia; tobacco and machinery. Pop. (1910) 9036.

ÖHLENSCHLÄGER, ADAM GOTTLOB (1779-1850), Dan. poet; b. in Copenhagen. The turning-point in his career was the return to Copenhagen of Henrik Steffens, who introduced the Dan. world to Goethe, Schiller, and the new Romantic movement. This event inspired his beautiful poem *Guldhornene*. His three finest works are *Baldur hin Gode*, *Palnatoke*, and *Axel og Valborg*.

OHLIGS (51° 10′ N., 6° 40′ E.), town, Rhine province, Prussia; formerly *Merscheid*; cutlery. Pop. (1910) 27,839.

OHM, GEORG SIMON (1787–1854), Ger. physicist; discovered *Ohm's Law* (see ELECTRICITY).

OHMMETER, instrument for measuring high resistance offered by a circuit to an electric current; essentially consists of two coils placed with their axes at right angles; at intersection of axes is pivoted small iron needle whose deflection is a measure of the resistance.

OHRDRUF (50° 48′ N., 11° 44′ E.), town, on Ohr, Saxe-Coburg-Gotha, Germany; porcelain. Pop. (1910) 6500.

OIL, a combustible, more or less viscous liquid, which does not mix with water. O's may be of mineral, vegetable, or animal origin, and may consist of hydrocarbons, aldehydes, phenols, or—more commonly—ethereal salts or esters, such as glycerides, which are saponifiable. *Fats* are distinguished from oils by their solidity.

Mineral oils are hydocarbons belonging chiefly to the series of *paraffins* (q.v.). They are unsaponifiable, and unacted on by acids and alkalies. They include *petrol* (B.P. 40° to 70° C.), *light petroleum* (B.P. 80° to 120° C.), *kerosene* or *refined petroleum* (B.P. 150° to 300° C.). The residue from their distillation yields vaseline, etc.

Vegetable oils are divided into volatile or essential oils, and fixed or fatty oils, with which the liquid animal fats may be included. ESSENTIAL OILS are found in the leaves, fruits, or seeds of plants. They are used as flavourings or perfumes, and are extracted by distillation with or without water, by expression, or by maceration in solid or liquid fat, followed by alcoholic extraction. The chief essential oils are: Oil of almonds, anise, bergamot, caraway, cedar, chamomile, cinnamon, citron, cloves, dill, eucalyptus, geranium, juniper, lavender, lemon, lime, mustard, nutmeg, orange, orange flowers or Neroli, peppermint, rose (attar of), rosemary, rue, sage, terebene, thyme, turpentine, verbena, wormwood.

FATTY OILS are extracted from the fruits or seeds of

plants or the tissues of animals, by draining (cod-liver oil), boiling with water (blubber), melting (lard, tallow), expression (olive oil), extraction with a solvent (bone oil). They are colourless or pale yellow liquids; unctuous to the touch; leave a permanent grease spot on paper; lighter than water; somewhat soluble in alcohol, and readily soluble in ether, chloroform, benzene, petroleum, and other oils. Chemically they consist chiefly of esters (glycerides) of the triacidic radicle, glyceryl, C_3H_5''', whose hydroxide glycerol or glycerin ($C_3H_5(OH)_3$) results, together with a fatty acid when they are hydrolysed by acids or superheated steam (i.), or its alkali salt, which is a soap, when they are saponified by alkalies (ii.).

(i.) $C_3H_5A_3 + 3HOH = \underset{\text{(glycerol)}}{C_3H_5(OH)_3} + 3\underset{\text{(fatty acid)}}{HA}$.

(ii.) $C_3H_5A_3 + 3NaOH = C_3H_5(OH)_3 + 3NaA$ (soap).

Fatty oils are not directly inflammable, but may be burnt by means of a wick. Some, known as drying oils, thicken into a varnish by atmospheric oxidation. They are purified by light, heat, treatment with water, acids, alkalies, oxidising and reducing agents, and by hydraulic pressure to remove solid constituents.

The chief fatty oils are: *Olive oil*, yellow to olive green in colour; easily turns rancid; used for lubrication, burning, cooking, eating, and soap-making. *Rape-seed* or *Colza oil*, light yellow, and nearly odourless when refined; used for lubrication, burning, and soap-making. *Cotton-seed oil*, straw-coloured or golden yellow when refined; agreeable taste, used for cooking, making margarine, and adulterating other oils and fats. *Linseed oil*, a drying oil; used for making paints and varnishes, soft soap, and oilcloth. *Castor oil*, colourless; very viscous; used medicinally, for making cheap soaps, and for lubrication. *Palm oil*, semi-solid; yellow to brown; used chiefly as railway grease. *Neatsfoot oil*, yellow; odourless; does not become rancid; used for lubricating clocks and machinery, and for leather-dressing. *Bone oil*, yellowish; used for soap-making. *Whale oil*, yellow or brown; fishy odour; used for burning and soap-making. *Cod-liver oil*, nearly colourless; peculiar fishy taste; used medicinally and in leather-dressing.

Oils are tested qualitatively and quantitatively thus: by specific gravity, refractivity, melting or solidifying point, solubility, especially in glacial acetic acid, colour tests with sulphuric and nitric acids, temperature reactions, estimation of saponification value, volatile acids, bromine and iodine absorption.

OIL BIRD, see GUACHARO.

OIL CITY (41° 27′ N., 79° 48′ W.), city, Pennsylvania, U.S.A., at junction of Oil Creek and Allegheny; oil. Pop. (1910) 15,657.

OIL ENGINE, see ENGINE.

OIL-BEETLES, see under HETEROMERA.

OIL-CAKE, see FLAX.

OIRON (47° N., 0° 15′ W.), town, Deux-Sèvres, France; old castle.

OISE (49° 20′ N., 2° 25′ E.), department, north France; formed of old provinces, Île-de-France and Picardy; area, 2261 sq. miles; chief rivers, Oise, Aisne, and Lorain; capital, Beauvais; principal products, vegetables, beetroot, fruits; manufactures iron, textiles, leather, lace, chemicals, cider. Pop. (1911) 411,028.

OISE (49° 54′ N., 3° 50′ E.), river, France; joins Seine; length, 186 miles.

OJIBWAS, see INDIANS, RED.

OKAPI, see GIRAFFE FAMILY.

OKEHAMPTON (50° 45′ N., 3° 59′ W.), town, Devonshire, England; has ruined castle; remains of Rom. road. Pop. (1911) 3175.

OKEN, LORENZ (1779–1851), Ger. philosopher and scientist; b. in Baden, and studied at Würzburg and Göttingen. In 1807 he became prof. at Jena—first of Med. and subsequently of Natural Science. In 1828 he went to Munich, having been obliged to resign his chair at Jena for political reasons. Finally he taught at Zürich, where he died. Oken was less a scientist than a philosopher; his system was a nature-philosophy, which endeavoured to relate scientific facts to a preconceived ideal. In this he resembled many scientists of his time, but his scientific observations were in general more exact, and his philosophical interpretations more consistent than those of the majority of his contemporaries.

OKHOTSK, SEA OF (50° N., 147° E.), arm of North Pacific, with Kamchatka on E., island of Sakhalin and E. Siberia on W.

OKI (36° 16′ N., 133° 10′ E.), group of islands, N. of Izumo province, Japan. Pop. 6300.

OKLAHOMA (36° N., 98° W.), state of U.S.A.; bounded N. by Colorado and Kansas, E. by Missouri and Arkansas, S. by Texas, W. by Texas and New Mexico; area, 70,500 sq. miles. Surface consists chiefly of prairies and rolling plains rising in N.W. corner to elevated tableland, which forms part of Great Plains; Wichita and Arbuckle Mts. in S., Ozark Mts. in E., and Chautaugua Mts. in W. are principal elevations; most important river in state is Arkansas, with tributaries, Salt Fork, Cimarron, and Canadian Rivers; Red River forms southern boundary of state, and has its affluents, N. Fork, Washita, and Kiamichi waters. Plains are treeless, but many of hills well wooded; river valleys and certain upland districts fertile and well cultivated.

O. formerly consisted of W. part of Indian Territory and strip of land N. of Texas Panhandle, known as 'No Man's Land'; Indians ceded portion of Territory to U.S.A., and land opened for public settlement, 1889; organised as territory, 1890; O. and Indian Territory proclaimed one State in 1907. State has Gov., Senate, and House of Representatives. System of Initiative and Referendum prevails. There are some 6000 miles of railway.

Chief crops are Indian corn, wheat, hay, oats, and cotton; barley, flax, tobacco, vegetables, and fruits also produced; stock-raising important industry, particularly in W.; sandstone, gypsum, limestone, granite, and petroleum found, besides smaller quantities of coal, zinc, and lead. Manufacturing industries are unimportant, except flour and grist milling and cotton-seed oil. Chief towns are Guthrie, Oklahoma City (capital), Shawnee, Muskogee, M'Alester, Tulsa, and Enid. Pop. (1910) 1,657,155.

Buck, *The Settlement of O.* (1907).

OKLAHOMA CITY (35° 30′ N., 97° 30′ W.), capital, Oklahoma, U.S.A.; cotton. Pop. (1910) 64,205.

OKUMA, COUNT SHIGENOBU (1837–), Jap. statesman; sought to introduce Western reforms, roused opposition and lost limb from bomb, 1889; revised international treaties; Premier, 1898–99.

OKYO, MARUYAMA (1733–95), Jap. artist; realist of remarkable gifts; painted all subjects, but excelled with birds and flowers. His influence was immense, and is still felt. See JAPAN (Art).

OLAF, OLÄUS, kings of Norway.—**Olaf I.** (969–1000), after piratical youth, introduced Christianity with great cruelty; leapt into sea after defeat by Danes and Swedes.—**Olaf II.**, *the Saint* (995–1030), also attempted to enforce Christianity.

ÖLAND, ŒLAND (57° 3′ N., 9° 34′ E.), Swed. island in Baltic; area, *c.* 520 sq. miles; produces cereals; town, Borgholm. Pop. 230,000.

OLBERS, HEINRICH WILHELM MATTHIAS (1758–1840), Ger. astronomer and physician; discovered minor planets *Pallas* (1802), *Vesta* (1807), and five comets; rediscovered *Uranus* (1781).

OLBIA, ancient port on E. coast of Sardinia; remains survive of Rom. city but not of previous Gk. town; called *Civita* in Middle Ages, and afterwards *Terranova*.

OLBIA (*Borysthenes*), ancient Gk. colony on Euxine, at mouth of Hypanis; established by Milesians, *c.* 655 B.C.; destroyed by Getæ, 50 B.C.; rebuilt by Romans; destroyed by Goths, *c.* 248 A.D.; interesting excavations.

OLD AGE PENSIONS.—Denmark led the way in

granting State pensions to old people (over 60) by Act of 1891. A Ger. Act of same year grants pensions to workmen over 70, who have qualified therefor by weekly contributions for 1200 weeks. The Brit. Statutes of 1908 and 1911 rejected the contributory principle. Qualifications for pension under these Acts are that the recipent shall be—(1) Brit. subject resident for 12 out of past 20 years in U.K.; (2) seventy years of age; (3) possessor of no more than £31, 10s. yearly income. Pensions, which rise to 5s. weekly, vary with pensioner's independent income. Since 1909 old age pensions have been paid throughout Australia by the Commonwealth Government. In New Zealand pensions are granted to male applicants of 65, women of 60. In 1910 an Act was passed in France enabling introduction of contributory system of old age pensions.

Sutherland, *Old Age Pensions*; Booth, *Old Age Pensions and the Aged Poor.*

OLD CATHOLICS.—On promulgation of the doctrine of papal infallibility by Vatican Council of 1870, some Roman Catholics (including renowned scholars like Döllinger) refused to accept the doctrine and were excommunicated. A conference took place at Munich, and others have been held since, with the result that an OLD CATHOLIC CHURCH was formed, and relations were entered into with the Eastern and Anglican Churches. There was further divergence from official Catholic doctrine, and only the Councils up to 787 were accepted. Marriage of the clergy and other departures from Roman tradition were sanctioned. Since its beginning the O. C. movement has not been very successful, its number remaining almost stationary. There are about 125,000 adherents in Germany, Austria, and Switzerland, some in Holland, one church in Paris, and some in America, and a few churches in Italy. The next revolt against the Roman Church from within was Modernism.

Scarth, *Old Catholic and Kindred Movements.*

OLD FORGE (41° 20′ N., 75° 45′ W.), town, on Lackawanna, Pennsylvania, U.S.A.; anthracite coal mines. Pop. (1910) 11,324.

OLD POINT COMFORT (37° 1′ N., 76° 16′ W.), watering-place, Virginia, U.S.A., at mouth of James River.

OLD RED SANDSTONE, see DEVONIAN SYSTEM.

OLD STYLE, see CALENDAR.

OLD TOWN (44° 55′ N., 68° 40′ W.), city, on Penobscot, Maine, U.S.A.; manufactures lumber. Pop. (1910) 6317.

OLD WIFE, or **OLD WENCH**, see TRIGGER FISHES.

OLD WORLD MONKEYS, see CERCOPITHECIDÆ.

OLDBURY (51° 38′ N., 2° 34′ W.), town, Worcestershire, England; iron- and steel-works. Pop. (1911) 30,240.

OLDCASTLE, SIR JOHN (d. 1417), Eng. Lollard; friend and companion of Prince Henry; imprisoned as heretic, 1413; escaped, failed in attempted risings, but remained concealed in Welsh Marches till 1417; hanged and burned.

OLDENBARNEVELDT, JOHAN VAN (1547–1619), Dutch statesman; accepted reformed religion and assisted house of Orange in freeing Holland from Spain; Advocate of Holland, 1586, and became chief authority in state; opposed Maurice of Nassau's foreign policy, 1600–9, and forced him to accept peace, when Spain agreed to recognise Dutch independence, 1609. Backed by States of Holland, O. raised troops to keep order in threatened religious strife of Armenians and Gomarists; arrested and beheaded.

OLDENBURG (53° 5′ N., 8° 10′ E.), grand-duchy of N.W. Germany; composed of (1) duchy of O., bounded N. by North Sea, W., S., and E. by Hanover; (2) principality of Lübeck (*q.v.*) since 1803; (3) principality of Birkenfeld (*q.v.*) since 1815. Total area is 2479 sq. miles; surface flat; coast district marshy, with rich agriculture and pasture land; inland known as Geest, chiefly heath and moorland; principal rivers, Weser, Hunte, Hase; several lakes; Oldenburg, capital. Counts of O. are first mentioned *c.* X. cent.; Christian VIII. became king of Denmark, 1448, Norway, 1450, Sweden, 1457; and gave O. to his bro. Gerhard, 1457; under Dan. rule, 1667–1773; became a duchy, 1777, a grand-duchy, 1815. O. has a Landtag (45 members). Prevailing religion is Prot. Industries include fisheries; extensive agriculture and fine live stock (especially horses). Pop. (1910) 391,246; with Lübeck and Birkenfeld, 483,042.

OLDENBURG (53° 8′ N., 8° 12′ E.), capital of Oldenburg, Germany; has grand-ducal palace, fine library, and art galleries. Pop. (1910) 30,242.

OLDHAM (53° 32′ N., 2° 8′ W.), town, Lancashire, England; one of leading cotton towns; also manufactures silks, machinery, leather. Pop. (1911) 147,495.

OLDHAM, JOHN (1653-83), Eng. poet; wrote *Pindaric Odes*; best known as a writer of satires against the Jesuits.

OLEAN (42° 5′ N., 78° 27′ W.), city, on Allegheny, New York State, U.S.A.; oil refineries. Pop. (1910) 14,734.

OLEANDER (*Nerium*), genus of evergreen plants, order Apocynaceæ; native of Asia, N. Africa, S. Europe; very poisonous.

OLEFINES, hydrocarbons (C_nH_{2n}) resembling the paraffins in physical properties; lower members are gases, higher are liquids or solids. *Ethylene* (C_2H_4), the simplest o., is formed by destructive distillation of coal; therefore present in coal gas. Higher o's exist in tar distilled from bituminous shales. Term 'olefiant' (oil-forming) was originally applied to ethylene, which, being unsaturated, forms an oily liquid ($C_2H_4Cl_2$) with chlorine.

OLEIC ACID ($C_{18}H_{34}O_2$), organic compound occurring in fats and oils, commonly prepared by saponifying an oil (such as olive oil), with the addition of lead acetate; the lead oleate thus formed is finally treated with hydrochloric acid, which extracts o. acid; colourless, solid, without smell; B.P. 223°.

OLÉRON (45° 57′ N., 1° 15′ W.), island, Charente-Inférieure, France, at mouths of Charente and Seudre.

OLFACTORY SYSTEM, THE, embraces the external and internal nose, which form air passages below and the organ of smell above. The upper part of the external nose is formed from the nasal bone and a process of the upper jawbone; the upper end is joined to the frontal bone, and beneath the lower end, the bridge, the upper and lower lateral cartilages and the smaller cartilagines *minores* define its shape. The internal nose consists of the two *nasal fossæ* (opening at the nostrils), separated by the *nasal septum*, which is covered by the mucous membrane of the nose. Each of the fossæ is occupied by three *turbinated* bones, which run horizontally from front to back, each being rolled up like a scroll, forming a space below for the passage of air. It is in the highest passage and turbinated bone that the olfactory nerve, or nerve of smell, terminates, ending in several branches which pass into the mucous membrane. The fossæ terminate at the back end in slits leading into the pharynx, and near the orifices of the Eustachian tube leading to the drum of the ear.

OLGIERD (d. 1377), grand-duke of Lithuania; extended territory at Russia's expense; defeated and drove back Tatar hordes. 1362.

OLHÃO (36° 58′ N., 7° 46′ W.), seaport, Portugal, on Atlantic; fisheries. Pop. 7300.

OLIBANUM, frankincense (*q.v.*).

OLIGOCENE SYSTEM, subdivision of Cainozoic or Tertiary series, resting on Eocene strata and beneath Miocene; divided into Hempstead Beds—freshwater marls and clays; Bembridge Beds—marls and limestones; Osborne Beds—freshwater clays, marls, sandstones, and limestones; Headon Beds—clays, marls, sandstones, and limestones.

In Britain O. strata are found only in Hampshire, Devonshire, and Isle of Wight. In France they overlie the Eocene of the Paris Basin, while in Germany

they form the oldest Tertiary rocks. The life of the O. period includes numerous palms and conifers, cowries, cones and spindle shells, lamellibranchs, paroquets, cranes, pelicans, etc., and among mammals many survivors from Eocene times.

OLIGOCHÆTA, EARTHWORMS, see under CHÆTOPODA.

OLINDA (7° 53′ S., 34° 54′ W.), town, Pernambuco, Brazil; formerly capital. Pop. 8200.

OLIPHANT, LAURENCE (1829–88), Brit. author; s. of Sir Anthony Oliphant, Chief Justice of Ceylon. His first works were books of travels called *A Journey to Khatmandu* and *The Russian Shores of the Black Sea.* These were followed by two important books on China and Japan, *Minnesota and the Far West* and a *Narrative of the Earl of Elgin's Mission to China and Japan in 1857–59.* His later years were devoted to occultism, the influence of which is seen in *Sympneumata, Scientific Religion,* and *Masollam.*

OLIPHANT, MARGARET OLIPHANT (1828–97), Brit. novelist; *née* Wilson; b. at Wallyford, Midlothian. She was a prolific writer of novels and critical sketches, and is most successful in depicting scenes from simple Scot. life.

OLIVARES, GASPAR DE GUZMAN, COUNT OF, DUKE OF S. LUCAR (1587–1645), Span. courtier and statesman; ruled Spain as chief favourite of Philip IV., 1621–43, and was made by nation and king scapegoat of disasters abroad; extravagant, corrupt, and inefficient; driven from office, 1643.

OLIVE (*Olea europœa*), tree, order Oleaceæ, cultivated from early times for its fruit, especially in Mediterranean region, to which it is indigenous. The fruit is plum-like and possesses an oily mesocarp from which o. oil (see OILS) is obtained by pressure. The cultivated form, unlike the wild parental stock, is thornless, and has larger and more oily fruit. The foliage is lanceolate and greyish green in colour, and the flowers have a tetramerous calyx and corolla, with two stamens and a bilocular ovary. The bottled fruits are unripe when gathered, and are preserved in brine mixed with certain aromatic substances. Among allied Eng. plants are privet, ash, and lilac.

OLIVEIRA MARTINS, JOAQUIM PEDRO DE (1845–94), great Portug. writer; b. at Lisbon. His first important work was *O. Socialismo,* which revealed his sympathy with the industrial classes. His *History of Portugal* is the work of a psychologist, sociologist, and moralist rather than of a historian.

OLIVENZA (38° 33′ N., 6° 58′ W.), town, Estremadura, Spain; fortified; tanning, potteries. Pop. 10,500.

OLIVES, MOUNT OF, MOUNT OLIVET (31° 47′ N., 35° 16′ E.), mountain ridge, E. of Jerusalem; favourite resort of Christ and disciples.

OLIVETANS, small mendicant order with Benedictine rule; founded, 1324; still exists.

OLIVINE, olive green mineral, occurring in lavas, basalts, gabbros, and sometimes in meteorites; composed of silicate of iron and magnesium. See CHRYSOLITE.

OLLIVIER, OLIVIER ÉMILE (1825–), Fr. statesman; one of 'The Five' who opposed Napoleon III.'s despotism; chief instrument in obtaining constitution of 1869; committed Princes Pierre Bonaparte and Joachim Murat for trial, 1870; held responsible for Franco-Prussian War, which overthrew his ministry; remained true to ideal of *L'Empire libéral,* whose history he wrote.

OLMÜTZ (49° 36′ N., 17° 16′ E.), town, Austria; archiepiscopal see; has fine Gothic cathedral; formerly an important fortress; besieged by Frederick the Great, 1758. Pop. (1911) 22,257.

OLNEY.—(1) (52° 9′ N., 0° 42′ W.) town, Buckinghamshire, England; residence of Cowper. (2) (38° 45′ N., 88° 10′ W.) city, Illinois, U.S.A.; flour-mills, iron foundries. Pop. (1910) 5011.

OLONETS (62° 30′ N., 37° E.), government, N.W. Russia; area, 49,355 sq. miles; contains Lake Onega; produces timber, cereals; manufactures iron goods, leather, flour. Pop. (1910) 443,400.

OLOPAN (VII. cent.), Nestorian missionary to China; first to introduce Christianity there.

OLORON-SAINTE-MARIE (43° 12′ N., 0° 35′ W.), town, Basses-Pyrénées, France; tanneries.

ÖLS, see OELS.

OLTENITZA (44° 8′ N., 26° 43′ E.), town, Rumania, at junction of Argesh and Danube; here Turks twice defeated Russians, 1853–54.

OLUSTEE (30° 12′ N., 82° 25′ W.), village, Florida, U.S.A.; here Confederates defeated Federals, 1864.

OLYMPIA, plain in Elis, in Peloponnesus, where celebrated Olympic games took place; bounded on W. by Cladeus and S. by Alpheus Rivers, on N. by group of hills, chief of which, Cronion, was sacred to Cronus. Situated on plain was Altis, or sacred Grove of Zeus, surrounded by walls with several gates, and containing temples, public buildings, and countless statues. Name O. was given to buildings in and around Altis. Principal features within Grove were: (1) Temple of Zeus Olympius, containing statue of Zeus by Pheidias and other famous statues; (2) Temple of Hera; (3) Temple of Mother of the Gods; (4) Pelopium, precinct, sacred to Pelops; (5) Philippeium, erected by Philip of Macedon to celebrate battle of *Chæronea*; (6) Treasuries; (7) Zanes, bronze statues of Zeus; (8) Great Altar of Zeus; (9) Prytaneum. Outside Altis were: (1) Stadium, in which foot-races and games were held; (2) Hippodrome, where chariot and horse-races took place; (3) Gymnasium and (4) Palæstra, both used for exercise of competitors; (5) Leonidæum; (6) Boulenterium or Council Halls; (7) Roman Triumphal Arch; (8) Roman house believed to have been occupied by Nero, and many other buildings. Festivals were celebrated every four years, and interval between called *Olympiad*; catalogue of victors began in 776 B.C. and ended *c.* end of IV. cent. A.D. Festivals were controlled by Pisa till its destruction by Eleans and Spartans, *c.* 572 B.C.

OLYMPIA (47° 3′ N., 122° 48′ W.), capital of state of Washington, U.S.A., on Puget Sound; lumber, industries. Pop. (1910) 6996.

OLYMPIAD, see CHRONOLOGY.

OLYMPIC GAMES, see ATHLETICS.

OLYMPIODORUS, name of several Gk. authors, especially (1) the historian of Honorius' reign, b. Thebes (Egypt), V. cent. A.D.; (2) a philosopher of Alexandria in V. cent. A.D., teacher of Proclus; (3) the last Alexandrian Neoplatonist, in VI. cent. A.D.; (4) the Aristotelian commentator, in VI. cent. A.D.

OLYMPUS.—(1) (40° 4′ N., 22° 20′ E.) mountain range, separating Macedonia and Thessaly; legendary home of the gods. (2) (39° 57′ N., 29° 20′ E.) mountain, on borders of Mysia, Bithynia, and Phrygia, Asia Minor.

OLYNTHUS, city of ancient Greece; became chief city of Chalcidice, 432, establishing Chalcidic Confederation, which extended power to Pella; might have been bulwark against Macedonia, but weakened by jealousy of Sparta and Athens; destroyed by Philip, 348.

OMAGH (54° 36′ N., 7° 19′ W.), county town, Tyrone, Ireland. Pop. 4900.

OMAHA (41° 23′ N., 96° 1′ W.), chief city, Nebraska, U.S.A.; capital of Douglas County, on Missouri River; public buildings include courthouse, Federal building, city hall, public library, and many educational establishments; chartered as city, 1857; headquarters of military department of Missouri; railway terminus; chief industries, refining and smelting works, distilleries, breweries, flour and grist mills. Pop. (1910) 124,196.

OMAN (22° 30′ N., 56° 30′ E.), Arab state, Arabia, between Persian Gulf, Gulf of O., and Ind. Ocean; area, 82,000 sq. miles; surface mountainous; capital, Muscat; produces fruits, vegetables, cereals. Pop. (1912) *c.* 500,000.

OMAR, see CALIPH.

OMAR KHAYYÁM, the astronomer-poet of Persia; b. Nishapur, Khorassan, *c.* 1050 A.D. He

co-operated in a wonderful reconstruction of the Persian calendar. As a poet he has great popularity owing to Eng. translations by Fitzgerald (*q.v.*).

OMAR PASHA, MICHAEL LATTAS (1806–71), Turk. general; writing-master to Abdul-Medjid; defeated Russians at Danube, 1853–54; repulsed 40,000 Russians at Eupatoria, Crimea, 1855; crushed rebellion in Bosnia and Herzegovina, 1861; captured Cettinje, 1862.

OMBRE, card game in vogue in England during reign of Queen Anne; mentioned by Pope; three or four may play; object is to win the pool; game is Span. in origin.

OMDURMAN (15° 36′ N., 32° 47′ E.), town, Egyptian Sudan, on Nile; trading centre; scene of Kitchener's victory over Khalifa, 1898. Pop. 45,000 (under 1000 Europeans).

OMEN, the divining of the future, in various religions. A very common method was to examine the entrails, especially the liver, of a sacrificed animal. Owing to the amount of blood it contained, it was natural to regard it as the seat of life. The exact steps by which it came to be believed that by the peculiarities of the liver the will of the gods could be ascertained, are uncertain. A regular system of interpretation came to be followed out, something like that of palmistry or phrenology. A system of divination was practised in Babylon before 2000 B.C., and in Greece and Rome in early times. Another system of taking omens in Rome was from the way the sacred chickens took their food. The flight of birds, especially eagles, was also watched for portents.

OMNIBUS (Lat. *omnibus*, 'for all'), vehicle introduced by Pascal, who obtained patent to run public coaches in Paris, 1662. Shillibeer (1797–1866) ran the first o. in London, 1829; and in 1832 the Stagecoach Act allowed o's to take up or let down passengers on the street. In 1855 the London General O. Co. was formed; roof-seats were first seen in 1857, by which date the G.O.C. had c. 600 'buses. Horse-o's are being rapidly superseded by motor-o's.

OMNIUM, JACOB, see HIGGINS, MATTHEW JAMES.

OMSK (54° 58′ N., 73° 24′ E.), fortified town, at junction of Om and Irtish, Russia; capital of general government of the Steppes and of province Akmolinsk. Pop. (1910) 90,200.

ON, see HELIOPOLIS.

ONAGER, see under HORSE FAMILY.

ONAGRACEÆ, a dicotyledonous natural order consisting chiefly of perennial herbs, though it includes a few shrubs and trees; leaves simple and flowers usually tetramerous, with inferior ovary; among better-known forms are willow herb (*Epilobium*), with plumed seeds, *Fuchsia*, *Œnothera* (evening primrose), and *Circœa* (enchanter's nightshade).

ONEGA (61° 45′ N., 35° 30′ E.), one of largest European lakes, in Russia; drains into Lake Ladoga; area, 3765 sq. miles.

ONEGLIA (43° 53′ N., 8° 2′ E.), town, on Gulf of Genoa, Italy; wine, oil. Pop. 8600.

ONEIDA (43° 7′ N., 75° 40′ W.), city, New York State, U.S.A., on Oneida Creek; wagon-works. Pop. (1910) 8317.

ONEIDA COMMUNITY, famous Amer. settlement, founded by John Humphrey Noyes at Putney, Vermont, 1838, and removed by him to neighbourhood of Oneida (*q.v.*), 1847. Plan is original Christianity, combining communism, trade, and 'the simple life'; communism extended to wives till interference of legislature, 1882, but deeply religious character of settlement prevented 'complex marriage' system degenerating into 'free love'; community prospered, and was formed in 1881 into Oneida Co. Ltd., which has now large capital, and is noted for quality of its manufactures and agricultural produce; model villages are built for employees.

O'NEILL, Irish family; lords of Tyrone; descended from famous Irish king **Niall** (d. 405), s. of King Eochaidh Muighmheadhoin, and called 'of the nine hostages'; frequent figure in Irish legend and history; among his fourteen sons were Laeghaire, ancestor of O'Coindhelbhains; Conall Crimhthainne, ancestor of O'Melaghlins; Fiacha, ancestor of MacGeoghegans and O'Molloys; Maine, ancestor of O'Catharnaighs; Eoghan, ancestor of O'Neills; and Conall Gulban, ancestor of O'Cannanains and O'Donells. Eoghan's descendants were many of them prominent early kings of Ireland, among them being 'NIALL OF THE THREE SHOWERS' (715–78), his grandson, NIALL (791–845), and the latter's grandson, **Niall** (c. 870–919), famous in song, with whom the patronymic *O'Neill* begins. HUGH O'N., lord of Tyrone, led opposition to English under John; The O'N. held one of the four kingships into which Ireland was at that time divided. Con Bacagh O'N., 'the lame,' s. of Con O'N., lord of Tyrone, became The O'N., 1519, but after years of warfare submitted to English, and received title, 'Earl of Tyrone'; Shane O'N. (c. 1530–67) appeared at Eng. court with his followers in wild costumes designed to deceive English. Turlough was elected as The O'N. on Shane's death, but resigned dignity to Earl Hugh, 1593; after repeated rebellions Hugh lost earldom, 1614; his famous nephew, Owen Roe O'N. (d. 1649), General of the Confederates, 1642, was last to claim title.

ONEONTA (42° 25′ N., 75° 5′ W.), town, on Susquehanna, New York State, U.S.A.; railway repair-shops. Pop. (1910) 9491.

ONION (*Allium cepa*), a Liliaceous plant of Asiatic origin, cultivated for culinary purposes; possesses a tunicate bulb, and hollow, centric leaves; flowers white, and arranged in cymose umbels.

ONORE, see HONAWAR.

ONTARIO (43° to 57° N., 79° to 95° W.), province of Dominion of Canada, bounded on N. by Hudson Bay, W. by Manitoba, S. by Great Lakes and Minnesota, E. by Quebec; length from E. to W. about 1000 miles; area, *c.* 370,000 sq. miles; surface undulating; highest point not exceeding 2000 feet, northern part undeveloped and swampy; Laurentian Plateau in E., mostly waste land; large forests; soil fertile; magnificent scenery (Niagara Falls, Great Lakes, Thousand Islands, etc.); rivers include Ottawa (part of boundary between Ontario and Quebec), Albany, Trent, Niagara, St. Lawrence, Severn, Maganetawan, Trench; numerous large lakes—Superior, Huron, Ontario, Erie, Nipigon, Nipissing, Simcoe, Lake of the Woods, etc.; fauna includes wolf, fox, mink, skunk, bear, moose, caribou, otter; principal towns are Toronto (capital of Ontario), Ottawa (capital of Dominion), Kingston, London.

O. was first visited and explored by Champlain, 1613, 1615; mission founded among Indians, 1615; influx of Amer. loyalists took place, 1782–84; became a separate province and called *Upper Canada*, 1791; joined Dominion of Canada as province of Ontario, 1867; part of Keewatin named 'Patricia' (147,000 sq. miles) added, 1912.

O. is administered by lieut.-gov. and executive council, and legislative assembly; entitled (1913) to 24 seats in Federal Senate, 82 in House of Commons. Education is nominally compulsory; Toronto univ., Queen's univ., and military coll. at Kingston, etc.; important agricultural coll. at Guelph. Methodists predominate, then Presbyterians, R.C's, Anglicans, Baptists. There are about 6000 miles of railway; several important canals (Welland between Erie and Ontario, Rideau between Kingston and Ottawa, etc.). Chief products are cereals, hemp, tobacco, sugar-beet, tomatoes, fruits, furs; manufactures, agricultural implements, cotton and woollen goods, leather, iron- and hard-ware, machinery, carriages, furniture, lumber trade; rich in minerals except coal; nickel, copper, iron, silver, gold, lead, gypsum, etc.; numerous petroleum wells. Pop. (1911) 2,523,208. See CANADA.

ONTARIO, LAKE (43° 30′ N., 78° W.), smallest and most easterly of five Great Lakes of N. America; length, 195 miles; extreme breadth, 55; greatest

depth, 738 ft.; area, 7240 sq. miles; shores flat; subject to violent storms; connected with Lake Erie by Welland Canal.

ONTENIENTE (38° 53′ N., 0° 39′ W.), town, Valencia, Spain; textiles. Pop. 12,500.

ONTOLOGY, science of Being as Being (Gk. *on, ontos*, being). See METAPHYSICS.

ONYCHOPHORA, class of Arthropods; see PERIPATUS.

ONYX, variety of agate (*q.v.*), consisting of alternate layers of white and black, or white and brown chalcedony; found in river gravels in Deccan (India) and used for cameos, brooches, etc.

OODEYPORE, UDAIPUR (*q.v.*).

OOLITE (Gk. 'egg-stone'), variety of limestone composed of very small clustered globules resembling fish roe. The Oolite series of strata consist of limestones, calcareous sandstones; they are members of the Mesozoic or Secondary group; underlie the Cretaceous formations, and rest on the Lias; subdivided into Upper, Middle, and Lower groups, and contain numerous interesting fossil remains, including over 200 species of ammonites.

OONALASHKA, UNALASKA, see ALEUTIAN ISLANDS.

OOTACAMUND, UTAKAMAND (11° 24′ N., 76° 44′ E.), town, sanatorium, Nilgiri Hills, Madras, India. Pop. 16,000.

OOZE, see FORAMINIFERA, DIATOMACEÆ.

OPAH, KING-FISH, MOON-FISH, or JERUSALEM HADDOCK (*Lampris luna*), a large, compressed, bright red and green, bony fish, sometimes 6 feet long; found rarely in the Pacific, but chiefly in the North Atlantic and occasionally in British waters.

OPAL, gem-stone, consisting chiefly of silica and water; since ancient times prized on account of its beautiful colours; found in Hungary, Saxony, and S. America; chief varieties—*Precious* or *noble opal* (brilliant reflected colours), *fire opal* (red reflections), *common opal* (white reflections), and *semi-opal* (opaque).

OPALINA, see under INFUSORIA.

OPEN SPACES, see COMMONS.

OPERA, a work for the stage, in which music, words, action, and scenery combine to represent a certain story. The essentials of the form are as old as Grecian art; but it was not until the end of the XVI. cent. that the first specimens of o., as we now understand it, were produced. These tentative efforts—*Daphne* (1594) and *Eurydice* (1600)—were the work of a Florentine, Jacopo Peri, who wrote, as he averred, 'to test the effect of the kind of melody said to be the same as that used by the ancient Greeks and Romans throughout their dramas.' Following him came Claudio Monteverde (1566–1650), a Milanese, who gave o. a fresh complexion, and even foreshadowed Wagner in some of his effects. A new epoch opened with the Neapolitan Alessandro Scarlatti (1659–1725), the real founder of Ital. o. so called—that form in which melody takes the chief place, with the singer as the leading personage. Meanwhile, o. had been establishing itself outside Italy. In 1645 it was transplanted to France by Cardinal Mazarin, and some thirty years later was introduced to Germany. In England, Henry Purcell (1658–95) wrote no fewer than thirty-nine works for the stage; and there Ital. o. received a further fillip when Händel subsequently established himself in London. Gluck (*q.v.*) introduced certain forms also, anticipating Wagner. A host of minor composers essayed the form before Mozart touched it to such splendid purpose in *Don Giovanni*, *Figaro*, and other o's. Later, Rossini raised Ital. o. to further heights, seconded by Bellini and Donizetti. In Germany, Weber and Meyerbeer; in France, Auber, Boieldieu, Gounod, Thomas, and Bizet all wrote valuable works. The part of Wagner (*q.v.*) in the process of development was unique. Later composers like Mascagni, Puccini, Leoncavallo, Strauss, and Debussy have not essentially advanced the form.

Arthur Elson, *A Critical History of Opera* (1905).

OPHICLEIDE, brass-wind instrument of the family of bugle horns with keys; in reality, the bass of the military bugle. O's of various sizes and different keys were formerly used, but only those in B flat and C are now employed in orchestras, and these infrequently. The tone, so powerful that it has been described as a 'chromatic bullock,' prevents its blending satisfactorily with other brass instruments, hence it is often replaced by the tuba.

OPHIDIA, Snakes (*q.v.*).

OPHIOGLOSSALES, see PTERIDOPHYTA.

OPHIR, a region, whose exact locality is disputed, famed for its gold. From Ophir the ships of Solomon brought gold, silver, and jewels. Probably it was the country at the mouth of the Indus.

OPHISTOBRANCHIATA, an order of Gastropod Mollusca. See GASTEROPODA.

OPHITES (Gk. *ophis*, serpent), ancient Gnostic sect; they had a strange and elaborate cosmogony, in which the world is created by Ialdaboth.

OPHIUROIDEA, see ECHINODERMATA.

OPIE, JOHN (1761–1807), Eng. painter; noted pictures are *Murder of Rizzio*, *Arthur and Hubert*, *Juliet in the Garden*.

OPINION, affirmation aiming at truth, but not claiming more than approximate truth; unlike a hypothesis, does not look for future verification.

OPITZ VON BOBERFELD, MARTIN (1597–1639), Ger. poet; b. Bunzlau; wrote *Trostgedichte in Wiederwärtigkeit des Krieges*, *Zlatna* (epics), *Buch von der Deutschen Poeterey* (prose work), besides numerous translations.

OPIUM, dried, milky juice (*latex*) of unripe capsules of the poppy—*Papaver somniferum*. It was known to Theophrastus (III. cent. B.C.). The greatest amount of o. is produced by India, about 80,000 chests, each containing 1 Chin. picul (133⅓ lb.), being exported annually, nearly all to China, while about 5000 chests were consumed annually in India itself, before 1907. In 1907, on the Chin. Government attempting to put down the use of o., the Brit. Government offered to reduce the export of Indian o. to China by one-tenth each year, so that in ten years the export to China would cease altogether, but only on condition that China should reduce her native production at the same time. In 1911 an agreement between Britain and China provided for the complete stoppage of importation from India in seven years, on condition that China should stop producing o. In 1912 China failed to carry out the bargain; she increased the area of production and imposed duties on Ind. o.

A conference of the Powers at The Hague, Jan. 1912, drew up a Convention of 25 Articles by which they agreed to control the supply of and gradually suppress the manufacture of o. Persia exports about 10,000 chests of opium, partly to China and partly to Europe, while Asia Minor exports about 7000 chests, practically all to Europe.

The o. poppy is cultivated from seed sown from Nov. to March, and successive crops are ready from May to July. The flowers are white or purplish; and a few days after the petals have fallen, when the capsules are about 1½ inches in diameter, they are cut round the middle with a knife, and left overnight for the juice to flow out and harden. After further drying on poppy leaves, the dark, plastic masses are made into lumps for sale.

Opium is bitter, and has a characteristic smell. Its properties depend upon the 19 or 20 alkaloids it contains. The chief of these are: *morphine*, $C_{17}H_{17}NO(OH)_2$ (1·6–17 %, average, 9 %); *narcotine*, $C_{19}H_{14}NO_4(OCH_3)_3$ (5 %); *papaverine*, $C_{16}H_9N(OCH_3)_4$ (0·8 %); *thebaine*, $C_{17}H_{15}NO(OCH_3)_2$ (0·4 %); *codeine* or *methylmorphine*, $C_{17}H_{17}NO(OH)(OCH_3)$ (0·3 %); *narceine*, $C_{30}H_{29}NO_9(OCH_3)_2$ (0·2 %). All these bases are combined in o. with meconic acid, $C_3HO_3(OH)(COOH)_2$, lactic or sulphuric acid, and there are present also ammonium salts, mucin, pectin, albumin, caoutchouc, wax, etc. Morphine (*q.v.*), the most important alkaloid, is separated from the others by extracting the opium with hot

water, and boiling the extract with milk of lime. Alcoholic tincture of o. is known as *laudanum* (q.v.). It contains about 0·75 % of morphine.

O. is used medicinally, mainly to relieve pain and to produce sleep, and for this purpose is best given hypodermically as morphine. It is also employed to relieve vomiting, to stop diarrhœa, to lessen distressing coughing, to stop bleeding in the stomach and intestines, while it is valuable in heart disease, diabetes, in cystitis and other inflammatory conditions, for hæmoptysis, and, as Dover's powder, to cause perspiration in, for instance, common cold. Externally the *linamentum opii* and fomentations sprinkled with laudanum are of value in relieving pain.

O. is sometimes eaten; its stimulating effect is followed by depression, which produces a craving for more. Most o. grown is used for smoking, the Chinese being specially addicted thereto. The evil effects of o.-smoking have been disputed; certainly they are not so great as those of eating the drug, and probably the smoke contains no morphine. Nevertheless, the Chinese are overcoming the habit; public burnings of o.-pipes are taking place, and whole districts are being denuded of the poppy. O. is very poisonous; ½ grain has proved fatal to an infant, and 4 grains to an adult. In acute o.-poisoning there may be excitement at first, but drowsiness soon comes on, followed by deep coma. At first the patient can be roused, but later this is impossible. The pupils are contracted, reflexes are abolished, the skin cold, face and lips livid, the pulse slow and weak, and there is, later, profuse perspiration. The breathing becomes slower, more irregular, and more difficult, and, if treatment is unsuccessful, the patient dies of asphyxia. The treatment is to wash out the stomach with dilute permanganate of potash, give emetics (apomorphine hypodermically), keep the patient awake by walking him about, flapping him with a towel, applying electric current. Strong coffee is injected into the rectum and a suboutaneous injection of atropine sulphate, an antidote to morphine, is given, while oxygen and amyl nitrite inhalations are valuable. This treatment is continued for many hours if necessary.

A person addicted to o.-eating or the morphine habit is usually pale, with dull eyes, suffering from nervous irritability, dyspepsia, and circulatory disturbances, with sometimes albuminuria or glycosuria (albumen or sugar in the urine). The treatment of the condition is to isolate the patient, gradually diminish the amount of o. or morphine, until in a fortnight the quantity has been reduced to nothing. Sudden cessation of the drug may cause serious nervous disturbances and collapse. Cure is usually effected at the end of a few weeks, but relapses are unfortunately common.

OPLADEN (51° 5′ N., 7° E.), town, on Wupper, Rhine province, Prussia. Pop. (1910) 9390.

OPON (10° 15′ N., 124° E.), town, Cebu, Philippine Islands; scene of Magellan's death, 1521. Pop. 13,000.

OPORTO (41° 7′ N., 8° 33′ W.), city, on Douro, Portugal; in province of Entre-Douro-e-Minho; prominent seaport and large commercial centre; notable features are cathedral (XII. cent.), São Martinho (founded *c.* 560), São Francisco (XV. cent.); Nossa Senhora da Serra do Pilar (Augustine convent, now barracks), São Pedro (Capuchin convent, now public library, museum, and art academy); Ponte de Dom Luiz (iron bridge with single arch of 560 ft.); fine public parks; originally *Portus Cale* before Roman conquest; taken by Visigoths, 540 A.D.; in Moorish hands, 716–1092; prominent through Portug. history; taken by French, 1809; centre of port wine trade; woollens, silks, hats, cork-cutting, tanning, soap, tobacco, shipbuilding, iron and steel goods, leather, etc. Pop. 170,000.

OPOSSUM SHRIMPS, see under MALACOSTRACA.

OPOSSUMS, see under MARSUPIALS.

OPPELN (50° 40′ N., 17° 54′ E.), town, on Oder, Silesia, Prussia; cement, beer. Pop. (1910) 33,907.

OPPENHEIM (49° 51′ N., 8° 15′ E.), town, on Rhine, Hesse, Germany; wine; destroyed by French, 1689. Pop. (1910) 3739.

OPSONIC INDEX, see BACTERIOLOGY.

OPTIC NERVE, see EYE.

OPTICS, science of Light (*q.v.*).

OPTIMISM, see PESSIMISM.

OPTION, right to demand sale of ('call o.') or right to sell ('put o.') stock on a future day at price fixed on day of granting o. A *straddle o.* is a 'put and call o.' in the same stock.

ORACLE, a sacred spot where a god is supposed to answer questions or make known his will. O's have existed among various peoples and in various religions, but they were a special characteristic of ancient Greece. The most famous was the o. at Delphi (*q.v.*). One chief way of consulting an o. was by omens, thus, if the animal sacrificed showed certain characteristics, various inferences were drawn. The other oracular method was by means of ecstasy. Certain natural gases in a cave threw a priestess into a frenzy, and the cries she uttered were interpreted by priests to those who inquired of the o. The Delphic o. was of some political importance, and by the advice given often helped to determine the foundation of Gk. colonies. The opinion of competent scholars as to the general moral effect of the Delphic o. is, on, the whole, favourable, particularly in insisting on the wrong involved in taking human life, and stressing the moral impurity incurred in murder and not merely the ritual uncleanness in homicide as such. Some sayings of the Pythoness (the priestess of Apollo) have come down to us; many are probably spurious. The Delphic o. waned in influence in the III. cent. B.C., but continued some time longer. Other famous o's were those at Cumæ, Delos, Dodona, Epidaurus (*qq.v.*).

Farnell, *Cults of the Greek States*.

ORAN (35° 40′ N., 0° 38′ W.), fortified seaport, Algeria, on Mediterranean; contains Grand Mosque, Roman Catholic cathedral, Château Neuf (1563), Château Vieux (citadel), Fort de la Moune, museum, etc.; taken by Spaniards from Moors, 1509; flourished in XV. cent.; abandoned after severe earthquake, 1792; taken by French, 1831; chief exports are wool, cereals, wine, grain, esparto grass, cattle, sheep, hides, tomatoes, potatoes. Pop. (1911) 123,086.

ORANG, ORANG-UTÁN (*Simia*), a genus of Simian Apes (see under PRIMATES), found in the forests of Sumatra and Borneo; vegetarian and arboreal; with brain most like that of man.

ORANGE (40° 47′ N., 74° 14′ W.), town, New Jersey, U.S.A.; large manufacture of hats. Pop. (1910) 29,630.

ORANGE (33° 15′ S., 149° 10′ E.), town, health-resort, New South Wales; gold and silver mines. Pop. 7600.

ORANGE (44° 7′ N., 4° 49′ E.), town, on Aigue, France; in department Vaucluse with Notre Dame; has fine Roman remains (triumphal arch, theatre, etc.); capital of independent principality, XI. cent.; passed to house of Nassau, XVI. cent.; acquired by France, 1713; silks, textiles, etc. Pop. 10,600.

ORANGE, largest S. African river; rises in Kathlamba Mts., in E. of Basutoland, and winds *c.* 1000 miles W. to Atlantic; separates Cape Province from Orange Free State, Griqualand West, Bechuanaland, and German Namaqualand. Chief tributaries are Caledon and Vaal; volume varies greatly in dry and wet seasons; mouth obstructed by a bar.

ORANGE, fruit of *Citrus aurantium*, a tree included in the Rutaceæ, to which the lemon and the lime also belong. Among sweet varieties may be mentioned the Jaffa and the Tangierine; the Seville, or bitter o. (*C. vulgaris*, or *C. Bigaradia*), is used for marmalade, and the Bergamot o. (*C. Bergamia*) yields oil of Bergamot, used in perfumery. O. trees are very prolific, and bear glossy, evergreen foliage and masses of white, sweet-scented flowers, which yield oil of neroli on distillation (see OILS). The o. is a native of Asia,

probably of Chino-Jap. origin, and was first introduced into Mediterranean countries by the Portuguese, still prominent among its cultivators and exporters. O's for export, being collected whilst green, lack the delicate flavour which characterises the naturally ripened fruit.

ORANGE FREE STATE, Oranje Vrij Staat (27° 31′ S., 25° 30′ E.), inland province of the Union of South Africa; bounded N. and N.W. by Transvaal, W. and S. by Cape Province, E. by Basutoland and Natal; length from N.E. to S.E., *c.* 350 miles; breadth, 180 miles; area, 50,392 sq. miles. The surface is an immense plateau from 3000 to 5000 ft. above sea-level, generally flat with a few low ridges and numerous isolated hills, known as *kopjes*, not exceeding 7000 or 8000 ft. On the borders of Natal (S.E.) are the Drakensberg Mountains, with part of Mont aux Sources (11,000 ft.), Platberg (8000 ft.), Melanies Kop (7500 ft.), Draken's Berg (5682 ft.) in the O. F. S. Rivers are few: Vaal (boundary between Transvaal and O. F. S.), Orange (boundary between Cape Province and O. F. S.), Modder, Caledon, Klip, etc.; none navigable; no lakes. Climate is very healthy, but dry and hot; annual rainfall, *c.* 20 to 30 in. in northern provinces; average rainfall, *c.* 14 in. in W. and S.W., where droughts are common and severe; hottest in W., where temperatures of 105° F. are not unusual. Flora is scanty; the plains are generally covered with grass after rains, but for many months they are dry and barren; few trees (viz. willow, mimosa, acacia, euphorbia, gum, pepper-trees, aloe, etc.); large tracts of pasture and arable land, though only a small area is under cultivation (mainly N. and E.). Fauna includes hyena, lynx, baboon, monkey, ant-bear, wild-cat, jackals, springbok; numerous snakes, tarantulas, scorpions; destructive locust plagues.

History.—O. F. S. was originally inhabited by Bushmen, Hottentots, and Bantu tribes. Boer settlements were made, 1824; 'Great Trek' by Boers from Cape Colony and agreement with Bantuang chief ceding country between Vet and Vaal Rivers to Boers, 1836, and Republic proclaimed with Piet Retief as first Commandant-General; annexed by Great Britain, 1848; became an independent Dutch Republic, 1854, with President (elected for 5 years), Executive Council, and *Volksraad* (Parliament); enjoyed excellent government under distinguished Pres. (Sir) John Brand, 1864–88; warred with and defeated Moshesh, 1867; 'Conquered Territory' acquired and boundaries fixed, 1870; Kimberley diamond fields (discovered, 1867) annexed by Britain, 1871; compensation of £90,000 paid to O. F. S. Government; Reitz president, 1889–96; Steyn president, 1896–1900; having formed alliance with Transvaal, O. F. S. joined that republic in South African War, 1899–1902; annexed by Britain, 1900, and made Crown Colony as **Orange River Colony**; responsible government granted, 1907; joined Union of South Africa, 1909, its old title, 'Orange Free State,' being restored.

Government.—The province is divided into 24 districts; administered by Administrator, Provincial Council (25 members elected for 3 years), and Executive Committee (4 members); there are 39 municipalities. Principal towns are Bloemfontein (capital), Kroonstadt, Heilbron, Ladybrand, Harrismith. Dutch Reformed Church predominates; majority of population is Dutch-speaking. Education is generally compulsory; elementary and secondary education is under the control of Provincial Council (until 1915); higher (univ.) education in under the Union Government. The province has over 500 government and government-aided schools; Grey Univ. College (Bloemfontein). Principal products are wheat, maize, Kaffir-corn, fruit, tobacco; important stock-rearing (sheep, cattle, horses, ostriches); coal mines in N.; diamond mine at Jagersfontein in W.; salt-pans near Bloemfontein; chief exports are wool, skins, ostrich feathers, hides, mohair, mealies, wheat, meal, and dairy produce. Dairy farming is extending. Pop. (1911) 526,906 (including 175,435 whites). See South Africa.

ORANGEBURG (33° 30′ N., 80° 50′ W.), city, on North Fork of Edisto, S. Carolina, U.S.A.; cotton industries. Pop. (1910) 5906.

ORANGEMEN, association of Protestants who uphold Prot. succession to Brit. throne and Prot. religion in Church and State as laid down in Bill of Rights and Act of Settlement, 1688. Its aims were formulated (1688) by Dr. Burnet, William, Prince of Orange's chaplain. The association still exists, but the term O. is generally used of Ulster Protestants who celebrate anniversaries of the Siege of Londonderry, Battle of the Boyne (July 1), William's landing at Torbay (Nov. 5). It is divided into lodges united in each country in a grand lodge.

ORANIENBAUM (59° 52′ N., 29° 45′ E.), town, summer resort, on Gulf of Finland, Russia. Pop. 6200.

ORATORIO, a sacred musical composition of an extended nature, the words generally taken from Scripture. The term comes from the *Oratory* in which St. Philippo Neri assembled his congregation to listen to tentative experiments of the kind. The first o's dealt almost exclusively with Christ's sufferings, and consisted chiefly of antiphonies and short choruses. Ital. composers, like Scarlatti and Carissimi, subsequently selected other Biblical subjects for treatment; but it was not until the master-mind of Händel (*q.v.*) operated on the form that o. assumed its highest power and interest. Händel's *Messiah* still remains the most popular of all o's, the leader in a splendid series, which includes *Israel in Egypt*, *Samson*, and *Judas Maccabæus*. After Händel, as a master of o., came Mendelssohn (*q.v.*), whose *Elijah* and *St. Paul* occupy a front rank. Haydn's *Creation* stands in a manner by itself, the style being somewhat light and the text a hybrid re-cast of Scripture and *Paradise Lost*. Later o's, such as Gounod's *Redemption* and certain specimens by Brit. composers, do not seem made for permanence.

Patterson, *Story of Oratorio* (1902).

ORBETELLO (42° 27′ N., 11° 13′ E.), town, Grosseto, Italy, near Mediterranean. Pop. 7600.

ORBIT (Lat. *orbis*, 'a ring'), path followed by a celestial body in its revolution round (1) its primary, or (2) a common centre of gravity. The earth's o. round the sun (which it takes 365 days, 6 hours, 9 mins., 9 secs. to complete) is 186 million miles in diameter, whilst that of Neptune, the farthest known planet, has a diameter of 5580 million miles. The o. of the earth around the sun is regarded as the plane of the solar system for convenience.

ORCAGNA, the corrupted nickname (from Arcagnuolo, 'archangel') of Andrea di Cione (*c.* 1308–? 1368), painter, sculptor, and architect; b. Florence. He was architect of the church of Or San Michele there, the marble tabernacle of which is his *chef-d'œuvre*. Orvieto Cathedral was also built from his designs. The majority of his paintings, chiefly frescoes and panel pictures, were done for Florence churches. One is now in the National Gallery, London.

ORCHARDSON, SIR WILLIAM QUILLER (1835–1910), painter; b. Edinburgh and studied there under Scott Lauder. He was elected A.R.A., 1868, and R.A., 1877. He was in the front rank of genre-painters, and many of his pictures, from 'The Challenge' of 1865 onwards, achieved deserved popularity.

ORCHESTRA, a term applied in three distinct senses: (1) to the space occupied by the players in a theatre; or, in a concert room, to both players and chorus; (2) to a body of players collectively; (3) to the united groups of instruments upon which they perform. The latter is the most usual sense of the term. In this case an o. includes three different classes of instruments—stringed instruments, wind instruments (subdivided into wood and brass), and instruments of percussion. The term 'band,' often regarded as synonymous, has a more restricted meaning.

ORCHESTRATION, see Instrumentation.

ORCHHA (25° N., 79° E.), native state, Bundelkhand, Central India. Pop. 325,000. Capital, Tehri.

ORCHIDS (*Orchidaceæ*), family containing the most specialised of monocotyledonous plants; characterised by their herbaceous nature, entire and parallel-veined leaves, and irregular flowers with six petal-like segments, one of which forms a variously modified lip. O. occur all over the world, but are most common in tropical countries. In temperate regions generally terrestrial, thousands of tropical species are epiphytic, growing upon branches of jungle undergrowth and trees, without being parasitic. Almost all are specially modified for insect fertilisation, most interesting being the arrangement of pollen in club-shaped pollen masses or pollinia, which become glued to the head of any insect seeking the flower's nectar, and are so borne to other flowers. O. are extensively cultivated for the variety and beauty of shape and colour; from several species of Orchis salep is prepared, and vanilla from unripe fruit of *Vanilla planifolia*.

ORCHIL, ARCHIL (*q.v.*).

ORCHOMENUS.—(1) ancient Gk. city of Arcadia. Its kings were supreme in Arcadia till VII. cent., when they abandoned Messene to Sparta; site of modern Kalpaki. (2) ancient Gk. city of Bœotia; capital of prehistoric race Minyæ; superseded by Thebes; important excavations.

ORDEAL, the appeal to a supernatural power to settle by some sign a legal decision, has been practised very widely, particularly in the Middle Ages. A favourite method of ordeal was that of making the accused person carry a lump of red-hot iron or walk over red-hot ploughshares. If he escaped unscathed he was innocent. Sometimes he had to plunge his arm into boiling liquid. The guilt of a person could be proved by giving him food, which, if he were guilty, would stick in his throat. This last, in certain circumstances, it is possible to do without injury. If a murderer approached the corpse of the person he had murdered, blood, it was thought, would flow out afresh from the wounds.

ORDERIC VITALIS (*c.* 1075–1142), mediæval chronicler; b. near Shrewsbury; became priest in Abbey of St. Evroul, Normandy, and devoted leisure to historical research. His *Historiæ Ecclesiasticæ* is a history of England and Normandy.

ORDERS, HOLY, the state of those who have entrusted to them the power of exercising certain functions in the Christian Church. Thus the Anglican Church recognises three orders—bp's, priests, and deacons; the R.C. Church calls these (with the subdeaconate) the *major orders*; the *minor orders* are acolytes, exorcists, readers, and doorkeepers, but these are now only preliminaries to the priesthood. The Eastern Churches have the same major orders, but only readers besides; the Armenian hierarchy is the same as the Roman. Most Prot. Churches have not episcopal government, though the Lutheran Churches of Scandinavia and some others retain bp's; but a sacerdotalism, and hence 'holy orders' in the Catholic sense, does not exist. There has been much controversy between Roman and Anglican theologians as to the validity of Anglican orders, but in the bull *Apostolicæ curæ* of 1896 Leo XIII. declared them to be invalid. In the Gk. Church, however, Anglican orders are recognised.

The early history of orders in the Christian Church is much disputed. Some deny the Catholic claim that the threefold ministry existed from the beginning. Presbyterians defend their Church government on historic grounds. It is probable that at first (*e.g.* in the New Testament) bp's and presbyters were not differentiated. In the early II. cent. the monarchical episcopate was evolved. See BISHOP.

Gore, *Church and Ministry, Orders and Unity*; Lindsay, *Church and Ministry in Early Centuries.*

ORDERS OF KNIGHTHOOD, see KNIGHTHOOD.

ORDINANCE, former method of legislation. Act of Parliament requires consent of full Parliament—Crown, Lords, Commons; o's might be issued by any of the three.

ORDINARIES, see HERALDRY.

ORDNANCE.—At the close of the Four Years War in America (1861–65) no fewer than 47 types of o. were in use by the Federal and Confederate armies, and in 1866 the Prussians introduced breech-loading steel guns at Königgrätz. At this time Austria, France, Italy, Prussia, and Russia each had 24 to 37 types—breech-loading and muzzle-loading, rifled and smooth-bored guns, howitzers and mortars—of steel, cast-iron, and bronze. Britain had 10 types of field artillery, from 6-pounder rifled B.L. guns to 32-pr. S.B. howitzers, and 46 types of siege and garrison artillery. The projectiles of the period were 'case' and solid shot; common, segment, and shrapnel shells; carcasses and rockets. The Armstrong 18-pr. had a range of 7550 yards with an elevation of 33°, and the 7-inch rifled gun (or 68-pr. S.B. gun) fired shot which at 1000 yards penetrated nearly 25 feet of earthen parapet. Probably few specimens of all this artillery exist to-day except in museums; and so it is hardly worth while here to attempt more than to show the character and distribution of the guns produced in the XX. cent., so far as the details are made public, and premising that the appearance of a new weapon or a new projectile would render all existing types obsolescent.

Indeed, invention is only checked by economy—for example, the adoption of a pointed shell (which would give a longer range and a flatter trajectory) would render the existing limbers and wagons useless (the pointed shell would be too long for them), while all the stores of shells accumulated would be wasted and all sights on gun mountings would have to be re-graduated. The larger the army the more serious would be the drain on its financial resources if a complete re-armament took place. Germany and Austria both need a new field gun, and both hesitate to embark millions of pounds on a weapon which may soon become obsolete, so busy are inventors of warlike material to-day.

The power of field artillery is limited by the extreme weight which can be drawn by a handy team, say, 6 horses. The weight of field guns in cwts. varies as follows: England 40, Russia 38½, Austria 37½, France 37, Germany 34·4, Spain 34, Italy 33½; but the extra weight of the Austrian gun is due to using bronze instead of steel, while the lightness of Italian and Spanish guns is necessitated by the small size of their horses. Howitzers are no heavier, though they throw a heavier shell, because the tube is shortened for high-angle fire.

In the field, two shells are used: (*a*) Shrapnel, for disabling men; (*b*) High Explosive, for destroying guns, houses, earthworks, etc. Shrapnel are burst in the air by using a time fuse. H.E. shells detonate on impact, and shrapnel may be made to burst on impact by using a percussion fuse.

The proportion of field guns to 1000 bayonets is in Germany 6–4, France 4–8, Russia 4–4, Japan 4–1, Italy 3–4, United States 3–3, Austria 3–25. This calculation is based on the army corps, except as regards Japan, which like Great Britain has no higher organisation than the division.

The range of foreign guns varies from 9000 yards (France) to 6000 yards (Russia and Italy), and no distinction is made between horse and field artillery: the range of heavy guns is about 10,000 yards. France has decided (December 1912) to adopt a new type of gun for horse artillery of the same calibre as the field gun (2·95 inches or 75 mm.), but half a ton lighter; it is made at the Creusot Works. The late General Langlois promoted the new theory that rapidity of fire is more important than mathematical accuracy of aim, and caused the reduction of guns in a field battery from 6 to 4 in order to provide additional vehicles for ammunition. Bulgaria, Greece, Rumania, Servia, Turkey, and the United States have adopted the 4-gun battery. Russia retains the 8-gun battery. Germany is about to convert 20 (horse) batteries of 6 guns into 30 (horse) batteries of 4 guns.

Howitzers enable a heavy shell to be combined with light draught. A Krupp 4·7 weighs only 26 cwt., and throws a 46-lb. shell. The Coventry Ordnance Works make a 4·625 piece to weigh only 24¼ cwt., and to throw a 37½-lb. shell. The Krupp 6-inch weighs 43 cwt. with 90-lb. shell, and the French 6·1 Rimailho is 64 cwt. with 88-lb shell; the Krupp 5·9 (used in Germany) weighs 44 cwt. and throws a 95-lb. shell.

The guns of coast fortresses and defended ports are constructed to encounter naval ordnance. The guns of the 'fixed armament' are of three types: (*a*) heavy and medium guns, to deal with armoured vessels; (*b*) high-angle-fire guns, to attack the decks of vessels which keep beyond the range at which their side armour would be pierced; (c) light Q.F. guns, for use against torpedo-boats and destroyers.

Coast defence batteries in the Brit. service mount 9·2-inch B.L. (heavy), 6-inch B.L., 4·7-inch Q.F. (medium), 4-inch Q.F., 12-pr. Q.F. (light) guns. The charge is always cordite. The shells are high-explosive (filled with lyddite), armour-piercing, and common pointed (filled with 'P' mixture).

Gun Construction.—The earlier types of B.L. guns consisted of a steel tube, rifled inside, with various hoops, or coils, and a jacket carrying the trunnions *shrunk over the tube.* Improvements in steel have enabled wire construction to be used with the more modern guns. Modern guns consist of a tube over which layers of wire or flat steel tape are wound under a tension graduated for each layer, the exterior of the wire being protected by a jacket. In the larger guns the tube is in two parts, the inner part being capable of renewal, and the jacket is supplemented by a forward coil. The wire gives great circumferential strength, combined with accuracy of tension, and certainty as to the soundness of the material. Longitudinal strength, which is absent in the wire itself, is obtained by the support given to the barrel by the jacket, or by jacket and forward tube combined. Guns built on this system are lighter than guns of equal power built *on the all-steel system.*

Method of Attachment to the Mounting.—Until recently guns were attached to their mountings by means of trunnions. These fitted into trunnion holes in the carriage and enabled the gun to be elevated or depressed; both gun and carriage recoiled together.

All modern guns are trunnionless. They fit inside a cradle and recoil through it. A recoil-checking device keeps the gun in the cradle, and feathers on the gun fitting into featherways in the cradle, or some similar arrangement, prevent the gun turning in the cradle. The cradle does not recoil with the gun.

The sights are carried on the cradle instead of on the gun, and this enables continuous laying to be carried out.

B.L. guns are fired by means of tubes (electric, percussion, or friction), Q.F. guns by a primer (electric). Tubes and primers are brass cylinders closed at the head, where the means of firing is placed.

Tubes are placed in the vent and actuated by a lock: a primer is screwed into the base of the metal cartridge case. Electric tubes and primers are fired by means of a current of electricity which, heating a platinum bridge, ignites the powder in the body. Percussion tubes contain a percussion cap, and are fired by the striker of the lock hitting the cap. Friction tubes contain a roughened bar covered with friction composition fixed in the head. When the bar is drawn out (or pushed in), friction causes the composition to ignite and the tube to fire.

The requisites of a modern gun mounting are provided in our garrison artillery by a massive pedestal, bolted to an anchorage embedded in a concrete emplacement, thus affording the stable platform essential to accuracy. Ball bearings give smoothness and rapidity in elevating and traversing. Some form of hydraulic buffer absorbs recoil, and a portion of the energy of recoil is utilised to run the gun up again into the firing position. To provide for continuous laying, the sights and elevating and traversing gears are attached to non-recoiling portions of the mounting; the sights thus form part of the mounting, not of the gun.

An elevation-indicator determines mechanically the elevation of the gun in relation to the mounting, and a gear is provided to either adjust or compensate for want of level in the mounting—so essential in obtaining quadrant elevation or laying with auto-sight. A traversing arc let into the floor of the emplacement or attached to the mounting enables a gun to be laid under cover for direction. A range dial and training dial (electric) attached to the mounting ensures the rapid and accurate passing of ranges and trainings. The combined rammer and sponge, the single-motion breech mechanism, wireless electric tubes, etc., save manual labour and ensure a rapid service of the gun. Protection of gunners and gear from hostile fire is obtained by curved vertical shields which keep out splinters of shell, so that it is no longer necessary to raise earthen parapets, or fire through port-holes, which limited the arc of fire and often the elevation of the gun.

Shells when filled are painted black, with red and white bands round the tip—except lyddite shells, which are painted yellow with red band at tip.

Fortress guns all have percussion fuses (which need no preparation) or depression angle fuses (which are prepared by removing the safety pin and cap, or safety plug).

The term 'Fire Control,' which is often misused, may be defined as the choice of methods to meet attack in all its forms, and the issue of standing orders to ensure the execution of plans; it involves the identification of attacking vessels and the selection of projectiles to deal with different targets, and the amount of fire to be expended upon each target. Fire Control is of course limited to the Fire Command, and must conform to a general scheme which is prepared in peace-time by the fortress commander. Naval officers and coast defence commanders mutually inspect each other's practice in methods of defence and attack.

The artillery usually taken into the field with an army consists of field guns, horse artillery guns, heavy field guns, balloon guns, field howitzers (light and heavy); but in mountainous countries these are supplemented or replaced by mountain guns and mountain howitzers; and in countries where pack animals cannot be used the fighting force takes portable guns, which are divisible into loads carried by porters or coolies.

The land forces are also equipped with siege, fortress, and coast-defence artillery.

In most armies the fighting unit consists of a brigade of 3 batteries, comprising guns and limbers, ammunition wagons, also wagons for telephone and observatory, and special stores for laying and signalling, and wagons for supplies and 'baggage.' Foreign armies also take forge wagons and travelling kitchens.

The field gun and its wheeled carriage with sights, recoil gear, and shield constitutes the fighting unit. The Q.F. gun is one of which the carriage does not recoil on firing, being held fast by a spade at the end of the trail, but the gun itself is allowed to recoil on guides until checked by a hydraulic buffer. The general horizontal direction of the gun is given by shifting the trail, called traversing. The gun is elevated or depressed by a screw; it is layed by open or telescopic sights, or when firing from behind cover by a clinometer, with spirit-level for elevation, and a dial sight with horizontal graduated circle for line. The gun is loaded with fixed ammunition—that is, the shell and brass cartridge are combined as in the case of a rifle cartridge. After loading, the breech is closed by a breech-block (screw or wedge) worked by one motion of a lever. The gun is fired by a percussion lock contained in the breech-block. The men who lay the gun and attend to the breech mechan-

ism are seated on the trail and are protected from shrapnel and rifle bullets by a steel shield. The gun is a nickel steel tube made in two layers shrunk together to give greater strength, and British guns are further strengthened by wire-winding. The gun is rifled with a number of small grooves to give the shell sufficient spin to keep it point foremost during its flight. The calibre (diameter of the bore not including the grooves) of our 18-pr. Q.F. gun is 3·3 inches, that of most foreign field guns is 75 millimetres or 2·95 inches. The system of breech action in our service is that called the 'interrupted' screw: the French system is the 'eccentric' screw, but the wedge breech action is used in all the Krupp equipments, except the Argentine guns, which use the Welin screw. A field gun with ordinary Q.F. action can fire 20 aimed rounds a minute, but Krupp's 'fully automatic' action is capable of 40 rounds a minute—a rate of fire only possible for a few rounds, as against torpedo-boats. German guns have the ordinary type of sight, but the British, French, and Italian guns have the 'independent line of sight.' The *Goetz Panorama Telescope* (which is replacing the dial sight) enables the layer to lay on an aiming point behind him. The clinometer is used when the target is not visible from the gun, to give elevation either for the angle of sight or for the range. The recoil gear differs in the German, English, and French guns.

The types of ordnance in use are almost infinite in their variety and are continually undergoing changes in detail by makers like Schneider, Krupp, Vickers Maxim, Ehrhardt, Armstrong, Coventry Ordnance Works, but taking the English, French, and German guns as standard types of field guns the following differences are apparent:—

	English.	French.	German.
Weight of shell (lb.) . .	18·5	16	15
Muzzle velocity (f.s.) . .	1610	1740	1525
Calibre (inches) . .	3·3	2·95	3·03
Weight of gun behind team (cwt.)	43	41·5	42
Rounds in limber . .	24	24	36
„ wagon . .	76	96	88
Weight of wagon behind team (cwt.)	42·75	46	42·5
Men carried . . .	6	8	10
Range (yards) . . .	6500	9000	5500 (time fuse)

A howitzer is a short and stumpy gun, so mounted as to be capable of firing at angles up to 45 degrees, and thus causing a 'vertical' or high-angle descent of projectiles to reach men behind gun shields or steep cover, or to destroy 'overhead' cover; its shell weighs 35 lb. to 40 lb., and with a velocity of 1000 feet per second it ranges about 6000 yards; the calibre is from 4·2 to 4·7 inches.

The Q.F. heavy field gun can throw a 60-lb. shell nearly 6 miles. The 6-inch heavy howitzer fires a 90-lb. shell nearly 7 miles.

The horse artillery gun carries no men (the gunners ride like cavalry) and in the Brit. service the gun and shell are lighter than the 'field' equipment.

A mountain battery has no limbers or wagons; the Brit. gun is a 12½-pr., forming 4 mule loads, and it can be brought into action in one minute, but the Russian mountain gun (Schneider) is only 4 lb. heavier, and throws a 14·31-lb. shell.

Naval ordnance corresponds with the growth in dimensions and speed of battleships of the super-Dreadnought type. New ships building for Great Britain and Japan are to mount 15-inch guns. The United States and Japan both have vessels with 14-inch guns throwing shells of 1400 lb. The Brit. battleship *King George V.* has 13·5-inch guns. France at present has only 12-inch guns, but is to have 13·4-inch guns for her new 'Dreadnoughts.' Portugal's new fleet and Russia's Black Sea fleet will carry 13·5-inch guns. With regard to Germany it can only be said that 'no reliable details' are available as to her recent naval activities, but her 'Dreadnoughts' launched in 1911 mounted only 12-inch guns.

The erosive effect of various powders affects the life of a gun; in Italy, for example, the 12-inch gun which throws a shell of 870 lb. is good for only 100 rounds, whereas in France 200 rounds can be fired with less damage to the gun, owing to a better powder. Changes in artillery go on in every country all the year round, and often are only heard of after they have in turn become obsolete.

Jerram, *Armies of the World;* Loyd and Hadcock, *Artillery, its Progress and Present Position.*

ORDOVICIAN SYSTEM, group of strata occurring below the Cambrian and above the Silurian formations; well developed in region formerly inhabited by **Ordovices** (Celtic tribe in Wales); hence name suggested by Lapworth, 1879; Murchison called the group Lower Silurian; consist of all types of sedimentary rocks, as sandstones, slates, and quartzites, or metamorphic rocks, and are widely distributed; divided as follows: Caradoc or Bala series; Llandeilo beds; Arenig beds; contain numerous fossil remains, including molluscs, plants, fish, and insects. The O. period was one of great volcanic activity.

ORDU (41° N., 37° 45′ E.), town, on Black Sea, Asia Minor; ancient *Cotyora.* Pop. 6200.

ORDUIN-NASHCHOKIN, ATHANASY LAVRENTEVICH (d. 1680), Russ. statesman; insisted on carrying on Polish and Swed. Wars till Russ. demands were conceded; enlightened home policy, developing trade, navy, etc.

ORE, substance taken from earth's crust, containing one or more minerals, generally in composition with other elements or compounds. The operation preliminary to the extraction of the ore is called **Ore-dressing.** Ore is sent to the surface undressed, and it may contain native metal or metal combined with other substances, such as sulphur and oxygen. The material combining with the metal may be quartz or felspar, and is of no value except for the metal it contains. Ore-dressing is generally carried out by mechanical means, and chiefly consists of crushing the rock into small fragments, for which purpose various types of machines are employed.

Crushing is generally divided into three stages: coarse, medium, and fine, and for each process a different machine is used. As a rule, *coarse crushing* is carried out by a machine having a movable jaw set vertically, which approaches to and recedes from a fixed jaw. The ore is fed or falls between the two jaws, and is crushed by the pressure of movable jaw. *Medium crushing* is done by horizontal rollers or stamps. The rollers are placed close together, and the ore fed to them; they revolve in same direction, and crush ore as it passes through. The process resembles the domestic mangle. Stamps are generally worked by steam, and resemble steam hammers in their action. *Fine crushing* is accomplished by gravity or pneumatic stamps.

The ore is *sized* by a series of grids, having differently gauged meshes. Zinc and lead ores are cleaned from their adhering clay by sluicing with a stream of water. In diamond mines, as at Kimberley, the material from the mine is exposed to elements and weathered. Disintegration is completed by stirring in vats of water, and the débris is passed over a greased surface, which retains the diamonds.

ÖREBRO (59° 16′ N., 15° 12′ E.), town, on Svartå, Örebro, Sweden; iron-mining centre; mechanical works. Pop. (1911) 31,066. The län or division of Örebro lies in interior of S. Sweden; area, 3500 sq. miles. Pop. (1911) 208,626.

OREGON (44° N., 121° W.), north-western state of U.S.A.; bounded N. by Washington, W. by Pacific Ocean, S. by Nevada and California, and E. by Idaho; length from N. to S., 375 miles; breadth, 290 miles; area of land surface, 96,699 sq. miles; area of water

surface, 1092 sq. miles; coast-line, *c.* 300 miles, steep and rocky with numerous indentations.

O. is traversed by volcanic and snow-capped mountains—Cascade Mts. running parallel with coast, with highest peaks, Mt. Hood (11,225 ft.), Mt. Jefferson (10,200 ft.), Pitt (9750 ft.), Diamond Peak (8807 ft.); Steens Mts. in S.E. (9000 ft.); Blue Mts. in E., with average elevation *c.* 6000 ft.; undulating tableland running eastward, broken by several mountain ranges; extensive plains and large valleys with fine arable and pasture land. Principal rivers are Columbia, Snake, Powder, Grande Ronde, Owyhee, Burnt, Malheur, Jamhill, John Day, Deschutes, Willamette, Umpqua, Rogue; numerous lakes in S., viz. Malheur, Harney, Summer, Goose, Manns, Warner, Klamath, Crater, etc. Climate is varied; mild on coast with heavy rainfall in winter; dry and hot E. of Cascade Mts., with severe winters; average mean temperature, 50° F.; average annual rainfall, 36 inches; irrigation necessary in some parts. Fauna includes wolf, fox, deer, bear, elk, lynx, coyote; numerous aquatic birds, viz. puffin, gulls, terns, petrels, etc.; abundant marine fauna. Extensive forests, especially in W. and mountain regions; chief trees are pine, fir, spruce; also hemlock, cedar, maple, ash, aspen, oak, and others.

O. was probably first discovered by Spaniards; taken by Francis Drake as far as 43° N. (1519), and named *Albion*; visited and explored by several Spaniards, including Juan Perez, 1774; Columbia River discovered by American, Robert Gray, 1792; Nootka Convention (1790), between Spain and Great Britain, gave Brit. subjects the right to trade and settle on unoccupied coast; Spain ceded territory N. of 42° to U.S.A., 1819; *Astoria* founded by John Jakob Astor, 1811; several trading posts established by North-Western Fur Co. and Amer. Fur Co.; Ind. mission founded, 1834; serious boundary disputes between Great Britain and America, which were finally settled, 1846, boundary being fixed at 49° N. lat. O. became a state, 1859, and was admitted into the Union.

O. has a Gov., Senate (30 members, elected for 4 years), and House of Representatives (60 members, elected for 2 years); the state has 2 Senators and 3 Representatives in Congress, and is divided into 33 counties. Principal towns are Portland, Astoria, Salem (capital), Eugene. Roman Catholics predominate; then Methodists, Baptists, Presbyterians. Elementary education is compulsory; there are Oregon Univ. at Eugene, State Agricultural Coll., and other colleges. Total railway mileage exceeds 2600. Principal products are wheat, hay, hops, sugar-beet, potatoes, fruits, timber, live stock, wool, dairy produce; gold, silver, copper, coal are mined; lead, gypsum, quicksilver, nickel, opals found. Chief industries are lumbering, flour-milling, fish-canning, brewing, paper-making, printing, publishing, slaughtering and packing, machinery; valuable fisheries (salmon, trout, herring, oyster, halibut, cod, etc.). Pop. (1910) 672,765.

Lyman, *History of Oregon* (1903); Clark, *Pioneer Days in Oregon History* (2 vols., 1905).

OREGON, name for Columbia River (*q.v.*).

OREGON CITY (45° 21′ N., 122° 55′ W.), city, on Willamette, Oregon, U.S.A.; woollen- and flour-mills. Pop. (1910) 4287.

OREL, ORLOV (53° N., 35° E.), central government of Russia; area, *c.* 18,000 sq. miles; capital, Orel; surface undulating and well cultivated; principal rivers, Don, Oka, and Desne, with their tributaries; agriculture chief occupation; horses and cattle reared; manufactures include machinery, wagons, leather, and glass. Pop. (1910) 2,580,400.

OREL (52° 55′ N., 36° 7′ E.), town, capital of O. government, Russia, at confluence of Oka and Orlik; grain market; flour-mills. Pop. (1910) 88,200; (govt.) 2,580,400.

O'RELL, MAX, pseudonym of PAUL BLOUET (1848–1903), Fr. writer of wit and satire; author of *John Bull and his Island*, *Her Royal Highness Woman*, etc.; editor of the *Figaro*, 1901–3.

ORENBURG.—(1) (54° 50′ N., 57° 30′ E.) government, European Russia, along southern Urals; area, 73,254 sq. miles; great mineral wealth; produces cereals; live stock raised. Pop. (1910) 2,065,200. (2) (51° 47′ N., 55° 12′ E.) town, capital of above, on Ural; trading centre; tallow. Pop. (1910) 91,240.

ORENSE.—(1) (42° 20′ N., 7° 40′ W.) province, Galicia, Spain; mountainous. Pop. (1910) 411,573. (2) (42° 20′ N., 7° 40′ W.) town, capital of above, on Minho; warm springs; XIII.-cent. cathedral; chocolate. Pop. 16,500.

ORESTES (classical myth.), s. of Agamemnon and Clytæmnestra; bro. of Electra; reared by Strophius the Phocæan with Pylades. On attaining to manhood O. slew his mother and her second husband Ægisthus (*q.v.*), who had murdered Agamemnon in revenge for the sacrifice of Iphigeneia (*q.v.*). For this he was pursued by the Furies, nor was he given rest till interceded for by Athene, as described in the *Eumenides* of Æschylus.

ORFILA, MATHIEU JOSEPH BONAVENTURA (1787–1853), Span. chemist and toxicologist; b. Minorca; sent by authorities of Barcelona to study at Paris; after graduating, lectured on chem. in Paris; app. prof. of Medical Jurisprudence, 1819; later prof. of Chem. (1823) and dean (1830) in faculty of Med.; practically founded science of toxicology; author of many scientific works, chiefly on toxicology and medical jurisprudence.

ORFORD (52° 6′ N., 1° 32′ E.), small town, Suffolk, England.

ORFORD, EDWARD RUSSELL, EARL OF (1653–1727), Brit. seaman; signed invitation to William of Orange, 1688; made admiral, 1690; won battle of *La Hogue*, 1692; commander of Mediterranean fleet, 1694–95; cr. earl, 1697.

ORFORD, ROBERT WALPOLE, EARL OF (1676–1745), Brit. statesman; s. of Whig country gentleman of Houghton, Norfolk; member of Parliament for Castle Rising, 1701; sat for King's Lynn, 1702–42; Tories seized pretext for imprisoning him, 1712; Townsend married his sister Dorothy, 1713, and Walpole became First Lord of Treasury and Chancellor of Exchequer, 1715; on collapse of South Sea Co. was called to power, 1721, and retained it for 21 years. One of the greatest Brit. statesmen; decried in later times for cynical sincerity characteristic of XVIII. cent. at its best; strengthened hold of Hanoverian dynasty; pioneer in finance, firm upholder of peace, and author of a few classical epigrams.

Morley, *Life*.

ORGAN, musical instrument found in most churches and large concert halls. Its history has been described as 'nothing more than a narrative of the efforts made by men to bring under the control of one performer a large number of the instruments called flutes' (Stainer). The particular sort of pipe or flute, the use of which led eventually to the construction of an o., was the *flûte-à-bec* or beak-flute; that is, a pipe with a mouthpiece, which was placed against the lips to receive the breath of the player. The first step in organ-building was to set several flutes on end over a box of wind supplied by bellows. The contrivance known as *Pan's Pipes*, a graduated series of open pipes fixed together, may have furnished the idea for this. What the earliest o's were like we have no means of determining, for descriptions are meagre and indefinite, and there are no survivals. The instruments mentioned by many of the Latin authors (notably Tertullian) must have been of a rudely primitive kind; if for no other reason than that as yet there was no keyboard. Even when this was invented, in the VI. or VII. cent., the keys were so large and clumsy that they had to be struck with the clenched fist. As late as the XII. cent. the compass did not exceed two octaves, usually without semitones. An o. set up in Winchester Cathedral in 951 was the largest then known, having 26 pairs of bellows operated by

70 mes. This instrument had 10 keys, with 40 pipes to each key. Gradually the keys approximated more to the modern form, though for long the sharps were white and the naturals black, the reverse of the present colours. Early in the XV. cent. the important addition of *Pedals* or keys for the feet was made. This now essential feature of the o. progressed quickly in Germany, where it originated, but was slow in reaching England. Another important invention was the *Swell*, the enclosing of a complete department in a box, the front of which is constructed on the Venetian-blind principle, so that the sound 'swells' out or diminishes under the control of a foot-pedal. The Swell was first applied by Abraham Jordan to a London church o. in 1712.

No verbal description can possibly convey a clear idea of the construction and working of a large and complicated instrument like the modern o. For this the technical handbooks must be consulted; or, better still, an o. should be seen in process of building. Broadly speaking, there are three main departments: (1) the pipe-work; (2) the mechanism by which the player is enabled to produce and control the sound from the keys; and (3) the mechanism for blowing. As regards the pipes, these are of two chief divisions—metal pipes and wood pipes. Every 'speaking' *stop* has its separate set of pipes, running usually throughout the entire compass of keyboard or pedalboard. These sets are controlled by the familiar handles to the right and left of the player; so that when the player draws, say, a stop marked 'Flute,' he is operating on a series of pipes constructed to produce a flute quality of tone. Every stop has its individual tone character. Further, some stops are of unison pitch (8-feet stops), some an octave lower, some an octave and some two octaves higher. In the Pedal, the foundation pitch is an octave lower than that of the manual. The longest o. pipes made are 32 feet, the shortest half-an-inch or less. In most cases an o. has at least two manual keyboards besides Pedal. The lower *manual* is then called the 'Great,' the upper the 'Swell.' In a three-manual instrument the lower is the 'Choir.' Concert and cathedral o's have often four or five manuals, the additions representing so-called 'Solo' and 'Echo' o's. All these can be played separately, or combined by coupling actions. In recent years electric action applied to o's has secured many advantages, notably that of a shifting console. Blowing is also now frequently done by electric motor.

Hopkins and Rimbaults, *The Organ and its Construction*; C. F. Abdy-Williams, *The Story of the Organ*.

ORGANON (Gk. = 'instrument'), any system of rules, such as those of Aristotle and Bacon, to assist the mind as an 'instrument' of reasoning.

ORIA (40° 32′ N., 17° 40′ E.), town, Italy. Pop. 9500.

ORIENTATION, in architecture, is the placing of a church so as to have the chancel pointing to the east. The term is also used for the eastward turning of worshippers.

ORIENTE (2° S., 77° W.), province, Ecuador, E. of the Andes; capital, Archidona. Pop. 80,000.

ORIGEN (185–254 A.D.), Christian theologian who has left as great a mark on Christian dogma as any; b. at Alexandria; studied in the catechetical school, a leading seat of theological speculation; became head of the school, 203. He devoted himself diligently to the study of philosophy and Scripture; spent most of his time in Alexandria till 231, though he journeyed in Syria and elsewhere; ordained priest, 230, but a dispute arose, and he was deprived of his order. The remainder of his life he spent mostly in Palestine. His writings were very voluminous, but only a small part of them have been preserved—some in the original, some in Rufinus' Latin translation. Of his correspondence very little has been preserved. His *Hexapla*, or editions of the Gk. versions of the Old Testament, is preserved in part. O. wrote commentaries on Scriptures, but as he adopted the 'allegorical' method of interpretation, much of what he wrote is not now valuable. His main apologetic work is that against Celsus. Some theological and dogmatic works still survive. O.'s theology is intricate, and so many sided, if not contradictory, that in subsequent disputes controversialists of all sides appealed to him.

Swete, *Patristic Study*; Harnack, *History of Dogma*; Bethune-Baker, *Introduction to History of Christian Doctrine*.

ORIHUELA (38° 5′ N., 0° 57′ W.), town, on Segura, Alicante, Spain; textiles. Pop. (1910) 35,072.

ORILLIA (44° 36′ N., 79° 26′ W.), town, summer resort, on Lake Couchiching, Ontario, Canada; sawmills; iron foundries. Pop. 5000.

ORINOCO (9° 30′ N., 61° 40′ W.), river, N. of S. America; rises in Sierra Parima and flows through Venezuela into Atlantis Ocean; over 1500 miles long; flows through densely wooded and hilly region, and forms delta c. 120 miles from sea; principal tributaries, Apure, Meta, Guaviare, Ventuari, Caura, and Caroni; chief port, Bolivar. O. was explored first by Ordaz, 1531. As hundreds of miles of O. and tributaries are navigable, river is of great commercial importance.

ORIOLES, ORIOLIDÆ, an Old World family of passerine birds, with brilliant yellow plumage. The Golden O. (*O. galbula*) breeds rarely in England.

ORION (classical myth.), a great hunter who presumed to love the goddess Artemis, for which audacity she slew him; afterwards he was placed among the stars.

ORISKANY (43° 10′ N., 75° 20′ W.), town, New York State, U.S.A.; ironworks.

ORISSA (20° 30′ N., 86° 20′ E.), former kingdom, India; was great centre of Buddhism, afterwards of Hinduism; now a division of BIHAR AND ORISSA (*q.v.*); total area, 13,770 sq. miles. Pop. (1901) 8,200,000. Orissa has a number of tributary states.

ORISTANO (39° 54′ N., 8° 36′ E.), town, Sardinia; seat of archbishopric; has cathedral dating in part from XII. cent. Pop. 7500.

ORIZABA.—(1) (18° 39′ N., 97° 8′ W.) town, Vera Cruz, Mexico; sugar, tobacco. Pop. (1910) 32,894. (2) (19° N., 97° 15′ W.) volcanic peak (18,314 *ft.*); highest mountain in Mexico.

ORKNEY ISLANDS, group of islands and islets off E. part of N. coast of Scotland, forming county by themselves; separated from mainland by Pentland Firth; comprise 29 inhabited islands, 39 smaller islands (useful for grazing purposes), and large number of rocky islets or *skerries*; principal island, Pomona or Mainland, containing more than half population. Coastline is irregular, with deep bays; navigation rendered difficult by rapid currents; surface of islands low except in Hoy. Islands contain numerous lakes, principal being Stenness and Harray in Pomona. Only towns are Kirkwall and Stromness on Pomona. Antiquities, which are numerous and interesting, include cairns, brochs, stone circles, Picts' houses, castles, and churches. Original inhabitants believed to have been Picts; subdued by Harold Haarfager in 875, and continued under Norse rule till 1231. Agriculture and fishing are leading industries. Pop. (1911) 25,896.

ORKNEY, EARLDOM OF.—Norwegian *jarldom* dates from IX. cent., when Norwegians colonised Orkney Is.; modern earldom from 1379; held by Sinclairs of Roslin, 1379–1470. From Lord George Hamilton, cr. earl, 1696, it has descended to present holders, the Fitz Maurices.

ORLÉANAIS, ancient province, France; capital, Orleans; now mainly included in departments Loiret, Eure-et-Loir, and Loir-et-Cher.

ORLEANISTS, members of Fr. party, led by house of Orleans, seeking to establish constitutional monarchy in France. When opposition to elder branch of house of Bourbon revived after Restoration, house of Orleans stood out as candidates for rule; Louis Philippe, who became king, 1830, united hereditary and elective claim; dynasty overthrown, 1848, but again acquired political significance as alternative to despotism or republic under Second Empire; surrendered claim to Legitimists, 1873.

ORLEANS (47° 54′ N., 1° 55′ E.), city, on Loiret, France; capital of department, Loiret; with fine cathedral, Ste Croix (XIII. cent. onwards), St. Aignan,

St. Euverte, St. Pierre-le-Puellier (X. cent. onwards); Hôtel-de-Ville, with picture and sculpture gallery, and natural history museum; palais de justice; episcopal palace; Hôtel Dieu (hospital); houses of Joan of Arc (*Maid of Orleans*), Agnes Sorel, and Diane of Poitiers; equestrian statue of Joan of Arc; the Celtic *Genabum* was destroyed by Cæsar; renamed *Civitas Aureliani* by Romans, 272 A.D.; besieged by Attila, 451; sacked by Northmen, 855, 865; dukedom of O. held by Fr. royal family, XIV. cent. onwards; siege of English raised by Joan of Arc, 1429; a stronghold of Protestantism in XIV. cent.; notorious St. Bartholomew massacre, 1572; since taken by Germans in Franco-German War, 1870. Manufactures include blankets, cottons, machinery, agricultural implements, tobacco, preserved vegetables; trade in wine, grain, wool, oil, live stock. Pop. (1911) 72,096.

ORLEANS, CHARLES, DUKE OF (1391–1465), Fr. prince; nephew of Charles VI. and f. of Louis XII. of France; taken prisoner at *Agincourt*, 1415, and kept captive in England till 1440; occupied himself in composing Fr. verses (and possibly English), which are mediæval classics; kept open house for poets, musicians, etc.

ORLEANS, LOUIS PHILIPPE JOSEPH, DUKE OF, 'PHILIPPE EGALITÉ' (1747–93), Fr. prince; f. of Louis Philippe I. (*q.v.*); initiated connection of house of Orleans with constitutionalism; led outrageous private life, but inspired popular criticism of court before Revolution; member of 'Mountain' in National Convention, and voted death of king, his cousin; inevitably mistrusted, and included in general proscription of Bourbons; arrested by Committee of Public Safety; sentenced by Revolutionary Tribunal; executed.

ORLEANS, LOUIS PHILIPPE ROBERT, DUKE OF (1869–), head of Fr. Orleanists; went to France at Bourbon recall, 1871; exiled with his f., the Comte de Paris, 1886; served in Brit. regiment in India, 1888; arrested on return to France, 1890, but allowed to depart.

ORLEANS, PHILIP II., DUKE OF (1674–1723), Fr. statesman; seized regency on death of Louis XIV., 1715; Prime Minister, 1723; distinguished soldier and able administrator, but immoral and corrupt.

ORLOV, ORLOFF, noble Russ. family; founded by IVAN, who saved himself from execution by bold reply to Peter the Great, 1689. Grandson, GRIGORII (1734–83), favourite of Catherine II., and commander-in-chief, was cr. count, 1762, Roman prince, 1772; bro's, ALEXIS (1737–1808) and FEDOR (1741–96), famous admirals and generals; Fedor's five illegitimate sons were ennobled and allowed name of O. Of this line ALEXIS, ambassador, was made prince, 1856; son, PRINCE NIKOLAI (1827–85), diplomatist and author.

ORM, ORMIN (fl. XIII. cent.), Eng. author; wrote a book of metrical homilies in the Midland dialect and called by himself the *Ormulum*. The value of the work is linguistic rather than poetic.

ORMAZD, ORMUZD, see AHRIMAN.

ORMEROD, ELEANOR A. (1828–1901), Eng. entomologist; studied especially injurious insects and methods of combating their ravages.

ORMOC (11° N., 124° 40′ E.), town, W. coast of Leyte, Philippine Islands.

ORMOND (29° 15′ N., 81° 5′ W.), village, health-resort, Florida, U.S.A. Pop. (1910) 780.

ORMOND, EARLDOM OF, named from northern part of county of Tipperary; cr. for JAMES BUTLER, 1328; held by Butlers, prominent family in Irish history, till 1515, and from 1528 to present time. JOHN, 6th earl, was called by Edward IV., 'The finest gentleman in Christendom.'

ORMOND, MARQUESSATE OF, cr. 1642, for 13th earl, who was cr. duke, 1661 (Ireland), and 1682 (England).

ORMOND, JAMES BUTLER, 1ST DUKE OF (1610–88), Brit. statesman; grandson and heir of 12th Earl of O.; brought up in Eng. court as Prot.; succ. to earldom, 1633; commander-in-chief in Ireland, 1641; cr. Marquess of O., 1642; Lord-Lieut. of Ireland, 1643–47, 1648–50, 1662–69, 1677–85; proclaimed Charles II., 1649, and departed to St. Germain-en-Laye; after other honours, cr. duke, 1661; suffered from ill-will of Buckingham, who was suspected of instigating Blood's attack, 1670; blamed by Shaftesbury for not sharing in Prot. panic after Titus Oates' depositions, but effectively prevented Irish riots; one of most spotless characters of century.

ORMOND, JAMES BUTLER, 2ND DUKE OF (1665–1745), Viceroy of Ireland, 1703–7; succ. Marlborough as captain-general, 1711; impeached, 1715, and fled abroad to Bolingbroke; assisted in Jacobite invasion, 1715.

ORMSKIRK (53° 34′ N., 2° 53′ W.), market town, Lancashire, England; cordage. Pop. (1911) 7409.

ORMUZ, see HORMUZ.

ORMUZD, see PARSEES; AHRIMAN.

ORNE (48° 40′ N., 0°), department, N.W. France; formed of part of Normandy (*q.v.*), Alençon, and Perche; area, 2354 sq. miles; large forests; fine agriculture and pasture land; chief river, Orne; capital, Alençon; iron-wares, lace, linen, cider, horses, etc. Pop. (1911) 307,433.

ORNITHODELPHIA, see under MAMMALS.

ORNITHODORUS, see under MITES.

ORNITHOLOGY (Gk. *ornis*, a bird; *logos*, science), the branch of zoology which deals with Birds and Bird-life. It is concerned with a class of vertebrates which, less mentally endowed than most Mammals, and with less perfect instincts than the Invertebrate Insects, nevertheless stands, by reason of the diversity and unified perfection of its organs, almost at the top of the scale of life. It is, moreover, one of the most familiar and largest of vertebrate classes, containing more than 12,000 species.

Birds are feathered creatures—a sure guide to their identity, for no bird is without *feathers*, and no other creature possesses them. To birds the feathers are of the utmost importance, for not only do they form a light coat suitable for a creature which has conquered the air, but their conservation of warmth enables the body to be kept at the uniformly high temperature (sometimes as much as 112° F.) which is an index of a bird's extraordinary metabolism and activity. So they have helped in the conquering of climate, for wherever food is to be found, there birds occur irrespective of cold, from Arctic to Antarctic. Feathers, however, are not uniformly sprinkled over the body, but, with a few exceptions, are confined to definite feather tracts, or *pterylia*, which differ in position in different birds. In the feathers reside the distinctive colours, and these may be due to fine striations which disperse the light rays giving metallic colours, or to deposition of actual pigment, which is sometimes so soluble that, in the Turacos for example, it washes out when the birds bathe.

Birds are, again, predominantly flying creatures, only a few, such as the extinct Great Auk, the Burrowing Parrot (*Stringops*), the Penguins, and the Running Birds, having almost or altogether lost the power of flight. And with this habit many of the peculiarities of bird-structure are associated. Flight demands that the framework of the body shall be light and yet capable of bearing the great strain of rapidly moving wings. So the bones are light, many of them being hollow, and that part of the central axis of the skeleton, upon which under-pressure falls, is made rigid by the fusion of dorsal, lumbar, sacral, and caudal vertebræ. The body is buoyed also by the presence of many air sacs connected with the lungs, and penetrating, one might almost say, every nook and cranny where air can be stored, a phenomenon known as *pneumaticity*. But these air sacs are probably of more value as adjuncts to lung respiration, for the energy of flight demands a great supply of oxygen, and in this aerating function the air sacs share. Flight further demands a stable body which will offer the minimum resistance in the air; so the lungs, air sacs, and wing attachments are high, while the digestive organs

and heavier muscles lie low, and the body is boat-shaped.

Lastly, flight demands the presence of a means of motion—the *wings* and their muscles. The wings are formed of the fore-limb, to the bones of which long strong feathers are attached: to the hand bones are attached the longest feathers, primaries or manuals, usually 10 in number, to the fore-arm bones the shorter secondaries or cubitals, varying from 6 to over 30 in number, while the bases of these feathers are concealed by the wing coverts. A few feathers are also attached to the thumb, these forming the thumb, bastard, or false wing or *alula*. The wings are moved by exceedingly strong breast muscles attached at the lower end to a ridge, the keel, on the front of the breast-bone or sternum. As a rule, the stronger the muscles and the flight of a bird the larger the keel, which is altogether absent from the breast-bones of the flightless Running Birds.

Apart from those directly concerned with flight a few other bird characteristics may be mentioned. Many are skeletal: thus the lower jaw is composed of several bones, and unites with the skull through a quadrate bone; the skull itself is articulated with the skeletal axis through a single condyl; the surfaces of the vertebræ are saddle-shaped, concave from side to side, convex up and down; and the vertebral column ends in a set of fused vertebræ forming the ploughshare bone or pygostyle, which supports the tail feathers. A few bodily peculiarities are the absence of sweat glands in the skin, the only skin gland being the oil or preen gland on the rump; the frequent presence of crop, gizzard, and compound vent or cloaca; the four-chambered heart, with only a right aortic arch; and the presence of a song-box or syrinx with vocal chords at the lower end of the bronchial tubes.

Of the **life activities** of birds many deserve mention. Flight varies from the rapid beating of wings which propels the bird at speeds up to 50 feet a second, and even 100 miles an hour, through stationary hovering, and soaring against the wind, to simple gliding, achieved by several other vertebrates. The *moulting* of mammals is represented in birds by a more perfect autumnal moult, when the plumage is completely renewed, and often assumes a striking variation of colour; thus the speckled Ptarmigan of spring becomes grey in autumn and snow-white in winter. A spring moult also takes place, but it is less complete, although it furnishes the breeding garb, and is particularly characterised by the changes of design and colour which accompany it. The wooing of birds is of a nature peculiar to themselves, for no other creatures, unless it be man himself, makes so much 'business' of the preliminaries. The antics, stately exhibitions, scrapings, and curtseyings of the males in some species, and the coyness of the females, have a distinct suggestion of love-dazed humanity. Chiefly associated with the courting season is the wonderful power of *song*, best developed at this time in the males. But apart from exquisite emotional expression given to comparatively few in perfection, birds also have warning-calls, food-calls, and so on, recognised by their kind. Associated also with the breeding season is the *nest-building* habit—a structure, scraped in earth, burrowed in sand, plastered of mud, woven of grass, sewn of leaves, built in endless variety of shapes with materials innumerable, being created for the sheltering of eggs and of young.

The **food** of birds and their feeding habits are of great interest, especially as these are generally correlated with adapted structures in beak, claws, and food tract. Many species confine themselves to a diet of grain and seeds, and these, such as the Finches, have short stout beaks with splitting edges, large storing crops, and grinding gizzards; but the latter structures are small and the beak slender in such as feed on worms, insects, and the like. An almost abnormal food habit is exhibited by the honey-sipping Humming-Birds. In such tree-inhabiting species the feet are formed on the same plan, the toes being long, supple, and separate, suited for clinging to branches, and armed with moderate claws. In the birds of prey the claws become hooked talons and the beak curved and strong, fit structures to grasp and tear active living prey such as birds and mammals. Of birds which find their food on the seashore or in streams, the majority have long, unfeathered, wading legs, and swimming feet. But the latter may be completely webbed to the tip of the toes (as in Ducks), half-webbed (as in the Avocet), or having separate toes margined with a simple or lobed membrane (Grebe and Coot). The aquatic birds, also, present the greatest variety of beak structure, each type adapted to a special requirement. The Avocet, Curlew, and many others, which pick dainties from deep in mud, have extremely long slender bills; the Spoon-Bill dabbles in mud with its curious beak for insects, larvæ, molluscs, and worms; Ducks for the same end sift the same material through the plates bordering their bills; fish-eating birds have beaks curved at the tip to retain their slippery prey; the Pelican stores its catch in a large dilatable sac attached to its lower jaw. In all such flesh-eating birds the mechanical gizzard and crop are reduced in favour of purely digestive apparatus.

The *development* of birds—from egg, through chick, to adult—is familiar, but two great divergences may be mentioned. Some young are hatched equipped for an immediate start in life, *e.g.* the young of the farmyard fowl, such being known as *Præcoces*; while the majority leave the egg naked and blind, and have to be fed until they can use their own wings, *e.g.* the Blackbird, Robin, etc., these being known as *Altrices*. The young are covered with moderately simple down-feathers, and often pass through several stages of plumage before the adult coloration is attained. It is a curious and unique fact that two distinct down stages, a white, and a dusky brown, occur in a species of Penguin.

Birds as a class enter greatly into human economy. They are amongst the comparatively few creatures which man has been able to *domesticate*; their flesh is eaten, their eggs form an invaluable source of nourishment, the nests of the Eastern Edible Swifts are made into soup, the Oil-Bird of America furnishes oil and 'butter.' Apart from their food value they have been put to little direct use by man, but trained Pelicans catch fish for their Chinese owners. Many species are the objects of sport, as the game birds, or the agents of sport, as the hawking Falcons; the plumage of others is esteemed by some as ornament; and the ageless accumulations of the food-refuse and excrement of seabirds form the invaluable *guano* deposits of a few tropical islands. But the most beneficent work of birds towards man is indirect; for, although some destroy fruit and grain, these depredations are more than overbalanced by the unsparing war waged by birds upon destructive insects, insect larvæ, and vermin.

Birds fall two into sub-classes—I. ARCHÆORNITHES—Extinct Birds, such as the tailed *Archæopteryx*.

Sub-class II. NEORNITHES—including the divisions of 1, RATITÆ or RUNNING BIRDS (*q.v.*); 2, the extinct TOOTHED BIRDS or ODONTORNITHES (*q.v.*); and 3, the KEELED BIRDS or CARINATÆ, which include almost all living forms. The latter were once conveniently, if roughly, divided by their predominant habits into Swimmers (*Natatores*), Waders (*Grallatores*), Gallinaceous Birds or Scratchers (*Rasores*), Birds of Prey (*Raptores*), Climbers (*Scansores*), and Perchers (*Insessores*), the last two groups in part containing the Picarian Birds, characterised by their habits of building nests and laying white eggs at the bottom of excavations in trees, stems, or in the ground. Present classifications group existing Carinate Birds in about thirty more or less distinct orders separated into four divisions according to the minute arrangement of the palatal bones of the skull.

Coward, *Migration of Birds* (1912); Hartert and others, *A Hand-List of British Birds* (1914); Lea, *The Romance of Bird Life* (1900); Pycraft, *History of Birds* (1910).

ORNITHOPHILY, see POLLINATION.

ORNITHORHYNCHUS, DUCKMOLE, DUCKBILL, or PLATYPUS, one of the Monotremes (*q.v.* under MAMMALS for general characters)—a primitive Mammal found in the rivers of Australia and Tasmania, in the banks of which it burrows. It has many peculiar characters; is an active swimmer, with webbed and clawed feet, and jaws flattened like a duck's bill, with which it grubs in mud for worms, crustacea, aquatic insects, and such-like. Two eggs are laid at a time.

ORNITHOSAURIA, extinct Reptile (*q.v.*).

OROBUS, genus of plants, order Leguminosæ; related to Vetch (*q.v.*). Bitter Vetch, *O. tuberosus*, has purple flowers; its roots are edible and in Scot. Highlands are used in brewing a kind of ale.

ORONTES (35° N., 36° 50′ E.), chief river, Syria; falls into Mediterranean; modern Nahr-el-Asi.

OROPUS (38° 18′ N., 23° 49′ E.), ancient seaport, on Euripus, Attica, Greece.

OROSIUS, PAULUS (fl. 415 A.D.), Span. historian; adopted theological views of his contemporary, St. Augustine; wrote widely—read treatises against Pelagian heresies, 415; chief work, *Historiarum libri VII. adversus Paganos*; trans. by Alfred the Great.

ORPHEUS (classical myth.), Gk. hero; s. of Apollo and Calliope (according to principal legend); b. in Thrace; journeyed with Argonauts, and by his lyre, given by Apollo, delivered companions from dangers; able to charm animate and inanimate objects with his music. On death of his wife Eurydice, O. descended to Hades to rescue her, but lost her by disobeying orders and looking back to see if she was following him. There are diverse legends concerning his death; killed by Zeus, or torn in pieces by Mænads, women of Thrace. Myth was probably woven round some hist. sacred Thracian bard.

ORPHIC POETRY consists of fragments of verse older than Homeric and Hesiodic poems.

ORPHIC BROTHERHOOD consisted of number of ascetics in some ways akin to Pythagoreans; flourished in later Rom. Empire.

ORPIMENT, see ARSENIC.

ORPINGTON (51° 22′ N., 0° 6′ E.), town, Kent, England. Pop. (1911) (reg. sub-dist.) 16,075.

ORRERY, ROGER BOYLE, 1ST EARL OF (1621–79), cr. baron of Broghill, 1627; fought for Charles I. in Ireland, but accepted commission from Cromwell, and helped to subdue Ireland; secured Ireland for Charles II. at Restoration; wise statesman and voluminous, not always dull, writer.

ORSEOLE I., PIETRO, Doge of Venice, 971–91; founded new Church of St. Mark and bought Pala d'Oro; philanthropist.—**Orseole II.**, PIETRO, Doge of Venice, 991–1008; won naval victories, 998; originated yearly custom of wedding the sea.—**Orseole III.**, Doge of Venice, 1008–26; increased power of state, but was banished by republicans.

ORSHA (54° 30′ N., 30° 30′ E.), town, Mogilev, Russia, on Dnieper; trade in grain. Pop. 13,500.

ORSINI, celebrated Ital. family; Rom. branch produced Popes Celestin III., Nicholas III., Benedict XIII., and famous Ital. nobles; in Papal States O. were great enemies of Ghibelline Colonnas.

ORSINI, FELICE (1819–58), Ital. patriot; fought in War of Independence, 1848; worked with Mazzini till imprisoned, 1854; pub. *Austrian Dungeons in Italy*, 1857; executed in Paris after throwing bomb at Napoleon III.

ORTA, LAKE OF (45° 50′ N., 8° 23′ E.), lake, Novara, Italy; length, 7½ miles.

ORTELIUS, ABRAHAM (1527–98), geographer, of Ger. parentage; b. at Antwerp; pub. the first atlas (*Theatrum Orbis Terrarum*) and critical works on ancient and modern geography.

ORTHEZ (43° 31′ N., 0° 47′ W.), town, Basses-Pyrénées, France, on Gave de Pau; cotton fabrics. Pop. 6400.

ORTHOCLASE, or common felspar, consists of silicate of aluminium and potassium; white, green, and transparent; an important rock-forming mineral.

ORTHODOX EASTERN CHURCH, see GREEK CHURCH.

ORTHOPTERA (Gk. *orthos*, straight; *pteron*, a wing), an order of insects which includes earwigs, cockroaches, mantidæ or praying-insects, stick- and leaf-insects, grasshoppers, locusts, and crickets. These possess the common characters that the young reach maturity by a series of slight changes or moults, from three to six in number, instead of by a violent metamorphosis as in most other insects. The adults have mouths adapted for biting, are carnivorous or vegetarian, and may possess or lack wings. Amongst O. are found the largest of insects, and they are also amongst the oldest, for one Orthopterus form has been found in Silurian rocks. To-day their distribution is world-wide.

ORTIGUEIRA (43° 40′ N., 8° W.), seaport, Corunna, Spain. Pop. 19,000.

ORTLER SPITZE (46° 30′ N., 10° 34′ E.), highest mountain, Austrian Tyrol (12,800 ft.).

ORTOLAN, see EMBERIZIDÆ.

ORTON, ARTHUR, see TICHBORNE CASE.

ORTONA-A-MARE (42° 21′ N., 14° 26′ E.), seaport, Chieti, Italy; cathedral. Pop. 15,500.

ORURO.—(1) (c. 18° 10′ S., 67° 30′ W.) dept., Bolivia; area, 19,000 sq. miles; produces tin. Pop. 100,000. (2) (17° 55′ S., 66° 50′ W.) capital of above; has gold, silver, and tin mines. Pop. 21,000.

ORVIETO (42° 43′ N., 12° 6′ E.), city, Italy, on Paglia, in province Perugia; situated on isolated rock, 640 ft. high; has numerous interesting houses, palaces, and churches; cathedral (XIII.–XVI. cent.), S. Andrea, S. Giovenale, S. Domenico; bp.'s palace; Faina, Papi, and other palaces. O. was ancient *Volsinii*, later *Urbs Vetus*; passed to popes *c.* X. cent.; first *podesta* elected, 1199; became part of kingdom of Italy, 1860. Pop. 18,300.

ORYX, a genus of African antelopes, with maned neck, long, straight horns, and long tail. The GEMSBOK and BEISA are two common species.

OSAKA, OZAKA (34° 40′ N., 135° 32′ E.), seaport, Japan, on Yodogawa; cotton-mills; ironworks. Pop. 1,226,647.

OSAWATOMIE (38° 30′ N., 95° W.), city, Kansas, U.S.A.; coal mines; oil refineries. Pop. (1910) 4046.

OSBORN, SHERARD (1822–75), Brit. rear-admiral, explorer, and writer; commanded *Pioneer* in Franklin search expeditions, 1850–51 and 1852–54; served in Chin. and Crimean Wars; wrote accounts of Arctic voyages.

OSBORNE, see LEEDS, DUKE OF.

OSBORNE, royal mansion, Isle of Wight, England; presented by Edward VII. as convalescent home for army and navy officers.

OSBORNE JUDGMENT, see TRADE UNIONS.

OSCA LINGUA, the language of an ancient Ital. people of Campania and Samnium. The Oscan language does not differ substantially from Latin, but is a cruder and more primitive form of it. The language in very ancient times had taken a literary form, and an improvised comedy with fixed characters was in vogue. This farce, known as the *Atellanæ fabulæ*, was introduced into Rome, and existed side by side with the regular drama.

OSCAR I. (1799–1859), king of Sweden and Norway; succ. his f., Charles XIV., 1844; showed thorough knowledge of finance; successfully negotiated alliances to prevent Russ. aggression.

OSCAR II. (1829–1907), king of Sweden and Norway (1872–1905), of Sweden (1905–7); s. of Oscar I.; a gifted writer; separation of Norway and Sweden in his reign was due to no fault of sovereign.

OSCEOLA (*c.* 1804–38), Anglo-Amer. Indian; s. of Englishman, William Powell, by Creek Indian; wife seized as dau. of fugitive slave, 1835; inspired massacres of whites.

OSCHATZ (51° 19′ N., 13° 7′ E.), town, on Döllnitz, Saxony; sugar. Pop. (1910) 10,750.

OSCHERSLEBEN (52° 3′ N., 11° 13′ E.), town, on Bode, Prussian Saxony, Germany; sugar. Pop. (1910) 13,131.

OSCILLOGRAPH, an electrical instrument used to record the alternations of an electric current. Two delicate phosphor-bronze strips lie stretched vertically between the poles of a magnet. When a current passes, one strip moves back and the other forward, thus turning an attached mirror which, by reflecting a spot of light on to photographically prepared paper moved by clockwork, records the motion.

OSH (40° 43′ N., 72° 35′ E.), town, Ferghana, Asiatic Russia. Pop. (1910) 44,800.

O'SHANASSY, SIR JOHN (1818–83), Australian statesman; emigrated from Ireland, 1839; led agitation for separation of Port Philip from New South Wales and aided in framing constitution of new colony, Victoria, 1851–56; premier, 1857, 1858–59, 1861–63; important Land Act, 1862.

O'SHAUGHNESSY, ARTHUR WILLIAM EDGAR (1844–81), Eng. poet; wrote *Epic of Women* (1870), *Lays of France* (1872), *Music and Moonlight* (1874); charming sonneteer and lyrist.

OSHAWA (43° 50′ N., 78° 50′ W.), town, Ontario, Canada, on Lake Ontario; flour-mills; canneries. Pop. 5300.

OSHIMA (28° 20′ N., 129° 20′ E.), small island, Japan; has an active volcano.

OSHKOSH (44° 9′ N., 88° 26′ W.), town, Wisconsin, U.S.A.; trades extensively in lumber; meat-packing and dairy-farming. Pop. (1910) 33,062.

OSIER (*Salix viminalis*), species of willow from whose twigs baskets are made; grown in what are termed o. beds along low-lying flanks of water-courses, or on land subject to periodic inundation (*e.g.* Fen district); raised from cuttings about a foot and a half long, of vigorous two-year-old shoots which strike root very readily. The slips are cut for commercial purposes when about eight feet long.

OSIMO (43° 30′ N., 13° 29′ E.), town, Ancona, Italy; ancient *Auximum*; silk industries. Pop. 18,500.

OSIRIS, see EGYPT (RELIGION).

OSKALOOSA (41° 15′ N., 92° 39′ W.), city, Iowa, U.S.A.; brick and tile works. Pop. (1910) 9466.

OSMERUS, see under SALMON FAMILY.

OSMIUM (Os = 190·9), noble metal, occurs in platinum ores; bluish-white; S.G. 22·48; M.P. 2300–2500° C. *Osmiridium* alloy is used for tipping gold pens. Oxides: OsO, Os_2O_3, OsO_2, OsO_4 = 'osmic acid,' aqueous solution used for staining microscopic preparations.

OSMOSIS, diffusion of liquids through a septum. Place a jar containing sugar in solution and covered with parchment in a vessel of pure water; the water, flowing through the parchment into the jar, produces *osmotic pressure* on the parchment. Osmotic pressures are inversely proportional to the molecular weight of substances dissolved. Sap rises to great heights in trees and plants by means of osmosis.

OSNABRÜCK (52° 17′ N., 8° 3′ E.), town, Hanover, Germany; seat of R.C. bishopric; has episcopal palace and XIII.-cent. cathedral; formerly fortified. Pop. (1910) 65,957.

OSORIO, JERONYMO (1506–80), Portug. scholar and divine; bp. of Silves, 1564; wrote hist. and exegetical works in polished Latin.

OSPREY, FISH-HAWK (*Pandion*), forms a genus and family of Birds of Prey found in the Old World and America; feeds on marine and freshwater fishes; all but exterminated from Britain. The so-called 'osprey plumes' are not taken from this bird, but from the egret.

OSRHOENE, OSROENE, region, Mesopotamia; was small kingdom under Abgar dynasty, 137 B.C.–116 A.D.; afterwards came under Rom. control.

OSSA (39° 45′ N., 22° 40′ E.), mountain, Thessaly, ancient Greece; modern Kissovo.

OSSETT (53° 41′ N., 1° 35′ W.), town, Yorkshire, England; woollen mills; collieries. Pop. (1911) 4081.

OSSIAN, see MACPHERSON, JAMES; CELTS (CELTIC LITERATURE).

OSSINING (41° 10′ N., 73° 50′ W.), town, on Hudson River, New York State, U.S.A.; iron foundries; Sing Sing state prison. Pop. (1910) 11,480.

OSTADE, the name of two Dutch painters, brothers, both born at Haarlem. **Adrian Ostade** (1610–85) was a pupil of Franz Hals, and later fell under the influence of Rembrandt's style. He was a prolific painter, and dealt in a vigorous way with scenes and characters of rustic life. **Isaac Ostade** (1621–49) painted somewhat similar subjects, favouring winter aspects of the country and village street life.

OSTASHKOV (57° 8′ N., 33° 12′ E.), town, on Lake Seliger, Tver, Russia; leather. Pop. 11,500.

OSTENDE (51° 14′ N., 2° 56′ E.), seaport, watering-place, W. Flanders, Belgium; casino; taken by French, 1706, 1745; fisheries, oyster-beds. Pop. (1910) 42,207.

OSTEOLOGY, see BONE, SKELETON.

OSTEOPATHY, method of treating disease; based on theory that diseases are due to displacement of bones; consists in treating bones, blood-vessels, etc., by a system akin to massage; much practised in U.S.A.; a few qualified doctors in Britain have taken it up, and many laymen testify to wonderful cures.

OSTERMAN, ANDREI IVANOVICH, COUNT (1686–1747), Russ. statesman; held office under Peter the Great, Catherine I. (1725–27), and Peter II. (1727–30); aided Anne Ivanovna to establish her rule, 1730; banished, 1741.

OSTERODE.—(1) (51° 44′ N., 10° 14′ E.) town, Hanover, Prussia, in Harz Mountains; cottons, woollens. Pop. (1910) 7505. (2) (53° 41′ N., 19° 57′ E.) town, on Lake Drewenz, E. Prussia province, Prussia; machinery. Pop. (1910) 14,359.

OSTERSUND (63° 6′ N., 14° 42′ E.), town, Jemtland, Sweden, on Storsjö; tanneries. Pop. 7300.

OSTIA, ancient town of Latium in Italy, situated at mouth of Tiber, 14 miles from Rome; harbour for long was considered one of best in central Italy; O. became prominent with growth of Rome, and rose to be a trading port of great commercial importance; after construction of safer and larger harbours by Claudius and Trajan, O. began to lose its importance. Excavations began in XVIII. cent.; ruins, which are extensive and well preserved, include forum, temples, warehouses, and barracks; modern village of O. exists near site.

OSTIAKS, Finnish people of Siberia; towns, destroyed by Russians, 1501, still to be traced round Obdorsk; barbarians, and rapidly dying out.

OSTRACIIDÆ, see TRUNK FISHES.

OSTRACISM (Gk. *ostrakizein*, earthen tablet), judicial expedient of ancient Greece. Citizens not liable to process at common law but dangerous to state were banished, after ballot in which names of proscribed were written on earthen tablets; said to have been introduced into Athens by Cleisthenes, 508 B.C. Leaves being used at Syracuse, system was called *petalism*.

OSTRACODA, see under ENTOMOSTRACA.

OSTRACODERMS (Gk. *ostracon*, a shell; *dermos*, skin), or HYPOSTOMATA, extinct primitive fishes without jaws and without a backbone, but with complicated protecting shields; the oldest known vertebrates, found in Silurian and Devonian rocks.

OSTRAU, MÄHRISCH- (48° 59′ N., 17° 23′ E.), town, on Ostrawitza, Moravia, Austria; collieries; ironworks. Pop. (1910) 36,754. *Polnisch-Ostrau* is a commune in Silesia, Austria.

OSTRICH, see under RUNNING BIRDS.

OSTROG (50° 21′ N., 26° 31′ E.), town, Volhynia, Russia; tanneries. Pop. 15,700.

OSTROGOTHS, see GOTHS.

OSTROVSKIY, ALEXANDER NIKOLAIVICH (1823–86), Russ. dramatist; b. Moscow; wrote excellent comedies and hist. dramas (*The False Demetrius*, etc.).

OSTUNI (40° 46′ N., 17° 34′ E.), town, Lecce, Italy; cathedral. Pop. 5200.

OSUNA (37° 16′ N., 5° 7′ W.), town, Seville, Spain; grain, fruit. Pop. 18,000.

OSUNA, PEDRO TELLEZ GIRON, DUKE OF (1575–1624), Span. noble, called 'the great duke'; Viceroy of Sicily, 1610–16; of Naples, 1616–20.

OSWALD (d. 992), Eng. cleric; bp. of Worcester, 961; abp. of York, 972.

OSWALDTWISTLE (53° 45′ N., 2° 23′ W.), town, Lancashire, England; cotton-mills. Pop. (1911) 15,720.

OSWEGO (42° 8′ N., 76° 19′ W.), port, New York State, on L. Ontario, U.S.A.; falls of O. River supply water-power for large cornflour mills, starch works, etc. Pop. (1910) 23,368.

OSWESTRY (52° 52′ N., 3° 4′ W.), town, Shropshire, England; has workshops of Cambrian Railway; manufactures iron goods, leather, etc. In neighbourhood is old Brit. camp. Pop. (1911) 9991.

OTAHEITE, see TAHITI.

OTARIIDÆ, see SEALS.

OTCHAKOV, see OCHAKOV.

OTHMAN, see CALIPH.

OTHO I.–IV., see OTTO I.–IV.

OTHO, MARCUS SALVIUS (32–69), Rom. emperor; app. gov. of Lusitania, 58, by Nero, formerly his boon companion, but now anxious to obtain his wife, Poppea; aided insurrection of Galba, 68; revolted, 69, and with aid of prætorians became emperor; attacked by Ger. troops under Vitellius; showed great prowess, but slew himself after defeat at *Bedriacum*.

OTIS, JAMES (1725–83), leader of Amer. rebellion; advocate-general of Massachusetts, 1755; refused to plead for Crown when writs of search not specifying house to be searched were issued; resigned and took popular brief, 1761; represented Boston at Massachusetts General Court, 1761–69; wrote *Vindication of the House of Representatives of the Province of Massachusetts Bay*, 1762.

OTLEY (53° 54′ N., 1° 42′ W.), market town, on Wharfe, Yorkshire, England; textiles. Pop. (1911) 9843.

OTOCORYS, a genus of Larks (*q.v.*).

OTOCYON, see DOG FAMILY.

OTRANTO (40° 8′ N., 18° 30′ E.), seaport, Apulia, Italy; ancient *Hydruntum*; ruined castle.

OTTAWA (45° 28′ N., 75° 20′ W.), river, Canada; enters St. Lawrence by two channels, enclosing the island on which stands Montreal.

OTTAWA (45° 20′ N., 75° 43′ W.), capital of Dominion of Canada, in Ontario Province; beautifully situated on Ottawa (south bank) at confluence with Rideau, below Chaudière Falls. Notable features are R.C. cathedral, Christ Church, Government buildings on Parliament Hill, Archive Buildings, and Royal Mint on Nepean Point, museum, art gallery, univ., art academy, gov.-gen.'s residence (Rideau Hall), and several public parks. Founded 1829, O. was named BYTOWN until 1854; became capital of the two Canadas, 1858, of Dominion, 1867. Rideau Canal joins O. with Kingston on Lake Ontario. O. is centre of lumber trade; manufactures leather, ironware, machinery, matches, etc.; numerous saw- and flour-mills. Pop. (1911) 87,062.

OTTAWA (38° 33′ N., 95° 17′ W.), city, on Osage, E. Kansas, U.S.A.; flour-mills. Pop. (1910) 7650.

OTTAWA (41° 21′ N., 88° 45′ W.), town, Illinois, U.S.A.; coal centre; manufactures agricultural implements, cutlery, flour, glass, etc.; has mineral spring. Pop. (1910) 9535.

OTTER, see WEASEL FAMILY.

OTTERBURN (55° 15′ N., 2° 10′ W.), village, Redesdale, Northumberland; scene of Douglas's defeat of Hotspur, 1388, celebrated in ballads *Chevy Chase* and *The Battle of Otterburn*.

OTTER-HOUNDS, see DOG FAMILY.

OTTERY ST. MARY (50° 45′ N., 3° 16′ W.), town, Devonshire, England; Coleridge's birthplace. Pop. (1911) 3700.

OTTIGNIES (50° 40′ N., 4° 33′ E.), village, Brabant, Belgium.

OTTO I., OTHO (912–73), emperor of Holy Rom. Empire; s. of Henry the Fowler; elected king of Germany, 936; conquered Huns, Hungarians, Bohemians, and Dukes of Bavaria and Franconia; invaded France in aid of Louis IV., a prisoner of Hugh the Great; drove back Danes; in response to appeal of Adelaide, widow of Lothair, crossed Alps, and declared himself king of the Lombards, 951; defeated Magyars by decisive battle of *Lechfeld*, 955; crowned emperor, 962, and sought to revive empire of Charlemagne, but remained primarily Ger. king; struggled with Romans and Byzantine emperor. See EMPIRE, HOLY ROMAN.

OTTO II. (955–83), emperor of Holy Rom. Empire, 973; Bavaria partitioned, 976–78; Fr. attempts on Lorraine checked, 978; protected Papacy and attacked Muhammadans; greatly developed mediæval imperial idea.

OTTO III. (980–1002), emperor of Holy Rom. Empire, 983; crowned, 996, and with Popes Gregory V. and Sylvester II. sought to revive Rom. greatness, and brought mediæval empire to its height; general revolt in Italy, 1001; a visionary.

OTTO IV., THE LION (*c.* 1175–1218), emperor of Holy Rom. Empire; rival of Philip of Swabia for empire, 1197; after years of warfare was crowned, 1209, by Pope Innocent; excommunicated for annexation of Apulia, 1210; Germany set up rival emperor in Frederick of Hohenstaufen, 1212, crowned by pope; O. invaded France, Pope's ally; defeated at *Bouvines*, 1214, and retired from contest.

OTTO I. (1815–67), king of Greece; s. of Ludwig I. of Bavaria; elected king, 1832, by conference of London; insurrection, 1843, forced him to grant constitution, 1844, and to expel Bavarian suite, but he never became popular; foreign policy twice alienated Brit. and Fr. allies; insurrections ended in O.'s flight and deposition, 1862.

OTTO OF FREISING (*c.* 1114–58), Ger. chronicler and bp.; wrote *De Duabus civitatibus*, a chronicle in eight books; *Gesta Friderici imperatoris* (hist. work).

OTTO OF NORDHEIM (d. 1083), Duke of Bavaria, 1061; frequently in revolt against Henry IV., king of Germany; deposed, 1070; led Saxon revolts, 1073, 1077, supporting anti-emperor, Rudolph of Suabia.

OTTO OF ROSES, see ATTAR.

OTTOCAR I. (d. 1230), king of Bohemia; steered skilful course between rival emperors, Philip of Swabia and Otto IV.—**Ottocar II.,** THE VICTORIOUS, king of Bohemia, 1253–78; united Austria, Styria, Carinthia, and Carniola to Bohemia; slain at *Laa*.

OTTUMWA (41° 2′ N., 92° 29′ W.), city, on Des Moines, Iowa, U.S.A.; coal-mines, iron- and steel-works. Pop. (1910) 22,012.

OTWAY, THOMAS (1652–85), Eng. tragedian of the first order; b. at Trotton, in Sussex; entered Christ Church, Oxford, but failed to take a degree. His life was embittered by a long intrigue with Mrs. Barry. In 1680 he wrote a poem, *The Poet's Complaint of his Muse*, the fine tragedy called *The Orphan*, and *Caius Marius*. In 1682 appeared his greatest drama, *Venice Preserved*.

OUDENARDE (50° 51′ N., 3° 36′ E.), town, on Scheldt, Belgium; in province of East Flanders; with Notre Dame (XIII. cent.), St. Walburga, and fine town hall; textile industries. Here Allies under Prince Eugene defeated French under Vendôme, 1708. Pop. *c.* 7000.

OUDH, see UNITED PROVINCES OF AGRA AND OUDH.

OUIDA, pseudonym of LOUISE DE LA RAMÉE (*c.* 1840–1908), Eng. novelist; wrote *Strathmore* (1865), *Under Two Flags* (1867), *Puck* (1870), *Moths* (1880).

OUDINOT, CHARLES-NICHOLAS (1767–1847), duke of Reggio, 1810; marshal of France, 1809; dis-

tinguished in revolutionary wars under Marceau and Masséna; led 'grenadiers of Oudinot' in chief campaigns till capitulation of Paris, 1814; submitted to Bourbons and continued in high commands.

OUNCE, originally $\frac{1}{12}$ of a lb., as it still is in Troy weight, where an o. weighs 20 pennyweights or 480 grains; in avoirdupois weight 16 drams or 437·5 grains.

OUNCE, see under CAT FAMILY.

OUNDLE (52° 29′ N., 0° 28′ W.), town, on Nen, Northamptonshire, England.

OURO PRETO (20° 18′ S., 43° 18′ W.), city, state of Minas Geraes, Brazil; owing to mountainous situation, streets steep and crooked; has numerous interesting buildings and mining school; once famous gold-mining centre, but mines now almost exhausted. Pop. 12,000.

OUSE.—(1) (53° 43′ N., 0° 44′ W.) Yorkshire river, formed by junction of Swale and Ure, and enters Humber. (2) Great Ouse rises in Northampton and falls into Wash. (3) Little O., tributary of Great O. (4) river in Sussex; flows into Eng. Channel.

OUSELEY, SIR FREDERICK ARTHUR GORE (1825–89), Eng. composer; prof. of Music, Oxford, 1855; master of lit. on music.

OUTRAM, SIR JAMES (1803–63), Brit. soldier; app. *aide-de-camp* to Sir John Keane in First Afghan War, 1838; performed famous ride in disguise through Afghanistan, 1839; won title of 'Bayard of India' by defence of Hyderabad, 1843; distinguished in Ind. Mutiny, 1857–58.

OUZEL, WATER, see DIPPERS.

OVAR (40° 51′ N., 8° 38′ W.), town, Beira, Portugal, on Aveiro Lagoon; fishing centre. Pop. 10,700.

OVARIOTOMY, the operation of removing one or both of the ovaries, for cystic and other changes or to alleviate morbid conditions in other organs of generation; first successfully performed, partially, by Houston of Carluke in 1701, and completely by M'Dowell of Kentucky, in 1809; since the introduction of antiseptic methods the mortality has fallen to 5 to 7 % of cases.

OVARITIS, see GYNECOLOGY.

OVARY, DISEASES OF, see GYNECOLOGY.

OVATION, see TRIUMPH.

OVERBECK, JOHANN FRIEDRICH (1789–1869), Ger. painter; studied first in Vienna, later in Rome, where he attracted notice in 1811 by a picture of the Madonna. He painted several frescoes in Rome, and one fresco, *The Vision of St. Francis*, his best work of that kind, at Assisi. His most famous pictures, as well as his drawings and cartoons, deal with religious subjects.

OVERBURY, SIR THOMAS (1581–1613), Eng. poet and prose writer; friend of Robert Carr, a minion at court of James I.; became implicated in intrigues of Frances Howard, wife of Earl of Essex, and Carr; was poisoned in Tower. His *Characters* are important in the history of the essay.

OVERLAND ROUTE, route from Britain to India, *via* Paris, Lyons, Mount Cenis Tunnel, Brindisi, thence by boat through Suez Canal; journey takes 14 days.

OVERSOUL, term used by Emerson to express absolute reality from which is derived all that is valuable and universal in experience of mankind.

OVERTURE, the name of a musical form, originally given to the opening number of an opera. Strictly, it is the instrumental introduction to any vocal work, whether opera or oratorio; but there is also the concert Overture, an individual composition, of which Beethoven's *Egmont* and Mendelssohn's *Hebrides* are specimens.

OVERYSSEL (52° 25′ N., 6° 30′ E.), province, N. Holland, between Zuyder Zee and Prussia; area, 1291 sq. miles; rich grazing land; manufactures cotton. Pop. (1910) 387,381.

OVID, PUBLIUS OVIDIUS NASO (43 B.C.–17 A.D.), Rom. poet; b. Sulmo; s. of Rom. knight; ed. in rhetoric, Rome, with view to legal career; after filling minor offices, abandoned law for poetry; friend of Tibullus, Propertius, Æmilius Macer (with whom he spent a year in visiting Asia and Sicily), and other poets of younger generation; thrice married, lastly to member of Fabian *gens*, who introduced him into imperial society. In A.D. 9 Ovid was suddenly banished to Tomi, a town situated in semi-civilised country near mouth of Danube; reasons for banishment very obscure, though it is certain that Augustus cherished a grudge against O. for his immoral *Ars Amatoria*, written about the same time as the discovery of the liaison between Augustus's dau. Julia with Julius Antonius, 2 A.D. In his own writings O. speaks of an error of judgment as reason for his banishment, but the fact that the banishment coincides with Augustus's discovery of scandal between his granddaughter Julia and Silanus is significant. At Tomi O. spent remaining years of life, in discomfort and apprehension of barbarian inroads from Scythia; wrote continually to friends and patrons to procure his return, but Augustus remained firm, nor would Tiberius reverse his predecessor's decision. In character O. was a genial pleasure-seeker; though cynical and heartless he generally spoke kindly of his fellow-poets; probably greatest master of the elegy, his style is smooth and pleasing, never harsh or discordant. The *Amores*, dealing in three books with his relations with Corinna, who occupied his affections between his first and second marriage; the *Ars Amatoria*, giving directions to both sexes for the gratification of affection; the *Remedia Amoris*, sequel in different vein to *Ars Amatoria*; and *Medicamina formæ*, on the use of cosmetics, constitute his earlier poems. Next come *Metamorphoses* (in hexameters), recounting mythical tales of transformations; *Fasti*, unfinished antiquarian calendar; *Tristia*, poems of exile; and *Epistulæ ex Ponto*, complete the bulk of poet's work.

Church, *Ovid*.

OVIEDO.—(1) (43° 20′ N., 6° W.) province, N. Spain; area, 4205 sq. miles; drained by Nalon, Sella, Navia; cattle-breeding, mines, fruit; rich in minerals. Pop. (1910) 686,132. (2) (43° 22′ N., 5° 52′ W.) town, N. Spain; episcopal see, has cruciform cathedral; seat of univ.; manufactures textiles. Pop. (1910) 52,874.

OVOCA, see AVOCA.

OVULE, see FLOWER.

OVUM, or EGG, is a single cell which, when fertilised by male seed, develops into a many-celled animal. Eggs are distinctively female products, and the majority are so minute as to be almost invisible. In some groups of animals, however, the egg reaches large size, notably in the closely related groups of reptiles and birds, where it is covered with a limy protecting *shell*. In all cases, however, the ovum remains a single cell, its size depending on the amount of food material or *yolk* which accompanies the essential portion. This essential portion, as in all cells, consists of a protoplasmic body in which is embedded a nucleus or germinal vesicle, containing a number, definite for each species, of tiny chromatin threads (*chromosomes*). It is generally held that in the nucleus, and probably in the chromosomes, there resides the maternal heritage of the offspring, the mysterious foundations upon which, in conjunction with those of the male cell, are built the sum-total of the characters of the progeny.

Eggs vary as much in their mode of deposition as in their size and appearance. The majority are laid singly, as in birds and reptiles, but many also are held together in aggregates, such as the clumped spawn of frogs, the ribbons of toads or nudibranch molluscs, or the floating egg-rafts of some aquatic insects. Except in cases of vegetative reproduction, the egg is the beginning of all living things; but this fact is not always patent, for, characteristically in mammals, and exceptionally in other groups, the eggs develop and hatch in the body of the mother, and living young are born.

OWATONNA (44° 10′ N., 93° 20′ W.), city, Minnesota, U.S.A.; flour-mills. Pop. (1910) 5658.

OWEGO (43° 23′ N., 76° 36′ W.), village, summer resort, New York State, U.S.A., at junction of Owego and Susquehanna. Pop. (1910) 4633.

OWEN, JOHN (1616–83), Eng. Puritan theologian; ed. at Oxford; on the Parliamentary side during the Civil War; abandoning Presbyterianism, became Independent; accompanied Cromwell to Ireland and Scotland, and was made dean of Christ Church, 1651; as a scholar protested at the Restoration; on good terms with the king; helped to get Bunyan let out of prison.

OWEN, SIR RICHARD (1804–92), Eng. zoologist; conservator of Royal College of Surgeons, and, till 1884, superintendent of the Natural History Department of Brit. Museum; a comparative anatomist of great skill. His published papers, dealing with the description and classification of animals, cover a wide field: amongst Invertebrates—Sponges, Brachiopods, Cephalopods; amongst Vertebrates—recent Fishes, Monotremes, Marsupials, and Apes, and fossil reptiles, birds, and mammals. He also published general memoirs on the comparative anatomy of vertebrates.

OWEN, ROBERT (1771–1858), Eng. Socialist reformer; m. dau. of David Dale, owner of cotton mills at New Lanark on Clyde, 1799, and started to reform conditions of work of hands. O.'s importance is that he provided models for future legislation and roused strong feeling against existing conditions of labour; pub. *A New View of Society*, 1813. New Lanark grew into model town, and first infant schools of kingdom were established there. O. preached Socialism with success until he gave expression to his anti-religious opinions. Several experiments were made elsewhere in imitation of New Lanark. His sons, Robert Dale, William, David Dale, and Richard, became prominent in U.S.A.

OWEN SOUND (44° 35′ N., 80° 50′ W.), town, port of entry, Ontario, Canada, on Georgian Bay; machinery; wooden-ware. Pop. 10,500.

OWENSBORO (37° 47′ N., 87° 2′ W.), city, on Ohio, Kentucky, U.S.A.; tobacco factories; coal and iron mines. Pop. (1910) 16,011.

OWL-FACED MONKEYS, see Douroucolis.

OWLS, nocturnal birds of prey, with sharp strong beaks and claws. The 'wise' look so characteristic of owls is due to the fact that the eyes are large, are directed forwards, and are surrounded by a whorl or circle of fine radiating feathers. Owls are found all the world over, living mainly in trees but sometimes in old buildings, and feeding usually on rats, mice, and smaller mammals, or on birds, reptiles, and insects. They fall into two families: the **True Owls** (Bubonidæ), with almost 300 species, including the large Eagle-Owls (*Bubo*), which kill hares, rabbits, or even young deer, and the British Tawny, Long-Eared, and Short-Eared Owls (*Syrnium* and *Asio*); and the **Barn Owls** (Strigidæ), with 26 species, but only one Brit. and European representative—the White or Common Barn Owl (*Strix*).

OWOSSO (43° N., 84° 12′ W.), city, on Shiawassee, Michigan, U.S.A.; beet-sugar. Pop. (1910) 9639.

OX GROUP, a section of the cattle tribe, *Bovidæ* (*q.v.*), distinguished by a broad, naked muzzle, the presence of round or ridged equal horns, long tails, usually tufted, and a dewlap on the throat of the male. Although common in Europe, Asia, and Africa, there is only one Amer. species and one in Celebes. This last is the small black Anoa (*Anoa depressicornis*), included in the group of the Buffaloes (*q.v.*), to the young of which it presents a striking resemblance. Closely related to the Buffaloes are the Bisons (*Bison*), comprising two species, the European and the Amer. Bison—the American, now nearly extinct, being slightly smaller than the European species (only found in the forests of Lithuania and the Caucasus).

Distinguished from the Bisons and Oxen by the different position of the long hair forming a fringe over shoulders, flank, and tail, the Yak (*Poëphagus*) inhabits the high plateaux of Tibet, where the tame animals are used as beasts of burden.

Those nearly related to the typical Oxen are three Oriental species comprising the shy Gaur (*Bos gaurus*), with arched back and strange concave profile, found in the large Indian forests; the Gayal or Mithan (*Bos frontalis*) occurring in Assam and adjacent districts, with shorter and rounder horns and without the large frontal crest of the Gaur; and the Banteng (see Bantin).

Lastly, the typical Ox is represented at the present day only by domesticated breeds (see Cattle) belonging to two species, *Bos taurus* and *Bos indicus*, though half-wild herds of the former have been preserved at Chillingham Castle, Northumberland, and Cadzow Castle, Lanarkshire.

OXALIC ACID ($H_2C_2O_4+2H_2O$), crystalline solid, soluble in water; poisonous; salts present in wood sorrel (*oxalis*), rhubarb, dock; formed when sugar, fats, etc., are oxidised with nitric acid, or sawdust is heated with alkali. The simplest dicarboxylic acid, constitution, HOOC.COOH, gives ($CO+CO_2$) with hot H_2SO_4.

OXENBRIDGE, JOHN (1608–74), Eng. Nonconformist minister.

OXENSTJERNA, AXEL, COUNT OF (1583–1654), Swed. statesman; greatest member of prominent Swed. family; app. Chancellor by new king, Gustavus Adolphus, 1612, and restored peace and prosperity; made peace with Denmark, 1613; ended war with Russia by Treaty of Stolbova, 1617, acquiring lands on Baltic coast for Sweden; disapproved of aid to elector palatine, but arranged supplies and made negotiations; recognised leader of Evangelical Union, 1633; educated Christina; won provinces from Denmark, 1646; opposed abdication of queen. See Sweden: *History*.

OXENSTJERNA, BENEDICT (1623–1702), Swed. statesman; Chancellor and Prime Minister, 1681; vainly opposed foreign policy of Charles XI. and Charles XII.

OXENSTJERNA, GABRIEL THURELON, COUNT OF (1641–1707), Swed. poet and statesman.

OXFORD (39° 30′ N., 84° 45′ W.), town, Ohio, U.S.A.; seat of Miami Univ. Pop. (1910) 2017.

OXFORD (51° 46′ N., 1° 16′ W.), city, parliamentary and municipal borough, county town of Oxfordshire and seat of celebrated univ.; beautifully situated on junction of Cherwell and Isis (Thames). The principal streets (High St., Queen St., Cornmarket St., and St. Aldate's St.) meet at place called Carfax in centre of old O. The town belongs to an earlier date than the univ., and takes a prominent place in history; after many attacks by Danes, O. was taken by Sweyn in 1013; in 1142 besieged by Stephen; Ridley, Latimer, and Cranmer were martyred here in reign of Mary Tudor; during Civil War town became headquarters of Charles I.'s party, and was the scene of Jacobite riots in beginning of George I.'s reign.

The University is believed to have originated in XII. cent., and now comprises 21 colleges and 1 hall:—

All Souls' College, founded by Chichele in 1437, possesses beautiful chapel and important library; front quadrangle remains almost unchanged. Balliol College, founded by Devorguilla, mother of Balliol, king of Scotland, in 1269. Brasenose College, built on site of Brasenose Hall in 1509, contains a particularly fine gateway. Christ Church, most magnificent of all O. colleges, was founded by Wolsey in 1525 as Cardinal Coll.; the site included St. Frideswide Priory, and some of old buildings still exist; coll. was remodelled by Henry VIII., and in 1546 named Christ Church; buildings are of great architectural interest, particularly those built by Wolsey; old church of the Priory serves as cathedral and coll. chapel. Corpus Christi College was founded in 1516; Exeter College, founded 1314; Hertford College, founded 1874, but since XIII. cent. there have been many halls on same site; Jesus College, founded in 1571 for Welshmen by

Price, and site provided by Elizabeth; KEBLE COLLEGE, erected by subscription in 1870 in memory of Keble. LINCOLN COLLEGE, founded 1429; refounded, 1474; contains fine chapel. MAGDALEN COLLEGE was founded in 1458 by bp. of Winchester, who bought up Hospital of St. John the Baptist; hospital chapel and kitchen still remain; notable features are bell-tower and beautiful gardens; chapel music is celebrated. MERTON COLLEGE was founded first in Surrey in 1264 by Merton, and removed to O. in 1274; chapel and library particularly noteworthy. NEW COLLEGE, founded in 1379; chief features are chapel cloisters and gardens. ORIEL COLLEGE, founded by Edward II. in 1326; now almost completely modern (St. Mary's Hall was incorporated with Oriel in 1896). PEMBROKE COLLEGE was founded in 1624. QUEEN'S COLLEGE was erected in honour of Queen Philippa in 1340; buildings belong mostly to XVII. and XVIII. cent's. ST. JOHN'S COLLEGE, built in 1555 on site of St. Bernard's, includes portions of old coll.; Canterbury quadrangle was erected by Laud. TRINITY COLLEGE, founded 1555, stands on site of Durham Coll.; several of ancient buildings still remain. UNIVERSITY COLLEGE, endowed by William of Durham in 1249; none of old buildings remain. WADHAM COLLEGE, founded 1613, occupies site of Austin Friary; contains beautiful chapel and gardens. WORCESTER COLLEGE, founded in XIII. cent. as Gloucester Coll., was refounded in 1714. ST. EDMUND'S HALL was founded in 1226.

Other educational institutions are St. Hugh's Hall, St. Hilda's Hall, Somerville Coll., and Lady Margaret Hall for women; Manchester Coll., Mansfield Coll., Wycliffe Hall, Pusey House, and St. Stephen's House; connected with univ. are Sheldonian Theatre (where univ. public ceremonies take place), Ashmolean Museum, Univ. Museum, Indian Institute, Bodleian Library, Divinity School, Clarendon Press buildings, Univ. Galleries, Univ. Observatory, Radcliffe Observatory and Library, and Taylor Institute. Apart from cathedral, principal churches are St. Mary's, St. Michael's, St. Peter's-in-the-East, St. Giles', and All Saints'. O. contains many interesting old houses and remains of a castle. O. has no important manufactures. Pop. (1911) 53,049. See UNIVERSITIES.

Headlam, *Oxford* (1904); Godley, *Oxford* (1911).

OXFORD, EDWARD DE VERE, EARL OF (1550–1604), Elizabethan courtier and author of comedies and light verse; succ., 1562; first wife was dau. of Lord Burleigh; fought against Armada.

OXFORD, PROVISIONS OF, decrees of Parliament which sat at Oxford, 1258, for reform of abuses in realm; sole record preserved in *Annales monastici* (Rolls Ser.). See ENGLAND: *History.*

OXFORD, ROBERT DE VERE, EARL OF (1362–92), cousin of Richard II.; laden with honours and roused jealousy of nobles; defeated by Gloucester at *Radcot*, 1387; attainted and fled abroad.

OXFORD, ROBERT HARLEY, EARL OF (1661–1724), Brit. statesman; Speaker of House of Commons, 1701–5; Northern Sec. of State, 1704–8; Chancellor and Under-Treasurer of Exchequer, 1710–11; cr. Baron Harley of Wigmore, Earl of O., and Earl Mortimer, 1711; First Lord of Treasury, 1711, and made Treaty of Utrecht; dismissed by Queen Anne as suspected Jacobite, 1714; impeached and imprisoned, 1715; acquitted, 1717, but never regained power; highly praised by literary men, who had reason to be grateful for his liberal patronage. His character, though blackened by rivals, was without serious faults; *Life*, by Roscoe.

OXFORD MOVEMENT, THE, a revival of Church feeling in England, heralded by Keble's *Christian Year*, and inaugurated by Keble, Newman, Pusey, and others, who published *Tracts for the Times*; emphasised the catholicity of the English Church and the value of the Sacraments; differed from the Evangelical revival in its adherence to ecclesiastical teaching and tradition. The secession of Newman to Roman Catholicism (1845) did it tremendous harm; essentially a 'High Church' movement.

OXFORDSHIRE (51° 45′ N., 1° 15′ W.), county, England; bounded N. by Warwick and Northampton, E. by Bucks, S. by Berks, W. by Gloucester; area, 755 sq. miles. Surface generally is level; N. mostly bare and bleak, but in S. are finely wooded hills and valleys; S.E. crossed by branch of Chiltern Hills; well watered by numerous beautiful rivers, including Thames and its tributaries, Windrush, Evenlode, Cherwell, and Thame. Soil is particularly fertile, O. being one of most productive counties in England; chief crops are barley, oats, and wheat; stock raised; paper made at Shiplake and elsewhere, gloves at Woodstock, blankets at Witney, agricultural implements at Banbury; manufactures of bricks and lace also carried on. Chief towns are Oxford (county town), Banbury, Henley, Chipping Norton, Abingdon, and Woodstock. County holds important position concerning education, owing to celebrated Univ. at Oxford and other educational institutions. Oxford and Bampton are among few remaining castles; there are many ecclesiastical remains, finest specimen being Dorchester Abbey; interesting churches at Iffley, Adderbury, and Minster Lovell; many fine mansion-houses. O. played prominent rôle in Civil War; battles of *Chalgrove* (1643) and *Cropredy Bridge* (1644). Pop. (1911) 146,288.

Oxfordshire, in Victoria County Histories.

OXIDE, compound of an element or radicle with oxygen. Metals form chiefly basic o's, non-metals acidic o's. Also there are *peroxides*, which readily yield oxygen, or are oxidising agents, and a few neutral o's (*e.g.* H_2O).

OXIMES, first obtained by Victor Meyer (1882), are colourless liquids or crystalline solids. They contain the group $>C=NOH$, being formed by interaction of hydroxylamine and aldehydes (aldoximes) or ketones (ketoximes): $>CO + H_2NOH = >C=NOH + H_2O$, and yield primary amines by reduction: $>C=NOH \xrightarrow{4H} >CHNH_2 + H_2O$. Isomeric oximes exist, *e.g.* two benzaldoximes (C_6H_5CHNOH), α (M.P. 35° C.), β (M.P. 128° C.); they are probably stereoisomeric.

OXUS, or AMU DARYA, important river in Central Asia; rises in Pamir plateau, forms for some distance boundary between Afghanistan and Bokhara, flows through Bokhara and Khiva, and falls into southern extremity of Sea of Aral by numerous mouths. Two head-streams of O., Aksu or Murghab and Ab-i-Panja, unite at Kala Wamar; river has many tributaries in upper course, but few after it enters deserts of Turkestan, where streams often disappear in sand; before entering plains of Turkestan O. has difficult course through mountainous country; forms a delta *c.* 90 miles from Sea of Aral; largest island is Paighambar Island. River banks in some parts are fertile, and canals are made to assist in cultivation; in some seasons O. floods large tracts of country. River took prominent part in ancient history, and was crossed by both Cyrus and Alexander; believed to have flowed at one time into Caspian Sea. O. is navigable as far as Charjui, where it is crossed by railway from Merv to Samarkand; there is regular steamer service.

OXYGEN, O=16·00. Gaseous element, molecule= O_2; occurs free in air (23 % by weight) and combined in water (88·81 %), and in the rocks of the earth's crust (44 to 48 %); the most plentiful and widely diffused terrestrial element. O. was first obtained by Scheele (1773), and by Priestley (1774), who prepared it by heating 'mercurius calcinatus' (HgO); named by Lavoisier (oxygen = acid-producing), who thought it the essential constituent of an acid, and explained its function in combustion.

PREPARATION:

(i.) By heating mercuric oxide: $2HgO = 2Hg + O_2$.

(ii.) By heating potassium chlorate: $2KClO_3 = 2KCl + 3O_2$ (manganese dioxide catalytically causes decomposition at a lower temperature).

(iii.) A number of other highly oxygenated com-

pounds yield the gas when heated, *e.g.* MnO_2, PbO_2, CrO_3, BaO_2.

(iv.) From the air: (*a*) by Brin's process, by which heated baryta is alternately made to absorb and give up oxygen ($2BaO + O_2 \rightleftarrows 2BaO_2$); (*b*) by fractionation of liquid air. See LIQUEFACTION OF GASES.

PROPERTIES.—Colourless, invisible, tasteless, odourless gas; coefficient of solubility in water at 0° C. = 0·0489. Liquid oxygen is pale blue and strongly magnetic; B.P. (atm. press.) – 182·5°, critical temperature, – 119°; critical pressure, 58 atmospheres. Solid oxygen melts below – 223°. Vigorously supports combustion of phosphorus, sulphur, charcoal, iron, wood, a taper, etc. In the oxyhydrogen flame platinum melts, and lime shines with a dazzling light (lime-light).

PHYSIOLOGICAL ACTION.—Oxygen is necessary for respiration, and for the decay of dead organic matter. It is thus converted into atmospheric carbon dioxide, from which the carbon is removed by green plants in sunlight. On account of its vigorous action pure oxygen is substituted for air when respiration is difficult, as in cases of suffocation, gaseous poisoning, and low vitality. Its long-continued respiration is harmful.

Oxides are formed by combination with every element except (bromine) fluorine, and the members of the helium family. They may be basic, acidic, neutral, or peroxides.

OYSTER BAY (40° 50′ N., 73° 28′ W.), township containing several summer resorts, Long Island, New York State, U.S.A.; residence of Mr. Roosevelt, where Russo-Japanese Peace was arranged, 1905. Pop. (1910) 21,802.

OYSTER-CATCHERS, see PLOVER FAMILY.

OYSTERMOUTH, THE MUMBLES (51° 35′ N., 4° W.), town, Glamorganshire, Wales; has ruined Norman castle; Rom. remains. Pop. (1911) 6098.

OYSTERS, a genus (*Ostrea*) of Lamellibranch or Bivalve Molluscs which forms a favourite food supply of many nations. Its members possess the general structures of Lamellibranchs (*q.v.*), and in particular of the Pseudo-Lamellibranchia; are inactive creatures protected by a heavy shell composed of two unequal valves, the larger and convex left valve being that on which the animal lies, the lighter, flat right valve forming the upper lid. The two valves are held together by a single strong muscle. O's, of which there are many species, live in all seas, near the shore, preferably in shallow water free from disturbing currents. They congregate in great banks or beds, and so great is the fertility of the individuals that during the spawning season from May to Sept. the sea in the neighbourhood is turbid with the young or 'spat.' The young o's grow about an inch in diameter each year until the third year, after which growth becomes much slower. Seven to ten years is a common age for average o's.

The catching of o's for food forms a great industry centred chiefly in the U.S.A., France, and Britain. Many o's are dredged from native beds, but still more are cultivated in special ponds and artificial banks. The annual consumption is reckoned in many hundreds, almost thousands, of millions.

Related to the Edible O's are the Pearl O's (*Meleagrina* or *Margaritifera*) of tropical seas, the shells of which supply useful and ornamental articles of mother-of-pearl, and from which marine pearls are obtained.

OZAKA, see OSAKA.

OZANAM, ANTOINE FRÉDÉRIC (1813–53), Fr. author; prof. at Sorbonne; researches throw new light on Dark Ages; wrote important *Études Germaniques, Dante ou la Philosophie Catholique.*

OZIERI (40° 35′ N., 9° 1′ E.), town, Sassari, Sardinia. Pop. 10,000.

OZOKERITE, mineral wax varying from very soft to hard; colours—brown, yellow, green; may be streaked or spotted; generally found in bituminous sandstones of coal measures, chiefly in Galicia and Austria.

OZONE, O_3, allotropic form of oxygen, produced by passing electric sparks on the silent electric discharge through the gas; also by chemical means; peculiar smell; powerful oxidising agent, unstable, destroyed by heat; presence in the atmosphere uncertain.

P, 16th letter of alphabet; originally in Gk. a hook which gradually became a loop in Lat. alphabet; a labial mute; seldom used as initial letter in Teutonic; often silent, as in *pneumonia, receipt*; *ph* is pronounced *f*.

PAARL (33° 39′ S., 18° 54′ E.), town, on Berg River, Cape Province, S. Africa; wines. Pop. (1911) 11,020.

PABIANICE (51° 30′ N., 19° 20′ E.), town, Piotrkow, Russ. Poland; textiles. Pop. 27,500.

PABNA, PUBNA (24° N., 89° 17′ E.), town (and district), Rajshahi Division, Bengal, India. Pop. 21,000; (district) 1,500,000.

PACA (*Agouti paca*), large nocturnal Rodent found in forests and on river banks in Central and South America.

PACHMARHI (22° 30′ N., 78° 30′ E.), hill station, sanatorium, Hoshangabad district, Central Provinces, India.

PACHUCA (20° 5′ N., 98° 50′ W.), capital of state of Hidalgo, Mexico; silver mines. Pop. (1910) 38,620.

PACIFIC OCEAN, largest of the five great oceans of the world; occupying about half the water surface of the globe. P. O. extends from Arctic Ocean at Bering Strait to the Southern Ocean at *c.* 40° S., and lies between America (on E.) and Australia and Asia (on W.); total length from N. to S., *c.* 9000 miles; greatest breadth (near equator), over 10,000 miles. Area—*c.* 65,000,000 sq. miles—is more than twice area of Atlantic; drainage area, however, is only 7,500,000 sq. miles (much less than that of Atlantic); largest Asiatic rivers are Amur, Hoang-ho, Yang-tse-kiang, Mekong, Menam, Canton; American rivers are Yukon, Fraser, Columbia, Colorado. Salinity is less than that of Atlantic. Mean depth is about 2500 fathoms; greatest depth on Asiatic side, viz. 40 miles E. of Mindanao (Philippines), 32,089 ft. (greatest recorded ocean depth); between Midway Islands and Guam, 31,614 ft.; E. of Kermadec Islands, 30,920 ft.; N.E. of Japan, 27,925 ft. The coast-line of America and Australia is generally mountainous with few inlets—Gulf of California, Puget Sound, etc.; the Asiatic coast is generally flat with many large indentations—Yellow, China, Japan, Okhotsk Seas, etc.

P. O. has innumerable continental and oceanic islands, mainly in centre and west, either of volcanic or coral formation, viz. New Zealand, New Guinea, Borneo, Sumatra, Java, Japan, Philippines, New Hebrides, Galapagos, Solomon, Fiji, Samoa, Hawaii, Ladrones, Carolines, Aleutians, etc. Climate generally is tropical. Principal prevailing winds are the two trade-winds blowing from N.E. and S.E., with broad belt of equatorial calms between them. Monsoons also blow regularly, and violent storms occur in lat. 30° to 5° N., China Sea, etc. The currents resemble those of Atlantic; the warm Kuro-shiwo Current, or Black Stream of Japan, corresponds to Atlantic Gulf Stream; the cold Humboldt or Peruvian Current in South Pacific (corresponding to Atlantic Benguela Current) flows northward, eventually joining the South Equatorial Current.

P. O. was discovered by Vasco Nuñez de Balboa, 1513, when he crossed the Isthmus of Panama; traversed by Magellan, 1520–21, and named Pacific on account of calms encountered there after previous violent storms. Brit. Pacific cable connects Vancouver, Australia, and New Zealand; American cable links San Francisco and Manila (Philippines). Chief steamship routes are from Vancouver and San Francisco to New Zealand, Australia, and Japan; another route from New Zealand to Europe passes round Cape Horn. Panama Canal (*q.v.*) will revolutionise Pacific trade routes. Chief powers represented in Pacific are Britain, Japan, U.S.A., Germany, France.

Fox, *Problems of the P.* (1912); Colquhoun, *Mastery of the P.* (1902).

PACORUS, name of several Parthian rulers of Arsacid line. Chief: PACORUS, who won great victories in Syria, Palestine, etc., against Romans, as lieutenant of his f., Orodes I., 40 B.C., but was defeated and slain, 39.

PACUVIUS, MARCUS (*c.* 220–130 B.C.), Rom. tragic poet; considered one of great poets of Rome; works have almost entirely perished, but were famous for their sublimity.

PADDINGTON.—(1) W. division of London, N. of Hyde Park. Pop. (1911) 142,576. (2) eastern suburb, Sydney, New South Wales. Pop. 23,000.

PADDLE-WORM, see under CHÆTOPODA.

PADERBORN (51° 43′ N., 8° 45′ E.), town, Westphalia, Prussia; seat of bishopric; has R.C. cathedral; trades in cattle, wool, fruit; has large railway workshops. Pop. (1910) 29,418.

PADEREWSKI, IGNACE JAN (1860–), Polish pianist and composer; brilliant virtuoso.

PADIHAM (53° 48′ N., 2° 19′ W.), town, on Calder, Lancashire, England; cotton mills. Pop. (1911) 13,637.

PADILLA, JUAN LOPEZ DE (*c.* 1485–1521), Span. hero; led rebellion against Charles V.'s taxations; defeated at *Villalar* and beheaded.

PADISHAH, PADISHAG, one of titles of Shah of Persia and Sultan of Turkey.

PADSTOW (50° 33′ N., 4° 56′ W.), port, Cornwall, England; has good harbour; trades in fish; site of former monastery; has several interesting churches. Pop. (1911) 2480.

PADUA, PADOVA (45° 23′ N., 11° 53′ E.), city, N. Italy, capital of P. province, on Bacchiglione; Lat. *Patavium* (q.v.); chief features—arcaded streets, several ancient bridges, churches of St. Anthony, Eremitani (XIII. cent.), Madonna della Arena (frescoes by Giotto), Santa Giustino, Palazzo Ragione (1172–1219), univ. (XIII. cent.), library, Donatello's equestrian statue of Gattamelata, Museo Civico; chief industries, machine works, chemicals, silk, distilleries; great centre of learning and art during Middle Ages and Renaissance. Pop. (1911) 96,135; (prov.) 518,810.

Foligno, *Padua* (Mediæval Towns Series).

PADUCAH (37° 7′ N., 88° 41′ W.), city, Kentucky, U.S.A., at junction of Tennessee and Ohio; sawmills; railway workshops; trade in tobacco. Pop. (1910) 22,760.

PÆAN, Gk. hymn to Apollo, then of thanksgiving.

PÆLIGNI, ancient Italian people; fought against Rome in second Samnite War, 325 B.C.; received as allies by Rome, 305–302 B.C.

PÆONIA, land of the Pæones, a Thracian people; situated in N. of Macedonia, between borders of Illyria and eastern bank of river Strymon.

PÆONY (*Pæonia officinalis*), a member of the Ranunculaceæ, possessing showy, honey-bearing flowers and tuberous roots; fruit a follicle.

PÆSTUM, ancient city of Italy; called *Posidonia* by Sybarite colonists, VI. cent. B.C.; made Rom. colony and named *Pæstum*, 273 B.C., Christian bishopric; deserted during Muhammadan invasions; magnificent ruins, with famous temple of Poseidon.

PAGAN (21° 10′ N., 95° E.), town, Myingyan, Upper Burma; capital of Burma till 1298. Pop. 7500.

PAGANINI, NICOLO (1784–1840), Ital. violin virtuoso, remarkable for a technique still unsurpassed.

He travelled widely, and his astonishing feats gave rise to many weird legends; known also as a composer for his instrument.

PAGE, THOMAS NELSON (1853–), Amer. lawyer and author; noted for stories of negro life.

PAGEANT (M. E. *pagyn, padgin,* forms of Lat. *pagina,* to which *t* was added, as in other words, *e.g.* ancient).—(1) scene or act of play; so used, XIV. to XIX. cent's. (2) platform or stage of action of play; applied to the wheeled machine used by strolling players before construction of theatres. (3) any show.

All these uses appear early. (4) modern pageant, an attempt at representation of hist. events—when possible at actual scene of action—usually shows progress in history of a town, nation, or empire, an institution—*e.g.* army—or some aspect of civilisation, *e.g.* The Masque of Learning, Edinburgh (1912); great feature of early XX. cent., cf. Quebec Tercentenary P. (1908), Bath P. (1909), Union of S. Africa P. at Cape Town (1910), Festival of Empire, London (1911), all arranged by FRANK W. C. C. LASCELLES. LOUIS N. PARKER (1852–), dramatist, has produced many p's.

PAGET OF BEAUDESERT, WILLIAM PAGET, 1ST BARON (1506–63), Eng. statesman; one of chief sec's of state, 1544; member of council of regency app. by will of Henry VIII.; obtained Beaudesert, with other spoils, under Protectorate; Lord Privy Seal, 1556–58.

PAGET, SIR GEORGE EDWARD, K.C.B. (1809–92), Eng. physician; bro. of Sir James Paget (*q.v.*); ed. at Charterhouse and Cambridge (B.A., 1831; M.D., 1838); regius prof. of Physics at Cambridge, 1872; helped to develop modern medical education.

PAGET, SIR JAMES, Bart. (1814–99), Eng. surgeon; b. at Yarmouth, where he was apprenticed to a medical practitioner, and entered as a student at St. Bartholomew's Hospital; became a member of the Royal Coll. of Surgeons in 1836; lectured on morbid anat., and later anat. and physiology, and app. warden of the hospital coll. By 1851, when he resigned the wardenship and began practice as a surgeon, he was a famous physiologist and pathologist, his classic work, *Lectures on Surgical Pathology,* being given as a course of lectures in 1847–53 and pub. in 1853. Success as a surgeon soon came to him; in 1853 he was app. surgeon extraordinary to Queen Victoria; in 1871 cr. a baronet; pres. of the Royal Coll. of Surgeons, 1873; retired from practice, 1878. He discovered the disease of the breast and the disease of bone which are named after him, and was the author of *Clinical Lectures and Essays, Studies of Old Case-Books,* etc.

Memoirs and Letters, edit. by son, Stephen Paget.

PAGHMAN (35° N., 69° E.), small, mountainous district, Afghanistan.

PAHANG, see MALAY STATES.

PAHARI, term applied to group of Indo-Aryan dialects spoken in N. India; three main divisions—W., spoken around Simla; central, in N. of United Provinces; E., spoken in Nepal by Aryan population and called by them *Khas-kura,* though frequently termed, inaccurately, *Nepali.* Khas-kura contains a considerable admixture of Tibeto-Burman words and idioms, notably the indefinite tense formed by affixing verb-substantive to verb-root, and the impersonal conjugation (honorific). P. possesses small literature: *Birsicca,* collected folk-tales; *Ramayana,* by Bhanu Bhatta; and translations from Sanskrit.

Grahame Bailey, *Languages of Northern Himalayas.*

PAHLANPUR, see PALANPUR.

PAHLAVI, PEHLEVI, a Persian form of Parthian, word used of script in which the Zoroastrian sacred writings have been transcribed. For long there was dispute as to whether P. was Persian or Semitic, as it seemed strangely composed of both. It is now known to be Persian, but for many Persian words are written Semitic translations. The same characters are often used for several Semitic letters. Thus the system of writing is ideographic. The sacred books were written about the VI. cent., and are almost the only ones surviving in the original of a miscellaneous literature.

PAIGNTON (50° 26′ N., 3° 35′ W.), seaside resort, Devonshire, England. Pop. (1911) 11,241.

PAILLERON, ÉDOUARD JULES HENRI (1834–99), Fr. dramatist; wrote great satirical comedy, *Le Monde où l'on s'ennuie.*

PAIMPOL (48° 48′ N., 3° W.), seaport, Côtes-du-Nord, France; fisheries.

PAIN.—(1) pain-sensations, *e.g.* aroused by a prick or blow. The skin, except in a few small areas, contains a great number of special 'spots,' stimulation of which occasions pain-sensations. (2) an affective state, the opposite of pleasure (cf. 'painful' news); better called 'unpleasure,' or 'unpleasant feeling.'

PAINE, THOMAS (1737–1809), Eng. Theist and economist; b. in Norfolk of Quaker stock; sailed for Philadelphia, 1774; pub. (1776) a pamphlet entitled *Common Sense,* advocating Amer. independence, which was followed up by his *Crisis.* He returned to England in 1787, and published *The Rights of Man,* a reply to Burke. *The Age of Reason* is a plea for Theism. *Life,* by Conway (1892).

PAINESVILLE (41° 45′ N., 81° 20′ W.), city, on Grand, Ohio, U.S.A.; iron foundries, flour-mills. Pop. (1910) 5501.

PAINTING.—In view of our fragmentary knowledge, derived mainly from literary sources, of pre-Christian and Early Christian art, the history of p. may be said to begin with the liberation of art from the magnificently decorative and dignified, but formal and lifeless style of the Byzantine mosaicists. The XIII.-cent. Florentine master, Cimabue, is generally credited with being the 'father of modern p.,' but his excessively rare extant works prove him to have been scarcely more than an excellent follower of the Byzantine tradition. It was his pupil, GIOTTO, in Florence, and Duccio, in Siena, who first broke away from this tradition and infused life into the frozen images of their predecessors. Each became the founder of a great school that endeavoured to bring p. into closer touch with life; but whereas Giotto and his followers were more concerned with physical life and corporeality, the Sienese devoted themselves to expressing the inner life of the soul. The *Florentines* were more monumental, the *Sienese* more emotional. The medium of these early painters was *tempera,* that is, ground colours mixed with the yolk of eggs. Although these primitives produced many portable altarpieces and panels, they were essentially painters of frescoed wall decoration, which demands a broad treatment of flat masses of colour, this colour being invariably subordinated to linear design. Throughout the XIII. and XIV. cent's the painters worked entirely in the service of the Church.

Italian Renaissance.—In Siena the tradition of Duccio was carried on by Simone Martini, Lippo Memmi, and the Lorenzetti, but this art, which had never entirely shaken off the fetters of Byzantinism, was incapable of further developments, and, by the end of the XIV. cent., had fallen into stagnation and decay. To the Florentines whole worlds were left to conquer—the worlds of perspective anatomy, light and shade, movement, plastic life. But Giotto had moved too rapidly, and for a cent. his followers, the *Giottesques,* contented themselves with imitating his types and motifs without adding a new word to the artistic language. Giottism became a formula, almost as much as Byzantinism, until, on the threshold of the Renaissance, Masaccio broke new ground by increasing the weight and volume of his figures and investing his frescoes with something of statuesque classic dignity. Others continued to build upon the foundations laid by him.

The Florentine painters of the XV. cent. were stimulated by the spirit of the revival of classic learning and by the newly awakened love of classic art. They approached Nature and all the pictorial problems with passionate curiosity. Uccello and

Andrea del Castagno developed the science of perspective; Domenico Veneziano was the first Florentine to introduce the *oil technique*, which gradually was to oust the technique of tempera p.; Piero dei Franceschi was the discoverer of atmosphere; the Pollaiuoli, and after them Luca Signorelli of Cortona, almost exhausted the significance of the human body in muscular action; Filippo Lippi's pupil, Botticelli, was the supreme master of expressive decorative line and rhythmic movement.

Other schools had meanwhile risen in Italy. In *Padua*, the great seat of learning, the erudite and travelled Squarcione had founded a school for the study of the antique, from which issued not only the great Mantegna, the most 'classic' of the Ital. painters, but its influence spread over the whole of N. Italy and became paramount at Ferrara and the surrounding cities. In *Umbria*, at Perugia, Fiorenzo di Lorenzo, the first of a long line of painters whose art reflects the tenderness and gentle beauty, so inducive to serene spirituality, of the lovely Umbrian landscape under its limpid blue sky, became the teacher of Pinturicchio and Perugino—the most typical of the Umbrian masters.

The end of the XV. and the beginning of the XVI. cent's witnessed the full flowering of the Renaissance, dominated by the mighty triple constellation of Leonardo da Vinci, Raphael, and Michelangelo. Leonardo, the heir of two cent's of development, was a universal genius of vast knowledge and experience—a supreme master of line and colour, movement and expression, and, above all, of modelling by means of light and shade, the perfecting of which was his chief contribution to the evolution of art. Raphael, who had mastered all the difficulties of his craft while still in his teens, was an eclectic who deliberately took the best that he could find in others, Umbrians and Florentines, in Perugino, Leonardo, Maraccio, Michelangelo, Sebastiano del Piombo, and others, and combined these elements with an art of unrivalled purity and perfection. He was the greatest master of space composition. Michelangelo, the giant with the turbulent, passionate spirit, heightened the vitality of humour movement almost to breaking-point and invested it with a deep, general significance. What had been individual and realistic in his precursors, became in his hands typical.

Further development on these lines was impossible, and where art falls into mere imitation, decline is inevitable. Leonardo's followers in Milan contented themselves with the more or less mechanical copying of their master's types and designs. Raphael and Michelangelo impressed their genius upon Rome and the greater part of Italy. The XVI. cent. is the age of the *Mannerists*, or imitators of one master. Of those whose strong personality added a new note to the artistic achievement of the country are Correggio, who worked mostly at Parma, and perfected the art of *chiaroscuro*; and Andrea del Sarto, 'the perfect painter,' in Florence, where portraiture found a strong exponent in Bronzino.

The Mannerists were followed by the *Eclectics*, or imitators of many, who issued mainly from the Academy of the Caracci in Bologna. A wholesome reaction was the movement of the *Naturalists*, led by Caravaggio and Ribera, who had their headquarters in Naples and who returned to a closer touch with Nature. After them came complete decadence, except in Venice, where the rise of p. had been tardy, but where a great decorative tradition lingered to the end of the XVIII. cent.

Venetian p. owed its characteristics partly to the Republic's constant intercourse with the splendour-loving East, partly to the unique atmospheric conditions of the lagoon city, which could not fail to develop that keen sense of beautifully harmonised, mellow colour, which is to be found in Venetian art from the days when Jacopo Bellini and his sons, Giovanni and Gentile Bellini, founded the school from which were to issue such masters as Giorgione, Palma, and Titian, through the late XVI. cent., which could boast a Tintoretto and a Paolo Veronese, to Tiepolo, the brilliant and facile decorator who held undisputed sway in the XVIII. cent. What distinguished the Venetians throughout from the other Italians, and especially from the Florentines, was that they thought in colour, whereas the others conceived their pictures more or less as linear designs, to which colour was subsequently added.

Flemish School.—In the North, in Flanders, the art of p. did not reach perfection by a process of gradual evolution, as in Italy. It sprang from a flourishing school of miniaturists and illuminators, fully fledged, as Minerva issued in full armour from the head of Jupiter. The first masters of whom we have definite knowledge, the bro's Van Eyck (b. in the second half of the XIV. cent.), who are known as the inventors of *oil-painting*, represent the highest achievement of the early Flemish school. Technical perfection, exquisite finish, painstaking precision in the rendering of the minutest details of costume, types, arch. and landscape, could not go further. Yet, whilst every touch was guided by close study of actuality, the realism of the Van Eycks and their followers at Bruges—Memline and Gerard David—or of the Tournai master, Robert Campin, and of his pupils, Rogier van der Weyden and Jacques Daret, was anything but photographic. Their works are charged with tender feeling, poetry, and symbolism, and have a wonderful rhythm of design and pure, brilliant colour.

Towards the end of the XV. cent., when Bruges had lost its political importance and Antwerp had become the chief centre of commercial activity, the artistic hegemony, too, passed from Bruges to Antwerp, where Quentin Matsys became the founder of an important school. But already with Mabuse, who d. in 1532, and even more with Barend van Orley, a pupil of Raphael, the national tradition was sacrificed to the mannered imitation of the later Italians, until new life was infused into Flemish p., towards the end of the XVI. cent., by Rubens, a true son of his race. Rubens, too, had studied the Italian, and especially the Venetian, masters, but he never became their slave. His pictures, which represent Flemish taste and Flemish character of his period, have extraordinary vitality and movement. As a painter of the nude he stands unrivalled. His apparently spontaneous, impulsive brushwork is always controlled by an instinct for noble design and sumptuous colour. He had a whole army of assistants, who continued to work in his manner, but of whom only few were destined to rise to greatness. Chief among them was Van Dyck, who became the favourite painter of Charles I. and his court, and who in this capacity exercised an enormous influence upon the art of portraiture in England. But the towering genius of Rubens was as fatal for Flemish art as Raphael's and Michelangelo's had been for Ital. art. It created a generation of accomplished imitators, and stayed the normal course of slow evolution.

Holland.—The early art of Holland is almost merged with that of the primitive Flemings. The Reformation and the War of Independence waged against Spain retarded progress and were inimical to the fostering of the arts. But peace came in the end; and victorious Protestantism, that looked askance at religious art, brought the country back to prosperity. A new demand arose for art, but now patronage was no longer in the hands of the Church and the nobles. Art became democratic; it entered the citizen's home. The XVII. cent. in Holland witnessed the rise of landscape and of genre-p., of still-life and of civic portraiture. Excepting Rembrandt, the greatest of all Northern masters, a magician of golden light and mysterious shade, an artist whose profound human sympathy with all life made him probe the full significance of the visible world, the

Dutchmen were, above all, realists, whose chief aim was to create a literally true record of the life around them in terms of beautiful, precious paint. The 'small masters'—Terburg, Vermeer, Jan Steen, Dow, Metsu, and their kin—were the discoverers of indoor atmosphere, and delighted in expressing the material beauty of all manner of textures. Landscape was raised to the dignity of a subject worthy of being painted for its own sake, and not as a mere background, by Hobbema, Ruysdael, and their followers. Paul Potter, Cuyp, and others devoted themselves to animal p., whilst a whole band of able craftsmen, fascinated by the surface qualities of flowers, fruit, and inanimate objects, confined their attention to still-life. The XVIII. cent. in Holland was a period of stagnation, in which not a single new word was added to the artistic language evolved in the great epoch of Dutch art.

Germany.—In Germany local schools were flourishing as far back as the XIV. cent., though most of the painters' names are unknown to fame, the artists being known merely by their chief works, as 'the masters of such and such a picture.' Such schools arose in the Rhineland, at Cologne, Augsburg, and Prague. The early Ger. painters lacked the classic rhythm and beauty of the early Italians. Their figures were angular and realistic almost to the verge of caricature, but have great naive charm in their passionate sincerity. This characteristic absence of a real sense of pure beauty clung to the school even in later ages. ALBERT DÜRER himself (1471–1528) is no exception to the rule. He is intensely dramatic and serious, simple and direct, and combines in his work all the qualities that mark the Ger. Renaissance, a movement which was intellectual and moral rather than artistic. A keener sense of beauty, stimulated by contact with Ital. art, was the gift of HOLBEIN, whose noble style, while retaining the typical Ger. quality of careful, minute observation, had none of the taint of Ger. ugliness, and was marked by sympathetic insight into character. Holbein became Court painter to Henry VIII. of England, and gave the impetus to the great school of miniature p. that was to arise in that country.

France.—The early art of France was ruled by the contending influences of the Flemings and the Italians. Indeed, nearly all the early painters were of foreign, mostly of Flemish birth. The first great master of Fr. birth was the illuminator Jean Fouquet. In the XVI. cent. the leading figures in Fr. art were JEAN and FRANÇOIS CLOUET, whose exquisite portraits are closely allied to the style of Holbein. In 1531 François I. called to France the Italians Primaticcia and Rosso, who started the School of Fontainebleau, thus introducing the Italianising tendencies from which Fr. art was to suffer for two cents., during which most painters, including the great POUSSIN and the landscape painter, CLAUDE LORRAIN, received their training in Rome. In the pompous age of Louis XIV. the official Italianising school, presided over by LE BRUN, ruled with autocratic sway, but under the following reigns the decoration of the boudoir rather than of the state-room became the painters' chief object. WATTEAU, the great painter of the *fêtes galantes*, determined the direction of the Fr. *rococo*, which broke away from formal classicism, and devoted itself to the decorative rendering of the artificial, pseudo-bucolic life of the ruling classes, which gradually degenerated into coarse suggestiveness. Boucher and Fragonard must be mentioned among the great Fr. masters of the XVIII. cent.

Spain.—In Spain, individual expression was from the outset handicapped by the strict censorship of the Church and the Inquisition, which not only forbade the nude, but dictated even the details of Scriptural subjects, and would not allow the slightest departure from its dogma. Dominated during the XV. cent. by Flemish, and during the XVI. cent. by Ital. influences, Span. painting never entirely ceased to retain its national characteristics of intense seriousness and sombreness. In Italy religious art loved to dwell upon the joy of motherhood, in Spain it preferred to find its subjects in the sufferings of Christ and of the martyrs. Span. painting first rose to great achievement at Sevilla, which produced in the first half of the XVII. cent. the two greatest masters of the Span. school—VELASQUEZ, the first real impressionist portrait painter, and a very magician of the brush, unrivalled in the atmospheric truth of his tone-values; and MURILLO, 'the embodied expression of Span. Catholicism.'

The tradition of Velasquez was carried on at Madrid by a generation of painters who, like his son-in-law, J. B. del Mazo, had come under the spell of his genius. Then followed a complete eclipse of the Span. genius, until the versatile GOYA (1746–1828) made the national spirit flare up in a bright flame for a brief while. He was not only a painter, but a brilliant etcher and lithographer, and a great satirist who in his art mercilessly exposed the corruption, the vice, and the ignorance of his time, the dangers of the Inquisition, and the incompetence of the Government.

Britain.—Eng. art was entirely under the domination of foreign schools until with HOGARTH (1697–1764) arose a painter, whose robust, healthy style created a truly Eng. and democratic art, to oppose the essentially aristocratic art of the masters that had been called to the Eng. court from abroad—from Holbein to Van Dyck, Lely, Kneller, Moro, Mytens, Largillière, and many others. Hogarth, it is true, put his art to the service of his self-imposed mission as a preacher of morality, but in his painted sermons and anecdotes purely artistic considerations are never sacrificed to literary interest. The efflorescence of Brit. portrait-painting belongs to the second half of the XVIII. cent., and was headed by GAINSBOROUGH and REYNOLDS. Gainsborough based his style on the cool elegance of Van Dyck, and became the painter of all that was refined and dandified in Eng. society of that period. He delighted in cool harmonies of colour, and his best work is distinguished by a feathery looseness of touch. Reynolds drew his inspiration from the Venetians, the Bolognese, and, above all, from Rembrandt. He was an eclectic who for ever preached the 'grand manner,' but was at his best when he forgot his theories and devoted himself to straightforward portraiture. One of the greatest Brit. masters of portrait-painting, whose true merit has only comparatively lately found due acknowledgment, was the Scotsman RAEBURN, who exceeded all his contemporaries in virility of brushwork and incisiveness of characterisation. He is the father of the modern Scot. school of portraiture.

On a much lower plane is ROMNEY, whose pleasing paintings of pretty women follow a rather mechanical convention and are lacking in character and sincerity. The Royal Academy was founded in 1768, with Reynolds as first Pres. His advocacy of eclecticism, and his encouragement of the imitation of the Bolognese with their bituminous shadows, laid the foundation to the decline of the school, which, however, continued to excel in portraiture, and produced such distinguished painters as Hoppner, Opie, and Lawrence. The early Eng. landscape painters, notably those of the *Norwich school*, of which John Crome was the head, based their art on that of the Dutch school. A special branch of landscape, combined with animal and sporting life, was cultivated by G. Morland and J. Ward, whose technical method is really a development of Hogarth's manner of handling paint.

XIX.-cent. art, the significant movements of which are almost exclusively confined to France and England, was a constant struggle between classicism, or the pursuit of an arbitrarily imposed ideal of classic beauty, and a more naturalistic conception of painting. Classicism began to choke the free development in France under the first Empire under the lead of Louis David, who reflected the spirit of the Revolution and of the Napoleonic era by turning to the history and art of ancient Rome for his inspiration. His pupil, INGRES,

one of the world's greatest draughtsmen, but a cold, formal painter, became the head of the *Classicist school*, against which the *Romanticists* under DELACROIX rose in revolt. Apart from romantic subject-matter, Delacroix and his followers, basing their style upon Rubens and the Venetian colourists, instead of Raphael and Gk. sculpture, restored a new vitality to the art of painting.

In England, too, the early part of the XIX. cent. was marked by complete exhaustion, although with CONSTABLE arose a new school of landscape painting. Constable may be called the discoverer of the landscape in movement. His pictures are filled with the breezes of heaven, and he replaced the conventional vista and the brown tones of the earlier landscape painters by a realistic treatment of design and colour. Constable exercised an enormous influence, not only upon Delacroix, but upon the Fr. painters of the 'thirties, who became known as the BARBIZON SCHOOL. Among the masters of this school were the lyricist, COROT; the epic poet of Nature, MILLET; the animal painters, TROYON and Jacques; Diaz, who connects the Barbizon School with the Romanticists, DAUBIGNY and ROUSSEAU.

The next school that revolted against the classicism which remained the official art of France were the *Realists*, headed by COURBET, whose chief dogma was that it does not matter *what* you paint, as long as it is well painted. The *Impressionists*, headed by MONET, again were inspired by an Eng. master, TURNER, the greatest magician of light who ever wielded a brush. The Impressionists based their technique on their scientific knowledge of spectral analysis, dividing light into its constituents, the pure colours of the spectrum. Another group of Impressionists, led by MANET, devoted themselves to the representation of contemporary life, which was held in but slight esteem, although history shows that all vital art must be in sympathy with the life of its time. The influence of the Impressionists has been enormous, and has permeated the art of every country. In England, WHISTLER was among its chief exponents.

All these movements sailed under the flag of a return to nature from the artificialities of eclectic academic art. The same claim was made for the Eng. *Pre-Raphaelites*, chief among whom were HOLMAN HUNT, MILLAIS, and ROSSETTI, but the realism of this Eng. group consisted in a minute rendering of details, sometimes at the loss of the more important general truth. Their chief merit is that they introduced something of the sincere spirit of the early primitives.

United States.—West and Copley at beginning of XIX. cent. commenced the Brit. tradition, which lasted till Leutze introduced from Düsseldorf (1859) Ger. influence, which prevailed some ten years until ousted by Fr. art through Hunt (a pupil of Millet) and Hicks. The somewhat crude but native artists Cole and Doughty belong to period before Leutze; but Hunt's contemporaries Eastman Johnson and G. Inness were notable landscapists; indeed, the latter, with Wyant and Homer Martin, must be reckoned among America's strongest landscapists. The art display of Philadelphia Exhibition, 1876, quickened interest in art and gave birth to that numerous band who, like John La Farge, Winslow Homer, and Howard Pyle, have achieved eminence as distinctively Amer. painters, or, like Whistler, E. A. Abbey, Sargent, Fisher, Shannon, Alex. Harrison, Melchers, Hitchcock, Dannat, Stewart, and Gay, have their roots abroad and rank rather as cosmopolitan.

Modern Tendencies.—Towards the end of the cent., dissatisfaction with the convention of traditional methods, and with an art that is tied to the more or less faithful representation of superficial facts, and the recognition of the impossibility to carry the illusion of reality farther than it had been carried by the different modern realistic groups, led to the rather archaistic movement of the so-called *Post-Impressionists*, originated by CÉZANNE, VON GOGH, and GAUGUIN. Their art is essentially synthetic, and not imitative or representative. It is claimed for them that they probe the real significance of things, instead of being satisfied with representing their mere outward appearance. In this they have much in common with the painters of China and Japan, from whom they differ, however, in so far as they adopted a coarse, unbeautiful technique, far removed from the calligraphic suppleness of Eastern art. The later followers of the Post-Impressionists took up all manner of extravagant eccentricities. The most extreme groups of these modernists are the *Cubists* and the *Futurists*, whose pictures and intentions are utterly incomprehensible without lengthy printed explanations. See also JAPAN: *Japanese Art*.

Haldane Macfall, *A History of Painting* (8 vols.); T. Leman Hare, *Masterpieces in Colour*; Ruskin, *Modern Painters*; Muther, *History of Modern Painting*.

PAINTS, liquids applied for decorative purposes; prepared by mixing colour-powders or pigments (generally chromates or oxides) with oil or varnish, which is heated and rendered more absorbent by some metallic salt such as zinc sulphate or litharge. House-painters' colours generally consist of oil, white lead, and pigment, with turpentine added to 'thin' mixture. Artists' colours are much finer than common p., vehicle used being linseed oil, camphor, and amber resin mixed at high temperature.

Varnishes are resinous liquids hardened by heating; give protective coating; used separately or to form enamel paints.

PAISIELLO, GIOVANNI (1741–1816), Ital. composer; b. Tarento; studied under Durante, Naples; best operas, *L'Idolo Cinese*, *Il Barbiere di Siviglia*, *La Molinara*; church and chamber music.

PAISLEY (55° 51′ N., 4° 26′ W.), parliamentary burgh, river port, and seat of important manufactures, in Renfrewshire, Scotland; on White Cart River near its junction with Clyde; consists of old town, new town, and suburbs; possesses old XII.-cent. Abbey, founded *c.* 1163, and numerous public buildings. Industries include dyeing, bleaching, engineering, waaving, founding, brewing, distilling, tanning, shipbuilding, and manufacture of cotton thread, starch, soap, corn-flour, and preserves. Pop. (1911) 84,477.

PAITA, PAYTA (5° S., 81° 7′ W.), seaport, Puira, Peru, S. America; exports cotton. Pop. 4500.

PAJOL, CLAUDE PIERRE, COUNT (1772–1844), Fr. soldier; fought in revolutionary armies from 1791; adhered to Napoleon in 'Hundred Days'; peer of France, 1815.

PAKHOI, PEIHAI (21° 32′ N., 109° 17′ E.), treaty port, on Gulf of Tong-king, China. Pop. 21,000.

PAKOKKU (21° 42′ N., 95° 7′ E.), capital of Pakokku district, Upper Burma; commercial centre; shipbuilding yards. Pop. 12,000; (dist.) 365,000.

PALACE, official residence of a sovereign, abp., or bp.; any magnificent abode or building, as Ital. *palazzo*, Fr. *palais*; derived from *Palatium*, Augustus's residence on Palatine Hill; a place of amusement, cf. *gin p.*, *picture p.*

PALACKÝ, FRANTIŠEK (1798–1876), Bohemian historian and patriot; pub. *History of the Bohemian People* in dual tongue, 1836–67.

PALÆOBOTANY may best be defined as that branch of botany which treats of the structure, affinities, and distribution in time and space of fossil vegetable remains. The subject has considerable value technically in coal-mining, but its chief scientific importance lies in the suggestions it provides as to the phylogeny and inter-relationships of existing and extinct plant groups. Plant remains usually occur in a more or less fragmentary condition, and may be preserved in a variety of ways. Of these perhaps the most familiar are the casts, impressions, and moulds which give us in many instances a clear idea of the external form of the specimen or, as in the case of hollow plant organs, of their internal cavities. Such fossils do not, however, give

us any idea of internal structure, this being provided by petrifactions in which the whole of the plant tissues were thoroughly penetrated with calcium carbonate or silicic acid, which subsequently solidified. The calcareous concretions known as 'coal balls,' occurring in certain seams in the Lancashire and Yorkshire coalfields, are of the first type, whilst the black nodules found in various localities in France are of the siliceous type. By these methods of preservation the most delicate cells are often retained in their original form, and it is such specimens that yield the most valuable indications of plant affinities. In the case of coal it is the actual compressed, carbonised, and chemically altered remains of plant débris which are represented, and it is only occasionally, as in 'Spore' coals, that recognisable plant structures are found.

In **Palæozoic** times the now dominant flowering plants appear to have been non-existent, whilst on the other hand the various pteridophyte families were in their hey-day, many attaining treelike dimensions. The flora of this epoch also included an immense group of seed-bearing forms of fern-like habit as well as numerous Coniferæ, the majority of which belonged to families now extinct. Algal remains, many of which appear to be similar to those existing Siphoneæ possessing incrustations of lime, are found from the Ordovician and Silurian onwards, and one genus Nematophyeus, first described from the Devonian of Canada by Dawson, seems to be allied in character to the Brown Algæ. Neither these nor the Fungi or Bryophyta are, however, of much importance, and it is in the Pteridophyta, or Vascular Cryptogams, and Gymnosperms, the majority of which occur in the Carboniferous, that the interest of the epoch centres.

The *Palæozoic Pteridophyta* fall into four groups, viz. the Equisetales, Sphenophyllales, Lycopodiales, and Filicales respectively. The *Equisetales* were represented by the Calamarieæ, a group of arborescent forms possessing the whorled foliage and branch systems characteristic of the existing genus Equisetum, whilst the primary structure of the stem was also practically identical. The majority, however, unlike modern forms, arose from a basal root system and not from a rhizomic stem. The centre of the stem was generally hollow, the pith being fistular, and as a result the casts of this internal cavity are among the commonest coal-measure fossils known. In the older stems a broad band of secondary wood and also a well-developed zone of bark were present, the former being of a comparatively simple and homogeneous character, and consisting principally of tracheides. The leaves, except in the Devonian Archæocalamites, which had repeatedly forked leaves, were narrow and showed strong xerophytic characters. They are usually included in the form genera Annularia and Asterophyllites. Many types of fructification are known, some of which show an exceedingly complex structure. One of the best known is Calamostachys, which bore alternate whorls of sporangiophores and fused sterile bracts, whilst other types are Palæostachya, Cingularia, and Archæocalamites.

The *Sphenophyllales*, now entirely extinct, combined many of the characters of Lycopods, Ferns, and Equiseta, with certain peculiar to themselves, and are as a consequence of great value phylogenetically. The plants were of slender habit and bore whorls of leaves showing dichotomous venation. The stem was ribbed, and was traversed by a solid triarch xylem strand, whilst it also developed abundant secondary wood. It probably had a scrambling habit similar to that of Galium. The cones resembled those of the Calamarieæ superficially, but bore two stalked sporangia in the axil of each of the coherent members of the bract whorls. The complex fructification known as Cheirostrobus, from the Calciferous Sandstone of Scotland, is also included in this group.

The *Lycopodiales* were mostly gigantic arborescent forms with a large pith, and were clothed with a persistent armour of very characteristic leaf-cushions having a rhomboidal, hexagonal, or ovate form. The genus Lepidodendron, which extended from the Devonian to the Permian, comprised a number of species with stout median axes bearing dichotomising branches clothed with crowded lanceolate leaves. The pith was absent in one or two species (*L. pelaginoides*, *L. rhodumnense*), and where present was surrounded by a ring of secondary wood, outside which came the cortex, periderm, and leaf-cushions. These last, which were lozenge-shaped in Lepidodendron, show a median area indicating the actual region of attachment of the leaf. The fructification consisted of large cones bearing elongate ligulate sporophylls, each with a single sporangium on its upper surface containing microspores or megaspores. The underground portion of this genus and also of the allied genus Sigillaria consisted of massive repeatedly forked axes clothed with rootlets, and to these the generic name of Stigmaria has been applied.

The *Filicales* were on the whole synthetic in type, foreshadowing many of the characters of the modern groups in addition to exhibiting elaboration along peculiar lines of their own. The Psaronieæ were massive forms with complex stelar arrangements, and the stems possessed a complete clothing of adventitious roots: they were probably allied to the modern Marattiaceæ. The Botryopterideæ were monostelic in character and presumably eusporangiate. They resemble the Hymenophyllaceæ in the production of an axillary strand, but differ from all modern forms in the singular character of the petiolar strand. The Pteridospermæ or Cycadofilices were forms which combined with the possession a typically fern-like foliage, external form, and primary anatomical features, the character of seed production. The seeds were often elaborate structures, in some respects suggesting those of the Cycads, and in many cases exhibit striking ornamentation. Both the ovules and microsporangia were borne on specially modified foliage leaves in which the assimilatory portion is more or less reduced. The impressions of so-called fern fronds commonly occurring in the Coal Measure shales are, in the majority of cases, fragments of Pteridosperm foliage. Among the best known of these are Neuropteris, Mariopteris, Alethopteris, and Pecopteris, whilst Heterangium, Lyginodendron, and Medullosa are the genera which have been most thoroughly studied anatomically.

The *Gymnosperms* may almost all be referred to the Cordaitales, a group with specialised fructifications, and one which, anatomically, shows indications of affinities with the existing Araucaria (monkey puzzle) and Agathis (kauri pine).

The flora of *Permo-Carboniferous* times, whilst of the same general character as that of the older rocks, indicates that a regional differentiation had arisen, resulting in the development of a special flora, the *Glossopteris* flora, in certain parts of the world, notably in India (Gondwana formation), South Africa, South America, and Australia. The chief genera included are Glossopteris, a form with a large lanceolate leaf and a creeping jointed rhizome, Gangamopteris, Schizoneura, Phyllotheca, and a sprinkling of Cycads and Coniferæ. This flora had by Rhætic times spread northwards until we find its members constituting a characteristic feature of the plant remains of Indo-China. Certain species such as *Neuropteridium grandifolium* and *Schizoneura paradoxa* also occur both in the 'Glossopteris' areas and in the Bunter of the Vosges.

The **Mesozoic** floras, though in one or two instances providing forms which have persisted from the Palæozoic, are dominated by a new series of plants, Cycadales, Ginkgoales, and Coniferæ, which largely replace the arborescent Pteridophyte stock. The Equiseta show a graded series of forms commencing with large plants of the genus Equisetites, such as *E. Investeri* from the Rhætic, and leading up to smaller species (e.g. *E. Lyelli*). None of these appear to differ

essentially, except in their greater size, from the modern genus Equisetum.

In the Lycopods the genus Pleuromeia is of considerable interest as suggesting a link between Isætes on the one hand and the Lepidodendraceæ on the other, whilst herbaceous species such as Lycopodites and Selaginellites are also known. The Filicales are represented by members of the Marattiaceæ, Osmundaceæ (*e.g.* Iodites, Osmundites), Schizæaceæ, Gleicheniaceæ, Matonineæ, Dipteridineæ, and Cyathaceæ, as well as by a number of fronds which, owing to the absence of seri, are of doubtful affinities. It will thus be seen that the ferns still hold an important place during the Mesozoic. The Ginkgoales, now represented by the monotypic Ginkgo biloba, were abundant and widely distributed throughout *Rhætic*, *Jurassic*, and *Wealden* times, whilst the Cycads at this period attained the height of their prosperity.

Frond material of Nilssonia, Williamsonia, Podozamites, and others is abundant as impressions in the *Inferior Oolite*, whilst magnificent structural material of Cycadeoidea and Bennettites occurs in the *Lower Cretaceous* and *Upper Jurassic* of England and North America respectively. These latter produced remarkable flowers, the outer portions of which were protective, whilst the inner parts were extremely elaborate, microsporangiate and carpellary structures respectively. The Conifers comprise forms allied to the Araucarias, Pines, and Sequoias in addition to others of which the reproductive organs are unknown.

The **Tertiary** floras are remarkable for the sudden appearance and almost immediate dominance of the Angiosperms, many of which are closely allied to modern species. In the *Lower Cretaceous* beds lying immediately above the Jurassic in certain areas, the flowering plants are still in a minority, the flora being dominated by ferns, cycads, and conifers, but from the upper strata of the Lower Cretaceous onwards the Angiosperms hold the field. Among the more interesting forms are oaks, willows, poplars, Aralias, and Magnoliaceæ, the majority being trees, whilst the herbaceous forms are practically absent. In the *Eocene*, which is well represented in Britain, there are abundant plant remains, including palms, conifers, and a large number of Dicotyledons, represented by fruits alone in some cases and in others by vegetative fragments. Various species of oak, almond, laurel, eucalyptus, the swamp palm (Nipa), Rhus, and many others are frequently found, whilst aquatic Monocotyledons allied to Potamogeton and other genera also occur. Among the *Oligocene* forms the chief interest centres in those which occur in the Baltic and other amber deposits. These consist of both trees and herbaceous forms, Ericaceæ, Geraniaceæ, Umbelliferæ, and many more occurring with Pinus, Quercus, Laurus, and many other species of trees.

Following this period came the *Miocene*, the flora of which approximated more nearly to that of the present day with regard to the relative abundance of many orders, although the Tubifloræ were still sparsely represented or entirely wanting. The earlier *Pliocene* is marked by abundant and varied types, but the plants of the upper strata afford strong evidence of a gradual decrease in temperature which eliminated those forms demanding more tropical conditions and caused the flora to approximate to that now existing. Thus in the Cromer Forest bed hawthorn, oak, hornbeam, hazel, and many other still existing species were abundant, whilst plants of warmer and colder climes are alike absent.

The Pliocene was succeeded by a period, the *Pleistocene*, characterised by alternating periods of arctic coldness and temperate conditions and known as the 'Ice Age.' Whilst the glaciers held sway the temperate flora was eliminated or driven farther South, and was replaced by typical arctic forms such as dwarf willows and birches, mosses, and the like, whilst during the warm interglacial periods there occurs an influx of the more mobile members of the typical modern flora of temperate Europe.

Scott, *Studies in Fossil Botany*, vols i. and ii.; A. C. Seward, *Fossil Plants*, vol's i. and ii.; Clement Reid, *Origin of the British Flora*.

PALÆOGRAPHY, science of ancient handwriting. It is usually held that every alphabet (*q.v.*) is derived from the Egyptian, and Egyptian handwriting dates back to at least 4000 B.C. Stone and metals were used in early times for reception of writing, but were early appropriated to inscriptions (*q.v.*); leaves are used in the East; bark (Lat. *liber*) gave its name to Lat. book; the Teutonic book, *Buch*, is derived from beech, the wood of which is specially suitable for inscription; and the Egyptian papyrus is one of the great historic writing materials. Linen was also used in Egypt, but the papyrus rolls appear in the earliest sculptures and are extant from the third millennium. *Papyrus* superseded skins in Greece in the V. cent. B.C. or earlier, and is said to have been introduced into Italy in the II. cent. B.C.; it was manufactured in Egypt until the X. cent. A.D., and used until that time for ephemeral matter throughout Europe, having been long displaced for literary and legal purposes by vellum.

Skins have a long history as writing materials, and when the discovery was made by which the skin was turned into *vellum* it slowly displaced the papyrus. The discovery, according to tradition, was made at Pergamum in the first half of II. cent. B.C.; hence the name *parchment*. Shortly afterwards it was introduced into Rome. Papyrus, however, was used throughout the Dark Ages, and the ancient custom of using waxen *tablets* continued among the Greeks and Romans until the IV. cent. A.D. The Romans used vellum largely for backing books, but in the Middle Ages this material became the literary writing material; it is still the material for legal title deeds, etc. *Paper* is the immemorial Chin. writing material; the Arabs learned the secret of its production and used it from IX. cent. A.D. onwards. It was known in Greece in the XII. cent., Italy in the XIII. cent., and came into general use in the XIV. cent.

The Greeks and Romans used the *stilus* for writing on wax tablets, etc., the reed (*calamus*) for the papyrus. No mention of the quill (*penna*) is found until the V. cent. A.D. *Ink* of various colours and ingredients had been used from Egyptian times, and black has always been the usual colour. It was removed by sponge or knife. A MS. written over an obliterated MS. is called a *palimpsest*; often valuable classical texts have been deciphered under mediæval superscriptures.

The classical *roll*, the first form of book, is composed of various membranes fastened together, following one after the other as the script is unrolled; the wax tablets, however, were joined like the leaves of a modern book, and received the name *codex*, applied later to the vellum books made in a similar way, a way which speedily became universal, although legal documents of a certain nature have been enrolled right down to modern times, and, in fact, gave its name of the Rolls to the old Record Office. *Diploma*, the folded membrane of the early codices, has given the Fr. word *diplomatique* p. (the modern Lat. *res diplomaticus*); the single sheet was called leaf (*folium*). The system of columns, called pages (*paginæ*), went back to classical times. The *Codices* of the Dark Ages very often employed triple columns.

Writing from right to left is the custom of Semitic nations and is found in the first Gk. remains. The practice of separating words by a blank was established IX.–XI. cent. The titles, placed at the end of the roll, as a colophon, in classical lit., commenced in the Middle Ages to appear at the heads of books; they were for long smaller than the text. The paragraph was marked by the Gks. and the first letter thereof enlarged, and a system of punctuation evolved.

Both Gk. and Lat. MSS. are divided into the two main classes of *book-hand* and *cursive*—everyday writing. The book-hand was the special sort of legible and decorative hand-writing used before the invention of printing for much-valued books and books intended for sale. It is judged, *a priori*, to have developed out of the cursive. Both have a separate history of development. Gk. and Lat. MSS. may also be classified as in *majuscules* (large letters) or *minuscules* (small letters), and the majuscules are either capitals or uncials, the former having a square, the latter a curved shape. The history of the word *uncial* is not known, but it was employed in this way in common speech in the Dark Ages. Lat. capitals have also a less square form, called *rustic*, and Lat. p. developed styles of 'half' and 'mixed' uncial. Nearly all literary documents were written in majuscules until the IX. cent., book letters for long imitating the size of those of the inscriptions.

Greek MSS.—Greece probably obtained its alphabet from Egypt through Phœnicia, although the medium is questioned by some modern authorities. Gk. MSS. of an early period (I. cent. B.C. or I. cent. A.D.) were found in excavations at Herculaneum in 1752, but no more have been found in the numerous modern diggings in classical territory. A great number of these that have survived have been conserved in Egyptian tombs and belong to the periods of Macedonian and Rom. supremacy over Egypt, while the rest, later examples, belong to the Byzantine empire which had its seat at Constantinople and kept Gk. culture alive throughout the Middle Ages. Alexander the Great conquered Egypt in 332; under the Ptolemies it became the centre of civilisation, and owing to the Egyptian habit of placing articles of value with the dead, and also of utilising papyrus for coffins, many copies of old Gk. classics made at that time have been preserved. Many MSS. of IV. cent. B.C. onwards have been discovered since the first find in 1778, and many more will, it is hoped, be found.

In the earliest specimens, many of the capitals (A, E, I, O; B, K, M, N, T, X, and the rudimentary form of S) of our present alphabet are present. Egypt became a Rom. province in 30 B.C., and the MSS. were much modified by Rom. influence before the second Gk. period began in 284 A.D., when Egypt was made a province of the Byzantine empire. The second Gk. period was chiefly marked by the development of long heads and tails to the letters. Many of these MSS. are not from the tombs, but from the old libraries of Europe. Three vellum codices of the Bible, in Gk. uncials of the IV. and V. cent., are now known by the places of their compilation or assigned creation, as *Codex Vaticanus*, *Codex Sinaiticus*, and *Codex Alexandrinus*. These, the palimpsest *Ephræmi Syri rescriptus* of the V. cent., and the *Codex Bezæ* of the VI. cent. are the 'five great uncials.' The Byzantine minuscule hands which became literary scripts in the IX. cent. have been classed as *codices vetustissimi* (IX.–X. cent.), *codices vetusti* (X.–XIII. cent.), *codices recentiores* (XIII. cent. to 1453), *codices novelli* (later than 1453, the end of the Græco-Rom. empire).

Latin MSS.—No examples, either on wax or papyrus, have been found dating before the Christian era. As it first appears in the I. cent. A.D. in Rom. tablets, an occasional papyrus, and the wall scratchings (*graffiti*) at Herculaneum and Pompeii, the *Lat. cursive* is easily seen to be the parent of our modern handwriting; several of our small letters stand there in a medley with our present capitals; at the same time many of these letters have since undergone revolutions. In the book-hands, however, the rustic capitals often employed from the I. to the VI. cent. are very nearly the same as our present capitals.

Mediæval MSS.—The barbarians who over-ran the Rom. empire and built up our modern nations adopted the Rom. script and developed it in their different ways. At first they devoted themselves, not to literary products, but to working out useful cursive scripts from which, later, new book-hands were made. After the acceptance of Christianity, handsome religious books were in demand. Ireland produced, among other famous MSS., the *Book of Kells*, in half-uncials of the VII. cent., with the beautiful illuminations which were the mediæval contribution to p.; and England, who learned her script chiefly from her Irish missionaries, produced the uncial Bible of Jarrow (*c.* 700), half-uncial Lindisfarne Gospels (of the same period), Bede's *Historia Ecclesiastica* (VIII. cent.), and the *Liber Vitæ* of Durham (IX. cent.).

Irish writing gave way to French in England at the Norman Conquest. Fr. writing owed much to Charlemagne's renaissance. He ordered the production of sumptuous books, and his helper, Alcuin of York, started a school of calligraphy at Tours, where he was abbot (796–804).

The book-hand of the XV. cent. was adopted by the first printing-presses, though Ital. printers soon turned back to models of the XII. cent., which was considered the great age of handwriting. Extensive contractions have been used from Gk. times in all cursive hands for economy of time and space, and an elaborate system of abbreviations was evolved in the Middle Ages. These may be found explained in Wright's *Court Hand Restored*, and Martin's *Record Interpreter*.

Sir E. M. Thompson, *Gk. and Rom. P.* (3rd edit., 1906).

PALÆOLITHIC, see ANCIENT HISTORY.

PALÆONTOLOGY (Gk. *palaios*, ancient; *ὄν, ontos*, being; *logos*, science), the science which reads in fossils the history of the past and endeavours to trace from them the story of life's progress in the world. That branch which deals with fossil animals is known as PALÆOZOOLOGY, that with plants as PALÆOBOTANY (*q.v.*).

To earlier observers *fossils* presented great difficulties. The two main theories which for many centuries held sway were that they were sports of nature with no more meaning than a mineral crystal, or that, as Xenophanes suggested about 500 B.C., they actually represented the remains of entombed animals. There were other views, as that of Empedocles, who interpreted hippopotamus' bones as representing the remains of extinct giants fallen in a war with the gods, or the idea that fossils were fruits of life that had failed to reach the surface. Many cent's passed before universal recognition was given to fossils as the remains of living things, but it is interesting to remember that, in the Middle Ages, the artist Leonardo da Vinci upheld that view. In the XVIII. cent. it was currently believed that fossils had been deposited by Noah's flood, although at its close Werner first suggested that by their aid different geological formations could be recognised.

But p. as a science began with Cuvier and Lamarck, both of whom described many fossil remains and showed their relationships with living animals. At the same time, William Smith, 'the father of English geology,' had observed in England that in different rock layers different series of fossils were preserved. One cannot pass over unmentioned the magnificent work accomplished for p. by Richard Owen (1804–93) and by Louis Agassiz (1807–73), and for palæobotany by Brongniart in 1828. New life was given to the researches of palæontologists by Darwin's evolution theory, and since his time innumerable workers have entered the field, of whom we can note only Prof. Cope (1840–97), whose remarkable investigations on vertebrates were illumined by wide-reaching generalisations, and Prof. von Zittel (1839–), who has been described as the premier palæontologist.

P. has accomplished much for her sister sciences of geology, botany, and zoology. She has helped to fill in our pictures of the world in ages long dead. From the nature of the fossil animals and plants discovered are revealed some of the conditions of their lives:

whether they lived in fresh water or in the sea, in marshy places or on dry land, and still more in detail, even whether they lived in the abysses of ocean or in shallow water. Furthermore, fossils of the same kind found in different places indicate that similar conditions prevailed, and often that the rocks in which they occur were formed at the same time.

To the biologist results are even more interesting and more important. Occasionally a missing link is found—the toothed bird *Archæopteryx*, which, distinctly avian, shows evidence of descent from reptile stock; or an extinct group may help to fill a gap in the table of descent—the reptilian Dinosaurs of Mesozoic times possess characters which point to the coming of birds. So p. illumines the history of life and sheds its own light upon the evolution of living things. Close study has shown that even in limited periods evolution has been at work—for example, Pond Snails (*Viviparus* or *Paludina*), found in the lowest and highest layers of the Pliocene deposits of Slavonia, appear to be distinct species, but specimens from the intermediate layers show that by gradual steps the highest form developed from the lowest. Another well-known example is that furnished by the horse and its ancestors. These in early Tertiary times at first possessed five toes, but were succeeded by species in which the number of toes was gradually reduced until at the end of the series representatives of our domesticated horse (*Equus*) appear in Pliocene deposits with only one toe.

A wider view gives further support to the theory of organic evolution. Zoologists, on grounds of the complexity and integration of their structures, place in ascending order fishes, amphibians, reptiles, and birds. This, however, is exactly the order in which those groups first appear as fossils. P., like many another science, gives its testimony in favour of the unity of organic things.

Von Zittel, *History of Geology and Palæontology* (Eng. trans., 1901); Ray Lankester, *Extinct Animals* (1905); Woods, *Elementary Palæontology: Invertebrate* (1909).

PALÆOSPONDYLUS, see CYCLOSTOMATA.

PALÆOTHERIUM, see under HORSE FAMILY.

PALÆOZOIC ERA, the lowest division of fossiliferous rocks; contain the remains of the earliest forms of life. They are also known as PRIMARY ROCKS, and are divided into groups — Permian, Carboniferous, Devonian, Old Red Sandstone, Silurian, Cambrian. See GEOLOGY, PALÆOBOTANY, PALÆONTOLOGY.

PALAFOX Y MELZI, JOSÉ DE (1780–1847), Duke of Saragossa, and grandee of Spain, 1836; famed for heroic defence of Saragossa against French, 1808–9; languished in Fr. dungeons till 1813; captain-gen. of Aragon, 1813.

PALAMAU (23° 52′ N., 83° 57′ E.), district, Chota-Nagpur, Bihar and Orissa, India; coal mines. Pop. 625,000.

PALAMCOTTAH (8° 42′ N., 77° 46′ E.), town, Tinnevelly, Madras, India; mission station. Pop. 21,000.

PALAMEDEIDÆ, Screamers (*q.v.*).

PALAMEDES (classical myth.), prince of Nauplia; stoned to death by Odysseus at siege of Troy.

PALANPUR, PAHLANPUR (24° 12′ N., 72° 28′ E.), native state, Gujarat, Bombay, India. Pop. 225,000.

PALATINATE, PFALZ (49° 30′ N., 80° E.), part of Bavaria, Germany. The Palatinate (also called *Rheinpfalz* or *Rheinbayern*) is bounded by Hessian province of Rhein-Hessen, Baden, Alsace-Lorraine, and Prussian Rhine Province; leading town, Spires; most important rivers are Rhine and Lauter; soil very fertile and produces corn, flax, fruits, and vegetables in large quantities; principal minerals are coal, iron, quicksilver, and salt. In old Germany P. was much larger region, ruled by a count palatine; two capitals were Heidelberg and Mannheim. Upper and Lower P. disjoined after Thirty Years War, when Upper P. (*Oberpfalz*) fell into hands of Bavaria; manufactures include machinery, chemicals, paper, beer, leather, and tobacco; cattle-rearing carried on. Area of Palatinate, 2289 sq. miles. Pop. (1910) 937,085. Area of Upper Palatinate (which lies in E. Bavaria on the Bohemian border; capital, Regensburg), 3728 sq. miles. Pop. (1910) 599,461.

PALATINE, PALATINUS MONS, largest of the seven hills on which Rome was built. Here Romulus laid the foundations for his city *Roma Quadrata*. There was a temple of Apollo on the P., and this temple Augustus rebuilt and founded therein a public library with a fine collection of Gk. and Rom. MSS. See ROME.

PALATKA (29° 40′ N., 81° 40′ W.), city, on St. John's, Florida, U.S.A.; trade in lumber. Pop. (1910) 3779.

PALAVARAM (12° 57′ N., 80° 13′ E.), town, Chingleput, Madras, India. Pop. 6500.

PALAZZOLO ACREIDE (37° 3′ N., 14° 55′ E.), town, Syracuse, Sicily. Pop. 15,500.

PALE, see IRELAND (HISTORY).

PALEMBANG (2° 46′ S., 104° 50′ E.), capital, P. residency, Sumatra; seaport; cotton, pepper, silk, dye-woods; great trading centre in Middle Ages. Pop. 60,200.

PALENCIA.—(1) (42° 30′ N., 4° 30′ W.) province, Old Castile, Spain; mountainous in N.; chief rivers, Pisuerga and Carrion; produces grain, wine. Pop. (1910) 196,031. (2) (42° 2′ N., 4° 26′ W.) city, capital of above, on Carrion; cathedral; woollens. Pop. 16,500.

PALENQUÉ, name given to ruined Mexican city; known to Spaniards from 1750, but not explored till modern times; possibly *Xibalba*, the mythical city of the Mayas.

PALERMO (38° 7′ N., 13° 22′ E.), capital of Sicily, on north coast facing Ital. mainland; important seaport in sheltered bay; P. means 'all-harbour'; beautifully situated in fertile valley (Conca d'Oro) partly surrounded by mountains; once the greatest European city. Notable features are fine cathedral (1169–85), San Giovanni degli Eremiti (1132), La Martorana (1143), Santa Maria della Catena; royal palace with beautiful Capella Palatina; Chiaramonte (Lo Steri, 1307), Bruiccia, Abetelli, and numerous other palaces; univ. (1805), Museo Nationale (with celebrated metopes from the temples of Selinunt), libraries, town-house, theatres, and old gateways; founded by Phœnicians; conquered by Carthaginians, Romans, Saracens, and Normans, 1071; then capital of kingdom of Sicily (*q.v.*); captured by Garibaldi, 1860, and annexed to Sardinia. Chief industries — machinery, chemicals, sumach, essences, sulphur, tartar, wine, green and dry fruits, tobacco. Pop. (1911) 341,656. The province of P. has area of 1948 sq. miles. Pop. (1911) 794,635.

PALESTINE (31° to 33° 21′ N., 34° 30′ to 36° 5′ E.) is the name given in early times to a part of the Syrian seaboard only, but applied during the Christian era to the whole country of the Jews.

History.—Situated at eastern end of Mediterranean, P. must at an early date have come into contact with the old civilisations of Assyria and Babylonia on the N.E. and of Egypt on the S.W. There are no native records for its early history, the only sources of which are references in Egyptian and Babylonian inscriptions. According to the earliest of these, P. was already in the IV. millennium B.C. inhabited by a Semitic race; the Semites, whose original home is by many scholars believed to have been Arabia, must have been preceded in P. by earlier races. Traces of these have been found in antiquities belonging to the stone age, impossible to ascribe to the Semites, who had attained to a higher degree of civilisation before migrating from their earlier home in Arabia.

Probably **Babylonian** supremacy was established towards close of IV. or beginning of III. millennium B.C.; an inscription of about 2920 expressly states

that Lugalzaggisi of Babylon was supreme over whole region from Mediterranean to Persian Gulf. About 2500 B.C. there occurred an invasion of the Amorites, who spread over all W. Asia; a result of this was decay of Babylonia and its conquest by the Elamites. The traditional rise of the Hebrew nation (see JEWS) occurs during Elamite period, which lasted till *c.* 2230, when Khammurabi, mentioned in *Genesis* as Amraphel, liberated his country from Elamite control and established his authority in P. as well as in Babylon.



This second period of Babylonian rule probably lasted till the end of the XVIII. cent. B.C., soon after which the country must have come under Egyptian suzerainty; and it has been suggested that it was conquered by the Hyksos prior to their invasion of Egypt.

The **Egyptians** retained control of P. until reign of Amenhotep IV. (succ. *c.* 1392), when their power began to decline, owing partly to the king's religious reforms and partly to the invasions of warlike people from the N. The Hittites are known to have invaded Syria in Amenhotep III.'s reign, but their great conquests began in that of Amenhotep IV., when appeals from all parts of Syria and P. for aid against them were sent to the Pharaoh at Tel-el-Amarna. After this the Hittites seem to have become predominant in the country, and they carried on long struggle against Egypt. Eventually (*c.* 1303) they concluded a treaty with Rameses II., whereby P. was recognised as a province of Egypt. The rise of the Aramæans took place about the same time as that of the Hittites, whom they eventually superseded.

From the end of the XIII. cent. B.C. P. was undisturbed by the great surrounding nations, and during a period of comparative isolation the Hebrews established their supremacy first under judges and later as a monarchy (see JEWS). This kingdom soon split into the two states of **Israel** and **Judah**, whose relations were marked by three distinct periods — (1) mutual hostility and constant war; (2) alliance, and combined enmity to Syria; (3) fresh disputes, and the gradual decay of both kingdoms before the increasing power of Assyria and Babylonia. Israel was eventually conquered by Assyria, *c.* 722 B.C.; and, after a prolonged struggle against Assyria and Egypt in turn, Judah was defeated by Nebuchadnezzar in 588; P. thus passed under control of the Babylonian empire, and so remained until with the fall of Babylon in 539 B.C. it came to the possession of Cyrus of Persia. Under the Persians a settled form of government was established in P. by Ezra and Nehemiah; and this period was marked by the growth of organisation, order, and ritual among the Jews. Persian domination came to an end with the break-up of Persian Empire before the victorious armies of Alexander the Great, after whose death P. came to the hands of one of his generals, Laomedan; in 320 it was seized by Ptolemy Soter of Egypt; between 314 and 301 it was held by Antigonus of Syria, but at the latter date it reverted to the Ptolemies, and became a buffer between Egypt and Syria. After a time of struggle between the Ptolemies and the Seleucids it was taken by Antiochus the Great, *c.* 198; his successors, Seleucus Philopator and Antiochus Epiphanes, persecuted the Jewish inhabitants and endeavoured to hellenise the country, a policy which resulted in a national rising under Mattathias and the establishment of the Asmonæan dynasty by his son, Judas Maccabæus. The dominion of the Asmonæans continued till 63 B.C., when internal disputes led to the intervention of the Romans; the country was then conquered by Pompey, who app. Hyrcanus II. as High-Priest. Hyrcanus left the conduct of affairs to Antipater the Idumæan, who curried favour with the Romans, and whose son, Herod the Great, afterwards became king of all Judæa, 40 B.C.

During the first half of the I. cent. A.D., P. passed through four distinct political phases: in the time of

Herod the Great it had been a single united kingdom, but at his death in 4 B.C. it was divided up into principalities under his sons, Archelaus, Herod Antipas, and Herod Philip; before long Samaria and Judæa became a Rom. province, while Galilee, Trachonitis, and Ituræa continued under native rulers; then the former kingdom was revived for a short time under Herod Agrippa; and finally the entire country became a Rom. province. Owing to the cruel oppression of the Rom. governors a great rebellion broke out in 66 A.D., but was eventually put down by Titus, s. of Vespasian, and in 70 Jerusalem was utterly destroyed. After the suppression of Bar Cochba's revolt in 132–35, the new city of Ælia Capitolina was built by Hadrian on the site of Jerusalem.

P. remained under Rom. control for several cent's, and after 395 A.D. formed part of the Byzantine empire; it was taken early in VII. cent. by Chosroes of Persia, but was recovered by Byzantines in 629. The Saracens obtained possession of it in 636, and remained supreme for four cent's. In the XI. cent. it was taken by the Seljuk Turks, and in 1095 Peter the Hermit's exposure of the treatment to which Christian pilgrims in P. were subjected by Muhammadans led to First Crusade; this resulted in capture of Jerusalem and election of Godfrey de Bouillon as Latin king of Jerusalem. During XII. and XIII. cent's eight other crusades were carried on, and in the XIII. and XIV. cent's occurred the great Mongol invasions. The country was eventually captured by the Ottoman Turks in 1516, and formed part of Selim I.'s empire. It has remained under Turk. dominion ever since, except for a short time in XIX. cent., when it was held by Egypt.

The P. Exploration Fund, founded 1864, has provided survey maps, etc. Dr. Bliss excavated south wall of Jerusalem, 1896–98, and Gath in 1898–1900. Macalister began to excavate Gezer in 1902.

Geography.—Palestine is washed on the W. by the Mediterranean, and on the E. merges into the Syrian desert without any clearly defined boundary. Its most characteristic physical feature is the deep gorge which forms the valley of the Jordan, dividing the country into two unequal parts by a line running N. and S. This gorge is central part of a fissure on earth's surface, and stretches from Antioch in N. to Ezion-geber on Red Sea in S. To W. of this valley rises an irregular mountain range, which is broken only by the Plain of Esdraëlon, but otherwise extends from Lebanon in N. to Beer-sheba in S.; these mountains are intersected by many deep, water-cut ravines, and culminate in Jebel Jermuk, 3934 ft. above Mediterranean; on the E. they slope abruptly to the Jordan valley, and near the Dead Sea they terminate in precipitous cliffs; on the W. they slope more gradually to the great plain, which extends to Mediterranean coast and is broken only by Mt. Carmel.

To E. of Jordan the surface consists of a vast plateau rising now and then into ridges and peaks which attain an extreme height of 4245 ft. On the W. this tableland slopes abruptly, at times precipitously, to Jordan valley; on the E. it slopes more gradually to the desert. Principal rivers are—Jordan, rising in valley of Lebanon, and passing through Waters of Merom and Sea of Galilee into Dead Sea; Kishon (Nahr el Makutta), draining Plain of Esdraëlon; Yarmuk, draining Hauran plateau, and entering Jordan on E.; Jabbok (Zerka), tributary of Jordan; Arnon (Mojib), entering Dead Sea. The Brook Kedron is generally dry. Lakes are Merom, Sea of Galilee and Dead Sea. Largest towns are Jerusalem, Jaffa, Gaza, and Safed.

Geology.—The Sinaitic mountains are composed chiefly of crystallines, which are of Archæan age; to the N. these are covered by sandstone and limestone deposits of Carboniferous age; the coastal plain is of Pleistocene formation, and volcanic rocks are found upon the limestone tableland of Moab; the Jordan valley coincides with a displacement or fault, so that the strata to the W. have been depressed and those on the E. raised; hence the two sides are of different geological character, crystallines overlaid by sandstones and limestones being found on the E., chalks and more recent deposits on the W.

The climate is extremely hot in summer and very wet in winter, the rainy season lasting from December to March. Characteristic trees are the olive tree, cedar, and sycamore; and considerable quantities of cereals and fruit are produced. There is a railway connecting Jaffa with Jerusalem. The inhabitants are chiefly Muhammadans, only about 14 per cent. being Jews. Pop. c. 700,000.

L. B. Paton, *Syria and Palestine* (1902); Huntingdon, *Palestine and its Transformation* (1911); Leach, *Romance of the Holy Land* (1911); Macmillan, *Guide to Palestine and Syria* (1908); Cook's *Tourist's Handbook for Palestine and Syria* (1906).

PALESTINE (31° 46′ N., 95° 37′ W.), city, Texas, U.S.A.; cotton industries. Pop. (1910) 10,482.

PALESTRINA, see PRÆNESTE.

PALESTRINA, GIOVANNI PIERLUIGI DA (*c.* 1524–1594), Ital. composer; b. at Palestrina, from which he derived his surname. He was early appointed choirmaster at the Vatican, and in 1544 wrote an epoch-making set of Masses dedicated to Pope Julius III. In 1555 he became music director at the Lateran, and in 1561 went in a similar capacity to S. Maria Maggiore. In 1563 he was officially requested to demonstrate how the secularising abuses which had crept into the music of the Church could be reformed, and the result was the famous *Marcellus Mass*, since regarded as a classical model by the R.C. Church. This is his chief title to fame.

PALEY, FREDERICK APTHORP (1815–88), Eng. classical scholar; editions of classics famous.

PALEY, WILLIAM (1743–1805), Anglican theologian and scholar; archdeacon of Carlisle, 1782; pub. *The Principles of Moral and Political Philosophy*, 1785, *Horæ Paulinæ*, 1790, and *View of the Evidences of Christianity*, his most famous work, 1794; *Natural Theology*, 1802; energetic opponent of slave-trade; an able and kindly man.

Meadley, *Life of P.* (1809).

PALGHAT (10° 45′ N., 76° 43′ E.), town, Malabar, Madras, India. Pop. 46,000.

PALGRAVE, FRANCIS TURNER (1824–97), Eng. critic and poet; prof. of Poetry at Oxford, 1886–95. His poetical work was considerable, but he is best known by his *Golden Treasury of English Lyrics*.

PALGRAVE, SIR FRANCIS (1788–1861), Eng. historian; deputy keeper of Public Records, 1838–61, and edit. several Record Office publications; one of pioneers in scientific study of history.

PALI, an Ind. language, which in early times (*c.* 600–200 B.C.) was the chief speech of cultured people in N. India. It has filled for India a very similar rôle to that of Latin in mediæval Europe: inscriptions, religious treatises, canon law, learned lit. were all written in Pali, besides which it exercised a profound influence on the surrounding cruder dialects. It is no longer in common use, being now restricted to the use of Buddhists in Siam, Indo-China, Burma, and Ceylon. In origin Pali is closely related to Sanskrit, and thus belongs to the Indo-European group. In 1882 a Pali Text Society was founded, which has published many of the more valuable Pali works.

PALIMPSEST, a manuscript from which the original writing was washed off with a sponge or scraped so that a new writing could be superimposed. Many ancients texts have been discovered and restored from p's, *e.g.* the Vatican Cicero. See PALÆOGRAPHY.

PALINGENESIS, theory that the soul undergoes succession of rebirths; also employed by Schopenhauer (*q.v.*) for theory of reappearance of the will after death, in a new individual, until the will-to-live is exhausted.

PALISSY, BERNARD (1510–89), Fr. potter; worked for some twelve years as a glass- and portrait-

painter. About 1538 he settled at Saintes as a land surveyor, and shortly afterwards, determined to discover how to make enamels, he began a series of experiments which lasted sixteen years before proving successful. Fame came to him by the ware he produced, with objects in high relief, mostly coloured; and he was appointed 'inventor of rustic figulines' to the king. He established a workshop in Paris in 1564; escaped the massacre of St. Bartholomew by the intervention of Catherine de' Medici; but in 1585 was thrown into the Bastile as a Huguenot, and died there.

PALITANA (20° 31′ N., 71° 53′ E.), native state, Kathiawar, Bombay, India; capital, Palitana. Pop. of state, 53,000; (town) 13,500.

PALK STRAIT (10° 5′ N., 80° E.), separates India from Ceylon.

PALLADIUM (Pd = 106·7), metallic element in platinum group; occurs, alloyed with platinum or gold, in S. America and the Harz. Silvery white, S.G. 11·4; unalterable in air, when heated in oxygen forms PdO; dissolves in hot nitric acid; used for coating silver, and as a substitute for gold in dentistry. After heating, palladium 'occludes' (*i.e.* absorbs) about 900 times its volume of hydrogen, increasing nearly 10 % in bulk.

Chief compounds: PdO, $PdCl_2$, $PdSO_4$; PdO_2, $PdCl_4$, K_2PdCl_6.

PALLANZA (45° 55′ N., 9° 33′ E.), town, health-resort, on Lago Maggiore, Novara, Italy. Pop. 5600.

PALLAS ATHENE, see ATHENA.

PALLAS, PETER SIMON (1741–1811), Ger. naturalist; travelled in Kirghiz Steppes and Siberia (1768–74), and wrote account of flora and fauna.

PALLIUM, or PALL, vestment bestowed by pope on abp's, who cannot act as such before it has been bestowed; it is a strip of lamb's wool, looped in front, and hanging down back and front.

PALM.—(1) in anatomy, is the inner surface of the undivided portion of the hand. (2) botanically, the palms are a group of monocotyledons mainly tropical in distribution; the majority are arborescent and unbranched (Hyphæne, the Doum Palm, branches), and bear an apical crown of leaves, which are primarily entire, but become palmately or pinnately divided, owing to the loss of the more delicate tissues. Some genera (*e.g.* Calamus, the Rattan Palm) are climbers, whilst others, such as Nipa, a swamp palm, have a very short stem and radical leaves. The inflorescence is large, and during its earlier stages is enclosed by a protective sheath or spathe. In the majority it is axillary, but in a few (*e.g.* Corypha, the Talipot Palm; Metroxylon, the Sago Palm) it is terminal, and results in the death of the plant. The flowers are trimerous, and may be dioecious or monoecious. On fertilisation a berry (Phœnix, the Date Palm) or a drupe (Cocos, the Coco-nut Palm) is produced. Economic products —fibre (Cocos), oil (Cocos, Elæis), vegetable ivory (Phytelephas), sago (Metroxylon), areca-nuts, etc.

PALM BEACH (26° 40′ N., 80° W.), town, winter resort, Florida, U.S.A.; on Atlantic.

PALM CIVET, a carnivore; see under CIVET FAMILY.

PALM OIL, see OILS.

PALM SUNDAY, the day celebrating Christ's entry into Jerusalem (the Sunday before Easter), thus called because of the carrying of palms to place them in church, though the origin of the custom is obscure. It has an elaborate ceremonial in the Rom. Church, and with it begins the mournful services of Passion Week; in the Eastern Church it is joyful; called simply 'Sunday before Easter' in Book of Common Prayer.

PALMA, SAN MIGUEL DE LA PALMA (28° 42′ N., 17° 52′ W.), one of the Canary Islands; chief town, Santa Cruz. Pop. 44,000.

PALMA (39° 35′ N., 2° 43′ E.), port, Majorca, Balearic Isles; seat of bishopric; has cathedral, episcopal and royal palaces; trades in wine, cereals, fruit, etc. Pop. (1910) 68,359.

PALMELLA (38° 34′ N., 8° 57′ W.), town, Estremadura, Portugal. Pop. 7200.

PALMER (42° 10′ N., 72° 15′ W.), town, Mass., U.S.A.; cotton manufactures. Pop. (1910) 8610.

PALMER, PALMER-WORM, name given to several species of destructive caterpillars; in America especially to that of moth *Ypsilophus pometella*.

PALMER, EDWARD HENRY (1840–82), Brit. archæologist; devoted himself to Oriental studies, became Lord Almoner's prof. of Arabic at Cambridge; perished in an expedition connected with Arabi's Egyptian rebellion; wrote chiefly on Oriental subjects.

PALMER, RAY (1808–87), Amer. Congregationalist minister and hymnologist.

PALMER, ROUNDELL, see SELBORNE, EARL OF.

PALMERSTON (12° 28′ S., 130° 51′ E.), town, capital, Northern Territory of S. Australia, on Port Darwin.

PALMERSTON, HENRY JOHN TEMPLE, VISCOUNT (1784–1865), Brit. statesman; succ. his f. in peerage, 1805; Sec. of War in Tory Government of Duke of Portland, 1809, and retained this office till Huskisson's resignation, 1828; adhered to Canning under Lord Liverpool's administration, and warmly supported Canning's policy of aiding revolution abroad during that statesman's brief premiership, 1827, deserting Tory party. He became Minister of Foreign Affairs under Whig Government of Earl Grey, 1830, and made alliance with new constitutional ruler of France, Louis-Philippe, thus ending long enmity of England and France; actively assisted in establishing Belgian kingdom and supported popular claimants, Donna Maria in Portugal and Isabella in Spain; remedied unfortunate result of Canning's assistance to Greece, *i.e.* the weakening of Turkey, by helping to put down revolt of Turk. pasha, Mehemet Ali, 1840.

These measures met with strong opposition at home, especially after disasters in Afghanistan, 1841; fall of ministry, 1841; again Foreign Minister under Lord John Russell, 1846–51; vote of censure on his policy carried in House of Lords, counter-vote in House of Commons, 1850, P. making impressive speech of vindication in Lower House. P. was dismissed by queen, 1851, for unauthorised action with regard to France; Home Sec. in Aberdeen administration, 1852; Premier, 1855–58, 1859–65; last years marked by temporising in all great questions being agitated at home and abroad; not an impressive personality, but skilful and popular.

Dalling and Ashley, *Life* (1870–76).

PALMISTRY, the pseudo-science of pretending to tell a person's character or fortune by the study of the lines and formation of the palm of the hand. It has been practised all over the world and from very ancient times. To do it for money is now illegal in England, but the law is constantly evaded, and there was a considerable revival of it in the XIX. cent. According to medical experts it is entirely worthless.

PALMYRA, celebrated ancient city in Syria, once important centre of caravan trade owing to central position in oasis in Syrian Desert. Mark Antony attempted (*c.* 42 B.C.) to plunder city, but inhabitants fled with their property; under first Rom. emperors P. was independent, with large trade and considerable importance as commercial and religious centre; during Parthian War in III. cent. rose to great power; under Odenathus and then Zenobia P. extended its sway far and wide, till captured by Romans and Zenobia taken prisoner (*c.* 270). Rom. Emperor Aurelian treated inhabitants leniently till they revolted a few months after capture, when he returned and almost completely destroyed city; although partly rebuilt under Diocletian and believed to have been fortified by Justinian, P. never recovered importance; was captured early in Arabian Conquest and turned into Muslim fort; now inhabited by wandering Arabs. Ruins of city are remarkable but of no particular architectural interest; Temple of Sun and Sepulchre Towers finest remains; there are interesting inscrip-

tions in Greek, Latin, and Hebrew, and some traces of foundations of houses and streets.

Wright, *Palmyra and Zenobia.*

PALNI HILLS (10° 27′ N., 77° 33′ E.), mountain range, Madura, Madras, India; highest summits, 7000 ft.

PALO ALTO (37° 25′ N., 122° 10′ W.), city, California, U.S.A.; seat of Leland Stanford, Junior Univ.; earthquake, 1906. Pop. (1910) 4486.

PALPITATION, see HEART.

PALSY, see PARALYSIS.

PALUDAN-MÜLLER, FREDERICK (1809–76), Dan. poet; masterpiece, *Adam Homo*, a satire.

PALWAL (29° 9′ N., 77° 22′ E.), town, Gurgaon, Punjab, Brit. India. Pop. 13,500.

PAMIERS (43° 6′ N., 1° 36′ E.), city, Ariège, France, on Ariège; cathedral; ironworks. Pop. 10,600.

PAMIRS, lofty plateau region in Central Asia, where Hindu Kush, Himalayas, Kuen Lun, and Tian Shan Mts. converge; average height, *c.* 13,000 ft. Mountain ranges are separated by broad valleys or *pamirs*, chief of which are Great Pamir, containing Lake Victoria; Little Pamir; Pamir-i-Wakhan; Sarez Pamir, with river Murghab; Rang Kul, Kara Kul, and Taghdumbash Pamirs; these valleys are drained mostly by tributaries of Oxus, occasionally contain lakes, and are intersected at intervals by passes; region almost destitute of vegetation, except along banks of rivers and lakes, where there is fine pasturage during summer months; climate severe and storms sudden and violent; inhabited by Kirghiz tribes.

PAMPA (36° 30′ S., 65° W.), territory, Argentina, S. America, W. of Buenos Ayres; largely covered with grass; cattle-ranches.

PAMPAS (*c.* 26° S., 61° 30′ W.), vast plain in Argentina, stretching from Andes to Atlantic and from Gran Chaco to Rio Colorado; consists mainly of level expanse covered with shingle; in some parts solitary trees to be found; contains several salt lakes; in N.E. is more fertile district, covered with pampas grass, where horses, cattle, and sheep are reared.

PAMPAS HARE, see VISCACHA.

PAMPHLETS, small paper-covered booklets issued for controversial purposes, generally on a literary, political, or theological topic. There seems little doubt that in inception at least the p. is largely an Eng. institution, and it certainly attained its fullest scope in England in XVII. to XVIII. cent's. It is impossible to give anything here but a list of some of the more notable Eng. p's: Sexby's *Killing no Murder*, Knox's *Blast against the Monstrous Regiment of Women*, Milton's *Areopagitica*, Defoe's *Shortest Way with Dissenters*, Steele's *Crisis*, Swift's *Drapier's Letters*, Whately's *Historic Doubts*, the anonymous *Letters of Junius*, Burke's *Thoughts on Present Discontent*, and Shelley's *Necessity of Atheism*. These filled the rôle now played by review articles and letters and leading articles in the public press, and with the advent of a cheap press the p. has fallen into disuse.

PAMPHYLIA, originally a narrow, mountainous region on S. coast of Asia Minor lying along Gulf of Adalia; intersected by several rivers from the Taurus; inhabited by mixed races.

PAMPLONA, PAMPELUNA (42° 50′ N., 1° 12′ W.), town, capital of Navarre, Spain; strongly fortified; seat of bishopric; has fine Gothic cathedral. Pop. (1910) 29,472.

PAN, the great god of flocks and harvest festivals in the myth. of ancient Greece, and particularly associated with Arcadia. In art Pan is represented with horns and goat's feet, and playing on a set of pipes.

PANA (39° 20′ N., 89° 10′ W.), city, Illinois, U.S.A.; coal mines. Pop. (1910) 6055.

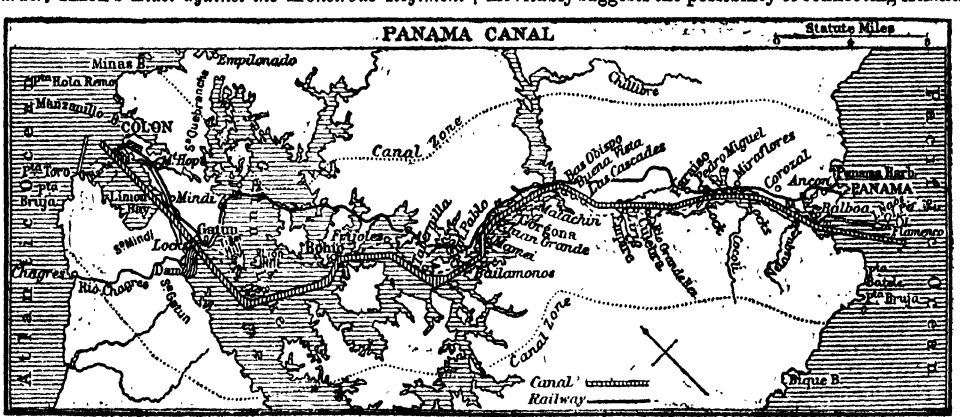
PANAMA (9° N., 80° W.), Central American republic; bounded N. by Caribbean Sea, W. by Costa Rica, S. by Pacific, E. by Colombia; length, *c.* 460 miles; breadth, 120 miles; area, 31,571 sq. miles. Off coast lie numerous islands; several large bays—Almirante, Gulf of San Blas, Chiriqui Lagoon, Gulf of P. It is traversed by mountains—Sierra de Chiriqui, with Chiriqui (11,970 ft.), Pico Blanco (11,740 ft.), Cordillera de Veragua, with Santiago (9275 ft.). Chief rivers, Bayano, Tuira, Chagres. Dense forests; climate tropical; fevers almost stamped out. Principal ports are Colon, Bocas del Toro, Porto Bello, Panama (capital), Dulce.

Columbus established a colony, 1499; destroyed by Indians and restored, 1510; disastrous scheme to colonise Darien region (eastern portion of Atlantic seaboard), 1695 (see DARIEN SCHEME); P. incorporated with Colombia, 1821; an independent state, 1855–61; revolted from Colombia and became separate Republic, 1903; a belt of land on either side of PANAMA CANAL (*q.v.*) is under jurisdiction of U.S.A. Railway runs from Colon to Panama. Chief products are coffee, cocoa, rubber, valuable timber, tropical fruits, live stock; gold, iron, copper, coal found; pearl fisheries. Pop. *c.* 400,000.

Albert Edwards, *Panama* (1912).

PANAMA (8° 59′ N., 79° 32′ W.), capital and principal port of Panama Republic, on Gulf of P.; with cathedral St. Ana, government palace, etc.; founded, 1519; exports india-rubber, hides, tortoise-shell, mother-of-pearl, coffee, bananas, mahogany, live stock. Pop (1910) 37,505.

PANAMA CANAL.—The narrow Panama isthmus inevitably suggests the possibility of connecting Atlantic and Pacific by canal. The project dates from early XVI. cent., but although pioneers of various nations entertained it in turn, no practical progress was made till Ferdinand de Lesseps (*q.v.*) and a Fr. company made the attempt (1879–89), which—after a dozen miles had been excavated and some £50,000,000 expended—



failed through gross mismanagement, disease, engineering and other difficulties. In 1902 the U.S.A. assumed the heavy task; negotiations with Colombia (*q.v.*) broke down, but obstacles were speedily removed by Revolution whereby Panama (*q.v.*) established itself as independent republic; for $40,000,000 U.S.A. acquired rights of existing company, and for $10,000,000 (plus $250,000 yearly after nine years) P. granted (1904) a 5-mile zone on each side of canal. Anglo-Amer. Treaty (Hay-Pauncefote, 1901), superseding Bulwer-Clayton Treaty (1850), guaranteed neutralisation of canal and use on equal terms by all nations; on U.S.A. proposing to remit canal dues of American coastwise ships, Britain claimed submission of question to Arbitration Court, 1912–13.

Abandoning idea of sea-level canal, Americans finally adopted Colon-Panama route; work begun, May 4, 1904; official opening originally fixed for Jan. 1, 1915, but completion expected in 1913; estimated cost to U.S.A., *c.* $375,000,000. Credit of achievement is due to Army Engineers and Sanitary Department, who removed greatest obstacle—fever, by exterminating mosquitoes.

Canal will be *c.* 50 miles long; over 20 angles; time of passage, 10–12 hours; three sections—(1) Atlantic, with Gatun locks (raising ships 85 ft.—canal's highest level) and dam: (2) Central, with gigantic Culebra cutting (*c.* 90 million cubic yards of earth removed): (3) Pacific, with Miraflores locks; depth, 41 ft.; width, 300–500 ft.

P. C. will enormously reduce distance by ship between E. and W. coasts of America, between Europe and Australasia, etc.; New York to all U.S.A. Pacific ports shortened by 8000 or 9000 miles; Liverpool to New Zealand by *c.* 1500 miles; hence canal's inestimable importance to America, Europe, Australasia, and East.

Johnson, *Four Centuries of the Panama Canal* (1907); Edwards, *Panama: the Canal, the Country, and the People* (1911).

PAN-AMERICAN CONFERENCES, American International Conferences (*q.v.*).

PANATHENÆA, a great festival of ancient Athens in honour of the patron deity, Athena. The robe of Athena was carried in a procession and placed on Athena's statue in the citadel. Important contests in the arts were held during the festival.

PANAX, see GINSENG.

PANCH MAHALS (22° 50′ N., 73° 50′ E.), district, Gujarat, Bombay, India; chief town, Godhra. Pop. 265,000.

PANCREAS, a gland present in vertebrates (with exception of some divisions of fishes), originating from a diverticulum of the gut near the beginning of the mid-gut or the stomach. It secretes ferments, such as trypsin, which aid the process of digestion by changing proteids and peptones into amino-acids, starch into sugar, and fats into fatty acids and glycerine. The p. of cattle or sheep used as food is known as *sweetbread*.

PANDA, see RACCOON FAMILY.

PANDANACEÆ, natural order of tropical trees and shrubs; flowers are unisexual and arranged on a spadix.

PANDECTS, see JUSTINIAN I.

PANDERMA (40° 18′ N., 27° 57′ E.), town, ancient *Panormus*, Asia Minor, on Sea of Marmora.

PANDHARPUR (17° 39′ N., 75° 21′ E.), town, Sholapur, Bombay, India, on Bhima; place of pilgrimage. Pop. 34,000.

PANDION, OSPREY (*q.v.*).

PANDORA (classical myth.), first woman; created to place discord in men's hearts by her beauty. P.'s casket, opened by Epimetheus, contained all human ills, or, according to different legend, blessings on mankind.

PANDULF (d. 1226), papal legate sent to Eng. king, John; bp. of Norwich later.

PANDURA, TANBUR, MANDORE, BANDORE, an ancient stringed instrument of the lute kind, with vaulted back, long neck, and two, three, four, or six strings plucked by the fingers; oval-shaped p. used by Egyptians and, later, by Spaniards; pear-shaped p. used by Persians and Assyrians.

PANENTHEISM, name applied by Krause to his attempted reconciliation of theism and pantheism; God is not in the world, nor outside it, but the world is in Him, and He extends beyond it.

PANGENESIS, theory of Darwin that the egg or bud, the agent in reproduction, contains granules (*gemmules*) from cells in all parts of the parent body; the gemmules give rise to cells similar to those by which they were thrown off. See HEREDITY.

PANGOLINS, see under EDENTATES.

PANICLE, see GRASS.

PANICUM, see MILLET.

PANIN, NIKITA IVANOVICH, COUNT (1718–83), Russ. statesman; chief minister during regency of Catherine II. after revolution of 1792; initiated idea of alliance of northern powers, including Britain, against France, Spain, and Austria; failure of this policy led to his fall, 1781; bro., Peter (1721–89), was distinguished general; Nikita's s., Victor, was also a statesman.

PANIPAT (29° 23′ N., 77° 1′ E.), town, Punjab, Brit. India; scene of defeat of Mahrattas by Afghans, 1761. Pop. 28,000.

PANIZZI, SIR ANTHONY (1797–1879), Eng. librarian of Ital. stock; studied at Padua, but, being implicated in revolution of 1821, fled to Liverpool. In 1828 he became prof. of Italian at Univ. College, London; assistant librarian at Brit. Museum, 1831, and from 1856 to 1866 librarian-in-chief; always took a keen interest in cause of Ital. freedom.

PANJDEH, PENJDEH (36° N., 62° 40′ E.), village, fort, Russ. Turkestan, on Murghab.

PANNA, PUNNA (24° 44′ N., 80° 14′ E.), native state, Bundelkhand, Central India. Pop. 195,000. Chief town, Panna. Pop. 12,300.

PANNONIA, ancient country, part of Rom. Empire, lying S. and W. of Danube in Austria-Hungary; probably originally inhabited by brave but treacherous Illyrian race; country fairly productive and originally well wooded; chief rivers, Drave and Save.

PANŒTIUS (II. cent. B.C.), Stoic philosopher; b. Rhodes; succ. Antipater as head of Stoic school at Athens. See STOICS.

PANORAMA, all that the eye can see at one time; also used of photographs and models giving extensive views of towns, etc.

PANORMUS, Lat. name for PALERMO.

PANORPIDÆ, see SCORPION-FLIES.

PANPSYCHISM, theory that not only human beings have a psychical life, but that all through nature atoms and molecules exhibit a rudimentary life of sensation, feeling, impulse.

PANSLAVISM, movement towards unity of Slav peoples; took definite shape *c.* 1825; congresses at Prague (1848) and Moscow (1867). The Russo-Turkish War was declared, *inter alia*, to free oppressed Slavs (1877); plays great part in Austro-Hungarian politics, and on death of present emperor will become still more important. Russ. Panslavists desire to unite all Slav peoples under rule of tsar. The Balkan Alliance of 1912 is the most significant Panslavistic confederacy.

PANSY, HEARTSEASE (*Viola tricolor*), a herbaceous dicotyledon; many varieties are garden favourites; flower is pentamerous and has velvety texture.

PANTELLERIA, PANTALARIA (36° 48′ N., 12° E.), island to S.W. of Sicily, Mediterranean; produces olives, cereals; exports wine. Pop. 9100. Chief town, Oppidola.

PANTHEISM, the philosophical and religious conception which makes God and the Universe the same thing. It is found in Hindu, Gk., mediæval, and modern philosophy; one of its greatest exponents was the Jewish philosopher, Spinoza; but worship of a God who is 'imprisoned in His universe' fails to satisfy the religious needs of many.

PANTHEON.—(1) Rom. temple built to Mars and Venus by Agrippa, 27 B.C.; rebuilt in Hadrian's reign;

now S. Maria Rotunda. (2) building in Paris, originally Church of Sainte Guinevière (1746); now dedicated *Aux grandes hommes la Patrie reconnaissante*, burial-place of celebrities.

PANTHER, see under CAT FAMILY.

PANTHOLOPS, see CHIRU.

PANTIN (48° 53′ N., 2° 23′ E.), town, Seine, France; railway wagons, chemicals. Pop. (1911) 36,359.

PANTOGRAPH, instrument for copying maps, plans, sketches, etc., on the same or a different scale; consists of long wooden or metal arms so arranged that while the artist traces over the original figure with one, a pencil placed in another makes an enlarged, reduced, or exact copy as desired.

PANTOMIME (Lat. *pantomimus*, spectacular performance with incidental music), in modern times signifies a play dependent more on pageantry, gesticulation, and burlesque than on strength of plot or excellence of acting; developed from rustic ballets and folklore plays; greatly developed in Italy; imported into France, where it became extremely popular though more sophisticated. In Germany the rough *Hanswurst* died about 1740; its descendant is the *Zauberposse*.

In England the masque preceded the p., which began to develop independently on the decay of the former about 1700, and grew to be a regular Christmas entertainment, and the 'Harlequin,' 'Columbine,' and 'Pantaloon' were familiar figures till the later half of the XIX. cent. The earlier p's were characterised by the alternation of serious and comic interludes, as in *Perseus* and *Andromeda* (early XVIII. cent.).

The XX.-cent. p. is a composite affair, containing ballets, spectacular effects, popular songs, and topical jests. Of these the music is by far the most inferior —songs are specially written for a season and seldom survive it, while a sameness pervades both the theme and the execution. The inspiration which has been given to music of this nature by the United States since 1911 is doing much to improve the quality of p. music.

PANTÓN (42° 30′ N., 7° 40′ W.), town, Lugo, Spain. Pop. 13,500.

PANTOPODA, see PYCNOGONIDA.

PANTUN, a type of Malay verse imitated in French and English. The pantun is a quatrain rhyming *a*, *b*, *a*, *b*; the first two lines have no immediate connection with the following lines, or with each other, but furnish rhymes for the last two.

PAOLI, PASQUALE (1725–1807), Corsican soldier; almost won independence for Corsica; fled to England, where he received a pension; raised another unsuccessful insurrection, 1795.

PAPACY is the name given to the historic line of the bp's of Rome as supreme heads of the Catholic Church. The office is elective. The power of election lay originally with the neighbouring bp's, clergy, and the laity of Rome. But from time to time the emperors interfered, and even, it would appear, popes appointed their own successors. Still, in all such cases ratification was expected from the people. In VIII. cent. the laity were excluded, but brought back again in IX. In 1059 the power of election was limited to the cardinal bp's, but the assent of the lower clergy and laity was required. Finally, even this assent was abolished in the Œcumenical Council of the Lateran, 1139, which left the whole matter, as it is still, in the hands of the cardinals.

On the ecclesiastical side this institution claims to represent the supreme authority committed, according to its theologians, by Christ to St. Peter. It is based on a doctrinal interpretation of certain texts of Scripture in which St. Peter is singled out for some especial office, and the practical exercise of this primacy is traced to the *Acts of the Apostles* wherein, from the election of St. Mathias onwards, his assumption of this authority is depicted. It is contended further, that the Early Christian Fathers unexpectedly admit in their writings and in their actions some authority in the See of Rome, greater than in any other Apostolic Church, and that they themselves agree in tracing this back in a continuous line to St. Peter as the first bp. of that see. Indeed, a letter of Pope Clement, written as early as 96 A.D., is so strong and authoritative that Bp. Lightfoot describes it as 'the first step towards Papal Aggression.' Even the early heretics appeal to the supreme jurisdiction of the popes as to the highest court of dogmatic competence.

To this divine appointment as Head of the Church other powers were added almost by the mere action of time, or by momentum. Beginning with the doctrinal position of succeeding to the primacy of St. Peter, and consequently of having power to decide all controverted points of faith and morals, the Papacy by the sheer weight of its power gradually gathered round it the administration of the whole Church. Catholic theologians seem willing to admit that the full force of the pope's powers was not at first fully recognised, but that the result of experience and of development produced an evolution whereby the sovereign pontiffs have by a consistent growth become the central authority in the Church, not merely in matters concerning the Creed, but in disciplinary regulations as well. The glamour of the Rom. name had no doubt its part to play in helping on the acceptance of the papal sovereignty, but the Catholic divines would contend that this fixing on Rome as the seat of the Papacy and the results following therefrom were due neither to accident nor to craft, but to the direct divine command, given by Christ and accepted by St. Peter.

At the present day the influence of the pope in the Church is paramount. The centralisation of administration is immense; and the Definition of Papal Infallibility in 1870 at the Council of the Vatican has, of course, added enormously to the dignity of the office. Though generally admitted, this belief had not yet found its place in the Catholic Creed, nor was it very accurately determined. Now it is declared of obligation on the whole Church that when the Pontiff (*a*) as Shepherd and Teacher of all Christians (*b*) defines (*c*) a doctrine concerning faith or morals (*d*) to be held by the whole Church, he cannot err. The conditions of infallibility must be noted, for they are all essential.

Early History.—Viewed from its historic position, the Papacy has had a tumultuous career. At the conversion of Constantine it emerged from the Catacombs, where it had assumed a leadership even in martyrdom, and became a central power, dealing almost on equal terms with the emperors. The genius of the place at once affected the policy of the pontiffs. Without any attempt to allow the tangled Gnostic heresies, the Rom. Church developed along a practical line of law and order. Gradually as the Imperial government shrunk more and more to the city of Constantine and became more and more absorbed in Eastern affairs, the popes were left as bp's, and therefore as Imperial officials, in a city which still retained, at least in name, the idea of majesty. Europe found itself with only one central figure, which, by the weight of history behind it, was forced on by the momentum of the past. Working purely through disciplinary methods and continuously upholding to the restless East an unchanging Creed, the triumph of Rom. steadfastness was assured. Even the General Councils, which typified the collective infallibility of Christendom, were presided over by Rom. legates or had their decrees confirmed by the popes. Otherwise, said St. Athanasius, the Acts would have been contrary to tradition. For a while there was some sort of rivalry to be feared from Antioch, Alexandria, and Constantinople. But it was the latter only which caused any serious opposition. However, it never really boasted of more than equal jurisdiction. Rome alone claimed the dominion of the world. For the Papacy looked West as well as East. Missions were sent out to the Western Islands where Imperial legionaries

had never penetrated; then as the Teutonic tribes, which flooded Europe from East to West and in their ships harassed every coast, settled down within boundaries, they, too, were drawn to the civilising pale of the Church.

It was the age of Benedictine enterprise, and the religious orders have always been Rome's farthest reaching hand. These missions were Roman in liturgy, language, Canon Law, and cast of civilisation. Ireland came first, the Franks next, then England's pirate ancestors, the Saxons, later the Germans, Danes, Norsemen, Wends, lastly, far down into XIII. cent., the Poles and Hungarians. The old inheritance of the empire that St. Jerome thought to be shattered beyond recovery was found, when the dust had settled and there was peace, to have been remade by papal statecraft. Stone after stone of St. Augustine's city of God fell into place; and the Church rose in the Middle Ages like the jewelled Jerusalem of the Apocalypse, set about with the quaint magnificence of secular power.

Middle Ages.—From Leo the Great (440–61) to Innocent III. (1198–1216), the Papacy appears in Europe as the principle of novelty and progress, expanding and assimilating, standing indeed always upon precedent, interpreted, however, to apply with surprising force and unexpected modernity to questions of political and social importance. Out of this long line stand prominent, Leo I., Gelasius I., Gregory I., Nicholas I., Gregory VII., and then Innocent III. The first two belong to the Imperial tradition—Leo going out to meet Alaric and bidding him depart from Rome, Gelasius laying down the principles of ecclesiastical interference in the Christian polity. But with Gregory I. the Middle Ages began. His upbringing was monastic, and the glory of the mid-period of Christian history was almost entirely due to monasticism; his methods are eminently practical; his Scripture commentaries may be over-allegorical, they are never philosophical. To his hand, too, came the newly baptized sword of the Franks. The baptism of Clovis and the monasticism of St. Benedict were a hundred and fifty years old when St. Gregory received pontifical consecration. But he was the first to use them in their completest way. From the two really sprang forth feudalism. It is true that the idea of the Holy Rom. Empire was conjured up to prop a failing Frankish line, and that Gregory VII. had to reform the Benedictines before he could use them. It is true also that under Innocent III. came the fearless obedience of St. Louis, a Celt, not a Teuton, and the zealous activity of St. Francis and St. Dominic, friars, not monks. Yet for almost a thousand years it was the political religiousness of the Germanic nations and the civilising influence of Benedictine monasticism which made mediæval Christianity. For both, the pope was the power supreme. To the one he appealed as a Spiritual Emperor, to the other as an Imperial Abbot.

At once the pope began to fit himself in with human life, and took his place, no mean one, in the world's polity. By the will of the people he accepted the hegemony of the nations. He transferred the Empire from Greek to German, and in recompense was allowed to sit in judgment on each elected representative of the new line of Cæsars. He crowned emperors, anointed kings, hallowed the newly dubbed knights. His bp's sat in the royal Council Chambers and helped in the efficient working of the courts of justice. Through his influence fields were tilled, fens drained, cathedrals and univ's built, and Europe broke out into art and music and song. By canonisation he set high a moral excellence in king and bp., monk and knight, burgher and hind that made the Ages of Faith an astonishing epoch, without equal in the records of the children of men.

Of all this Dante sang; and his poem does not begin, but ends the second chapter of the Papacy. It became powerful, enriched; eventually it became enslaved, tangled in a system. The captivity of Avignon and the Great Schism ruined its political prestige and went far to unsettle the foundations even of its spiritual dominion. Its power had come to it because it had been a unifying principle; but now its action in the pragmatic sanctions of Bourges (1438) and Mainz (1439), and in its recognition of the *Compactata* of the Hussites (1433), completed its work of giving individual life to the nations.

The essence of Protestantism, politically seen in the adage *cujus regio, ejus religio*, spiritually in the claim of the individual to judge of all matters of faith by the light of his own illumination, is the very antithesis of the genius of the Papacy. For the latter the Church is founded on a rock; it is something which may grow, but never change, which is novel perhaps, but always traditional, which is adaptable to modern life only because it stands in the full stream of all past human experience. Young nationalism, therefore, expressed, for example, in the Tudors, in German territorialising princes, even in Span. and Fr. monarchies, chafed under the Papacy. Some left, some remained. But over all the Papacy lost its true papal power. It hardly felt at home with the political organisation of Europe from the Renaissance to the Revolution. It lay crushed under the absolutism which Protestantism unconsciously produced. Philip II. really ruled his empire according to the political science, not of Julius II. or Pius V., but of Luther and Calvin.

Modern Times.—The Papacy, therefore, almost from XV. to XIX. cent., though it could boast of some great rulers, like Eugenius IV., Pius II., Pius V., Benedict XIV., etc., relinquished its imperial task of guiding the life of Christendom. Several of the popes, whose genius lies enshrouded in the massive decrees of Trent, issued well-balanced legislation, but it was chiefly to regulate the clergy, only in a minor fashion to guide the lay-folk.

Since the Revolution, the popes have once more taken their old place in the hegemony of the nations. Against Napoleon, Pius VI. and Pius VII. were really the leaders of traditional Christendom; under Pius IX., Leo XIII., and Pius X. the same force is to be noticed. Even among Christians who would reject any alliance with the spiritual claims of the Papacy, this institution is looked upon as the bulwark of the orthodox faith. It is regarded now as it was regarded by the East in the early ages, as the one great organised rule which moves but is unmoved, which, because it rests all its power on the traditions of the race and not on the individual's private judgment, has marched in majesty down the high road of human destiny, avoiding all bypaths and even all short-cuts. Here is its danger, because here is its power. When alone and without rivals it has a tendency to be progressive; when it finds itself surrounded with institutions which claim private judgment and the right to break off from the main advance, its tendency is to cling to the past, for it sees from its neighbours all the evils of too rapid change.

On the whole the Papacy has stood for the development of Europe and the human race, and, if now and again she may have appeared narrow in her ideas, her conduct has been in every century broad-minded and deep-thinking. She alone, too, is there left of all the older world; round her alone can the history of Christendom be written, for she traces back her unbroken line from Pius to Peter. 'Its chronicle has been a tragedy and a romance, or, as millions of its faithful believe, a prophecy and a fulfilment.' See ROMAN CATHOLICISM.

Hergenroether, *Catholic Church and Christian State* (1889); Milman, *Latin Christianity*; Allies, *Formation of Christendom* (London, 1904); Harnack, *History of Dogma*; Pastor, *History of the Popes* (1898); Creighton, *History of the Papacy* (1882); Horace Mann, *Lives of the Popes* (1902); Barry, *Papal Monarchy* (1902).

THE POPES.

Below will be found a complete list of the Popes from S. Peter to Pius X., with the date of their accession. In the case of the first 26 the dates are doubtful. (S. is prefixed to names of those canonised and B. to those beatified.)

	A.D.
S. Peter,	40
S. Linus,	67
S. Anacletus, or Cletus,	78
S. Clement I.,	90
S. Evaristus,	100
S. Alexander I.,	107
S. Sixtus I.,	116
S. Telesphorus,	125
S. Hyginus,	136
S. Pius I.,	142
S. Anicetus,	154
S. Soter,	168
S. Eleutherius,	177
S. Victor I.,	189
S. Zephyrinus,	200
S. Calixtus I.,	218
S. Urban I.,	222
S. Pontianus,	230
S. Anterus,	235
S. Fabian,	236
S. Cornelius,	251
S. Lucius I.,	253
S. Stephen I.,	254
S. Sixtus II.,	257
S. Dionysius,	259
S. Felix I.,	269
S. Eutychian,	275
S. Caius,	283
S. Marcellinus,	296
S. Marcellus I.,	304?
S. Eusebius,	309
S. Melchiades,	311?
S. Sylvester I.,	314
S. Marcus,	337?
S. Julius I.,	341?
S. Liberius,	352
S. Damasus I.,	366
S. Siricius,	384
S. Anastasius I.,	399?
S. Innocent I.,	402
S. Zosimus,	417
S. Boniface I.,	418
S. Celestine I.,	428?
S. Sixtus III.,	432
S. Leo I.,	440
S. Hilarius,	461
S. Simplicius,	468
S. Felix III.,	483
S. Gelasius I.,	492
S. Anastasius II.,	496
S. Symmachus,	498
S. Hormisdas,	514
S. John I.,	523
S. Felix IV.,	526
Boniface II.,	530
John II.,	532
S. Agapetus I.,	535
S. Silverius,	536
Vigilius,	537
Pelagius I.,	555
John III.,	560
Benedict I.,	574
Pelagius II.,	578
S. Gregory I.,	590
Sabinianus,	604
Boniface III.,	607
S. Boniface IV.,	608
Deusdedit I.,	615
Boniface V.,	619
Honorius I.,	625
Severinus,	640
John IV.,	640
Theodore I.,	642
S. Martin I.,	649
S. Eugenius I.,	655
S. Vitalianus,	657
Deusdedit II.,	672
Donus I.,	676
S. Agatho,	678
S. Leo II.,	682
S. Benedict II.,	684
John V.,	685
Conon,	686
S. Sergius I.,	687
John VI.,	701
John VII.,	705
Sisinnius,	708
Constantinus,	708
S. Gregory II.,	715
S. Gregory III.,	731
Zachary,	741
Stephen II.,	752
Stephen III.,	752
S. Paul I.,	757
Constantinus II.,	767?
Stephen IV.,	768
Adrian I.,	771?
S. Leo III.,	795
Stephen V.,	816
S. Paschal I.,	817
Eugenius II.,	824
Valentinus,	827
Gregory IV.,	827
Sergius II.,	844
S. Leo IV.,	847
Benedict III.,	855
S. Nicholas I.,	858
Adrian II.,	867
John VIII.,	872
Martin II.,	882
Adrian III.,	884
Stephen VI.,	885
Formosus,	891
Boniface VI.,	896
Stephen VII.,	897?
Romanus,	898?
Theodore II.,	898?
John IX.,	898
Benedict IV.,	900
Leo V.,	903
Christopher,	903
Sergius III.,	904
Anastasius III.,	911
Lando,	913
John X.,	915?
Leo VI.,	928
Stephen VIII. (or VII. ?),	929
John XI.,	931
Leo VII. (or VI.),	936
Stephen IX. (or VIII. ?),	939
Marinus II.,	943?
Agapetus II.,	946
John XII.,	956
Leo VIII.,	963
Benedict V.,	964
John XIII.,	965
Benedict VI.,	972
Benedict VII.,	975?
John XIV.,	984?
Boniface VII.,	984
John XV. or XVI.,	985
Gregory V.,	996
Sylvester II.,	999
John XVII.,	1003
John XVIII.,	1003
Sergius IV.,	1009
Benedict VIII.,	1012
John XIX.,	1024
Benedict IX.,	1033
Gregory VI.,	1045
Clement II.,	1046
Damasus II.,	1048
S. Leo IX.,	1049
Victor II.,	1055
Stephen X. (or IX. ?),	1057
Nicholas II.,	1059
Alexander II.,	1061
S. Gregory VII.,	1073
Victor III.,	1087?
Urban II.,	1088
Paschal II.,	1099
Gelasius II.,	1118
Calixtus II.,	1118
Honorius II.,	1124
Innocent II.,	1130
Celestine II.,	1143
Lucius II.,	1144
B. Eugenius III.,	1145
Anastasius IV.,	1153
Adrian IV.,	1154
Alexander III.,	1159
Lucius III.,	1181
Urban III.,	1185
Gregory VIII.,	1187
Clement III.,	1187
Celestine III.,	1191
Innocent III.,	1198
Honorius III.,	1216
Gregory IX.,	1227
Celestine IV.,	1241
Innocent IV.,	1243
Alexander IV.,	1254
Urban IV.,	1261
Clement IV.,	1265
B. Gregory X.,	1271
Innocent V.,	1276
Adrian V.,	1276
John XXI.,	1277
Nicholas III.,	1277
Martin IV.,	1281
Honorius IV.,	1285
Nicholas IV.,	1288
S. Celestine V.,	1294
Boniface VIII.,	1294
B. Benedict XI.,	1305?
Clement V.,	1305
John XXII.,	1316
Benedict XII.,	1334
Clement VI.,	1342
Innocent VI.,	1352
B. Urban V.,	1362
Gregory XI.,	1370
Urban VI.,	1378
Boniface IX.,	1389
Innocent VII.,	1404?
Gregory XII.,	1406
Martin V.,	1417
Eugenius IV.,	1431
Nicholas V.,	1447?
Calixtus III.,	1455
Pius II.,	1458
Paul II.,	1464
Sixtus IV.,	1471
Innocent VIII.,	1484
Alexander VI.,	1492
Pius III.,	1503
Julius II.,	1503
Leo X.,	1513?
Adrian VI.,	1522
Clement VII.,	1523
Paul III.,	1534
Julius III.,	1550
Marcellus II.,	1555
Paul IV.,	1555
Pius IV.,	1559
S. Pius V.,	1566
Gregory XIII.,	1572
Sixtus V.,	1585
Urban VII.,	1590
Gregory XIV.,	1590
Innocent IX.,	1591
Clement VIII.,	1592
Leo XI.,	1603?
Paul V.,	1605
Gregory XV.,	1621
Urban VIII.,	1623
Innocent X.,	1643?
Alexander VII.,	1655
Clement IX.,	1667
Clement X.,	1670
Innocent XI.,	1676
Alexander VIII.,	1689
Innocent XII.,	1691
Clement XI.,	1700
Innocent XIII.,	1721
Benedict XIII.,	1724
Clement XII.,	1730
Benedict XIV.,	1740
Clement XIII.,	1753?
Clement XIV.,	1769
Pius VI.,	1775
Pius VII.,	1800
Leo XII.,	1823
Pius VIII.,	1829
Gregory XVI.,	1831
Pius IX.,	1846
Leo XIII.,	1878
Pius X.,	1903

PAPAL STATES, see STATES OF THE CHURCH.

PAPAVERACEÆ, natural order of plants; flowers, on long stalks, have two sepals and four petals; fruit is a capsule containing many seeds; yields opium (*q.v.*).

PAPAVERINE, see OPIUM.

PAPAW (*Carica papaya*), S. Amer. tree yielding melon-like fruit, which is used as a vegetable and peptoniser.

PAPEETE, PAPEITI (17° 32′ S., 149° 34′ W.), seaport, Tahiti; capital of Society Islands. Pop. 3700.

PAPENBURG (53° 4′ N., 7° 26′ E.), town, Hanover, Prussia; shipbuilding yards. Pop. (1910) 8430.

PAPER, material used for wrapping, writing, and printing, as well as a variety of other purposes.

History.—Paper was probably first made in Egypt, China, and Japan. Egyptian p. was made from the papyrus, a kind of rush which grew to a height of 10 feet in marshy districts. The outer covering of the rush was removed and the stems sliced longitudinally. They were then woven together by hand, moistened with Nile water, pressed, dried, and finally smoothed. Up to about the X. cent. most p. used in Europe was imported from Egypt. According to the Chinese, the manufacture of p. from cotton or other vegetable fibres commenced in II. cent. B.C. P.-making was probably introduced into Europe by the Arabs, and p. was first made from cotton fibres in Spain about XI. cent. Later the manufacture was carried on in Germany, France, and Italy. Until about 1495, however, p. was entirely hand-made, and large quantities were imported from France and Holland. John Tate in XV. cent. commenced to manufacture p. at Stevenage (Herts), and his mill was probably the first p. factory in England. P.-making was commenced in Scotland in 1685. P. was up to this time made chiefly from cotton and linen rags, but towards the end of XVIII. cent. p.-makers commenced experiments with a view to manufacturing p. from vegetable fibres other than those already mentioned. It was found that esparto grass, straw, and even wood pulp might be used as the basis of p. The demand for p. nowadays is so great that over 400 varieties of woods and grasses have been, and are, used; rags are only used for the better qualities of writing-p. *Esparto grass* abounds in North Africa and south-eastern Spain. The crop is plucked, not cut, and over 200,000 tons are imported into England annually from Spain alone, while some £2,000,000 worth of wood pulp is sent to England from Norway and Sweden.

Paper-Making.—Whether p. be made from wood,

rags, or grass, the primary substance contains a considerable portion of foreign matter, which must be removed and the remainder pounded to pulp before ready for use. *Wood* is cut into small cubes, which are crushed by rollers and then boiled in a solution of soda or sulphuric acid. This softens the tough fibres and reduces the whole to a pulp. It is imported into Britain in this form, resembling sheets of brown cardboard, and is thus received at the p.-mill. *Rags* are sorted, dusted, cut up into small pieces by machinery, boiled, and thoroughly cleansed before being reduced to a pulp. *Grass* is sorted and dusted and placed in boilers, which each hold about 3 tons of grass. Steam and caustic soda solution are then introduced for several hours, and the grass thus reduced to a pulp. Wood, rag, or grass pulp is now bleached, sized, and coloured. Sometimes each variety is mixed together in varying quantities, or they may be used separately —depending on the required quality of the finished p. The pulp is next poured into square frames or trays, which have a fine wire mesh for a bottom; this allows the water to drain off, and the pulp then settles in thin sheets. Pressure is applied to squeeze out the moisture, the sheets are sized (and if necessary glazed), and finally dried and cut to the required size. *Machine-made p.* was first manufactured in France, at the end of XV. cent. Pulp is placed in troughs and fed to strainers. When the water has drained off, the sheets are passed between a series of felt-covered rollers and sized by passing between hot cylinders. Glazing is done by cast-iron rollers, and the finished p. is wound on reels at the 'dry end' of the machine.

PAPER NAUTILUS, a genus of Cephalopoda (*q.v.*).

PAPER DUTY, see NEWSPAPERS.

PAPHLAGONIA, ancient mountainous district on N. side of Asia Minor, along Black Sea; boundaries uncertain; famous for hunting-grounds; known to Greeks in mythical period; *Paphlagon*, according to Argonautic legends, eponymous hero.

PAPHOS, PAPHUS, two towns on W. coast of Cyprus.—(1) Old P., on river Bocanus, was chief seat of worship of Aphrodite. (2) New P., on fertile plain.

PAPIAS, bp. of Hierapolis (*c.* 60–135 A.D.), included in Apostolic Fathers (*q.v.*); wrote *Exposition of the Lord's Oracles*, of which fragments are preserved in Eusebius. The work is valuable, as P. knew St. John and Polycarp.

PAPIER MÂCHÉ, substance manufactured from useless paper by pulping and drying, or by superimposing several sheets of paper one on another, and subjecting the whole to pressure; sometimes admixed with earthy substances; used for pilaster work, surface for gilding, and other japanned ornaments, masks, etc. The p. m. work done in Japan is world-famous.

PAPILIONACEÆ (Lat. *papilio*, butterfly), division of plants, order Leguminosæ; flowers have 5 petals, one of which, the *standard*, is superior; 2 inferior, forming the *keel* or *carina*; 2 lateral, forming *wings* or *alæ*; types are Pea, Bean, Clover, Broom, etc.

PAPIN, DENIS (1647–*c.* 1712), Fr. physicist; b. Blois; physician, then prof. of Mathematics, Marburg; invented 'digester,' safety-valve, and discovered principle of siphon; with Boyle experimented on properties of gases.

PAPINEAU, LOUIS JOSEPH (1786–1871), Canadian politician; leader of Fr. party in Quebec Parliament; chosen Speaker, 1815, and again, despite Dalhousie's opposition, in 1827, thus causing adjournment of Parliament; drew up 92 disloyal 'Resolutions' and advocated stoppage of supplies; Britain rejected demands, with result that riots broke out, 1837; forced to fly; returned at amnesty, 1840.

PAPPENHEIM, GOTTFRIED HEINRICH, COUNT OF (1594–1632), Ger. soldier; famous cavalry general on Catholic side in Thirty Years War; left for dead on field of *Prague*, 1620; field marshal, 1630; assisted in sack of Magdeburg, 1631; blamed for undisciplined fury as commander of cavalry at *Breitenfeld*, 1631; slain at *Lützen*.

PAPPUS OF ALEXANDRIA (fl. III. cent. A.D.), Gk. mathematician; known chiefly by his great work of eight books, of which only part remain; also wrote commentaries on the works of Ptolemy, Diodorus, and on the *Elements* of Euclid; only fragments of the latter have survived. P.'s great work gives a systematic account of the most important results of earlier writers, together with additions and notes. The theorems on centres of gravity named after Guldinus are due originally to P.

PAPUA, see NEW GUINEA.

PAPUANS (from the Malay *papuwah*, 'woolly-haired'), a tall race, dark brown to black in colour. Their origin is still disputed. They dwell in village communities in New Guinea, without priests, or hereditary chiefs. Except for the converts to Islam and Christianity they are spirit worshippers and pagan; great boat-builders and house-builders. Communal houses, 500 to 700 ft. long, are found in various parts of New Guinea, but generally each family has its own separate dwelling, 60 to 70 ft. long. Bows and arrows, stone and hardwood clubs and spears are the chief weapons. Stone axes are the commonest instruments used. The P. are akin both to E. Africans and aboriginal Australians in many customs and habits. Polygamy is common amongst them, but there are certain prohibited degrees of affinity. Their numerals do not go beyond 5.

PAPYRUS (*Cyperus papyrus* = *Papyrus antiquorum*), a reed allied to the sedges, which grows abundantly along the banks of rivers in hot countries (*e.g.* the Nile). The shoots attain a considerable height and have an extremely graceful appearance, the leaves forming a pendent crown. The flowers are borne in spikelets enclosed by long bracts. The pith of the stem was utilised by the ancients in the manufacture of paper, being cut into strips, which, whilst still wet, were pressed together. Much valuable lit. is preserved to us in ancient papyri, some taking the form of rolls (*volumina*), whilst others were composed of flat sheets bound together bookwise. The oldest known specimens date from about the XXXV. cent. B.C. See PALÆOGRAPHY.

PARÁ (GRÃO PARÁ) (4° S., 52° W.), state, Brazil, bounded by three Guianas, Atlantic and other Brazilian states; area, *c.* 443,900 sq. miles; thickly wooded and well-watered region; communication carried on by rivers, chief of which, Amazon; principal towns, Pará (capital), Alemaquer, Breves, Bragança, and Obidos; considerable stock-raising; fruits and cacao cultivated; rubber, gutta-percha, tonka beans, sarsaparilla, gums, and Brazil nuts produced. Pop. 570,000.

PARÁ, BELEM, BELEM DO PARÁ (1° 28′ S., 48° 24′ W.), city, port, capital of Pará State, Brazil, on Pará River; well laid out, with several fine squares and gardens; notable buildings are XVIII.-cent. cathedral, bp.'s palace, episcopal seminary, theatre, municipal and government buildings, public library, and Museum. P. was founded, 1615, by Portuguese; scene of many revolts; connected with Bragança by rail; important centre of commerce, and entrepôt for Amazon River trade. Pop. 120,000.

PARABLE, simple story with allegorical interpretation; popular since earliest times in Oriental countries; frequently employed in New Testament.

PARABOLA, the curve of section of a cone by a plane parallel to a generating line of the cone; or the locus of a point which moves so that its distance from a fixed point (*focus*) equals its distance from a fixed straight line (*directrix*). Taking the axis of symmetry for Ox and the vertex of the curve for origin, the Cartesian equation is $y^2 = 4ax$, where a is the distance of both focus and directrix from the origin. See CONIC SECTION.

PARACELSUS (*c.* 1490–1541), Ger. physician; the

name given to himself by Theophrastus Bombast von Hohenheim; b. in Swiss canton of Schwyz; s. of a physician; received his early education from his f.; at age of 16 entered Basel Univ., but soon left to study chem. under Trithemius, and deserted him, in turn, to go to the mines of Tyrol to study minerals and metals. P. became convinced of the superior value of personal experience to theory and scholarship, and wandered over Europe studying diseases and the practice of med.

Returning to Basel in 1526, he became town physician, and lectured on med. in the univ. in the Ger. language, and not, as customary, in Latin, attacking the prevailing methods of the physicians and apothecaries and propounding his own views with much success. He was involved in many disputes, and, on becoming embroiled with the authorities, fled from Basel to Esslingen, and wandered, staying a few months at each place, in succession, to Colmar, Nuremberg, Appenzell, Zürich, Augsburg, and many other towns. Eventually he settled, in 1541, at Salzburg, under the protection of Abp. Ernst, and there in the same year he died, the cause of his death being uncertain, his friends attributing it to violence at the hands of his enemies, the physicians and apothecaries.

Of some 360 works which he is said to have written, only from 10 to 24, according to different authorities, are admitted as genuine, the others being assigned to disciples. Collected editions and translations into Latin, English, and other languages were published during the XVII. cent., but are now very rare. The influence of P. was very great in encouraging the direct observation of nature, with experiment and research, in opposition to mere annotation of Galen and other ancient physicians, and scholastic disputation. See MEDICINE.

Hartmann, *Life of P.*; Waite, *Hermetic and Alchemical Writings of P.*

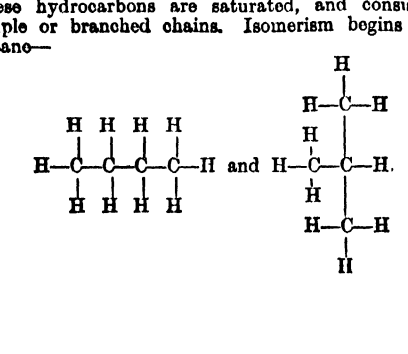
PARACHUTE, an apparatus by which descents may be made from balloons or dirigibles; in shape it resembles an umbrella, and from its extremities metal stays are passed to the main upright to prevent it being turned inside out. Blanchard was first practical parachutist, 1793. Experiments are at present being carried on in connection with descent by parachute from aeroplanes.

PARADISE (Gk. *paradeisos*), the place of future bliss of the righteous in Christian and other religions. The word is of Persian derivation, and the Hebrew derivative is used of an enclosed part of garden in the Old Testament.

PARADOXURUS, a carnivore; see under CIVET FAMILY.

PARAFFIN, name given to the methane series of hydrocarbons, because p. wax consists chiefly of some of the higher members of this series. The name—derived from Lat. *parum affinis*, 'small affinity'—was given to the wax on account of its chemical inertness, which is shared by all the members of the series.

The p. hydrocarbons form a homologous series having the general formula C_nH_{2n+2}; there is thus a common difference of CH_2 between adjacent members, *e.g.* Methane, CH_4; Ethane, C_2H_6; Propane, C_3H_8; Butane, C_4H_{10}; Pentane, C_5H_{12}; Hexane, C_6H_{14}. These hydrocarbons are saturated, and consist of simple or branched chains. Isomerism begins with butane—



With the higher members isomers are more numerous. The p's occur as natural gas, petroleum, and earth wax or *ozokerit*. They are prepared—

(i) By heating the alkali salt of a fatty acid with alkali (*e.g.* soda-lime)—

$$CH_3.COONa + NaOH = CH_4 + Na_2CO_3.$$

(ii) By reduction of alkylhalides with nascent hydrogen or sodium—

$$CH_3I + 2H = CH_4 + HI$$
$$2CH_3I + 2Na = C_2H_6 2NaI.$$

(iii) By electrolysis of aqueous solutions of the alkali salts of fatty acids—

$$2CH_3.COONa + 2H_2O = C_2H_6 + 2NaHCO_3 + H_2.$$

Pentane is the first liquid hydrocarbon; thenceforth there is a fairly constant rise in B.P. and S.G. from member to member. The p's are insoluble in water, but dissolve in alcohol, ether, etc. They are not acted on by strong acids or alkalis, nor by oxidising or reducing agents, but form substitution products with chlorine.

PARAGUAY (25° S., 56° W.), inland republic, S. America, bounded N. by Bolivia and Brazil, E. by Brazil, S. and W. by Argentine; area, *c.* 171,200 sq. miles. Republic is divided from N. to S. by Paraguay River, eastern portion being larger and more important; large tract to W. of river unexplored. Surface consists of undulating plains, low hills, swamps, and dense forests; highest ground to be found in N. and E. Chief rivers are Paraguay, Pilcomayo, and Paraná. Soil is rich and fertile, vegetation luxuriant; leading industries, stock-raising and cultivation of *yerba maté* (P. tea), rice, sugar, tobacco, maize, and coffee; forests produce fine timber, gums, dyes, and oils. Principal towns are Asuncion (capital) and Villa Rica; inhabitants chiefly Spaniards and Indians. Pres. is elected for four years. P. was visited in 1515 by De Solis, and in 1526 by Cabot; colonised by Spanish; from 1608 progress made under administration of Jesuits until their expulsion, 1768; P. declared independent, *c.* 1811; 1865–70, war against Brazil, Uruguay, and Argentine, resulting in complete defeat of P.; frequent revolutions, *e.g.* 1911–12. Pop. *c.* 750,000.

La Dardye, *Paraguay* (Eng. edit., 1892).

PARAGUAY TEA, see MATÉ.

PARAHYBA.—(1) (7° S., 37° W.) maritime state, N. of Pernambuco, Brazil, S. America; surface elevated; chief products, cotton, sugar. Pop. 520,000. (2) (6° 58′ S., 34° 59′ W.) city, capital of above; port on river P. Pop. 30,000.

PARAHYBA DO SUL (21° 40′ S., 40° 50′ W.), river, Brazil, S. America; rises in state São Paulo; flows into Atlantic.

PARALDEHYDE ($C_6H_{12}O_3$), colourless liquid, with odour resembling ether and burning taste, obtained by the action of various acids or salts on aldehyde; used in med. as a hypnotic, especially to produce sleep in the insane, and, as it does not act on the heart, in patients with heart disease.

PARALLAX (Gk. *parallasso*, 'I vary'), the amount of apparent change in position of any distant object as seen from two points. Identical with p. is *Triangulation*, the former term being used in connection with Astronomy. The two eyes of a human being (and animals) form a parallax, and so enable us to judge distances. Theoretically, two observers at different parts of the earth, working in conjunction, might take the altitude and azimuth of a given star and, knowing the distance between their two stations, apply Triangulation and thus measure the distance of the star from the earth. However, in practice it is found that the distances of even the nearest stars are so vast that the diameter of the earth is useless as a base, and so observations are made after an interval of six months by the same observer, for in this time the earth will have made half a circuit of her orbit, which is thus used as a base. The majority of stellar distances are so immense, however,

that even with this huge base (186 million miles) it is impossible to obtain parallaxes for the majority of the stars.

PARALLELISM (*Psycho-physical*), theory that every conscious process or variation of conscious process is accompanied by a corresponding nervous process or variation of nervous process.

PARALYSIS, Palsy, condition in which there is loss or impairment of the power of voluntary muscular contraction or movement, the loss being either generalised in the muscles all over the body, or localised to one or several muscles. The course of the motor impulses from the brain to the muscles is in two main segments, motor nerve fibres passing from the motor nerve cells in the grey matter of the cortex of the brain by the motor tracts of the spinal cord to the anterior horn of grey matter of the cord, and from the nerve cells these motor nerve fibres go, by the anterior nerve roots, to the muscles. If there is injury or disease of the part of the brain controlling voluntary movement or of the motor tracts of the spinal cord, *i.e.* of the first segment of the course of motor impulses, loss of voluntary muscular power results; while if there is injury or disease of the anterior horn of grey matter of the spinal cord, of the anterior nerve roots, or of the motor nerve fibres to the muscles, *i.e.* of the second segment of the course, there is, in addition to loss of voluntary muscular power, atrophy of the muscles supplied by the fibres concerned. Besides being due to injury or disease of nervous structures (*organic paralysis*), p. may be due to functional derangement of the part of the brain controlling voluntary muscular movement, as in such mental conditions as hysteria, or *functional motor paralysis*; in addition, p. may be due to injury or disease of the muscles themselves.

Hemiplegia, p. affecting one side of the body, is due to a lesion of some part of the motor tract in the brain above the medulla oblongata. The chief causes are, when the onset has been sudden, injury, hæmorrhage, embolism (blocking of a cerebral artery), thrombosis (clotting of the blood in a cerebral artery, due usually to disease of its wall); and when the onset has been gradual, a tumour of the brain, altered states of the blood (*e.g.* in anæmia, diphtheria), abscess, chronic cerebral meningitis, or chronic degenerations of the nervous system.

Paraplegia, p. of both legs, is due usually to disease or injury of the spinal cord. The more common causes are pressure on the spinal cord as a result of injury or disease of the spine (*e.g.* fracture, curvature, or caries), and injury or disease of the cord itself (tumours, or acute or chronic inflammation).

Infantile Paralysis (*acute anterior poliomyelitis*) is a form of p. often occurring in young children, due to an acute inflammation of the anterior horn of grey matter of the spinal cord. The legs are usually first affected, but all the limbs or only a group of muscles may be implicated, and the muscles soon atrophy. There may be permanent deformity or a wasted limb, after recovering motor power.

Progressive Muscular Atrophy is the result of chronic inflammation with sclerosis of the anterior horn of grey matter. It is a disease usually of adult life, in which there is slow and gradual atrophy of groups of muscles, commencing generally in one or both arms, at the muscles of the hand. A characteristic feature of the disease is the peculiar fibrillary twitchings of the affected muscles.

Bulbar Paralysis, due to disease of the medulla oblongata or bulb, occurs most often in old persons, and is frequently associated with chronic diseases of the spinal cord. It is characterised by gradual p. and atrophy of the muscles concerned in speaking, mastication, and swallowing (*i.e.* of tongue, lips, pharynx, etc.), and is accompanied by difficulty in articulation, eating, swallowing, and sometimes in breathing. It invariably ends fatally, either from inanition or from pneumonia or similar complications.

Neuritis, or inflammation of a nerve or nerves, may cause p. of a muscle, a group of muscles, or an entire limb, owing to swelling and compression (*e.g.* the facial nerve in its long passage through the skull); while a *multiple neuritis*, causing a paraplegia, may occur in toxic conditions, such as lead or arsenic poisoning, diabetes, and similar toxæmias.

Pseudo-hypertrophic Paralysis (*progressive muscular dystrophy*) is a hereditary disease, usually affecting boys, transmitted through the females of a family who are not themselves affected. There is progressive weakness, with hypertrophy of some muscles and atrophy of others, while certain deformities are caused through the construction of muscles not being antagonised by those which are paralysed, the gait being peculiar and characteristic. Where the muscles are apparently enlarged there is really atrophy of muscle fibres, with increase of fibrous tissue and fat, the muscles of the calves and buttocks being those which are generally much hypertrophied. The essential changes are, therefore, not in the nervous system, but in the muscles themselves.

Parkinson's Disease, *Paralysis agitans*, is a chronic affection, usually occurring after the age of 50, characterised by progressive weakness, rhythmical tremors of certain muscles, a distinctive attitude, the body being bent forward, and a peculiar gait, at first slow and then trotting. It is believed to be due to a senile condition of the brain cortex.

The *General Treatment of Paralysis* includes rest in bed, support of the strength of the body, regulation of nutrition and of the excretions, careful attention to the action of the heart and of the lungs, regular sound sleep must be ensured, and for these purposes stimulants and other drugs are given as required. Precautions must be taken to prevent bed-sores, to which paralytic patients are very liable, and the skin of prominent parts exposed to pressure is bathed with eau-de-Cologne or methylated spirits. Massage and passive movement are employed with benefit after acute symptoms have disappeared, and electricity is often of value in maintaining the nutrition of atrophied muscles.

PARAMARIBO (6° 50′ N., 55° W.), capital, Dutch Guiana, on Surinam; exports coffee, sugar. Pop. (1910) 25,346.

PARAMATTA, Parramatta (33° 40′ S., 151° E.), town, on Paramatta, New South Wales, Australia; trade in fruit. Pop. 14,500.

PARAMŒCIUM, see under Infusoria.

PARANÁ.—(1) (20° 30′ S., 55° W.) southern state, Brazil; area, 85,451 sq. miles; large area forested; produces tea; chief town, Curityba. Pop. 327,130. (2) (31° 45′ S., 60° 38′ W.) capital, Entre Rios, Argentina, on Paraná, S. America. Pop. 41,000.

PARANAGUA (25° 33′ S., 48° 24′ W.), seaport, Paraná, Brazil, on Bay of Paranagua. Pop. 6300.

PARANDHAR, hill fort, sanatorium, Bombay, India, 20 miles S.E. of Poona.

PARANOIA, term which has been used for a considerable period in Germany and in America, and which is now coming into use in England, to define a type of insanity which is characterised by a marked and permanent delusion, while the affected person may be in other respects sane. In persons thus affected there is nearly always a hereditary tendency to mental or nervous derangement, and the condition is of slow and gradual evolution. Queerness and eccentricities of conduct frequently develop, the power of reasoning is affected, there may be delusions of grandeur and self-importance or of persecution and morbid suspicion. Normal instincts and ideas of morality are changed, the affected person's affection for his wife, parents, brothers, or sisters disappears; he dislikes the society of his fellow-beings, and his sexual instincts may be perverted. Persons affected with this type of insanity may be dangerous, and often commit crimes. King Louis II. of Bavaria, with his love of music and friendship with Wagner, his wild

extravagances, his various eccentricities of conduct, the sexual perversities of which he is suspected, and yet his statesmanlike action in regard to the war of 1870, is a well-known and typical example of the paranoiac. Change of scene, a nourishing diet, an open-air life, and similar conditions which will induce a healthy state of body, with diversion of the mind, and removal of all possible causes of irritation, is the treatment for paranoiacs, but the prognosis is bad in all such cases which have lasted over a year. See INSANITY.

PARAPLEGIA, *see* PARALYSIS.

PARASITIC DISEASES is a term now much more comprehensive than a few years ago, for many diseases formerly classified otherwise have been recently brought under this heading. Many are caused by bacteria, others by vegetable parasites of a somewhat higher type, while others again are due to parasites which are low forms of animal life. In certain diseases, in all probability of parasitic origin, the precise etiology is still obscure; while there are other diseases, such as some forms of anæmia, which, while they may be the result of the presence of animal parasites in the intestine, can hardly be included under the heading of parasitic diseases.

The diseases here considered may be sub-divided under A., those caused by vegetable parasites, including (1) those due to the pyogenic micrococci, (2) those due to specific bacilli, and (3) those due to higher forms of vegetable life; B., those caused by animal parasites, including (1) those due to protozoa, and (2) those due to higher forms of animal life; and C., those infective diseases (1) in which, although a micro-organism has been found, it has not been absolutely proved to be the cause of the disease; and (2) those which have not been proved to be caused by micro-organisms, although in all probability caused by them.

A. (1) SUPPURATION and SEPTICÆMIA are most commonly caused by the pus-forming or pyogenic bacteria, in the former causing the death and digestion of the tissues with which they come in contact, and an emigration of leucocytes which may, to a greater or less extent, break down under the influence of their toxins, and thus, with the dead and digested tissues, form pus; while in the latter the toxins formed at the point of introduction of the bacteria into the tissues, are absorbed into the blood, giving rise to fever and other untoward symptoms, and may cause secondary abscesses in other tissues or organs. The chief pyogenic bacteria are the *staphylococci* (micrococci arranged like grapes in bunches), *streptococci* (micrococci arranged in chains), and, less commonly, *pneumococci*, *bacillus pyocyaneus*, *bacillus coli communis*, and the *typhoid bacillus*.

ERYSIPELAS is an infective inflammation of the skin which is caused by a streptococcus, the *Streptococcus erysipelatis*, the advance of which in the skin is prevented by painting a ring of iodine some distance from the zone of inflammation.

ENDOCARDITIS may take place in certain forms of septicæmia, caused by the *Streptococcus pyogenes*, the *Staphylococcus pyogenes aureus*, the most common of the staphylococci, the *pneumococcus*, or less commonly the *gonococcus*, the *tubercle bacillus*, or the *typhoid bacillus*. Endocarditis due to the streptococcus has been successfully treated with anti-streptococcic serum.

GONORRHŒA is an infective inflammation of the urethra, due to a small diplococcus, the *gonococcus*, which may also be found in the conjunctiva, in gonorrhœal conjunctivitis, in the fluids of joints affected with gonorrhœal arthritis, and, more rarely, in the vegetations of gonorrhœal endocarditis, or in the pleuritic fluid.

A. (2) PNEUMONIA was at first attributed to the action of the pneumobacillus discovered by Friedländer, but it was found later that a much more active agent in the causation of the disease was an encapsuled diplococcus, the pneumococcus of Fraenkel. An anti-pneumococcal serum has been produced, but more accurate information regarding its action and value in treatment is still required.

ANTHRAX may attack man in various forms, according to the method of infection, malignant pustule being a local lesion of the skin, while the disease may also be of an intestinal or of a pulmonary ('Woolsorters' disease') type. The specific organism is the *anthrax bacillus*, which is a comparatively large, rod-like organism, found either single or in short chains, and forming spores under adverse conditions of life. A vaccine has been prepared from cultures of the bacillus which is successfully employed in immunising animals against the disease.

TYPHOID FEVER is an acute infectious fever caused by a micro-organism which is a somewhat short bacillus, with rounded ends, and surrounding it there are numerous long flagella, which give the bacillus its characteristic appearance. In addition to being present, in the disease, in the lymphatic follicles of the intestine, the bacilli are also in the mesenteric glands, the spleen, liver, and kidneys, and are found in the fæces and urine. A vaccine has been prepared from cultures of the bacillus which confers a very marked, if not altogether complete, protection on persons in whom it is inoculated.

DIPHTHERIA is caused by a slightly curved, rod-shaped micro-organism, a small bacillus with rounded ends which shows, when stained for microscopical observation, clear unstained spaces in its body, while aberrant types may be spindle-shaped, wedge-shaped, or, under certain conditions, club-shaped. In the disease they are found in large numbers on the surface of the diphtheritic membrane. An antitoxic serum, prepared by injecting into a horse the filtered products of the bacillus, is now universally employed in the treatment of the disease, successfully neutralising the action of the bacillus and its toxins in the patient; and the death-rate of the disease has fallen, since the introduction of the antitoxic serum, from about 40 % to under 10 %, while the mortality is practically *nil* when the serum is administered on the first manifestation of the disease.

TETANUS (or *Lockjaw*) is a disease caused by a micro-organism which grows in long slender threads, which break up into shorter motile rods surrounded by flagella, and these bacilli eventually become non-motile, lose the flagella, and form spores at one end, giving them the characteristic 'drum-stick' appearance. The bacilli are found, in the disease, only at the local lesion in which it is inoculated, and the effects are due to the action of the toxins of the bacilli upon the central nervous system.

CHOLERA is due to the 'comma' bacillus or vibrio, which is a slightly curved rod with a flagellum at either end, unable to reach its full development in the healthy stomach and intestine, and therefore exerts its evil effects upon the individual only when the digestive tract is deranged, *e.g.* by eating unripe fruit, or by intemperance. Haffkine has prepared a vaccine from cultures of the cholera bacillus, which seems to be an efficient protective against attacks, but more statistics in regard to this are still required.

RELAPSING FEVER is caused by a micro-organism, the *Spirillum obermeieri*, which is found in the blood of persons in the acute stage of the disease, while during the periods of intermission the organisms appear to disappear from the blood and go to the spleen. Infection is believed to be carried by some blood-sucking insect.

YELLOW FEVER is an infective fever, affecting chiefly the blood vessels of the liver, kidney, and gastro-intestinal system, and appears to be caused by a specific micro-organism, but up to the present, although different authorities have isolated organisms which they have assigned as the cause of yellow fever, the evidence does not sufficiently point to any one organism. It has been proved, however, that the intermediate host is a mosquito, the *Stegomyia fasciata*, and

by preventive measures, such as the draining of the stagnant pools where the mosquitoes breed, and the extensive use of mosquito nets, the spread of the disease has been controlled in districts where it was formerly endemic.

PLAGUE is caused by a short, oval bacillus with rounded ends, and when stained for microscopical examination a broad, clear, unstained band is left in the middle. In the body the bacilli are present in the lymph glands, the blood, and the spleen, and in the pneumonic form, in the lungs and sputum. It is found in the fæces and urine, which must therefore be carefully disinfected in cases of plague. Infection is carried by three different species of fleas living on two species of rat, and when an infected rat dies the fleas leave it for human beings, who thus become infected. Haffkine has produced a vaccine, of a type similar to his cholera vaccine, for the treatment of plague from cultures of the bacillus, which is of great value in preventing or diminishing the virulence of attacks. In individuals already attacked it has no effect, and in such cases the serum obtained by Yersin by inoculation of plague in a horse is employed with much success.

TUBERCULOSIS is due to a micro-organism which is a delicate rod, generally very slightly curved, and, when stained, shows clear spaces alternating with deeply stained masses in its substance. It may be found in the body, in the lungs and sputum, in lymph spaces and lymph glands, in tuberculous ulcers in the intestine, in the skin (in lupus), and in tuberculous nodules in all parts of the body. Koch, the discoverer of the bacillus, prepared from cultures a product termed tuberculin, which at first failed to produce the therapeutic effects expected of it, although, by the researches of Sir Almroth Wright regarding the opsonic index, a more exact knowledge of the factors affected has enabled more successful results to be obtained. In regard to diagnosis, however, tuberculin has been of great value, producing a characteristic reaction when administered by injection, or by treating the skin as in vaccination against small-pox, and applying the tuberculin in the same manner as calf lymph; a third method is to drop a weak solution into the conjunctival sac of the eye, producing a characteristic conjunctivitis.

LEPROSY is due to a bacillus which is very like the tubercle bacillus, but differs from it in being shorter and in having somewhat different staining properties. The bacilli are found in the body in a gelatinous substance in the lymphatics of the skin, or, in another form, they may affect the nerves.

A. (3) ACTINOMYCOSIS is due to a fungus, which is a streptothrix, found in long threads, or, under certain conditions, assuming a club-like form through the swelling of the sheath of the thread. It may affect any of the organs of the abdomen or thorax, cavities containing a purulent mass being formed.

MADURA FOOT is a tropical disease, occurring in India, due to a streptothrix, resembling that of actinomycosis.

B. (1) MALARIA is a disease which assumes various forms, due to various species of a protozoal parasite, the differences being chiefly in the arrangement of the pigment in the protozoon. Infection is carried by certain mosquitoes of the genus Anopheles, and the disease is now efficiently controlled by draining the swampy breeding-grounds of the mosquitoes, or, where this is impossible, by pouring kerosene on the surface of the pools, and by making the banks of streams clean and well built up.

DYSENTERY is caused by an amœba, the *Amœba histolytica*, which is a minute rounded globule of protoplasm, in which a distinct nucleus can be made out, and found, in the body, in the intestinal lesions, and, where abscesses occur, in the liver and lungs.

SYPHILIS is an infective disease, due to a specific organism, the *Spirochæta pallida*.

Those diseases in which investigators have found an organism, without yet having sufficient data to declare it the cause of the disease, include *hydrophobia* and *scarlet fever*; while the diseases which appear, from a greater or less accumulation of evidence, and from analogy, to be infectious, but which have not been proved to be due to micro-organisms, include *smallpox, typhus fever, measles, mumps, whooping-cough*.

See BACTERIOLOGY, PROTOZOA, and separate articles on diseases mentioned.

PARASITISM, a type of interrelationship between plants or between animals, in which one of a pair nourishes itself at the expense of the other. The term has sometimes been used to designate such associations as that of the 'Parasitic' Sea Anemone with a Hermit Crab, but this mutually friendly relationship of messmates is better known as *Commensalism*.

There are several more or less perfect types of true p., however, varying from the temporary association of some external parasites, such as Fish-Lice—the Copepod Crustacean *Argulus*—which attach themselves to the skin of freshwater fishes and suck their juices, or leave them and swim freely in the water at will, to the complete p. of internal parasites such as Tapeworms and Liverflukes, the adults of which can exist and feed only in the body of their hosts. Some parasites, again, pass their complete life-cycle in the same host, while others pass through a series of hosts at different stages, sometimes with the intervention of non-parasitic periods—thus the Fluke which causes liver-rot in Sheep passes from them to water, hence to a Water Snail, from it to grass, and so to Sheep again. Other non-parasitic animals may have parasitic stages—the larvæ (*glochidia*) of some Bivalve Molluscs are temporarily parasitic in the gills of Sticklebacks.

Amongst animals, both external and internal parasites frequently possess hooks or suckers for attachment, and almost all parasites, plant and animal alike, exhibit traces of degeneracy from their nearest free-living relatives—many internal animal parasites losing eyes, mouth, digestive organs, etc., and indeed becoming little more than a sac which absorbs the juices ready prepared by the unfortunate host.

PARASNATH (23° 58′ N., 86° 11′ E.), hill, Chota Nagpur Division, Bihar and Orissa, India; place of Jain pilgrimage.

PARAY-LE-MONIAL (46° 27′ N., 4° 9′ E.), town, Saône-et-Loire, France; place of pilgrimage. Pop. 4500.

PARCÆ, Fates (*q.v.*).

PARCHIM (53° 26′ N., 11° 41′ E.), town, on Elde, Mecklenburg-Schwerin, Germany; paper-mills. Pop. (1910) 10,610.

PARCHMENT, a writing material of great antiquity made from the skins of animals. In Asia among the Persians and Jews skins were universally used, and therefore Varro is not justified in saying that p. was an invention of Eumenes II. of Pergamum on the prohibition by Ptolemy Epiphanes of the exportation of papyrus. In Rome p. was used chiefly for wills and notes, while papyrus was used for literary work. P. is chiefly made from sheep-skin; vellum, a finer kind, is made from calf-skin. See PALÆOGRAPHY.

PARD, see under CAT FAMILY.

PARDON is the prerogative of the Crown, only exercised upon the advice of the Home Sec., in Scotland of the Sec. for Scotland. It may be granted before or after trial and sentence. A free pardon from the Crown is given to release an innocent person from prison after a miscarriage of justice. The commutation of a death sentence to penal servitude is in form a pardon.

PARDUBITZ (50° 3′ N., 15° 46′ E.), town, on Elbe, Bohemia, Austria; sawmills, iron foundries. Pop. (1911) 20,394.

PARÉ, AMBROISE (1510–90), Fr. surgeon; apprenticed to a barber-surgeon and trained at Hôtel Dieu; served as army surgeon; introduced treatment of gunshot wounds by bandaging in place of cauterisation by boiling oil, and prevented hæmorrhage by ligaturing arteries; author of an *Anatomy* and other medical works.

PARENZO (45° 14′ N., 13° 37′ E.), port, Istria, Austria; seat of R.C. bishopric; has fine basilican cathedral, built VI. cent.; Rom. remains. Pop. (1911) 12,358.

PARGA (39° 16′ N., 20° 51′ E.), seaport, vilayet of Janina, Albania. Pop. 5000.

PARIAH, in Tamil, signifies 'outcast'; used of low-born Hindus; also used of mongrel curs which infest Eastern cities.

PARIAH DOGS, see DOG FAMILY.

PARIDÆ, TITS (*q.v.*).

PARINI, GIUSEPPE (1729–99), Ital. poet whose writings are characterised by strong moral tone; admirer of Alexander Pope; works include *Odi* and *Giorno*; wrote excellent blank verse.

PARIS (48° 50′ N., 2° 20′ E.), capital of France and of Seine department; largest city of continental Europe; beautifully situated on both sides of Seine; first-class fortress; important railway, river, road, and canal centre of France. P. claims to be the world's most intellectual and artistic city, and its magnificent architecture, handsome streets, statues, art treasures, educational institutions, romantic history, places of entertainment, cafés, restaurants, and unique atmosphere give the *Ville Lumière* an irresistible appeal to people of all nations.

The Seine divides the city into two regions, the Right and Left Banks—*Rive droite* and *Rive gauche*—and is crossed by 32 bridges—notably Pont Neuf (1578), Pont de Notre Dame, Pont d'Jéna, Pont d'Austerlitz, Pont de la Concorde, and Pont Alexandre III. (1896–1900). The heart of P. is the Île de la Cité, in midstream, with famous Gothic cathedral, Notre Dame (begun XII. cent.; two fine square towers, 218 ft. high, and central spire, 300 ft.; beautiful stained glass); here Napoleon was crowned Emperor by Pope, 1804; the Palais de Justice and exquisite Sainte-Chapelle (XIV. cent.); Hôtel-Dieu; Prefecture of Police. Paris proper is encircled by a wall (obsolete *Fortifications*), the Ceinture Railway, and an outer ring of spacious boulevards. The Boulevard St. Michel, continued by Boulevard de Sébastopol, crosses P. from S. to N.; this main artery is intersected at right angles by Boulevard Montparnasse, Boulevard St. Germain, Rue de Rivoli, and the Grands Boulevards-Bonnenouvelle and St. Martin, and other leading thoroughfares. P. is comparatively flat with exception of hill of Montmartre, with Sacré-Cœur and quaint artists' quarters, with cabarets, etc.

On right bank are many handsome squares, including Place de la Concorde at entrance to Champs Elysées, with famous obelisk of Luxor (73 ft. high) in centre, where Louis XVI., Charlotte Corday, Marie Antoinette, Robespierre, and many other notabilities were guillotined; Place du Carrousel, surrounded on three sides by Louvre, with Arc de Triomphe on west forming entrance to Tuileries; Place Vendôme, with Napoleon column of victory; Place de l'Étoile, with beautiful Arc de Triomphe (1806–36), 162 ft. high, 137 ft. broad, covered with fine reliefs; 12 avenues radiate from this magnificent square including the Champs Elysées, the most fashionable promenade of Paris, with President's residence—L'Élysée; Place de la Bastille, with Colonne de Juillet; other fine squares are Place de la Nation, Place de l'Opéra, Place de l'Hôtel de Ville, Place de la République, etc. On left bank is the large Champs de Mars, with Eiffel Tower, 984 ft. high.

Outstanding features on right bank of Seine are Palais du Louvre, extending about ½ mile along the river (built as fortress, 1204; rebuilt, XVI. cent. onward), with world-famous art collections—left wing contains the Treasury; Palace of the Tuileries (begun, 1564; burnt down by Communards, 1871), with fine Jardin des Tuileries; Palais Royal, built by Richelieu, now containing shops and offices; the churches St. Germain l'Auxerrois (XII.–XVI. cent's), St. Eustache (XVI. cent.), St. Gervais (XVI. cent.), La Madeleine (1806–24), in Corinthian style, with 62 columns; Hôtel de Ville (municipal headquarters); Conservatoire des Arts et Metiers; the old Tour St. Jacques; Musée Carnavalet (historical museum); Port St. Denis and Port St. Martin; Halles Centrales (markets); Bourse, Bibliothèque Nationale, Grand Opéra (1861); Opéra Comique, Théâtre Français; Conservatoire of Music; Petit Palais and Grand Palais (exhibition buildings); Trocadéro (1878, in Oriental style), with museums of sculpture and ethnography; Parc Monceau.

On left bank opposite the Île de la Cité is the *Latin quarter*, with Sorbonne (univ., founded 1253), Collège de France, École de Médecine, École des Beaux Arts, and other educational institutions; Musée de Cluny, with collection of antiquities; Panthéon (1764), with fine frescoes and tombs of Voltaire, Victor Hugo, Rousseau, etc.; Luxembourg (1612–20), which includes the Palace of the Senate, a fine modern art gallery and beautiful gardens; Odéon (theatre); St. Sulpice (XVI. cent.), St. Germain-des-prés (1163), Hôtel des Monnaies (Mint), Palais de l'Institut, Palais Bourbon; Hôtel des Invalides, with tomb of Napoleon I.; Jardin des Plantes, with fine botanical and zoological gardens; Salpêtrière (famous hospital).

Chief cemeteries are Père Lachaise, Montmartre, Montparnasse. P. has interesting catacombs and remarkable sewers. Round P. lie beautiful wooded slopes, with suburbs of Versailles, St. Cloud, Meudon, Sèvres, Saint-Denis, Montreuil, Vincennes, etc.; and the famous Bois de Boulogne, with Jardin d'Acclimatation and Longchamp (racecourse), and Bois de Vincennes.

History.—In earliest times P. was known as *Lutetia*; capital of the Gallic tribe *Parisii*, on Île de la Cité. Under Roman rule Lutetia became a prominent town. Christianity was established in III. cent.; in IV. cent. it took the names of Parisia or Paris. In 451 St. Geneviève preserved P. from Huns. Clovis made P. the capital of his realm, 508; P., attacked by Northmen, IX. cent., became residence of Hugh Capet and permanent capital of France, 987; during reign of Philippe Auguste (1180–1223) Notre Dame was begun, castle of the Louvre built, univ. founded, and city surrounded by strong wall; Revolution, 1358, under Étienne Marcel, famous provost of the city. Charles V. (1337–80) erected Bastille; revolt of the *Maillotins*, 1382; between 1412–18 the government was alternately held by Burgundian party (known as Cabochiens) and Armagnacs; in 1420 Crown of France passed to England, and P. was held by English until 1436; unsuccessfully besieged by Joan of Arc, 1429; massacre of St. Bartholomew, 1572; besieged by Henry IV., 1594. Louis XVI., Louis XV., and Louis XVI. did much to beautify Paris, which became the centre of European civilisation. P. was chief scene of Fr. Revolution, 1789; Bastille stormed, July 14; Allies entered P., 1814; Napoleon I. resigned, and First Treaty of P. signed, followed by Second Treaty of P., 1815; fresh Revolutions, 1830, 1848. Peace of P., 1856, ended Crimean War. During reign of Napoleon III. P. was richly adorned by avenues, squares, and handsome buildings; besieged by Germans, Sept. 19, 1870; capitulated, Jan. 28, 1871. During Commune, 1871, numerous fine buildings were destroyed; great fire in Opéra Comique, 1887; Treaty of P., 1898, ended Spanish-American War; International Exhibitions, 1855, 1867, 1878, 1889, 1900; disastrous flood, 1910.

For administrative purposes P. is divided into 20 arrondissements, each comprising 4 quarters; each quarter is represented by one member in Conseil-Municipal and Conseil-Général of department of Seine; mayoral functions are shared by Prefect of Seine and Prefect of Police. P. has an extensive system of communications—suburban circular railway, underground electric railways (*Métropolitain*), motor-buses, cabs, etc.; numerous steamboats on Seine. Principal industries are ladies' clothes, hats, boots and shoes, furniture, jewellery, bronzes, mirrors, clocks, watches,

decorative articles, scientific instruments, book-publishing, objets-d'art. Pop. (1901) 2,714,068; (1911) 2,881,110.

Belloc, *Paris* (1900); Baedeker, *Paris* (1907).

PARIS.—(1) (33° 35′ N., 95° 32′ W.) city, Texas, U.S.A.; cotton industries. Pop. (1910) 11,269. (2) (39° 38′ N., 87° 45′ W.) city, Illinois, U.S.A.; flour-mills. Pop. (1910) 7664.

PARIS (classical myth.), son of Priam of Troy; awarded prize of beauty to Aphrodite, thereby offending Hera and Athene; stole Helen from Menelaus, causing Trojan War; killed Achilles by treachery.

PARIS BORDONE, see BORDONE.

PARIS, BRUNO PAULIN GASTON (1839–1903), Fr. scholar; apostle of Romantic school; his researches in Mediæval Fr. lit. were epoch-making.

PARIS, LOUIS PHILIPPE ALBERT D'ORLÉANS, COMTE DE (1838–94), grandson of King Louis Philippe, and, in 1842, heir-apparent; abandoned claim, 1873, to Comte de Chambord, who d. 1883; lived and wrote a good deal in England. See ORLEANISTS.

PARIS, PLASTER OF, see GYPSUM.

PARIS, TREATIES OF (1814–15).—(1) May 30, 1814; Talleyrand, on behalf of Louis XVIII., agreed to restore Fr. conquests made since 1791; Ger. empire was abolished, Belgium and Holland united, Italy parted asunder, Swiss independence guaranteed. (2) Nov. 20, 1815, more harsh towards France, because of the Hundred Days; territory to be that of 1789, war contribution of 700,000,000 francs to be levied, and garrisons of 150,000 men maintained on frontiers for 5 years. See FRANCE (HISTORY).

PARISH (Gk. *paroikia*), at first a district presided over by a bp.; after about 400 A.D. generally used as now of a smaller district with one priest. In England a parish consists of one or sometimes (especially in the north of England) of several townships. In its non-ecclesiastical sense a parish is a district capable of levying a poor rate; it may be coterminous with, or a portion of, an ecclesiastical parish. The Local Government Act of 1894 set up parish councils, and thus the parish got back something of its old position.

PARK, EDWARDS AMASA (1808–1900), Congregationalist divine in U.S.A.

PARK, MUNGO (1771–1806), Scot. African explorer; sent by African Association to explore valley of Niger, 1795; carried out two years' often solitary exploration; first modern European to reach the Niger, 1796; delayed by illness and imprisonment and believed to be dead; returned, 1799, and wrote famous *Travels*, model in this kind of writing; sent out by Government, 1805; slain with all his men; fate not known till 1812.

Joseph Thomson, *Mungo Park and the Niger* (1890).

PARKER, JOSEPH (1830–1902), Congregationalist minister; founder of City Temple.

PARKER, LOUIS N., see under PAGEANT.

PARKER, MATTHEW (1504–75), abp. of Canterbury; chaplain to Anne Boleyn, 1535; influenced by Ger. Reformation, P. was consecrated abp., 1559; on the validity of his consecration depends that of Anglican orders; P. was Elizabeth's chief tool in carrying out the new Anglican *via media*; helped to draw up the Thirty-nine Articles; made a valuable MS. collection now in Corpus Christi Coll., Cambridge.

PARKER, SAMUEL (1640–88), bp. of Oxford, 1686.

PARKER, SIR GILBERT (1862–), Brit. politician and novelist; b. Canada, and achieved fame by fine Canadian stories.

PARKER, SIR HYDE, Bart. (succ., 1782) (1714–82), Brit. vice-admiral; fought in Seven Years and Amer. Wars. His s., the admiral SIR HYDE PARKER (1739–1807), commanded Baltic fleet, 1801, and vainly gave signal for Nelson to retreat at *Copenhagen*.

PARKER, THEODORE (1810–60), Amer. Unitarian divine; ed. Harvard; became minister, 1837; though by no means destructive he took a more liberal line than others of his denomination, and was suspected; P. wrote largely on religion and other subjects; a vigorous anti-slavery worker and social reformer.

PARKERSBURG (39° 15′ N., 81° 30′ W.), ity, on Ohio, W. Virginia, U.S.A.; oil refineries. Pop. (1910) 17,842.

PARKES, SIR HARRY SMITH (1828–85), Brit. diplomatist; consul to China, 1856; one of three commissioners placed in control of Chin. government, 1858; imprisoned at Peking, 1860; consul at Shanghai; minister to Japan, 1865–82; supported westernising party; minister to China, 1882–85.

PARKINSON'S DISEASE, see PARALYSIS.

PARKMAN, FRANCIS (1823–93), Amer. historian; s. of well-known Unitarian minister, and nephew of distinguished physician; impaired health by residence among Indians of Rocky Mountains, which he explored; studied Fr. archives; prof. of Horticulture at Harvard, 1871–72; completed *France and England in North America*, 1892, chief work, in several vol's with different headings; combined popular style with accurate research, knowledge of Indian tribes, and impartial judgment.

PARLA KIMEDI (18° 47′ N., 84° 8′ E.), town, Ganjam, Madras, India. Pop. 18,000.

PARLEMENT (Fr. *parler*, to speak), Fr. court of justice abolished, 1790; name never applied in Fr. history to entire national gathering, but used in early times for privy council, *curia regis*, of which functions were primarily judicial; at first followed king, but was established in Paris by Philip IV. (1285–1314); composed of *chambre des requêtes*, *chambre des enquêtes*, and *grande chambre*, relic of older gathering, in which peers had right of sitting. Similar p's arose in provinces and often withstood tyranny of king, retaining right of registering national law before it came into force locally, and of 'remonstrance' if law infringed on local liberties; hence, king's *lettres de cachet* or personal appearance in *lit de justice* to enforce registration.

PARLEY, PETER, see GOODRICH, SAMUEL G.

PARLIAMENT, name of Brit. legislative assembly, composed of king, House of Lords, and House of Commons. Name P. came into use in XIII. cent. (*parlement* occurs, 1275); it developed out of Anglo-Saxon *witenagemot* and feudal court of Norman and Angevin kings, and was thus composed of the dignitaries who sat by virtue of their offices in the earlier assembly, and the barons who sat by virtue of their land tenancy in the later court. In neither did popular element or principle of representation appear. It was summoned at pleasure of ruler, usually in late Saxon times, and under the Conqueror at the three great festivals—Christmas, Easter, and Whitsuntide.

The council after the Conquest had little power beyond advice, though instances of resistance, like Becket's, are forthcoming. Magna Carta (1215) gave it control of taxation. It was frequently summoned during XIII. cent., when it acquired power of browbeating Crown and first received representative element. Henry III. and Edward I. both aquiesced in maxim that what touches all must be approved by all. Two knights for each shire were summoned to P., 1254, to be elected by lesser barons, and again in 1265, but these were not full P's, hence P. of Westminster, 1295, in which representatives of shires again sat, is called the *Model Parliament*. When writs for P. are not issued to all claimants (by Magna Carta) the P. is not considered full. In this Model P. sat the abp's and bp's, three heads of religious orders, 53 abbots and priors, 11 earls, 53 barons, the chief-justice, clerks, etc., representatives of lower clergy, two knights from every shire, and two burgesses from selected boroughs, with full powers to act for shires and boroughs. These representatives, it used to be thought, merely assisted in assessment of taxation; now it is agreed that they may have served as witnesses in settling numerous petitions of the time to the king in council for redress of legal grievances.

The House of Lords had always remained court of justice for trying peers (according to provisions of Magna Carta), but otherwise P. lost its judicial functions

in XIV. cent. The Commons appear in separate house in early XIV. cent., while lower clergy successfully resisted summons to appear, and were moreover represented by lower house of Convocation. Summons to P., for long merely a burden to Commons, became at this time a hereditary privilege of barons. Knights of shire were at first of knightly rank, but ultimately acquired this title as representatives of shire. The electorate, after law of 1430, was composed of freeholders of 40s. or above; in towns only burgesses were enfranchised. The *Speaker*, who was always chosen from knights, was already an institution by 1376.

The commencement of parliamentary initiative in legislation is seen in petitions of XIII. and XIV. cent's; power enormously increased by deposition of Richard II., but the baronage who led it showed themselves unfit to rule and became insignificant under Tudors. Henry VIII. made P. instrument of his despotic will, but at same time his constant use of it from 1529 was of constitutional importance. Ecclesiastical element was lessened by elimination of abbots and priors. Democratic influence of Calvinism may be seen in outbursts of independence of Commons in last years of Elizabeth's reign. *Petition of Right*, 1628, set forth political claims of Eng. people as opposed to Crown. House of Lords, abolished by Commonwealth, was restored, 1657, though bp's were not restored till 1661. Restoration meant no retrogression for P., while Commons won sole control of money bills, 1671 and 1678. *Bill of Rights*, 1688, made P. supreme in government; strife henceforth was between Whig and Tory, Liberal and Conservative parties; attitude of Commons, now chief power, to lords, as become *Mend or End.*

Acts of Union with Scotland (1707) and Ireland (1800) provided respectively for merging Scot. and Irish P's in P. of U.K. By *Triennial* Act, 1694, new P. must be summoned within three years of dissolution of old one, but necessities of government ensure its yearly sitting, and new P. is always summoned by proclamation dissolving old. Crown issues proclamation under Great Seal, by advice of Privy Council, to Chancellors of Great Britain and Ireland, ordering issue of writs of summons. Scot. peers are not summoned by individual writs, and only appear by 16 elected representatives. Repeated neglect of right to vote for Scot. representative peer entails loss of elector's peerage. A duly elected member of P. cannot resign (by resolution of House, 1623), but has means of escape from his position by obtaining *Chiltern Hundreds.* Sovereign has prerogative of opening P. at commencement of session, and sometimes does so by commission. Speaker of House of Commons is then elected and oaths of allegiance taken by all Lords and Commons; Commons then summoned to Upper House to hear *King's Speech*; both houses make formal declaration of their constitutional independence, and then draw up replies to King's Speech.

Legislation may be initiated in either House, though House of Lords does not introduce or amend money bills (bills of attainder and reversals of attainder were generally dealt with first by the Lords); judges of High Court of Justice attend to assist decisions of Lords when summoned. Bills, which replaced *petitions* in time of Henry VI., take the form of *Act of P.* (*q.v.*); after passing both Houses (which communicate with each other by messages), they receive king's assent generally by commission and become Acts of P.; royal prerogative of refusing assent not used since 1707; form of refusal is that the sovereign '*s'avisera.*'

In 1911 the Brit. Government passed the Parliament Act. Its chief enactments were: (1) Lords lost power of rejecting or amending a money bill; (2) the Speaker of the Commons decides what is or is not a money bill; (3) any bill, other than a money bill, passed by Commons in 3 successive sessions and rejected by Lords in those sessions becomes law if 2 years have elapsed between the second reading in the first Commons session and the final passing in third Commons session; (4) duration of Parliament is changed from 7 to 5 years.

Members of the Commons received payment for expenses in mediæval times like any other subjects employed on the king's business, the expenses being assessed on the locality from which they were summoned; in fact, the town was called on to furnish a member of P. as the port was called on to furnish a warship. This payment was automatically abolished in the XVIII. cent. (when members bribed the electors to return them), and never resumed until 1906, when funds were appropriated by Government for payment of £400 yearly to each member. In the Brit. Colonies, U.S., and most countries with constitutional government, members of both chambers receive salaries. Fr. members all obtain £600 yearly.

PARMA (44° 48′ N., 10° 19′ E.), town, on Parma, northern Italy; capital of province P., with cathedral (began 1059), Baptistery (XII. cent.), San Giovanni Evangelista (with frescoes by Correggio), Madonna della Steccata, Palazzo della Pilota (containing fine picture-gallery with works by Correggio, Tintoretto, Tiepolo, and others), Palazzo Municipale, univ. (1512). P. flourished under Romans, and rose to great importance during Middle Ages; home of Correggio. P. was once famed for woollen manufactures; chief industries, silks, iron-ware, pianos, tobacco. Pop. (1911) 51,919.

PARMENIDES, see Eleatic School.

PARMIGIANO (1504–40), celebrated painter of Lombard school, whose real name was Girolama Francesco Maria Mazzola. He worked at first in Rome, where he painted *The Vision of St. Jerome*, now in National Gallery, London; then in Bologna, where he executed a notable altarpiece, *The Madonna and Child*; and finally in his native Parma. *Cupid shaping a Bow* is his best-known picture.

PARNAHYBA (2° 58′ S., 41° 38′ W.), seaport, on Parnahyba, Piauhy, Brazil; exports hides. Pop. 10,500.

PARNASSUS, modern Liakoura (38° 31′ N., 28° 37′ E.), mountain-ridge, Greece; sacred to Apollo and the Muses.

PARNASSUS PLAYS, three entertainments performed at St. John's Coll., Cambridge, between 1597 and 1603. The plays record the adventures of two students, Philomusus and Studioso, and reveal satirically the small respect paid to learning at the time. Their chief value lies in their allusions to Shakespeare and his contemporaries.

PARNELL, CHARLES STEWART (1846–91), Irish politician; s. of John Henry P. of Avondale, County Wicklow; ed. at Magdalene Coll., Cambridge; M.P. for County Meath, 1875–80; at once commenced policy of opposition to England; in first speech in Parliament advocated Home Rule and preached Irish nationality; afterwards attacked Sir Michael Hicks Beach for using expression, 'Manchester murderers,' of Fenians; joined Amnesty Association (for obtaining release of Fenians), 1876; in 1877 he developed Irish plan of parliamentary obstruction, causing record sitting of Parliament, July 31 to August 1; sought to win over Fenians and establish united Irish party; this union was largely brought about by agrarian distress; 'Ireland for the Irish' became general gospel of revolutionists; National Land League was founded, 1879, of which P. became pres. He visited America to win support of Amer. Fenians, and obtain funds for League, 1880; represented Cork, 1880–91; chairman of nationalists in House of Commons, 1880; founded *The Irish National Newspaper and Publishing Company*, and reissued *The Flag of Ireland* as *United Ireland*, 1881; imprisoned, 1881–82, for speeches at League Convention in Dublin; acclaimed by his party as 'the uncrowned king of Ireland.' England began to see need of temporising, but better feeling was killed by Phœnix Park murders; P.'s condemnation of the crime threatened him with loss of influence over party; he refounded Land League as *Irish National League*, 1883; Fenianism continued, and

revolutionary crimes were repeated; attempts to blow up Tower of London and Houses of Parliament, 1885. P. was bitterly attacked, but refused responsibility, and continued policy of obstruction; chairman of Irish parliamentary party, 1886, when Gladstone declared for Home Rule; the Bill of 1886 failed, but resulted in alliance of Irish nationalists with Liberal party; P. had to face, in 1887, charge of having sympathised with Phœnix Park murders; a forged letter, by Richard Pigott, was pub. in *Times* under heading 'Parnellism and Crime.' In 1891 he m. Mrs. O'Shea, divorced from Captain O'Shea, 1890, on ground of her adultery with P. The Irish parliamentary party re-elected P. chairman, but Gladstone's letter to Morley, stating that P. must resign, altered matters. The Committee met, and P. refused a motion for his own deposition; 45 members (the Anti-Parnellites) retired, and in another room decreed his resignation; the minority of 26 (the Parnellites) stood by him. A great leader, to whom patriotism seems to have been sufficient moral code.

Life, by T. P. O'Connor (1891), Walsh (1892), E. M. Dickinson (P.'s sister) (1896).

PARNELL, THOMAS (1679–1718), Eng. minor poet. Goldsmith wrote his life, and Pope published a selection of his poems in 1719.

PARNON, modern MALEVOU (37° 10′ N., 22° 38′ E.), mountain-ridge, Greece, E. of Laconia.

PARODY, imitation, generally humorous, of another's writing; famous Eng. p's include works of Horace and James Smith, Hookham Frere, Calverley, Owen Seaman. See also BURLESQUE.

PAROPAMISUS (34° 40′ N., 67° E.), mountain range, W. of Hindu-Kush, India.

PAROS, PARO (37° 2′ N., 25° 11′ E.), Gk. island, in Cyclades (*q.v.*) group, Ægean Sea; separated from Naxos by narrow channel; length, 13 miles; breadth, 10 miles; area, 96 sq. miles; dominated by Mount Elias, 2500 ft. (ancient Marpessus); capital, Parikia, on N.W. coast; Naoussa Bay (safe harbour) on N.; famous white Parian marble quarries worked from VI. cent. B.C. onwards. Pop. 9000.

PARR, see under SALMON FAMILY.

PARR, SAMUEL (1747–1825), Eng. schoolmaster; pub. an edition of Bellenden, with a celebrated preface; his works, issued in 1828, filled eight huge volumes.

PARRAMATTA, see PARAMATTA.

PARROT TRIBE (order PSITTACIFORMES), an order of brilliantly coloured birds, containing almost 600 species, with large, strongly curved beak, fleshy tongue, and feet in which the first and fourth toes turn backwards, the second and third forwards. They are arboreal, feed mainly on fruits and seeds, live in companies, but pair in couples. The NESTOR PARROTS (*Nestor*), found only in New Zealand and neighbouring islands, include the KEA, which has gained an unenviable reputation on account of its habit of tearing open the backs of sheep in order to gorge upon the kidneys. The LORIES and LORIQUETS (*Loriidæ*) have brush-tipped tongues, and are confined to Australia and islands near it. In COCKATOOS (*Cocatuidæ*) the tongue is simple, and the head is crowned by a crest of feathers; whereas the TRUE PARROTS have a smooth tongue, have no crest, and often have a metallic green colouring in their plumage. True Parrots, of which there are about 440 species, are found in both Old and New Worlds. Familiar examples are the GRASS PARAKEET of Australia (*Melopsittacus*); the GREY PARROT of Africa (*Psittacus erithacus*), the most imitative, and best talker; the beautiful nimble Amer. LOVE-BIRDS or PARAKEETS (*Psittacula*); the most showy of Parrots, the large, long-tailed MACAWS (*Ara* and *Anodorhynchus*) of South Amer. forests, brilliant in coats of scarlet, blue, green, and yellow; and the peculiar winged, but flightless, nocturnal OWL PARROT (*Stringops*) of New Zealand.

PARROT-FISHES (*Scaridæ*), Wrasse-like fishes with teeth fused into a kind of beak, whence the name; mostly tropical.

PARRY, SIR CHARLES HUBERT HASTINGS, Bart. (1848–), Eng. composer; app. director of Royal Coll. of Music, 1894; knighted, 1898; composed *Prometheus Unbound*, *The Lotus Eaters*; also symphonies, chamber music, concertos, etc.; author of *Style in Musical Art* (1912).

PARRY, SIR WILLIAM EDWARD (1790–1855), Eng. explorer, admiral, and author; commanded *Alexander* in Capt. Ross's Arctic expedition, 1818; led famous expedition by which direction of North-West Passage was discovered, 1819.

PARSEES, a people originally in Persia, occupying the province of Farsitan (Farsees = Parsees = Persians), c. 558 B.C. Their religion was Zoroastrian and dualistic. Ormuzd, the 'Lord Wisdom,' the god of the sky, whose symbol is the sun, or fire, or light, is the creator, and against him Ahriman, the prince of darkness, wages war. In the VII. cent. A.D. the P's were practically exterminated by the Muhammadan invaders, save those who migrated to India, and whose descendants still live in the Bombay Province. They are now a rich merchant class, responsive to Brit. influence, and aloof from the Indians around them, preserving their race and religion intact.

PARSIMONY, LAW OF, nominalist maxim that it is bad scientific method to attempt to explain the same facts by independent hypotheses.

PARSLEY (*Petroselinum*), genus of plants, order Umbelliferæ; Common P. (*P. sativum*) is a familiar garden plant; seeds are sown in April.

PARSNIP (*Pastinaca*), genus of plants, order Umbelliferæ; Common P. (*P. sativa*) is cultivated for its root, which must not be cut before cooking; root of wild P. is not edible.

PARSONS (37° 20′ N., 95° 20′ W.), city, Kansas, U.S.A.; cars, machinery. Pop. (1910) 12,463.

PARSONS, FATHER ROBERT (1546–1610), Eng. Jesuit; entered Society of Jesus, 1575, and became a priest, 1578; with Edmund Campion went to England as missionary; forced to flee to the Continent, he there plotted against England and was mainly responsible for dispatch of Armada to England; rector of Eng. Coll. at Rome; wrote *Conference about the next Succession* (1594), to prove the Infanta of Spain Elizabeth's successor.

PARSONS, SIR WILLIAM (c. 1570–1650), 1st baronet (1620); nephew of Sir Geoffrey Fenton, whom he succ. as surveyor-general of Ireland, 1602; aided policy of colonisation; Lord Justice, 1640–48.

PARTABGARH (25° 34′ N., 81° 59′ E.), native state, Rajputana, India. Pop. (1911) 62,704. Capital, PARTABGARH. Pop. 10,000.

PARTHENAY (46° 39′ N., 0° 15′ W.), town, Deux-Sèvres, France; woollens. Pop. 7300.

PARTHENOGENESIS, see under REPRODUCTION.

PARTHENON, temple on Athenian Acropolis dedicated to Athena; dates from V. cent. B.C. (supplanting earlier temple); it became later a Christian church, then a mosque; famous for its sculptures, some of which were removed to England, 1821, among Elgin marbles. See ACROPOLIS, ATHENS.

PARTHIA, mountainous country S.E. of Caspian Sea; part of Realm of Seleucidæ, existing roughly between 250 B.C. and 220 A.D.; inhabited by an Iranian tribe; was a province of the Achæmenian and later Macedonian Empire; Gk. towns founded by Seleucus I. and Antiochus I.; capital, Hecatompylos (Hundred-gated). P. corresponds to modern Khorasan. Favourite tactics of Parthians was to retreat, and fire arrows in so doing—hence, a *Parthian shot* or *shaft*.

PARTICK (55° 53′ N., 4° 10′ W.), town, on Clyde, Lanarkshire, Scotland; shipbuilding yards; incorporated with Glasgow City, 1912. Pop. (1911) 66,848.

PARTINICO (38° 2′ N., 13° 7′ E.), town, Sicily; cotton and wool manufactures. Pop. 24,000.

PARTITION, division of land by its co-owners by authority of Court of Chancery. Recompense in the

form of pecuniary compensation must be made in the case where one party to the partition has laid out money on improvements of the estate, or where houses, forming part of the estate, cannot be divided.

PARTNERSHIP is defined by the Eng. Act of 1890 as 'the relation which subsists between persons carrying on a business in common with a view to profit.' Each of the partners must be competent to contract, and, therefore, if an infant enters into a contract of partnership, he is not responsible for the debts of the firm, and he may repudiate the partnership before or when he comes of age. A married woman can be a partner, but she cannot always be made a bankrupt with the rest of the firm. Barristers cannot make a professional partnership, though solicitors may and do. A private partnership cannot be formed of more than ten persons for banking, or twenty for any other business. If that number is exceeded, such persons can only carry on business together legally when registered as a company. A partnership may be at will, or it may be for a definite period. A *dormant* or *sleeping partner* is one who participates in the profits without taking any active share in the management, and without appearing before the world as a partner. Such a partner is, however, like any other, responsible for the debts of the firm. Every partner is an agent of the firm and of his other partners for the purpose of the business of the partnership, and his acts bind the firm and his partners, if they are performed within the usual course of the firm's business.

Lindley, *Treatise on the Law of P.* (7th ed., 1909); Sir J. Pollock, *Digest of the Law of P.*

PARTON, JAMES (1822–91), Amer. historian; wrote biographies of Franklin, Jefferson, Voltaire, etc.

PARTRIDGE, see under PHEASANT FAMILY.

PASADENA (34° 3′ N., 118° 5′ W.), city, California, U.S.A.; fruit industries. Pop. (1910) 30,291.

PASARGADÆ (30° 16′ N., 53° 26′ E.), former capital of Persia, said to have been founded by Cyrus after his defeat of Astyages; has been identified with ruins in plain of Murghab, near Persepolis.

PASCAL, BLAISE (1623–62), Fr. religious philosopher; b. at Clermont-Ferrand; at twelve years of age evolved, without books, first thirty-two propositions of Euclid; at sixteen wrote treatise on conic sections; invented several mechanisms; delicate, and after accident which brought him to death's door, retired to Port-Royal and embraced doctrines of Jansenists; wrote in their defence against the Jesuits the famous *Lettres Provinciales* (1656–57), supposed to be written by a man of the provinces to a Jesuit. First three letters defend Jansenists, rest attack Jesuits; novelty and literary merit is that they were in French, so that public—'even women'—might take part in controversy; they are in turn vehement, jovial, indignant, and disdainful. He wished to write an apology for Christian religion which would persuade the reader of its truth, and result was fragments which were collected as *Pensées*, another Fr. classic. His publishers thought fit to alter it for literary and religious reasons, but original text was *in extenso*, 1844; simple, graceful, dignified style.—*Life*, by Tulloch (1882), St. Cyres (1909).

PASCHAL I., pope, 817–24; crowned Emperor Lothair, with whom he made *Pactum Ludovicianum* (genuine but interpolated), 823; took part in iconoclastic controversy, vigorously upholding worship of relics.—**Paschal II.**, pope, 1099–1118; importance of his pontificate lies in continuation of investiture conflict, P. declining to give way.

PASCO, see CERRO DE PASCO.

PAS-DE-CALAIS (50° 35′ N., 2° 10′ E.), maritime department of N. France, formed out of Artois and Picardy; area, 2551 sq. miles; surface generally flat; capital, Arras; extensive coal-fields; agricultural products and varied manufactures. Pop. (1911) 1,068,155.

PASEWALK (53° 30′ N., 13° 59′ E.), town, Pomerania, Prussia; ironworks. Pop. (1910) 10,914.

PASIG (14° 30′ N., 121° E.), town, Luzon, Philippine Islands. Pop. 13,000.

PASLEY, SIR CHARLES WILLIAM (1780–1861), Brit. general (1860) and engineer; served in Baltic campaign, 1801, and Peninsular War; author of books on art of war, and inventor of engineering reforms.

PASQUIER, ÉTIENNE DENIS, DUKE (1767–1862), Fr. lawyer and statesman; imprisoned as Moderate, 1794, but speedily released on close of Terror; won regard of Napoleon, and was able statesman under empire and restored monarchy.

PASSAGLIA, CARLO (1812–87), Ital. ecclesiastic, supported doctrine of Immaculate Conception of Virgin, but wrote against temporal power of pope; excommunicated; recanted before his death.

PASSAIC (40° 50′ N., 74° 7′ W.), city, Passaic County, New Jersey, U.S.A., on Passaic; woollen and rubber goods. Pop. (1910) 54,773.

PASSAU (48° 34′ N., 13° 28′ W.), town, Bavaria, Germany; has large trade in timber, graphite, iron, grain, salt; seat of bishopric; has XVII.-cent. cathedral. Treaty of P. (1552) ensured religious liberty. Pop. (1910) 20,984.

PASSER, sparrow; see under FINCH FAMILY.

PASSION PLAY, stage performance representing the last scenes of Christ's life. See OBERAMMERGAU.

PASSION WEEK commences on Passion Sunday, a fortnight before Easter; Lenten fast.

PASSION-FLOWER (*Passiflora*), a genus of tendrillar climbing plants characterised by peculiar pentamerous flowers, possessing elaborate corona with ovary at the apex; fruit, a berry.

PASSIONISTS, see PAUL OF THE CROSS, ST.

PASSOVER, a Jewish feast, observed in memory of the coming out of Egypt. The feast was instituted traditionally by Moses at the command of the Lord. A lamb was to be killed on the evening of the 14th of Nisan, and its blood sprinkled on the lintel and doorposts. It was to be roasted and eaten by the people, who were to be ready equipped for a journey. For a week afterwards only unleavened bread was to be eaten. The origin and exact meaning of the feast is still obscure, and the different documents which compose the Pentateuch show different versions of it. Probably a pastoral festival in which a lamb was sacrificed was combined with an agricultural feast which the Israelites may already have found in Canaan.

Jacobs, *Studies in Biblical Archæology.*

PASSPORT, document entitling foreigners to travel in country; still used in Russian Turkey, and in times of war as a precaution against espionage.

PASTES, see GEM (ARTIFICIAL GEMS).

PASTEUR, LOUIS (1822–95), Fr. chemist; studied crystallography, and showed the relation between optical activity and molecular asymmetry, thus laying the foundations of stereo-chemistry; best known for his work on micro-organisms; showed that alcoholic and acetic fermentation and putrefaction are caused by living organisms, and that when these are killed or excluded decay is prevented. Thus he opposed the idea of spontaneous generation, and introduced sterilisation.

Studies on wine, beer, and the silk-worm disease led to investigation of the cause and means of prevention and cure of virulent diseases (*e.g.* hydrophobia), to the germ theory of disease, and the principles of preventive medicine, of which the Pasteur Institute is the enduring memorial; *Life*, by Franklands (1898).

PASTO (1° 16′ N., 77° 20′ W.), city, Cauca, Colombia, at foot of P. volcano; woollens. Pop. 13,500.

PASTON LETTERS, collection of correspondence and miscellaneous papers of Paston family between 1422–1509; throw much light on contemporary history and law; sold by William Paston, Earl of Yarmouth; passed through several hands; purchased, 1774, and edited by John Fenn; original manuscripts presented to George III.; lost trace of; authenticity doubted till vindicated by Gairdner, 1865; rediscovered at various times between 1875–89; majority in Brit. Museum; see Gairdner's Edition of *Paston Letters* (latest edition), 1904.

PASTORAL EPISTLES, *i.e. 1* and *2 Timothy* and *Titus* (*qq.v.*).

PASTORAL LETTER, document written by bishop to his congregation; read by clergy from pulpit.

PASTORAL STAFF, a staff with the top curved to resemble a shepherd's crook, one of the symbols of the episcopal office; the bp. was given it when invested, and if deposed he gave it up; some mediæval pastoral staffs are of beautiful workmanship.

PASTURE, see under GRASS.

PATAGONIA (*c.* 48° S., 70° W.), name given to extensive region in S. of S. America, stretching from Rio Negro on N. to Straits of Magellan on S., and divided in two by Andes. Portion E. of Andes, recognised since 1881 as belonging to Argentine, consists of vast plateau region rising in succession of terraces occasionally crossed by valleys; these plains are covered mostly by shingle, stones, and rock, and are almost destitute of vegetation, except in some parts where coarse grass and bushes grow; in hollows lakes are frequent. Chief rivers are Rio Negro, Chubut, Chico, and Santa Cruz; most fertile and productive country to be found at base of Andes; large tracts devoted to rearing of horses and cattle. To W. of Andes is Chilean P., strip of rugged mountainous country with luxuriant forests. P. was discovered by Magellan in 1520, and explored by Gamboa and many others. Patagonians (now almost extinct) are very tall and uncivilised.

Skottsberg, *Wilds of Patagonia* (1911).

PATAN (27° 38′ N., 85° 17′ E.), town, Nepal, India. Pop. 31,000.

PATAN (22° 51′ N., 72° 10′ E.), town, Baroda, India, on Saraswati. Pop. 35,000.

PATARA (36° 12′ N., 39° 21′ E.), ancient city, Lycia; chief seat of the worship of Apollo.

PATAS MONKEY, see under CERCOPITHECIDÆ.

PATAVIUM (45° 23′ N., 11° 53′ E.), ancient town, Italy, on site of modern Padua; was an important trading centre under Romans; sacked by Attila, 452.

PATEL, FRAMJEE NASARWANJEE (1804–94), Parsee merchant and publicist; went into business in Bombay at fifteen, at fifty-four had established two houses with Eng. partners and made a fortune; pioneer of education, and helped to found the Elphinstone Institution; pres. of the Parsee Law Association, and largely responsible for the Parsee legislation of 1865 relating to marriage, divorce, and succession.

PATELLA, a Mollusc; see under GASTEROPODA.

PATEN, plate for the Eucharistic bread.

PATENTS.—A patent in the U.K. is a grant from the Crown by *letters patent* to the true and first inventor of some manner of new manufacture, conferring on him the sole right or monopoly of making, using, or selling it during the period for which the patent is granted. This prerogative of the Crown was settled by Act of Parliament (22 James I.) in the XVII. cent. In 1883 the control of such grants was transferred to the Board of Trade. By the Patents Acts, 1907 and 1908, a limited examination into the novelty of the invention claimed is to be made at the time when a complete specification is deposited. But this investigation does not in any way guarantee the validity of any patent. The legal validity of a patent and the question of the possible infringement of some existing patent can only be determined in a court of law. A patent is granted for fourteen years, and is maintained in force by payment of annual renewal fees after the end of the fourth year. A patentee may, however, before the expiration of his patent, present a petition to the king in Council praying for an extension of his patent, and if the Judicial Committee of the Privy Council report that the patentee has been inadequately remunerated by his patent, the term may be extended for a further period of seven, or, in exceptional cases, fourteen years.

The essentials of the subject-matter of a valid patent are that it shall be an invention, new, and useful. It may be something entirely new, as, for example, the telephone was, or it may be some new mechanical method of carrying out an old process. But novelty is essential, and if the invention has become known in this country by prior use or publication, even by the inventor himself, no patent can afterwards be granted—an exception being made where the prior use was in the nature of an experiment, or where the matter has been disclosed in confidence to assistants. Utility, though not necessarily commercial profit, is equally required for a valid patent. It must be shown that the purpose designed will be fulfilled by the patent. The first step in the application for a patent is to fill in a declaration, obtainable at any postal money-order office, and send it to the Patent Office with provisional or complete specifications. This latter specification must be filled in with great care, and a fee of £3 must be sent with it. A fee of £1 must also be paid for further investigation. Unless opposition is made within two months after the public advertising of the patent, the applicant duly receives his patent sealed with the seal of the Patent Office.

In U.S.A. an inventor pays 15 dollars on application, and 20 dollars on p's being granted; p's last for 17 years.

Edmunds, *Patents*; Frost, *Patent Law and Practice*; Cunynghame, *Patents*.

PATER, see PEMBROKE.

PATER, WALTER HORATIO (1839–94), Eng. author; b. in London. His prose is of the prose-poetry type, and includes the famous *Studies in the History of the Renaissance*, *Marius the Epicurean*, and *Appreciations*.

PATERNO (37° 32′ N., 14° 53′ E.), town, ancient *Hybla*, Catania, Sicily. Pop. 25,000.

PATERSON (40° 53′ N., 74° 12′ W.), city, capital of Passaic County, New Jersey, U.S.A.; founded *c.* 1792; manufacturing centre; has foundries and machine-shops; slaughtering and meat-packing carried on; manufactures include silk and jute. Pop. (1910) 125,600.

PATERSON, WILLIAM (1658–1719), founder of the Bank of England, and a director, 1694; s. of Dumfriesshire farmer; became important in the City of London as a member of the Merchant Taylors' Company; established the Darien colony, 1698, but could not prevent its failure; persuaded the Government to adopt scheme for consolidation and conversion of the National Debt, 1717; his financial proposals were embodied in Walpole's Sinking Fund; gave active assistance in Union of England and Scotland; see Barbour's *P. and the Darien Co.* (1907).

PATHOLOGY, the science which treats of the causes, nature, and results of diseases, generally divided into (a) *general pathology*, and (b) *special pathology*. General p. includes *inflammation*, or the series of phenonema arising in normal tissues from the action of a chemical or physical irritant, the most common being the action of bacteria, and *repair*, the process of restoration of damaged tissues; *degenerations* and *infiltrations*, the former being the retrograde conversion of the complex protoplasm of a cell into a simpler substance, *e.g.* fat or colloid material, and the latter being the deposition of a new substance, *e.g.* fat, in an otherwise unaltered cell; *necrosis*, cellular death in a part of the tissues, and *gangrene*, death of the tissues in mass; *pigmentation*, the abnormal deposition of colouring material in the tissues, usually in the cells; *atrophy*, abnormal decrease in the size and number or the size alone of the elements of a normal tissue, and *hypertrophy*, abnormal increase in the size of the elements of a normal tissue, the term *hyperplasia* being applied to increase in number; *malformations*, errors in development of various parts of the body, *e.g.* hare-lip, due to incomplete development of the upper jaw; *tumours*, abnormal local growths of new tissue, with no physiological function, which may be either *innocent*, i.e. resembling the tissue from which it

springs, restricted in growth, and only harmful through pressure, or *malignant*, of more or less embryonic nature, irregularly invading the surrounding tissues and with a tendency to reproduce itself in other parts of the body, eventually causing death; *granulomata*, including those chronic infective diseases with a characteristic lesion resembling granulation tissue, *i.e.* tuberculosis, syphilis, leprosy, glanders, actinomycosis; *diseases of the blood*, e.g. pernicious anæmia, leucocythæmia; *œdema* and *dropsy*, the former being the undue accumulation of lymph between the cells of a tissue, causing it to swell, and the latter the accumulation of lymph in one or other of the body cavities; *thrombosis* and *embolism*, the former being coagulation of the blood in a part of the circulatory system, and the latter the impaction of a body, usually part of a thrombus or clot, in a vessel too small to allow it to pass farther; *animal parasites* of the human body, tape-worms, thread-worms, fluke-worms, and protozoa; *bacteria* are not generally included under the heading of general p., but under the special heading of *bacteriology* (q.v.). Special p. includes the different manifestations of diseases in the various organs, the results of a particular disease or morbid condition being naturally more or less widely divergent in different tissues and organs.

The modern science of p. is founded upon the researches of Rudolf Virchow (1821–1902) and Sir James Paget (1814–99), the *Cellular Pathology* of the former being pub. in 1850, and the *Lectures on Surgical Pathology* of the latter, delivered during the six years preceding publication in 1853. With the introduction of improved methods of experiment and investigation the science made rapid strides in the last quarter of the XIX. cent., the discoveries of Koch, working on the lines initiated by Pasteur, of the bacillus of anthrax in 1876 and of tuberculosis in 1882, being perhaps the most notable and the most far-reaching in effect. At the present time considerable attention is being devoted by pathologists to investigation regarding the bacterial and parasitic origins of various diseases, —cancer, for instance, a subject engaging at present much patient and elaborate research, being attributed by some authorities, so far on insufficient grounds, to such causes, while the p. of the nervous system, including the localisation of function on the cortex of the brain and cerebellum, and the p. of the blood and blood-forming tissues, are also among the most important problems now being investigated.

See HEART, KIDNEYS, SPLEEN, and other organs; also such articles as RESPIRATORY SYSTEM, URINARY SYSTEM, PARASITIC DISEASES, BACTERIOLOGY.

PATIALA, PUTTALIA (30° 20′ N., 76° 25′ E.), native state, Punjab, India. Pop. (1911) 1,407,659. Capital, Patiala. Pop. 25,000.

PATIÑO, JOSÉ (1666–1736), Span. statesman; sec. of navy and Indies, 1726, and afterwards of finance; Minister of War, 1730; counteracting influence to misrule given by Philip V., Alberoni, and Ripperdá.

PATKUL, JOHANN REINHOLD (1660–1707), Livonian patriot; led Livonian opposition to Sweden; formed leagues of northern powers for partition of Sweden; delivered by Saxony to Sweden and broken on wheel.

PATMORE, COVENTRY KERSEY DIGHTON (1823–96), Eng. poet and critic; b. at Woodford, Essex; in 1847 he became a librarian at the Brit. Museum. His poetry is delicate, chaste, and melodious. The best of his works is *The Angel in the House*, consisting of the four parts—*The Betrothal, The Espousals, Faithful for Ever*, and *The Victories of Love*.

PATMOS (37° 20′ N., 26° 33′ E.), one of Sporades Islands, Ægean, belonging to Turkey; area, 20 sq. miles; here St. John lived in exile and, according to tradition, wrote Apocalypse; site of monastery of St. John. Pop. 4000.

PATNA (20° 30′ N., 83° E.), native state, Bihar and Orissa, India. Pop. 285,000.

PATNA (20° 35′ N., 83° 4′ E.), capital of Bihar and Orissa, India, on Ganges, stretching almost 9 miles along right bank; Gov. headquarters, college, and other educational institutions; famous for massacre of P. (1763) and Sepoy Mutiny (1857); important commercial centre; rice, opium, indigo, cotton, salt. Pop. (1911) 136,153.

PATON, SIR JOSEPH NOEL (1821–1901), Scot. painter; noted works are *Reconciliation of Oberon and Titania* and *Quarrel of Oberon and Titania* (both in Edinburgh National Gallery), and *The Pursuit of Pleasure*. Wrote two vol's of poems.

PATRAS (38° 14′ N., 21° 44′ E.), fortified town, W. Greece; Orthodox archiepiscopal see; has cathedral; exports large quantities of currants, also olives, olive oil, wine, etc. Pop. 37,724.

PATRICIAN (Lat. *patricius*).—(1) Rom. noble. Rom. *populus* was divided into *gentes* or clans, each descended from common ancestor; head of *gens* was also its father, *pater*; besides those so descended, the p's, the *gens* contained aliens named clients. Outside the *gentes* there was the *plebs*, without rights of citizenship, possibly composed of outlawed members of *gentes*; plebs was admitted to some civil rights before fall of monarchy and gradually won equality. (2) title conferred at will by Byzantine emperor; also given under late empire to provincial gov. (3) use retained in Ital. cities where title is applied to hereditary noble.

Nearly all Rom. citizens of the patrician class had their clients, who were of the working class, but were also citizens. The patron was the legal adviser, protector, and guardian of his client, both in public and private life. The client, if his patron were a poor man, subscribed money for the marriage portion of his patron's daughter, for ransom in the event of being taken prisoner, for law expenses. Neither could accuse or give evidence or vote against the other.

PATRICK, ST. (*c.* 387–461 A.D.), patron saint of Ireland; subject of many legends; b. probably in Glamorganshire, Wales; he was carried off to Ireland by pirates about 405; escaped after six years, and fled to Lérins in Gaul. He formed the idea of evangelising Ireland. In 432 he was consecrated and went to Ireland, where Christianity had already some footing. He preached vigorously, and to him the real conversion of Ireland is due. Scholars differ as to the credence to be given to the authorities for his work.

Bury, *Life of St. Patrick*.

PATRICK, SIMON (1626–1707), bp. of Chichester, 1689; dean of Peterborough, 1691.

PATRON AND CLIENT, see PATRICIAN.

PATTESON, JOHN COLERIDGE (1827–71), bp. of Melanesia, 1861; murdered by natives by mistake.

PATTI (38° 8′ N., 15° E.), seaport, Messina, Sicily, on Gulf of Patti. Pop. 5600.

PATTI, ADELINA, BARONESS CEDERSTRÖM (1843–), famous soprano; from 1861 played all chief Ital. operatic rôles.

PATTISON, MARK (1813–84), Eng. author; at Oxford came under influence of Newman, but abandoned Catholicism for agnosticism. His writings are numerous, and perhaps best known is *Milton*.

PAU (43° 18′ N., 0° 20′ W.), chief town, Basses-Pyrénées, France, on Gave-de-Pau; fine castle (XIV. cent.); former capital of province of Béarn; birthplace of General Bernadotte; winter health-resort; linen, chocolate, hams, Jurançon wine. Pop. (1911) 37,149.

PAUL I., PETROVICH (1754–1801), Tsar of Russia; unhappy youth and violent temperament led to tyranny and misery of his rule, though those who suffered from his temper believed him to have good disposition; hatred of republicanism led to his successful but exhausting war with France, 1798; upheld Napoleon after his overthrow of republic, 1799.

PAUL III., pope. See FARNESE.

PAUL V., pope. See BORGHESE.

PAUL OF SAMOSATA, patriarch of Antioch, *c.* 260–72; raised great storm by heresies, specially opposition to doctrine of Trinity; evolved doctrine that the

Son was 'consubstantial' with the Father; condemned and deposed by Council, 269, but Antioch supported him; expelled by decree of Ital. bp's, 272; 'Paulicians' (*q.v.*) or 'Samosatans' were long important.

PAUL OF THE CROSS, ST., Paolo della Croce (1694–1775), founder of Passionist Fathers ('of the Most Holy Cross and Passion'), which was fully sanctioned, 1737; canonised, 1867.

PAUL, THE APOSTLE, called by some the second founder of Christianity, was born of the tribe of Benjamin. His Jewish name was *Saul*. He was a citizen of the Rom. Empire, and lived in the midst of the later Gk. civilisation. These three elements in him, the Hebrew, the Greek, and the Roman, are fundamental for the understanding of his work and person. He spent his early life at Tarsus in Cilicia, and then under Gamaliel at Jerusalem. It is uncertain whether he had ever seen Jesus in the flesh, but he became the bitter persecutor of the Christians. The turning-point of his life was the vision on the road to Damascus. But P.'s mind must have been prepared for the coming change. It is impossible to account for it merely by excitement—or sunstroke, as some would have it.

Henceforth the former persecutor of the Church was to be its most passionate defender. He began his ministry in Damascus, and spent some years in Arabia. He visited Jerusalem and became acquainted with St. Peter. His work was then carried on mostly around Antioch. (The exact dates of the various events in P.'s life are uncertain, and in some points, particularly as regards his writings, the order is uncertain too. The general chronological sequence of events is, however, known.) About 44 A.D. he was again in Jerusalem to confer with the elders, and about 47 set out on his first missionary journey, accompanied by Barnabas and Mark. They went to Cyprus, then, going through Paphos and Perga, came to Pisidian Antioch, then through Iconium, Lystra, Derbe, and back to Antioch in Syria. To P.'s great grief Mark had left them. P. and Barnabas then went to Jerusalem to settle the relations of Jewish and Gentile Christianity. P. and Barnabas were to devote themselves to work amongst Gentiles, the older apostles to the Jewish Christians.

About 51 P. set out on his second missionary journey, separating from Barnabas, who refused to go unless Mark accompanied them. P. was accompanied finally by Silvanus. They went to Cilicia and Syria, where he had been before, then to northern Galatia. Here he had to face again the difficult problem of the relation of Jew and Gentile Christian, and came into conflict with the Judaisers. About the year 50 he passed over into what is now Greece. His work on European soil commenced at Philippi. At Athens he faced the curiosity-loving Gk. mob and idle pedants; at Corinth he was among the luxury and immorality of a great commercial city, and his subsequent letters to his converts at Corinth show the troubles he had with his converts; moreover, that those, even though their conversion had been sincere, were far from exemplary Christians, is shown by the *Epistle to the Romans*, P.'s greatest work. After his visit to Europe P. returned to Galatia. He then went to Jerusalem, meeting once more James, the brother of the Lord. It had been P.'s great desire to visit Rome, and at length he resolved to go there, but the Jews got him arrested in Jerusalem; he was kept in prison at Cæsarea Philippi two years, and then carried prisoner to Rome. His letters to Philemon, Timothy, and Titus were written there. The exact date and the circumstances of his death are quite unknown, but he probably perished in the Neronian persecution.

St. P. was an extraordinary spiritual genius, but a man with real grasp of practical affairs; a 'spiritual man' if ever there has been one, and yet very human. Realising the supernatural side of religion, he never lost sight of plain moral and spiritual issues (witness, *e.g.*, his dealing with 'spiritual gifts'). Before his conversion he was a Pharisee, and despite his rejection of the law and what it signified afterwards, his theology retained a Jewish colouring to the end. His later writings, such as *Ephesians*, show a deeper and more mystical theology; his eschatology became more spiritual and his Christology developed. His letters are not systematic treatises, but were called forth by special occasions, and his theology developed as different aspects of it had to be faced. With the human passion and tenderness of much of his theology, which often renders it easy for any one to grasp his meaning, much that he wrote, especially in *Romans*, is singularly difficult, and deals with the law in a way quite alien from our present modes of thought. While St. John appeals to all classes of Christians, St. P.'s appeal is more limited; to some his writings are practically sealed books, and others have gravely misunderstood when they have essayed to interpret him. None of the writers of the primitive Church fully grasped his meaning, even when they adopted his phraseology, and while subsequent theologians have sometimes developed and drawn out his thought, they have as often obscured it. Even by the time the latest books in the New Testament were written the stage represented by P. was already passed through (St. John often thinks on quite different lines), and neither the personality of P. himself, nor the special circumstances under which he wrote, could ever occur again in Christian history.

The authenticity of the Epistles attributed to him is now assured, with the possible exception of the Pastoral Epistles (*1* and *2 Timothy* and *Titus*). His follower on some lines was St. Augustine, and at the Reformation there was a fresh impetus given to the study of the writings of the 'Apostle of the Gentiles'; but it is very doubtful whether he can fairly be called the founder of 'Protestantism'—Catholicism owes to him quite as much. Some have seen the root of his doctrines in the Hellenic mysteries of his day, others in Jewish eschatology. But among Christians none are greater than P.

Martin, *Philippians, Ephesians*, etc. (Century Bible); G. B. Stevens, *The Pauline Theology* (1895); Garvie, *St. Paul* (Century Bible Handbooks).

PAUL, THE DEACON (*c.* 720–800), Lombard historian; little known of his life; s. of Lombard noble, Warnefrid; became instructor of king's dau., and subsequently Benedictine monk at Monte Cassino; chief work incomplete, but valuable, *Historia gentis Langobardorum*.

PAULA, see Francis of Paula, St.

PAULDING, JAMES KIRKE (1779–1860), Amer. writer; friend of Washington Irving, in whose *Salmagundi* he collaborated. His works, edit. by his s., extend to four vol's. The familiar patter lines, *Peter Piper picked a peck of pickled peppers*, occur in one of his novels.

PAULICIANS, an Armenian sect first mentioned by the patriarch, Nerses II., 553 A.D. An account is given of them in an anonymous document included in the Chronicle of Georgius Monachus (this document is called Esc.). The P's (it says) were so called after Paul of Samosata, but their founder was Constantine of Mananali. They were persecuted by the Emperor Leo. V. and the Empress Theodora, who is said to have slaughtered 100,000. They spread over Bulgaria, Syria, and Cilicia, and are mentioned in Armenian writings down to the XIII. cent., then not till the XVIII. In 1828 a body of them migrated to Russ. Armenia, carrying with them a book, the 'Key of Truth,' containing rites and liturgies, some obviously very old. The theology of the P's was heretical, though they tolerated outward submission to traditional observances. Like the Manichæans they were dualists, believing in a Good God and an evil World-Creator; their Christology was adoptionist; they detested monasticism, and disbelieved in a sacerdotal ministry. One who was completely initiated became a 'Christ.'

Some Syrian P's still survive. In the IV. cent. they were probably the survivors of Adoptionist heretics.

Conybeare, *The Key of Truth*.

PAULINUS, ST., OF NOLA (353–431), of good family; consul, 378, then became Christian, and later ordained; bp. of Nola, 409; his letters survive and show a spiritual personality.

PAULUS, HEINRICH EBERHARD GOTTLIEB (1761–1851), Ger. theologian and Orientalist; prof. at Jena; wrote *Life of Jesus* (1828), and interpreted New Testament on rationalist principles.

PAUMOTU, or LOW ARCHIPELAGO (20° S., 140° W.), broad belt of c. 78 atolls in Pacific, belonging to France; extending over 1300 miles; largest, Rangiroa; sparsely inhabited; pearl fisheries; form altered by storms.

PAUPER, see POOR LAW, VAGRANCY.

PAUSANIAS (fl. II. cent. A.D.), Gk. writer; nothing known of his life except that his book, *Description of Greece*, was partly written under Hadrian (d. 138) and Antoninus Pius, and finished c. 174, under Marcus Aurelius; believed to have been native of Asia Minor, probably Lydian; travelled eastward as far as Jerusalem, as far as oracle of Jupiter Ammon in Libya, and was acquainted with Macedonia, Italy, and Spain. *Description of Greece* has often been printed; new Eng. edition, 1898, by J. G. Frazer, with translation and commentary. It is divided into 10 books, each treating of separate division of Greece, *i.e.* 1. Attica; 2. Argolis; 3. Laconia; 4. Messenia; 5 and 6. Elis; 7. Achæa; 8. Arcadia; 9. Bœotia; 10. Phocis. Accuracy has been established whenever possible to test accounts; great authority on Gk. mythology (with which he enlivens his topography) and archæology; describes buildings and works of art which have perished, and is often means of discovering and interpreting Gk. antiquities.

PAUSANIAS (d. c. 470 B.C.), Spartan regent, 479; joint commander of Greeks with Aristides at battle of *Platæa*, 479; admiral, 478, against Persia; relieved Cyprus and recovered Byzantium.

PAVIA (45° 11′ N., 9° 9′ E.), ancient town of N. Italy and capital of province P., on Ticino, near confluence with Po. Outstanding features are churches of San Michele (XI. cent.), S. Pietro in Ciel d'Oro (rebuilt, c. 1132), S. Francesca (XI. cent.), unfinished Renaissance cathedral (XV. cent.), Castle of Visconti (1360), Palazzo Malaspina (now Museo Civico), Univ. (1361), and 5 miles north of P. the magnificent Certosa di Pavia (Carthusian monastery); chief industries, iron foundries, chemicals. Pavia (ancient *Ticinum*) was Lombard capital, 572–774; Francis I. of France here defeated and captured by Charles V., 1525; Austrian possession, 1714; passed to Sardinia, 1859. Pop. (1911) 39,319.

PAVIA, BERNARD OF, B. CIRCA (d. 1213), bp. of Pavia (1198). See CANON LAW.

PAVLOVO (56° N., 43° E.), town, on Oka, Nizhniy-Novgorod, Russia; cutlery. Pop 13,500.

PAVLOVSK (52° 42′ N., 47° 8′ E.), town, summer resort, St. Petersburg, Russia. Pop. 5400.

PAVLOVSKIY POSAD, VOKHNA (50° 40′ N., 38° 40′ E.), town, on Klyazma, Moscow, Russia; silk- and cotton-mills. Pop. 10,500.

PAVO, Peacock; see under PHEASANT FAMILY.

PAWNBROKING is regulated in Great Britain by the Pawnbrokers Act of 1872. The pawnbroker must be a person of good character, and must take out a yearly licence. The maximum profit is fixed, and the pledge on which the money has been lent must not be sold till a year has elapsed after the transaction. A pawnticket must be given to the borrower, and on this ticket the conditions of the loan are stated. No licensed pawnbroker may take pledges from a young person under 12, or from a person intoxicated, may employ an assistant under 16 years, or do business on a public holiday. A stipendiary magistrate may at any time order a pawnbroker to produce his books and papers concerning any transaction where reasonable suspicion exists that stolen goods have been pawned.

P. in U.S.A. is regulated by each state; in Boston State the police grant licences, in New York State the mayor and aldermen; interest is 3 % for first 6 months, 2 % per month afterwards. In some states pawned articles can be sold a year after deposit; in Massachusetts, 4 months.

In France the *Monts de Piété* (originally started in Italy in the Middle Ages) are the instruments for pawnbroking. These institutions are authorised by the municipality and managed by a paid official, and the profits beyond working expenses are devoted to local charities. An official valuer decides the worth of the pledge, and at the end of the year the pledge, if not redeemed or renewed, is sold by public auction, the borrower being allowed three years to claim any surplus on the sale over the sum lent. In France, as in Great Britain, pawnbroking offers assistance to those in temporary financial difficulties, but the cost of the loan is far heavier at the private pawnbroker's than at the Mont de Piété.

PAWTUCKET, town, Rhode Island, U.S.A.; cottons, woollens, machinery, etc.; print-, bleach-, and dye-works; site of state armoury. Pop. (1910) 51,622.

PAX, tablet kissed by priest at Mass.

PAXO, ancient *Paxos* (30° 12′ N., 20° 10′ E.), one of the Ionian Islands, Greece; olive oil.

PAYNE, JOHN HOWARD (1791–1852), Amer. dramatist, actor, and song writer; author of poem 'Home, Sweet Home.'

PAYNE, PETER (c. 1380–1455), Eng. Lollard; teacher at Oxford; fled to Bohemia and joined Hussites; represented Bohemia at Council of Basel.

PAYSANDU (32° 27′ S., 58° 6′ W.), port and chief town of P. department, Uruguay, on river Uruguay; exports preserved meat. Pop. 21,000; (dep.) 45,000.

PAYTA, see PAITA.

PAZMANY, PETER (1570–1637), Hungarian ecclesiastic; Protestant, but joined R.C. Church; cardinal, 1629; prominent in politics; did much for Hungarian lit.

PEA (*Pisum sativum*), member of Leguminosæ, cultivated for its edible seeds; plant a tendril climber, the tendrils representing modified leaflets, but dwarf varieties are also grown; leaves pinnate and stipulate, with alternate phyllotaxis; inflorescence is racemose, the flowers being typically papilionaceous. See LEGUMINOSÆ, SWEET PEA.

PEABODY (42° 31′ N., 71° W.), town, Massachusetts, U.S.A.; manufactures leather. Pop. (1910) 15,721.

PEACE (59° N., 115° W.), river, Canada; rises in British Columbia, enters Great Slave River near Lake Athabasca.

PEACE MOVEMENT.—War was declared by Greeks and Romans of classical periods to be against *jus naturale* or universal rule of right. Whatever may have been the attitude of the primitive Church, war as such was never denounced by the later Christian Church (excepting heretic sects). Heralds of the peace movement may be seen in ancient Gk. Amphictyonic League, cities belonging to which might not wage war on or injure each other, and in mediæval Truce of God, which secured certain intervals of respite from warfare. A strong dislike of war marked reformers of Renaissance, such as Erasmus, and war is one of chief existing institutions attacked in More's *Utopia*. Outstanding XVI.-cent. rulers like Elizabeth of England and Henry IV. of France set themselves against mediæval ideal of warlike glory, preferring triumphs of diplomacy, and Sully credited Henry IV. with a 'great design' of European federation. The Treaty of Westphalia, 1648, was important as an international settlement.

The idea of the federation of mankind which sprang up among cosmopolitan XVIII.-cent. philosophers was due to XVI.- and XVII.-cent. jurists, Gentili, Hobbes, Grotius, Pufendorf, etc., who developed Roman ideas of *jus naturale* and *jus gentium* into 'international law,' and 'though they did not create a sanction, created a law-abiding sentiment.' Quakers preached against war in XVII. cent. Saint-Pierre published his *Projet de paix perpétuelle*, 1713, and in 1795 appeared Kant's *Zum ewigen Frieden*. A strong cosmopolitan

influence was exercised by the Fr. Revolution, and writings of men like Bentham, Saint-Simon, Victor Hugo.

XIX.-cent. railroads effected a great intermixture of races. Numerous peace associations arose, *e.g.* F.I.G. (*Fraternitas inter gentes*), an international society, and 'American Association for International Conciliation.' Peace Congresses, started in 1843, are now regularly held in different countries in rotation. Treaties of XVIII. and XIX. cent. show development of international law. The tendency to submit international questions to arbitration has increased; Alexander I. of Russia suggested an international code and court in 1804, and at Conference of Aix-la-Chapelle, 1818, and from his *European System* developed *Concert of Europe*, the idea of a league of Powers to keep order in Far East; Britain has been member of or plaintiff before over fifty international tribunals since commencement of XIX. cent., and four times that number of cases altogether have been settled by this means. The Berlin Congress, 1885, which partitioned Africa among the Powers, is of great importance as precedent. Hague Peace Conferences have provided permanent court of arbitration to which recourse is at present voluntary, but will, it is hoped, become obligatory. Again, during XIX. cent. several of the old cockpits of Europe—Switzerland, Belgium, Luxemburg—have become neutral states, as has Norway. International law has won recognition as customary code. An Association for the Reform and Codification of the Law of Nations and Institute of International Law were founded, 1873; former has become International Law Association. American Society of International Law was formed, 1906. Inter-Parliamentary Union, founded 1887, holds international congresses and aims at federation of the world.

International **Peace Conference** to abolish or mitigate warfare assembled at Hague, 1899 and 1907, under auspices of Tsar Nicholas II. Great Britain agreed to chief conventions, *i.e.* that arbitration should be accepted in international disputes, and that laws of war by land and sea should be ascertained and insisted on; many resolutions were adopted as to missiles, captives, prizes, etc.

In 1910 Mr. Andrew Carnegie placed $10,000,000 in hands of trustees to be used for abolishing war. Desirability of war is vexed question with modern philosophers; old assumption that it was contrary to *jus naturale* or absolute rule of right is now widely questioned, and important German school claims that fighting is permanent and desirable human quality. See ARBITRATION, WAR, NEUTRALITY.

Perris, *History of War and Peace* (1911); Angell, *The Great Illusion* (1910); Crane, *The Passing of War* (1912); Bloch, *Is War Now Impossible?* (1899).

PEACE, PIPE OF, see CALUMET.

PEACH (*Prunus Persica*), rosaceous tree grown for its fruit; allied to apricot, cherry, plum, and almond; best reared in shelter of old wall, facing south-east; requires deep, well-drained soil containing calcareous matter, which may be supplied in form of old mortar or lime. If soil is on light side, a judicious addition of loam will improve it, whilst plenty of vegetable manure is also beneficial. Normally the p. is grafted on to a hardier stock, mussel plum or almond being generally used, although other stocks are used for the most susceptible varieties. Young trees should be pruned annually, late Jan. or beginning of Feb. being best time.

PEACOCK, see under PHEASANT FAMILY.

PEACOCK, GEORGE (1791–1858), Eng. mathematician; 2nd Wrangler, 1812; largely instrumental in introducing to Cambridge continental calculus notation and methods, and in founding Cambridge Philosophical Soc.

PEACOCK, THOMAS LOVE (1785–1866), Eng. writer; friend of Shelley, who persuaded him to abandon business for letters and aided him financially; eventually obtained government post; f.-in-law of George Meredith. Poems include *Palmyra*, *Philosophy of Melancholy*, and *Rhododaphne*; his best novels are *Melincourt*, *Nightmare Abbey*, and *Maid Marian*. Edited by Prof. Saintsbury (1895).

PEAK, THE (53° 23′ N., 1° 53′ W.), mountainous district, Derbyshire, England; contains Kinder Scout (2088 ft.), Mam Tor, and Axe Edge, and several caverns. *Peveril Castle* is in vicinity.

PEAL, see under SALMON FAMILY.

PEALE, CHARLES WILLSON (1741–1827), noted Amer. portrait painter; f. of **Rembrant Peale** (1778–1860), also a painter.

PEA-NUT, see GROUND-NUT.

PEAR (*Pyrus communis*), member of Rosaceæ, indigenous to temperate Europe; cultivated for its fruit (known botanically as a pseudocarp, the edible portion representing the enlarged apex of the receptacle, whilst the fruit proper constitutes the core); requires a deep, fairly moist, clayey loam with good drainage, and a southern outlook.

PEAR, PRICKLY, see CACTUS.

PEARL, globular concretion found in shells of certain bivalve molluscs; highly valued for ornamental purposes, and classed among gems. Most molluscs line their shells with a smooth secretion consisting of thin scale-like films. If a particle of foreign matter—say a grain of sand—finds its way into the interior of the shell, it sets up irritation, and as the inhabitant of the shell cannot remove offending particle it surrounds it with a layer of nacreous matter. The longer this process continues, the larger of course will be the globule of nacre, which is known as a p. The principal sources of p's are the p. oyster (*Meleagrina margaritifera*), found throughout the Pacific; p. mussel (*Avicula margaritifera*), and freshwater mussel (genus *Unio*) of Brit. rivers.

The chief p. fisheries are those of Ceylon, carried on principally in the Gulf of Manaar. Those of the Persian Gulf were known to the ancients. P's are also obtained from the Sulu Archipelago, N.E. Borneo, New Guinea, Gulf of Mexico, and Australia. Native divers descend 60 or 70 ft., weighted by a stone and lowered from a boat by a rope. They carry a net and gather the p. oysters in it from the sea-floor. They remain below for perhaps 30 or 40 seconds at a time, and are hoisted to surface after signalling with a rope. The oysters are allowed to rot on the beach in sun's rays. Then in 7 or 10 days they are searched for p's.

Famous Pearls.—The largest known p., 2 inches in length and 4 inches in circumference, is in the South Kensington Museum, and valued *c.* £50,000.

Julius Cæsar presented Servilia (the mother of Marcus Brutus) with a p. worth £48,000. Cleopatra swallowed a p. valued at £60,000 to £80,000, while Tavernier sold one to the Shah of Persia for £180,000.

Scottish Pearls are obtained from freshwater molluscs in Scot. rivers. They were famous even in Middle Ages, but the search for them was practically abandoned many years ago. 'Freshwater pearls' are still searched for in Germany, China, and U.S.A.

Artificial Pearls are largely made in France, Germany, and Italy, by blowing a thin globe of glass and filling it with a solution of ammonia and fish scales.

Kunz and Stevenson, *Book of the Pearl*.

PEARL OYSTERS, see under LAMELLIBRANCHIATA.

PEARL SPAR, see DOLOMITE.

PEARSON, JOHN (1612–86), Anglican bp. of Chester. 1672: wrote *Exposition of the Creed*, 1659.

PEARY, ROBERT EDWIN (1856–), Amer. Arctic navigator and discoverer of North Pole; Rear-Admiral, U.S. Navy (retired); led expedition of Academy of Natural Sciences, Philadelphia, 1891–92, discovering Melville Land and Heilprin Land and demonstrating insular character of Greenland; in expedition 1893–95 discovered Iron Mountain; commanded expedition of Peary Arctic Club, New York, 1898–1902; led fresh expeditions, 1905–6, 1908–9; reached Pole, April 6, 1909. See POLAR REGIONS.

Peary, *The North Pole* (1911).

PEASANT PROPRIETORSHIP, see CROFTER, SMALL HOLDINGS.

PEAT, remains of bog-moss, *Sphagnum*, together with partially preserved remains of vegetation swamped and killed by its overgrowth; owes its preservative power to presence of humic acid. P.-bogs are found in many parts of England, are more common in Scotland, and still more numerous in Ireland. Various attempts have been made to compress p., and so make it commercially available as fuel, but no satisfactory system has yet been produced. It is, however, used as fuel by peasants.

PECCARY (*Dicotyles*), a genus and family of Swine, with five species confined to the New World, in the forests of which they wander in large herds.

PE-CHIH-LI, see CHIH-LI.

PECHORA (65° N., 57° E.), river, N.E. Russia; rises in Urals, flows into Gulf of P.

PECKHAM, JOHN (d. 1292), Eng. Churchman; lectured at Paris and Oxford; abp. of Canterbury, 1275; generally on good terms with Edward I., but a vigorous defender of Church.

PECORA, COTYLOPHORA, the Pecora, or true Ruminants, a group of Artiodactyle Ungulates, include deer, giraffe, cattle, and sheep. The name *Cotylophora* refers to the connection between the unborn young and the mother, the two being connected by patches of small villi or finger-like processes—that is to say, the placenta is cotyledonary. They have many structural features in common, such as the presence of horns or antlers, the absence of upper incisors and usually of canines, the presence of compound cannon bones in the fore-limbs, and the complete development of only the third and fourth digits.

Most interesting is their habit of *ruminating* or chewing the cud, associated with the presence of a four-chambered stomach, known as (1) the *Paunch*, (2) the *Honeybag* or *Reticulum*, (3) the *Manyplies* or *Psalterium*, and (4) the *Reed* or *Abomasum*. The food passes into (1), is softened, regurgitated, rechewed, and now passes along (2) into (3); filtered here, it finally passes to (4), where it is digested.

PÉCS, FÜNFKIRCHEN (46° 6′ N., 18° 13′ E.), town, Hungary; bp.'s see; cathedral; held by Turks, 1543–1686; woollens, porcelain. Pop. (1910) 49,822.

PECULIAR PEOPLE, THE, see FAITH.

PEDEN, ALEXANDER (c. 1626–86), Scot. Covenanter; minister of New Luce, but forced to leave by Ejectment Act, 1663.

PEDICULOSIS, condition in which lice (*pediculi*) are present on the head, body, or pubes. P. of the head is treated by soaking the hair with methylated spirits for one or two nights to kill the parasites and their eggs, and then the hair is thoroughly combed out with a small-toothed comb.

PEDICULUS, see LICE.

PEDIPALPI, see WHIP SCORPIONS.

PEDLAR, see HAWKER.

PEDRO, see PETER.

PEEBLES (55° 38′ N., 3° 13′ W.), town, on Tweed, Peeblesshire, Scotland; county town; manufactures woollens and tweeds. Pop. (1911) 5554.

PEEBLESSHIRE (55° 35′ N., 3° 20′ W.), inland county, Scotland, bordered on N. by Edinburghshire, on W. by Lanarkshire, on S. by Dumfriesshire, on E. by Selkirkshire; area, 348 sq. miles; country rough and hilly, rising to 2745 ft. (Broad Law); agriculture and sheep-farming are pursued; coal is mined, while wool-manufacturing is an important industry. Pop. (1911) 15,258.

PEEKSKILL (41° 17′ N., 73° 58′ W.), town, on Hudson, New York State, U.S.A.; iron manufactures. Pop. (1910) 15,245.

PEEL (54° 13′ N., 4° 42′ W.), watering-place, fishing town, Isle of Man; castle; ruined cathedral. Pop. 3300.

PEEL, ARTHUR WELLESLEY, VISCOUNT PEEL (1829–1912), Brit. Liberal statesman; s. of Sir Robert P.; elected Speaker, 1884, 1886, 1892; cr. viscount on resignation, 1895; chairman of Commission on Licensing Laws, 1896.

PEEL, SIR ROBERT, Bart. (1788–1850), Brit. statesman; s. of wealthy Lancashire cotton manufacturer; grad. from Christ Church, Oxford, 1808; Tory member for Cashel, 1809; Under-Sec. for Colonies, 1811; Sec. for Ireland, 1812–18; adopted ultra-Prot. imperial attitude, winning nickname *Orange Peel*; as chairman of Bank Committee, 1819, alleviated economic distress by restoring cash payments; supported Government in repressive measures; excellent administrator but fearful of revolution; Home Sec., 1822, with Liberal Canning as Foreign Sec. and chief influence; disliked Canning's assistance of revolution abroad and support of Catholic emancipation at home; with Wellington and Eldon, resigned when Canning became First Lord of Treasury, 1827. Canning died the same year, and Wellington formed a purely Tory ministry in which P. was again Home Sec.; compelled by expediency to pass Catholic Emancipation Bill, 1829, owing to agitation of country, but steadily resisted outcry for parliamentary reform; Tories forced to resign, 1830. P. had reorganised London Police (hence slang terms, *peeler, bobby*); member for Tamworth, 1833–50; led opposition in ministries of Grey (1832–34) and Melbourne (1834). He became Prime Minister, Nov. 1834; was forced to resign, April 1835. The restored Whigs continued sweeping reforms, but lost favour through distress of country, misfortunes abroad, and fear of Irish secession. Conservatives returned, 1841, with P. as Prime Minister. He restored order in finances, imposing Income Tax. Famous Free Trade measures, 1842, show new strength of manufacturing as opposed to landed interest; great Irish agitator O'Connell imprisoned; revolts in India crushed and Sind annexed; retired before new Liberal wave, 1846; killed by fall from horse; a 'Trimmer' of the best type.

Peel, from his Private Papers, edit. by Parker (1899).

PEELE, GEORGE (c. 1558–c. 1597), Eng. dramatist; wrote *Arraignment of Paris* (1584), a masque; *Old Wives' Tale* (1595); one of pioneers of great blank verse outburst.

PEERAGE, upper ranks of Brit. society, possessed of legal and social privileges usually hereditary. It might be defined as consisting of the temporal members of the House of Lords, as distinction originated in legislative powers, and spiritual lords of Parliament are no longer considered to be peers; but life peers have no right to legislate *ex honore*. '*Perage*' of England occurs in roll of Parliament of 1454; 'peer' in this sense, in 1321 (Middle English *per* is from Old French *per, peer*, from Lat. *par*, equal).

The technical meaning of peer originated in the feudal system: those were *pares* who took same oaths of service to lord; hence vassals who held immediately of the king of France and formed feudal court acquired title of peers. Above Fr. barons, or ordinary peers, were 'peers of France,' whose origin is wrapped in obscurity. Despite Charlemagne's legendary twelve peers, no hist. mention of the Fr. court of peers has been found before XIII. cent., when it was composed of six lay peers (the dukes of Normandy, Burgundy, and Guienne, and counts of Champagne, Flanders, and Toulouse) and six ecclesiastical peers (abp. of Rheims, bp's of Langres, Laon, Châlons-sur-Marne, Beauvais, and Noyon), who had each a separate function at the king's coronation; it is believed that they represented the full number of original tenants-in-chief. Kings assumed the right of creating new peerages, of which there were 49 at the Revolution, though the original number of 6 ecclesiastics still obtained. Fr. lay peers had the right of sitting in the *Grande Chambre* of the *Parlement de Paris* behind ecclesiastical peers and princes of blood; they could be cited to appear before no other court.

In England, as in France, tenants-in-chief, or 'barons,' did suit at the lords', that is, the king's, court, and chief barons acquired title of peers. There is evidence

in both countries that the name peer was originally given to *afferors* in manorial, borough, and other courts, but it only survived in the case of the great council of the realm. The Eng. Parliament, however, was not a mere feudal assembly, but inherited traditions of the Saxon *witenagemot*. Hence, from the Conquest, magnates were summoned as such, not purely as landowners, and it is doubtful in which capacity individual bp's may have appeared. Also from the custom of sending writ of summons to magnates, apart from general summons through sheriff of shire, the element of Crown selection entered into composition of Parliament. All tenants-in-chief were not summoned, and barony by tenure ceased to be qualification for seat in Parliament. Magna Carta made this special summons the right of abp's, bp's, abbots, earls, and greater barons; smaller barons appeared by representatives from 1254.

The peerage is divided into successive ranks of duke, marquess, earl, viscount, baron, possessing same privileges and divided only by order of precedence (fixed by statute, 1539). The family of a peer do not share his privileges and are not considered to have 'nobility of blood.' No claim can now be made to *peerage* on plea of barony by tenure; baronies are either by writ or (more usually) letters patent, but writ to ancestor is not sufficient proof of right to barony if it cannot be established that he actually sat in Parliament as baron by writ.

The first creation of barony by patent was 1387. Earls existed before the Conquest, though the legal status of dignitaries holding that title is obscure, as is that of immediate post-Conquest earls. The earl took a baronial character under the feudal system and represented the highest rank in the peerage until dukedom was created, 1337, for the king's son. The first marquessate created in the realm was in 1385; first viscounty, 1440. The Crown has the prerogative of creating peers. Peeresses are either so *jure suo*, by descent or creation, or as wives of peers, and have, like peers, the right to appear before no law court but House of Lords, but have not right to sit in the House of Lords.

PEEWIT, see PLOVER FAMILY.

PEGASUS (classical myth.), winged horse which sprang from the slain Medusa's blood; Bellerophon mounted him and slew the Chimæra.

PEGAU (51° 10′ N., 12° 15′ E.), town, on Elster, Saxony, Germany; felt, boots and shoes. Pop. (1910) 5785.

PEGMATITE, coarse granite rocks occurring in veins in diorites, gabbros, and syenites, and associated with plutonic and intrusive rocks; irregularly composed of alkalies, felspar, and quartz; irregularly distributed; some varieties rich in mica; used in porcelain manufacture.

PEGNITZ (49° 27′ N., 11° 10′ E.), river, Bavaria; unites with Rednitz at Fürth to form the Regnitz.

PEGU (17° 20′ N., 96° 30′ E.), town, Pegu division, Lower Burma, on Pegu River. Pop. 14,000.

PEHLEVI, see PAHLAVI.

PEIHAI, see PAKHOI.

PEINE (52° 19′ N., 10° 12′ E.), town, Hanover, Prussia; ironworks. Pop. (1910) 16,668.

PEIPUS, CHUDSKOYE OZERO (58° 35′ N., 27° 30′ E.), lake, Russia; discharges by Narova into Gulf of Finland; connected on S. with Lake Pskov; area, 1356 miles.

PEIRÆUS, PIRÆUS (37° 45′ N., 23° 10′ E.), town, Greece, on Saronic Gulf; the port of both ancient and modern Athens. Pop. 71,600.

PEISISTRATUS (*c.* 600–527 B.C.), tyrant of Athens; relation of Solon; of great wealth and influence. Pretending to have been attacked and wounded by Eupatridæ (*q.v.*) for upholding democracy, he gradually increased the armed guard assigned him by the indignant populace, and at last seized the acropolis, 560; expelled by Lycurgus and Megacles, 559; restored by Megacles, 554; again expelled, 552; remained in exile till 541. Returning with an army P. ruled till 527, when his sons Hippias and Hipparchus succeeded him; expelled his opponents, but ruled as a benevolent despot, building public works and protecting democrats against aristocrats.

PEKIN (40° 43′ N., 89° 34′ W.), city, Illinois, U.S.A., on Illinois; manufactures wagons; vicinity coal-fields. Pop. (1910) 9897.

PEKING, PEKIN (39° 53′ N., 116° 29′ E.), capital of China, between Peiho and Hun-ho, Chih-li province. P. consists of two cities, each surrounded by high walls with numerous towers and gates. The Tartar or Manchu city in N. includes *Hwang-cheng* (old imperial city), with military arsenal, public offices, univ., astronomical and magnetic observatory (founded XIII. cent.), residences of nobles, etc., and *Tsze-kin-cheng* (Forbidden City), with palaces and parks. The Chinese city on S. has Temple of Heaven and Agriculture, warehouses, theatre, etc.; summer palaces, several temples, and convents within vicinity. P. was imperial capital under various names for cent's; siege of foreign legations during which many fine buildings were destroyed, 1900. Pop. (1910) 805,110. See also CHINA.

PELAGIA, ST. (*c.* III. cent.), virgin martyr, whose historicity has been doubted.

PELAGIUS I., pope, 555–61; elected owing to influence of Emperor Justinian.—**Pelagius II.**, pope, 579–90; tried to settle disputes existing since P. I.

PELAGIUS (*c.* 360–420 A.D.), heresiarch founder of heresy called Pelagianism. For most of his life P., who was of Brit. birth, was reputed orthodox and was the friend of St. Augustine. The controversy in which he engaged with Augustine centred round original sin, which the Eastern Church had tended to minimise. P.'s religious experience was less stormy than Augustine's, and his religion, therefore, tended to develop into an ethical moralism, and did not emphasise the necessity for Divine grace. It was possible, according to him, to lead a sinless life. The controversy began in 410, and became acute in 419. P. is not heard of after 420. Pelagianism has appeared since in Christian doctrine, but has never given rise to a formal sect.

Harnack, *History of Dogma*; Bethune-Baker, *Introduction to Early History of Christian Doctrine*.

PELARGONIUM, genus of plants, order Geraniaceæ; the beautiful garden p's are hybrids. See GERANIUM.

PELASGIANS, people mentioned in *Iliad* as allies of Troy, and in *Odyssey* as a Cretan tribe; thought to have inhabited Thessaly, and by Herodotus to have preceded the Hellenes as inhabitants of Greece. A legendary King Pelasgus was at Argos. All the early population—pre-Mycenæan—of Greece and Rome is sometimes called Pelasgian. See GREECE (History).

PELECANIDÆ, Pelicans (*q.v.*).

PELECYPODA, see LAMELLIBRANCHIATA.

PELEW ISLANDS (7° N., 134° 13′ E.), group of small mountainous islands, W. Pacific, belonging to Germany. Pop. 3000.

PELHAM, Eng. family; originated from Pelham, Herts; from it descended P's of Laughton and Stanmer, Sussex, afterwards Dukes of Newcastle and Earls of Chichester.

PELHAM, GEORGE (1766–1827), bp. of Bristol, 1803; of Exeter, 1807; of Lincoln, 1820; s. of Earl of Chichester.

PELHAM, HENRY (1696–1754), Brit. Prime Minister; bro. of Duke of Newcastle; formed ministry, 1745, uniting all shades of Whigs; ended war, 1745; blind to signs of European coalition against Britain.

PELHAM, JOHN DE (d. 1429), Eng. Lord Treasurer, 1412–13; one of first prominent members of this family; aided Henry IV. to secure throne.

PELHAM, JOHN THOMAS (1811–94), bp. of Norwich, 1857–93; s. of Earl of Chichester; friend of Cardinal Manning.

PELHAM OF LAUGHTON, BARONY OF, cr. 1706,

for Sir Thomas P., Bart.; extinct, 1768. SIR THOMAS was prominent upholder of Revolution, 1688; Lord of Treasury, 1689–94, 1701–2; m. Grace, dau. of Earl of Clare and sister of Duke of Newcastle. His s. THOMAS, cr. Earl of Clare, 1714, became Duke of Newcastle-upon-Tyne, 1715, Duke of Newcastle-under-Lyme, 1756.

PELHAM OF STANMER, BARONY OF, cr. for 2nd baron P. of Laughton, 1762, with special remainder, by which cousin Thomas succ., 1768; 2nd baron was cr. Earl of Chichester, 1801.

PELHAM, SIR WILLIAM (d. 1587), Lord Justice of Ireland, 1579; ruthlessly stamped out Desmond revolt in Munster; marshal in Netherlands, 1581–87. His bro., **Sir Edmund** (d. 1606), chief baron of exchequer in Ireland, 1602; first Eng. judge to go on circuit in N. of Ireland.

PELICANS (*Pelecanidæ*), family of swimming birds with four webbed toes, found near lakes and swamps all over the world, except in polar areas. Their remains have been found in Britain.

PELION (39° 26′ N., 23° 3′ E.), mountain, Magnesia, E. Thessaly; celebrated in Gk. myth.; modern Zangora or Plessidi.

PELLA (40° 44′ N., 22° 27′ E.), capital of ancient Macedonia; Alexander the Great's birthplace.

PELLAGRA, mysterious disease occurring in Italy, Spain, Egypt, as well as several other widely-separated parts of the world, characterised by a burning of the skin, a red rash, pigmentation, nervous disorders, muscular wasting, and progressive general weakness; formerly believed to be due to eating diseased maize, but now attributed to a protozoon communicated by sandflies. Arsenic has a beneficial effect. In recent years p. has appeared in U.S.A. and Britain; investigations by Tropical Medicine Schools of these countries are in progress.

PELLEW, see EXMOUTH, VISCOUNT.

PELLICANUS, CONRAD (1478–1556), Ger. Prot. divine; studied at Tübingen; wrote first Hebrew Grammar in a European language; prof. at Zürich; a good scholar, and man of fine character.

PELLICO, SILVIO (1788–1854), Ital. poet and dramatist; was intimate with Byron, and trans. his *Manfred* into Italian.

PELLITORY (*Parietaria*), genus of plants, order Urticaceæ; Common P. (*P. officinalis*) has reddish stem, narrow leaves, and small flowers.

PELOMYXA, a protozoon; see under LOBOSA.

PELOPIDAS (d. 364 B.C.), Theban patriot; exiled, 382; drove out Spartans and oligarchs, 379; organised 'sacred band' of Theban youths, who established Theban military prestige.

PELOPONNESIAN WAR (431–404 B.C.), conflict between the Delian League (Athens and her allies) and Peloponnesian confederacy (Sparta, etc.). Three periods: (1) The *Archidamian War*, 431–421; (2) 421–413; (3) The *Decelean War*, 413–404.

(1) Athens had incurred jealousy of Sparta, and provoked war by damaging Corinthian trade. Immediate cause was aid given by Athens to Corcyra, in its revolt against Corinth, 434–433. Corinth in return stirred up Potidæa against Athens and made new coalition with Sparta against Athens, 432. Thebes attacked Platæa, 431, and Spartan king Archidamus marched with large army northwards. Pericles did not make hopeless attempt to defend Attica, but gathered inhabitants into Athens, which Spartans failed to storm; issued to make short raids when Archidamus retired. Siege of Athens was repeated, 430, when besieged were visited by terrible plague, 428, 427. Athenian fleet meanwhile won great successes, culminating at *Pylos*, 425, when Sparta sought peace. Failure at *Megara*, *Amphipolis*, and *Delium*, 424–422, made Athens accept truce of 50 years.

(2) Anger of confederacy with Sparta and intrigues of Athenians, Nicias and Alcibiades, led to alliance of Sparta and Athens, 421, but Athens accepted leadership of democratic states of Peloponnesus, 419; terrible disaster of Athens in Sicilian expedition, 415, put her at mercy of Sparta.

(3) Sparta now made Attic town of **Decelea** her base of operations against Athens. Persia again established suzerainty over Asia Minor, aided by Sparta, the banished Alcibiades assisting them with his advice; and the members of Delian League revolted. Athenians, with exhausted treasury, still retained naval supremacy, and Alcibiades, recalled, destroyed Spartan fleet at *Cyzicus*, 410. Restoration of Spartan fleet under Lysander led to crushing victory of *Ægospotami*, 405. Athens fell, 404.

PELOPONNESUS (37° 28′ N., 22° 10′ E.), ancient name of peninsula forming southern part of Greece; modern Morea. See GREECE.

PELOPS (classical myth.), grandson of Zeus and son of Tantalus, who killed him and presented him as a dish at an entertainment given to the gods. He was credited with reviving the Olympic games.

PELOTAS (31° 38′ S., 52° 24′ W.), town, Rio Grande do Sul, Brazil; trade in cattle; meat-preserving works. Pop. 20,000.

PELTUINUM (modern Ansedonia) (42° 22′ N., 13° 35′ E.), ancient town, Italy, on Via Claudia Nova.

PELUSIUM (30° 55′ N., 32° 30′ E.), fortified town, ancient Egypt, on Pelusiac mouth of Nile.

PELVIS, see SKELETON.

PEMBA (5° S., 39° 40′ E.), Brit. island off E. coast of Africa, N. of Zanzibar; made of coral; produces cocoa, cloves. Pop. c. 75,000.

PEMBROKE (45° 46′ N., 77° 4′ W.), town, on Lake Alumette, Ontario, Canada; lumber trade and manufactures. Pop. 5500.

PEMBROKE (51° 40′ N., 4° 54′ W.), county town, Pembrokeshire, Wales, situated on Creek of Milford Haven; contains mediæval castle and Monkton Priory. **Pembroke Dock** or **Pater,** 2 miles distant, is naval dockyard and garrison town. Pop. (1911) 15,673.

PEMBROKE, EARLDOM OF, was palatinate, possibly until Wales became shire land under Henry VIII. GILBERT DE CLARE, lord of Strigul, was cr. earl, 1138; not certain whether epithet, *Strongbow*, belongs to him or his s. RICHARD, earl, 1148–76. Richard's dau. and heir, Isabel, m. WILLIAM MARSHAL, who thereupon became earl (c. 1189), and was succ. in turn by his five sons (1219–52), after which earldom reverted to crown. WILLIAM DE VALENCE, the king's uterine bro., who m. dau. of coheir of last earl, was cr. earl, c. 1265; succ. by s. AYMER and afterwards by the HASTINGS, descendants of his dau. Isabel. Earldom reverted to crown on death of John Hastings, 1389; Humphrey, Duke of Gloucester, held it, 1414–47, William de la Pole, Marquess of Suffolk, 1447–50, Sir Jasper Tudor, 1453–61, 1485–95. Sir William Herbert of Raglan was cr. earl, 1468, Edward Prince of Wales, 1479; Anne Boleyn was marchioness, 1532–36; WILLIAM HERBERT was cr. earl, 1551, and dignity is still held by his descendants. MARY, COUNTESS OF P. (1557–1621), 'Sidney's sister, Pembroke's mother,' wrote poetry, and published her bro's *Arcadia* after his death.

PEMBROKESHIRE (51° 50′ N., 4° 55′ W.), most westerly county, Wales; bounded N., W., and S. by sea, E. by Cardigan and Carmarthen; area, 558 sq. miles. Coast is wild and rugged; chief inlets, Milford Haven and St. Bride's Bay; islands of Ramsey, Grassholm, Skomer, and Caldy lie off coast. Inland are fertile hills and valleys; in N. is Precelly Range; principal rivers, Teifi, E. and W. Cleddau. Agriculture is chief industry; stock-raising; deep-sea fishing; coal, lead, and slate worked. Chief towns are Pembroke, Haverfordwest, and Tenby. P. is celebrated for castles; also contains Cathedral at St. David's, some interesting churches, Brit. encampments, and cromlechs. Owing to settlement of Flemings (XII. cent.), who adopted Eng. language, population is mostly English-speaking. Pop. (1911) 84,869.

PEMPHIGUS, a disease of the skin, characterised by the appearance of large bullæ, or blisters, of which fresh crops may continue to come out for several

months; these burst, leaving a raw, ulcerated surface. The treatment is general, warm baths, tonics, and plenty of nourishing food being given, while arsenic and an antistreptococcic vaccine have both proved beneficial in certain cases.

PENAL LAWS, see CRIMINAL LAW.

PENANG (5° 18′ N., 100° 4′ E.), island lying extreme N. of Straits of Malacca, off W. coast of Malay Peninsula, with province of Wellesley (on mainland); forms one of Brit. Straits Settlements; capital, Georgetown; total area, 270 sq. miles. Pop. (1911) 278,003. See STRAITS SETTLEMENTS.

PENARTH (51° 27′ N., 3° 10′ W.), seaport, watering-place, at mouth of Taff, Glamorganshire, Wales. Pop. (1911) 15,488.

PENATES, Rom. household gods particularly associated with the store, as the *Lar* was associated with the hearth. As the State was considered a large family, there were public P. as well as private. The State P. of Rome were said to have been carried by Æneas from Troy. To the P. were offered the first-fruits.

PENCILS, in original form, sticks of metallic lead, then of plumbago; graphite powdered and cast into cakes, 1843; now mixed with clay and water and placed in crucible. Graphite mines exist in Siberia, Bavaria, and Ticonderoga (N. Y.); Cumberland mines are worked out.

PENDENNIS CASTLE, see FALMOUTH.

PENDLESIDE SERIES, series of strata below the Upper division of the Carboniferous limestones, and above the Millstone grits; consist principally of black limestone, black shales, and sandstones.

PENDLETON, suburb of Salford (*q.v.*), Lancashire. Pop. (1911) 64,386.

PENELOPE (classical myth.), wife of Odysseus (Ulysses); during his absence at Trojan War many suitors sought her hand, and she put them off on the pretence that she was weaving a robe for Laertes, her father-in-law; she unravelled by night the web she had woven during the day; Odysseus returned to her after 20 years' absence.

PENGUIN, SPHENISCIDÆ, interesting order of flightless birds, confined to Antarctic and Southern Oceans; good swimmers and divers, using their wings, totally devoid of quills, as paddles, while on land they walk erect, but awkwardly.

The KING (*Aptenodytes patagonica*) and EMPEROR PENGUINS (*A. forsteri*) are two of the largest species, the latter nesting and hatching its eggs in mid-Antarctic winter.

PENINGTON, SIR ISAAC (c. 1587–1660), lord mayor of London, 1642-43; a fishmonger; sheriff, 1638; sat for city in Short and Long Parliaments, and financed revolutionary forces; on commission for king's trial.

PENINSULA, a piece of land nearly surrounded by water, *e.g.* Balkan P., Denmark, Florida (the 'Peninsular State'), Italy, Malay P., Morea, Scandinavia; Spain and Portugal form *the Peninsula* or Iberian P.

PENINSULAR WAR (1808–14), war in which Britain assisted Spain and Portugal in driving French from Iberian peninsula. Portugal appealed to Britain for aid against Fr. general Junot, and Sir Arthur WELLESLEY was sent with troops, 1808; won decisive battle of *Vimeiro*, 1808, and Convention of Cintra was made, by which French evacuated Portugal; this constituted the first successful opposition to Napoleon on land. NAPOLEON made his bro. Joseph king of Spain, 1808, with consent of its king, Charles IV., but people revolted and forced Dupont to make *Capitulation of Baylen* (1808), by which 18,000 Fr. soldiers surrendered; every town which French retained had to be garrisoned; Napoleon himself led army of 135,000 men, and occupied Madrid, December 13, his marshals winning battles of *Burgos*, *Espinosa*, and *Tudela*.

SIR JOHN MOORE, who had superseded Wellesley, made *sortie* from Portugal to divert Napoleon from Andalusia; Napoleon turned to attack Moore, who then made famous retreat in bitter weather, fighting as he went; Napoleon, recalled to France, left Soult in command; SOULT overtook British at *Corunna*, and Moore was killed in great battle which covered embarkation of his troops, January 16, 1809. Soult then invaded Portugal and captured Oporto while other Fr. armies busily reduced Span. fortresses; Brit. reinforcement sent under Wellesley expelled French and invaded Spain, winning battle of *Talavera*, July 28; French succeeded in capture of Andalusia.

Napoleon dispatched MASSÉNA to conquer Portugal, 1810; he entered from N.E., while Soult attacked from Andalusia, a plan which failed from disagreement of the two generals. Wellesley, now Viscount WELLINGTON, was at first compelled to retreat before Masséna, and took up position behind *Torres Vedras* near Lisbon. Masséna, who received no help from Soult, was not strong enough to attack separately, and endured great hardships as Portuguese had laid waste country round; he retreated into Spain, 1811, but returned and was defeated by Wellington at *Fuentes de Onor*, May 5, 1811; Beresford won battle of *Albuera* against Soult's invading army, May 16. Wellington then invaded Spain, and Masséna, out of favour, was recalled; France remained successful in E., and defeated Brit. force under Blake at *Albufera*.

Under MARMONT, Masséna's successor, France lost *Ciudad Rodrigo*, January 1812, and *Badajoz*, April, thus opening Spain to Portug. attack; by great victory of *Salamanca*, July 22, Wellington compelled Joseph Bonaparte to fly from Madrid and evacuate Andalusia; Wellington occupied Madrid, August 12, but was forced to retire; Brit. troops sent to make diversion on E. coast signally failed. While Napoleon was fighting life and death struggle in Germany, 1813, Wellington succeeded in establishing himself between Madrid and France, and prevented Joseph Bonaparte crossing the Ebro, defeating his general, Jourdan, at *Vittoria*, June 21, 1813. Wellington then assisted Spanish in expelling French, fought several engagements in Pyrenees, and invaded France, October 1813; victories of *Orthez* and *Toulouse*, 1814; *Peace of Paris*, 1814.

Hutchinson, *Operations in the Peninsula, 1808–9* (1905).

PENIS, see REPRODUCTIVE SYSTEM.

PEÑISCOLA (40° 24′ N., 0° 25′ E.), fortified town, Spain, on Mediterranean. Pop. 3000.

PENITENTIAL, Catholic book imposing and regulating penances due for sin. It began with the discipline of the 'lapsed,' those who had fallen away during persecution. Various p's were compiled; the *Pœnitentiale Theodori* became the standard; owing to the development of canon law on the subject, p's were disused after XII. cent.

PENJDEH, see PANJDEH.

PENKRIDGE (52° 44′ N., 2° 7′ W.), town, on Penk, Staffordshire, England.

PENMARCH (47° 50′ N., 4° 25′ W.), decayed fishing town, Finistère, France.

PENN, WILLIAM (1621–70), Eng. admiral; distinguished as general at sea with Blake against Holland, 1653; took Jamaica, 1655; served against Holland with Duke of York, 1665.

PENN, WILLIAM (1644–1718), Eng. Quaker; founder of Pennsylvania; s. of Admiral Sir William P.; ed. at Christ Church, Oxford; sent down for nonconformity, 1661; led gay court life in Paris, 1661–64; attended Quaker meetings at Cork, 1667, and was imprisoned; speedily released, but henceforth a confirmed Quaker; preached in 1668, and was imprisoned, 1668–69, for publishing *Sandy Foundation Shaken* without licence; twice imprisoned, 1670–71; assisted Quakers to settle in New Jersey, 1676 onwards, and negotiated purchase of the colony.

In March 1680–81 P. received, for quitclaim of crown debt, province called *Pennsylvania* after his father, and

in 1682 received from Duke of York province afterwards called Delaware. P. immediately drew up constitution for the province, of which he was to be gov. as well as proprietor; its system of gov., council, and assembly was very similar to that of other colonial governments, but no oaths were to be taken and all forms of Christian religion were to be tolerated. P. landed, made treaty with the Indians, founded Philadelphia, and promulgated the 'Great Law' before close of 1682. The Great Law made swearing, drunkenness, incontinence, together with various amusements, punishable offences. Emigrants flocked in large numbers. P. visited England, 1684, and in 1686 obtained from James II. release of religious prisoners. He pleaded cause of fellows of Magdalen Coll. with king. Suspected of Jacobitism, he was deprived of governorship of Pennsylvania, 1692, but restored, 1694; returned to his colony, 1699–1701, and settled political disputes. These broke out again after his departure for England, and the colony proved unable to support expense of its own government; imprisoned for debt, 1707, and mortgaged the colony. P. was a fine-looking man, religious without rant, but without talent as administrator. See PENNSYLVANIA.

Fisher, *True William Penn* (1900); Colquhoun Grant, *William Penn* (1907).

PENN YAN (42° 40′ N., 77° 5′ W.), town, on Keuka Lake, New York State, U.S.A.; paper-mills. Pop. (1910) 4597.

PENNA, see PALÆOGRAPHY.

PENNANT, THOMAS (1726–98), Welsh zoologist and antiquary.

PENNAR, NORTH, PENNER, PINAKINI (13° 23′ N., 77° 43′ E.), river, India; enters Bay of Bengal below Nellore.

PENNAR, SOUTH (13° 32′ N., 77° 45′ E.), river, India, falls into Bay of Bengal near Fort St. David.

PENNE (42° 30′ N., 13° 55′ E.), town, Teramo, Italy; ancient *Pinna;* bp.'s see. Pop. 4500.

PENNINE CHAIN (54° 15′ N., 2° 25′ W.), range of hills stretching from Cheviot Hills to the Peak in Derbyshire, and forming one of chief watersheds in England; principal heights, Cheviot (2676 ft.), Crossfell (2930 ft.), Whernside, and Ingleborough.

PENNON, see FLAG.

PENNSYLVANIA (40° N., 77° 30′ W.), North Atlantic state of U.S.A.; bounded N. by Lake Erie and New York, W. by Ohio and W. Virginia, S. by Delaware, Maryland, and W. Virginia, E. by New Jersey and New York; length (E. to W.), *c.* 300 miles; breadth, 158 miles; area, 45,215 sq. miles; coast-line of 45 miles on Lake Erie.

Surface is varied; traversed from N.E. to S.W. by parallel ranges belonging to Appalacian system, viz. Alleghany Mts. (Western Range, *c.* 2500 ft.), Blue Ridge or South Mts. (Eastern Range); secondary ranges are Savage Mts., Wyoming Mts., Bald Eagle, Mauch Chunk, etc.; extensive Alleghany plateau (with general elevation 1000–2000 ft.) in W., with Pocono Mountain in N.E.; country flat in S.E.; several fine fertile valleys (Susquehanna, Wyoming, Cumberland, etc.). Geologically P. belongs mainly to the Archæan and Palæozoic periods. Numerous rivers have fine waterfalls; Delaware, Susquehanna, Ohio, Allegheny, Juniata, Lehigh, Lackawanna, Schuylkill, Monongahela; no lakes. Climate is healthy, but inclined to extremes; especially fine in S.E. province; valleys exceedingly hot; mean annual temperature of S.E. province, *c.* 52° F.; central province, *c.* 50° F.; average annual rainfall, *c.* 44 inches. Fauna includes deer, lynx, black bear, minx, fox, weasel, raccoons, skunk, porcupine, opossum; birds include bald eagle, hawk, turkey-vulture, quail, pheasant, grouse, thrush, woodpecker. There are extensive forests, trees including pine, hemlock, elm, birch, maple, cedar, willow, ash, poplar, chestnut, magnolia, pawpaw, wild cherry.

History.—First settlement was made by Swedes, 1643; taken by Dutch, then English; colonised by Quakers under William Penn (*q.v.*), who was made proprietor by Charles II., 1681. Several disputes arose concerning boundaries of Maryland, Virginia, and New York; Quaker rule ceased, 1764, and Scots-Irish pioneers predominated; great influx of immigrants (German, English, Dutch, Swedes, etc.). P. took a leading part in the War of Independence and Civil War. First Continental Congress met at Philadelphia, 1774; Scots-Irish rebellion against Federal excise tax, known as 'Whisky Insurrection,' 1794. P. was an original state of the Union; called 'Keystone State,' being the 7th of the 13 states.

P. is administered by gov. and General Assembly consisting of Senate (50 members, elected for 4 years) and House of Representatives (204 members, elected for 2 years). The state has 2 Senators and 36 Representatives in Congress, and is divided into 67 counties. Principal towns are: Harrisburg (capital), Philadelphia, Pittsburgh, Scranton, Reading, Erie, Wilkesbarre. Roman Catholics predominate; then Methodists, Lutherans, Presbyterians. Elementary education is compulsory; several univ's, colleges, and other institutions—Univ. of P. (at Philadelphia, non-sectarian), Lehigh Univ. (Bethlehem, non-sectarian), Lincoln Univ. (Presbyterian), Lafayette Coll. (Easton), Pennsylvania State Coll., Dickinson Coll., Westminster Coll., etc. Railway mileage is *c.* 12,000 miles.

P. is an important mining and agricultural state; principal products are maize, wheat, oats, rye, tobacco, fruit, potatoes, timber, live-stock, wool; important manufactures of iron and steel ware, machinery, railway carriages, shipbuilding, textiles, carpets, leather, glass, flour, sugar and petroleum refining, printing and publishing; extensive anthracite and bituminous coal mines; also petroleum natural gas, iron ore, pig iron, quarries, and brickworks; output of coal (1910), 231,966,070 tons. Pop. (1910) 7,665,111.

Legislative Handbook and Manual of the State of P. (1911); Sharpless, *Quaker Government in P.*

PENNSYLVANIA, UNIVERSITY OF, was founded as Charity School in Philadelphia, 1740, under influence of Franklin, who had become leader of Philadelphian intellectual life. Franklin became president of board of trustees (1749), who in 1750 purchased New Building, in 1751 opened elementary school, obtained charter, 1753, and further charter, 1755, incorporating the Coll., Academy, and Charitable School of the province of P.; property confiscated by state, 1779, when Univ. of P. was incorporated; restored, 1780, but amalgamated with the Univ., 1791.

PENNYROYAL (*Mentha pulegium*), a species of Mint; grows on damp moors, and has a well-known scent; a popular medicine.

PENRHYN, GEORGE SHOLTO GORDON DOUGLAS-PENNANT, 2ND BARON (1836–1907), s. of Colonel Edward Gordon Douglas, first Lord P.; Conservative M.P. for Carnarvonshire, 1866–68 and 1874–80; refused to recognise quarrymen's trade union at P. slate quarries, North Wales.

PENRITH (54° 41′ N., 2° 45′ W.), town, Cumberland, England; has ruined castle and old grammar-school; manufactures beer, leather. Pop. (1911) 8973.

PENRITH (33° 45′ S., 150° 44′ E.), town, New South Wales, Australia. Pop. *c.* 5000.

PENRY, JOHN (1559–93), Welsh Puritan leader; preached in Wales; incurred enmity of Abp. Whitgift; executed on charge of sedition.

PENRYN (50° 10′ N., 5° 7′ W.), port, Falmouth Bay, Cornwall; manufactures paper, gunpowder; exports granite; imports coal, timber. Pop. (1911) 3092.

PENS of metal superseded quill, *c.* 1840, though they were known as early as Rom. era; reed pens similar to those used in ancient times are still used by Persians, while Chin. and Japanese characters demand a fine brush. When wax tablets were used for paper, wooden *stylus* was employed to incise characters. Birmingham is centre of Brit. pen manufacture; about 200,000 gross of pens per week are made in Britain.

PENSACOLA (30° 27′ N., 87° 23′ W.), city, capital

of Escambia County, Florida, U.S.A., situated on P. Bay; possesses good harbour, well defended by several forts; has large shipping trade, foundries, and mills; founded *c.* 1700 by Spaniards. Pop. (1910) 22,982.

PENSHURST (51° 12′ N., 0° 12′ E.), village, Kent, at confluence of Eden and Medway; Sir Philip Sidney's birthplace.

PENSION, annual payment, generally to superannuated servant of public body. The Brit. Crown had unrestricted right of granting perpetual p's till 1887, when it was enacted that consent of Parliament should in future be obtained for appropriation of public funds for this purpose, and policy was adopted of terminating existing p's by buying off tenants for life. These payments were important as enabling the Crown to secure a parliamentary party; hence statutes of 1707 and 1716 to disqualify holders of p's from sitting in House of Commons; civil servants have since been made exempt from this disqualification. By statutes 1 & 2 Vict. £1200 yearly was set apart for p's to be granted for need and merit, with parliamentary approval. Superannuation Acts, 1834 and 1859, provide for p's of permanent Civil Service; special provision for colonial governors, 1865, 1872, 1889; for persons in Diplomatic Service by statute 32 & 33 Vict.; and for politicians by Political Offices Pension Act, 1869. Police Acts, 1890 and 1893, provide for p's of borough police; Poor Law Officers Superannuation Acts, 1896 and 1897, provide for Poor Law officers. P's are also paid to school teachers on superannuation. P's may be paid to superannuated or incapacitated clerks in orders of Church of England from revenues of cure they leave. Army and Navy p's are regulated by Pensions Act, 1839, Pay and Pensions Act, 1865, Pensions Commutation Acts, 1871, 1882, Pensions and Yeomanry Pay Act, 1884. See OLD AGE PENSIONS.

PENSIONARY, leading magistrate of civic corporations of Netherlands. The position was remunerative, but was annulled in 1795. The pres. at the time of the republic was called *Grand P.*

PENTAMETER, verse with five metrical feet (*e.g.* Blank Verse or *Iambic P.*), as—

'The qual | ity | of mer | cy is | not strained.'

PENTAPOLIS, see CYRENAICA.

PENTASTOMIDA, see ARACHNIDA.

PENTATEUCH, term applied to Mosaic books, *Genesis* to *Deuteronomy* (qq.v.) inclusive.

PENTECOST, ancient Jewish festival, in celebration of ingathering of harvest. It lasted fifty days, whence its name (Gk. for 'fifty'). In later portions of Pentateuch full ritual directions are given for its observances. See WHITSUNDAY.

PENTELICUS (38° 2′ N., 23° 55′ E.), mountain, Attica, Greece; modern Mendeli; marble quarries.

PENTHESILEA, queen of Amazons (*q.v.*); slain by Achilles.

PENTSTEMON, genus of plants, order Scrophulariaceæ; native of America, but cultivated in Brit. gardens; flowers of great beauty, e.g. *P. Hartwegi*, a scarlet flower.

PENUMBRA, see ECLIPSE.

PENZA.—(1) (*c.* 53° 45′ N., 44° 30′ E.) government, E. Russia; area, 14,997 sq. miles; watered by tributaries of Don, Oka, and Volga; produces grain; manufactures flour, leather, woollens. Pop. (1910) 1,803,900. (2) (53° 10′ N., 45° 3′ E.) chief town of above, at junction of Sura and Penza; paper- and flour-mills. Pop. (1910) 69,040.

PENZANCE (50° 7′ N., 5° 33′ W.), municipal borough, seaport, market town, and popular watering-place, Cornwall, England; beautifully situated on shores of Mounts Bay; has handsome public buildings, esplanade, and extensive harbour; chief industries, fishing and market-gardening. Pop. (1911) 13,488.

PEONY, PÆONY (*q.v.*).

PEORIA (40° 41′ N., 89° 36′ W.), city, Illinois, U.S.A., on Illinois River at end of Peoria Lake; contains some notable buildings; chief industries, distilling, brewing, slaughtering, and meat-packing; has many important manufactures; shipping point for grain and coal. Pop. (1910) 66,950.

PEPE, GUGLIELMO (1783–1855), Neapolitan soldier; supported Murat, but accepted Bourbon restoration; exiled, 1821; commanded against Austria, 1848–49, showing great skill and courage in defence of Venice; wrote accounts of events of time.

PEPIN, see PIPPIN.

PEPPER is, properly speaking, the product of unripe berries of *Piper nigrum*, a tropical shrub of climbing habit. Both black and white p. of commerce are derived from the same plant; the latter's loss of colour being due to removal, by maceration, of dried skin. The leaves of an allied form, *P. Betle*, are chewed by Asiatics, with areca-nut and a little lime, as a preventive of dysentery.

PEPPER, WILLIAM (1843–98), Amer. physician; prof. of Clinical Med. (1876) and of Theory and Practice of Med. (1887) at Univ. of Pennsylvania; author of valuable *System of Medicine*, and of other medical works.

PEPPERMINT (*Mentha piperita*), member of Labiatæ, with smooth stem and stalked ovate leaves, yielding, on distillation, an oil used medicinally and also in flavouring. For this purpose the upper parts of the plant, including the flowers, are cut in August, and left to dry on the ground before treatment. The cheaper kinds of p. cordial are not prepared from the plant extract, but are derived from an artificial substitute with similar properties.

PEPSIN, a ferment or enzyme obtained by drying the fresh stomach of a pig, sheep, or calf; consists, as med. employed, of a pale yellow-brown powder or translucent scales; used to assist gastric digestion in debilitated conditions or to predigest albuminous food. See DIGESTION.

PEPTONES, see under DIGESTION.

PEPYS, SAMUEL (1633–1703), Eng. diarist; b. London (probably); ed. Huntingdon, St. Paul's, Cambridge Univ.; m. Elizabeth St. Michel, a young girl, 1655; app. Clerk of the Acts of the Navy, 1660, and Sec. to the Admiralty, 1673. He was imprisoned in Tower, 1679, on charge of selling information to French. Though acquitted, he lost his post. Reappointed, 1684, he held his office till 1689. His *Diary*, begun 1659, was in cypher, and was never intended for publication. Hence he wrote freely of his thoughts, his vices, his domestic affairs; he noted down all the scandal he heard. It is invaluable as a source of information concerning XVII.-cent. manners. It stops short at May 1669. It was deciphered by Smith and pub. 1825. P. also wrote *Memoirs of the Navy* (1690).

Lord Braybrooke, *Memoirs of P.* (1825); J. Smith, *Life, Journals, and Correspondence of P.* (1840); Wheatley, *Samuel P. and the World he Lived in* (1880), *Samuel P., Citizen and Clothworker* (1897).

PERA, see CONSTANTINOPLE.

PERAK, see MALAY STATES.

PERAMELES, see BANDICOOT.

PERCEPTION, apprehension of particular objects present to sense. See PSYCHOLOGY.

PERCEVAL, hero of Arthurian legends; Celtic variant of wide group of legends (cf. Romulus, Siegfried); first version extant, *Syr Percyvelles of Galles*; later became hero of Grail search, supplanting original Gawain, and himself supplanted later; Chrétien de Troyes' *Perceval, Conte del Graal*, first Perceval-Grail poem; later best-known versions, Wolfram von Eschenbach's *Parzival*, Wagner's *Parsifal*, and Tennyson's *Morte d'Arthur*; see *The Legend of Sir Perceval* (Grimm Library, xvii.).

PERCHE, ancient division, France, corresponding generally to departments of Eure-et-Loire and Orne; capital, Mortagne.

PERCHES (*Percidæ*) include about 90 forms, confined to the fresh waters of the northern hemisphere; excellent game fishes, highly esteemed as food. The Common Perch (*Perca fluviatilis*) is the best known of the two Brit. species. The large PIKE-PERCH or ZANDER (*Centrokumus lucioperca*) is a central European game fish.

PERCUSSION CAPS, see under FULMINIC ACID.

PERCY, Eng. family, founded by WILLIAM DE PERCI, who held lands in Yorkshire and Lincolnshire at time of Domesday Survey. His male line died out in co-heiresses, but descendants of his grand-dau., Agnes, assumed name of P.; of this second house, HENRY PERCY was made Earl of Northumberland, 1377; direct line extinguished, 1670, on death of Joceline, 12th Earl of Northumberland. His dau. and heir, Elizabeth, m. 6th Duke of Somerset; her grand-dau., Elizabeth, m. Sir Hugh Smithson, ancestor of third and present house of P.

PERCY, SIR HENRY, HOTSPUR (1364–1403), Eng. noble; c. s. of Earl of Northumberland; gov. of Berwick and warden of Scot. Marches; commanded against Scots at *Otterburn*, 1388 (probably the *Chevy Chase* of later ballad); aided in deposition of Richard II.; fought at *Homildon Hill*; slain at *Shrewsbury* in revolt against Henry IV.

PERCY, THOMAS (1729–1811), bp. of Dromore, 1782.

PERDRIX, see PHEASANT FAMILY.

PERE DAVID'S DEER (*Cervus davidianus*), a species of deer kept in semi-captivity in the imperial park at Peking; probably a native of northern China. Small in size, its lack of a brow-line distinguishes it from other Old-World deer.

PEREDA, JOSÉ MARIA DE (1833–1906), Span. novelist; b. at Polanco; apostle of Realist School of Spain. He is perhaps most successful in his descriptions of fisher life, viz. *Sotileza* and *La Puchera*.

PEREGRINE, a member of Hawk Family (*q.v.*).

PEREKOP (46° 8′ N., 33° 40′ E.), town, Taurida, Russia, on isthmus of P.; formerly important fortress. Pop. 5600.

PERENNICHORDATA, an order of Tunicata.

PEREYASLAVL.—(1) (56° 43′ N., 38° 54′ E.) town, Vladimir, Russia, on Lake P.; linen-mills; fisheries. Pop. 9000. (2) (50° N., 31° 30′ E.) town, gov. Poltava, Russia, near Dnieper. Pop. 15,000.

PEREZ, ANTONIO (*c.* 1539–1611), Span. statesman; Sec. of State, 1564; had John of Austria's envoy murdered to please king, 1578; John secured his condemnation, 1581; P. escaped to Aragon; protected by Aragonese against king and Inquisition; escaped from Spain, but Aragon lost its liberties.

PERFUMES, fragrant odours or substances which are manufactured to emit them. They may be natural or artificial. Natural p's are plant products, except musk, ambergris, and civet. Artificial p's (alcoholic solutions) embrace pomades, scented soaps, hair oil, etc. Flowers for perfumes are grown at Grasse near Cannes, *e.g.* violets, jonquils, roses, orange-flowers, thyme, rosemary, myrtle, tuberoses, jasmine, lavender, geranium. The perfumes are obtained by pressing, extraction with a solvent, distillation, maceration in melted fat, or 'enfleurage,' *i.e.* absorption by cold fat.

Analysis of perfume essences has been followed by the artificial compounding of perfumes; thus essence of jasmine has been made. Partially or wholly synthetic perfumes are now elaborated; *e.g.* oil of bitter almonds is benzaldehyde; oil of winter-green is methyl-salicylate; coumarin, or essence of new-mown hay, is coumaric anhydride; vanillin, or essence of vanilla, is protocatechuic aldehyde methyl-ether; heliotropine, or heliotrope perfume, is protocatechuic aldehyde methylene-ether; artificial musk is trinitro-butylxylene; white lilac scent is terpineol, made from oil of turpentine; artificial violet perfume is ionone, made from oil of lemons.

Askinson, *Perfumes and their Preparation* (1907).

PERGA (37° N., 30° 55′ E.), ancient city, Asia Minor; seat of worship of Artemis; visited by St. Paul.

PERGAMUM, PERGAMUS (modern *Bergama*), ancient city of Mysia; known from beginning of V. cent. B.C. Philetærus, a eunuch, seized treasures of P. and founded small kingdom (283). Attalus I., who succeeded 241, took title king, with three successors preserved friendship with Rome; Attalus III. (d. 133 B.C.) left P. to Romans. P. became capital of Rom. province, Asia, and was one of the Seven Churches. Excavations 1878–86 revealed fine sculptures.

PERGOLESI, GIOVANNI BATTISTA, PERGOLESE (1710–36), Ital. composer; studied at Naples under Greco and Durante; composed two masses for double chorus, *Stabat Mater*; operas, *La Serva Padrona*, *La Sallustia*, *L'Olimpiade*, etc.

PERIANDER (ruled, 625–585 B.C.), tyrant of Corinth, and one of *Seven Sages of Greece*; destroyed possible rivals, and made Corinth famous.

PERIANTH, see FLOWER.

PERICARDIUM, see HEART.

PERICENTRE, see ANOMALY.

PERICLES (499–429 B.C.), Athenian statesman of 'golden age'; descendant of Alcmæonidæ; attended lectures of Anaxagoras, Protagoras, and Zeno, and acquired powers of oratory and cultivated well-balanced mind. On death of Aristides, c. 468, P. assumed leadership of democrats against oligarchic party under Cimon, but stooped to no demagogic arts; supreme after banishment of Cimon, 461. He and Ephialtes took judicial power from Areopagus and council of 500 and gave it to *dicastai*, chosen from citizens, who received small payment. The P. age was a time of tremendous activity; Athenian Empire was extended; seat of Delian League was transferred from Delos to Athens, but in 445 Athens was forced to abandon to Sparta claim to hegemony over Greece on land; Thucydides was exiled, 443, for attack on imperial policy. During 'the age of P.' a new town was built at Peiræus (*q.v.*); glorious temples and theatres (Parthenon, etc., see ATHENS) were raised by architects, Ictinus, Callicrates, Coræbus, and Mnesicles, and adorned by Phidias the sculptor and Polygnotus the painter; Sophocles and Euripides wrote their plays. The terrible Peloponnesian War broke out, 431; already the threat of storm had caused exile of Anaxagoras and death of Phidias and Aspasia, P.'s brilliant mistress; nevertheless P. conducted resistance to siege, 431–430; one of the world's greatest and noblest statesmen.—Evelyn Abbot, *Pericles* (1891).

PERIDINIALES, sub-class of Mastigophora (*q.v.*).

PERIDINIUM, see under MASTIGOPHORA.

PERIDOTE, gem-stone, variety of green olivine; transparent; shades of olive or leek green; found in Brazil, Ceylon, and Egypt; soft and difficult to polish.

PERIDOTITE, group of basic plutonic rocks of deep-seated origin; colours—mostly dark; several varieties, including dunites (which contain much olivine, and are granular); others contain augite, hornblende, or biotite; named after mineral they contain as hornblende-peridotite, etc.

PÉRIER, CASIMIR PIERRE (1777–1832), Fr. statesman and banker; criticised financial policy at Restoration; minister, 1831, and established the *juste milieu* between conservatism and democracy; descendants took name Casimir-Périer.

PERIGEE, see APOGEE.

PÉRIGORD, former province of France; now forms department of Dordogne and part of Gironde; old capital, Périgueux.

PÉRIGUEUX (45° 11′ N., 0° 44′ E.), town, on Isle, France; capital of Dordogne department; has St. Front cathedral (984–1047), and fine Rom. remains (baths, aqueduct, etc.); woollens, ironware, furniture, etc.; famous Pâtés de Périgueux. Pop. 28,300.

PERIGYNOUS, see FLOWER.

PERIHELION, see ANOMALY.

PERIM (12° 38′ N., 43° 20′ E.), small Brit. island in Strait of Bab-el-Mandeb; coaling station.

PERIM, PIRAM (21° 38′ N., 72° 24′ E.), island, in Gulf of Cambay, India.

PERINTHUS, HERACLEA PERINTHUS (40° 57′ N., 27° 58′ E.), ancient city, on Propontis, Thrace; modern Eski Eregli.

PERIODICALS. — While newspapers are concerned with the news of the moment, periodicals, which include magazines and reviews, are chiefly devoted to lighter reading for the entertainment or instruction of their readers. The *reviews*, one of the earlier forms of the magazine, are mainly of a literary, political, and critical character. In the pioneer journals, as in those of the present day, were found the contributions of eminent writers who found in their pages a convenient medium for the expression of their views. Reviews stand in a class by themselves, and as a rule leave the lighter forms of lit. to the magazines. In the latter a great development has taken place. At one time Brit. magazines were pre-eminent on both sides of the Atlantic, but there came a period when the best of the magazines in the U.S.A. surpassed those of the U.K. in enterprise, in excellence of typography, and in beauty of illustration. That superiority is now more disputed, not because American publications have become less attractive, but because Brit. publishers have responded to the stimulus of powerful competition.

Most of the first attempts to establish reviews and magazines met with small success. The cost of production was high, the machinery crude, and the readers few. The *Weekly Memorials for the Ingenious*, dated 1681, existed only for a year, and its immediate successors were not more fortunate. There were also the *Gentleman's Magazine*, founded in 1731, the *Scots Magazine* (afterwards the *Edinburgh Magazine*), and the *British Critic*, which managed to keep alive from 1793 to 1843. The *Edinburgh Review* (1802) and its great rival, the *Quarterly Review* (1809), were the outcome of political exigencies, and commenced a new era in magazine history. The *Edinburgh* stood for Whig principles, and the *Quarterly* was the organ of the Tories. Another still existing journal, the *Westminster Review*, was founded in 1824 to represent radicalism. The *Fortnightly Review*, founded in 1865, is published monthly. The *Contemporary Review* first appeared in 1866, and the *Nineteenth Century* in 1877.

Blackwood's Magazine, founded in 1817, set up a new ideal, and demonstrated the possibilities of this form of publication by opening its brilliant pages to fiction, verse, travel, and adventure, as well as to combative politics. Other notable ventures were *Fraser's Magazine* (afterwards *Longman's*), *Tait's Edinburgh Magazine*, and *Bentley's Miscellany*, which was incorporated with *Temple Bar*. *Cornhill*, *Country Life*, *The Field*, *Engineering*, *Badminton*, and *Cassell's* are typical of various classes.

No more remarkable departure took place than that represented by the production of *Chambers's Journal* (1832), published weekly, and also in monthly parts. That and similar journals provided general reading of the highest class and at a popular price.

In the early eighties the illustrated magazines began to appear. The *English Illustrated Magazine* (1883) was the first to challenge Amer. supremacy in this department. Among others are the *Strand Magazine* (1891), the *Pall Mall Magazine* (1893), *Pearson's Magazine*, the *Royal Magazine*, the *Windsor Magazine*, and *Nash's Magazine*. Several magazines devote themselves entirely to fiction, such as *Everyone's Story Magazine* and *The New Magazine*.

The success of *Tit-Bits*, started in 1881, led to the foundation of numerous penny weekly journals, which deal in interesting scraps. A later development for the increase of circulations has been the conduct of guessing, verse-making, and other competitions, in which large sums are given as prizes, usually made up by the entrance money of the competitors.

Of the thousands of Amer. periodicals and magazines the best known in Britain are *Harper's*, *Scribner's*, *M'Clure's*, *Munsey*, and the *Century*.

Probably the most famous foreign magazine is the French *Revue des Deux Mondes*.

PERIŒCI, ancient Laconian tribe; occupied mountainous country; unlike Helots (*q.v.*) they were free, but had no voice in government; subject to Spartiates, who oppressed them.

PERIOSTEUM, see BONE.

PERIPATETICS, name given to Aristotle's disciples, supposedly from his habit of walking to and fro as he lectured. The chief P's were Theophrastus, Eudemus, Dicæarchus, Critolaus, and Strato of Lampsacus. This school retained its influence longer than any other school of antiquity, and gave to the Church a more effective means of regulating the scholastic philosophy.

PERIPATUS (Class *Onychophora*, amongst Arthropods), caterpillar- or worm-like Arthropods, with beautiful brown or dark green velvety skin and long body borne on from seventeen to forty-three pairs of dumpy, unjointed legs; of great interest as forming a link between Arthropods and Worms. The head, which is not marked off from the body, bears two exceedingly mobile and sensitive antennæ, at the bases of which lie the eyes; respiration is carried on by tracheæ with scattered openings to the exterior, and the rejection of waste products by paired nephridia segmentally arranged, although there is no trace of segments on the exterior of the plump body.

The species of Peripatus are shy, night-loving creatures, and during the day lurk beneath stones, bark, etc., where there is sufficient moisture. They move slowly (but for the jaws, striped muscle being entirely absent), sensing every step of the way with their antennæ. They feed on insects, which they capture with a gummy substance secreted in a pair of oral papillæ. The distribution of the 50 or 60 species of Peripatus is remarkable. They are found only in the southern hemisphere, and there in far separated groups, each group showing similarities within its own limits; South America has many species widely spread; Africa has representatives in Cape of Good Hope and on the Congo; others occur in Australasia from Malay Archipelago to New Zealand; and one has recently been discovered on the N.E. frontier of India.

PERISSODACTYLA, ODD-TOED UNGULATES, a sub-order of *Ungulata*, comprising Tapirs, Horses, and Rhinoceroses. They are characterised by the presence of an odd number of toes in each foot, except in the fore-feet of Tapirs, where there are 4 digits; but in all cases the middle or third digit is larger than the others, and lies in line with the central axis of the limb as a whole. The middle digit is usually accompanied only by the second and fourth; the first is never present in living forms. All the back teeth are similar, and there are never less than 23 dorso-lumbar vertebræ; horns, if present, are not paired, but in the median line of the skull; femur has third trochanters; stomach is simple. There are many fossil forms dating from earliest Tertiary times.

PERITONITIS, inflammation of the peritoneum, or lining membrane of the abdominal and pelvic cavities, which may be localised or diffuse. It is caused by various micro-organisms, and an attack is usually brought on by exposure to cold or wet, general debility, or is associated with injury or disease of some abdominal organ. *Acute diffuse p.* is characterised by persistent vomiting, pain and tenderness in the abdomen, which is usually swollen because of the distended intestines, while there is generally constipation. The temperature is raised and the pulse rapid. The abdominal muscles are rigid, and the patient lies with an anxious expression and his knees drawn up. If the p. is due to sudden perforation of a hollow organ there is profound shock at first, recovered from three or four hours later. The only treatment of any value is by surgical interference, the abdomen being opened, irrigated, and drained.

Acute localised p. may be suppurative or non-suppurative, and occurs in lesions when the peritoneal

cavity has been shut off by fibrinous adhesions between the intestines and other parts. The symptoms resemble diffuse p., if somewhat less severe, and a distinct tumour can be felt at the affected part. The treatment is rest, sips of hot water, and the application of hot fomentations. Incision into the abdominal cavity and drainage may be necessary. *Tuberculous p.* is more common in children; the general health is low, there is wasting, and constipation alternates with diarrhœa. The treatment is by general hygiene, and feeding up on cod-liver oil, malt extract, and the like. Incision into the abdomen, without any drainage or irrigation, often cures all but the advanced ulcerous type.

PERIWIGS, see HAIR.

PERIWINKLE, see GASTEROPODA.

PERJURY is false swearing, at a judicial proceeding, and before a competent authority, by a person knowing it to be false. It must be material to the case being tried, that is, it is p. when the false swearing is explanatory of the case. The maximum punishment for p., or for procuring a person to commit p., is seven years' penal servitude.

PERKIN, SIR WILLIAM HENRY (1838–1907), Eng. chemist; pupil of Hofmann; prepared aniline black and mauve (1856) by oxidising aniline, laying foundation of coal-tar colour industry; condensed aldehydes with fatty acids; studied magnetic rotation.

PERLEBERG (53° 4′ N., 11° 51′ E.), town, on Stepenitz, Brandenburg, Prussia. Pop. (1910) 9665.

PERLIS, see MALAY STATES.

PERLITE, PEARLSTONE, glassy volcanic rock of pearly lustre; consists of silicate of aluminium, iron, lime, and alkali in varying quantities; occurs in spherules.

PERM, government of Russia, eastern part of which lies in Siberia; area, *c.* 128,200 sq. miles; Ural Mts. cross government from N. to S.; much of the surface covered by forests; chief rivers are Kama, Tobol, and Pechora; capital, Perm; P. is rich in mineral wealth, producing iron, silver, copper, platinum, nickel, lead, manganese, rare metals, and precious stones. Leading industries are agriculture, cattle-rearing, and mining. Pop. *c.* 4,000,000.

PERM (58° 1′ N., 56° 32′ E.), river-port, on Kama, chief town of P. government, Russia; tanneries; transit trade. Pop. (1910) 48,800.

PERMIAN, series of strata which, in U.K., rest unconformably on the Carboniferous system; grouped as follows: Upper Red Sandstone; Magnesian limestones; Marl Slate; Lower Red Sandstone and Mottled Sandstone. Lower Red Sandstone is found in Devonshire, Staffordshire, Cheshire, and Lancashire, Westmoreland and Cumberland. Magnesian limestone is the most important constituent of the P. series, and is highly fossiliferous as compared with the other groups.

In Germany the P. series consist of two groups, the Zechstein and Kupferschiefer and the Rothliegendo. The former represent the Upper Strata (Magnesian limestones and Upper Red Sandstones) and the latter the Lower (Marl Slate and Lower Red Sandstones).

In Russia the P. is well developed between the Ural Mt's and Moscow; especially well seen at town of Perm, hence its name. The life of the P. period included ferns and conifers, polyzoa (fossils found in the Magnesian limestones), brachiopods, lamellibranchs, and gastropods (fairly numerous), and some varieties of fish.

PERMUTATIONS AND COMBINATIONS, see COMBINATORIAL ANALYSIS.

PERNAMBUCO (9° S., 39° W.), state, N.E. Brazil; area, 49,573 sq. miles; surface broken and mountainous; fertile and wooded district along coast; chief river, San Francisco; capital, Recife (or Pernambuco). First settlements were made XVI. cent. P. has been scene of many revolutions. State is chiefly agricultural; sugar, coffee, cotton, tobacco, and fruits cultivated; manufactures, cotton, sugar, rum, and cigars. Pop. (1890) 1,030,224; (estimated 1910) 2,190,000.

PERNAU, PERNOV (58° 22′ N., 24° 34′ E.), seaport, watering-place, Russia; exports flax. Pop. 20,000.

PERNE, ANDREW (1519–89), dean of Ely, 1557.

PERNIS, HONEY BUZZARD, see HAWK FAMILY.

PEROGNATHUS, Pocket Mice, see POCKET GOPHERS.

PÉRONNE (49° 55′ N., 2° 56′ E.), town, Somme, France; captured by Germans, 1871. Pop. 4600.

PEROSI, LORENZO (1872–), Italian priest and musical composer; most famous works, *Resurrection of Lazarus* and *Passion of Christ*.

PÉROUSE, see LA PÉROUSE.

PEROWNE, JOHN JAMES STEWART (1823–1904), bp. of Worcester, 1891–1901; Old Testament scholar.

PERPENDICULAR, see ARCHITECTURE (GOTHIC).

PERPETUAL MOTION, generally used with reference to a machine which, when once set in motion, will continue moving for ever without assistance from any outside source of energy. Much ingenuity has been expended upon the problem of constructing such machines, but with establishment of the principle of the conservation of energy the impossibility of a p. m. has been realised. The initial energy of a p. m. machine is gradually used in overcoming resistance and friction, and therefore the machine must stop after a time if no further energy is imparted to it. If all friction and resistance could be avoided, a body such as a simple pendulum or a spinning top would retain for ever motion given to it, but only on condition that it was not made to act on other bodies—that is, to do any work; so that even if practicable, it would be of no utility.

PERPIGNAN (42° 43′ N., 2° 53′ E.), town, Pyrénées Orientales, France; strongly fortified; has cathedral dating from XIV. cent.; trades in wine, brandy, silk, wool. Pop. (1911) 39,510.

PERRAULT, CHARLES (1628–1703), Fr. author; started (in 1687) the *Querelle des Anciens et des Modernes* with his poem, *Siècle de Louis le Grand*; best known by his *Contes* (1697), including *Tom Thumb*, *Puss in Boots*, *Blue Beard*, *Little Red Riding Hood*, *Cinderella*, *The Sleeping Beauty*, taken from the Tales of Mother Goose (*Contes de ma mère l'oie*); exquisite style, simple, sententious, and witty.

PERRAULT, CLAUDE (1613–88), Fr. architect; bro. of Charles P.; introduced Palladian architecture into France; architect of Louvre; trans. Vitruvius, 1673.

PERRONE, GIOVANNI (1794–1876), Ital. R.C. theologian.

PERROT, SIR JOHN (*c.* 1527–92), lord deputy of Ireland; putative s. of Henry VII.; pres. of Munster, 1570–73, and crushed rebellion of James Fitzmaurice Fitzgerald; lord deputy of Ireland, 1584–88; able, but fell by machinations of enemies; condemned as traitor, 1588.

PERRY (36° 18′ N., 97° 18′ W.), city, Oklahoma, U.S.A.; cotton manufactures. Pop. (1910) 3133.

PERRY, MATTHEW CALBRAITH (1794–1858), Amer. commodore; s. of Christopher Raymond P. (1760–1818), whose five sons all won distinction in navy; fixed spot for colony of Liberia, 1819; advocated use of steam instead of sailing ships in war; made commercial treaty with Japan, 1854.

PERRY, OLIVER HAZARD (1785–1819), Amer. naval officer; distinguished in war of 1812.

PERSEPHONE, see PROSERPINE.

PERSEPOLIS, ancient city, former capital of Persia, situated in Kur Valley, *c.* 40 miles from Shiraz; now a great series of ruins, finest being those of Takhti Jamshid, or Throne of Jamshid; behind Takhti Jamshid and at Nakhshi Rustum, some miles distant, are sepulchres cut out of rock—buildings thought to have been begun under Darius I., and added to by other Achæmenidæ; believed to have been taken and palaces burned by Alexander, after which city gradually fell into decay. See PERSIA: *Architecture*.

PERSEUS (classical myth.), son of Zeus and

Danaë; with enforced aid of the Graeae and Nymphs, slew the Gorgon Medusa, thereby rescuing Andromeda, whom he married; turned Polydectes of Seriphus into stone by means of the Gorgon's head. P. is the subject of many and conflicting legends; worshipped as a hero.

PERSHORE (52° 7′ N., 2° 5′ W.), market town, on Avon, Worcestershire, England.

PERSIA, IRAN (25° to 40° N., 44° to 63° E.), country of S.W. Asia; bounded N. by Russia, E. by Afghanistan and Baluchistan, S. and S.W. by the Gulf of Oman and the Pers. Gulf, and W.S.W. by Turkey-in-Asia; extreme length E. to W., *c.* 850 miles; breadth from the Caspian to Pers. Gulf, *c.* 450 miles; area, *c.* 628,000 sq. miles.

Physical Features.—In the N. is the great range of the Elburz, over 19,000 ft. high; along the S.W. are a series of parallel mountain ranges running N.W. and S.E., with heights of from 10,000 to 13,000 ft.; the rest of the surface, in the centre and also the W., is a dry, barren plateau of from 6000 to 8500 ft. The whole district from mountains to mountains, S.E. of Teheran, forms the Dasht-i-kavir or Great Salt Desert, of height of *c.* 2000 ft., and covered with thin deposits of saltpetre. In many parts of the vast waste the soil is excellent, and, were irrigation possible, would produce good crops. More than half the entire area is drained towards the interior to salt marshes or lakes, more than one-fourth to inland seas and lakes (Caspian, Aral, etc.), less than a quarter to the open sea; and that portion, owing to the position of the mountains, sends merely short streams, the chief being the Karum, flowing to the Shat-el-Arab, at the top of the Pers. Gulf.

Geologically P. is far from having been extensively surveyed, but Lower Oolite, Cretaceous, volcanic, and metamorphic rocks have been observed. The CLIMATE varies extremely, but on the plateaux is generally one of extremes, very hot from May to Oct., very cold during other months. The low strip in the N. is damp and excessively hot in summer and mild in winter; in the S.E., winter and spring are temperate, summer warm, autumn oppressively hot. The rainfall is 5 to 10 inches on the plateaux; it occurs mostly in winter, and is entirely absent in summer, but the snow of the hills provides, in many of the districts in their neighbourhood, summer supply that can be used for irrigation. The FAUNA includes lions, leopards, bears, wolves, jackals, hyenas, antelopes, wild sheep and swine, the wild ass, and mountain-goat; the Persian horse (especially when crossed with the Arab) and the camel are valuable. VEGETATION is most luxuriant on the coast, where flowers, especially roses, grow in great profusion, and the date palm is widely spread. There is little timber, the forest district being mainly confined to the N. slope of the Elburz, but there are numerous varieties of shrubs. The orange, lemon, olive, almond, gum-trees, pomegranate, fig, mulberry, wine, rice, cotton- and tobacco-plants, sugar, a much-valued wheat, and the usual cereals are found.

HISTORY.

Our knowledge of early Pers. history is mainly derived from the Greeks. An agricultural and pastoral Aryan race, Zoroastrians and fire-worshippers, seems to have settled in Persia (Pers. FÂRS) S.W. of the Iranian plateau. The N.W. was occupied by the kindred race of Medes, and the Persians probably underwent Assyrian and Babylonian subjugation before becoming vassals of the Medes early in the VIII. cent. B.C. Nearly three cent's later CYRUS THE GREAT (Pers. *Kai-Khusru*) overthrow the Median yoke, and after defeating King Astyages (*c.* 550) founded the famous Persian dynasty of the **Achæmenides**, which lasted until 330 B.C. Their capital was first Pasargadæ, then Persepolis. Cyrus established his rule over Asia Minor, and died in 529; his son CAMBYSES (529–522) conquered Egypt; after his death and the attempted reign of the *Pseudo*-Smerdis, DARIUS I., *Hystaspes* (521–485), succeeded, and conquered Babylon (517).

Under Darius one of the greatest conflicts between E. and W. commenced. Darius conquered Ionia, Thrace, and Macedonia, and threatened Greece, but was forced to retreat after his repulse at *Marathon* (490). His s., XERXES I. (485–465), after recovering Egypt, for long henceforward a Pers. province, in 484 again invaded Greece, and was defeated at *Thermopylæ* and *Salamis* (480), *Platæa* (479), and lost many of his Ionian towns. His son, ARTAXERXES I., *Longimanus* (465–425), was succeeded by his son, XERXES II. (425), under whom the satraps who governed the various Pers. provinces began to assert their independence. He was deposed by DARIUS II., *Nothos* (424–404), no more successful than himself. His son, ARTAXERXES II., *Mnemon* (404–361), won a great victory over his insurgent bro. Cyrus, the younger, at *Cunaxa* (401), after which the 10,000 Greeks who had aided Cyrus made their famous retreat under Xenophon; the long, terrible journey through hostile country is immortalised in Xenophon's *Anabasis*. ARTAXERXES III., *Ochos* (361–337), recovered Egypt, which had again seceded.

The empire was overthrown under DARIUS III., *Codomannus* (336–331), by Alexander the Great, who won great victories at the *River Granicus* (334) and *Issus* (333), where Darius and his queen were captured, crossed the Tigris and Euphrates, won the battle of *Arbela* (331), and took enormous spoil from Susa, Babylon, Persepolis, etc. Over all this region, as far as India, Hellenic influence was established, and can still be traced. Darius was murdered by Bessus in 330. His realm, which had become a province of the Macedonian Empire, broke away again after Alexander's death (323).

P., without Egypt, was assigned to the satrap SELEUCUS NICATOR, founder of the **Seleucid Dynasty**, who ruled over nearly the whole realm of the old Achæmenides. In the middle of the III. cent., however, Bactria (which is said to have included a large part of India) and Parthia broke away, becoming independent states, and Parthia under ARSACES I. subjugated P. The **Arsacid Dynasty**, hated by the Persians, was speedily overthrown by the native **Sassanid Line**. Ardashir Babegan, grandson of Sassan, won Fars, Kerman, and part of Irak, and the final victory of *Hormuz* (218). The Middle Persian dynasty of the Sassanidæ protected P. for long against her two chief enemies, Rome on the W., Turkey on the E.; and P. was prosperous and renowned under SAPOR I. (241–72), SAPOR II. (309–79), who showed great rigour towards Christians, CHOSROES I. (531–78), and CHOSROES II. (590–628), who conquered Syria (storming Jerusalem in 614), subdued Asia Minor and Egypt, and threatened Constantinople, saved by the victory of the Emperor Heraclius in 628. After his murder by his son Siroes, the realm fell into disorder. The last Sassanid king, YESDEGERD III., lost P. to the Arabs by the battle of *Nahavend* (639).

P. then became a province of the caliphate, and when Bagdad was built in the middle of the VIII. cent. by Almansour it became the capital of the ABBASID EMPIRE. Under the nominal suzerainty of the caliphs the local dynasties of TAHARIDES (820–72), SAFFARIDES (869–903), SAMANIDES, and GHAZNEVIDS won fame. Finally, in 1038 the Seljukian Turks under Togrul Beg united P. under one rule. After their decline P. was conquered by Mongols under Genghis Khan (1223), and experienced great miseries under Hulagu Khan and his successors the Ilkhanians (1256–1366). In 1399 the Mongols were driven out by Timur and his Tatars, who, a hundred years later, were expelled by the Uzbeg Turks.

The **Shiite Dynasty** of Sufi was established in 1502, and lasted until 1736. ISMAIL I. (1502–24), who introduced Shiism as the state religion, drove the Uzbegs back beyond the borders of Khorasan and conquered Georgia, but was defeated in his attempt at a holy war against Turkey. The greatest of the line of Sufi was ABBAS I. (1587–1628), under whom Ispahan was made the capital. He defeated Uzbegs, Turks, and Mongols, extended his rule W. over Kurdistan and E. over

Kandahar, built towns and roads, and set an example of Western culture. The preponderance of religion, however, in the Shiite system, proved in the end fatal to the Sufides. Afghanistan was driven by persecution to revolt (1709); in 1722 the Afghans captured Ispahan; and in 1736 the Turks deposed the last *shah* (Pers. king) of this line. The Turk. NADIR SHAH (1736–47) ruled tyrannically over P., and under his successors the various states of P. revolted, Afghanistan and Baluchistan becoming finally independent.

The rest of P. was reunited in 1795 by AGA MUHAMMAD, a Turkoman eunuch, who deposed Lutf 'Ali Khan and founded the present Kajaran Dynasty, Teheran becoming the new capital. After his death in 1797 Georgia was again separated from P., becoming in 1802 a Russ. province, and P. was forced (1813 and 1829) to cede to Russia everything N. of the Aras, the present boundary. Attacks on Brit. power in N.W. India (1836–38 and 1856–57) signally failed, and P. has since sunk into a protected state. The boundary between India and P. was fixed by a Brit. commissioner in 1872.

During the reign of MUZAFFER-ED-DIN (1896–1907) court corruption and misrule led to the demand for a constitution, which was granted in 1907, and guaranteed by MUHAMMAD ALI MIRZA, who then succeeded. The new shah soon came to blows with the nationalist party; in 1908 martial law was proclaimed and the constitution abolished, but the nationalists took to arms, wrested from the monarch a new constitution, and deposed him in 1909 in favour of his son, AHMED MIRZA, still a minor. Meanwhile P. was distracted by attacks of Turks and Russians, and revolts within her frontiers. In 1907 Russia and Great Britain made a treaty, marking out their respective spheres of influence in P., and guaranteeing her independence and integrity; Russ. sphere is confined to N., Brit. sphere to S. Persia, with intervening neutral region; convention accepted by P., 1912. There are Brit. consuls-general at Teheran, Bushire, Ispahan, Meshed, and Tabriz, consuls at Kerman and Resht, and vice-consuls at Bunder Abbas, Mohammerah, and Seistan.

LANGUAGE AND LITERATURE.

Persian belongs to the *Iranian* group of languages closely allied to Indo-Aryan languages (*q.v.*), and forming with latter an important section of the Indo-European family. Language and literature fall into four periods, marking national activity and revival, intervals representing periods of decline.

I. **Zend** or **OLD IRANIAN.**—Extends from c. VI. cent. B.C. to c. 300 A.D.; represented by *Avesta*, sacred book of modern Parsis, which is ascribed to religious lawgiver Zarathustra (Zoroaster), who flourished between VII. and VI. cent's B.C. Language is archaic and closely related to Vedic Sanskrit. *Avesta* was collected under Sassanian kings, III. cent. A.D.

II. **Ancient Persian.**—Represented by inscriptions of Achæmenian dynasty, consisting of about 1000 lines of texts in cuneiform writing (*q.v.*) carved upon face of great rock at Behistun. After fall of Achæmenians no lit. was produced for five cent's.

III. **Pahlavi** (Middle Persian).—About 100 works have survived, chiefly religious and in Zoroastrian spirit.

IV. **Modern Persian.**—Begins with conversion of P. to Islam by Arab conquest, resulting in enormous Semitic admixture in thought and language, and adoption of Arabic writing. Lit. really begins with death of Caliph Harun-al-Rashid, and consists chiefly of poetry. FIRDAUSI (940–1020 A.D.), whose Shahnamah is P.'s great national epic, was first great poet, whose work had many imitators, and led to development of romantic, mystical, and didactic poetry. Passing over RUDAGI, lyric poet, X. cent., and ANVARI (d. 1190 A.D.), satirist, we come to OMAR KHAYYAM (d. 1123), whose *Rubá'iyát* or Quatrains have obtained disproportionate popularity in Europe through FitzGerald's translation; NIZAMI, epic poet (1141–1203 A.D.), author of *Khusrau and Shirin*, *Iskandar námah*, and *Laili and Majnun* (beautiful pathetic tale); JALAL-UD-DIN RUMI, greatest Sufi or mystic poet, author of *Masnavi* (6 vols.); SHEIKH SA'DI, great novelist and poet; b. in Shiráz c. 1176 A.D., author of *Divan* or collection of lyrics, and famous *Bústán* (Garden of Perfume) and *Gulistán* (Rose Garden); HAFIZ (d. 1389), pseudonym of P.'s greatest lyric poet, Shams-ud-din Muhammad; and JAMI (b. 1414), last of classic poets and Sufis. After Jámi lit. declines and becomes chiefly historical. No drama appears till beginning of XIX. cent., when great national passion-play *Tázieh* was produced, dealing with massacre of Hussain and his family. Among modern poets best are KÁANI SHIRÁZI, YAGHMA KHORÁSÁNI, and MIRZA SERÚN ISPAHÁNI.

Edward Browne, *Literary History of Persia* (2 vols.).

Architecture and Archæology.—P. learned much from the Assyrians. The difference of material brought constructional differences, the sun-dried brick and alabaster of Assyria being unsuitable for forms which could be carried out with the stone of P., but the platform by which Assyrian palaces were raised above the clay soil, and consequently the steps leading up to them, and the winged bull with human head which was an Assyrian architectural ornament, were repeated in P. The columnar feature is supposed to have been learned from the Medes. Of the brickwork of these empires and the Babylonian little remains, and much that has been learned of their architectural styles is deduction from buildings raised in P. while under their rule. The columns of the palace of Cyrus and Cambyses at Pasargadæ are still to be traced; the tomb of Cyrus here is also on a terrace after the Assyrian fashion.

The chief remains are at Persepolis, which Darius Hystaspes made the capital. Here are to be traced the palace of Darius, the two palaces of Xerxes, the palace of 100 columns, and other buildings all on the same platform, to which a broad flight of steps ascends. The palaces were raised by separate platforms; they were square in plan, with many rows of columns supporting the roof, and long porticoes on three of the four sides. The largest was the palace of Xerxes, which was 350 by 300 ft. in area, and apparently the largest building of antiquity. Characteristic capitals to the columns were bulls' heads back to back, giving the impression of Ionic volutes; some of the capitals consist of Ionic volutes. There are also remains of the pre-Muslim period at Susa, Ecbatana, and Teheran.

The Muhammadan art of P. is famed. The tomb of Zobeide (VIII. cent.) at Bagdad is interesting for its stalactite vaulting. The mosque at Tabriz ascribed to the Ilkhanians shows beautiful decoration of glazed tiles, brightly coloured and adorned by characteristic Arabic interlaced ornament. The mosque of Masjid Shah at Ispahan, built by Abbas Shah (1585–1628), has between its minarets a noble gateway, the squareness of which forms a fine contrast to the beehive-shaped dome behind; but it is its interior which has made this mosque famous, having, besides gay decoration, memorable perspective effects. The designs of architectural ornament, Pers. pottery, carpets, etc., are largely dependent for their effect on arrangements of lines, P. having acquired great art in this direction through being restrained by the Muhammadan religion from using animal and plant motifs in ecclesiastical ornament. The rosette, however, figures largely in antique sculptures of dresses and in wall decoration, and the Pers. rose is frequent in modern pottery design.

Government of P. was until 1907 a despotism exercised by the *Shahan* or *Shahin Shah* (Pers. king of kings), who was, however, unable to act against the precepts of the *Koran* or the traditions of Shiite Muhammadanism. The Great Council, or *Mejliss*, as re-established in 1909, consists of *c.* 150 members elected for two years and supposed to meet annually; the suffrage is confined to the upper and middle

classes. The Council was given the power of the purse, which had hitherto belonged to the Shah, and the control of foreign policy. Arrangement was made for the appointment of a senate, half the members of which were to be elected by the Shah, half by the Council, but this has never been carried out, nor is it yet certain how long the representative Council will be continued. There are separate ministers for the seven departments of the executive. Governors-general (*Hakim, Wali*, etc.), always royal or noble, govern the provinces (c. 30 in number) and appoint their own deputy-governors (also called *Hakim*) in the subdivisions of the same. The chief provinces are: Arabistan, Ardalan, Astarabad, Azerbaijan, Fars, Gilan, Hamadan, Irak, Ispahan, Kamseh, Kerman, Kermanshah, Khorasan, Kurdistan, Luristan, Mazanderan, Savah, Teheran, Yezd. The municipalities have a chief official known as *Beglerbegi, Darogha* or *Kalantar*; the village reeves are called *Kedkhoda*. The nomad tribes are outside this system, but their chiefs (variously known as Ilbegi, Ilkhani, Serdar, Sheikh, Tushmal, and Wali) are accredited officials of the central government. Justice is based on the *Koran* and is carried out by the Hakim (who are reputed extremely unjust and extortionate) assisted by the priests.

The regular (*nizam*) ARMY is nominally composed of 79 battalions of infantry, 23 batteries of field artillery, and 1 battalion of pioneers; the popular levy is supposed to furnish 50,000 cavalry and 10,000 infantry. The famous Cossack Brigade consists of 8 squadrons, 1 small battalion of infantry, and 1 horse battery of 6 guns. It is generally considered that the Persians are a fine fighting force badly provided and directed. There are 8 warships.

The chief towns are Teheran (the capital), Tabriz, Ispahan, Meshed, Kerman, Yezd, Barfurush, Shiraz, Hamadan, Kashan, Kazvin, Kom, Resht; the principal ports, Bunder Abbas, Bushire, Lingah, and Mohammerah on the Pers. Gulf, Astara, Bender-i-Gez, Enzeli, and Meshed-i-Sar on the Caspian Sea. Six miles of railway constructed by a Belg. Co., from Teheran to Shah Abdul-azim, were opened in 1888. The construction of a trans-Persian railway to provide an overland route *via* Russia to India is under consideration (1913), but is open to objection on strategic and other grounds. Road-making has been busily carried on in the last ten years, with the result that, besides the caravan routes and old roads from Teheran to Kom and Resht, there are now roads from Tabriz to the Russ. border, Kazvin to Hamadan and Meshed to Askabad. The Pers. Road and Transport Co., a Brit. firm, was formed in 1903. A state department of Posts and Telegraphs originated in 1909.

Products and Industries.—The inhabitants are chiefly agricultural and pastoral, and are very thinly distributed. Large quantities of wheat, barley, rice, fruits, asafœtida, gums, hashish, opium, silk, wool, lambskins, goats-hair, and cotton are produced. The wool of Khorasan is equal to that of Astrakhan. Hand-manufactures of carpets, felts, shawls, silk, cotton, prints, leather, copper, brass-ware, enamelled work, pottery, glazed tiles, and attar of roses, and dealing in pearls and pearl-shell are important. Minerals are abundant, but most of them are still unworked, the distance from markets and the bad communications rendering the transport of them unwrought impossible, while scarcity of fuel prevents treatment on the spot. Lead, copper, and turquoise (near Nishapur) are worked; silver-lead, iron in large quantities, coal (especially in the S.E.), tin, antimony, manganese, borax, salt, and naphtha (all along W. and in part of N.) are found. The oil, which has only lately begun to be worked by the British, promises to bring much profit. The exports amount to about £8,000,000 yearly, the imports, chiefly cottons, woollens, petroleum, glass, sugar, tea, coffee, drugs, amount to about £10,000,000.

Inhabitants.—Native elementary education is poorly supplied by the schools of the larger towns, but secondary instruction is fairly good, and W. powers are all making an effort to extend their influence by means of schools. Westernisation commenced with the polytechnic established in Teheran in 1849, and in late years Fr. and Ger. schools on a grand scale have been established. There are about 8,500,000 Shiite Muhammadans, about 850,000 Sunnites, 50,000 Armenians, 40,000 Jews, 30,000 Nestorians, and 10,000 Parsis. The principal ecclesiastic, the Mujtahid of Kerbela, has great authority under the Shiite creed; all the chief priests are called Mujtahids, the simple priests Mullâs; their appointment belongs to the church, but the state elects the church officials, Sheikh-ul-Islâm and Imâm-i-Jum'ah. Persians are usually tolerant to non-Mussulmans, but are subject to fanatical outbursts. About a quarter of the inhabitants are nomads, the chief nomadic tribes being Turks (720,000), Kurds and Leks (675,000), Arabs (260,000), Lurs (234,000), Baluchis and Gipsies (20,000). Pop. (estimated) 10,000,000.

Jackson, *Religion of Ancient Persia*; Ragozin, *Media, Babylon, and Persia* (1889); Benjamin, *P. and the Persians* ('Story of the Nations' Ser. (1888)); Curzon, *P. and the Persians* (1892); Layard, *Early Adventures in P.* (1894); Browne, *The Revolution in P.* (1910); Shuster, *Strangling of P.* (1912); Sykes, *P. and its People* (1910).

PERSIMMON, VIRGINIAN DATE PLUM (*Diospyros virginiana*), tree c. 60 ft. high; yields delicious plum-like fruit containing 8 to 10 seeds.

PERSIS, in ancient geography, district in S.W. of Persia now embraced in province of Fars; region mountainous, barren, and unhealthy along coast, but fertile and well watered inland. Little is known of history before time of Cyrus, who founded Pers. monarchy; Pasargadæ (*q.v.*), first capital, believed to have been founded by Cyrus, whose palace and tomb were built there; later capital, Persepolis (*q.v.*). After Macedonian Wars many Gk. cities were built in P.

PERSIUS, AULUS PERSIUS FLACCUS (34–62 A.D.), Rom. poet; b. at Volaterræ, in Etruria; taken to Rome when twelve, and studied grammar under the famous Remmius Palæmon, but his greatest debt was to Cornutus the Stoic, whose philosophy he followed with indefatigable zeal. P.'s poems consist of six satires. His expression is tortuous and enigmatical, but there are lines which prove that P. would have been great had he not died so young.

PERSON.—(1) a subject of legal rights and duties. (2) a rational individual, capable of moral rights and duties.

PERSONAL PROPERTY, anciently distinguished from 'real' property, by the fact that in the case of *realty* the thing itself could be recovered, but in *personalty* only damages could be recovered. Freehold land is 'real' property, the leasehold is 'personal.' Furniture, money, assurance policies, stock in public companies, are all p. p.

PERSPECTIVE, art of representing, by a drawing on a flat surface, solid objects or surfaces, in such a way that the drawing appears to the eye in the same manner as the object itself. The eye is supposed fixed at a point called *centre of p.*, the picture being drawn in a plane (*picture plane*) perpendicular to the line of vision. If now straight lines be drawn from every point of the object to the eye, the point where each of these lines cuts the picture-plane is corresponding point of the picture. The foot of the perpendicular from the eye on the picture-plane is the *centre of vision*, and all lines of the object perpendicular to the picture-plane appear to *vanish* at this point. Other sets of parallel lines inclined to picture-plane have *vanishing-points* at other points of the horizontal line through the centre of vision.

PERSPIRATION, see SKIN.

PERTH (31° 57′ S., 115° 52′ E.), capital, Western Australia, on Swan River; seat of R.C. and Anglican bp's; and of state univ. Pop. 54,354.

PERTH (56° 24′ N., 3° 27′ W.), county town of Perthshire, Scotland; city, royal burgh, river port, and assize town. Main part of town—including ancient quarters—stands on right bank of river Tay; chief suburb on left bank. Town is beautifully situated, with fine buildings—including ancient church of St. John; regularly planned and sometimes called 'The Fair City.' Till James I.'s assassination here (1437) P. was seat of Scot. king and Parliament, owing to vicinity of Scone (*q.v.*); scene (North Inch) of encounter between Clans Chattan and Quhele (see Scott's *Fair Maid of Perth*). Industries include dye-works, linen, floor-cloth, and glass manufactures, iron-works, foundries, etc.; salmon fisheries. Pop. (1911) 35,851.

PERTH, EARLDOM AND DUKEDOM OF.—James, Lord Drummond, was cr. Earl of P., 1605. Fourth earl, JAMES, followed James II. to St. Germains, where he was cr. duke, 1701. His s., James, was attainted after 1715 invasion; his s., JAMES, 3rd titular duke, commanded at *Preston*, *Carlisle*, *Stirling*, and *Culloden*, 1745; bro. and heir, John, also fought for Stewarts, 1745; uncle, Edward, 6th titular duke, was imprisoned in Paris as Jansenist. JAMES DRUMMOND (formerly Lundin) received restitution of Drummond Castle, etc., 1783, and was cr. Lord Perth, 1797, but left no male issue. Title of earl was assumed by Drummonds till 1853, when attainders of 1715 and 1745 were reversed.

PERTH AMBOY (41° 31′ N., 74° 20′ W.), city, port of entry, on Raritan, New Jersey, U.S.A.; terra-cotta, fire-bricks. Pop. (1910) 32,121.

PERTHSHIRE (56° 30′ N., 3° 45′ W.), large inland county in centre of Scotland; bounded by Inverness, Aberdeen, Forfar, Fife, Kinross, Clackmannan, Stirling, Dumbarton, and Argyll; area, *c.* 2500 sq. miles. County is almost completely mountainous, with many beautiful lochs, rivers, forests, and passes; chief mts. are Grampians, Sidlaws, and Ochils, and among highest summits are Ben Lawers (c. 4000 ft.), Ben More (3843 ft.), Ben Lui (3708 ft.), and Schiehallion (3547 ft.); river Tay, with tributaries (Garry, Tummel, Earn, and others), drains almost whole county; S. watered by Forth and Teith; largest lochs are Lochs Tay, Earn, Rannoch, Katrine, Vennacher, and Achray; chief towns, Perth, Crieff, Blairgowrie, and Dunblane. Antiquities include many cairns, stone circles, Rom. camps, castles; cathedrals at Dunblane and Dunkeld, and interesting palace at Scone. Much fruit is grown. Chief industries are dyeing, bleaching, tanning, brewing, distilling, quarrying, and manufacture of woollens, cotton, and linen. Pop. (1911) 124,339.

PERU (3° 20′ to 18° S., 69° to 81° 30′ W.), republic, in N.W. of S. America. Peru is bounded N. by Ecuador, E. by Brazil and Bolivia, S. by Chile, S.W. and W. by Pacific; area, 695,733 sq. miles; coast-line, *c.* 1400 miles. Surface has a narrow coastal strip rising rapidly to the Andes, which here form three or more parallel chains with a width of *c.* 250 miles, running in same direction as coast and having great fertile valleys and tablelands spread out among them. Mt's reach height of 21,000 to 22,000 ft., the highest peaks being Huascan (*c.* 22,050 ft.) and Huandoy (*c.* 21,090 ft.), while there are many volcanic peaks over 19,000 ft. in height. The plateaux attain a height of from 12,000 to 13,000 ft. above sea-level. To the E. of Cordilleran ranges is region of forest and pampas sloping to Amazon basin. Drainage of this region as well as of the northern and central tableland is carried off by head-waters of Amazon (Marañon) and of its great tributaries, Huallaga, Ucayale, and Javari, and by the upper streams of the Jurua, Purus, and Madeira farther S. The rivers of the coastal strip are unimportant. In extreme S.E. is Lake Titicaca, which belongs to a basin of inland drainage, though it discharges its own waters southward by the Desaguadero to Lake Aullagas in Bolivia. The largest towns are Lima (capital), Arequipa, Callao, Ayacucho, Cuzco. Climate varies with elevation; temperature on coast, 60° to 80° F.; on tablelands, 40° to 60° F.; in W. districts, 64° to 86° F.

History.—In very early times a considerable degree of civilisation was attained by various peoples in P. About the XII. cent. the *Incas* established themselves in the country, and, making Cuzco their seat of government, gradually increased their dominions until the whole region from Ecuador to Chile was under their sway. Their rule continued for over three cent's, during which they developed a fairly successful system of socialism and carried out magnificent building and engineering works. The Span. conquest of P. was carried out by Francisco Pizarro between 1531 and 1541, in which year he was murdered by followers of Almagro, the Inca prince. P. became a Span. viceroyalty in 1542, and so remained until the rebellion of the Span. colonies against the mother country early in XIX. cent.

P. was last of colonies to attain independence. It became a republic only in 1824 after defeat of Spaniards at *Ayacucho*; ruled by the liberator, Bolivar, until 1826. During next two decades various revolutions occurred and several new constitutions were drawn up, but under Ramon Castillo, Pres. in 1845–51 and 1855–62, the prosperity of the country increased. A boundary dispute with Brazil was settled in 1876; and in 1879 occurred the war with Chile which ended in 1883 with the Treaty of Ancon, whereby Chile obtained Tarapaca and the right to hold Arica and Tacna for ten years, after which a popular vote was to decide to which state these two provinces should belong; this question, however, still remains open. Another revolution took place in 1894–95. Boundary disputes have also occurred with Bolivia, Colombia, and Ecuador; that with Bolivia was settled by negotiations between the states concerned; that with Colombia and Ecuador was referred to Alfonso of Spain, who in 1910 refused to act further in the matter, which was then referred to the mediation of U.S.A., Argentina, and Brazil. Further boundary disputes with Brazil were settled in 1910.

Government is republican; executive power vested in Pres. (elected for four years by popular vote), two Vice-Presidents (similarly elected), and Cabinet of six ministers. Legislature consists of Congress of two houses—Senate (52 members) and House of Representatives (116 members), both senators and representatives being elected by popular vote. P. is divided for administrative purposes into 18 departments and two provinces. Primary education is gratuitous and nominally compulsory. The state religion is Roman Catholicism; other religions are tolerated in practice, although prohibited by the terms of the Constitution of 1860. Army numbers about 4000 in all, and military service is obligatory. The majority of the population are Indian; whites, chiefly Spanish, form about one-seventh and half-breeds about one-fourth, while there are smaller proportions of negroes and Chinese. Pop. variously estimated at from 2,661,000 to 4,500,000.

Resources.—Mineral resources are enormous, but the difficulty of transport has arrested development. Silver occurs in vast quantities, and gold, copper, lead, quicksilver, antimony, iron, petroleum, sulphur, and other minerals are produced. The forests of the eastern slopes produce valuable timber, as well as cinchona, coca, cacao, rubber, sarsaparilla, and vegetable ivory. Bananas, vines, olives, cotton, tobacco, coffee, sugar-cane, and cacao are cultivated, and various cereals are grown. Llamas and cattle are raised. Exports include minerals, sugar, cotton, wool, gums, etc.; imports textiles, machinery, provisions, and general goods. Railway mileage in 1911, 1656.

M. R. Wright, *The Old and New Peru* (1909); P. Martin, *Peru of the Twentieth Century* (1911).

PERU.—(1) (41° 21′ N., 89° 3′ W.) city, Illinois, U.S.A., on Illinois; agricultural implements. Pop. (1910) 7934. (2) (40° 46′ N., 86° 1′ W.) city, on Wabash, Indiana, U.S.A.; agricultural district; woollens. Pop. (1910) 10,910.

PERUGIA (43° 7′ N., 12° 23′ E.), city, on Tiber, Italy (Umbria); capital of province P.; with cathedral (XV. cent.), S. Pietro (XI. cent.), and other interesting churches; municipal palace, exchange (with fine frescoes by Perugino), old gateways, univ. (c. 1266), museum, etc. *Perusia* one of the twelve cities of Etruria; taken by Romans, 310 B.C.; passed to popes, IX. cent.; united to Piedmont, 1860; centre of Umbrian school of painting, XV. cent.; woollens, silks, liqueurs. Pop. c. 66,000. For Perugia province, see UMBRIA.

PERUGINO, PIETRO (1446–1524), eminent Ital. painter; studied at Florence; went to Rome about 1483, and in the Sistine Chapel executed the still extant fresco of *Christ giving the Keys to Peter*. From 1486–99 he was again in Florence, where he gave lessons to Raphael. He was at Perugia from 1499 to 1504, helping to adorn the Hall of the Cambio; in Rome again from 1507–12, where he assisted in decorating the stanze of the Vatican. He died at Perugia, from plague, and a fresco on which he was then engaged is now at South Kensington.

Brinton, *Perugino* (Masterpieces in Colour).

PERUVIAN BARK, dried bark of Cinchona (*q.v.*). See also QUININE.

PESARO (43° 55′ N., 12° 53′ E.), town, E. coast, Italy; walled and fortified; episcopal see, has two cathedrals and several palaces. Pop. (1911) 27,343.

PESCADORES (24° N., 119° 40′ E.), group of small Jap. islands in Strait of Formosa, China Sea. Pop. 50,000.

PESCARA (42° 20′ N., 14° E.), river, Italy; flows into Adriatic; ancient *Aternus*.

PESCARA, FERNANDO FRANCESCO D'AVALOS, MARQUIS OF (1489–1525), Ital. condottiere in service of Spain; fought with distinction at *Pavia*, and settled in Milan; conspired with Morone for crown of Naples, but plot was abortive.

PESCHIERA SUL GARDA (45° 26′ N., 10° 42′ E.), fortified town, Verona, Italy, at foot of Lake Garda.

PESCIA (43° 53′ N., 10° 42′ E.), town, Firenze, Italy; silk, olives. Pop. (commune) c. 18,000.

PESCIA (43° 53′ N., 10° 42′ E.), city, Lucca, Italy; cathedral; silk. Pop. 18,500.

PESHAWAR.—(1) (c. 34° 2′ N., 71° 45′ E.) district, North-West Frontier Province, India; area, c. 2560 sq. miles. Pop. 790,000. (2) (33° 59′ N., 71° 30′ E.) capital of above; important military station; centre of trade with Afghanistan and Bokhara. Pop. (1911) 97,935.

PESHIN, PISHIN (30° 27′ N., 67° E.), district, Brit. Baluchistan.

PESSIMISM, view that what is, is bad; opposed to *optimism*, the view that what is, is good (or as good as possible). Schopenhauer is the most distinguished modern pessimist; the ultimately real is blind, irrational will, which cannot be satisfied, and therefore, when it becomes conscious, as in man, leads to far more pain than pleasure.

PESSINUS, ruined town near Bala Hissar, Asia Minor; founded by Phrygians, subsequently belonged to Gauls; was centre of cult of Cybele.

PESTALOZZI, JOHANN HEINRICH (1746–1827), Swiss educationist; dwelt with waifs at his farm, Neuhof, but failed owing to lack of business ability; kept school at Yverdon, 1805–25; wrote novels on educational themes; taught by intuitional method, making psychology his foundation and combining manual with mental exercises. See EDUCATION.

PESTH, see BUDA-PESTH.

PETALISM, see OSTRACISM.

PETAURUS, FLYING PHALANGER, see under MARSUPIALS.

PETER I. (d. 1104), king of Aragon and Navarre; famous slaughterer of Moors.—**Peter II.** (1174–1213), king of Aragon; cruel, handsome, amorous, and a troubadour.—**Peter III., the Great** (1236–85), king of Aragon; profited by *Sicilian Vespers* (q.v.), 1282, to seize Sicilian throne.—**Peter IV., the Ceremonious** (1319–87), king of Aragon; long reign occupied in civil and foreign wars.—**Peter the Cruel,** PEDRO I. (1334–69), king of Castile; pitiless and extortionate, but gave order to realm.

PETER I., THE GREAT (1672–1725), emperor of Russia; succ., 1682; sole ruler on death of bro. Ivan, 1696; illiterate himself, but introduced western civilisation into Russia, modernising army and creating navy; encouraged trade. To win a port on Black Sea P. attacked Turkey and captured Azof, 1696; revolt of Strelitz faction ruthlessly crushed, 1698; defeated at *Narva*, 1700, in attempt to partition Sweden with Poland and Denmark, but captured part of Ingria and founded new capital, Petersburg, there, 1703; defeated Sweden at *Poltava* and seized Baltic provinces and part of Finland, 1709, thus acquiring wide seaboard; coalition of Sweden and Turkey compelled restitution of Azof, 1711; m. his mistress (afterwards famous Catherine I.), 1712; Finland wholly conquered, 1713; but restored to Sweden, 1721, for quitclaim of Baltic provinces, etc.; Caspian provinces wrested from Persia, 1722; law passed, 1722, empowering tsars to nominate successor. Peter the Great was a barbarian genius.

Life, by Barrow, Browning, Schuyler, Ragozin, Waliszewski.

PETER III. (1728–62), emperor of Russia; s. of eldest dau. of Peter the Great by Duke of Holstein-Gottorp; succ., 1762; offended nobility by Liberal reforms and favour shown to Germans, assisting enemy Prussia; overthrown by wife, Catherine II.; assassinated.

PETER DES ROCHES (d. 1238), justiciar of England, 1213; bp. of Winchester, 1205.

PETER, EPISTLES OF, in New Testament, though both bearing the name of Peter, must be considered separately.—**1 Peter** has fairly good attestations. There are parallels to it in Clement of Rome (though which is earlier is uncertain). It is referred to in *2 Peter*, by Polycarp, and the writer of the *Didache*. Irenæus first quotes it by name. If by the apostle St. Peter it cannot be later than the Neronian persecution, in which by unquestionable tradition he died. Some critics think it dates from the reign of Trajan or Domitian. Its theology shows Pauline influence.—**2 Peter,** according to most scholars, is not genuine. It has close parallel with *Jude*, which Epistle the author of *2 Peter* probably used; attestation not good; date, c. 150–200 A.D.

Commentary by Bennett (Century Bible).

PETER, ST., the 'chief of the Apostles,' often called Simon Peter, Simon being the Greek for the Semitic Simeon, and Peter (Gk. *petros*, rock) corresponding to Aramaic *kepha* (rock). P. is prominent in the Gospel story; he is one of the small group of apostles in closest personal association with the work of Christ. His confession at Cæsarea Philippi can almost be called the turning-point of the Gospel story. (The term 'Son of God' has probably here only a Messianic significance.) His denial of Christ at the Passion is also extremely important—particularly interesting in such a detail as his Aramaic accent's being noticed.

After the earthly life of Christ P. becomes leader of the Apostles in Jerusalem. Much controversy has raged round the exact relation of Peter and Paul as regards the admission of the Gentiles to Christianity. The date of his death is uncertain; according to early tradition he was the founder of the Roman Church and was martyred there, though probably not at the same time as St. Paul. How far he was 'bishop of Rome' is still further disputed. See PETER, EPISTLES OF.

Hort, *Judaistic Christianity*; Barnes, *St. Peter in Rome*; Lightfoot, *Apostolic Fathers*, 2nd edit., pt. i. vol. ii. p. 482.

PETER LOMBARD (c. 1100–60), mediæval scholar; first doctor of theology of Paris univ.; wrote great manual of scholastic system, *Sententiarum Libri*

IV., commentaries upon which were written by Albertus Magnus and Thomas Aquinas.

PETER OF AIGUEBLANCHE (d. 1268), bp. of Hereford, 1240.

PETER THE HERMIT, priest associated with First Crusade, which he preached and helped to lead in 1096; his army was destroyed by Turks; date of death uncertain; tradition has exaggerated importance of his work.

PETERBOROUGH (44° 17′ N., 78° 24′ W.), town, port of entry, on Otonabee, Ontario, Canada; machinery. Pop. 15,300.

PETERBOROUGH (52° 35′ N., 0° 16′ W.), city, municipal and parliamentary borough, Northamptonshire, England, on river Nene, on borders of Fen district; chief feature, cathedral, erected on site of two older buildings, begun in XII. cent., presents various types of architecture; other buildings include episcopal palace, deanery, town hall, and corn exchange. P. contains various educational establishments; important railway centre; manufactures agricultural implements. Pop. (1911) 33,578.

Soke of P., administrative county, containing P.; area, 83½ sq. miles. Pop. (1911) 44,722.

PETERBOROUGH AND MONMOUTH, CHARLES MORDAUNT, EARL OF (*c.* 1658–1735), Eng. statesman; succ. f. as Viscount Mordaunt, 1675; favoured Revolution of 1688; cr. Earl of Monmouth, 1689; implicated in Fenwick's conspiracy, and imprisoned, 1697; succ. uncle as Earl of P., 1697; gov. of Jamaica, 1702; general of allied armies in Spain, 1705, and expelled Fr. force of over double numbers; brilliant commander, but had ill-fate always to be considered light and untrustworthy.

PETERHEAD (57° 30′ N., 1° 46′ W.), port, Aberdeenshire, Scotland; centre of herring and other fisheries; large granite quarries and polishing works; convict station. Pop. (1911) 13,613.

PETERHOF (59° 50′ N., 29° 53′ E.), town, St. Petersburg government, Russia, on Gulf of Finland; gem-cutting industry; contains Great Palace of Peter the Great. Pop. 12,000.

PETERS, HUGH (1598–1660), Eng. Puritan; preached in England, then in Holland and America; returned to England and attacked Laud; served with Parliamentarians in Civil War; at Restoration arrested and executed, though denying complicity in king's death; an able leader, with some practical breadth of view, but violent and unrestrained.

PETERS, KARL (1856–), Ger. traveller in Africa; founded Ger. Society for Colonisation at Berlin; director of Ger. East Africa Co., 1885; commissioner for settling Anglo-Ger. frontier in East Africa, 1892.

PETER'S PENCE, tax formerly levied on R.C. families; institution attributed to Ina of Wessex (688–725) or Offa of Mercia (757–96); sometimes refused by Eng. kings; abolished in England by Henry VIII.; now voluntary contribution to maintenance of papal state.

PETERSBURG, see ST. PETERSBURG.

PETERSBURG (37° 10′ N., 77° 22′ W.), city and port of entry, Virginia, U.S.A.; situated at head of navigation, on S. bank of Appomattox River, 11 miles from its mouth, and *c.* 22 miles from Richmond; lay formerly in counties of Chesterfield, Dinwiddie, and Prince George, but is now independent. P. is an interesting and historic city, containing P. Female Coll., Bp. Payne Divinity School, Virginia Normal and Industrial Institute, many hospitals, orphanages, and other charitable institutions; has two public parks; at Blandford is fine old church, erected *c.* 1734. In 1645 Fort Henry was built by whites on site of present city; P. founded in 1733 and incorporated as town in 1748; scene of conflict between British, under Phillips, and Americans in 1781; chartered as city in 1850. P. took prominent part during Civil War; Grant, Federal commander, in hope of capturing Richmond, laid siege to P. in 1864; city defended for about ten months by Confederates under Lee; Grant exploded nine and killed great numbers of Confederates, but was repulsed in attack; on April 1, 1865, Confederates were defeated at Five Forks, and Richmond and P. occupied by Federals; some days later Lee was completely defeated at Sailor's Creek, and on April 9 surrendered at Appomattox courthouse. P. has large export trade, and numerous manufactures, including those of cotton, tobacco, bags, trunks, paper, flour, machinery, and agricultural implements; Falls above city supply water-power for factories. Pop. (1910) 24,127.

PETERSFIELD (51° N., 0° 57′ W.), town, Hampshire, England. Pop. (1911) 3947.

PETERWARDEIN (45° 17′ N., 19° 51′ E.), fortified town, on Danube, Croatia-Slavonia, Hungary; Turks defeated here by Prince Eugène, 1716. Pop. 4100.

PETHERICK, JOHN (1813–82), Welsh traveller; acquired extensive knowledge of Sudan, 1845–59; consul at Khartum, 1861; aided Speke expedition, 1862; pub. *Travels in Central Africa*, 1869.

PETIOLE, see LEAF.

PÉTION DE VILLENEUVE, JÉRÔME (1756–94), Fr. politician; one of Girondins; pres. of Convention; wrote on legal and other subjects.

PETITIO PRINCIPII, begging the question; in logic, the fallacy of assuming the proposition to be proved.

PETITION.—The subjects' right of petitioning has from early times been a fundamental part of the Brit. Constitution. P's, *i.e.* formal requests and applications, may be addressed to the Sovereign, to either House of Parliament or to a Court of Law. In 1689 the *Bill of Rights* (q.v.) finally confirmed the right of petitioning the Crown. Bills of Parliament used to be presented in the form of p's to the king, e.g. *Petition of Right* (q.v.), 1628. P's to Parliament now usually deal with questions of general policy (*e.g.* for and against Women's Suffrage) rather than particular matters demanding redress. The Standing Orders prescribe a certain form for such p's. Election p's may be filed under Corrupt Practices Act (*q.v.*).

PETITION OF RIGHT, THE, granted (but not acted upon), June 1628, by Charles I., to whom Parliament refused supplies until he conceded its demands for suppression of illegal taxation and imprisonment and billeting of soldiers on private persons. The term p. of r. is also applied to p's (regulated by *Petition of Right Act*, 1860) submitting claims against the Crown for possession or restitution of property; an old Common Law remedy.

PETŐFI, ALEXANDER (1823–49), Hungarian poet; b. Kis-Kőrös; his enthusiasm in the revolutionary cause inspired him to write noble lyrics and break down the pedantic traditions of Hungarian poetry.

PETOSKEY (45° 20′ N., 85° W.), city, Michigan, U.S.A.; on Little Traverse Bay; health resort; lumber. Pop. (1910) 4778.

PETRA, ruined city in N. Arabia, lying in valley near Mound Hor and surrounded by cliffs and ravines; once important caravan centre and capital of Nabatæans; many ruined buildings to be found; most remarkable remains are treasury, temples, tombs, and dwellings hewn out of cliffs and rocks enclosing city; architecture of Gk., Rom., and Oriental types. P. remained independent till *c.* 106 A.D., when taken by Romans; declined with rise of Palmyra.

PETRARCH, FRANCESCO PETRARCA (1304–74), Ital. poet; one of the greatest lyric poets of all time. His life was a somewhat stormy one, due to the varied vicissitudes of Ital. political life. Destined for the law, he studied at Montpellier and Bologna, but devoted himself to classical and especially Rom. letters. Although an ecclesiastic he never took orders, and refused a secretaryship to the Pope. He travelled extensively and made valuable discoveries of manuscripts. In 1341 he was crowned poet laureate at Rome.

In an age of great humanists P. stood pre-eminent;

this is reflected in his work by a tendency to repress all originality of style in favour of a purist imitation of the best Latin models. His chief works are the epic poem *Africa*, centering round the character of Scipio, the prose hist. biographies known as *De Viris Illustribus*, the prose dialogues *De Contemptu Mundi* and *Secretum*, a couple of theological treatises, and the famous collection of letters in groups called *Variæ*, *Seniles*, *Familiares*, *Ad Veteres Illustres*, and *Sine Titulo*. But his fame as a lyric poet rests on the *Canzoniere*, sonnets to the mysterious Laura (whom he met at Avignon, and whose death he laments in his *In Morte di Madonna Laura*), the lyrical story of one of the great loves of the world's lit. P.'s influence on subsequent sonneteers was considerable, and may be seen in the verse of Surrey and Wyatt. See SONNET.

Jerrold, *Francesco Petrarca, Poet and Humanist* (1909); Symond, *Renaissance in Italy* (vols. ii. and iv.).

PETREL FAMILY, *Procellariidæ*, a family of marine swimming birds found in all the great oceans. They are strong swimmers and include the Storm P., a British breeding bird.

PETRIOU (13° 40′ N., 101° 10′ E.), town, port, Pachim division, Siam. Pop. *c.* 10,000.

PETROGRAPHY, see PETROLOGY.

PETROL, one of the light oils (*q.v.*); a mixture of hydrocarbons; distilled from petroleum or paraffin; highly inflammable, and used as source of power for internal combustion engines as fitted to motor-cars, motor-cycles, and aeroplanes. To produce the necessary explosive mixture a carburettor (*q.v.*) or vaporising device is necessary. Passing through this instrument the p. is turned to vapour, and is mixed with a proportion of air. It is introduced into the cylinder, where the explosion takes place, through an induction pipe, the supply being shut off or opened by a valve. See ENGINE, MOTOR-CARS.

PETROLEA (42° 52′ N., 82° 6′ W.), town, Ontario, Canada, on Bear Creek; petroleum wells. Pop. 4600.

PETROLEUM (Lat. *petra*, a rock, and *oleum*, oil) strictly includes all the naturally occurring hydrocarbons, but the term is usually applied to the well-known inflammable liquid. It is found in very large quantities in Russia, Canada, U.S.A., Burma, and elsewhere. The earliest method of collecting p. was that of skimming the oil from the surface of water upon which it had accumulated. It is now obtained by drilling in much the same way as water is got by the artesian well system, the actual details of the drilling process varying considerably with the nature of the strata, which have to be bored through, and the depth to which the well must be carried. The oil may flow spontaneously, or may require to be pumped. It is sometimes possible to induce a flow of oil by stopping the escape of the gas which issues along with the oil, so that the latter is raised by the pressure of the gas. At Baku, on the Caspian Sea, compressed air is used for raising the oil.

When a well falls off in its yield, it is usual to shock it by the explosion of a special kind of torpedo in order to increase the flow. In some cases quite dry wells can be made to resume their productiveness by the use of the torpedo. The transport of p. in large quantities is generally carried out by means of the pipe-line system, the oil being forced through the pipes by pumps which vary in size, according to the length of the line and other matters, from about 30 to 800 horse-power. At the wells the oil is usually stored in circular wooden tanks, but in Canada it is frequently contained in reservoirs cut out of the soft clay of the oil regions. Clay-lined reservoirs are used to some extent in the Russian oil-fields. At the other end of the pipe-line the oil is received in large tanks made of boiler plate.

By various processes of refining, p. is made to yield a great variety of products, such as naphthas, kerosene, gasoline, vaseline, paraffin wax, etc. P. products are largely used in the manufacture of air-gas, oil-gas, and coal-gas, and for all kinds of lighting and heating purposes. Emulsions of p. are employed in the treatment of chest and lung diseases. P. is also used to a large extent as a lubricant for various kinds of machinery and for railway vehicles. The demand for p. has greatly increased on account of the enormous development of petrol-driven automobiles, and the use of p. as a liquid fuel is rapidly extending, recent tests having shown the value of this fuel, either alone or in conjunction with coal, for warships and other large vessels, and also for locomotives. See OIL, PETROL, ENGINE, FUEL.

PETROLOGY (PETROGRAPHY), the science of rocks and the investigation of their composition, structure, and history; sometimes called **Lithology**. Nearly all rocks consist of mineral ingredients, although a few are composed of animal or vegetable tissues. The origin of all rocks can be effectively traced, and they are classed according to their origin. P. goes hand in hand with GEOLOGY (*q.v.*), and a knowledge of p. is as important to the geologist as a knowledge of geology is necessary to the petrologist.

The number of important rock-forming minerals is relatively small, and does not exceed 100. The commonest is quartz; others are felspar, mica, chlorite, kaolin, calcite, olivine, augite, hornblende, magnetite, and hematite. Calcite composes limestones, while quartz is found in the sandstones and with a percentage of silica in igneous rocks. Disintegration produces constant changes in rocks, as does weathering. Some minerals are not affected by these causes, however, *e.g.* white mica and quartz. Felspar may be changed into kaolin, and muscovite to quartz, while biotite yields chlorite and epidote. Disintegration may so affect rocks that, the essential compositions being taken away or changed, the remainder may form sand or gravel and give rise to beds.

IGNEOUS ROCKS (Lat. *ignis*, 'fire') owe their origin to volcanic action. While some of the *crystalline rocks* are composed of the same ingredients as occur in many igneous rocks, they differ so materially from lavas that they could not have been consolidate at or near the earth's surface. These include diorites, doleritos, quartz-porphyries, granites, and gabbros. The microscope reveals them to be of igneous origin. They have cooled deep down in the earth, and denudation has caused them to appear near the surface. Thus the igneous rocks are divided into two classes: the *volcanic*, or superficial, and the *plutonic*, or deep-seated. Some of the igneous rocks are crystalline or massive, others fragmentary. The former include granite, obsidian, pumice, and basalt; the latter are composed of volcanic ashes more or less closely compacted together, and are known as *tuffs* (q.v.).

SEDIMENTARY ROCKS are generally the débris of pre-existing rocks which, having accumulated in seas, lakes, or upon land, have been subsequently subjected to pressure and pressed into solid form. Among these may be mentioned the sandstones, conglomerates, clays, and shales. ORGANICALLY DERIVED ROCKS.—Some rocks owe their origin to living organisms, *e.g.* corals, limestones, lyenite beds, and chalk; others again may be due to remains of vegetable life as peat and coal. METAMORPHOSIC ROCKS are rocks which have been changed by chemical action, percolation of water, or pressure. Sedimentary rocks are changed, too, at their point of contact with igneous rocks as limestones, which become crystalline marbles, sandstones are changed to quartzites, coal to graphite, and clay to porcellanite. Nearly all such rocks are distinguished by their foliated structure. Rocks which are subjected to intense pressure become schistose and crystalline in structure, and this applies equally to sedimentary and igneous rocks.

Some authorities form another class of rocks called the DERIVATIVE ROCKS, because these rocks are derived from other pre-existing rocks.

Williams, *Modern Petrography*; Harker, *Petrology*

for Students; Hatch, *Petrology Text-Book*; Adye, *Modern Lithology*.

PETRONIUS (I. cent.), Rom. satirist, probably GAIUS PETRONIUS, whom Tacitus describes as refined debauchee and connoisseur, hence the poet's surname *Arbiter*. Gaius P. was proconsul of Bithynia and boon companion of Nero; fell owing to jealousy and suspicion; committed suicide by slow degrees with great calmness. P.'s work has survived in a mutilated form; two books and some fragments extant; collection of satires, medley of prose and verse; marked by originality and strength; valuable picture of contemporary Rom. life; humorous in refined manner, in marked contrast to coarseness of Juvenal (*q.v.*).

PETROPAVLOVSK.—(1) (55° N., 69° E.) town, on Ishim, Akmolinsk, Asiatic Russia; trade in cattle. Pop. 20,000. (2) (53° N., 159° E.) seaport, Kamchatka, Siberia, on Sea of Kamchatka.

PETROPOLIS (22° 40′ S., 43° 5′ W.), town, health-resort, Rio de Janeiro state, Brazil; cotton industries. Pop. 20,000.

PETROVSK.—(1) (42° 59′ N., 47° 36′ E.) seaport, on Caspian Sea, Daghestan, Russian Transcaucasia. Pop. 9000. (2) (52° 17′ N., 45° 16′ E.) town, on Medveditza, Saratov, Russia. Pop. 14,500.

PETROZAVODSK (61° 45′ N., 34° 28′ E.), chief town, Olonets government, Russia, on Lake Onega; cannon foundry. Pop. 14,500.

PETTY, SIR WILLIAM (1623–87), Eng. politician and economist; sent to Ireland as physician, and volunteered to survey forfeited estates, which it was proposed to sell; drew up *Down Survey*, a model of statistical excellence; became chief agent of settlement; one of founders of Royal Soc., incorporated, 1662; ancestor of Earls of Shelburne.

PETUNIA, genus of plants, order Solanaceæ; native to S. America; flowers funnel-shaped and blue or white; garden flower in Britain.

PETWORTH (50° 59′ N., 0° 37′ W.), market town, Sussex, England.

PEVENSEY (50° 49′ N., 0° 22′ E.), small seaport, Sussex, England.

PEWTER is an alloy, generally of tin and lead, long known and valued. Cauldrons, mugs, plates, dishes, etc., were cast or hammered from this alloy. Common p. consists of four parts of tin to one of lead; a finer p. contains no lead, but antimony, and a little copper and bismuth.

PÉZENAS (43° 29′ N., 3° 27′ W.), town, Hérault, France, on Hérault; Rom. *Piscenæ*; trade in brandies. Pop. 7100.

PEZZA, MICHELE, see FRA DIAVOLO.

PFALZ, Ger. name for Palatinate (*q.v.*).

PFALZBURG (48° 47′ N., 7° 15′ E.), town, Lorraine, Germany, in Vosges; formerly a fortress; taken by Germans, 1870. Pop. (1910) 3804.

PFLEIDERER, OTTO (1839–1908), Ger. theologian of advanced critical school; wrote *Philosophy of Religion, Origins of Christianity, Primitive Christianity*, etc.

PFORZHEIM (48° 52′ N., 8° 41′ E.), town, Baden, Germany, at junction Nagold and Enz; Roman *Porta Hercyniæ*; jewellery. Pop. (1910) 73,788.

PHÆDRUS (I. cent. A.D.), the Rom. fabulist, appears to have been brought as a slave to Rome from Thrace. The fables were probably renderings of Gk. fables of Æsop and others, but some are original and refer to events of the reign of Tiberius.

PHÆTON, Tropic Birds (*q.v.*).

PHAGOCYTOSIS, term applied to the engulfing and destruction of micro-organisms and other minute bodies by certain cells of the body termed *phagocytes*. This power is possessed by minute unicellular organisms, such as the amœba, as their sole method of obtaining nutrition; in higher organisms we find phagocytic cells on the external surface and lining the alimentary tract; and in the most highly organised animals, such as man, there are many cells, fixed or wandering, which retain their power of p., the purpose of which is to remove débris resulting from injury, inflammatory processes, etc., or to remove foreign particles or micro-organisms.

The most important fixed phagocytic cells of the body are the large cells of the pulp of the spleen and of the lymph glands, certain endothelial cells, *e.g.* in certain lining membranes of the body, and neuroglia cells. Of greater importance are the wandering cells, which include the white corpuscles of the blood, all of which are not, however, phagocytes, the phagocytic power being possessed by the *polymorpho-nuclear*, *eosinophil*, and *large hyaline* leucocytes, but not by the *lymphocytes*. When a foreign particle or micro-organism is taken within a cell, if it is digestible a digestive fluid is secreted by the cell, which forms a vacuole around the foreign body, digests it, and the resulting products are absorbed. If the foreign body is not digestible, it may be retained for a time within the cell and at length discharged, or it may be killed and eventually digested, or, if it is very resistant, it may multiply and destroy the cell. See BLOOD, BACTERIOLOGY.

PHALANGERS, see under MARSUPIALS.

PHALANSTÈRE, see FOURIER, FRANÇOIS.

PHALARIS (d. 554 B.C.), tyrant of Agrigentum, Sicily; suppressed republic, *c.* 570; increased prosperity of state; ultimately overthrown by Telemachus, and consumed in instrument of his tyranny, the *brazen bull*; character, a problem of archæology.

PHALLIC EMBLEMS, see under PHALLICISM.

PHALLICISM, worship of the sex organs or of representations of them (*phallic emblems*), as symbols of the generative power in nature.

PHALLISM, Phallicism (*q.v.*).

PHALTAN (18° N., 74° 29′ E.), town, capital of native state Phaltan, Bombay, India. Pop. (town) 10,000; (state) 46,000.

PHANEROGAMS, see BOTANY.

PHARISEES, Jewish religious party frequently mentioned in the New Testament, especially as opponents of Christ. It must be remembered that it is the worst side of Pharisaism that is represented by the Evangelists. Their one great principle was loyalty to the Law, which is to them what Christ is to Christians.

PHARMACOLOGY, the science which deals with the physiological action on animals and on man, of drugs and of their therapeutic uses. The science of p. may be said to have begun with the experiments of WEPFER and BRUNNER in 1676, who produced convulsions resembling those of tetanus in dogs with nux vomica; and similar experiments of more or less value were carried out by later experimenters. HALLER (1708–77) conducted experiments on human beings, and in 1765 FONTANA published an exhaustive work showing the effect of poisons on different organs of the body. MAJENDIE, at the beginning of the XIX. cent., and CLAUDE BERNARD, somewhat later, made important physiological and pharmacological investigations, and by the middle of the cent., when BUCHHEIM established his pharmacological laboratory, the action of many important drugs had been ascertained and p. had gained a scientific basis. Modern methods of pharmacological investigation include the study of the effect of substances on bacteria, leucocytes, frogs, rabbits, guinea-pigs, and other animals, and not only the general symptoms, but the effects on the circulation, nerves, muscles, etc., must be studied experimentally. It is by such methods that the practical value and the therapeutic uses of a drug can be gauged.

Action of Drugs.—The action of a drug may be either *primary*, i.e. due to the unaltered drug, or *secondary*, i.e. due to compounds formed by the drug in the body; its action may be also either *direct*, i.e. the action produced on an organ with which the drug comes in actual contact, or *indirect*, i.e. when an organ or part of the body is affected secondarily to the action of the drug on another organ.

Drugs may be classified according to the organs

or parts of the body on which they act, but a number of drugs may be included in several classes, as they may act in different ways upon different organs.

I. Drugs arresting Putrefaction: those which prevent the growth of micro-organisms are termed *antiseptics*, and those which destroy micro-organisms *disinfectants*. Carbolic acid, perchloride of mercury, and peroxide of hydrogen are examples.

II. Drugs acting on Parasites: those which kill parasites inhabiting the intestine are termed *anthelmintics*, e.g. filix mas, santonin; the term *parasiticide* being usually reserved for those which act on parasites of the skin, *e.g.* mercury and sulphur preparations, formalin.

III. Drugs acting on the Blood: (*a*) on the blood plasma: *antitoxins*, e.g. diphtheria antitoxin, are injected to neutralise the toxins of certain diseases, while certain *toxins* may be injected to stimulate the plasma to form antitoxins; *alkalies*, e.g. potassium and sodium salts, are given to make the plasma more alkaline, as in gout. (*b*) On the red corpuscles: *hæmatinics* increase the amount of hæmoglobin in the red corpuscles, *e.g.* iron, arsenic. (*c*) On the white corpuscles: quinine arrests the migration of white corpuscles through the vessel walls. (*d*) Altering the coagulability of the blood: calcium chloride and other calcium salts increase coagulability, citric acid and citrates diminish it.

IV. Drugs acting on the Blood Vessels: certain drugs dilate the vessels, either applied locally, *e.g.* ammonia, silver nitrate; or taken internally, *e.g.* amyl nitrate, caffeine; or by acting on the nerve centres for the vessels, *e.g.* ether, chloroform. Others contract the vessels, either applied locally, *e.g.* suprarenal extract, lead salts; or taken internally, *e.g.* ergot, digitalis; or by acting on the nerve centres for the vessels, *e.g.* cocaine, belladonna. *Astringents* stop bleeding by diminishing the size of the vessels, while perchloride and certain other salts of iron stop bleeding by coagulating the issuing blood.

V. Drugs acting on the Heart: (*a*) directly on the heart: certain drugs increase the force of the contraction, *e.g.* digitalis, strophanthus; some increase the rate of the beat, *e.g.* atropine, cocaine; others slow the rate of the beat, *e.g.* digitalis, strophanthus, pilocarpine; some increase both force and rate of the beat, *e.g.* alcohol, ether; others decrease both the force and rate of the beat, *e.g.* arsenic, hydrocyanic acid. (*b*) On the vagus centre which controls the nerve supply of the heart: some slow the pulse, *e.g.* strychnine, digitalis; others increase the rate of the pulse, *e.g.* amyl nitrite, cocaine. (*c*) First stimulating and then paralysing the nerve ganglia of the heart, *e.g.* nicotine, lobelia.

VI. Drugs acting on the Skin: those which increase the amount of perspiration are termed *diaphoretics*, acting either on the terminations of the nerves to the sweat glands, *e.g.* pilocarpine, muscarine; or upon the centres in the spinal cord controlling these nerves, *e.g.* salts of antimony, ipecacuanha; those which decrease the amount of perspiration are termed *anhidrotics*, and act on the terminations of nerves to the sweat glands, *e.g.* atropine, hyoscyamus; or in a way which has not been exactly determined, *e.g.* nux vomica, quinine.

VII. Drugs acting on the Urinary System: (*a*) those drugs which increase the quantity of urine secreted are termed *diuretics*. Certain of them act by raising the arterial pressure either *generally*, by (1) acting on the heart, *e.g.* digitalis, caffeine; or by (2) acting on the blood vessels, *e.g.* digitalis, squill; or *locally* in the kidney, by (1) contracting the efferent vessels, *e.g.* caffeine, buchu; or by (2) dilating the renal vessels, *e.g.* pituitary extract, caffeine. Other diuretics act on the nerves controlling the secreting parts of the kidney or on the renal cells, *e.g.* caffeine, alcohol, potassium citrate, and acetate. (*b*) Certain drugs decrease the quantity of urine secreted, but this takes place by causing inflammation of the kidney and so they are not given medically, *e.g.* cantharides, turpentine. (*c*) Some drugs make the urine acid, *e.g.* benzoic acid. (*d*) Other drugs make the urine alkaline, *e.g.* potassium and sodium salts. (*e*) Those drugs which prevent the formation of calculi in the urinary passages are termed *lithontriptics*, the drugs given depending on the different causes of the condition—alkalies, benzoic acid, salicylates being given under various conditions. (*f*) Certain drugs prevent decomposition of the urine, *e.g.* urotropine, copaiba.

VIII. Drugs acting on the Bodily Heat: those drugs which decrease the temperature of the body are termed *antipyretics*, and act either by increasing the loss of heat, *e.g.* the diaphoretics and dilators of the cutaneous blood vessels (see above), or by diminishing the production of heat, *e.g.* acetanilide, phenagonum. Certain drugs cause a rise of temperature, *e.g.* cocaine and belladonna in poisonous quantities, but are not used medicinally for the purpose.

IX. Drugs acting on the Digestive System: (*a*) drugs which increase the amount of saliva secreted are termed *sialogogues*, and act (1) either on the secreting cells or upon the terminations of the nerves to them, *e.g.* jaborandi, mercury; (2) on the ganglion cells, *e.g.* nicotine; (3) reflexly by stimulation of the terminations of afferent nerves, in the mouth, *e.g.* acids, alcohol; in the stomach, *e.g.* antimony, ipecacuanha.

(*b*) Those drugs which decrease the amount of saliva secreted are termed *antisialogogues*, and act (1) either on the secreting cells or upon the terminations of the nerves to them, *e.g.* atropine, hyoscyamus; or (2) reflexly by their depressant action on the terminations of afferent nerves, *e.g.* opium, alkalies.

(*c*) Those drugs which act upon the stomach may (1) increase the amount of gastric juice secreted, *e.g.* aromatics and bitters, alcohol; (2) decrease the amount of gastric juice secreted, *e.g.* alcohol and ether in large doses, alkalies; (3) modify the contents of the stomach, either by making them more acid, *e.g.* dilute mineral acids, or more alkaline, *e.g.* alkalies (specially bicarbonate of soda), or by preventing putrefaction, *e.g.* carbolic acid, creosote; (4) dilate the blood vessels of the stomach walls, *e.g.* dilute mineral acids, pepper and other pungents, squill; (5) contract the blood vessels of the stomach walls, *e.g.* alum, dilute solutions of silver salts; (6) act as sedatives upon the nerves of the stomach, *e.g.* bismuth subnitrate and carbonate, opium; (7) stimulate the muscular movements of the stomach, *e.g.* strychnine, aromatics, and bitters; (8) act as emetics in various ways, (i.) on the nerve centre, controlling vomiting, *e.g.* apomorphine; (ii.) partly on the nerve centre and partly on the stomach, *e.g.* tartar emetic, ipecacuanha; (iii.) locally on the stomach, *e.g.* copper sulphate, mustard; (9) cause vomiting to cease, (i.) by acting on the nerve centre controlling vomiting, *e.g.* opium, bromides; (ii.) by acting locally as gastric sedatives, *e.g.* bismuth subnitrate and carbonate.

(*d*) Those drugs which act upon the intestines may act (1) as astringents, on the vessels of the walls of the intestines, *e.g.* alum and dilute silver salts solutions; (2) as astringents, constricting the vessels by coagulating albuminous fluids, *e.g.* tannic acid, lead salts; (3) by diminishing the muscular contractions of the walls of the intestines, *e.g.* opium, hyoscyamus; (4) by exercising a purgative action, chiefly by stimulating the muscular contractions of the walls of the intestines—(i.) laxatives or mild purgatives, *e.g.* tamarinds, figs, and other fruits, sulphur; (ii.) simple purgatives, more powerful than laxatives, *e.g.* cascara sagrada, aloes, rhubarb; (iii.) cathartics or drastic purgatives, *e.g.* jalap, elaterium, colocynth; (5) as intestinal antiseptics, preventing undue putrefaction of the intestinal contents, *e.g.* salol, soured milk.

(*e*) Those drugs which act upon the liver may act (1) as *cholagogues*, increasing the quantity of bile secreted, *e.g.* podophyllin, euonymin; or (2) as *anticholagogues*, decreasing the quantity of bile secreted, *e.g.* castor oil, calomel—but these drugs are not employed medicinally for this purpose.

(*f*) Drugs which stimulate the secretion of the pancreas include dilute mineral acids.

X. Drugs acting on the General Metabolism: the term *alterative* is applied to drugs which alter the course of a disease, but the mode of action of which is not understood, *e.g.* mercury in syphilis; while the term *tonic* is applied to drugs which improve the general health, and this may obviously be brought about in several different ways, *e.g.* by improving the digestion or the state of the blood. Strychnine, dilute mineral acids, iron, arsenic are all well-known tonics.

XI. Drugs acting on the Respiratory System: (*a*) certain drugs act locally on the bronchial tract, being administered by inhalation, some stimulating, causing increase of mucous secretion and dilatation of blood vessels, *e.g.* creosote, compound tincture of benzoin, while others may have a sedative action, *e.g.* hydrocyanic acid; other inhalations are employed to disinfect the foul secretion in certain conditions, *e.g.* creosote, carbolic acid; while certain inhalations relieve spasm of the muscular coats of the bronchial tubes, *e.g.* stramonium, amyl nitrite. (*b*) Some drugs act on the respiratory centre in the medulla oblongata, either stimulating it, *e.g.* ammonia, strychnine, or depressing it, *e.g.* physostigmine, chloroform. (*c*) Certain others act upon the bronchial secretion, increasing it, *e.g.* alkalies, ipecacuanha; or diminishing it, *e.g.* acids, belladonna; or disinfecting it, *e.g.* copaiba, cubebs. (*d*) Drugs which relieve spasm of the muscular coats of the bronchial tubes are termed *antispasmodics*, e.g. stramonium, hyoscyamus; while (*e*) those which cause spasm include physostigmine and pilocarpine. (*f*) Certain drugs have an effect upon expectoration, aiding the expulsion of the contents of the bronchial tubes, and classed according to their effect upon the general circulation as stimulants, *e.g.* acids, benzoin, turpentine preparations; or depressants, *e.g.* alkalies, antimony salts, ipecacuanha.

XII. Drugs acting on the Nervous System: (*a*) Certain drugs act upon the peripheral terminations of sensory nerves, some stimulating them, *e.g.* silver nitrate, zinc chloride, others depressing them, the latter being divided into (i.) those which relieve pain, termed *local anodynes*, e.g. carbolic acid, aconite; and (ii.) those which diminish sensibility, termed local anæsthetics, *e.g.* cocaine, extreme cold produced by the ethyl chloride spray.

(*b*) A number of drugs act on the nerve trunks, although not used medicinally for that purpose, causing irritation and inflammation, *e.g.* lead, arsenic.

(*c*) Some drugs act upon the spinal cord, a number (i.) increasing the irritability of the anterior horns of grey matter, *e.g.* strychnine, ammonia; while others (ii.) have a depressant action upon the anterior horns of grey matter, *e.g.* physostigmine, bromides.

(*d*) Those drugs which act upon the brain may be divided into (i.) drugs acting upon the motor centres, either depressants, *e.g.* alcohol, bromides, or stimulants, *e.g.* atropine, strychnine; (ii.) drugs acting as general cerebral stimulants, exciting the mental faculties, but, if taken in quantity, with eventually a paralysing influence, *e.g.* alcohol, opium, cannabis indica; (iii.) drugs acting as general cerebral depressants may be further classed as (*a*) *hypnotics*, which produce sleep, *e.g.* bromides, chloral hydrate; (*b*) *narcotics*, which, in addition to producing sleep, in large doses act as depressants of the circulatory and respiratory systems, *e.g.* opium, belladonna; (*c*) *general anæsthetics*, which lead to total unconsciousness, with abolition of reflexes and insensibility to pain, *e.g.* chloroform, ether.

(*e*) Drugs acting on the special sense organs, including (i.) dilators of the pupil of the eye, or *mydriatics*, e.g. atropine, cocaine; (ii.) contractors of the pupil of the eye, or *myotics*, e.g. pilocarpine, physostigmine; (iii.) drugs which paralyse accommodation of the pupil by acting on the ciliary muscle, *e.g.* atropine, hyoscyamine; (iv.) drugs which cause noises in the ear, *e.g.* quinine, salicylic acid.

(*f*) Drugs acting on the sympathetic nervous system, causing paralysis of the ganglion cells, *e.g.* nicotine, curara.

XIII. Drugs acting on the Generative System: (*a*) Those drugs which are supposed to stimulate sexual desire are termed *aphrodisiacs*, e.g. cantharides, cannabis indica, while those which have the opposite effect are termed *anaphrodisiacs*, e.g. bromides, opium; (*b*) drugs which stimulate the uterus to contraction are termed *ecbolics*, e.g. ergot, quinine; (*c*) drugs which increase the menstrual flow are termed *emmenagogues*, e.g. ergot, guaiacum; (*d*) certain drugs have a depressant action upon the contractions of the uterus, *e.g.* bromides, hyoscyamus; (*e*) those drugs which increase the secretion of milk in the breasts are termed *galactagogues*, e.g. jaborandi, and those which decrease the secretion of milk, *anti-galactagogues*, e.g. belladonna.

PHARMACOPŒIA, term applied to a book pub. by an authorised body, containing a list of drugs, their characters, and their preparations, together with a list of approved compound medicines with directions for preparing them. The first such work pub. under authority appears to be that of Nuremberg in 1542, a student, Valerius Cordus, having shown a collection of the receipts of various medical authorities to the physicians of that city, who persuaded him to publish it under the authority of the city council. The first edition of the London Pharmacopœia was issued by the Coll. of Physicians in 1618, the Edinburgh Pharmacopœia in 1699, and the Dublin Pharmacopœia in 1807, but by the Medical Act of 1858 the General Medical Council was ordained to publish the British Pharmacopœia to take the place of the former three. This work first appeared in 1864, and the latest edition is that of 1898. Most countries have now national pharmacopœias pub. by the respective governments, the pharmacopœia of the U.S.A. being issued, however, only under the authority of a commission of medical and pharmaceutical societies.

PHARMACY, the art of preparing and preserving drugs and compounding and dispensing medicines according to the prescriptions of physicians. *Druggists*, i.e. persons who sold drugs, and *apothecaries*, i.e. persons who dispensed medicines, were formerly classed among merchants and grocers, and had no organisation or separate status until 1617, when the apothecaries obtained a charter. By the end of the XVII. cent. apothecaries began to prescribe medicines and take upon themselves the duties of physicians, whose opposition they thus incurred, and by whom, in retaliation, chemists and druggists were encouraged to compound and dispense medicines. In 1748, and again in 1815, the apothecaries attempted, without success, to obtain legal control over the chemists and druggists; and when, in 1841, the apothecaries again made such an attempt, on the ground that there was no proper education or examination of chemists and druggists in Britain, the latter met the objection by forming the Pharmaceutical Soc. of Great Britain, which received a royal charter of incorporation in 1843, to protect their interests and to organise an adequate system of education in pharmacy.

In 1852 a Pharmacy Act was passed, establishing a register of pharmaceutical chemists, the Act of 1868 added a register of chemists and druggists and made it illegal for unregistered persons to sell the poisons mentioned in the Act, while the Poisons and Pharmacy Act of 1908 extended the list of poisons and laid down strict rules regarding their sale. There are three examinations which candidates for registration must pass, the first being in general knowledge, from which certificates of univ. entrance and certain other similar examinations exempt; the second, known as the Minor Examination, is in bot., chem., physics, materia medica, pharmacy, dispensing, posology, prescription reading, toxicology, and admits to the register of chemists and druggists; while the third, or Major Examination, is not compulsory, requiring an advanced knowledge of bot. and materia medica, microscopic

structure of plants and drugs, plant diseases, organic, quantitative analysis, spectrum analysis, optics, a knowledge of antitoxins, gland secretions, Röntgen rays, and similar resources of the modern scientific physician, and admits to the register of *pharmaceutical chemists*.

PHARNABAZUS (fl. V.–IV. cent. B.C.), Persian satrap of Phrygia under Darius II.; entrusted with reduction of Gk. cities of Asia Minor; received and assassinated Alcibiades (*q.v.*); defeated Spartans off Cnidus, 394.

PHAROMACRUS, see TROGONS.

PHAROS, see under LIGHTHOUSE.

PHARSALUS (39° 17′ N., 22° 27′ E.), town, Thessaly, Greece; scene of battle of *Pharsalia*, where Cæsar defeated Pompey, 48 B.C.

PHARYNGITIS, inflammation, frequently chronic, of the mucous membrane of the pharynx, or upper part of the throat, and of the soft palate, usually due to unhygienic surroundings, exposure to cold and damp, a debilitated condition, anæmia, or digestive disorders, or associated with a tendency to gout or rheumatism. It may often be due to speaking too much (especially in school-teachers or clergymen), or to excessive smoking. *Adenoids* (q.v.) is a form of chronic p. with adenoid vegetations and granulations. The treatment of acute p. is to apply a cold compress externally, with warm gargles of sodium bicarbonate or weak alum to relieve congestion. In chronic forms the practice is to remove cause of irritation, gargle regularly with a pinch of common salt or alum in water, or spray locally with menthol, astringent paints (*e.g.* silver nitrate, 20 grs. to the oz.) later. Tonics, cod-liver oil or iron, and a change of air are recommended.

PHARYNX, that part of the alimentary canal that lies between the mouth and nasal passages above and the œsophagus or gullet below, the larynx, which leads to the trachea and lungs, going off from its anterior aspect. It is formed by the three overlapping constrictor muscles of the pharynx behind and at the sides, while in front the soft palate dips downwards and backwards, dividing the nasal p. from the oral p. Above the soft palate, in the posterior part, the Eustachian tubes, communicating with the ear, open, one on each side, and below their openings is a mass of lymphoid tissue, termed the pharyngeal tonsil. Between the p. and the mouth are projections called the pillars of the fauces, and between the anterior and posterior pillars on each side, the oval lymphoid masses, the tonsils lie. In the embryos of the higher vertebrates and in lower vertebrates the bronchial arches and clefts are situated in the walls of the p., and in water-breathing vertebrates the gills are situated there. See DIGESTION, EAR, ADENOIDS.

PHASCOLOMYDÆ, Wombats, see under MARSUPIALS.

PHASIANIDÆ, PHEASANT FAMILY (*q.v.*).

PHASMIDÆ, Leaf Insects (*q.v.*).

PHEASANT FAMILY, PHASIANIDÆ, large and important family of game-birds, widely distributed throughout the Old World, the majority being of Oriental origin. They are birds of splendid colouring, and often bear combs or wattles. Amongst them are the true Pheasants (*Phasianus*), a familiar (introduced) sporting bird in Britain, while other handsome genera are the GOLDEN PHEASANT (*Chrysolophus pictus*), the ARGUS PHEASANT (*Argusianus argus*), and the HORNED PHEASANTS OR TRAGOPANS of Northern India and China. The PARTRIDGES (*Perdrix*), with mottled protective colouring and alternate beating and gliding flight, ranges over a wide area in Europe and Asia, while one species is a Brit. resident. The QUAIL (*Coturnix*), though less in size, resembles the Common Partridge, but has a peculiarly distinctive note. It is a visitor to Britain, but ranges throughout Europe, N. Asia, and India, and winters in Africa. Most wonderful of all are the showy PEACOCKS (*Pavo*), of which three species are known, all of which hail originally from the Far East.

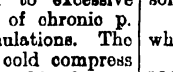
PHEIDIAS (b. *c.* 500 B.C.), the greatest sculptor of ancient Greece; b. at Athens. He executed a number of splendid statues for Athens, including an ivory and gold figure of the goddess Athena. A colossal figure of Zeus at Olympia was considered his masterpiece. Fragments of his work are among the Elgin Marbles in the British Museum. See SCULPTURE, ATHENS.

PHEIDON (*c.* VII. cent. B.C.), king of Argos; sought supremacy in Peloponnesus; said to have laid plot to murder flower of Corinthian youth; resisted by Sparta.

PHELPS, AUSTIN (1820–90), Congregationalist divine in U.S.A.

PHENACETIN, drug prepared by the action of glacial acetic acid upon para-phenetidin, a coal-tar derivative, consisting of colourless, tasteless, scaly crystals; used as an antipyretic for reducing the temperature in certain conditions, and as an analgesic for relieving the pain of neuralgia, sciatica, migraine, or headache.

PHENACODUS, see under HORSE FAMILY.

PHENAZINES, yellow solid, forming blue or red solutions in sulphuric acid, and yielding derivatives which are dyestuffs; p. itself is  ; M.P. 171° C.

PHENOL, see CARBOLIC ACID.

PHENOMENALISM, see METAPHYSICS.

PHENOMENON, that which appears, as opposed to *noumenon* (q.v.).

PHIDIAS, see PHEIDIAS.

PHIGALIA, ancient Gk. city in S.W. Arcadia, situated on rocky site amongst Peloponnesian Mts.; captured by Lacedæmonians, *c.* 660 B.C.; later regained independence, but fell into decay under Rom. rule; considerable part of city wall and a large square fortress still traceable; also temple, famous for its beauty and dedicated to Apollo Epicurius, some 5 or 6 miles distant.

PHILADELPHIA (39° 57′ N., 75° 9′ W.), city, on Delaware R., Pennsylvania, U.S.A. Public buildings include the old State House, where Declaration of Independence was promulgated in 1776, city hall, U.S.A. government buildings, mint, Masonic Temple. Univ. of Pennsylvania (*q.v.*) was incorporated in 1779; other educational establishments are the academies of music, art, and natural science, and there are numerous colleges and schools, including the William Penn Charter School, founded in 1689. There is a modern R.C. cathedral, completed in 1864; great number of churches of various denominations; fine system of parks, of which Fairmount Park is one of largest in America, with an area of over 3400 acres, containing numerous statues, monuments, and fountains. In neighbourhood are the zoological gardens. There are numerous hospitals and other philanthropic institutions.

P. was founded in 1682 by William Penn; incorporated as city, 1701; capital of Pennsylvania till superseded by Lancaster, 1799. First American Congress met here in 1774, and here Declaration of Independence was adopted, 1776, and Union Constitution drawn up, 1787; capital of Union, 1790–1800; first meeting of National Union Convention held here, 1866; site of international exhibition, 1876; damaged by storm, 1878; commemorated first coming of Penn, 1882; recent events include labour riots, 1910.

P. is largest city in Pennsylvania, and third in point of size in U.S.A.; great industrial and commercial town, situated on Delaware R.; important port, a ship channel enabling vessels of large draught to reach centre of city. Tonnage of foreign trade entered in 1910–11 was 2,672,883; cleared, 2,327,119; imports in 1910 valued *c.* £13,000,000, exports *c.* £13,051,389. P. has important shipbuilding yards, sugar and oil refineries, breweries, chemical works; manufactures carpets and other woollens, tapestry,

hosiery, cotton, hemp, and jute goods, silks, hardware, machinery, clothing; about half the glazed kid of U.S.A. is made here. Pop. (1910) 1,549,008.

Lillian I. Rhoades, *Story of Philadelphia* (New York, 1900).

PHILADELPHIA, RABBATH-AMMON (31° 56′ N., 36° E.), chief town of the Ammonites, Palestine.

PHILÆ (24° 1′ N., 32° 47′ E.), island in the Nile, Egypt, near Aswan Dam; covered with interesting temples and other buildings, of which most notable are the great columned hall known as 'Pharaoh's bed,' and the temple of Isis; these are sometimes submerged by waters of the Dam.

PHILARET (c. 1553–1633), ecclesiastical name of FEDOR NIKITICH ROMANOV, patriarch of Moscow; forced into his position among revolutions in which his powerful house fell; showed himself an able administrator; forbade peasantry to leave their holdings.

PHILATELY (Gk. *philein*, to love, and *atelēs*, free from taxation), the systematic collection of postage stamps. The craze started about the time of the first issue of Brit. penny stamps (1840), originating with the collection of Dr. Gray of the Brit. Museum. P. has now become a science cultivated by numerous societies and possessing a large body of lit. The Philatelic Society of London is the most important association of collectors.

PHILEMON AND BAUCIS, name of opera of Gounod's. See BAUCIS.

PHILEMON, EPISTLE TO, New Testament, book, written by St. Paul while in prison at Rome, about Onesimus, a runaway slave of Philemon's and convert of Christianity; authenticity hardly doubted.

PHILIP, the Apostle; often confused with Philip the Evangelist (*Acts* 6[5]); mentioned several times in Fourth Gospel.

PHILIP II. (382–336 B.C.), king of Macedon; f. of Alexander the Great. Anarchy prevailed after death of P.'s f., King Amyntas, 370. P. secured throne, 359, and speedily restored order; conquered several Gk. cities in Thrace, and founded Philippi, 358; capture of Olynthus inspired Olynthiac orations of Demosthenes; conquered Phocis, 346; commander-in-chief of forces of Amphyctyonic Council, 338; defeated Athens and Thebes at *Chæronea*, 338, and became supreme in Greece. P. instituted Macedonian phalanx.

PHILIP I.–VI., kings of France.

Philip I., PHILIPPE I. (1052–1108), succ., 1060; his vassal, William, Duke of Normandy, made himself stronger than Crown by conquering England; but P., though reputed lazy and debauched, always held his own against Normandy; excommunicated for evil living, 1094, but refused to repudiate wife; annexed Vermandois, Vexin, Valois, and bought Bourges.

Philip II., PHILIPPE AUGUSTE (1165–1223), succ., 1180; m. Isabella of Hainault, descendant of Carolingians, and thus strengthened Capetian dynasty; wrested his wife's lands, Artois, Amienois, Valois, Vermandois, from Count of Flanders; subdued Duke of Burgundy, 1186, and established strong rule; aided St. Bernard in monastic revival and persecuted heretics, especially Jews; went on Third Crusade, 1282; ambitious of conquering Normandy; aided sons of Henry II. in revolt, 1189, receiving homage of Richard and capturing Le Mans. On Richard's accession P. planned to divide his Fr. lands with John, but was diverted by feudal revolt of counts of Boulogne, Brittany, Champagne, and Hainault; assisted Arthur against John, and on Arthur's death united Normandy, Anjou, etc., to France (1202–4); recovered Brittany, 1206; repelled attacks of John and emperor, 1211–14. P. was the greatest of the Capetians; gave France unity; built royal castles and fortified towns, making Crown strong; religious, but enforced obedience of clergy to state; *Life*, by Hutton. See FRANCE (History).

Philip III., THE BOLD (1245–1285), succ., 1270; pious, virtuous, and mediocre; for some time continued to rule France after wise fashion of his f., Louis IX., but ultimately fell under influence of Charles of Anjou, who incited him to ambitious foreign policy; d. during ill-fated expedition to Sicily.

Philip IV., LE BEL (1268–1314), succ., 1285; united Brie, Champagne, and Navarre to France by marriage with Joan of Navarre; established strong despotism; attempt to tax clergy brought forth papal bull, *Unam Sanctam*, 1302; excommunicated for burning bull; transferred papal headquarters to France; Rom. law adopted. See FRANCE (History).

Philip V. (c. 1294–1322), succ., 1316, setting aside niece Jeanne; restored order after misrule of Louis X.; codified laws, improved coinage, crushed feudal risings.

Philip VI. (1293–1350), s. of Charles of Valois, younger bro. of Philip IV.; assumed throne to exclusion of niece, 1328; won great victory over Flemings at *Cassel*, 1328, but was unfortunate against English; Hundred Years War began, 1337; important acquisition of Dauphiné, 1349.

PHILIP II. (1527–98), king of Spain; m. Mary of Portugal, 1543, Mary I. of England, 1554, Isabella of France, 1559, Anne of Austria, 1570; his f., Charles V., abdicated, 1555, and P. became chief monarch of Christendom; attack of France and pope defeated by battles of *St. Quentin*, 1557, *Gravelines*, 1558; peace of Cateau-Cambrésis, 1559; lost northern Netherlands through persecution of Protestants, 1579; Armada defeated, 1588; strong, narrow, rigid mind; aided decline of Span. Empire.

PHILIP IV. (1605–65), king of Spain; assisted decline of Spain; governed by favourite Olivares till 1643; Portugal and Catalonia revolted, 1640; France gained territories by Peace of Pyrenees, 1659.

PHILIP (c. 1177–1208), Ger. king; Duke of Suabia, 1196; guardian of his nephew, Frederick II., western emperor, 1197; elected Ger. king, 1198; defeated rival claimant, Otto of Saxony, after 9 years' war; popular, warlike, and handsome.

PHILIP, THE MAGNANIMOUS (1504–67), landgrave of Hesse; one of first Protestants; became head of Ger. opposition to emperor; founded Marburg Univ., 1527; with Luther's sanction committed bigamy, 1540; made peace with emperor at Regensburg, 1541, but overthrew Catholic ruler of Brunswick-Wolfenbüttel, 1542; under ban of empire, 1546; surrendered, 1547.

PHILIP THE BOLD (1342–1404), duke of Burgundy, 1363; younger s. of King Jean; won title *le hardi* by gallantry at *Poitiers*, 1356; led French against English, 1372; crushed large Flemish army at *Rosbeck*, 1382; inherited Artois, Burgundy, Flanders, etc., 1384, and developed their resources; ruled France for Charles the Mad.

PHILIP THE GOOD (1396–1467), duke of Burgundy; in revenge for his f.'s assassination made Treaty of Arras, 1419, with Henry V.; aided him in early victories; deserted, 1429; bribed by fief of Champagne, but in 1435 drove bargain with France; aided in expulsion of English; strong, able ruler over whole of Netherlands; crushed Ghent rising, 1454, by terrible massacre.

PHILIP, JOHN (1775–1851), Eng. Congregationalist missionary to S. Africa; went out, 1818, and denounced treatment of natives by Europeans; influenced public opinion in England.

PHILIP, KING (c. 1639–76), chief of Wampanoag Indians, and called by them METACOMET. His father had made an alliance with the colonists of Rhode Island, but Philip abandoned the peace policy and commenced hostilities in 1675. He was vanquished and killed by a company under Benjamin Church.

PHILIPPA OF HAINAULT (c. 1314–69), wife of Edward III. of England, 1327; alliance important to Edward's Fr. ambitions; P. encouraged Eng. industries by bringing over Flemish weavers, working Tynedale coal mines, etc.; praised by Froissart.

PHILIPPEVILLE (36° 52′ N., 6° 53′ E.), seaport,

Constantine, Algeria, on Gulf of Stora; ancient *Rusicada*.

PHILIPPI (41° 5′ N., 24° 15′ E.), city, ancient Macedonia; scene of victory of Octavianus and Antony over Brutus and Cassius, 42 B.C.; visited by Apostle Paul, who addressed an epistle to its inhabitants.

PHILIPPIANS, EPISTLE TO THE, in New Testament, generally put with Epistles to Philemon, Colossians, and Ephesians as a group forming 'Epistles of the imprisonment.' The genuineness of P. is almost universally accepted, being only denied by very extreme critics. Early testimony to it is good, for it is referred to by Polycarp, and recognised by Justin Martyr, Marcion, and the Muratorian fragment. P. is important as showing a more advanced Christology than Romans and Corinthians.

Martin, *Philippians*, etc. (Century Bible).

PHILIPPINE ISLANDS (5° to 22° N., 117° to 127° E.), large group of about 3141 islands and islets in Pacific Ocean, belonging to U.S.A.; bounded N. and W. by China Sea, E. by Pacific, S. by Celebes Sea; total area, including Sulu Archipelago, *c.* 127,853 sq. miles; largest islands are Luzon in N., Mindañao in S., Mindoro, Samar, Leyte, Cebú, Negros, Panay, Masbate, Bohol in centre, and Palawan and Balabac in W. Coastline (over 11,000 miles) is broken, with numerous gulfs and bays; coral reefs, especially on E. Chief rivers are Cagayan, Pampanga, Agno, Bicol, Pasig, on Luzon; Agusán, Mindañao, on Mindañao; numerous lakes, Laguna de Bay, Taal, on Luzon; Lanas, Liguasan, Kadagun, etc., on Mindañao. P. Islands are connected by submarine ridge with Borneo and Celebes; traversed by high mountain ranges (mostly volcanic); highest peaks are Mount Apo, 10,312 ft., on Mindañao, Halcón, *c.* 8850 ft., on Mindoro, Mayón, *c.* 8000 ft., Banájao, 7382 ft., Datá, 7364 ft., Isargog, 6634 ft., on Luzon; there are 12 active volcanoes and several extinct ones. The islands are subject to frequent earthquakes, heavy rains, and violent hurricanes (typhoons); climate fairly healthy. Vegetation is luxuriant; immense forests of valuable timber. Fauna includes buffalo, boar, deer, antelope, water-buffalo (caraboa), etc.; mammals scarce; numerous birds, bats, reptiles, sea- and land-turtles; fish abound; beautiful and varied land, freshwater, and marine molluscs. Principal towns are Manila (capital), Bawan, Lipa, Laoag, Batangas, San Carlos, Tabac (in Luzon), Janúay, Ilo-ilo (in Panay), Aragao, Barili (Cebú), Baybay, Ormoc (Leyte).

Islands were discovered by Magellan, 1521, and named *San Lazarus* Islands; first Span. settlement established, 1565 (San Miguel on Cebú); Manila founded, 1571; present name dates from 1543, in honour of Philip II.; Manila taken by British, 1762, and held until 1764; revolts against Span. rule, 1872, 1896; scene of hostilities during Span.-American War; ceded to U.S.A., 1898; Filipino rising under Aguinaldo, 1899, which ended with latter's capture, 1901; military government abolished, 1901. Islands are now administered by civil gov., assisted by mixed commission of Americans and natives and P. Assembly. Dominant religion is Roman Catholic. Education is advancing rapidly under Amer. rule; St. Thomas Univ. at Manila; also industrial and trade schools, etc. Natives are mostly of Malayan origin, Negritos and Indonesians; chief tribes are Visayan, Tagálog, Bicol, Mows, Ingorrotes, etc. Railways on Luzon, Panay, and Cebú have been completed, and some are under construction. Chief products and exports are sugar, coffee, hemp, rice, tobacco, copra, cigars, indigo, timber, edible birds' nests; gold, iron, lignite, copper, sulphur, petroleum, rock-salt, gypsum are found; but mineral resources have as yet hardly been developed; extensive pearl fisheries. Pop.—about 25,000 Europeans and Americans, 50,000 Chinese, and *c.* 8,000,000 natives.

Atkinson, *The Philippine Islands* (1906); Blair and Robertson, *The Philippine Islands, 1493–1898* (1903–8); Wright, *Handbook to the Philippines* (1908).

PHILIPPOPOLIS (42° 3′ N., 24° 53′ E.), capital, E. Rumelia, Bulgaria, on Maritza; seat of Gk. and Bulgarian abp's; commercial centre; tobacco, silk-cocoons. Pop. (1910) 47,981.

PHILIPPSBURG (49° 13′ N., 8° 27′ E.), small town, Baden, Germany; tobacco.

PHILIPS, AMBROSE (*c.* 1675–1749), Eng. minor poet; wrote plays, pastorals, and miscellaneous verse. He was intimate with Addison and Steele, and had unpleasant passages with Pope.

PHILISTINES, name given in Old Testament to people on the coast of Palestine. Recent research tends to identify them with the PURASATI mentioned in Egyptian monuments of Rameses III., about 1200 B.C. They probably came from Crete, the extremely important and only recently discovered civilisation of which received its death-blow shortly before this. The incoming Israelites had a long struggle with them, Samuel and David being victorious, but the Philistines lifted their head again shortly. Gaza, on the way from S. Arabia to Edom, was one of their chief cities. Tiglath-pileser IV. of Assyria seized it (734 B.C.), and other towns around were conquered. Egypt succ. Assyria as the dominant power. An Arab migration took place about 300 B.C. It is difficult to piece together into a coherent story the fragmentary and contradictory notices of the Philistines and Philistia in the Old Testament. As known to the Hebrews they were either Semites or had absorbed Semitic civilisation. But excavations at Gezer show an undoubtedly Ægean element in their culture.

Cook, *Critical Notes on O.T. History*; Macalister, *History of Civilisation in Palestine*.

PHILLAUR, PHILAUR (31° 1′ N., 75° 50′ E.), town, on Sutlej, Jalandhar, Punjab, Brit. India. Pop. 7000.

PHILLIP, JOHN (1817–67), Scot. painter; at first dealt with Scot. subjects, but, going to Spain, drew his inspiration from there and became known as 'Spanish Phillip.'

PHILLIPPS, see HALLIWELL-PHILLIPPS.

PHILLIPS, EDWARD (1630?–1695?), Eng. writer; nephew of Milton, whose *Letters of State* he translated; first to edit Drummond's *Poems*; edited various works and wrote two novels.

PHILLIPS, JOHN, Eng. poet; wrote *Splendid Shilling* (1701) and other poems.

PHILLIPS, JOHN (1800–74), Eng. geologist; b. at Marden, Wilts; nephew of William Smith (*q.v.*), and accompanied him in his geological travels; app. prof. of Geol. at King's Coll., London, 1834; elected F.R.S., 1834.

PHILLIPS, STEPHEN (1868–), Eng. poet; poems include *Marpessa* (1890), *Christ in Hades* (1896); plays are *Paolo and Francesca* (1899), *Herod* (1900), *Nero* (1906).

PHILLIPS, WENDELL (1811–84), Amer. orator and abolitionist; b. at Boston. His great speech in Faneuil Hall in 1837 secured his recognition as the greatest orator of the anti-slavery party, and he became Garrison's chief guide and co-operator. He did much to advance the women's movement, and advocated the rights of the Indians.

PHILLIPSBURG (40° 39′ N., 75° 1′ W.), city, on Delaware, Warren County, New Jersey, U.S.A.; iron manufactures. Pop. (1910) 13,903.

PHILLPOTTS, HENRY (1778–1869), bp. of Exeter, 1831.

PHILO, Jewish philosopher, contemporary of Christ; lived at Alexandria, and forerunner of Alexandrian school. Little is known of his life, save a visit to Rome, 40 A.D. His philosophy blends Platonism and Judaism. The Jewish element is the claim to divine origin of Mosaic writings, through which Jews possess absolute truth in religious matters; everything right and good in Gk. philosophy previously taught by Moses. Philo adopts the allegorical method of interpreting the Old Testament customary among cultivated Alexandrian Jews. God is conceived as

the most general of existences, incorporeal, invisible, cognizable only through reason, imperishable, eternal; in essence incomprehensible; we can know that He is, not what He is, and attributes can be applied to Him only figuratively. The world is created by God not directly, since He is polluted by contact with matter, but through incorporeal potencies or ideas; like those of Plato, ideal patterns of things produced before creation of sensible world, yet differing as being efficient causes. The Logos is the highest of these divine forces, intermediate between God and the universe, dwelling with God as His wisdom, and giving rise to numerous lower potencies, ministering spirits, angels, demons, immortal souls. The Logos is the first-begotten of God; to us, itself a God. The human soul is imprisoned in the flesh, and the highest end of life is to loose the bonds of sense and rise to an ecstatic vision of the Divine.

Drummond, *Philo Judæus.*

PHILOLAUS, see PYTHAGORAS.

PHILOLOGY, the study of languages, especially as regards their hist. development and their mutual points of contact, their internal structure and external groupings. Though it has of late acquired a new form, it is an old science, pursued with good results in ancient Greece, in Alexandria, and in Rome. It lay dormant till the Renaissance, when it acquired a great impetus, especially in Italy, France, and Germany. The great names in this period were Budé in France, Lambin and Muret in Italy, Scaliger and Casaubon, who eventually settled in England, Justus Lipsius of Louvain, and Erasmus.

The beginnings of *comparative p.* were an attempt, often repeated but without much success at the time, to establish a common origin of Greek and Latin, possibly in Hebrew. In 1786 an Eng. scholar, Jones, published conclusions ascribing a common origin to Greek, Latin, Gothic, Sanskrit, and Celtic, and his work, taken up by Franz Bopp, and later by Jakob Grimm, became the foundation of the modern science of p. Grimm in particular crystallised much of the loose knowledge of his day, and gave his name to that law of p. which, so far as Teutonic languages are concerned, absolutely revolutionised the scientific study of languages. That law, briefly stated, amounts to this: that whenever a *p*, *t*, or *k* occurs in the parent language, it reappears in English, for instance, as *f*, *th*, or *h*, while aspirates *bh*, *dh*, and *gh* become *b*, *d*, and *h*. Changes ringing on this law are used to explain most alterations of the purely Teutonic languages (see TEUTONIC LANGUAGES). This discovery led to a much stricter investigation into the phenomena of p., and the placing of this as of other sciences under definite general laws.

This enabled a much more accurate classification of the languages of the world than had been possible before. Three large groups are recognised:—

1. Languages without inflection, *e.g.* Chinese, Tibetan, etc. These are also called Isolating Languages, because each word or sound represents an idea and composite ideas are represented by an agglutination of isolated words.

2. Languages capable of some degree of inflection, *e.g.* Turkish, Mongolian, Tamil, and some of the North American Indian languages.

3. Languages capable of a high degree of inflection. These are in every respect the most important, and are usually divided into the Semitic and the Indo-Germanic family, the latter being also termed Aryan.

The Semitic family embraces Hebrew, Phœnician, Syrian or Aramaic, Arabic, and the Abyssinian and Choan dialects. Changes in these languages (*e.g.* from singular to plural) are mainly effected by change of vowel.

The Indo-Germanic family, the members of which are probably derived from some lost Aryan parent language, is capable of considerable subdivision. Of several systems of classification proposed, the following is probably the most convenient:—

A.—Sanskrit, Zend, and Old Persian.

B.—Armenian.

C.—Roman (*q.v.*) and its offshoots, including perhaps Albanian, though this language is often put in a group by itself.

D.—Italic, comprising the *Romance Languages* (*q.v.*), Italian, French, Spanish, Rumanian, Romaunsh (the S.E. Swiss dialect), and Portuguese, with their dialects (*e.g.* Provençal).

E.—Celtic, in its few surviving forms, Welsh, Gaelic, Erse, and Bas Breton and Manx, and its extinct forms (*e.g.* Cornish). See CELTS.

F.—*Teutonic* (q.v.), comprising the Scandinavian languages, the Germanic languages (German, Dutch, Flemish, Cape Dutch, and Frisian), and English.

G.—*Slavonic* (q.v.), including Russian, Polish, Old Bulgarian, Bohemian, Lithuanian, Servian, and Lettish.

Brugmann's *Comparative Grammar*, Max Müller's *Essays on the Science of Languages*, and Paul's standard *Principien der Sprachgeschichte* (Strong, 1888).

PHILOSOPHER'S STONE, see ALCHEMY.

PHILOSOPHY, in the widest sense, is the reference of any set of phenomena to its determining principles, *e.g.* the p. of invention, of digestion, natural p.; in its technical sense, practically equivalent to Metaphysics (*q.v.*), an account of the fundamentally real, of the laws applying to all phenomena. The meaning and scope of the term have varied in different ages and among different writers. It was first used by Pythagoras as the disinterested pursuit of knowledge. All branches of knowledge were at first parts of p.; thus Aristotle included mathematics and physics in its scope. Later, as knowledge increased, the special sciences became independent, and the task of p. was to co-ordinate the principles of each science, to harmonise the claims of their postulates, so far as conflicting. Further, since Gk. thought sought the real substance underlying the phenomena of sense, p. approximated to Ontology, the science of being as being. If, however, as by modern empiricists, it is held that sensible objects and their laws may be known, but not any ultimate ground beyond phenomena, that things *are* only as they are *known*, p. then becomes Epistemology, an examination of the forms and categories of human thought. And great stress is laid on Epistemology, even by those who oppose this scepticism and seek the ultimate end of the universe. Besides these inquiries, p. is taken to include Logic, Ethics, Æsthetics, Psychology, Sociology, P. of Law, of Religion, of History. Certain of these have two aspects, and only as far as they deal with the fundamental nature of existence are they strictly parts of p.; in other respects, they are separate sciences. Thus, psychology, experimental science, and philosophical investigation of knowing mind; ethics, natural history of moral ideas, metaphysical theory of obligation; æsthetics, branch of physiological psychology and a p. of the beautiful.

Watson, *Outlines of Philosophy.*

PHILOSTRATUS, name of several Gk. sophists, especially—(1) THE EGYPTIAN, of the time of Cleopatra; (2) P. VERUS, in the I. and II. cent's A.D.; (3) FLAVIUS P., s. of preceding, taught at Athens and Rome; author of *Life of Apollonius of Tyana, Lives of the Sophists*, etc.

PHILOXENUS OF MABBOG (fl. latter half of V. cent.), Syriac writer and fervid upholder of the Monophysite doctrine. The work by which he is best remembered is his rendering of the Bible (the so-called *Philoxenian Version*), long the standard version of the Monophysites.

PHIPS, SIR WILLIAM (1651–95), gov. of Massachusetts, U.S.A., 1692; commanded force which captured Port Royal from French, but met no further success, 1690; brave but narrow-minded and quarrelsome.

'PHIZ,' see BROWNE, HABLÔT KNIGHT.

PHLEBITIS, inflammation of a vein; may follow injury to the wall of the vein, debilitating diseases in which there is a feeble circulation, or may occur in connection with a septic wound. A clot, or *thrombus*,

is apt to form, which may be carried to the heart or lungs with serious results. The symptoms of p. are pain and tenderness in the part affected, redness of the skin, the affected vein becoming like a cord. If it is septic there is much swelling, accompanied by high temperature. The treatment is rest, hot fomentations, elevation of the part continued for three or four weeks after inflammation has gone down to prevent detachment of the clot if one forms. For septic p. surgical interference is necessary, the area of suppuration being opened up.

PHLOX, a genus included in the Polemoniaceæ, and a favourite garden flower for borders and the like. The inflorescence is a cyme.

PHOCÆA (38° 40′ N., 26° 43′ E.), ancient city, on Ægean, Ionia, Asia Minor.

PHOCÆNA, see Dolphin Family.

PHOCIDÆ, see Seals.

PHOCION (*c.* 402–317 B.C.), Athenian politician and general; opposed patriotic resistance to Philip of Macedon, but strove to check war party, who brought on fatal battle of *Chæronea*, 336, and war with Antipater.

PHOCIS, ancient district in N. Greece, bounded by Corinthian Gulf on S.; mountainous and unproductive; chief mt., Parnassus; river, Cephissus, with productive valley; also fertile Crisæan plain; possessed Delphic oracle.

PHŒBUS, see Apollo.

PHŒNICIA (*c.* 32° to 36° N., 34° 45′ to 36° 30′ E.), coast region, Syria. Like the rest of Syria, P. was under overlordship of Egypt from about the beginning of the XVI. cent. B.C., and suffered from the invasions of Hittites from Asia Minor in the two following cent's. Egyptian rule began to decline soon after death of Amenhotep III., *c.* 1392, owing partly to the religious innovations of his successor, and partly to the continued aggression of the northern invaders; and soon afterwards P. ceased to be a dependency of Egypt and became a flourishing and independent country. Tyre and Sidon became most important cities, but colonies were also established on the Mediterranean islands and the coasts of N. Africa, as at Carthage, Hippo, Utica, Tripolis. The Phœnicians were a trading and colonising race; they are said to have had dealings with Solomon, and to have visited Britain in search of tin.

The country was invaded by Assyrians under Assur-nazir-pal in IX. cent. B.C., and from this time till late in the VII. cent. was a dependency of Assyria; Assyrian period was at first marked by peaceful prosperity, but in VIII. and VII. cent's numerous revolts took place, and about 630 P. again became virtually independent. Subdued by Nebuchadrezzar *c.* 605 B.C., P. became part of Babylonian empire, in the conquest of which by Cyrus of Persia it was included, 537 B.C. As part of the Persian empire, the various states were ruled by their own princes and the country enjoyed considerable prosperity; it was still dependent on Persia at the coming of Alexander the Great in 333 B.C., after whose victory at Issus several of the states at once surrendered; Tyre, however, opposed Alexander, and was besieged and after a magnificent resistance compelled to submit to the conqueror. The decline of Phœnician trade begins about this time, when Gk. colonies were planted everywhere on Mediterranean coasts.

After Alexander's death part of P. passed to Egypt, and afterwards belonged, for a short time in the III. cent. B.C., to the Seleucids; most of it subsequently came into the possession of the Ptolemies, and in I. cent. B.C. the whole was among the dominions of Tigranes of Armenia. It was conquered by Pompey in 64 B.C., and became part of Rom. province of Syria (*q.v.*), with which its subsequent history is coincident.

Phœnicians were of Semitic race; they acted as the carriers of the world, and had large distributing trade between E. and W.; among their most important industries was dyeing with Tyrian purple, which was obtained from the murex; linen-weaving, glass-making, and metal-working were also carried on. Most of their arts and crafts were taken from other nations; and the fact that they spread abroad so much useful knowledge is their chief claim to the gratitude of the world. Ægean civilisation is supposed to have been derived from contact with the Phœnicians, who in passing on the knowledge derived from Egypt and Babylonia, and possibly also in passing on the alphabet, form an important link in the chain of civilisation.

Rawlinson, *Phœnicia* (1889), and *History of Phœnicia* (1889).

PHŒNIX (33° 20′ N., 112° W.), city, on Salt River, capital Arizona, U.S.A.; agricultural region. Pop. (1910) 11,134.

PHŒNIX, fabulous bird of Egypt which lived for 500 years. Out of the ashes of the dead p. a new p. arose. The p. built his own pyre out of rare Arabic spices. The p. was especially associated with Heliopolis in Egypt.

PHŒNIX, see Date Palm.

PHŒNIX ISLANDS (3° 11′ S., 170° 40′ W.), group of small Brit. islands in Pacific.

PHŒNIXVILLE (40° 7′ N., 75° 30′ W.), town, Pennsylvania, U.S.A., at junction of French Creek with Schuylkill; steel and iron works. Pop. (1910) 10,743.

PHOLAS, see under Lamellibranch.

PHONETICS is the science of speech sounds, or of voice, *i.e.* embracing articulate and inarticulate sounds, but the former signification is the more general. The science has many immediate applications. By phonetics a correct pronunciation of foreign languages is best acquired, defects of speech are remedied, and the deaf and dumb are taught articulate speech. In this last department marvellous progress has been made in recent years. Moreover, the phonetician can by phonetic symbols register speech in languages that have no written form. In phonetics there are two methods of procedure. The external method describes the effect of sounds on the ear of the listener. (The descriptions of sounds by this so-called acoustical method are often vague, but for testing and comparing the method is very useful.) The internal method describes the position occupied by the vocal organs in the production of sound. This latter method is usually adopted. A detailed knowledge of the anatomy of the vocal organs is necessary.

Speech sounds fall into two main classes: (1) sounds which are produced by the passage of the breath through the mouth; (2) sounds which are produced by the passage of the breath through the nose. These may be combined, as in the French nasalised vowels. Numerous subdivisions of sounds produced by these two methods are determined by the extent and nature of the check to which the breath passage is subjected—*e.g.* in vowel sounds the breath has a more or less free passage through the throat and mouth, in the sound *f* there is an observable friction, and in the sound *p* the passage is blocked.

The following are the principal groups of articulate sounds: (1) *Stop Consonants*, where the passage of the breath is blocked and then released (*p, t, k, b, d, g*); (2) *Spirant Consonants*, where the stream of breath is checked by the lips and point or back of the tongue (*f, wh, th, kh, v, w, dh, gh*); (3) *Sibilants*, where the blade of the tongue acts on the passage (*s, z, sh*, and *zh*); (4) *Nasals*, where the mouth passage is closed by the lips or tongue, and the breath escapes by the nasal passage (*m, n, ng*); (5) *Vowel* sounds depend on the point of articulation of the tongue (tip, blade, or back) and its vertical position (high, middle, and low). The part played by the lips and nasal passage is also taken into account. The beginner in phonetics should first learn to isolate sounds and then to analyse them patiently. Various mechanical appliances are used in determining the position of the vocal organs, *e.g.* the laryngoscope (a mirror inserted in the mouth and throat), the X-rays, the palatogram (a thin plate inserted in the mouth which takes a chalk impression

of the point of contact). The sounds are then registered by adequate phonetic symbols.

The writing of all languages is at first phonetic, but orthography, which is by nature conservative, soon loses sight of the spoken sound. The written language is then said to be unphonetic, *i.e.* the pronunciation of the spoken word and the phonetic symbols of the written word no longer correspond—*e.g. knife*, the initial consonant of which was formerly sounded. The divergence in English is extremely great. Hence various attempts to institute a reformed spelling system have been made. Such reforms are not really an innovation, but a readjustment of the written symbol to bring it into its right relation to the spoken sound.

PHONOGRAPH (Gk. *grapho*, 'I write,' and *phonè*, 'sound'), an instrument which records sounds by transferring the vibrations of an elastic membrane to a needle which impresses them on a drum of tinfoil or wax, thus making a series of very fine indentations which, if the needle be passed over them again, will cause the delicate membrane to vibrate, thus producing sounds similar to the original ones, but of less intensity.

Many were the devices for recording sound waves brought out in the XIX. cent. All were for graphic records, however, and it was not until T. A. Edison invented his instrument in 1876 that the sounds could actually be reproduced. His first phonograph consisted of a chisel-like needle, a delicate membrane of gold-beater's skin, and a disc of tinfoil. Such an instrument was very imperfect, and from 1877 to 1888 Edison worked on improvements. The tinfoil was replaced by cylinders of wax, the gold-beator's skin by a thin glass plate, and the mechanical action of the machine by an electrical motor which drove the drum at a uniform speed.

Nowadays phonographs have reached a high state of perfection, reproducing such sounds as the human voice with almost lifelike reality, the mechanical parts of the machines being silent, ball-bearing clockwork motors. Cylinders or discs are made of a compound of shellac and other materials. A master record, taken in wax, is duplicated by a plaster cast and then electro-plated and used as a matrix. Wax impressions are again made and plated with copper, and from these 'negatives' the 'positives' are made by pressing the shellac into them by hydraulic power.

PHONOGRAPHY, see SHORTHAND.

PHONOLITE, CLINKSTONE, an igneous rock, composed of sanidine and nepheline, and belonging to Tertiary period; colours—green, grey, and brown; splits easily into slabs which, when struck with hammer, give metallic ring or clink, hence other name.

PHORMIUM, a genus, included in the Liliaceæ, which possesses isobilateral leaves. These are very resistent in character, the fibre termed New Zealand flax being derived from those of *Phormium tenax*.

PHORONIDEA, class of animals containing only the genus *Phoronis* with about six species. They are small marine animals which build leathery tubes encrusted with particles from the sea-floor, diatoms, sponge spicules, sand grains, and such-like. Several tubes are associated in a colony, though there is no organic connection between individuals. The animal itself is 'worm'-like, with an elongated body, crowned by a horseshoe-shaped group of tentacles within which lies the mouth. The individuals are hermaphrodite, and the development from the larva (Actinotrocha) to the adult is one of abrupt change. *Phoronis hippocrepia* occurs on Brit. coasts.

PHORORHACOS, an extinct land bird belonging to the group Stereornithes, Carinate birds the remains of which are found in the lower Tertiaries of S. America.

PHOSPHATES are salts of phosphoric acid, H_3PO_4 $\left(O=P\begin{matrix}OH\\OH\\OH\end{matrix}\right)$. From bone ash, $Ca_3(PO_4)_2$, or mineral phosphate, phosphoric acid and other phosphates are prepared.

Ordinary sodium phosphate is Na_2HPO_4, $12H_2O$; but, since the acid is tribasic, two other salts exist, viz. NaH_2PO_4 and Na_3PO_4.

The alkali phosphates dissolve in water, others in dilute acid by double decomposition, thus—

$$Ca_3(PO_4)_2 + 6HCl \rightleftarrows 3CaCl_2 + 2H_3PO_4.$$

When the acid is neutralised, the phosphate is reprecipitated; this complicates analysis. $CaH_4(PO_4)_2$, contained in 'superphosphate,' is soluble, and a plant fertiliser. Microcosmic salt, $NaNH_4HPO_4$, $4H_2O$, occurs in urine.

Solutions of phosphates give a yellow precipitate of Ag_3PO_4, a white crystalline precipitate of $MgNH_4PO_4$, $6H_2O$, and a characteristic yellow precipitate on warming with excess of a nitric acid solution of ammonium molybdate. Metaphosphates are $M'PO_3$, pyrophosphates, $M'_4P_2O_7$.

PHOSPHORESCENCE is the emission of a pale light—which may be white, orange, green, or violet—without apparent combustion. It is sometimes due to slow oxidation (chemiluminescence), or to electric excitation (electroluminescence), but otherwise is probably the accompaniment of molecular readjustment after strain produced by absorbed light energy. Diamond, when moderately heated, 'Bononian phosphorus' (barium sulphide), and Balmain's luminous paint (calcium sulphide) are phosphorescent in the latter sense. The phosphorescence of phosphorus and of organisms is due to oxidation. Fungi cause phosphorescence of decaying wood, minute organisms that of the sea, oxidation of fat probably that of glow-worms, fireflies, centipedes, and deep-sea fishes.

PHOSPHORUS, P=31·04, non-metallic element. Occurs combined, chiefly as calcium phosphate, $Ca_3(PO_4)_2$, in phosphorite, apatite, coprolites, bone ash. Widely diffused; essential to plants and animals. Isolated from urine by Brand in 1674.

P. is prepared from $Ca_3(PO_4)_2$ by separating H_3PO_4 and distilling with charcoal, thus—(i.) $Ca_3(PO_4)_2 + 3H_2SO_4 = 3CaSO_4 + 2H_3PO_4$, (ii.) $H_3PO_4 = HPO_3 + H_2O$, (iii.) $4HPO_3 + 12C = 2H_2 + 12CO + 4P$; or by heating a mixture of the phosphate with sand and charcoal in an electric furnace, thus—$Ca_3(PO_4)_2 + 3SiO_2 + 5C = 3CaSiO_3 + 5CO + 2P$.

Properties.—P. exists in several allotropic forms. I. White phosphorus is almost colourless, translucent, and waxlike; crystallises in octahedra, S.G. 1·83, M.P. 44°·3 C., B.P. 290° C. Molecule of vapour below 1500° C. = P_4, above, dissociation into P_2 molecules occurs. Molecule in solvents is P_4. P. is nearly insoluble in water, easily soluble in carbon disulphide. Ignites at 45° and burns to P_4O_{10}; kept under water. Luminous in dark (phosphorescence) owing to slow oxidation. When vapourised with steam shows greenish phosphorescence; peculiar smell; very poisonous, 1 decigram has caused death; vapour attacks jaw (*necrosis*, 'phossy jaw'). Use for matches now prohibited. Used as vermin killer, for chemical experiments, for making red and scarlet phosphorus, and as a nerve tonic.

II. Red phosphorus ('amorphous') is formed by action of light and heat on white phosphorus; change is promoted by a trace of iodine, and is rapid at 240–250° C., but reversed at higher temperature; dark reddish brown, partially crystalline, tasteless, odourless, insoluble in carbon disulphide, not poisonous, oxidised slowly in moist, hot climates. Used for safety matches.

III. Scarlet phosphorus (Schenck's) made by heating white phosphorus with the tribromide. Used for matches that strike anywhere (P_4S_3 also employed).

HYDRIDES: PH_3 (gas), P_2H_4 (liquid), $P_{12}H_6$, P_8H_2 (solid). CHLORIDES: PCl_3, PCl_5, $POCl_3$. OXIDES: P_4O_6, P_2O_4, P_4O_{10}. OXYACIDS: H_3PO_2, H_3PO_3, $H_4P_2O_6$, $H_3PO_4(HPO_3)$, $H_4P_2O_7$).

PHOTIUS (*c.* 820–91), patriarch of Constantinople; app. in irregular way; refusal of Pope Nicholas I. to confirm his election led to Council of Constantinople, 867, and secession of Eastern Church; deposed after death of emperor, 867, but restored, Pope John VIII. consenting; new council at Constantinople, 879, attacked Rom. doctrines; second exile, 886; cultured scholar.

PHOTOCHEMISTRY is the study of chemical change promoted by light. The fixation of the carbon of atmospheric carbon dioxide by green plants in sunlight is the most important photochemical process, whilst the action of light on silver salts forms the basis of photography. Other examples: $H_2+Cl_2=2HCl$; $CO+Cl_2=COCl_2$; $CH_4+Cl_2=CH_3Cl+HCl$.

Violet rays have the greatest chemical effect; they are called actinic.

PHOTOGRAPHY.—Photography is the name given to the process by which the rays of light reflected, or emitted by objects, are used to produce, by chemical means, a permanent picture of the object. It is the outcome of many attempts to fix the vivid pictures produced in the 'Camera Obscura,' which has been known since the XVI. cent. The camera is a light-tight box, in one side of which is fitted a lens which projects images of external objects on to the opposite side where a plate is fixed. The first permanent pictures were made by Daguerre, in France, in 1839. His process gave one picture, a positive on a plate of silvered copper—for each exposure. Daguerre was also the first to discover the *latent image*. He had attempted to secure a visible image on the plate by exposure in the camera, with little success; but he found by accident that if a plate, which had been exposed in the camera for a very short time, and showing no trace of an image, was then exposed to the vapour of mercury a complete image *developed*, and became visible. Henry Fox-Talbot, in England (1841), discovered a process of making negative images on paper which were developed by gallic acid. These *negatives* represent the light parts of the subject as black or opaque, and the dark parts as white or transparent, and by placing this negative, after treatment to make it translucent, on a fresh piece of sensitive paper, and exposing to light, a positive print is obtained which represents the lights and shadows of the picture in their proper relation. It is from this process, rather than from the process of Daguerre, that modern photography has developed. The next advance was the use of glass plates in place of paper, which was rendered possible by the adoption of an organic substance to carry the sensitive salts. Albumen was first used, but was soon displaced, for negatives at least, by collodion, which was introduced by Scott-Archer in 1851. These collodion plates were exposed and developed whilst still moist with the solution of silver nitrate used to sensitise them, and from this they were known as '*Wet plates*' or '*Wet Collodion plates*,' to distinguish them from the gelatine '*Dry plates*,' which came into use about 1880. The Wet Collodion process is still largely used for special purposes such as the various reproduction processes.

The Gelatine **Dry Plate** is the only plate known to the majority of photographers. It consists of a glass plate coated on one side with a film of gelatine containing the sensitive bromide of silver in the form of an emulsion. The film contains no free silver, and is used dry. The image formed by exposure in the camera is invisible or *latent*, but, when treated with a suitable *developer*, the parts of the film which have been altered by light become dark and opaque owing to the reduction of the silver bromide into metallic silver in proportion to the amount of light action. The unaltered bromide is next dissolved by the *fixing solution*, which is sodium thiosulphate ('*Hypo*'), leaving the opaque silver in the film. After washing and drying, the negative is ready for the process of making prints.

If the negative is too dense it may be 'reduced' by treatment with solutions having a solvent action on the silver image, whilst if it is too thin and flat it can be 'intensified' by treatment which increases the density of the silver image, or changes its colour, increasing the contrast at the same time.

All the processes mentioned have the disadvantage that they are much more sensitive to blue and violet light than to green, yellow, and red, the result being that the latter colours appear much darker, and the former much lighter on the print than they ought. In 1873 Dr. Vogel discovered that certain dyes had the property of altering the colour-sensitiveness of plates treated with them, moving the region of maximum sensitiveness towards the red end of the spectrum. Plates so prepared are known as *Orthochromatic* or *Isochromatic*, and are much more sensitive to yellow and green than ordinary plates, but the sensitiveness to blue remains so strong that it is necessary to interpose a 'light-filter' or 'screen' of a yellow colour to subdue the blue and violet. *Panchromatic* plates are a further development, and are sensitive even to deep red. They require a strong yellow or orange filter during exposure, and must be handled and developed in almost total darkness.

Films consist of thin transparent celluloid, coated on one side with gelatino-bromide emulsion. They are either cut to the standard sizes, and used like plates; or the celluloid is in the form of a long band on which successive exposures are made. The first are known as 'Flat' and the second as 'Roll' films. The advantage of the latter is that, being wound on a spool together with a longer band of opaque black paper, fresh spools can be inserted in the camera, and exposed ones removed, in ordinary daylight. Films are prepared of the same speed as plates, and made orthochromatic in the same way.

The Camera.—The simplest form of photographic camera has already been described.

Another type of camera has extensible sides so that the distance between lens and plate can be adjusted to focus objects at any distance. The lens may also be made to be raised or lowered in relation to the plate, to 'swing back,' to enable the plate to be kept vertical when the camera has to be tilted, and so on. A form of camera largely used in press photography is the *Reflex*, inside of which is a mirror inclined at an angle of 45°, which reflects the image on to a ground-glass screen in the top of the camera. The picture may be observed on this screen, exactly as it will appear on the negative, up to the moment of exposure, when the mirror flies up and allows the light to fall on the plate.

The photographic Lens is made in many types: for portraiture, a lens of long focus and large aperture; for interiors and other confined situations, a lens of short focus and great covering power (wide-angle), and so on. The *Telephoto* lens enables large-scale photographs to be made of subjects impossible to approach closely, such as mountain peaks, architectural details, and wild animals.

Printing.—The print is usually made on sensitised paper, which may be prepared with a number of salts other than the bromide and iodide of silver used in making negatives.

The first class are called *Bromide* or *Development* papers, and consist of stout paper coated with a bromide of silver gelatine emulsion similar to that used for dry plates, but not so sensitive. It is developed and fixed in the same way as plates, and is, indeed, coated on glass and used in making lantern-slides.

Contact prints are made by placing the paper in contact with the negative in a printing-frame, exposing to weak white light for a short time, and developing. This paper is also suitable for making *Enlargements*. The negative is placed in an enlarging camera which projects the image, of any desired size, on to the paper. A variety of this paper made with specially slow emulsion is known as *Gaslight* paper, as all the operations may be conducted by artificial light.

The normal colour of a bromide print is neutral black and white, but the colour may be altered by

modifying the developer, or by *toning* after development. Bromide paper is prepared with a great variety of surfaces, from a high gloss to that of very rough drawing paper. A second class of papers are known as *Print-out* papers, or 'P.O.P.,' as the image becomes visible as exposure proceeds. The sensitive salt employed is silver chloride. It is suitable only for contact prints. When the picture appears slightly stronger than is required it is fixed with 'Hypo,' but, as the colour of the image is unpleasant, it is usual to tone the print with a solution containing gold chloride before fixing. This produces tones ranging from reddish brown to purple black. A variety of this paper, known as *Self-toning*, contains a toning salt in the emulsion, which tones the image when the print is placed in the fixing solution. 'Platinotype' paper is used for contact prints, but while the image becomes visible during exposure it must be developed. The sensitive salt is platinum, and it is developed in potassium oxalate, and fixed with weak hydrochloric acid. The prints are very permanent, beautifully soft and delicate, the colour ranging from black to warm sepia, with a matt surface.

A very large number of printing processes are based on the action of light on bichromated gelatine, gum, albumen, and similar substances. If the substance is readily soluble in water, the effect of light is to make it insoluble. This is the principle of the *Carbon* or *Autotype* process, also the *Gum-Bichromate* process. An insoluble pigment is mixed with the bichromated gelatine or gum, coated on paper, and exposed in contact with the negative. The print is developed in warm water, which dissolves the soluble portions, leaving a graduated thickness of insoluble pigment-bearing film representing the various shades of the picture. If the print is dabbed over with a greasy ink, the ink does not adhere to the soft, moist parts but only to the more or less hardened portions in proportion to the amount of light action. This is the principle of the *Oil* process, and of the *Collotype* reproduction process, in which the ink image is transferred to paper in a special printing-press.

By a modification of the above method a print may be produced in high relief, and this is the principle of various processes for producing photographs in relief, also the *Woodburytype* reproduction process.

Another modification is to mix a hygroscopic substance, such as glycerine, sugar, or honey, with the bichromated colloid. After exposure the print is exposed to moist air, when the parts unaffected by light absorb the moisture and become sticky, while the affected parts remain dry. If a very fine powder is brushed over the print it will adhere in inverse proportion to the amount of light action, thus producing a negative from a negative. It is chiefly used in *Photoceramic* processes, i.e. making photographic prints on china and porcelain.

An interesting print-out paper for the reproduction of colours has been produced by Dr. Smith. It is prepared by coating paper with a black film containing three dyes which combined appear black. These dyes bleach out in white light, but as each dye is bleached only by the colour rays which it *absorbs*, the black film bleaches to red under red glass, green under green glass, and so on, and if exposed under a coloured transparency it will give a fair reproduction of the colours. The printing is slow, and there is some difficulty in fixing the colours satisfactorily, but these faults will probably be remedied.

Colour Photography.—The production of photographs in natural colours has been attempted by experimenters from Daguerre and Fox-Talbot onwards, but no advance was made till 1861, when Clerk Maxwell suggested a method based on the Young-Helmholtz theory of colour vision, that our eyes perceive colour by the stimulation of one or more of three *colour sensations*. Each sensation is stimulated by a different range of vibrations, approximating to red, green, and blue-violet. White is perceived by the equal stimulation of all 3 sensations, and colours by stimulation in varying degree of one or more sensations. Clerk Maxwell showed that if negatives were made recording respectively the amount of red, green, and violet contained in the camera image, and if the positives were projected by lanterns so that the images coincided, using for the projection of each the same coloured light as had been recorded in the negative, then the picture would appear in its natural colours.

Clerk Maxwell's results were imperfect, but the principles he demonstrated are the basis of almost all modern processes of colour photography.

In addition to projection by three lanterns, the images may be combined by projecting them in rapid succession, as in the cinematograph, the stimulation of each sensation recurring so rapidly as to blend. Another method is employed in Ives' 'Kromskop,' in which the three images are superimposed and combined by an arrangement of transparent reflectors, but the most convenient way is to make the three colour-sensation records in very minute portions side by side on one plate. The divisions of colour are too small to be distinguishable by the eye, and only the colour produced by the combination is seen. The two disadvantages of this method are that (1) the picture must be in the form of a transparency, and (2) the great loss of light, which even in the whites amounts to two-thirds. Of several processes making use of this method the Autochrome plate of Messrs. Lumière is the most widely used. In this plate the compound filter consists of starch granules, dyed in three batches and mixed in the proportions which approximate to white when spread on glass in a film the thickness of a single grain. The panchromatic gelatine emulsion is spread on this film, and the plate is placed in the camera with the glass side next the lens so that the light passes through the coloured grains before reaching the plate. A yellow filter is required in the lens to correct the excessive blue sensitiveness of the plate (see above). The negative is developed, converted into a positive, and the image appears in its natural colours.

All the above methods are known as '*additive*,' as one light is added to another, but the three-colour principle may also be employed by subtracting colours from white, which has the advantage of enabling prints to be made on paper, as well as in the form of transparencies. The negatives are made in exactly the same way, through red, green, and violet filters, but the colours used for the print are the complementaries to those. The basis, which may be paper, porcelain, or glass, reflects or transmits red, green, and violet light (*i.e.* white), and it is required to subtract from it successively these colours in the proportions recorded in their respective negatives. This is done by making a print from each negative, by the carbon process generally, and transferring the tissues on to the paper or glass, one over the other, making them coincide. The colours of the tissues must be such that each absorbs the rays passed by the filter used for that negative, and reflects the rays passed by the other two filters. These colours are found to be for the red filter print, a greenish blue; for the green filter print, a magenta pink; for the violet filter print, yellow. The widest use made of this method is in reproduction of coloured pictures by means of half-tone process and the printing-press. Half-tone blocks are made from the three-colour negatives, and are printed in yellow, red, and blue inks, so that the three impressions coincide.

The Lippmann process, making use of the colours produced by *interference*, and Prof. R. W. Wood's process, based on *diffraction* (see LIGHT), are only of scientific interest so far.

One of the most remarkable developments in modern photography is the CINEMATOGRAPH, which records and reproduces action and movement by photography. This has been achieved by making use of the fact that the impression made on the retina of the eye by momentary vision persists for an appreciable time afterwards. The first practical apparatus, made by

Edison in 1892, was a camera which made a series of negatives in rapid succession on a roll of celluloid film; a roll of positives was made, and these were viewed in an instrument called the *Kinetoscope*, by one or two persons at a time. A few years later Mr. Friese Green in England and Messrs. Lumiere in France evolved the 'Cinematograph,' which projects the tiny pictures on to a screen (about 1000 per minute), enlarging them enormously.

One of the latest achievements is the production of living pictures in natural colours by the *Kinemacolor* process, on the principle of Colour Photography. The adoption of the full three-colour principle being very difficult, it was found that a sufficient range and variety of colour for most purposes could be obtained by the use of two complementary colours, the two selected being an orange-red and a greenish blue, which produce white when superimposed by projection. The camera is fitted with a mechanism which interposes 'filters' of these colours alternately as the film is exposed, so that the negatives record alternately the amount of orange-red and greenish blue in the subject. A positive film is printed from this, and projected by a cinematograph projector fitted with a similar filter mechanism to the camera so that the print from the orange-recording negative is projected by orange light, and that from the green-recording negative by green light. The impression produced on the eye is of a single, brightly-coloured, moving picture.

Amongst the numerous scientific applications of photography may be mentioned star-mapping and spectroscopic work in astronomy, X-rays in surgery, and the wide use of microphotographs in pathology and in the iron and steel industries. Several systems have been devised for the transmission of photographs by telegraph, the Korn system employing selenium, the electrical resistance of which varies with the intensity of the light falling on it, and the Thorne Baker system transferring directly without the necessity for development as in the Korn apparatus.

PHOTOMETRY deals with the measurement of the relative illuminating powers of different sources of light. The apparatus used is a *photometer*. The illuminating power of any source is the amount of light received by unit surface at unit distance from it. This varies inversely as the square of the distance, so that if the distance is doubled the light received by the same surface is one-fourth. A standard source must be fixed. The Brit. standard is a *sperm candle* burning 120 grains per hour and weighing six to the lb. For practical purposes, the *Harcourt lamp*, burning pentane and air, equal to 10 candles, is more manageable. The French *Carcel lamp* burns 42 grammes of colza oil per hour; the Ger. and U.S.A. standard *Hefner-Alteneck* burns amyl-acetate and gives a reddish but very accurate light. The relation between these sources has been defined as Harcourt = 1·02 Carcel = 10·95 Hefner (Zürich Congress, 1907). As a final standard Violle proposed the light given out by a square centimetre surface of platinum at melting-point.

Since equal illuminations cannot be gauged directly by the eye, various devices are resorted to in photometers. Rumford's consists of a rod a short distance from a ground-glass screen. Two lights, one of known candle-power (c.p.) are moved till the shadows thrown by the rod are of equal darkness; then the powers of the two sources vary as the squares of their distances from the corresponding shadows, and the unknown light is determined. Bunsen's is a simple and common form, consisting of a grease-spot on a screen of paper. When viewed from the same side as a light, the spot appears dark; from the opposite side it appears bright. The lights to be compared are moved on opposite sides of the screen till the spot becomes invisible from both sides, when the powers of the lights are proportional to the squares of their distances from the screen. In Lumner and Brodhun's photometer by an optical arrangement two patches appear, showing a spot from one source inside a ring from the other. Equal illuminations are judged accurately either (1) when the two patches are uniformly bright, (2) the two spots are of equal darkness. Photometers in general give varying results with different observers, when the lights compared are not the same tint. This difficulty is removed with the 'flicker' instrument, where the reflections from two lights are rapidly presented alternately, and equal illumination is achieved while the reflection becomes steady. The Harvard and other stellar photometers are described under STAR.

PHRAATES, five kings of Parthia who ruled between 175 B.C.–5 A.D.

PHRENOLOGY (Gk. 'science of the mind'), a science or pseudo-science which infers from the shape of the head and skull of any given person what are his characteristics. It comes under the domain of physiological psychology, but as a worked-out system it is due firstly to Gall, who began to publish writings on it in 1798. Earlier thinkers to some extent had forestalled him. It was only gradually in antiquity that the idea of the brain as the seat of the mind was evolved. From this it was not unnatural to go on to assert that each separate function had a different place in the brain. Both this view and its negative were vigorously upheld in the Middle Ages.

Gall worked out in full detail the idea of what are vulgarly called *bumps*. Other systems were worked out on similar lines by a number of other thinkers, particularly Spurzheim, who postulated 35 'bumps' (as against Gall's 26). Though these schemes have not generally won acceptance, they certainly resulted in a deeper study of the brain—a branch of physiology which is still far from having reached its completion. Thus, the rate of growth of the brain, the amount of grey and white substance, and the folds in the brain itself all have to be taken into account.

The physiological side of the question is a difficult one, for while anatomically the brain is fairly well understood now, physiologically much is still open to doubt. Though it seems probable that there is 'division of labour' in the brain, yet, if a portion be removed, its duties seem to be taken over by other parts of the brain.

Psychologically considered, p. is also open to question. It is difficult to assume the existence of a number of different faculties which are as separate from each other as are the organs of the body, or else to assume a sort of common substance on which they all worked. An attempt has been made to work out the principles of p. with recent research in psychology and physiology, but its validity is not always accepted by the best authorities. Even if these results, however, be fairly well assured, there still remains the difficulty of arguing from the shape of the brain itself to that of the skull on the outside, but the two do not by any means entirely coincide, and various circumstances, *e.g.* artificial malformation, may alter the skull without much affecting the brain. All these facts tend to prove that for the reading of character p. is really of little avail, and as popularly expounded it is often a pseudo-science rather than a real one.

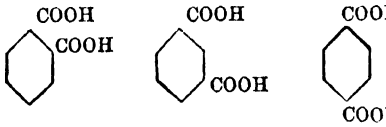
Holländer, *Scientific Phrenology* (1902).

PHRYGIA, large country in Asia Minor, which varied greatly in regard to boundaries at different periods of history, but generally speaking formed western part of central plateau region of peninsula; consisted principally of plateau region, most fertile district being valley of Sangarius, and most thickly populated part in S.W.; celebrated for marble, vines, and wool. Little is known about nationality and origin of inhabitants, but they are generally supposed to have been one of oldest nations in Asia Minor. Exact date of beginning of Phrygian monarchy is unknown; downfall of kingdom believed to have been in VII. cent. B.C., at time of Cimmerian Invasion; in VI. cent. B.C. Crœsus conquered country, but was defeated by Cyrus c. 546 B.C., and P. passed into hands of Persians; invaded in III. cent. by Gauls, who took possession of E.

part of country and called it Galatia; country given by Alexander the Great to Antigones, and kept by him till his death; later succumbed to Pergamum kings; under Rom. Empire P. comprised part of Province of Asia, and in W. in particular Græco-Rom. civilisation spread; at reorganisation of Roman Empire by Diocletian all that remained of P. was divided into P. Pacatiana in E. and P. Salutaris in W. Name of P. disappeared at division of Eastern Empire, and now Byzantine P. is comprised in vilayets of Broussa, Konia, and Aidin. P. had important influence on Gk. art and culture. Chief deities were Cybele the Mother and Sabazias the Son (Gk. Dionysus). P. was early Christianised. See ASIA MINOR.

PHRYNICHUS, the name of three Gk. writers. The first, a tragic poet, flourished about 560 B.C.; the second, a poet of Attic comedy, and abused by Aristophanes; the third, a grammarian of the time of Marcus Aurelius.

PHTHALIC ACIDS, benzene dicarboxylic acids.



Phthalic acid.	Isophthalic acid.	Terephthalic acid
M.P. 184°.	M.P. above 300°.	sublimes.

PHTHISIS, condition due to tuberculosis of the lungs. See TUBERCULOSIS.

PHYLE (38° 10′ N., 23° 40′ E.), fortress of Attica, on borders of Bœotia; taken by Thrasybulus and the Athenian patriots, 404 B.C.

PHYLLITE, group of schistose clay-rocks containing quartz, mica, chlorite, and muscovite; composed of metamorphosed argillaceous matter.

PHYLLOPODA, see under ENTOMOSTRACA.

PHYLLOSTOMATIDÆ, see VAMPIRE BATS.

PHYLLOXERA, VINE INSECT, a genus of minute insects (family Aphidæ, order Hemiptera) which do enormous damage to vines. The life-history is very complicated, the females living on the vine roots and laying each 30 to 40 unfertilised eggs from which in a week the fresh brood hatches. So many generations succeed each other in a season that, barring accidents, the progeny of a single individual would in a year number more than 20 millions. In spring the leaves are attacked by newly hatched insects and great harm is done. In vineries the stems of roots are scraped in winter to destroy any *Phylloxera* eggs that may lurk in the crevices of bark.

PHYSALIA, see under HYDROMEDUSÆ.

PHYSETERIDÆ, a family of Whales (*q.v.*).

PHYSIOCRATIC SCHOOL, founded by Francis Quesnay (1694–1774); included Turgot, Gournay, Mirabeau, Morellet; doctrines preponderant under Louis XVI., and in Revolution; held that the earth is the only source of natural wealth; farmers, fishermen, etc., who use or increase the natural powers at work in the animal and vegetable kingdoms increase the actual wealth of a country; manufacturers and merchants only change form of articles so produced—the first being productive, the second unproductive; opposed to mercantile system; advocated freedom of foreign trade.

PHYSIOGNOMY, the theory and art of discerning mental character from bodily appearance. The earliest monograph on the subject is that wrongly attributed to Aristotle, which discusses (1) the signs of character in general, (2) the physiognomy of the sexes, and (3) the comparison of human and animal appearance. In the Middle Ages the study became implicated with cheiromancy and magic. Many treatises on it appeared in the XVI. cent., that of della Porta being the chief. In the XVII. cent. John Evelyn and John Bulwer treated of it in this country. By far the best-known XVIII.-cent. writer on it is Lavater, the later editions of whose works are admirably illustrated. Lavater tried to bring the subject into relation to the fine arts. More recent writers, *e.g.* Sir Charles Bell and Darwin, have discussed the subject from a more scientific standpoint.

PHYSIOLOGUS, name of a collection of animal stories widely read and circulated in the Middle Ages, originally written in Greek, and now existing in various forms in Lat., Syriac, Armenian, Arabic, Ethiopic, Old Eng., Old Fr., Old High Ger., Provençal, and Icelandic versions. It is sometimes called the *Bestiary*, as it contains stories of animals with morals appended. These were probably chiefly taken from scriptural commentaries, particularly on Genesis. Its science was curious and its theology doubtful, and it was condemned by Pope Gelasius in 496, but it remained popular, though writers took great liberties with the text, modifying it as they pleased.

PHYSIOLOGY, the science which deals with the functions of living organisms, as distinguished from anatomy, which deals with their structure. Human p. may be considered under the headings of *nutrition*, including the processes concerned with the digestion of food and its assimilation and absorption into the blood and thence to the tissues, the absorption of oxygen from the air by the blood through the agency of the lungs and its conveyance to the tissues, the circulation of the blood and of the lymph, with the excretion of waste matters by the bowel, kidneys, lungs, and skin; *growth* of the body, brought about by the continued division of the cells composing the tissues; and *reproduction*, which is a specialised form of growth in which there is increase of living substance formed by cell division in such a way that a new individual is set free; *nervous activity*, comprising the functions of the brain, which is the seat of consciousness, the spinal cord, sympathetic system, sense-organs, and nerves; *movement*, which is carried out by the muscles in relation with their supporting structure, the skeleton.

History.—The history of p. commences with the beginnings of med. as a science in ancient India and Egypt, followed by the speculations of the ancient Gk. philosophers regarding life. HIPPOCRATES was the first to attempt to explain the phenomena of health and disease in a rational rather than a mystical way, and ARISTOTLE a cent. later (c. 350 B.C.) dissected animals and investigated the functions of different organs, but his methods are more important than the results which he achieved. The cent's after this were occupied with speculations and discussions regarding the vital spirits and similar subjects, until the time of GALEN, who flourished about the middle of the II. cent. A.D. He made physiological experiments upon living animals, and made several discoveries of importance, particularly in regard to the nervous system; for every problem he found some answer, and his dogmatic teaching dominated the science of med. for many cent's. The Arab. school of med. which arose in the X. cent., in which the most eminent name is Avicenna, made no real advance in p., and mysticism and speculation held away until the XV. cent. With the fall of Constantinople (1453 A.D.) and the diffusion of the Gk. scholars through Western Europe, the writings of Hippocrates and Galen became known in the originals, and to their influence was due the revival of interest in anatomy and p. PARACELSUS, in the XV. cent., promulgated theories of life independent of Galen, but his influence was fleeting.

The study of anatomy was revived in Italy in the XVI. cent. by Vesalius, who dissected the human body and opposed the physiological theories of Galen; he was followed by FABRICIUS, and, at the beginning of the XVII. cent., WILLIAM HARVEY, who had studied under the Ital. anatomists, made the epoch-making discovery of the circulation of the blood (1628). About this period arose the Iatro-mechanical school, of which Borelli and Pitcairne were the most notable members, and the Iatro-chemical school, founded by the Dutchman Sylvius, one of his most eminent followers being

WILLIS, who made valuable researches in regard to the secretions. Both of these schools attempted, on opposing lines, to explain the phenomena of life in accordance with scientific facts. The invention and improvement of the microscope in the XVII. cent. stimulated research, LEEUWENHOOK and MALPIGHI especially making valuable discoveries with its aid, the science of Histology being founded by them (see CYTOLOGY).

VON HALLER, in addition to making various discoveries of greater or less importance, particularly in regard to muscular irritability, co-ordinated the different parts of the science, and gave it a definite form. JOHANNES MÜLLER, in the first half of the XIX. cent., laboured in the same direction, and showed, among other things, that different forms of stimuli produce the same effect upon a particular organ. VON BAER made valuable researches regarding the development of animal life, and may be regarded as the founder of the science of Embryology; CUVIER linked palæontology with comparative anatomy, and was the first to realise the inter-dependence of the organs and parts of an organism; LAMARCK foreshadowed the theory of natural selection, and promulgated an important, but still debated, theory of evolution. SCHLEIDEN and SCHWANN showed that all organisms are built up of cells, while VON MOHL and DU JARDIN discovered that protoplasm is the essential constituent of the cells.

Among noteworthy stages in the progress of the science are the discovery of the law of the conservation of energy by MAYER and HELMHOLTZ and its application to the living organism, the researches regarding the nervous system by MARSHALL HALL, who discovered the laws of reflex action, and of WEBER, who discovered the laws of inhibitory nerve action, and the widespread investigations of CLAUDE BERNARD, among whose discoveries may be noted the saccharine function of the liver and its connection with the nervous system. CHARLES DARWIN added to the primary ideas of evolution of Erasmus Darwin and Lamarck the theory of natural selection, and made possible an explanation of the structure and evolution of living things, and harmonised all the branches of science. See BRAIN, CELL, DIGESTION, HEART, NERVOUS SYSTEM, RESPIRATORY SYSTEM, REPRODUCTIVE SYSTEM, and similar articles.

PHYSOPHORA, see under HYDROMEDUSÆ.

PHYSOSTIGMINE, see CALABAR BEAN.

PHYTO-PLANKTON, see under PLANKTON.

PHYTOTOMY, see PLANTS (ANATOMY).

PIA MATER, see BRAIN.

PIACENZA (45° 3′ N., 9° 40′ E.), town, near Po, northern Italy; capital of province P.; with cathedral (1122), Sant' Antonia; San Sisto (1499), formerly possessed Raphael's Sistine Madonna; communal palace, Farnesi and other palaces; Museo Civico, etc.; founded by Romans as *Placentia*, 219 B.C.; a leading town of the Lombard League in Middle Ages; united to Parma, 1545–1860; engaged in silk industry. Pop. (estimated) 36,600.

PIANOFORTE, a familiar keyboard musical instrument, evolved from its immediate predecessors the *clavichord* and the *harpsichord*, of which latter the *spinet* was a variety. The fundamental difference between the p. and the instruments named lies in the mechanism of the tone production. In the clavichord, the earliest mention of which occurs in a work of 1404, the tone was produced by brass blades impinging against the strings; in the harpsichord, by quills or strips of leather (technically called 'jacks') plucking the strings. In the p. the tone is produced by hammers striking the strings and rebounding immediately afterwards. The latter (technically the 'check' action) is an essential condition; for if the hammer were to remain in contact with the string for the minutest fraction of a second, the contact would deaden the vibration and practically stop the sound. The tone of the clavichord was weak and metallic; that of the harpsichord was louder, but hard and inflexible. Both instruments had the crowning defect implied in the fact that the tone could not be varied, as to loud or soft, by the player's impact of the key. It was precisely because this was at last attained in the p. that the new instrument was so named: that is to say, it could play *piano* (soft) or *forte* (loud), with ranges of power between these extremes. At first it was called indifferently 'pianoforte' or 'fortepiano.'

The inventor was a Florentine maker named Bartolommeo Christofori (1655–1731), his hammer action, essentially that of to-day, being announced and described in 1711. Other claims to independent discovery have been advanced, notably those of the Saxon organ-builder, Gottfried Silbermann, whose action admittedly resembled that of Christofori. Silbermann's p's certainly enjoyed some reputation, whereas Christofori's attracted no attention outside Italy. Nevertheless, Christofori is accepted by all the leading authorities as the real inventor. Harpsichords continued to be made till the beginning of the XIX. cent.; and it is significant that up to 1799 the title-pages of Beethoven's sonatas bore the words, 'for the p. or harpsichord.' Curiously enough, it was not until 1767 that the first recorded performance on a p. took place in England. This was at Covent Garden Theatre, when the playbill announced that 'Miss Brickler will sing a favourite song from "Judith," accompanied by Mr. Dibdin on a new instrument called the p.' In the last quarter of the XVIII. cent. the new instrument was more and more gaining supremacy over its predecessors. Once fairly established, its development towards perfection was rapid. In this process, such makers as Erard, Collard, Brinsmead, Pleyel, Broadwood, Steinway, Bechstein, Blüthner, and Chickering have played a prominent part.

The most natural form of the p. is that known as the *Grand*, in which the strings are placed in a horizontal position parallel with the keyboard. This form, the same as that of the harpsichord, was probably suggested by the varying length of the strings. Grand pianos are of three kinds—the concert-grand, the semi- or drawing-room grand, and the boudoir grand, these names denoting the length. In the more familiar *cottage* or upright piano the strings are stretched vertically over the sound-board from top to bottom of the instrument. The different forms involve certain differences in the mechanism, but the essentials are in all cases the same. The hammer action has already been mentioned. What is known as the *damper* action is necessary for checking the continuance of the sound when the finger has left the key. It consists of a piece of leather or felt, elevated upon a vertical wire connected with the back of the key. When the key is struck, this mechanism, which otherwise rests upon or presses against the strings, is immediately removed therefrom, so that the tone may be clear and unimpeded; when the key is quitted, the 'damper' instantly springs back and stops the vibration of the wires. Intimately connected with this action is the so-called *Loud Pedal*, which, on being pressed down by the foot, virtually deprives the instrument of its dampers, so that the sound runs on without check so long as the vibrations last. The *Soft Pedal* is a contrivance which shifts the hammers slightly to the side so that one string fewer is struck, thus producing less tone. The number of strings to each key varies in different instruments. In the grand p. there is usually one string to the lowest octave, two strings to the succeeding lower notes, and three to the middle and upper notes. The first p's had a compass of about five octaves, thus corresponding to the harpsichord. Gradually this has been extended, until the instrument has now a range of seven octaves. Probably the compass will be still further increased, though already the extremely high notes have a pitch nearly inappreciable by the ear.

Practically all the really great composers, Wagner excepted, have made important contributions to p.

music. Bach and Händel, and to some extent Haydn and Mozart, wrote for either the clavichord or the harpsichord, but, so far as their music is concerned, the p. may be regarded as synonymous with these instruments. Beethoven, especially in his sonatas, was the first great classic of the piano. Schubert, Schumann, Mendelssohn, Brahms, and Liszt made each his peculiarly characteristic addition to the growing lit. In Chopin the p. found its most poetic exponent, and his compositions remain unmatched in their kind.

History of the P., by Brinsmead (1889), Bie (1899); Krehbiel, *The P. and Its Music* (1911).

PIANOSA, ancient *Planasia* (42° 35′ N., 10° 3′ E.), island, Italy; off W. coast.

PIATRA (46° 56′ N., 26° 20′ E.), town, on Bistritza, Moldavia, Rumania; trade in timber. Pop. 18,500.

PIAUHY (7° 30′ S., 43° W.), maritime state, Brazil, drained by Parnahyba; cattle-rearing; capital, Therezina. Pop. 400,000.

PIAZZA ARMERINA (37° 22′ N., 14° 22′ E.), city, Caltanisetta, Sicily; bp.'s see; woollens. Pop. 25,000.

PICA, a magpie; see under CROW FAMILY.

PICARDY, old province in N. of France, now comprising departments of Somme and portions of Pas-de-Calais, Aisne, and Oise; contained many important towns, including Amiens and Boulogne, and battlefields of Agincourt, Crécy, and St. Quentin.

PICARESQUE NOVEL, THE (Span. *picaro, picaroon*, 'rogue'), type of story common in W. Europe from middle of XVI. to end of XVIII. cent. Since classical times writers have not been backward in catering to the taste of those who delight to hear of picturesque rascality. The p. n. emanated from Spain; first known story (pub. anonymously *c.* 1550), *La Vida de Lazarillo de Tormes*, wittily written tale of cynical irreverent young adventurer, ran through three editions before being placed on *Index*, 1559; expurgated version pub., 1573. From Spain, p. n. penetrated to Holland, where it enjoyed a limited popularity and formed, as in other countries, theme of many plays; thence to England, where Nash's *Unfortunate Traveller* was followed by Defoe's *Moll Flanders* and Fielding's *Jonathan Wild*. France adopted the idea enthusiastically; *Gil Blas*, *Barbier de Seville*, and *Mariage de Figaro* good though late examples. These ended true p. n., as interest in picaroon had declined; never popular in Italy and Portugal.

PICARIAN BIRDS, see under ORNITHOLOGY.

PICAS, MOUSE HARES, or TAILLESS HARES (*Ochotona*), genus of guinea-pig-like Rodents which live in mountainous regions of Europe, Asia, and America.

PICCINNI, NICCOLA (1728–1800), Ital. opera composer; Gluck's famous rival at Paris; wrote *La Cecchina*, *Roland*, etc.

PICCOLO, see FLUTE.

PICCOLOMINI, OTTAVIO, PRINCE (1599–1656), Austrian commander; distinguished in Thirty Years War; made famous attack on Gustavus Adolphus at Lützen, 1632; helped to win day at Nordlingen, 1634; defended Austria against Swedes, 1640 and 1648; cr. field-marshal, Prince of Empire, and Duke of Amalfi after peace of Westphalia.

PICENUM, former district, Italy, bordering on Adriatic; came under Rom. control about 270 B.C.; rebelled, 90 B.C., when Social War broke out.

PICHEGRU, CHARLES (1761–1804), distinguished general of Fr. Revolution; commander-in-chief of army of Rhine, 1793, and captured imperial fortresses; overran Holland, 1795; plotted with Bourbons and frequently fell under suspicion; great conspiracy for assassination of Napoleon, 1804; betrayed; either murdered or committed suicide.

PICKEREL, Amer. name for small Pike.

PICKERING (54° 15′ N., 0° 46′ W.), market town, Yorkshire, England. Pop. (1911) 3674.

PICKERING, EDWARD CHARLES (1846–), Amer. astronomer and physicist; b. Boston; invented meridian photometer, an instrument for classifying magnitude of the stars.

PICKERING, TIMOTHY (1745–1829), Amer. general and statesman; commanded in War of Independence, and held offices under Washington's administration. Sons, JOHN (1777–1846), philologist, and OCTAVIUS (1792–1868), who prepared State *Reports*, grandson CHARLES (1805–78), naturalist, and great-grandson, EDWARD CHARLES (b. 1846), astronomer, are all well-known men.

PICKET, or **PIQUET**, a small body of men posted beyond the general line of sentries for purposes of observation, and to give warning of attack.

PICKETING, see LABOUR (LABOUR DISPUTES).

PICKLE THE SPY, writer of correspondence revealing Jacobite secrets; held by Andrew Lang to be Alastair Ruadh Macdonnell (*q.v.*).

PICO (38° 20′ N., 28° 30′ W.), volcanic island of the Azores, rising to height of 7612 ft. Chief town, Lagens. Pop. 25,000.

PICO DELLA MIRANDOLA, GIOVANNI, COUNT (1463–94), Ital. philosopher; member of Academy, Florence; sought to reconcile Plato with Aristotle, religion with philosophy; later, a mystic.

PICRITE, rock well represented in Great Britain; contains abundant olivine and also augite and plagioclase.

PICROTOXIN, neutral principle, consisting of colourless glistening prisms of a bitter taste, obtained from the fruit of an Indian plant called the Indian berry (*Anaminta paniculata*); a powerful poison, used medicinally, internally to check the night-sweats of phthisis, and externally as a parasiticide.

PICTON, SIR THOMAS (1758–1815), Brit. general; distinguished in W. Indies, 1794–97, and app. gov. of Trinidad; stamped out disorder, built fine roads, etc.; complaints led to resignation, 1803; tried and found technically guilty of cruelty, 1806; commanded under Wellington in Peninsular War, and won fame at sieges of *Ciudad Rodrigo* and *Badajos*, 1812, *Vittoria*, etc., 1813–14; slain at *Waterloo*.

PICTOU (45° 42′ N., 62° 45′ W.), seaport, Nova Scotia; exports coal. Pop. 3400.

PICTS, see SCOTLAND (HISTORY).

PIEDMONT (45° N., 8° E.), division of Italy, partly surrounded by Alps and Apennines, consisting of four provinces, Navara, Cuneo, Alessandria, Turin; area, 11,336 sq. miles; long under house of Savoy (*q.v.*). Pop. (1910) 3,492,334.

PIENZA (43° 5′ N., 11° 40′ E.), town, Siena, Italy; cathedral; birthplace, Pope Pius II.

PIER, name given to solid support of masonry or brick which carries an arch or other similar superstructure, or to mole or jetty used to shelter a harbour or to form landing-stage or seaside promenade. P's are largely used in the construction of bridges and viaducts, their form depending upon the weight to be supported and the nature of the ground. Promenade p's are usually carried upon an open pilework structure of iron, or sometimes timber, so that they offer a small surface to the wave action. P's employed in harbour works are really breakwaters (*q.v.*).

PIERCE, FRANKLIN (1804–69), 14th Pres. of U.S.A.; distinguished in Mexican War, 1846–47; Pres., 1853–57, and established democratic cabinet; stemmed abolitionist movement as inexpedient, and supported slave trade in Kansas to retain loyalty of southern states to Union; made determined opposition to Brit. press-gangs, 1853; purchased Mexican territory and carried out arrangements for railways to be constructed from Mississippi to Pacific.

PIERRE (44° 21′ N., 100° 15′ W.), city, capital, S. Dakota, U.S.A.; trade in live stock. Pop. (1910) 3656.

PIERREFONDS (49° 40′ N., 2° 55′ E.), town, Oise, France; celebrated feudal château.

PIERS PLOWMAN, see LANGLAND.

PIETERMARITZBURG, 'MARITZBURG (29° 46′ S., 30° 13′ E.), capital of Natal Province, formerly of Natal Colony; 41 miles from coast, 2220 ft. above

sea-level; government buildings, town hall, Univ. Coll.; bp.'s seat. Pop. (1911) 30,539 (14,848 white).

PIETERSBURG (23° 50′ S., 29° 30′ E.), town, Zoutpansberg, Transvaal; goldfields. Pop. 3500.

PIETISM, a religious development in Lutheranism in the XVII. and XVIII. cent's. The Lutheran Church had a rigid and rather formal system, with too much emphasis on externals and dogmatic standards, and not enough on simple piety or the Bible. One of the leaders was Philip Jacob Spener (1635–1705). Pietism had most influence in N. and Central Germany, but by about 1750, was on the wane. It is sometimes viewed as carrying still further the principles of the Reformation.

PIG FAMILY (*Suidæ*), a family of Even-Toed Ungulate Mammals belonging to the section SUINA, and including 40 species found only in the Old World. They possess in common a long, cylindrical, mobile snout with the nostrils on its flat disc-like extremity; narrow, four-toed feet, only the two central ones touching the ground; canines of upper jaw curving upwards and outwards to form tusks. The true Pigs (*Sus*) are found in Europe, Asia, and Africa, inhabiting bush country and devouring vegetable or animal food almost indifferently, though they show preference for roots.

The COMMON WILD BOAR (*S. scrofa*), which persisted in England till the Middle Ages, is the probable originator of British DOMESTIC PIGS, of which there are many varieties derived from the old races of tall, bristly 'old English Hogs,' or small, brownish Scot. Highland Hogs, by crossing chiefly with Chinese stocks to give 'white breeds,' and Neapolitan to give 'black breeds.' Domestic Pigs are known also as HOGS, or SWINE: the male is a boar, the female a sow. The BUSH PIGS, or RIVER HOGS (*Potamochærus*), frequent the banks of rivers and lakes in Africa and Madagascar, while the BABIRUSSA and WART HOGS (*Phacochærus*) are confined to the Malay Archipelago and Africa respectively.

PIGEON FAMILY, COLUMBIDÆ.—The true Pigeons, found in most parts of the globe, include the swiftly flying Common Wood P. (*Columba palumbus*), the Rock P. (*C. livia*), the wild form of the Domestic P. inhabiting the cliffs and foreshores of Scotland and Ireland, and the smaller STOCK DOVE (*C. œnas*). The Carrier P. is one of the most useful of the many domestic varieties, serving as message-bearer in times of war and peace.

PIGEON-FLYING, sport popular in Belgium, England, and France. Homing pigeons are specially trained. Annual races take place in Belgium; birds sent from Toulouse to Brussels (*c.* 500 miles). Sport was introduced into U.S.A., 1875. The speed of pigeons is 1200–1800 yards per minute.

PIGEON-POST, the employment of trained pigeons to carry news; in use amongst the Greeks; still in use for military purposes in continental fortresses; carried out with remarkable success at siege of Paris, 1870–71.

PIGMENTS are powdered colouring matters applied through a medium in which they are insoluble. When natural, they may be of mineral, vegetable (*e.g.* gamboge, indigo), or animal (*e.g.* cochineal) origin. Substantive pigments have an original colour; adjective pigments (*e.g.* crimson lake) are precipitated on a colourless base (*e.g.* alumina).

Pigments must be finely ground in a drying oil (*e.g.* linseed) for oil paints, or in gum water for water colours. They must have stability and body, and must not interact, when mixed.

Important mineral pigments: lamp black and Indian ink (carbon), zinc white or Chinese white (ZnO), Venetian red and burnt sienna (Fe_2O_3), red lead (Pb_3O_4), white lead ($2PbCO_3$, $Pb(OH)_2$), viridian green (hydrated Cr_2O_3), vermilion (HgS), chrome yellow ($PbCrO_4$), cadmium yellow (CdS). Prussian blue is ferric ferrocyanide; carmine and crimson lake are cochineal combined with alumina, rose madder is alizarin (from *Rubia tinctorum*) with alumina. Indigo and alizarin are now prepared artificially.

PIGMY, see PYGMY.

PIGOTT, RICHARD, see PARNELL, CHARLES.

PIG-STICKING, sport popular in India, especially among Army officers. Wild pigs are hunted on horseback by riders armed with long lances.

PIG-TAILED BABOON, see under CERCOPITHECIDÆ.

PIGTAILS, see HAIR.

PIKE, wooden weapon tipped with iron, and from 12 to 14 ft. long, used very extensively in war before introduction of bayonet.

PIKE PERCH, see PERCHES.

PIKE, ZEBULON MONTGOMERY (1779–1813), Amer. general; surveyed Upper Mississippi, 1805; captured by Spain while exploring Louisiana, 1807; pub. *The Sources of the Mississippi and its Tributaries*, 1810.

PIKES (*Esocidæ*), long-bodied, slender, large-mouthed bony fishes, which are exceedingly voracious, feeding on their own kind and other fishes, and even on frogs, voles, and water-fowl; found only in the rivers of the N. hemisphere; *Esox lucius* in Britain, and in N. Asia and America.

PIKE'S PEAK (38° 50′ N., 105° 14′ W.), peak, Rocky Mountains, Colorado (14,107 ft.).

PILATE, PONTIUS (I. cent. A.D.), Rom. gov. of Judæa; procurator of Judæa, Idumea, and Samaria, 26–36; merciless tyrant according to secular historians; attitude towards Jesus Christ has made his character theme of much later speculation; Spenser's picture of him eternally washing his hands in hell is from old legend.

PILCHARD, see under HERRING FAMILY.

PILES, see HÆMORRHOIDS.

PILGRIM FATHERS, see MASSACHUSETTS.

PILGRIMAGE, a journey to a religious place, embarked on as an act of piety. P's have been a special characteristic of Catholic Christianity, but they are found too in non-Christian religions. Thus the river Ganges is sacred to Hindus; the city of Benares on its banks is specially holy to Brahmans. Certain spots were sacred in classical Greece, *e.g.* Apollo's shrine at Delphi. Every pious Muhammadan must sometime visit Mecca. P. is not found in the first age of the Christian Church, but before long Christians naturally desired to tread in the footsteps of the Saviour. The supposed spot of the birth of Christ was pointed out in the IV. cent. From this time onwards large numbers of Christians came on pilgrimage to the Holy Land. These became more frequent when Constantine built the Church of the Holy Sepulchre, where formerly a temple of Venus had stood, on the site of the tomb of Christ. His mother, the Empress Helena, discovered as she thought the true Cross, and happy was the church which preserved any portion of it. Indeed, the possession of relics gave any shrine a fame which drew thousands of pilgrims to it. As pilgrimages in Palestine increased, the demand for sacred sites produced a supply, and many were believed in by the credulous, which can have had but little historic attestation.

In the Middle Ages the popularity of the p. steadily increased, and a visit to the Holy Land was viewed as a means of expiating sin. Various abuses grew up, till some prelates were obliged to check the tendency of their people to leave their homes. England possessed many famous shrines, particularly that of St. Thomas Becket at Canterbury (cf. Chaucer's *C. Tales*). These were all destroyed at the Reformation, for Protestantism never took kindly to the idea of pilgrimage. Of present-day shrines, one of the most famous is Lourdes (*q.v.*), and thither thousands of Catholic pilgrims resort.

PILIBHIT (28° 48′ N., 79° 51′ E.), town, Pilibhit, United Provinces, Brit. India. Pop. 35,000; (district) 475,000.

PILLAR-WORSHIP.—The pillar (Gk. *baitulos*)

was a cult-object of early Hellenes and Semites. In the Dictæan Cave of Crete, the legendary birthplace of the Hellenic Zeus, a bætylic table of offering has been found, and Jacob's Bethel seems clearly to have been a similar observance. It is believed that the bætylic altar found at Cyrenaïca was associated with the Libyan Zeus Ammon, and that Celtic dolmens are akin. These pillars seem, therefore, to point to a universal primitive religion.

Evans, *Mycenæan Tree and Pillar Cult.*

PILLAU (54° 40′ N., 19° 56′ E.), fortified seaport, watering-place, E. Prussia, Prussia, at entrance to Frisches Haff; sail-making, shipbuilding. Pop. (1910) 7066.

PILLNITZ (51° 1′ N., 13° 53′ E.), village and royal castle, on Elbe, Saxony.

PILLORY, apparatus of punishment; board, with holes for head and wrists, mounted above platform; not used in Britain since 1837.

PILOÑA (43° 16′ N., 5° 35′ W.), town, Oviedo, Spain. Pop. 19,000.

PILOT, a special steersman taken on board a vessel to take it into or from a port or through a particular channel. In the U.K. p's are licensed and under the control of a number of different authorities, each of which has jurisdiction over a certain district, subject to the supreme control of the Board of Trade. The London Trinity House is the most important of these authorities. In cases where a ship requires a pilot and no qualified pilot offers his services, an unqualified pilot may take charge of the vessel, but he must relinquish his charge when a qualified pilot offers himself. In British waters and in most foreign ports British warships are not required to employ a pilot.

Pilotage in British waters may be either compulsory or free. If the former, a pilot has supreme control of the ship, temporarily superseding the master; but if the latter, he is considered as only advising the master, not superseding him. According to the majority of foreign mercantile codes the pilot is regarded as an adviser only, and the master is not freed from liability.

PILOT WHALE, see Dolphin Family.

PILOT-FISH (*Naucrates ductor*), so called on account of its supposed alliance with the Shark; a rare relative of the Horse-Mackerel; found in the open waters of the Atlantic and Pacific Oceans.

PILPAY, see Bidpai.

PILSEN (49° 45′ N., 13° 23′ E.), town, Bohemia, at confluence of Mies and Radbusa; famous *Pilsener* beer. Pop. (1911) 81,165.

PIMENTO, Jamaica Pepper, Allspice, fruit of *Eugenia Pimenta*, a tree of W. Indies; dried and sold as spice. **Oil of Pimento**, distilled from fruit, is a popular remedy for toothache.

PIMPERNEL (*Anagallis*), genus of plants, order Primulaceæ; Scarlet P. (*A. Arvensis*), 'Poor Man's Weather-Glass,' closes its petals in dull weather; Bog P. (*A. tenella*) has large pink flowers.

PIMPLES, see Acne.

PINAR DEL RIO (22° 26′ N., 83° 32′ W.), city, Pinar del Rio, Cuba; trade centre for tobacco district of Vuelta Abajo. Pop. 11,000; (dist.) 240,372.

PINCKNEY, CHARLES (1758–1824), Amer. statesman; member of congress of S. Carolina, and convention which drew up U.S.A. constitution, 1787; gov. of S. Carolina, 1789–92, 1796–98, 1806–8; U.S.A. senator, 1799; supported Jefferson; member state legislature, 1810–14.

PINCKNEY, CHARLES COTESWORTH (1746–1825), Amer. statesman; organised revolt of S. Carolina in War of Independence, and secured its accession to confederation; minister to France, 1796, when he and Directory defied each other.

PIND DADAN KHAN (32° 35′ N., 73° E.), town, Jhelum, Punjab, Brit. India, on Jhelum. Pop. 14,500.

PINDAR, Pindaros (c. 522–443 B.C.), Gk. lyric poet; b. Cynoscephalæ, Bœotia: after preliminary education at Thebes, he studied music and poetry at Athens; after long study began to write choral odes, and attained great fame, not only in Greece, but in Sicily, Cyrene, and Magna Græcia. He was frequently entertained by potentates, notably by Hiero of Syracuse and Arcesilaus of Cyrene; died, probably at Argos, at age of 80.

P. came of ancient Cadmean stock, tracing his ancestry to Ægeus, and was therefore thoroughly imbued with Theban tradition, but as branches of the family had settled in various parts of Greece, he was really Panhellenic in sentiment.

His poems consisted of songs in praise of gods and men, processional songs, festal songs, dirges, and pæans of victory, besides poems on other themes. A great part of his work has been lost, but his songs of victory (*Epinikia*) have come down to us in four books, describing and praising the victors at the four Greek games—Olympian, Isthmian, Pythian, and Nemean. The language is epic, abounding in Doric touches and homely pictures; his similes are numerous and sometimes of extreme beauty. References to mythology are frequent, as might be expected from P.'s family, and a deep religious feeling pervades all his poetry. He is sometimes obscure and complicated, but his syntax is usually easy of interpretation. P.'s influence on posterity may be judged from the action of Alexander the Great, who, when he razed Thebes, left the poet's house untouched, thus following the traditional example of Pausanias of Sparta. The discoveries at Oxyrhynchus (1905–7) provided several hitherto unknown poems of P.

E. Myers' *Translation* (2nd ed., 1883); O. Schiöder, *Text and Notes* (1908).

PINDARICS, a form of verse, so called from its imitation of the irregular odes of Pindar (*q.v.*).

PINDUS (39° 15′ N., 21° 46′ E.), range of mountains in Greece, separating Thessaly and Epirus; highest elevation, 7000 ft.

PINE (*Pinus*), evergreen coniferous trees of typically symmetrical appearance, this being due to the production of annual pseudo-whorls of branches. These produce scale leaves in the axils of which dwarf shoots, or 'foliar spurs,' arise, each bearing from two (*Pinus sylvestris*) to five (*P. strobus*) needle-shaped leaves. The male cones are borne in clusters, each one consisting of numerous stamens containing abundant, powdery pollen. The pollen grains have a pair of wing-like extensions which facilitate their transport by the wind. The female cones take three years to ripen, being pollinated about June, fertilised the following June, and matured during the third season. Each scale bears two winged seeds, containing an embryo with a whorl of cotyledons, embedded in a rich nutritive tissue. On this account the seeds of some species (*P. pinea*) are utilised as food. The p's (including *P. sylvestris*, the Scots *Fir*) are of immense value as timber trees, *P. sylvestris* yielding deal, *P. palustris*, pitch-pine, and *P. echinata*, yellow pine, whilst in addition turpentine is obtained by tapping the trunks of various species, and also by distillation of the resin exuded from the wounds. Tar and pitch are yielded on destructive distillation in closed chambers.

Veitch, *Manual of the Coniferæ.*

PINE BLUFF (34° 13′ N., 91° 55′ W.), city, Arkansas, U.S.A., on Arkansas; cotton manufactures. Pop. (1911) 15,102.

PINE-APPLE (*Ananassa sativa*), plant of order Bromeliaceæ; sharp leaves spring from root, and in centre flowers grow on a spike; fruit comes to Britain from the Azores.

PINEL, PHILIPPE (1745–1826), Fr. physician, chief physician at the Saltpêtrière and prof. of Pathology at École de Médecine, Paris; one of first to advocate humane treatment of the insane. See Insanity.

PINENE, see Terpenes.

PINERO, SIR ARTHUR WING (1855–), Eng. dramatist. See Drama.

PINEROLO (44° 53′ N., 7° 19′ E.), city, Turin

province, Italy; cathedral; textiles; formerly important Fr. fortress. Pop. 18,500.

PINK (*Dianthus caryophyllus*), a member of the Caryophyllaceæ, garden varieties of which are largely grown on account of their scent and attractive appearance. The plant is often propagated by layering, but is easily raised from seed.

PINK EYE, a disease of horses; symptoms are—high temperature, loss of appetite, redness of eye, stiffness and swelling of joints, constipation; treatment—stimulation of heart to prevent clotting of blood, laxatives, absolute rest.

PINKERTON, ALLAN (1819–84), Amer. detective; b. Glasgow; emigrated to America, 1842, to escape imprisonment as a Chartist; first detective for Chicago, 1850; organised secret service division of the N. Army at the Civil War, and established detective agency. Pub. various stories.

PINKERTON, JOHN (1758–1826), man of letters; b. in Edinburgh; settled in London; died in Paris. He is most frequently quoted for his collection of *Ancient Scottish Poems*.

PINNA, see under LAMELLIBRANCHIATA.

PINNACLE, architectural term for stone upright ending in spired point, used in Gothic architecture.

PINNIPEDIA, a sub-order of Carnivora (*q.v.*).

PINOCHLE, PENUCHLE, card game played with two packs; cards from two to eight discarded; combinations of cards sought, as in bezique.

PINS are generally manufactured in Wright machine; brass wire is drawn to requisite length; head shaped by die; dropped into slot and pointed by rotating cutter; coated with tin; formerly made with separate heads. P's and safety p's of various metals are found on prehistoric dwelling sites and in classical remains. Birmingham is Brit. centre of industry.

PINSK (52° 10′ N., 26° 7′ E.), town, on Pina, Minsk, Russia; potteries; active transit trade. Pop. 28,000.

PINT, see WEIGHTS AND MEASURES.

PINTADO, see GUINEA FOWL.

PINTO, contagious disease, occurring in Mexico and Central America, in which the whole body is discoloured brown, blue, and black; due to a vegetable parasite.

PINTO, FERNÃO MENDES (1509–83), Portuguese traveller and writer; set out for East, 1537; visited Japan, 1542; joined Jesuits and undertook mission to Japan, 1556, but deserted Order 1558; returned to Portugal and wrote famous *Peregrination*.

PINTURICCHIO, BERNARDINO DI BETTI (1454–1513), Ital. painter; executed large number of frescoes, including six on the walls of the Vatican library. At one time he was assistant to Perugino; painted also some fine panel pictures

PINZON, family of Span. sailors who claim to share with Columbus honour of discovering America; Martin Alonzo (d. 1493) and his bro's, Vicente Yañez and Francisco, supplied Columbus with funds and sailed in his expedition, 1492–93.

PIOMBINO (42° 55′ N., 10° 31′ E.), seaport, province Pisa, Italy, on Mediterranean. Pop. 8000.

PIOMBO, see SEBASTIAN DEL PIOMBO.

PIOTRKOW (51° 30′ N., 19° 40′ E.), gov., Russ. Poland; undulating and hilly; well cultivated; lignite and iron deposits; textile industries. Pop. 1,933,400. Capital, Piotrkow (51° 25′ N., 19° 45′ E.), manufactures flour. Pop. 40,000.

PIOZZI, HESTER LYNCH (1741–1821), Eng. writer; the Mrs. Thrale immortalised by Dr. Johnson; a prolific writer, but it is not as an author so much as the devoted friend of the lexicographer that she will be remembered. Only second to Boswell in literary interest are her *Anecdotes of Dr. Samuel Johnson*.

PIP, see POULTRY-FARMING.

PIPAL, Bo TREE, sacred Fig of Hindus, who believe Vishnu was born under it.

PIPE.—(1) musical instrument consisting of pierced cylinder; mediæval p. had three holes; was chromatic; Highland bag-p. has eight holes, one in back; achromatic. (2) device for smoking tobacco, probably N. American in origin, though some authorities hold that p. was used by ancients for smoking aromatic herbs; first made of stone, now of wood, clay, or meerschaum; briar p. most popular.

PIPE ROLLS, see RECORD.

PIPE-FISHES AND SEA-HORSES (*Syngnathidæ*), some 175 species of very long, slender fishes, with bodies covered by bony rings; found in almost all seas. Many of the males possess a brood pouch in which the eggs are retained until hatched. Five kinds of Pipe-Fishes, distinguished by their long, hard snout, occur on Brit. coast, as also does the peculiar Sea-Horse (*Hippocampus*), which clings to seaweeds by its prehensile tail, but it prefers warmer S. seas.

PIPERNO (41° 28′ N., 13° 12′ E.), town, ancient Privernum, Rome, Italy, on Amaseno. Pop. 7000.

PIPITS (*Anthus*), genus of Perching Birds closely related to the Wagtails, having long legs, a slender bill slightly notched at the tip, and dull-coloured plumage. They occur in almost all parts of the world.

PIPPIN I., PEPIN (d. 640), mayor of palace to Dagobert I.—P. II. (d. 714) established power over Neustria and Austrasia and external status.—P. III. d. 768) crowned, 751; f. of Charlemagne.

PIPRAWA, village on Birdpur estate, in Basti district, United PROVINCES, India. Buddha's birthplace is only 12 miles distant; there, after excavation, many finely wrought articles—now in Calcutta Museum—were discovered in a ruined tope or burial-mound.

PIPRIDÆ, Manakins (*q.v.*).

PIQUA (40° 7′ N., 84° 13′ W.), city, on Miami, Ohio, U.S.A.; iron foundries, wool, flour. Pop. (1910) 13,388.

PIQUET, card game, prob. of Fr. or Ital. origin; two players participate; pack prepared by discarding from two to six in all suits; no trumps; game of six hands. If loser scores over 100 points his score is deducted; if under, he is penalised by being *rubiconed*, i.e. score added to opponent's. Game originally of 101 points; very popular in England, XVII. and XVIII. cent's; now little played.

PIRACY, see under THEFT.

PIRÆUS, see ATHENS.

PIRANO (45° 32′ N., 13° 34′ E.), seaport, Istria, Austria, on Gulf of Trieste; exports salt. Pop. (1911) 15,320.

PIRKE ABOTH, 'Sayings of the Fathers,' part of the Mishnah; a book of proverbs illustrating Judaism just before time of Christ; Hebrew, but partly in Aramaic; printed in Jewish Prayer Book.

PIRMASENS (49° 12′ N., 7° 37′ E.), town, Rhine Palatinate, Bavaria; boots and shoes. Pop. (1910) 38,463.

PIRNA (50° 57′ N., 13° 56′ E.), town, on Elbe, Saxony; sandstone quarries, glass-works. Pop. (1910) 19,525.

PIROT (43° 12′ N., 22° 35′ E.), town, department Pirot, Servia; manufactures cloth; scene of defeat of Servians by Bulgarians in 1885. Pop. 10,700; (department) 100,000.

PISA (43° 43′ N., 10° 23′ E.), city, N. Italy (Tuscany), on Arno, capital of P. province, with well-preserved walls and fine quays along river known as Lung'arno. Outstanding features are cathedral of white marble (XI. cent.) with magnificent façade and valuable paintings by Andrea del Sarto, Salembeni, and others; marble baptistery (begun 1153), with famous pulpit by Niccola Pisano and fine marble font; Campanile or Leaning Tower (1174–1350), 183 ft. high; Santa Caterina (XIII. cent.), San Niccolo, Santa Maria della Spina, San Francesco, and other churches; Campo Santo, burial-ground (founded XIII. cent. by several shipfuls of earth from Jerusalem) surrounded by cloisters with frescoes by Tuscan and other painters, Univ. (La Sapienza, 1338), with library, natural history museum, and botanical garden; Communal, Agostini, Upezzinghi, and other palaces; Museo Civico, with

fine art collection; manufactures of silks, cottons, coral and alabaster work; royal stud-farm; horses and dromedaries in vicinity. P. was a Rom. colony, 180 B.C.; important commercial centre and one of greatest naval powers in XI., XII., and XIII. cent's; continuous wars with rivals, Venice and Genoa, led to final defeat by Genoese at *Meloria*, 1284; conquered by Florence, 1406; became independent under Charles XIII. of France, 1494; retaken by Florentines, 1509. In XII. and XIII. cent's P. held a prominent place in the history of art; birthplace of Galileo (*q.v.*). Pop. (1911) 65,200.

Ross and Erichsen, *Pisa* (Mediæval Towns Series).

PISA, COUNCIL OF (1409), Church Council, purporting to be general, held during great Western Schism, 1409. It deposed rival popes and elected Alexander V.; important in Conciliar movement as leading the way to Council of Constance; generally held not œcumenical. Other councils were held at P. in 1134 and 1511.

PISAN, CHRISTINE DE (1363–*c.* 1429), Fr. poetess; dau. of Venetian astrologer of King Charles V. of France; widow without means at twenty-five; wrote to keep her family. Amongst her numerous productions are *Faits et bonnes Mœurs de Charles V.*, moral and allegoric poems and fine ballades on events of the time.

PISANO, NICCOLA (*c.* 1206–78), eminent Ital. sculptor, architect, and engineer. Three important and excellent works of his survive, viz. the pulpit in Siena Cathedral, the shrine in St. Dominic's, Bologna, and the pulpit of the Baptistery, Pisa.

PISAURUM, modern PESARO (*q.v.*) (43° 55′ N., 12° 55′ E.), ancient town, on Via Flaminia, Umbria, Italy.

PISCES, see FISHES.

PISCICULTURE, the artificial rearing of fishes from the egg for the purpose of stocking suitable localities with young fishes. The aim of p. is to guard and shield the embryonic fishes during the early stages, when they are so liable to wholesale destruction, until they are able to fend for themselves, that is to say, until at least the yolk sac is wholly absorbed. Methods of hatching and rearing have long been carried out in specially adapted hatcheries, where especially trout and salmon were dealt with; but great advances have been made as regards edible marine creatures and many plaice and other marketable fishes, and even lobsters are hatched and released on suitable grounds every year.

PISEK (49° 18′ N., 14° 10′ E.), town, on Wottawa, Bohemia, Austria; iron foundries. Pop. (1911) 16,479.

PISIDIA, a rugged and mountainous country of ancient Asia Minor, immediately N. of Pamphylia; boundaries not clearly defined; occupied from early times by wild and lawless people; traversed by St. Paul.

PISISTRATUS, PEISISTRATUS (*q.v.*).

PISO, Rom. surname in *gens* Calpurnia. From beginning of II. cent. B.C. this plebeian family produced many distinguished statesmen and generals; Cæsar's wife belonged to this family.

PISTACIA, genus of small trees, order Anacardiaceæ; flowers are diœcious and have no petals; fruit is a single-seeded dry drupe; *P. vera* yields Pistachio Nut used in cooking; *P. lentiscus* gives Mastic, a gum-resin; and from *P. terebinthus* Cyprus Turpentine is obtained.

PISTIL, see FLOWER.

PISTOIA, PISTOJA (43° 57′ N., 10° 55′ E.), town, Tuscany, Italy, near river Ombrone; of considerable importance during Middle Ages; contains many buildings of great sculptural and architectural interest; manufactures include iron- and steel-ware, small-arms, glass, and textiles. Pop. 62,800.

PISTOIA, SYNOD OF (1786), assembled under auspices of grand-duke of Tuscany; declared Bible and Fathers to be test of faith, etc.; condemned by pope, 1794.

PISTOLS.—As early as 1570 a firearm to be held and fired with one hand—that is, a pistol—was used by cavalry. At the Pigeon-House Fort, Dublin, are preserved pistols of the period 1625–90. A century later pistols were made with three brass barrels which unscrewed to load; they were fired by flint and steel. Like the musket, the pistol has undergone many changes in regard to its bore and the mechanism for loading and firing. As late as 1866 we had in use, side by side, the naval smooth-bore pistol and the cavalry rifle pistol, as well as Colt's and other revolver (rifled) pistols.

The Webley pistol is now used in the British Army; its calibre is ·441 inches; its length, 10½ inches (barrel, 4 inches); weight, 2 lb. 3 oz. The cylinder (1⅛ inch) is chambered to hold 6 cartridges, and it revolves on a tube, in which is the stem of the extractor. The barrel is rifled (7 grooves); weight of bullet, 265 grains; charge of cordite, 6½ grains; muzzle velocity, 640 f.s.; weight of packet of 12 cartridges, 9½ oz. The pistol may be fired in two ways: (1) by the trigger action for 'continuous' practice; (2) by the cocking action for 'single' practice. The extreme range of a bullet is 1550 yards, but the pistol is intended to be used at close quarters (it is sighted to 50 yards), and as loss of accuracy occurs in a continuous firing, this should only be resorted to in an emergency.

The latest type of pistol is 'automatic,' which relieves the firer of all manipulation except the replenishing of the magazine, taking aim, and pressing the trigger, but its special danger is that the recoil is apt to cause another shot to be fired unintentionally; and when the catch which holds back the hammer gets worn, the whole contents of the magazine may be discharged automatically.

PISTONS or VALVES, in brass musical instruments, are mechanical contrivances whereby the gaps in the instrument's natural scale of sounds are filled up. They lengthen or shorten the vibrating column of air in the tube, and so produce alterations of pitch. The narrow-scale instruments have three pistons: the first lowers a whole tone, the second half a tone, the third one and a half tones; and combinations of two, or all three, give further variations of pitch. The most generally familiar use of the piston is seen in the cornet.

PITCAIRN (25° 5′ S., 130° 5′ W.), island, S. Pacific; area, 2 sq. miles; produces coffee, fruits. Discovered 1767, and peopled in 1790 by mutineers of the *Bounty*; annexed by Britain, 1839. Pop. 170.

PITCAIRNE, ARCHIBALD (1652–1713), Scot. physician; studied med. at Edinburgh and Paris; prof. of Med. at Leiden, 1692; returned to Edinburgh, m., and remained there, to become the most eminent physician of Scotland; persuaded the Town Council to allow him to dissect the unclaimed bodies of paupers for the purpose of anatomical study, thus laying the real foundations of the Edinburgh school of med.; author of medical and other works.

PITCH is the term generally used to denote the precise degree of acuteness or gravity of any given musical note or notes. Musical sounds are produced by a series of vibrations, and according to the number of vibrations so is the sound of higher or lower pitch. More precisely, p. is the recognised standard according to which voices and instruments are set or tuned. In that sense it is synonymous with the term, 'concert pitch.' This pitch was formerly much lower than now — the later heightening being chiefly due to makers of wind instruments, who thus obtain a more brilliant tone. Uniformity of pitch has long been desired for all musical countries, so that the particular note, A or C, chosen for tuning should be everywhere of exactly the same degree, but so far this has not been secured.

PITCHBLENDE, $U(UO_4)_2$, uranate of uranium, a mineral, the source of uranium and radium (*q.v.*), found in Cornwall and Saxony; composed largely of oxide of uranium and generally found with uranite; colour, brown or black.

PITCHER-PLANTS, forms in which the whole leaf (*Sarracenia Darlingtonia*) or the apical portion

(*Nepenthes*) is modified to form a lidded pitcher-like structure for the capture and digestion of insects. The pitcher is often brightly coloured, and has an incurved lip round which are numerous honey glands. Beyond this is a slippery zone down which insect visitors glide helplessly, to fall into the liquid below and be prevented from returning by downward-pointing hairs. Here they drown and decay, and are digested by special secretions, thus forming an additional source of nitrogenous food.

PITCHSTONE, an acid volcanic glass occurring in dykes in S. Europe, S. America, and the Hebrides; has a greasy lustre resembling pitch. Colours: green, brown, yellow, blue, and black.

PITESCI, PITESHTI (44° 52′ N., 24° 52′ E.), town, Argesh, Rumania, on Argesh. Pop. 16,500.

PITH, see PLANTS (ANATOMY).

PITHECANTHROPUS ERECTUS, a genus of Anthropoid Ape, represented by a few fossil bones from Java, and believed to link the highest apes to man.

PITHECIA, see SAKI MONKEYS.

PITHIVIERS (48° 11′ N., 2° 15′ E.), town, on Œuf, Loiret, France; trade in grain, saffron. Pop. 6300.

PITIGLIANO (42° 36′ N., 11° 32′ E.), town, Grosseto, Italy. Pop. 5100.

PITLOCHRY (56° 42′ N., 3° 44′ W.), village, health-resort, Perthshire, Scotland.

PITT, THE ELDER, see CHATHAM, 1ST EARL OF.

PITT, WILLIAM (1759–1806), Brit. statesman; 2nd s. of great orator and statesman, William P., 1st Earl of Chatham; delicate, precocious child trained in oratory by f.; ed. at Pembroke Hall, Cambridge; called to Bar, 1780; member for Appleby, Cumberland, 1781, in Lord North's administration; took important part on opposition side, and a month after taking seat made 'the best first speech,' said North, that he had ever heard. The Amer. War brought about a dissolution, March 1782. P., under twenty-three, astonished the world by declaring that he would not accept a subordinate position.

On death of Rockingham, July 1782, Shelburne became Prime Minister and the youthful P. Chancellor of the Exchequer, while the Rockinghamites resigned. A vain endeavour to include Fox in the cabinet was the occasion of the life-long quarrel between Fox and P. Parliamentary criticism of terms of peace with America led Shelburne to seek to strengthen himself by alliance with North. Bitter opposition, headed by P., led to Shelburne's resignation. P. was pressed to accept treasury, but firmly refused, and Portland coalition ministry (including Fox) was formed, April 1783. Months of obscurity ended Nov. and Dec. by eloquent denunciation of Fox's India Bills. The ministry being dissolved by the king, P. formed new cabinet.

He was only twenty-four, and the 'boyish freak' of his accepting office excited mixed laughter and rage. His cabinet was without ability and opposed by House of Commons, led by Fox, but he was supported by king and lords, and, as s. of Chatham, by the country. He represented patriotic tradition in opposition to Whig carpet-bag politicians, and the result of an appeal to the country, 1784, was a triumph for the government; P. sat for the Univ. of Cambridge henceforward. He proceeded to restore Britain to the position in Europe she had lost by the Amer. War. He restored national credit by his genius for finance, initiated a scheme of offering public loan for private tender, lowered tea duties, suppressed smuggling, etc., while he himself, although bitterly poor, scarcely took legitimate spoils. He had already brought in bills for parliamentary reform and made a last vain effort to extinguish rotten boroughs, 1785. He carried a bill for free trade with Ireland, after some modifications, through Brit. parliament, despite the outcry of Eng. manufacturing interests, but the modifications caused its rejection in Ireland; he carried a commercial treaty with France, 1786, strongly opposed by landed interest; gave no support to repeal of Test and Corporation Acts, 1787, not being strong enough to alienate Church; made alliance with Prussia for restoration of Prince of Orange, 1787; alienated powerful interests by his support of Wilberforce, 1788–92; passed India Bill, 1788.

The great regency question arose when George III. became insane, 1788. P. carried his Bill of Regency through the Commons, 1789, but fortunately for him the king recovered. He was forced by opposition to allow Russ. aggression, 1791. P. refused to perceive the international importance of the Fr. revolution until his ally, Holland, was attacked, 1792, and until he was forced to repress seditious writings and call out the militia in London. War with France was declared, 1793. Unfortunate Irish action was taken, 1795, P. withdrawing measures of relief which he had intended to give to Catholics. Despite a tremendous deficit, P. was attacked for his anxiety to make peace with France; at the same time mobbed for his taxation. A repressive policy in Ireland and at home was adopted.

Encouraged by battle of *Nile*, 1798, P. formed a coalition against Napoleon. To meet the crisis the Income Tax was introduced, 1800. Legislative union with Ireland was passed, 1800. A quarrel with the king on Catholic emancipation was followed by a fresh attack of royal madness and P.'s resignation, 1801, after 18 years' rule. P. supported Addington till 1803, when he made a brilliant oration condemning the half-hearted conduct of war. Again called to office, 1804, he formed a new coalition, 1805, against Napoleon. Petty parliamentary attacks achieved the ruin of his health, and he never recovered his spirits after news of *Austerlitz*. His last words were, 'Oh, my country! How I leave my country!' Self-contained and apparently cold of nature, P. was passionately patriotic and a great orator. He had no vices save intemperance.

Life, by Gifford (1809), Rosebery (1891), Whibley (1905), Holland Rose (1911).

PITTAS, or OLD WORLD ANT-THRUSHES (*Pittidæ*), a family of about 70 Perching Birds, with brilliant crimson, green, and blue plumage, found in the tropics of Africa, South-East Asia, Australia, and the intermediate islands.

PITTIDÆ, Pittas (*q.v.*).

PITTSBURG (37° 26′ N., 94° 40′ W.), city, Kansas, U.S.A.; lead and zinc region; coal mines. Pop. (1910) 14,755.

PITTSBURGH (40° 27′ N., 80° 1′ W.), city, port of entry, capital of Allegheny County, Pennsylvania, U.S.A.; situated on Allegheny, Monongahela, and Ohio Rivers; business part of city is built on 'Point' between Allegheny and Monongahela, where they meet to form Ohio; residential districts lie mostly on surrounding hills; Fourth and Fifth Avenues are two busiest thoroughfares; principal public parks are Schenley, Riverview, West, and Highland Parks; P. contains many fine buildings, including court-house, Government buildings, Frick Office, city hall, Exposition building, Carnegie Institute, Carnegie Library, Phipps Conservatory (in Schenley Park), and St. Paul's Cath.; Univ. of P. embraces numerous educational institutions. Stockade built on site of P., 1754, and captured by French, who named it Fort Duquesne; taken by English, 1758, and called Fort Pitt, in honour of William Pitt; incorporated as borough, 1804, and chartered as city, 1816; Allegheny joined to P., 1906.

P. is a city of enormous industrial importance; built in centre of rich coal-fields; region also produces natural gas and petroleum; centre of extensive railway system; great river traffic, locks and dams being constructed on rivers to secure slack-water navigation; slaughtering and meat-packing are important industries; factories extend for miles along river banks; among leading manufactures are iron and steel products, glass, rolled brass and copper, foundry and machine-shop products, silver and nickel-plated ware, earthenware, tin-plate,

electrical machinery, bricks, carriages, and furniture. Pop. (1910) 533,905.

PITTSFIELD (42° 30′ N., 73° 18′ W.), town, Massachusetts; manufactures cottons, woollens, silks, boots, and shoes; has cathedral, and various educational and philanthropic establishments. Pop. (1910) 32,121.

PITTSTON (41° 18′ N., 77° 53′ W.), city, on Susquehanna, Pennsylvania, U.S.A.; anthracite coal mines. Pop. (1910) 16,267.

PITYRIASIS VERSICOLOR, skin disease, consisting of irregular, dry, yellowish patches, usually on front of the trunk, due to a parasitic fungus, *microsporon furfur*; treated locally by a mercurial ointment, internally by arsenic.

PIURA (5° 12′ S., 80° 52′ W.), coast department, N. Peru; area, 16,825 sq. miles; capital, P.; produces petroleum, tobacco, cotton; live stock raised. Pop. *c.* 220,000.

PIUS II., ÆNEAS SILVIUS PICCOLOMINI (1405–64), pope; studied at Siena, and was employed as secretary to various prelates, to Pope Felix V., 1438, and the Emperor Frederick III., 1442. He was made cardinal, 1448, and elected pope, 1458. He defended the papal claims as against councils, and did what he could to stir up Europe against the Turks. An acute and scholarly man, he was a typical product of the Renaissance; wild as a youth, he was serious later. His own writings are the chief source of information about him.

Boulting, *Enea Silvio de' Piccolomini*.

Pius IV., GIOVANNI ANGELO MEDICI (1499–1565), pope; cardinal, 1549, and pope, 1559; a careful statesman and man of the world; his pontificate marked by the Council of Trent.

Pius V., MICHELE GHISLERI (1504–72), pope; in early life a Dominican; became grand inquisitor, and was elected pope, 1566. A man of stern morals and the enemy of all corruption, he was a passionate opponent of Protestantism and a relentless persecutor. He urged on the persecution of Alva, excommunicated Queen Elizabeth, and drove the Jews from Rome. A high principled and intensely bigoted man, he typified the counter-Reformation. He was canonised, 1712.

Pius VI., GIOVANNI ANGELO BRASCHI (1717–99), pope; cardinal, 1773; pope, 1775. An able administrator, he carried through several reforms in the papal States. During his pontificate French Church was disturbed by the Revolution. Rome was captured by the French, 1798, and Pius taken prisoner.

Pius VII., LUIGI BARNABA CHIARAMONTI (1740–1823), pope; cardinal, 1785; pope, 1800. The events of his pontificate were largely concerned with France; he formulated the Concordat, 1801, and crowned Napoleon in Paris, 1804; but later relations became strained and Pius was taken off, only returning to Rome, 1814. He was a conscientious man and a patron of art.

Pius IX., GIOVANNI MARIA MASTAI-FERRETTI (1792–1878), pope; cardinal, 1840; elected pope on the death of Gregory XVI., 1846. At first his government showed liberal leanings, but forces were so strong that his concessions were of no avail, and a revolution took place in 1848, Pius himself having to flee. His return to Rome in 1850 began a reactionary policy. In 1859 the pope lost most of his dominions, the patrimony of St. Peter was annexed, and the Papacy thus deprived of all temporal possessions, in 1871. The doctrine of the Immaculate Conception of the Virgin was promulgated, 1854, and the Infallibility of the Pope in the Vatican Council of 1870. P. reigned longer than any other pope.

Pius X., GIUSEPPE SARTO (1835–), cardinal and patriarch of Venice, 1893; pope on the death of Leo XIII., 1903.

PIZARRO, FRANCISCO (*c.* 1475–1541), Span. conqueror of Peru (*q.v.*); as a boy served under Gonsalvo di Cordova in Italy; was with Balboa when he discovered the Pacific; along with Almagro (*q.v.*) set out for Peru, but having few men sent Almagro for reinforcements; the governor of Panama gave small help. P. went to Spain and received the royal assent to his undertaking conquest of Peru; landing in Peru, he marched inland, captured the Inca Atahualpa by treachery and strangled him. P. and Almagro set up Manco as nominal Inca; they founded Lima as the new capital, 1535. P. quarrelled with Almagro about their respective shares of land, and in a civil war Almagro was slain. P. was finally assassinated by Almagrists. See Prescott, *History of the Conquest of Peru*.

PLACE-NAMES, see NAMES.

PLACENTA, the structure by which a fœtus is nourished in the uterus, or womb, of its mother, and which is expelled after the young is born, constituting, with the membranes, the 'after-birth.' When the fertilised ovum reaches the uterus it becomes embedded in the decidua, or thickened lining of the uterus, and gradually enlarges. Processes, or villi, grow out from the ovum into the deep parts of the decidua on which it lies, where blood sinuses are formed, filled with maternal blood, into which the thin-walled, vascular, fœtal villi hang free, dissolved substances in the two bloods are exchanged by diffusion, the fœtal and maternal blood never becoming intermixed, and nourishment thus taken up for the fœtus. This forms the placenta, and to it the fœtus is attached by the allantoic stalk, which ater becomes elongated and is known as the umbilical cord. The fully developed human placenta is a circular disc-like structure, seven or eight inches in diameter, about 1½ inches thick at the centre, and becoming thinner at the edges, and weighing about 1 lb.

PLACUNA, see under LAMELLIBRANCHIATA.

PLAGIOCLASE, an important group rock-forming minerals; occurs as primary constituent of igneous rocks. See FELSPAR.

PLAGIOSTOMI, see under FISHES.

PLAGUE, term formerly applied to any epidemic disease of considerable mortality, but now restricted to a particular malignant contagious disease caused by a specific bacillus, the *Bacillus pestis*, and characterised by buboes, or swellings of the lymphatic glands, and carbuncles. Although the disease is noted in works of earlier date the first extensive epidemic of *bubonic* p. of which there is hist. evidence occurred in the VI. cent. A.D., beginning in Lower Egypt, passing along the N. African coast to Constantinople, and spreading all over the Rom. Empire. From this time epidemics frequently broke out in Europe, an exceedingly fatal cycle of pestilences, known as the *Black Death*, some of which, at least, were certainly bubonic p., occurring in the XIV. cent., when over a quarter of the population of Europe is believed to have been destroyed. P. continued to ravage Europe during the XV. and XVI. cent's, hundreds of thousands of persons dying of the disease, but in the first half of the XVII. cent. a decline began to set in, which was still more marked in the second half of the century.

For some years before the outbreak of the *Great Plague* of 1664–65 London had been unusually free from the disease, which is believed to have been introduced from Holland, although, bearing in mind the insanitary condition of London of that time, it is at least quite as probably of local origin. In 1665 there were about 70,000 deaths from p. in London in a population of 460,000, and the epidemic spread all over the country. In 1666 there were 2000 deaths in London, but since that year there has been no epidemic in England, and the disease finally disappeared from the country about 1680.

About the same time p. began to disappear in other parts of western Europe, reappearing, however, in 1703–14 from Constantinople along the Danube and as far as Hamburg, Copenhagen, and Scandinavia, while in 1720 there was a destructive outbreak in

Marseilles and S. France, nearly 90,000 persons dying altogether. A destructive epidemic occurred in Sicily in 1743, the disease being introduced by a ship into the port of Messina, and another spread from the East to Moldavia, Hungary, and Poland in 1770, spreading also in a different direction to Kieff in Russia, where there was a very fatal outbreak in the same year, and reaching Moscow, where a quarter of the population was carried off, in the year following. During this period p. was constantly present in the countries on the shores of the Eastern Mediterranean, Egypt, Syria, Asia Minor, and Turkey, and there were a number of outbreaks in Eastern Europe in the first half of the XIX. cent., extending on one occasion to Italy, where rigorous measures restricted the disease to one small district. P., however, has gradually disappeared from the Mediterranean countries, the last cases in Egypt occurring in 1845, although there was an outbreak in Tripoli in 1858, dying out the following year.

In 1878–79 the disease appeared in Russia in the neighbourhood of Astrakhan, creating considerable alarm in Europe, but it rapidly declined, after having caused several hundred deaths. P. was not known in India before the XIX. cent., but since 1815 there have been a number of outbreaks, while the disease has also been observed in China since 1871. It attacked Hong-kong in 1894, supposed to have been introduced from Canton, where an epidemic was raging, and this outbreak was followed by the destructive and long-continued epidemic at Bombay, which began in 1896, over 206,000 persons dying of the disease in Bombay presidency in 1897–99, 45,000 of them in the city alone. In spite of efforts to arrest the spread of infection the epidemic continued all over India, a maximum of 940,000 deaths in all India being reached in 1905. In the Bombay presidency the ravages of the disease reached a maximum in 1903, when 281,000 deaths were recorded. Outside China and India, however, the mortality of p. has not been great, except, to a less extent than in these two empires, in Arabia, where the precise mortality is unknown. After an absence of over 200 years p. broke out in Oporto in 1899, the source being unknown, and over 100 deaths occurred, the epidemic ceasing in 1900.

In 1899 there was also a limited epidemic in Russia near the mouth of the Volga, while in 1900 there was an outbreak of cases in Australia, widely scattered in the larger cities of the West, South, and East, but the outbreak never had serious proportions. In the same year p. appeared in Glasgow, 34 cases with 15 deaths occurring, the origin of which could not be traced. With the exception of this slight outbreak and of a small number of cases which have been carried from plague-infected countries to seaports from time to time, p. has not appeared in Britain since the XVII. cent.

The SYMPTOMS of p. usually include a preliminary stage of depression and pains, but the onset of the disease is sudden, with shivering, and the temperature rising to 103°, or even three or four degrees higher; there may be delirium, and there is marked prostration, headache, dizziness, and lethargy. In a day or two swellings usually appear, due to the inflamed glands, singly, or in groups, which may be very painful and may suppurate, while there may be small hæmorrhages under the skin.

There are three main varieties of p.—*bubonic*, with the characteristic glandular swellings, *septicæmic*, a very fatal type, in which the symptoms are more severe than in bubonic, without the glandular swellings, *pneumonic*, in which there is an inflammatory condition of the lungs, resembling pneumonia, with intense prostration, no glandular swellings, and usually death about the second or third day.

The only treatment is to treat symptoms as they arise, *e.g.* headache, or delirium, while alcohol and other stimulants may be given to keep up the strength of the heart. Some success has attended the injection of carbolic acid into the glands, but it is probably better to treat them by the same surgical measures as in simple inflammatory conditions. An antitoxin serum, termed the Yersin-Roux serum, is of great benefit when employed within twenty-four hours of the commencement of the disease, very large doses being injected. As a preventive measure inoculation with Haffkine's fluid, which is prepared from the sterilised virus of plague, has been proved to be of the greatest value, and is systematically carried out by the Indian Government. It has been shown that infection is carried by the fleas which have their habitat on the bodies of rats, and fleas also convey infection from one human being to another. This, in conjunction with the well-known fact that an unhealthy and filthy environment favours the disease, shows that the best preventive of p. is a clean and hygienic mode of living.

PLAICE, see under FLAT-FISHES.

PLAINFIELD (40° 36′ N., 74° 26′ W.), residential city, New Jersey, U.S.A. Pop. (1910) 20,550.

PLAIN-SONG, PLAIN-CHANT, a style of ecclesiastical music, unisonous, corresponding to Gregorian song; so called since, in the course of centuries, its former rhythmical motion was lost, and it became stiffened into a monotonous succession of notes of equal length. It exhibits peculiarities unknown to any other music; and is the only type of Church music prescribed by ecclesiastical authority.

PLANARIAN WORMS, see TURBELLARIAN WORM.

PLANE (*Platanus*), genus of trees, order Platanaceæ; *P. orientalis*, a native of the East, and Buttonwood, or N. Amer. Plane (*P. occidentalis*), are common; in Scotland the Sycamore (*Acer pseudoplatanus*) is called a p. (see MAPLE); p's are unaffected by smoke, hence their abundance in cities.

PLANET (Gk. *planetes*, 'a wanderer'), name given to eight celestial bodies revolving in same direction around sun by gravity, and known collectively as the Solar System (*q.v.*), and called p's because of their apparent wanderings among the fixed stars.

A p. may be distinguished by (*a*) this movement, or (*b*) its steady 'glare,' for unlike the stars p's very seldom twinkle, except when low in sky and thus near horizon vapours; and (*c*) telescopically by the fact that they show an appreciable disc, whilst even in the largest telescopes the stars are seen only as points of light, owing to their extreme distances.

The p. are divided into two groups, Major and Minor, and sometimes the four major p's nearest to the sun are called the Inner p., and the other four the Outer p.

The major planets are (in order of distance from sun, commencing with nearest) Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune (*qq.v.*).

The minor p. (*q.v.*) are small bodies, occupying a zone between the orbits of Mars and Jupiter.

All p's shine by reflected light, but probably both Jupiter and Saturn have some inherent luminosity.

Planets, Minor, PLANETOIDS, ASTEROIDS (Gk. *astron*, 'a star'; *eidos*, 'form'), small planets revolving around sun in a zone between orbits of Mars and Jupiter. Some Ger. astronomers, working in connection with Bode's Law, agreed to constitute themselves into 'celestial police,' and to patrol heavens in search of a planet which, according to Bode's Law, should have been revolving in an orbit between Mars and Jupiter. They did not find a large planet, as expected, but instead discovered several small bodies, called the minor planets, which revolve in orbits approximating to that of the missing planet. The first to be discovered was found by Piazzi on New Year's Day, 1801, and is called Ceres; it is 477 miles in diameter. Since that time over 700 have been discovered, and fresh ones are continually being found at the present day.

It is supposed, as the m. p. are mostly small and apparently fragmentary bodies, that they are the

wreckage of some former planet blown to pieces, perhaps, by some great convulsion.

PLANIMETERS, see CALCULATING MACHINES.

PLANKTON, the medley of marine animals and plants which, incapable of active movement, drift with the surrounding water. Its importance lies in furnishing the basis of the food-supply of all the animals in the sea.

The p. consists of three types of ingredients. (1) Most important in point of numbers and significance are the microscopically minute *vegetable organisms*—Bacteria, Diatoms, and Blue-Green Algæ (*Cyanophyceæ*). These form the true pastures of the ocean, for they alone (with a few of the simplest animals—Peridinians, some Flagellates and Halosphæra) aided by sunlight have the power of manufacturing from the inorganic substances in the sea the organic fats, proteids, and carbohydrates, upon which alone animals can subsist. (2) A PERMANENT ZOO-PLANKTON, formed of *animal organisms* which spend their whole life floating in the waters. Such are the microscopic Protozoa which, besides those mentioned above, include the Foraminifera—Radiolarians and some Ciliata (*qq.v.*); many Cœlenterates—Jelly-Fishes, Sea-Blebs (Ctenophores), etc.; the Arrow-Worms (*Sagitta*, *Spadella*), and a few Chætopods (*Tomopteris*, *Chætopterus*); countless hosts of minute Crustaceans, chiefly Copepods; and, amongst Vertebrates, the Sea-Squirts (*Salpœ*). (3) A TEMPORARY ZOO-PLANKTON, constituted by the early stages of animals which when adult live on the bottom or swim freely—for example, the larvæ of Zoophytes and Corals, of Star-Fishes and Sea-Urchins, of Molluscs, Worms, and Crustacea, and the eggs and larvæ of Fishes.

So minute are most of the members of the p. that only their enormous numbers and fertility can give them significance; and even Lohmann's examination of a cubic metre of Mediterranean water, which yielded 2,425,665 minute organisms, gives but a faint idea of the numbers generally present.

P., however, is not uniform in kind nor uniformly distributed in the sea. There are seasonal fluctuations varying from an almost pure zoo-, or animal, p. to an almost pure phyto-, or vegetable, p. There is a more or less distinct neritic, or in-shore, and oceanic, or off-shore, grouping. Again, polar seas are more fertile than temperate or tropical waters, and shallow seas than oceanic deeps.

P. is all-important economically as the ultimate food-supply upon which all fisheries depend. Man eats the haddock, which feeds on young cod and launces, which feed on copepods, molluscs, or worms, and these feed on diatoms. So it is in every case: in every marine food-chain diatoms form the final link.

PLANORBIS, Pond-Snail, see under GASTEROPODA.

PLANTAGENET, nickname of Geoffrey, Count of Anjou, who wore as badge sprig of broom (*Planta genesta*); applied to his Eng. descendants; Richard, Duke of York, f. of Edward IV., adopted this surname; last P. was Edward, Earl of Warwick, grandson of Edward IV., executed 1499.

PLANTAIN (*Plantago*), plant of order Plantaginaceæ; Greater P. (*P. major*), a common wayside plant, has long spikes whose seeds are given to cage-birds; Ribwort P. (*P. lanceolata*) is a 'soldier' to children, who knock off the head.

PLANTAIN-EATERS, see TURACOS.

PLANTIN, CHRISTOPHE (1514–89), Fr. printer; settled in Antwerp, established printing-presses there, and became distinguished for the excellence of his workmanship. His office in Antwerp, bought by the city in 1876, survives as the 'Musée Plantin.'

PLANT-LICE, see APHIDES.

PLANTS.—The living world is divided by common consent into two kingdoms, the *animal* and the *vegetable*. These are separated from each other by two main distinctions: the plant is not capable of free locomotion, and the p. possesses green colouring matter. Neither of these distinctions is anything like universally true. Many p's and parts of p's can move freely and whole classes of p's possess no green pigment. But it is true that in the vegetable kingdom there is a *tendency* towards these two properties; and those p's which depart from this tendency may be recognised as p's because of their near resemblance in other points to forms undoubtedly vegetable.

As a living being a p. possesses a certain *form*, a certain *structure*, and performs certain *functions*. The study of the form of the p. is termed *morphology*; of its structure, *anatomy*; and of its functions, *physiology*. These three branches of study have in the course of time given off subsidiary branches, such as *cytology*, which deals with the structure of the cell, and *palæontology*, which treats of the form, structure, and classification of fossil plants, and others which will be mentioned in their proper connection.

Morphology.—If we examine any common weed we observe that it may be divided into a *root system* and a *shoot system*. The root system occurs characteristically underground and is usually much branched. There may be present one large tap-root, which gives off side-roots—*e.g.* plantain; or there may be a bunch of more or less equal roots also giving off side-roots—*e.g.* grasses. The roots traverse a large volume of soil and fix the plant firmly in position; but they also serve to absorb moisture, and this is accomplished by fine hairs which are found near the tips of the finest root branches, and which attach themselves firmly to the soil particles. The tip of the root is protected by a little cap. Roots do not, however, always remain of the typical fibrous form. Very frequently they become swollen up and serve as stores of food—the most important examples of this being the carrot and turnip.

The *shoot system* is readily divided into two classes of organs—the stem and branches, and the leaves. The leaves are the part of the plant in which food is built up, and to carry out their functions properly it is necessary that they should spread a large area out to the light. This the form of the typical leaf aims at—it has a thin blade with a large area, and is frequently held out from the stem on a special stalk. The leaves also are frequently modified to suit other ends. Thus the bulbs of hyacinth and onion are nothing but collections of leaves which have become much thickened, lost their green colour, and have taken to storing food instead of manufacturing it. Many leaves are thin and brown—*e.g.* the scales which protect delicate buds from the weather. Most important modification of all is that which is seen in the *flower* (q.v.). The outer circle of the leaves which compose the flower is protective in function, and is named the *calyx* (separate parts are the *sepals*); the second circle is generally brightly coloured, and may have associated with it scent or honey glands, it is named the *corolla* (composed of *petals*), and serves to attract insects; inside the corolla are two sets of organs, the *stamens* and the *carpels*, also modified leaves, but bearing, the one *pollen-sacs*, the other *ovules*. The pollen-sac and the ovule are not modified leaves, they are special organs known as *sporangia*, whose special duty it is to produce *spores*, with which we shall deal later.

The *stem* has as its function the holding of the leaves and flowers in an advantageous position; to this end it is typically rigid or else suited to twisting itself round or otherwise fastening itself to an external support. It may, however, under certain conditions, take on the functions of a leaf; this takes place when for some reason the leaves are much reduced in size: thus in the common broom leaves are almost absent, and the stem becomes green and winged, and so increases the surface which it exposes to the light. The stem, too, may become thickened and form a food store; especially is this the case in underground stems (distinguished from roots by the fact that they bear buds which give rise to shoot systems), as in the potato.

The surface of stem and leaves is frequently set

with hairs, prickles, and spines, which are mere surface excrescences, or may be modified branches or leaves.

Anatomy or Phytotomy.—When we examine with the microscope a thin slice of a very young part of a p., we find that it is built up of a mass of little boxes closely united together and known as *cells*. The study of the structure of these cells is called *cytology*. It is found that they consist of a wall (made of *cellulose*, a substance seen almost pure in cotton wool) lining which is a layer of viscous, half-fluid substance, called the *cytoplasm*: this, together with a more solid, round object, the *nucleus*, which is embedded in it, is the actual living substance of the plant (*protoplasm*). Various other bodies are found embedded in the cytoplasm, of which in the plant the most important are the *chloroplasts*, which contain the green colouring-matter, *chlorophyll*. Inside the cytoplasm is a watery fluid containing various salts and other substances dissolved in it—the *cell-sap*.

All cells of the p. do not, however, remain in this state; if we examine older parts of the p. we find that many of the cells have taken on quite different shapes and properties in order to perform different functions. One important requirement of many parts of p's is mechanical strength, and this is attained generally by the thickening of the walls of the cells, which thickening may or may not be accompanied by a deposition in the wall of substances which change it into *wood*. At the same time these strengthening cells generally lose their contents and thus die, and elongate greatly, taking on the character of fibres. Another important function which must be carried out by the cells is the carriage of water and food substances. This is most easy if the cells are very long, and consequently we find that the water-conducting cells are greatly elongated, and very frequently that the end walls separating them disappear, so that the water can traverse tubes consisting of rows of cells joined end to end. Such cells are also dead, and have thickened walls which serve to strengthen the p. The cells which are used for conducting food are also long and wide, and the end walls between are pierced by small pores to allow of the more ready passage of the contents.

These different types of cells are not scattered at random through the p. but are arranged in definite groups called *tissues*. Thus the water-conducting cells and vessels are grouped together as *wood*, the food conductors form the *bast*, strengthening cells form the *stereome*. These tissues are also arranged definitely in the different organs of the p. As an example we may take the young stem of a p. such as the sunflower. To the outside we have a tissue consisting of a single layer of cells extending over the whole surface and known as the *epiderm*; inside this we have a broad layer of ground tissue, the *cortex*. Then comes a ring of bundles—the so-called *fibro-vascular bundles*—each of which has a group of wood cells inside and of bast cells outside; inside the ring of bundles is a central core of ground tissue, the *pith*. If we examined an older stem we would find that certain changes had occurred: there would be a complete ring of wood surrounded by a complete ring of bast—or at least the rings would be broken only by slender spokes, the *medullary rays*, connecting the pith with the cortex. This change has occurred because a single circle of cells running between the wood and bast has remained in an actively growing condition and has given rise to new wood and bast; this growing layer is called the *cambium*, and is responsible for the increase in thickness shown by many stems—of trees, for example.

The arrangement of the tissues varies greatly in different organs—roots, stems, leaves—and in different p's. In the simpler forms of vegetation not all the kinds of tissue described are found. Thus in the mosses it is impossible to distinguish true water-conducting vessels; and at the same time the mosses possess no true root. In p's like the seaweeds and their relatives the structure is still simpler—leaves, stem, root are all absent; we are left with a simple, or branched, more or less strap-like body, which is named a *thallus*; it consists of cells which may take on different shapes, but which are far less distinct in form and function than are those of the higher p's. In still simpler forms we find that the p. consists of a simple row of cells joined end to end, or may even be reduced to one single cell, *e.g.* the bacteria.

This tracing of similarities and dissimilarities between different members of the vegetable kingdom is known as *comparative morphology* or *anatomy*, and on the basis of such comparative studies is built up the system in which p's are classified.

The system is, however, largely based on the difference in the methods of reproduction seen in various p's. Reproduction is one of the p's *functions*, so that its study comes under the head of physiology.

Physiology studies the way in which a p. lives—that is, the different functions of the p. These functions are conveniently grouped under three heads: (1) growth and reproduction, (2) nutrition, (3) movement.

Of *growth* it must be remarked that, in general, increase of size is restricted to a definite region of the p. Thus the root elongates just behind the tip. In the stem growth is also restricted to particular regions. The actual process of growth consists of two distinct processes: one is the enlargement of the individual cells, due either to an increase of living substance or of cell-sap; the other is the division of the cell into two halves, a process which is carried out with great nicety. The rate of growth and the form which a p. assumes are influenced greatly by external conditions. Thus heat increases rate of growth, as does also moisture. A prime necessity is the presence of oxygen. Particularly light and water are efficacious in altering the form of a p.: many water p's produce one type of leaf in the water and another in the air; leaves grown in the shade are larger and of a finer texture than those from sunny positions. Growth ultimately brings the p. to a stage at which it sets about reproducing its kind.

Reproduction may be very simple: in the bacteria it consists simply in one cell dividing into two new ones. In the seaweeds and their relatives we have, however, a more complicated state of affairs; here we have special cells set aside for reproduction; they are termed *spores*, and may be of the most diverse design. For our purpose we may divide them into two classes: (*a*) *asexual spores* (usually spoken of simply as *spores*), which can germinate directly and produce a new plant; (*b*) *sexual spores* or *gametes*, which can germinate only after two have fused together and formed a completely homogeneous starting-point for the new organism. In many cases the spores and the gametes are produced by the same p. in response to different external conditions; but in some it is found that one p. will only give rise to spores, and that these spores give origin to a p. which produces only gametes, which give rise to a spore-bearing p., and so on. The two p's may be morphologically exactly alike, or they may differ the one from the other.

In such a case it will be seen that the complete cycle of development of a p. must include the p. which produces gametes and that which produces spores; the former is termed the *gametophyte*, the latter the *sporophyte*, and this phenomenon of the occurrence of two distinct types of p. in one life cycle is spoken of as the *alternation of generations*.

Considering the reproduction of the higher classes of p's we find that this alternation of generations is universal, but that the higher we go the less prominent becomes the gametophyte. In the mosses the leafy moss p. produces in special organs, as its tip gametes; from the fusion of these arises the moss capsule, in which are produced spores, which in turn give rise to new moss p's. The moss p. is thus the gametophyte,

the capsule the sporophyte. In the ferns the gametophyte is a tiny green thallus, which grows in wet places, and is not generally connected with the fern; from the fused gametes arises the fern p. or sporophyte, on the backs of the leaves of which are to be found sporangia containing spores. In the flowering p's the whole p. as we know it is the sporophyte; the sporangia are of two kinds: the pollen-sacs of the stamens, and the ovules: the spores are the pollen grains, and the *embryo-sac* a large cell in the ovule. The gametophyte is scarcely recognisable: it is reduced to one or two cells or even nuclei formed by the division of the pollen grain and embryo-sac; the fused gametes give rise to a new sporophyte which develops to a certain extent in dependence on the old p. — it forms the embryo inside the seed; when the seed is set free it continues its development and becomes a new spore-producing p.

Mention must be made of the fact that while in some of the seaweed-like p's the gametes are equal, yet in many and in all the higher p's there is a differentiation into a large female *egg* and a small, and often motile, male *sperm*; and that, as in the flowering p's, these two may be produced on different gametophytes, which have developed from different spores. The significance of the fusion of two gametes is probably to be found in the theory that the union of two different organisms produces a more robust offspring. It should be observed that it is this fusion of cells from two different p's that gives opportunity for *hybridising*—that is, the production of p's combining the properties of two different parents. This is of much importance in *plant-breeding*, as it allows of the production of new forms which may combine advantageous properties of two parents. The other means of securing new varieties consist chiefly in selecting carefully any forms which appear showing characters differing from those of the strain to which they belong.

Bearing in mind the different types of reproduction, we may turn to the **classification** of p's. The arranging of p's in a system of groups, each of which contains forms more nearly related to each other than to those of other groups, has a practical interest only when it is recognised that one type of p. has *evolved* from another ancestral type — that is, that an actual 'blood' relationship between different forms exists. P's are divided into four main groups. The first contains the seaweed-like forms, or *algæ*, and the *fungi*—toadstools, etc., which differ from the algæ by their lack of chlorophyll. These are distinguished by their simplicity of structure—there is no differentiation into leaves, stem, and root. An alternation of generations is frequently not to be observed. The *mosses* and *liverworts* are more complex, and many have distinct stems and leaves. All have typical alternation of generations, the gametophyte predominating. The *ferns*, and their allies the *club mosses* and *horsetails*, have distinct roots and vascular systems, and are distinguished from the highest plants—*cone-bearers* and *flowering plants*—by the fact that the latter produce seeds. In flowering plants and ferns the sporophyte is best developed. The study of fossil plants—*palæontology*—has shown that many plants formerly existed which bridged the gaps at present existing between the four great groups (see PALÆOBOTANY).

To return to physiology. We come now to the physiology of *nutrition*. The p., like the animal, consists largely of three types of organic compounds: fats, carbohydrates (*e.g.* sugar and starch), and proteids; the latter form the main part of the protoplasm. To these must be added a large quantity of water and certain mineral salts. Unlike the animal, however, the p. is able to build up these substances from carbon dioxide obtained from the air, and water and mineral salts obtained from the soil—the animal obtains its organic compounds from the p. or from other animals. The water supply is taken over by the root, which pumps a sufficient amount, containing the necessary mineral salts in solution, into the conducting vessels of the stem. The hairs suck up this water and perform a twofold function. In the first place they give off a large amount of water vapour; this is necessary in order that a large amount of water may pass through them, leaving behind the mineral salts necessary to the p's nutrition. This water vapour passes out through openings in the leaf surface—the *stomata*—through which enter, from the air, small quantities of carbon dioxide. In the leaf these meet—the mineral salts, the carbon dioxide, and the water necessary for the building up of organic food substances. In order to form these a supply of energy is necessary, and the second function of the leaf is to absorb by means of its green chlorophyll energy from the sunlight. In the leaf and with this supply of energy are formed sugar and starch from carbon dioxide and water, and with liberation of oxygen: from these carbohydrates in turn are formed fats, and, along with nitrogen from the mineral salts, proteids. The food substances are used partly to build up the p.'s structure, and are partly combined with oxygen and turned back into carbon dioxide, water, and energy, the latter being used for carrying on the vital activities of the p.

Movement in p's is chiefly carried on under the direction of external stimuli, with the object of obtaining suitable conditions of growth. Thus under the influence of gravity roots move down into the earth; under the influence of light, leaves turn so as to obtain a suitable light supply.

Ecology (q.v.) is a recent development of botany which aims at studying the way in which p's are related to their environment. *Plant pathology* is economically important in that it studies the cause and cure of p. diseases.

Bevis and Jeffrey, *British Plants* (1911); Ch. Darwin, *The Movements and Habits of Climbing Plants* (1875), *Insectivorous Plants* (1888); F. Darwin, *Practical Physiology of Plants* (1894); Keeble, *Plant-Animals: A Study in Symbiosis* (1911); Scott, *The Evolution of Plants* (1911).

PLASENCIA (40° 5′ N., 6° 7′ W.), cathedral town, on Jerte, Caceres, Spain. Pop. 8200.

PLASMODIOPHORA, see under MYCETOZOA.

PLASMODIUM, see under MYCETOZOA, SPOROZOA.

PLASSEY (23° 46′ N., 88° 11′ E.), village, Bengal, India; here Clive defeated Suraj-ud-Dowlah (*q.v.*), 1757.

PLASTER OF PARIS, see GYPSUM.

PLASTER WORK is of ancient origin, and in some cases, as in the Pyramids, it has survived in good condition for thousands of years. The Greeks brought the art to great perfection, and used it in their temples. At a much later period p. was used in England for ornamenting mansions, and the decorated p. ceilings of Tudor times are specially fine. The extensive use of p. for small houses probably does not date back much more than a century. The composition of p. varies, but generally a mixture of Portland cement or lime with sand is used, ox-hair, sometimes horse-hair or goat's hair, being added to bind the mixture. Instead of hair, Manilla hemp fibre or sawdust may be used, the latter being employed also as a substitute for sand. Colours are obtained by colour-washes or by mixing certain oxides with the lime.

PLATA, RIO DE LA, RIVER PLATE (35° S., 57° W.), wide estuary on E. coast of S. America, between Uruguay on N. and Argentine on S., formed by junction of Paraná and Uruguay Rivers; *c.* 200 miles long, 25 miles wide at head, and 135 miles at mouth; through tributaries it drains vast area, including portions of Brazil, Argentine, Uruguay, Bolivia, and whole of Paraguay; shores of Uruguay on N. are lofty and rocky, and those of Argentine on S. low and flat; estuary of great commercial importance, but navigation is hampered by extreme shallowness; bed of estuary composed of sandbanks; Paraná, longer of two rivers, enters estuary by 11 outlets, largest being Paraná-quazu and Paraná de Las Palmas. Chief ports are Buenos Ayres in Argentine and Montevideo in Uruguay.

Estuary was discovered by de Solis in 1516, and explored by Magellan in 1520.

PLATÆA, PLATÆÆ (38° 13′ N., 23° 16′ E.), ruined city, Bœotia, Greece; situated on Mt. Cithæron; walls and portion of citadel remain; near here Persians were defeated by Greeks, 479 B.C.; destroyed by Spartans (427 B.C.); by Thebes (375 B.C.); finally restored, 330 B.C.

PLATALEIDÆ, Spoonbills (*q.v.*).

PLATEAU, an elevated tract of level or slightly undulating tableland.

PLATEN-HALLERMUND, AUGUST GRAF VON (1796–1835), Ger. poet and dramatist; b. Ansbach; studied Würzburg; best works, *Ghaselen* (Oriental poems), *Sonette aus Venedig*; *Die Abbasiden* (epic), and plays, *Der Romantische Ödipus*, etc.

PLATINUM, Pt=195·2, a noble metal, occurring in the Urals, native, but impure.

METALLURGY.—The crude metal is extracted with *aqua regia*, ammonium chloride added, and the platini-chloride, $(NH_4)_2PtCl_6$, crystallised; ignition yields spongy p., which is melted in a lime crucible by the oxy-hydrogen blowpipe.

PROPERTIES AND USES.—Tin white, soft, and malleable, can be welded at white heat; S.G. 21·42, M.P. above 1700° C.; unattacked by nitric or hydrochloric acid, corroded by hot caustic alkali; forms fusible alloys with tin, lead, etc., whose compounds must not be heated with p.

Used for making wire for chemical purposes and incandescent electric lamps, also for foil, crucibles, dishes, etc., for analysis, and for photographic prints. Finely divided p. catalytically causes combination between hydrogen and oxygen, and sulphur dioxide and oxygen. Demand for p. now exceeds supply, and so the metal is very costly.

COMPOUNDS: PtO: $PtCl_2$, K_2PtCl_4, $BaPt(CN)_4$.
PtO_2: $PtCl_4$, H_2PtCl_6, K_2PtCl_6.

PLATO (*c.* 427 B.C.–347 B.C.), Gk. philosopher; came of a wealthy Athenian family. In boyhood he inclined towards poetry, but at the age of twenty, after having been taught by the Heraclitean Cratylus, he made the acquaintance of Socrates, and thenceforward devoted himself to philosophy. After Socrates' death he is said to have travelled widely, and probably visited Italy and Sicily. When about forty years old he began to teach and write in Athens, where he remained till his death, except (the story runs) for two journeys to Syracuse, the first of which took place in 367 B.C., its purpose being to mould the young Dionysius II. (lately become the ruler of Syracuse, and then under the guidance of the philosophically minded Dion) into the perfect 'philosopher-king' whom Plato had sketched in the *Republic*. Dionysius, though enthusiastic at first, was soon bored, and banished Dion; Plato returned home unsuccessful, and a second visit a few years later also failed of its purpose.

All P.'s philosophical writings have been preserved. They are cast in the form of dialogues, and are as remarkable for dramatic power and literary beauty as for their substance. In most of them Socrates is represented as the chief speaker. In order of composition the slighter, so-called *Socratic*, dialogues undoubtedly come first, such as the *Laches* and the *Crito*; they were followed probably by the *Protagoras*, *Gorgias*, and *Meno*, and then by the first set of great constructive dialogues: the *Symposium*, *Phædo*, *Republic*, and *Phædrus*. Then come four dialogues in which logical outweighs ethical interest: the *Theætetus*, *Parmenides*, *Sophist*, and *Politicus* or *Statesman*; then the *Timæus* and *Philebus*, and, last of all, the *Laws*.

Plato's Philosophy.—The dialogues treat of practically all philosophical topics, though not after the manner of a systematic treatise. In his ethical and political teaching—and with this he doubtless began—Plato, like Socrates, is at war with sceptical theories that deny the possibility of a common good, and so reduce society to a collection of competing individuals, each of whom finds his welfare in purely selfish pleasures. Socrates had seen that the uniting force in society is reason, but by simply identifying virtue with knowledge, he had represented moral goodness as nothing but intellectual excellence. P. does more justice to the complexity of human nature, distinguishing three 'parts' of the soul, the rational, the appetitive, and (intermediate between them in value) the 'spirited,' which is the natural ally of reason, and includes the more generous emotional impulses, such as indignation at wrong-doing. Human welfare consists, not in mere pleasure, but in the harmonious activity of all functions of the soul under the guidance of the highest; and this harmonious activity is at once Wisdom and respect of Reason, Courage in respect of 'Spirit,' Temperance or moderation in respect of Appetite, and Justice in that each 'part' of the soul contributes to the good of the whole by doing its own proper business in its proper place and way. Vice, on the other hand, is spiritual anarchy or disease, and cannot be welfare, however pleasant it may seem. The highest welfare evidently requires the highest possible activity of reason, or knowledge; but P. allows that ordinary men may attain such welfare as they are capable of by following the precepts of those who know. This is of importance in P.'s political theory, which is not separate from his ethical theory, since man is necessarily a social being, and can make the best of himself only in a well-ordered State. It is above all things necessary (and P. vehemently accuses contemporary democracy of ignoring this), that those who know should rule, and that each citizen should perform that function in the State which he is best fitted to perform. Now the mass of men is not capable of wisdom, but can recognise and follow wise rulers, and exercise the virtue of Temperance; they should be the productive workers and traders in the State. A smaller number is representative of Spirit, and should be the State's courageous warriors; a very few, selected early for mental, moral, and physical promise, and carefully trained, not only in general culture, but through many years' arduous study of science and philosophy, are to be the rulers of the State. They must have no private interests, but devote themselves wholly to the public good; and therefore Plato denies them any private property and private family life. Necessities are to be provided for them; all children are to be children of the State.

The goal of the 'philosopher-king's' knowledge P. calls the *Idea* (or Form) of the good. Most men have opinions which they hold without justification or steadfastness about this, that, and the other changeful event or thing. But true knowledge is reasonable and abiding, and has for its object what really and eternally is. The mathematician is not concerned with this diagram that he uses, but with circularity itself or triangularity itself; the philosopher, not with this or that imperfect action, but with virtue itself, to which our acts only approximate; and, generally, he who knows, knows not particular material things, or the flux of events in time, but immaterial, universal, eternal objects. Such an object P. calls an Idea or Form; but the word is apt to mislead the modern reader, who thinks of Ideas as somehow in his mind, whereas P. means real objects which the mind apprehends in knowing. What in common parlance we often nowadays call 'actual' things—the particular objects of sense-perception—are not for P. real objects. Sense-perception, though it stimulates thought, is not itself a mode of thinking, and its objects, whilst not entirely unreal or fictitious, occupy a level between being and not being; they 'partake in' or 'copy' real Ideas or Forms more or less fully, but they always include an incalculable, material, evil element, whereas real being is free from imperfection or any unintelligibility. The Ideas constitute a rational organic system, the object of non-sensuous thought, and every member of the system derives its being and intelligibility from an ultimate principle which P.

calls 'the Good' or 'the idea of the Good'; in other words, all that really is has the unity of perfect purpose, and every member of it is, and is knowable, because it plays its proper part in contributing to the good of the whole. P.'s meaning is doubtless most easily grasped if we personify the Idea of the Good as God; but it is not clear that he made this identification himself.

P. agrees with Socrates that to impart knowledge is impossible, and in two dialogues he represents the process of learning as 'reminiscence' (or 'recollection') of knowledge gained in a state of existence before bodily birth. He consistently maintains that the life of the soul neither begins nor ends with the body, soul being akin to the eternal Ideas and being, not an effect of inanimate things, but the very principle and cause of life; in certain passages, however, he regards spirit and appetite as due to the conjunction of soul with body, and attributes deathlessness to reason only. In several dialogues there occur 'myths,' in which he depicts the fate of the soul between its successive incarnations; and in them we find the notion of transmigration, the soul passing at its next birth into the body of man or some other animal whose character is like its own.

Certain statements of Aristotle's are usually taken to imply that, in his later oral teaching, P. represented his Ideal Theory in a more mathematical form, akin to Pythagoreanism: and this is certainly true of the earliest successors to the leadership of his school, Speusippus (*q.v.*), Xenocrates (*q.v.*), and others. The school was from its locality known as the *Academy*. For a time its interests were chiefly mathematical and scientific; later, it developed a critical and even sceptical tendency.

Neo-Platonism.—Far more important, however, than the Academy is the *Neo-Platonic* movement of the III. to V. cent's A.D., the final effort of philosophy. Its greatest name is PLOTINUS (b. in Egypt *c.* 204 A.D.), who is said to have gone to Persia and studied Oriental philosophy, taught in Rome from 244 A.D., and died about twenty years later. His doctrine is at once scientific philosophy and mystical religion. Central in it is his conception of God, the absolute and perfect One, superior to all positive statements that we can attempt. The One, though immutable, yet 'shines forth' or 'overflows,' first as Intelligence, which involves the diversity as well as unity of subject and object,—and here Plotinus regards the Ideas as the real archetypes of the sensible world in the divine mind,—and more remotely as Soul, which again is a single world-principle but is pluralised in individual souls. Last comes Matter, but the material sensible world does not really exist in its own right, but is only '*our* view of the Intelligible World.' The aim of the soul is to free itself from the illusions of sense, and by virtue, abstinence, and love of beauty to rise to an ecstatic condition of 'contact' or direct communication with God. Of the later members of the school the most famous are PORPHYRY OF TYRE (233–*c.* 303 A.D.), a disciple of Plotinus in Rome, best known for his work on logic; JAMBLICHUS, a Syrian (died *c.* 330 A.D.), who wrote rather fantastically in favour of an eclectic polytheism; HYPATIA, who taught at Alexandria and was killed by the Christians in 415 A.D.; and PROCLUS, a Lycian (410–85 A.D.), who wrote on philosophy and math's, and taught in the Academy at Athens.

(1) PLATO.—All the dialogues have been eloquently translated by B. Jowett. Davies and Vaughan's trans. of the *Republic*, and Church's trans. of the *Euthyphro, Apology, Crito*, and *Phædo*, under the title of *The Trial and Death of Socrates*, are handy and useful. In general, Adam, *The Religious Teachers of Greece*; Benn, *The Greek Philosophers*, vol. i.; Bosanquet, *Companion to Plato's Republic*; Caird, *The Evolution of Theology in the Greek Philosophers*; Gomperz, *The Greek Thinkers*, vols. ii., iii.; Grote, *Plato and the other Companions of Socrates*; Nettleship, *Lectures on Plato's Republic*; Pater, *Plato and Platonism*; D. G. Ritchie, *Plato*; A. E. Taylor, *Plato*; Zeller, *Plato and the Older Academy*.

(2) NEO-PLATONISM.—Bigg, *Neo-Platonism*; Caird, as above; Whittaker, *The Neo-Platonists*.

PLATONIC LOVE, spiritual affection between the sexes.

PLATTE, NEBRASKA (40° 50′ N., 99° 40′ W.), river, U.S.A., formed by union of N. and S. Forks; joins Missouri.

PLATTSBURG (44° 42′ N., 73° 27′ W.), city, New York, on Lake Champlain, U.S.A.; lumber manufactures. Pop. (1910) 11,138.

PLATTSMOUTH (41° N., 95° 48′ W.), city, Nebraska, U.S.A., at junction of Platte and Missouri; railway-car shops. Pop. (1910) 4287.

PLATYELMIA, a subdivision of the animal kingdom and a group of flat, wormlike animals, including forms having more or less flattened oval bodies with distinct segmentations; of widely varying forms and habits; generally divided into three classes: Planarians, Cestodes (tape- or ribbon-worms), and Trematodes (flukes). Latter two are parasitic.

PLATYHELMINTHES, FLAT-WORMS, Worms, generally with a flattened body, the majority of which occur as parasites within other animals, although some are found living independently in water or on land. They possess no blood system, and the food canal is either absent or without posterior opening. The Flat-Worms form a phylum which includes the Turbellarians, the Trematodes (with Liver-Flukes), and the Tapeworms (*qq.v.*).

PLATYPUS, see ORNITHORHYNCHUS.

PLATYRRHINI, or PLATYRRHINE APES, a group of PRIMATES (*q.v.*).

PLAUEN (50° 26′ N., 12° 7′ E.), town, on White Elster, Saxony; cotton goods. Pop. (1910) 121,104.

PLAUTUS, T. MACCIUS (*c.* 250–184 B.C.), Rom. comic poet and dramatist; b. Sarsina, Umbria; pioneer of Rom. lit.; after employment (exact nature unknown) in theatre, became successively merchant, bankrupt, servant in mill, and playwright. Of the numerous comedies attributed to him, 31 are probably genuine; we possess 20 whole plays and numerous fragments. P. borrowed plots from Gk. New Comedy, and adapted them to suit Rom. audience; uses familiar New Comedy characters—roguish slave, parasite, etc.; lacks finer touches of Terence (*q.v.*), but is robust and distinctively Roman; differs from Terence in free use of lyrical monologues; imitated by many writers, including Shakespeare and Dryden. Most famous plays are *Aulularia, Captivi*, and *Menæchmi*.

Translations, by Riley, Sugden, Collins.

PLAYFAIR, JOHN (1748–1819), Scot. mathematician: b. Forfarshire; studied at St. Andrews; prof. of Natural Philosophy, Edinburgh (1805). Pub. *Elements of Euclid, Outlines of Natural Philosophy*, besides important papers.

PLAYFAIR OF ST. ANDREWS, LYON PLAYFAIR, BARON (1818–98), Liberal statesman; P.C., 1873; Postmaster-General, 1873–74; pres. of Commission which made report on Civil Service, 1874; Chairman of Ways and Means, etc., 1880–83.

PLAYS, see DRAMA, STAGE.

PLEADINGS, in Eng. law, the name given to certain documents which must be prepared for trials at law, and which contain either (1) Statement of Claim, or (2) Defence (other p. can only be delivered by special leave of the court). The purpose of these p. is to enable the parties to know exactly what are the matters in dispute, and what facts must be proved at the trial. They are also useful in determining whether the dispute is a pure point of law to be decided by a judge without the aid of a jury, or whether it is a question of fact to be decided by a jury. The record of matters in dispute is settled by the p., and it is of the utmost importance that there should be certainty as to these matters, for decisions upon them

made by a final court cannot be upset or even re-opened by any subsequent proceedings.

PLEBEIANS, see ROME (HISTORY); PATRICIAN.

PLECTROPHENAX, see EMBERIZIDÆ.

PLEDGE, see PAWNBROKING.

PLÉIADE, see RONSARD, FRANCE (FR. LITERATURE).

PLEIADES (Gk. myth.), seven sisters of Hyades; pursued by Orion, they besought Zeus for help and he changed them into stars; situated in constellation Taurus, the P. are the most famous star cluster in the heavens.

PLEISTOCENE (Gk. *pleistos*, 'most'; *kainos*, 'recent'), in geol., the lowest division of Post-Tertiary formation, in which most of the fossil remains belong to existing species, although those of P. mammals contain a few extinct forms. From the fossils it is gathered that great climatic changes took place on earth during P. era. Also known as GLACIAL and DRIFT period, owing to number of icebergs then.

PLENIPOTENTIARY, see AMBASSADOR.

PLESOSAURIA, extinct Reptile (*q.v.*).

PLEURA, see RESPIRATORY SYSTEM.

PLEURISY, inflammation of the *pleura*, or lining membrane of the lung cavity, caused by certain specific organisms. The chief varieties of p. are *dry p.*, in which there is inflammation of the pleura with a fibrinous exudation of lymph, tending to form adhesions, and *p. with effusion*, when an effusion of fluid varying in amount up to a gallon takes place after the inflammation. The onset is usually quite sudden, with a stitch-like pain in the side, increased on taking a deep breath, the patient has a dry cough, and the temperature may rise to 100° or a little over. In p. with effusion the pain gradually becomes less, the patient feels uncomfortable and has difficulty, because of the weight of the fluid, in lying on the unaffected side. Characteristic physical signs can be made out in both varieties on careful examination by a physician. The treatment in dry p. is to strap the affected side with adhesive plaster so as to limit the movements of breathing, apply locally a linseed poultice or an ice-bag to relieve pain, and administer a purgative. If effusion takes place, iodine is painted on locally as a counter-irritant, and saline purgatives (*e.g.* Epsom salts) given to get rid of the fluid, while tonics are useful. If good progress is not being made by these methods, the fluid is drawn off by puncturing the chest with an aspirator (an instrument which is a combination of a hollow needle and a syringe), which usually at once relieves distressing symptoms.

When a patient has sweatings, shiverings, and irregular rises of temperature, and the p. does not clear up, the disease is probably *Empyema* (q.v.), the fluid having become purulent, which is a serious condition requiring surgical treatment.

PLEURONECTIDÆ, see FLAT-FISHES.

PLEURO-PNEUMONIA, a specific, highly-contagious disease prevalent amongst cattle in Western Europe, U.S.A., S. Africa, and Australia. It affects the pleura and lungs, the latter finally becoming consolidated, and causes enormous loss of life.

PLEVNA (43° 27′ N., 24° 35′ E.), town, on Tutchinitza, Bulgaria; here defence and final surrender of Osman Pasha took place during Russo-Turkish War, 1877; woollens, silks, wines, live stock. Pop. 21,150.

PLEXUS, see NERVOUS SYSTEM.

PLIMSOLL, SAMUEL (1824–98), Eng. politician; secured the passing of the Merchant Shipping Act (1876), by which a Brit. merchant ship is prevented from sailing if deemed unsafe by Board of Trade. All such vessels bear a *Plimsoll mark* on the sides (circle crossed by a line at the centre), below which she must not sink when loaded.

PLINLIMMON, PLYNLIMMON (52° 28′ N., 3° 47′ W.), mountain, Wales (2465 ft.).

PLINY.—(1) CAIUS PLINIUS SECUNDUS, called 'elder' (*c.* 23–79 A.D.), Rom. writer; b. in N. Italy; ed. Rome; served in German campaign under Pomponius; became pleader, but retired to estate at Novum Comum (modern Como) and devoted himself to literature; most prolific writer; besides many treatises wrote *History of German Wars*, and brought up to date *History of Rome* by Aufidius Bassus (31 books). His *Historia Naturalis* shows encyclopædic knowledge; though inexact scientifically, is of great use regarding nomenclature and popular contemporary ideas; shows more signs of painstaking compilation than of original research; procurator in Spain, 71; guardian of younger Pliny (*q.v.*); killed by eruption of Vesuvius. (2) **Pliny**, CAIUS PLINIUS CÆCILIUS SECUNDUS (61–*c.* 115 A.D.), called 'younger' in contradistinction to his uncle and father by adoption; b. Novum Comum; ed. in rhetoric under Quintilian; practised as pleader and endeavoured to check prevailing system of bribery and flattery; military tribune in Syria, 83; consul, 100; friend of Trajan and Tacitus; his correspondence with emperor, during his proprætorship of Bithynia (103–5), regarding treatment of Christians, indicates moderation and fairness; delicate in health; married twice; no issue. His *Letters*, in 10 books, are written in best Ciceronian style; chiefly valuable for glimpses of life of upper classes in Rome. During his year of consulship P. wrote panegyric on Trajan; it is strained in style, and is very much inferior to his letters.

PLIOCENE (Gk. *pleion*, 'more,' *kainos*, 'recent'), in geol. the uppermost division of the Cainozoic or Tertiary strata, which was divided by Sir Chas. Lyell into four groups: Eocene, Miocene; Older and Newer Pliocene (or Pleistocene). Each is characterised by a different proportion of fossilised remains of existing species. The P., sometimes referred to as the *Crag Period*, consists of irregular beds of sands and gravels of about 120 ft. thickness and is arranged as follows:—

Name.	Composed of
Cromer Forest Beds	Silts, clays, and sands.
Chillesford Beds	Sands and clays.
Norwich Crag	Gravels, sands, and loam.
Red Crag	Red shelly sands.
Lenham Beds	Sands.
St. Erth Beds	Clays and gravels well seen near St. Erth, Cornwall, and consisting of coralline crag shells, sands, and clays.

Life of the P. period included *Flora*—ivy, maple, elm, mangolia, laurel, beech, poplar, and lime trees; and *Fauna*—mastodons, elephants, rhinoceri, horses, giraffes, bears, apes.

PLOCEIDÆ, Weaver Birds (*q.v.*).

PLOCK, PLOTSK.—(1) (*c.* 52° 50′ N., 20° 50′ E.) province, Russ. Poland; area, 3641 sq. miles; drained by Vistula and tributaries; produces grain. Pop. (1910) 700,000. (2) (52° 45′ N., 19° 40′ E.) town, capital of above, on Vistula; exports grain. Pop. (1910) 30,960.

PLOËRMEL (47° 55′ N., 2° 23′ W.), town, capital, Morbihan, France; slate quarries; trade in cloth. Pop. (commune) 9600.

PLOESCI, PLOYESHTI (44° 56′ N., 26° 14′ E.), town, capital Prahova, Rumania; petroleum refineries. Pop. (1911) 49,256.

PLOMBIÈRES (47° 58′ N., 6° 30′ E.), watering-place, department Vosges, France; mineral springs.

PLÖN (54° 9′ N., 10° 25′ E.), town, Schleswig-Holstein, Prussia. Pop. 3800.

PLOTIDÆ, Snake Birds (*q.v.*).

PLOTINUS, see PLATO (NEO-PLATONISM).

PLOTSK, see PLOCK.

PLOUGH, the p. is an implement made entirely of iron, and consisting essentially of a *beam* to which are attached the *coulter*, a knife which makes the preliminary cut in the soil, the *share*, which separates the sod from the underlying soil, and the *mould-board*, which throws the sod over in such a way that its upper side is turned down. The beam is continued in front, and is used for attaching the horses; behind are the *stilts*, by which the ploughman guides the p. The p. is usually driven by a pair of horses, but *steam p's* are in use. The function of ploughing is to turn over

the sod and present a surface of free soil for sowing; at the same time it keeps the soil broken up and loose in texture.

PLOVER FAMILY (*Charadriidæ*).—The Plovers are in general small, graceful birds, with long legs, usually partially webbed feet, and often long bills. In habit they are mostly waders, seeking their food amongst the aquatic insects and larvæ, worms, and molluscs which frequent the shallows of sea or river. They have long, pointed wings, are excellent fliers, and are so given to migration that at one part of the year or another every land knows them. Most lay four spotted eggs in a simple nest or mere excavation on the ground. Of the 200 species known, eight are resident in, while twenty-five are regular and nineteen irregular visitors to, Britain. The true Plovers, with short bills and three or four toes, include the Golden Plover (*Charadrius*), the American Kill-Deer Plover (*Ægialitis*), a rare straggler to British shores, the Dottrels (*Endromias*), the crested Green Plovers (*Hoplopterus*), all with three toes, and the four-toed and crested Common Lapwing or Peewit (*Vanellus*).

The members of another group possess long bills and four toes, of which at least two are united by a web; such are the Long-Legged Plovers or Stilts (*Himantopus*) and the Avocet (*Recurvirostra*), both with exceedingly long legs, the latter with an up-curved 18-inch long bill, formerly a common Brit. visitor; the Curlews and Whimbrels (*Numenius*), with long down-curved bill; the thick-set short-legged Oyster-Catchers or Sea-Pies (*Hæmatopus*); the Sandpipers, with short, straight, hard-tipped beak, including the Common Sandpiper (*Totanus*), and the Ruff (*T. pugnax*), noted for its courtship dances, and so called on account of the collar of feathers assumed by the male during the breeding season.

In another section of the family all the toes are quite free to the base, no trace of webbing being present. Here are classed the short-billed Turnstones (*Strepsilas*), so called from their habit of overturning stones on the seashore for the sake of the sand-hoppers lurking beneath; the long, slender-billed Woodcock (*Scolopax*) and Snipe (*Gallinago*), both of which may be reckoned as residents in the Brit. Isles as well as winter visitors from Scandanavia, the former particularly interesting on account of its peculiar grave aspect, the eyes being set far back in the head, its extraordinarily sensitive bill, and its habit of carrying the young; the latter on account of the 'drumming' sound caused by the vibration of the tail feathers of the male as it drops to earth. Both form a simple nest, that of the Woodcock being lined with dead leaves.

PLÜCKER, JULIUS (1801–68), Ger. mathematician and physicist; b. Elberfeld; ed. Bonn, Heidelberg, Berlin, and Paris. Prof. of Math's, Halle (1834), Bonn (1836–47); prof. of Physics, Bonn (1847–68). His mathematical researches were entirely geometrical; physical researches included discovery of magnecrystallic action, properties of magnetic and diamagnetic bodies, and spectroscopy of gases.

PLUM (*Prunus domestica*), a Rosaceous tree cultivated for its fruit, and growing best on a somewhat calcareous, well-drained soil. The fruit is known technically as a drupe, and consists of a seed (kernel) enclosed by a stony endocarp, a juicy mesocarp, and a membranous epicarp.

PLUMBAGO, see CARBON, GRAPHITE.

PLUMULARIA, see under HYDROMEDUSÆ.

PLUNKET, OLIVER (1629–81), R.C. abp. of Armagh, 1669; executed at Tyburn, July 11.

PLUNKET, WILLIAM CONYNGHAM PLUNKET, 1ST BARON (1764–1854), Irish lawyer; b. Enniskillen. Graduated at Dublin, and called to the Bar; K.C., 1797; sat in Irish Parliament; Solicitor-Gen. and Attorney-Gen. for Ireland in Eng. ministry, 1803–5; eloquent Prot. advocate of Catholic Emancipation; peer and chief justice, 1827; Lord Chancellor of Ireland, 1830–41.

PLUNKETT, SIR HORACE CURZON (1854–), Irish politician; promoted Agricultural Co-operative movement in Ireland; founded Irish Agricultural Organisation Soc., 1894; vice-pres. of new Irish Agricultural Council, 1899–1907, when he was forced to retire by Nationalist party; author of several works on Irish economic problems.

PLURALISM, philosophical doctrine that reality consists of plurality of beings.

PLUTARCH, PLOUTARCHOS (*c.* 46–120 A.D.), Gk. biographer; b. Chæronea, Bœotia; ed. Athens; lectured on philosophy in Rome; honoured by Trajan with consular rank, by Hadrian with procuratorship of Greece. P.'s best-known work is his *Parallel Lives*, in which he gives, side by side, biographies of celebrated Greeks and Romans, similar in character or circumstance, *e.g.* the lives of Alexander the Great and Cæsar form one book. Four single lives are appended. This work shows evidences of wide knowledge and painstaking research; facts are generally accurate; of great value to posterity. Besides this, some sixty essays on various themes (such as *On the Education of Children, On the Genius of Socrates*) are grouped under title of *Opera Moralia*.

P. belonged to no school of philosophy, but was an independent thinker. His knowledge of literature was tremendous, as may be seen from numerous quotations in *Moralia*. His style is cumbrous and involved.

Edition of *Moralia* by Wyttenbach (*q.v.*) is still classic. Langhorne's translation of *Lives* is most popular.

PLUTO, HADES (classical myth.), god of underworld; s. of Cronos; bro. of Zeus and Poseidon, with whom he divided the world; called Hades in early times—'the invisible' or 'the all-embracing'—while *ploutōn* merely meant 'wealthy' (hence Lat. variant *Dis*); P. carried off Persephone, dau. of Demeter; judge of the dead; worshipped especially at Elis.

PLUTO MONKEY, see under CERCOPITHECIDÆ.

PLYMOUTH (50° 22′ N., 4° 9′ W.), seaport, naval station, municipal, parliamentary, and county borough, Devonshire; situated at head of P. Sound, between estuaries of Plym and Tamar; connected with Stonehouse and Devonport, and constitutes with them the 'Three Towns.' Few traces of antiquity are left except citadel; town is well built, with many fine structures, including Guildhall, Municipal Buildings, Museum, Charles Church, St. Andrew's, R.C. Cathedral, and many educational establishments; on Hoe is statue of Drake, monument in memory of Armada, and tower of Smeaton's lighthouse. At Stonehouse are Marine Barracks, Naval Victualling Yard, and Naval Hospital; Devonport contains important dockyards; 'Three Towns' are protected by line of fortifications. Shipbuilding and fishing are chief industries; manufactures chemicals.

P. took prominent part in history; Pilgrim Fathers left here for America, 1620; among many famous men connected with town are Drake, Raleigh, Hawkins, and Grenville. Pop. (1911) 112,042.

PLYMOUTH (41° 14′ N., 76° W.), town, on Susquehanna, Pennsylvania, U.S.A.; coal mines. Pop. (1910) 16,996.

PLYMOUTH (41° 54′ N., 70° 53′ W.), township; county-seat of Plymouth county, Massachusetts, U.S.A., on Plymouth Bay; has good harbour, town hall, court-house, Pilgrim Hall (containing relics of Pilgrim Fathers), and National Monument; celebrated as landing-place of Pilgrim Fathers (1620); first permanent settlement in New England. Manufactures include woollen goods, silks, cordage, and rubber goods. Pop. (1910) 12,141.

PLYMOUTH BRETHREN, Christian sect founded by Rev. J. N. Darby (1800–82) in 1830; Darby founded congregations in Switzerland, France, elsewhere on Continent, and in England; but several schisms took place in Eng. congregations, and now the sect is in six divisions. P. B. object to an official ministry and regard infant baptism as non-essential.

PLYMPTON (50° 23′ N., 4° 2′ W.), town, Devonshire, England, including villages of P. St. Mary and P. Earle; stannary town; has ruined castle and monastery; Reynolds' birthplace. Pop. 4990.

PLYNLIMMON, see PLINLIMMON.

PNEUMATIC DISPATCH, transport of written documents through tubes by compressed air or vacuum. Chiefly used in post offices and for transmitting telegrams from central to suburban offices, or from one department to another in same building. The conveying pipe is of lead, about 1½ inches to 3 inches in diameter, and the dispatches are contained in a case of rubber. Behind this, compressed air is admitted and a velocity of 25 miles per hour has been attained. P. D. was introduced in 1858 by Clark, who laid tube between International Telegraph Co.'s offices and London Stock Exchange. There are now *c.* 60 miles of p. tubes in England, 40 miles being in London.

PNEUMATIC GUN, a gun which under pressure of expansive force of air discharges heavy explosives, or even projectiles loaded with high explosives.

PNEUMATIC SCHOOL, see MEDICINE.

PNEUMATIC TYRE, see TYRE.

PNEUMATOLYSIS, the effects produced on masses of rock by the discharge of certain vapours from igneous rocks. Such vapours include carbonic acid, hydrogen, nitrogen, hydrochloric acid, and fluorine. P. is generally found most active in lava flows, and in such its action continues long after an eruption.

PNEUMATOMACHI (Gk. *Pneumatomachoi*, Strivers against the Spirit), sect of IV. and V. cent's which denied divinity of the Holy Spirit.

PNEUMOCOCCUS, see PARASITIC DISEASES.

PNEUMONIA, inflammation of the lung tissue proper, due to specific micro-organisms, occurs in two forms, termed, according to the distribution of inflammation, lobar or croupous pneumonia and lobular or broncho-pneumonia. In ACUTE LOBAR or CROUPOUS PNEUMONIA the changes in the lung may be regarded as in three stages—*congestion*, in which the blood-vessels are much distended, but with the air-cells still containing air; *red hepatisation*, in which the air-cells are filled with a fibrinous exudate with blood corpuscles and epithelial cells, which coagulates, consolidating the lung; *grey hepatisation*, in which resolution changes take place in the exudate, which eventually becomes absorbed.

The onset of an attack is sudden, there is headache and rigor, the temperature rising to 103° or 104°. The face is flushed, and there is often herpes at the mouth. There is pain at the affected side, a short cough, rapid, shallow breathing, soon accompanied by rusty-coloured tenacious sputum, and the urine is scanty and high coloured. The ratio of pulse to respiration is 2 to 1 instead of the normal 4 to 1. Characteristic physical signs can be made out on examination by a physician. About the 7th or 8th day the fever terminates by crisis, falling to normal in a few hours, accompanied by perspiration, and there is general improvement, the pulse and respiration becoming normal. The treatment of acute lobar p. is absolute rest, plenty of fresh air, ice poultices over the chest to relieve pain, and to support the patient's strength by milk, soups, and similar light nourishment. Stimulants, of which strychnine and digitalis are the best, may be given if required. Sleeplessness is relieved by removing the cause if possible (*e.g.* pain or high fever), or hypnotic drugs—trional, paraldehyde, or, in the early stages, opium—may be administered by the physician. A vaccine treatment has been employed with some success.

ACUTE LOBULAR or BRONCHO-PNEUMONIA comes on more gradually than the lobar form and runs a different course, while it is due to catarrhal inflammation of the small bronchi spreading to the neighbouring air-cells. The fever is remittent, there is cough, difficulty in breathing, and a frothy sputum. The pulse is rapid, but pulse-respiration ratio is not altered to the extent it is in lobar p., while the physical signs, which can, of course, only be made out on careful and skilled examination by a physician, differ widely from those of the lobar type. An attack is very frequently secondary to an acute infection (*e.g.* measles, typhoid fever), or chronic debilitating conditions (*e.g.* chronic heart disease or Bright's disease). The treatment is practically the same as in lobar p., but stimulants are given from the beginning, while a steam tent for children, or opium, in the form of Dover's powder, are valuable for relieving the pain. Coughing may be very distressing, and may have to be relieved by stimulating expectorants or emetics.

CHRONIC INTERSTITIAL PNEUMONIA is a rare condition, consisting in a localised or diffuse increase of the fibrous tissue of the lung, occurring in connection with occupations in which dust is habitually inhaled (*e.g.* coal-miners, stone-masons, millers, jute workers) or after syphilis or repeated attacks of pleurisy. The symptoms resemble those of chronic phthisis, with progressive weakness and deficient expansion of the affected side, and the diagnosis is difficult. It is treated by respiratory exercises for the better expansion of the lung, painting iodine on the chest as a counter-irritant, and administration of potassium iodide.

PNOM-PENH (11° 40′ N., 104° 40′ E.), town, capital Cambodia, Fr. Indo-China, on Mekong; exports rice. Pop. 54,621.

PO (44° 55′ N., 12° 28′ E.), river, Italy; rises in Monte Viso; flows N.E. and E., through Piedmont and Lombardy, and enters Adriatic by numerous mouths; length over 400 miles; navigable from Casale Monferrato; chief tributaries, Dora Riparia, Ticino, Addo, Oglio, Sesia, Tanara.

POACHING, see GAME LAWS.

POCAHONTAS, see under INDIANS, RED.

POCHARD, see under DUCK FAMILY.

POCKET GOPHERS, POUCHED RATS (*Geomys* and *Thomomys*), small Rodents with cheek-pouches, lined with hair, opening on the cheek outside the mouth. In this respect they resemble the POCKET MICE (*Perognathus*) and KANGAROO RAT (*Dipodomys*), and all are American; but while the Gophers always live underground, the others are found on the surface.

POCOCK, SIR GEORGE (1706–92), Brit. admiral; nephew of George Byng; commander in the East Indies from 1757 to 1760; took Havana after protracted siege, 1762.

POCOCKE, EDWARD (1604–91), Eng. Orientalist, of remarkable erudition; chiefly distinguished for his works on Arabic subjects; first holder of Laud's Arabic Chair at Oxford (founded 1636).

PODESTA (Lat. *potestas*, power), Ital. official whose functions may range from the judicial to the supreme administrative and military.

PODGORITZA, PODGORICA (42° 27′ N., 19° 23′ E.), town, Montenegro, on Moraca; active trade; near remains of ancient Dioclea. Pop. 10,000.

PODICIPEDIDÆ, Grebes (*q.v.*).

PODIEBRAD, GEORGE OF (1420–71), king of Bohemia; as head of nationalists captured Prague from empire, 1448; app. regent of Bohemia, 1451; was prominent reformer and faced by enmity of pope; elected king, 1458; d. during imperial invasion aided by Catholics; national hero.

PODOLIA, one of most fertile of Russ. governments; situated in S.W. Russia. Area, *c.* 16,240 sq. miles; capital, Kamenetz-Podolsk; drained by Dniester and Bug. Pop. (1910) 3,743,700.

PODOLSK (55° 25′ N., 37° 30′ E.), town, on Pakhra, Moscow, Russia; limestone quarries. Pop. 4000.

PODOPHYLLIN, drug, consisting of a resin in yellowish-brown powder obtained from the root, or the powdered root itself, of the Amer. May-apple (*Podophyllum peltatum*) of natural order *Berberidaceæ*, with a bitter taste and disagreeable smell; used medicinally as a biliary stimulant and purgative, particularly in disorders of the liver.

PODOSTOMATA, see PYCNOGONIDA.

POE, EDGAR ALLAN (1809–49), Amer. writer;

b. Boston; s. of Eng. actress and an Amer. actor; adopted by rich merchant, John Allan; sent to Virginia University; left to his own resources, owing to dissipation; of indulgent and reckless habits, which reduced him to abject poverty. His weird and fantastic genius found lasting expression in his *Poems* and the *Tales of Mystery and Imagination.*

POERIO, ALESSANDRO (1802–48), Ital. patriot and poet; killed in battle for the liberation of Venice. His poems, often reprinted, contain some rousing songs of freedom.

POETRY.—Perhaps no definition has occasioned so much controversy and given so little satisfaction as the definition of poetry. Critics usually muster round one of two opposing standards. They accept as a view-point either form or content, and between such diametrically opposed bases of criticism there can be no agreement. The Gk. tendency was to regard the matter or content as of prior importance, and this view is upheld by Aristotle in his *Poetics*, a magnificent treatise on the art of p. The Romans, on the other hand, tended to regard p. as a mechanic art, and the *Ars Poetica* of Horace is mainly devoted to points affecting metre and *diction.* The Fr. school was for long trammelled by formalism, as is well illustrated by Boileau's treatise on Poetics. But no true understanding of p. can be reached until form and content are regarded as complementary and not independent.

There are certain qualities that are characteristic of the highest p. when regarded from the point of view of subject-matter, and among these the qualities of elevation and expansion stand conspicuous. Elevation is exhibited in divers ways, in sublime thoughts, sublime actions, and sublime forms. Expansion is manifest in wider sympathies, ecstatic emotions, and subliminal feeling. These characteristics explain why it is that imagination and symbolism are such potent factors in p.; they are gates to elevation and expansion. Thus, too, are the religious, philosophic, and metaphysical tendencies of p. explained. From the standpoint of form there are many adventitious accompaniments of p., but only one essential, and that is recurrent *rhythm.* There are, indeed, prosodists who insist that metre is essential to p., but such a view would exclude the whole of Hebrew p., the whole of Teutonic p. (Old German, Old English, and Icelandic), and much modern p. classified as *vers libre.* The rhythm in p. is marked in various ways. It may be restricted and systematised to form metre, or it may be given a loose rein and only marked by such devices as alliteration, parallelism, repetition, and rhyme.

The evolution of the various species of p. is best studied from the history of Gk. lit., because the lit. of Greece was a natural and independent growth, uninfluenced by extraneous models. P. in its embryonic state arises from religious worship, veneration of heroes, and instruction in conduct. This stage precedes the *ballad* stage, at which the veneration of heroes has reached a high degree of development. Succeeding the ballad stage is the age of the *epic*, where the various heroic ballads are woven into a unity round one central idea. Thus, the central idea of the *Iliad* is the wrath of Achilles, round which are gathered the exploits of the heroes who fought at Troy. The central idea of the *Odyssey*, the other great epic of Greece, is the return of Odysseus, and by this central idea are unified the many adventures of the hero. *Didactic* p. rises out of the old instruction verses. Thus Hesiod's great poem, *Works and Days*, is based on old charms and old proverbs relating to man's conduct and work. So far p. has been purely objective in character; subjectivity and analysis of emotion belong to an advanced state of culture. Thus, *lyric*, a highly subjective form of verse, is posterior to the epic, and its complexity of thought has its counterpart in the complexity of the metrical scheme. Last of all is evolved the *drama*, with its balance of subjectivity and objectivity, of psychology and action.

There is a conspicuous difference between classical and modern **prosody.** Ancient metre is based on *quantity*, and modern metre is based on *accent. Metre* is thus the grouping of longs and shorts or the grouping of accented and unaccented syllables. Accent did, indeed, play some part in ancient prosody, but it was subsidiary. Normally a long is equivalent to two shorts, and thus the *dactyl* (–◡◡) and *anapæst* (◡◡–) are balanced feet. Other balanced feet are the *spondee* (––) and the *pyrrhic* (◡◡), but these are incapable of forming a metre themselves, and must occur in combination with other species of feet. The feet which occur most frequently are the *iamb* (◡–) and the *trochee* (–◡), in which the proportion is 1 : 2 and 2 : 1 respectively.

In ascending **rhythms** the light syllable or syllables come first; in descending rhythms the heavy syllable comes first. Thus the rhythm of the iambic and anapæstic foot is ascending, and the rhythm of the trochee and dactyl is descending. Ascending rhythms are more stately than descending rhythms.

There are besides these a number of complex feet, e.g. *bacchius* (◡––), *choriamb* (–◡◡–), etc., but these are probably the invention of the later grammarians, and all classical metres can be analysed into spondees, iambs, dactyls, and anapæsts. Ancient epic was couched in the dactylic hexameter, which admitted spondees in all feet except the fifth. The *elegiac verse* was the next metre which was evolved. It consists of a hexameter followed by a pentameter or interrupted hexameter. It is thus admirably suited for the expression of meditation. Moreover, it is a miniature stanza, and thus heralds the elaborate stanzaic lyrics of later development. The dialogue of drama shows a preponderance of the iambic foot (the foot which occurs most frequently in ordinary speech). The chorus and other meditative portions are expressed in the more intricate metres.

In the transition period, when the quantitative system was fast disappearing, and the accentual system was gradually forming, rhyme was invented. **Rhyme** thus served as an indicator to separate lines which could no longer be distinguished by quantity and could not yet be distinguished by accent. In the hands of the Provençal poets the rhyming schemes became very elaborate, as was natural in a language so rich in rhymes. The Fr. poetry of a later development was governed by a rigid formalism, and the laws formulated by Boileau shackled Fr. verse until the emancipation of recent years. Old English p. was a system of verses or lines, with a strong middle *cæsura*, each section of the line having two stressed syllables and of these four stressed syllables three were alliterated. In Orm's *Ormulum* and Layamon's *Brut* we see this Old English tradition yielding to rhyme and metre. In the first decade of the XIII. cent. the Old English system disappeared, but in 1340 there was a revival of the native verse, and the greatest poet of the revival was Langland. Eng. p. then became shattered by the Fr. system of syllabic uniformity. Chaucer, however, released Eng. p. from bondage, and his work was completed by Spenser and Shakespeare.

Descriptive Poetry.—Species in which the primary object is to paint the appearance of inanimate nature and the elements. Its appeal is limited, since it lacks the fervour of the lyric form, and the link with humanity which makes didactic poetry attractive. The highest achievement in this kind in Eng. poetry is *The Seasons* of James Thomson (*q.v.*). Much of the verse of Wordsworth and Burns is also descriptive.

Didactic Poetry.—Name given to that kind of verse which is of an instructive or moral character. Amongst Gk. authors it is represented by the works of Hesiod, Nicander, and Empedocles; amongst the Latins by Lucretius and Vergil's *Georgics.* In French, examples are Boileau's *Art Poétique* and *Epistles*; in

German the writings of J. P. Uz and J. J. Dusch. In Eng. poetry Langland's *Piers Plowman* is a didactic allegory, and other early works come under the definition in a minor degree. Tusser's *Hundred Pointes of Good Husbandrie* (1557) is a notable example of its class. The *Botanic Garden* of Erasmus Darwin (1731–1802) comes under the category, while the poetry of Pope, Gay, James Thomson, Crabbe, Cowper, and Wordsworth is to a large extent didactic.

Pastoral (Lat. *pastor*, a shepherd).—The pastoral as a form of lit. includes poems, plays, operas, etc., dealing (generally artificially and often allegorically) with the joys and sorrows of shepherds and shepherdesses, or country life in general. It is derived from Gk. *idylls* (*e.g.* Theocritus) and Latin *eclogues* (Vergil's *Bucolics*); was revived at Renaissance and became popular in Italy (Sannazaro's *Arcadia*, Tasso's *Aminta*, Guarini's *Pastor Fido*, etc.), France (d'Urfé's *Astrée*), Spain (Cervantes' *Galatea*), and Britain. Among finest Eng. p's may be cited Spenser's *Shepherd's Calendar*, Sidney's *Arcadia*, Fletcher's *Faithful Shepherdess*, Jonson's *Sad Shepherd*: those of Herrick and other XVII.-cent. lyrists; Pope's *Pastorals*, Gay's *Shepherd's Week*, Ramsay's *Gentle Shepherd*. Since XVIII. cent. p. is practically obsolete, country scenes now being described by poets and others in more natural realistic fashion. In elegies, however, and kindred compositions, a pastoral element is still sometimes introduced.

Greg, *Pastoral Poetry* (1906).

POGGENDORF, JOHANN CHRISTIAN (1796–1877), Ger. physicist; b. Hamburg; apothecary's assistant; prof. of Physics at Berlin; made valuable discoveries in electricity.

POGGIO BRACCIOLINI (1380–1459), Ital. scholar; b. Terranova, Florence; studied Latin under John of Ravenna; visited numerous convents in Europe in search of classical MSS., and recovered Quintilian, Lucretius, Silius Italicus, Vitruvius, etc.; published a famous *Liber Facetiarum*, a collection of jests and anecdotes particularly directed against monastic life, and written in Latin of doubtful excellence.

POGLIZZA (43° 30′ N., 16° 45′ E.), mountainous region, Dalmatia, Austria; formerly seat of a small republic.

POIANA, a carnivore; see under CIVET FAMILY.

POINCARÉ, RAYMOND (1860–), Pres. of Fr. Republic; b. Bar-le-Duc; studied law with success; deputy at 27; Minister of Public Instruction, 1893, 1895; Minister of Finance, 1894, and again in 1906; elected Vice-Pres. of Chamber of Deputies; Senator, 1903; Premier and Minister for Foreign Affairs, 1911–13; elected Pres., 1913 (first election of premier in power); m. Henriette Benucci. During Balkan crisis came to fore as excellent and far-seeing diplomatist; clever writer; author of *Études et figures politiques* and *Causes littéraires et artistiques*; member of Académie Française, 1909. His bro., **Jules Henri** (1854–1912), was a distinguished physicist and astronomer, chevalier of the Legion of Honour, and author of *Les Méthodes nouvelles de la méchanique céleste*; another brother, **Lucien** (1862–), became inspector-general of public instruction, 1902.

POINT DE GALLE, see GALLE.

POINT PLEASANT (38° 49′ N., 82° W.), town, capital of Mason County, on Ohio River, W. Virginia, near mouth of Kanawha; here Virginians defeated Indians, 1774; coal and slate are mined in vicinity; manufactures bricks and tiles. Pop. (1910) 2045.

POISON, a substance which by internal or external use injures or destroys life; it may be local or general, acute or chronic; its effect may be modified by idiosyncrasy, and by habit (*e.g.* opium, arsenic, etc.).

SYMPTOMS include derangement of circulatory, nervous, muscular, and digestive systems; the latter often accompanied by stomachic pains, vomiting, diarrhœa.

TREATMENT embraces evacuation and cleansing of stomach, use of emetics (mustard, zinc sulphate, ipecacuanha), antidotes, etc.

Common Poisons (*treatment in brackets*).

(1) CORROSIVES—
- Corrosive sublimate (white of egg).
- Mineral acids and oxalic acid (chalk, lime-water).
- Caustic alkalies (dilute vinegar, olive oil).
- Carbolic acid (emetic—weak alkali, white of egg —keep warm).

(2) IRRITANTS—
- Arsenic (emetic—freshly precipitated ferric hydroxide—white of egg).
- Phosphorus (emetic—Fr. turpentine).
- Lead salts (emetic—Epsom salts).
- Copper salts (white of egg).

(3) NEUROTICS—
- Prussic acid, and the cyanides (emetic—artificial respiration).
- Opium and morphine (emetic—atropine subcutaneously—artificial respiration).
- Strychnine (emetic—chloroform or chloral).

(4) GASEOUS POISONS—
- Chlorine, sulphur dioxide, oxides of nitrogen, ammonia, carbon monoxide, carbon dioxide, coal gas, hydrogen sulphide, chloroform vapour (plentiful respiration of air or oxygen).

(5) MICRO-ORGANIC POISONS—
- Ptomaines, toxines.

The evidence of poisoning in a dead body depends upon the characteristic post-mortem appearances which certain poisons, *e.g.* corrosives, cause in the alimentary canal and elsewhere; upon the results of the chemical analysis of the contents of the stomach and bowels and of other tissues; and upon the results of experiments upon animals with the substances obtained from the stomach, bowels, and other tissues, or with the suspected food, when more conclusive evidence is difficult to obtain.

There are certain circumstances which point to a case of poisoning, and upon which the evidence of poisoning in a living person largely depends: the suddenness of the onset of symptoms (although violent symptoms may come on very suddenly in certain diseases, *e.g.* apoplexy), the fact that the symptoms usually follow the taking of food or drink, the finding of poison in the remains of food or drink, or in vomited matter from the affected person, suspicious conduct of individuals with easy access to the affected person, *e.g.* nurse or relatives.

It is a felony to administer a poison or other destructive thing with intent to murder, or in order to overcome or stupefy a person for the purpose of committing an indictable offence, and a misdemeanour to administer a poison or other noxious thing with the purpose of injuring or annoying a person. Registered chemists and druggists, pharmaceutical chemists, or legally qualified apothecaries, veterinary surgeons, or dealers in patent medicines are alone permitted by law to sell or dispense poisons. By the Pharmacy Acts of 1868 and 1908, two groups of poisons are scheduled; those in Part. I. are only allowed to be sold to persons known to, or introduced by persons known to, the seller, and the quantity of the poison sold, the purpose for which it is to be used, with the date and the name and address of the purchaser, must be entered in a register kept for the purpose; the name of the article, the word 'Poison,' and the name and address of the seller must be affixed to the box containing the poison. For those poisons included in Part II. no entry in the register is required, but on the box containing any of them must be affixed the name of the article, the word 'Poison,' and the name and address of the seller.

POISSON, SIMEON DENIS (1781–1840), Fr. mathematician; b. Pithiviers, Loiret; entered École Polytechnique, Paris, 1798, where he studied math's under Lagrange: became prof. there (1806), succeeding J. Fourier. Author of many important

works on mathematics and mathematical physics, including various memoirs on celestial mechanics, theory of attraction, and especially the theory of electricity and magnetism; wrote *Traité de mécanique*, and *Théorie mathématique de la chaleur*.

POISSY, ancient *Pinciacum* (48° 56′ N., 2° 1′ E.), town, Seine-et-Oise, France, on Seine; distilleries. Pop. 8000.

POISSY, COLLOQUY OF (1561), summoned by Catherine de' Medici to arrange service in which Catholics and Huguenots might join; utterly failed, and increased religious bitterness.

POITIERS (46° 34′ N., 0° 22′ E.), town, Vienne, France; gave name to countship from VIII. to XV. cent.; scene of battle, 1356, in which the Black Prince defeated King John II. of France; in later times it became a Huguenot stronghold. P. is an episcopal see, and has a fine Transitional cathedral dating from XII. cent.; other interesting old churches are those dedicated to St. Radegonde, St. Jean, and St. Hilaire. Fine public buildings are the Palais de Justice, formerly a ducal palace, and the Hôtel de Ville; seat of univ., founded 1431; has numerous educational establishments, fine library, museums, and several learned associations. Rom. remains include baths, amphitheatre, etc. Pop. (1911) 41,242.

POITOU (46° 30′ N., 0° 30′ W.), ancient province, France (capital, Poitiers); now included chiefly in Vienne, Deux-Sèvres, and Vendée.

POKER, card-game of Amer. origin, played without partners; player on dealer's left puts in stake, the *ante*, double of which must be put in by those who wish to play. Five cards are dealt, and players have option of discarding any or all their cards, and drawing a like number from the pack, in order to form combinations, which rank as follows: pair, two pairs, three of a kind, straight (sequence, irrespective of suit), flush (all of one suit), full house (threes and a pair), straight flush (sequence of one suit), royal flush (straight flush headed by ace). Players bet against each other; there is a great deal of 'bluff.' The joker is sometimes used.

POLA (44° 52′ N., 13° 50′ E.), seaport, principal naval station, and important commercial centre of Austria-Hungary, in peninsula of Istria; possesses remarkably fine harbour, defended by fortifications. Among notable features are famous Rom. remains, Cathedral (XV. cent.), Franciscan Convent (XIII. cent.), and town hall (XIV. cent.). Pop. (1910) 70,499.

POLAND, former country of Europe, now included in dominions of Russia, Austria, and Germany. In early times P. was inhabited by several Slavonic tribes, among which the Poliani attained pre-eminence. P. first appears as an important state about the X. cent., records previous to this date being so interspersed with legend as to have little hist. value. In reign of Mieczylaw, or Mieszko I., Christianity was introduced, and the suzerainty of the Emperor Otho was acknowledged; Mieczylaw was succeeded in 992 by his son, BOLESLAS I., under whom the country became a united state; Boleslas greatly increased his dominions by various conquests, and was recognised as king by Emperor Otho III. After his death in 1025 a time of disorder ensued, ending with the accession of his son Casimir in 1040; in Casimir's reign a great number of foreign ecclesiastics settled in the country; he died in 1058, when his s., BOLESLAS II., became king. Boleslas succeeded, in the course of a brilliant military career, in regaining Silesia and other provinces which had been lost in the years following the death of Boleslas I.; in 1079 he quarrelled with and killed Stanislaus, bp. of Cracow, in consequence of which Gregory VII. laid him under papal interdict and absolved his subjects from their homage and fealty; his subsequent flight to Hungary was followed by his death in 1081, when his bro. Wladislaus assumed control, though he had to content himself with only a ducal title, the country continuing as a duchy for over two cent's from this time.

Under BOLESLAS III. (1102–39) the Prussians were defeated, and Pomerania incorporated in Polish dominions; he encouraged Christianity, in which he was supported by Otho, bp. of Bamberg. After his death Silesia was practically severed from P. in the division of his dominions among his sons; under CASIMIR II. (1177–94) all the various parts except Silesia were reunited, and a constitution was framed; he died in 1194, when the succession was disputed and the country again subdivided, while Pomerania established its independence. About this time there occurred war against the Prussians, and afterwards against the TEUTONIC KNIGHTS, who seized various territories in Lithuania and Podlachia and settled there. In 1241 occurred an invasion of Mongols, who inflicted severe defeat on Poles at *Liegnitz*, but soon afterwards left the country. Various regions were transferred to Brandenburg during this period, and in reign of BOLESLAS V. (1242–79) numbers of Jews and Germans established themselves in P.

Under WLADISLAUS I., *Lokietek* (1305–33), P. was again united and various reforms were carried out; kingly title was revived in 1320, when Wladislaus was crowned with consent of pope; and successful war was waged against the Teutonic Knights. Wladislaus was succeeded in 1333 by his son, CASIMIR III., under whom further reforms were inaugurated, while the country became once more a prosperous and powerful state; wars were waged against Tartars, Lithuanians, and Wallachians, and Galicia was annexed to P.; with Casimir's death in 1370 the *Piast* dynasty came to an end, after having ruled for over five cent's. He was succeeded by his nephew, Louis the Great of Hungary, who died without male issue in 1382; his dau., JADWIGA, became queen in 1383, and in 1386 married JAGIELLO, Grand-Duke of Lithuania, thus uniting Lithuania and P. (which, however, were again separated in following reign), and founding the *Jagiellan* dynasty. Jagiello reigned as WLADISLAUS II.; he encouraged Christianity, and defeated Teutonic Knights at *Grünewald*, 1410; he was succeeded in 1434 by his son, WLADISLAUS III., who was elected to Hungarian throne, and was killed at *Varna* in 1444. CASIMIR IV. then became king, again uniting Lithuania and Poland; he obtained West Prussia and suzerainty over Prussia proper from Teutonic Knights by Treaty of Thorn, 1466. After his death in 1492 three of his sons reigned in succession. Under John Albert and Alexander, the Polish Diet became increasingly powerful, and Lithuania was more firmly united to P.

Under SIGISMUND I. (1506–48) and his son, SIGISMUND II. (1548–72), P. may be said to have reached its apogee; former defeated Wallachians, and acquired suzerainty over Moldavia, but lost Smolensk to Basil of Russia; he opposed Reformation, which, however, spread greatly in country under Sigismund II.; the latter captured Livonia from Knights Sword-Bearers; under him Lithuania and P. were inseparably united, and the state of which Warsaw now became capital was one of most powerful in Europe. With his death the Jagiellan dynasty ended, and monarchy was made elective. Henry of Valois was first king elected, but he presently gave up his claim on becoming king, as Henry III., of France, and was succeeded in Poland by STEPHEN BATHORI (1575–86), who waged war against, and defeated, Ivan IV. of Russia, and subdued the Ukraine Cossacks; in his reign numbers of Jesuits settled in country, and gradual decline of Reformed religion began. His successor, SIGISMUND III. (1586–1633), was son of John of Sweden; he persecuted Protestants, and formed alliance with Sweden, but failed to establish his claim to Swed. crown. His sons, WLADISLAUS IV. (1632–48) and JOHN CASIMIR (1648–68), warred against Sweden, Russia, and Turkey; in 1655 P. was invaded by Charles X. of Sweden, who took Cracow and Warsaw and compelled John Casimir to fly to Silesia; in 1657 Brandenburg succeeded in throwing off the Polish yoke, and in 1668 the king abdicated.

His successor, MICHAEL WISNIOWIECKI (1669–73), warred against Turks, who were eventually defeated by John Sobieski. At Michael's death JOHN SOBIESKI was elected king; he gained brilliant victory over Turks at *Vienna*, 1683, but his reign was disturbed by quarrels among nobles. After his death in 1696, Elector Frederick Augustus of Saxony became king as AUGUSTUS II.; he regained Ukraine from Turks; made treaty with Russia, and warred against Charles XII. of Sweden, who secured his deposition and election of STANISLAUS LESZCZYNSKI to Polish throne; but after Charles's defeat at *Pultowa* in 1709, Augustus was reinstated; his reign is also marked by persecution of Protestants and by beginnings of Polish dependence on Russia; he died in 1733, when the election of his son, AUGUSTUS III., was secured by Russ. influence, which further increased during this reign. Augustus III. was succeeded by STANISLAUS AUGUSTUS PONIATOWSKI in 1764; in his reign various reforms which had been effected by the Czartoryscy party were repealed through Russ. influence, against which the patriotic insurrection known as Confederation of Bar was unsuccessfully directed in 1768; in 1772 occurred the FIRST PARTITION of P., at whose expense Russia, Austria, and Prussia then extended their dominions. Diet then made great effort to reform constitution and to make monarchy hereditary; Russia, however, interfered, and was joined by Prussia in invading P., and by a SECOND PARTITION in 1793 both these powers obtained further territories.

The Poles, led by KOSCIUSZKO, rose in rebellion in 1794, and the invaders were at first defeated, but were presently joined by Austria, whose support changed the aspect of war; patriots were finally defeated by the capture of Warsaw by the allies; and by the THIRD PARTITION, 1795, the rest of the country was divided among the three great powers, and P. as a separate political unit ceased to exist. In 1807 Napoleon created the *Duchy of Warsaw*, which, however, came to an end in 1813. In 1815 the distribution of P. was altered, and some of the central provinces were organised as a kingdom to be ruled by Tsar of Russia as an independent state; risings occurred in 1830, 1846, and 1863, all of which were put down; since the suppression of the insurrection of 1863 the new kingdom of P. has been deprived of its separate government, and has lost even nominal independence.

Language and Literature.—Polish language belongs to Slavonic group, and is flexible and highly synthetic. Early lit. includes a few ballads and proverbs in the vernacular, dating from pre-Christian times, and a number of Lat. chronicles of later date; to the XV. cent. belongs the *Historia Polonicæ* of Dlugloszi, while Laski, who compiled the old Polish laws, and the astronomer COPERNICUS, are among the great names of the early XVI. cent.

First great age of Polish lit. begins about 1548; chief poetic forms were then the idyll and satire, and the period is perhaps best represented by JAN KOCHANOVSKI (1530–84), who wrote a wonderful series of elegies called the *Treny*, and Szarzynski, who first composed sonnets in Polish tongue; while SKARGA (d. 1612) is a well-known rhetorical writer, the product of the Jesuit counter-Reformation which dominated the intellectual life of P. from the beginning of the XVII. cent. till about 1760. The *Jesuit* or *Macaronic period* produced few literary monuments of importance; artificiality was a leading characteristic of the writers of this time, many of whom mixed the Polish and Lat. languages in extraordinary fashion in their works; and the only literary exercise which flourished was eloquence. From about 1760 onwards Polish lit. shows influence of Fr. writers; the drama now became an important literary form, Boguslawski being the best-known dramatist of the time; poetry showed a tendency to lapse into the mere making of rhymes, though Krasicki's plays, satires, and other works, and Wegierski's satirical poems gained their authors some reputation.

Greatest literary epoch, known as the *romantic period*, dates from 1820–50; to this era belong MICKIEWICZ, the greatest national poet, whose *Romanticism*, *Pan Tadeusz*, *Wallenrod*, and other poems are marked by enthusiasm for popular superstitions; KRASINSKI, whose work is tinged with sadness; and SLOWACKI, whose chief quality is brilliance of diction, while influence of Shakespeare and Byron is plainly seen in his poems. The playwright Fredro also flourished at this time, and produced a number of excellent comedies. The *Ukraine* school includes Zaleski, who wrote lyrical poems, Malczewski, author of *Marya*, a popular poem, and other writers. Among modern novelists is SIENKIEWICZ, whose *Quo Vadis* and other novels have been translated into most European languages.

Szujski, *History of Poland* (1865–66); Morfill, *Poland* (1893) and *Early Slavonic Literature* (1883).

POLAND, RUSSIAN (*c.* 50° to 55° N., 17° 30′ to 24° E.), was established as a separate kingdom under Russ. Tsar in 1815, but was deprived of its separate constitution after the rebellion of 1830, when it became a province of Russia; and another rising in 1863 was suppressed with such severity that the last trace of independent nationality disappeared. The country was then divided into the existing provinces of Kalisz, Kielce, Lomza, Lublin, Piotrkow, Plock, Radom, Siedlce, Suwalki, and Warsaw; the Russ. language was enforced, and the estates of the nobles were given to the peasants. R. P. has an area of 49,018 sq. miles; surface generally is a rolling plain, with a hilly forested region in S.; watered by Vistula, with its great tributary Bug, and other streams; crossed by several canals. Chief towns are Warsaw (capital), Lodz, Sosnowice.

The government is incorporated in that of Russia. Education is in a backward condition; Warsaw is seat of Univ. The principal faith is Rom. Catholicism, but Jewish, Gk., and Prot. religions are also represented. R. P. produces cereals, potatoes, and other crops; large area under wood; horses, cattle, sheep, goats, and pigs raised; minerals include coal, iron, tin, zinc, sulphur, malachite; manufactures cottons, woollens, leather, sugar, spirits, beer, flour, chocolate, etc. Pop. (1910) 12,129,200.

POLAR LIGHTS, see AURORA BOREALIS AND AUSTRALIS.

POLAR REGIONS.—From the chronicle of Alfred the Great we learn that Othere and Wulfstan made voyages in the Arctic Ocean, probably round the north coast of Lapland, but their exact route cannot be determined. In the X. and XI. cent's Norsemen made various voyages of discovery in the Far North. In 1001 Eric 'the Red,' an Icelander, made a settlement on the west coast of Greenland. Cabot in 1497 discovered Newfoundland and Labrador, subsequently Gaspar Cortereal attained a lat. of 60° N. But Arctic expeditions were comparatively sporadic until the XVI. cent., when the minds of the adventurous were fired by the idea of a North-East or a North-West Passage in the rich countries of the East, for, according to current beliefs, America and Asia were a geographical unit. The original motive of Polar exploration was therefore commercial and not scientific, and the direction was not due N., but either N.E. or N.W. In 1553 Sir Hugh Willoughby, in search of the N.E. Passage, discovered Novaya Zemlya, but he and his party ultimately perished. In 1556 Stephen Burrough discovered the Kara Strait, and in 1580 the Yugor Strait was discovered by Pet and Jackman. In 1585 Davis discovered Davis Strait and attained a lat. of 72° 41′ N. Barents discovered Bear Island and Spitzbergen in 1596, and was the first European explorer to winter in the Arctic regions. In 1607 Henry Hudson (*q.v.*) touched Cape Hold and discovered Hakluyt Island. In 1610 he tried the N.W. Passage and discovered Hudson Strait. Hudson Bay he believed to be a part of the Pacific Ocean (this was refuted by Button in 1613). In 1615 Baffin found the outlet in Baffin Bay and recorded some invaluable

observations. On his return journey he discovered Jones Sound and Lancaster Sound. In 1631 Fox and James explored the coast of N. America and reached Peregrine Point in the Fox Channel. The quest was then abandoned for over a century.

Peter the Great gave an incentive to Russ. exploration, and in 1725 gave Bering the conduct of an exploring expedition. On reaching Kamchatka, Bering discovered that America and Asia were not continuous. In 1741 he crossed the Sea of Okhotsk and reached the northern coast of America, but died in Bering Island. Phipps sailed in 1773 to Spitzbergen and attained a lat. of 80° 48′ N. Subsequently Scoresby registered important geographical observations in San Mayen Island and the east coast of Greenland (1822).

In 1818 John Ross, with the *Isabella* and *Alexander*, set out to explore the regions discovered by Baffin and abandoned for over a century. In 1819 Parry, in command of the *Hecla* and *Griper*, located N. Devon, Cornwall and Bathurst Islands, and Cape Walker, and Banks Land. In 1821, commanding the *Fury* and *Hecla*, he sailed up Fox Channel and named the Fury and Hecla Straits. In 1829 Ross sailed up Regent Inlet to the Gulph of Boothia, which he named after Felix Booth, a distiller, who financed the expedition. J. C. Ross, his nephew, explored King William Land and discovered the North Magnetic Pole (1831).

In 1845 Franklin started on his ill-fated voyage. He sailed in command of the *Erebus* and the *Terror*, seeking a N.W. Passage, *via* Lancaster Sound and Bering Strait. The ships were last seen in Baffin's Bay. In 1848 the first of the many search expeditions was dispatched. In 1859 M'Clintock found traces of the expedition and a MS. recording the route of the vessels and the death of Franklin in June 1847, on King William Land. The crew of the *Erebus* and *Terror*, under Captain Crozier, had started for the Great Fish River, and their remains were found near Adelaide Peninsula by Dr. Rae. Dr. Hayes in 1831 reached a lat. of 81° 35′ at Cape Lieber. Captain Hall, with the *Polaris*, reached 82° 16′ lat. and named Polaris Bay. In 1875 the great Nares expedition started with the *Alert* and *Discovery*. The *Alert* wintered off Grinnell Land in a lat. of 82° 24′ N. The sledge party under Markham reached 83° 20′. Lockwood of the Greely expedition in 1881 reached Lockwood Island (83° 24′ N.), the Farthest North till the voyage of Nansen. There were 25 explorers in this expedition, of whom 18 perished.

Lieut. Peary in 1892 crossed the north of Greenland to Independence Bay. In 1893 Nansen started on his voyage in the *Fram*, which reached a lat. of 85° 57′, and Nansen on foot, reached a lat. of 86° 14′. In 1897 a balloon expedition, under André, Strindberg, and Fraenkel, perished in search of the North Pole. Captain Cagni in 1900 reached 86° 33′. (In 1903 Amundsen started on an expedition to survey the region of the North Magnetic Pole and accomplished the North-West Passage entirely by water, a feat not accomplished by M'Clure in 1850.)

The year 1909 witnessed the culminating event of N. Polar exploration. Lieut. Peary, in the *Roosevelt*, with six colleagues and a large party of Eskimos trained during his long sojourns in the Far North, taking 133 dogs and 19 sledges, started in 1908 for the Pole. His method of advance was original, and aimed at saving the strength of the leaders for the final stages. A pioneer party, lightly equipped, marched a day ahead and cleared the route for the main party. Companies at various stages returned with the empty sledges and exhausted followers. Prof. Marvin was drowned while crossing a big *lead*—the only fatality of the expedition. Peary hoisted the Amer. flag at the Pole on April 6, 1909. Dr. Cook alleged that he had gained the Pole a year before, and at first received due honour for it; but his proofs were discredited.

Antarctic Exploration.—The Antarctic region was not explored for centuries after the Arctic had been an object of research and adventure. The idea of a rich and wealthy southern continent was in the minds of the early southern explorers—an idea that was doomed to have a rude disillusioning. The pioneer of Antarctic exploration was Captain Cook, who reached a lat. of 71° 10′ S. in 1774. Cook discovered and named S. Georgia and the Sandwich group. In 1819 William Smith discovered the S. Shetlands. But the next great expedition was sent out by Russia under Fabian von Bellingshausen. He reached lat. 69° 53′ S. and named Peter I. Island. In 1823 Weddell reached lat. 74° 15′ S. In 1830 Biscoe discovered Biscoe Island and sighted Graham Land. In 1839 John Balleny named and discovered Balleny Islands. Dumont d'Urville's expedition (1838–40) discovered Zoinville Land, Louis Philippe Land, Adélie Land, and Côte Clairie.

In 1840 J. C. Ross's great expedition sailed to the south with the *Erebus* and *Terror*. To mark the British occupation Ross named the Possession Islands and Victoria Land, which he skirted from Cape North to Cape Crozier. He discovered the marvellous ice barrier which rises precipitously out of the sea to the height of 200 feet, and which was subsequently the base of the British and Norwegian expeditions. He named Mt. Erebus (12,922 ft.), and Mt. Terror (10,900 ft.), and located the S. Magnetic Pole (lat. 75° 5′ S., and long. 154° 8′ E.). Ross reached a lat. of 78° 9′ 30″. In 1898 Captain de Gerlache spent the winter within the Antarctic Circle, his ship, the *Belgica*, being ice-bound. This was the first winter sustained by man within the Circle. In 1898 C. E. Borchgrevink made an expedition to Victoria Land in the *Southern Cross*.

In 1901–4 the British National Antarctic expedition, led by Captain R. F. Scott in command of the *Discovery*, followed the Ross Barrier eastward and named Edward VII. Land. Captain Scott and Sir Ernest Shackleton (3rd officer of the *Discovery*) attained with sledges a 'Farthest South' of 82° 17′. In 1901 the German Antarctic expedition, in the *Gauss*, sailed southward. New land was discovered and named Kaiser Wilhelm II. Land. An extinct volcano (1200 ft.) in the new territory was named Gaussberg. In 1901 the Swedish expedition sailed in the vessel *Antarctic* and made valuable geographical discoveries, proving the continuity of Oscar II. Land, Louis Philippe Land, and Graham Land. The *Antarctic* was lost in 1903, but the crew was rescued. In 1902 the Scot. National Antarctic expedition in the *Scotia* explored Weddell Sea. The expedition returned in 1904.

A great advance south was made in 1907 by Sir Ernest Shackleton, in command of the *Nimrod*. His route was *via* the Beardmore Glacier to King Edward VII. Plateau. He attained a 'Farthest South' of 88° 73′ (within 111 miles of the Pole). In 1910 two vessels were equipped for expeditions—the *Terra Nova*, a British vessel commanded by Captain R. F. Scott, and the *Fram*, a Norwegian ship commanded by Captain Roald Amundson. Amundsen started a few months later than Scott. His vessel was originally equipped for northern exploration, and the announcement in October 1910 of an Antarctic expedition occasioned much surprise. Amundsen indeed had started his career as an explorer in the Antarctic regions, having joined the expedition commanded by de Gerlache in the *Belgica* in 1897. In 1903 Amundsen, in command of the *Gjöa*, had set out on a northern expedition, and relocated the North Magnetic Pole. He was the first to sail the North-West Passage. Peary's successful expedition to the North Pole caused Amundsen to abandon his projected Arctic expedition and seek the great Southern Unknown.

Framheim, Amundsen's headquarters and base, was situated on the shores of the Bay of Whales. The Polar party, consisting of 5 men, 52 dogs, and 4 sledges, started on Oct. 20, 1911. Amundsen's route was entirely new. The journey during the first month was comparatively easy. On Nov. 19 a camp was made at a height of 4500 ft., and on Nov. 20 the descent of a dangerous glacier was made. On Nov. 25 mountain ranges were sighted to the east with peaks of 15,000 ft.

and upward. The ranges were named Queen Maud Ranges. On Nov. 30 the ascent of the Devil's Glacier was commenced. On Dec. 6 the last dépôt was made at a lat. of 87° 40′ S., when the greatest height (10,750 ft.) was reached. This was the most arduous stage in the march. The ice was hollow, and resounded to the tread, hence the region was named the Devil's Dancing-Room. The Pole was reached on Dec. 14, 1911. The Polar camp was named Polheim, and the vast plateau in which the Pole is situated was called King Haakon VII. Plateau. On Dec. 16 observations were carefully taken and registered. On Jan. 25, 1912, the Polar party reached Framheim without casualty, with 2 sledges and 11 surviving dogs.

The chief geographical results of the expedition were: (1) the discovery of the South Pole; (2) the discovering that the great Ross Barrier terminates in a bight (lat. 86° S., long. 163° W.), between the range running S.E. from South Victoria Land and range running S.W. from King Edward VII. Land (the barrier is thus a vast glacial mass, floating in great bay between South Victoria Land and King Edward VII. Land); (3) the discovery of the probable connection between South Victoria Land and King Edward VII. Land; (4) the discovery of the great range of Queen Maud Mountains, which appears to be a continuation of Queen Alexandra Ranges, and whose peaks reach an altitude of 15,000 ft. An expedition also left the *Fram*, under Lieut. Prestrud, and surveyed the Bay of Whales and the Ross Barrier.

Captain R. F. Scott set out to discover the South Pole and to make a scientific and geographical survey of the South Polar regions. His company therefore included several scientific experts. Captain Scott's vessel, the *Terra Nova*, sailed into Robertson Bay and landed a geological party at Cape Adare, and then landed the Polar party in M'Murdo Sound. Captain Scott's first task was to station a dépôt E.S.E. of Hut Point, the winter quarters of the previous expedition. On Feb. 8, 1911, Captain Scott proceeded south, but owing to the severity of the climatic conditions and the loss of several ponies, the party was forced to return to the main base, after depositing a ton of stores at 'One-Ton Camp.' On visiting Hut Point, Scott learned of the arrival of the *Fram*. In November, Captain Scott, accompanied by Dr. Wilson, Captain Oates, Lieut. Bowers, and Petty Officer Evans, pushed southwards and reached the South Pole on Jan. 18, 1912. On the return journey he and his four companions perished. Seaman Evans died from concussion on Feb. 17, 1912; Captain Oates, who had been failing for some time, rather than be a drag upon his comrades, on March 17 walked from the tent and perished; Captain Scott, Dr. Wilson, and Lieut. Bowers died from exposure on March 29.

A great field is yet open to scientists in order to bring those vast Polar regions into the realms of knowledge. Amundsen's project of using aeroplanes in the work of discovery in the Arctic and Antarctic Circles may be realised in the future with great success. No fields have witnessed greater 'hardihood, endurance and courage,' nobler sustenance of defeat and worthier merit of victory, than the North and South Polar regions.

POLARISATION.—It has been explained (see LIGHT) that a ray of light consists of a vibration which passes along a line in the luminiferous medium, or ether, and that this vibration takes place in a direction perpendicular to the direction of the ray. The phenomenon of polarisation, now to be explained, may be most readily understood from the following analogy. Imagine a string, a few yards in length, stretched horizontally between two rigid supports, and let a point on the string be slowly pulled downwards through a short distance and then suddenly released. A wave will be seen to travel along the string—that is, each point in succession along the string will experience a vibration in a vertical direction. Suppose now that we construct a rectangular frame on which wires are strung parallel to each other and so close together that the string, if passed through between two adjacent wires, may be just able to vibrate freely. Holding the frame in a position so that the wires are vertical, cause the string to vibrate as before. The wave will pass along the string and through the frame. But if the frame be held in a vertical plane so that the wires are horizontal, the wave will be stopped when it reaches the frame. If, by some suitable mechanism, the string could be maintained in a constant state of vibration so that a regular succession of waves passed along it, then on gradually turning the frame from the first position (with the wires vertical) into the second position, we should see the waves gradually extinguished by the frame.

In the case of light, if we pass a ray through a plate of tourmaline, placed perpendicularly to the ray, and then through a second plate placed parallel to the first, two positions of the latter may be found: one in which it allows practically all the incident light to pass, another (in the same plane) in which it allows none of the incident light to pass. The explanation is that the first plate of tourmaline stops all vibrations in the ray except those which take place in a particular plane, and these it transmits. The transmitted ray is then said to be *polarised*. The second plate allows the polarised ray to pass if the axes of the two plates are parallel to each other, but stops the ray if they are at right angles. In addition to tourmaline, certain other crystalline substances are capable of polarising light, and of these Iceland spar (a crystalline variety of calcium carbonate) is the most notable.

Polarisation of a ray may also be produced by its reflection from a polished surface at a particular angle of incidence. It is found that when polarised light is passed through a tube containing a solution of cane sugar, the plane of polarisation is rotated through an angle which depends on the strength of the solution, and this has been developed into a method (*saccharimetry*) for determining the proportion of cane sugar in any given sample.

POLE, REGINALD (1500–58), cardinal; s. of Sir Richard Pole and Margaret, dau. of the Duke of Clarence, the bro. of Edward IV. and Richard III.; ed. at Salisbury, and in 1517 was app. prebend of Salisbury. On the divorce of Henry VIII. P. was against the king, and therefore obliged to go abroad; cr. cardinal, 1536, and legate of Viterbo, 1541; prominent at Council of Trent, and on the accession of Mary returned to England as papal legate, becoming abp. of Canterbury, 1556.

A man of gentle temperament, he had no part in the Marian persecution. Pope Paul IV., an old enemy, summoned him to Rome on an almost forgotten former charge of heresy. He died soon after.

Lee, *Reginald Pole.*

POLE, RICHARD DE LA (d. 1525), the 'White Rose'; nephew of Edward IV. of England, and inheritor of pretensions to crown; supported by Fr king during reign of Henry VIII.; slain at Pavia.

POLE, WILLIAM (1814–1900), Eng. engineer and musician; b. Birmingham; worked under Stephenson and Rendel; prof. of Engineering at London Univ., 1859–67; pub. *The Philosophy of Music*, 1879.

POLECAT, see WEASEL FAMILY.

POLE-VAULTING, sport in which jumper endeavours to leap over bar with aid of pole, which he drops when in mid air; if bar is displaced, vault is foul.

POLICE.—The modern p. force in England was established by Sir Robert Peel, in 1829 (hence the vulgar use of the words 'peeler' and 'bobby'). Previous to that date the arrangements for maintaining public order were in the hands of the sheriffs, and were grossly inadequate. Each county in England now controls its own p. under a joint committee of the county council and the county justices of the peace. The *Metropolitan Police Force* (which consisted in 1911 of 31 superintendents, 604 inspectors, 2620 sergeants, and 16,506 constables—total 19,761) is not under the control of the London County Council, but under the direct authority of the Home Office.

The City of London has its own p. under the Lord Mayor and Corporation, and this force has 1 assistant commissioner, 3 superintendents, 5 chief inspectors, 23 inspectors, 23 sub-inspectors, 96 sergeants, and 1029 constables. In Ireland there are two bodies of p.—the *Dublin Metropolitan Force* and the *Royal Irish Constabulary*, the latter a semi-military organisation. Local Watch Committees app. by the town council control the p. in ordinary municipal boroughs.

POLIGNAC, old Fr. family of the Velay. In XVII. cent. Scipion Sidoine Apollinaire Gaspard, Vicomte de P. (d. 1739), and Cardinal Melchior de P. (1661–1742) were famous.

POLIGNY (46° 49′ N., 5° 43′ E.), town, Jura, France; ruined castle. Pop. 3800.

POLITIAN, POLIZIANO, ANGELO (1454–94), Ital. man of letters; b. Montepulciano; sent by impoverished mother to Florence, where he studied under Argyropoulos, Kallistos, Landino, and Ficino; commenced translation of *Iliad* into Latin hexameters, a work which attracted the attention of Lorenzo de' Medici; app. prof. of Classics at Florence, and was recognised as first scholar of his day. P. was, in addition, pre-eminent among Neo-Latin poets. After Lorenzo's death, he was badly treated, and did not long survive his patron. Among P.'s pupils were Linacre and Reuchlin.

POLITICAL PHILOSOPHY is distinct from, though related to, both political history and political science. Of these the former treats of unique series of events in the order of their occurrence; the latter generalises (*e.g.* about types of constitution, the relations of the different branches of government, the rise and treatment of colonies, etc.), but still deals solely with actual political development and institutions. But generalisations about what has been and is in human society necessarily drive us to ask how far what has been and is now is desirable or good, a question that can be answered only by bringing the actual to the test of the ideal. Thus arise the problems of p. p., which considers, not any particular State, but the State in general, seeking for truths that must hold good for any State and for all citizens, so far as it and they are what they profess to be. We may say with rough accuracy that p. p. has three main questions to answer: (1) What is the end of the State, its purpose and use when it performs its proper functions? (2) What is the nature of political obligation? Why should I not only be a citizen in fact (which I cannot well avoid being), but act as a good and loyal citizen? (3) On what principles and within what limits should the State use force upon its members to compel them to behave in certain ways?

The answer given to the first of these questions dominates the answers to the second and third. The anarchist, insanely optimistic about human nature, holds that the State serves no good purpose and has no just claim to obedience, government being simply force exercised by external authority, unnecessary and even pernicious. Less violent individualists regard the State and Government as necessary, but necessary evils. Necessary, because men are more secure as citizens of an organised society than they would be outside it; but evil, because they are less free. Regarding each man's individuality as self-contained, they take government to be inevitably an impairment of it, and liberty to be irreconcilable with law. Hence they tend to limit the purpose of the State and the sphere of its activity very strictly: it is there to see fair play between citizens, to protect life and property, and to give security against foreign aggression. Earlier writers like Locke supported their view by representing the State as originating in contract: men found the inconveniences of living without organisation and government so great that they deliberately entered into agreements with one another, and entrusted power to chosen governors to wield for the good of the consenting parties. This unhistorical notion of an original social contract (used by other writers for very different purposes) is generally accompanied by the dangerous dogma that every man in virtue of being a man, and antecedently to being a citizen, has certain natural rights which he can justly require the State to recognise under threat of rebellion; in itself, however, it has had its use as a demand that government should justify itself by its works and a protest against unreasoning claims of force or mere tradition. Later individualists have for the most part agreed with Bentham that this talk of natural rights and an original contract is 'nonsense upon stilts'; but the differences between the mode of thought of the writers, such as Locke, and that of the Utilitarians and other XIX.-cent. individualists, although important, are not so fundamental as their agreement about the opposition of liberty and law and their consequent jealousy of the State's activity.

Neither practical experience nor theoretical reflection has sustained this favourite opposition of the individualists. The one has discovered by actual trial that the health of the body politic is not improved by unregulated competition among its members; the other has shown that the supposed complete liberty of the isolated man is purely negative and worthless, and that valuable liberty—liberty to grow better—always involves law and restraint of casual or unworthy impulses in the interests of reasonable development. There has therefore been a return to the more generous conception of the State and its purpose that we find in Plato and Aristotle. The State on this view is not an artificial but a natural thing, natural in one sense because men are by nature members of some kind of society from the outset, and the development of looser forms of social union with the fully organised State is not brought about by the deliberate resolve of a moment, but by the steady, slow pressure of necessity: natural in another and more important sense, because man can make the best of his nature only in and by the aid of society, so that the State, whilst owing its gradual organisation in the first place to men's need of security, has for its final purpose to enable them, not to live merely, but to live well.

The State is essentially the co-operative spirit of men, or their common will, expressing itself in an external organisation, and its duty, like theirs, is quite generally to promote good life or welfare. So far as it does its duty, its laws are consonant with and even necessary to our liberty, being expressions of what in our most reasonable moments we really want to have performed; and our obligation to obedience is simply one aspect of our general duty to seek good, and not evil. If the State fails utterly to perform its duty, then rebellion is both inevitable and right; but as a rule any organisation of society is better than none, and at any rate where there is a chance of procuring improvement by constitutional means, rebellion can seldom be justified.

But if welfare is essentially spiritual (see ETHICS), how can the State promote it? For the distinctive instrument of the State is force, the welfare of the spirit, free activity; force can constrain the external act, but not the agent's temper and motive. It has been said that the right use of force is to restrain other force that is opposed to freedom, and this is certainly the first principle of State action. But force opposed to freedom need not be violence; for example, insanitary housing, unduly low wages, and the like, are not, as a rule, the consequences of choice (as ruin may be of gambling), but forcibly diminish, if they do not necessarily destroy, the welfare of those who suffer from them. In improving such conditions of life, the State gives its citizens a better chance of welfare, though it cannot force welfare upon them.

Since voluntary well-doing is incomparably more valuable than constrained obedience, the State should forcibly compel or restrain only when certain kinds of behaviour are so necessary or so injurious that they

must be procured or prevented immediately. Taxes, for instance, cannot be collected by voluntary subscription. But there are regions of human activity in which the external act, if unwillingly performed, has no value at all; thus it is self-contradictory for the State to attempt to compel citizens to be religious, since saying 'Amen' is worthless unless one means it. In general, when it can afford the slower process of moulding opinion and sentiment and disposition, this is better than enforcement of external conduct; and here the State can do much by encouragement and discouragement without compulsion. For example, without enforcing further education on adults, it can provide libraries, museums, art galleries, and the like without treating gambling or ordinary sexual immorality as crimes, it can refuse to recognise gambling debts or promises which are contrary to the interests of public morality.

T. H. Green, *Lectures on Political Obligation*; Bosanquet, *Theory of the State*; J. S. Mackenzie, *Introduction to Social Philosophy*; M'Kechnie, *The State and the Individual*; Ritchie, *Darwin and Hegel*; Sidgwick's *Elements of Politics*; Dunning, *History of Political Theories*; Pollock, *Introduction to the History of the Science of Politics*; Gierke, *Political Theories of the Middle Ages*; Graham, *English Political Philosophy*; Sidgwick, *Development of European Polity*; Ritchie, *Natural Rights*; L. Stephen, *English Utilitarians*; Dicey, *Law and Public Opinion in England during the XIX. Cent.* The student wishing to enter on the history of the subject might start with Pollock's *Introduction*, and read therewith Plato's *Republic*, Aristotle's *Politics*, Macchiavelli's *Prince*, Milton's *Tenure of Kings and Magistrates*, Hobbes's *Leviathan*, Locke's *Treatises on Civil Government*, Rousseau's *Social Contract*, Burke's *Reflections on the French Revolution*, Bentham's *Fragment on Government*, Mill's *Liberty*, Spencer's *The Man* versus *the State*, and then Green and Bosanquet as above.

POLK, JAMES KNOX (1795–1849), 11th Pres. of U.S.A.; Speaker of House of Representatives, 1836; gov. of Tennessee, 1839; Pres., 1845, to settle question of Oregon boundary; agreed to abate original claim of U.S.A.; war with Mexico, 1846–47, resulted in annexation of New Mexico and California; refused re-election, 1848; strongly democratic and upholder of states' rights.

POLLACK, Lythe (*Gadus pollachius*), handsome green member of Cod family, without barbel and with projecting lower jaw; common inshore amongst rocks on Brit. coasts; used for food.

POLLAN, see under Salmon Family.

POLLENTIA, modern Pollenza (44° 25′ N., 8° E.), ancient town, on Taranus, Luguria, Italy.

POLLINATION, the transference of pollen grains to the ovules, in Gymnosperms, or to the receptive part of the carpels in Angiosperms, is a necessary preliminary to fertilisation. This may be accomplished by the wind (*anemophily*), by animals (*entomophily, ornithophily*), or by water (*hydrophily*); of these the first is almost certainly the most primitive. Among the best-known anemophilous types are Coniferæ (*Pinus*), catkinate forms (alder, birch, hazel), and grasses, all characterised by absence of bright coloration, odour, or honey, by production of vast quantities of light pollen, and by provision of a large stigmatic surface for its collection. Insect-pollinated (entomophilous) flowers are usually attractively coloured and possess nectar; many have an agreeable scent (*e.g.* lavender). In more highly evolved types many adaptations to ensure cross-p. are noticeable (*e.g.* primrose), as this is believed to result in the production of more robust offspring, although in some forms the plants are normally self-pollinated.

POLLIO, GAIUS ASINIUS (76 B.C.–*c.* 5 A.D.), Rom. orator, poet, and soldier; patron of Vergil and Horace. Vergil's fourth and eighth eclogues were addressed to him. His orations, tragedies, and histories are no longer extant.

POLLOKSHAWS (55° 50′ N., 4° 18′ W.), town, Renfrewshire, Scotland; incorporated in Glasgow, 1912; cotton-spinning and weaving. Pop. (1911) 12,932.

POLL-TAX, the compulsory contribution from each person of a portion of his wealth at the demand of the government. It is a tax per head, irrespective of income or property, and the levying of it in England in the XIV. cent. was the immediate cause of the Peasant Revolt (1381). Since that year no poll-tax has been attempted in England. It is levied on natives in some British colonies.

POLLUX, see Castor and Pollux.

POLO, equestrian game popular in almost all English-speaking lands except Scotland; played for many cent's in Oriental countries, Persia, Tibet, Japan, under similar rules; first played by Europeans in Calcutta, 1863; spread with extraordinary rapidity. Except that it is played on horseback, p. closely resembles hockey (*q.v.*); stick used is about 4 ft. long with 8-inch cross-head; dimensions of field, 300 by 200 yards; distance between goal-posts, 22 ft.; four players on each side; height of ponies must not exceed 14 hands. These animals, when well trained, exhibit an almost human intelligence and command high prices; the best are trained in India. Hurlingham is the centre of p. in Britain.

Dale, *Polo* (1905).

POLO, MARCO (*c.* 1254–1324), Venetian traveller; when seventeen years old accompanied his father and uncle on journey to China (Cathay), where they had previously penetrated on trading expedition and had been kindly received by Kublai Khan, who had asked them to return bringing with them a number of European teachers and priests. The route followed was across Khorasan, over Pamir plateau and across Desert of Gobi, of which P. gives a graphic description. Kublai became attached to P. and entrusted him with various diplomatic and public duties; was unwilling to let him return to Europe, but fortunately P. was sent in retinue of the bride-elect of the Khan of Persia, and reached Europe, 1295; took part in war between Venice and Genoa, 1298, captured and imprisoned; told story of his journeyings to fellow-prisoner, Rusticiano of Pisa, who wrote them down.

The work is in two parts: a personal prologue giving P.'s reasons for journey, and a description of various states of Asia with special reference to dominions of Kublai Khan. The chapters vary in length, and bear more resemblance to occasional jottings than to systematic narrative.

Marco Polo (1903), edit. by Yule and Cordier.

POLONNARUWA (8° N., 80° 59′ E.), ruined city; ancient capital of Ceylon.

POLOTSK (55° 29′ N., 28° 47′ E.), town, Vitebsk, Russia, at junction of Volota and Dvina; taken by Russians from Poles, 1579 and 1685. Pop. 21,000.

POLTAVA—(1) (50° N., 34° E.) government, S.W. Russia, level and undulating; drained by Dnieper; very fertile; one of leading agricultural provinces of Russia; distilleries, flour-mills, tobacco factories; several important fairs. Pop. 3,580,100. (2) (49° 33′ N., 34° 38′ E.) capital of above, on Vorskla; flour-mills. Pop. (1910) 61,300.

POLTERGEIST, Ger. word (literally 'noisy spirit') applied to the movement of objects by no known agency. It is allied, therefore, to the physical phenomena of spiritualism. There have been many alleged instances of p., but instances are naturally difficult to prove. A typical instance of p. is the throwing about of furniture, crockery, etc., when there is no person present who is obviously doing it. Some stories may be legendary or due to exaggeration, but in at least some others the hypothesis of fraud or mechanical contrivance seems ruled out. Such a case was one at Worksop in 1883, which was investigated by Podmore, and also by Andrew Lang, who inclined to believe there was something in it. Naturally the majority of cases occur among those who are but imperfectly educated, but there are other cases besides

A great difficulty, as with all psychic phenomena, is of course that evidence is not always near enough the time to be of first-rate value. According to one theory these phenomena are due to a sort of power emanating from some one at a distance. See also PSYCHICAL RESEARCH.

POLYÆNUS, 'THE MACEDONIAN' (fl. II. cent. B.C.), rhetorician; collected *Strategemata*, or maxims of strategy, which he dedicated, c. 163, to Marcus Aurelius and Lucius Verus.

POLYANDRY, see POLYGAMY.

POLYANTHUS, flower possibly evolved from primrose, from which it differs in having the umbels carried on a stalk.

POLYBIUS (*c.* 204–122 B.C.), Gk. historian; s. of Lycortas of Megalopolis; among the 1000 Achæans sent to Rome on account of abstinence of Achæan League from aiding Rome against Macedonia; detained in Rome in household of L. Æmilius Paulus, 167. P. won friendship of Scipio the younger, through whom he obtained access to Roman archives; returned to Megalopolis, 151, but spent little time in his native city; joined Scipio's African expedition, 147, and saw Carthage destroyed, 146; returned to Greece and negotiated with Romans for merciful terms for revolted cities of Achæan League; travelled with Scipio to Egypt, and in 134 accompanied him to Spain to reduce Numantia; at some time visited Gaul and Atlantic coast. Five of forty books of history remain, and some fragments; style is ponderous and wearisome, but evidences of painstaking research are plentiful; account of Romans important; *Selections*, edit. by Strachan-Davidson (Clarendon Press).

POLYBORINÆ, CARACARAS, see HAWK FAMILY.

POLYCARP (69–155 A.D.), one of so-called 'Apostolic Fathers' (*q.v.*); little known of his life, but he must have been bp. of Smyrna for about 50 years. Irenæus (*q.v.*) relates that when a boy he had listened to the discourse of P., who had conversed with St. John. He was the uncompromising opponent of the Marcionite and Valentinian heresies of his time; a very devout man, though not an original thinker. He visited Rome about 150 to settle the controversy about the date of Easter. An elaborate account of his martyrdom and heroism has been preserved in the *Letter of the Church of Smyrna*.

Lightfoot, *Apostolic Fathers*; Swete, *Patristic Study*.

POLYCELIS, a Turbellarian worm (*q.v.*).

POLYCHÆTA, see under CHÆTOPODA.

POLYCLADIDA, a group of Turbellarian worms (*q.v.*).

POLYDACTYLISM, see under TERATOLOGY.

POLYERGUS, see SLAVE-MAKING ANT.

POLYGAMY, custom by which a man may have several wives; distinguished from Polyandry, the possession of several husbands by a wife; allowed among people of India and Africa and all Muhammadans; in Britain and U.S.A. it is punishable as bigamy; the Mormons of U.S.A. abolished bigamous marriage in 1890.

POLYGENIST, a believer in the theory that living things developed from more than one origin (cf. MONOGENIST).

POLYGLOTT, the technical name for a book which contains parallel versions of the same text in various languages. P. editions of the Bible are common. The Genoa Psalter (1516) embraces Hebrew, Latin, Greek, Chaldee, and Arabic.

POLYGON, a plane figure of many angles and sides; usually restricted to figures of more than four sides. P. of five sides is termed a *pentagon*, of six sides a *hexagon*, and so on. Similar p's have angles equal, each to each, and sides about equal angles proportional. Areas of similar p's are to one another as squares of homologous sides. Regular p's have all sides equal.

POLYGONACEÆ, herbaceous dicotyledons, with mainly trimerous, though occasionally (*Polygonum*) partly pentamerous floral symmetry; leaves characterised by possession of a membranous, sheathing stipule termed the ochrea; includes rhubarb, dock, and sorrel.

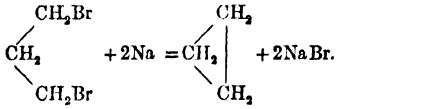
POLYHEDRON, a solid bounded by many faces or planes. Polyhedra are classified according to number of *faces*. If faces are similar and equal regular polygons, solid is a regular p. Only five regular polyhedra exist, as is easily proved by examining the number of ways in which a solid angle may be formed out of the plane angles of various regular polygons, remembering that the sum of the plane angles forming a solid angle is less than four right-angles. The regular polyhedra are: (i.) *tetrahedron* (4 faces), (ii.) *octahedron* (8 *faces*), (iii.) *icosahedron* (20 faces)—all of which have equilateral triangles for faces; (iv.) cube (6 square faces), (v.) *dodecahedron* (12 faces)—faces of which are regular pentagons. Euler's theorem proves that if F is the number of faces, E of edges, and V of vertices in any polyhedron, then $E+2=F+V$.

POLYHYMNIA, see MUSES.

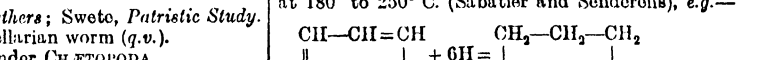
POLYMETHYLENES, a series of synthetic hydrocarbons, chiefly liquid, to some of which the terpenes are related. They consist of from three to nine *methylene* (CH_2) groups joined together in a ring, and are isomeric with the olefines, from which they differ by being saturated. *Trimethylene* (or cyclopropane) is somewhat unstable, combining with bromine to form the open chain compound 1·3 dibromopropane; *tetramethylene* is more stable, *penta-* and *hexa-methylene* are very stable, forming no addition products with bromine. These facts are accounted for by Baeyer's 'strain theory,' which shows why a 5- or 6-membraned ring is more stable than a ring containing fewer carbon atoms.

Methods of formation:—

(1) Action of sodium on dihalogen paraffins, *e.g.*—

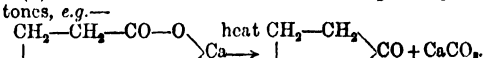


(2) Addition of hydrogen to unsaturated cyclic hydrocarbons, by the catalytic action of finely divided nickel at 180° to 250° C. (Sabatier and Senderens), *e.g.*—

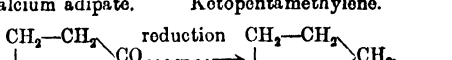


Benzene. Hexahydrobenzene.

(3) Formation and reduction of corresponding ketones, *e.g.*—



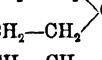
Calcium adipate. Ketopentamethylene.



Cyclopropane:  ; B.P. −35° C.

Cyclobutane:  ; B.P. 11–12° C.

Cyclopentane:  ; B.P. 50–51° C.

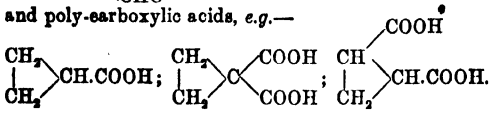
Cyclohexane (hexahydrobenzene):  ; B.P. 80–81° C.

Cycloheptane (suberane):  ; B.P. 117° C.

Cyclo-octane: $CH_2—CH_2—CH_2—CH_2$ / $CH_2—CH_2—CH_2—CH_2$; B.P. 146·3–148° C.

Cyclononane: $CH_2—CH_2—CH_2—CH_2$ / $CH_2—CH_2—CH_2—CH_2$ $>CH_2$; B.P. 170–172° C.

Derivatives: (1) alcohols, $>CH.OH$; (2) aldehydes, $>C<^{H}_{CHO}$; (3) ketones, $>CO$; (4) mono-, di-, and poly-carboxylic acids, *e.g.*—



Trimethylene-carboxylic acid. Trimethylene 1·1 dicarboxylic acid. Trimethylene 1·2 dicarboxylic acid.

Derivatives of hexahydrobenzene, *e.g.* the hexahydrophthalic acids, show similar isomerism.

POLYMORPHA, a sub-order of Beetles distinguished by their clubbed antennæ, serrate along inner margin; include Whirligig Beetles (*Gyrinidæ*), carnivorous forms, with paddle-like hind-limbs, which perform mazy dances on the surface of ponds; the Carrion and Burying Beetles (*Necrophorus*), the latter known for their habit of digging a grave beneath small dead vertebrates, so that they may afterwards enjoy an undisturbed feast; the familiar Lady-Birds (*Coccinellidæ*), valuable on account of the plant-destroying insects they devour; the Borers (*Anobium*), the larvæ of which bore into wood; they include the so-called 'Weevil,' which is responsible for weevilly ship biscuits; the larva of *A. paniceum*, also known as the Book-Worm; the cause of 'worm-eaten' furniture (*A. striatum*); and 'Death Watches' (*q.v.*). Click Beetles (*Elateridæ*), so called because when lying on their backs they can with a click jerk themselves in the air. The larvæ of some are known as 'Wire-Worms.' American Fire-Flies (*Pyrophorus*) belong to this family. While amongst *Malacodermidæ* the phosphorescent Glow-Worms and European Fire-Flies (*Luciola*) are placed. The family *Buprestidæ*, also grouped amongst P., is of interest because the metallic green and bronze wing-covers of its members are used as ornaments and for embroidering dresses.

POLYNESIA (*c.* 20° N. to 25° S., 120° to 180° W.), name given to islands of Pacific, which lie between 120° and 180° W. There are many groups, most important being the Samoan, Tonga, Sandwich or Hawaiian, Marquesas, Manahiki, Gilbert, and Ladrones groups; total area, *c.* 11,000 sq. miles.

The inhabitants are known as POLYNESIANS, and are remarkably homogeneous in type in spite of the distance of the islands from each other and the large area over which they are scattered. Their origin remains obscure, although some ethnologists consider that they belong to the Indonesian subdivision of the Caucasic section of mankind. They at all events differ considerably from both Malayan and Papuan races. They are generally of fine stature and physique, although these vary on the different islands. Their colour ranges from light to dark copper, and their hair is generally straight and very dark. Those inhabiting coral islands where natural resources are not great are more industrious than those who live on the more fertile volcanic islands; they are generally distinguished by considerable intelligence. Manners and customs are everywhere similar; religion generally polytheism; and the system of Tabu, whereby any person or thing could be rendered sacred, was the principal method by which chiefs exercised their authority. Christianity has now been introduced in most of islands. See OCEANIA, PACIFIC.

Grey, *Polynesian Mythology*.

POLYP (Lat. *polypus*, from Gk. *polupous*, many-footed), name applied on account of their many tentacles to individuals, whether solitary or colonial belonging to the groups Hydrozoa and Actinozoa of the stinging animals, Cœlentera. 'The Polyps' was once used as a name for the Hydroid class of Zoophytes.

POLYPEMON, see PROCRUSTES.

POLYPLACOPHORA, a sub-class of GASTEROPODA (*q.v.*).

POLYPROTODONTIA, a sub-order of the MARSUPIALS (*q.v.*).

POLYPTERUS, one of the two living genera of Crossopterygian fishes, found only in rivers of Western Tropical Africa. The body is covered with rhombic ganoid scales, there are numerous dorsal fins, and the air-bladder, which is double, is used as a lung. Nine species of P. are recognised, the best known being the Bichir (*P. bichir*). They live on muddy bottoms, rising occasionally to gulp air, and are esteemed as food.

POLYPUS, a genus of Cephalopoda (*q.v.*).

POLYPUS, pendulous, non-malignant overgrowth of mucous membrane, occurring in the nasal passages, uterus, intestine, and other situations; removed from the nose and uterus by twisting and tearing through the pedicle.

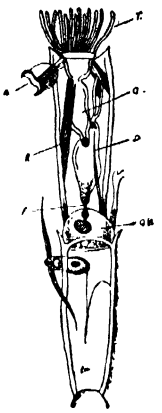
POLYTECHNIC, an institution to foster art and science. The Fr. *École Polytechnique* was founded by the National Convention to counteract the exaggerated importance attached to philosophy and lit. This institution became largely a training-ground for artillerists and engineers. In Switzerland the Zürich *Polytechnikum* gives training in sciences bearing on manufactures and trades. The polytechnica of Germany (especially Charlottenburg) are famous for their size, completeness, and thoroughness. The problem of co-ordinating such institutions and the univ's is engaging more and more attention. The first p. in England, established in William IV.'s reign, gave instruction in general science, with popular lectures. In 1880 it was reopened as an educational institution for artisans, with classes in science, art, and lit., a gymnasium, library, etc. It had a marked religious side, but services were optional. Other institutions have been opened in London under this name, and supported from funds under the City Parochial Charities Act, 1883, the Technical Instruction Act, 1889, the Local Taxation Act, 1896, and the Education Act, 1902. One of Besant's novels, *All Sorts and Conditions of Men*, emphasised the needs of East London, and outlined a scheme for a 'Palace of Delight.' This idea took hold, money was promised, particularly £7000 yearly by the Drapers Company, and the 'People's Palace' was instituted. Its educational side became known as the East London Technical College, which is now a recognised school of London Univ. The aim of these institutions is technical instruction, and the study of science, art, lit., and general subjects, and the work has been greatly assisted by London Univ.

POLYXEMUS, a Millipede, see MYRIAPODA.

POLYZOA, or BRYOZOA, SEA MOSSES, etc., a phylum or sub-kingdom of the animal kingdom, including small seaweed-like colonies commonly cast on shore after a storm. The colonies may be flat and encrusting, spread over a surface of seaweed, like the Sea-Mat (*Flustra*), or growing like miniature bushes or trees. This appearance is due to an external skeleton (really the cuticle), usually whitish on account of the lime it contains, and sometimes so massive and solid that it resembles coral (*Retepora*, *Porella*). The animals themselves are sheltered by small cups in the skeleton, within which they can altogether withdraw. When expanded they can be seen by the microscope to be small transparent sac-like creatures, surmounted by a crown of ciliated tentacles which waft food to the mouth lying in their midst; and also act as respiratory organs. The disc on which mouth and tentacles are placed is known as the lophophore.

P. are exceedingly simple creatures, without head,

heart, or vascular system, and with only a single ganglion to represent the nervous system. The food canal is U-shaped, the hinder end opening near the mouth. P. are mostly marine organisms, but a few forms are confined to fresh water. They live chiefly between tidemarks, fixed to or encrusting stones and seaweeds, and feeding on minute organisms, such as diatoms and Protozoa.



POLYZOA, *Bugula avicularia* (Sedgewick, *Text-Book of Zoology*). *T*, tentacular crown; *R*, retractor muscle; *D*, alimentary canal; *F*, funiculus; *A*, avicularia; *O*, œsophagus; *Ov*, ovicells.

The Phylum Polyzoa is divided into two classes: (1) ECTOPROCTA, in which the vent opens outside the crown of tentacles; containing by far the greater number of Polyzoa; (2) ENTOPROCTA, in which the vent opens within the crown of tentacles; containing a comparatively few small species.

POMBAL, SEBASTIÃO JOSE DE CARVALHO E MELLO, MARQUESS OF (1699–1782), Portug. diplomatist and statesman; reorganised finances, founded industries, encouraged colonisation; remedied distress after Lisbon earthquake, 1755; put down revolts and expelled Jesuits.

POMEGRANATE (*Punica granatum*), tropical tree which bears a fruit with an extremely tough, leathery pericarp. This is packed with a large number of red or purple seeds with succulent coats. The fruit, which is about the size of an orange, has never become popular in Britain. The tannin found in the rind is used in the manufacture of morocco leather.

POMERANIA, POMMERN (*c.* 53° 50′ N., 15° E.), coast province, Prussia; area, 11,631 sq. miles; surface flat, forming part of great N. German plain; eastern part has belonged to Brandenburg since 1648, whole to Prussia since 1815; capital, Stettin; important agricultural district, with rearing of cattle, horses, poultry; produces rye, potatoes; manufactures spirits, sugar, tobacco, leather. Pop. (1910) 1,716,921.

POMERANIAN DOGS, see DOG FAMILY.

POMEROY (39° 6′ N., 82° 3′ W.), city, Ohio, U.S.A., on Ohio; salt-works; coal mines. Pop. (1910) 4023.

POMFRET, see PONTEFRACT.

POMMERN, see POMERANIA.

POMONA, MAINLAND (59° N., 3° 10′ W.), largest of Orkney Islands; surface hilly and mostly moorland; chief industries, stock-raising and fishing; contains towns of Kirkwall and Stromness; famous antiquarian remains. Pop. (1911) 14,767.

POMONA (34° 5′ N., 117° 48′ W.), city, California, U.S.A.; fruit-growing region; canneries. Pop. (1910) 10,207.

POMPADOUR, MARQUISE DE, JEANNE ANTOINETTE POISSON LE NORMAND D'ÉTIOLES (*c.* 1721–64), mistress of Louis XV.; paternity claimed by Poisson and Le Normand; brought up by latter; m. Le Normand d'Étioles, 1741. A born *fille de plaisir*, she set herself to win the king; laden with riches; centre of literary coterie; ruled France till death; name associated with Louis Quinze modes. *Life*, by Williams (1903).

POMPEII (40° 45′ N., 14° 30′ E.), former town, Italy, at foot of Mt. Vesuvius, on Bay of Naples; said to have been founded by Oscans in late VII. or early VI. cent. B.C.; captured by Romans, 80 B.C., after belonging in turn to the Etruscans and Samnites. For about 160 years P. was a prosperous Rom. town and a favourite seaside resort of the upper classes; but in 79 A.D. it was overwhelmed by volcanic ashes during the historic eruption of Mt. Vesuvius, which destroyed also the neighbouring town of Herculaneum (*q.v.*). For cent's it was entirely lost sight of, but in 1592 some remains were discovered by Fontana when constructing an aqueduct here; and a century and a half later these were realised to be part of P. Excavations were begun in 1748, and since 1870 have been carried on with great regularity, so that now a large part of the town is exposed to view. It is regularly laid out and surrounded by walls, in which are eight gates. In the W. is the Forum, surrounded by colonnades (except in the N.) and by various important buildings; these include—the temples of Jupiter, Vespasian, and Apollo on the N., E., and W. respectively; the Macellum or market, the shrine of the Lares, and the building of Eumachia on the E., several halls on the S., and the great Basilica on the W. In S. of town is another open space called the Triangular Forum, containing an old Doric temple, and with the Great and Little Theatres and the Gladiator's Barracks on the E.; while to N. of Great Theatre are Temples of Æsculapius and Isis. Other temples are those of Fortuna Augusta and Venus Pompeiana to N. and S.W. of Forum respectively. There are thermæ to N. of Forum and in the E. part of the town; and the great amphitheatre stands in S.E. corner just within the walls. Private houses include the villas which belonged to Cicero and Diomedes. Great number of beautiful works of art have been discovered, including wall-paintings and statues.

Pisa and Mackenzie, *Pompeii* (1910).

POMPEIUS, 'POMPEY,' Rom. plebeian *gens*; noted members were—(1) **GNÆUS,** consul, 89, f. of (2) **Gnæus,** POMPEY THE GREAT (106–48 B.C.), who aided Sulla against Marius; repelled Lepidus, 77; defeated Marians in Spain, 76–71; put down revolt of Spartacus, and became consul, 71. Sent with extraordinary powers to suppress piracy, 67, he cleared the Mediterranean in 40 days; conquered Mithradates, and annexed Syria and Palestine, 66–63; finding bitter jealousy in Rome, formed coalition ('first triumvirate') with Cæsar and Crassus; defeated by Cæsar at *Pharsalus*, 48; murdered in Egypt by Achillas. His sons, **GNÆUS** and **SEXTUS,** were defeated by Julius Cæsar at *Munda*, 45.

POMPILIDÆ, see WASPS.

POMPONAZZI, PIETRO (1462–1525), Ital. philosopher; studied med. and philosophy at Padua; distinguished Aristotelian scholar; denied that immortality follows from Aristotle's doctrines.

PONANI (10° 47′ N., 75° 58′ E.), seaport, at mouth of Ponani, Madras, India. Pop. 10,500.

PONAPE, see CAROLINE ISLANDS.

PONCE (18° N., 66° 41′ W.), seaport, Porto Rico; sugar. Pop. (1910) 63,444.

PONCHIELLI, AMILCARE (1834–86), Italian musical composer; wrote *Gioconda*.

POND, JOHN (*c.* 1767–1836), Eng. astronomer; app. astronomer royal, 1811; began reforms in connection with practical astron.

PONDICHERRY, PONDICHÉRY (11° 56′ N., 79° 53′ E.), capital, Fr. India, on Coromandel Coast; chief industry, weaving. Pop. 50,000; territory (1911), 184,840.

PONIATOWSKI, JOSEPH ANTHONY (1763–1813), Polish prince and patriot; commander-in-chief against Russia, 1792, and assisted in Napoleonic campaigns; appointed commander-in-chief of new duchy of Warsaw; distinguished in last Napoleonic invasion of Russia.

PONIATOWSKI, STANISLAUS (1677–1762), Polish general and statesman; adopted by P. family; f. of King Stanislaus II. of Poland, Casimir, chancellor, Michael, abp., and Andrew, soldier, who was f. of Napoleon's marshal P.

PONIATOWSKI, STANISLAUS (1754–1833), nephew of Stanislaus II. of Poland, during whose reign he held high civil and military office; secret adviser of Tsar Paul I.; f. of PRINCE JOSEPH MICHAEL XAVIER FRANCIS JOHN (1816–73), author of operas.

PONSONBY, JOHN (1713–89), Irish politician;

one of 'undertakers' who managed Ireland, 1756–67 s., WILLIAM, cr. baron, 1806; s., GEORGE, lord chancellor of Ireland, 1806.

PONTA DELGADA (37° 40′ N., 25° 32′ W.), chief town, island of São Miguel, Azores. Pop. 18,500.

PONT-À-MOUSSON (48° 54′ N., 6° 2′ E.), town, on Moselle, Meurthe-et-Moselle, France; blast-furnaces. Pop. 14,000.

PONTANUS, JOVIANUS (1426–1503), Ital. humanist and poet; b. at Cerreto, in Spoleto; succeeds best in Lat. verse, e.g. *Urania, De Hortis Hesperidum, De on Cjugale Amoer.*

PONTARLIER (46° 54′ N., 6° 21′ E.), town, Doubs, France, on Doubs; absinthe distilleries. Pop. 9000.

PONT-AUDEMER (49° 20′ N., 0° 29′ E.), town, on Rille, Eure, France. Pop. (commune) 6300.

PONTECORVO (41° 28′ N., 13° 42′ E.), town, on Garigliano, Caserta, Italy. Pop. (commune) 12,000.

PONTEFRACT, POMFRET (53° 42′ N., 1° 19′ W.), town, W. Riding, Yorkshire, England; has ruined castle (built *c.* 1080) where Richard II. was killed, 1400; castle was several times besieged during Great Rebellion; there are two churches, dating from Norman times; market gardens and nurseries; trades in grain; manufactures Pomfret cakes (P. lozenges) from liquorice. Pop. (1911) 15,960.

PONTEVEDRA.—(1) (42° 30′ N., 8° 30′ W.) maritime province, Spain, in Galicia; mountainous. Pop. (1910) 496,292. (2) (42° 28′ N., 8° 35′ W.) seaport, capital of above, on Bay of P.; trade in grain. Pop. (1910) 24,218.

PONTIAC (*c.* 1712–69), Indian chief of Algonquin tribe of the Ottawas; assisted French in defence of Detroit and defeat of Braddock, 1755; discontented under Brit. rule and organised risings of 1763; Detroit, forewarned, stood siege of five months and was then relieved. P. showed wonderful ability, procuring food for besiegers by promissory notes written on bark, signed with symbol of otter; submitted, 1766; his murder caused Illinois War.

PONTIAC (42° 38′ N., 83° 19′ W.), city, on Clinton, Michigan, U.S.A.; trade in wool and agricultural produce. Pop. (1910) 14,532.

PONTIFEX (cf. Pontiff), Rom. high priest. Rom. college of priests was composed of *pontifex maximus, rex sacrorum, flamines, pontifices minores,* and vestal virgins.

PONTINE MARSHES (41° 25′ N., 13° 5′ E.), large marshy region, Rome province, Italy, extending along Mediterranean coast.

PONTIVY, formerly NAPOLÉONVILLE (46° 5′ N., 2° 59′ W.), town, on Blavet, Morbihan, France. Pop. 9500.

PONT-L'ABBÉ (47° 50′ N., 4° 10′ W.), town, Finistère, France, on inlet of sea; exports vegetables. Pop. 6500.

PONTOBDELLA, see under LEECHES.

PONTOISE (49° 3′ N., 2° 6′ E.), town, Seine-et-Oise, France; ancient *Briva Isarœ*; trade in grain; former capital of Fr. Vexin. Pop. 8500.

PONTOON, see RAFTS (or PONTOONS), BRIDGES.

PONTREMOLI (44° 23′ N., 9° 52′ E.), town, Massa e Carrara, Italy. Pop. (commune) 14,500.

PONTUS, geographical division of Asia Minor. Originally the Black Sea and its coasts were all named P. by the Greeks, but in Macedonian period term meant district south of Euxine, north of Anti-Taurus and Paryadres, east of Bithynia and west of Armenia, and was never extended to conquests of its rulers over southern Asia Minor. Kingdom was founded early IV. cent. B.C. by Mithradates I., from dominions of Seleucidæ. Mithradates VI. was defeated by Pompey, 65 B.C., when P. was annexed to Bithynia; Roman province of Pontus Polemoniacus formed, 63 A.D.

PONTYPOOL (51° 42′ N., 3° 3′ W.), town, on Avon, Monmouthshire, England; iron and tinplate manufactures. Pop. (1911) 6452.

PONTYPRIDD (51° 36′ N., 3° 21′ W.), town, Glamorganshire, Wales, at junction of Rhondda and Taff; ironworks; coal and iron mines. Pop. (1911) 43,215.

PONY, see under HORSE FAMILY.

PONZA (40° 50′ N., 12° 57′ E.), small island, Italy, chief of a group in Mediterranean; ancient *Pontia.* Pop. 4600.

POOLE (50° 43′ N., 1° 58′ W.), seaport, Dorsetshire, England; flourishing coasting trade; china- and pipe-clay; oyster-beds. Pop. (1911) 38,886.

POOLE, MATTHEW (1624–79), Eng. Nonconformist divine.

POONA, PUNA (18° 31′ N., 73° 55′ E.), city, Bombay, India; capital of Deccan division, and of P. district; was capital of the Mahrattas; annexed by Britain, 1817; important military station; residence of gov., June–Sept.; contains two colleges and numerous schools; silk, cotton, and jewellery manufactures. Pop. (1911) 158,856.

POOR CLARES, see CLARE, ST.

POOR LAW, law by which state provides for poor. Until 1601 almsgiving was regulated by charity only, though usually performed through medium of Church, which had received power by Act, 1553, to distrain on neglect of this religious duty. Overseers of poor were appointed from early in Elizabeth's reign; before close of reign *poor rates* were levied. Famous Act of 1601, summarising Elizabethan legislation, remained in force till Poor Law Amendment Act, 1834; it provided that *overseers of poor* with consent of justices of peace might levy taxes on propertied people of parish in sufficient amount to provide work for able-bodied, and funds for impotent, poor, and with consent of lord of manor, build houses on common for housing poor, and that parents, grandparents, and children of poor person should, if able, be compelled to support him. Corruption of overseers and increase of destitution through economic changes led to Gilbert's Act, 1783, for building *workhouses* and appointing *guardians*; before this Act a workhouse had been built at Bristol, 1697. A commission (app. 1832) led to Poor Law Amendment Act, 1834, which provided for appointment of three *Poor Law Commissioners* with supreme control over local relief, power to form Unions (united parishes for poor relief purposes), etc.; *Poor Law Board* established, 1847, replacing commissioners; superseded, 1871, by Local Government Board. The State, under Act of 1834, must relieve destitute. Liability of relatives still exists as in 1601, though only enforced where pauper is unable to work. A person deserting wife or legitimate family, who are thereby thrown on parish, becomes liable to punishment as rogue and vagabond. After affiliation order, the father may be compelled to contribute to support of a bastard; mother is otherwise responsible. By General Order, 1882, casual pauper must obtain signed order for admission into *casual ward* from relieving office, except in case of emergency, but Metropolitan Houseless Poor Act, 1865, still remains in force. *Outdoor relief* is given in certain cases under Orders of 1844 and 1852. Special Metropolitan Poor Acts were passed, 1867, 1869. Persons chargeable to rates may be removed to their place of settlement. By statute, 1865, residence for one year gives status of irremovability. Royal Poor Law Commission (app. 1905) issued in 1909 two Reports (Majority and Minority), agreeing as to the deficiencies of system, but differing in policy and principle. Up to 1913 neither of these Reports had led to legislative action. The Majority Report urges the creation of new local 'Public Assistance' Authorities and Committees; the Minority Report advocates the distribution of Poor Law Administrative duties among existing local bodies. Recent social legislation—Old Age Pensions Acts, Labour Exchanges Act, National Insurance Act, etc.—is exercising a profound influence on Pauperism and Poor Law Problems.

POORE, RICHARD (d. 1237), bp. of Chichester, 1214, Salisbury, 1217, Durham, 1228; commenced building of Salisbury Cathedral.

POPAYAN (2° 23′ N., 76° 35′ W.), town (and department), Colombia, on Cauca; founded, 1537; bp.'s see; cathedral and univ. Pop. 18,724; (district) 190,000.

POPE, see PAPACY.

POPE, ALEXANDER (1688–1744), Eng. poet; b. London (May 21); f. a well-to-do R.C. linen-draper; a studious, precocious, hunchbacked boy, with long arms, bright eyes, and beautiful voice; ed. privately, owing to religion; showed poetic bent from age of 8—'I lisped in numbers, for the numbers came.' His first work of note, *Pastorals* (written at 16), was published in 1709. *Essay on Criticism* (1711) gained him entrance to Addison's circle. *Rape of the Lock* (1712), a mock-heroic poem, won him instant fame. *Windsor Forest* appeared, 1714. Swift introduced young P. to his distinguished friends and clubs. P.'s translation of the *Iliad* came out, 1715–20. In 1718 he took Twickenham House, where he settled for life. Here he edited Shakespeare, translated the *Odyssey* (with Broome and Fenton, 1720–25), attacked his many enemies in the *Dunciad* (pub. 1728, with Lewis Theobald as hero), wrote *Essay on Man* (embodying Bolingbroke's philosophy, 1732–34), *Moral Essays*, *Imitations of Horace*, extended and reissued the *Dunciad* (1742, with Colley Cibber as hero), and edited (and doctored) his *Correspondence*.

P.'s physical deformity parallels and largely explains his defects of character: irritability, underhand ways, childishness, and moral infirmities. His life was 'one long disease.' He quarrelled with many of his friends (*e.g.* Addison) and treated most shabbily. P. polished the heroic couplet of Dryden to perfection; he made it a pointed rapier for satiric duels—light, glancing, piercing. He had an unlimited store of poetic diction, but a restricted vocabulary. He had wit unbounded, but not humour. He was a master of epigram. He is the prince of Society poets, elegant, artificial, brilliant. His rhythm is finished, but his closed couplet soon becomes tedious. He has the knack of making polished proverbs, with his common sense, gilt of phraseology, and metrical grace. Next to Shakespeare he is the most-quoted Eng. poet.

Sir Leslie Stephen, *Life* (1880); Dennis, *The Age of Pope* (1894).

POPE, JOHN (1822–92), Amer. general; successful as commander in Civil War, 1861 and early 1862; assumed command of army of Virginia in boastful spirit; signally defeated at *Bull Run*, Aug. 1862.

POPERINGHE (50° 52′ N., 2° 43′ E.), town, W. Flanders, Belgium; wool, linen, hop gardens. Pop. 12,000.

POPHAM, SIR HOME RIGGS (1762–1820), Brit. rear-admiral; energetic commander who promoted Brit. commerce; took part in occupation of Cape of Good Hope, 1806; reprimanded for action at Buenos Ayres, 1807; recovered prestige.

POPISH PLOT, see OATES, TITUS.

POPLAR (*Populus*), a genus of trees allied to willows (*Salix*), and included with them in Salicaceæ; several species—*P. tremula* (aspen), *P. fastigiata* (Lombardy p.), *P. alba* (white p.), and *P. nigra* (black p.) being the best known. The inflorescences take the form of catkins, the carpellary flowers being wind-pollinated. The timber, though used for scaffolding, is not of great value.

POPLAR, borough, on Thames, 3 miles E. of St. Paul's, London. Pop. (1911) 162,449.

POPOCATEPÉTL (19° N., 98° 40′ W.), volcano, state of Puebla, Mexico; one of highest peaks in N. America (17,880 ft.); immense crater yields sulphur.

POPPY (*Papaver rhœas*), a common cornfield weed; *P. somniferum*, the opium p. See OPIUM.

POPULATION, see CENSUS.

POPULONIUM (43° N., 10° 30′ E.), ancient seaport, Etruria, Italy.

POQUELIN, see MOLIÈRE.

PORBANDAR (21° 37′ N., 69° 48′ E.), chief town, seaport, P. state, Kathiawar, Bombay, India. Pop. 25,000.

PORBEAGLE, see under SHARKS AND DOG-FISHES.

PORCELAIN, see POTTERY.

PORCH, in architecture, an exterior appendage to a church or other building, making a covered approach or vestibule to a doorway.

PORCHARD, see under DUCK FAMILY.

PORCUPINE FISHES and **RABBIT FISHES** (*Diodontidæ*), globular or oblong fishes, armed with long projecting spines, movable or immovable; found in all but chiefly in tropical seas.

PORCUPINES, moderately large Rodents, protected by long, strong spines. The COMMON P. (*Hystrix cristata*) occurs in the countries round the Mediterranean Sea; the TREE P. (*Coendu*) is American.

PORDENONE (45° 57′ N., 12° 40′ E.), town, Venetia, Italy; cotton-mills. Pop. (commune) 12,500.

PORDENONE, IL (1483–1539), the name adopted by an Ital. painter of religious subjects, from his birthplace, near Pordenone, in Venetia.

PORFIDO ROSSO, see PORPHYRY.

PORGIES, see SEA BREAMS.

PORIFERA, see SPONGES.

PORISM, name given by ancient geometricians to a certain class of mathematical propositions whose object was to find what conditions will render certain problems indeterminate. Theorems were regarded as directed to *proving*, problems to *constructing*, and porisms to *finding*; so that p's are in a manner intermediate between problems and theorems. Playfair gives the definition—a proposition affirming the possibility of finding such conditions as will render a certain problem indeterminate, or capable of innumerable solutions.

POROS (37° 30′ N., 23° 30′ E.), small island, Greece, in Gulf of Ægina; ancient *Calauria*.

PORPHYRY (Gk. *purple*).—(1) (Petrology) hard stone, resembling granite and known also as *porfido rosso antiquo*; red, with green, black, or white variations; polished and used for ornamental purposes; composition: felspar, hornblende, and oxidised iron; found in Egypt (where, near Siout, there was a dyke some 80 ft. thick), in East, and in parts of England, Ireland, and Germany. (2) (Geology) term used in reference to any unstratified igneous rock containing felspathic crystals or other minerals, *e.g.* felspar-p., claystone-p., porphyritic-granite, porphyritic-greenstone, quartz-p., augite-p., etc.

PORPHYRY OF TYRE, see PLATO.

PORPOISE, see DOLPHIN FAMILY.

PORSON, RICHARD (1759–1808), Eng. scholar; b. E. Ruston, Norfolk; protégé of village squire, who sent him to Eton, 1774; entered Cambridge Univ., 1778; Fellow of Trinity, 1782; prof. of Greek, 1792. He had great ability, a marvellous memory and power of concentration, but intemperance and poverty ruined him. His works include *Letters* on Hawkins's *Life of Johnson*, edition of plays by Æschylus and Euripides, *Adversaria* and *Tracts and Criticisms* (both posthumous).

Life, by Weston (1808), Watson (1861).

PORT, see WINE.

PORT ADELAIDE (34° 52′ S., 138° 35′ E.), the port of Adelaide, S. Australia, on Gulf of St. Vincent; silver- and copper-smelting works. Pop. 21,000.

PORT ARTHUR.—(1) (38° 48′ N., 121° 20′ E.) fortified town, Liao-Tung peninsula, Manchuria (*q.v.*); Chin. name, *Lu-Shun-Kau*; taken by Japanese from Chinese, 1894; leased to Russia by China, 1898; surrendered by Russians to Japanese, 1905, after 11 months' siege; terminus of Trans-Siberian Railway. Pop. 51,000. (2) (48° 30 N., 89° W.) port, Ontario, Canada, on Lake Superior; shipping trade. Pop. 7000.

PORT AUGUSTA (32° 35′ S., 137° 40′ E.), seaport, S. Australia, on Spencer Gulf; exports wool; large ostrich farm.

PORT BLAIR (11° 41′ N., 92° 43′ E.), port, Brit.

Indian penal settlement, S. Andaman, Andaman Islands. Pop. 18,500.

PORT CHESTER (41° N., 73° 40′ W.), village, summer resort, New York State, U.S.A., on Long Island Sound; planing-mills. Pop. (1910) 12,809.

PORT ELIZABETH (33° 57′ S., 25° 37′ E.), seaport and district, Cape Province, S. Africa, on Algoa Bay; college, library, museum, botanical garden, parks; important transit trade; exports wool, skins, feathers, mohair. Pop. (1911) 30,676; (white) 18,216.

PORT GLASGOW (55° 56′ N., 4° 41′ W.), seaport, on Clyde, Renfrewshire, Scotland; shipbuilding yards, engineering works. Pop. (1911) 17,749.

PORT HOPE (43° 58′ N., 78° 20′ W.), town, port of entry, Ontario, Canada, on Lake Ontario; trade in lumber. Pop. 6100.

PORT HURON (42° 59′ N., 82° 29′ W.), city, Michigan, U.S.A., at junction of Black and St. Clair; shipbuilding yards; lumber trade. Pop. (1911) 18,863.

PORT JACKSON (33° 52′ S., 151° 11′ E.), harbour, New South Wales, Australia; on its S. shore is Sydney (*q.v.*); naval station.

PORT JERVIS (41° 22′ N., 74° 46′ W.), city, summer resort, on Delaware, New York State, U.S.A. Pop. (1910) 9314.

PORT LOUIS (20° 10′ S., 57° 28′ E.), port, capital of Mauritius; see of R.C. and Anglican bp's; observatory; sugar. Pop. (1911) 50,060.

PORT MAHON, MAHON (39° 54′ N., 4° 19′ E.), fortified seaport, Spain; capital of Minorca, Balearic Islands; naval station; ancient *Portus Magonis*. Pop. 18,500.

PORT NATAL, see DURBAN.

PORT PHILLIP (38° 10′ S., 144° 50′ E.), bay, Victoria, Australia. Melbourne is at N. end.

PORT PIRIE (33° 10′ S., 138° 1′ E.), town, S. Australia, on Spencer Gulf; exports wheat. Pop. 8000.

PORT RICHMOND, former village, Richmond County, New York, on Staten Island; now part of New York City.

PORT SAID (31° 15′ N., 32° 18′ E.), seaport, Egypt, at entrance of Suez Canal; coaling-station. Pop. 49,884.

PORT SUDAN (19° 35′ N., 37° 12′ E.), town, Anglo-Egyptian Sudan, on Red Sea. Pop. 4600.

PORT TOWNSEND (48° 8′ N., 122° 43′ W.), city, port of entry, Washington, U.S.A., on Puget Sound; trade in lumber; magnificent harbour. Pop. (1910) 4181.

PORTADOWN (54° 26′ N., 6° 27′ W.), town, on Bann, County Armagh, Ireland; textiles. Pop. (1911) 11,727.

PORTAGE (43° 31′ N., 89° 22′ W.), city, Wisconsin, U.S.A., on Wisconsin; manufactures bricks. Pop. (1910) 5440.

PORTAGE LA PRAIRIE (49° 57′ N., 98° 20′ W.), town, Manitoba, Canada; trade in grain. Pop. 6100.

PORTALEGRE (39° 14′ N., 7° 26′ W.), city, P. district, Portugal; bp.'s see; woollens. Pop. 12,000.

PORTALIS, JEAN ÉTIENNE MARIE (1746–1807), Fr. jurist; assisted Napoleon in framing *Code Civil*; works include *Discours sur le Code Civil* and *De l'Usage et de l'Abus de l'Esprit Philosophique*.

PORTARLINGTON (53° 9′ N., 7° 11′ W.), town, on Barrow, King's and Queen's County, Ireland.

PORT-AU-PRINCE (18° 34′ N., 72° 20′ E.), capital and chief seaport, Haiti, on Gulf of Gonaïves. Pop. 100,000.

PORTEOUS RIOTS, disturbances in Edinburgh, 1736. **Captain Porteous** of the City Guard fired on a crowd who were making a demonstration on the escape of a prisoner, an act for which he was imprisoned; mob broke open Tolbooth prison and hanged P. in Grassmarket. The opposition which the Scot. M.P's showed against punitive legislation for this deed is historically significant. See Scott's *Heart of Midlothian*.

PORTER, see BREWING.

PORTER, DAVID (1780–1843), Amer. naval commander, forced Brit. ship *Alert* to surrender, 1812; inflicted great losses on Britain in Pacific, 1813; commanded Mexican fleet against Spain, 1829.

PORTER, DAVID DIXON (1813–91), Amer. naval commander; s. of David Porter (*q.v.*), served in Mexican and Civil Wars and received thanks of Congress and grade of rear-admiral for action on Mississippi, 1863; captured Fort Fisher, 1865, again receiving thanks of Congress; vice-admiral, 1866; superintendent of U.S. Naval Academy, 1866–69.

PORTER, ENDYMION (1587–1649), Eng. courtier; beloved by James I. for wit; accompanied Prince Charles and Buckingham to Madrid, 1623; adhered to Charles during Civil War, though disapproving of his measures; distinguished *dilettante*.

PORTER, FITZ-JOHN (1822–1901), Amer. general; distinguished as commander of V. corps in Civil War, but involved in disgrace by its inaction at *Bull Run*.

PORTER, JANE, (1776–1850), Brit. novelist, was b. at Durham. She wrote many books in an exaggerated romantic style, but her best romance, *The Scottish Chiefs*, in spite of numerous faults, is a spirited and thrilling picture of the times of Wallace.

PORTEUS, BEILBY (1731–1808), bp. of Chester, 1776, London, 1787.

PORTHCAWL (51° 28′ N., 3° 42′ W.), seaport, watering-place, Glamorganshire, Wales; exports coal, iron. Pop. (dist.) 3443.

PORTICI (40° 50′ N., 14° 20′ E.), town, fishing port, on Bay of Naples, Italy. Pop. 14,600.

PORTLAND.—(1) (43° 40′ N., 70° 20′ W.) town, Maine, U.S.A., on Casco Bay; stands on narrow peninsula; episcopal see of R.C. and Prot. Churches; has two cathedrals; many fine public buildings, including Federal and Cumberland County Courts, Observatory, Post Office, and Custom-House; many educational and philanthropic establishments; several beautiful parks; fine harbour; has great elevators belonging to Grand Trunk Railway; exports grain, flour, dairy produce, lumber, live stock, etc. Pop. (1910) 58,571. (2) (45° 31′ N., 122° 31′ W.) largest city in Oregon, U.S.A., on Willamette; contains Portland Univ. and other important educational institutions; commercial and railway centre and seaport; extensive docks; iron and woollen manufactures; exports wheat, flour, lumber, salmon. Pop. (1911) 207,214. (3) (38° 21′ S., 141° 32′ E.) seaport town, Victoria, Australia.

PORTLAND, EARLDOM AND DUKEDOM OF, Eng. honours. Earldom cr., 1633, for Richard, Lord Weston, favourite of Charles I.; extinct, 1688; granted, 1689, to Dutchman, WILLIAM BENTINCK, whose descendants still hold it, with dukedom, cr. 1716.

PORTLAND CEMENT, see CEMENT.

PORTLAND, ISLE OF (50° 32′ N., 2° 27′ W.), peninsula, Dorsetshire, England, in Eng. Channel; castle built by Henry VIII.; quarries of building stone, and a great breakwater; convict prison. Pop. (1911) 17,013.

PORTLAND, WILLIAM BENTINCK, 5TH EARL OF (*c.* 1645–1709), Brit. statesman; one of Dutchmen promoted by William III.; lieut.-gen. at *Battle of Boyne*, 1690; fought at *Landen* and *Namur*; ambassador to France, 1698, 1700.

PORTLANDIAN, or **PORTLAND BEDS**, subdivision of Jurassic system; the strata between Kimeridge Clay and Burbeck Beds; oolitic limestones, freestone, clays, and sands; fossils—fish, molluscs, and reptiles; well seen in Island of Portland, hence name.

PORTO ALEGRE (30° 1′ S., 50° 4′ W.), city, port, capital of state, Rio Grande do Sul, Brazil; bp.'s see; important commerce; exports hides, hair, wool. Pop. (1912) 100,000.

PORTO FARINA, GHAR-EL-MELA (37° N., 10° 20′ E.), decayed town, Tunis, at mouth of Mejerda; ancient *Bagradas*.

PORTO MAURIZIO (43° 53′ N., 8° 1′ E.), seaport

(and province), Italy, on Mediterranean; olive oil. Pop. (1911) 7850. Province, which adjoins France, has area of 455 sq. miles. Pop. (1911) 146,847.

PORTO NOVO (11° 30′ N., 79° 48′ E.), seaport, Coromandel coast, Madras, India; Hyder Ali defeated here by British, July 1781. Pop. 14,500.

PORTO RICO, PUERTO RICO (17° 48′ to 18° 31′ N., 65° 29′ to 67° 15′ W.), most easterly island of Greater Antilles group, W. Indies; area, 3606 sq. miles. Surface rises from coast to a ridge running N.W. and S.E., and having extreme height of over 3650 ft.; drained by many short rivers; upper part forested; flat coastal districts and river valleys very fertile and highly cultivated.

P. R. was discovered by Columbus in 1493, after which it became a Span. possession; various unsuccessful attacks were made upon it by Brit. forces between 1595 (when Drake and Hawkins were repulsed) and 1797; remained in the hands of Spain until 1898, although during practically the whole of the XIX. cent. it was the scene of constant rebellion against the mother-country; passed to the U.S.A. as a result of the Span.-Amer. War, 1898.

Principal towns are San Juan and Ponce. Chief products are coffee and sugar; tobacco, rice, fruits, and vegetables are also grown, and live stock raised; railway mileage, *c.* 220. Administration is carried out by Gov., nominated by Pres. of U.S.A., and assisted by Executive Council and House of Delegates. Education is free and obligatory; univ. at Rio Piedras. Principal religion is R.C. Pop., including whites, mulattoes, negroes, and Chinese (1910), 1,118,012.

Van Middledyk, *The History of Puerto Rico.*

PORTO TORRES (40° 50′ N., 8° 30′ E.), seaport, Sardinia, on Gulf of Asinara; ancient *Turris Libisonis.* Pop. 3800.

PORTOCARRERO, LOUIS MANUEL FERNANDEZ DE (1635–1709), Span. cardinal (1669); abp. of Toledo, 1677.

PORTOVENERE (44° 5′ N., 9° 50′ E.), small seaport, Italy, on Gulf of Spezia (ancient *Veneris Portus*). Pop. 5300.

PORTRAITURE.—Coloured portraiture, except in its ruder forms on Egyptian mummy cases or on Rom. mosaics, was not much in vogue in ancient times. Sculptured busts, both Greek and Roman, are numerous and unrivalled. Mediæval art, dominated by the Christian conception, did not encourage p., though Ghirlandajo and some others introduced portraits incidentally into frescoes. The early Renaissance, in Germany and the Low Countries especially, revived p. (cf. works of Dürer, Cranach, Holbein, the Van Eyks). Courts and wealthy Flemish cities with purse-proud aldermen supplied a ready market for Moro, Rubens, Van Dyck, and Rembrandt. In Spain, Morales, Zurbaran, Velasquez, and Ribera, in France, Cousin, Rigaud, and, much later, Boucher, David, Greuze, and Gérard devoted their genius greatly to p. Reynolds and Gainsborough were the first great Eng. portrait painters; previously foreign artists had been employed. Among the principal later portraitists in Britain are Romney, Raeburn, Lawrence, Millais, Hole, Watts, Orchardson, and Herkomer; in U.S.A., Whistler, Sargent, and Shannon; in Canada, Wyatt, Eaton, and Williamson; and in Australia, Lambert in our own day. An interesting branch of p., miniature painting, was prevalent in the XVIII. cent., and is undergoing a slight revival.

PORT-ROYAL, PORT-ROYAL DES CHAMPS, famous Cistercian nunnery near Versailles, founded 1204; removed to Paris, and became prominent in XVII. cent. as Jansenist and educational centre; produced a noble type of spirituality; abolished, 1710. See ARNAULD, JANSENISM.

PORTRUSH (55° 13′ N., 6° 40′ W.), seaport, watering-place, County Antrim, Ireland.

PORTSMOUTH (50° 48′ N., 1° 5′ W.), seaport, Hampshire, England, on Portsea Island, at entrance of Portsmouth harbour; includes Portsmouth proper, Portsea, Landport, Southsea, and (on opposite shore) Gosport; noted for its magnificent harbour; greatest arsenal, strongest fortress, and principal naval station in U.K. At Portsea are the royal dockyards and naval establishments; close to it is the Spithead; birthplace of Dickens. Pop. (1911) 231,165.

PORTSMOUTH.—(1) (36° 46′ N., 76° 26′ W.) city, seaport, on Elizabeth River, Virginia, U.S.A.; navy yard; lumber, cotton. Pop. (1910) 33,190. (2) (43° 2′ N., 70° 49′ W.) city, port of entry, summer resort, New Hampshire, U.S.A.; excellent harbour. Pop. (1910) 11,269. **Treaty of Portsmouth** signed here—see JAPAN, p. 863. (3) (38° 41′ N., 82° 53′ W.) city, Ohio, U.S.A.; machinery, ironware. Pop. (1910) 23,481.

PORTSMOUTH, DUCHESS OF, LOUISE DE KÉROUALLE (1649–1734), Duchesse d'Aubigny, 1684; mistress of Charles II.; famed for gallantry and rapacity; mother of Duke of Richmond.

PORTUGAL (37° to 42° N., 6° 20′ to 9° 25′ W.), republic in extreme S.W. of Europe and Iberian Peninsula; bounded on N. and E. by Spain, W. and S. by Atlantic Ocean. P. consists of six provinces—Entre Minho-e-Douro, Beira, Tras-os-Montes, Alemtejo, Estremadura, Algarve; Azores and Madeira Islands are accounted integral parts of P.; length from N. to S., *c.* 350 miles; breadth, 138 miles; total area (of Continental P.), 34,250 sq. miles; including Azores and Madeira, 35,500.

Coast-line is *c.* 460 miles, with two large indentations—Bay of Setubal and estuary of Tagus. Cape da Roca is the most westerly point of P. **Surface** is generally mountainous, especially N. of Tagus; Serra do Gerez (4390 ft.), Serra de Nogueira (4331 ft.) in N.; Serra da Estrella (6532 ft.), highest mountains of P., in central region; Serra Gralheira (3681 ft.), Montemuro (4534 ft.), S. of the Douro; Serra de São Mamede (3363 ft.), N.W. of Alemtejo, and Serra de Monchique (2963 ft.), in extreme S. Immense plains stretch S. of Tagus; coastal districts generally flat (except near Lisbon and in S.) and marshy. Almost all geological formations are found in P.; about two-thirds belong to Archæan (granite, schist, gneiss, etc.) and Palæozoic periods: Cambrian and Silurian in region of Tagus and Douro; Carboniferous deposits in Alemtejo, etc.; extensive Jurassic rocks are found in Estremadura, Tertiary deposits in flat coastal regions and Tagus district. Principal rivers are—Tagus, Douro, Guadiana, Minho, Lima, Cavado, Mondego, Ave, Vouga, Homen, Sado, Tamenga, Sabor, Côa, Paiva, Ponsul, Ocreza, Niza, Caia, Cobres, Vascão, Oeiras; many navigable.

Climate is generally healthy and equable in elevated regions. Summers are tempered by sea-breezes; winters, short and mild; marshy districts unhealthy. P. is subject to heavy rainfalls (greatest in N. and Serra da Estrella); mean temperature of Lisbon, *c.* 61° F.; mean annual temperature of N., *c.* 59° F.; of S., *c.* 63° F. Flora is rich and varied; extensive forests of cork, pine, oak, Portug. cypress, etc., mainly in S.; large tracts of pasture-land; extensive moors of cistus; numerous fields of rhododendrons in Serra de Monchique. Fauna akin to that of Spain (*q.v.*).

History.—Like Spain, P. was in early times inhabited by Iberians and Celtiberians. Carthaginians made settlements on coast, III. cent. B.C.; P. came under Rom. rule, 138 B.C. (*Lusitania*); then successively taken by Alans, Suevi, Visigoths, V. cent., and Moors, VIII. cent.; partly recovered for Christendom by Ferdinand I. of Castile, and named *Portus Cale,* XI. cent. In 1095 P. became independent as hereditary fief of Count Henry of Burgundy; his son, ALFONSO I., assumed title of king, 1139, and conquered (with help of Eng. Crusaders) Lisbon, 1147, which became capital. The kingdom was gradually extended southward until Algarve was taken, 1251. In 1383 the male line of house of Burgundy became extinct with Ferdinand I., and the crown passed to JOHN I., his illegitimate son. From this time onward P. began to flourish; Portug. mariners, aided and encouraged by Prince Henry the Navigator, laid the foundation

of P.'s Colonial Empire and oversea trade; Ceuta taken, 1415; Madeira, 1420; slave trade begun, 1434. In reign of JOHN II. (1481–95), Cape of Good Hope was rounded by Dias, 1486, and Vasco da Gama discovered sea route to India, 1897. During reign of MANUEL I. (1495–1521) Brazil was taken (1500); Ascension and Madagascar discovered, 1501; Goa, 1510; Malacca, 1511; Ceylon, etc., and island of Ormuz (1515) in Persian Gulf. P. now controlled the Eastern trade and was at the zenith of her power.

In 1580 the illegitimate Burgundian line became extinct. Conquered by Philip II. of Spain, 1581, who claimed the crown, P. suffered severely through Spain's wars with Netherlands, etc. (see SPAIN). Revolution broke out, 1640, and Duke of Braganza was proclaimed king of P. as JOHN IV.; the struggle for freedom continued until 1668, when Spain was forced to recognise the independence of P. During succeeding reigns P.'s power declined, and a heavy price had to be paid for England's support against Spain and other foes. The famous Methuen Treaty was made between England and P. (1703), making the latter commercially practically dependent on the former. Great Government reforms were made by Pombal, the distinguished and powerful Minister of JOSEPH I. (1750–77); Lisbon partially destroyed by earthquake, 1775. When MARIA I. (1777–1816) ascended the throne, Pombal was dismissed. In the PENINSULAR WAR (*q.v.*), Portuguese were allied with Britain and Spain against Napoleon (1807–14). The royal family had fled to Brazil (*q.v.*) and when JOHN VI. became king of P. and Brazil, 1816, he remained in Brazil and appointed Marshal Beresford gov. of P. This caused the revolution of 1820, and in 1821 a Liberal Constitution was framed which John had to accept on his return, 1821. Bitter strife now ensued between Liberals and Reactionaries (led by John's bro., Miguel). Brazil established its independence under John's son, Pedro (1825), who, as PEDRO IV., resigned his claim to Portug. Crown in favour of his young dau., MARIA II. DA GLORIA, who ascended the throne, 1826, with her great-uncle, Miguel, as regent. In 1828 Miguel proclaimed himself king, and there followed a Civil War until 1833, when Miguel renounced his claim.

In 1836 Maria II. married Ferdinand, Prince of Saxe-Coburg-Gotha (FERDINAND II., d. 1885). PEDRO V. ruled, 1853–61, followed by LUIS I. (1861–89), during whose reign the various boundary disputes in Africa began. Britain claimed part of Delagoa Bay, which was eventually awarded to P. by arbitration, 1875; boundaries fixed in West Africa by Germany, France, and P., 1886; Macao ceded to P. by China, 1887; Nyasaland dispute with Britain, 1889; in 1891 Portug. Government withdrew claim, which caused great dissatisfaction throughout P. When CARLOS I. ascended the throne (1889) the financial condition of the country was deplorable; national bankruptcy ensued, 1892. Carlos attempted to improve matters, and made Franco dictator, whereupon the king and crown prince were assassinated, Feb. 1, 1908. MANUEL II. was proclaimed king; in 1910 a revolution broke out; the royal family fled to England; Lisbon was bombarded and P. was proclaimed a republic. In 1911 a Republican Constitution was adopted and formally recognised by Powers.

Language.—Portuguese (also spoken in Brazil) is a Romance tongue, akin to Span. Galician; influenced by Celtic, Frankish, and Arabic invaders; abounds in sibilants and nasal sounds.

Literature dates from XIII. cent., when Portug. language attained literary form, thanks especially to King DINIZ (*c.* 1300), himself an accomplished poet. Provençal influence prevailed till Ital. models were introduced in XV. cent. through Spain. GIL VICENTE (1490–1536), who created Portuguese drama, the poet SÁ DE MIRANDA (1495–1558) and BERNARDIM RIBEIRO (*c.* 1500), writer of eclogues, ushered in classical age of Portug. lit., of which greatest figure is CAMOENS (1524–80), whose *Lusiad* ranks among world's greatest epics. Other poets and prose writers of this period are Antonio de Ferreiro, Côrte-Real, Pereira de Castro, Ferreira de Vasconcellos, João de Barros, Albuquerque, Francisco de Andrade. Coimbra Univ. became a great seat of the Humanists. Montemayor, Portuguese by birth, wrote his *Diana* in Castilian. Loss of Portug. independence (1581) was fatal to Portug. lit., which showed little sign of recovery until XIX. cent. The Portug. nun ALCOFORADO, GONZAGA, BOCAGE, and DE MACEDO, may, however, be mentioned. D'ALMEIDA GARRETT (1799–1834), DE CASTILHO (1800–75), and HERCULANO (1810–79) introduced Romantic movement; CASTELLO BRANCO and BRAGA, the literary historian, among recent writers have kept Portug. lit. alive.

Government.—Since 1911 P. has been a republic, with President elected for four years, and Congress, consisting of Senate (71 members, elected for 6 years), and National Council (164 members, elected for 3 years). P. is divided into 21 districts, each administered by gov. and local council (*Junta*), viz. Aveiro, Algarve, Braga, Beja, Bragança, Coimbra, Castello Branco, Evora, Guarda, Leiria, Lisbon, Porto, Portalegre, Santarem, Villa Real, Dianna do Castello, Vizeu, on Portug. Continent; Madeira; and Azores (3).

Defence.—Military service is compulsory (Laws of 1887, 1911). From 16 to 20 youths undergo drill and rifle practice; at 20 they pass into active army; volunteers, supplemented (if necessary) by conscripts chosen by lot, serve 1 year; others receive preliminary training (15 to 30 weeks); then follow yearly courses of 2 weeks till men pass into reserve (at 30), and territorial army at (40), when periods of training are reduced. Peace strength is fixed at 30,000 men. The NAVY is manned from seafaring population by obligatory service. Ships are few and mostly old, comprising (1913) 1 battleship, 4 cruisers, some gunboats, torpedo-boats, etc.

Colonies.—Dependencies and colonies are: Cape Verde Islands, Portug. Guinea, Angola, São Thomé and Principe (islands), and Portug. East Africa, in Africa; Goa, Damão Diu (India), Macao (China), and part of Timor in Eastern Archipelago; total area, *c.* 805,000 sq. miles. Portug. colonies are administered by gov.-generals and gov's.

There is no State **religion**, but Catholicism is almost universal; there are 4000 to 5000 Protestants and several hundred Jews. P. is divided into 3 ecclesiastical provinces (including Azores and Madeira), with 3 sees: at Lisbon, Braga, and Evora. Monasteries were suppressed in 1834. Elementary **education** is nominally compulsory (since 1844), but from 70 to 80 % of population are illiterate. P. has a univ. at Coimbra (1290), schools of med. at Lisbon, Oporto, and Funchal, military and naval schools and conservatoire of music at Lisbon, polytechnica at Lisbon and Oporto, besides schools of commerce, agriculture, and various other institutions.

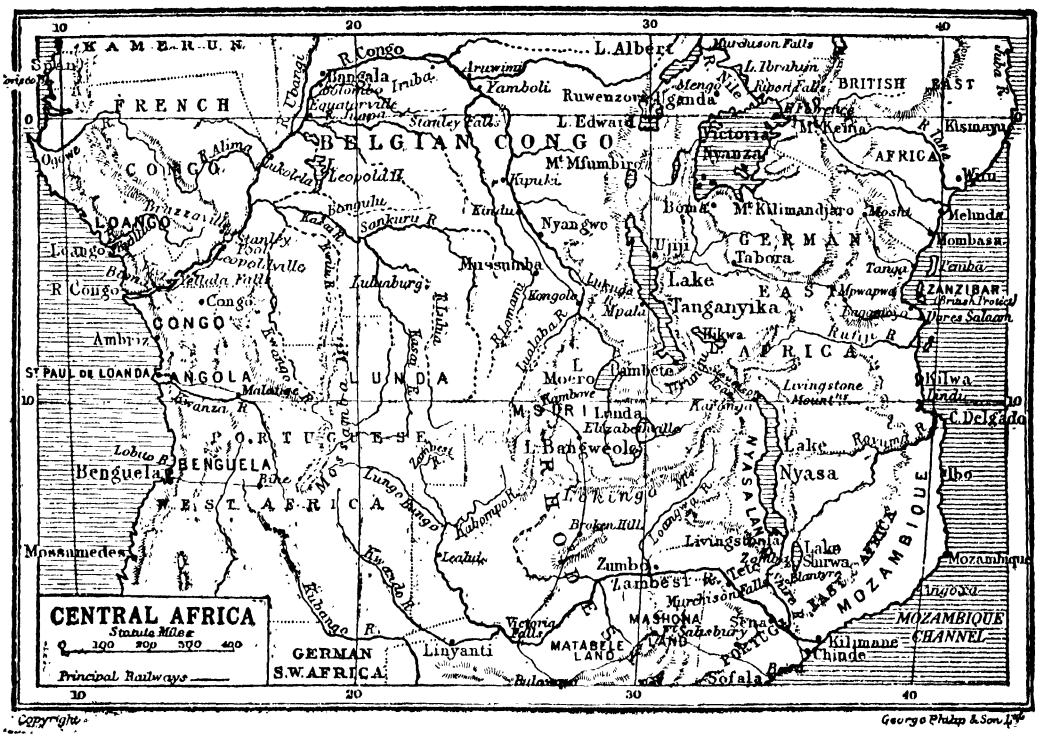
Of the TOWNS, chief seaports are Lisbon (capital), Oporto, Setubal, Funchal (Madeira), Ponta Delgada (Azores), Tavira, Faro; largest inland towns, Braga, Coimbra, Evora, Covilhã, Elvas, Portalegre. Total RAILWAY mileage (1912) 1900 miles, of which about one-third belong to State.

Principal **products** are: wheat, maize, rye, potatoes, tomatoes, oranges, lemons, figs, and other fruits, timber, olives, and vine. Wine-making is an important industry; famous port-wine district is Alto Douro; important cattle-rearing in the north; sheep and goats in the mountainous regions, and swine in the south; valuable fisheries (tunny, sardine, oyster, whiting, etc.). Large tracts of country are waste land. Chief exports are: wine, cork, cottons, fish, fruits, copper, timber, olive oil. P. is rich in minerals, viz. copper, antimony, iron, lead, tin, wolfram, manganese, salt, etc.; also marble, gypsum lime, and petroleum; coal is scarce, which accounts for many valuable mines not being worked. Other chief

industries are: cotton-spinning, weaving of woollens, cork-cutting, tanning, glass and earthenware, lace, paper, gold and silver filigree work, making of preserves, hats, etc. Exports are valued at over £8,000,000; imports over £15,500,000. Pop. (1900) 5,423,132; (1910) *c.* 6,000,000.

Baedeker, *Spain and Portugal* (1901); Koebel, *Portugal: its Land and People* (1909); MacMurdo and Monteiro, *History of P.* (1888, 3 vols.); Stephen, *Portugal* (Story of Nations: 2nd ed., 1903).

PORTUGUESE EAST AFRICA (10° 40′ to 27° S., 31° to 41° E.), Portug. territory on east coast of Africa; bounded by Ger. E. Africa (N.), Nyasaland, Rhodesia, Transvaal, and Swaziland (W.), Zululand (S.), Ind. Ocean (E.); area, 293,400 sq. miles; coast-line, 1400 miles, with several large bays (Delagoa, Sofala, Inhambane, etc). Colony is traversed inland by mountain ranges: Namuli Mts. in N. (8800 ft.); Gorongoza (6500 ft.) in centre; Libombo range in S. Coastlands are flat and swampy; immense forests in interior. Climate is unhealthy on coast; healthier inland.



Fauna includes lion, elephant, hyena, rhinoceros, zebra, buffalo, etc.; crocodiles, hippopotami; varied flora. Chief rivers are Zambezi, Limpopo, Rovuma, Save, Komati; mostly navigable. Principal ports are Lourenço Marques (capital), Guilimane, Chinde, Mozambique, Beira, Ibo, Inhambane.

Vasco da Gama visited mouth of Zambezi, 1498; Mozambique taken from Arabs, 1507; Portug. East African possessions received separate government, 1509; boundaries fixed by Anglo-Portug. agreements, 1890, 1891, and 1905.

Colony is divided into government districts, Lourenço Marques, Mozambique, Inhambane, Guilimane, Tete, and concessions of chartered companies; the Mozambique Co. administers the country between Lourenço Marques and the Zambezi (Manica and Sofala regions); Nyasa Co. controls northern region between Lake Nyasa and Ind. Ocean; Zambezi Co. develops Zambezi region. Railways run from Delagoa Bay to Transvaal; Beira to Rhodesia; Lourenço Marques to Swaziland; railway projected from Beira to Zambezi. Chief products are rubber, cocoa-nuts, sugar, ivory, beeswax, timber, skins; fish abound along coast; coal, copper, gold, malachite are found. Pop. *c.* 3,000,000.

Maugham, *Portuguese East Africa* (1906), *Zambezia* (1910); Reibeiro, *Annuario de Moçambique* (1908).

PORTUGUESE GUINEA (*c.* 12° N., 15° W.), colony of Portugal, Senegambia, W. African coast; area, 13,940 sq. miles; boundary was fixed by agreement with France, 1886; includes Bissagoz Islands; capital, Bolama; principal port, Bissau; produces rubber, ivory, hides, wax, ground-nuts, oil-seeds, mahogany, rice. Pop. *c.* 820,000.

PORTUGUESE MAN-OF-WAR, see under HYDROMEDUSÆ.

PORTUS (41° 45′ N., 12° 15′ E.), ancient harbour, Latium, Italy, at mouth of Tiber; constructed by Claudius; named by Nero, *Portus Augusti.*

PORT-VENDRES, ancient *Portus Veneris* (42° 33′ N., 3° 7′ E.), seaport, Pyrénées Orientales, France, on Mediterranean; exports wine.

POSEIDON (classical myth.), god of the sea in Gk. mythology and identified with the Roman god NEPTUNE. He was the son of Cronus, and when new order was established Zeus became lord of heaven, Poseidon of the sea, and Hades of the under-world. He is represented in art as driving a sea-chariot and bearing a trident.

POSEN.—(1) (52° 16′ N., 16° 50′ E.) province, Prussia; area, 11,190 sq. miles; surface generally flat, with one or two points rising to 600 ft.; drained by Warthe and other streams; was formerly part of Poland, but after partitions of 1772 and 1793 came to possession of Prussia; included in duchy of Warsaw, 1807; restored to Prussia, 1815; manufactures sugar, beer, paper, machinery; sheep raised. Pop. (1910) 2,099,831. (2) (52° 24′ N., 16° 51′ E.) fortified city, capital of above, on Warthe; was residence of the early Polish rulers; flourishing commercial centre in Middle Ages; seat of R.C. archbishopric; contains cathedral, town hall, and royal palace; agricultural implements; liqueurs. Pop. (1910) 156,691.

POSITIVISM, any system confining philosophy to data and methods of natural sciences, and opposed to *à priori* assumptions. See COMTE, AUGUSTE.

POSSESSION (Law), originally, the condition of mastery over a material thing, giving the power to deal with it at pleasure to the exclusion of other persons. Hence it was detention, or use. This power of use or detention became ownership under certain conditions, or the legal authority over an estate. So now possession may be either *actual*, where a person enters upon lands or tenements by inheritance; or *in law*, when lands, etc., have been bequeathed or inherited, but have not been actually entered upon.

For P. in sense of being controlled by spirits, see DEMONOLOGY, EXORCISM.

POSSNECK (50° 43′ N., 11° 38′ E.), town, Saxe-Meiningen, Germany, on Kotschau; flannel. Pop. (1910) 12,430.

POSTAL SERVICES.—In ancient Egypt, Assyria, Persia, Greece, and Rome, 'swift runners,' relays of men and horses, conducted primitive postal services. Some Gk. states possessed postmen (*hēmerodromes*, 'daily messengers'). Under the Rom. Empire a *cursus publicus* (public postal system) was established with offices (*stationes*) and postmen and postmasters (*stationarii, mancipes cursus publici* or *mancipes mutationum*). All over the Rom. world were to be found couriers' horses (*veredi*), couriers (*veredarii*), and the *judices curiosi*, who exercised police control. This elaborate system was solely for State use, and might not be employed by individuals until Diocletian granted private posting facilities. Rome never conceived the idea of utilising this important opportunity of revenue, but her system was of the greatest speed and excellence.

The Rom. organisation disappeared in the West on the barbarian conquest of the Empire, but survived in the Byzantine Empire. Charlemagne vainly attempted to revive it in the West. An international postal service was carried out in the Middle Ages by religious orders, whose various cells kept up communication with each other, the scholars of univ's, trade guilds, and merchants. The Univ. of Paris had organised an excellent service by 1464, when Louis XI. promulgated an edict by which the FR. ROYAL POST, for use of individuals as well as State, was established. The two services, however, ran side by side till 1696, when the State took charge of all private letters. Besides the excellent Prussian service of the Teutonic Knights, emperors of the Holy Roman Empire restored the Rom. *cursus publicus* in their Ital. and Ger. dominions. Germany had also from XIII. to XVII. cent. the 'drovers' post'; herdsmen and butchers were almost *ex officio* postmen.

The family of TAXIS organised the posts of the Empire. Francis, count of Thurn and Taxis, became captain and Master of the Posts in 1500, and undertook the service of Netherlands, Empire, and Spain, 1505, Rome and Naples, 1516. His nephew, Johann Baptista von Taxis, was appointed Postmaster-General of all Charles V.'s realms, 1520, and the position was made hereditary in the Taxis family, 1615. Despite the agitation of minor states of Germany the Taxis retained the privilege, confirmed by treaties of 1815 after reconstitution of the Empire; but sold their right to Prussia, 1867, for 3 million thalers, having carried out their task in an exemplary manner for 3½ cent's. Brandenburg had established a State postal service, 1646, which spread all over Germany in the first half of XIX. cent., before the purchase of the Taxis rights.

British Postal History.—The early history of the Brit. postal service is obscure. Expenses of *nuncii* (messengers), who carried government letters, are entered in Exchequer accounts from earliest times. Under Edward II. regular 'posts' (the Rom. *stationes*) were established. The system of employing casual messengers seems to have endured down to Henry VIII.'s time. The office of Master of the Posts is first mentioned, 1512, apparently lately introduced (see *Letters and Papers, Henry VIII.*, i. *passim*). Brian Tuke, who as king's sec. paid the postmaster in 1512, was made 'Gov. of the King's Posts,' 1517. Tuke in 1533 informed Cromwell, who was dissatisfied with the posts, that except the hackney horses between Gravesend and Dover, there were no regular posts in England as in France and other parts. Directed to establish posts where he thought expedient, he perfected the service between London, Calais, and Scotland. Elizabeth altered the title of Gov. of the Posts to Chief Postmaster.

The State for long had no monopoly, and Scot. services were separate; James I. regulated public postal charges, 1603, and the rate of speed at which letters were to be delivered, and in 1619 instituted the office of Postmaster-General for foreign parts. Charles I. in 1635 abolished private services. Attempts of the Common Council of London, 1649, and of John Hill of York during the Commonwealth to run a private improved service were stamped out by Parliament and Cromwell respectively. Hill opposed government monopoly, as against the 'liberty and birthright of every Englishman.' Similar attempts of Dockwra, under Charles II., and Povey, under William III., failed. An Act for Erecting and Establishing a Post Office, 1660, known as the *Post Office charter*, confirmed changes introduced during the Commonwealth.

The Post Office Act, 1710, brought the whole Brit. Empire under postal control of a *Postmaster-General*; this Act abolished the system of public horses, and provided for private persons receiving licence to keep post-horses. In 1784 John Palmer of Bristol induced Pitt to utilise newly introduced mail coaches, and provide armed convoys, this being the great age of highwaymen. The rise of railways in XIX. cent. exercised a profound influence on postal affairs. A Post Office Management Act, 1837, confirmed government monopoly, and decreed that although letters might be carried from friend to friend, if no fee were paid, no letters, even unpaid, except such as related to their goods, might be borne by common carriers or masters, crews or passengers of passenger vessels or barges.

In 1840 came the important reforms of ROWLAND HILL; two cent's earlier John Hill had shown that cheap rates of postage would increase profits, and in 1837 Rowland Hill published *Post Office Reform*, advocating prepayment of postage (adopted 1772 in Austria) by means of stamps and PENNY POSTAGE (a rate of 1d. for ½ oz., plus 1d. for each additional ½ oz.). A committee of the House of Commons made an enlightened report on these suggestions, predicting an improvement of revenue on their adoption, through increased use of the service, and emphasising the beneficial influence of cheap correspondence on civilisation. In spite of Government's reluctance, an Act of 1840 introduced penny postage, and ultimately increased postal revenue. Letters more than doubled in number the first year, as Hill had prophesied, but it took some years to abolish the deficit in revenue. This Act also suppressed the old system of *franking*, and introduced *Money Orders*, regularised by Money Order Act, 1848. *Book post* was inaugurated, 1885; *halfpenny postcards* issued, 1870; *Postal Orders* introduced, 1880; *Parcel Post* instituted, 1883; *Express Delivery Service* started, and *Express Messenger Co.* licensed, 1891; IMPERIAL PENNY POST was authorised, 1898, thanks to efforts of Sir J. HENNIKER-HEATON; extended to U.S.A., 1908.

Provident arrangements connected with the Post Office started with *Post Office Savings Banks*, opened 1861. Monopoly of electric TELEGRAPHS was granted to Post Office by Act, 1868, and lines of Electric Telegraph Co. were purchased, 1870; rate of 6d. for twelve words instituted, 1885. The Wireless Telegraph Act, 1904, placed WIRELESS TELEGRAPHY likewise under State control. The principle of government monopoly was also applied to TELEPHONES; by Telegraph Act, 1892, the Post Office worked and owned trunk lines, and was empowered to buy up lines of telephone co's, which had already (1881) been compelled to obtain licences from Post Office; National Telephone Company's lines purchased by Government, Dec. 31, 1911.

Espionage of Letters.—The Postmaster-General (P.M.G.) has the privilege of opening and detaining correspondence when so authorised by Sec. of State,

This right was assumed in early days of State provision for letter carriage. In XVII. and XVIII. cent's in France special officials were appointed to examine private correspondence. Napoleon revived *Cabinet noir*, which the restored Bourbons and Napoleon III. continued to utilise; prefect of police now has power to open correspondence. The Brit. system of espial was regulated by proclamation, 1663, and Post Office Act, 1710. As in France, this governmental right has been subject of much attack, notably in Mazzini's case, 1844. The system is much more employed in Russia, Austria, and Germany.

Postal Union.—The International Postal Union, formed by Treaty of Bern, 1874, now includes nearly every civilised country in the world; it holds quinquennial Congresses to settle international postal questions.

United States.—The p. s. has from first been carried on at a loss. Congress assumed direction in 1775; stamps were introduced 1847, made compulsory 1856; registration of letters 1855 (compensation for loss, 1897), effected in many districts at door of house, 1899; uniform 3 cents rate, 1863, reduced to 2 cents, 1885; money orders, 1864; express delivery in certain areas (10 cents extra), 1885; varying rates charged for four kinds of p. matter: (1) ordinary correspondence, (2) periodicals, (3) books and pamphlets, (4) other matter (parcels post matter), at rates (since 1913) varying with distance for from 5 to 12 cents per pound. POSTAL BANKS were authorised 1910, minimum deposit 1$, maximum 100$ per month, maximum balance 500$; certificates issued for deposits and surrendered on withdrawal; interest 2 % per annum.

Bennett, *Post Office and its Story*; Bowie, *Romance of the Post Office*.

POST-TERTIARY, see GEOLOGY.

POTASSIUM, K (kalium) = 39·10; metallic element of alkali group; occurs combined in many silicates; by the weathering of felspar, etc. The Stassfurt deposits include silvine, KCl, carnallite, $KClMgCl_2 6H_2O$, kainite, $K_2SO_4MgSO_4MgCl_2 6H_2O$. (For kainite, see MANURES.) P. compounds are an essential plant food, and wood ash contains p. carbonate (potash = ash from pot boiling). Metal was first obtained by Humphry Davy (1808) by electrolysis of potash (previously thought an element); now prepared by reduction of K_2CO_3 or KOH with carbon ($K_2CO_3 + 2C = 2K + 3CO$), magnesium, or aluminium, or by electrolysis.

Properties: Lustrous silvery white, crystalline, S.G. 0·862, brittle at 0° C., soft at 15° C., M.P. 62·5° C., B.P. 667° C.; vapour green, colours Bunsen flame lilac, spectrum contains a red and a violet line; quickly tarnishes in moist air, rapidly decomposes cold water; monovalent, and most electropositive of the well-known metals; hydroxide (KOH), a strong alkali. The salts are numerous and important; stable and soluble in water, the least soluble being $KClO_4$, $KHC_4H_4O_6$, K_2PtCl_6 (by which metal is estimated).

POTATO (*Solanum tuberosum*), a perennial vegetable, order Solanaceæ; first brought from America by Hawkins, Drake, Raleigh, and long grown as food for swine and poor folk. P's require a crumby soil and much farmyard manure, soot, and phosphates. In 1903–4 Findlay, a Fifeshire farmer, produced his El Dorado and obtained huge prices for single tubers, but disease-proof p's are as yet unknown. *Potato disease* appeared in England, 1845, caused the Irish famine of 1846–47, and has persisted since then; it is caused by a fungus, *Phytophthora infestans*, and results after prolonged rain or damp weather; symptoms are brown spots on the leaves; treatment consists in spraying with copper sulphate solution. P's are used in starch, sugar, and brandy manufacture.

Findlay, *The Potato: its History and Culture* (1906).

POTATO-BEETLE, see COLORADO BEETLE.

POTCHEFSTROOM (26° 30′ S., 27° 40′ E.), town, Transvaal; former capital of South African Republic. Pop. (1911) 12,449; 8107 white.

POTEMKIN, GREGORY ALEKSANDROVITCH, PRINCE (1736–91), Russ. statesman and general; favourite of Catherine II. (*q.v.*); retained power throughout life, skilfully managing her for his own ends; kept Prussia in check and won ports on Black Sea from Turkey; died during successful invasion of Turkey.

POTENTILLA, genus of plants, order Rosaceæ; common wayside plants are Creeping Cinquefoil (*P. reptans*), Goose-grass or Silverweed (*P. anserina*); flowers white or yellow.

POTENTIOMETER, instrument used for measuring the electromotive force between two points; a form of electrometer.

POTENZA (40° 39′ N., 15° 48′ E.), town, capital of P. province, Italy; ancient *Potentia*. Pop. 16,500; (prov.) 500,000.

POTEROO, RAT KANGAROO, see under MARSUPIALS.

POTI (42° 6′ N., 41° 41′ E.), seaport, Kutais, Russ. Transcaucasia, on Black Sea. Pop. 9000.

POTOMAC (38° 10′ N., 77° 10′ W.), river, U.S.A.; rises in Alleghany Mts. and, after forming boundary between Maryland and Virginia, falls into Chesapeake Bay; length about 400 miles.

POTOSI.—(1) (20° S., 65° 30′ W.) S.W. department of Bolivia, bordering Chile and Argentine Republic; mountainous; rich in metals. Pop. 364,689. (2) (19° 38′ S., 65° 25′ W.) city, capital of above; silver mines. Pop. 25,000.

POTOTAN (10° 50′ N., 122° 40′ E.), town, Panay, Philippine Islands. Pop. *c.* 30,000.

POTSDAM (52° 24′ N., 13° 3′ E.), town, on Havel, Prussia; capital of Brandenburg province; 17 miles from Berlin; Prussian royal residence; fine Brandenburger gate, Palace *Sans-Souci* (valuable pictures, beautiful grounds), New Palace, etc.; optical instruments, sugar refineries, breweries, etc. Pop. (1910) 62,243.

POTSDAM (44° 40′ N., 75° W.), village, St. Lawrence County, New York, on Racquette; sandstone quarries. Pop. (1910) 4036.

POTT, PERCIVALL (1714–88), leading Eng. surgeon of his time; surgeon to St. Bartholomew's Hospital (1749); introduced many important new surgical methods. A particular type of fracture of the ankle, and a tuberculous disease of the spine are named after him.

POTTER, ALONZO (1800–65), Prot. Episcopal bp. of Pennsylvania (1845); able as administrator and educationist. His bro., **Horatio Potter** (1802–87), was Prot. Episcopal bp. of New York. Alonzo's son, **Henry Codman Potter** (1835–1908), Prot. Episcopalian bp. of New York, 1887 (as assistant bp., 1883); prominent in social work.

POTTER, JOHN (1674–1747), bp. of Oxford, 1715; abp. of Canterbury, 1737.

POTTER, PAUL (1625–54), greatest of Dutch animal painters. The life-size *Young Bull* is the most celebrated of his pictures. His *Dairy Farm* was sold in London in 1890 for £6090.

POTTERY.—The art of fashioning rude clay urns, vases, and other earthen vessels evidently dates back to little after the first appearance of man, for traces of these vessels have been found in the tombs of the earliest prehistoric races. Indeed, wherever clay was to be found, the primitive savage appears to have been drawn by instinct to attempt the fashioning of it into shapes and figures with which he was acquainted, and it followed, as a natural consequence, that he should, in a little time, discover the use of this plastic material for domestic purposes. These earliest exam[illegible] been hardened by the heat of the sun, but when the properties of fire were fully realised the potter's art quickly developed, and we find in very early examples some attempt at decoration by means of incised lines forming zigzags and lozenges. In attempting, however, to trace the beginnings of pottery as a definite art we must turn to the ancient Egyptians.

We find there that the ceramic art had reached a high state of development as far back as the XVI. cent. Not only were the Egyptians then producing the fine red ware which is familiar to most visitors to museums, but they were making a kind of pottery from a substance consisting of a mixture of clay and sand, which was covered with a siliceous glaze, formed from oxide of copper, which produced beautiful colour effects. Likewise, with the Assyrians, the Babylonians, the Phœnicians, and the Romans, the potter's art reached a considerable state of development in the early stages of their civilisation. Of the Greeks, however, it may be said that down to the VII. cent. B.C. they showed little advance in the art, but a steady progress was maintained during the next 300 years, and by the IV. cent. B.C. it had reached its highest development. The most exquisite specimens of their work which have come down to us belong to this latter period, after which a marked decadence is to be observed. The early Gk. pottery consisted of plain baked earthen ware; later a brown glaze was used; subsequently a black pigment was employed to express upon the brown glaze the shapes of animals, and later of the human figure. Or, at another period, the rough clay vase was dipped in a solution of finer clay, known technically as 'slip,' which allowed the development of a more elaborate colour-scheme. The ceramic art reached a high state of development in Italy, France, and Germany during the XVI. and XVII. cent's; but in England, down to the beginning of the XVIII. cent., the native pottery ware was of a very rude character, which was probably due to the general employment of horn, or pewter, and other metals in the manufacture of articles of domestic use.

Pottery may be roughly divided under three heads: (1) EARTHENWARE, a material exposed only to a moderate heat in the process of baking, which can be scratched with a pointed instrument; (2) STONEWARE, a harder substance, baked at a great heat; and (3) PORCELAIN, including all the more delicate forms of pottery, which is fired at the highest possible temperature. The commoner sorts of clays are so impregnated with metallic ores and other foreign substances as to be useless except for the manufacture of bricks, tiles, etc. The purest kind of workable clay is that known as *kaolin*, or china-clay, which was first introduced into England in the early part of the XVIII. cent. It is found largely in China, also in France, Saxony, and the U.S.A., but its presence was not suspected in England until William Cookworthy discovered it in Cornwall about 1755. This clay consists of hydrated silicate of alumina, mixed with smaller proportions of lime, soda, and potash, and is derived from decomposed granitic rock. Another fine potter's medium is that known as *pipeclay*, or blue-clay, which is chiefly found in the neighbourhood of Poole, Dorset. The ingredients used in the mixing of porcelain clay vary in proportion in different countries and in different districts, but the following may be named as the chief constituent elements: kaolin, sand, pipeclay, chalk, ground flints, Cornish stone, and the calcined bones of oxen and sheep.

Process of Manufacture.—Having prepared his clay, the next work of the potter is to mould it into the required shape by means of the 'potter's wheel' (an instrument mentioned in Homer), which is said to have been invented by the Egyptians. A portion of the prepared clay is placed upon the wheel, or 'throwing-machine,' as it is also called, which is kept in rapid motion by hand, foot, or a machine-driven fly-wheel. Having roughly shaped his vessel, the thrower then passes it on to the turner, who smoothes down all roughnesses and inequalities, and then in turn gives it to the handler. Another method of manufacture is by pouring slip into moulds, which are often in several parts. Thus in making a china cream-jug there would probably be four moulds—one for the body, a second for the neck and lips, a third for the foot, and a fourth for the handle. Dishes, plates, saucers, and other flat ware are invariably made upon plaster moulds. The next process is by firing the moulded vessel in a kiln, or 'biscuit oven,' after which the baked article is allowed to cool and the glaze is then applied. The early Egyptian and Assyrian glazes were silicates of soda and lime, but these in time gave place to glazes produced from red and white lead, felspar, salt, and other materials. After glazing, the piece of pottery is placed in the glost-oven, in which the temperature varies according to the composition of the glaze and the kind of ware to be produced. After being removed from the glost-oven the article is in a finished state, or, if necessary, it may be enamelled in gold or some other colour.

Modern Porcelains.—A brief account must now be given of the development of the art of pottery amongst the Chinese, Japanese, and the peoples of the European continent—that is to say, we must now consider the rise and development of the porcelain industry.

CHINESE.—It is to the Chinese that we owe the invention of porcelain. While the early Greeks were producing their primitive earthenware vases the Chinese were manufacturing exquisite works of art in porcelain clay, and it is certain that the craft flourished in China under the Ming dynasty, which lasted from 1368 to 1644 A.D. Indeed, there is evidence to show that porcelain was being manufactured in China under the Tang dynasty (618 to 907 A.D.), and that it was a flourishing industry during the rule of the Sung emperors (960 to 1279 A.D.). The earlier examples of the art are now almost entirely lost to us, but there are in existence numerous examples of the XVII. and XVIII. cent's, at least, and at the present time excellent work is being manufactured, and the glorious traditions of the China we call Old Nankin is still preserved.

JAPANESE.—In the history of porcelain, Japan, although a long way after, is next in importance to China. Buddhism brought the Japanese knowledge of most of the arts, and they certainly learned the craft of porcelain manufacture from the Chinese. Though they had been making pottery from a comparatively early period, the first Jap. porcelains are believed to have been made about 1510 A.D. Europeans have little opportunity of comparing the early work of the Japanese in this medium with that of other nations, as most of the finest examples are still in Japan. Such specimens as are known to us are chiefly XVIII.-cent. work, and are called by the names of the districts in which they were made—Kaga, Kioto, Hizen, and Owari. The ware known as Satsuma does not, strictly speaking, belong to the porcelain class.

EUROPEAN.—Porcelain is believed to have been manufactured in Italy as early as the XV. cent., but the earliest examples which exist were manufactured about 1580 for Francis de' Medici, Grand Duke of Tuscany; after his death, seven years later, the industry appears to have languished. About a cent. later a small amount of porcelain was produced in Paris and Rouen, while in 1693 its manufacture was begun at St. Cloud, other Fr. towns shortly afterwards also engaging in the industry. A factory was established at Vincennes about 1745, in which Louis XV. eventually became a partner. Then in 1756, for want of space, the manufacture was transferred to Sèvres, and in 1759 the king became sole proprietor. The products of this noted factory have always been the fragile porcelains of the aristocracy, no attempt being made to cater for the requirements of the middle classes, and kings made presents to one another of Sèvres china, the nobility of Europe and leaders of society competing with each other in collecting examples of the work produced by the royal factory. All the earlier porcelain made at Vincennes and Sèvres was what is known technically as *soft porcelain*, and it was not until 1764 that the *hard* variety was first produced there. Saxony must be regarded as the real home of 'hard,' or true Chinese,

porcelain in Europe, and its invention was due to Johann Freiderich Böttger, who, in 1710, furnished Augustus II., king of Saxony, with the earliest example of what has since become known throughout the world as *Dresden china*. Every endeavour was made to keep the method of its manufacture a profound secret, but it was eventually betrayed, and factories for the making of Dresden ware came into existence in various places.

Amongst the most famous Eng. porcelain wares, each with its distinctive features, the following are the outstanding names: Bow, Chelsea, Staffordshire, Worcester, Derby, Crown Derby, and Lambeth. Eng. manufacturers have largely devoted themselves to the production of soft porcelain, and it was not until about 1768 that the making of hard porcelain was begun at Plymouth by Cookworthy, the discoverer of Cornish china-clay. The famous Bow works were established about 1740; those at Chelsea and Derby about five years later; and the manufacture of Staffordshire porcelain was begun at Longton Hall in 1752, Josiah Wedgwood's famous works being established at Burslem in 1759.

Walter, *History of Ancient Pottery* (1905); Benton, *History of English Earthenware and Stoneware* (1901); Franz, *French Pottery* (1906); Marryat, *History of Pottery and Porcelain* (1864); Shaw, *History of the Staffordshire Potteries* (1900); see also *Masterpieces of Handicraft* Series (Jack), including vols. on 'Japanese Porcelain,' 'Old Chinese Porcelain,' 'Royal Sèvres,' 'Old Bow,' 'Chelsea and Derby,' and 'Dresden Porcelain.'

POTTOS, African Slow Lemurs (*Perodicticus*), genus of Lemuroidea (*q.v.* under Primates) with short tail, short and nailless index finger; nocturnal and sluggish; found in West Africa.

POTTSTOWN (40° 13′ N., 75° 32′ W.), town, on Schuylkill, Pennsylvania, U.S.A.; iron and steel works. Pop. (1910) 15,599.

POTTSVILLE (40° 41′ N., 76° 17′ W.), town, Pennsylvania, U.S.A.; coal-fields. Pop. (1910) 20,236.

POUCHED MOUSE, Dormouse Phalanger (*Dromicia*), small marsupial (*q.v.*) related to the Flying Phalangers; nocturnal and arboreal; found in W. Australia, Tasmania, and New Guinea.

POUCHED RATS, see Pocket Gophers.

POUGHKEEPSIE (41° 38′ N., 73° 58′ W.), city, on Hudson River, New York State, U.S.A.; seat of Vassar Coll. (for women); iron and steel works; breweries. Pop. (1910) 27,936.

POULPE, an Octopus.

POULTICE, quantity of bread, linseed-meal, or other substance, mixed with hot water and spread on a cloth, applied to the skin in inflammation or sores, to reduce inflammation, soothe pain, or act as a counter-irritant.

POULTRY-FARMING is widely practised in Great Britain, but few farms are devoted entirely to poultry. The departmental system is found to be best, as the runs can thus frequently be changed without entailing waste of ground. Poultry-farming (which includes turkeys, ducks, and geese, as well as fowls) has three distinct ends — the production of eggs, the rearing of birds for the market, and the breeding of prize birds. The chief fowls suited to the Brit. climate are the following: (1) *Dorkings*, hardy and substantial birds, with white legs; (2) *Cochin-Chinas*, requiring careful attention; (3) *Brahmas*, Ind. birds of light and dark varieties; the plumage is heavy and the legs are thickly tufted; (4) *Malay*, Ind. birds with sparse plumage and of light build; (5) *Plymouth Rock*, an Amer. bird, stolidly built, with heavy chest; (6) *Minorcas*, a popular fowl of many varieties; (7) *Leghorn*, an excellent egg producer; (8) *Bantam*, dwarf golden-brown birds yielding small, finely flavoured eggs.

Scientific poultry-farming favours artificial incubation. The artificial process has three points of superiority—the chances of accidents to the fertile eggs during the hatching process are practically eliminated; the chickens are free from contagion and vermin; chickens reared in a scientifically constructed foster-mother escape the possibility of being trampled to death. Moreover, the progress of chickens kept in foster-mothers can be carefully examined, and only such foods are introduced as are suited to the various stages of development of the young chicks. The chickens are then transferred to cold brooders. The next stage is the transference of the chickens to the poultry-houses. These should be portable so that the ground can be changed from time to time.

Diseases.—Vermin is a great source of annoyance to the poultry farmer. Cleanliness should have scrupulous attention, and suitable preventatives should be employed. The chief internal parasite which attacks poultry is the worm *Sclerostoma syngamus*, causing *gapes*, a disease of the organs of respiration. The name is derived from the behaviour of birds attacked, which gape and stretch the neck owing to the contraction of the air-passage. A mixture of one part spirits of turpentine to two parts of olive oil should be applied to the affected parts. The birds should be placed in a new run to prevent the spreading of the disease. *Tuberculosis* is a fatal disease in poultry. Affected birds should be destroyed and a new coop procured. The mortality in cases of *fowl-cholera* is also very high, and in most cases destruction is advisable. The houses must be thoroughly disinfected. Another serious disease is *Avian diphtheritis* or *roup*. The characteristic symptom of the disease is the appearance of whitish growths about the mouth. These subsequently become tan, and the bird has great difficulty in breathing. A *pip* or scale forms on the tongue. Bacterial roup is generally fatal. Gregarious roup is a less fatal form of the disease. The best preventatives of disease are the use of disinfectants and the maintenance of cleanliness in the houses.

Poultry-farming has been developed to an enormous extent in U.S.A. In Denmark and Ireland co-operative principles are greatly promoting this branch of farming. Britain imports vast quantities of eggs and poultry from Denmark, France, Belgium, and Russia.

Weir, *Our Poultry and All about Them* (2 vols.).

POUND, the *pound sterling* was originally a pound weight of silver of the authorised standard, *i.e.* 11 oz. 2 dwt. fine metal, and 18 dwt. of alloy. In 1816 the gold standard was set up, and the sovereign has since been called a 'pound,' not because of its weight, but because it represents in value the old silver 'pound sterling.'

POUSSIN, NICOLAS (1594–1665), celebrated Fr. artist; b. in Normandy, settled in Paris, and d. in Rome. He was painter-in-ordinary to Louis XIII., and there is a fine collection of his pictures in the Louvre.

POUT, Bib, Pouting or Whiting Pout (*Gadus luscus*), a relative of the Cod and Haddock, with brown body marked with upright bands; abundant in the Channel and on most parts of the Brit. coast.

POUTING, see Pout.

POVOA DE VARZIM (41° 24′ N., 8° 38′ W.), seaport, watering-place, Oporto, Portugal. Pop. 13,500.

POWAN, see under Salmon Family.

POWELL, JOHN WESLEY (1834–1902), Amer. geologist; lost right arm in Civil War; app. prof. of Geol., Illinois Univ., 1885; conducted expeditions to Rocky Mts. and made geographical and geological surveys.

POWELL, VAVASOR (1617–70), Welsh Puritan preacher.

POWER TRANSMISSION, the transmitting of energy from a prime mover to machinery intended to use this energy. Four distinct methods of transmission are in general use—mechanical, pneumatic, hydraulic, and electrical.

Mechanical transmission is effected by a combination of ropes or belts, pulleys, shafting, and gearing. In rope-driving the ropes run in grooves in the rim of the

pulley, and are led to other pulleys on the distributing shaft. There may be a rope for each groove, or only one continuous rope driving a number of shafts from a common pulley. Manila or cotton ropes are mostly used, the latter being costlier, but usually more durable. Belts are very largely used for driving purposes, and are more flexible than ropes. When it is desired to transmit power from one shaft to another, gearing is used. If the shafts are parallel, the gear wheels are known as cog or spur wheels. When the shafts are inclined to each other so that they would meet if extended, the gear wheels are called bevel or mitre wheels, according to the angle; but if the shafts would not meet if extended, the wheels are called skew bevel wheels. Pitch chains may be used instead of belts, as in the case of cycles. It is possible to transmit power to distances of several thousand feet by means of wire ropes, but the greater efficiency and convenience of electrical t. has prevented developments in this direction.

Pneumatic transmission consists essentially of compressing air and transmitting it to motors placed where the work is to be done. It was employed in the construction of the Mont Cenis tunnel. The air was compressed by a series of water rams, and transmitted through pipes to the working faces, where it was used to drive drilling machinery. Pneumatic t. is used with success for haulage in mines, for working stone quarrying machinery, and for various purposes in iron working, steel bridge building, etc. It has been tried for tramways, tanks carried on the cars being filled with compressed air at central stations, but it has failed to compete with electric traction.

Hydraulic transmission is carried out by means of a central station where hydraulic pressure is produced, and a system of mains to distribute this pressure to machinery designed to use it. Where the demand for power is subject to sudden and large fluctuations, accumulators are employed to reduce the load on the central station pumps, and also to regulate to some extent the speed of the pumps under the constantly varying demand. The essential features of these accumulators are a cylinder, and a ram loaded to give the pressure in the mains. Frost is guarded against by covering all pipes not underground, and by raising the temperature of the water before pumping it into the mains, this being done by passing it through the surface condensers of the plant. Sometimes oil or glycerine and methylated spirit are mixed with the water to prevent freezing. Hydraulic pressure is employed successfully for hydraulic lifts, presses, and cranes, for hydraulic capstans for wagon haulage, for closing the bulkhead doors on ships, etc.

Electrical transmission has steadily gained ground on account of its efficiency and adaptability. Electric current is generated by dynamos at a central station and transmitted by cables to electric motors, which may be placed almost anywhere. Either continuous or alternating current may be used for short distances, but for long distance t. alternating current is used almost exclusively. In order to transmit electric

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or otherwise the expenditure in copper for the cables would be prohibitive. It is difficult to produce continuous current at high voltages, the practical limit at present being usually about 3000 volts, although by placing the dynamos in series the pressure may be raised to 25,000 or more volts. On the other hand, voltages of 50,000 and over are obtainable with alternating currents, and such currents have the advantage of being easily transformed down to the voltage required for use. The usual method is to generate alternating current at high pressure, transmit it to sub-stations, and there reduce it to the working pressure by means of step-down transformers, and at the same time, if necessary, convert it into continuous current by rotary converters or motor generators. The usual pressure for lighting is about 220 volts, and for tramways from 400 to 500 volts. Either single-phase or polyphase current may be generated, three-phase current being the most generally suitable. Electricity has completely ousted all rivals for street tramways, and has proved itself superior to steam for surburban railways. In general the chief advantages of electrical t. are high efficiency, economy in space, and absence of heat, noise, or vibration.

POWIS, Barony, Earldom, and Marquessate of, Eng. honours. Welsh principality of P. was changed into Eng. barony, 1283; descended from Owen of Griffin to Cherletons (1313–1421), Greys (1421–1587). William Herbert, whose f. purchased the feudal lordship, was created baron, 1629; grandson, William, cr. earl, 1674, marquess, 1687; extinct, 1748. Henry Lord Herbert of Cherbury was created baron and Earl of P., 1748; extinct, 1801. Edward Lord Clive received same, 1804, having m. sister and heir of last earl; his s. took name Herbert; still held by descendants.

POWIS, EDWARD LORD CLIVE, EARL OF (1754–1839), Gov. of Madras, 1797–1803; distinguished in Mahratta War.

POWIS, WILLIAM HERBERT, MARQUESS OF (1629–96), Eng. courtier; imprisoned, 1679–84, on suspicion of complicity in Popish Plot; followed James II. to St. Germains; wife was governess of James II.'s children, 1688-91.

POWLETT, Paulet, Pawlett, Eng. family; originated in manor of Pawlett, Somersetshire. Chief members: Sir Amias, who had custody of Mary, Queen of Scots, at Tutbury and Chartley; John, cr. baron, 1627, Royalist; John, cr. earl, 1706, 1st lord of treasury, 1710–11, ancestor of present earl. Younger line produced marquesses of Winchester (*q.v.*) and dukes of Bolton (*q.v.*).

POYNTER, SIR EDWARD JOHN, Bart. (1836–), Eng. painter; known for book-designs, water-colour picture portraits, designs for Houses of Parliament, St. Paul's Cathedral, etc.

POZAREVAC, Passarowitz (45° 15′ N., 21° 10′ E.), town (and department), Servia; treaty between Turkey and Austria signed here (1718). Pop. 13,000.

POZOBLANCO (38° 22′ N., 4° 45′ W.), town, Cordova, Spain. Pop. 13,000.

POZZO DI BORGO, CARLO ANDREA, Count (1764–1842), Corsican politician; personal enemy of Napoleon; supported Paoli against Revolution; left Fr. for Russ. service and aided coalition against Napoleon; stirred Alexander to new war after Treaty of Tilsit, 1809; signed Treaty of Vienna, 1815, as Russ. ambassador.

POZZUOLI, see Puteoli.

PRÆCOCES, see under Ornithology.

PRAED, WINTHROP MACKWORTH (1802–39), Eng. poet; b. in London; won early distinction for contributions to the *Etonian* and *Quarterly*. His verse is of a light, brilliant nature, aiming neither at depth of feeling nor originality of thought.

PRÆFECT, see Prefect.

PRÆMONSTRATENSIANS, see Premonstratensians.

PRÆMUNIRE, the offence of introducing a foreign power into England. Acts of Edward I., 1350, and Richard II., 1392, were expressly directed against provision of ecclesiastical benefices to aliens, and the procuring of authority from Rome against the king in the form of bulls and excommunications.

PRÆNESTE, Palestrina (41° 51′ N., 12° 54′ E.), ancient town on site of modern Palestrina, near Rome, Italy; was celebrated for temple dedicated to Fortuna; took part against Rome in Latin War, but was overcome, 338 B.C.; sacked by Sulla for supporting Marius, 82 B.C.; in later times belonged to Colonnas, afterwards to Barberinis; remains of citadel exist; associations with Marcus Aurelius, Hadrian, and others. Modern town has cathedral. Pop. 7200.

PRÆSEPE, see Cancer.

PRÆTOR, Rom. magistrate; name of consuls in Twelve Tables; supposed to have been revived

when plebeians were admitted to consulship, the *p. urbanus*, who was to be patrician, assuming functions of consuls; in any case soon open to plebs. *Prætor peregrinus* was established *c.* 242 to decide suits between citizens and aliens or outsiders; judicial powers lost under Empire; in some ways superseded by prefect (*q.v.*).

PRÆTORIANS, members of Rom. *prætoria cohors*, bodyguard of emperor; term applied to force in prætor's army under Republic; organised by Augustus; became chief force in state; abolished by Constantine.

PRAGMATIC SANCTION, decree affecting Church or State. Famous P.S's were: (1) by Charles VII. of France, asserting rights of Gallican Church, 1437; (2) by Charles VI. of Austria, settling crown on his dau., Maria Theresa, 1713 (see AUSTRIA-HUNGARY).

PRAGMATISM, in philosophy, a school of thought emphasising practical consequences as tests for determining truth of philosophical conceptions; a reaction against absolutism of recent metaphysics; theory put forward by C. S. Pierce, 1878; developed by William James and F. C. S. Schiller. All thought is purposive and personal; no knowledge is determined exclusively by abstract intellectual considerations. The difference between two conceptions lies in the different consequences for life purposes involved in their belief. P. is connected with religion as justifying the will to believe. Humanism is the application of the pragmatic method to all the sciences. James, *Pragmatism.*

PRAGUE, PRAG (50° 5′ N., 14° 26′ E.), fortified city, Austria; capital, commercial, and industrial centre of Bohemia; beautifully situated on Moldau, P. has many interesting palaces, churches, monasteries, beautiful parks, and public gardens; Cathedral of St. Vitus (1344, unfinished), with royal mausoleum; Teyn (XV. cent.) and Nicholas Churches (XVII. cent.); Emaus, Capuchin, and Strachov monasteries; Royal Castle on Hradschin (hill); Waldstein, Belvedere, Kinsky, Clam-Gallas palaces; univ. (1348); museums, theatre, Pulverturm (1475), Karlsbrücke (1357–1503), —bridge with gate-towers and statues,—Rudolfinum (with art academy, concert hall, etc.), Jewish synagogue, town hall, and cemetery. Founded *c.* VIII. cent., P. flourished under Charles IV.; associated with Huss (*q.v.*); stormy history through religious and racial quarrels, Prot. *v.* Catholic, Czech *v.* German. Chief industries are machinery, chemicals, cotton, linen, gloves. Pop. (1910) 223,741. See BOHEMIA.

PRAHRAM, S.E. suburb of Melbourne, Australia. Pop. 43,000.

PRAIRIE DU CHIEN (43° 3′ N., 91° 10′ W.), city, Wisconsin, U.S.A., on Mississippi; woollen goods. Pop. (1910) 3149.

PRAKRIT, a term applied to the vernacular languages of India as distinguished from the literary Sanskrit. Sanskrit itself developed from the *Midland Primary P.*, but the other P's became corrupted or passed into a secondary stage known as *Secondary* P. These secondary P's in some cases became literary languages and came to be regulated by a definite grammatical scheme. Pali itself, the language of Buddhism, is a literary secondary P. Secondary P's in turn became corrupted into *Tertiary* P's, and so on. The P. lit. is for the most part devoted to the Jaina religion, but the flower of P. lit. is lyric. The finest lyric work is that of Hala. His *Sattasai* shows remarkable grace and beauty, and has been imitated in Sanskrit and the minor dialects. There are two famous epics in P., the *Ravanavaha* (which is similar in theme to the *Ramayana*) and the *Gaüdavaha.* P. is also employed in Sanskrit dramas for delineation of subordinate characters.

PRATICOLA, a genus of the THRUSH FAMILY (*q.v.*).

PRATINCOLES (*Glareolidæ*), a family of ten species of wading birds confined to the Old World. The Common Pratincole (*Glareola pratincola*), whose winter home is chiefly in Africa, is a rare spring and autumn visitor to Britain. This species occurs in summer in S. Europe, Central and S. Asia.

PRATO (43° 53′ N., 11° 5′ E.), town, on Bisenzio, Florence province, Italy; sacked by Spaniards, 1512; surrounded by walls; ancient castle; cathedral (built chiefly in XIV. cent.) contains many fine works of art; wool, straw-plaiting. Pop. 27,000.

PRAWN, small translucent Crustacea distinguished by the long spike (rostrum) projecting in front of the head; esteemed as food. See MALACOSTRACA.

PRAXITELES (fl. IV. cent. B.C.), Athenian sculptor; left reputation of perfect craftsmanship. Nothing of his work was supposed to remain, but in 1877 his statue of *Hermes with Dionysos*, one of the masterpieces of sculpture, was discovered at Olympia; characteristics—beauty, grace, absence of severity of age of Pheidias. Several supposed copies of P.'s work are extant, *e.g. The Satyr* of the Capitol, and *Aphrodite* (Vatican).

PRAYER, in general, is dealt with under RELIGION.

Prayers for the Dead are associated with belief in a state of purgation after death. They appear in the Jewish liturgy and in Christianity from earliest times, though reference in New Testament is doubtful. At the Reformation, together with belief in Purgatory, prayers for the dead were scouted by Protestants. They hardly occur in the Anglican Prayer Book, but are not forbidden by the Church of England.

PRAYER, BOOK OF COMMON, the liturgy of the Church of England, in use since the Reformation. Before then there was a large number of local Uses, the most important that of Salisbury (Sarum). All these were in Latin, and the Catholic Church had not one book, but several—a Missal for the Mass, Breviary for daily offices, Manual for other sacraments, and Pontifical for episcopal services. Hence one book to be used everywhere was a great simplification. Cranmer's Litany appeared in 1544, and an Eng. Communion Office in 1548; the entire Prayer Book in 1549—the *First Prayer Book* of Edward VI. The *Second Prayer Book* was published in 1552, with numerous alterations in a Prot. direction. After the Catholic reaction of Mary's reign the Elizabethan Prayer Book appeared in 1559, on the basis of the second, but with differences in the Catholic direction. After being suppressed during the Commonwealth it again came into use with the Restoration. Fresh alterations roused Puritan feeling, and the refusal to accept them caused the Ejection of the Two Thousand in 1662. Since then the Prayer Book has remained practically unchanged. The forms for the Anniversaries of the Martyrdom of Charles I., Gunpowder Plot, and Restoration were abolished in 1859. In 1871 a new Lectionary was substituted, also a shortened form of daily service.

Pullan, *History of the Book of Common Prayer* (1900); Procter and Frere, *New History of the Book of Common Prayer.*

PRAYING INSECTS, SOOTHSAYERS (*Mantidæ*), a family of Insects with about 600 species, belonging to the order *Orthoptera*; furnished with long bristly fore-legs, the resting pose of which gives rise to the popular name, and which seize insects for food, for Praying Insects are extremely voracious. They occur in tropical and sub-tropical regions, but *Mantis religiosa* is sometimes found in central France.

PRAYING WHEEL, used by Lamaist Buddhists, a machine with cylinder from which prayer on paper band is unrolled.

PREACHING, from very early times, has been a regular part of worship and form of instruction, though at some periods, particularly in the Middle Ages, it has fallen into disuse. Little is known of Christian p. until about 200 A.D. Then came Origen, and later, especially in the Eastern churches, p. developed much. Among the most famous preachers were the Cappadocian fathers—Basil of Cæsarea, Gregory of Nyssa, and Gregory of Nazianzus; then St. John Chrysostom and St. Augustine. In the Middle Ages came St. Bernard and the Franciscans and Dominicans. The Reformation brought about a great revival of p. Though Catholic France produced great pulpit orators in the XVII. cent., p. has been greater in Prot. than in

Catholic Churches. The XIX. cent. produced several great preachers in England.

PREANGER (7° 15′ S., 107° 30′ E.), residency of Java, Dutch East Indies; mountainous, volcanic; chief products—tea, coffee, cinchona; capital, Bandong. Pop. *c.* 2,220,000.

PREBENDARY, the holder of a stall or endowment in a Cathedral or Collegiate Church, entailing upon him the duty of conducting services but no cure of souls.

PRE-CAMBRIAN, the period of time before the formation of Cambrian strata. P. C. rocks are all of sedimentary origin, and consist of dolomites, conglomerates, sandstones, freestones, slates, and limestones; many show signs of a glacial epoch. Fossils are rare.

PRECEDENCE.—Precedence of members of the royal family depends on their relationship to the reigning sovereign, and not on their relationship to any of his predecessors. Ambassadors take p. immediately after the blood-royal; envoys and ministers accredited to the sovereign after dukes and before marquises. The five degrees of honour and p. among peers correspond with the titles—duke, marquis, earl, viscount, baron. Of those belonging to the same rank, seniority of creation settles the place in the scale of honour. Peers have p. according as they are of England, Scotland, Great Britain, Ireland, or the U.K. Place and office give the Lord Steward and the Lord Chamberlain of H.M. Household p. before all peers of their own degree. The younger sons of a higher rank precede even the eldest son of a lower rank—hence the younger sons of a duke precede elder sons of a marquis. All sons of viscounts and barons precede baronets; and eldest sons and daughters of baronets precede eldest sons of knights of any degree. But eldest sons of knights precede younger sons of baronets.

Official p. of a husband or father confers no personal p. on his wife or children, *e.g.* the Lord Chancellor or the Speaker of the House of Commons does not transmit any rank or place to his wife or children from his official position, but only from his personal rank. Unmarried women take precedency from their father. Married women share their husband's dignities, but can confer none of their own upon their husbands. Nor can the daughter of a peer, unless a peeress in her own right, transmit any rank or place to her children. Distinctions of birth, creation, or descent are a woman's own, and remain if she marry a commoner; but, if she marry a nobleman, she must take her husband's place in the order of precedency. The wife of the eldest son of any degree precedes the daughters of the same degree, and both of them precede the younger sons of the next higher degree. Thus the wife of the eldest son of an earl walks before an earl's daughter, and both of them before the wife of the younger son of a marquis; and the wife of a marquis precedes the wife of the eldest son of a duke.

The Abp. of Canterbury (and in Scotland the Moderator of the General Assembly in attendance at a royal function) takes p. next to ambassadors, and is followed by the Lord High Chancellor. Then come in p. the Abp. of York, the Prime Minister, the Lord Chancellor of Ireland, the Lord Pres. of the Privy Council, the high officers of the Royal Household, and the peers according to their degree. Bp's of the Church of England rank between viscounts and barons.

Burke's *Peerage.*

PRECESSION OF THE EQUINOXES, a motion discovered by Hipparchus about 150 B.C., consisting of a slow advance of equinoxes, owing to revolution of earth's axis round pole of ecliptic, a similar effect to the 'wobbling' of a peg-top. Period of precession is about 26,000 years, or 50·35 seconds of arc per annum.

PREDESTINATION, theological term for God's foreknowledge of the future, or of His destination of mankind to eternal bliss or woe. Two great controversies one between Augustine and Pelagius, the other between Calvin and Arminius, have been fought over p. Augustine and Calvin held that God had foreordained some to salvation and others to damnation.

PREDICABLES, classification of the relations the predicate may bear to the subject of a proposition. See LOGIC.

PREDICATION, the nature of the relation between subject and predicate of a proposition. See LOGIC.

PRE-EXISTENCE, DOCTRINE OF, existence of soul before union with body (cf. Pythagoras, Plato, etc.).

PREFECT, title of Roman official.—(1) *Præfectus urbis.* Official dating from time of kings; represented king or consuls in their absence. (2) Under republic new præfectures sprang up; e.g. *præfecti annonæ* supervised food supply; in subject Ital. towns *præfecti jure dicendo* represented *præfectus urbis.* (3) Under the Empire a new class of prætorian p's, commanders of imperial guard, sprang up; p's became permanent magistrates and system was extended to provinces. Fr. republic gave in 1800 name *præfectus* (*préfet*) to heads of provincial departments who took place of old *intendants*; app. by State they form connecting link between central and local government; large local powers, though partly controlled by *conseil de préfecture*; each *arrondissement* has *sous-préfet*, who is mere agent of préfet.

PREFERENCE, see TARIFF, PROTECTION.

PRÉFET, see PREFECT.

PREJEVALSKI, PRJEVALSKY (*q.v.*).

PREJEVALSKI'S HORSE, see under HORSE FAMILY.

PRELATE (Latin, 'dignitary'), term now used only ecclesiastically. In the Anglican Church p's are abp's and bp's. In R.C. Church abbots and heads of orders and officials of Rom. Curia are also called p's.

PREMIER, see PRIME MINISTER.

PREMONSTRATENSIANS, NORBERTINES, religious order founded at Prémontré, France (1119), by St. Norbert; in England called 'White Canons'; branch of Canons Regular of St. Augustine; although primitive rule has been modified, it is still strongly ascetic.

PRENZLAU, PRENZLOW (53° 20′ N., 13° 50′ E.), town, on Ucker, Brandenburg, Prussia; ironworks. Pop. (1910) 21,389.

PRE-RAPHAELITES, see under PAINTING.

PRERAU (49° 25′ N., 17° 25′ E.), town, Moravia, Austria; woollen cloth. Pop. (1911) 20,245.

PREROGATIVE, the right pertaining to certain offices, now commonly used in reference to the Crown. The royal p. is a power of the Crown that does not depend upon the sanction of Parliament, and includes the making of treaties with foreign sovereigns and States, the right of declaring war on foreign States, the creation of peers and regulation of order of precedence, the appointment of bp's of the Established Church, and the granting of pardon to persons convicted of crimes. As a matter of fact treaties and declarations of war are the work of the king's ministers, peers are made and bp's appointed by the Prime Minister, and the prerogative of pardon is only exercised on the advice of the Home Sec.

PREROGATIVE COURT, court where a will of one dying in province of Canterbury and leaving goods in another diocese was proved by abp. of Canterbury; similarly with province of York; jurisdiction transferred to Probate Court, 1857.

PRESBURG, see PRESSBURG.

PRESBYTER, office in the Christian Church, properly the same as *priest* (*q.v.*), but the word really means 'elder,' and is generally used in a non-sacerdotal sense of the elders of Judaism and of Christian officials. The system of Church government called *Presbyterianism* (government by elders), has only existed in its present form since the Reformation. Much controversy has raged round the position of p's in the Early Church. According to one view—the most probable—p. and bp. were originally identical, though until about A.D. 60 there was little systematic organisation. See also BISHOP, PRIEST.

ITERIANISM, see FREE CHURCHES.

PRESBYTERY (arch.), that part of a church to which priests alone have access, *i.e.* around the altar.

PRESCOT (53° 26′ N., 2° 47′ W.), town, Lancashire, England; manufactures watches. Pop. (1911) 8154.

PRESCOTT, WILLIAM HICKLING (1796–1859), Amer. historian; grandson of WILLIAM PRESCOTT (1726–95), distinguished officer in War of Independence; blinded in one eye by accident in youth and always laboured at great disadvantage; opened up new field of research by study of Span. history; pub. *Ferdinand and Isabella*, which had immense success (1838), *Conquest of Mexico* (1843), *Conquest of Peru* (1847), 3 vols. of *Philip II.* (1855–58), and *Charles V. after his Abdication* (1857); light, picturesque style, condemned by Guizot for lack of requisite passion; accurate in details as far as authorities then accessible permitted, but careless in hist. judgments. *Life*, by Ticknor.

PRESCRIPTION (Law), the rule that long usage makes good possession, founded on the legal assumption that an uninterrupted possession of anything for a sufficiently long period implies that no one disputes the right of the possessor to its enjoyment. Long possession supposes the acquiescence by all other claimants and a reason for that acquiescence. Negative p., implying undisturbed possession for a given time, gives a valid and unassailable title, for it deprives all claimants of the right to contest. Positive p. depends upon usage from time immemorial. Rights of common, of use of water, and of building lights are prescriptive.

PRESENTATIONISM, term used in several distinct senses, more especially for (1) the view that in perception we have direct apprehension of other real things; and (2) the view that the mind is nothing but a flux of presentations.

PRESIDENT.—(1) chief official of a body, *e.g.* Pres. of Board of Trade, pres. of a college. (2) head of a republic (*q.v.*). Pres. of U.S.A. has salary of 75,000 dollars, is commander-in-chief of army and navy, holds supreme executive power, chooses a Cabinet, retains office for four years. Fr. Pres. is elected for seven years by National Assembly, chooses his ministers, holds the right of pardon, appoints to military and civil posts; with Senate's consent he may dissolve Chamber of Deputies; salary is £24,000, with a similar sum for expenses.

PRE-SOCRATICS, see METAPHYSICS.

PRESS, FREEDOM OF THE.—The law allows to the press the liberty it allows to the individual. It permits a newspaper to publish what it pleases, provided it does not break the law of the land or infringe the rights of particular persons. It must not, for example, publish blasphemous, seditious, or treasonable matter, or commit a libel or publish matter that is the copyright of others. It is for a jury to decide whether or not any of these offences has been committed should the charge be made and defended. Lord Campbell's Libel Act of 1843 gave the present liberty to the press. Government licence and censorship prevailed until 1695, and until 1843 any political comment in the press hostile to the Government could be punished as a seditious libel. By the Libel Act of 1843, a defendant indicted for criminal libel can urge as a sufficient defence that the libel was true and published for the benefit of the public. Hence the widest range of expression and the freest comment are now permitted in the press on matters of political interest. But libels on particular persons, the publication of statements reflecting on the private life of individuals, are still forbidden, and the editor, printer, and publisher of any newspaper making such publication are liable to criminal prosecution, or a civil action for damages. The publication of obscene or blasphemous statements, or indecent pictures, is also a criminal offence. Every newspaper must be registered, with the name of its proprietor, at *Stationers' Hall*, and must state on each copy the place of its publication.

PRESSBURG, PRESSBURG (48° 10′ N., 17° 6′ E.), town, on Danube; was capital of Hungary, 1541–1784, and seat of Hungarian Parliament until 1848; has cathedral, old ruined castle, and town hall; manufactures furniture, tobacco, liqueurs. Pop. (1910) 78,223.

PRESTER JOHN, semi-mythical Asiatic potentate of Middle Ages; mentioned in chronicle of Otto, bp. of Freisingen, who was told by a Syrian bp. (1145) that John, a few years previously, was both king and priest of a Christian country between Persia and Armenia. A writing of 1165, describing this realm as El Dorado and Utopia combined, took the form of a letter from P. J. to the Gk. emperor; a further document takes form of letter of Pope Alexander III. to P. J., *c.* 1177. John was identified later with Ung Khan, king of Tartar tribe of E. Asia, converted to Christianity and slain in warfare with tributary potentate Genghis, 1203. Innocent IV. sent a missionary to Batu Khan, grandson of Genghis. He sought P. J.'s kingdom, but it had vanished. Another missionary, Rubruquis, similarly failed, 1253, but wrote valuable account of travels (printed in Purchas's *Collection*), and P. J. formed continual stimulus to mediæval exploration. He is identified by modern scholars with Gur Khan, founder of empire of Black Cathay in XII. cent.

PRESTON (53° 46′ N., 2° 42′ W.), town, at mouth of Ribble, Lancashire, England. Here Scots Royalists were defeated by Cromwell, 1648; town gave support to Old Pretender, 1715, and to Young Pretender, 1745. P. is important railway centre, and dredging of river has given strong impetus to shipping trade; manufactures cotton, has ship-building, machinery- and boiler-works; exports coal. Pop. (1911) 117,113.

PRESTONPANS (55° 57′ N., 2° 59′ W.), village, Haddingtonshire, Scotland, on Firth of Forth; scene of Jacobite victory over Royal forces (1745).

PRESTWICH (53° 32′ N., 2° 17′ W.), town, Lancashire, England; cotton manufactures. Pop. (1911) 17,195.

PRESTWICH, SIR JOSEPH (1812–96), Eng. geologist; awarded Wollaston Medal, 1849, for essays on geological subjects; prof. of Geology, Oxford, 1874–87; knighted, 1896.

PRETENDER, THE, see CHARLES EDWARD STEWART, PRINCE, and JAMES, THE OLD PRETENDER.

PRETORIA (25° 53′ S., 29° 6′ E.), city, South Africa, seat of administration of Union of South Africa, and capital of Transvaal Province; founded by Boers, 1855; named after M. W. Pretorius (*q.v.*); entered by Lord Roberts, 1900; after which it became Brit. headquarters in South African War, 1900–2; fine government buildings under construction; Prot. Episcopal cathedral; Univ. College; railway and distributing centre, in midst of rich mining and agricultural district. Pop. (1911) 48,609.

PRETORIUS, ANDRIES WILLIAM JACOBUS (1799–1853), Boer general; a leader in *Great Trek* from Cape Colony; settled in Natal, 1838; drove off Zulus and founded republic of Natalia, 1838; Britain sent troops to occupy Natal, which became Brit. colony, 1843; P. petitioned against misrule, 1847; headed Transvaal revolts, 1848 and 1851, and secured establishment of Orange Free State. His son, **Marthinus Wessel Pretorius** (d. 1901) became first Pres. of Transvaal Republic, 1857–60; Pres. of Free State, 1859–63; and Pres. of United S. African Republic, 1864; one of leaders in war against Britain.

PREVEZA, PREVESA (38° 56′ N., 20° 42′ E.), seaport, Albania, European Turkey, on Gulf of Arta. Pop. 7400.

PRÉVOST D'EXILES, ANTOINE FRANÇOIS, ABBÉ PRÉVOST (1697–1763), Fr. author; produced two hundred novels, but owes renown solely to *Manon Lescaut* (1733), a book unique in the century; it is a history of Parisian Bohemians by an accurate observer.

PRIAM (classical myth.), old king of Troy, father of

Hector, Paris, Troilus, Cassandra; only once mentioned in Homer—when he begs Hector's body from Achilles.

PRIAPULOIDEA, a class of unsegmented worm-like animals, with mouth and anus at opposite ends of body. They have a retractile introvert bearing the mouth at its tip, and live in mud and sand in the sea.

PRIBILOF ISLANDS (58° N., 170° W.), group of islands, Bering Sea, belonging to Alaska (U.S.A.), seal fisheries.

PRIBRAM (49° 42′ N., 14° 1′ E.), town, Bohemia, Austria; lead and silver mines. Pop. (1911) 13,328.

PRICE, RICHARD (1723–91), Eng. Nonconformist minister who wrote on morals, economics, and politics; wrote *Review of the Principal Questions in Morals* (1756), in many respects akin to thought of Cudworth (*q.v.*); strongly opposed war with America and welcomed Fr. Revolution. His sermon, *On the Love of our Country* (1789), provoked Burke's attack on him in *Reflections on the Revolution in France*.

PRICHARD, JAMES COWLES (1786–1848), physician and ethnologist; physician to Bristol Infirmary; app. (1845) a commissioner in lunacy; the founder, in England, of the sciences of anthropology and ethnology, in which he made valuable researches, recognising the unity of mankind differentiated by various causes into the various races, and showing the relation of Celtic to other European languages and to Sanscrit.

PRICKLY PEAR, see CACTUS.

PRIDEAUX, HUMPHREY (1648–1724), Anglican theologian and Hebrew scholar; dean of Norwich, 1702.

PRIEGO DE CORDOBA (37° 28′ N., 4° 14′ W.), town, Cordoba, Spain; oil and wine. Pop. 17,400.

PRIENE, ancient Ionian city, Caria, Asia Minor.

PRIEST, derived from *presbyter* (*i.e.* elder), an order in the Christian ministry, and also applied to ministers or officials of non-Christian religion. The idea of priesthood is difficult to define, but it might almost be said that a p. is a person who offers sacrifice; the word is generally used of some one who performs a sacred office, very often with the idea besides of divine sanction or authority. In early times religion and magic were intermingled, and the functions of p. and chief ruler were combined. Hence the survivals into historic times in both Greece and Rome. In neither case was there a priestly caste, but in Athens the king-archon performed priestly functions, and in Rome after the abolition of the kingdom the title of *rex* was retained by an official who performed certain sacrificial rites. But in later times in Greece and Rome priestly functions were performed by ordinary magistrates. There was no hereditary priesthood in Rome and not much of one in Greece. In Rome the priestly offices were of considerable political importance.

In ancient Assyria and Babylonia there were various officials who performed sacred rites, but some scholars would hardly call them all p's. In ancient Egypt p's tended to be, as in Rome, mere state functionaries. In India the priesthood, to which only Brahmans could be admitted, possessed greater power than almost anywhere else. The place of the priesthood in Jewish religion is peculiar, for the primitive Semites had no real priesthood, but a priesthood gradually grew up (see LEVITES) which had charge of the Temple sacrifices. Since the destruction of the Temple in A.D. 70 there have been no more p's in Judaism, and Christian priesthood has taken over some ideas from Judaism. In the *Epistle to the Hebrews* Christ is the High Priest, so it is contended by some there can be no priesthood among Christians, or that every layman is a p.—the extreme Prot. as opposed to the Catholic view. In Episcopalian Churches p. denotes a member of the second order of clergy, who, like p's of R.C. and Greek Churches, performs sacred functions not reserved for bishops.

PRIESTLEY, JOSEPH (1733–1804), Eng. scientist and Unitarian divine; studied Oriental and modern languages; devoted himself to chem.; became famous by his discovery of oxygen; sympathised with Fr. Revolution; his books and apparatus were destroyed by mob; migrated to America, 1794. P. was a great scientist, but in experiment rather than logical power. See Thorpe's *Joseph Priestley* (1906).

PRIM, JUAN, MARQUIS DE LOS CASTILLEJOS (1814–70), Span. general; distinguished in war with Morocco, 1860; assisted Serrano in revolution against Queen Isabella, 1868; pres. of council and marshal, 1869; assassinated.

PRIMATE, title in Rom. Empire, both civil and ecclesiastical; now only ecclesiastical; used of a chief bp. in West (like patriarch in the East). The Abp. of Canterbury is *P. of All England*; the Abp. of York, *P. of England*. The Abp. of Lyons is *Primat des Gaules*.

PRIMATES, an order of Mammals: LEMURS, MONKEYS, APES, and MAN. The order which, on account of its highly developed brain, and its watchfulness over offspring, is placed highest in the animal kingdom. The majority of Monkeys are familiar on account of their semi-erect gait, and their faces caricaturing the human countenance, but the less-specialised individuals, and the Lemurs, have little external resemblance to their man-like relatives. The following characteristics which P. have in common will serve, however, to distinguish them from the other orders of Mammals. The eyes, instead of lying at the side of the head, are in front, and look almost straight forward, and the eye socket, or orbit, is completely surrounded by a ring of bone. The brain cavity is large, and the cerebral hemispheres of the brain are often much convoluted. The limbs are long, and neither the thigh-bone nor the upper arm-bone is hidden in the body. Both hands and feet are grasping organs (except the human foot) and both have five digits, the great toe, at least, having a flattened nail, except in the Orang-Utan, where the nail is sometimes absent. Again, the thumb or the great toe, or both, lies away from and can be opposed to its fellow-digits; and, lastly, all the females, except the Aye-Aye, with inguinal mammæ, have at least two mammæ on the breast.

The P. are on the whole fitted for life in forest regions, where they are to be found in companies, climbing by hands, feet, and often tails, roosting in the trees, but seldom traversing ground. They live mainly upon fruits and leaves, but some devour spiders, insects, eggs, young birds, and even mammals.

P. are warmth-loving animals, found only in tropical and sub-tropical regions, although some venture among the snows of the Himalayas. They are scattered over both Old and New Worlds, but the inhabitants of the one differ in marked characters from the inhabitants of the other (see classification below). In Europe the only representatives are the Barbary Apes, which dwell on the rock of Gibraltar, but in prehistoric times even English forests resounded to monkey chatter.

The order *Primates* falls into the following natural groups:—

Sub-Order 1.—LEMUROIDEA, monkey-like animals with fox-like faces; orbit opens freely into temporal fossa; front teeth separated in the middle line; brain poorly convoluted: Lemur, Galago, Indri, Potto, Loris, etc.

Sub-Order 2.—ANTHROPOIDEA, Man and Monkeys; monkey-like animals with more or less flat faces; orbit separated from temporal fossa by bony partition; front teeth in contact in middle line; brain usually highly convoluted; falls into two groups:—

Group I. PLATYRRHINI, New-World Monkeys; broad internasal septum; nostrils directed outwards; no bony external auditory meatus; three premolars; tail usually prehensile. Family 1. *Callitrichidæ* (Marmosets), small, furry monkeys, with two molars on each side; claws on all digits but great toe, which has flat nail; tail bushy, non-prehensile; found in tropical forests of Central and S. America; feed on insects and fruit; 35 species in two genera: HAPALE

and MIDAS. Family 2. *Cebidæ* (75 species of Spider-Monkeys, Howlers, Squirrel-Monkeys, Capuchin Monkey, etc.), flat nails on all toes; three molar teeth on each side.

Group II. CATARRHINI, Old-World Monkeys; narrow internasal septum; nostrils directed downwards; bony external auditory meatus; two premolars; tail not prehensile, or absent. Family 1. *Cercopithecidæ* (174 species of Macacques, Mandril, Proboscis Monkey, Vervet, Barbary Ape; see CERCOPITHECIDÆ), with arms shorter than legs; hairs on arm all pointing towards wrist; usually good tail; bare, often coloured, patches on buttocks. Family 2. *Hylobatidæ* (16 species of Gibbons), with erect gait; arms reaching ground; hairs on arm all pointing to elbow; no tail; feed on fruits, young birds, insects, etc., in forests of South-Eastern Asia. Family 3. *Simiidæ* (3 species—Gorilla, Orang-Utan, and Chimpanzee), semi-erect gait; arms longer than legs; hairs on arm all pointing to elbow; no tail. Family 4. *Hominidæ* (Man), with erect gait; arms shorter than legs; soles of feet set flat on ground; great toe in line with other toes; no tail; large, highly convoluted brain.

PRIME MINISTER, PREMIER, chief minister of Brit. Government; position developed with party system, P. M. being at first unofficial head of party in power; recognised from Walpole's time; legal recognition of office, 1905. The Australian Commonwealth has a 'Prime Minister'; the Australian States have 'Premiers.' The Fr. *Président du Conseil* corresponds to Brit. Premier.

PRIMITIVE METHODISTS, see FREE CHURCHES.

PRIMROSE (*Primula vulgaris*), an abundant indigenous species, possessing a rosette of crinkled sessile leaves, and bright yellow flowers which appear in spring. The flowers are dimorphic, one type showing a long style with anthers inserted midway up the corolla tube; the other short-styled, with anthers at the top.

PRIMROSE LEAGUE, THE, Conservative association founded, 1883, in memory of Beaconsfield (the primrose being his favourite flower); chief promoters, Lord Randolph Churchill, Sir John Gorst, Sir H. D. Wolff; objects—to uphold religion, the Union, and Brit. imperial ascendancy; organised into different 'Habitations' (*i.e.* lodges); observes PRIMROSE DAY, April 19 (anniversary of Beaconsfield's death).

PRIMULACEÆ, herbaceous perennials, with pentamerous flowers, the five stamens being opposite the petals; ovary is formed by five carpels, with free central placentation; include primrose, cowslip, cyclamen, pimpernel, and water violet.

PRINCE (Lat. *princeps*, first, sovereign).—The principal uses of the word are: (1) Sovereign of a sub-state (principality), not a duchy or county, *e.g.* P. of Monaco; (2) members of royal family in most European countries. After XI. cent. Welsh kings were only known as p.; hence title P. of Wales, granted to king's eldest son, 1301; other children of Eng. sovereign were not called p's till reign of James I. Under Victoria all children of sons of queen received title p. (or *princess*), and in 1905 King Edward created Duchess of Fife *Princess Royal* and granted the style *princess* to her daughters. This use is probably derived from title *princeps juventutis*, bestowed on designated successor to Roman Empire.

PRINCE EDWARD ISLAND (46° 25′ N., 63° 30′ W.), province, Dominion of Canada, in Gulf of St. Lawrence, near New Brunswick and Nova Scotia; area, 2184 sq. miles; surface generally undulating; soil remarkably fertile; 85¼ per cent. of total area under cultivation. Settled by French early in XVIII. cent.; captured by British, 1758, and formally ceded to them, 1763; incorporated with Nova Scotia till 1768, when it became a separate province; name changed from ST. JOHN'S to Prince Edward Island, 1799; joined Canadian Federation, 1873. It produces heavy crops of cereals, fruit, and vegetables; live stock largely raised; dairy-farming carried on. Industries include tanning, manufacture of flour, tobacco, starch, soap, canning of meat, fish, and lobsters. The province has a Lieut.-Gov. and Legislative Assembly and is represented in Dominion Parliament. Capital is Charlottetown. Inhabitants are mostly of British descent. Education is free and nominally obligatory. Pop. (1911) 93,728. See CANADA.

PRINCES' ISLANDS (40° 52′ N., 29° 5′ E.), group of islands, in Sea of Marmora, Turkey; ancient *Demonesi*. Pop. 11,000.

PRINCETON (40° 18′ N., 74° 42′ W.), town, in Mercer County, New Jersey, U.S.A.; Washington here defeated British, 1777. Pop. (1910) 5136. **Princeton University** was evolved from Coll. of New Jersey, incorporated, 1746; opened at Elizabeth, 1747; removed to Newark, 1748, when Aaron Burr became pres.; removed to Princeton, 1754, but retained name College of New Jersey till 1896; gov. of New Jersey is chairman *ex officio* of the board of trustees.

PRINCETON (38° 21′ N., 87° 39′ W.), city, Indiana, U.S.A.; manufactures carriages, bricks and tiles. Pop. (1910) 6448.

PRINCIPAL AND AGENT.—In law the relationship of principal and agent largely resembles that of master and servant. Generally the agent does not make contracts on his own behalf, but is merely a conduit pipe and the representative of his principal, and therefore the latter alone is usually bound by the agent's acts, and the agent himself does not incur any liability.

PRINGLE, SIR JOHN (1707–82), Scot. physician; prof. of Moral Philosophy at Edinburgh Univ. (1734); physician to forces in Low Countries, then settled in London, receiving various court appointments as physician; pres., Royal Society (1772); author of various works, the most important on military med.

PRINGSHEIM, NATHANAEL (1823–94), Ger. botanist; prof. of Bot. in Jena and Berlin, and did valuable work in determining the sex history of plants.

PRINTING, the art of stamping impressions of letters, figures, characters, or other designs with ink or pigment on paper, parchment, or similar substance. When such stamping is done on cloth, the process is known as Textile p. P. may be said to be of three kinds: (1) COPPER-PLATE, the basis of which is a metal plate, generally copper, having the necessary letters or design sunk or engraved on its otherwise smooth surface (see ENGRAVING); (2) LITHOGRAPHIC p., in which a perfectly flat and polished stone surface is used; and (3) LETTERPRESS p., which is by far the commonest and most used process of the three. In this process raised letters are used, their surfaces inked, and the ink transferred to paper. P. from fixed type seems to have been used more or less in very early times, and the rudiments of letterpress p. were known to the ancients; p. with movable types was probably practised in China about the XII. or XIII. cent., while books were printed in Korea by means of movable types of clay or wood in the early XIII. cent. Cicero suggested in his *De Natura Deorum* that types might be made of metal, referring to them under the name of 'formæ literarum.' Indeed, it has been suggested that the ideas of the later printers originated in this suggestion. Vergil mentions that in his time it was the practice to brand cattle with letters of the owner's name.

All p. up to the XIII. cent. was, however, of the crudest nature; it was still carried on by impressions of letters by hand, printing-presses not being brought into general use until *c.* 1500.

Impressions were taken from single pieces of wood on which were cut in relief a variety of characters and letters. Some of the early books had each leaf printed from a single block, and printing was done on one side of the paper only. Indeed, up to comparatively recent times the printing of both sides of a sheet of paper was not accomplished. When a book was made, two sheets, printed on one side only, were pasted together and the volume bound up.

Johan Gutenberg of Strasburg, if not the actual inventor of movable type and printing-presses, certainly did a great deal to set printing on a firm footing. L. J. Coster started business between 1420 and 1430, at Haarlem; his first types were of wood, but later he used lead and tin. Perhaps the earliest specimen of ·ing with movable types was *Speculum Nostræ Salutis*, by P. Schoffer. Gutenberg entered into partnership, and his partner invented matrices for casting types. Gutenberg with Fust and Schoffer set up a printing-house at Mainz, and about 1455 they published a Lat. Bible, called sometimes 'the forty-two line Bible,' because each column had 42 lines. The first p. was done in type (*black-letter*) imitating the written hand of XV. cent.

P. now made rapid strides in Europe. Workmen left the original printing-houses and carried their art with them, either taking service with other employers or setting up business for themselves. P. was established at Naples in1465; at Rome by Sweynheim and Pannartz in 1467; at Venice and Milan in 1469; at Paris, 1470; at Nuremberg and Verona, 1472; at Oxford in 1478 (by Theo. Rood); and at Constantinople in 1490. After this the art spread to almost every continental city, and also to Russia and America.

The early type used was Gothic style, but Roman type introduced by Sweynheim and Pannartz at Rome in 1467 replaced it for general use, although Ger. printers still largely use Gothic type. The first book to be printed in Greek characters is believed to be one dated 1476, and printed at Milan, while the Pentateuch, dated 1482, was the first work to be printed in Hebrew. Some of the early printers other than those above mentioned were: the Aldi of Venice (1490–1597), Baden of Paris (1502–98), Plantin of Antwerp (1514–89), Wechel of Paris and Frankfort (1530–72), Elzevir of Leiden and Amsterdam (1588–1680), and Bodoni of Parma (1768–1813).

The first p. establishment in England was that set up by William Caxton in 1476. He founded a press in the precincts of Westminster Abbey—not in the abbey itself, as is often stated. The first book printed in English, however, was printed at Bruges in 1474, where in the following year was printed *The Game and Playe of the Chesse*. The first book printed in England was *The Dictes and Sayings of the Philosophers*, Nov. 1477. Between that date and 1491 over 70 books were printed in England, mostly works by such authors as Gower, Lydgate, Chaucer, and Malory. A censorship of p. was established in 1530 for England, and printers were so abused and imprisoned that for a time the art almost became extinct in England. In 1694, however, the censorship was abolished and a revival in p. followed. No radical improvements were effected until mid-XIX. cent., when machines to lighten labour were introduced; the improvements in speed and the introduction of machine p. rendered the daily newspaper a possibility.

Printing-Presses.—The first p.-press was probably some sort of contrivance used by Gutenberg, and no doubt it was constructed of wood. The presses used in the early part of the XVII. cent. were wooden ones, and resembled the old wine-press in design. An upright frame held in place a flat table of smooth wood or stone. The paper was held in a frame parallel to the table, and was screwed down upon the inked type resting on the table. Joseph Moxon wrote *Mechanick Exercises as applied to the Arte of Printing* (1683), and the existing kind of press was improved by Blaeu. The earliest illustration of a press, dated 1607, shows how primitive the press was. It remained in this state until the close of the XVIII. cent. In 1800, Charles Mahon, 3rd Earl of Stanhope, invented the iron p.-press. It had an upright frame, but in design was different from its predecessors, enabling a greater power to be obtained. With this press some 200 copies per hour, printed on one side, could be taken. In 1823 the Albion press was invented by R. W. Cope of London, and soon after, Clymer, an American, introduced the Columbian. Both these machines were capable of turning out 250 copies per hour printed on one side. In 1772 Adkin and Walker invented a rotary press, the forerunner of modern p.-machines. Several improvements were suggested by Wm. Nicholson of London, embracing cylindrical formes and inking devices. In this machine the type was fixed on one cylinder, while another roller, covered with leather, pressed the paper into contact. The paper was carried through the rollers—or 'fed'—with tapes moving to and fro. It was feared that the rotating movement of the rollers would tend to blur the impression of the type on the paper, but in actual practice it was found that it did not differ appreciably from the impressions obtained with flat press machines.

Probably the first newspaper to be printed by steam-driven p.-machine was the *Times* of Nov. 28, 1814, 900 sheets per hour being printed on both sides, but by two distinct operations. Small iron hand-presses are still used at the present day for pulling proofs, while small *platen* machines worked by treadle (or by power, when employed continuously) are used for printing cards, circulars, etc. The design of these machines is practically the same as the old Albion and Columbia machines, although minor improvements have been added as experience suggested. Single-cylinder machines are used where one side of the sheet only is to be printed, and machines which print both sides of the sheet are called Perfecting machines. The sheet is perfected before leaving the press, but is printed on both sides by different operations. Two-colour machines have only one cylinder, which, however, has two p. surfaces and two sets of inking apparatus. Rotary p.-machines are used for that class of work where rapid dispatch is required, as in daily newspapers and sometimes periodicals. The paper is contained on great reels, and is wound in at one end of the machine, only to issue from the other in printed, cut, and folded copies of the newspaper. The cycle of operations is too complex to give here.

Letterpress Printing is the process mostly used for general work. The letters of characters are cast on pieces of metal. Large lettering, however, such as posters and placards, is made of wood, carved in relief. A complete set of type is called a *fount*; each type is notched at one end so that the compositor may place it right way up without looking at the letter. The fount is contained in a tray or *case* which stands on a frame. The tray is divided into compartments, each of which contains type of a certain letter. These compartments are so placed that those types which are most often used are close to the compositor's hand. The chief heading of this article is in Clarendon capitals, and the subheading, 'Printing-Presses,' in Clarendon lower case; the body of the article in Roman, and the title *De Natura Deorum* in italics. The sizes of types in general use are:—

This type is called Pica.
" " " Small Pica.
" " " Long Primer.
" " " Bourgeois.
" " " Brevier.
" " " Minion.
" " " Nonpareil.

The three smaller types, Ruby, Pearl, and Diamond, are not in common use. The length of a line is measured by the number of *ems* that the line will take.

The compositor picks up the required letters, places them in a setting-stick, or kind of box-like arrangement which holds them in place; when sufficient lines have been arranged they are transferred to the galley, a brass tray with wooden sides. A proof is now 'pulled' by a hand-press and read over by a printer's reader, who corrects any errors and returns to the compositor for amendment. A 'clean proof' is then taken for the author. A very small number of

impressions is printed direct from the galley type, but if, on the other hand, a large number is required, the type is stereotyped, *i.e.* a paper mould of page is filled with molten metal. After use the type is 'broken up,' *i.e.* returned to the cases.

Textile Printing, the art of ornamenting woven fabrics by p. designs in colour. The art is of very ancient origin. The Chinese used engraved wooden blocks before any kind of p. was known in Europe, while, according to Pliny and some of the hieroglyphics of the tombs of Egypt, the ancient Egyptians also practised the art of p. on cloths, as the repeated designs found in tombs show. Other peoples familiar with the practice were the Incas, the Peruvians, and the natives of Chile and Mexico. Textile p. was introduced into England in 1675 by a Fr. refugee who started works at Richmond-on-Thames. The industry does not seem to have flourished greatly anywhere before the latter part of the XVII. cent. and the early part of the XVIII.; about this time a development took place, and works were erected in France, Germany, Switzerland, and Austria. Calico p. was commenced in Scotland in 1738, while Messrs. Clayton erected an establishment at Bamber Bridge, near Preston, which subsequently became famous. Textile p. is now done in all parts of the world and in many varieties of style; the French have always been the most artistic in design.

The design may be imprinted by stencil, wood blocks, or engraved plates or rollers. The ink is thickened and specially prepared to prevent its running and spoiling the design, while it is also rendered 'fast' to prevent washing out. The following are the styles most commonly in use:—

(1) Hand Block Printing.—This is the simplest and slowest process, but it is considered to give the most artistic results. Blocks are cut from special woods (as sycamore, plane, or pear-tree), a wood of even texture and of medium hardness being requisite. The wood is first cut into convenient sizes and planed perfectly smooth. The design is then drawn on its surface or imprinted with a transfer. The superfluous wood is then cut away, leaving the design in relief. As fine details either break away in working, or would soon wear away in practice, it is customary to build them up with strips of metal. If the finished pattern is to be in different colours, separate blocks are made for each part of the pattern having a different colour, and the printing is done by separate operations.

(2) Perrotine, or Block Printing by machinery, is a somewhat complex process, consisting of a kind of printing-press; the system was invented by Perrot of Rouen in 1834.

(3) Printing by Engraved Copper Plates was first invented by Bell in 1770, but is now obsolete in England, although still used in Switzerland in specially fine engraving work for handkerchiefs.

(4) Engraved Roller Printing, a process also invented by Bell in 1785. The actual invention was improved by Parkinson and used by Messrs. Livesey, Hall, Hargreaves, & Co., of Bamber Bridge, Preston, in the early days of textile p. This machine printed calico in from two to six colours at one operation, and was an ingenious arrangement. Modern machines of this type print in from two to sixteen colours, and are of essentially the same principle. A comparatively recent invention is the *Duplex* machine, which prints both sides of the cloth. In modern roller p. some 10,000 or 12,000 yards of cloth can be printed in a ten-hours' day by a single-cylinder machine. All manner of designs are used, from fine to broad effects, and great exactitude in the 'register' of the pattern is obtainable.

(5) Stencilling is a very old art in itself, and has been used for ages by the Japanese. The desired pattern is cut from a sheet of strong paper with a sharp knife. The sheet is then laid on the cloth, and the colour brushed through. A machine for stencil p. in one colour was patented by Sharp in 1894.

[illegible] has been tried in textile p., but is of little practical value. The chief cloths treated are calico, cotton, woollen, and silk.

E. A. Parnell, *Dyeing and Calico Printing* (1849); W. Crookes, *Dyeing and Calico Printing* (1864).

PRIOR, ecclesiastical title given to monastic officials, and then technically to one ranking immediately after the abbot; some orders called the head of a house 'prior.'

PRIOR, MATTHEW (1664–1721), Eng. poet. His early training was under the care of an uncle, a vintner in Channel Row. At his uncle's office he met the Earl of Dorset, who helped to finance him during his student days. Under Anne he rose to be an ambassador, but it is as a writer of light verse rather than as a diplomatist that he is remembered.

PRISCIAN, Priscianus, surnamed Cæsariensis (fl. VI. cent. A.D.), Latin grammarian; b. in Mauretania; lived in reign of Anastasius and taught rhetoric and grammar at Constantinople.

PRISCILLIAN (d. 385), Span. heresiarch; founder of heresy bearing his name; preached rigid asceticism, denouncing marriage; burned to death at Treves; followers afterwards persecuted; his views preached later by the Cathari.

PRISHTINA, Pristina (42° 30′ N., 21° 18′ E.), town, vilayet Kossova, European Turkey; occupied by Balkan Allies, 1912–13. Pop. 17,500.

PRISON, place of confinement for ill-doers. The aim of p's has varied considerably; originally mere detention of person wanted by justice; punishments were then death, fines *in re*, corporal chastisement, and torture. Humaner ideas suggested imprisonment. From then till last cent. the aim of imprisonment seems to have been slow torture; prisoners were treated like wild beasts, left in damp, disease-ridden, and filthy quarters, in rags and with insufficient food.

It is significant that the Fr. Revolution started by razing the most notorious prison of the time (the Bastille). John Howard, J. Neild, and Miss Fry drew public attention to the shocking state of p's, and a Prison Society was formed (1817). Differentiation of sex was the first object attained (1823), separate cells and the provision of occupation followed (1839). Mr. Crawford had been sent to America to report on the p's there (1834), and had suggested many improvements to a parliamentary Select Committee. In 1840 the first 'new model' p. was built at *Pentonville* on the separate cell system. Lately p. reform has taken a different direction, and save in cases of penal servitude the separate treatment has yielded to supervised common occupations. The theoretical aim of modern p's is not so much to inflict personal punishment as to remove the subject from his criminal surroundings, protect society from him for a time, and give him a chance of fitting himself out for honest livelihood on his release. It is as yet largely a theory, but progress is being made, especially in Belgium, towards its accomplishment. This is particularly the case with youthful offenders; 'Borstal' institutions and training-ships have replaced p's in numbers of these cases. The present system of p. discipline in Britain, with its wide use of ticket-of-leave, is based on the recommendations of a Departmental Committee in 1895.

PRISTIS, see under Rays.

PRITCHARD, CHARLES (1808–93), Brit. astronomer; schoolmaster and Savilian prof. of Astron., Oxford, 1870.

PRITTLEWELL, parish, Essex, England, in borough of Southend-on-Sea.

PRIVAS (44° 44′ N., 4° 37′ E.), chief town, Ardèche, France, on Ouvèze; iron-mines. Pop. (comm.) 7200.

PRIVATEER, war-vessel owned privately and licensed by 'letters of marque' from a government. See Declaration of Paris.

PRIVY COUNCIL, body of advisers of Brit. Crown. Its original was Great Council of Norman kings composed of magnates of realm. Great Council

became House of Lords of new Parliament and also developed into Privy Council, which existed as separate body (*consilium regis*) in XIV. cent. Instead of general body of tenants-in-chief the Council was composed in 1404 of 3 bp's, 9 lay lords, 6 knights, and 1 lesser councillor. Under Tudor and Stewart, 'King in Council' sought to exercise authority of king and council of early feudal times; lost power, 1640; Cabinet appeared in XVII. cent. and was organised by Charles II.; and various boards, *e.g.* Board of Trade, Board of Education, have assumed other functions of Privy Council. King in Council is still tribunal of final appeal (*Judicial Committee*). The rank of P.C. is a distinguished one (members being styled *Right Honourable*). Council includes certain Brit. colonial statesmen and administrators. All members are seldom summoned to Council meetings. Lord President of Council is important Cabinet minister. Ireland has its own P.C.

PRIZE OF WAR (Fr. *prise*, seizing, capture), property (especially vessels and their cargoes) captured and kept by belligerents, in accordance with international rights of war. Prizes may be taken from the enemy and from neutrals violating laws of neutrality (*q.v.*). *Prize money* is awarded to those who effect capture, and a Prize Court adjudicates on questions concerning such captures. The second *Hague Conference* decided to establish an *International Prize Court* (comprising 15 judges, one each from a number of European and other countries) to settle disputed cases; and by *Naval Prize Act*, 1911, endorsing the *Declaration of London*, the Brit. Prize Court is subordinated to this International Court. See also CONTRABAND.

PRIZE-FIGHTING, see BOXING.

PRIZREN, PERZERIN (42° 8′ N., 21° E.), chief town, Kossovo, European Turkey; seat of Roman Catholic abp. and Gk. bp.; active trade; former capital of Servian kings; manufactures glass and weapons. Pop. *c.* 60,000.

PRJEVALSKY, NIKOLAI MIKHAILOVICH (1839–88), Russ. Asiatic traveller and writer; sent out by Russ. Imperial Geographical Soc. and visited hitherto unexplored regions of Central Asia; made important geographical and scientific discoveries.

PROBABILITY.—(1) The usual definition of p., or *chance*, is as follows: 'If an event can happen in a ways, and fail in b ways, and all these ways are *equally likely* to occur, then the p. of its happening is $\frac{a}{a+b}$, and the probability of its failing is $\frac{b}{a+b}$.' Events are said to be *equally likely* when we have no reason to expect one any more than the other; *e.g.* drawing a ball from a bag containing only black and white balls in unknown proportions, there is no reason to expect one more than the other; so the drawing of a black ball and of a white one are equally likely, and the probability of drawing either is $\frac{1}{2}$. Again, if *in the long-run* events occur equally often, we may say they are equally likely; *e.g.* in tossing a coin, the ratio of the number of times *heads* occurs to that of *tails* is in the long-run little different from unity. So we get another definition, consistent with the first, that the p. of an event occurring is the ratio of the number of times in which the event occurs, in the long-run, to the sum of the number of times in which events of that description occur, and in which they fail to occur.

(2) If an event is certain, it will occur always, and its p. is 1. Hence, if p is the probability of an event occurring, $1-p$ is the probability of it failing. If the ratio of the p. of an event occurring to that of it failing is $a:b$, it is said that *the odds* are a to b *for* the event, or b to a *against* it, according as a or b is the greater.

(3) When different events are *mutually exclusive* (*i.e.* if one occurs, other can not occur), the chance that one or other of the different events occurs is the sum of the chances of the separate events.

(4) The p. of two independent events both happening is the product of the separate p's of their happening; *e.g.* the p. of throwing *heads* twice in two throws of a coin is $\frac{1}{4}$, for the p. of throwing heads each time is $\frac{1}{2}$. The odds, therefore, against two successive throws of heads is 3 to 1.

(5) If two events are dependent, the p. of the second being different when the first happens from when it fails, we get a similar result to that of (4). If p_1 is the probability of the first occurring, and, that having occurred, the probability of the second is then p_2, the probability of both happening is $p_1 \times p_2$; *e.g.* the chance of drawing two red balls in succession from a bag containing three red and five white balls is $\frac{3}{28}$. For the chance of drawing a red ball the first time is $\frac{3}{8}$, and, the ball drawn not being replaced, the chance of again drawing a red ball is $\frac{2}{7}$. Hence the p. of drawing both red balls is $\frac{3}{8}\times\frac{2}{7}=\frac{3}{28}$.

(6) The p. of a certain event happening being known in one trial, the p. of it happening once, twice, three times, etc., in n trials can at once be written down. For, p being the probability of the event happening, the probability of it failing is $1-p=q$. Hence, the probability of its happening r times and failing $n-r$ times *in any given order* is $p^r q^{n-r}$. But the total number of ways in which the event could occur exactly r times in n trials is ${}_nC_r$, and since these ways are all equally likely and mutually exclusive, the probability of the event happening exactly r times in n trials is ${}_nC_r p^r q^{n-r}$. So, expanding $(p+q)^n$ by the binomial theorem, the successive terms give the probability of the event happening exactly n times, $(n-1)$ times, $(n-2)$ times, etc., in n trials. From this we can get the most probable number of successes and failures in n trials by finding the greatest term in the expansion. Again, the probability of it happening *at least* r times in n trials is

$$p^n + np^{n-1}q + \frac{n(n-1)}{1.2}p^{n-2}q^2 + \ldots + \frac{\lfloor n}{\lfloor r \lfloor n-r}p^r q^{n-r},$$

e.g. (i.) The chance of throwing 10 with two dice is $\frac{1}{12}$. For the whole number of different throws is 6^2, and there are 3 ways of throwing 10. Hence the required chance is $\frac{3}{6^2}=\frac{1}{12}$. (ii.) In four throws with a pair of dice, the chance of throwing doublets at least twice is $\frac{19}{144}$. For in a single throw the chance of doublets is $\frac{6}{36}$ or $\frac{1}{6}$; ∴ chance of failing is $\frac{5}{6}$. Hence required chance is sum of first 3 terms of $\left(\frac{1}{6}+\frac{5}{6}\right)^4$, *i.e.* it $=\frac{1}{6^4}(1+4.5+6.5^2)=\frac{19}{144}$.

(7) **Inverse Probability.**—If it is known that an event has happened in consequence of a certain number of causes, the determination of the p's of the different possible causes is a problem in *inverse* p.; *e.g.* a purse contains 5 sovereigns and 2 shillings; a second, 2 sovereigns and 5 shillings; a sovereign has been drawn; find the chance that it came from the first or second purse. Considering a large number, N, of trials, the chance of the sovereign being drawn from the first purse is $\frac{5}{7}\times\frac{1}{2}\mathrm{N}=\frac{5}{14}\mathrm{N}$, and from the second, $\frac{2}{7}\times\frac{1}{2}\mathrm{N}=\frac{2}{14}\mathrm{N}$. Putting $\mathrm{N}=14n$, the chances are $5n$ and $2n$, and hence the p's are $\frac{5}{7}$ and $\frac{2}{7}$. Questions

relating to testimony may be solved by similar methods, but are of no practical value.

(8) **Local Probability.** — Most of the problems require the Integral Calculus, but a few may be solved by simple geometrical methods.

Whitworth, *Choice and Chance*; Bertrand, *Calcul des probabilités*; Todhunter, *History of Theory of Probability*.

PROBATE.—The proving of a will. The P. Registry is now at Somerset House. P., or Letters of Administration, cannot be taken out till a week after the testator's death, but must be taken out within six months, or the executors are liable to penalties. Where the will is not disputed, it can be proved cheaply by common form at Somerset House. To be proved in solemn form it must be done in court. P. (with Divorce, and Admiralty) is the Third Division of the High Court of Justice.

PROBATION, proof; a person app. to an office is on p. when the appointment is not finally ratified until there is assurance that the person so app. will give satisfaction. Under the Probation of Offenders Act, 1907, any person charged before a court of summary jurisdiction may be released on p., when the court thinks the charge proved, but that it is inexpedient to inflict punishment; the offender entering into a recognizance to be of good behaviour.

PROBOSCIDÆ, Elephants (*q.v.*).

PROBOSCIS, an elongated nose, such as that of Elephants or Tapirs, applied also to almost any elongated or protrusible mouth organ, as in many Worms, Butterflies, and Moths, etc.

PROBOSCIS MONKEY, see under Cercopithecidæ.

PROCAVIA, Conies (*Procaviidæ*, or *Hydracoidea*), a sub-order of small Ungulate Mammals confined to Syria, Arabia, and Africa. They are small, brownish-grey, rabbit-like animals, with short snout, ears, and legs, and very small tail. They live in the crevices of rocks and feed upon foliage and tree-shoots. Many are arboreal and expert climbers. Formerly known as *Hyrax* and *Dendrohyrax*, all are now grouped in genus *Procavia*.

PROCELLARIIDÆ, Petrel Family (*q.v.*).

PROCESSION, a number of persons going ceremonially in ordered array. P's have been common in both religious and secular life, especially the former; religious p's were a regular part of official Gk. and Rom. religion. Their beginning in the Christian Church does not date certainly farther back than IV. cent., though they may be older. The eucharistic p's are somewhat later. Processional litanies were early in use; these were penitential in times of disaster. Funerals were accompanied by p's as they are among nearly all churches to this day. At the Reformation p's were generally abandoned in the Reformed churches, but they continued to some extent in the Lutheran and Anglican churches. There has been a great revival of them in England since the Oxford Movement. Except in the burial service a p. is not enjoined in the Prayer Book and they are nowhere forbidden. The Rom. ritual has elaborate regulations for them.

PROCIDA (40° 56′ N., 14° 2′ E.), volcanic island, Italy, W. of Bay of Naples; ancient *Prochyta*. Pop. 14,600.

PROCLUS, see Plato (Neo-Platonism).

PROCOP THE GREAT (*c.* 1380–1434), Hussite leader; became general of Taborites on death of Zizka; spread terror over Europe; ruled Bohemia till death in battle of *Lipan*. With him fell his great general, Procop the Little.

PROCOPIUS (fl. VI. cent.), Byzantine historian; became chief adviser of Belisarius, *c.* 527, and went with him to African, Ital., and Pers. Wars, which he described; settled in Constantinople from 542 to death, about 562; chief works: *Books of the Wars*; the *Anecdota* or '*Secret History*,' a scurrilous attack on Justinian and Theodora; *The Buildings of Justinian*; chief source of history of time.

PROCRUSTES, Damastes, Polypemon, a robber of Attica who placed victims on a bed ('Procrustean bed'); if too tall he hewed off their limbs, if too short he racked them; Theseus slew him.

PROCTER, BRYAN WALLER, 'Barry Cornwall' (1787–1874), Eng. poet of little merit; fame rests on his personality; his friends included Lamb, Keats, Scott, Tennyson, Dickens. His dau. **Adelaide Ann** ? (1825–64) was also a poet.

PROCTOR, a shortened form of Procurator, meaning one who acts on behalf of another. In the Law Courts solicitors have taken the place of p's (who formerly were officers in ecclesiastical courts), but the King's P. survives to intervene in divorce cases, and prevent a decree being made absolute when collusion or concealment of facts has taken place. Univ. p's are masters of arts app. by the univ. authorities to preserve discipline in public places.

PROCTOR, RICHARD ANTHONY (1837–88), Brit. astronomer; wrote many books in popular style; greatest work, perhaps, *Old and New Astronomy* (unfinished at death; completed later by Ranyard).

PROCURATOR, literally one to whom a charge has been committed by another person; name of various officials in Middle Ages, and of administrator in certain religious houses. In Scotland the *p.-fiscal* is a public prosecutor app. by the sheriff.

PROCYON, see Raccoon Family.

PROCYONIDÆ, Raccoon Family (*q.v.*).

PRODUCTION, meaning the Production of Wealth, is one of the great divisions into which political economists arrange their subject, distinguishing it thereby from the Distribution of Wealth.

PROFIT-SHARING, a system of remuneration adopted by certain employers, who allocate a fixed proportion of the profits of industry—in addition to wages—to the working people engaged in the particular business. It has been tried with success in England by the South Metropolitan and other gas companies, and by Leclaire and Godin in France.

PROGLOTTIDES, segments of a Tapeworm.

PROGNOSIS, the forecast of the course and termination of a disease.

PROGRAMME MUSIC, in its highest sense, is any instrumental music, usually orchestral, which avowedly seeks to 'tell a story,' or depict certain definite scenes and emotions. In a lower sense it may be taken to include such music as Händel's imitation of the plague of flies in *Israel in Egypt*. Beethoven was the first great writer of p. m., though Haydn and Mozart often 'worked to a picture.' Mendelssohn's *Scotch* Symphony and *Hebrides* Overture, Schumann's *Carneval* and *Fantasia in C*, Liszt's *Mazeppa* and Symphonic Poems, and MacCunn's *Land of the Mountain and the Flood* overture are good examples. Recently Strauss, Debussy, and others have made p. m. something of a cult; but many of these modern efforts undoubtedly go beyond the legitimate sphere of music.

Prof. Niecks, *Programme Music in the Last Four Centuries* (Novello).

PROGRESSION (in math's), see Series.

PROHIBITION, see under Temperance.

PROJECTILES.—A knowledge of the properties of p. is essential to modern gunnery, which has now assumed the position of a science (*ballistics*, from Gk. *ballo*, throw). The projectile is the thing thrown: its path, the trajectory. Considering alone the action of gravity, acting vertically downwards, the trajectory is a parabola, the path to the highest point being exactly reproduced on the opposite side of the origin. But under the resistance of air the trajectory loses its symmetry, the descent from the highest point being sharper than the path to it. The resistance depends on the velocity, shape, size, and mass of the projectile, factors given or calculable from those given.

The earliest authority on p. was Tartaglia in *Nova Scientia* (1537); Galileo followed, but neglected the resistance of the air, and, indeed, this governing factor was not accurately investigated until 1864, when the

Rev. F. Basforth commenced to measure the resistances experimentally over long ranges. For velocities lower than 1000 ft. and above 1300 per second, the resistance, as Newton deduced, varies as the square of the velocity; but between these limits the resistance is very much higher. With projectiles of the same shape the resistance varies as the square of the diameter, but inversely with the weight.

The velocity of shot had been measured as early as 1742 by the *ballistic pendulum* of B. Robins, and nearly a century passed before the invention was superseded (see CHRONOGRAPH). The science is now so complete that time of flight, elevation, and penetration (factors included in tables drawn up for every weapon) can be computed as well as the charge, size of chamber, shape of projectile, length and thickness of weapon.

The part of ballistics which treats of the gun's properties is called *interior ballistics*. It has for its problems the pressure of the explosive gas and the strains produced in the gun. From one point of view the gun is merely a heat engine (see ENGINE), the cycle of operation being completed in a single stroke. Its problem is therefore the general one of thermo-dynamics (*q.v.*). The pressures inside the gun-bore were discovered by accurate experiments, and the first were carried out by Robins. The advantage of modern explosive charges, as compared with the abandoned black gunpowder, are the evolution of greater values of gas at an increased pressure and temperature. The charges are therefore smaller. Cordite is used in British ordnance.

Exterior and Interior Ballistics, Ingalls; *Ordnance and Gunnery*, Lessak.

PROJECTION.—If all the points of any figure be joined to any fixed point in space (O), the joining lines form a cone with O as *vertex*. The section of this cone by any plane gives a figure called the *projection* of the given figure. The plane cutting the cone is called the *plane of p.* Different positions of the vertex give rise to different types of p.: (i.) *Orthographic p.*—vertex is infinitely distant, so that projecting rays are parallel. (ii.) *Orthogonal p.*—rays parallel and perpendicular to plane of p. (iii.) *Projections of Sphere* (of great importance in map-making)—(*a*) *Stereographic p.*, vertex on surface of sphere; plane of p., the tangent plane at end of diameter through vertex. (*b*) *Globular p.*, vertex is at distance $\sqrt{2}\times$ radius from surface; plane of p. is perpendicular to diameter through vertex. (*c*) *Mercator's p.*, not true p. as in above (see MERCATOR). *Method of p.* is very useful in geometry.

The following elementary theorems are proved in most text-books (*e.g.* Salmon's *Conic Sections*, C. Smith's *Conic Sections*). A straight line is projected into a straight line. Any plane curve is projected into one of the same degree. Any tangent to one is projected into a tangent to the other. Any property of a given curve not involving the *magnitude* of lines or angles, but dealing merely with relative positions of points, lines, and the curve, will be true for the projected figure. Thus, since the tangents at the extremities of chords of a circle through a fixed point intersect on a straight line, the *polar* of the point, and since it can be shown that any conic can be projected into a circle, the theorem of poles and polars is true for all conics. Pascal's theorem, that the three intersections of the opposite sides of any hexagon inscribed in a conic are in a straight line, and Brianchon's theorem, that the three opposite diagonals of every hexagon circumscribing a conic intersect in a point, only require proving for the circle, and by p. they are easily seen to be true generally. Properties like the above, which remain true on p., are called *projective properties*. Some of these do involve magnitudes. Most important of these is: Cross ratios of pencils and ranges are unaltered by p. Angles constant in any figure are not in general constant in the p., but we have such theorems as the following: Any two lines at right angles to each other will be projected into lines which cut harmonically the line joining the two fixed points, which are the p's of the imaginary points at infinity on a circle.

PROKOPOVICH, THEOFAN (1681–1736), abp. of Novgorod, 1724, and reformer of Russ. Church.

PROLETARIATE, lower classes in a state; in Servius Tullius' time *proletarius* was a man valuable only as a begetter of offspring (*proles*).

PROLOGUE, term denoting a preface to a poem or a drama. The original p. in Greek was an integral part of the drama, but it has degenerated into a mere explanatory address to the audience.

PROME (18° 43′ N., 95° 15′ E.), district, Pegu division, Lower Burma. Pop. 375,000. Chief town, **Prome**, on Irrawadi; trade in rice; silk-weaving industry. Pop. 30,000.

PROMETHEUS (classical myth.), s. of Iapetus, a Titan, and Clymene, bro. of Atlas and Epimetheus; is represented as helping men against Zeus and teaching the arts; has been called the culture-hero of the Greeks; helped Zeus against the Titans; brought fire to mortals, and as punishment was chained to Mount Caucasus, where an eagle by day devoured his liver, which grew again by night; delivered by Heracles; subject of many legends (see Hesiod's *Works and Days* and Æschylus' *Prometheus Bound*). The Gk. legend of the theft of fire is analogous to many stories in all parts of the world.

PRONG-BUCK (*Antilocapra americana*), an antelope-like hoofed mammal, found only on the prairies of western North America, and distinguished from antelopes proper by its horns, with a short branch, which are shed annually.

PROOF-READING is the art of correcting errors of the compositor (and if necessary of the author) in order to make the printed sheet mechanically perfect. To facilitate proof-correcting there is a recognised system of signs, by which all the commoner errors are indicated. Corrections are marked in the margin. Proof-reading requires wide general knowledge, thorough understanding of typography, and keen vision.

PROPERTIUS, SEXTUS, (fl. 28–15 B.C.), Rom. poet; b. Assisium, Umbria; ed. Rome; joined literary coterie of which Mæcenas was patron; became friend of Vergil and Ovid; infatuated by courtesan whom he calls 'Cynthia'; parted by mutual infidelity. P. was greatest master of the elegiac metre; is imaginative, tender, brilliant in flashes, though his work is not consistent; wonderful descriptive power and command of language. Four books of his poems are extant, mostly love-poems interspersed with verses on political and historical themes. Best-known poem describes the appearance of Cynthia's ghost to the poet.

PROPERTY, see INHERITANCE.

PROPHET (Gk. 'one who speaks forth'), name given to a certain class of men, especially among the ancient Hebrews, and to some extent also in Christianity and elsewhere.

I. JEWISH.—The *Prophets* is given as a title to one portion of the Old Testament both in Hebrew and English. There are the four *Greater P's*—Isaiah, Jeremiah, Ezekiel, and Daniel; and the twelve *Lesser P's*—Hosea to Zechariah (*qq.v.*) in the Old Testament. The ordinary conception of a p. is that of one who foretells future events, but this is only one aspect of his work. It seems probable that the Old Testament p's were possessed at least of extraordinary insight and did sometimes foretell future events. In reaction from this, the tendency has been to emphasise exclusively the work of the p's as moral reformers—also a one-sided view. Rather should they be viewed fundamentally as those who spoke forth the will of God—His interpreters to His people. The constant refrain, 'The word of the Lord came unto me, saying,' shows that the p. did not regard his message as simply his own.

In early times the p. seems to have been a seer or visionary, one who in ecstatic frenzy uttered strange sounds, so we are told that he that was formerly called a seer

was now called a p. (*1 Samuel* 9⁹). Then from Samuel onwards the ecstatic element tends to disappear and the moral and spiritual to come uppermost. The great age of Hebrew prophecy, however, begins in the VIII. cent., with Amos, Hosea, Isaiah, and Micah, when Israel was threatened with Assyrian supremacy. The main task, at any rate, of these men was not to prophecy future events, but to speak to men of their own age—firstly, against prevalent moral and idolatrous corruption; secondly, to proclaim the greatness and love of God. Their work was continued by Jeremiah and others, and prophetic activity continued till the IV. cent. B.C. But the understanding of the work of the p's is intimately bound up with the hist. criticism of the Old Testament. The prophets' writings cannot be understood except by always keeping in sight the political history of their time. It is now known that the Law took its final shape after the p's had written. Owing to the sins of their time the work of the p's was bound to be largely denunciatory. It is a great mistake to think that Isaiah was primarily 'poetic,' as a certain school of critics have done.

II. CHRISTIAN.—P's in the Christian Church were very different from the famous names of Old Testament times. St. Paul mentions prophesying in *1 Corinthians* 12 as a special gift, and it seems to have been akin to preaching. A p. was one inspired by the Holy Spirit to speak certain things. We find continual warnings against false p's, either hypocrites, or, more often, those who were self-deceived, and would lead others astray. The *Didaché* (Teaching of the Twelve Apostles) is hostile to the p's, who in the III. cent. became extinct.

Burney, *Theology of the New Testament*; Robertson Smith, *Prophets of Israel*.

PROPITHECUS, see SIFAKAS.

PROSELYTE (Greek), literally a sojourner, now used only of a convert from one religion to another: in ancient Judaism there are (1) full p's, admitted by circumcision and baptism; and (2) p's of the gate.

PROSERPINE, called **Persephone** by the Greeks, was the dau. of Demeter. She was gathering flowers in the vale of Henna when Pluto, king of the underworld, carried her away. Her mother mourned her, and as she mourned the crops ceased. A reconciliation was brought about, by which it was agreed that during half the year P. should dwell with her mother in the land of the living, and during the other half she should dwell with Pluto among the dead.

PROSKUROV, PLOSKUROV (49° 25′ N., 27° E.), town, Podolia, Russia; active trade. Pop. 25,000.

PROSODY, the art of versification. Terms used are: *verse*, line of poetry; *stanza*, set of verses 'standing' together; *foot*, a single syllable, or a group of syllables; *accent*, stress of voice on syllable; quantity, time occupied in pronouncing a syllable, essential in classical, not in Eng. p.; *scansion*, act of counting feet in a verse; *metre*, measure of a verse; *alliteration*, recurrence of an initial sound in a verse.

Common feet in Eng. p. are *iamb* (⏑ –), *trochee* (– ⏑), *spondee* (– –), *dactyl* (– ⏑ ⏑), *anapæst* (⏑ ⏑ –).

Metres.—(1) Iambic Dimeter, *e.g.*—

Then sigh | not so.

(2) Iambic Trimeter, 'Ballad Metre,' 'Common Metre' (of hymns), *e.g.*—

Our hope | for years | to come.

(3) Tetrameter, *e.g.*—

She stole | along, | she nothing spoke.

(4) Iambic Pentameter, *e.g.*—

The ev | il that | men do | lives af | ter them.

(5) Alexandrine (6 feet), *e.g.*—

Without | a grave, | unknelled, | uncof | fined, and | unknown.

(6) 'Fourteener,' *e.g.*—

The king | is come | to mar | shal us | all in | his ar | mour drest.

See COUPLET, LYRICAL POETRY, SONNET, CÆSURA.

PROSPER OF AQUITAINE (390–465), ecclesiastical author and follower of St. Augustine, whom he defended in several writings; his most important work is his *Epitoma chronicon*.

PROSSNITZ (49° 29′ N., 17° 7′ E.), town, Moravia, Austria; cloth manufactures. Pop. (1910) 31,162.

PROSTATE GLAND, see REPRODUCTIVE SYSTEM.

PROSTITUTION may be defined as promiscuous fornication for the sake of gain. It is not to be confounded with *concubinage* or *adultery*, for the concubine may be the lawful, though unmarried, wife of a bigamous or polygamous husband, and adultery, being the violation of marriage, requires that one at least of the offending parties shall be married. From the earliest times of civilisation the prostitute, the woman who sells her body for the gratification of the man's sexual instinct, has been found in the world, and while common public opinion condemns the woman and holds her profession in disrepute it has not been strong enough to abolish p. or to attach infamy to the man for whom the prostitute caters. Over and over again the Christian Church and European governments have tried to check and to make an end of p., but without success.

Various reasons are offered for its persistence. P. is the only alternative in many cases to a life of hard and badly paid work. It promises degradation in exchange for purity, but it also promises luxury, ease, and indolence in exchange for the daily round of toil. Passion having made a mother of an unmarried woman, the difficulty of obtaining employment is so great that p. becomes the only means of obtaining a livelihood. A certain number of men and women are so over-sexed and so dominated by sex lust that they will maintain p. in spite of all morality and decency. These are the chief explanations offered. P. is defended by those who declare that man is a polygamous animal, and that since he must have an outlet for his lusts, it is better he should seek a prostitute than seduce his neighbour's wife. On the other hand, p. not only violates the Christian principles of marriage and personal purity, destroys the happiness of home life, and keeps all who practise it in under the ban of social order, it is also the fatal agency of venereal disease.

In continental countries, p., though forbidden, is tolerated by law, and its control is left in the hands of the police. Women are accordingly registered, and are required to live in certain houses and to be subject to medical examination. In Great Britain there is no recognition by law, and houses set apart for p.—houses of ill fame, or disorderly houses—are not permitted (by law) to exist. Neither is the prostitute allowed by law to solicit. In spite of the law, houses of ill fame abound, and thousand of prostitutes ply their trade in Brit. cities. The Criminal Law Amendment Act, 1912, aims at suppressing some of the worst features of what is known as the *White Slave Traffic* (procuring of girls for purposes of p.).

W. F. Amos, *State Regulation of Vice: The Social Evil* (1907).

PROTAGORAS, see SOPHISTS.

PROTANDRY, PROTOGYNY, see FLOWER.

PROTEACEÆ, natural order of shrubs and trees of W. Africa and Australia; includes Banksia (*q.v.*).

PROTECTION (Fiscal), the policy of excluding the produce of other countries (in the case of articles that can be produced at home) by means of high tariffs or import duties. The protectionist claims that his first principle is that of nationality or patriotism, the promotion of native industry; and John Stuart Mill said of such: 'Many of them have been led to it (protection) much more by consideration for the higher interests of humanity than by purely economic reasons' (*Principles*, bk. v. ch. 10). Next to zeal for the public welfare comes private interest as the argument for p. The special interest of certain classes of producers makes them zealous for p. Thus many agriculturists desire p. for corn, while manufacturers are against taxes on corn or on raw material, and desire p. against the foreign manufactured article. Yet a third body of protec-

tionists urges the raising of revenue, by 'making the foreigner pay,' as the chief ground for stringent import duties. As a political creed p. in Great Britain lost its followers under the free trade budgets that followed the repeal of the Corn Laws in 1846, and both political parties accepted Free Trade as the settled policy of the country until Mr. Joseph Chamberlain started his campaign for Tariff Reform in 1903. Taking Imperialism for his warcry, Mr. Chamberlain urged free trade within the empire and p. against the foreigner. Tariff Reform has become the chief item in the programme of the Conservative party. See FREE TRADE, TARIFF.

W. J. Ashley, *The Tariff Problem*; Rev. W. Cunningham, *Rise and Decline of Free Trade Movement*; L. G. Chiozza-Money, *Elements of the Fiscal Problem.*

PROTECTIVE COLORATION and RESEMBLANCE, schemes of colouring or peculiarities of shape which tend to render animals inconspicuous in their natural surroundings and thus protect them from the observation of their enemies. P. c. is exceedingly common and is all but universal among birds and fishes, the palor under-parts of the former and silvery bellies of the latter counteracting the effect of the shadow cast by strong overhead light, and merging the body as a whole into the monotone of an average background. Or there may be more patent general resemblances to environment, such as the tawny tints assumed by many desert animals, the greens of many arboreal forms, such as tree-frogs, tree-snakes, and parrots, the blue transparencies of pelagic organisms, or the varying coats of Arctic creatures, such as the Mountain Hare, the Arctic Fox, the Stoat, and the Ptarmigan, which change to white when snow covers the ground. Again, more particular resemblances to immediate environment are common, most wonderful of these being the colour-changes which many creatures, *e.g.* some Shrimps (*Hippolyte*), the Octopus, Plaice, Trout, the Chameleon, and several other Lizards undergo as they pass from one set of colour-surroundings to another.

The habitual resting-place is imitated in the Pine Lappet Moth, which merges with the bark of the Pine tree, in the peculiar Madagascar Weevil (*Lithinus*), which exactly resembles the grey and black lichen upon which it feeds, or in countless leaf-devouring Caterpillars.

Often resemblance in structure goes with similarity in colour: Stick Insects agree in shape as in tint with the dark twigs on which they rest, so do the looping Caterpillars of Geometrid Moths; a Bornean Praying Mantis (*Deroplatys*), and the Indian Leaf-Butterfly (*Kallima*), resemble withered leaves, the likeness in the case of the latter, with midrib, veins, and all, having deceived many acute observers.

PROTECTOR, Eng. title given to gov. or regent; held by Earl of Pembroke (1216), Dukes of Gloucester —Humphrey (1422), Richard (1483)—Duke of Somerset (1547), Oliver Cromwell (1653), Richard Cromwell (1658).

PROTECTORATE, term in international law for (1) overlordship of a civilised state over a barbarous or semi-barbarous state. These p's are a new international development, being entirely different from the well-known hist. feature of hegemony of one state over its equals. The subordinate states have varying amounts of autonomy, but foreign policy rests with protecting state. (2) Generally, overlordship of one state over another. Interference of other powers with a protected state frequently precipitates annexation.

PROTEIN, see DIETETICS.

PROTELES, see AARD-WOLF.

PROTEOMYXA, minute animals, parasitic in living organisms, or saprophytic, included in a sub-order of Amœba (*q.v.*), an order of primitive Protozoa. It comprises elemental forms which reproduce only by simple division, such as *Protogenes*, a marine creature found in the Mediterranean, 0·1 to 0·2 mm. in diameter, with fine pseudopodial rays which seize Protozoa or Diatoms for food. Or more complicated forms, which form cysts from which Amœboid individuals issue, such as *Vampyrella*, which inhabits the sea or fresh water, living on and penetrating algæ, furnished with fine direct pseudopodial rays. It measures 0·5 to 0·7 mm. **Protomyxa** belongs to a still more advanced type, for the cysts to which it gives rise produce minute flagellated individuals which later become amœboid. For an amœba, *Protomyxa* is large, 1 mm. across; it is furnished with many, much-branched pseudopodia and lives in the sea.

PROTESILAUS (classical myth.), first Greek to leap ashore at siege of Troy; slain by Hector.

PROTESTANT, name given to Reformed Churches in distinction to the R.C. or ancient Eastern Churches; because Luther and his followers 'protested' against a Catholic decree passed at the Second Diet of Spires, 1529. The Anglican Church is called 'Protestant' by Roman Catholics and by some of its own members, but others repudiate the term. See REFORMATION.

PROTESTANT EPISCOPAL CHURCH.—The Anglican Church in America before the Declaration of Independence was merely a group of local churches under the control of the Bp. of London. The first bp. was consecrated in 1787, but for some time, as it was largely identified with England, the Church made little progress. Several able men, however, were consecrated, particularly R. C. Moore, who became Bp. of Virginia in 1814; theological colleges were established and several new dioceses were founded. During the Civil War the Southern churches seceded for a time, but were soon reunited. The Church is now widely extended and has missionary dioceses in South America and the East. It is more democratic than in England, the parochial clergy being app. by laymen, who also share in Church government.

PROTESTANTENVEREIN, Ger. association, founded 1863, to promote unity among Protestants; great object, federation of Prot. churches; exercised some influence on State, but roused opposition of orthodoxy.

PROTEUS (classical myth.), 'the old man of the sea,' tender of Neptune's flocks; a prophet, he hated prophesying, and, to escape an inquirer, assumed various forms. When caught he resumed his true form and prophesied.

PROTEUS, a blind, newt-like amphibian, sometimes a foot in length, found in limestone water-caves of Carinthia and Dalmatia.

PROTISTA, comprehensive name applied to simplest unicellular forms of life, whether plant or animal. See ALGÆ.

PROTOBRANCHIA, an order of LAMELLIBRANCHIATA (*q.v.*).

PROTOGENES, an amœboid Protozoon; see under PROTEOMYXA.

PROTOGENES, a painter of ancient Greece, who flourished *c.* 300 B.C.; practised chiefly at Rhodes.

PROTOMYXA, an amœboid Protozoon; see under PROTEOMYXA.

PROTOPHYTA, term applied to simplest forms of plant life, *e.g. diatomaceæ, bacteria.*

PROTOPLASM is the living matter of organic things, plants, or animals. It is contained in cells (*q.v.*) which in animals may be naked or bounded by a delicate membrane, and in plants have strong walls of cellulose. To the naked eye and under a microscope of moderate magnifying power p. in its simplest known state, cytoplasm, appears to be a homogeneous, transparent, semi-fluid substance, but high magnification and the use of suitable staining materials reveal a complicated structure. This appears to differ in different cells and at different times, but in general it is fibrillar—interspersed with minute filaments of denser material; reticular—with a meshwork of delicate threads; granular—with exceedingly minute particles scattered in the substance; or alveolar—with a foam-like structure of liquid containing vacuoles round which the protoplasm streams.

The chemical composition of p. is complicated, for it contains albumens, fats, alcohols, compounds of iron, as well as phosphates of sodium, potassium, magnesium, and calcium. P., besides forming cytoplasm, builds the nucleus and other ingredients of a cell (*q.v.*), the unit of organic structure.

PROTOTHERIA, see under MAMMALS.

PROTOZOA (Gk. *protos*, first; *zoon*, an animal), the simplest animals: the most primitive of all animals, standing with the simplest plants (*Protophyta*) at the base of the tree of life. They are to be distinguished from other animals by the simplicity of their structure, for as a rule they consist of a single cell or bead of jelly-like protoplasm; even where many single cells are united into a colony, as in *Volvox*, each cell is similar to its neighbours and is more or less independent of them, a congregation very different from the tissues of cells which make up the bodies of other animals. So simple, however, is the structure of P. that it is almost impossible to distinguish them from the simplest plants.

The single usually microscopic cell of a protozoon consists essentially of a body-mass of protoplasm-cytoplasm, containing one or more nuclei, contractile vacuoles which eject waste products, food vacuoles with digestive ferments, and many small granules in the cell substance. So the cell is complete in itself, possessing the powers of life, of growth, and of reproducing its like, for when it has reached its maximum of size the cell splits into two (in *Amœba* the entire process lasts only 15 minutes), and each daughter cell is a new individual. In some higher forms, such as *Paramœcium*, a sort of conjugation and interchange of nuclear material takes place previous to division—a primitive sexual union; while in others, such as the Mycetozoa and Sporozoa, spore formation is the rule.

Even within the limits of a single cell there is much room for variation. Some forms have naked bodies, others have a rind of tougher protoplasm, some have skeletons of lime or silica, others build for themselves protecting shells of similar materials, of chitin, or of diatom valves and other débris. The simplest P. merely crawl over the substratum by a flowing motion of their bodies, which project into finger-like processes or *pseudopodia*; but others swim or glide with ease and rapidity by the action of one or a few whip-like filaments or *flagella*, or by the rhythmical movement of hundreds or thousands of *cilia*.

P. are found all the world over. Some occur in fresh-water pools, many in the sea, and such feed upon bacteria, diatoms, or even upon P. more minute than themselves. Others live upon decaying vegetation, absorbing the organic solutions resulting from the breaking down of tissues, while a few contain coloured grains (*chromatophores*, or *chromoplasts*), by the aid of which they can, like plants, utilise sunlight for the decomposition of carbon dioxide into usable substances. But many are parasitic, living in the bodies of larger animals, and even of man, feeding upon the ready prepared substances in which they lie, and so occasionally interfering with the health of their hosts, and sometimes causing death.

Apart from their relation to disease (see especially under TRYPANOSOMES and SPOROZOA) P. have little apparent economic significance. The Infusorians and Mastigophora, or Flagellates, however, purify waters by their destruction and assimilation of harmful bacteria, while the Foraminifera and Radiolaria of past ages have contributed to the building of great formations of limestone and chert.

The Phylum PROTOZOA is divided into four classes:—

Class I. SARCODINA, p., with naked bodies, which feed and move by means of indeterminate, changing lobes or threads (pseudopodia).

Class II. MASTIGOPHORA, or FLAGELLATA, p., with bodies naked or having a definite rind, which feed and move by whip-like filaments or flagella.

Class III. SPOROZOA, p., with bodies having definite rind, but without feeding or motile organs in the adult.

Class IV. INFUSORIA, p., with bodies having definite rind, which feed and move by means of numerous close-set short filaments or cilia.

PROUDHON, PIERRE JOSEPH (1809–65), Fr. writer and politician; of peasant origin; pub. *Qu'est-ce que la propriété*, 1840, followed by other socialistic writings; founded paper, *Représentant du peuple*, 1847; imprisoned for attacks on government, 1849, and abandoned political life; fled from new imprisonment, 1858, on account of attack on Church and institutions in *De la justice*.

PROVENCE, ancient province of France, bounded on S. by Mediterranean, E. by Alps and Italy, N. by the Dauphiné, and W. by Rhône and Languedoc. Earliest inhabitants were Iberians and Ligurians; c. 600 B.C. Gk. colony of Massalia (Marseilles) is said to have been founded; Romans entered Gaul c. 125 B.C., and later took possession of large portion of country, and founded *Provincia Romana* with Aix as capital; after Cæsar's conquest of Gaul in 50 B.C. Arles became leading town; P. was attacked by Visigoths and Burgundians in V. cent., and in VIII. cent. by Arabs from Spain; two cent's later region was overrun by Saracens; country was ruled by counts of P.; in 1245 P. passed into hands of Charles of Anjou, king of Naples, and was joined to France in 1486 under Charles XIII. District is remarkably rich in Rom. and mediæval remains, finest being at Aix, Arles, Avignon, Nimes, and Orange. At end of XVIII. cent. P. was divided up, and now forms departments of Bouches du Rhône, Var, and Basses Alpes, with portions of Alpes-Maritimes and Vaucluse.

Provençal Language and Literature.—Provençal is the language which was spoken in France south of the Loire during the earlier Middle Ages. It was called *Langue d'Oc* (see FRANCE: *Language*), and was spoken also in Catalonia, joined to Provence under Raymond-Bérenger (1092). The lit. of the *Langue d'Oc* was very different from that of the *Langue d'Oil*, because Rom. civilisation had left a deeper mark and Ger. and Norman invasions were less felt. Rom. learning revived in Toulouse, Bordeaux, Narbonne, and Arles; southern France (the eastern part under the counts of Toulouse and the western under the kings of England) enjoyed for many cent's more peaceful government than northern France; mild climate and frequent intercourse with Moors of Spain contributed to give the *Langue d'Oc* its harmony and colour, to which the name of *gaye science* or *gay savoir* is due. Poets of the north were called *Trouvères*, the Provençal poets *Troubadours* (*robar*, to find, invent). They were often nobles, even kings, sometimes poor vassals. Their chief subjects were love in all its phases, the joys of home, war, and sometimes personal satire; they composed *cansos* (songs), *pastourelles*, *tensons* (poetical dialogues), and *sirventes* (satires). Some Troubadours went from castle to castle, starting in early spring; they wore many-coloured dress, and carried a guitar or other instrument.

The Troubadours filled an important place in mediæval life. One of the best known is SORDELLO, of whom Dante speaks with admiration and Browning writes. Others are ARNAUD DE MARVEL, a serf, troubadour of Viscount of Béziers, who sang the charms of Adelaïde, dau. of Raymond V., Count of Toulouse; BERNARD DE VENTADOUR, GAUCELIN FAYDIT, and PIERRE VIDAL, also of humble origin; ARNAUD DANIEL, celebrated by Dante and by Petrarch, who calls him 'the great master of love'; PEYROLS D'AUVERGNE, who sang the Crusade; GUILLAUME IX., Count of Poitiers and Duke of Aquitaine, celebrated for his *Chant d'adieu* before starting for the Crusade (1108); the warrior BERTRAND DE BORN, who wrote bold *sirventes*, and encouraged the sons of Henry II. of England in making war against their father; and RICHARD CŒUR-DE-LION (1157–99), who learnt the *gaye science* in southern courts, and who, the story goes, was released after eighteen months' imprisonment in the castle of Dürrenstein,

being found by the troubadour BLONDEL, who went from castle to castle singing *Cœur-de-Lion's* songs.

None of those poets left masterpieces, therefore the *Langue d'Oc* could not become a literary language. Soon the religious war of the Albigenses broke out; North seized the opportunity to attack South; Raymond, Count of Toulouse, was defeated and all the country sacked; the Troubadours disappeared and Provençal poetry ceased. In 1323 Toulouse made attempt to recall it to life by instituting the *Jeux floraux*, the foundress of which is supposed to have been Clemence Isaure, about whom very little is known.

In the XVII. cent. the *Jeux floraux* formed an academy which exists to this day. It takes its name from flowers distributed to the laureates. This presentation, called *fête des fleurs*, takes place at Toulouse, May 3.

Towards the middle of the XIX. cent. there was a renaissance of Provençal language and poetry, under the association called FÉLIBRIGES, its members being the *Félibres*. The first impulse was given by Jasmino; founded, 1854, by Mistral (1830–), Roumanille (1818–91), Anselme Mathieu, Théodore Aubanel (1829–86), and others. It has made proselytes in Aquitaine, and fraternises with Catalonia, which is also experiencing a parallel renaissance.

Cook, *Old Provence* (2 vols.).

PROVERBS, BOOK OF, in the Old Testament is part of the 'Wisdom' Literature. The word 'Wisdom' is here used specially of a certain sort of intellectual acuteness. The interest of the Wisdom lit. is not so national as that of the 'Prophetic,' and is concerned largely with reflections on human nature. 'Proverb' in Hebrew is *māshâl* (also the equivalent of parable), and means a 'representative statement.' The book falls into eight divisions, viz.: (1) Chapters 1–9; (2) $10–22^{16}$; (3) $22^{17}–24^{22}$; (4) 24^{23-34}; (5) 25–29; (6) 30; (7) 31^{1-9}; (8) 31^{10-31}. All these 'differ in tone and subject.' (2), called the '*Proverbs of Solomon*,' forms the central portion of the book, and some, though hardly all, may be by King Solomon. The style of *Proverbs* is distinctive; some words and phrases are not found much elsewhere in the Old Testament. The date of the book is uncertain: (2) is certainly the most ancient, but the book as a whole suggests the greatest days of the monarchy. Chapters 1–9 are later, and in the opinion of several critics about the time of the Exile. 25–29 were added to the body of the book, and 30–31 seem to be still later and post-Exilic.

Driver, *Introduction to Old Testament Literature*; Martin, in *Century Bible*; Toy, in *International Critical Commentary*.

PROVIDENCE (41° 47′ N., 71° 27′ W.), capital, Rhode Island, U.S.A.; founded by Roger Williams, the apostle of religious liberty and founder of Rhode Island, in June 1636; became a city in 1832; stands on P. Harbour, an inlet of Narragansett Bay; built on hilly ground and laid out with less regularity than most Amer. towns; fine public buildings, including Federal Building, City Hall, State Capitol, various libraries; seat of Brown Univ. (under Baptist control; dates from 1764), whose buildings include an Observatory, Women's Coll., Natural History Museum, and several libraries; many schools and philanthropic establishments, the Athenæum and Rhode Island Historical Society buildings; R.C. cathedral; numerous beautiful parks. P., formerly a great seaport, is now more important as an industrial centre, deriving water-power from its rivers; manufactures gold and silver ware, locomotives and machinery, woollens, cottons, lace, etc. Pop. (1910) 224,326.

PROVINCE.—*Provincia* generally signified the territory governed by a Rom. magistrate vested with military authority (*imperium*); term originally applied to scope of a magisterial office. Under Republic, captured countries were made p's, under a gov. sent annually from Rome, with a *quæstor* for financial and mechanical purposes, and a staff; peaceful p's administered by prætors (proprætors), unsettled districts by consuls (proconsuls) with army. Provincials were frequently oppressed by rapacity of gov., Rom. money-lenders, and tax-farmers. Under Empire, conditions improved, gov's were paid a fixed salary, and were under imperial supervision; tenure of office lengthened; franchise given by Caracalla to provincials.

Provincia was specialised to mean Rom. p. in southern Gaul, part of later Provence (*q.v.*).

PROVINCETOWN (42° 3′ N., 70° 13′ W.), town, summer resort, Massachusetts, U.S.A., on Cape Cod peninsula; cod, mackerel and whale fisheries. Pop. (1910) 4369.

PROVINS (48° 33′ N., 3° 17′ E.), town, Seine-et-Marne, France; interesting features are XII.-cent. church of St. Quiriace and the Grosse Tour; mineral springs; flour-mills; extensive rose gardens in vicinity. Pop. 7700.

PROVISIONS OF OXFORD, see OXFORD, PROVISIONS OF.

PROVO (40° 10′ N., 111° 49′ W.), city, on Provo, Utah, U.S.A.; woollen manufactures. Pop. (1910) 8925.

PROVOST, ancient title of certain ecclesiastical and secular officers. It survives in Scotland, where the principal magistrate of a royal burgh (corresponding to the Eng. *mayor*) is called a p. or (in the case of Edinburgh, Glasgow, Aberdeen, Perth, and Dundee) 'lord p.' The governing officer of certain univ. colleges, notably Oriel, Queen's, and Worcester at Oxford, King's at Cambridge, and Trinity, Dublin, is also called p. In France in the Middle Ages the p. of Paris was a royal judge.

PRUDENTIUS, MARCUS AURELIUS CLEMENS (b. 348 A.D.), Lat. writer; b. Spain; wrote sacred verses; called by Bentley 'the Horace and Vergil of the Christians.'

PRUDNIK, see NEUSTADT.

PRUNING, removal of branches from fruit trees, so as to improve fruit-supply, or from hedges, etc., for ornamental purposes. *Winter p.* is done in Jan. or Feb., and the spur left must have one or two buds; red currant bears fruit on old branches; black currant and gooseberry on young shoots; raspberry old wood is cut away. Cherry, holly, ivy may be pruned in summer. When p. fails to make a tree bear fruit, root-pruning may effect a cure; fruit trees should be planted on a stone slab, else roots will grow downwards and thus be beyond reach of p.

PRURITUS, itchiness of the skin, due to various causes, *e.g.* nervous derangements, jaundice, eczema; improving on treating the cause; in obstinate cases, warm baths, sponging with weak carbolic lotion, and pilocarpine injected hypodermically, are beneficial.

PRUSSIA (49° 10′ to 56° N., 6° to 22° 30′ E.), kingdom of German Empire; mainly situated in great north Ger. plain; bounded N. by North Sea, Denmark, and Baltic; W. by Holland, Belgium, and Luxemburg; S. by Bavaria, Saxony, Austria, and several smaller Ger. states; E. by Russia. P. contains 13 provinces: West Prussia, East Prussia, Silesia, Pomerania, Posen, Brandenburg, province of Saxony, Schleswig-Holstein, and Heligoland, Hanover, Westphalia, Rhineland, Hesse-Nassau, Hohenzollern; and Berlin (*qq.v.*); total area, 136,616 sq. miles. Seaboard is c. 1000 miles—850 on Baltic, rest on North Sea. Baltic islands are Rügen, Fehmarn, Usedom, Alsen, Wollin; Frisian Islands (*q.v.*) in North Sea.

Surface is generally level; large stretches of moorland (Lüneburger Heide, in Hanover), sandy plains (Brandenburg), and marshland along coast. Mountains lie in S. and S.W.; Riesengebirge (with Schneekoppe, 5255 ft.), in Silesia; Hartz Mts. (with Brocken, 3750 ft.), in province of Saxony; Hunsrück, Taunus, Eifel, Westerland, etc., in Rhineland; and other ranges. Principal rivers are: Rhine, Vistula, Weser, Elbe, Oder, Havel, Saale, Ems, Pregel, Vechte, Niemann, Wippe, Trave; many navigable; numerous lakes, including Spirdingsee, Mauersee, Plauensee, Plönersee, Schwerinersee, Müritzsee; vast lagoons on coast—Kurische

Haff, Frische Haff, and Stettiner Haff. Climate is generally healthy; N.E. much exposed and coldest; **annual mean temperature of Berlin, 48° F.**; average annual rainfall is *c.* 21 in. P. has extensive forests of fir, spruce, larch, beech, birch, oak, etc., especially in Hesse-Nassau, Brandenburg, and Hohenzollern.

History.—P. was erected into a Prot. duchy, 1525; in 1618 the Elector of Brandenburg (Hohenzollern House) became Duke of P. (see BRANDENBURG, HOHENZOLLERN). FREDERICK WILLIAM (1640–88), the Great Elector, obtained at Peace of Westphalia the secularised bishoprics, Minden, Kammin, Magdeburg, Halberstadt, and secured Prus. sovereignty by Swedish-Polish War, 1655–60. During his reign P. became a well-organised state and important military power. His successor, Frederick III. (1688–1713), assumed title of king, 1701, as FREDERICK I. FREDERICK WILLIAM I. (1713–40) was a careful and thrifty monarch; he obtained Guelders and Limburg at Peace of Utrecht, and Swed. Pomerania and Stettin, 1720. FREDERICK II., *the Great* (1740–86), increased the possessions of P. enormously, annexing greater part of Silesia (without Danzig and Thorn), 1740–42; East Friesland, 1744; received West Prussia and Netze district at first Partition of Poland, 1772; his successor, FREDERICK WILLIAM II. (1786–97), lost many of P.'s valuable possessions on Rhine, but gained Slavonic territory at second and third Partitions of Poland, 1793, 1795. During the reign of FREDERICK WILLIAM III. (1797–1840) took place disasters of *Jena* and *Auerstädt*, and Napoleon entered Berlin, 1806. P. lost most of her territory west of Elbe, and greater part of Prus. Poland, 1807.

Then began a great national revival, and P. shared largely in Napoleon's overthrow and victory of *Waterloo*, 1814. At Congress of Vienna, 1815, she regained most of her old possessions west of Elbe, and part of Saxony, Rügen, Swed., Pomerania, etc. In FREDERICK WILLIAM IV.'s reign (1840–61) took place abortive revolution of 1848. Under WILLIAM I. (1861–88) Bismarck became Prime Minister (1862) and brought about the war with Austria, 1866, which gave P. Schleswig-Holstein, Hanover, Hesse-Nassau, Hesse-Cassel, Frankfort, Lauenburg, and made P. predominant Ger. state. After FRANCO-GERMAN WAR (*q.v.*) (1870–71), king of P. was elected Ger. Emperor, and military and commercial power of Ger. Empire was built up under Pruss. guidance. FREDERICK III. (1881) reigned only from March 9 to June 15, and was succeeded by WILLIAM I., 1881, who dismissed Bismarck (1890) and secured colonies and a great navy for Germany. See GERMAN EMPIRE.

Government.—P. is governed by a hereditary monarch and *Landtag* (Parliament), consisting of *Herrenhaus* (House of Lords), with app. life members, and *Abgeordnetenhaus* (Chamber of Deputies) of 443 members, elected for 5 years. Principal towns are: Berlin (capital), Cologne, Breslau, Frankfort-on-Main, Düsseldorf, Hanover, Essen, Magdeburg, Königsberg, Duisburg; Altona, Kiel, Danzig, Stettin, Swinemündel important seaports. Two-thirds of population are Protestant; *c.* one-third Catholics. Elementary education is compulsory from 6 to 14 and maintained by local taxation and State aid. P. has 10 univ's (see UNIVERSITIES), besides 5 technical high schools, mining, agricultural, forestry, art, music, and other schools.

Resources and Industries.—Total railway mileage is 24,000 to 25,000; over 20,000 miles State railway. P. is an important agricultural, mining, and manufacturing state. Principal products are cereals, beet, hemp, flax, potatoes, hops, oil-seed, live stock, timber, etc.; famous wines made in Nassau and Rhineland; valuable horses bred in East Prussia. P. is rich in minerals; zinc, iron, coal, copper, lead, cobalt, arsenic, sulphur, nickel, etc.; important mining centres are Westphalia, Silesia, Rhine province, Harz, Prussian Saxony, Brandenburg, Nassau. Manufactures include textiles, iron and steel goods, leather, glass, china, earthenware, chemicals, musical instruments, paper, etc.; celebrated Krupp cannon works at Essen; extensive breweries and distilleries; valuable salmon, herring, cod, oyster, etc., fisheries; many mineral springs. Pop. (1905) 37,293,324; (1910) 40,165,219. See GERMAN EMPIRE.

Baedeker, *Northern Germany*; Prutz, *Preussische Geschichte* (1899); Hodgetts, *House of Hohenzollern* (1911); Petre, *Napoleon's Conquest of Prussia* (1907).

PRUSSIAN BLUE, see FERROCYANOGEN.

PRUSSIC ACID, hydrocyanic acid, hydrogen cyanide, HCN, occurs free and combined in plants (*e.g.* bitter almonds); formed (1) synthetically, (2) by dehydrating ammonium formate: $H.COONH_4 = 2H_2O + HCN$, and (3) by distilling simple or complex cyanides with dilute acid. PROPERTIES: Colourless liquid, B.P. 26·1° C., burns with blue flame, soluble in water; very feeble acid, scarcely reddens litmus, salts decomposed by CO_2; acid and salts exceedingly powerful and rapid poisons. Constitution: $HC{\equiv}N$; with nascent hydrogen yields methylamine: $HCN + 4H = CH_3.NH_2$; forms cyanhydrins with aldehydes and ketones: $>CO + HCN = >C\begin{matrix}OH\\ \diagup\\ \diagdown\\ CN.\end{matrix}$

CYANIDES: Potassium cyanide, KCN: prepared by igniting ferrocyanide ($K_4Fe(CN)_6 = 4KCN + FeC_2 + N_2$) and by passing ammonia over a heated mixture of potassium carbonate and carbon: $K_2CO_3 + C + 2NH_3 = 2KCN + 3H_2O$. Colourless crystals, a reducing agent, but used chiefly in gold metallurgy. Silver cyanide, AgCN, a white precipitate; $KAg(CN)_2$, soluble. Complex cyanides: $K_4Fe(CN)_6$, $K_3Fe(CN)_6$. Organic cyanides or nitriles, R.CN, liquids, yielding carboxylic acids and ammonia by hydrolysis, *e.g.*—

$$CH_3.CN + 2H_2O = CH_3.COOH + NH_3.$$

Methylcyanide = Acetonitrile. Acetic acid.

Isocyanides or carbylamines: $R.N{\equiv}C$.

PRYNNE, WILLIAM (1600–69), Eng. Parliamentarian; barrister of Lincoln's Inn, but never practised; wrote numerous anti-episcopal pamphlets, and in 1632 *Histrio-mastix, or a Scourge for Stage Players*, a violent Puritan invective without any literary quality; punished by Star Chamber with fine, loss of both ears, and perpetual imprisonment; issued another pamphlet from Tower and was further fined, mutilated, and branded on cheeks with 'S. L.' (Seditious Libeller); released by order of House of Commons, 1641; returned to Parliament for Newport, Cornwall; imprisoned for attacks on Cromwell; worked for Restoration; ultimately Keeper of Records in Tower, and issued valuable calendars.

PRYTANEUM, place in Gk. community where sacred fire was kept alight; it was used as town hall on state occasions.

PRYTANIS (Gk. 'chief').—(1) Gk. magistrate; (2) member of Athenian Council of Five Hundred.

PRZEMYSL (49° 47′ N., 22° 47′ E.), fortified town, Galicia, Austria, on San; seat R.C. and Gk. bp's; trade in timber. Pop. (1910) 54,078.

PRZHEVALSK (42° 30′ N., 78° 30′ E.), town, Semiryechensk, Russian Turkestan. Pop. 8000.

PRZHEVALSKI, PRJEVALSKY (*q.v.*).

PSALMANAZAR, GEORGE (*c.* 1680–1763), Fr. impostor; after much travelling came to London, 1703; trans. Church Catechism into 'Formosan,' and wrote a *Hist. and Geographical Description of Formosa*, a work full of absurd imagining; lionised for a time, then, losing popularity, became tutor, clerk, fan-painter, hack journalist; Dr. Johnson admired and believed in him.

PSALMS, BOOK OF, in the Hebrew Bible begins the Hagiographa or Sacred Writings, forming the third part of the Hebrew Scriptures (the others being the Law and the Prophets). In Hebrew it is called *Tehillim*, i.e. 'Songs of praise.' Many Psalms are traditionally ascribed to King David, and others to his chief singers, to Solomon, etc. But the majority are doubt-

less of later date, both as regards language and reference. In the Hebrew the *Psalms* are divided into 5 books, containing respectively Psalms 1–41, 42–72, 73–89, 90–106, 107–150; but scholars consider the real division to be threefold, Books 2 and 3 being taken together, also 4 and 5. The middle group thus formed, 42–89, is distinguished by the use of the term *Elohim*, which seems to be a consistent alteration from the original Jehovah in the text.

The structure of the Psalms in Hebrew is rhythmical, but various attempts to discover metre in it have failed. For in Hebrew there is not such a clearly marked distinction as in English between poetry and prose. Rhythmical prose makes use of parallelism of clauses, and tries to get the number of syllables evenly balanced. The Psalms were used in the services of the second Temple, which was modelled on the first founded by David, who was thus looked up to as the writer of the Psalms. Many, however, are probably post-Exilic, and according to some scholars some contain reference to the Maccabees, and can therefore only be placed about the II. cent. B.C. The question whether the Psalms contain reference to contemporary historical events is one that is still hotly disputed. The LXX version of the Psalms is fairly literal. From it were derived (1) the Old Latin, the basis of the *Psalterium Romanum*; (2) *Psalterium Gallicanum*, which appears in the Vulgate. The *Psalter* has played a prominent part in Christian worship.

Cheyne, *Book of Psalms, Origin of the Psalter*; Kirkpatrick, in *Cambridge Bible*; Driver, *Parallel Psalter, Introduction to Literature of Old Testament*; Briggs, in *International Critical Commentary*; Barnes, in *Cambridge Biblical Essays*, and *Lex in Corde*.

PSALTERIUM, a division of the ruminant stomach; see under PECORA.

PSALTERY, see DULCIMER.

PSAMMETICHUS, see EGYPT (HISTORY).

PSARONIEÆ, see PALÆOBOTANY.

PSEUDOLAMELLIBRANCHIA, an order of Lamellibranchiata (*q.v.*).

PSEUDONYM, a pen-name; well-known p's are Mark Twain (S. L. Clemens), Max O'Rell (Paul Blouet), George Eliot (Marian Evans), Lewis Carroll (Rev. C. L. Dodgson), Max Adeler (Charles Heber Clark), Calchas (J. L. Garvin).

PSEUDONYMITY, see ANONYMITY.

PSEUDOPOD (Gk. *pseudos*, falsehood; *pous, podos*, a foot), an animal with pseudopodia, *i.e.* belonging to the Sarcodina class of the Protozoa. **Pseudopodia** (derivation, see *pseudopod*), blunt, mobile extensions of protoplasm which proceed from the body and play a great part in the life-activities of the simplest Protozoa.

PSEUDOSCORPIONIDÆ, see BOOK SCORPIONS.

PSITTACIFORMES, Parrot tribe (*q.v.*).

PSKOV (57° 51′ N., 28° 26′ E.), government, Russia, between Livonia and Smolensk; surface flat in N., hilly in S.; many lakes and marshes; largely forest-covered; unfertile; fisheries, flax industries, distilleries, tanneries. Pop. (1910) 1,354,800.

PSKOV (57° 51′ N., 28° 26′ E.), town, Pskov government, Russia, on Velikaya; abp.'s see; tanneries. P. was a member of the Hanseatic League; annexed by Moscow in 1510. Pop. (1910) 34,440.

PSOCPTERA, PSOCIDÆ, see BOOK-LICE.

PSOPHIIDÆ, Trumpeters (*q.v.*).

PSORIASIS, skin disease characterised by development of patches of dry, silvery scales on a red base, tips of elbows and lower part of knees being most commonly affected; treatment is, in acute cases, sodium salicylate or antimony wine; in chronic cases, arsenic, with local treatment of alkaline baths, removal of the scales by scrubbing, and application of chrysarobin ointment.

PSOROSPERMIASIS, rare disease caused by animal parasites, psorosperms, found in the liver, kidneys, and ureters.

PSYCHE (classical myth.), royal maid whose beauty aroused Venus's jealousy. Venus sent Cupid to inspire her with love for the meanest of men, but he fell in love with her. He warned her not to inquire who he was; she disobeyed, and Cupid deserted her. They were finally united in Elysium.

PSYCHICAL RESEARCH is a recent development of scientific or (as some would say) of pseudo-scientific thought. It is concerned with all those phenomena—thought-transference (or telepathy), hypnotism, clairvoyance, crystal-gazing, poltergeist, apparitions, etc.—which are not ordinarily explicable and the occurrence of which is often set down to fancy or superstition. The 'Society for P. R.' was founded in 1882, and similar organisations exist in America and elsewhere. Its object was to investigate these phenomena without presuppositions of any kind. It has examined a large mass of evidence and has at any rate done good work in exposing frauds. Telepathy at least seems to have been proved. There are many cases of a vision of a person at the point of death appearing to a friend, and the phenomenon does not seem adequately explained by hallucination. The investigation of other sorts of 'ghosts,' *e.g.* haunted houses, does not seem to have much result. Automatic writing is another psychic phenomena much studied. The receipt of messages by mediums from another world is still open to doubt.

See *Proceedings of S. P. R.*; Myers's *Human Personality and its Survival of Bodily Death*.

PSYCHOLOGY means by derivation the 'theory of soul.' But the term is not now usually so defined, and is indeed rather ambiguous. Problems such as that of the substantiality of soul, its existence before the birth and after the death of the body, and the like, which at one time were referred to the branch of Metaphysics then called *Rational Psychology*, are now generally termed simply speculative, or metaphysical. On the other hand, some popular writers, especially novelists, are apt to use the word 'psychological' more particularly for discussions of or stories about communications between the living and the spirits of the dead, and similar subjects. But most commonly by p. is meant an empirical study, scientific, or at any rate on the way to become scientific, in method, of actual mental activities and states. Objection has been taken to defining it as the science of soul or of mind, and to introducing the words 'mental' or 'psychical' into its definition, because, it is said, the existence of soul or mind is an unverified hypothesis. Again, to call it the 'science of consciousness' or of conscious processes has been considered inadvisable, because that prejudges the question of the existence of unconscious, and yet not merely physiological, factors of conduct. 'The science of behaviour' has been suggested as free from prejudice, but it may be questioned whether this definition is not too comprehensive, unless the word 'behaviour' be artificially restricted in meaning; and probably we cannot in the end avoid introducing 'mind' or 'mental' or some equivalent term into our definition of p., despite the difficulties raised by those terms themselves.

P. treats, we may say, of the behaviour of minds, or of the behaviour of living things so far as that behaviour depends on their exercise of mental activity in any degree. As an empirical study, it deals with mental behaviour as we find it actually occurring in ourselves and believe it actually to occur in others; as a positive study, it does not inquire into the validity of such distinctions as good and bad, true and false, but concerns itself equally with all manner of conduct, considering any act or state, not as having logical or moral value, but simply as an event in time whose conditions and consequences need to be assigned; and, finally, as a scientific study, it tries to start from accurate observation and analysis and to arrive at well-established general principles of mental behaviour.

The whole subject may be divided into departments in a variety of ways. For instance, we may distinguish the investigation of the human from that of the animal

mind; abnormal from normal human behaviour: within the latter, study of childhood or of adolescence from that of adult life; again, the study of individual differences, and the study of the behaviour of masses of men and of the characteristics of peoples (*Social P.* and *Folk-Psychology*). As a rule, when the word p. is used without any qualification, it refers to the study of the normal human being. Again, attention may be given mainly to the analysis, description, and explanation of a particular stage of mental behaviour, or to the development of mental behaviour; in the latter case we speak of *Genetic P.* *Physiological P.* studies the connection between mental and bodily processes, and is usually regarded as a special branch of the subject; but some more justly maintain that it is rather a supplementary method which may be pursued in different branches of the subject.

The psychologist must start, of course, with investigation of the normal adult mind, for until he has learned to reflect on his own activities and states he cannot consider those of other beings with profit. This process of reflection is technically called *Introspection*, a somewhat misleading name. It is fundamental in p., but it needs to be supplemented, first by the reports of others concerning the results of their reflection; secondly, by observation of the conduct of others and inference therefrom to the mental processes which occasioned and are occasioned by that conduct; and, thirdly, by examination of such products of mental activity as tools, works of art, and institutions, from which also we may be able to argue to the character of the activities that produced them. Each of these modes of procedure has its special difficulties. Reflection on our own activities and states is impeded by the transitory nature of its objects and their liability to change as soon as we begin to think about them. Communication of the results of reflection to others is impeded by differences of temperament and character and by ambiguities of language. Inference from the conduct or products of others to their thoughts, motives, purposes, or feelings becomes increasingly dangerous as they are further removed from us in interests and character or in stage of development; and yet in the investigation of the lower animals, where the difference and difficulty are greatest, it is upon such inference alone that we have to rely. In recent years the use of experiment in p. has been much extended, so that some speak of it as a special branch of the subject; but it is rather an application, requiring special knowledge and skill, of any of the above methods, or of them all in combination, under conditions which admit of accurate statement and produce more or less accurately measurable results.

The first aim in the investigation of mental behaviour must be to analyse its complexity in such a way as to make description as accurate and simple as possible. Ordinary language embodies a considerable amount of such analysis, when we speak of perceiving, thinking, feeling, desiring, will, and so on, as so many powers or faculties of mind. But this popular analysis is not very systematic; sometimes it duplicates what is really a single function, sometimes it omits, and sometimes it speaks as of a single function where several are involved. Nevertheless, it does imply that mental behaviour involves the activities of a subject which is aware of and acts upon objects, and it is thus superior to any theories which assume that p. is concerned with 'states of mind' rather than with functions of mind.

Yet the reaction against the unsystematic classification of popular thought led to the prolonged dominance of mechanical theories of this kind. It was supposed that any concrete 'state of mind' may be exhaustively described by the enumeration of a number of mental elements consisting in it, and the general tendency was to find these elements solely in sensations. External stimulation occasions the simple states of mind known as sensations (of colour, sound, movement, etc.); these may be retained and revived as less vivid images; and all other states of mind consist of varied combinations of these images, associated together according to a few ascertainable principles. A characteristic example of this *Associationist p.* was the assertion that our idea of space consists of series of motor sensations. The whole position is mistaken. Sensations in this sense are not states of mind, but qualities of objects as apprehended by mind in perception; and it is absurd to say either that space is, or is apprehended as, our experiences of our own movements. The real fact is that the infant's apprehension of spatial characters is extremely undeveloped, and that its motor activities and experiences are an important and perhaps necessary aid to improvement in this respect. The real problem is to assign exactly the conditions of this improvement in function, not to attempt to reduce one object to a multitude of quite different objects. Consistently carried out, the Associationist theory was bound to represent mental 'states' as wholly passive, the result of more elementary states miraculously combining themselves in manifold ways; actually, however, it almost always admitted by a back door some power of the mind to combine, compare, or discriminate between its sensations, and thus harked back to the notion of faculties which it began by condemning.

In more recent years psychologists have generally recognised that mental behaviour is predominantly purposive, not in the sense, of course, that it always makes to the fulfilment of ends consciously forethought and designed—for that would obviously be false of the behaviour of the lower animals and of small children, and indeed of much adult behaviour also, but in the sense that it does nevertheless make towards ends, the gradual attainment of which gives satisfaction, whilst obstruction and failure occasion annoyance, anger, or some kind of dissatisfied feeling. The recognition of this truth has been a great step in advance. On the other hand, it cannot be said that general agreement has been reached in the solution of the first analytical problem of p., which is usually stated as: What are the ultimate modes of being conscious, or the ultimate functions or faculties of mind? The commonest view is that we must in the first place distinguish three attitudes of the mind towards its objects: it is aware of or apprehends them (*Cognition*), is affected by them (*Feeling* or *Affection*), and strives to bring about some alteration in them, or in their relation to itself (*Conation*). It is usually added that most, if not all, concrete mental behaviour includes these three attitudes at once. On the other hand, some have argued that Feeling and Conation are so closely inbound with one another that they should not be called distinct functions; others, with more plausibility, that cognition is not an activity distinct from conation, but every awareness of objects is the issue of an impulse or volition, or generally of some conative process.

If the usual threefold division be accepted, we have to ask further whether within each of its heads there are irreducible modes of consciousness to be distinguished. Some writers distinguish, for example, under cognition, Perceiving, Imagining, Conceiving, Judging, Reasoning; others distinguish only *Simple Apprehension* or Awareness and *Judgment*. It is pretty clear that apprehending a present sensible object (*Perception*) and apprehending one that is not present (*Imagining* or, better, *Imaging*) are psychologically the same function, though there are physiological differences and usually differences also in the characters of the object apprehended. Some would say the same also of *Conception*, the apprehension of universals. On the other hand, Conception, Judgment, and probably Reasoning also, are inseparable in their development; and it should be added that they involve a power of comparison and discrimination, which specially deserves to be called ultimate, if any mental function deserves that title more than others. As to simple awareness of any kind, in the adult mind thought reacts so constantly on perception and other

modes of apprehension that it is difficult to discover indisputable instances of it. It may be doubted, in view of the present uncertainty, whether the search for irreducible faculties is profitable; it is at least possible that even the most primitive acts of perception involve some rudimentary kind of judgment, though it may express itself only in movements of approach and withdrawal.

In the further analysis of affection it is generally admitted that we have to distinguish feelings of pleasure and unpleasure, and probably there are also several other feelings on the same level as these. It is to such feelings that the term 'states of mind' may most justifiably be applied. The emotions too are to be reckoned here, and also moods. Most writers regard only a few *emotions* as 'primary,' *e.g.* fear and anger, and the rest as derivative or composite, *e.g.* admiration and reproach. But whilst it is true that such emotions as these latter are each akin to more than one 'primary' emotion, and do not arise until the primary emotions have been experienced, they are nevertheless unitary states of mind and not merely the presence of two or more primary emotions at once.

The further analysis of *Conation* is also matter of dispute. From one point of view, we may safely distinguish the two modes of appetite towards an object and aversion from it. From another, some maintain, whilst others with more probability deny, that the act of *volition* is capable of analysis. Here again it is probably more profitable, instead of contesting these points of analysis, which are often in the main verbal, to investigate the growth of mental behaviour from lower to higher stages (*e.g.* from the instructive and purely impulsive stage to that where deliberate volition appears), and to attempt to assign the conditions of this growth.

As soon as the psychological problem is stated in this way, it becomes apparent that we have to consider, not only the mind's powers of perceiving, feeling, willing, etc., at any moment, but in addition its power of benefiting by experience. Past is continually modifying present experience, even though the past be not recalled, and even when it can no longer be recalled. A man says that he sees a tree or hears a motor-car. He could not do this had he never met with them, and yet he need not now recall past occasions on which he did so. It is often said that he 'interprets' what he sees or hears as 'meaning' this or that; but the statement is misleading because it seems to imply, what is false, that he must first contemplate this white surface or that sound, and then by a separate act recognise it as paper or the sound of a motor-car. Another mode of statement is that as the result of growing experience there are gradually formed *mental dispositions* to behave in certain ways. The term is useful; ordinarily applied to affective and conative conditions (A. is well or ill disposed towards X., his disposition is to act in such and such a way), it is easily transferred to cognition also. The problem then becomes that of tracing the growth of special dispositions, and showing how they become differentiated or inter-connected.

Certain dispositions are evidently inherited. Action consequent upon the exercise of dispositions commonly inherited by all normal members of a species is usually called *instinctive*. It must be noted, however, that not only the reaction, but also the interest in and attention to a particular type of object, deserves to be called instinctive; *e.g.* the chicken would not peck at small objects on the ground unless it instinctively noticed them. Moreover, it has lately been argued with much force that a train of instinctive behaviour includes not only this preferential attention to certain objects and the consequent reaction, but also some special affective state; and the 'primary' emotions have been connected in this way each with a special instinctive tendency. There are, however, also certain *inherited tendencies*, of which that to imitate is the most important, which do not seem to involve specific emotions: and in addition we must recognise that individuals have *congenital dispositions* and capacities not common to the whole species. Musical capacity may serve as an instance.

If we survey the development of mental behaviour to the human stage from lower levels, it seems at first sight to have involved the acquisition of totally new powers (*e.g.* of judging, reasoning, willing); and in the small child also capacities seem after a time to appear which were not manifest before. But in observing the child's growth we are never really able to say, 'This is the moment at which a totally new power has first been exercised,' so gradual is the development; and perhaps, as has already been suggested, we ought throughout to think rather of a development of capacities out of more rudimentary forms in which we observers fail to recognise their existence. However that may be, it does not seem that in the history of the human race totally new powers have been developed, though many have been enormously heightened. There may be urged as exceptions certain kinds of artistic creation, of which the musical is the most notable, and the power of telepathic communication, if it exists, but too little is known about either to justify any definite assertion. Apart from the origination of new capacities, mental development presents two main features—increasing breadth and increasing organisation of interest. The growth of intellect is not only acquisition of new information, but also the systematisation of thought in such a way that what has been acquired can be effectively utilised, whether for practical or for theoretical purposes. The growth of feeling is exhibited in the formation of sentiments or complex emotional dispositions towards objects; thus a child learns to love his parents, his home, then perhaps his school, his country, or abstract objects such as truth and honesty, and throughout his growth the sentiment of love is a system which may issue in a variety of emotions—not only in the tender emotion or emotion of love, but in joy if the beloved object is pleased or honoured, in sorrow or anger if it is injured or despised, and so on. Lastly, on the conative side there can be traced a similar and closely connected growth and organisation of desires and purposes.

The main result of the study of *animal behaviour* has been to throw light on the importance of congenital instinctive dispositions as the basis of mental development. These dispositions and their modifications in response to varying circumstances are more easily observed in the lower animals than in human society, where they are almost from the outset altered by imitation and tradition and social influences generally.

The study of *abnormal* and *diseased state of minds* has given p. more problems than it has solved. The interpretation of these 'natural experiments' is usually very difficult, largely owing to the unreliability of patients' statements about themselves, which is specially marked in cases of hysteria. One result of this study has been to emphasise very strongly the influence of emotions and moods on thought and action. This has been brought out, for example, by cases of *alternating personality*, in which patients seem to lead two (or more) alternate lives, with different temperament and character and interests. As a rule, they do not remember their abnormal life in their normal periods, and often they also forget events of their normal in their abnormal conditions, though they either retain, or at any rate very rapidly regain, many dexterities, the power of speech, ability to recognise common things, and the like. It seems fairly well ascertained that in a great number of these cases the change of interest and memory rests on an extreme alteration of mood. How such alterations of mood are themselves produced is more doubtful; changes of organic sensibility are doubtless often an important contributing factor.

Obsessions or *Insistent Ideas* are also abnormalities

which seem frequently to arise from exaggerated emotional conditions, *e.g.* from extreme anxiety. When, as is frequently the case, they are ideas of action, they are interesting examples of impulsive tendencies, not, like instinctive behaviour, prompted mainly by perception, but guided by thought, and yet not voluntary. Thus a person may be impelled by the idea of killing another against whom he has no grudge, though all the time he does not wish to do so, and is tortured by the belief that he is going to commit the crime.

Closely related to certain parts of abnormal psychology is the study of *hypnotic phenomena*. This is a very promising field of research, but at present the interpretation of the facts, and even the exact statement of the facts to be interpreted, are very much disputed.

(1) Introductory survey: M'Dougall, *Psychology, the Study of Behaviour*. (2) General: Angell, *Psychology*; James, *Principles of Psychology*; Mitchell, *Structure and Growth of the Mind*; Stout, *Manual of Psychology* and *Analytic Psychology*. (3) Experimental: Myers, *Introduction to Experimental Psychology* and *Text-Book of Experimental Psychology*. (4) Physiological: M'Dougall, *Primer of Physiological Psychology*. (5) Social: M'Dougall, *Introduction to Social Psychology*. (6) Abnormal: Hart, *Abnormal Psychology*; Moll, *Hypnotism*; Störring, *Mental Pathology in its Relation to Normal Psychology*. (7) Educational: Loveday and Green, *Introduction to Psychology for Teachers*; Sally, *Teacher's Handbook of Psychology*; Welton, *Psychology of Education*. (8) Animal: Groos, *The Play of Animals*; Lloyd Morgan, *Animal Behaviour* and *Habit and Instinct*; Thorndike's *Animal Intelligence*.

PSYCHOPHYSICS, the study of the relations between physical stimuli and sensations, especially in respect of intensity. See WEBER'S LAW.

PTAH, see EGYPT (HISTORY).

PTARMIGAN (*Lagopus mutus*), a member of the Grouse Family, with the interesting habit of changing its brown coat to white in winter, is found on the mountains of Scotland and of Europe generally.

PTERIA, town in ancient Cappadocia; was massively built and strongly fortified. Here Crœsus was said to have been defeated by Cyrus (*Herodotus*, i. 76); ruins at Boghaz-Keui.

PTERIDOPHYTA, VASCULAR CRYPTOGAMS, the most highly developed group of flowerless plants, including all the existing Ferns, Horsetails, and Club-mosses, as well as a large number of extinct forms. They exhibit a characteristic alternation of generations, the sexual, termed the gametophyte or prothallium, bearing male and female organs, the antheridia and archegonia respectively, and the asexual, termed the sporophyte, arising from the fertilised egg, and in its turn producing asexual spores. These reproduce the sexual generation again, thus completing the cycle. The prothallium is always minute and insignificant, and may, as in the ferns, resemble a small thalloid liverwort, or be an underground, tuberous structure, as in Lycopodium. The antheridia are usually globular structures producing numerous motile sperms, and require the presence of water for their further function as fertilising agents. The archegonia are flask-shaped, and contain a single ovum. When mature they exude mucilage apically, this, owing to its chemical properties, attracting the sperms, one of which fuses with the ovum. The fertilised egg then surrounds itself by a delicate wall, and divides up, producing the stem apex, and the first leaf and root of the sporophyte. In addition, an organ termed the 'foot' is developed, which absorbs nutriment from the prothallium until the young structures are capable of self-support.

The mature stem varies considerably in the different groups, and may be aerial, creeping, climbing, or subterranean. On it are borne large numbers of adventitious roots and leaves, both of which are essentially similar in structure to those of flowering plants, and, together with the stem, are traversed by highly differentiated conducting strands or vascular bundles, which exhibit a concentric structure. The spores are borne in special receptacles, the sporangia, which may be developed on the backs of the ordinary vegetative leaves, or on specially modified leaves, termed sporophylls. The spores are usually of one kind, but in certain cases (*e.g.* Selaginella) are differentiated into large megaspores, producing female prothallia, and small microspores, producing male prothallia only.

The Pteridophyta are classified as follows: (1) LYCOPODIALES, including four orders—(*a*) *Lycopodiaceæ*, or *Club-mosses*, homosporous forms, mainly tropical in distribution, with small leaves and a dichotomously branched stem. The prothallia are subterranean. (*b*) *Selaginellaceæ*, heterosporous forms commonly grown in greenhouses. (*c*) *Isataceæ*, or *Quillworts*, heterosporous forms growing in deep lakes. (*d*) *Lepidodendraceæ*, extinct tree-like forms. (2) PSILOTALES, tropical forms intermediate in character between the Lycopodiales; and (3) SPHENOPHYLLALES, an extinct homosporous group, which were in their heyday during the Carboniferous and died out in the Permian. (4) EQUISETALES, including the *Horsetails*, plants with verticellately branched stems, and the *Calamariaceæ*, gigantic tree-like forms with secondary thickening, which flourished in Coal-Measure times. Equisetum bears its sporangia in cones at the apex of special fertile shoots. The spores produce green unisexual prothallia. (5) OPHIOGLOSSALES, forms allied to the ferns proper, and including two British genera, *Ophioglossum* (adder's tongue) and *Botrychium* (moonwort). As a rule only one leaf is produced annually, this showing characteristic division into a sterile and a fertile segment. The prothallia are subterranean. (6) FILICALES: this order includes all the true ferns, and is to-day the dominant group of flowerless plants. The leaves are usually very large in proportion to the size of the plant, and when young are folded in a crozier-like manner. They may bear the sporangia on special fronds, or on the backs of the vegetative leaves. The sporangia are often arranged in little groups, or sori, protected either by specialised outgrowths, as in the male fern, or by the inrolling of the modified leaf margin, as in the bracken. Vegetatively they show immense variety of structure, the filmy ferns of the tropics being extremely minute, whilst the tree-ferns attain a palm-like stature, and may be 70 or 80 feet high. The gametophyte is usually heart-shaped and green, and bears the sexual organs on the lower surface.

PTEROBRANCHIA, an order of HEMICHORDATA or ENTEROPNEUSTA, containing the genera *Cephalodiscus* and *Rhabdopleura*. These are small marine animals associated in colonies and protected by an external gelatinous or chitinous skeleton composed of tubes. *Cephalodiscus* colonies (some 9 inches long) occur in Antarctic and Pacific Oceans, off S. Africa, and in Magellan Straits; *Rhabdopleura* exceedingly small in the North Sea and Atlantic. They possess in common, short bodies, the collar on the anterior of which bears two or more paired, tentacle-bearing arms. There is a proboscis which builds the tubes wherein the animals dwell and is flattened into a disc at the base; there are never more than two gill-slits, and the short food canal is U-shaped, the vent opening near the mouth. In both genera the bodies are borne on long narrow stalks.

PTEROCLIDIDÆ, Sandgrouse (*q.v.*).

PTERODACTYLS, extinct Reptiles (*q.v.*).

PTEROPOD, Gasteropod Mollusc. See GASTEROPODA.

PTEROPODIDÆ, see FLYING FOXES.

PTEROSAURIA, extinct Reptiles (*q.v.*).

PTILORHIS, Rifle-Bird (*q.v.*).

PTOLEMAIS, ancient name for ACRE (*q.v.*).

PTOLEMIES, Macedonian rulers of Egypt (323–30 B.C.).—**Ptolemy I., SOTER**, became satrap of Egypt on division of kingdoms of Alexander the Great, 323; assumed title of king, 306; serious soldier and historian; abdicated, 285.—His s., **Ptolemy II., PHILADELPHUS**, developed resources of Egypt; court was one of most classically magnificent and vicious of history.

Rome claimed Egypt by bequest of Ptolemy X., Alexander II., but agreed, 51, to joint-rule of Ptolemy XII. and his sister Cleopatra, whom, after Egyptian custom, he was to marry; Ptolemy XII. d., 44; Cleopatra and her s. Cæsarion (putative child of Cæsar) perished during Rom. attack, 30; Cleopatra's dau. by Mark Antony left son, Ptolemy, who d. childless, 40 A.D. Egyptian blood, religion, and culture survived throughout this period, though there was heavy foreign infusion.

PTOLEMY, CLAUDIUS PTOLEMÆUS, famous astronomer, geographer, and mathematician, was a native of Egypt and worked at Alexandria, his first extant astronomical observation being in 127 A.D., his last in 151 A.D. His descent, place and date of birth, date of death are uncertain.

As an astronomer he is celebrated as the author of the *Megale Syntaxis*, more commonly known as the *Almagest* (after the title of the Arabic translation to the order of Caliph Al-Mamún, at Bagdad, *c.* 827 A.D.), a summary of his own and his predecessors' work. This is the main authority for the labours of Hipparchus and Eratosthenes. The *Ptolemaic system*, herein set forth, assumes the earth—a sphere, and stationary on its axis—at the centre of the heavens, with the planets, including the sun and the sphere of the fixed stars, revolving round it. To explain the apparent motion of these bodies P., following Apollonius, used a system of eccentrics or epicycles and deferents. The former theory was held till the publication of Copernicus's work; eccentrics were rejected by Kepler (*q.v.*). The *Almagest* contains also Ptolemy's important discovery of the moon's 'evection' and a catalogue of 1022 stars.

His *Geographike* was based on Marinus of Tyre and was only gradually corrected by the discoveries of the XV. and XVI. cent's. For this design his materials were very inadequate, namely, a few astronomical data and mainly travellers' estimates of distances. The following are the most evident errors: the length of the Mediterranean is one-third too great; Europe is too narrow between the Baltic and Black Sea; India is not shown as a peninsula; Ceylon is much too large; Asia is extended too far eastwards and joined to the south of Africa. This last point encouraged Columbus to sail westwards for the east coast of Asia, and spread the belief that Africa could not be circumnavigated. P.'s methods, however, are quite scientific. His mathematical skill is illustrated in the *Almagest*. With Hipparchus he founded and developed Plane and Spherical Trigonometry in a form unsurpassed for some 1400 years.

PTOMAINE, organic base or alkaloid formed by the action of putrefactive bacteria on organic matter; some of them are poisonous, and to them is due the poisonous action of putrefying sausages, tinned meats, etc.

PTYALIN, see DIGESTION.

PUBERTY, the period of life at which persons begin to be capable of begetting or bearing children; in temperate climates, the age of fourteen in males, and twelve in females.

PUBLIC HEALTH, LAW OF, requires that the State, either national or local authorities, shall prevent the pollution of rivers; define the proper construction of buildings—with a due regard to sewage and scavenging; ensure an adequate water supply; insist upon cleanliness in dairies, and bakehouses where food is prepared; and limit as far as possible the area of infectious disease. The Local Government Board is the central authority for the carrying out of all laws relating to Public Health in the U.K.

PUBLIC SCHOOLS, see EDUCATION.

PUBLIC-HOUSES, see LICENSING LAWS, INN.

PUBLICANI, Rom. tax-gatherers in the provinces. As the monopoly was frequently granted to the highest bidder, the publicani practised cruel extortion to secure personal profit. Hence the hatred they inspired among the Jews in New Testament times and the opprobrium of 'publicans and sinners.'

PUBLISHING, producing books or periodicals and issuing them for the market. Originally authors were to a great extent publishers and booksellers as well. Next change saw publishing booksellers contracting with authors and printers. To-day the division of labour usually is author, publisher (doing his own printing or contracting out), and bookseller. Periodicals of all kinds are usually written, printed, and published by the same firm, and put on market by a distributing agency. Bookselling has divided itself into wholesale and retail, of which former mainly deal with publishers. The beginning of last cent. saw this separation of production and distribution completed, and subdivision has since gone on the lines of specialism. Few publishers to-day publish indiscriminately, but have their own sphere or spheres of work; they tend to employ specialists as readers. In 1896 a Publishers' Association was formed, and in common with Booksellers' Association has put trade interest on a sound footing. Their last big fight was with Times Book Club (1905-9). Latest tendency is issue of cheap editions, both fiction and educative, to cope with large increase in reading public. See BOOK.

PUBNA, see PABNA.

PUCCINI, GIACOMO (1858–), Ital. composer; best known operas are *La Bohemie* (1896), *Tosca* (1900), *Madame Butterfly* (1904).

PUCK, ROBIN GOODFELLOW, fairy who plays practical jokes; figures in Shakespeare's *A Midsummer Night's Dream*, Jonson's *Masque of Love Restored*, Drayton's *Nymphidia*, Burton's *Anatomy of Melancholy*, Kipling's *Puck of Pook's Hill*.

PUDDING-STONE, CONGLOMERATE (*q.v.*).

PUDSEY (53° 47′ N., 1° 39′ W.), town, Yorkshire, England; woollen manufactures. Pop. (1911) 14,027.

PUDUKOTTAI (10° 23′ N., 78° 52′ E.), native state, Madras, India. Pop. 385,000. Capital, **Pudukottai.** Pop. 21,000.

PUEBLA.—(1) (18° 30′ N., 98° W.) state, Mexico, on southern part of Anahuac plateau; contains Popocatepetl. Pop. (1910) 1,101,600. (2) (18° 59′ N., 98° 2′ W.) capital of above; bp.'s see; cathedral; coll.; cottons and woollens. Pop. (1910) 101,214.

PUEBLO (38° 18′ N., 104° 40′ W.), city, on Arkansas, Colorado, U.S.A.; blast furnaces; iron and steel works; important industrial and commercial centre. Pop. (1910) 44,395.

PUENTE GENIL (37° 25′ N., 4° 45′ W.), town, on Genil, Cordova, Spain; olive oil. Pop. 13,200.

PUENTEAREAS (42° 10′ N., 8° 32′ W.), town, Pontevedra, Spain. Pop. 13,700.

PUERPERAL FEVER, term formerly applied to an acute disease affecting women at the lying-in period, now known to be a septicæmia due to septic infection by various organisms, and prevented, first by Semmelweiss (*q.v.*), by antiseptic methods; it now rarely occurs in midwifery practice. See MIDWIFERY, OBSTETRICS.

PUERPERIUM, see OBSTETRICS.

PUERTO CABELLO (10° 23′ N., 67° 52′ W.), seaport, Carabobo, Venezuela, on Caribbean Sea; exports coffee. Pop. 10,300.

PUERTO CORTES (15° 49′ N., 88° W.), seaport, Honduras, on Gulf of Honduras. Pop. 3000.

PUERTO DE SANTA MARIA (36° 37′ N., 6° 20′ W.), seaport, Cadiz, Spain, on Bay of Cadiz; exports sherry. Pop. 20,900.

PUERTO PRINCIPE, officially CAMAGÜEY (21° 23′ N., 77° 56′ W.), inland city, Cuba; chief produce —cigars, woods, sugar. Pop. 30,000.

PUERTO REAL (36° 30′ N., 6° 10′ W.), seaport, Cadiz, Spain, on Bay of Cadiz; ancient *Portus Gaditanus*; salt mines. Pop. 10,700.

PUERTO RICO, see PORTO RICO.

PUFENDORF, SAMUEL (1632–94), Ger. historian of institutions; followed Hobbes and Descartes; pub. *Elementa jurisprudentiæ universalis*, 1661; received as reward chair of Law of Nature and Nations at

Heidelberg; treatise *De statu imperii germanici*, 1667, got him into trouble; retired to Sweden and wrote chief work, *De jure naturæ et gentium*, 1672; historiographer of Elector of Brandenburg, 1686–94.

PUFF-BALL, see FUNGI.

PUFF-BIRDS (*Bucconidæ*), a family of about 50 species of Picarian birds found in Central and S. American forests; aboreal and insectivorous.

PUFFERS, see GLOBE-FISHES.

PUFFIN, see under GUILLEMOT AND AUK FAMILY.

PUFFINIDÆ, SHEARWATER FAMILY (*q.v.*).

PUGACHEV, EMEL'YAN IVANOVITCH (*c.* 1741–75), Russ. pretender; claimed to be Peter III., 1773; supported by enemies of Catherine II.; towns sacked and imperial army defeated; captured after bloody battle, 1774; executed.

PUG-DOGS, see DOG FAMILY.

PUG-MILL, see BRICKS.

PUGILISM, see BOXING.

PUGIN, AUGUSTUS WELBY (1812–52), Eng. architect, of Fr. parentage; known first for his decorations and sculpture at Houses of Parliament. Becoming a convert to Roman Catholicism, he devoted himself mainly to designing churches and other buildings for that communion.

PUKET (7° 55′ N., 98° 25′ E.), town, island of Junk Ceylon (Salang), belonging to Siam; tin mines. Pop. 33,000.

PULEX, see FLEAS.

PULICAT (13° 25′ N., 80° 21′ E.), town, Chingleput, Madras, India. Pop. 5700.

PULITZER, JOSEPH (1847–1911), Amer. journalist and newspaper proprietor.

PULKOVO, PULKOWA (59° 46′ N., 30° 20′ E.), village, St. Petersburg, Russia; noted observatory.

PULLEY, a wheel rotating on an axle. A groove is cut in the circumference and a rope passed over it. The wheel is called the sheave and the rope the tackle. A p. may be fixed or movable. Fixed p's are those in which the axle is fixed to some stationary spot. Movable p's are those in which the extremes of the axle are supported on a block of wood.

P's may be used either singly or combined. When the former they give no mechanical advantage, merely changing the direction of the force. When combined, however, they give a greater purchase and leverage, and may be used for such operations as raising weights, small boats, etc. There are many methods of combining p's, and theoretically the more p's used the greater the mechanical advantage, but in practice it is found that the friction is so great when a large number is used (the rope can never have perfect flexibility) as to counteract largely any advantage of more number.

P's are used also in engineering shops and factories. These kinds have a flat circumference over which a broad leather belt passes and transmits power from the engine to the loom or to other inactive machinery. These p. are generally made of metal, but the smaller varieties are of wood. See MECHANICS.

PULLMAN, formerly village, Illinois, U.S.A.; now a part of city of Chicago; car-works.

PULMONATA, an order of Gasteropod Mollusc. See GASTEROPODA.

PULQUE, a drink of Central America and Mexico; fermented from agaves and cacti.

PULSATILLA, PASQUE FLOWER (*Anemone pulsatilla*), plant of order Ranunculaceæ; mauve-coloured; poisonous.

PULSE, the throbbing of the arteries due to the additional quantity of blood forced through them by the contraction of the ventricles of the heart.

PULTENEY, WILLIAM, see BATH, WILLIAM PULTENEY, 1ST EARL OF.

PULTOWA, POLTAVA (*q.v.*).

PULTUSK (52° 43′ N., 21° 12′ E.), town, Russ. Poland, on Narev; woollens. Pop. 17,500.

PUMA, see under CAT FAMILY.

PUMICE, lava composed of silica and alumina, ejected by volcanoes; colours: grey, white, brown, or black; varieties: glassy, common, and porphyritic; hard, rough, and porous—floats in water; used for polishing wood, ivory, marble, etc., and for toilet.

PUMP, machine for raising fluids; the commonest, the suction p., consists of a piston working air-tight inside a barrel, and moved up and down by a handle attached by a rod. The piston has a valve opening upwards, and a similar valve is fitted at the bottom of the barrel, covering the mouth of a tube sunk into the water. As the piston is raised the air below is rarefied, and the atmospheric pressure on the surface of the water forces it to rise in the tube until equilibrium is regained. After some strokes the water gets above the piston, and being raised with it is discharged by a spout. Other p's are the force p., a more effective form of suction p.; the centrifugal p., in which water is driven by rotatory motion along the vanes of a wheel, from centre to circumference, thus gaining sufficient velocity to force it through the discharge pipe; and the air-p., which is used to exhaust the air in, or pump air into, a vessel.

See books by Davey, Innes, Björling.

PUMPKIN, popular name for GOURD (*q.v.*).

PUN, play on words alike in sound, but different in meaning, *e.g.* Hood's 'They went and told the sexton, and the sexton tolled the bell.' The p. is eschewed in modern wit. Noted punsters were Lamb, Sidney Smith, Hood, Hook, Wilberforce, Oliver Wendell Holmes.

PUNCH, or the *London Charivari*, is the most famous Eng. journal of humour. The first number appeared on July 17, 1841, Henry Mayhew and Mark Lemon being joint-editors. Among famous contributors have been Douglas Jerrold, Tom Hood, Albert Smith, Thackeray, and illustrators such as Browne, Leech, Tenniel, Du Maurier, Keene, and Furniss. It has been said that the height of a politician's ambition is to have a cartoon for himself in *Punch*. The humour is always kindly, clean, and essentially English.

PUNCTUATION, the art of dividing a sentence by conventional signs. The 'stops' are: full stop (.), colon (:), semicolon (;), comma (,). Other signs are: mark of interrogation (?); mark of exclamation (!), wrongly used when intended to point out a joke; brackets ([]), and dashes (— . . . —), used in parenthesis.

Rules for p. are useless; the sentences of good writers should be studied. See *The King's English* (1906).

PUNCTURE, see TYRE.

PUNDIT, a Brahman teacher; p's have done much in exploration for Ind. Government; in Kashmir a p. is a native official.

PUNIC WARS, wars between Romans and Carthaginians [*i.e.* descendants of Phœnicians (*Pœni*, adj. *punicus*)] in III. and II. cent's B.C.

First Punic War (264–241 B.C.) was occasioned by Carthaginian interference in Sicily. Fruitless fighting took place in Sicily, 263–257; Rom. naval victory at *Cape Ecnomus* and invasion of Africa, 256. Carthage was beaten, but reorganised forces, defeated Regulus near *Tunis*, 255, and drove Romans from Africa. War in Sicily, 254–242, wearied both parties; HAMILCAR BARCA commanded Carthaginians from 247. After destruction of Carthaginian fleet at *Ægates*, 241, Sicily surrendered to Rome.

Second Punic War (218–201).—Hamilcar Barca found outlet for his energy in Span. conquest, aided by his young son, the warrior HANNIBAL, and son-in-law, HASDRUBAL, who founded Carthagena. Hasdrubal made treaty with Rome as to boundary of his Span. dominion; Rome declared war on capture of *Saguntum* by Hannibal, 219. While Rom. armies set out for Spain and Africa, Hannibal marched over Alps into Italy; Carthaginan victories culminated at *Lake Trasimene*, 217, and *Cannæ*, 216. Fabian tactics of Quintus Fabius Maximus at last brought Romans victory of *Metaurus*, 207; Carthaginians departed, 203. The Scipios had conquered Spain, 206, and P. Scipio inflicted final defeat in Africa at *Zama*, 202.

Third Punic War (149–146).—Destruction of Carth-

age preached by the elder Cato and carried out by Scipio Æmilianus. Mommsen, *History of Rome.*

PUNISHMENT, the infliction of a penalty for the breach of a command or law. The three chief theories of the purpose of punishment by the State are that it is (1) retaliatory, (2) deterrent, (3) reformatory. See PRISON.

PUNJAB, PANJAB (*c.* 28° to 34° N., 70° to 78° E.), province of N.W. India; comprises 96,652 sq. miles of Brit. territory and 36,532 sq. miles of native states, all of which are, however, more or less under control of government of India; the Chief-Commissionership of Delhi (*q.v.*) enclosed in the Punjab is an imperial enclave. Surface slopes from N., which is occupied by foot-hills of Himalayas, and from the Salt Range Mountains on the S. (5000 ft.) to the great plain of the Indus and its five great tributaries, from which it receives its name, P. being Hindu for 'five rivers'; these are the Sutlej, Beas, Ravi, Chenab, and Jhelum; climate exceptionally hot and, except in the Himalayas, very dry, cultivation being rendered possible largely by means of irrigation, for which the rivers provide ample means.

P. was invaded by Alexander of Macedon in 327 B.C., by Mahmud of Ghazni in XI. cent., and by Timur towards close of XIV. cent.; was an autonomous principality from *c.* 1791 till death of Runjeet Singh in 1839, and after the war between Sikhs and British was annexed to Britain in 1849. In 1901 the region W. of Indus was separated from P. and became N.W. Frontier Province.

P. is administered by lieut.-gov., assisted by two commissioners and a legislative council. Chief towns are Lahore, Multan, Amritsar, Peshawar. Delhi (*q.v.*) is no longer under Punjab government. P. produces and exports grain, indigo, salt, spices, tea, tobacco; manufactures cottons, iron goods, leather, silk, shawls, etc. Inhabitants belong chiefly to Muhammadan, Hindu, and Sikh religions. Pop. (1911) 19,974,956.

PUNNA, see PANNA.

PUNSHON, WILLIAM MORLEY (1824–81), Eng. Wesleyan minister.

PUNTA ARENAS (9° 59′ N., 84° 46′ W.), seaport, capital of Punta Arenas, Costa Rica, on Gulf of Nicoya; exports coffee. Pop. 3700.

PUPPET, see MARIONETTES.

PUPPIS, see ARGO.

PURASATI, see PHILISTINES.

PURBECKIAN, a group of rocks; members of Jurassic system; well seen at Purbeck, Dorset—hence name; composed of argillaceous and calcareous shales, limestones, and marbles.

PURCELL, HENRY (1658–95), Eng. composer; b. Westminster; studied with Blow and others; app. organist of Westminster Abbey, 1680; of Chapel-Royal, 1682. Combining great technical skill with deep emotional expression and genuine inspiration, P. ranks as England's greatest composer; *Te Deum* and *Jubilate*, and *King Arthur*, best works; *Dido and Æneas* (opera); 12 sonatas for 2 violins and bass; besides anthems, songs, cantatas, etc.

PURCHASE SYSTEM, see OFFICERS.

PURGATORY, in Catholic theology, the place where the souls of such as are not pure enough to go straight to heaven are purified. Belief in it is connected with the practice of Indulgences; it is mostly denied by Protestants.

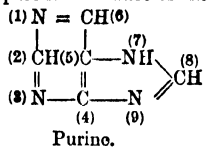
PURGSTALL, see HAMMER-PURGSTALL.

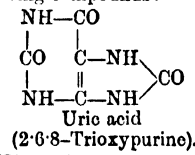
PURI, JAGANNATH (19° 48′ N., 85° 31′ E.), town and district, Orissa Division, Bihar and Orissa, India; contains famous temple of Jagannath. Pop. *c.* 40,000 (fluctuating); district, 1,120,000.

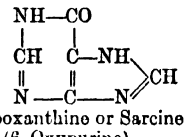
PURIFICATION, practice found in most religions of cleansing by ritual acts. Many different kinds could be enumerated. The idea attains to highest form in the Christian rite of baptism—*cf.* anointing, sacrifice, mutilation.

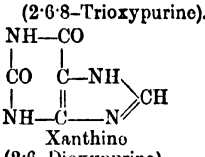
PURIM, feast of the Jews on 14th and 15th of the month Adar, traditionally observed in commemoration of their delivery from Haman, during the reign of King Artaxerxes, the account of which is contained in the *Book of Esther*. Its real origin is obscure, but it was probably adopted by the Jews during the captivity from the Persians, who themselves borrowed and modified an ancient Babylonian festival. It is connected by Dr. Frazer with the festival of the dying god in Western Asia.

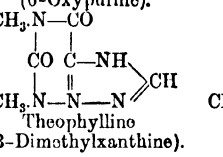
PURINE, $C_5H_4N_4$, name given by E. Fischer to the parent substance of the following compounds:—

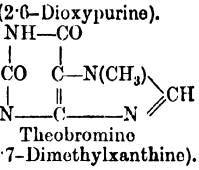

Purine.

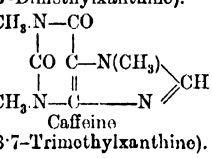

Uric acid (2·6·8–Trioxypurine).

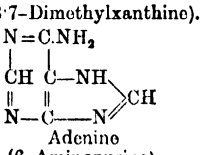

Hypoxanthine or Sarcine (6-Oxypurine).

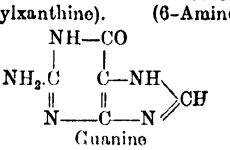

Xanthine (2·6–Dioxypurine).


Theophylline (1·3-Dimethylxanthine).

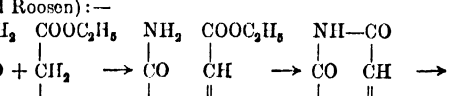

Theobromine (3·7-Dimethylxanthine).

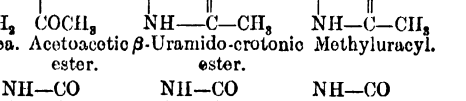

Caffeine (1·3·7-Trimethylxanthine).

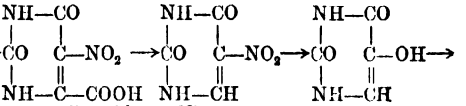

Adenine (6-Aminopurine).


Guanine (2-Amino-6-Oxypurine).

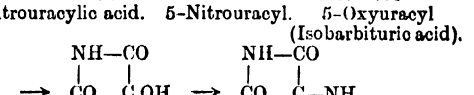
Purine has been synthesised from 5-nitrouracyl, obtained as an intermediate product in the synthesis of uric acid from acetoacetic ester and urea (Behrend and Roosen):—

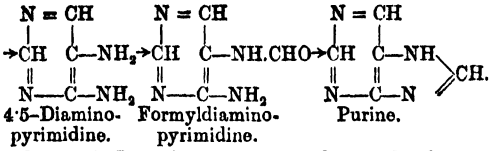

Urea. Acetoacetic ester. β-Uramido-crotonic ester. Methyluracyl.


Nitrouracylic acid. 5-Nitrouracyl. 5-Oxyuracyl (Isobarbituric acid).


Isodialuric acid. Urio acid.

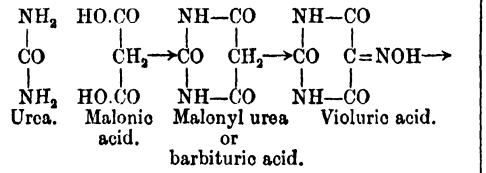
SYNTHESIS OF PURINE.

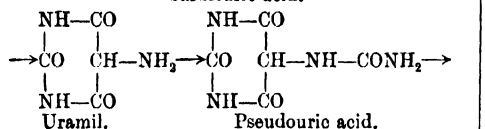

5-Nitrouracyl. 2·4-Dichloro-5-nitropyrimidine. 2-Chloro-4-amino-5-nitropyrimidine.

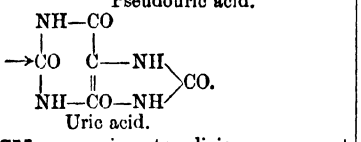


Purine, M.P. 217° C., is stable, and neutral to litmus, but is both basic and acidic.

The work of E. Fischer upon the purin derivatives is noteworthy, *e.g.* the synthesis of uric acid from malonic acid and urea:—







PURITANISM, name given to religious movement of XVI. and succeeding cent's, averse to Catholicism and ritual.

PURLEY, see TOOKE, HORNE.

PURNEA (25° 46′ N., 87° 30′ E.), district, Bhagalpur Division, Bihar and Orissa, India. Pop. 1,875,000. Capital, PURNEA. Pop. 14,300.

PURPLE EMPEROR, see LEPIDOPTERA.

PURPLE MEDICK, see LUCERNE.

PURPURA, a condition in which there are purple spots on the surface of the body due to extravasations of blood into the skin, accompanied sometimes by similar extravasations into mucous membranes and internal organs. It is not a disease, but a symptom of pathological change, due to one or other of several causes: (1) constitutional changes, *e.g.* heart disease, scurvy, Bright's disease, severe debility; (2) certain fevers, especially typhus and cerebro-spinal; (3) certain drugs and poisons, *e.g.* iodides, copaiba, quinine, snake venom; (4) nervous conditions, *e.g.* locomotor ataxia, myelitis, cerebro-spinal meningitis; (5) associated with arthritis; (6) *p. simplex,* a mild form for which no cause can be given, and *p. hæmorrhagica,* a more severe form of the same type.

The treatment is to look after general hygiene; iron and arsenic are valuable, and ergot and turpentine for severe bleeding. Calcium chloride is advised, to increase the coagulability of the blood.

PURPURA, a Mollusc; see under GASTEROPODA.

PURULIA (23° 19′ N., 86° 24′ E.), town, Chota Nagpur division, Bihar and Orissa, India. Pop. 18,000.

PURVEYANCE, Eng. legal term for royal right (abolished in 1664) to impress goods or labour at valuation fixed by appraisers.

PUSA (26° 10′ N., 85° 43′ E.), village, Darbhanga district, Tirhut Division, Bihar and Orissa, India; Government agricultural station. Pop. 5000.

PUSEY, EDWARD BOUVERIE (1800–82), Anglican divine; ed. Oxford; Regius prof. of Hebrew, 1829; leader of High Anglican movement; aimed at restoring Catholicism in Anglican Church, though not a ritualist. A learned man, he was hardly a great thinker, but an able controversialist, and learned in ecclesiastical antiquity; wrote *Doctrine of the Real Presence,* and *What is of Faith as to Everlasting Punishment. Life,* by Liddon (1899).

PUSHKAR (26° 30′ N., 74° 36′ E.), town, Rajputana, India; place of pilgrimage. Pop. 4000.

PUSHKIN, ALEXANDER (1799–1837), famous Russ. poet and novelist; b. Moscow; entered lyceum, Tsarskoe Selo, near St. Petersburg, 1811; received post in Ministry of Foreign Affairs, 1817; killed in duel in St. Petersburg. P. wrote excellent lyrics; greatly influenced by Byron; *Eugene Onegin, Poltava* (narrative poems); *The Captain's Daughter, History of the Revolt of Pugachev* (prose works); *Boris Godunov* (tragedy); *The Prisoner of the Caucasus.*

PUSHTU, PUKHTU, language of Pathans, Afghanistan; derived from Zend and mixed Arabic, Persian, Hindustani.

PUTEAUX (48° 50′ N., 2° 18′ E.), town, Seine, France, on Seine; iron manufactures. Pop. 29,000.

PUTEOLI (c. 40° 48′ N., 14° 8′ E.), ancient town, on site of modern POZZUOLI, Italy; colonised by Romans, 194 B.C.; became important trading centre and port of Rome; in later times it was sacked at different dates by Visigoths, Vandals, Ostrogoths, Saracens, and Turks; contained temple dedicated to Augustus, remains of which form part of modern cathedral; there are also remains of the columned temple of Serapis and of fortifications, baths, amphitheatre, and private houses; has medicinal springs, which were known in Rom. times. Modern town has arsenal. Pop. 24,000.

PUTNAM (41° 55′ N., 71° 55′ W.), city, Connecticut, U.S.A., on Quinebaug; cotton and woollen goods. Pop. (1910) 6637.

PUTNAM, ISRAEL (1718–90), Amer. general; famous for adventures with Indians in early years; fought against England in War of Independence; sought to entrench Bunker's Hill, and after defeat occupied Prospect Hill, 1775; distinguished under Washington.

PUTNAM, RUFUS (1738–1824), Amer. general and settler; rose during War of Independence; co-founder of Ohio Company, 1786, and established settlement at Marietta, Ohio, 1788.

PUTNEY (51° 28′ N., 0° 13′ W.), suburb of London; part of Wandsworth borough; P. Bridge is starting-point of Oxford and Cambridge boat race.

PUTORIUS, Weasel (*q.v.*).

PUTTENHAM, GEORGE (d. 1590), reputed author of *Arte of English Poesie.* The treatise is divided into three parts—the first dealing with the history of poetry, the second with rules of prosody, and the third with style.

PUTTING THE WEIGHT, sport; 16-lb. iron ball thrown from shoulder with one hand; competitor stands in 7-foot square or throws from mark; at the Olympic Games, 1912, throw of 50 ft. 4 in. was registered.

PUTTKAMMER, ROBERT VON (1828–1900), Pruss. statesman; Bismarck's right hand in conservatism and bureaucracy; suggested order of 1882, directing state officials to support government; forced to retire, 1888–89.

PUVIS DE CHAVANNES, PIERRE CÉCILE (1824–98), Fr. painter, noted for mural decorations, especially in the Sorbonne and Pantheon, Paris.

PUY, LE, see LE PUY.

PUY-DE-DÔME (45° 45′ N., 3° 10′ E.), central department, France; area, 3090 sq. miles; surface generally mountainous, reaching extreme height of 6186 ft. in Puy-de-Sancy; watered by Allier, Cher, Dordogne; chief town, Clermont-Ferrand. Produces wine; has large deposits of coal; silver lead mined; many mineral springs. Pop. (1911) 525,916.

PWLLHELI (52° 53′ N., 4° 26′ W.), seaport, Carnarvonshire, Wales; fisheries. Pop. (1911) 3791.

PYÆMIA, see SEPSIS.

PYAPUN (16° 16′ N., 95° 40′ E.), town (and district), Lower Burma, on Pyapun. Pop., town, 6000; district, 230,000.

PYAT, AIMÉ-FELIX (1810–89), Fr. publicist, dramatist, and politician; took prominent part in July

Revolution and in Fr. literary life of time of George Sand; opposed romanticism as conservative movement.

PYATIGORSK (44° 5′ N., 42° 10′ E.), town, watering-place, Terek Territory, Russian Caucasia; sulphur springs. Pop. 21,000.

PYCNOGONIDA (Gk. *puknos*, thick; *gonu*, the knee), SEA-SPIDERS, PANTOPODA, PODOSTOMATA; spider-like marine Arthropods with (except in the case of an Antarctic species) four pairs of long legs into which the food-canal runs. They clamber upon seaweeds and zoophytes near the shore, but some large forms occur at great depths in the sea. See ARACHNIDA.

PYGMALION (classical myth.) made an ivory statue of a girl. In answer to his prayer, Aphrodite breathed life into the statue and P. married the maid. W. S. Gilbert called her GALATEA in his comedy without classical authority.

PYGMY, term used for human races of small stature, *i.e.* about 4 or 4½ feet. They are found in various parts of Africa and in the Malay Archipelago. The former are sometimes called *Negrilloes*, the latter *Negritoes*. According to some ethnologists they are the remains of a primitive race whence on the one side the African negroes, on the other the Malay races are descended. Though this theory is unproven, it has much to recommend it. P's vary in colour, generally dark brown. They are fairly intelligent and are of a refined disposition. They shoot with arrows, but have little agriculture, living mostly in the forest. They practise polygamy, but are devoted in family life. P. have several times been brought over to England and exhibited.

PYLE, HOWARD (1853–1911), noted Amer. artist; famous as illustrator and decorative painter.

PYLOS, modern NAVARINO (36° 54′ N., 21° 43′ E.), ancient town, Messenia; home of Neleus and Nestor; fortified by Athenians under Demosthenes, 425 B.C.

PYM, JOHN (1584–1643), Eng. statesman; agitated for execution of penal laws against Catholics, 1621–25; pressed for Act for redress of grievances, supported Petition of Right, impeachment of Mainwaring for royalist speech, and joined attack on Buckingham, 1628; led opposition in Short Parliament, 1640; drew up with St. John petition for new Parliament to be summoned; member of committee to enquire on state of kingdom, Nov. 10; carried up impeachment of Strafford to Lords, Nov. 11, 1640; moved impeachment of Laud. P. enunciated attitude towards Crown in statement 'that to endeavour the subversion of the laws of this kingdom was treason of the highest nature'; on these lines conducted impeachment of Strafford, 1641; supported Root and Branch Bill, member of committee of defence, unmasked army plots, helped to prepare Grand Remonstrance, and secured exclusion of bp's from Lords, 1641. P. was impeached, Jan. 3, 1642, with other 5 members; king's attempt to carry out arrest failed. P. was a member of committee of public safety which organised the revolution; effected alliance with Scotland; a Puritan, but noted for good temper and reasonableness. His constructive ability secured success to the revolution.—Wade, *John Pym.*

PYRAMIDS, structures of stone or brickwork, standing on a square base and tapering upwards to an apex. Commonly erected in ancient times to the memory of some dead ruler. The Egyptians were particularly noted as pyramid-builders, and about forty p's, erected between 4000 B.C. and 2000 B.C., still stand in Egypt. In most cases they are built over a chamber containing the sarcophagus of a king. Limestone was the chief material used, but huge blocks of granite formed the outer casing. In every instance the four points at the base were so placed as to face the four points of the compass. An intricate passage was left during the raising of each pyramid, leading to the central chamber. The best-known group of pyramids is that of Gizeh, a few miles north of Cairo. There are eleven in this group—that of Cheops, which is 450 ft. in height, and contains over 80,000,000 cubic ft. of masonry, being the largest and most imposing in the country. The pyramids suffered considerably from the Arab spoliations in VII. cent. A.D.

See books by Perrin, Day, Proctor, Flinders-Petrie.

PYRAMUS AND THISBE (classical myth.), lovers who met clandestinely. One night T., arriving first, saw a lioness and fled, dropping her cloak; P. arrived to find it blood-stained, and thinking T. dead, slew himself. T. returning saw his corpse, and in despair killed herself.

PYRAZINE ($C_4H_4N_2$), solid; M.P. 55° C.; smelling like heliotrope. P's—

$$HC\cdot N\cdot CH$$
$$HC\cdot N\cdot CH$$

are feeble bases, with neutral reaction, resembling the pyridines—

$$HC:CH\cdot CH$$
$$HC:N\cdot CH$$

PYRAZOLE ($C_3H_4N_2$), colourless needles; M.P. 70° C.; weak base, forming unstable salts. Constitution: CH—CH ‖ ‖ N CH; gives pyrazole silver, $C_3H_3AgN_2$, with ammoniacal silver nitrate. Pyrazoline, CH—CH_2 ‖ | N CH_2 NH, and pyrazolone, CH—CH_2 ‖ | N CO NH, are related.

Dimethylphenylpyrazolone, CH_3—C = CH | | CH_3—N CO is *antipyrine*. N—C_6H_5

PYRENEES (42° 45′ N., 0°), great mountain chain stretching from S.E. corner of Bay of Biscay eastward to Mediterranean along borders of France and Spain, with total length of c. 280 miles. Western part has height of 3000–4000 ft.; in centre, highest points range from 9500 to 11,168 ft., and include Monte Aneto (11,168 ft.) and Mont Perdu (10,994 ft.); eastern part has elevation of 9500 to 2000 ft. at extreme eastern end. The P. are an intensely folded range of comparatively recent elevation, and are poor in minerals; the crystalline core comes to surface in Monte Aneto, while Mont Perdu is of cretaceous formation. There are many passes and tracks, while railways pass along coast at either end.

Belloc, *The Pyrenees.*

PYRÉNÉES-ORIENTALES (42° 35′ N., 2° 30′ E.), S.W. department, France; area, 1598 sq. miles; extends from Mediterranean inland along N. side of Pyrenees; watered by Agly, Tet; chief town, Perpignan; has large deposits of iron ore; produces vines, mulberries, chestnuts, olives, timber; manufactures wines. Pop. (1911) 212,986.

PYRETHRUM, genus of plants, order Compositæ; best-known species is Feverfew (*q.v.*).

PYRGI, ancient town, Etruria, Italy.

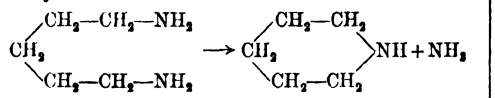
PYRGOS (37° 40′ N., 21° 26′ E.), town, Achæa and Elis, Greece. Pop. 13,700.

PYRIDINE (C_5H_5N), formed by the destructive distillation of coal tar and bone oil, is a colourless liquid with a pungent odour; B.P. 115° C.; soluble in water, alkaline in reaction; a tertiary base, forming salts, *e.g.* C_5H_5N, HCl, $(C_5H_5N)_2$, H_2PtCl_6, and giving with methyl iodide: C_5H_5N, CH_3I. P. is constituent of some alkaloids, or rather it is truer to say that the alkaloids are derivatives of the *p. bases*, which include p., quinoline, the isomeric, and isoquinoline; these bear the same relation to one another as benzene to naphthalene; they are among the most complex of

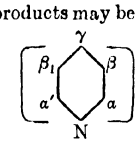
organic compounds, and their artificial production marks the highest achievement in organic chemistry. P. is very stable, but reduced by alcohol and sodium to hexahydropyridine or piperidine, $C_5H_{11}N$. P. is used to relieve asthma, as an antiseptic and a germicide, and to denaturise alcohol. In constitution, it may be regarded as a benzene with N replacing one CH; thus—

$$HC:CH\cdot CH$$
$$HC:N\cdot CH$$

established by the synthesis of piperidine from pentamethylene diamine—



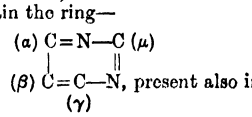
Monosubstituted products may be α, β, γ—



and disubstitution products—

$$\alpha\beta,\ \alpha\gamma,\ \alpha\beta_1,\ \alpha\alpha',\ \beta\beta_1,\ \beta\gamma.$$

PYRIMIDINE ($C_4H_4N_2$), base with narcotic smell; M.P. 21° C.; soluble in water. P's, or metadiazines, contain the ring—



PYRITES.—Iron pyrites, FeS_2, is a yellow mineral occurring crystallised in the cubic system in quartz veins, slate, coal, etc.; probably formed by reduction of ferrous sulphate by organic matter. Often contains copper (copper pyrites), cobalt, nickel, arsenic, and gold. Found chiefly in Spain, France, and the United States, and used for sulphuric acid manufacture, being roasted in special burners, thus—

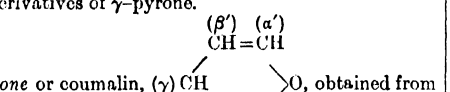
$$4FeS_2+11O_2=2Fe_2O_3+8SO_2.$$

PYRITZ (53° 10′ N., 14° 53′ E.), town, Pomerania, Prussia. Pop. (1910) 8676.

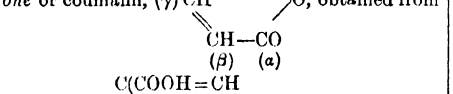
PYROMANCY, divination (*q.v.*) by fire.

PYRMONT, see WALDECK-PYRMONT.

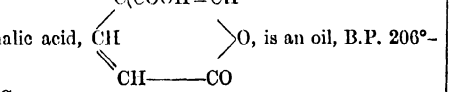
PYRONES [$C_5H_4O_2$ (α and γ)], coumarin, the odoriferous principle of tonka bean, woodruff, and 'new-mown hay,' is α-benzopyrone. Certain yellow vegetable dyes are derivatives of γ-pyrone.



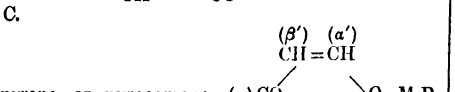
α-pyrone or coumalin,



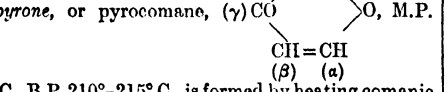
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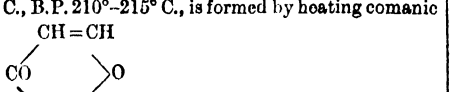
coumalic acid,



is an oil, B.P. 206°–209° C.



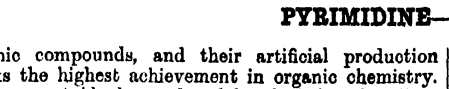
γ-pyrone, or pyrocomane,



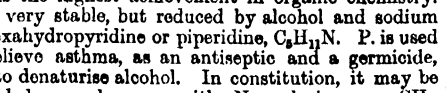
M.P. 32·5° C., B.P. 210°–215° C., is formed by heating comanic acid,



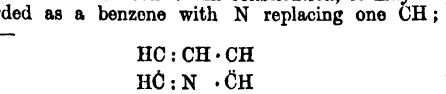
α-pyrones are lactones of δ-oxydiolefinedicarboxylic acids, *e.g.*



; γ-pyrones anhydrides of diolefinedioxyketones, *e.g.*



Meconic acid (in opium) is oxy-γ-pyronedicarboxylic acid 3.2.6:



PYROPE, a variety of garnet found in certain rocks of Bohemia and Saxony; composed of silica, alumina, magnesia, and lime; varieties: fire garnet, carbuncle, Bohemian garnet, and hyacinth.

PYROSOMA, a genus of Tunicata (*q.v.*).

PYROTECHNY, see FIREWORKS.

PYROXENES, group of important rock-forming minerals, including augite, diallage, enstatite, bronzite, and hypersthene.

PYRRHULA, BULLFINCH; see under FINCH FAMILY.

PYRRHUS (c. 318–272 B.C.), king of Epirus; overran Macedonia; expelled, 286; led army to aid Tarentum, 281, and for first time Greeks came into conflict with Romans at battle of *Heraclea*, 280; victory of P. was dearly bought—hence expression, a *Pyrrhic victory*; further victories, 279, but decisively beaten at Beneventum, 275.

PYRROL (C_4H_4NH), liquid obtained from bone oil and coal tar; B.P. 131° C.; with hydrochloric acid colours wood red; feeble secondary base.

PYTHAGORAS OF SAMOS (VI. cent. B.C.), Gk. philosopher, of whose life little is known; settled at Crotona in Magna Græcia, and there founded an order or society. The first purpose of the order was ethical and religious, and in this it resembled the Orphic societies, which also represented dissatisfaction with the local cults of Gk. cities, and aimed at purification of the soul by abstinence and ceremonial 'mysteries.' But the order came into conflict with established political custom, and after a period of power was in V. cent. ejected from Crotona and in part dispersed through the Gk. world.

Of the teaching of P. himself little is certainly known; but he undoubtedly believed in transmigration of souls and inculcated abstinence from flesh; he seems to have preached a 'way of life' or 'way of purification'; and he was much interested in (and perhaps was the first scientific student of) harmonies and arithmetic. It may have been his discovery of the numerical values of musical intervals that led him to the theory that all things are ultimately numbers.

Of the **Pythagoreans** towards the end of V. cent. the most famous is the Sicilian PHILOLAUS, who wrote on numbers and on med., and seems at one time to have taught at Thebes. There are extant *Fragments* attributed to him, which, however, are probably not his. The later Pythagoreans very probably interpreted the doctrine that all things are numbers as meaning that things are composed of geometrical figures, though this view is disputed. Their cosmology also is interesting, because they did not regard the earth as in the centre of the cosmos, but held that the earth, sun, and all the heavenly bodies revolve round a central fire. The most notable of the IV.-cent. Pythagoreans was ARCHYTAS OF TARENTUM, the astronomer. In the I. cent. B.C. there arose a movement known as NEO-PYTHAGOREANISM, mainly religious in tendency, but philosophically more akin to Platonism than to Pythagoreanism. Especially notable is APOLLONIUS OF TYANA in the I. cent. A.D., a wandering magician, ascetic, and religious teacher, some of

whose reported sayings are curiously parallel to those of Christ. See METAPHYSICS.

Benn, *The Gk. Philosophers*, vol. i.; J. Burnet, *Early Gk. Philosophy*; Gomperz, *The Greek Thinkers*, vol. i.; Zeller, *Pre-Socratic Schools*.

PYTHAGOREANS, see METAPHYSICS.

PYTHEAS (fl. early III. cent. B.C.), Gk. navigator and astronomer; b. Marseilles; navigated North Sea as far as 'Thule,' perhaps island of Shetlands; penetrated into Baltic; knowledge of his travels preserved by other writers; nucleus of much myth, but has claim to astronomical discoveries; see paper by Sir Clements Markham in *Geographical Journal* (June 1893). See GEOGRAPHY.

PYTHIAS, see DAMON.

PYTHO, see DELPHI.

PYTHON (classical myth.), serpent formed from mud left by Deucalion's deluge; slain by Apollo.

PYTHON, see under SNAKES.

PYTHONOMORPHA, extinct Reptiles (*q.v.*).

Q, 17th letter of alphabet; originally a picture of a knee; Hebrew *qoph*, Greek, *koppa*; arrived in England in mid-XII. cent. and replaced O.E. *cw* (O.E. *cwyc*=quick); in Middle Scots *qu*=*hw* (Middle Scots *quhat*=O.E. *hwat*, modern *what*).

QARAITES, KARAITES, mediæval Jewish sect, so-called because of their emphasis on the sacred text as opposed to tradition; they arose in VIII. cent.; about 12,000 exist, mostly in Russia; they have a good reputation, and are favoured by the Russ. government.

QUADRATIC EQUATION, see EQUATION.

QUADRATRIX, curve with ordinates proportional to area (quadrature) of another curve. Most famous is that of Dinostratus $\left(\text{equation, } y=x\cot\frac{\pi x}{2a}\right)$, by which quadrature of circle can be effected.

QUADRATURE, finding a square of area equal to the area bounded by any lines, straight or curved; finding the q. of a circle is the old game of 'squaring the circle.'

QUADRUPLE ALLIANCE (1718) was made between the Triple Alliance (Britain, France, Holland) and Austria to counteract Span. schemes and to enforce terms of Treaty of Utrecht which related to Hanoverian Succession in Britain and Orleans Succession in France.

QUÆSTOR, Rom. official who had originally criminal, later chiefly financial, jurisdiction; nominated by consuls till middle of V. cent. B.C., when right of election fell to *comitia tributa*. Number increased from 2 to 4 (421 B.C.), 8 (*c.* 267), and to 20 by Sulla, 81 B.C.

QUAGGA, see under HORSE FAMILY.

QUAIL, see under PHEASANT FAMILY.

QUAIN, SIR RICHARD, Bart. (1816–98), Irish physician; practised in London; physician to Brompton Hospital for Diseases of Chest (1855); physician-extraordinary to the queen; an authority on heart diseases, and author of *Dictionary of Medicine*. His cousin, **Jones Quain** (1796–1865), was the author of the well-known standard *Elements of Anatomy*, and **Richard Quain** (1800–87), bro. of Jones Q., was pres. of Royal Coll. of Surgeons (1868), and endowed the Q. professorships of Bot., Eng. Language and Lit., Law, and Physics in Univ. Coll., London.

QUAKERS, name (at first nickname) of Society of Friends. See FREE CHURCHES.

QUARANTINE (Fr. *quarantaine*, '40 days'), the time during which those exposed to infection on a given date must wait without further exposure to infection, before it is known whether they have taken the disease or not. The time varies with each infectious disease. When a vessel arrives from a port where infectious disease is prevalent she is not permitted to land her cargo, nor is any one on board allowed ashore except at appointed places, and under special regulations. The vessel is 'in q.' and may be thus secluded for 40 days.

QUARLES, FRANCIS (1592–1644), Eng. religious poet; most voluminous in production; best work, *Emblems*; figures in Pope's *Dunciad*.

QUARRYING, known as early as 4000 B.C. Quarries from which stone for the Pyramids was cut are still to be seen near Cairo. Q. is practised on an extensive scale in Britain; Craigleith (sandstone), Aberdeenshire (granite); limestone quarried in N. Eng., and small marble quarries exist in Skye and parts of Ireland, but Italian marble is preferred. U.S.A. possesses supplies of stone for quarrying.

QUARTAN FEVER, see MALARIA.

QUARTER SESSIONS, COURT OF, in Eng. law, the court in which justices of the peace have their highest criminal jurisdiction. These sessions are held quarterly in the counties, and deal—without a jury—with all manner of crimes except treasons, murders, capital felonies, and felonies punishable by penal servitude for life. The chairman is elected by the magistrates themselves. The laws of vagrancy, the administration of the poor law and the laws relating to the highway are all under the jurisdiction of the court of quarter sessions. In all boroughs that have a separate court of quarter sessions the Recorder presides. Generally offences too serious to be dealt with at Petty Sessions and yet not grave enough for the Assizes are brought before Quarter Sessions.

QUARTER-STAFF, pole, 6 to 8 ft. long; grasped in middle by one hand and midway between middle and end by the other; weapon of mediæval Eng. peasants.

QUARTZ is silica $(SiO_2)_n$ crystallised in the hexagonal system; S.G. 2·65, hardness 7. The purest form is rock crystal; impure varieties are milk, rose, smoky, and amethystine q.; is a constituent of granite, etc., and itself forms a massive rock; sand and sandstone are chiefly q. grains. Q. is used for making spectacle lenses, pivots, balance weights, etc. Fused q. is made into fine threads for suspensions, and tubing and laboratory vessels, which stand sudden changes of temperature.

QUARTZITE, a sandstone generally found in such ancient rocks as the pre-Cambrian; specially large blocks have been found in Reading Beds.

QUARTZ-PORPHYRY, acid igneous rock containing crystals of quartz and felspar scattered in compact mass of same minerals, and occurring in intrusive lavas. Non-porphyritic varieties are known as felsite (*q.v.*); owing to earth movements, many of the q.-p's have become schistose, especially in Palæozoic rocks.

QUARTZ-TRACHYTE, see RHYOLITE.

QUATERNIONS.—A quaternion is the mutual relation of two *vectors* with respect to *quantity* and *direction*. The sum of a *scalar* and a *vector* is called a quaternion because it involves four independent numbers, such as the scalar and the three coefficients of the vector when that is resolved along three given directions. The quaternion analysis was invented by Sir W. R. Hamilton in 1843. The *tensor* of a vector α is the number of units contained in its length, and is denoted by $T\alpha$. The *versor* $U\alpha$ of a vector α is a vector of unit length having the same direction as α. Hence $\alpha=T\alpha.U\alpha$, and $T\alpha=T(-\alpha)$, $U\alpha=-U(-\alpha)$. More generally, n being a real scalar, $Tn\alpha=nT\alpha$, and $Un\alpha=U\alpha$ if $n>0$; $Tn\alpha=-nT\alpha$, $Un\alpha=-U\alpha$ if $n<0$.

The product of the length of one vector (α) into the length of the projection of another (β) upon it is denoted by $-S\alpha\beta$, and $S\alpha\beta$ is called the *scalar* of $\alpha\beta$. By similar triangles it follows that $S\alpha\beta=S\beta\alpha$. Further, $S\Sigma\alpha\Sigma\beta=\Sigma\Sigma S\alpha\beta$, and the function is doubly distributive. A unit of length having been assumed, let a vector be drawn at right angles to two given vectors α and β, so that rotation round this vector from α to β is positive, and let the length of this vector be numerically equal to the area of the parallelogram determined by α and β. This vector, called the *vector* of $\alpha\beta$, is denoted by $V\alpha\beta$. The axis of a rotation is the direction of advance of a right-handed screw turning in a fixed nut. We have $V\beta\alpha=-V\alpha\beta$, and further $V\Sigma\alpha\Sigma\beta=\Sigma\Sigma V\alpha\beta$.

The *product* of the vectors α and β is defined by the

equation $\alpha\beta = S\alpha\beta + V\alpha\beta$, and since both terms $S\alpha\beta$ and $V\alpha\beta$ are doubly distributive the product is also, $\therefore \Sigma\alpha\Sigma\beta = \Sigma\Sigma\alpha\beta$. But $\beta\alpha = S\alpha\beta - V\alpha\beta$, and so multiplication of vectors is not commutative. The product of a pair of vectors is a quaternion, since it is the sum of a scalar and a vector. Conversely, every quaternion may be expressed as the product of a pair of vectors. If q is a quaternion, Sq its scalar part and Vq its vector part, $q = Sq + Vq$. If α and β^1 are two vectors at right angles to one another and to Vq, so that $V\alpha\beta^1 = Vq$, and if $\beta - \beta^1$ is the vector parallel to α for which $S\alpha(\beta - \beta^1) = Sq$, then $q = \alpha\beta$. The sum of any number of quaternions is defined to be the sum of their scalar parts plus the sum of their vector parts. The product of a quaternion and a vector is distributive with respect to the scalar and the vector of the quaternion. Thus $\gamma q = \gamma(Sq + Vq) = \gamma Sq + \gamma Vq$; $q\gamma = (Sq + Vq)\gamma = Sq \,.\, \gamma + Vq \,.\, \gamma$. Hence $\gamma Sq = Sq \,.\, \gamma$. Consideration of three mutually perpendicular vectors ijk (with the right-handed notation) leads to the results $i^2 = j^2 = k^2 = -1$, $jk = i = -kj$, $ki = j = -ik$, $ij = k = -ji$, and we may deduce that multiplication of vectors, and hence of quaternions, is associative. Division of vectors may be reduced to multiplication, for $a^2 = S.a^2 = -(Ta)^2$; so that $\frac{-a}{(Ta)^2} = \frac{1}{a} = a^{-1}$. Thus $\frac{-a}{(Ta)^2}$ is the reciprocal of a. Hence the reciprocal of any product of vectors is the product of their reciprocals taken in the reverse order. The same applies to quaternions.

The *conjugate* Kq of a quaternion q is defined by $Kq = Sq - Vq$. So if $q = \alpha\beta$, $Kq = \beta\alpha$, and $qKq = Tq^2 T\beta^2 . = (Tq)^2$, Tq is the *tensor* of the quaternion. Again, $q = \alpha\beta = T\alpha \,.\, U\alpha \,.\, T\beta \,.\, U\beta = T\alpha \,.\, T\beta \,.\, U\alpha \,.\, U\beta = Tq \,.\, Uq$, where $Uq = U\alpha U\beta$, and is the *versor* of the quaternion. If $\pi - \angle q$ is the angle between α and β which is $\angle\pi$ and measured from α to β, $Sq = Tq \cos \angle q$, $TVq = Tq \sin \angle q$. The angle $\angle q$ is called the *angle* of the quaternion and is independent of any particular set of vectors. A plane at right angles to Vq is called the *plane* of the quaternion and UVq is called the *axis*.

Regarding a quaternion as an operator, it turns vectors *in its plane* through a given angle, and alters their lengths in a given ratio. For applications of quaternion analysis to geometry, statics, dynamics, electromagnetics, etc., see text-books: C. J. Joly, *Manual of Quaternions*; P. G. Tait, *Elementary Treatise on Quaternions*; Sir W. R. Hamilton, *Lectures on Quaternions* and *Elements of Quaternions*.

QUATRE-BRAS, see WATERLOO.

QUATREFAGES DE BRÉAU, JEAN LOUIS ARMAND DE (1810–92), Fr. naturalist; prof. of Anat. and Ethnology in Natural History Museum, Paris, 1856; expert anthropologist; works include *L'Espèce humaine* and *Crania Ethnica*.

QUATREMÈRE, ÉTIENNE MARC (1782–1857), Fr. Orientalist; proved that Coptic language is derived from ancient Egyptian.

QUEBEC (*c.* 44° 57′ to 53° N., 56° to 79° 30′ W.), eastern province, Dominion of Canada; lies along lower course of St. Lawrence R., and (since acquisition of Ungava, 1912) has area *c.* 800,000 sq. miles; surface generally undulating; drained by St. Lawrence and its tributaries; principal towns are Montreal and Quebec (capital). Much of surface is forested; produces cereals, tobacco, flax, hemp, fruits; live stock largely raised; dairy-farming carried on; minerals include gold, copper, lead, silver, platinum; manufactures textiles, leather, hardware, paper, etc.

First settled by French in XVI. cent., Q. was temporarily occupied by English, 1629–32; permanently taken by Britain, 1759.

Administration is carried out by lieut.-gov., aided by a responsible ministry and by Legislative Council and Assembly; Q. sends 24 Senators and 65 representatives to Dominion Parliament. Education is free and nominally obligatory; Montreal, Quebec, and Lennoxville are seats of univ's. Chief religions are R.C., Anglican, Presbyterian, Methodist. Inhabitants are mainly of Fr. extraction. Pop. (1911) exclusive of Ungava, 2,002,712. See CANADA.

QUEBEC (46° 48′ N., 71° 13′ W.), capital of Q. province, Canada, on St. Lawrence River; founded in 1608 by Fr. traveller, Samuel Champlain, who settled here with 28 followers; taken by British under Wolfe, who, like Fr. leader, Montcalm, fell during action, 1759; great Tercentenary Celebrations, 1908; three times capital of Canada. City consists of Upper and Lower Town; former includes walled city, and two suburbs, St. John and St. Louis, between walls and Plains of Abraham; monument marks place where Wolfe was slain; Lower Town is devoted to commerce. Q. is seat of Laval R.C. Univ., which dates from 1663; episcopal see of Anglican Church, R.C. archiepiscopal see; has R.C. archiepiscopal palace, Anglican and R.C. cathedrals; various philanthropic establishments, and several religious houses; excellent harbour; exports timber, lumber, grain, cheese, etc.; important railway centre; manufactures woollens, hardware, etc. Pop. (1911) 78,190.—Parker, *Old Quebec* (1903).

QUEDLINBURG (51° 47′ N., 11° 7′ E.), town, on Bode, Prussian Saxony; has interesting abbey church; vegetable and flower-seeds; iron- and brass-ware; founded by Henry the Fowler; was long a royal residence. Pop. (1910) 27,245.

QUEEN ANNE'S BOUNTY, see BOUNTY, QUEEN ANNE'S.

QUEEN CHARLOTTE ISLANDS (53° 50′ N., 132° 10′ W.), group, in Pacific, belonging to Brit. Columbia; inhabited by Haida Indians; coal mines.

QUEENBOROUGH (51° 25′ N., 0° 44′ E.), town, Isle of Sheppey, Kent, England; cement works.

QUEEN'S COUNTY (52° 58′ N., 7° 25′ W.), county, Leinster, Ireland; generally flat, rising in N.W. to the Slieve Bloom mountains; fertile, interspersed with large tracts of bog; agriculture and dairy-farming; pop. mostly R.C.; capital, Maryborough. Pop. (1911) 54,362.

QUEENSBERRY, EARLDOM, MARQUESSATE, AND DUKEDOM OF, Scot. honours. William, Lord Douglas, was cr. earl, 1633; his grandson, William, was cr. marquess, 1682, duke, 1684; marquessate and earldom still remain with Douglases; dukedom, by re-grant, 1706, passed in 1810 to Duke of Buccleuch, descendant of dau. of 2nd duke.

QUEENSBERRY, CHARLES DOUGLAS, 3RD DUKE OF (1698–1778), Eng. Lord Justice-General, 1763–78. Wife, KATHARINE, DUCHESS OF Q. (d. 1777), is the 'Kitty' of Prior's *Female Phæton*; of great beauty and political influence, and patron of literary men.

QUEENSBERRY, JAMES DOUGLAS, 2ND DUKE OF (1662–1711), first Scot to join William of Orange, 1688; instrumental in bringing about Anglo-Scot. Union; fell through implication in Jacobite plots, but reinstated, 1705, and received many honours.

QUEENSBERRY, JOHN SHOLTO DOUGLAS, 8TH MARQUESS OF (1844–1900), originator of '*Queensberry rules*' for boxers.

QUEENSBERRY, WILLIAM DOUGLAS, 4TH DUKE OF (1725–1810), called by Wordsworth 'degenerate Douglas'; career of unwearied debauchery; familiarly called 'Old Q.'

QUEENSCLIFF (38° 16′ S., 144° 40′ E.), seaport, watering-place, Victoria, Australia, on Port Phillip Bay.

QUEENSFERRY, SOUTH (55° 59′ N., 3° 23′ W.), seaport, Linlithgowshire, Scotland, on Firth of Forth; connected by ferry and Forth Bridge with **North Queensferry** (56° 1′ N., 3° 23′ W.), seaport, Fifeshire; near Rosyth Naval Base.

QUEENSLAND (10° to 29° S., 138° to 153° 30′ E.), second largest state of Australian Commonwealth, is bounded N. by Gulf of Carpentaria and Torres Strait, N.N.E. by S. Pacific, S. by New South Wales, W. by South Australia; area, *c.* 670,500 sq. miles; seaboard, *c.* 2250 miles. Surface is marked by Great Dividing Ranges, continued northward roughly parallel to the E.

coast, becoming lower towards the N., and spreading out westward into plateaux, very much as in New South Wales. The hill country falls to a coastal strip, *c.* 50 miles in width. Drainage is carried off in four different directions; northward to Gulf of Carpentaria go the Mitchell, Gilbert, Norman, Flinders, Leichhardt, and Albert rivers; eastward to Pacific, Burdekin, Fitzroy, Burnett, Mary, Brisbane; southward to Darling basin, Condamine, Warrego, Bulloo; westward to Lake Eyre, Georgina, Diamantina, Barcoo, Thomson. Chief towns are Brisbane, Rockhampton, Townsville, Maryborough, Gympie, Ipswich, Charters Towers, Toowoomba.

The northern part of Q. is chiefly of crystalline formation; in S.E. the primary rocks are overlaid by stratified rocks of slaty formation; and the S.W. region is chiefly of Secondary formation. Climate varies with latitude and height, N. being tropical and subtropical, S. having mean temperature of 67° Fahr.

Although discovered by Captain Cook in 1770, little was known of this part of Australia until it was partially explored by Surveyor-General Oxley, who discovered and named the river Brisbane in 1823. From this time onwards further explorations were carried out by various travellers. A branch convict settlement was established in Moreton Bay in 1825–26, but was subsequently given up. Q. formed part of colony of New South Wales till 1859, when, after years of disputation, it was constituted a separate colony, and obtained responsible government, Brisbane, the capital, being made a bishopric. In 1866 there occurred a financial crisis, from which, however, the country soon recovered. The discovery of gold in 1867 led to a great influx of settlers, and to an immediate increase in the prosperity of the colony; but labour strikes and destructive floods in 1890 and 1892 resulted in another financial crisis, and in 1893 several banks stopped payment; of these the National and the Royal were soon afterwards reopened, and in case of former further heavy losses again rendered reconstruction necessary in 1897. In 1900, Q. united with the other Australian colonies to form a federation. Dissatisfaction arising from indentured Kanaka labour in sugar plantations led to their repatriation, 1901–6. In recent years the prosperity of the state has greatly increased; and in 1905 it was announced in Parliament that for the first time for many years the revenue was in excess of the expenditure.

Q. has a gov., a Legislative Council of 42 members, app. by Crown, and an Assembly of 72 members elected by popular vote. There is adult suffrage for both men and women. Education is gratuitous and obligatory; a Univ. of Q. was founded at Brisbane, 1910. There is no State religion, the principal denominations in order of numerical importance being Anglican, R.C., Presbyterian, Wesleyan, Lutheran. Q. produces cereals, sugar-cane, cotton, tea, fruits, timber; sheep, cattle, and horses are extensively reared, and form one of chief sources of wealth. Minerals are of great importance, including gold, copper, tin, coal. Industries include manufactures of sugar, tobacco, leather, boots, spirits, flour, machinery, textiles, soap; and meat-preserving is largely carried on. Railway mileage exceeds 4000. The population is more mixed than in any other part of Australia, and includes English, Germans, Chinese, Japanese, Polynesians. Pop. (1911) 605,813.

Queensland Official Year-Book; Russell, *The Genesis of Queensland* (1888); Weedon, *Queensland, Past and Present* (1892).

QUEENSTOWN.—(1) (51° 51′ N., 8° 17′ W.) seaport, County Cork, Ireland; port of call for Atlantic mail steamers. Pop. 9000. (2) (42° 10′ S., 145° 35′ E.) town, Tasmania, Australia; smelting-works. Pop. 6000. (3) (31° 53′ S., 26° 52′ E.) town (and division) Cape Province, S. Africa, on Great Kei. Pop. (1911) 9016; division, 32,860.

QUELPART (33° 20′ N., 126° 30′ E.), mountainous, volcanic island, off S. coast of Korea, to which it belongs; fertile; populous. Pop. *c.* 110,000.

QUERÉTARO.—(1) (21° N., 99° 30′ W.) central state, Mexico, on the Anahuac plateau; area, 3556 sq. miles. Pop. (1910) 244,663. (2) (20° 36′ N., 100° 10′ W.) city, capital of above; cotton goods; scene of death of Maximilian of Austria, 1867. Pop. (1910) 35,000.

QUERFURT (51° 23′ N., 11° 36′ E.), town, province of Saxony, Prussia, on Querne. Pop. 5000.

QUERQUEDULA, Garganey, see under Duck Family.

QUESADA Y MATHEUS, JENARO DE (1818–89), 1st Marquis of Miravalles; Span. commander-in-chief; distinguished in Morocco War; put down Carlists and revolutionaries; made minister of war, marquis, and grandee, 1883.

QUESNAY, FRANÇOIS (1694–1774), Fr. court physician and political economist; founded physiocratic school of economics, based on natural law; showed primary importance of agrarian question and true nature of wealth; advocated benevolent despotism, and tax on property.

QUÉTELET, LAMBERT ADOLPHE JACQUES (1796–1874), Belgian astronomer and meteorologist; b. Ghent; app. director, new Royal Observatory, Brussels, 1828.

QUET'TA, Shalkot (30° 10′ N., 67° E.), capital of Brit. Baluchistan, N.W. of the Bolan Pass; occupied by a Brit. garrison; strongly fortified; connected with the railway system of India. Pop. 26,000. Quetta district has area 5130 sq. miles. Pop. 120,000.

QUEVEDO Y VILLEGAS, FRANCISCO GÓMEZ DE (1580–1645), Span. satirist; b. at Madrid. His thorough acquaintance with the inner mechanism of court life prompted him to write his great work, the *Política de Dios*, an attack on Philip IV. and an appeal for juster rule.

QUEZAL, see Trogons.

QUEZALTENANGO, ancient Xelahuh (14° 51′ N., 91° 35′ W.), town (and department), Guatemala, Central America; textiles. Pop. 35,000.

QUIBERON, BATTLE OF, 1759, episode of Seven Years War. Fr. plan was to unite Brest fleet under Conflans with Toulon fleet under La Clue, and invade England; Boscawen defeated La Clue at Lagos, Aug. 17, while Hawke kept watch off Brest and defeated Conflans in brilliant victory in *Quiberon Bay*, on south coast of Brittany, east of Lorient, on Nov. 20.

QUICHERAT, JULES ÉTIENNE JOSEPH (1814–82), Fr. historian and archivist; director of the École des Chartes; member of Society of Antiquaries; did important archæological work in France, and produced books which are contributions to hist. research and architecture.

QUICKSILVER, see Mercury.

QUIETISM, a development of religious life within the Catholic Church in France and elsewhere mainly in the XVII. cent., though anticipated before and continued since. It was partly due to St. Theresa, whom Quietists followed in her mysticism but not in her devotion to the Church. The essence of Q. was the disparaging of the Church and sacraments, and the attainment of immediate communion with God. Among its greatest exponents were Abp. Fénelon and Mme Guyon. It incurred the enmity of the Jesuits.

QUILIMANE, Kilmane (17° 50′ S., 33° 44′ E.), seaport, Portug. E. Africa, on Quilimane; trade in copra, rubber; unhealthy.

QUILL, technically the lower, hollow, horny portion, or calamus, of a feather, but from this applied to strong flight-feathers themselves, to the pens made from them, to spines like them, such as those of the Porcupine, and to many stalk- or reed-like objects.

QUILLER-COUCH, SIR ARTHUR THOMAS (1863–), Eng. poet and novelist; writes under pseudonym 'Q.'; chief works: *Troy Town*, *The Splendid Spur*, *The Vigil of Venus*; edit. *Oxford Book of Eng. Verse*; prof. of Eng. Literature, Cambridge, 1913.

QUILLOTA (32° 58′ S., 72° 51′ W.), town, Val-

paraiso province, Chile, on Aconcagua; copper mines. Pop. 12,000.

QUILON (8° 53′ N., 76° 37′ E.), seaport, Travancore, India. Pop. 16,000.

QUIMPER (48° N., 4° 4′ W.), town, capital of Finistère, France, at confluence of Odet and Steir; ancient capital of Cornouailles; bp.'s see; XIII.-cent. cathedral; potteries, sardines. Pop. 16,700.

QUIMPERLÉ (47° 53′ N., 3° 32′ W.) town, Finistère, France, at junction of Ellé and Isole. Pop. 7000.

QUINAULT, PHILIPPE (1635–88), Fr. dramatist; s. of Parisian baker; first heard at *Hôtel de Rambouillet* in comedy, *Les Rivales* (1653); wrote words for Lully's operas, *Atys* (1676), *Proserpine* (1680), *Roland*, etc.

QUINCE (*Pyrus cydonia*), a tree cultivated largely for its fruit, which has an extremely acid flavour. It differs from the apple in the larger number of seeds.

QUINCY.—(1) (39° 51′ N., 91° 20′ W.) city, Illinois, U.S.A., on Mississippi; flour, machinery, ironware. Pop. (1910) 36,587. (2) (42° 15′ N., 71° W.) city, on Massachusetts Bay; granite quarries; manufactures boots and shoes. Pop. (1910) 32,642.

QUINCY, JOSIAH (1744–75), Amer. lawyer and political writer; counsel for Capt. Preston, who fired on crowd in 'Boston Massacre,' 1770; covered with popular abuse, which changed to approval; encouraged separatists. His s. JOSIAH (1772–1864), politician, was extreme federalist; opposed admission of Louisiana to Union.

QUINET, EDGAR (1803–75), Fr. historian; prof. at Collège de France; wrote about poetry, history, religion, and travels; style recalls Châteaubriand (*q.v.*) by its vivid colour; inclined towards democracy and pantheism, and was deprived of chair. He tried, without much success, epic poem in *Napoléon* and again in *Prométhée*; afterwards wrote much-admired *Ahasvérus* in poetical prose.

QUININE, $C_{20}H_{24}N_2O_2$, the chief alkaloid in cinchona bark (from Peru, Jamaica, India, etc.), was first prepared by Pelletier and Caventou in 1820. It is extracted by dilute sulphuric acid, and separated from cinchonine and numerous other alkaloids by fractional crystallisation of the sulphate. Q. (M.P., anhydrous, 177°) crystallises with $3H_2O$; its chief salts are the sulphate, $(C_{20}H_{24}N_2O_2)_2$, H_2SO_4, $8H_2O$, and dihydrochloride, $C_{20}H_{24}N_2O_2$, $2HCl$, $3H_2O$. Solutions of salts have an intensely bitter taste, and give an emerald green colour with chlorine or bromine water and ammonia; dilute solutions show a light blue fluorescence. A valuable tonic and antipyretic, and an antidote to malaria. Q. is ditertiary base, since it forms the dimethyliodide $C_{20}H_{24}N_2O_2(CH_3I)_2$; a derivative of quinoline because it is oxidised by chromic acid to quininic acid = methoxyquinoline-γ-carboxylic acid.

QUINOLINE, C_9H_7N, colourless, highly refractive liquid, with characteristic smell, occurring in coal tar and bone oil; B.P. 239° C. Synthesised by Skraup's reaction from aniline, and glycerol, with sulphuric acid to dehydrate, and nitrobenzene to oxidise, thus:—

$$CH_2OH.CHOH.CH_2OH - 2H_2O = CH_2:CH.CHO$$
Glycerol. Acrolein.

$$C_6H_5NH_2 + OHC.CH:CH_2 = C_6H_5N:CH.CH:CH_2 + H_2O$$
Aniline. Acrolein-aniline.

Q. is sparingly soluble in water; a tertiary base forming salts, *e.g.* C_9H_7N, HCl, the platinichloride $(C_9H_7N)_2$, H_2PtCl_6, $2H_2O$, and the methyl iodide C_9H_7N, CH_3I.

QUINONES are benzene (or anthracene) derivatives containing two CO groups. Quinone consists of yellow needles, M.P. 116°, formed by oxidation of aniline, or hydroquinone.

QUINSY, popular name for acute tonsillitis (*q.v.*).

QUINTAIN, instrument used in tilting; post with movable cross-bar having board at one end and a bag of sand at the other; horseman aimed at board, and quickly got out of range of sandbag which swung round.

QUINTESSENCE, the fifth element, the substance of the heavenly bodies (Aristotle).

QUINTILIAN, MARCUS FABIUS QUINTILIANUS (c. 35–95 A.D.), Rom. rhetorician; b. Calagurris, Spain; ed. Rome; became distinguished pleader; instructed younger Pliny; favoured by Vespasian. His chief work is *Institutiones Oratoriæ* (commonly called *The Institutes*), a complete system of rhetoric dedicated to Marcellus Victorius; style clean and pure in spite of Silver-Age idioms; spurious works ascribed to him, such as *Declamationes* and *De oratoribus*. See RHETORIC.

QUINTUS CURTIUS, see CURTIUS.

QUIRINUS, see ROMULUS AND REMUS.

QUITO (0° 14′ S., 78° 50′ W.), capital, Ecuador, S. America, on a plateau of the Andes; seat of an abp.; cathedral; numerous churches and convents; astronomical observatory and univ.; cottons, woollens; ancient capital of Incas; taken by the Spaniards, 1534. Pop. 51,000.

QUO WARRANTO, writ demanding by what warrant a person holds an office; abused by Charles II. and James II. in depriving cities of their rights; by Judicature Act, 1884, Q. W. is a civil proceeding.

QUOITS, game played with heavy iron rings; object to encircle a peg fixed in ground at some distance; derived from discus-throwing.

QUORRA, part of Upper Niger.

R, 18th letter of alphabet; originally a picture of a lion; in modern English nearly silent, as in *girl, bird.*

RAAB, Hungarian GYÖR (47° 41′ N., 17° 40′ E.), town, on Raab, Hungary; occupies site of Rom. *Arrabona*; formerly fortified; XII.-cent. cathedral; manufactures machinery, agricultural implements; trade in grain, horses. Pop. (1910) 44,300.

RABAB, see REBAB.

RABAT (34° N., 6° 20′ E.), seaport, Morocco, at mouth of Bu Regreg; manufactures carpets; exports wool and hides. Pop. 29,000.

RABBA (9° 19′ N., 5° E.), decayed town, Nigeria, Brit. W. Africa, on Niger.

RABBI (Hebrew 'teacher'), Jewish title first given to Gamaliel (*q.v.*); now a teacher of the young, rather than a priest.

RABBIT (*Lepus* (*Oryctolagus*) *cuniculus*), relative of Hare, with smaller body, shorter ears, and characteristic habit of burrowing; found widely distributed in Old World, probably often through man's introduction, as in Australia and New Zealand. Unlike those of the Hare, its young are naked and helpless at birth.

RABBIT-FISH, see BURBOT.

RABBIT-FISHES, see PORCUPINE-FISHES.

RABELAIS, FRANÇOIS (*c.* 1483–1553), Fr. writer; b. in Chinon; soon showed his love for science; studied Gk. and Lat. authors, natural history, law, math's, and professed med. at the Univ's of Montpellier, 1530, Lyons, 1532; made remarkable anatomical discoveries; pub. two editions on Galen and Hippocrates; member of chief literary circle; went to Rome as medical adviser of Jean du Bellay, 1533. R. published *Pantagruel*, 1533, *Gargantua*, c. 1535 (et seq.); his other writings are of no intrinsic interest. He enjoyed the curacy of Meudon, 1550–52.

Many changes and phases in his life have caused wrong biographical presumptions; all that can certainly be said is that he was a monk without a calling, a learned medical man, and in his leisure hours a lively story-teller. The works which made his name took up little of his time. Those who knew him well called him a sober, estimable, and learned man. *Gargantua* and his fellows are giants performing the most extraordinary feats, lovers of pleasure and good cheer. Characteristics of R.'s style are frankness, wonderful power of expression (which is aided by vast vocabulary enriched by archaisms, *patois*, classicisms), pervading spirit of mockery, a simple broad humour, and indecency. There is nothing quite like R. in England, though many Eng. authors owe much to him. His influence was strong on Fielding, Smollett, and Swift. Sir Thomas Urquhart (*q.v.*) made a remarkable translation of R.

Sir W. Besant, *Rabelais* (1879); Tilley, *Rabelais* (Fr. Men of Letters); Millet, *Rabelais* (Grands Ecrivains Français).

RABIES, HYDROPHOBIA (*q.v.*).

RACCONIGI (44° 47′ N., 7° 39′ E.), town, Cuneo, Italy. Pop. 9400.

RACCOON DOG, see DOG FAMILY.

RACCOON FAMILY (*Procyonidæ*), a family of Carnivores whose members have clumsy bodies, short necks, and sharp muzzles. They include the carnivorous RACOONS (*Procyon*) of America, the beaver-like fur of which is much used by man; the vegetarian PANDA (*Ailurus*), found in the Himalayas above an altitude of 7000 feet; and the COATI and KINKAJOU.

RACE, CAPE, see NEWFOUNDLAND.

RACEMOSE, see FLOWER.

RACES OF MANKIND.—Mankind has been divided by modern ethnologists into these races: (1) NEGRO, or black; (2) RED INDIAN, or brown; (3) MALAYAN, and (4) MONGOLIAN, yellow; (5) INDO-EUROPEAN or CAUCASIAN; and (6) SEMITIC, white. The total population of the world is, according to estimation, 1623 millions, of whom 170 millions are Negro, 23 millions Red Indian, 50 millions Malayan, 655 millions Mongolian, 645 millions Caucasian, 80 millions Semitic. The race of many peoples, especially those of apparently Malayan or Negroid type, has not yet been determined, and the data upon which ethnological judgments should be made have not yet been definitely agreed upon, but it has been clearly demonstrated that neither geography nor language is a test of race.

One of the chief phenomena of history is the movement of peoples; the history of Europe has been that of the inflowing of Eastern invaders, a fact which gave rise to the old mystical belief in an hist. progression which followed the course of the sun from east to west; there are, however, instances of Eastward expansion. Colour is, on account of race-mixture, not a perfect test, but it appears to have taken as long ages to produce as other racial distinctions, and the world may be roughly ethnogeographically divided into (1) the *black* races of the tropics, (2) the *yellow* and *brown* men of Southern and Central Asia and of America, (3) the *white* peoples of temperate climes. The best test, however, is held to be the build of a man, especially with regard to the proportions of his skull. Universal tradition of common parentage is confirmed by modern science, though untold ages must be allowed for deep differentiation of present races to have taken place.

The chief reasons for believing in a common origin are: (1) physiological similarities and power of cross-breeding; (2) modern philology has resolved the thousand tongues of the world into a few parent speeches, though the search for one original language has been unsuccessful; (3) there are common phenomena of social development, so that every race has its Stone Age, etc. Comparative mythology, law, etc., give the same result as comparative philology. Before the era of Darwinism, the theories of *polygenism* and *monogenism* waged bitter war, the more so as the former contradicted the Biblical story. The new theory of the origin of species throws extra weight on to monogenist side, though the missing link has not been found—Dubois' *Pithecanthropus Erectus* not being generally accepted.

The earliest relics of man in Europe, found in Somme valley and at Taubach in middle of XIX. cent., proved that he existed in the Drift period (*Palæolithic Age*); later discoveries of Fraas were made at source of Schussen. Moreover, palæolithic implements are found in France, Britain, Russia, the countries of Southern Europe, North Africa, America, southern India. It is an old theory that man spread over the world from Asia; Asiatic fauna are found with remains of palæolithic man in Drift Beds. Dubois' discovery has led those who accept it to place the cradle of the race in Java and to trace the first migration therefrom. If so, man must have started on his wanderings when the Eastern Archipelago was part of the Asian mainland, when no Indian Ocean separated Asia from Africa nor Pacific Ocean lay between Asia and America, and when Java had land communication with Australia. Whatever part of the world may have been the cradle of the race, men must have separated under those conditions, for early man had no knowledge of navigation.

Neolithic, who followed Palæolithic, man, still exists. The Neolithic Age represents the stage in social development through which every race has not yet completely passed. Egypt, Babylonia, and Chaldæa, followed by 'Mycenæans,' were the first to emerge from Stone Ages into Copper, Bronze, and Iron Ages. From the civilised countries of the Mediterranean basin later **European civilisation** has descended. In the earliest writings of Egyptians and Greeks it may be seen that the great human races had already taken their later forms, and men were already speculating on their origin.

The **Negro race** may be subdivided into African negroes, Negritos, Melanesians, perhaps Papuans, Australians, and Tasmanians. The relation of these peoples is yet only matter of conjecture. Andaman tribes of Sea of Bengal represent, it is suggested, the primitive negro type. *African negroes*, whose home is south of Sudan, have spread all over Africa, Madagascar, and into West Indies, southern United States, and South America. They are possibly not indigenous African population, but conquerors of the Negritos (Span. 'little negroes') or *pygmies*, and made their entry into Africa through Arabia. Pygmies are believed to have occupied the whole equatorial region before the subsidence of the Indo-African continent cut them into two divisions, that of Africa and that of the Malay peninsula.

The **Red Indian race** is confined to America, and owes its name to the old error of Columbus in imagining the new continent to be the West Indies. Physical likenesses, among which is the strong resemblance of Eskimo to Japanese, and speech have led to the accepted opinion that Indians are Mongol peoples from Asia. Besides the fact that the ancient civilisations of Central America have to be accounted for, there was land communication between western America and eastern Asia before the comparatively recent subsidence of the 'Pacific continent.' Indians (*q.v.*), still numerous, have been driven into arctic and uncultivated regions of America.

The **Malayan race** inhabits the Malayan peninsula and 'Malaysia' (the East Indies). Believed until lately to be Mongolians, they are now considered a separate race of southern conquerors. It is suggested that they belonged to the same race as Polynesians, from whom they were separated at the subsidence of the Indian continent.

Mongolians probably made their early home on the tableland of Tibet, from which they soon spread over Mongolia, China, and Siberia, and ultimately over Central Asia, parts of Armenia, Caucasia, Irania, Russia, Finland and Lapland, Manchuria, Japan, Siam, Formosa, Korea, parts of Hungary and Balkan peninsula, Madagascar, and the Philippines.

To the **Indo-European** (formerly called CAUCASIAN, and lately INDO-GERMANIC) **race** belong most of the peoples of India and Europe, and in historical times it has colonised a large proportion of America, much of Africa and Australia. The Indo-European tongue comprises Sanskrit, Greek, Latin, Romance tongues, Persian, Slavonic, Teutonic, Celtic, etc.

Arabia or North Africa is assigned as the home of the **Semitic race**; thence it spread over Syria and Palestine.

RACHEL, ELISA (1821–58), Fr. actress; from 1838 onwards enjoyed phenomenal popularity in tragic parts such as Phèdre. *Adrienne Lecouvreur* was written specially for her.

RACHETIS, see RICKETS.

RACIBORZ, see RATIBOR.

RACINE (42° 48′ N., 87° 48′ W.), city, Wisconsin, U.S.A., on Lake Michigan; manufactures agricultural machinery. Pop. (1910) 38,002.

RACINE, JEAN (1639–99), Fr. dramatist; b. at La Ferté-Milon; ed. first at the coll. of Beauvais, then at Port-Royal. Verses on the king's marriage (1660) and convalescence (1663) won for him a pension and began his fame. *La Thébaïde* (1664), his first tragedy, and *Alexandre le Grand* (1665) recalled the style of Corneille. His masterpieces are *Andromaque* (1667), *Britannicus* (1669), *Bérénice* (1670), *Bajazet* (1672), *Mithridate* (1673), *Iphigénie* (1674), *Phèdre* (1677). R. had a perfect knowledge of Greek. His characters are true, and their passions are finely depicted, though his plays have preserved the manners and language of Louis XIV.'s court. *Les Plaideurs* (1668), imitated from Aristophanes' *Wasps*, is an amusing satire on the judges, advocates, and pleaders of his time, written in exquisite verses.

R.'s success made enemies for him. Pradon was induced to produce a *Phèdre* which threatened to supplant R.'s; but justice was soon done to R.'s beautiful work. But, discouraged by unjust criticisms, R. now underwent religious experiences, which resulted in retirement to Port-Royal. He married, and was made, with his friend Boileau, historiographer to Louis XIV. Madame de Maintenon begged him to write plays for her School of St. Cyr, and he wrote *Esther* (1689), which was acted several times before the court, and *Athalie* (1691), of greater force and character. *Esther's* charm lies in beauty of style and poetry of choruses. The authorities, however, decided that henceforth such things were not for schoolgirls. R.'s sensitiveness hastened his death. Literary troubles had hurt him deeply, and he incurred the king's displeasure by his Jansenistic ideas and sympathy with the people; R. is the greatest tragic writer after Corneille (whom he sometimes equals) of Fr. classical school.

Canfield, *R. and Corneille in England* (1904); Larroumet, *Racine* (Grands Ecrivains Français); Lemaître, *Racine* (Paris, 1908).

RACING.—Horse-racing was a highly credited sport among the ancient Greeks. There is mention of chariot-racing in Homer, and Pindar bestows on the subject the tribute of highest poetry. But in the modern sport the horses run single and are mounted. In Britain, Newmarket and Epsom are the oldest courses, dating from the times of James I. It was not, however, till the closing decades of the XIX. cent. that the turf became an object of universal interest in this country. King Edward VII. took an active interest in the sport and was himself a successful owner. There are now high-class race-meetings at Ascot, Ayr, Bath, Birmingham, Brighton, Carlisle, Chester, Curragh, Derby, Doncaster, Epsom, Folkestone, Gatwick, Goodwood, Hamilton Park, Haydock Park, Hurst Park, Kempton Park, Leicester, Leopardstown, Lewes, Limerick, Lincoln, Liverpool, Manchester, Musselburgh, Newbury, Newcastle-upon-Tyne, Newmarket, Nottingham, Phœnix Park (Dublin), Pontefract, Redcar, Salisbury, Sandown Park, Stockton, Warwick, Windsor, Wolverhampton, York.

The most fashionable meetings are the Ascot and Epsom. It was not till the XVIII. cent. that race-course regulations were specifically formulated with regard to weight of jockeys and stakes; in that cent. also 'handicap' races took the place of the old 'give-and-take' race; the object of the innovation being to equalise the weighting of horses. In the reign of George III. the tax of two guineas was first levied on every horse started. The breed was temporarily vitiated in recent years owing to the popularity of the two-year-old short race. This forced immature animals and preventative measures had to be taken. In the modern selling-races, the owner fixes the selling-price on entering the horse. Should the winner on being put to auction after the race realise a larger sum the difference is divided between the owner of the 'proxime accessit' and the general funds.

Meetings on the Continent are popular, but the 'turf instinct' is not so keenly developed as in Britain. The interest taken in the sport in the Brit. colonies, especially Australia and New Zealand, is intense, but the racing has not yet reached the high refinement of our 'drawing-room' sport. Steeplechasing was originally a race of hunting horses which tested both speed and jumping, and was run from one church

steeple to another. The first mention of the sport is of a steeplechase match in Ireland in 1752, and in Ireland to-day the sport is still much more cultivated than in Great Britain. The most important steeplechase is the Grand National, run in March at Aintree, a suburb of Liverpool. The most important race is the Derby, run at Epsom. The Derby of June, 1913, was sensational; a suffragette, Miss Emily Wilding Davison, stopped the King's horse, Anmer, and received fatal injuries, and Craganour, the first horse home, was disqualified for bumping, and a 100 to 1 "outsider," Aboyeur, won the race.

In U.S.A. racing dates from the XVII. cent., but first Jockey Club was that at Charleston, 1735. Thoroughbred stock has been much imported; but trotting races, where time is supreme test, excel in interest. National Trotting Association was founded, 1869, and since then trotting prizes have grown enormously. The mile record (Uhlan, 1912) is 1 min. 58 secs. In pacing it is 3 secs. lower. Flat-racing is almost all on prepared soil, not turf. Richest event is for two-year-olds, Futurity Stakes (run at Sheepshead Bay), which have exceeded $67,000. Withers and Belmont Stakes (May, Westchester Racing Association) are famous, but Brooklyn (Gravesend) and Suburban (Sheepshead Bay) Handicaps draw largest atttendances.

RACK, see TORTURE.

RACKAROCK, see BLASTING.

RACKETS, RACQUETS, wall-game, somewhat similar to Fives (*q.v.*), except that it is played with a racquet and not with gloved hand. The modern form of the game came into force some sixty years ago when the four-walled enclosure superseded the back- or one-walled court. Dickens paints an interesting picture of the debtors playing r. in the Fleet, but we can find no account of it before the XIX. cent.

The game is played by two or four persons, and, like fives, consists of fifteen points; the server or 'hand-in' is the only player who can score points; his opponent must first 'get him out,' *i.e.* win a stroke, then the positions are reversed. The dimensions of the court are usually 60 ft. long, 30 ft. broad, 40 ft. high; there is a 'cut line,' which corresponds in function to the net in tennis, on the front wall, 9 ft. 6 in. from the floor. Half-way up the court are the service-boxes, squares marked off against the walls. Behind the half-way line the court is divided into two. The racquet is lighter and shorter than a tennis one.

Standing in one of the service-boxes, the server delivers the ball so that it hits the front wall and drops into the opposite back court. In every case the ball must strike the front wall above the prescribed height and must be taken not later than first rebound. When the server wins a stroke he scores a point, when he loses one he is down and changes places with his opponent. The game is played at Oxford, Cambridge, and public schools.

RACOONDA, fur of Coypu (*q.v.*).

RADAUTZ (47° 50′ N., 28° 54′ E.), town, Bukovina, Austria. Pop. (1911) 16,543.

RADBERTUS PASCHASIUS, IX.-cent. Catholic theologian; wrote book on Eucharist.

RADCLIFFE (53° 33′ N., 2° 19′ W.), town, Lancashire, England; cotton. Pop. (1911) 26,085.

RADCLIFFE, JOHN (1650–1714), Eng. physician; ed. Oxford; practised med. there and afterwards at London, where he had great success, and entered Parliament; he founded two medical travelling fellowships in Univ. Coll., Oxford, and his executors also built the Radcliffe Observatory, Hospital, and Library at Oxford, and enlarged St. Bartholomew's Hospital, London.

RADCLIFFE, MRS. ANN (1764–1823), Eng. novelist; writer of mysteries—secret passages, etc.; works include *A Sicilian Romance* (1790), *Mysteries of Udolpho* (1795), *The Italian* (1797).

RADEBERG (51° 10′ N., 13° 55′ E.), town, Saxony, on Röder; manufactures glass. Pop. (1910) 13,413.

RADETZKY, COUNT, JOHANN JOSEF WENNEL ANTON FRANZ KARL (1766–1858), Austrian general; distinguished in Napoleonic invasions; helped to reorganise army; commander-in-chief of army of Italy, 1831; won high praise in campaign, 1834; field-marshal, 1836; evacuated Milan, 1848, but skilfully held Sardinians in check, and restored Austrian rule, 1849.

RADEVORMWALD (51° 12′ N., 7° 30′ E.), town, Rhineland, Prussia; hardware manufactures. Pop. (1910) 11,525.

RADHANPUR (23° 49′ N., 71° 39′ E.), native state, Bombay, India. Pop. 62,000. Capital, **Radhanpur**. Pop. 11,500.

RADIATA, old term introduced by Cuvier to include the Echinoderms, Cœlenterates, Entozoa, and Infusoria; now disused.

RADIATION is the term applied to the stream of energy which, in one form or another, can be emitted by a body, transmitted through the luminiferous medium or ether, and absorbed by another body. It may take a form which can affect the optic nerve, and we then know it as light. It may also produce an appreciable rise of temperature in a body which absorbs it, and we then call it radiant heat. It may take the form of electro-magnetic waves, such as are used in wireless telegraphy, and it is then termed Hertzian radiation. These are not distinct forms; they are only aspects of the same phenomenon which differ in respect of one common quality, viz. wave-length. The properties of radiation may be most clearly understood by reference to the two forms familiar in all experience, and with these we shall deal here. That radiant heat and light are identical in nature may be readily believed. They travel through space with the same speed, are reflected and refracted according to the same laws, and their intensity diminishes with distance according to the same law of the inverse square. We have, therefore, every reason for the belief that radiant heat, as well as light, is due to an undulatory motion in the ether.

The only difference between them is that of wave-length. The human eye is sensitive to light whose wave-length is more than $\frac{1}{33000}$ of an inch and less than $\frac{1}{67000}$. In this range we have all the colours of the visible spectrum, the violet rays having the least, and the red rays the greatest, wave-length. But the spectrum does not stop at either of these limits. For instance, a solution of quinine fluoresces strongly when placed beyond the violet end of the spectrum; and a thermopile, bolometer, or other microradiometer will show that heat not only accompanies colour in the visible spectrum, but also continues past the red end into the invisible ultra-red. In this way waves up to a length of $\frac{1}{1000}$ of an inch have been observed. (Beyond this length there is a gap in observed wave-lengths until we come to the shortest Hertzian wave produced, which is several inches long.)

Now these radiation waves are emitted by bodies in conditions which are determined chiefly by the temperature. Taking a body at ordinary air temperature and heating it gradually, we find that, to begin with, the radiation emitted consists of waves of greater wave-length beyond the visible part of the spectrum. As the temperature increases, waves of shorter wave-length appear, until when the body has attained a temperature of about 700° C., visible rays of red light appear. This is the temperature of dull red heat, as it is termed. At higher temperatures the wave-lengths are smaller, until when the highest attainable temperature has been reached (that of the electric arc) the radiation includes all known wave-lengths. The stream of radiation from a body, and also the energy of radiation of each particular wave-length, thus depends on temperature. As regards the total amount of energy emitted, different surfaces have, of course, different emissive powers at the same temperature, that of a carefully blackened surface being the highest and a highly polished surface the lowest. Different surfaces have also different absorptive powers, blackened surfaces

being again the highest. Hence, radiating and absorptive powers go together, this being true, however, only for each particular kind of radiation, *i.e.* for each wave-length.

Pressure of Radiation.—We have, however, to take a more general view of the matter. Suppose a body is placed inside a hollow sphere whose inner surface is maintained at a constant temperature. The body will ultimately acquire that temperature. When it has done so, it does not stop radiating or absorbing, but must be radiating as much as it absorbs in each second. Further, this statement must be true, not only for the total amount radiated or absorbed, but also for the radiation of each particular wave-length. Another conclusion is that the radiation at that temperature must be the same, both as regards total amount and amount for each wave-length in any other enclosure at the same temperature. From these results we conclude that in any enclosure at a constant temperature radiation must be .streaming in all directions, and that the amount of this stream for each wave-length depends only on the temperature. This is known as the *black body radiation* or *full radiation* for that temperature. Clerk-Maxwell showed in 1873 that, according to the electro-magnetic theory of light, radiation should exert a mechanical pressure on any surface upon which it falls perpendicularly, and that this pressure should be equal to the energy per unit volume of the radiation. The difficulty of proving this experimentally was not overcome for more than thirty years, when it was shown by Lebedew to exist. The pressure of radiation has been applied to explain the curious way in which the tail of a comet is always directed away from the sun.

Suppose a particle in the tail of a comet is cubical in shape. The sun's gravitational attraction will be proportional to its volume, *i.e.* to the cube of the length of an edge. The pressure of radiation will be proportional to the surface and therefore to the square of the length of an edge. If the cube is very small, the radiation pressure may be greater than the gravitational attraction, and the particle will tend to recede from the sun.

The pressure of solar radiation on the earth's surface is equal to the weight of about 100,000 tons. Radiation pressure may be viewed in the same way as the pressure of steam in the cylinder of a steam engine, and we may therefore apply to it the principles of thermo-dynamics. In this way it has been shown that the energy emitted by a radiating body is proportional to the fourth power of the absolute temperature. This, known as *Stefan's law*, had been previously deduced from the results of Dulong and Petit's experiments on the cooling of a body in a vacuum.

P. Phillips, *Radiation*; E. Edser, *Heat for Advanced Students* (chapters on radiation); E. Edser, *Light for Advanced Students* (chapters on the spectrum).

RADICAL, in Brit. politics, the name given to advanced section of Liberal Party (*q.v.*).

RADICAL or **RADICLE**, see CHEMISTRY.

RADIOACTIVITY.—The discovery in 1895 of the Röntgen rays (*q.v.*) led physicists to examine those substances which are phosphorescent after exposure to light, in order to ascertain whether they gave out rays with properties similar to the Röntgen rays. While so engaged, BECQUEREL discovered in 1896 that the double sulphate of potassium and uranium emitted rays which affected a photographic plate when wrapped in black paper, and also ascertained that all the compounds of *uranium* possessed this property. But further investigation showed that pitchblende (the mineral from which uranium is extracted) was more active in the above respect than could be accounted for by its uranium content, and this led to the belief that the action of uranium was due to some substance, present in minute quantity in uranium, to which the phenomenon was due. Monsieur and Madame CURIE undertook the search for this substance and, after most laborious work, extracted from pitchblende ore two new elements, *polonium* and *radium*. These elements are present in excessively minute quantities in the ore, several tons of which are required in order to supply a few grains of radium. The activity of the radium was found to be more than a million times that of uranium, and it is the principal radioactive substance known. It emits rays which can pass through metal and other substances which are opaque to ordinary light, can affect a photographic plate, can discharge the electricity of an electrified body, and can cause phosphorescence in bodies exposed to them. All this it does *spontaneously*; that is, external agencies such as heat, pressure, etc., have no influence in altering the emission of the rays. Any substance which emits rays in this manner is said to be *radioactive*.

The rays emitted by radium are of three distinct kinds, known as the α (*alpha*), β (*beta*), and γ (*gamma*) rays. The distinction between them can be demonstrated in various ways, but that which will be most readily understood is the action of a magnet. Suppose a small quantity of radium be placed at the bottom of a short cylindrical leaden tube, standing vertically, and that a strong magnetic force be made to act horizontally on the rays as they emerge from the upper end of the tube. It is then found that the α rays are very slightly deviated to one side of the vertical, the β rays are strongly deviated to the other side so as to describe circular paths, while the γ rays proceed vertically upwards without deviation. This difference in behaviour is connected with the fact that the α rays consist of positively charged corpuscles, the β rays are exactly similar to *kathode* rays (see RÖNTGEN RAYS), and therefore consist of negatively charged corpuscles, or electrons, while the γ rays are in reality Röntgen rays. They also differ in their power of penetrating metals. Roughly speaking, if the power in this respect of the α rays be represented by 1, that of the β rays is 100, and that of the γ rays is 10,000. The speed of the α rays is about one-fifteenth that of light, *i.e.* about 12,500 miles per second; that of the β and γ rays is nearly that of light.

In addition to these rays, radium also evolves a considerable quantity of *heat*. In one hour the amount evolved from a given weight of radium is sufficient to raise an equal weight of water from the freezing-point to the boiling-point. Lastly, there is given off a gaseous emanation which is itself radioactive. But the most interesting feature of radium is revealed when we study the later history of these rays and consider what is left behind after their emission. The facts may be briefly summarised as follows: The charges exhibited by radium form only a few of the stages in the process of atomic disintegration which, beginning with uranium, finally ends in lead. The atom of uranium first loses three α particles and radium is produced. These particles form what is known as *helium*, a gas which is found in ores containing uranium. The α particle is known to carry two atomic charges of electricity and its atomic weight is therefore 4, which is also the atomic weight of helium. Now the atomic weight of uranium is 238 (approximately), and if we subtract from this the equivalent of three helium atoms, *i.e.* 12, we get 226, which is the atomic weight of radium. Next, the radium atom passes through several further stages, including polonium, and in the course of these it loses four α particles. This would leave behind an element whose atomic weight would be 16 less than 226, and the atomic weight of *polonium* is, in all probability, very close to this figure. Again, the loss of one α particle by polonium would result in lead, whose atomic weight is 206.

No general theory of atomic structure has as yet been worked out which will fully account for this process of disintegration or explain the conditions in which a radioactive substance emits electrically charged particles. But the tendency is to suppose

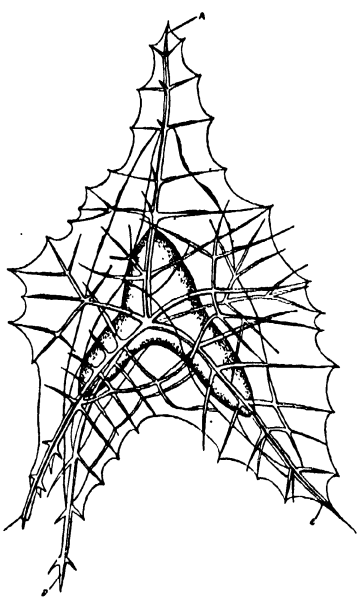
that the electrons constituting an atom are in a state of rapid vibration or circulation about the centre of the atomic system: that they are therefore subject to accelerative forces and consequently radiate energy: that when this energy loss has become considerable, the system becomes unstable and a β particle is expelled, this expulsion producing the pulsational disturbance in the ether which we know as the γ ray or Röntgen ray. The α particles are expelled in proportion to the β particles.

In addition to uranium, radium, and polonium, other elements exhibit radioactive properties. Among these may be mentioned *thorium* and *actinium*. There is also reason to believe that all metals are more or less radioactive. Evidence has been obtained of the almost universal presence of radium in the earth's crust and in the atmosphere, and it is believed that the total quantity present is sufficient to account for the present temperature of the earth.

Detailed information on the subject may be obtained by consulting Rutherford's *Radioactivity*; Sir J. J. Thomson's *Electricity and Matter* (chaps. v., vi.).

RADIOLARIA, sub-class of the Sarcodina group of Protozoa, microscopically minute animals with a body which may be globular, disc-like, or elongated, but from which the flesh streams in long, fine, radiating threads or pseudopodia (hence the name 'Radiolaria'). These threads never form a network. R. are further characterised by the presence of a membranous 'central capsule.' Almost all are furnished with skeletons, generally composed of silica, and these are structures of wonderful complexity and beauty.

All R. are marine, and are to be found floating near the surface of the sea, where they drift at the mercy of wind and waves. A simple contraction of the flesh or sarcode, however, enables them to sink in the waters, and on the bottom they creep slowly by means of their pseudopodia. The deepest portions of the ocean are coated with ooze formed almost wholly of empty R. shells which have sunk to the bottom, and the oozes of past geological ages have consolidated to form the rocks known as Radiolarian Cherts. In spite of their small size these insignificant Protozoa, by reason of their multitude, form an important constituent in the food of minute pelagic animals. Examples are *Thalassicola* without skeleton, *Actinomma*, *Eucyrtidium*, and the colonial *Collozoum*.



RADIOLARIA, *Polyplecta Heptacantha* (after Haeckel, *Challenger* Report, 1882). *A*, apical horn; *B*, *C*, *D*, basal feet.

RADIOMETER, an instrument invented by Sir W. Crookes to show the effect of a rarefied gas on unequally heated surfaces. It consists of four small discs of mica mounted on the ends of arms, which project radially from a vertical rod. This rod is pivoted at top and bottom so that it can rotate upon its own axis. Each disc is coated with lampblack on one face, and the blackened faces are so arranged that when the rod rotates all the discs have either their blackened faces in front and their non-blackened faces behind, or *vice versa*. The system of discs, projecting arms, and rod are mounted within a glass bulb, in which the air pressure has been reduced to a very low amount, and the whole is placed on a suitable stand. When the instrument is exposed to radiation from any source (*e.g.* a ray of sunlight) the arms revolve.

Poynting and Thomson's *Heat*.

RADISH (*Raphanus sativus*), a cruciferous biennial which stores food in the root. This has a pungent taste, and is used in salads.

RADIUM (Ra=226), a chemical element obtained from pitchblende uranium ore. It is the most radioactive substance known, is phosphorescent, and a given quantity of it emits sufficient energy in an hour to raise the temperature of an equal quantity of water from the freezing to the boiling point. It disintegrates in process of time and produces helium. See RADIOACTIVITY, HELIUM.

RADNOR, EARLDOM OF COUNTY OF, Eng. honour; cr. 1679 for John Lord Robartes, field-marshal for Parliament, 1644; extinct, 1757. William, Lord Folkestone, was cr. earl, 1756; since held by his descendants, Pleydell-Bouveries.

RADNORSHIRE (52° 16′ N., 3° 15′ W.), county, S. Wales, bordering on Montgomery, Shropshire, Hereford, Brecon, and Cardigan; area, c. 470 sq. miles; surface generally mountainous, reaching extreme height of 2164 ft. in Forest of Radnor; drained by Wye and Teme, which form parts of S.W. and N.E. boundaries respectively, and by other streams; capital, New Radnor; there are mineral springs at Llandrindod and elsewhere; soil comparatively poor; corn is grown, and sheep are extensively raised; excellent fishing in the rivers. Pop. (1911) 17,504.

RADOM (51° 20′ N., 21° 10′ E.), government, Russ. Poland, bordering Austrian Galicia; drained by the Vistula; hilly and wooded in S.; fertile in centre; low marshy plains in N.; chief crops wheat, rye, barley; important iron industry; flour-mills, distilleries. Pop. (1910) 1,080,800. Capital, **Radom**, has pop. (1910) 40,800.

RADOMYSL (51° 15′ N., 29° 10′ E.), town, Kiev, Russia, on Teterev; tanneries. Pop. 12,200.

RAE BARELI (26° 14′ N., 81° 16′ E.), district, Lucknow division, United Provinces, India. Pop. 1,040,000. Capital, **Rae Bareli**. Pop. 16,000.

RAEBURN, SIR HENRY (1756–1823), Scot. portrait painter; b. in Edinburgh; received some training and practised his art there; went for study to Italy for two years; returned and settled in Edinburgh in 1787. His fine portrait of Lord President Dundas, painted that year, led to other commissions, and in course of time his sitters included nearly all the notable Scotsmen of the day; recent years have witnessed growing appreciation of his work; see Greig's *Raeburn* and Caw's *Raeburn* (Masterpieces in Colour).

RÆTIA, see RHÆTIA.

RAFF, JOSEPH JOACHIM (1822–82), Ger. composer. A prolific writer, he produced some important instrumental works, especially in chamber music and symphony.

RAFFLES, SIR THOMAS STAMFORD, Kt. (1781–1826), Brit. colonial gov.; sec. to gov. of Penang, 1807; his report decided East India Company to retain possession of Malacca; ultimately proved wise policy; suggested and organised occupation of Java, 1811; gov.-gen. of Java, 1811–16, and showed initiative and wisdom; pub. *History of Java*, 1817; lieut.-gov. of Sumatra, 1818–23; defeated Dutch ambitions in Archipelago by founding Singapore, 1819; founded Zoological Soc., London.

RAFTS OR PONTOONS when carried as life-saving appliances by vessels would not be lowered from davits, but would be thrown overboard or merely

allowed to float away when the ship sank. They are not recognised as part of the equipment of foreign-going ships, but may be placed on home-trade vessels. No definite form is specified, but the type used must be approved by the Board of Trade. They must have 3 cubic ft. of enclosed buoyancy per person carried. One pontoon described had a number of cylindrical metal cases placed side by side and enclosed in a wooden frame. When carrying 25 persons its platform was 9 in. above water-level.

Buoyant seats are carried on the decks of excursion steamers. These are double seats with metal tanks secured underneath, by means of which they are able to support a number of people when afloat.

RAGATZ (47° 1′ N., 9° 30′ E.), watering-place, canton St. Gall, Switzerland; mineral springs.

RAGLAN, FITZROY JAMES HENRY SOMERSET, 1ST BARON (1788–1855), Brit. general and diplomatist; distinguished in wars against Napoleon, losing arm at *Waterloo*; commander-in-chief of Crimean army, 1854, leading at *Alma*, *Balaclava*, and *Inkerman*; made field-marshal, 1854; d. before Sebastopol, heart-broken by censures at home.

Kinglake, *Invasion of the Crimea.*

RAGMAN ROLL, documents with signatures of Scot. nobles who swore fealty to Edward I. of England; only a copy remains.

RAGUSA (42° 37′ N., 18° 7′ E.), town, Dalmatia, Austria; surrounded by walls and fortified; episcopal see, has cathedral, built in XVIII. cent. to replace an older foundation; several interesting old churches; Dominican and Franciscan religious houses; among most notable buildings is the Rector's Palace, a Transitional structure of XV. cent.; after being subject to Venice and Hungary in succession, R. became an independent republic in XV. cent.; captured by France, 1805; ceded to Austria, 1814. Pop. (1911) 14,241.

RAGNARÖK (Ger. *Götterdämmerung*), the 'twilight of the gods,' end of the world, when the gods shall be killed.

RAGUSA (36° 56′ N., 14° 45′ E.), town, Syracuse, Sicily, on Ragusa; silks, woollens. Pop. 32,500.

RAGWORT (*Senecio*), composite plant with yellow florets; Common R. (*S. jacobæa*) is a Brit. weed.

RAHWAY (40° 36′ N., 74° 15′ W.), city, New Jersey, U.S.A.; carriage-works. Pop. (1910) 9337.

RAIA, see under RAYS.

RAICHUR (16° 12′ N., 77° 24′ E.), town, Hyderabad State, India. Pop. 22,500.

RAIFFEISEN, FRIEDRICH WILHELM (1818–88), Ger. economist; founder of 'R.' Banks, co-operative agricultural banks.

RAIGARH (21° 54′ N., 83° 25′ E.), native state, Central Provinces, India. Capital, **Raigarh.** Pop. c. 7000. Pop. of state, c. 183,000.

RAIKES, ROBERT (1735–1811), see under EDUCATION.

RAIL FAMILY, RALLIDÆ, a world-wide family of birds, including the common LAND-RAIL or CORNCRAKE (*Crex pratensis*), the MOOR or WATER HEN (*Gallinula chloropus*), with red and yellow bill and greenish legs, and the COOT (*Fulica atra*), a common pond bird easily distinguished by the white bald patch on its forehead. The Rallidæ are unready flyers frequenting well-vegetated localities, most species, apart from the Land-Rails, preferring the neighbourhood of lakes and rivers.

RAILWAYS.—Railways originated in the tramways used in the mining districts round Newcastle-on-Tyne for conveying coal from the pits to the Tyne. The date of invention of these tramways is not certain, but they were probably in use as early as the middle of the XVI. cent. The first rails were simply wooden beams, flanges being added later to prevent the wagons from leaving the rails. The wagons were drawn by horses, and one horse could draw a load of 42 cwt., as compared with 17 cwt. along the ordinary road. Up to the end of the XVII. cent. little or no advance was made in construction, but about 1700 the wooden beams were covered with a thin sheathing of iron in order to add to their life.

This sheathing was found to be incapable of resisting the weight of the loaded wagons, and about 1740, rails consisting entirely of cast-iron were substituted. This kind of r. became fairly general in mining districts, but it attracted little attention for general traffic, and, moreover, it had to face the opposition of those interested in the promotion of canals. A further improvement was made by placing flanges on the wagon wheels instead of on the rails, and trains of small wagons linked together superseded the single large wagon. The possibilities of the r. system gradually became realised, and efforts were made to utilise steam instead of horse traction.

In 1802 an engineer named Trevethick obtained a patent for a steam carriage, and in 1804 this, the first practical locomotive, was used for wagon haulage on the Merthyr-Tydvil Railway. This locomotive was to a certain extent successful, but it only could haul a load of 10 tons at a rate of about 5 miles an hour. No immediate improvements upon this invention were made, largely owing to the belief that locomotives with plain wheels running on plain rails could not draw heavy loads or ascend moderate inclines, and that cogged wheels and rack rails were necessary. In 1811 it was demonstrated on the Wylam Railway that the weight and friction of a locomotive were sufficient for the purpose, and from that time steady progress was made.

The present r. system may be said to date from 1821, when an Act was passed for the construction of the Stockton and Darlington Railway, which was opened in 1825. Carriages for conveying passengers were used for the first time on this r., and the locomotives could draw 90 tons at a rate of from 10 to 15 miles an hour. In spite of this success the general public remained indifferent or even hostile, and it was not until the Liverpool and Manchester Railway was opened in 1830 that the opposition was finally broken down. This line, which for that time was a great engineering triumph, was immediately successful, and other railways were quickly commenced.

During the years 1844–46 an absolute r. mania prevailed, and reckless speculation and over-competition resulted in the financial panic of 1847. The example of England was quickly followed by the United States, and with characteristic enterprise, the railway mileage increasing between 1840 and 1880 from 2818 to 87,801. R's were speedily opened on the Continent, many of them being constructed by Brit. engineers and largely by Brit. capital. France, Belgium, and Holland took the lead, Germany, Austria, and Russia being somewhat behind. Great r. developments were also made in the Brit. Colonies, Canada, Australia, and India, and in 1877 about 5000 miles of r. were in construction throughout the British Empire.

In the U.K. r's are owned by independent companies. They are constructed and worked according to Acts of Parliament, but the Government takes no part in initiating them or in providing the necessary capital. The promoters of a contemplated r. engage an engineer to make an exhaustive survey, and then proceed to ascertain the agreement or opposition of every proprietor whose land is involved. The claims for compensation of all proprietors and tenants are then settled, and any special stipulations for bridges, level-crossings, drainage, and other matters are arranged. The scheme is then submitted to Parliament in the form of a Private Bill. In the Act which authorises the scheme, the company is constituted a corporation, the members of it being responsible only to the extent of their shares. There are now in existence many statutes dealing with r. matters, and r. law has become extremely complicated. In 1844 an Act was passed giving the Government power to purchase all r's after they had been in existence for 25 years from that date, but in 1872 a Parliamentary Committee reported that the Act was then impracticable. Since then State

purchase has frequently been urged, but, owing to the enormous expense which would be involved and to other considerations, the proposal has not found favour.

The ideal r. line would be quite straight and perfectly level, but this is seldom if ever practicable. Elevations and depressions have to be negotiated, and while in some cases they may be avoided by means of curves, in others the constructor has to resort to cuttings, tunnels, and bridges. Efforts are made to arrange matters so that the earth excavated in cuttings shall be sufficient for the construction of the embankments, but this is not always possible. Small streams are conveyed through embankments by culverts of brick or masonry, bridges or viaducts being used for crossing rivers, roads, or deep narrow valleys. Bridges are also used to carry public roads over the line, or to carry one line over another. Level-crossings are now as far as possible avoided in thickly populated districts where the traffic is heavy, on account of their danger and general inconvenience for cross traffic.

Ferries are used to convey trains across stretches of water too wide to be bridged, such as the Great Lakes in N. America. When the levels are determined and the embankments and cuttings are complete, a special track is laid down to carry the line. This is formed of a layer of small stone, gravel, slag, and other material, called ballast. On this are laid the sleepers, which are transverse slabs to support the rails. Sleepers are usually made of wood, but steel is also employed, especially where wood is scarce or liable to be attacked by white ants. Before being laid down wooden sleepers are usually treated with creosote. The rails are of two chief types, the bull-headed rail and the flanged or Vignoles rail. Bull-headed rails are wedged in cast-iron chairs bolted to the sleepers, and flanged rails, which have a flat base, are attached to the sleepers by hook-headed spikes, the heads of which project over the flanges.

Rails formerly were made of iron, but steel of special toughness and hardness is now used. The distance between the two rails forming the line is called the *gauge*, that used in Britain being 4 ft. 8½ in., and known as the standard gauge. The old broad gauge of 7 ft. formerly used on the Great Western Railway was done away with in 1892. The standard gauge is not universal. It is fairly general on the Continent, but the normal gauge in Russia is 5 ft., and in Spain and Portugal 5 ft. 5½ in. In the Brit. Colonies the gauge is mostly 3 ft. 6 in.

The rate at which a line rises or falls from the horizontal is called the *gradient*, and is usually expressed by stating the amount of rise or fall occurring in a certain distance, such as 100 ft., or by the horizontal distance in which the difference in level amounts to 1 foot. Gradients may also be expressed in percentages. The load which an engine can haul over any stretch of line is determined by the steepest gradient, and this is therefore known as the ruling gradient. The adhesion between the wheels and the rails is lessened in wet weather, and the maximum gradient must be such as can be negotiated with a full load under all weather conditions. In theory gradients of 1 in 16 are possible, but practically 1 in 22½ is about the limit, and this is too great for general use. For the steep slopes of mountains rack railways are necessary. In these the engine is fitted with a cogged wheel engaging in a toothed rack along the line, and gradients of 1 in 2 are possible. For excessively steep inclines cable r. are employed.

In the U.K. curves are expressed by stating the length of their radius. The early main lines had few curves with a radius of less than a mile, but now curves are made with a radius of as little as 30 chains, or 1980 ft. The outer rail of a curve is placed at a slightly higher level than the inner one, to resist the tendency of centrifugal force to overturn a train rounding the curve.

Trains are transferred from one set of rails to another, as for instance from a main line to a siding, by *points*, or *switches*. At the junction of the four rails the inner two are tapered to a point, and fixed so far apart that if one point is pushed against the outer rail of the main line or of the siding, there is room left between the other point and the remaining outer rail to allow of the passage of the wheel-flanges on one side of the train. The opposite wheel-flanges travel along the other tapering rail, and thus take the required direction. Where a branch line leaves the main line, or where one set of rails crosses another set, check rails are placed to guide the wheel-flanges. Switches are usually connected with the signal cabins by means of iron rods passing over grooved wheels fixed on supports close to the ground, and are worked in conjunction with the signalling. Points may also be set by small hand levers, as in shunting yards.

SIGNALLING is done mainly by discs and *semaphores*, with lamps. The common semaphore signal is a movable arm working on a spindle, and fixed to an upright post so that it is horizontal and at right angles to the line. The normal or horizontal position indicates that the train must stop, and the arm is pulled down when the train may proceed. At night the movements of the arm are indicated by the colours shown by a lamp, usually red for stop and green or white for go ahead. In addition to the main or home signals there are also distant or cautionary singals, usually placed from 600 to 1000 yards before the home signals, the distance varying with the gradient.

Distant signals are worked in conjunction with the home signals, so that when the driver reaches a distant signal its position tells him how to expect to find the home signal, and accordingly he goes ahead or slackens speed ready to stop at the home signal. Distant signals are distinguished by their different shape, and they may also show a different colour. In order to prevent one train following another at a dangerously close interval, the line is divided into sections, and no train is allowed to enter a section until the preceding train has passed into the next section. These sections are called blocks, and the method of working is known as the *block system*.

The signal boxes are telegraphically connected, and are provided with indicating discs showing 'train on line' and 'line clear,' sometimes also 'line closed.' If a signalman were quite independent he might through oversight cause dangerous situations, by displaying signals over points not set accordingly, and to avoid this danger the points and signals are interlocked. The signalman is also automatically prevented from overlooking the setting of distant signals, and from showing conflicting signals simultaneously. Single lines are usually worked on the staff system. In the simple form of staff system the line is divided into blocks, each of which has staff assigned to it, and the possession of this staff constitutes the driver's right to pass through the section. There are many modifications of this system, to allow of several successive trains in one direction without any return train, and to ensure that the staff always shall be where it is required.

Signals and points are interlocked as in double lines. The actual work of moving signals and points is now frequently done by electricity or compressed air, the mechanism being controlled by small levels moved by the signalman. Many attempts have been made to eliminate the possibility of accidents due to mistakes by signalmen, and automatic electric systems, which do away with the signalmen altogether, are now in use to a small extent. In such systems the train itself works the signals, setting them to danger as it enters a section, and keeping them there until it leaves the section. In some cases each train has control over the following train, so that the driver of the latter cannot overrun the signals.

In foggy weather the ordinary signals are insufficient, and are supplemented by detonators placed on the line and exploded by the wheels, or by fog-horns blown

by men stationed at the distant signals. These methods involve some risk to the men employed, and are not infallible, but the automatic fog-signalling systems already tried have not proved completely successful.

Railway locomotives may be divided roughly into two classes—tank engines, in which the fuel and water are carried on the engine itself, and tender engines, with a larger quantity of supplies carried in a separate vehicle. There are various types of engines for passenger and goods traffic and for shunting purposes.

Vehicles for passenger traffic usually consist of first, second, and third class carriages, restaurant and sleeping cars. In Great Britain the second class is becoming obsolete, but on Continental lines there are frequently four classes. In the United States there is usually only one class, but extra charges for sleeping and other accommodation have much the same effect as different classes. In England sleeping-cars date from 1873, and dining-cars from 1879. In America and on the Continent such cars are often owned by an independent company, which takes the extra fares charged for use of the cars. Prominent among these companies are the Pullman Car Co. and the Compagnie Internationale des Wagon-lits. In Great Britain vehicles for goods traffic are called goods wagons or trucks, and in the United States, freight cars. Vehicles are joined together by couplers, which may be automatic and operated by the impact of two vehicles, or non-automatic and coupled by hand.

At one time trains were brought to a standstill by shutting off steam at a considerable distance from the desired stopping place, some assistance being given by feeble screw brakes on the guard's van and the engine. This process was dangerously inadequate for fast passenger traffic, and more powerful brakes affecting the whole length of the train came into use. Practically all passenger trains are now fitted with automatic continuous brakes, those most used being the vacuum automatic brake and the Westinghouse compressed air brake.

Railway lines are provided with stations at the termini and at suitable intermediate points. Large stations are subdivided into passenger and goods stations, the two usually being kept quite distinct, and are furnished with dépôts for locomotives, passenger carriages, and goods wagons. Passenger stations are on the main line itself, goods stations generally being approached by a branch line. The equipment of a passenger station consists of booking offices, refreshment and waiting rooms, left and lost luggage offices, inquiry office, etc. In Great Britain station platforms are not less than 2½ ft. above the rail, the standard height being 3 ft. In other countries the height is usually less, and in the United States the platforms are often at the rail level, or raised only a few inches.

At the close of 1909 the total railway mileage of the world was estimated at 625,698, the approximate figures being: Europe, 204,896; N. America, 277,015; S. America, 42,329; Asia, 61,800; Africa, 20,809; Australia, 18,849.

The mileage of Great Britain and Ireland at the end of 1910 was estimated at 23,387.

RAIMONDI, MARCANTONIO (*q.v.*).

RAIN, condensed vapour of atmosphere.

RAINBOW, caused by the sun shining on very small drops of water, the sun's rays being bent and split up into their primary colours on passing through such a drop. Sometimes several bows are seen, the brightest, called the Primary Bow, being red on its outer and violet on its inner edge. A larger and fainter bow (Secondary Bow), often seen outside the primary, is coloured red on its inner and violet on its outer edge. The primary bow subtends an angle of 41° at the observer's eye, and the secondary an angle of 52°.

RAINOLDS, JOHN (1549–1607), dean of Lincoln, 1593; of Puritan sympathies.

RAINY, ROBERT (1826–1906), Scot. Presbyterian minister; professor at New College, Edinburgh, 1862–1900; Principal, 1874 onwards; first Moderator of United Free Church.

RAIPUR (21° 11′ N., 81° 32′ E.), town, Nagpur, Central Provinces, India; grain, cotton. Pop. *c.* 33,000.

RAISIN, the sun-dried fruit of the grape vine (*Vitis vinifera*). The varieties known as *Valencia* and *Sultana* are the best known in England.

RAJAHMUNDRY, RAJAMAHENDRI (17° N., 81° 48′ E.), town, on Godavari, Godavari district, Madras, India.

RAJGARH (24° N., 76° 47′ E.), native state, Bhopal, Central India. Pop. 90,000. Chief town, **Rajgarh.** Pop. 5600.

RAJKOT (22° 18′ N., 70° 56′ E.), native state, Kathiawar, Bombay, India. Pop. 55,000. Capital, Rajkot. Pop. 37,000.

RAJMAHAL (25° 3′ N., 87° 53′ E.), village, Sonthal Pargauas district, Bhagalpur division, Bihar and Orissa, India, on Ganges; ancient capital of Bengal.

RAJPIPLA (21° 40′ N., 73° 30′ E.), native state, Rewa Kantha, Bombay, India. Pop. 120,000. Capital, Nandod.

RAJPUT, race of N. India, mostly of Hindu persuasion, but including a considerable number of Muhammadans. The Rajputs are a fine race and predominently fighters.

RAJPUTANA (26° 50′ N., 74° E.), region, India, including Brit. district of Ajmere Merwara and a number of native states of which the largest are Jodhpur, Bikanir, Jaisalmer, Jaipur, and Udaipur; total area, *c.* 127,535 sq. miles; surface crossed by Aravalli Hills; in N. are plains and desert lands, but the S. is fertile; drained by Banas, Chambal, and other streams; live stock raised. R. was included in dominions of the Moguls in the XVII. and early XVIII. cent's; it then came under control of the Mahrattas, after whose defeat by the British the different states became allies of Great Britain. Pop. (1911) 10,530,432.

RAJSHAHI (24° 30′ N., 89° E.), division and district, Bengal, India. Pop. (div.) 9,140,000; (dist.) 1,470,000.

RÁKÓCZY, FRANCIS I. (1645–76), Hungarian patriot; s. of George II. R. (see below); elected prince, 1652, but never secured throne.

RÁKÓCZY, FRANCIS II. (1676–1735), Hungarian patriot; s. of above; was brought up in Austria; imprisoned for plotting with France a Hungarian rising; escaped to Hungary, 1703, and led country against Austria; fled after eight years' fighting, 1711.

RÁKÓCZY, GEORGE I. (1597–1648), s. of Sigismund R. (see below); after death of Bethlen, 1629, and abdication of his s. Stephen, became Prince of Transylvania, 1630; went to war with Austria and won religious liberty for Hungary.

RÁKÓCZY, GEORGE II. (1621–60), Prince of Transylvania; s. of above; met with disaster in Thirty Years War; deposed by Turkey.

RÁKÓCZY, SIGISMUND (1544–1608), Hungarian patriot; supported insurrection of Bocskay, on whose death he was elected Prince of Transylvania, 1607.

RALEIGH (35° 48′ N., 78° 29′ W.), city, capital of N. Carolina, U.S.A.; cotton industries, iron foundries, machine-shops. Pop. (1910) 19,218.

RALEIGH, SIR WALTER (1552–1618), Eng. courtier, soldier, traveller, and author; b. Hayes, Devonshire; brought up in anti-Catholic, anti-Span. traditions; left Oxford to aid Huguenots, 1569; took part in rising of Netherlands against Spain; sailed in unfortunate voyage of half-bro., Sir Humphrey Gilbert, 1579; served in Ireland, 1580; became personal favourite of Elizabeth. R. planted Eng. flag in 'Virginia,' but failed in several attempts at colonisation; brought home hitherto unknown potato and tobacco plants; fought against Armada, 1588; fell from favour by marriage, 1593, but ultimately restored; expedition to Guiana, 1595; commanded in 'Essex' Cadiz expedition, 1596, and attack on Azores, 1597. Imprisoned on charge of treason, R. wrote in captivity part of projected *History of the World,* of no hist. value

but lofty prose; persuaded James I. to allow him to lead expedition to gold mine on Orinoco; failed to find mine, burned Span. town against king's orders and returned; executed.

Biographies by W. Stebbing, Martin Hume, Sir J. R. Rodd.

RALEIGH, SIR WALTER, Eng. man-of-letters; prof. of English at Liverpool, Glasgow (1890–1904), Oxford (1904–); wrote *The Eng. Novel* (1894), *Style* (1897), *Shakespeare* (E.M.L., 1907).

RALIK ISLANDS, see MARSHALL ISLANDS.

RALLIDÆ, see RAIL FAMILY.

RAM MOHAN ROY (1774–1833), Ind. theist; studied Oriental and Western languages; in 1830 founded Brahmo Somaj (*q.v.*); visited England, 1830.

RAMAYANA, see HINDUSTANI.

RAMBAUD, ALFRED NICOLAS (1842–1905), Fr. historian; associated with Lavisse in compilation of *Histoire générale*, both being Fr. pioneers of new Ger. hist. school; important books on Byzantine subjects, Germany, Russia, and Fr. history.

RAMBOUILLET (48° 40′ N., 1° 48′ E.), town, Seine-et-Oise, France; celebrated ancient château. Pop. 6200.

RAMBOUILLET, CATHERINE DE VIVONNE, MARQUISE DE (1588–1665), dau. of Ital. Marquis de Tisani. With her daughter, Julie d'Angennes, in their Paris salon, *L'Hôtel de Rambouillet*, she received select society of courtiers and literary men and women, and started *salon* movement of XVII. and XVIII. cent's; laid down canons of lit. and taste; poems by famous men offered to the dau., 1641, as *Guirlande de Julie*.

RAMEAU, JEAN PHILIPPE (1683–1764), Fr. composer and theorist; conductor of Opéra Comique and court composer, 1745; wrote *Treatise on Harmony*, *Nouveau système*, etc.; operas, *Hippolyte et Aricie*, *Castor et Pollux*, etc.

RAMESES, RAAMSES, RAMESSES, town, Goshen, Lower Egypt; built by Israelites; received name from Egyptian king, Rameses II.; site disputed.

RAMESWARAM (9° 17′ N., 79° 21′ E.), town, Madura district, Madras, India, on island of Rameswaram; place of pilgrimage. Pop. 7200.

RAMIE, also called RHEA, and CHINA GRASS; a valuable fibre derived from the inner bark of *Bœhmeria nivea*, a member of the Urticaceæ largely cultivated in China. The fibre is exceptionally long and tough, but the gum with which it is impregnated renders it unsuitable for certain types of work.

RAMILLIES (50° 40′ N., 4° 55′ E.), village, Brabant, Belgium; scene of Marlborough's victory over French, 1706.

RAMNAD (9° 22′ N., 78° 52′ E.), town, Madura district, Madras, India. Pop. 15,500.

RÂMNICU SARAT, RIMNICU (45° 28′ N., 27° 5′ E.), town (and department), Rumania, on Râmnicu; scene of defeat of Austro-Russian army by Turks in 1789. Pop., department, 137,000; town, 14,000.

RAMNICU VALCEA, RIMNICU (45° 14′ N., 24° 20′ E.), town, Valcea department, Rumania, on Aluta; trade in wine and salt. Pop. 7500.

RAMPARTS, see FORTIFICATION.

RAMPOLLA, COUNT MARIANO DEL TINDARO (1843–), Ital. cardinal and papal Sec. of State, 1885; resigned on death of Leo XIII.

RAMPUR (28° 48′ N., 79° 5′ E.), native state, United Provinces, India. Pop. (1911) 531,898. Capital, **Rampur,** on Kosila. Pop. (1911) 74,316.

RAMPUR BEAULEAH (24° 22′ N., 88° 39′ E.), town, on Ganges, capital of Rajshahi district, Bengal, India. Pop. 22,500.

RAMSAY, ALLAN (1686–1758), Scot. poet; b. at Leadhills, Lanarkshire; established as wig-maker in Edinburgh. He published *The Tea Table Miscellany* and *The Ever Green* collections of poems, but it is as the author of *The Gentle Shepherd* that he is chiefly remembered. The poem is a dramatic pastoral of the realistic type, and is a forerunner of the poetry of Burns. *Life*, by Smeaton (1896).

RAMSAY, ALLAN (1713–84), Scot. portrait-painter; s. of author of *The Gentle Shepherd*. From 1767 he was principal portrait-painter to the King.

RAMSAY, SIR ANDREW CROMBIE (1814–91), Brit. geologist; b. Glasgow; began life as a chemist, taking up geol. as a hobby; served in Geological Survey, 1841–81.

RAMSBOTTOM (53° 39′ N., 2° 19′ W.), town, on Irwell, Lancashire, England; iron foundries; cotton mills. Pop. (1911) 15,147.

RAMSEY (52° 27′ N., 7′ W.), market-town, Huntingdonshire, England. Pop. (1911) 5328.

RAMSEY (54° 19′ N., 4° 23′ W.), seaport watering-place, Isle of Man. Pop. 4700.

RAMSGATE (51° 20′ N., 1° 25′ E.), seaport, watering-place, Isle of Thanet, Kent, on North Sea. Pop. (1911) 29,605.

RAMUS, PETRUS (1515–72), Fr. humanist; b. Picardy, s. of charcoal burner; ed. Navarre; wrote treatise on logic; inclines towards rhetoric; denies fourth figure of syllogism; deduces figure from position of middle term.

RAMUSIO, PAOLO, RHAMNUSIO, RANNUSIO (*c.* 1443–1506), Venetian magistrate and jurist; pub. *De re militari* of Valturius, which he translated into Italian.

RAMUSIO, GIROLAMO (1450–86), bro. of above; translated Avicenna's works from Arabic into Italian, and wrote various treatises and verses.

RAMUSIO, GIAN BATTISTA (1485–1557), s. of Paolo; secretary of Venetian Council of Ten, 1533, and held various other offices in republic. Famous as editor of *Navigationi e Viaggi*, the Italian Hakluyt, pub. 1550–59.

RAMUSIO, PAOLO GIROLAMO GASPARE (1532–1600), s. of above; translated with amplifications part of chronicle of crusader Villehardouin into Italian.

RANAVALONA, QUEEN, see MADAGASCAR.

RANCHI (23° 22′ N., 85° 22′ E.), chief town of Chota Nagpur division, Bihar and Orissa, India. Pop. 25,970. Ranchi district has area 7128 sq. miles. Pop. 1,187,925.

RAND (*i.e.* low range of hills), popular and abbreviated name for *Witwatersrand*, rich gold mines W. of Johannesburg (*q.v.*), S. Africa.

RANDAZZO, ancient TISSA (37° 50′ N., 14° 57′ E.), town, Sicily, at foot of Mount Etna. Pop. (commune) 12,500.

RANDERS (56° 27′ N., 10° E.), town, Jutland, Denmark, on Gouden-Aa; manufactures gloves. Pop. (1911) 22,970.

RANDOLPH, EDMUND JENNINGS (1753–1813), Amer. statesman; delegate to Congress, 1779–82; gov. of Virginia, 1786–88; his draft of constitution for U.S.A. rejected; Attorney-Gen., 1789; Sec. of State, 1794; forced from office on account of intercepted letter disclosing private intrigue with France; suspected further of malversation of funds.

RANDOLPH, JOHN, OF ROANOKE (1773–1833), Amer. statesman; chairman of Committee of Ways and Means under Jefferson, 1801; acted part of republican free-lance; abolitionist, but states' rights man.

RANDOLPH, THOMAS (1523–90), Eng. ambassador; his dispatches from Scotland constitute an important hist. source for Elizabeth's reign; envoy to Russia, 1568; France, 1573, 1576.

RANDOLPH, THOMAS, 1ST EARL OF MORAY (d. 1332), Scot. patriot; nephew and follower of Robert Bruce; scaled and captured Edinburgh Castle from English, 1314; second in command at *Bannockburn*, 1314; defeated English at *Milton*, 1319; Regent of Scotland, 1329–32.

RANELAGH, London pleasure-gardens with concert-hall, etc., fashionable in XVIII. cent.; near Thames, Chelsea.

RANGE FINDER, TELEMETER, instrument for

finding the distance, or 'range,' of objects to be fired at. Its principle is based on trigonometry, and one or more telescopes are used, the range being recorded in metres or yards without any calculation. Many varieties are used for different purposes, *e.g.* navy, army, and harbour defence. In 1891 the Brit. Admiralty advertised for a r. f., and the winning instrument was that designed by Professors Barr and Stroud. A naval r. f. is made up of a tube with two telescopes, free to revolve about its longer axis. The type formerly used by the army was practically a box-sextant consisting of two instruments, used simultaneously in connection with a base of known length. Since 1908, however, this instrument has been superseded by the invention of Captain Marindin of the Black Watch. R. f's for harbour defence are adjusted for long-distance firing, and solve a triangle in the vertical plane, the base of which is the known height on the r. f. from the sea-level.

RANGIFER, Reindeer; see under Deer Family.

RANGOON (16° 53′ N., 96° 4′ E.), capital and chief port of Burma, on R. River; regularly laid out; has Anglican cathedral and other churches, and contains the sacred Shway-Dagon pagoda; has belonged to British since 1852; good harbour; exports rice, rubber, teak, cotton. Pop. (1911) 293,316.

RANGPUR, Rungpore (25° 45′ N., 89° 17′ E.), district, Rajshahi division, Bengal, India. Pop. 2,155,000. Capital, **Rangpur**, on Ghaghat. Pop. 16,300.

RANIDÆ, Frogs (*q.v.*).

RANJIT SINGH (1780–1839), Indian *Maharaja*; seized Lahore, 1799, Amritsar, 1802; by treaty, 1809, surrendered district south of Sutlej to Britain; established Sikh rule over whole Punjab.

RANKE, LEOPOLD VON (1795–1886), Ger. historian; b. Wiehe, Thuringia; became schoolmaster; pub. *Geschichte der Romanische und Germanische Völkerschaften von 1494–1535* (1824); became prof. extraordinary of History at Berlin Univ., 1825, and won distinction by original researches; *Fürsten und Völker von Südeuropa im 16 und 17 Jahrhunderts*, 1827, shows modern hist. methods; produced famous *Die Römischen Päpste, ihre Kirche und ihr Staat im 16 und 17 Jahrhunderts*, 1834–36, showing deep insight into ecclesiastical history, width of view, and excellent literary style; many other books, widely translated; *Französcsche Geschichte vornehmlich im 16 und 17 Jahrhunderts*, 1852–57, and *Englische Geschichte vornehmlich im 16 und 17 Jahrhunderts*, 1859–67 (trans., 1875), never superseded; ennobled, 1866.

RANNOCH (56° 37′ N., 4° 32′ W.), elevated moorland district, N.W. Perthshire; contains Loch Rannoch.

RANNUSIO, see Ramusio.

RANUNCULACEÆ, a natural order of herbaceous dicotyledons, many species being indigenous to Britain. The plants often possess underground parts stored with food, and many show palmatisect leaves (*Ranunculus bulbosus*), although in others (*R. hederaceus*) they are merely lobed. The flower, in the Buttercup, has five sepals and petals, and numerous spirally arranged stamens and carpels. Some forms such as Aconitum and Delphinium diverge considerably from this type, being zygomorphic, with petals represented by nectaries.

RAPALLO (44° 22′ N., 9° 13′ E.), seaport, winter resort, Genoa, Italy, on Gulf of Genoa; exports olive oil. Pop. (commune) 12,000.

RAPE (*Brassica napus*), a member of the Cruciferæ, allied to the cabbage. **Rape Oil** or **Colza** is derived from its seeds; when refined, light yellow, nearly odourless; S.G. ·915; uses—burning, lubrication, soapmaking.

RAPE, the carnal knowledge of a woman by violence and against her will. Formerly a capital offence, but now punishable as felony by penal servitude. In Britain consent of the female is no excuse if she is under 16.

RAPHAEL, SANTI, Raffaello Sanzio (1483–1520), the greatest Ital. painter of the Rom. school, was born at Urbino. His father was a poet and painter of some distinction, but he died when his son was only eleven years old. The boy studied under Timoteo Viti, and from him learned gentleness and grace of touch of his early paintings (e.g. *The Vision of a Knight*, in the National Gallery, and the *St. Michael* and *St. George* of the Louvre). At seventeen, R. went to study with Perugino of Perugia, then the most famous painter in Italy. R. quickly absorbed and translated the best qualities of his master's art, and in his *Crucifixion* and the *Conestabile Madonna* he exceeds the master. R.'s culminating work of this first period is the *Sposalizio* (1504). Here are harmonised, blended, and transformed the excellences of his first master Timoteo and of Perugino.

R. then proceeded to Florence. Here his genius became intoxicated with the artistic glories of the wonderful city. He studied reverently and tirelessly the art of Donatello, Michelangelo, Mantegna and Signorelli, and Fra Bartolommeo; but Leonardo inspired him most. Here his own genius began to manifest itself in its full splendour and maturity. He commenced that long series of Madonnas, whose tender loveliness and exquisite beauty have purified and inspired initiated and uninitiated alike. The most masterful work of his Florentine period was the *Entombment*, painted in 1507, for the chapel in the Duomo of Perugia; but though this work compels admiration for its magnificence of conception and perfection of execution, it does not reveal the characteristics of R.'s finest productions.

R. proceeded to Rome in 1508. Pope Julius II. committed to him the decoration of the Vatican Stanze. On the right wall of the Camera della Segnatura he represented the Church triumphant. On the left were depicted the great Athenian philosophers. On the two remaining walls he represented Apollo and the Muses with the poets of Greece and Rome, seated on the slopes of Parnassus, and Justinian and Gregory XI. as lawgivers. The whole is a perfect blending of the Pagan and Christian ideals. In the next hall, Raphael painted the expulsion of Heliodorus from the Temple of Jerusalem, and the pope and the cardinals kneeling at the altar where the miracle of Bolsena is performed. His fresco, the *Deliverance of St. Peter from Prison* is in some aspects the finest of the series. Under the patronage of Julius II. Raphael also painted the *Madonna della Sedia*.

In 1515 Raphael commenced his magnificent cartoons of the *Acts of the Apostles*, as designs for the tapestries of the Sistine Chapel. From this period, though his genius was fertile as ever, the master was constrained to leave the execution of his designs to his pupils. His last days were devoted to the great *Transfiguration* which Cardinal Giulio dei Medici had ordered for the Cathedral of Narbonne. He painted the upper half of the picture, but as he sketched the lower half the brush dropped from his hand, and he was removed to his bed of death. He was mourned by all Rome.

Raphael, Masterpieces in Colour Series.

RAPHIDIIDÆ, see Snake-Flies.

RAPPOLTSWEILER, Ribeauville (48° 12′ N., 7° 19′ E.), town, Alsace-Lorraine, Germany; trade in wine; manufactures textiles. Pop. (1910) 5945.

RARE EARTHS are oxides of the following metals: scandium (Sc=44·1), yttrium (Y=89·0), lanthanum (La=139·0), cerium (Ce=140·25), praseodymium (Pr=140·6), neodymium (Nd=144·3), samarium (Sm=150·4), europium (Eu=152·0), gadolinium (Gd=157·3), terbium (Tb=159·2), dysprosium (Dy =162·5), erbium (Er=167·4), thulium (Tm=168·5), neo-ytterbium (Yb=172·0), and lutecium (Lu=174·0).

They occur in rare and complex minerals in Scandinavia, Siberia, N. and S. America, etc.; such as cerite, gadolinite, samarskite, lanthanite, monazite; and are separated by fractional crystallisation, precipitation, etc., of their salts. Auer von Welsbach

divided didymium into praseo- and neo-dymium, and Crookes fractionated yttria into about eight slightly different components. It is consequently difficult to pronounce on the elementary nature of some of the rare earth metals, or to classify them in the periodic system. Ceria finds application in med., and, mixed with 99 parts of thoria, forms the material of the incandescent gas mantle.

RASK, RASMUS CHRISTIAN (1787–1832), Dan. philologist; b. near Odense; pub. admirable works on the Icelandic language, Anglo-Saxon grammar, Sanskrit, Persian, and Arabic; also an authority on Egyptian and Hebrew chronology.

RASPBERRY (*Rubus Idæus*), member of the Rosaceæ commonly cultivated for its fruit, which is, technically, an aggregate of drupes, or stone fruits; plant propagates largely by means of suckers, which produce new 'canes' some distance from parent stem.

RASPE, RUDOLF ERICH (1737–94), Ger. author; b. Hanover; d. Ireland; wrote inimitable *Adventures of Baron Munchausen*, besides poems and translations.

RASTATT (48° 52′ N., 8° 12′ E.), town, on Murg, Baden, Germany; scene of two peace congresses—between Austria and France in 1714, and between France and Germany in 1797–99; hardware, beer, tobacco. Pop. (1910) 15,199.

RASTENBURG (54° 6′ N., 21° 22′ E.), town, E. Prussia, Germany; manufactures flour. Pop. (1910) 11,949.

RATAK, see Marshall Islands.

RATEL, see Weasel Family.

RATHENOW (52° 37′ N., 12° 20′ E.), town, on Havel, Brandenburg, Prussia; spectacles and optical instruments. Pop. (1910) 24,906.

RATIBOR, Polish Racibórz (50° 6′ N., 18° 13′ E.), city, on Oder, Silesia, Prussia; steel and iron manufactures. Pop. (1910) 38,424.

RATIONALISM, in wide sense, revolt of individual reason against authority; narrower, the attempt to deduce geometrically all knowledge from certain elementary concepts (Descartes, Spinoza, Leibnitz). Kant denied validity of this mathematical method; rational concepts to yield new truths must be applied to matter of sense given in experience.

RATISBON, see Regensburg.

RATITÆ, Running Birds (*q.v.*).

RATLAM (23° 21′ N., 75° E.), native state, Malwa, Central India. Pop. 87,000. Capital, Ratlam. Pop. 37,000.

RATNAGIRI (16° 59′ N., 73° 20′ E.), district, Bombay, India. Pop. 1,200,000. Capital, Ratnagiri, on Arabian Sea. Pop. 16,500.

RATNAPURA (6° 40′ N., 80° 25′ E.), town, Sabaragamuwa, Ceylon. Pop. 4100.

RATON (37° N., 104° 30′ W.), city, New Mexico, U.S.A.; coal-fields. Pop. (1910) 4539.

RATS, see Mouse Family.

RATTAZZI, URBANO (1808–73), Ital. statesman.

RATTLESNAKE, see Snakes and Serpents.

RAU, KARL HEINRICH (1792–1870), Ger. political economist; prof. of Political Economy at Heidelberg, 1822–69; chief work, *Lehrbuch der politischen Œconomie*, 1826–37, one of ablest modern treatises.

RAUDNITZ (50° 25′ N., 14° 16′ E.), town, Bohemia, Austria, on Elbe; noted château. Pop. (1911) 9256.

RAUMER, FRIEDRICH LUDWIG GEORG VON (1781–1873), Ger. historian.

RAVELIN, see Fortification.

RAVELLO (40° 40′ N., 14° 40′ E.), small town, Salerno, Italy; XI.-cent. cathedral.

RAVEN, see under Crow Family.

RAVENNA (44° 25′ N., 12° 12′ E.), chief town, R. province, Italy; surrounded by wall with five gates; communicates with Adriatic Sea by Corsini Canal. R., an archiepiscopal see, has a large number of interesting churches, many dating from V. cent. Cathedral of St. Urso, originally built in IV. cent., was rebuilt in first half of XVIII. cent.; it has a baptistery and a Rom. bell-tower. Church of San Vitale, built originally in early VI. cent. and restored in late XIV. cent., has some Byzantine mosaics of great interest. S. Apollinare Nuovo was originally an Arian basilica, built by Theodoric the Goth, *c.* 504, and dedicated then to St. Martin; it also contains some remarkable VI.-cent. mosaics. Churches also ascribed to Theodoric are those of Santo Spirito and Santa Maria. Church of San Francesco dates from V. cent., and that of S. Apollinare in Classe, built in the VI. cent., is the largest Early Christian basilica in Italy; that of SS. Nazario e Celso, built *c.* 450, contains tomb of Galla Placidia. Many of the foregoing have campaniles, and several have baptisteries; and there are other churches of considerable interest.

R. was seat of government of Rom. emperors in V. cent., and was taken by Theodoric (*q.v.*) in 493; recovered by Rome in 539; subsequently belonged to Lombards and then to Franks, from whom it passed to pope. Pop. (1911) 71,690; (prov.) 248,645.

Gardner, *Ravenna* (Mediæval Town Series).

Ravenna, Exarchate of, lands of Byzantine empire in Italy, 568–751, ruled by exarch (new form of prætorian prefect), whose capital was at Ravenna. Exarch was appointed at close of VI. cent. to command all Rom. troops in Italy against Lombards; submitted to Lombard king, Astulf, 751; granted to Papacy by Pippin, 754.

RAVENSBURG (47° 46′ N., 9° 37′ E.), town, on Schussen, Württemberg, Germany; textiles. Pop. (1910) 15,594.

RAVI (32° N., 74° 50′ E.), river, Punjab, India; joins Chenab.

RAWALPINDI (33° 36′ N., 73° 3′ E.), division, Punjab, India. Pop. 562,000. Capital, **Rawalpindi.** Pop. (1911) 86,483.

RAWITSCH, Polish Rawicz (51° 37′ N., 16° 50′ E.), town, Posen, Prussia; snuff. Pop. (1910) 11,529.

RAWLINSON, SIR HENRY CRESWICKE (1810–95), Brit. soldier, archæologist, and politician; distinguished in Afghan War, 1842; consul at Bagdad, 1844; carried out Assyrian and Babylonian excavations.

RAWLINSON, SIR ROBERT (1810–98), Eng. engineer; began life as stone-mason, then engineer; app. to Sanitary Commission to inquire into condition of troops in Crimea.

RAWMARSH (53° 27′ N., 1° 21′ W.), town, Yorkshire, England; ironworks; collieries. Pop. (1911) 17,190.

RAWTENSTALL (53° 42′ N., 2° 18′ W.), town, Lancashire, England; cotton and woollen industries. Pop. (1911) 30,516.

RAY, JOHN, Wray (1628–1705), Eng. naturalist; the 'father' of Eng. natural history; famous for his contributions especially to the science of bot. He demonstrated the ascent of sap in plants; classified them according to their cotyledons; was also author of several zoological works, and emphasised the importance of anatomical characters in a natural classification, so that, along with his pupil Willoughby, he has been regarded as the founder of systematic zool. His merits are commemorated by the *Ray Society,* founded in 1844 for the publication of monographs on natural history.

RAY SOCIETY, see Ray, John.

RAYAH, a Christian subject living under Turk. rule.

RAYLEIGH, JOHN WILLIAM STRUTT, 3RD BARON (1842–), Eng. physicist; senior wrangler and Smith's prizeman; Cavendish prof. of Physics, Cambridge, 1879–84; Nobel prize, 1904; pres., Royal Soc., 1905–8; discovered argon (*q.v.*).

RAYMUND OF PENNAFORTE, see Canon Law.

RAYMUND IV. OF TOULOUSE, Count of Provence (d. 1105), prominent leader in First Crusade; disputed with Bohemund possession of Antioch, 1098; vainly sought to establish himself in rival city at Arca; refused offered dignity of advocacy of Holy Sepulchre, however, being unwilling to rule where Christ suffered; commenced conquest of Tripoli, afterwards Provençal countship.

RAYMUND, PRINCE OF ANTIOCH (1099–1149), selected by Fulk, king of Jerusalem, to marry infant heiress of Antioch, 1130; constant struggles against Gk. emperor; typical mediæval Fr. noble.

RAYNAL, ABBÉ DE, GUILLAUME THOMAS FRANÇOIS (1713–96), Fr. author; wrote on eve of Fr. Revolution with assistance of various noted men, *Establishments and Commerce of the Europeans in the Indias*, 1770, a compilation with political aim.

RAYNALD OF CHÂTILLON (d. 1187), second husband of Constance, princess of Antioch; defeated Saladin, 1177, and after many times breaking faith with him, suffered death at his hands.

RAYNAUD'S DISEASE, a disease usually affecting women in early adult life, of nervous origin, predisposed to by cold. It occurs in three stages: first, *local syncope*, temporary bloodlessness in the part, with pain and pallor; then *local congestion*, the part being blue from local congestion, painful, and cold; and lastly, *necrosis*, in which gangrene appears, and the dead part may become detached. The extremities are affected symmetrically by the disease. The treatment is to attend to the general health, induce local hyperæmia in the early stages by a bandage applied round the limb for a few minutes daily, while the electric current is of benefit.

RAYS (*Batoidea*), group of Selachian fishes (*q.v.* for general characters) with flattened bodies, large pectoral fins, ventral gill-openings, and often a long whip-like tail. Most common are the SKATES, found in temperate and colder seas, 9 species of which are British, best known being the Common Skate (*Raia batis*), up to 6 ft. long, and the Thornback (*R. clavata*), up to 3 ft. The STING RAYS and EAGLE RAYS—armed with a strong spine up to 6 or 8 in. long, placed at the base of the tail, and capable of inflicting grievous wounds—are represented by *Trygon pastinaca* and *Myliobatis aquila* respectively. Even an ELECTRIC RAY, *Torpedo hebetans*, with strong, muscular, electric battery hidden between head and pectoral fin, has not infrequently been found. The SAW FISHES (*Pristis*), however, are confined to tropical seas, where, with the strong flat-toothed blade which continues the snout, they do much havoc amongst their brethren.

RAZGRAD (43° 30′ N., 26° 30′ E.), town, Bulgaria; active agricultural trade. Pop. (1910) 13,975.

RAZINE, STEPHEN TIMOFEEVICH (d. 1671), Russ. rebel Cossack; seized Jaïk (Ouralsk), 1667, and pillaged ships navigating Volga and Oural; gathered large band of discontented men, and captured town after town; driven back from Simbirsk, 1670, and captured.

RAZOR, see CUTLERY.

RAZOR-BILL, see under GUILLEMOT and AUK FAMILY.

RAZOR-SHELL, see under LAMELLIBRANCHIATA.

RÉ, ÎLE DE, Rhé (46° 11′ N., 1° 25′ W.), island, Charente-Inférieure, France; unsuccessfully besieged by English, 1627. Pop. 14,500.

READE, CHARLES (1814–84), Eng. novelist; b. at Ipsden, Oxfordshire. His first works were dramatic, and include *Masks and Faces* (or *Peg Woffington*), *Christie Johnstone*, and *Peregrine Pickle*. His novels include *It's Never Too Late to Mend* (a study of prison life), *The Cloister and the Hearth* (his masterpiece, dealing with the life of the father of Erasmus), *Hard Cash* (a study of asylum life), *Put Yourself in his Place* (dealing with Trade Unionism). His novels nearly all deal with social problems, and are written with a purpose.

READING (51° 27′ N., 0° 59′ W.), county town, Berkshire, England, at junction of Kennet and Thames; has a Univ. Extension College; fine municipal buildings, several interesting churches, and the remains of a XII.-cent. Benedictine abbey; biscuit factories; iron foundries; occupied by the Danes in 871; by Parliamentarians in 1643. Pop. (1911) 75,214.

READING (40° 20′ N., 75° 58′ W.), city, on Schuylkill, Pennsylvania, U.S.A.; coal and iron region; railway workshops; large manufactures of iron and steel. Pop. (1910) 96,071.

REAL PROPERTY is distinguished from '*personal*' property by the fact that it can be recovered by law when in the hands of a false owner. Freehold estates, rights over minerals, and landed property generally is 'real' property. The greatest estate which a person can hold is the fee simple, and it arises where land is given 'to a person and his heirs.' In the strict eye of the law, all land in England is held either directly or indirectly from the Crown; but the owner of the fee simple is to all practical intents and purposes the absolute owner of the property. He is entitled to hold it for ever, for it is a legal maxim that 'there can be no reversion on a fee simple.' In the case of 'real' property, when the owner dies intestate it descends to the heir-at-law, whereas, with 'personal' property, the next-of-kin inherits. If the real estate is entailed it cannot be disposed of by the owner, but on his death becomes the property of his heir 'of the body begotten'; or, if it is entailed in special by a particular wife, then it becomes the property of his heir begotten by that particular wife.

REALISM (Modern), theory that reality exists apart from consciousness. R. in lit. is opposed to romanticism; it shows life as it is, not as an idealist wants it to be. Among realists are Zola, Guy de Maupassant, Tolstoi, Gorki, Upton Sinclair (in *The Jungle*). Ibsen's influence has given r. a strong position in modern drama.

REAPING-MACHINES have now almost completely replaced sickle and scythe as a means of cutting standing crops. The reaping-machine consists of a long iron comb carried horizontally a few inches above the ground, on which works a cutting knife which is like a very coarse saw with sharpened teeth. The comb holds the stalks in position, while the saw cuts them. In older forms the cut cereal was removed by a hand-rake, but now a *binder* is generally added to the reaper, and this automatically binds the cereal into sheaves and throws them out at the side of the machine.

REASON.—(1) mind as drawing or capable of drawing inferences; (2) mind as apprehending or capable of apprehending systematic truth; (3) mind as the source of system and order.

RÉAUMUR RENÉ ANTOINE FERCHAULT DE (1683–1757), Fr. naturalist and physicist; discovered production of steel from iron, iron tinning, production of opaque glass, artificial incubation, etc.; constructed thermometer (*q.v.*) with temperature scale bearing his name.

REBAB, RABAB, probably the oldest of stringed instruments. According to some authorities, it originated in Arabia, and was brought thence to Spain in the VIII. cent.; others suggest that by the conquest of Spain it became known to the Arabians. It was played with a bow, and but for the absence of deep curved indentations, and the peculiar form of the resonance box, might be regarded as an early violin. The r. subsequently developed into the *rebeck* (q.v.).

REBECK, REBEC, ancient stringed instrument of the violin kind played with a bow, in use during the Middle Ages; introduced by the Moors into Spain; rendered obsolete by violin. R. has a pear-shaped body with sound-holes, three gut-strings, and a bridge; chiefly used for accompanying singing and dancing. R. may be treble, alto, tenor, and bass.

REBELLION, in England 'The Great R.' is the struggle between Charles I. and Parliament; in Scotland 'The R.' means the Jacobite revolt of 1715 and 1745.

REBELLION, THE GREAT, see GREAT REBELLION.

RÉCAMIER, JEANNE FRANÇOISE JULIE ADELAIDE (1777–1849), Fr. leader of society; wife of banker, Jacques R.; presided over famous *Salon de l'Abbaye-au-bois*; reputation not of wit but physical

perfection and elegance and strong influence; celebrated portrait by David in Louvre.

RECANATI (43° 24′ N., 13° 31′ E.), city, Macerata, Italy; cathedral. Pop. (commune) 17,000.

RECEPT, see GENERIC IMAGE.

RECESSIVE CHARACTER, see MENDELISM.

RECHABITES, 'Sons of Rechab' (*Jeremiah* 35[6]), Total Abstinence Friendly Soc.

RECHBERG-ROTHENLÖWEN, JOHANN BERNHARD, COUNT (1806–99), Austrian statesman; minister of foreign affairs, 1859–64, and minister pres., 1859, at moment of great Austrian weakness; failed to carry emperor's scheme of Federal reform against Prussia, 1863; sought to detach Prussia from France; fell from power through short-sighted seconding of Prussian policy in Schleswig-Holstein.

RECIFE, PERNAMBUCO (8° S., 35° 53′ W.), city, seaport, capital of Pernambuco state, Brazil, on Atlantic; consists of three parts, Recife, San Antonio, and Boa Vista, separated by narrow channels and connected by bridges; contains government buildings, naval and military arsenals, hospital, theatre, observatory; manufactures cotton; exports sugar. Pop. 117,000.

RECKLINGHAUSEN (51° 40′ N., 7° 13′ E.), town, Westphalia, Prussia; collieries; manufactures linen. Pop. (1910) 53,701.

RECLAMATION OF LAND, see LAND.

RECLUS, JEAN JACQUES ELISÉE (1830–1905), Fr. geographer; for several years a prof. at Brussels. The greatest of his works is the *Nouvelle Géographie Universelle* in 17 vol's.

RECORD, name given in England to MS. document which has been the instrument of a legal or official transaction. These documents used to be known as the ROLLS from the fact of their being usually in the form of Rolls; this gave its name to their depository, now called the RECORD OFFICE (built on the Rolls estate, Chancery Lane, London, 1851), to their Keeper (the MASTER OF THE ROLLS), and to the publications of chronicles, etc., known as the *Rolls Series*. In the Advocates' Library, Edinburgh, the persevering searcher may still find publications under the heading 'Rolls.' Many r's formerly kept in the Tower of London, State Paper Office, and elsewhere have been moved to the R. Office, but the principle of centralisation has not been entirely adopted, and there are even provincial register houses like those of the Ridings of Yorks. Scotland has a General REGISTER HOUSE and several other repositories; Ireland has a Public R. Office and State Paper Office.

ARTHUR AGARDE (1540–1615), 'recordorum . . . diligens scrutator,' was the pioneer indexer of Eng. public documents. The rolls suffered general neglect until the XIX. cent. The work of the RECORD COMMISSION (1800–37), which printed in more or less correct form numerous important r's, is still useful, but being rapidly superseded by the usually minutely accurate editions of present R. Office officials. Reference can be made here to only a few of the numerous sorts of r. They are classified by Mr. Scargill-Bird, whose *Handbook* (3rd edit., 1908) is a necessary guide, as r's of (1) the superior courts of law; (2) special and abolished jurisdictions (*e.g.* Star Chamber); (3) duchy of Lancaster; (4) palatinate of Durham; (5) palatinate of Lancaster; (6) principality of Wales (including the palatinate of Chester); with (7) State papers and departmental r's.

The oldest r's are in one of the many branches of the 1st division, *i.e.* the 'Cartæ Antiquæ,' transcripts of CHARTERS from Ethelbert to Edward I. Birch and others have published the Saxon charters, and the R. Commission printed a *Calendarium Rotulorum Chartarum* of John, and a calendar of later charters bound up with their *Calendarium Inquisitionum ad quod damnum*, largely superseded by the R. Office Calendars of Charter Rolls commencing with Henry III. and Inquisitions *ad quod damnum* in the *Lists and Indexes* series. While many of the r's are being fully calendared, others are being merely made accessible by the *Lists and Indexes*; at the same time it may be noted that the *Calendars of State Papers* are by no means full, often omitting important facts.

Other forms of royal grant are CLOSE ROLLS (of which there are over 18,000) and PATENT ROLLS, which also contain miscellaneous orders by the king to individual subjects, towns, etc. These documents became the title-deeds of their possessors and copies retained by the Crown (on the rolls) became r's. The roll generally begins and ends with the regnal year. They have been printed almost to the end of the XV. cent., and the very full *Letters and Papers of Henry VIII.* contains those of his reign. Important for genealogy and topography are the Inquisitions *post-mortem*, made whenever a tenant-in-chief of the Crown died, the Proof of Age (*Probatio ætatis*) of the royal ward before he could receive his lands, the Fine Rolls, Subsidy Rolls, and similar feudal documents, all in process of being calendared.

The PIPE ROLLS (Henry I. to William IV.), many of the early ones of which are printed, were the final account of the Exchequer; there are also Exchequer Issue and Receipt Rolls. The *Taxatio* of Pope Nicholas (*c.* 1292), the *Inquisitio Nonarum* (XIV. cent.), and *Valor Ecclesiasticus* of Henry VIII., all printed by the R. Commission, are valuable r's of Church history. Parliamentary matter has been largely printed. The Record Commission published the *Rotuli Curiæ Regis* (5 Ric. I. to 56 Hen. III.) and the *Abbrevatio Placitorum*, but the vast bulk of judicial matter is even yet unlisted, except in a partial way in Boyd's MS. Indices and Plantagenet Harrison's extraordinary MS. 'Notes' (both at the R. Office). The Feet of Fines and RECOVERY ROLLS represent an extinct method of conveying land; in order to make the title of the grantee sure, a fictitious suit was brought (after payment of a fine to the king) by the grantor, against whom judgment was given.

Canada and Australia have their own repositories, but the same material is to be found in the Colonial Office at the R. Office. The U.S.A. have both States and Federal archives; r's before the separation are to be found both in the Eng. R. Office and in the States' archives, and the historian usually finds it more convenient to consult them in London than to travel from state to state. The *Archives Nationales* at Paris and the central Archives of Berlin have taken the lead in Europe in publishing historical sources. See ARCHIVES.

RECORDER, obsolete Eng. beak-flute, something like a flageolet, with six or seven holes. It is referred to in a famous scene in *Hamlet*.

RECOVERY ROLLS, see RECORD.

RECTOR, in Church of England a clergyman who enjoys the benefices of the parish where the tithes are not impropriate. In Scotland the name is given to the headmaster of academies or leading schools.

RECTUM, see DIGESTION.

RECURVIROSTRA, Avocet Bird; see under PLOVER FAMILY.

RECUSANT, in England, one refusing to attend Established Church; R.C. and Puritan r's were punished from Elizabeth's reign onwards; latter relieved by Toleration Act, 1089, former by Emancipation Act, 1829.

RED BANK (40° 20′ N., 74° 5′ W.), town, New Jersey, U.S.A. Pop. (1910) 7398.

RED CROSS, see AMBULANCE.

RED RIVER (31° 20′ N., 92° 30′ W.), river, rises in Staked Plain, Texas; flows through Texas, Arkansas, and Louisiana; joins Mississippi; length, 1200 miles; navigable to Shreveport.

RED RIVER OF THE NORTH (48° N., 96° W.), rises near source of Mississippi, Minnesota, U.S.A.; flows northwards, separating Dakota from Minnesota; traverses Manitoba, and falls into Lake Winnipeg; length, 750 miles.

RED RIVER SETTLEMENT (50° 20′ N., 98° W.),

Scot. colony; founded, 1812, on Red River of the north, near Winnipeg, Canada.

RED SEA (24° N., 38° E.), an extension of Ind. Ocean, passing north-westward, between Arabia and Africa, towards Mediterranean, with which it connects by Suez Canal; opens off Gulf of Aden by Strait of Bab-el-Mandeb; at N. end breaks into two arms, GULF OF SUEZ on W., GULF OF ARABIA on E.; water very salt, owing to great amount of evaporation; coral reefs along both shores; length, *c.* 1300 miles.

'RED SPIDER,' see under MITES.

RED WATER FEVER, see under MITES.

RED WING (44° 34′ N., 92° 31′ W.), city, on Mississippi, Minnesota, U.S.A.; flour-mills; exports wheat. Pop. (1910) 9048.

REDAN, see FORTIFICATION.

REDBREAST, or ROBIN, see under THRUSH FAMILY.

REDCAR (54° 37′ N., 1° 4′ W.), watering-place, Yorkshire, England. Pop. (1911) 10,509.

REDDITCH (52° 18′ N., 1° 56′ W.), town, Worcestershire, England; needles, fish-hooks. Pop. (1911) 15,463.

REDEMPTIONISTS, TRINITARIANS (*q.v.*).

REDESDALE, JOHN FREEMAN-MITFORD, LORD (1748–1830), Eng. lawyer; wrote valuable *Pleadings in Suits in the Court of Chancery by English Bill*, 1777; attorney-general, 1799–1801; speaker, 1801–2; chancellor of Ireland, 1802–6; lord of trade, 1808.

RED-EYE, see CARPS.

REDFERN, suburb of Sydney, New South Wales, Australia; iron and railway works. Pop. 26,000.

REDLANDS (34° 5′ N., 117° 20′ W.), city, California, U.S.A.; centre of orange-growing district; canneries. Pop. (1910) 10,449.

REDMOND, JOHN EDWARD (1851–), Irish politician; a clerk in the House, a barrister, then M.P.; leader of United Nationalists (1900); protagonist of Home Rule.

REDON (47° 39′ N., 2° 4′ W.), town, on Vilaine, Ille-et-Vilaine, France; emery paper. Pop. 6700.

REDONDA (25° 5′ N., 61° 35′ W.), small mountainous island, Brit. W. Indies; phosphate mines.

REDONDELA (42° 27′ N., 8° 40′ W.), seaport, Pontevedra, Spain; sardine and oyster fisheries. Pop. 11,100.

REDOUBT, see FORTIFICATION.

REDPOLLS, see under FINCH FAMILY.

REDRUTH (50° 13′ N., 5° 13′ W.), market town, Cornwall, England; tin mines. Pop. (1911) 10,815.

REDSHANK (*Totanus calidris*), a member of the Plover Family (*q.v.*), distinguished by bright red legs, yellow black-tipped bill, and noisy cry. It breeds in tussocky places inland, but in winter frequents the sea-coast. The Spotted R. (*T. fuscus*) is a spring and autumn visitor to Britain.

REDSTART, see under THRUSH FAMILY.

REDWING, see under THRUSH FAMILY.

REED, a division of the ruminant stomach; see under PECORA.

REED, JOSEPH (1741–85), Amer. soldier and politician; pres. of Pennsylvania Convention, 1775; adjutant-general of Washington, 1776; pres. of Pennsylvania, 1778.

REED INSTRUMENTS, distinguished from instruments in which the tone is produced by strings or by blowing into an open tube, are those in which the sound is obtained by means of a reed. In instruments like the clarinet and oboe the reed is placed within a tube; in those like the harmonium and concertina no tube is required. The two classes are known respectively as *beating* and *free reeds*.

REEDBUCK, see REITBOK.

REEF, see CORAL.

REES, THOMAS (1777–1864), Welsh Unitarian minister.

REEVE, HENRY (1813–95), Eng. writer; wrote foreign political articles for *Times*, 1840–55; edit. *Edinburgh Review*, 1855–95; edit. *Greville Memoirs*, 1865.

REEVES, JOHN SIMS (1818–1900), Eng. tenor; studied at Paris and Milan; best tenor of his time.

REFERENDUM, political system by which measures approved by the legislature are submitted to the electorate before they can become law. Advocates of the system claim that it is the only practical check upon single-chamber government, preventing the passing of hasty and ill-advised measures which might be pressed forward by a democratic legislature. Opponents urge that the position of parliamentary representatives would be degraded, and that the better class of men would withdraw from the political arena if such conditions obtained. In Switzerland, on the demand of 50,000 voters, or of eight cantons, any law passed by the Federal Parliament must be submitted to the general body of the people. Similarly, laws passed by the parliaments of the separate cantons may be, and in many cantons must be, referred to the cantonal voters. The system, in one form or another, has been employed in Switzerland for several centuries, but the modern institution dates from about the middle of the XIX. cent. The R. is embodied in the Constitution of the Australian Commonwealth, and alterations in the federal constitution must be submitted to the electors. The democratic schemes of a Labour Government were, in 1911, defeated in this manner. R. has been adopted by a number of Amer. states (and cities, for municipal affairs), and most of these have *Initiative* also, providing that legislature consider and in some cases submit to R. any law for which a certain percentage of voters have petitioned.

REFLECTION, see LIGHT.

REFORMATION, THE, one of the greatest movements which have affected all subsequent European history, must be viewed in close connection not only with what followed but with what went before. The mediæval Church was not only a great religious organisation, it was part and parcel of the whole fabric of the mediæval world.

The mediæval Church was, broadly speaking, compounded of three elements—early Christianity, the Roman Empire, and the barbarians; from the IV. cent. it had been coextensive with the Empire, and it had largely civilised the ruder northern races. It had become interwoven with the feudalism resultant on the clash of Roman and barbarian, it had risen to great heights of pretension and of power under Hildebrand, and again under Innocent III., but in the XIV. and XV. cent's a decline had set in. For seventy years the Papacy had been in 'captivity' at Avignon; it had been weakened by schisms and antipopes; the Councils of Constance, 1415, and Basel, 1431, had been futile. The close of the XV. cent. saw the dawning of humanistic culture, the rediscovery of the ancient classics, and mental awakening in various directions. But what threatened the Church more than all was the worldliness of its clergy. Granted that Prot. historians have often painted unfair pictures of the Middle Ages, it cannot be denied that the Church had reached a low ebb, not only of spirituality but even of morality. Its prelates were courtiers; many of its monks and even friars corrupt. Outwardly it was flourishing; schools and univ's, churches and shrines existed in abundance.

That a reformation of some sort was needed was frequently asserted—but none could bring it about. It is important to distinguish between the reform of morals and discipline, which it is universally agreed was necessary, and the reform in doctrine, which of course the R.C. Church would not admit. According to Protestants the abuses of the sacramental and sacerdotal system of Catholicism were inherent in that system itself. Now, widespread as was the corruption of the Church, definite doctrinal movements had only been spasmodic. Heresy had cropped up from time to time in the Middle Ages, particularly in the LOLLARDS of the later XIV., and HUSSITES of the XV. cent's, but no great impression had been made on Catholicism.

The importance of the R., however, was not only

religious but political. So much did religion and politics become intertwined, that some have said that the R. was essentially political rather than religious. And the history of the period is so complicated that it is hardly possible to give a connected story of it here, but the principal dates must be enumerated. The immediate cause of the outbreak of the German R. was the sale of indulgences, which provoked Luther's famous ninety-five theses, which he fastened to the church door of Wittenberg. But this did not at first set Europe aflame. It was two or three years before LUTHER (*q.v.*) became famous. In 1521 at the Edict of Worms he was outlawed. By 1524 Germany was becoming split into factions, and next year the peasants revolted and perpetrated great cruelties, for which an ample vengeance was exacted. Meanwhile, an independent Prot. movement had begun in Switzerland under the leadership of ZWINGLI. He had a strong following in Zürich and Bern, but ever since Switzerland has been divided.

In 1530 the CONFESSION OF AUGSBURG was drawn up in protest against Catholic doctrine and practice. The *Schmalkaldic League* was founded in 1531. Within a few years Protestantism had got a firm footing in Scandinavia. In both Denmark and Sweden episcopal government was retained. The R.C. Church was now realising the seriousness of its own position. The Emperor Charles V. showed some willingness to compromise, but he soon saw that his efforts in that direction were useless. The so-called *Counter-Reformation*—a reform movement within the Church, urged on by those who were eager to reform abuses, but intent on keeping the entire doctrinal and ecclesiastical fabric of Catholicism intact—came into being.

Just before the outbreak of the R. the fifth Lateran Council in 1513 had failed to carry through any reforms; now, a Council was summoned to meet at Trent in 1545. The Council migrated to Bologna in 1549; it went back to Trent, 1552, when it was suspended for ten years, finally closing, 1563. The COUNCIL OF TRENT carried through a number of reforms; the Church was purged, but there was no compromise or attempted compromise with Protestantism, and it was now obvious (even if it had not been so before) that the split in Western Christendom was irrevocable. After various disputes, the PEACE OF AUGSBURG of 1555 secured that the ruling prince in each Ger. state should determine its religion—the day of complete toleration was not yet.

The beginning of Fr. Protestantism was even before Luther. But the great leader was JOHN CALVIN, whose *Institutes of the Christian Religion* appeared in 1536. Calvin went to Geneva in 1541 where he remained till his death in 1564, and formulated not only a theology but an ecclesiastical state, both strong, but terrible. But the rigorous tyranny of Calvinism in Geneva was no worse than that of other states, and the execution of Servetus showed Calvin to be no more than a man of his time. The rise of the Fr. Protestants or HUGUENOTS caused a series of religious wars in France, 1562–98, which were brought to an end by the *Edict of Nantes* granting liberties to the Protestants; it was revoked by Louis XIV., 1685, a bigoted and in every way disastrous act.

The R. in England and Scotland cannot be here described in detail, but it must never be forgotten that the Eng. R. was less complete than elsewhere, the Anglican Church retaining more Catholic elements. See ENGLAND: *History*; SCOTLAND: *History*.

Though some districts, *e.g.* southern Germany, were won back for Roman Catholicism by the COUNTER-REFORMATION, others have never since acknowledged the claims of Rome.

In its broader aspects the R. can be viewed as part of the general upheaval on the break-up of mediæval ideas. The political effect was rather to strengthen absolutism than to encourage democracy. The rise of the Jesuits and the power of the Inquisition influenced Catholicism, and Protestantism in time has become modified. But even now we are too near to give a final verdict.

Cambridge Modern History, vols. i.–iii.; Creighton, *History of the Papacy*; Lindsay, *History of the Reformation*. For Eng. Reformation—Gairdner, *Lollardy and the Reformation*.

REFORMED CHURCH IN AMERICA, formerly called *The Reformed Prot. Dutch Church in North America*, was started by Dutchmen who settled in New England when a Dutch possession. After the Eng. conquest the Dutch Churches were unfriendly to the English establishment and got a charter, 1696. Though independent, it works closely with Ger. and other Prot. Churches. It has various institutions and activities and over 120,000 members.

REFORMED CHURCHES, those bodies of Continental Protestants who are not Lutheran, *i.e.* Calvinistic.

REFORMED EPISCOPAL CHURCH, offshoot in 1873 from Episcopal Church in U.S.A. in Prot. interest against High Church tendencies; now nearly 10,000 members.

REFRACTION, see LIGHT.

REFRIGERATION.—R. is the cooling of a substance by the transference of some of its heat to another and cooler substance. Refrigerating machines may be divided into two main classes, liquid machines, and compressed air machines. One machine of the former class depends upon the fact that the boiling-point of water varies according to the pressure. Water is placed in an air-tight vessel connected with a vacuum pump, and the pressure is lowered until the water boils. The heat required for evaporation is abstracted from the water, and as the pressure is reduced further and further, the temperature gradually falls to the freezing-point, and ice is formed. In other machines, liquids more volatile than water, such as ammonia, carbonic acid, or ether, are employed as the refrigerating agent. The principle of these machines is much the same as that of the water machine, except that the refrigerating agent is recovered by compressing the vapour.

Still another type of liquid machine makes use of the fact that certain vapours are capable of being absorbed in water, and separated again by heat. Compressed air machines consist essentially of three chambers, for compression, cooling, and expansion respectively. Air is drawn into the first chamber and compressed. It is then cooled by passing through the cooling chamber, and finally it enters the expansion chamber. Here it is allowed to expand to atmospheric pressure, and during this expansion it is made to perform mechanical work by pressing upon a piston. The air thus loses heat equivalent to the energy expended upon the piston.

Refrigerating machines are used for the production of ice for domestic purposes, and on a commercial scale in special ice factories, and for cooling the air in rooms for the cold storage of meat. They are used also in dairies and breweries, for cooling the magazines on warships, and to some extent for cooling the air-blast for blast-furnaces. On vessels for the transport of meat ammonia or carbonic acid machines are chiefly used, though some ships still use the compressed air machine. The water vacuum machine is employed principally in making ice for domestic use.

REFUSE DESTRUCTORS, furnaces for destroying by burning miscellaneous refuse of towns. During recent years great attention has been given to the problem of utilising this rubbish as a low-class fuel for the production of steam. The value of town refuse varies greatly, being highest in coal-mining districts. The amount of refuse also varies, the average in Britain being roughly from 5 cwt. to 10 cwt. per head per annum.

The first destructor was erected in Manchester by Mr. Fryer of Nottingham, about 1876, and it was quickly followed by others in Leeds, Birmingham, and Bradford. This destructor had many defects, and the types which immediately succeeded it were also

unsatisfactory, chiefly on account of the necessity of mixing with the refuse a considerable proportion of other fuel. It was soon realised that a furnace specially adapted to the purpose was necessary. Fryer's destructor forms the basis of many of the modern garbage-furnaces, while others are on quite different lines, but in all the main features are a furnace designed to consume the refuse with the least possible remainder, arrangements to prevent escape of noxious gases, and appliances for utilising heat generated for the production of power for pumping, electric lighting and traction, and other purposes, thus reducing the cost of the disposal of the refuse.

Besides furnaces and boilers, a modern destructor station contains elaborate plant for speedy handling and transport of refuse material. This includes railways or tramways for the removal, and appliances for the utilisation of the clinker, centrifugal dust-catchers, solder extraction furnaces, etc. Destructors are worked in conjunction with the other sanitary arrangements of the town, under municipal control.

REGALIA (neuter plural of Lat. *regalis*, royal), emblems of royalty, which in U.K. are crown, sceptre, sword, ring, bracelets, robe, orb, cross, spurs.

REGENCY, government by deputy. The Brit. sovereign has the prerogative of appointing a regent or lords justices to rule during his absence from the realm or his own or heir's infancy. The question as to the powers of Parliament arose when George III. (*q.v.*) went mad. The Regency Act, 1910, appoints Queen Mary regent in case one of her children accedes to the throne before attaining the age of 18.

REGENERATION OF LOST PARTS, reproduction of a part lost through disease or injury, frequently associated with the power of first casting off the part so damaged; exhibited in very different degrees by different animals, but generally more highly developed where the organism is less complex: a sea-cucumber can regrow fresh viscera, a worm a new head or tail, a crab a new limb, a lizard a new tail, but in man regeneration is exceedingly limited.

REGENSBURG, RATISBON (Gallic *Radaspona*, Rom. *Castra Regina*) (49° 1′ N., 12° 6′ E.), city, on Danube; capital of Upper Palatinate, Bavaria; contains Gothic cathedral founded 1275; other notable buildings are the abbey of St. Emmeran, church of St. Ulrich, Schottenkirche, Golden Cross Inn, and town hall (seat of Imperial diets, 1663-1806); has active transit trade; iron and steel manufactures; suffered in the Thirty Years and other wars; annexed by Bavaria in 1810. Pop. (1910) 52,624.

REGGIO DI CALABRIA (38° 8′ N., 15° 39′ E.) (ancient *Rhegium*), town, on Strait of Messina; capital of province of same name, Italy; manufactures perfumes. Pop. (1911) 42,876; (province) 444,215.

REGGIO NELL' EMILIA (44° 42′ N., 10° 38′ E.) (ancient *Regium Lepidi*), city, capital of province of same name, Italy; cathedral; manufactures silk goods. Pop. (1911) 70,499; (province) 308,167.

REGICIDE (Lat. *Rex*, *regis*, king; *cædere*, to kill).—(1) one who kills a king. (2) one of those who sat in the tribunal which sentenced Charles I.

REGILLUS (41° 50′ N., 12° 42′ E.), lake, Latium; scene of victory of Romans over Latins, 496 B.C.

REGINA (50° 25′ N., 104° 38′ W.), capital of Saskatchewan, Canada; agricultural centre; swept by cyclone, 1912. Pop. (1911) 30,213.

REGIOMONTANUS (1436–76), name adopted by JOHANN MÜLLER, Ger. astronomer; prof. of Astron., Vienna; compiled *Kalendarium Novum*.

REGISTER HOUSE, see RECORD.

REGLA, formerly seaport, province Havana, Cuba; now part of city of Havana. Pop. 16,000.

REGNARD, JEAN FRANÇOIS (1655–1709), Fr. dramatist; travelled in various countries; made a slave in Africa; his masterpiece, *Le Joueur*, appeared, 1696; one of most successful comic writers of classical school.

REGNAULT, HENRI VICTOR (1810–78), Fr. chemist and physicist; worked on organic chem., thermometry, expansion of gases, specific heats, hygrometry, steam-engines.

RÉGNIER, MATHURIN (1573–1613), Fr. satirist; typical poet of Renaissance; wrote 16 *satires* against bad poets, courtiers, hypocrites, and other permanent human types; many of his expressions have become proverbs.

REGNITZ (49° 40′ N., 11° E.), river, Bavaria; joins Main near Bamberg.

REGULIDÆ, Kinglets (*q.v.*).

REGULUS, ST., ST. RULE (IV. cent.), legendary monk who carried bones of St. Andrew from Patras to St. Andrews.

REICHENAU (47° 42′ N., 9° 5′ E.), island in the Untersee of Lake Constance, belonging to Baden.

REICHENBACH (51° 8′ N., 14° 45′ E.), town, province Silesia, Prussia, on Peile; scene of victory of Prussians over Austrians, 1762. Pop. (1910) 16,369.

REICHENBACH (50° 38′ N., 12° 17′ E.), town, kingdom of Saxony; textiles. Pop. (1910) 29,685.

REICHENBERG (50° 47′ N., 15° 3′ E.), town, Bohemia, Austria; cloth. Pop. (1910) 36,359.

REICHENHALL (47° 42′ N., 12° 51′ E.), town, watering-place, on Saalach, Bavaria; salt-springs. Pop. (1910) 6386.

REICHSTADT, DUKE OF, see NAPOLEON II.

REICHSTAG, see GERMAN EMPIRE.

REID, THOMAS (1710–96), Scot. philosopher; b. Strachan; prof. at Glasgow. Against Berkeley and Hume, R. affirmed doctrines of sense perception and of common sense; denied that objects are perceived through ideas. Mind is active, every sense perception an act of judgment. Common sense is the criterion of knowledge. Certain necessary truths belong to the constitution of the human mind. These principles include 'contingent' truths (*e.g.* self-identity, existence of fellow-creatures, uniformity of nature) and 'necessary' truths (mathematical axioms, moral and metaphysical truths).

REID, THOMAS MAYNE (1818–83), Irish writer of adventure stories, e.g. *The Rifle Rangers*, *The Scalp Hunters*, *The Headless Horseman*.

REID, WHITELAW (1837–1913), Amer. diplomatist; editor of *New York Tribune* (1872); U.S.A. Minister to France, 1889–92; to Britain, 1905–13.

REIGATE (51° 14′ N., 0° 12′ W.), market-town, Surrey, England. Pop. (1911) 28,505.

REIGN OF TERROR, see FRENCH REVOLUTION.

REIMARUS, HERMANN SAMUEL (1694–1768), Ger. philosopher; champion of natural religion; believer in purposiveness of Nature, and human blessedness in future life; denied reasonableness and morality of contents of Biblical lit.; argued that New Testament writers seek their own selfish ambitions.

REIMS, RHEIMS (49° 15′ N., 4° 2′ E.), town, Marne, France, on Vesle and Aine and Marne canal; famous Gothic cathedral (XIII.–XIV. cent's, magnificent façade, paintings, windows, etc.), where Fr. kings (since Clovis) were crowned; church of St. Rémi, Mars gate (c. IV. cent.), archiepiscopal palace (1498–1509), town hall (containing picture gallery and library); great champagne centre; merinoes, flannels, cashmeres, cloths of mixed silk and wool, ironmongery, glass-making. Pop. (1911) 115,178.

REINACH JOSEPH (1856–), Fr. publicist and politician; sec. of Gambetta, 1881; political editor of *République française*; personal attacks involved him in several duels; fought for revision of Dreyfus sentence, 1897–1900. His brothers, SALOMON (1858–) and THÉODORE (1860–), are distinguished archæologists.

REINDEER, see under DEER FAMILY.

REINDEER MOSS, see LICHENS.

REINEKE FUCHS, old Ger. version of *Reynard the Fox* (*q.v.*).

REINKENS, JOSEPH HUBERT (1821–96), bp. of Old Catholics of Germany (1873).

REISKE, JOHANN JACOB (1716–74), Ger.

Arabic scholar, born at Zörbig in Saxony. He early mastered Arabic, and in spite of extreme poverty he made his way to Warnerianum to study Arabic MSS. In 1746 he graduated M.D., hoping by medicine to secure a nucleus income, and so prosecute his materially unprofitable studies in Arabic. As a practitioner, however, he was unsuccessful, but was rescued from abject poverty by his appointment to the rectorate of St. Nicolai. The last decade of his life was mainly devoted to Greek.

REITBOK, Reedbuck (*Cervicapra arundinaceum*), rare antelope found in the N. portion of Cape Colony; colour, reddish ash-grey; tail, short and bushy; horns, 1 ft. long and ringed; height, 3 ft.

RELAPSING FEVER, an infectious fever, characterised by sudden onset and very high temperature, declining and returning to normal in from five to seven days, and followed in another week by a recurrent attack. The disease is due to a specific spirillum, the *Spirochæte Obermeieri*, probably conveyed to man by fleas, and usually occurs in times of famine—overcrowding, lack of nutrition, dirty, unhealthy surroundings being predisposing causes. The incubation period varies considerably, the onset is abrupt, with headache and shiverings, and the temperature may go as high as 109°; the skin is dry, there is thirst, pain in the limbs, enlargement of the spleen and liver, and often constipation or diarrhœa. A slight eruption may be present, but it is unusual. The fall of temperature is accompanied by profuse perspiration, and the patient feels quite well in a day or two, a relapse, with renewed rise of temperature, taking place in a week, after which recovery is prolonged, with or without other relapses. The treatment is rest, careful dieting, the administration of quinine in the early stages, while the high fever is relieved by cold packs or sponging. A serum has been prepared which is said to prevent relapse when injected during the period following the first attack.

RELATIVITY OF KNOWLEDGE.—(*a*) Objects of knowledge are known not absolutely, but only in relation to other objects; with Green, all experience becomes a system of relations, and sensation has no part in its constitution. (*b*) We know things not as they are, but as they affect the percipient mind.

RELICS, objects held sacred because of their connection with the saints, such as parts of their bodies or instruments used at their martyrdom. Great veneration has been paid to r's in Catholic Christianity. It had its origin partly in the respect paid to the dead, partly in the idea of association by which sanctity was held to be communicated by a person. Among the most famous r's was the true cross which Helena, mother of Constantine the Great, believed she had discovered. Catholic theologians defend reverence paid to r's, but the practice has sometimes exceeded the theory.

RELIEF, in sculpture or architecture, is the projection of a figure beyond the plane on which it is formed. Technically it is of three kinds, high, low, and middle, according to the degree of projection.

RELIGION.—The word's original signification is probably something akin to 'awe,' or that feeling we experience in the presence of powerful but unknown forces; but the exact etymology is uncertain. As used by us, r. has come to have a real and definite meaning, but one exceedingly difficult to define; thus,' the worship of a God or gods' is inadmissible, as one of the most important of the world r's, Buddhism, is atheistic, hence prayer, the commonest outward expression of most r's, has no place. A man, too, might still have a r. and never belong to any ecclesiastical organisation, though both Prayer and Church are so bound up into r. that it is impossible to separate the treatment of them.

Perhaps it is best to say that r. is a sort of sixth sense, or rather complex of senses, the exact nature of which it is very difficult to understand, as it is concerned with the deepest and most mysterious part of man's nature. All attempts to explain away r., if not futile, are at any rate begging the question, for they generally assume the non-existence of the spiritual forces the man of r. feels himself to possess. The explanation that all manifestations of religious feeling are due to illusion, while difficult to refute in theory, is one that satisfies few of those who have studied it most deeply. But in its earliest stages r. is very crude, and many of its primitive forms seem little more than degraded superstitions hardly worthy the name r. at all. Thus in Animism every object is thought of as alive and possessed of a soul. A more advanced stage is Polytheism, then Monotheism, but among the Jews monotheism was preceded by Monolatry—*i.e.* only one God was to be worshipped, but the existence of others was not denied.

It is impossible even to summarise here the different r's of the world, as regards either their history or their tenets—reference must be made to the articles on the r's themselves. Most of them have an extensive religious lit., and as their growth falls within historic times, they can be studied, so to speak, in the full light of day, but with more primitive forms this is not so; literary remains are more scanty, or can only be traced in survivals, or by way of analogy in the rites of savage races at the present time. But such inquiries, though extremely valuable, can at times be futile or misleading; resemblance does not prove derivation, and it is not always easy to argue back from a rite to the idea which underlies it. The results of the still young science of Comparative Religion are used by controversialists for exactly opposite purposes, so the exact significance of much that is known (itself but a small portion of what we may hope to know) is often an open question.

Considerable care, too, must be taken in the study of religions not to group them in an arbitrary way. Though divisions such as 'polytheistic,' 'monotheistic,' etc., may be useful, it is often best to keep to hist. or geographical arrangement, for certain times and countries seem to give their peculiar character to the faiths which have grown up in them, however different these faiths may be in origin. As civilisation has gradually progressed we can notice tendencies, both in the internal development of religious feeling and in the place occupied by religion in political and social life. The first may be considered under the heading *Prayer*, though it includes other sides of r. besides, such as ritual and sacrifice (*qq.v.*), the latter under the conception of the *Church*.

Prayer is the intercourse between the soul and God, but in cruder forms of religious thought it can only take the form of petition for the receiving of good things and the averting of evil. Sometimes the relation between a savage and his god takes the form (at any rate from the point of view of the savage) of a business transaction. The devotee promises certain gifts to his god if he can have benefits in return. Here there is nothing really spiritual; that only comes later, and increases with the growth of the moral as distinct from the ritual side of relation. Prayer is then the means of intercourse between God and man, for by it man brings himself into harmony and union with God, so that he is capable of receiving spiritual benefits, and, if the spiritual be the only real, other benefits besides. Given the existence of the Unseen, it is in prayer that communion with the Unseen is realised.

But r., like every other aspect of life, must have its corporate as well as its individual expression, and this we have in the **Church.** In primitive r., and in some forms of r. not primitive, there is no clear conception of the Church as distinct from human society, for r. was corporate and was shared in by all. No one could be outside the Church any more than he could be outside the tribe to which he belonged. But with Christianity, while the conception of the Chosen People was taken over from Judaism, there was now no distinction of race, and till the Church could be realised and the Kingdom of God come, the Church was bound to be set over against the world. Only in the Church could man be brought to God—***Extra Ecclesiam nulla salus*** **(outside the Church no salvation).**

According to the Catholic view the Church consists of all the baptized, and all can claim her privileges and sacraments, however they may have sinned, if they will but submit to her discipline. But this view did not win acceptance without challenge, for some, holding a most rigid theory, excluded from all participation in Church membership here and hope of salvation hereafter those guilty of serious post-baptismal sin. A somewhat similar position was taken up in the XVII. cent. by the Puritans, who would limit Church membership to a chosen few rather than the sinful many. Hence Protestantism tends rather to view the Church as the company of the converted.

The tendency of some forms of Liberal thought at the present time is to open the Church to all who are desirous in any way of participating in its activities. Stated differently, the Catholic view makes the Church an organism, the Protestant a collection of individuals, the Liberal an engine of progress. Besides these, many like the idea of the Church as a spiritual and heavenly company, of which the Church on earth is but a feeble reflection.

For primitive religion: Frazer, *Golden Bough*; Robertson Smith, *Religion of the Semites*. On religious psychology: W. James, *Varieties of Religious Experience*; Sanday, *Christologies Ancient and Modern*; Inge, *Christian Mysticism*. Generally: Martineau, *Study of Religion*; Gwatkin, *Knowledge of God*; Pfleiderer, *Philosophy of Religion*. Various modern interpretations in Inge, *The Church and the Age*; Figgis, *The Gospel and Human Needs*. For non-Christian religions: Menzies, *History of Religion*, and *World Religions*.

REMAGEN (50° 35′ N., 7° E.) (ancient *Rigomagus*), town, Rhineland, Prussia; Rom. antiquities. Pop. 3700.

REMAINDER, that portion or residue of interest which is made over to some other person, on the creation of a particular estate. It is always the work of certain parties; whereas **Reversion**—that portion of an estate left over, after a grant of less than the whole has been made by the owner to another person—arises by operation of law.

REMBRANDT, R. HARMENSZ VAN RHYN (1606-69), greatest painter of Dutch school, was born in Leiden. His first master was Jacob von Swanenburch. In 1624 he entered the studio of the famous Pieter Lastman at Amsterdam, but after six months' study Rembrandt left, finding his master's artificial style abhorrent to his own realistic taste, and resolved to develop his art according to the dictates of his own genius. Among his earliest pictures are *St. Paul in Prison*, the *Money Changer*, and the famous *Lesson in Anatomy*. In 1634 he married Saskia van Uylenborch, who died eight years later.

From this time the artist's life was darkened with domestic trouble, and the gloom within is reflected in his art. It was character in the human face which appealed to R. above all else, and in which his intuitive realism found its noblest expression. This fact accounts for his preference for portrait-painting and the predominance of old age among his subjects. In his Biblical subjects his art is simple, frank, and bold: characteristic are the *Entombment* and *The Woman taken in Adultery*. His finest portrait groups are the *Night Watch* and the *Lesson in Anatomy*.

His landscapes are also dark and sombre. The *Mill* is a magnificent specimen. As an etcher Rembrandt also reaches the highest perfection. There is a fine collection of his etchings in the Brit. Museum.

Rembrandt, Masterpieces in Colour Series.

REMEDIOS, SAN JUAN DE LOS REMEDIOS (22° 30′ N., 79° 30′ W.), town, Santa Clara province, Cuba. Pop. 6800.

REMIGIUS, ST. (437–533), bp. of Reims, France.

REMINISCENCE.—(1) in general, a term for memory. (2) particularly, a translation of Plato's *Anamnesis*, or recollection in this life of knowledge gained in a previous state of existence.

REMIREMONT (48° N., 6° 36′ E.), town, on Moselle, department Vosges, France; has interesting remains of mediæval abbey; cotton spinning and weaving. Pop. 10,600.

REMONSTRANTS, Dutch followers of Arminius (*q.v.*) who, in 1610, drew up Remonstrance against orthodox Calvinist views on predestination.

REMSCHEID (51° 12′ N., 7° 12′ E.), town, Rhineland, Prussia; hardware manufactures. Pop. (1910) 72,159.

RÉMUSAT, CHARLES FRANÇOIS MARIE, COMTE DE (1797–1875), Fr. statesman and writer; took an active part in politics from 1830; philosophic and hist. works of value for impartial attitude and width of view.

RENAISSANCE, THE, RENASCENCE, the intellectual development by which modern Europe was evolved from the Middle Ages. The R. (Fr. *renaissance*, rebirth) meant the full restoration of civilisation.

For hist. convenience modern history has been divided into the three chief periods of Dark Ages, Middle Ages, Modern Times. The Dark Ages commenced with the final overthrow of classical civilisation by the barbarians who overran the Rom. Empire; a convenient date is 476, when the Ger. king Flavius Odoacer deposed the last Rom. emperor of the West, Augustulus. The Middle Ages ended when the Teutonic barbarians, who had been evolving a civilisation of their own, rediscovered the civilisation of antiquity. Concurrent discoveries made the movement no mere **Revival of Learning**, as it is sometimes called, but a development of the human spirit almost amounting to rebirth.

There were many signs that, in an infinitely longer time, the Middle Ages would by themselves have achieved the new civilisation: the mediæval conception of the Holy Rom. Empire of the Ger. nation, mediæval Rom. Catholicism, the very theology and law which constituted the mediæval 'scholastic system' (anathema at the R.), were wonderful intellectual structures, undertaken in the spirit of the men of the R. Gothic architecture, which started with the imitation of Rom. buildings, mediæval art, the *troubadours* and *minnesingers*, great poets like Dante, Chaucer, and Petrarch, show that there is some exaggeration in christening the subsequent development *Renaissance*.

A great difference, however, between mediæval and R. culture was the conscious *humanism* of the latter. HUMANISM, antagonistic to Rom. Catholicism, struck at the roots of mediæval thought; instead of setting before man an ideal for the realisation of which his individuality was to be sacrificed, it insisted on the further development of his actual character. The men of the R. chose to be called Humanists from their salient characteristic. Their attitude towards the Middle Ages may be judged by the adjective with which they described its arch.: not for 300 years did 'Gothic' cease to be a term of contempt.

'The first modern man was an Italian'; the Italians, with Latin blood in their veins and living among the ruins of classical culture, readily revived the pagan spirit. PETRARCH (1304–74), although belonging to the Middle Ages, was one of first to feel the spell of antiquity; he treasured MSS. of Latin classics and wrote to the pope begging him to restore Rome to its place as the head of civilisation. The Humanistic movement began when the study of Gk. classics was added to that of Latin. Scholars like the famous Poggio visited Byzantium, learned Greek, and spread the knowledge in Italy, but the study was attended with difficulty till the FALL OF CONSTANTINOPLE, 1453, when Gk. scholars fled from Turk. rule to Italy. The R. is generally said to date from 1453.

Closely connected with this Revival of Learning is the movement which produced the REFORMATION. Study of the Gk. Scriptures and Gk. Fathers, known then as the NEW LEARNING, resulted in the break-up of the mediæval universal Church. The other movements concurrent with the Revival of Learning were chiefly—the invention of printing, about 1450; the

development of nationalities, which destroyed the mediæval conception of a world-empire; the use of gunpowder, which revolutionised the art of war and dealt a great blow at feudal organisation of society, and astronomical and geographical discoveries. With the Revival of Learning came the knowledge, handed down by the Egyptians, that the earth is spherical in form, and COPERNICUS (1473–1543) proved that the earth was a satellite of the sun. Portug. and Genoese travellers, who discovered America, rounded the Cape of Good Hope, and circumnavigated the globe, drew their inspiration from geographical works of ancients and received the congratulations of the Humanists. Their discoveries played almost as important a part in the imaginative outburst as did the classical revival.

The Italian R. produced great scholars and archæologists like Giovanni di Conversino, Coluccio de' Salutati, Gasparino da Barzizza, Lorenzo Valla, Bembo, Paulus Jovius, Poggio, Biondo, Pico della Mirandola, and the Aldi, patronised by Humanists like the Medici; but the immortal works of Ital. R. are seen in Architecture (*q.v.*), Sculpture (*q.v.*), and Painting (*q.v.*); famous names—Brunelleschi, Alberti, Michelangelo, Raphael, Donatello, etc. France and Germany were both influenced by the movement before England; cf. famous Fr. R. buildings, art, printing, etc., and great literary outburst of *Pléiade*. England had its small Oxford school of Humanists, of whom ERASMUS was Dutch and of the others MORE alone enjoyed European fame. Architecture, etc., was little influenced till XVII. cent. Surrey, Wyatt, and others experimented with new verse-forms, but true R. outburst in England only came with age of Shakespeare.

J. A. Symonds, *Renaissance in Italy*; *Cambridge Modern History*; Sidney Lee, *French Renaissance in England*; Hudson, *Story of the Renaissance* (1912).

RENAISSANCE OF WONDER, RENASCENCE OF WONDER, name given by Theodore Watts-Dunton (*q.v.*) to the Romantic Revival. To fact, the Romanticists sought to impart "the light that never was on sea or land." Coleridge's *Ancient Mariner* is perhaps the Eng. masterpiece of the Romantic movement, considered in this aspect. In Germany Tieck and Hoffman showed similar mastery of the supernatural.

RENAIX (50° 45′ N., 3° 45′ E.), town, province E. Flanders, Belgium; dye-works; bleachfields. Pop. 22,000.

RENAN, ERNEST (1823–92), Fr. philosopher. A Breton fisherman's grandson, he was (owing to his brilliant gifts) trained for priesthood at Saint Sulpice Seminary. Leaving through religious doubts, R. began to seek truth in Science. His first work, *The Future of Science* (1849), was published last. He studied philosophy, theology, history of religions, and ancient languages, but never became a great scholar; although he did much service to Biblical criticism, his style is his great merit; his opinions have roused much disputation; *Life of Jesus* (1863) and *Origins of Christianity* caused great sensation by rejection of divine elements from history of Christianity; best work, partly autobiographical *Souvenirs d'Enfance et de Jeunesse* (1876–82), written in exquisitely simple style; last work, *People of Israel* (1887–92).

Barry, *Renan* (1905, Literary Lives Series).

RENARD, ALPHONSE FRANÇOIS (1842–1903), Belg. geologist; prof. of Geol., Univ. of Ghent, 1888; awarded Bigsby medal (Geological Soc., London), 1885.

RENAUD DE MONTAUBAN, hero of Fr. and Ital. romance. Aymon, a favourite of Charlemagne, has four sons—Renaud, Alard, Guichard, and Richard. A feud arises between Charlemagne and the youths. Renaud in his exile becomes a hero of Christian chivalry.

RENAUDOT, THÉOPHRASTE (1586–1653), Fr. physician and philanthropist; b. at Loudun; summoned to Paris by Richelieu; opened a charitable information bureau, and a free dispensary; in 1631 established the first Fr. newspaper, the weekly *Gazette*; app. Historiographer Royal by Mazarin.

RENDSBURG (54° 18′ N., 9° 40′ E.), town (former fortress), Schleswig-Holstein, Prussia, on Eider and Kaiser Wilhelm Canal; cotton goods. Pop. (1910) 17,315.

RENÉ, GOOD KING RENÉ (1409–80), Duke of Anjou, of Lorraine, and Bar, count of Provence, etc., king of Naples and of Jerusalem; m. Isabel, heiress of Charles II. of Lorraine, on whose death he sought to enter duchy of Lorraine, but was defeated and imprisoned, 1431; released, 1432, but revived claim, 1435, and returned to prison; succ. bro., Louis III., in Naples, Provence, and Anjou, 1435; liberated, 1437, but could not wrest Naples from Alphonse of Aragon, and established himself in Provence, where he made a great name in the history of lit.

RENFREW (55° 53′ N., 4° 24′ W.), town, on Clyde, Renfrewshire, Scotland; shipbuilding yards, engineering-works. Pop. (1911) 12,565.

RENFREWSHIRE (55° 50′ N., 4° 30′ W.), county, W. Scotland, lying along Clyde; area, 239 sq. miles; surface reaches an extreme height of 1711 ft. in Hill of Stake; chief towns, Renfrew (county town), Paisley, Greenock, Gourock, Port-Glasgow; agriculture, dairy-farming, and stock-raising are important industries; produces coal, iron-stone, and shale; manufactures thread, cottons, chemicals; has shipbuilding, engineering, sugar-refining, and print and bleach works. Pop. (1911) 314,574.

RENI, GUIDO, see GUIDO RENI.

RENNES (Gallic *Condate*) (48° 6′ N., 1° 40′ W.), town, at junction Ille and Vilaine; capital, department Ille-et-Vilaine, France; ancient capital of Brittany; abp.'s see; principal buildings are the cathedral, church of Notre Dame, Mordelaise gate, palace of justice, and town hall; has univ. coll., picture-gallery, and library; tanneries, sawmills; besieged by the English in 1356. Pop. (1911) 79,372.

RENNIE, JOHN (1761–1821), Scot. engineer; began life as millwright; constructed or designed Waterloo Bridge, London Bridge, London Docks, Plymouth Breakwater, and other great engineering undertakings.

RENO (39° 40′ N., 119° 55′ W.), city, on Truckee, Nevada, U.S.A.; reduction-works; flour-mills. Pop. (1910) 10,867.

RENOUVIER, CHARLES BERNARD (1815–1903), Fr. philosopher; disciple of Kant; held that metaphysics cannot reach knowledge of God, yet claims of religion are vindicated on practical grounds.

RENSSELAER (42° 40′ N., 73° 45′ W.), city, on Hudson, New York State, U.S.A.; railway-shops; felt manufactures. Pop. (1910) 10,711.

RENT, the charge made by the landlord for the use of land or premises thereon. It is legally due on the morning of the last day of the tenancy, according to the length of time of the tenancy. Different kinds of rent exist—*Rack rent*, an excessive charge equal to the full annual value of the property; *peppercorn rent*, a nominal charge, often inserted in building leases, to be paid while premises are in course of erection; *ground rent*, paid to the owner of the freehold; *net rent*, the amount payable to the landlord clear of all deduction; *quit rent*, the ancient rent of a freeholder to the manor whereby he went quit and free of all services. Defined by Ricardo as 'that portion of the produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil'; by Marshall as 'the income derived from the ownership of land and other free gifts of nature.'

RENTON (55° 58′ N., 4° 35′ W.), town, on Leven, Dumbartonshire, Scotland; dye-works. Pop. (1911) 4977.

REPINGTON, PHILIP (d. 1419), bp. of Lincoln, 1404–17; cardinal, 1408.

REPNIN, PRINCE ANIKITA IVANOVICH (1668–1726), Russ. general under Peter the Great; made field-marshal by Catherine I. Grandson, PRINCE

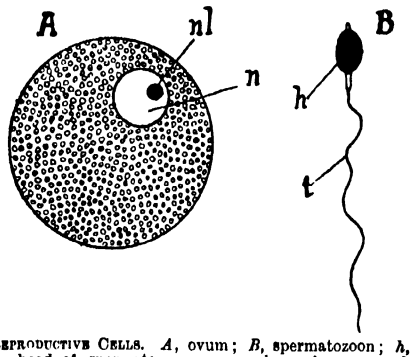
NIKOLAI VASILEVICH (1734–1801), field-marshal, 1796; won great victories against Turks.

REPORTING.—Reporting staffs of important newspapers number from six to fifteen or more men, their work being supplemented by reports of News Agencies, *Press Associations*, etc. A recent innovation is the inclusion of women, to whom special duties are assigned, such as attendance at social functions. Except in the case of political leaders, verbatim reports are rarely given. Speeches in Parliament were at first reported surreptitiously, but now ample accommodation is provided for the Press. The successors of Luke Hansard (b. 1752) provide a substitute for an official report by supplementing newspaper reports by notes taken by their own staff.

REPRESENTATION, see ELECTION, PARLIAMENT.

REPRODUCTION, the power possessed by plants and animals, and by them alone, of giving origin to new forms of life after their own kind. R. in general follows two main types, *vegetative* or *asexual* and *sexual*.

The former, in spite of its name, is by no means confined to plants, for it is chiefly shown in the formation of buds which assume adult characters before or after being set free from the parent to become independent individuals. This asexual reproduction is equally exhibited by the runners of Strawberry plants and the stolons of Hydroid Zoophytes, by the tubers of Potatoes and the buds which spring from the bodies of Sponges and of many Cœlenterates. Especially in the last, generation after generation of buds frequently remain attached to the parent and result in the formation of colonies such as those of coral polyps or of many Hydrozoa. Asexual r. is manifested in its simplest form in the division of a single cell into two daughter



REPRODUCTIVE CELLS. *A*, ovum; *B*, spermatozoon; *h*, head of spermatozoon; *n*, nucleus of ovum; *nl*, nucleolus of ovum; *t*, tail of spermatozoon.

cells which become independent, as in many Protozoa and Protophyta and, in more complex form, in those successive divisions which take place usually in drought-withstanding cysts and results in the formation of many minute spores which develop into adults, as in Mycetozoa, Sporozoa, other Protozoa. A highly specialised asexual development is illustrated in the alternation of generations (*q.v.*) which takes place in many Cœlenterates, pelagic Tunicates, some Worms and Sponges.

SEXUAL REPRODUCTION, however, is more common than asexual, and consists essentially in the union of two cells set aside for the purpose, and kept apart during their existence from the construction of the body which contains them. In flowering plants sexual cells of a kind are obscured in the vegetative pollen grain and ovule, but in animals their relationships are comparatively simple and definite, although there are different grades of sexual specialisation in the two cells concerned. Thus in Protozoa two or many similar cells may flow together, their nuclei may fuse, and finally the conjunct cell may break afresh into two or more individuals, each endowed with a new lease of life. Or, again in Protozoa, the cells which unite may show slight differences in structure and habit, a small active member uniting with a larger more passive individual, and this foreshadows the final development, found in most animals higher than Protozoa, where a minute active *spermatozoon* or male cell fuses with larger immobile *ovum*, egg, or female cell, and so starts the growth of a new individual.

In a few cases, often under special conditions, eggs may develop into new individuals without the help or presence of spermatozoa; this occurs, for example, in many Aphides or Green-Flies, small Crustacea, Wheel Animalcules or Rotifers, and in the case of drone-bees, and is known as *parthenogenesis*.

But the more normal course of sexual r.—fertilisation—may be glanced at. A minute, active, often tadpole-like spermatozoon, wriggles to the ovum (*q.v.*), which has undergone a strange process of preparation or *maturation*, for it has rejected two polar bodies split off the nucleus or germinal vesicle, in such a way that the definite number of chromatin rods (chromosomes) of the nucleus is reduced by half. A similar reducing or meiotic division has taken place during the formation of the spermatozoon, so that when the head of the latter, bearing the nucleus, enters the ovum, the intimate fusion of the nuclei of both results in a new single nucleus with the full specific number of chromosomes. And in this mixing of two parental strains, or *amphimixis*, lies the possibility of variations so characteristic in the results of sexual union.

Following on this intimate union of spermatozoon and ovum the latter begins to segment or divide into daughter cells, the typical course being the formation of two, four, eight, sixteen cells, and so on until a solid ball of cells or morula results. Further division leaves a central hollow, and the hollow ball is known as a *blastula* or *blastosphere*.

At one pole the wall of the bastosphere topples in, and dinted thimble-shaped ball is known as a *gastrula*, the outer wall of which becomes *ectoderm*, while the dinted-in wall, now lying close against the other, forms an inner layer, the *endoderm*. There are many modifications of this process due to the presence of varying quantities of yolk upon which the embryo is to be nourished, but all divisions result in the formation of these two layers—ectoderm and endoderm, separated eventually by a layer of secondary origin, the *mesoderm*. It is valuable to remember that throughout the animal kingdom these primitive layers always give rise to similar types of organs: from the ectoderm develop the outer skin and its products, such as nails, hair, and horny armour, the nervous system, and portions of the sense organs and food tract; from the mesoderm develop the lower skin layer (*dermis*), muscles, bone, the vascular system, and such like; while the endoderm gives rise to the notochord, and to the mid portion of the food tract with its products, liver, kidneys, lungs, etc.

So various are the details of development in different groups and even species of animals that it is impossible to follow them further, but it is well to remember that in most ova there is a comparatively large supply of nutritive yolk upon which the embryo is sustained until it is able to fend for itself.

The young of higher vertebrates—Reptiles, Birds, and Mammals—are protected by a membrane, the *amnion*, which forms a fluid bag around the developing embryo, and with this is associated another outgrowth, the allantois, with respiratory and yolk-absorbing powers. This latter structure in great part forms the placenta which in most Mammals unites the young with the mother, a means whereby the embryo is nourished directly by the blood of the parent which shields it.

The reproductive faculty varies in different animals almost without limit. On the one hand a single liver-fluke may engender half a million embryos, or a cod-fish may produce in a year over four million eggs; on the other hand the limit is reached by most Mammals and by some Birds, such as the Fork-tailed Petrel,

which have only one young at a time. Again, many Insects and lower animals have a multitude of broods in a year, while some Mammals, such as the Elephant, have only offspring at intervals of several years. As a general rule, where the offspring is better cared for by the parent and where it runs fewer risks of destruction before maturity is reached, there the numbers of young broods and of young in a brood become reduced. See also EMBRYOLOGY and SEX.

REPRODUCTIVE SYSTEM in man has certain parts in common with the urinary system (*q.v.*), and includes, in the *male*, the testicles or testes, epididymis, vasa deferentia, seminal vesicles, prostate gland, urethra, and penis, and in the *female*, the ovaries, Fallopian tubes, uterus or womb, vagina, and vulva.

The *testicles* or *testes* are two in number and are situated side by side in the *scrotum*; each is oval in shape, about 1½ inches long and 1 inch broad, covered with a strong fibrous coat, from which fibrous partitions go into the substance of the gland, dividing it up into compartments in which are, intricately coiled, the seminiferous tubules, where the spermatozoa, or male sexual elements, are formed. The *epididymis* lies behind the testis, and is a body formed of a greatly convoluted tube, the duct from the testis.

The *vas deferens* is the continuation of the tube which forms the epididymis, at first also convoluted, but soon becoming straight, and running up from the scrotum, through the external and internal abdominal rings, down the side of the pelvis to the base of the bladder, where it becomes dilated and then joins its fellow of the opposite side to form the common ejaculatory duct.

The *seminal vesicles* are two sacs, which are really tubes coiled upon themselves and held in a sac-like form by dense tissue; they lie close behind the bladder and alongside the vasa deferentia, into the ends of which they open. It is now considered that the vesicles are not merely receptacles for the semen, or secretion of the testes, but that they themselves secrete a mucous fluid which mixes with the semen.

The *prostate gland* is a cone-shaped structure partly of glandular and partly of muscular tissue, and covered with a strong fibrous capsule; it lies with its base in contact with the bladder, and its substance is traversed by the urethra and by the ejaculatory ducts from the seminal vesicles and vasa deferentia.

The *urethra* is the tube which conveys the urine from the bladder and also the semen, or secretion of the testes, from the vasa deferentia and seminal vesicles. It may be considered as in three parts, the prostatic urethra, in which the ejaculatory ducts, which convey the semen, and the numerous small ducts of the prostate open; the membranous urethra, which is very narrow, and is between the two layers of the triangular ligament; the spongy urethra is that part which is within the penis, and into it mucous glands and the two small glands known as *Cowper's glands* open.

The *penis* is composed of three cylindrical masses of erectile tissue, covered with subcutaneous tissue and skin; two of the cylindrical masses, the *corpora cavernosa*, are situated above, side by side, and one, the *corpus spongiosum*, in which the urethra runs, below, in the middle. At the root of the penis the two corpora cavernosa become thicker and more fibrous, and are joined at each side to the arch of the pubis, while the corpus spongiosum enlarges to form the bulb, which is attached to the triangular ligament. At the front of the penis the corpus spongiosum enlarges to form the *glans*, which constitutes the whole of the front part of the organ, and is covered by the foreskin.

In the female the *ovaries* are two in number, almond-shaped, situated in the pelvis, one on each side, joined by short folds of peritoneum with the broad ligaments which attach the uterus to the sides of the pelvis. Embedded in the fibrous tissue of the substance of the ovary are little masses of epithelial cells, from which the *Graafian follicles*, and eventually the ova, or female sexual elements, develop.

The *Fallopian tubes* lie one on each side in the upper borders of the broad ligaments and serve to convey the ova from the ovaries to the uterus into the upper angles of which they open; the distal end of each tube has in it a small opening into the peritoneal cavity of the abdomen, and has fringes, or *fimbriæ*, hanging from it, the largest of which is attached to the ovary. The ova, which are discharged upon the surface of the ovary, thus pass actually into the abdominal cavity before being swept by the fimbriæ into the Fallopian tube and so to the uterus.

The *uterus* or *womb* is a pear-shaped, muscular, hollow organ, about 3 inches long, 2 inches broad at its widest part, and nearly 1 inch thick, in its non-pregnant condition; it is usually considered in three parts: the *fundus*, or upper rounded part, above the entrance on each side of the Fallopian tubes; the *body*, which gradually diminishes in breadth, and is marked off by a slight constriction from the *cervix*, which is narrower and more cylindrical than the body, with a knob-like, rounded, lower extremity, in which is a minute opening, termed the *os externum* of the uterus. The normal position of the uterus is that of anteflexion, *i.e.* it is bent forward upon itself so that the body and cervix meet at an acute angle. From each side of the organ the *broad ligaments*, formed of a double layer of peritoneum, go out to the wall of the pelvis; to them are attached the ovaries, and they contain several important structures, including the Fallopian tubes and the muscular *round ligaments*, which have an important share in holding the uterus in position.

The *vagina* is the passage, lined with mucous membrane, which leads from the uterus to the exterior.

The *vulva* includes all the female external genital organs, comprising the *mons veneris*, the fatty pad covered with hair in front of the pubis; the *labia majora*, the two folds of skin extending from the mons veneris almost to the anus; the *labia minora*, two smaller folds of skin lying internal to the labia majora, enclosing the clitoris in front; the *clitoris*, which is the representative of the male penis in the female, composed like it of erectile tissue; the *urethral orifice*, a puckered opening about an inch below the clitoris; the *hymen*, a fold of mucous membrane incompletely closing the entrance to the vagina.

The development of the reproductive organs is practically the same in the two sexes up to the fifth or sixth week of intra-uterine life, and only then does the differentiation of the sexes begin to become evident. The main points are that the embryonic *Wolffian duct* becomes, in the male, the epididymis, vas deferens, seminal vesicle, and ejaculatory duct, while in the female it disappears, except for a few traces; on the other hand the embryonic *Müllerian duct* is represented in the male only by a minute diverticulum in the upper part of the urethra, while in the female it develops into the Fallopian tubes, uterus, and vagina.

Cunningham, *Textbook of Anatomy*; Gray, *Anatomy*.

REPTILES, Class REPTILIA (Lat. *repo* or *repto*, I crawl).—In this great class are grouped the very diverse animals known as crocodiles, tortoises, turtles, snakes, lizards, and a host of gigantic extinct forms as various in shape and habit as are their modern relatives. Together they form a class of great interest, placed far on in vertebrate lineage at that vital point in evolution when, after a period of oscillation between water and land, the latter was selected as the site for that development which was to lead to man. R. show relationships both backwards with Amphibia and forwards with Birds and Mammals, but they are more closely connected with the latter groups, which they resemble in the protection given to the embryo by a fœtal membrane, the *amnion*. Hence R., Birds and Mammals are known collectively as *Amniota*. But the likenesses between R. and Birds are particularly striking—so that Huxley even termed the latter greatly modified Reptiles, and placed both in a new division, Sauropsida (*q.v.*).

The distinctive features of R. as a class may be

summarised thus. They are cold-blooded Vertebrates with bodies protected externally by an armour of scales or horny plates. They breathe by lungs, and at no stage have functional gills. They lay large eggs, and the embryos are protected by two membranes, an amnion and an allantois.

To glance at reptilian features in greater detail, the body is generally elongated, with a well-developed, strong tail, and is the chief organ of locomotion, for the four legs, which are present except in Snakes and a few limbless Lizards, usually act as simple paddles which push the main bulk of the body along the ground. Particularly characteristic from an external point of view is the armour of scales, composed of horny material or keratin and formed by the epidermis, which protects the animal from injury as it creeps along or from the attacks of enemies. This scaly coat is cast regularly, either in fragments or, in Snakes and many Lizards, as a whole—the process being known as *sloughing* or *ecdysis*. In some Lizards the protecting scale-like structures are true dermal ossifications.

In the skeleton, generally strongly built, there are several points of interest. The skull has many cartilage bones and articulates with the backbone by a single condyle. The jaws, except in adult Chelonia which possess horny sheaths, have small sharp teeth, often curved backwards, suitable for grasping prey but useless for crushing. In some Snakes (*q.v.*) specialised teeth in the upper jaw are associated with a poison gland, and a somewhat similar structure occurs in the Lizard, *Holoderma*. The bodies of the vertebræ, which are often exceedingly numerous, are usually concave in front, convex behind—procœlous, but in *Sphenodon*, Gecko Lizards, and many fossil forms they are amphicœlous, concave at both ends. Ribs are well developed, sometimes immobile as in Tortoises and Turtles, where they are guard to the carapace, but usually free and movable as in Snakes, where they take a great part in locomotion, or in Flying Lizards, where they form the framework on which a parachute is stretched.

Muscular and nervous systems are well developed, and the senses of R. are in many cases acute. Peculiarities are to be noted in the lidless eyes of Snakes and some Lizards, in the sensitiveness to vibrations of the tongue of Snakes, and in the valved nostrils of some aquatic forms.

The majority of R. feed on flesh, and their digestive system is regulated accordingly. Thus there are well-developed salivary or sublingual glands; the gullet is long, generally with plaited walls so that it may undergo the inordinate amount of stretching necessary where large prey is swallowed without previous mastication; and the intestine is short. Exceptions occur in the case of the vegetarian Chelonians where the gullet often bears horny processes used in tearing the food, such as seaweed upon which many marine species live, and the intestine, as in most vegetarian animals, is long and coiled. In all, the food canal ends in a common vent or cloaca, into which the urinary passage and genital ducts open, the latter being accompanied in the case of males by a protrusible sexual organ which lies on the anterior or posterior of the common vestibule.

R. differ from Amphibia in that at no stage of their existence do they breathe by gills. Lungs are well developed and air enters them by the action of the ribs or by simple swallowing. The heart shows a gradual advance in efficiency, for while in most it is three-chambered, the undivided ventricles allowing pure and impure blood to mingle, in the Crocodiles it is four-chambered, the ventricles being separated by an internal partition which divides arterial from venous blood. At least two aortic arches rise from the ventricles. As in Birds, the red blood corpuscles bear a nucleus and are oval in shape, but R. are cold-blooded creatures, their temperature standing only a little above that of their surroundings, with which it fluctuates.

Reproduction and development are of great interest. Like Birds, R. lay large eggs, protected by a limy or sometimes membranous shell, but in a few forms development takes place within the body of the parent and living young are produced. Unlike most Birds, however, they give little care to the development of the egg, which is generally allowed to hatch by the heat of the sun. As in Birds and Mammals, part of the egg forms a sort of water-jacket—the amnion—which surrounds the embryo, keeping it afloat in a liquid medium and protecting it. With it is associated a respiratory and yolk absorbing outgrowth, the allantois; but both these, allantois and amnion, are cast off at birth.

R. are predominantly terrestrial creatures, but they exhibit much diversity of habit. The majority crawl on the surface, but some Snakes and Lizards burrow underground, many Chelonia and a few Snakes have adopted an aquatic life, Snakes and Lizards frequently adopt an arboreal habit, Flying Lizards parachute from tree to tree, and the extinct Pterodactyls conquered the air. All are dwellers in tropical or temperate regions, but the former is their true home and their numbers dwindle as one recedes from the Equator. Like many creatures subjected to extremes of heat, a large proportion of their number pass over the dangerous drought seasons in a state of torpor, known as *æstivation*, a phenomenon very similar to the physiological winter sleep or *hibernation* in which others of their class (Tortoises are well-known examples) spend the cold periods of the year.

At the present day R., though they number almost 5000 species, are decadent members of the animal kingdom, for in earlier ages no creatures could compare with them in size, strength, or number. Their earliest fossilised remains have been found in rocks of Permian Age, but in Jurassic and Cretaceous times they reached their greatest development, constituting the predominant inhabitants of air, land, and water. A few of the strange forms then in existence are mentioned below in the note on classification.

R., though of little use to man, still have much significance for him, for in India alone an annual toll of some 20,000 lives is paid to the bite of poisonous Snakes, and Crocodiles add to the death-roll. African Crocodiles harbour in their bodies a Trypanosome which subsequently develops in the Tse-tse Fly, and has been considered to be the cause of the fatal disease sleeping sickness. But this allegation seems to be due to a confusion between some stages of the Crocodile parasite, *T. grayi*, and the distinct *T. gambiense*—the true cause of sleeping sickness. Reptiles serve useful purpose from the human point of view in destroying the multitudes of insects upon which most Lizards and many Snakes feed, and the latter especially do much to keep down the numbers of ground vermin. Apart from such indirect services, Crocodiles furnish a stout ornamental leather, manufactured from portions of their skin, and the horny carapace of Tortoises is made into articles of tortoise-shell.

The Class REPTILIA is divided into eleven orders, sometimes grouped in various sub-classes:—

Order I. RHYNCHOCEPHALIA, e.g. *Sphenodon* (q.v.), sometimes made the solitary occupant of the sub-class PROSAURIA.

Order II. LACERTILIA or LIZARDS (*q.v.*).

Order III. OPHIDIA or SNAKES (*q.v.*). (Owing to their many resemblances, Lizards and Snakes are sometimes grouped together in the sub-class SAURIA.)

Order IV. CHELONIA, TORTOISES AND TURTLES (*q.v.*).

Order V. CROCODILIA, CROCODILES (*q.v.*).

Extinct forms:—

Order VI. PYTHONOMORPHA, e.g. *Liodon* and *Dolichosaurus*, elongated Cretaceous relatives of *Sphenodon* and the Lizards, found in American and European deposits; body snake-like,

sometimes 80 ft. long, with two pairs of swimming paddles; marine and carnivorous.

Order VII. ICHTHYOSAURIA or ICHTHYOPTERYGIA, e.g. *Ichthyosaurus*; extinct r. which lived in the Old World from Triassic to Cretaceous times; body whale-like, 30 to 40 ft. long, with two pairs of swimming paddles; marine and carnivorous.

Order VIII. PLESIOSAURIA or SAUROPTERYGIA; inhabitants of Europe, New Zealand and America in the Chalk period; heavy-bodied, long-necked r. related to Tortoises and Turtles, but without external armour. Some lived on land, but the majority were marine and had paddle-like limbs and tail, e.g. *Plesiosaurus*, 40 ft. long, found fossil in England, and the American *Elasmosaurus*.

Order IX. THEROMORPHA, e.g. *Dicynodon* and *Elginia*; Permian and Triassic, r. whose remains are found mainly in S. Africa, though *Elginia* and others are Scot. fossils, and several are Amer. Lizard-like land creatures, interesting because they exhibit both reptilian and mammalian characteristics, indicating perhaps the point of origin of the mammals.

Order X. DINOSAURIA, DINOSAURS, mammal-like r. with large body bearing four limbs, on all of which or on the hinder pair only, the creatures moved. Their remains, which show bird and mammal relationships, are widely distributed in deposits ranging from Triassic to Cretaceous Age, especially in America and Belgium. All were terrestrial, but some, such as the gigantic *Diplodocus*, *Brontosaurus* (50 ft.), and *Iguanodon* (28 ft.), were herbivorous and probably amphibian, while *Læaps* and *Megalosaurus* were fiercely carnivorous; examples of the former stood 18 ft. high.

Order XI. PTEROSAURIA, ORNITHOSAURIA or PTERODACTYLS, e.g. *Pterosaurus* and *Rhamphorhynchus*, highly specialised flying reptiles, the remains of which are found in rocks from Lower Jurassic to Upper Chalk; wing-like flaps of skin extended from an exceedingly long finger to hind limbs and tail. Though distinctly reptilian, in many structures they closely resemble birds, varying 'from the size of a sparrow to that of a condor,' but no traces of such external covering as feathers have been found.

REPTON (52° 50′ N., 1° 32′ W.), village, on Trent, Derbyshire, England; noted grammar school.

REPUBLIC (Lat. *res*, business; *publicus*, public), state in which government is aristocratic or democratic, not monarchical. The city-states of antiquity usually passed through a monarchical to a republican phase, and attained their highest culture in the latter, but the r's of Greece and Rome were oligarchic—a few ruling a large slave class. The ancient cities of Italy retained the Rom. ideal. Rome itself made attempts at republican revolution in XII. and XIV. cent's, while Venice quickly won freedom from imperial control. Florence became the centre of republican feeling under Renaissance influence; the political institutions of Greece and Rome were studied, but the Florentine republic came to an end, 1530, and the greater part of Italy, like the rest of the world, came under absolute government. Calvinism was the parent of modern democracy,—the Swiss federation, the Dutch republic, the Eng. Commonwealth, and Amer. colonies (of which republicanism was natural development); and Fr. Revolution, it is agreed, was largely due to admiration of the *philosophes* for Eng. and Amer. ideas. The Fr. Revolution, however, was the child of both Reformation and Renaissance, owing as much to Plutarch as to democratic ideals of Reformed countries. U.S.A. and Switzerland are *federal* r's, *i.e.* composed of federated states; France and Portugal are unitary r's. For methods of government in r's, see CHINA, UNITED STATES, FRANCE, SWITZERLAND, MEXICO, PORTUGAL, and various S. Amer. states.

REPUBLICAN PARTY, first arose in America in disputes of North and South as to slavery. The Kansas-Nebraska Bill raised the whole question, and both Whigs and Democrats of North joined in formation of new Abolitionist party, which they named Republican, 1854, under leadership of Henry Ward Beecher, Abraham Lincoln, Sumner, Seward, Greeley, etc. The strength of the party determined the South to secede, and Republicans thereupon became identified with the Union party. They secured Lincoln's election as Pres., 1860, but on immediate secession of Southern States slavery agitation was for a while laid aside. Their statesmanship in crushing Southern revolt secured their future importance, and they remained supreme in U.S.A., 1865–77; followed up victory by liberation of slaves, 1863; enormous question of treatment of liberated slaves tried their powers of administration to utmost. Disputes between Congress and Pres. as to latter's powers, restiveness of South under misgovernment, and, finally, corruption of R. party culminating in scandals at Washington, 1874–76, destroyed enthusiasm for it.

The election of 1874 gave Democrats a majority in House of Representatives, though Republicans carried their candidate, Hayes, at disputed presidential election, 1876. For 16 years between 1874–94 the Democrats controlled the House of Representatives and then (1896) the Republicans' support of gold standard of currency and increased Protection led to their return, with M'Kinley as Pres.; split between R. 'Insurgents' (of whom Roosevelt assumed leadership) and 'Old Guard' (led by Pres. Taft) was followed (1910) by Democratic triumph in House of Representatives elections, although Republicans retained majority in Senate. Roosevelt (*q.v.*) and new Progressive party broke away from R. party, and Democrat candidate won at presidential election, 1912.

REQUEÑA (39° 31′ N., 1° 10′ W.), town, Valencia, Spain; manufactures wine. Pop. 17,000.

REQUEST, LETTERS OF, are sent by an inferior judge to the Dean of Arches, for the trial of cases, when the right of jurisdiction has been waived in the lower court.

RESCHEN SCHEIDECK (46° 50′ N., 10° 31′ E.), Alpine pass (4890 ft.) between Inn and Adige valleys.

RESERVE, see ARMY.

RESHT (37° 15′ N., 49° 25′ E.), town, Gilan, Persia; trade in silk and cocoons. Pop. *c.* 42,000.

RESINS, vegetable compounds of oxygen, carbon and hydrogen; soluble in alcohol, ether, essential oils, alkalis. Hard r's are solid; they include lac, copal, guaiacum, mastic, jalap (*qq.v.*). Soft r's contain essential oils (see BALSAM). See GUM, ROSIN.

RESORCIN, RESORCINOL ($C_6H_4(OH)_2$), metadihydroxybenzene, colourless crystals, soluble in water, alcohol, ether; M.P. 118° C.; obtained by heating galbanum resin with potash; used to make fluorescein, eosin, azo-dyes.

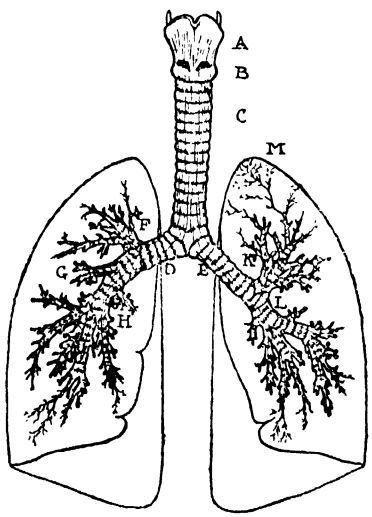
RESPIRATORY SYSTEM includes the nasal passages, pharynx, larynx, trachea, bronchi, and lungs; the first three are treated under OLFACTORY SYSTEM, PHARYNX, LARYNX, so that the trachea, bronchi, and lungs only fall to be considered here.

The TRACHEA is the tube which conveys the air from the larynx to the bronchi, being rather over 4 inches in length, the upper inch being situated in the neck, and the remaining part in the thorax. It is composed of a fibro-elastic membrane, in which are horseshoe-shaped plates of cartilage which serve to keep the passage permanently open; the posterior aspect, where the cartilages are deficient, being closed by non-striped muscle, which, by contracting, can alter the diameter of the tube. The interior is lined with mucous membrane.

The BRONCHI, into which the trachea divides, are two in number, the right being rather wider, shorter, and at a less acute angle than the left. The structure of

the bronchi resembles that of the trachea, rings of cartilage, deficient behind, similarly keeping the tubes permanently open. The bronchi branch freely on all sides in the substance of the lungs, the smaller branches sending off still smaller branches, and as the air passages become smaller the cartilages disappear, and the muscle fibres form a layer all round the passages.

The LUNGS are two in number, and are conical, spongy, vascular organs, situated one on each side of the thorax. Each is invested with a serous membrane, the *pleura*, which is continuous at the root of the lungs with a similar membrane which lines the cavity of the chest, the practically non-existent space between the two membranes, which are only separated by a slight film of serous fluid, being termed the pleural cavity. Each lung has a deep fissure running obliquely downwards and forwards in its substance, and the right lung has also a secondary fissure running horizontally from the middle of the greater fissure to the inner border of the lung. The left lung is thus divided into two, and the right into three lobes. Each lung is attached on its inner aspect to the mediastinal



RESPIRATORY SYSTEM. *A*, thyroid cartilage; *B*, cricoid cartilage; *C*, trachea or windpipe; *D*, right bronchus, leading to right lung; *E*, left bronchus, leading to left lung; *F*, main branch to upper lobe of right lung; *G*, main branch to middle lobe of right lung; *H*, main branch to lower lobe of right lung; *K*, main branch to upper lobe of left lung; *L*, main branch to lower lobe of left lung; *M*, terminal branches of bronchi ending in the air-cells.

wall of the pleural cavity, at the root, where the blood vessels, bronchi, lymphatics, and nerves enter and leave its substance. The terminal branches of the bronchi end in irregular passages, from the sides of which go off the air-sacs or *alveoli*, which have delicate membranous walls containing a fine network of capillaries. The blood in these capillaries is thus only separated from the air in the alveoli by the slight framework of the walls of the capillaries and the alveoli being spread by the capillary network over a comparatively large surface, and it is here that the interchange of gases between the air and the blood takes place.

The process of **breathing** consists in enlarging the chest by raising the ribs to a more horizontal plane and depressing the diaphragm, so as to inspire air into the lungs, the former being the more important factor in women and the latter in men. The movements of the ribs in *inspiration* are produced by muscles attached from the ribs to the skull, vertebral column, and scapulæ, including the levatores costarum, scalein, sternomastoid, serratus posticus superior, cervicalis ascendens, pectoralis minor, and, in certain cases, the serratus magnus and pectoralis major, while the external intercostal muscles are also concerned. The diaphragm is depressed by the longitudinal curves being straightened through the contraction of the muscular fibres, the central tendon moving but slightly in respiration. In *expiration* the ribs and diaphragm regain their position of rest, and, except the internal intercostal muscles, no special expiratory muscles are called into play in ordinary expiration. In forced expiratory effort, however, the muscles of the abdominal walls force up the diaphragm and pull down the ribs and sternum, assisted by the triangularis sterni, which is attached to the costal cartilages and sternum, the serratus posticus inferior, attached to the lumbar fascia and the lower ribs, and the quadratus lumborum, attached from the pelvis to the last rib.

The *chest* acts practically like a bag, which, when it is enlarged, draws in air, and when it is collapsed, drives it out again. The movements of the chest change the air only in the trachea and the larger bronchi, the air-sacs or alveoli not being affected to any extent by the movements, and the air which they contain is renewed by diffusion of gases; since the air in them is not changed, as in the larger passages, it is always poorer in oxygen and contains a greater quantity of carbon dioxide than the outside air.

The amount of air which is taken in and passes out at an ordinary respiration is about 20 to 30 cubic inches, this being termed the *tidal air*; the *complemental air*, or the amount that can be inspired beyond this by a forced inspiration, is about 100 to 120 cubic inches; the *supplemental air*, or the amount that can be forcibly expelled from the chest after an ordinary expiration, is about 100 cubic inches; while the *residual air*, or the amount that remains in the lungs after the most complete effort of expiration, is about 100 to 120 cubic inches.

The oxygen is held in the blood in chemical combination with the hæmoglobin of the red corpuscles, and is carried in this way from the lungs to the heart and thence by the arteries and capillaries to the various tissues of the body, where it breaks away from the hæmoglobin and is absorbed. Carbon dioxide, on the other hand, is given off by the tissues and is dissolved in the blood plasma and combined with the sodium carbonate in it, forming sodium bicarbonate; this is conveyed by the veins to the lungs, where it is given off and passes out in the expired air.

The composition of pure atmospheric air is 20·9 % oxygen, 79 % nitrogen, 0·04 % carbon dioxide, and a slight quantity of moisture; the composition of dried expired air is about 16 % oxygen, 79 % nitrogen, and 4·5 % carbon dioxide, while it contains, in addition, up to 6 % of moisture.

The respiration is governed by a nerve centre in the medulla oblongata, the lowest part of the brain immediately above the spinal cord, and the nerve by which it is chiefly regulated is the vagus; if the centre in the medulla is injured, respiration stops, if the end of the vagus nearer to the brain is stimulated, respiration is quickened, and if the vagus is cut, respiration is slowed. Stimuli through various other nerves, however, may excite the respiratory centre, and, reflected to the muscles of the chest and the diaphragm, have an effect upon the respiration; for instance, cold water suddenly dashed on the back of the head causes a person to take a deep inspiration and hold it, while in *artificial respiration* pressure is made upon the chest walls, or the chest is enlarged and compressed alternately by moving the arms or body of the affected person, according to various methods, in order to stimulate the mechanism of respiration in cases of persons apparently drowned. The respiration is regulated by the carbon dioxide in the blood, which, when it is in sufficient quantity, stimulates the nervous centre in the medulla, which causes contraction of the inspiratory muscles, and thus the lungs receive a fresh supply of oxygen.

Pathology.—The various diseases of the respiratory

system will be found described under their different headings, *e.g.* ASTHMA, BRONCHITIS, EMPHYSEMA, PLEURISY, PNEUMONIA, TUBERCULOSIS. The main general symptoms of diseases of the r. s. are *pain*, which may be burning, as in bronchitis, or stabbing, as in pleurisy or in pneumonia, the pain in the latter being due to the associated pleurisy; *interference with respiration*, either the respiration being accelerated or difficulty in breathing experienced; *rise of temperature*, to a greater or less extent, a feature common to practically all diseases of the respiratory system; *cough*, generally accompanied by sputum, which may be frothy, as in bronchitis, gelatinous and plum-coloured, later of a rusty tinge, as in pneumonia, in disc-like purulent masses, 'nummular,' as in phthisis.

Certain occupations predispose towards diseases of the r. s., stone-masons, coal-miners, knife-grinders, mill-workers, and others working in dusty atmospheres being affected. The particles of stone, coal, or other dust which are inhaled may cause chronic bronchitis, which is followed by emphysema, or they may cause an overgrowth of fibrous tissue in the lung itself, this tissue sometimes becoming softened in parts and breaking down to form cavities, a condition known as stone-masons' or coal-miners'or knife-grinders' phthisis. Glass-blowers are also liable to bronchitis.

Tracheotomy, or the making of an opening into the trachea or wind-pipe by cutting into it from the front of the neck, may be necessary through a foreign body in the air-passages, acute laryngitis causing great swelling of the walls of the air-passages, diphtheritic inflammation, or some similar cause, preventing the passage of air into the trachea by the natural passages. A bent silver double tube is introduced as a means of communication between the trachea and the exterior, the inner tube being loosely in the outer so that it can easily be removed by coughing when sputum is coughed into it.

RESTIF, NICOLAS EDME, RÉTIF DE LA BRETONNE (1734–1806), Fr. novelist and printer; pub. more than 200 vol's of licentious nature but skilful description.

'RESURRECTION MEN,' see BURIAL.

RETFORD, EAST (53° 20′ N., 0° 57′ W.), town, on Idle, Nottinghamshire, England; iron foundries. Pop. (1911) 13,386.

RETHEL (49° 32′ N., 4° 21′ E.), town, on Aisne, Ardennes, France; fine woollen cloths. Pop. 5800.

RETICULUM, see under PECORA.

RETINA, see EYE.

RETRIEVER DOGS, see DOG FAMILY.

RETZ, GILLES DE, RAIS (1404–40), leader of Fr. resistance to English and protector of Joan of Arc; marshal of France, 1426; kept magnificent mediæval household; a man of horrible depravity; murder and torture of numbers of children disclosed, 1440; hanged; of literary interest for connection with mystery plays and Bluebeard legend.

RETZ, JEAN-FRANÇOIS-PAUL DE GONDI, CARDINAL DE (1613–79), Fr. *Frondeur*; member of family which had produced three abp's; coadjutor of his uncle, Abp. of Paris, 1643; raised regiment and fought against court party, 1649 and 1651; made terms with king, receiving cardinalate, 1652; arrested, 1652, and fled; returned after Mazarin's death; abandoned claim to archbishopric; made abbot of St. Denis; accumulated enormous debts; wrote remarkable *Mémoires*.

REUCHLIN, JOHANN (1455–1522), Renaissance scholar; studied Greek at Paris and Basel, and then studied law. In 1492 he began to study Hebrew, and to his work the revival of the language was largely due. Though devout, R. was the bitter opponent of ignorance and bigotry, and he became embroiled in a controversy with Johann Pfefferkorn, a converted Jew, who got an imperial mandate for burning all Jewish books. He was tried for heresy, but at length proceedings against him were annulled. His most famous work was *De Rudimentis Hebraicis*. R. and Erasmus were the greatest scholars of their time.

RÉUNION, ÎLE BOURBON (21° 5′ S., 55° 35′ E.), island belonging to France, one of group lying to E. of Madagascar; area, 965 sq. miles; surface generally mountainous; has one very active volcano, Piton de Fournaise; drained by many short streams; chief towns, St. Denis (capital), St. Pierre, St. Paul, and St. Louis. R. was first visited by Portug. explorers early in XVI. cent. and was settled by French c. 1649; occupied by British, 1810–15, when reverted to France. R. is administered by gov.; represented in Fr. Parliament by one Senator and two Deputies; produces sugar, coffee, vanilla, tapioca, spices, rum; horses, cattle, mules, sheep, and goats raised. Inhabitants include Europeans, Creoles, British Indians, negroes. Pop. (1911) 173,822.

REUS (41° 10′ N., 1° E.), city, province Tarragona, Spain; wines; cotton and silk goods. Pop. (1910) 25,763.

REUSCH, FRANZ HEINRICH (1823–1900), Ger. Old Catholic divine; prof. at Bonn, 1858; opposed papal infallibility and was excommunicated; wrote theological works—some with Döllinger.

REUSS, two Ger. principalities.—**Reuss-Greiz** is held by elder branch of R. family; area, 122 sq. miles; capital, Greiz; woollens are manufactured and live stock reared. Pop. (1910) 72,769. **Reuss-Schleiz-Gera** belongs to younger branch of R. family; area, 319 sq. miles; capital, Gera; principal industries—agriculture, manufacture of woollens. Pop. (1910) 152,752. All princes of R. family have been called Heinrich since XI. cent.

REUSS, ÉDOUARD GUILLAUME EUGÈNE (1804–91), theologian; prof. at Strassburg, 1836; pub. works in German, French, and Latin; a pioneer in Old Testament criticism.

REUTER, FRITZ (1810–74), 'Low German' novelist and humorist; b. Stavenhagen (Mecklenburg-Schwerin); sentenced to death for high treason, afterwards commuted to imprisonment; released after seven years; best works, *Ut mine Stromtid*; *Ut mine Festungstid*; *Ut de Franzosentid*, etc. (prose works).

REUTER, PAUL JULIUS, BARON DE (1821–99), originator of Reuter's News Agency; b. Cassel, Germany; became a naturalised Brit. subject (1851), and founded his offices in London, with correspondents in all parts of the world.

REUTLINGEN (48° 30′ N., 9° 13′ E.), town, on Echatz, Württemberg, Germany; leather manufactures. Pop. (1910) 29,763.

REVAL, REVEL (59° 27′ N., 24° 49′ E.), fortified seaport, watering-place, on Gulf of Finland; capital of Esthonia, Russia; among chief buildings are the castle, cathedral, and churches of St. Olai and St. Nicolai; exports grain and flax. Pop. (1910) 73,340.

REVELATION, BOOK OF, sometimes called the **Apocalypse,** bearing the name of John certainly since 200. It is the last and in many ways the most remarkable of the New Testament, in which it is the only Apocalypse. There are several possible references to it in sub-Apostolic writings, but none certain before Justin Martyr, who ascribes it to the Apostle St. John. Its authenticity was denied by Marcion, Dionysius of Alexandria, and Eusebius, and for some time it was rejected in the East.

The history of the interpretation of the Apocalypse is a very long one, for the book presents numerous difficulties to the scholar, the exegete, and the theologian, and of much of it the meaning is still obscure. For long the book was viewed as containing a picture of the Millennium, the reign of Christ and His saints that was to be. At the Reformation Protestants identified the pope with Antichrist. Another view made the Revelation a prophecy of all future history, and many theologians have sought in it reference to political events of their own time. This view has generally gone out, and is only followed now by cranks and fanatics.

Far saner are those who would see in it reference to the history of the writer's own day. Indeed, it is only since this has been recognised as the starting-point that any scientific study or real progress in interpretation has been possible.

All these views, however, presuppose the book to be a literary unity. But there has recently been an increasing number of scholars who think they can find trace either of a number of sources, or of several redactions, or of the incorporation of older fragments, *i.e.* of myths derived from outside Christianity. This leads to another interpretation called by a recent critic 'traditional historical.' The great point here is chapter 12, which can hardly be derived from a pure Christian source, and it has been thought to come from Babylonian, Egyptian, or Gk. mythology. This theory was started by Gunkel, and he has expanded it in an extreme form. It is now accepted by many scholars as accounting for something otherwise inexplicable. We view, therefore, *Revelation* as a literary work of one author, though of different dates, into which have been incorporated ancient myths, the whole to be interpreted in the light of the history of the writer's time.

There is another point to be considered, that is the psychology of its author. It is undoubtedly the work of an intense mystic whose visions are not mere literary vehicle, but owe something to his own experience. Over its date scholars have long quarrelled. A generation ago the reign of Nero was preferred, and, though this is true of parts, there are passages which seem to necessitate the time of Domitian, *i.e.* c. 93–95 A.D. It is then difficult to ascribe it to the same author as the Fourth Gospel, which was written about, or soon after, this time, for there would not be sufficient time to account for the difference in language and standpoint between the two works. Though the question is not settled, yet it is probably not by John the Apostle, and if not by John the Elder, it is the outcome, like the other Johannine writings, of his disciple and his school.

Scott, *Revelation* (Century Bible); Swete, *The Apocalypse of St. John*; Ramsay, *Letter to the Seven Churches of Asia*; Green, *The Ephesian Canonical Writings*; Gunkel, *Schöpfung und Chaos in Urzeit und Endzeit*.

REVELSTOKE (50° 30′ N., 118° W.), town, Brit. Columbia; mining industries; railroad-shops. Pop. 3700.

REVENTLOW, CHRISTIAN DITLEV FREDERICK, COUNT (1748–1827), Dan. statesman; pres. of *Rentekammeret*, 1784; carried out agrarian reforms; obtained appointment of royal commission, 1786, to inquire into condition of peasantry; result—abolition of feudal services; introduced free trade measures; fell, 1813.

REVENUE, see FINANCE.

REVERBERATING FURNACE, see FURNACE.

REVERE (42° 25′ N., 71° W.), watering-place, Massachusetts, U.S.A., on Massachusetts Bay. Pop. (1910) 18,219.

REVERSION, see REMAINDER, HEREDITY.

REVIEWS, see PERIODICALS.

REVILLAGIGEDO (19° 25′ N., 110° 30′ W.), group of islands, N. Pacific, belonging to Mexico; mostly uninhabited.

RÉVILLE, ALBERT (1826–1906), and his son **Jean** (1854–1908), Fr. liberal Protestants; prof's at Paris.

REVIVAL OF LEARNING, see RENAISSANCE.

REVOLVER, see PISTOLS.

REWA (24° 31′ N., 81° 20′ E.), native state, Baghelkhand, Central India. Pop. 1,330,000, Capital, **Rewa**. Pop. 26,000.

REWA KANTHA (22° 30′ N., 73° 30′ E.), collection of native states, Bombay, India. Pop. c. 480,000.

REWARI (28° 12′ N., 70° 40′ E.), town, Gurgaon district, **Punjab**, Brit. India; trade in grain. Pop. 30,000.

REYKJAVIK (64° 8′ N., 21° 55′ W.), capital of Iceland (*q.v.*).

REYNARD THE FOX, an epic of animal life common to French, Dutch, and German Romance. Of this story there were various versions, but all are based upon the cunning of Reynard the Fox directed against his enemy, Isengrim the Wolf, who was chief informer against him at the court of the Lion, king of beasts.

REYNOLDS, JOHN FULTON (1820–63), Amer. soldier; commander of Federal left wing at Gettysburg, where he fell.

REYNOLDS, SIR JOSHUA (1723–92), painter; born near Plymouth, studied in England and in Italy, established himself in London, and became so successful that in 1755 he had 120 sitters. Though he worked in other departments, it was as a portrait-painter that he excelled. His pictures of children have a peculiar tenderness and beauty, and his greatest portrait, that of Mrs. Siddons as 'The Tragic Muse,' remains unsurpassed for many distinctive qualities. At the foundation of the Royal Academy in 1768, he was elected President, and in 1784 was made painter to the King. He founded the famous literary club of which Johnson, Goldsmith, and Burke were members, and his name figures prominently in Boswell's *Johnson*.

REYNOLDS, WALTER (d. 1327), treasurer of England, 1307; bp. of Worcester, 1308; chancellor, 1310; abp. of Canterbury, 1313.

REZÁNOV, NICOLAI PETROVICH DE (1764–1807), Russ. diplomatist and financier; obtained charter for Russian-American Fur Company; obtained great wealth as promoter, and sought to extend Russ. territory in hunting districts of western North America; untimely death prevented realisation of plans.

RHABDOCŒLIDA, a group of Turbellarian Worms (*q.v.*).

RHABDOMANCY, science of using Divining-rod (*q.v.*).

RHACOPHORUS, Flying Frog, see FROGS.

RHADAMANTHUS (classical myth.), s. of Zeus and Europa; because of his justice he was made a judge of the dead in Hades.

RHÆTIA, RÆTIA, former country of Central Alps; inhabitants thought immigrant Etruscans; Rom. province, 5 B.C.

RHÆTIC BEDS, uppermost strata of Triassic, or lowest of Liassic, systems; found in England, Germany, but most extensively developed in Rhætian Alps; highly fossiliferous, especially in marine remains, the characteristic being *avicula contorta*, while Celemontes make their first appearance. Corals, plants, bones, teeth, insects, and first appearance of mammals in northern hemisphere are other interesting features.

RHAMNACEÆ, natural order of trees and shrubs; two genera: *Rhamnus* (Buckthorn), used in dyeing as an astringent; and *Zizyphus*, the lotus of antiquity.

RHAMNUSIO, see RAMUSIO.

RHAMPHASTIDÆ, Toucans (*q.v.*).

RHAMPHORHYNCHUS, an extinct REPTILE (*q.v.*).

RHAPSODISTS, in ancient Greece, itinerant reciters of epic poetry; competed at games and festivals; wore rich robes; possibly the earliest r's composed epics, but later ones merely declaimed Homer, *e.g.* Plato's *Ion*.

RHATANY (*Krameria*), plant of order Polygaleæ; roots of Peruvian R. and Savanilla R. are used as strong astringent.

RHAYADER (52° 18′ N., 3° 28′ W.), town, on Wye, Radnorshire, England. Pop. (1911) (rural district) 5198.

RHÉ, ÎLE DE, see RÉ.

RHEA, see RAMIE.

RHEA, see under RUNNING BIRDS.

RHEGIUM, REGIUM (modern REGGIO DI CALABRIA) (38° 5′ N., 15° 40′ E.), ancient city, on coast of Brut-

tium, S. Italy; founded by Chalcidians and Messinians, VIII. cent. B.C.; became a Rom. colony, III. cent. B.C.

RHEIMS, see REIMS.

RHEIN, see RHINE.

RHEINBAYERN, see PALATINATE.

RHEINE (52° 16′ N., 7° 25′ E.), town, on Ems, Westphalia province, Prussia; manufactures cotton. Pop. (1910) 14,417.

RHEINPFALZ, see PALATINATE.

RHENISH PRUSSIA, see RHINELAND.

RHETORIC is the art of public speaking. The popular assemblies of the Gk. states made it essential for all men to be able to express their thoughts lucidly and correctly, and hence among the ancients the art was widely cultivated and highly esteemed. R. was first taught in Sicily by Corax and Tisias, about the year 460 B.C., in order to assist those involved in the many lawsuits which the redistribution of land at that period had occasioned. Gorgias brought the art to a pitch of high perfection, but he was essentially a stylist and cared little about the content. R. was one of the chief subjects taught by the sophists, but it was Aristotle who first raised the study to the dignity of a science. His *Rhetoric* survives, and consists of three books containing copious illustrations from Gk. rhetoricians and writers. The first two books are mainly devoted to *proofs*, but the third which treats style is the most interesting. Of the Attic orators, Antiphon, Lysias, and Isocrates are famous, but Demosthenes is on a plane by himself. Among the Romans the art was cultivated assiduously, being in harmony with Rom. ideals and temperaments.

Cicero extends the sphere of r. to include the formation of a man's character and the entire field of his studies. His best works on the subject are the *De Oratore* and the *Brutus*. The *Rhetoric* of Quintilian is an exhaustive manual dealing with r. on the broad basis defined by Cicero. In modern times r. has not received the close attention it received in classical times. Perhaps the most brilliant and systematic Eng. rhetorician has been John Bright.

Saintsbury, *History of Criticism*.

RHEUMATISM, term popularly applied to a number of conditions characterised by pain, more accurately differentiated as acute r., chronic r., and muscular r.

ACUTE RHEUMATISM or RHEUMATIC FEVER is an acute fever due to a toxic condition of the blood caused by a micro-organism, the chief symptom in *adults* being the affection of the joints, which become swollen, reddened, hot, and tender, first one of the larger joints (knee, ankle, shoulder) being affected, then some of the others, often in symmetrical order. At the same time the temperature rises, accompanied by other symptoms, and the heart may become affected, but the latter is not so usual as in children. In *children* the affection of the joints is slight, the other symptoms are not so marked, and the patient does not seem very ill. There is, however, a particular liability to affection of the heart and pericardium, and the heart must be frequently examined by a physician. The presence of fibrous nodules under the skin is also often a characteristic of the disease in children. The *treatment* of acute r. is to put the patient to bed between blankets, give him a dose of calomel, and keep the affected joints at rest, wrapped in cotton wool. Salicylate of soda (grs. xx. every two hours till pain is relieved, then every four hours till temperature is normal) has a remarkable effect in relieving pain, reducing the temperature, and shortening the course of an attack. Alkaline drinks in liberal quantities are also of benefit. Aspirin is a valuable substitute for salicylates.

CHRONIC RHEUMATISM may follow one or more acute attacks, or it may be chronic from the beginning, sometimes several joints being affected, sometimes only one. The capsule, tendon sheaths, and ligaments are thickened, and there is a tendency towards adhesions and fibrous thickenings in the joint, which may be somewhat distorted. There is no tendency to heart or kidney affections. The treatment is to give potassium iodide, quinine, cod-liver oil internally; and massage, iodine, and other liniments are of value. Alcohol of any kind and sugar should be avoided in the diet, while Turkish baths, hot-air or hot-sand baths are of benefit.

MUSCULAR RHEUMATISM usually comes on suddenly with pain in certain groups of muscles, with little or no swelling, often accompanied by digestive disturbances, the chief varieties being *lumbago* (affecting lower part of the back), *intercostal rheumatism* (affecting the muscles between the ribs), and *torticollis* (affecting one side of the neck), gouty or rheumatic persons being generally affected. The treatment is to administer calomel and saline purges, while sodium salicylate, quinine, and potassium iodide are of benefit. Counter-irritants (*e.g.* iodine or mustard leaves) should be applied locally, and rest is necessary. Massage, electricity, and mineral baths have been found valuable, and the diet should be kept simple, alcohol and sugars being avoided.

RHEUMATOID ARTHRITIS, OSTEO-ARTHRITIS, ARTHRITIS DEFORMANS, is a disease characterised usually by a chronic course and destructive changes in the joints, the cause of which is believed to be either a micro-organism or toxæmia due to absorption of toxins from the alimentary canal. It may assume one of several types: in the most *common form* the tissues around the joint and the synovial membrane of the joint are involved, the joints are swollen, painful, and tender, and there is often fever. Later, there may be a certain amount of muscular atrophy, the skin is glossy and pigmented, and the joint may become deformed. In the *atrophic* type, which is rarer and more serious, there is atrophy of bone and of cartilage in the joint, which becomes disorganised and usually ankylosed. In the *hypertrophic* type new bone is formed, projecting around the joint and sometimes leading to ankylosis, while there are also changes in the cartilage. In a type of r. a. which usually affects children (*Still's disease*) there is usually fever in the acute stages, and, in addition to the swelling of joints, swelling of the lymph glands and the spleen, accompanied by anæmia, muscular wasting, and limitation of movement.

The *treatment* of r. a. is, in the acute stages, rest and an abundant nourishing diet. Passive hyperæmia has been induced with benefit by applying an elastic bandage above the joint for a few hours each day. Douches, massage, hot-air and mineral baths afford relief, and the treatment as carried out at such spas as Bath, Buxton, and Aix-les-Bains is valuable. It is necessary to improve the general health, and iron, arsenic, or cod-liver oil are given for that purpose, while potassium iodide and guiacum have proved beneficial in the general treatment of the condition.

RHEYDT (51° 11′ N., 6° 28′ E.), town, Rhineland, Prussia, on Niers; textiles. Pop. (1910) 43,999.

RHINA, see ANGEL-FISH.

RHINE, RHEIN (50° 12′ N., 7° 34′ E.), largest river in Germany and chief commercial river of European continent; rises in Switzerland; formed by union of Hinter and Vorder R. at Reichenau; enters Lake Constance; famous falls near Schaffhausen (*q.v.*); flows N. through Germany to Mainz, then N. and N.W., entering Holland below Emmerich, divides into several arms and enters North Sea. R. forms boundary between Switzerland and Germany; chief tributaries —Aar, Ill, Neckar, Main, Lahn, Moselle, Ruhr, Lippe; chief towns—Strassburg, Speyer, Ludwigshaven, Mannheim, Wörms, Mainz, Bingen, Coblenz, Bonn, Cologne, Düsseldorf; total length, 760 miles, of which over 500 are navigable, beginning at Basel. R. is connected by canals with Danube, Rhône, and Marne. Large quantities of timber are floated down from Black Forest, etc.; important lamprey, salmon, and sturgeon fisheries; famous wine district. R. has

always played an important part in history, romance, lit., and commerce; a great natural frontier from Rom. Empire onwards; left bank annexed by French, 1801; retaken by Germans, 1871; scenery between Bingen and Coblenz especially romantic — with mediæval castles (Rheinfels, Rheinstein, Ehrenbreitstein), Lorelei, Mousetower, etc.

Mackinder, *The Rhine: Its Valley and History* (1908).

RHINELAND, RHINE PROVINCE, RHENISH PRUSSIA (50° 50′ N., 7° E.), most westerly province of Prussia, between Luxemburg, Belgium, and Holland on W., and Westphalia and Hesse-Nassau on E.; area, 10,423 sq. miles; chief rivers, Rhine, Moselle, Sieg, Ruhr, Lippe; capital, Coblenz; other towns—Cologne, Düsseldorf, Duisburg, Elberfeld-Barmen, Crefeld, Essen, etc. Province was constituted in 1815 out of duchies of Berg, Cleves, Guelders, Jülich; Trier, Cologne, Aix-la-Chapelle, and other territories. R. is great manufacturing centre of iron, brass, and steel goods; cutlery, chemicals, textiles; fertile soil; famous wines; mineral springs at Aachen, Kreuznach, etc. Pop. (1910) 7,121,140.

RHINOCEROSES (*Rhinocerotidæ*), a genus and family of large Odd-toed or Perissodactyle Ungulate Mammals, with five species found only in Africa, N.E. India, Burma, Malay, Sumatra, Borneo, and Java. They are shy nocturnal creatures, with thick skins and one or two upright horns on or behind the snout. They live on foliage and the young shoots of trees, and are often found wallowing in muddy pools or in rivers.

RHIZOPODA (Gk. *rhiza*, a root; and *podos*, a foot), a sub-class of the simplest class (*Sarcodina*) of the Protozoa. Its members are distinguished by the possession of pseudopodia, which are mobile, branched, and root-like (hence the name), in contradistinction to the unbranched, ray-like pseudopodia of the *Actinopoda*. The structure is of the simplest nature, consisting essentially of a single cell without definite bounding walls, and containing a nucleus, and vacuoles utilised in digestion and respiration.

Movement amongst the R. is a simple creeping, in the majority of forms a mere flowing forwards of the cell-substance in indefinite processes. They possess a diffuse capacity of response to chemical and physical stimuli. Their food consists of minute plants, such as Diatoms and Desmids, and organic débris. It is engulfed by the protoplasm at any part of the body, within which it is digested in a food vacuole, the residue being ejected from the cell by a contractile vacuole. Reproduction normally occurs by simple division.

R. are found all the world over. The majority are aquatic, living in fresh water or in the sea. Some live in damp earth, while many are parasitic in the bodies of animals and of man, and to such are due amœbic dysentery and abscesses in the liver and other organs.

The R. are divided, according to Minchin, 1912, into four orders, distinguished as follows: (1) *Amœbœa*, simple indefinite individuals, with naked protoplasm or a simple shell; (2) *Foraminifera*, marine, with complex shells of carbonate of lime or cemented sand particles and fine net-like pseudopodia; (3) *Xenophyophora*, marine, with skeleton of hollow tubes, containing the protoplasmic body; (4) *Mycetozoa*, terrestrial forms, without skeleton, and with complex spore reproduction.

RHODANUS, see RHONE.

RHODE ISLAND (41° 19′ to 42° 3′ N., 71° 7′ to 71° 50′ W.), smallest state of U.S.A.; bounded N. and E. by Massachusetts, S. by Atlantic, W. by Connecticut; area, 1250 sq. miles. Surface generally undulating, but nowhere reaching any great height. Narragansett Bay, which extends inland over 30 miles, increases the coast-line so that it has a total length of nearly 400 miles; drained by Pawtuxet, Pawcatuck, and other streams. Largest towns are Providence (capital), Pawtucket, Woonsocket, and Newport.

R. I. is said to have been reached by Norsemen in X. cent. It was first permanently colonised by Roger Williams, the apostle of religious liberty, and other settlers from Massachusetts, in 1636; and was incorporated as a Brit. colony in 1663; had an active share in War of Amer. Independence, was temporarily occupied by British, 1776-79, and became one of the thirteen original states of the Union, 1790; remained loyal to Union in Civil War.

R. I. is administered by a gov. assisted by lieut.-gov. and other state officials; legislature consists of Senate of 40 members and House of Representatives of 72 members. Education is gratuitous and obligatory; Providence is seat of Univ. and of other educational institutions. Chief religious denominations, in order of numerical importance, are R.C., Baptist, Prot., Episcopal, Congregational, and Methodist.

R. I. produces graphite, talc, lime, and building stone; it is pre-eminently an industrial state; manufactures woollens, cottons, locomotives, screws, hardware, jewellery, rubber, leather; has dye-, bleach-, and print-works. Railway mileage is *c.* 600. Inhabitants include Americans, British, Canadians, Italians, Germans, negroes; most densely populated state of Union. Pop. (1910) 542,610.

Richman, *Rhode Island: Its Making and Meaning* (1902), *Rhode Island: A Study in Separation* (1905).

RHODES, RHODOS (36° 10′ N., 28° E.), island belonging to Turkey in Ægean Sea; area, 423 sq. miles; surface mountainous, reaching extreme height of 4560 ft. in Mt. Atairo; considerable area wooded; climate mild; capital, RHODES, long celebrated for its Colossus. The island was originally peopled by Greeks, and afterwards passed into hands of Persians, Saracens, and Knights of St. John; the last-named held it for over two cent's, but finally surrendered it in 1522 to the Turks; occupied by Italians, 1912; claimed by Greece, 1913 (see TURCO-BALKAN WAR). Trade is now unimportant, as the two harbours have been neglected and are sand-choked. Pop. 33,000; (town) 10,500.

Torr, *Rhodes in Ancient Times* and *Rhodes in Modern Times*.

RHODES, CECIL JOHN (1853–1902), Brit. colonial statesman; b. at Bishop Stortfort, Herts; s. of clergyman; sent to Natal for health, 1871; with bro. Herbert made fortune in Kimberley diamond fields; founded De Beers Mining Co., 1880; early formed plan of making S. Africa British and linking it with Brit. protectorate of Egypt; entered Cape politics, 1881; negotiated (1883) surrender of territories in Bechuanaland; obtained Brit. troops which secured establishment of Brit. protectorate of Bechuanaland, 1884; established, with Rudd, Gold Fields of South Africa Co., 1886, and British South Africa Co. with Rothschild; through Sir Hercules Robinson secured for Britain pre-emption of Matabeleland, 1888; obtained charter for South Africa Co. ('Chartered Co.'), 1889. The company occupied Mashonaland, 1890, extended influence to great lakes, and built up what is now known as RHODESIA (*q.v.*).

R. became prime minister at Cape, 1890; advocated policy of 'Equal rights for all civilised men south of the Zambezi,' regardless of colour; strove to conciliate the Dutch; Jameson (*q.v.*) Raid (1895) forced him to resign, 1896; quelled Matabele revolt, 1896; censured by parliamentary inquiry for not preventing Jameson Raid, 1897; chief promoter of Cape to Cairo railway and trans-African telegraph line; present in siege of Kimberley, 1899–1900, when his health broke down. Public-spirited, energetic, autocratic, R. was a great 'empire-maker.' With his immense fortune he endowed (175) RHODES SCHOLARSHIPS (for British Colonial, American, and German students) at Oxford.

Life, by Colvin (1912), 'Vindex' (1900), Michell (2 vols., 1910), Jourdan (1910), Fuller (1910).

RHODESIA (13° to 22° S., 22° to 33° E.), territory of Brit. South African Co. in South-Central Africa, named after founder, Cecil Rhodes (*q.v.*); bounded N. by

Belg. Congo, Lake Tanganyika, Ger. East Africa, E. by Nyasaland and Portug. East Africa, S. by Transvaal, S.W. by Bechuanaland, W. by Ger. South-West Africa and Angola; length, *c.* 980 miles; breadth, 600 miles; area, *c.* 445,000 sq. miles. R. is divided into (1) SOUTHERN RHODESIA, containing the provinces of Matabeleland and Mashonaland, with area, 148,500 sq. miles; and (2) NORTHERN RHODESIA, which was formerly divided into North-Eastern and North-Western R. or Barotseland (*q.v.*), amalgamated 1911; area nearly 300,000 sq. miles. The Zambezi separates N. and S. Rhodesia. Surface consists mainly of an elevated plateau from 3000 to 7000 ft. above sea-level; Inyana plateau in Southern Rhodesia with highest part *c.* 7000 ft.; Tanganyika and Matoka plateaux highest elevations of Northern Rhodesia. Chief rivers are Zambezi (*q.v.*), Luangwa, Kafue, Chembezi, Kabompo, Gwaai, Hanyani, Umniati. Large lakes are Bangweolo and part of Tanganyika and Mweru; many swamps; climate is sub-tropical; tableland healthy, river valleys and low-lying country unhealthy, malaria being very prevalent; sleeping sickness in some districts owing to tse-tse fly; rainy season between Oct. and April. Fauna is that of tropical Africa; affords splendid big-game shooting; includes eland, kudu, giraffe, zebra, baboons, elephant, hippopotamus, rhinoceros, lion; numerous reptiles, butterflies, and birds; white ants and locusts abound and are very destructive. Vegetation generally is sub-tropical; extensive forests; immense tracts of grass and large stretches of country suitable for pasturage and agriculture.

History.—Numerous ruins (see ZIMBABWE) prove that Rhodesian gold-mines were worked in the Middle Ages; a now abandoned theory traced them to Solomon's days; R. is probably old Empire of Monomotapa; Portuguese entered Mashonaland, XVI. cent.; Matabeles overwhelmed pastoral tribes, 1836 onwards; region explored by Livingstone; British South Africa Company (B.S.A. Co.) obtained Charter, 1889; Mashonaland administered under Rhodes (*q.v.*); Matabele rebellion, 1893; *Shangani River* disaster, 1893; King Lobengula died in 1894; name Rhodesia officially adopted, 1895; Jameson Raid, 1895; Matabeles again revolt, 1896; Protectorate proclaimed over N.W. Rhodesia, 1900.

R. is under the administration of B.S.A. Co.; Southern R. is governed by Administrator and Executive Council (not less than 4 members) app. with Sec. of State's approval, and Legislative Council of Administrator, Resident Commissioner, and 7 members app. by the Company with Sec. of State's approval and 12 members elected by registered voters of Matabeleland and Mashonaland; Northern R. is administered by Resident Commissoner app. by Northern Rhodesian Order in Council, and administrator app. by B.S.A. Co., with Sec. of State's approval; feeling in R. is as yet adverse to the suggested incorporation in the Union of South Africa. Principal towns are Salisbury (capital of S.R.), Bulawayo, Victoria, Umtali, Gwelo; Fort Jameson (capital of N.R.), Abercorn, and Fife.

Of utmost importance for development of R. are its railways. Cape-to-Cairo railway traverses R. Rhodesian and Mashona railways begin at Vryburg (Bechuanaland), pass Bulawayo, Victoria Falls (*q.v.*), Wankie coal-fields, and cross Congo border at Bwana Mkubwa to Katanga copper region. Another important line runs from Bulawayo *via* Salisbury, Umtali, and Gwelo to east coast at Beira (*q.v.*); small branches link main lines with mining districts; total railway mileage, *c.* 2400 miles; chief products are wheat, maize, cotton, coffee, rice, rubber, tobacco, timber, ivory; rich in minerals which are already extensively worked; gold, silver, copper, coal, lead, chrome iron, diamonds, asbestos; output of gold (1909) valued at £2,623,708; country is being rapidly developed, and is of great promise. Pop. (1911) 1,750,000.

Hone, *Southern Rhodesia* (1909); Honsman, *History of Rhodesia* (1900); MacIver, *Mediæval Rhodesia* (1906); Gouldsbury and Sheane, *Great Plateau of N. Rhodesia* (1911).

RHODIUM (Rh=102·9), rare metal of platinum group, named from red colour of salts; occurs with platinum and gold; white, S.G. 12·1, difficult to fuse, tarnishes fused, easily attacked by chlorine, employed for crucibles, etc.; colloidal solution obtainable. Compounds: RhO, Rh_2O_3, $RhCl_3$, Na_3RhCl_6, $Rh_2(SO_4)_3$, and alum, RhO_2.

RHODODENDRON (Gk. 'rose-tree'), an ericaceous evergreen shrub with tough glossy leaves; handsome flower, slightly zygomorphic; high decorative value.

RHONDDA (51° 40′ N., 3° 32′ W.), parliamentary division, Glamorganshire, Wales; includes 9 ecclesiastical parishes; watered by R. river, a tributary of Taff, and by R.-Fach river, which forms E. boundary; has coal mines. Pop. (1911) 120,790.

RHÔNE (45° 40′ N., 4° 35′ E.), department of S.E. France, embracing old provinces of Lyonnais and Beaujolais; area, 1077 sq. miles; traversed by river Rhône; capital, Lyons; silk industry, wines, copper, coal, manganese, iron-smelting. Pop. (1911) 915,581.

RHÔNE, RHONE (43° 20′ N., 4° 41′ E.), swiftest Fr. river (Rom. *Rhodanus*); rises in Swiss Alps between Furka and Grimsel mts.; flows into and through Lake of Geneva; from Genova westwards to Lyons, then S. to Mediterannean, entering Gulf of Lyons through delta known as La Camargue; chief tributaries, Ain, Saône, Ardèche, Gard, Arve, Isère, Drôme, Durance; chief towns, Geneva, Brieg, Seyssel, Lyons, Vienne, Valence, Avignon, Tarascon, Arles; total length, 504 miles; passes through fine scenery; fierce current prevents navigation above Lyons; canals connect R. with Loire, Seine, Rhine.

Wood, *Valley of the Rhone* (1900).

RHÖNGEBIRGE (50° 30′ N., 10° E.), mountain group, N.W. Bavaria and Hesse-Nassau, Germany; highest peak the Wasserkuppe (3115 ft.).

RHOPALOCERA, see under LEPIDOPTERA.

RHUBARB, any one of several plants of the genus *Rheum*, the *R. rhaponticum* and *R. undulatum* being grown extensively in Britain, U.S.A., and other temperate countries; their leaf-stalks, boiled with sugar, being a favourite article of food. The *R. officinale* and *R. palmatum* are grown chiefly in northern China, but also to a small extent in Europe, their roots being dried and employed as a drug, used, in small doses, from ½ to 2 grs., as an astringent tonic, and in larger doses, 15 to 30 grs., as a purgative. *Gregory's powder*, composed of rhubarb, magnesia, and ginger (dose, 20 to 60 grs.), is a popular and valuable means of administering the drug.

RHYL (53° 39′ N., 3° 29′ W.), watering-place, near mouth of Clwyd, Flintshire, Wales. Pop. (1911) 9005.

RHYME, the recurrence of similar sounds at intervals not too great to be perceived by the ear. Rhyme as a poetical device was not used by the ancients. Only when the quantitative system had grown corrupt in mediæval times did rhyme come into prominence. Rhyme usually denotes a correspondence in the final syllables of words at the ends of lines, and in English the vowel sounds and following consonantal sounds of a perfect rhyme must be the same, but the preceding consonantal sound must be different, *e.g.* love, dove; crew, true. For *false r.*, see ASSONANCE. See also POETRY.

RHYMNEY (51° 45′ N., 3° 16′ W.), town, Monmouthshire, England; ironworks; collieries. Pop. (1911) 11,451.

RHYNCHOFLAGELLATA, a sub-class of Flagellata (*q.v.*).

RHYNCHOPHOROUS BEETLES, RHYNCHOPHORA, a sub-order of Beetles with head prolonged into a snout or rostrum. Those most familiar are the Weevils (*Curculionidæ*), the 20,000 species of

which occur all over the world. Both larvæ and adults are vegetarian, but many are exceedingly destructive to plants. The Ambrosia, and Elm Beetles (*Scolytidæ*) are wood- and bark-borers, the former living gregariously in a burrow and feeding on fungi growing therein.

RHYNCHOPS, Skimmer, see under Gull Family.

RHYOLITE, Liparite or Quartz-Trachyte, group of volcanic rocks, widely distributed and resembling granite in chemical composition; highly acidic; occurs mostly in lava flows, especially in Lipari Islands (whence name *Liparite*); with exception of dacites (*q.v.*) the only lavas containing free primary quartz. They contain orthoclase, plagioclase, felspar, and biotite.

RHYTHM, a combination of movements or sounds halting and recurring at intervals on a more or less settled plan, producing that balance which is one of the main constituents of harmony. It applies to the world of motion and of sound that peculiar quality of harmonious order which in the visual world is called symmetry. Its three chief spheres are music, lit., and dancing. In all three it is notable that the modern tendency is to favour an irregular and apparently unsettled system of cadence rather than the staid and well-ordered r. of classical times. A striking instance of this may be found in the comparison of a fugue of Johann Sebastian Bach with a modern composition of Debussy.

Contrary to popular impression r. is fully as important an element in prose as it is in verse; it is more obvious in verse because it is aided by outward manifestations, but it is perhaps of even greater importance in prose, where, owing to the absence of formal restrictions, the danger of inharmonious lack of balance is all the greater. There is without doubt an unconscious use of r. as the vehicle of emotion, and it is noticeable that impassioned prose such as oratory often acquires a perfection of r. which brings it near to blank verse.

Thomson, *The Basis of Eng. Rhythm* (1904); Saintsbury, *History of Prose Rhythms* (1912).

RHYTINA, Steller's Sea Cow, see under Sirenia.

RIAZAN, see Ryazan.

RIBBON FISHES and **OAR FISHES** (*Trachypteridæ*), long, laterally compressed, fragile, bony fishes with thin light bones and silvery skin. The Oar Fish or 'King of the Herrings,' many specimens of which have been stranded on British coasts, may be over 20 ft. long. They live in the open sea, but are seldom captured alive.

RIBBON-WORMS, see Nemertine Worms.

RIBEAUVILLE, see Rappoltsweiler.

RIBEIRA (42° 35′ N., 9° 5′ W.), town, province Corunna, Spain. Pop. 12,500.

RIBEIRO, BERNARDIM (1482–1552), Portug. poet and sec. to the court. Disappointed in his love for his cousin, D. Joanna Zagalo, and banished from court, the poet composed his five exquisite eclogues. His chief work is *Menina e Moça*, a pastoral romance.

RIBERA, GIUSEPPE (1588–1656), a leading artist of the Span. school, settled in Naples, became Court painter, and member of the Academy of St. Luke at Rome. The subjects of his pictures are mostly horrible and gruesome.

RIBES, see Currants.

RIBOT, ALEXANDRE FÉLIX JOSEPH (1842–), Fr. statesman; moderate Republican, prominent 1877 onwards; Foreign Minister, 1890–93; Premier, 1892, 1895, and 1898; brought about alliance with Russia, 1895; as leader of opposition greatly dreaded; lofty, eloquent speaker; member of Fr. Academy.

RIBS, see Skeleton.

RIBWORT PLANTAIN, see Plantain.

RICARDO, DAVID (1772–1823), Eng. political economist; Jew converted to Christianity; obtained practical knowledge of economics from early life as stockbroker, when he amassed large fortune; pub. *High Price of Bullion a Proof of the Depreciation of Banknotes*, first scientific treatise on currency, 1810. This and various articles written at about this time, in clear, trenchant style, exercised great influence on economic theories. He published *Principles of Political Economy and Taxation*, 1817, universally praised, though now to a large extent antiquated; most important feature, doctrine of nature of rent; M.P., 1818–23.

RICCI, MATTEO (1552–1610), Ital. Catholic missionary; entered Society of Jesus, 1571, and went to East; in India, 1578–82; went to China and settled with his friends in Peking. R. devoted himself to teaching and the writing of works in Chinese, astonishing the people by his mathematical and scientific knowledge; was specially popular for constructing a map which made China prominent.

RICCIO, see Rizzio.

RICE (*Oryza sativa*), the staple Asiatic cereal; grown in hot, damp plains, well irrigated; unhusked r. is known as *paddy*, and the areas under cultivation as 'paddy fields'; flower differs from that of most grasses in possessing six stamens. Principal rice-producing countries are: India (78¾ million acres under r.), Japan, Siam, Madagascar, Ceylon, U.S.A.

RICE BUNTING, Bob o' Link, Boblink, Bob-Lincoln (*Dolichonyx oryzivora*), N. Amer. relative of the Buntings—a favourite singer, and an esteemed article of food.

RICE, JAMES (1843–82), Eng. novelist; collaborated with Sir Walter Besant (*q.v.*).

RICH, EDMUND, see Edmund, Saint.

RICH, PENELOPE, LADY (*c.* 1562–1607), dau. of Walter Devereux, Earl of Essex; famous as the Stella of Sidney's *Astrophel and Stella*.

RICH, RICHARD, 1ST BARON (*c.*1500–67), Eng. Lord Chancellor, 1547–51; Attorney-General of Wales, 1532; Speaker, 1536; long career of treachery; Henry VIII.'s tool in persecution of More and Fisher, and suppression of monasteries; reformer under Edward VI., but eager to persecute Protestants under Mary.

RICH HILL (38° 5′ N., 94° 20′ W.), city, Bates County, Missouri, U.S.A.; coal mines; brick- and tile-works.

RICHARD I., Cœur-de-lion (1157–99), king of England; third s. of Henry II.; Duke of Aquitaine, 1168; succ. to Eng. throne, 1189; raised money for Crusade; prominent in capture of Acre, 1191; defeated Saladin at *Arsuf*, 1191; on way home, captured and imprisoned by Leopold of Austria; handed over to Emperor Henry VI., who released him for ransom; on return to England, 1194, crushed bro. John's intrigues against him; subsequently returned to Fr. dominions; killed during siege of castle of Châlus.

Archer, *Crusade of Richard I.*

RICHARD II. (1367–1400), king of England; s. of Black Prince; succ., 1377; met rebels under Wat Tyler at Mile End and Smithfield, 1381, and ended their insurrection; deprived of absolute power by Lords Appellant under Gloucester, 1388; concluded peace with France, 1396; revenged himself on Lords Appellant, 1397–98, sentencing them to death or exile; captured and deposed by cousin, Henry of Bolingbroke (afterwards Henry IV.), 1399; subsequently imprisoned in Pontefract Castle.

RICHARD III. (1452–85), king of England; s. of Richard, Duke of York; distinguished at battles of *Barnet* and *Tewkesbury*; crowned, 1483; shortly afterwards his nephews, Edward V. and his bro., were murdered in Tower, by his orders; suppressed Buckingham's insurrection, which ensued; defeated and killed at *Bosworth* by Henry of Richmond (afterwards Henry VII.), 1485. See *Life and Reign of Richard III.*, by Gairdner; and *Life and Character*, by Markham.

RICHARD, EARL OF CORNWALL, see Cornwall, Earl of.

RICHARD, FRANÇOIS MARIE BENJAMIN (1819–1908), abp. of Paris, 1886; cardinal, 1889.

RICHARD OF CANTERBURY (d. 1184), abp. of Canterbury, 1173.

RICHARD OF CIRENCESTER (*c.* 1335–1401),

Eng. monk and historian; wrote *Speculum Historiale de Gestis Regum Angliæ, 447–1066* (Rolls Ser.), of little value; forgery, *De situ Britanniæ*, for long accepted.

RICHARD, ST. (1197–1253), bp. of Chichester, England, 1244.

RICHARDSON, HENRY HOBSON (1838–86), Amer. architect of great and original gifts.

RICHARDSON, SIR JOHN (1787–1865), Scot. zoologist, associated with Franklin and Parry in their arctic expeditions.

RICHARDSON, SAMUEL (1689–1761), Eng. novelist; b. Derbyshire; s. of joiner; after successful apprenticeship, entered into business, became printer of House of Commons Journals, and King's Printer; was made master of the Stationers' Company. R. began to write novels when advanced in years; he had gained some reputation as a writer of letters, and was approached with a view to publishing a 'model' letter-writer; this he did (1741), but his first novel, *Pamela*, suggested by the other idea, was published some months before (1740).

It was intended as a 'moral' novel, and therefore met with much ridicule, but was original and full of life. *Pamela* was followed by *Clarissa Harlowe*, a somewhat tedious seven-vol. novel, witten in 1744–48, and *History of Charles Grandison*, 1753.

R.'s chief legacy is his introduction of the analysis of human emotion into novel-writing, but his constant moralising is wearisome, and he occasionally degenerates into prurience. He had many continental admirers.

Fielding's *Joseph Andrews* was begun as a satire on *Pamela.—Life*, by Austin Dobson (1902).

RICHELIEU, CARDINAL DE, ARMAND JEAN DU PLESSIS (1585–1642), Fr. statesman; bp. of Luçon, 1607; representative of clergy in States-General, 1614; Sec. of War and Foreign Affairs, 1616; assisted Marie de' Medici in recovery of power, 1620; cardinal, 1622; Minister of State, 1624–42. R. laid foundations of France's pre-eminence; won permanent power over king on 'Day of Dupes,' 1630; over-rode opposition of Gaston d'Orléans, bro. of Louis XIII., and secured supersession and exile of Marie de' Medicis; made government strong by suppression of feudal nobility; captured Rochelle, 1628, and destroyed political power of Huguenots, but granted them certain amount of religious toleration; initiated policy of opposition to Austria in Thirty Years War, and so destroyed power of France's great rival; opposed Hapsburgs in Netherlands and Piedmont, and aided revolt of Catalonia against Spain; patron of letters (founded *Académie française*), magnificent, extravagant; his taxes and wars sapped real prosperity of country.

Lodge, *Life of Richelieu*; Hanotaux, *Histoire du Cardinal de Richelieu*; Perkins, *Richelieu*.

RICHELIEU, DUC DE, ARMAND-EMMANUEL-SOPHIE-SEPTEMANIE DU PLESSIS (1766–1822), Fr. statesman; grandson of the great R.; volunteer in Russ. army, 1790; Foreign Minister of France after Restoration, procured speedy evacuation by allies; failed to carry through electoral reform and new Concordat.

RICHEPIN, JEAN (1849–), Fr. dramatist, poet, novelist; good psychologist, especially in his plays.

RICHERUS (later X. cent.), Fr. chronicler; monk at Reims.

RICHFIELD SPRINGS (42° 50′ N., 75° W.), village, summer resort, on Schuyler Lake, Otsego Co., New York; sulphur springs. Pop. (1910) 1503.

RICHMOND (39° 49′ N., 84° 52′ W.), city, capital Wayne Co., Indiana, U.S.A.; railway and commercial centre; manufactures agricultural machinery. Pop. (1910) 22,324.

RICHMOND (37° 43′ N., 84° 16′ W.), city, capital, Madison Co., Kentucky, U.S.A.; manufactures tobacco, flour. Pop. (1910) 5340.

RICHMOND, city, Victoria, Australia; S.E. suburb of Melbourne. Pop. 40,000.

RICHMOND (37° 32′ N., 77° 26′ W.), town, capital of Virginia, U.S.A.; finely situated on James River (with falls); public buildings include City Hall, capitol, various libraries and museums; seat of Richmond Coll., a Women's Coll., and a Negro Univ., and of many educational institutions; has R.C. cathedral. R. was capital of the Southern Confederacy, 1861–65, but being evacuated, was occupied by the Federals, April, 1865; great coal-mining and industrial centre; important manufactures of tobacco and cigars; has also ironworks, manufactures of machinery, locomotives, paper, cottons, flour, artificial manure, etc. Pop. (1910) 127,628.

RICHMOND (54° 24′ N., 1° 45′ W.), town, on Swale, Yorkshire; fine old ruined castle; trade chiefly consists of agricultural produce. Pop. (1911) 3934.

RICHMOND (51° 28′ N., 0° 18′ W.), formerly SHEEN, town, Surrey, on Thames; noted for its scenery; has remains of the Royal palace of Sheen. Pop. (1911) 33,223.

RICHMOND, EARLDOM AND DUKEDOM OF.—The Counts of Brittany held in early times the title of Richmond in Yorkshire; first of line to rank as Eng. earl is COUNT ALAN, lord of R. (*c.* 1145). In 1399 the earldom was finally separated from Brittany; it was granted to EDMUND TUDOR, 1453; merged in Crown, 1485. Henry VIII. created his illegitimate son Duke of R., 1525; dukedom has been held by STEWART family of Lennox, 1623–72, and from 1675 by the LENNOX family, descendants of Charles II.'s illegitimate son.

RICHMOND AND LENNOX, DUCHESS OF, FRANCES TERESA STEWART (1648–1712), Eng. court beauty; maid of honour; m. 5th Duke of R., 1667; attack of small-pox, 1668, spoiled her appearance.

RICHMOND, LEGH (1772–1827), Anglican clergyman; wrote *The Dairyman's Daughter*, which had extraordinary circulation.

RICHMOND, SIR WILLIAM BLAKE (1843–), Eng. painter; succ. Ruskin as Slade prof. at Oxford, 1878; fashionable portrait-painter.

RICHTER, EUGEN (1839–1906), Ger. politician; liberal and free-trader of old-fashioned type; opposed to Socialism; one of first *Freisinnige*; founder, 1885, and editor of *Freisinnige Zeitung*.

RICHTER, HANS (1843–), Hungarian musician; conductor at Bayreuth festivals since 1876, of Birmingham festivals, 1885–1909, of Hallé concerts, Manchester, 1900 on.

RICHTER, JOHANN PAUL FRIEDRICH, JEAN PAUL (1763–1825), celebrated Ger. novelist and humorist; b. Wunsiedel, Bavaria; studied, Leipzig, 1781–84; best works, *Die unsichtbare Loge, Hesperus oder 45 Hundsposttage, Flegeljahre* (novels); *Leben Fibels, Doktor Katzenbergers Badereise* (humoristic works); *Levana oder Erziehungslehre* (educational treatise).

RICHTHOFEN, FERDINAND, BARON VON (1833–1905), Ger. geographer; pub. well-known geographical work, *China, Ergebnisse eigner Reisen und darauf gegründeter Studien*, 1877–85; prof. of Geography at Berlin, 1886–1905.

RICINA (43° 20′ N., 13° 30′ E.), ancient town, Picenum, Italy, on Potenza.

RICINUS, see CASTOR OIL.

RICKETS, RACHETIS, a constitutional disease of childhood, characterised chiefly by softening and consequent deformities of the bones. The disease is due to alteration of metabolism believed to be due to defective diet, the deficiency being in proteids and fats, but there is another opinion that it is due to a toxæmic condition of the alimentary tract. Unhealthy conditions of life and bad hygiene are contributory causes. The symptoms which are first evident are digestive disturbances, vomiting, and diarrhœa, with profuse sweating, especially of the head, and general restlessness. Changes in the bones become evident, enlargements appear at the ends of the ribs, the wrists, and ankles. The long bones become curved, this being best seen in the bones of

the leg, which curve usually outwards (bow-leg), and the chest is deformed, the breast-bone standing out prominently, and the ribs sinking in, at the junction of ribs and rib-cartilages, at the side. There is often also deformity of the pelvis, which, in females, leads to serious difficulties in childbirth. The treatment of r. is mainly in the direction of improving the general hygiene and nutrition. Starchy foods are reduced in quantity, and plenty of milk and, after the first year of life, light soups and meat juice given. Attention is paid to the warmth and general conditions of the child, and plenty of fresh air and sunshine is necessary. Cod-liver oil and lacto-phosphate of iron are drugs of great value in improving this condition.

RICKMANSWORTH (51° 38′ N., 0° 28′ W.), town, on Colne, Hertfordshire, England; paper-mills. Pop. (1911) 6288.

RICOCHET, the low firing of a gun, so that the shot bounds along the ground—a deliberate device in the XVII. and XVIII. cent's.

RICOLD OF MONTE CROCE (1242–1320), Ital. Dominican, who preached in Muslim lands.

RIDDLES, very ancient form of diversion, mentioned in Homer; most famous classical instance, the Riddle of the Sphinx, answered by Œdipus; references in the Bible, *e.g.* Samson's conundrum to the Philistines. Frequently embodied fragment of mythology. Popular in the Middle Ages, still in vogue in Russia and in the East.

RIDING, use of animals, especially horse, as means of locomotion known since earliest time; Greeks and Romans expert horsemen, rode without saddle; Numidian cavalry in great demand as mercenary troops, rode barebacked without bridle; horses never used extensively by Jews. Good horsemen ride with body above hips loose, to move with swing of horse; bridle held in left hand; both hands kept low; right hand used as means of preserving seat sure sign of bad horseman; seat preserved by balance combined with gripping with thigh and knee; foot should be level with horse's barrel except in such forms as fox-hunting (*q.v.*) and horse-racing (*q.v.*) when stirrup-leathers must be shortened. Military horsemanship differs from ordinary; Italian cavalry probably best horsemen.

RIDINGS (originally *thrithing*, the third part), name applied to the three districts of Yorkshire (N., E., and W.).

RIDLEY, NICHOLAS (1500–55), Eng. chaplain to Henry VIII., 1541; supported Lady Jane Grey; tried as a heretic under Mary, and burnt.

RIEGO NUÑEZ, RAFAEL DEL (1784–1823), Span. agitator; imbibed Liberal ideas while prisoner in France; made independent revolt backed by his regiment, 1820; captured and hanged.

RIEHM, EDUARD KARL AUGUST (1830–88), Ger. Old Testament scholar; prof. at Heidelberg, 1861, Halle, 1862.

RIEL, LOUIS (1844–85), Canadian rebel; led discontented Métis; headed insurrections in Manitoba region, 1869, 1885; betrayed and executed.

RIEMANN, GEORG FRIEDRICH BERNHARD (1826–66), Ger. mathematical physicist; studied at Göttingen (1846) and Berlin (1847–50) under Dirichlet and Jacobi; wrote thesis on theory of functions of a complex variable (1851). This theory he applied subsequently in a memoir on Abelian functions (1857). Much of his best work deals with the applications of pure math's to the solution of problems in physics.

RIENZI, COLA DI, Rienzo (*c.* 1313–54), Rom. tribune; friend of Petrarch, and one of precursors of Renaissance in that he strove to restore glories of ancient Rome; raised the people, who proclaimed him tribune, 1347, and established republic; several Ital. towns joined, but R. alienated supporters by extortions, and in few months was forced to fly; again obtained power, 1354, but was murdered.

RIESA (51° 20′ N., 13° 18′ E.), town on Elbe, kingdom of Saxony; sawmills; boat-building yards. Pop. (1910) 15,253.

RIESENER, JEAN HENRI (1734–1806), Fr. cabinet-maker; b. Gladbach; apprenticed in Paris to Oeben, whom he succeeded; married twice; divorced second wife; greatest of Louis Seize cabinet-makers; son became famous portrait painter.

RIESENGEBIRGE, Giant Mountains (50° 48′ N., 15° 35′ E.), mountain range, Germany, separating Bohemia from Pruss. Silesia and connected westward with the Erzgebirge, and eastward with the Sudetengebirge; length, 24 miles; highest point, Schneekoppe (5260 ft.).

RIETI (42° 25′ N., 12° 53′ E.), ancient *Reate*, cathedral city, province Perugia, Italy. Pop. 10,500.

RIEVAULX (54° 16′ N., 1° 6′ W.), town, Yorkshire, England; ruined mediæval abbey.

RIFLE-BIRDS (*Ptilorhis*), genus of Birds of Paradise, found in woods of N. Australia and New Guinea.

RIFLES.—Military rifles, that is, muskets with grooved barrels, date from the XVIII. cent., and examples may be seen in the museum of the Royal United Service Institution.

The Minié rifle used in the Crimean War (1854) was the final type of muzzle-loading weapon. The modern rifle is associated with a breech-loading action, and the first type was used at the battle of Sadowa in 1866; it was called the needle-gun, but four years later it was out-ranged by the French 'Chassepôt.'

In Britain in 1866 the old Enfield rifle of 1853 was provided with Snider's breech action, but in 1877 the Martini-Henry b.-l. rifle was adopted. The third stage of the rifle was reached when the breech action was connected with a chamber, placed either along the barrel or near the trigger-guard, to contain a reserve of cartridges. The Brit. army was re-armed with the Lee-Metford Magazine rifle, 1892–94. According to the official *Field Service Pocket Book* (1911), the sixteen principal states have in use: the Mannlicher (·315 and ·256); the Mauser (·311, ·301, ·276, ·256); the Krag-Jorgensen (·315 and ·256); the Lebel (·315); the Year 38 (·256); the 3 Line (·3); the Schmidt-Rubin (·295); the Springfield (·3).

These various rifles are sighted to 2000 to 2460 yds. Except the Belgian and Swedish rifles (Mauser), which have round-nosed bullets, all fire pointed bullets; and all are charger-loading except the Mannlicher rifles used by Bulgaria, Austria, Holland, and Italy, which are clip-loaders, and the French 'Lebel' rifle, which loads from a tube at the fore end.

In every army various other types of rifle exist, as on the score of expense a complete re-armament with a new weapon is rarely carried out. First line troops have the newest rifles and hand over their discarded weapons to reserve troops. It is estimated that £24,000,000 would be needed to re-arm the French infantry (3½ million) with a new rifle. An automatic rifle would double the expenditure of ammunition, and its delicate mechanism would doubtless unfit it for the rough usage of active service; there is also a special danger pointed out in our article on automatic pistols (*q.v.*). Existing rifles are often improved as to ballistics by changes in powder and bullet; for example, the German 'S' bullet has advantages up to half a mile, but at longer ranges the French 'D' bullet, which is heavier, should prevail.

Brit. infantry are armed with the short magazine Lee-Enfield rifle, calibre ·303 in., composed of 62 separate parts. It is constructed on the bolt system, the breech being closed by a bolt which is worked by a lever on the right side. The bolt contains the main-spring and striker. It is 'charger' loading, and the charger holds 5 cartridges. The rifling is on the Enfield system, with left-hand twist, one turn in 10 in. Muzzle velocity about 2440 f.s. This rifle has an adjustable blade foresight and radial backsight with vertical adjustment and wind-gauge. Length of rifle with normal butt about 3 ft. 8½ in., or with sword bayonet about 5 ft. 2 in. Weight with magazine empty about (Mark IV.) 8 lb. 14½ oz.

The foresight is of blade pattern, and is made in seven heights. The backsight is fitted with a leaf and has a curved ramp on each side of the bed on which the slide rests and by means of which elevation is obtained. The leaf is graduated on the right by lines for every hundred yards from 200 to 2000 yds. The slide can be adjusted for every 50 yds. The lines on the left of the leaf give graduations for 25 yds. The wind-gauge is adjusted by means of a screw with milled head on the right. On the left side of the rifle long-range sights are provided for ranges from 1600 yds. to 2800 yds.

A magazine of sheet steel to hold 10 cartridges is fixed in front of the trigger-guard. The cartridges rest on a platform which is actuated by a spring made from ribbon steel: to afford a smooth bearing for the platform an auxiliary spring is fixed by a lip and stud to the front of the magazine. With a distinct aiming mark within about 1000 yds. soldiers can deliver 12 to 15 rounds a minute with fair accuracy.

Morris Tube is a small-bored rifled tube inserted in a rifle barrel for purposes of firing-practice at short range.

RIGA (56° 57′ N., 24° 3′ E.), port, Livonia, Russia; near mouth of Dvina; formerly fortified; has an old castle; formerly a member of Hanseatic League; has very large import and export trade, although the harbour is closed by ice for four months every year; exports corn, flax, hemp, timber, skins, linseed, eggs; manufactures cottons, machinery, glass, paper, etc. Pop. (1910) 324,720.

RIGG, JAMES HARRISON (1821–1909), Eng. Wesleyan minister and educationist; member of first London School Board.

RIGGING, term applied to whole machinery of propulsion of a sailing ship, including mast, yards, sails, and the complexity of cordage; divided into 'standing' (fixed) and 'running' (haulable). 'Standing r.' comprises those ropes by which mast is secured and assisted against force of wind; backstays support against force from behind, breast-stays and shrouds resist lateral pressure, all combine against force from front. 'Running r.' includes movable timber (spars), sails, and the tackle necessary for their management.

There are two main types of rigging, one where sails are slung parallel with vessel (fore and aft), the other where sails are placed crosswise (square); shape of sails usually triangular in first case, rectangular in second. Most primitive form, still to be seen in small craft, consists of quadrangular sail with rope for hoisting; mast must be between wind and sail, hence, in tacking, sail frequently lowered and rehoisted. 'Lug-sail,' the next development, is 'lifting' sail, *i.e.* carries wind-pressure upwards. Both these styles are cumbersome. A further step is introduction of 'jaws,' bifurcation of boom (spar attached to lower border of sail) to meet mast enabling sail to swing either way; second sail, 'jib,' now makes its appearance, attached in front of mast to bowsprit (prolongation of bows). Schooner-rigged vessels are development of this class, generally two- or three-masted. In large vessels such as *Sovereign of the Seas*, 1637, square sails were used; modern large sailing-vessels usually combine these types.

It is impossible to give history of evolution of sail; process of adaptation differing in various countries; *e.g.* in Mediterranean and East, lateen rig. Variation of 'lug' still habitually used.

Cordage now made of hemp or esparto grass, formerly hide or leather; matting sails used on Chin. junks.

R. of all vessels is development of above types; no different types evolved; difference lies in development.

RIGIDITY, MODULUS OF, see ELASTICITY.

RIGORISM, term used of any ethical theory (such as those of the Stoics and of Kant) which is ascetic in type and finds the moral value of conduct rather in self-control and obedience to law than in conduciveness to happiness.

RIMBAUD, JEAN ARTHUR (1854–91), Fr. poet; after producing marvellous 'Symbolist' poems between ages of seventeen and nineteen, and enjoying friendship (which turned to enmity) of Verlaine and other chief contemporary poets, vanished from Europe; his poems appeared as *Les Illuminations*, 1886.

RIMINI (44° 3′ N., 12° 33′ E.), town, Forli, Italy; there are many remains of the ancient city of ARIMINUM, which, after belonging to the Umbrians and Etruscans, was taken by the Romans in 286 B.C., and at a later date was a bone of contention between Goths and Byzantines; after passing through the hands of Byzantines, Lombards, and Franks, it came in 1237 to the possession of Malatesta family, by whom it was sold to Venice in 1503; seized by pope in 1528, remaining a papal possession until 1860. Rom. remains include triumphal arch erected to Augustus, five-arch marble bridge, and parts of the old walls. There are many interesting mediæval and Renaissance buildings, including fine cathedral (built by Sigismondo Malatesta in middle of XV. cent. as a monument to his romantic attachment to his third wife, Isotta degli Atti), and the Palazzo Ruffo, which is associated with the murder of Francesca da Rimini in 1285; the churches of St. Girolamo and St. Giuliano contain pictures by Guercino and Veronese respectively. R. is an episcopal see. The principal industries are shipbuilding, fisheries, and the manufacture of matches, furniture, and silk. Pop. (commune) 48,000.

RIMPLER, see FORTIFICATION.

RIMSKY-KORSAKOV, NIKOLAS ANDREIEVITCH (1844–1908), Russ. composer; wrote operas, symphonies, and songs.

RINDERPEST, CATTLE-PLAGUE, infectious disease affecting cattle, sheep, goats, camels, deer, and similar animals; endemic in Central and Southern Asia; introduced into S. Africa towards end of XIX. cent.; only occurring in Western Europe from time to time by infection through imported cattle or hides. The last outbreak in Britain occurred in 1872, infection being due to cattle imported from Germany.

The disease is believed to be caused by a bacterium, but the infective agent has not yet been isolated, although it is known to exist in the excretions, and in the blood, flesh, organs, and their secretions, of the affected animal. The symptoms include fever, diarrhœa, inflammation of the mucous membranes, and great prostration; there may be discharges from the nose, mouth, and eyes, difficulty in breathing, a hard cough, and sometimes an eruption on the skin. In districts where the disease is endemic an attack is usually much slighter than in cases elsewhere, and the symptoms mild and difficult to recognise. Diagnosis is most certain when made after a post-mortem examination of an animal which has died or has been killed, the intensely congested appearance of the alimentary canal and respiratory passages being characteristic. The chief protection against the disease is by the prohibition of the importation of cattle from infected countries, while inoculation methods, either of bile or of blood serum from affected animals, have had some success in producing protection against attacks.

RING, ornament for fingers or ears; also used by savages for various other parts of body. R's have been worn from earliest times, most ancient being those found in Egyptian tombs. They may be made of gold, silver, or precious metal, and may carry precious stones.

It is supposed that r's owe their origin to the cylindrical seals of early times. These developed from small stones to signet rings, or rings with engraved seals, used by their owners for giving their authority to documents, etc. Among the later r's of the ancients are found those used for ornamental purposes only, and of these the pure gold belonged to the rich, but the poorer classes had rings of silver, bronze, iron, glass or porcelain. Episcopal r's are given to bishops on consecration; betrothal and wedding r's are given as pledges, and were used in this way by the Jews before the Christian era. Posy r's had rhymes engraved on the inside of the hoop, and were common in XVI.–XVII. cent's. See also EAR-RING.

RING OUSEL, see under THRUSH FAMILY.

RINGWOOD (50° 51′ N., 1° 47′ W.), market-town, on Avon, Southampton, England. Pop. (1911) (rural district), 7151.

RINGWORM, disease usually affecting the scalp, caused by a fungus which grows on the hairs, characterised by the development of a bald spot which is scaly and has broken hairs upon it. The treatment is to apply X-rays to the affected spot, which remove the hairs, or paint it with formalin, which kills the fungus.

RIO CUARTO (34° S., 64° 39′ W.), town, on Rio Cuarto, Cordoba, Argentina. Pop. 16,000.

RIO DE CONTAS (13° 17′ S., 42° 34′ W.), town, Bahia, Brazil. Pop. 18,000.

RIO DE JANEIRO (22° 57′ S., 43° 7′ W.), maritime state, Brazil, drained by Parahyba; interior is mountainous; chief product, coffee. Pop. 970,000. Capital, Nictheroy.

RIO DE JANEIRO (22° 57′ S., 43° 7′ W.), capital, Brazil, beautifully situated on east coast, on inlet of same name; archiepiscopal see, but no cathedral. Public buildings include the old city palace, formerly viceregal residence, and the museum, formerly imperial palace, national library, observatory, arsenal, exchange, palace of justice, and various ministerial offices. There are numerous philanthropic institutions, one or two educational establishments, fine parks, and botanical gardens. The climate is hot and unhealthy.

R. was discovered by Portug. explorers early in XVI. cent.; French settled here in 1555, but were subsequently expelled by Portuguese; taken by French for short time in 1711; became capital of Brazil, 1763; scene of rising in 1831, which led to abdication of Pedro I. In 1875 several large banks failed; and here occurred the revolution of 1889, when Brazil was proclaimed a republic, and rising of 1893, when town was damaged by bombardment.

The harbour is one of the finest in the world, and the commercial importance of the city is very great, half the imports and exports of Brazil passing through it; exports coffee, gold, manganese ore, hides, tobacco, diamonds, rubber, etc. Pop. 858,000.

RIO DE ORO (23° 30′ N., 16° W.), Span. possession, W. Africa, extending along Atlantic coast between Capes Bojador and Blanco, and forming part of W. Sahara; area, 71,000 sq. miles; administered under the control of the governor of the Canary Islands. Pop. 13,000.

RIO GRANDE DEL NORTE (35° N., 106° 40′ W.), river, N. America, rises in San Juan mountains, Colorado, and flowing S.E., forms boundary between Mexico and Texas; falls into Gulf of Mexico; length 2000 miles.

RIO GRANDE DO SUL (21° 47′ S., 40° 52′ W.), most southerly state, Brazil, lying between Atlantic and Uruguay R.; area, 91,333 sq. miles; plateau in N., grass-covered plains in S. Colonised by Jesuits in XVII. cent., R. G. came under Portug. control, 1750; rebellion occurred, 1835–45; became state of Brazilian Republic after revolution of 1889. Soil is fertile; pastures of S. and S.W. given up to rearing of cattle, horses, and sheep, the principal exports being hides, horse-hair, bones, tallow, and preserved meat. Cereals, vegetables, fruit, coffee, and sugar-cane are grown. Minerals include coal, gold, lead. Chief towns are Porte Alegre and Rio Grande do Sul. Pop. 1,400,000; (town) 20,000.

RIO GRANDE DO SUL (32° 7′ S., 52° 18′ W.), city, seaport, state **Rio Grande Do Sul**, Brazil; exports dried meats, hides. Pop. 22,000; (state) 1,410,000.

RIO MUNI, see MUNI RIVER SETTLEMENT.

RIO NEGRO (40° S., 64° W.), (1) territory, E. part of Argentina. Pop. 30,000. Capital, Viedma, on Rio Negro; (2) river, rises as Guainia, Colombia, S. America, tributary of Amazon; length *c.* 1400 miles.

RIO PARDO (29° 58′ S., 52° 30′ W.), town, Rio Grande do Sul, Brazil, at junction of Rio Pardo and Jacuhy. Pop. 4000.

RIO TINTO (37° 46′ N., 6° 38′ W.), town, Huelva, Spain; copper mines. Pop. 11,300.

RIOBAMBA (1° 38′ S., 78° 40′ W.), town, capital, province Chimborazo, Ecuador. Pop. 19,000.

RIOJA, LA (25° 25′ S., 67° W.), province, N.W. Argentina. Pop. 89,000. Capital, **Rioja**. Pop. 6500.

RIOM (45° 54′ N., 3° 8′ E.) (ancient *Ricomagus*), town, Puy-du-Dôme, France; formerly capital of Auvergne. Pop. 10,700.

RIOT, a tumultuous disturbance of the peace by three or more persons assembling on their own authority, with the intent to assist one another mutually against any who shall oppose them in some enterprise of a private nature; also the carrying out of this enterprise in a violent and turbulent manner to the terror of the people—whether the act intended were of itself lawful or unlawful; punishable by fine and imprisonment, with or without hard labour. Compensation is to be paid out of the police rate to persons sustaining damage in a riot; formerly it was recoverable from the Hundred. The RIOT ACT (1714) makes it felony for twelve or more persons, assembled unlawfully to the disturbance of the peace, to refuse to disperse after proclamation.

RIOUW, RHIO (0° 59′ N., 104° 26′ E.), archipelago, Dutch East Indies, S. of Malay Peninsula. Pop. 115,000.

RIPLEY (53° 3′ N., 1° 25′ W.), town, Derbyshire; collieries; silk-mills. Pop. (1911) 11,848.

RIPLEY, GEORGE (1802–80), Amer. man of letters; took active part in Transcendental movement, and inaugurated Brook Farm experiment.

RIPON (43° 50′ N., 88° 50′ W.), city, on Silver Creek, Fond du Lac County, Wisconsin, U.S.A.; flour-mills, canneries. Pop. (1910) 3739.

RIPON (54° 8′ N., 1° 31′ W.), town, on Ure, Yorkshire, England; episcopal see, has fine cathedral (dating from XII. cent. and containing many interesting monuments); R.'s manufactures (especially spurs) have greatly declined; in neighbourhood is Studley Royal, seat of Lord R., with Fountains Abbey in the grounds. Pop. (1911) 8218.

RIPON, BARONY, EARLDOM, AND MARQUESSATE OF, Eng. honours.—Duke of Queensberry (*q.v.*) was created Lord R., 1708. FREDERICK JOHN, younger son of Thomas Robinson, Lord Grantham, cr. Viscount Goderich, 1827; Prime Minister, 1827–28; was created Earl of R., 1833; known as 'Prosperity Robinson.'

RIPON, 1ST MARQUESS OF, GEORGE FREDERICK SAMUEL ROBINSON (1827–1909), Brit. Liberal statesman; succ. his f. as Earl of R., 1859; Sec. for War, 1863–66; Sec. for India, 1866; pres. of the Council, 1868–73; commissioner to decide Alabama claims, 1871; cr. Marquess, 1871; Viceroy of India, 1880–84; incurred disapproval at home for too Liberal measures; Colonial Sec., 1892–95; Lord Privy Seal, 1905–8.

RIPPERDA, DUKE OF, JOHN WILLIAM (1690–1737), Dutch minister of Philip V. of Spain; bitterly disliked by Castillian nobility; concluded treaty with Austria, 1725, falling into disgrace when Austria broke agreement, 1726; imprisoned for treasonable utterances; escaped; slain at *Ceuta*, fighting against Spain.

RISTITCH, JOVAN, RISTICH (1831–99), Servian Liberal statesman; responsible for wars with Turkey, 1876–78, which resulted in some gains to Servia, but loss of Bosnia and Herzegovina; fell, 1893.

RISTORI, ADELAIDE (1822–1906), famous Ital. tragic actress; in *Studies and Memoirs* left her interpretation of her characters.

RITSCHL, ALBRECHT (1822–89), Ger. theologian and philosopher; ed. at Halle; prof. at Bonn, 1852, Göttingen, 1864; at first influenced by Tübingen school, but rejected their standpoint. His view of Christianity is to divorce it from metaphysics; thus all controversies as to the nature of the Father and Son are fruitless; spiritual experience is everything. His theology has had considerable influence, though often only partially accepted.

RITSCHL, FRIEDRICH WILHELM (1806–76),

Ger. philologist; b. Grossvargula, in Thuringia; prof. of Philology, Breslau (1834), Leipzig (1865). Among his pupils were Curtius, Ihne, Ribbeck, Bücheler. As a scholar his fame will always be secure on account of his great collection of Latin inscriptions, *Priscæ Latinitatis Monumenta Epigraphica* (1862), on which was modelled the famous Berlin *Corpus Inscriptionum Latinarum*.

RITSON, JOSEPH (1752–1803), Eng. antiquary; collected Minot's *Poems*, *Ancient Eng. Metrical Romances*, etc.

RITTER, see KNIGHTHOOD.

RITTER, KARL (1779–1859), Ger. geographer whose name is borne by geographical institutions in Berlin and Leipzig; chief work, *Geography in its Relation to Nature and the History of Men*.

RITUAL, the outward acts of worship. In common use, a *Ritualist* is a High Churchman or one who copies in the Anglican Church the ceremonial of the Roman, but this is a narrowing of the term. R. plays a prominent part in all religions, indeed it would be difficult to imagine a religion with no outward forms: it is more necessary even than priesthood or sacrifice. R. is historically closely allied to sacramentalism, *i.e.* the performance of certain outward acts, and the use of symbols becomes a supernatural act and the symbol becomes identified with the thing symbolised. Gradually a rite once practised becomes more and more elaborate, and once begun is seldom dropped; the two chief tendencies of R. thus are to complexity and conservation. Some religious systems are almost entirely r.; in others, *e.g.* Catholic Christianity, the doctrinal and r. are both highly developed.

Frazer, *Golden Bough*; Robertson Smith, *Religion of the Semites*.

RIVA (45° 54′ N., 10° 50′ E.), town, on Lago di Garda, Tyrol, Austria; tourist resort. Pop. (1911) 9224.

RIVE-DE-GIER (45° 33′ N., 4° 41′ E.), town, on Gier, Loire, France; coal mines; glass- and iron-works. Pop. 15,600.

RIVER ENGINEERING, works for the improvement of a river; either for preventing floods or increasing the capacity of the river for navigation. R. e. is often a difficult matter owing to irregular flow of river and materials it carries. A river's power of moving objects depends on the velocity of the current, but this difficulty is modified where there is a lake in its course, for rocks, stones, and other débris are left lying in the lake, and the remaining flow is much freer than would otherwise be the case. Floods also cause difficulties. When the land through which a river flows is hard and impervious to rain, the water flows rapidly from the hills into the river, which cannot accommodate the extra supply, and therefore a flood takes place. The remedy is to widen or deepen the river channel; in some cases dams are built across one end of a valley, thus forming a reservoir, which can be emptied when the flood is past. Sometimes rivers may be helped against floods by removing obstructions which occur in their course. Obstructions may be either natural, such as accumulations of gravel, tree trunks, or artificial, as mining refuse, sluices for mills, wide piers for bridges.

Sometimes the embankments of the river are raised, but this course tends to lift the level of the river bed, and is not to be recommended, for if the river bed be of a higher level than the surrounding country, there is the danger that the banks may be broken and the land devastated. An instance of this is found in the Hoang Ho, China, where periodic floods take place. Artificial banks were erected some time back, and they have caused the river bed to rise. The consequence is that very often large numbers of lives are lost, and great damage is done to property, by the bursting of the banks when the river is in flood.

Bends in a river tend to become carried away by the current endeavouring to take a short cut. They often can be protected or eased by the erection of timber or concrete walls.

R. e. may also be said to include operations at the mouths of rivers, which have to be kept free from sand accumulations by dredging. Bars are soon formed by the deposits of sand and mud, carried some distance from the actual mouth of the river by the current. This is especially so in the case of river mouths where there are deltas.

Fresh-water rivers depend entirely on their own supply for their capacity, but those rivers which are tidal, as the Humber for instance, have their navigational capacity greatly increased by the tides. In these cases great improvements may be effected by dredging. Narrow rivers like the Clyde and the Tyne are more satisfactorily improved by deepening than are wide ones.

In the case of estuaries, r. e. may be said to extend to the reclamation of land by the erection of artificial river banks (see LAND).

RIVERINA (33° S., 145° E.), large pastoral tract between Murray and Darling, New South Wales.

RIVERS, EARLDOM OF.—Richard Woodville, 1st Earl (d. 1469), Eng. noble; m. Jaquetta of Luxemburg, widow of the Duke of Bedford; commanded in French wars; his daughter Elizabeth married Edward IV., 1464, after which he adhered to Yorkist side; seized by Lancastrians and beheaded. — **Anthony Woodville, 2nd Earl** (1442–83), held great positions as uncle of Prince Edward (Edward V.); executed by Gloucester's orders without trial; author of translation, *Dictes and Sayings*, first book printed in England.—**Richard Savage, 4th Earl** (c. 1660–1712), Eng. general; first nobleman to desert James II. on landing of William of Orange, 1688; dissolute but able character; commander-in-chief, 1712.

RIVERSIDE (33° 55′ N., 117° 20′ W.), city, on Santa Ana, capital, Riverside County, California, U.S.A.; orange orchards. Pop. (1910) 15,212.

RIVIERA (44° N., 8° E.), the narrow strip of coast on Gulf of Genoa, Italy, between Nice and Spezia; celebrated holiday resort.

RIVOLI (45° 34′ N., 10° 48′ E.), village, Verona, Italy; scene of Fr. victory over Austrians, 1797.

RIVOLI, DUKE OF, see MASSÉNA.

RIXDORF, suburb of Berlin, Germany; manufactures linoleum. Pop. (1910) 237,369.

RIZZIO, DAVID, RICCIO (c. 1532–66), Ital. musician; sec. to Mary Queen of Scots; murdered in her presence in supper-room, Holyrood Palace, by Darnley and others.

ROACH, see under CARPS.

ROADS are lines of communication constructed from place to place for vehicular and pedestrian traffic. 'Road' is applied generally to a broad way, 'street' is restricted to ways which pass through cities, towns, and villages.

The Romans were the first European people to construct roads scientifically and secure their permanency. The oldest and most famous of Rom. roads was the Appian Way, commenced in 312 B.C. and named after Appius Claudius. The construction of the Rom. road is characteristic of the people who invented it; it follows a geometrically straight line without deviation according to the contour of the land, and in solidity it is almost imperishable. Two trenches were first constructed indicating the breadth of the road. The interspace was then excavated until a solid foundation was reached. Slabs of stone were then laid on the foundation and consolidated by mortar; the second layer consisted of rubble, the third of fine concrete, and the fourth of a finely fitted mosaic of polygonal pavement stones. The total depth of the construction was frequently as much as 4 feet. The width was usually about 15 feet. Pavements of about 7 feet in width frequently bordered the Rom. way. The Latin expression for road-making, *munire viam* (lit. 'to fortify a way'), is graphic. Some of the ancient Rom. roads are in a state of perfect preservation to-day; others form the foundation for more modern ways.

The Rom. methods were adopted to some extent in

France in the XIX. cent., but the ancient type has now been superseded by less costly and less massive types. The two principal modern systems are the Telford and the Macadam methods. The Telford road rests on a built foundation; the Macadam road consists of several layers of broken stones. In London, owing to the noise of motor-traffic and the constant wear and tear, wood pavement is almost exclusively adopted. This road pavement consists of a layer of concrete, on which is laid a layer of wood, and which is finally covered with a thin layer of tar-Macadam.

In concrete roads the stone or clinker is broken into nodules of about 2 in. in diameter. The stones are then laid between layers of cement to a depth of about 7 in., and are then rammed down to a depth of 6 in. In metalled roads the 'soiling' or lower layer of metalled work consists of lighter and cheaper materials than the true metal or top surface. Trap rock and granite well watered and rolled make the best surface.

ROANNE (46° 2′ N., 4° 4′ E.), town, Loire, France; ancient *Rodumna*; cottons, woollens. Pop. 36,697.

ROANOKE.—(1) (36° 10′ N., 77° 15′ W.) river, Virginia and N. Carolina, U.S.A.; flows into Albemarle Sound. (2) (37° 15′ N., 80° W.) city, on Roanoke, Virginia; coal and iron mining; tobacco factories. Pop. (1910) 34,874.

ROASTING, see COOKERY.

ROB ROY, ROBERT M'GREGOR (1671–1734), the Scot. Robin Hood, subject of one of Scott's novels. His exploits are matters of familiar knowledge.

ROBBEN ISLAND (33° 47′ S., 18° 23′ E.), small flat island in Table Bay, S. Africa; leper and convict establishments.

ROBBERY, see THEFT.

ROBBIA, see DELLA ROBBIA.

ROBERT I., THE DEVIL (d. 1035), Duke of Normandy; aided Edward the Confessor and was f. of William the Conqueror. His grandson, ROBERT II. (d. 1134), succ. William the Conqueror as Duke of Normandy, 1087.

ROBERT I., ROBERT BRUCE, BRUS (1274–1329), Scot. king and national hero; of Norman descent; great-grandson of Robert le Brus, 4th lord of Annandale, by Isabel, 2nd dau. of David, Earl of Huntingdon, bro. of William the Lion of Scotland. His grandfather was one of three claimants to Scot. throne on death of 'Maid of Norway.' Bruce swore fealty to Edward I., 1296; joined Wallace (*q.v.*), 1297; one of four regents who continued struggle in Baliol's name, 1299, but submitted when Edward again marched north; murdered his rival, Comyn, in quarrel in a church, 1306; crowned king at Scone, March 27, 1306; fled on news of Edward's approach; Edward d. at Burgh-on-Sands. The Eng. army under Pembroke scoured Scotland for Bruce, who led wild life in hiding, collecting forces; Pembroke captured his castles and confiscated his estates and Bruce was excommunicated. The tide turned, 1307; Bruce won battle of *Loudon Hill*, and by 1309 was lord of most of Scotland; Edward II. was compelled to retreat, 1309; Stirling alone held out. A large Eng. army under Edward II., marching to relief, was decisively defeated at *Bannockburn*, June 24, 1314, by superior skill of Bruce. Invasions of England extorted recognition of independence of Scotland by Treaty of Northampton, 1328. Bruce died of leprosy; a wise king, a brave soldier, and a true patriot. Murison, *King Robert the Bruce*; Maxwell, *Robert the Bruce*.

ROBERT II. (1316–90), king of Scotland; s. of Walter the Steward and Robert Bruce's dau. Marjory; succ. uncle, David II., 1371; founded Stewart dynasty; his peaceable nature was unfitted to troublous times.

ROBERT II., THE PIOUS (c. 970–1031), king of France; succ. his f., Hugh Capet, 996; excommunicated for uncanonical marriage with cousin, Bertha, Countess of Blois; submitted after long struggle with papacy.

ROBERT GUISCARD, see GUISCARD.

ROBERT OF GLOUCESTER (fl. late XIII. cent.), Eng. chronicler; notable in early history of prosody as user of 'fourteener' verses.

ROBERT OF JUMIÈGES, bp. of London, 1044; abp. of Canterbury, 1051–52; d. 1070.

ROBERTS, DAVID (1796–1864), Scot. landscape and architectural painter; he travelled extensively, and most of his pictures were worked up from drawings made abroad.

ROBERTS OF KANDAHAR, EARL, FREDERICK SLEIGH ROBERTS (1832–), Brit. soldier; b. Cawnpore, India; distinguished in Mutiny, 1857–58, Afghan War, 1878; commanded at relief of Kandahar, capture of Kabul, defeat of Ayoob Khan, 1879–80; cr. baronet, 1881; app. commander-in-chief in India, 1885, and commanded in campaigns in Upper Burma, 1886–87; became general, 1890, field-marshal, 1895; cr. baron, 1892; frequently thanked by Parliament; commander-in-chief in South African War, 1899–1900; secured triumph of Brit. arms and annexed Transvaal and Orange Free State; commander-in-chief of Brit. Army, 1901–4; cr. Earl Roberts of Kandahar, Pretoria, and Waterford, 1901, and voted grant of £100,000 by Parliament; O.M., 1902; pres. of National Service League and advocate of compulsory military training in Britain. Author of *Rise of Wellington*; *Forty-One Years in India*; see *Life*, by Cobban (1901). His only son won V.C. and met death at *Colenso*, 1899.

ROBERTSON, FREDERICK WILLIAM (1816–53), Anglican divine; studied law, then worked for army, but went to Oxford and was ordained; an earnest and able preacher and spiritual leader, though not a great thinker; had considerable influence.

ROBERTSON, THOMAS WILLIAM (1829–71), Eng. dramatist and actor, produced several plays in the 'sixties, such as *David Garrick*, *Society*, and *Caste*.

ROBERTSON, WILLIAM (1721–93), Scot. historian and Presbyterian minister; member of General Assembly, 1746; nominated to Edinburgh living, 1756; pub. *History of Scotland*, 1759, which speedily ran through numerous editions; principal of Edinburgh Univ., 1762; royal historiographer, 1763; pub. *Charles V.*, 1769; excellent at generalisation; style good, but not brilliant.

ROBES, see COSTUME.

ROBES, MISTRESS OF THE, see BEDCHAMBER, OFFICIALS OF THE.

ROBESPIERRE, MAXIMILIEN FRANÇOIS MARIE ISIDORE DE (1758–94), Fr. revolutionist; b. at Arras, of a legal family of Irish descent. Having qualified for the Bar, R. was appointed criminal judge at Arras; resigned to avoid passing death sentence. His fame in the political world was made by his participation in discussion as to mode of electing the States-general; elected as one of the deputies of the *tiers état* of Artois in the States-general, 1789. R. was an ardent believer in Rousseau (*q.v.*). In the Assembly he was leader of the Extreme Left, or 'the Thirty Voices,' as Mirabeau called them; but it was in the Jacobin Club that the influence of R. was truly in the ascendant. The death of Mirabeau in 1791 gave his policy room in the Assembly, but his narrowness and lack of insight were apparent in his motion that no member of the present Assembly should be eligible for the next. This was a death-blow to Mirabeau's ideal of a competent ministry. Then followed the flight of the king, the dissolution of the Assembly, and the triumph of R. Meanwhile the Girondist party urged war with Austria, which Marat and R. successfully opposed. In April 1792 R. resigned his post as public prosecutor, and during the weeks of Terror which saw the overthrow of the Bourbon dynasty he lay inactive. To Danton and Billand-Varenne he left the responsibilities of the deeds of August 10, but the deeds being accomplished he took his seat in the Commune of Paris and petitioned a revolutionary tribunal and a convention. As deputy for Paris to the Convention he met with attacks, but in demanding the execution of Louis drew Danton and his party to him. The Girondists

were overcome, and R. was elected to this new Committee of Public Safety. R. was now the leader of the Revolution, and his power seemed supreme. All important offices he filled with his own tools, and abolished even a show of justice in the year of Terror, when he took from the tribunal the right of hearing witnesses. R. now began to oppose the Committee and to carry his own policy into practice. He instituted a great fête in honour of the Supreme Being and the soul's immortality—thus following Rousseau's ideas. Matters drew to a crisis. R. retired from the Convention for a month, and on his return his position was no longer secure. Open feud followed, and R. was guillotined on July 28 as an outlaw. Narrow, unpractical, the victim of a fixed idea, R. was unfitted for the life of a statesman, but he was whole-hearted and, according to his lights, an unflinching patriot.

ROBIN, see under THRUSH FAMILY.

ROBIN GOODFELLOW, see PUCK.

ROBIN HOOD, Eng. mediæval hero, frequently mentioned in literature from XIV. cent.; probably historical character; there is no reason to doubt existence of famous brigand when historical basis is conceded to earlier Arthurian legends; variant name, Robin o' the Wood; depicted as brave and chivalrous adventurer who had his headquarters in Sherwood Forest, where he levied toll upon travellers. Friar Tuck and Maid Marian are probably later additions to story. R. H. was popular hero as Arthur was pattern of nobility.

Hunter, *Great Hero of the Ancient Minstrelsy of England* (1852); Child, *English and Scotch Popular Ballads* (1888); Gummere, *Old English Ballads* (1894).

ROBIN HOOD'S BAY (54° 27′ N., 0° 31′ W.), inlet and seaside resort, Yorkshire, England.

ROBINIA, genus of trees, order Leguminosæ; flowers pink or white. Chief species, the Locust tree of America, yields hard wood of value.

ROBINSON, AGNES MARY F., see DUCLAUX.

ROBINSON, EDWARD (1794–1863), Amer. Biblical scholar and philologist; chief work, *Biblical Researches in Palestine and Adjacent Countries*, 3 vols.

ROBINSON, JOHN (1575–1625), Eng. clergyman; founded church in Leiden which produced Pilgrim Fathers (*q.v.* under Massachusetts).

ROBINSON, SIR HERCULES, see ROSMEAD.

ROBSART, AMY, see LEICESTER, ROBERT DUDLEY, EARL OF.

ROC, RUKH, bird in *Arabian Nights* which carried Sindbad from Valley of Diamonds.

ROCAMADOUR (44° 47′ N., 1° 42′ E.), village, Lot, France; place of pilgrimage.

ROCHAMBEAU, JEAN-BAPTISTE-DONATIEN DE VIMEUR, COMTE DE (1725–1807), Fr. soldier; marshal of France; sent as lieutenant-general to America, 1780, and obtained capitulation of Cornwallis at *Yorktown*. His s., DONATIEN-MARIE-JOSEPH (1750–1813), was distinguished general.

ROCHDALE (53° 37′ N., 2° 10′ W.), town, on Roch, Lancashire; woollens, cottons; seat of first co-operative society (1844). Pop. (1911) 91,437.

ROCHE, SIR BOYLE, Bart. (1743–1807), Irish politician and soldier; celebrated for Irish 'bulls.'

ROCHEFORT (50° 9′ N., 5° 13′ E.), town, Namur, Belgium; marble quarries. Pop. 3600.

ROCHEFORT (45° 56′ N., 0° 57′ W.), fortified seaport, on Charente, Charente-Inférieure, France; important naval station, with arsenal, hospital, and other establishments; naval and commercial harbour; shipbuilding yards; scene of victory of Brit. fleet over French, 1809. Pop. (1911) 35,019.

ROCHEFORT-LUÇAY, VICTOR HENRI, MARQUIS DE, HENRI ROCHEFORT (1831–1913), brilliant Fr. journalist; editor of *La Patrie*; founder of *La Lanterne* (1868), *La Marseillaise* (1869), *L'Intransigeant* (1880); a leader in Commune (1871); transported to New Caledonia, 1873; escaped, 1874; returned to Paris, 1880; attacked Thiers, supported Boulanger, stirred up feeling against Panama scandals (1892–95), and against Dreyfus (1897–99); author of frequently acted vaudevilles and novels.

ROCHEFOUCAULD, see LA ROCHEFOUCAULD.

ROCHESTER.—(1) (51° 24′ N., 0° 29′ E.) town, Kent, England; episcopal see, has interesting cathedral, originally founded by St. Augustine in 604; part of original building remains, but most of present structure is in the Norman and Early Eng. styles of XI., XII., and XIII. cent's. R. has a grammar school, founded, 1544; and ruins of an old Norman castle. Pop. (1911) 31,388. (2) (43° 8′ N., 77° 41′ W.) city, New York State, U.S.A.; on Genesee R., 7 miles above L. Ontario; seat of Univ. (founded, 1850); has R.C. cathedral; Erie Canal crosses river by aqueduct; falls of river supply power for lighting, haulage, and industrial purposes; principal manufactures are clothing, boots and shoes, rubber goods, agricultural tools, hardware, and photographic appliances; fruit-canning is carried on; seed-gardens and nurseries. Pop. (1910) 218,149. (3) (43° 16′ N., 71° 6′ W.) city, New Hampshire, U.S.A.; woollen manufactures. Pop. (1910) 8868. (4) (44° 1′ N., 92° 24′ W.) city, Minnesota, U.S.A.; flour-mills. Pop. (1910) 7844.

ROCHESTER, JOHN WILMOT, 2ND EARL OF (1647–80), Eng. wit, b. Ditchley, Oxfordshire. He was a reprobate at the court of Charles II., but in spite of his excesses his wit was keen to the end. He is the author of the famous epitaph on Charles II.:—

> 'Here lies our sovereign lord the king,
> Whose word no man relies on;
> He never said a foolish thing,
> Nor ever did a wise one.'

To which Charles is said to have replied, 'My words are my own, my acts are my ministers'.'

ROCHESTER, LAWRENCE HYDE, EARL OF (1641–1711), Brit. statesman; first lord of treasury (one of 'the Chits'), 1679–84, 1685–87; pres. of Council, 1684–85, 1710–11; led Tory reaction under Charles II.; able and conscientious; wife, HENRIETTA, a famous beauty.

ROCHET, white linen garment with sleeves, worn by bp's in Roman and Anglican churches; in R.C. Church it is short and edged with lace; in Anglican Church long and with full sleeves, and is worn under chimere.

ROCHFORD (51° 35′ N., 0° 42′ E.), town, Essex, England, on Roach estuary.

ROCK, DANIEL (1799–1871), R.C. theologian; wrote *Hierurgia, or the Holy Sacrifice of the Mass, The Sacrifice of the Mass.*

ROCK HILL (34° 55′ N., 81° 5′ N.), city, S. Carolina, U.S.A.; cotton manufactures. Pop. (1910) 7216.

ROCK ISLAND (41° 28′ N., 90° 32′ W.), city, on Mississippi; capital, Rock Island County, Illinois, U.S.A.; seat of arsenal and armoury; agricultural implements. Pop. (1910) 24,335.

ROCK ROSE, see CISTUS.

ROCK-CRYSTAL, pure silica $(SiO_2)_n$, crystallised, colourless, six-sided prisms; found in quartz veins of granite, especially in Switzerland; used for spectacle lenses.

ROCKEFELLER, JOHN DAVISON (1839–), Amer. millionaire; with bro. WILLIAM (1841–), Samuel Andrews, Henry M. Flagler, and Stephen V. Harkness, formed first great 'trust,' 'Standard Oil Co.,' 1870, himself pres.

ROCKET.—(1) name of two species of plants; (2) cylindrical case filled with explosives, used in pyrotechnics, signalling, and life-saving apparatus.

ROCKFORD (42° 14′ N., 89° W.), city, on Rock River, Illinois, U.S.A.; agricultural machinery; woollen goods. Pop. (1910) 45,401.

ROCKHAMPTON (23° 25′ S., 150° 25′ E.), seaport, Queensland, Australia, on Fitzroy; outlet for produce of Central Queensland; frozen meat, live stock; gold, silver, copper, coal; sapphires and opals. Pop. 16,500.

ROCKINGHAM, CHARLES WATSON-WENT-

WORTH, 2ND MARQUESS OF (1730–82), Brit. Whig statesman; first lord of treasury, 1765–66, with Burke as sec.; fell through passing unpopular repeal of Stamp Act; formed second ministry, 1782; poor orator and party manager.

ROCKLAND.—(1) (44° 6′ N., 69° 7′ W.) town, Maine, U.S.A., on Penobscot Bay; lime-kilns; shipbuilding yards. Pop. (1910) 8174. (2) (42° 15′ N., 70° 54′ W.) town, Massachusetts, U.S.A.; boots and shoes. Pop. (1910) 6928.

ROCKVILLE (41° 52′ N., 72° 28′ W.), city, Conn., U.S.A.; silk and woollen goods. Pop. (1910) 7977.

ROCKY MOUNTAIN GOAT (*Haplocerus montanus*), a goat-like relative of the Chamois (but no true goat) found on the Rocky Mountains from Alaska to the latitude of San Francisco.

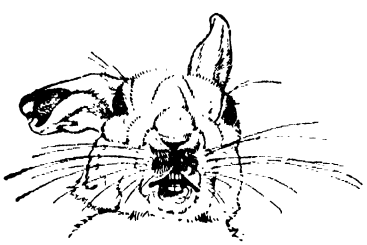
ROCKY MOUNTAINS, system of ranges of W. N. America from Alaska to Mexico; greatest breadth (*c.* 40° N.) 1000 miles; highest peaks, Mt. M'Kinley (20,464 ft.) in Alaska, and Blanca Peak (14,464 ft.).

ROCROI (49° 55′ N., 4° 31′ E.), fortified town, France; scene of Fr. victory over Spaniards, 1643.

ROD, ÉDOUARD (1857–1910), Swiss novelist; prof. of Comparative Literature, Geneva, 1887–93; obtained wide appreciation as writer of psychological novels; among chief books are *La Course à la mort*, *Le Sens de la vie*, *L'Affaire J. J. Rousseau.*

RODBERTUS, KARL JOHANN (1805–75), Ger. politician and writer; minister of public worship and education for fourteen days in Hansemann ministry, 1848; leader of left centre in lower house, 1849; retired from politics on introduction of new electoral law; called 'founder of scientific socialism.'

RODENTS, RODENTIA, GLIRES, or GNAWERS (Lat. *rodo*, I gnaw), an order of mammals important on account of its wide distribution, for Rodents occur everywhere, and on account of the extraordinary number (almost 2700) of its species. From all other mammals they can readily be distinguished by their front or incisor teeth, which are long, parallel-sided, and chisel-edged, this last unique feature being due to the absence or insignificance of a layer of hard enamel on the back of the tooth, so that the back wears more rapidly and leaves the front edge projecting. The incisors never cease growing, but are worn away in front by gnawing as they are pushed forward from behind. There are no canine teeth, a great gap or diastema between front and back teeth allowing a pad of cheek skin to fall within the mouth. Rodents walk on the joints of their toes, which are tipped with blunt, sometimes hoof-like, nails.



HEAD OF RABBIT, TO SHOW RODENT TYPE OF TEETH.

A great family likeness runs through the Rodent family—they have long heads with sharp snouts projecting far beyond a small mouth. Their gnawing and the sideways motion of their jaws in chewing is very characteristic. They are typically vegetarian, but some, such as SQUIRRELS, occasionally feed on birds' eggs, or even young birds, while RATS devour fish, game, birds, frogs, and at times their own kind.

Many different modes of life are exhibited by Rodents. Most are protected by their nocturnal habits; but the POCKET-GOPHERS spend the whole of their lives underground, the RABBITS, MARMOTS, and many others trust to the safety of burrows, the HARES to their speed of foot, the PORCUPINES to their spiny covering, the BEAVERS to a house entered from under water, while the SQUIRRELS live in the tree-tops, and the 'FLYING' SQUIRRELS have made an effort to conquer the air. Several species hibernate in winter.

Of peculiar structures, perhaps the most interesting is the skin-fold which enables the Flying Squirrels to parachute from tree to tree. The fur is generally short and soft, but it may be coarse, as in Rats, or even spiny, as in Spiny Mice and Porcupines. Very common are special glands which give a characteristic odour, as in the case of the MUSK RAT.

To man the group is of considerable importance. Owing to their vegetarian habit many Rodents are exceedingly destructive: Squirrels destroy young trees by gnawing the bark, while Rats, Lemmings, and Voles often ruin the crops throughout wide districts, being slaughtered by thousands in 'plague' years. On the other hand, Beavers, Marmots, Chinchillas, Hares, the American Coypu, and others possess soft fur highly valued for garments and wraps, while garbage-feeders, such as Rats, play a useful part as scavengers.

At the present day Rodents are found all the world over, although their chief home is in South America. Fossil remains indicate that they were plentiful even from early Tertiary times.

The order RODENTIA falls into two great divisions—SIMPLICIDENTATA with a single pair of incisors in the upper jaw, and DUPLICIDENTATA with two pairs. The former includes three sub-orders: (1) SCIUROMORPHA—Squirrels, Beavers, Marmots, etc.; (2) MYOMORPHA—Rats, Mice, Dormice, Gerbils, Jerboas, Lemmings, Voles, Gophers, etc.; (3) HYSTRICOMORPHA—Porcupines, Chinchillas, Cavies, Agouties, Capybara, etc. DUPLICIDENTATA includes only the sub-order LAGOMORPHA—Rabbits, Hares, and Picas.

RODERIC (d. 711), 'The last of the Goths,' was Visigothic king of Spain, supplanting Witiza, whose sons, aided by Tarik, a Moor, defeated and slew R. at Guadalete. R.'s story was treated by Scott and Southey.

RODEZ (44° 21′ N., 2° 35′ E.), chief town, Aveyron, France, on Aveyron; ancient *Segodunum*; cathedral; textiles. Pop. 15,600.

RODIN, AUGUSTE (1840–), Fr. sculptor; chiefly distinguished for portrait busts and statues. A bust and monument of Victor Hugo are his masterpieces; has executed Biblical and symbolical groups.

RODNEY, GEORGE BRYDGES RODNEY, BARON (1718–92), Brit. admiral; admiral of the White, 1778; vice-admiral of Great Britain, 1781; destroyed Havre harbour, 1759; took Martinique, 1761; cr. baronet, 1764; won victories of *Cape Finisterre* and *Cape St. Vincent*, and relieved Gibraltar, 1780; captured St. Eustachia, 1781; defeated Fr. fleet off Leeward Islands, 1782, his crowning victory; cr. baron, 1782; characterised by Lecky as vain, boasting, daring, skilful.—*Life*, by Hannay.

RODOSTO (41° N., 27° 31′ E.), seaport, European Turkey, on Sea of Marmora; ancient *Bisanthe* or *Rhædestus*. Pop. 40,000.

RODRIGUEZ (19° 40′ S., 63° 25′ E.), island, dependency of Mauritius, in Ind. Ocean; area, 42 sq. miles; of volcanic formation; surface mountainous; chief town and port, Mathurin; R. was first visited by Portuguese, 1645, and has belonged to Britain since 1810; produces rice, cotton, sugar-cane, tobacco, fruits, vegetables, timber. Pop. (1911) 4826.

ROE, EDWARD PAYSON (1838–88), Amer. Presbyterian clergyman and novelist; wrote *From Jest to Earnest*, etc.

ROE DEER, see under DEER FAMILY.

ROEMER, FRIEDRICH ADOLPH (1809–69), Ger. geologist; prof. of Geol., Clausthal, 1845; director of School of Mines, 1862.

ROEMER, OLE (1644–1710), Dan. astronomer; prof. at Copenhagen Univ.; discovered velocity of light and invented accurate astronomical apparatus.

ROERMOND (51° 12′ N., 5° 59′ E.), town, Limburg, Netherlands, at junction of Roer and Meuse; cathedral; cloth manufactures. Pop. (1910) 13,858.

ROESKILDE, see ROSKILDE.

ROGATION DAYS, the Monday, Tuesday, and Wednesday before Ascension Day; these days are appointed for prayer and fasting.

ROGER I. (1031–1101), Count of Sicily; youngest of twelve sons of Tancred de Hauteville; divided Calabria with bro., Robert Guiscard, 1062; conquered Sicily, 1060–1101.

ROGER II. (1093–1154), king of Sicily; succ. his f., Roger I., as Count of Sicily, 1101; Duke of Apulia and Calabria, 1127; conquered Capua, Amalfi, and Naples, thus establishing later realm of the Two Sicilies, which he made civilised Norman state; crowned, 1130; established over-lordship over Arabs of Africa.

ROGER (d. 1139), Norman priest; entered service of Henry I., who created him bp. of Salisbury; became very powerful; a worldly man.

ROGERS, JAMES EDWIN THOROLD (1823–90), Eng. economist; Drummond prof. of Political Economy, Oxford; author of *History of Agriculture and Prices*.

ROGERS, JOHN (1500–55), Eng. Prot. divine; helped to publish Tyndale's Bible; prebendary of St. Paul's, 1551; accused of heresy and martyred under Mary; first Protestant to suffer in her reign.

ROGERS, RANDOLPH (1825–92), Amer. sculptor; made bronze doors of Capitol at Washington.

ROGERS, ROBERT (1727–1800), Anglo-American colonel and author; *Rogers's Rangers* were distinguished in Canada against French, 1755–60; mistrusted by nationalists and fought for Britain in War of Independence.

ROGERS, SAMUEL (1763–1855), Eng. poet; b. Stoke-Newington; entered his father's bank, 1784; became head of the firm, 1793; famous as poet in his own day, and was ranked by Byron above Wordsworth and Coleridge, but his works are unread to-day, and even *The Pleasures of Memory* is but a name. His home at 22 St. James's Place, London, was noted for its elegance, and the witty company that visited it.

ROGIER, CHARLES LATOUR (1800–85), Belg. statesman and author; aided revolution, 1830; member of provisional government; Minister of Interior, 1832–34; laid down railroads; Minister of Public Works, 1840–41; Minister of Interior, 1847–52, 1857–61; avoided revolution, 1848, by concessions; Minister of Foreign Affairs, 1861–68; freed navigation of Scheldt.

ROHAN, LOUIS RENÉ ÉDOUARD, CARDINAL DE (1734–1803), Fr. courtier; notorious for the **Diamond Necklace Affair**. The necklace, originally made for Madame du Barry, was priced at £80,000; R., duped by De Lamotte, an adventuress, believed that the queen wanted it and became security; De Lamotte and her husband sold the separate stones; the theft discovered, De Lamotte was branded, her husband fled to England, R. was tried and acquitted by the Parlement of Paris; becoming a popular hero R. was elected to the States-general, 1789.

ROHAN, HENRI, DUC DE (1579–1638), Fr. Huguenot commander; obtained for Huguenots Treaty of Montpellier, 1623, and became marshal; Huguenots crushed by Richelieu, despite warfare waged by R. and younger bro., SOUBISE, 1625–29; wrote *Mémoires*, famous book *Parfait capitaine*, etc.

ROHILKHAND (28° 50′ N., 78° 40′ E.), division, United Provinces, India. Pop. 5,500,000. Chief town, Bareilly.

ROHLFS, FRIEDRICH GERHARD (1831–96), Ger. explorer and author of books of travel; first European to visit oasis of Touat in Sahara, 1864; explored Kamar, 1866; Siwa, 1869; Libyan Desert, 1873–74; oases of Sokna and Koufra, 1878; consul at Zanzibar, 1885.

ROHTAK (28° 54′ N., 76° 38′ W.), district, Punjab, India. Pop. 635,000. Capital, ROHTAK. Pop. 21,000.

ROKITANSKY, CARL, FREIHERR VON (1804–78), Ger. pathological anatomist; b. Königgrätz, Bohemia; studied med. at Prague and Vienna; became assistant and later prof. of Pathological Anat. in Vienna, medico-legal anatomist to the city, and medical adviser to the Minister of Education; pres., Imperial Academy of Sciences, 1869; founder of the great Vienna school of pathological anat., and author of various works on that subject.

ROLAND, the hero of the famous Charlemagne legend. There is a nucleus of historical truth in this *Chanson de geste*, for in Eginhard's *Vita Karoli*, one Hruodlandus, prefect of Brittany, was slain by the Gascons in a Pyrenees valley, but romance has magnified the hero and the campaign beyond recognition.

ROLAND DE LA PLATIÈRE, JEAN MARIE (1734–93), Fr. statesman; delegate of Lyons to obtain from Constituent Assembly nationalisation of debt, 1791; he and his wife became ardent Jacobins; Minister of Interior, 1792; one of '*Sans culottes*'; joined party opposed to Robespierre, and sought to save king; resigned, 1793; committed suicide on hearing of sentence against his wife, **Madame Roland**, JEANNE-MARIE PHLIPON (1754–93), heroine of Fr. Revolution; nourished on classic lit. and full of Rom. republican ideas; presided over celebrated *Salon*; perished by guillotine, 'fresh, calm, smiling.'

ROLANDSECK (50° 40′ N., 7° 12′ E.), village, Rhineland, Prussia, on Rhine; noted ruined castle.

ROLLE DE HAMPOLE, RICHARD (d. 1349), Eng. author; b. Pickering, Yorkshire. His habits were rigidly ascetic; adopted garb of hermit. He records visions and revelations; and is reputed to have performed miracles. His most famous work is *The Pricke of Conscience*, a long religious poem in rhyming couplets.

ROLLERS (*Coraciidæ*), so called from their habit of turning somersaults in flying; a family of over 30 species of Picarian Birds distributed throughout the Old World. The **Common Roller** (*Coracias garrulus*) is an occasional visitor to Britain.

ROLLING MILLS, apparatus for reducing masses of metal to plates, bars, etc.; metal is first heated, then roughly flattened by steam-hammer or coarse cogging-mill, then reduced between two iron rollers, flat or grooved, according to shape required; vertical rolls sometimes used to smooth sides of plate; process repeated with smaller-geared rollers till desired thinness is reached; there are generally three rollers, plate goes through lower pair, repasses through top rollers; specially shaped rollers for shaping tyres and tubes.

ROLLS, see RECORD.

ROLLS, MASTER OF THE, see MASTER OF THE ROLLS.

ROMA (26° 33′ S., 148° 42′ E.), town, Queensland, Australia; wheat, fruit; vineyards in vicinity. Pop. 3000.

ROMAN (46° 57′ N., 26° 55′ E.), town, Rumania; seat of Gk. bp. Pop. 14,400.

ROMAN ARMY.—The genius of the Romans was seen in its highest expression in the organisation of the army. In the early days of the Republic the army was strictly a militia, where class distinctions were sharply drawn, but Gaius Marius (B.C. 157–86) reconstructed the forces and created the professional soldier. Marius admitted all freeborn citizens to the infantry, made the cohort, instead of the maniple, the unit, filled the ranks of the cavalry with Thracians, Africans, and Gauls, and the ranks of the light-armed troops with slingers from Liguria and the Balearic Isles. The Roman legion consisted of 4000 infantry and 300 cavalry. It was not so heavy as the Gk. phalanx, and consequently better suited for offensive warfare. The infantry was distributed into four divisions—*hastati* (light armed) and *principes* (heavy armed) forming the first and second lines, and the *triarii* (veterans) and *velites* (skirmishers) occupying the rear. The legion was subsequently extended to embrace more than 6000 men, and was divided into ten cohorts. In the days of the Empire this magnificent organisation degenerated into a purely mercenary army.

ROMAN ART, like Rom. literature, developed at a comparatively late date in the history of the State.

Only when Rome had made herself mistress of Italy and had secured her position in the Mediterranean Sea did she turn her thoughts seriously to the cultivation of her artistic talents; and just as in her literature her first efforts were imitative rather than creative, so in her art she commenced by reproducing Gk. originals. But there was latent in the ancient Italian temperament an autochthonous artistic talent, which, though checked by the Philhellenic enthusiasts of the late Republic and early Empire, was never quite extinguished, and reasserted itself in all its strength in the II. cent. A.D.

Realism and detail were the distinguishing features of the decorative masterpieces of the ancient Etruscan sarcophagi, and it was this realism and detail which combated Hellenistic conventions in the Imperial age and conditioned the genuinely Rom. artistic expression in the commemorative reliefs and portrait sculpture of the Flavian period. The most ancient works of art preserved at Rome were of Etruscan origin. The arch and vault, which persisted in Rom. architecture even during the period when Hellenism exerted its most potent influence, were derived from Etruria. The waves of Hellenistic influence in art reached Rome in 212 B.C., when Marcellus transported from Syracuse the finest specimens of Gk. statuary, and from that period the triumphs of Rom. generals were embellished with magnificent works of Gk. art.

In the age of Cicero it was the custom of the cultivated to adorn their palaces and villas with masterpieces of Gk. art, and the ardour of the connoisseurs is illustrated by the correspondence of Cicero. But Philhellenism rapidly degenerated into dilettantism. Art for art's sake was an ideal utterly alien to the Rom. mind; but the gift of moulding in marbles the busts of Rome's valorous sons and representing in relief the story of her greatness was an art worthy of Rom. cultivation, in that it was art for power's sake.

Augustus, realising the possibilities of art in establishing the new order, extended his patronage to sculptors, painters, and architects. The new temples were adorned with reliefs illustrating the great events of Rome's history. In these works the technical excellence reflects Gk. influences, but the motive ideal is purely Roman. A fine specimen of Rom. art in the Augustan age is the *Ara Pacis Augustæ*. Under the Julio-Claudian dynasty the Hellenistic conventions cramped and trammelled the native genius. But there followed a genuinely Rom. artistic revival which culminated in the magnificent stone column and forum of Trajan.

In the reign of Hadrian there was a revival of the Hellenistic tradition, which found expression in the ideal representations of Antinous. But in the Antonine period the purity of the Gk. spirit and verisimilitude of the Rom. spirit alike failed before the blatant and bizarre influences of the East. The simple appeal of marble is abandoned for the gaudy effectiveness of basalt, porphyry and alabaster, and mosaic work.

ROMAN DE LA ROSE, Fr. allegory of XIV. cent.; first part, written by Guillaume de Lorris, is full of the conventional allegorical incidents—the dream, the singing of birds, etc.; second part, by Jean de Meung (*q.v.*), is satirical, realistic, 'modern.' The Middle Scots school (*e.g.* Dunbar and Lyndesay) shows influence of both authors. The 'Rose' tradition coloured Eng. poetry for many years.

ROMAN CATHOLICISM is the oldest and largest form of Christianity. Its name sufficiently well sets forth its claim to be a Church for all time, all nations, all intelligences. From the name, too, the idea is further deduced of a union with the See of Rome as of essential consequence. Indeed, in the description of this portion of the Christian faith as the R.C. Church is contained the briefest and tersest account of all her claims and proofs. For, to begin with, the very notion of a Church, as continuing the work of Christ, implies the office of teaching all peoples. A Church is nothing else than an organised form of belief. If, then, it is admitted that Christ established through the Apostles a form of doctrine and a means of propagating that doctrine, the logical conclusion, according to the Catholic theologians, would be to acknowledge at once the most astounding claim of Catholicism, *i.e.* her infallibility.

This claim, therefore, she considers to be necessarily bound up with the idea of a Church, and to be based on those texts of Scripture in which Christ describes His claim to reveal the truths of His Father, and in those others in which He definitely commissions His Apostles to teach to others what He has taught to them. To achieve this, a visible divine Society is needed—visible, that is, in the sense first of being public; and second, of being recognisable among all other forms of belief. The first, or *material visibility*, is ensured by communion with the Roman See, as representing the apostolic line. It is the outward symbol of visible unity and, as such, acts as a material centre of unity, expressed in material relations to a definite authority. The *formal visibility* of the Church is looked upon as a finer and more delicate manifestation. It regards the divine Society of the Son of God as being clearly marked off from the Christian sects by certain attributes which evidently substantiate its claims to be of Christ. Necessarily it presumes certain moral predispositions on the part of the seeker; it postulates in the end a definite gift of God (never therefore originating from, or producible by, the would-be believer), known as the supernatural habit of faith. But granting a right disposition and the co-operation of God's grace, the clearness of her divinity, if she is at all to fulfil her mission of 'teaching all nations,' should be apparent to the most unlettered as well as to the most intelligent.

Lastly, from her name may be deduced her claim to the exclusive use of the title *Catholic*. This boast of her universality has been the great modern argument by which she has drawn to her some of the noblest of her converts. It is essentially the argument of Lacordaire, Newman, Brunetière, etc.; in an exaggerated form it is the pith of the modernistic defence. Briefly, it may be summarised thus: The facts brought forward by the study of comparative religions have proved a universal groping towards the full Christian faith as taught by Catholicism. A savage tribe here, a philosophical speculator there, a mystic rite, a heathen custom, have each some separate idea which is eventually found to exist also in the Catholic faith. These primitive notions are discovered by the force of the life of the human soul which has felt towards them and has found their truth by first finding their need. The void came first, then a religious idea was found to satisfy that void; the idea was held in consequence to be true. If then, as opponents assert, almost every Catholic doctrine has been held by one people or another in the stages of the world's development, the logical conclusion should not be, say her defenders, 'Therefore Catholic doctrine is purely natural,' but 'Therefore Catholic doctrine plainly suits the needs of the human heart.' In this sense, the Roman faith is Catholic, for it touches human nature at its base; it is the bringing into one and gathering together of all the strongest facts of religion, of all elements of the religious idea which could prove their fitness by survival, or their vitality by their growth, or by their richness their capacity for a deeper interpretation. It is here, say the modern apologists of the Church, 'in the bosom of humanity,' 'in the full pell-mell of human life,' and not in the efforts of any individual that the fulness of religion can be recognised.

Certainly the success and longevity of Catholicism are due to the unfaltering assertion of her claims. Hampered at first by her connection with the Byzantine emperors, she was unable to develop herself upon her own lines. But when once she had emancipated herself from New Rome and had baptized Clovis as earlier she had baptized Constantine, her influence over all Europe was without question. Then, at first tentatively, eventually with full consciousness, the

Greeks sprang off from her communion and caused that split between Eastern and Western Catholicism which has brought untold evil on the Asiatic portion of the faith. From time to time, at Lyons (1274) and Florence (1439), to go back no farther, union has been made between Latin and Greek, but its effects have been short-lived and its purpose very slightly religious.

European history she has to a great extent moulded, and the discoveries of America, etc., were due in no slight measure to her missionary zeal; and she endeavoured, through Las Casas and others, to mitigate the severe lot of the subject peoples. She is now in the whole of that continent numerically the strongest religious body.

The Reformation showed her power, for with the Reformation, ecclesiastical influence in the domestic life of the people has steadily declined; and only those religious organisations which are frankly political or frankly adopt her methods have any hold on the national life. By the penal laws, Catholicism was long excluded from any position of trust or any opportunity for fairly stating her claims; with their repeal, 1829, and the growth of the Oxford Movement her importance has been of marked increase. Her future in the British Isles will depend upon whether she will be able to grasp the opportunity which democracy affords her.

Newman, *Development of Christian Doctrine*, 1845; Coxon, *Roman Catholicism*, 1912; Williams, *Newman, Pascal, Loisy and the Catholic Church*, 1906; Procter, *Catholic Belief*, 1907; Batifoll, *Primitive Catholicism*, 1911.

ROMAN EMPIRE.—For the later Rom. Empire, the seat of which Constantine established at Byzantium (henceforth Constantinople), the description 'Byzantine' is most convenient. The title 'East Roman' is not always correct: from Augustulus to Charlemagne East and West were nominally united. The 'Later Rom. Empire,' again, leads to confusion with the 'Holy Rom. Empire of the German People.' This latter should always be spoken of as the 'Holy Rom. Empire,' not as the 'Rom. Empire'; its tenant as the 'Holy Rom. Emperor,' not the 'Rom. Emperor.' In the Middle Ages it was always, though not necessarily, held by the king of the Ger. people, and hence often called the Ger. Empire; in the middle of the XVI. cent. it became attached to Austria, and is thence often called Austrian; but these appellations lead to confusion with the bodies so named in the XIX. cent.

ROMAN EMPIRE, THE LOWER, see BYZANTINE EMPIRE.

ROMANCE LANGUAGES, the general name for a group of modern languages and dialects owing their common direct origin to Latin. They are thus all Indo-European (or Aryan) languages (see PHILOLOGY). The following languages are comprised in the group: French, Italian, Spanish, Portuguese, Rumanian; to these must be added Romaunsch, the speech common in S.E. Switzerland, Provençal, the popular language of S.E. France, Walloon, the dialect of southern Belgium, and a number of Ital. and Span. local dialects. Although all derived directly from Latin, these languages present great points of mutual difference, some being very much more altered than others. This is due partly to the fact that Rom. civilisation, and the language of the Romans, was more firmly established in some parts of the Empire than in others, and partly to subsequent alien invasions. Thus Spanish contains a considerable admixture of Arab. words, while Walloon and Romaunsch have absorbed a number of Teutonic words; French has been obviously influenced by the original Celtic and Germanic of natives and invaders, and Rumanian by the Slav speech of the surrounding populations. Some of the R. languages have in course of time been so profoundly modified by these influences as to become extinct, *e.g.* Dalmatian. Others, such as Sardinian, have been merged into one of the more vigorous R. languages or have sunk to a mere local dialect. A group of R. dialects may also be mentioned of extra-European growth, such as the French of the West Indies, the French of large parts of Canada, the popular Spanish of South and Central America, the Portuguese of Brazil; these generally show an older form of the parent language with an admixture of native and foreign words. In the Channel Islands dialect the oldest extant form of French is found.

ROMANES, GEORGE JOHN (1848–94), Brit. biologist, animal physiologist, and psychologist.

ROMANOV, FEODOR, see PHILARET.

ROMANS (45° 4′ N., 5° 4′ E.), town, on Isère, Drôme, France; leather manufactures. Pop. 17,700.

ROMANS, EPISTLE TO THE, the greatest of St. Paul's writings, was written from Corinth about 57 or 58 A.D. It is his most systematic theological treatise, and expands his view of Christianity and the Law, touching on many other matters besides. Its argument is sometimes hard to follow, and, while showing his intense spirituality and dealing with practical problems, manifests also the involutions of his unique mind. External testimony in support of it is good; it may have left traces elsewhere in the New Testament. Its authenticity is doubted only by the wildest critics. Its influence on Christian theology has been enormous, and all who have formed, or tried to form, their theology on Paul's have largely based it on this Epistle. Spiritually and intellectually it is one of the most wonderful productions of the Early Church.

Garvie, *Romans* (Century Bible); Sanday and Headlam, in *International Critical Commentary*.

ROMANSHORN (47° 34′ N., 9° 22′ E.), town, and port, on Lake of Constance, canton Thurgau, Switzerland; commercial centre. Pop. (1910) 5973.

ROMANTIC REVIVAL, see RENAISSANCE OF WONDER.

ROMANUS, name of four Byzantine emperors; first (919–48) was deposed by his sons; second (959–63) acquired Crete; third (1028–34) suffered Muhammadan attacks; fourth (1068–71) lost Bari.

ROMANY, see GYPSIES.

ROME (34° 15′ N., 85° 12′ W.), city, on Coosa, Georgia, U.S.A.; cotton and lumber industries. Pop. (1910) 12,099.

ROME, ROMA (41° 54′ N., 13° E.), capital of Italy and seat of the papal court, is situated on the E. bank of the Tiber, 15 miles above its mouth, on the Tyrrhenian Sea. Its site was marked out by nature for an important town. Its Seven Hills offered plentiful, though not perfect, refuge from the malaria of the valley, and the ford here was from early times the route from Etruria into Samnium. The Janiculan Hill on the right or W. bank of the Tiber was not included in the city until some time after its foundation, and of the hills on the left bank the *Aventine*, *Cœlian*, *Palatine*, *Esquiline*, *Viminal*, *Quirinal*, and *Capitoline* composed the Seven, commemorated in the festival of the *Septimontium*.

The Seven Hills.—The earliest settlement, *Roma quadrata*, said to have been fortified by ROMULUS (*q.v.*), was on the Palatine Hill, the central eminence, close to the stream, with the Germalan and Velian spurs running N.W. and N.E. respectively. The four steep slopes of the Palatine were crowned by a square wall, of which remains have been discovered, showing large stones with no trace of mortar. The Aventine lies S. by the Tiber; in the valley between it and the Palatine was the *Circus Maximus*, said to have been formed by Tarquinius Priscus. E. is *Mons Cœlius* separated by a deep valley from the Esquiline to the N., with *Mons Oppia* and *Mons Cispia*. The Viminal, Quirinal, and *Mons Pincius* follow to the N., enclosing on its E. the *Campus Martius*, between which and the Palatine Hill is the Capitoline. The Capitoline Hill has two peaks, the *Arx* and the Capitol; its steep S. slope was known as the TARPEIAN ROCK, from the top of which traitors were flung. The valley E. of the Capitoline Hill was known as the *Subura*, in the lowest portion of which, at the foot of the Palatine Hill, was the *Forum Romanum*.

Walls.—The city wall ascribed to SERVIUS TULLIUS, of extraordinary height, surrounding all the fortified hills of the regal period, is still in places to be seen, with its great trench and ditch. It just enclosed the Capitoline on the N.W., ending opposite the Tiber Island in the middle of the city, and excluding the plain of the *Campus Martius* between the hills and the river. The emperors AURELIAN (270–75) and PROBUS (276–82) built a wall, starting by the Tiber S. of that of Servius and making a wider circle; it touches the Tiber near the N.W. gate, goes S.E. along the left bank of the stream to within a short distance of the *Pons Aurelius* (the present Sistine Bridge), then includes part of the Janiculan Hill, returns to the Tiber and goes S. along the left bank to its starting-place, in all a distance of 12 miles. The Janiculan and its spur, *Mons Vaticanus*, became the papal quarters of the city and were enclosed by the Leonine Wall, built by Leo IV. (847–55).

Gates and Streets.—The various gates (R. possessed thirty-seven) in the Aurelian Wall correspond to the streets of ancient R., which all converged on the ford over the Tiber. From the valley round the Palatine Hill went the *Via Aurelia* W., crossing the Tiber by the *Pons Æmilius* (Ponte Rotto) and having issue at the *Porta Aurelia* (S. Pancrazio); the *Via Ostiensis*, S.W. to the Rom. port, Ostia, passing through the *Porta Ostiensis* (S. Paolo); the *Via Appia* (Via di Porta and Via S. Sebastiano), made by Appius Claudius, censor, 304 B.C., as far as Capua in the S.E. and extended later, the first great military road of R.; the *Via Tiburtina*, E., passing the Servian Wall by the *Porta Esquilina*, the Aurelian Wall by the *Porta Tiburtina* (S. Lorenzo); the *Via Nomentana*, passing the Servian Wall by the *Porta Collina*, the Aurelian by the *Porta Nomentana* (Porta Pia); and the great north road named from C. Flaminius, who repaired and extended it (220 B.C.), the *Via Flaminia* (del Corso), which issued by the *Porta Flaminia* (del Popolo). The *Via Latina*, still so named, branched off from the Appian Way and went S.E. through the *Porta Latina*. The *Via Prænestina* and *Via Labicana* branched off from the Tiburtine Way. The *Via Cassia*, built *c.* 187 B.C., went from R. to Arretium, the *Via Salaria* (di Pia Salaria) from the *Via Nomentana* to Reate; the *Via Cornelia* and *Via Triumphalis* built at a later date led N.W. from the *Campus Martius* over the Tiber; and on the right bank the *Via Portuensis* led S. from the *Via Aurelia* to the coast; the *Viæ Asinaria* and *Tusculana* ran S.E. from the *Porta Asinaria*, and there was another exit to the N. in the *Porta Pinciana*.

In the city itself the most important street was the *Sacra Via*, which started at the Esquiline Hill, curved round the foot of the Palatine Hill, and passed through the *Forum Romanum*, to the temple of Saturn below the *Clivus Capitolinus*. The *Vicus Tuscus*, an old Etrurian road, bounded the N.W. side of the Palatine square, running from the Sacred Way to the *Circus Maximus*. The *Vicus Iugarius*, containing the temple of *Iuno Iuga*, goddess of marriage, passed from the Forum to the *Porta Carmentalis* along the S. slope of the *Capitolium*. **Bridges** were the *Pons Sublicius* (the first), superseded by the *Pons Æmilius*, like itself in the centre of the city, the *Pons Probi* and *Pons Theodosii* farther south, and the *pontes Gratiani, Cestius* (the keystone of which is the Tiber Island), *Fabricius, Aurelius, Agrippæ, Neronianus*, and *Ælius*, ascending the stream. Three remain, and there are ten new ones.

Etruscan Remains.—The great Etruscan *Cloaca Maxima* and other **sewers** drained into the Tiber the marsh round the Palatine Hill, and the former is of architectural interest for its vaulting, the contribution of Etruria to the Rom. art of building. Another Etruscan building of interest is the *Tullianum*, known in mediæval times as the MAMERTINE PRISON of the Capitoline Hill. This vault, probably the city well in the regal period, was used for political prisoners during the republic, and is now consecrated as the Church of *S. Pietro in Carcere*, from the supposed imprisonment here of St. Peter.

Palatine Hill.—Primitive remains in the S.W. angle of the Palatine Hill were connected in historical times with various incidents of the Romulus story (see below); both here and in the *Area Palatina* of the centre various earthworks are found. To the Area Palatina (near which stood the temple of *Apollo Palatinus* and other splendid buildings) the *Clivus Palatinus* ascended from the Sacred Way, spanned at this point by the Arch of Titus, which commemorates his capture of Jerusalem (70 A.D.). Near the foot of the N. slope, parallel in the E. with the Sacred Way, was the *Via Nova* to the Forum; it was the S. boundary of the S. buildings of the Sacred Way. Between the two streets, one on each side of the *Summa Sacra Via*, were the temple of the *Lares and Penates*, and the temple thought to be that of *Iupiter Stator*. The stately palace of Augustus (*Domus Augustana*) stretched S. of the Palatine Area; adjoining are the remains of a remarkable temple of the republican period. The house of the notorious Livia follows, and near the primitive remains of the W. corner was the temple of the *Magna Mater*, built by Augustus. From this point the *Clivus Victoriæ*, a narrow winding path circling the N.W angle, led down towards the *Vicus Tuscus* on the W. The various dwellings of rich Romans and the great palaces of Tiberius and Caligula are to be traced in this angle, where the Farnese Gardens now stand; the palaces of Hadrian and Severus were in the S.E. Mention by classical writers of the marshy *Velabrum* show that it was between this hill and the Vicus Tuscus.

The CAPITOLIUM, the S. summit of the **Capitoline Hill**, was the site of the temple of *Iupiter Capitolinus* (Jupiter of the Capitol), three times burnt and always rebuilt in the most costly fashion. The N. peak, the *Arx*, held the temple of *Iuno Moneta* (the Mint, whence the term money), now the Church of S. Maria in Ara Cœli. On the **Aventine** there were temples of *Luna, Minerva, Honos et Virtus*, and the *Bona Dea*, the *Thermæ* (Baths) of Decianus and Antoninus, and the tombs of the Scipios; on the **Cœlian Hill** stood the temple of Claudius; on the Oppian and Cispian hills, peaks of the **Esquiline**, were the *Thermæ* of Trajan and Titus, Nero's Golden House, the temple of *Iuno Lucina*, and various gardens and graves, including the tomb of Horace. On the **Quirinal** were the Thermæ of Constantine; at the foot of the Viminal and Quirinal, surrounded by the Servian Wall, were the Thermæ of Diocletian; on the **Pincian** were the Gardens of Sallust.

From the beginning of the republic R. had an excellent **water-supply**; in addition to numerous springs, conduits were made, the chief being the *Aqua Appia* of the maker of the Appian Way, the *Anio Vetus, Aqua Marcia, Alsietina, Traiana, Iulia, Claudia*. These supplied the numerous *Thermæ*. In the old *Forum Boarium*, which occupied the E. side of the open space round the *Pons Æmilius*, the first gladiatorial show was held in 264 B.C.

The imperial *fora, Julium, Augustum, Nervæ, Traiani, Pacis Vespasiani*, adjoin the *Forum Romanum* The **Forum Romanum**, the meeting-place of the *comitia curiata* and various public assemblies, is believed to have been the grave of Romulus and was the scene of many important Rom. events. Its central space was surrounded by numerous statues and buildings. On the W. of the Forum stood the *Rostra*, where speakers held forth, so named from the beaks of ships which from the maritime success against the Carthaginians (338) adorned the public platform. On the N. was the *Curia*, where the Senate met; it was restored by Diocletian and afterwards consecrated as the Church of S. Adriano, still standing. In front of the *Curia* was the *Comitium*, in low-lying, formerly marshy, district. The marsh waters formerly collected in the *Lacus Curtius* and other pools in the centre of the Forum. The TEMPLE

of JANUS, ascribed to the regal period, was at the N.E. Its doors were always closed in time of peace; the closing was a solemn occasion, as when performed by Augustus in 29 B.C.

The temple of Saturn, of which remains are found, stood on the W. below the Capitoline slope; it was connected with one of the oldest religions of the State, and contained the public treasury. In the S.E. on the Sacred Way are remains of the imperial temple of Castor and Pollux (*Castorum*), built on the site of earlier temples, still to be traced, to these guardians of the Rom. State. The two republican *basilicæ*, or law-courts, in the N.E. were superseded by the great *Basilica Julia*, commenced by Julius Cæsar and frequently rebuilt in imperial times, on the S. side of the Sacred Way. Various arches erected by the emperors in this forum are, with the exception of the Arch of Severus in the N.W. (203 A.D.), now only to be traced by the archæologist.

The **Sacred Way** is of equal antiquarian interest. The site of the oldest building of all, the *Ædes Vestæ*, and even the ashes of the fire brought from Alba Longa by Romulus, have been discovered in the S.E., with remains of imperial temples to Vesta on the same spot. The Sacred Way also contained the house of the Vestal Virgins, the palace of the *Pontifex Maximus* (*Regia*), and the *Templum Divi Iulii* on the S.W. On its N.E. side were the *Templum Divi Antonini et Divæ Faustinæ* (erected by Antoninus Pius to his wife), which was rededicated to S. Lorenzo in Miranda in the Middle Ages, the *Templum Divi Romuli*, and the Basilica of Constantine. The *Curia* to the N. of the *Forum Romanum* faces the *Forum Iulium* on the other side of the modern Via Bonella. The legend elaborated in the *Æneid* of the connection of Venus with R. had been woven by Cæsar's time, and in the centre of his forum was the great temple of *Venus Genetrix*.

By crossing the Via del Priorato on the N.E. side the *Forum Augustum* is reached; it contained the temple of *Mars Ultor*, dedicated in commemoration of vengeance on the murderers of Cæsar. E. is the much-restored *Forum Traiani*, entered by the Arch of Trajan, facing which at the N.W. end is the Column of Trajan. The *Basilica* and *Bibliotheca Ulpia* stood at this point, now known as the Piazzo di Foro Trajano; farther N.W. is the temple of Trajan. On the S.E. side of the Via Bonella were the *Forum* of Nerva, the *Forum Transitorium* or *Palladium*, with the temple of Minerva, and the Forum of Vespasian or of Peace, with the *Templum Pacis*.

The **Campus Martius** contained in republican times the *Circus Flaminius*, the *Navalia* (on the bank of the Tiber), the *Theatrum Pompeii*, etc. But its chief buildings were due to the emperors; the *Sæpta Iulia*, the *Porticus Argonautarum*, Column of Aurelius, and Mausoleum of Augustus lined the Flaminian Way; in the centre were the *thermæ* of Agrippa and Nero, the *Stadium* and *Pantheon*; the theatres of Balbus and Marcellus lay S. of that of Pompey, and there were numerous *portici*. In the open space between the Cælian, Esquiline, and Palatine hills was the *Amphitheatrum Flavium* or COLISEUM. Augustus divided R. within the Aurelian Wall into the fourteen **Regiones** of *Porta Capena, Cælimontium, Isis et Serapis, Templum Pacis, Esquiliæ, Alta Semita, Via Lata, Forum Romanum, Circus Flaminius, Palatium, Circus Maximus, Piscina Publica, Aventinus, Trans-Tiberim*.

The **Christian Monuments** of R. almost equal in number the Pagan. By the Appian Way, outside the walls, are the CATACOMBS (*q.v.*). The Ital. law courts were often turned into churches, or their materials were employed in their construction, or else formed a model for the Early Christian churches, hence called *basilican* (see ARCHITECTURE). The eight BASILICAN CHURCHES of R. are those of S. Giovanni in Laterano, S. Pietro in Vaticano, S. Maria Maggiore, S. Lorenzo fuori le Mura, S. Paolo, S. Croce, S. Clemente, and S. Agnese, dating from the IV. cent. The church of St. John Lateran is by the Porta S. Giovanni on the Appian Way. It was given to the pope for his residence by Constantine the Great, who was possibly baptized there. The LATERAN PALACE is at its E. end; the Scala Santa in this building ascended to the pope's private chapel, the *Cappella Sancta Sanctorum*. Among the numerous other churches dating back to the early basilican period are SS. Giovanni and Paolo (IV. cent.), S. Stefano Rotondo and S. Vitale (V. cent.), S. Maria in Ara Cœli and S. Giorgio in Velabro (VI.–VII. cent's), S. Maria in Cosmedin, S. Pietro in Vincoli, and S. Giovanni ad Portam Latinam (VIII. cent.), S. Cecilia in Trastevere (IX. cent.), and S. Maria in Trastevere (XII. cent.).

The transition from Romanesque to GOTHIC ARCHITECTURE was, perhaps naturally, later in this classical region than elsewhere in Europe; in the XIII. cent., however, the essentially Gothic *campanili* were raised on many of the basilicas, and there are a few churches in this style (*e.g.* S. Maria sopra Minerva). The RENAISSANCE, again naturally, was earlier in R. than anywhere else. One of the most important facts in the mediæval topography of R. was that the popes took up their residence on the right bank of the Tiber on *Mons Vaticanus*. Here the **Basilica of St. Peter** stood, and here the abode of his successors, the **Vatican** palace, was raised in the early VI. cent. This palace, rebuilt in the Gothic period, was entirely reconstructed in the XV. and XVI. cent's by the best artists of the Renaissance, Fra Angelico, Michael Angelo, Bramante, Sangallo, and Raphael, Raphael decorating it with wall-ornament imitated from the classical work of Pompeii. The Renaissance Church which rose out of the basilica of **St. Peter** had a long history; it is the largest church in the world, and its dome is of the greatest architectural interest. Bramante erected in R. some of the most important Renaissance buildings in the world, the churches of S. Lorenzo in Damaso (of the Palazzo della Cancelleria also erected by him) and S. Pietro in Montorio, the Palazzo Giraud, and portions of various other buildings. The Rococo left by Bernini and other architects of the XVII. cent. was followed by the BAROCCO of the XVIII. cent.; the Gothic revival of the XIX. cent. has found little understanding in R.

There are many **New Quarters**, and the old town has been much altered under a scheme accepted by the State in 1882. The Via del Corso ends at the Piazza di Venezia; from it the Via Nazionale goes E., the Via Plebiscito W. to the Corso Vittorio Emanuele, which ends at the Tiber where the Ponte Vittorio Emanuele stands; other new streets are the Via di Ripetta, Via del Babuino, Via Sistina, Via delle Quattro Fontane, Via della Quirinale, Via del Venti Settembre, Via Veneto, Via Boncompagni, Via Ludovisi, Via del Tritone, Via Cavour, Via in Merulana, Via Arenula. There are numerous squares with fountains, columns, etc., and there are 400 churches. The palace of the king of Italy is on the **Quirinal Hill**. The modern city has no important manufactures, but derives its prosperity from the expenditure of the royal and papal households, and from tourists, who flock from all parts of the world to see the antiquities. It is the seat of a university. Pop. (1911) 538,634.

Hutton, *Rome* (1909); Lanciani, *Ruins and Excavations of Ancient Rome* (1897) and *Ancient Rome in the Light of Recent Discoveries* (1888); Pisa, Tuker, and Malleson, *Rome* (1905); Baedeker, *Handbook to Rome*.

History.—From the legends of the REGAL PERIOD of Rom. history (753–510 B.C.) the Romans themselves and modern historians have extracted a good deal of probable fact. The story of ÆNEAS '*fato profugus*' setting forth from Troy and founding a city at Lavinium in Latium is obviously due to Gk. influence. Ascanius, s. of Æneas, founded Alba Longa, head city of the Lat. League; finally his descendant, the Vestal virgin Rhea Silvia, had by the god Mars the twin sons ROMULUS and REMUS, suckled by a wolf under the fig tree by the Palatine Hill, where Romulus founded

R. The traditional date for the foundation of R. is 753 B.C.

The chief facts narrated of the regal period are these: Romulus (753–715) made the sacred trench, the *Pomœrium*, round the Palatine Hill, built the wall within it, established an 'asylum' for outlaws on the Capitoline Hill, where he allowed the SABINES to settle and amalgamate with the Romans. The Sabines were said to have been also called Quirites, probably as an explanation of the full title of the Rom. people, '*Senatus Populusque Romanus Quiritium.*' Romulus is said to have divided the citizens into three tribes (*i.e.* into three; this is the origin of the modern use of tribe), each divided into 10 *curiæ* or wards, and to have organised the Senate. His successor, the Sabine, NUMA POMPILIUS (715–673), is the traditional founder of all the religious observances of R., except the cult of Vesta, which goes back to the remotest Lat. antiquity; the sacred fire for the temple of Vesta had been brought from Alba Longa by Romulus. Numa organised the worship of Quirinus, Mars, and Jupiter. TULLUS HOSTILIUS (673–642), after destroying Alba Longa, allowed its inhabitants to settle on the Cælian Hill and become the first members of the plebeian order so important in Rom. history. ANCUS MARTIUS (642–616), a Sabine like Numa, established the inhabitants of defeated Lat. cities on the Aventine Hill, made a fort on the Janiculan Hill, the first bridge over the Tiber (the *Pons Sublicius*), and the port of Rome, Ostia.

The Etruscan, LUCIUS TARQUINIUS PRISCUS (616–579), probably represents a foreign dynasty thrust on the Romans after subjugation by their Etruscan neighbours; to his reign is due the first great engineering work of Rome, the *Cloaca Maxima* (still to be seen, with its great Etruscan vault, R.'s first lesson in architecture), which drained the marsh where the Forum lay. To him are also attributed the Great Circus and *Ludi* and the addition of the *patres minorum gentium to the Senate.* His slave, SERVIUS TULLIUS (578–535), succeeded, surrounded the Seven Hills with a wall, accompanied in certain parts by entrenchments, divided the people into six *classes* (subdivided into *centuriæ*) according to their wealth, the city into four *regiones*, added country tribes to the city tribes, and organised taxation, military service, and voting. The beginnings of plebeian uprising are to be traced to this reign. LUCIUS TARQUINIUS SUPERBUS (534–510), the last king, built the temple of Jupiter on the Capitoline Hill, so called, legend said, because a newly decapitated man's head was there found, a symbol that R. was to be head of the world. He extended the power of R. in Latium, but was a cruel tyrant. After the rape of Lucrece by his s. Sextus, the house of Tarquin was expelled.

The story of HORATIUS keeping the bridge against the Etruscans belongs to the still mythical days of the early republic, as does that of the final defeat of the Tarquinii at *Lake Regillus.* Indeed, it was 300 years before the legendary element was entirely eliminated from Rom. history. Theories as to these legends have become scientific since Niebuhr's time. Many of the heroes are thought to be eponymous; the desire of later Romans to explain existing institutions may be traced in many cases, but this is very often of service to history as throwing a new light on those institutions; many of the legends, too, may still have an undisclosed meaning. The abolition of the kingship probably coincided with the throwing off of the Etruscan yoke; this may explain why the name king was held in such detestation in republican R.

REPUBLICAN PERIOD (509–27 B.C.).—The Rom. people at the commencement of this period were arranged in *gentes* or clans, composed of families (*familiæ*) all supposed to be related and bearing the same name. The *paterfamilias*, with his formidable *patria potestas*, was the unit of Rom. life; the heads of the families of the original *gentes* formed the original patricians, their descendants the great PATRICIAN ORDER; *gentes* formed later consisted of the PLEBS (originally 'the many'), who possessed no political rights until they won them under the early republic. The *gentes* were gathered in wards (*curiæ*, with a meeting-house, *curia*, and a priestly official, the *curio* or *flamen curialis*), the wards into 21 (afterwards 35) tribes. There were originally the three tribes of Ramnes, Tities, and Luceres, probably representing three original peoples, who together constituted the Rom. people.

A popular assembly, the *comitia curiata*, assembled in the *comitium*, the Lower House; by it, and by the Servian institution, the *comitia centuriata* of the *Campus Martius*, the *populus* expressed its will. The Upper House, the SENATUS (originally composed of *senes*, old men, the heads of the *familiæ*), was said to have received its final complement of 300 *senatores* —all patricians—from Tarquinius Priscus. It was also known as the CONSCRIPT FATHERS, originally *Patres et Conscripti*, i.e. senators by right of rank and persons summoned by the king (the parallel of our mediæval barons by writ). The senate solemnly conferred the sole executive power of the State on the king and afterwards on the CONSULS. The kingship, elective, conferred the powers of punishment and death, symbolised by the *fasces* or rods and axes borne before the Rom. ruler by 12 *lictores.* The king (or the INTER-REX, *q.v.*) appointed his successor. The revolution of 509 was in many ways conservative; the two consuls exercised the regal power in secular matters, the *inter-rex* was still appointed, and the chief religious official, who performed the regal priestly functions, was called *rex sacrorum.* The power of the consuls was limited by their veto on each other's actions when in R. (*domi*), by the moral weight of the senate which made the government virtually aristocratic, and the fact of only holding office for one year. In times of crisis the consular power was suspended and a DICTATOR appointed for six months; unlike the consuls the dictator had axes in his *fasces* in R. itself.

PATRICIANS AND PLEBEIANS.—From the *regifugium* for over two cent's the history of R. is chiefly the struggle of the patrician and plebeian orders. The year of the expulsion of the kings was that of the *Lex Valeria de Provocatione* (509), forcing the magistrates to consult the *comitia centuriata* (*provocatio ad populum*) before putting a citizen to death. Poverty and the custom by which the debtor became the slave (*nexus* or *addictus*) of his creditor led in 494 to the secession of the plebeians to the *Mons Sacer* where they threatened to establish an independent city. They are said to have been persuaded to return by AGRIPPA's parable of the quarrel between the belly and the limbs. By the *Lex Sacrata*, however, they obtained some alleviation of their misery and the right to appoint annually *tribuni plebis*, originally 2, finally 10, in number, with power to protect members of their order against any one but a dictator, and the presidency of the plebeian assemblies who passed *plebiscita* at first only binding on themselves. Their persons were sacrosanct, and any one opposing them *dis inferis deditus.* By the *Lex Publilia* of 471 the method of electing the tribunes and the two ædiles who took charge of the *plebiscita* was settled.

The *comitia tributa*, the plebeian assembly (possibly responsible for the word tribune), received by the *Leges Valeriæ-Horatiæ* of 449 equal legislative rights with the *comitia centuriata*, the decisions of which were the regular *leges.* The *decemviri legibus scribundis* drew up, in 451–450, the Twelve Tables of the Roman law, thus abolishing a great plebeian grievance—law, like religion, having been previously a mystery only to be known by patricians. The *Lex Canuleia* (445) legalised, for the first time, marriage between patricians and plebeians; it was wrung from the patricians by a plebeian secession to the Janiculan Hill. When in 445 the *plebs* secured the appointment of *tribuni militares consulari potestate*, the patricians commenced to make the chief offices less important, some of the

most important consular functions being transferred to *censores*. The quæstorship was opened to plebeians in 421, which meant that they could be senators, and in 367, after a period of bitter social discontent, the military tribunes were abolished and, by the LICINIAN ROGATIONS, one consul must be a plebeian; the consul's judicial functions were given to a patrician *prætor*, but this office was shortly afterwards opened to plebeians; and two new 'curule' ædiles were appointed. In 339 a plebeian dictator passed the *Leges Publiliæ*, by which one censor must be a plebeian, and *plebiscita* were made binding on all. After the 4th secession the *Lex Hortensia* (287) gave *plebiscita* the full authority of *leges*. The *Lex Ogulnia* (300) removed the last disability, admitting plebeians to the colleges of *pontifices* and *augures*.

EXPANSION OF ROME.—By this time Rom. power had extended considerably beyond the Seven Hills; indeed, foreign warfare was one of the causes of the rise of the *plebs*. The ETRUSCANS, whose rule had been presumably thrown off in 509, seized all Rom. territory on the right bank of the Tiber, and there were wars with the LATINS until 493, when R. again entered the Lat. League. The joint attacks of Latins and Greeks on the Etruscans brought about their final decline in this century, Etruria being planted with Rom. colonies. The great GALLIC INVASION and sack of R. (390) followed, and marvellous legends were handed down of the successful defence of the Capitol. The three SAMNITE WARS (343–341, 326–304, 295–290), in which occurred the disaster of the *Caudine Forks* (321), left R. supreme in Campania, Etruria, Apulia, and Lucania. *Magna Græcia*, led by Pyrrhus, was subjugated (some of its cities voluntarily entered the Rom. alliance) by 272 and planted by Rom. colonies. With the destruction of Volsinii in 265 the whole peninsula was united under Rom. rule, and R. began almost immediately to acquire an empire over seas.

The three PUNIC WARS (*q.v.*), 264–241, 218–201, 149–146), in which a foreign foe was again at the walls of R., resulted in the formation of the Rom. provinces of SICILY (261), CORSICA (227), HITHER AND FURTHER SPAIN (197), and AFRICA (146). The three MACEDONIAN WARS ended in Macedonia being formed into a province (147) and the dissolution of the Achæan League, every Gk. city being made directly dependent on R. The province of ASIA was formed in 133. The Gauls between the Alps and Apennines and the Ligurians between that district and Spain were subjugated, and the provinces of *Gallia Cisalpina* (181) and *Gallia Narbonensis* (121) established (see GAUL, SPAIN).

During these wars, despite the theoretical supremacy of the *populus*, the SENATE, the only permanent body of experienced administrators, had become supreme in the state, and a new close order, the *nobilitas*, had taken the place lost by the patricians; this 'senatorial order' was a prominent factor in Rom. society until the passing of the Republic. The *equites* who exercised the business of tax-farmers (*publicani*), though forbidden the senatorial order, constituted an extremely wealthy middle class, and as provincial administrators members of the senatorial order amassed fortunes from the spoils of war and extortion. Italy, however, which had been devastated by Hannibal, lost its yeomanry in foreign conquest and was reduced to a great state of wretchedness by the slump in the market through the immense quantities of foreign corn brought to the Tiber; ploughing was no longer profitable, and wealthy cultivators began the course elsewhere attended with such suffering to the peasantry, the turning of arable land into large sheep-farms. The result was the effort of the GRACCHI (*q.v.*) to obtain agrarian reform, their defiance of the Senate, and murder (131 and 121 respectively). The conduct of the Senate in this affair, its misrule of the provinces and weakness and corruption in the JUGURTHINE WAR (111–106), destroyed the prestige it had hitherto possessed.

The plebeian MARIUS, who had at last captured Jugurtha, prepared the people's minds for the supersession of the Senate by an autocratic ruler. After the revolt of R.'s Ital. allies (*socii*) and the SOCIAL WAR (90–88), which resulted in all Italy S. of the Po receiving the Rom. franchise, internal politics became of chief importance. Marius' and SULLA'S rivalry for the command against Mithradates VI., who overran and sought to acquire the Rom. province of Asia, led to Sulla's march with his army on R. in 87. He then went eastwards and won brilliant victories against Mithradates, while Marius returned, massacred his opponents, and became consul (86), but soon died. Sulla returned, fought his way to R., 'proscribed' the Marians, and as dictator (81–79) passed many anti-democratic measures.

After his death in 78, POMPEIUS came to the front. Pompeius made a great name in the East, helped to subdue Spartacus (*q.v.*), and put down the pirates of the Mediterranean; in his absence the CATILINIAN CONSPIRACY had been disclosed, and the warring parties all welcomed the successful general, who celebrated a unique triumph (60). CÆSAR returned from Spain, covered with honour, in 60, and the FIRST TRIUMVIRATE was formed between Pompeius, Cæsar, and Crassus. Pompeius never showed much gift for politics, and his star at once paled before that of Cæsar, who became consul (59) and inaugurated agrarian and other reforms. From 58–51 Cæsar carried out his Gallic campaigns, and invaded England (*q.v.*), leaving Pompeius a free hand in R., where in 52 he was sole consul for six months to restore order; but as Pompeius grew ever more jealous, Cæsar had cause to fear that he would be impeached on his return home; as he could not be impeached before laying down his *imperium* (military command), he transgressed the laws of R. by crossing the Rubicon (Jan., 49) without doing so. Pompeius and the consuls fled to Greece, and Cæsar triumphantly entered R.

After five more years of warfare (Pompeius being finally defeated near *Pharsalus* in 48), Cæsar was assassinated (44). As dictator for nearly the whole period of his rule, Cæsar restored order at home, subdued Pontus, Egypt, 'Africa,' and Spain, and received the title '*imperator*,' or autocrat, a rank lesser in kind in R. than that of king. The suggestion of coronation led to his murder by the republicans in 44. The Triumvirate of Cæsar's heir, OCTAVIANUS, MARCUS ANTONIUS, and LEPIDUS, was victorious over the republicans at *Philippi* (42), and the subsequent quarrel of Octavianus and Antonius ended in the former's victory at *Actium* (31). The Triumvirate had, however, done its work in the proscription of all prominent republicans, including Cicero.

PRINCIPATE AND EMPIRE (27 B.C.–476 A.D.).—Cæsar Octavianus had already accustomed the Rom. populace to his rule, receiving from 36 onwards the sacrosanctity of the tribunate, and he carefully restored republican forms, reversing the acts of the Triumvirate. He was granted *proconsulare imperium* throughout his rule, and as an honorary distinction the titles AUGUSTUS and *princeps senatus*. He reformed the provincial, army, and home administrations, and sought to crush Asiatic cults and orgies prevalent in R. Unfortunately his corn doles and other devices for contenting the city *plebs* ended in the demoralisation complained of by Juvenal (*q.v.*), the sole demand for 'bread and public displays' (*panem et circenses*). He added provinces to the empire, created a new imperial feeling, and the cult of R.

His successors made his purely republican titles symbols of more than royal power, and the rulers of his house, TIBERIUS (14–37 A.D.), CALIGULA (37–41), CLAUDIUS (41–54), and NERO (54–68), left names which have become almost synonymous with luxury and vice, no doubt exaggerated by the Christians, whom they persecuted, and by the republicans, who continued to cherish anti-monarchical feeling. They fully maintained R.'s power abroad, but tyranny at home led to Nero's assassination in 68. Claudius was the first Rom. ruler to be proclaimed by the prætorians (*q.v.*).

After the deposition of the Julian line the soldiery took the chief part in the election of emperors. Among the more famous emperors who succeeded may be mentioned TRAJAN (98–117), who extended the frontier to the Tigris, HADRIAN (117–38), who withdrew to the Euphrates, but held his restricted territory with a firm hand, ANTONINUS PIUS (139–61), who, like Hadrian, made a wall in Britain, and the Stoic MARCUS AURELIUS (161–80), who allowed Ger. tribes to settle in the empire. The 'decline' then started, Alemanni, Franks, and Goths taking up their abode within the frontiers in the middle of the III. cent. They were driven back for a while by the Illyrian emperors, CLAUDIUS II. (268–70), AURELIAN (270–75), and DIOCLETIAN (284–305), whose reign is known as the *Era of the Martyrs*. Diocletian reorganised the empire in 285, dividing the command between himself, another Augustus, and two *Cæsares*, with respective headquarters at Nicomedia, Milan, Treves, and Sirmium, not R.

CONSTANTINE THE GREAT, who made Christianity the State religion, made Byzantium the capital of the whole empire (330). The system of division into **Western** and **Eastern Empire** (see BYZANTINE EMPIRE) originated in 334, and was fixed in 364. JULIAN THE APOSTATE (360–63) restored paganism, but Christianity was replaced after his death. VALENTINIAN (364–75) and VALENS (364–78) had to face barbarian inroads on every frontier and were distracted by the quarrels of Athanasians and Arians. THEODOSIUS (378–95), who temporarily united the empire, suppressed the latter. R. was sacked (410) by ALARIC the Visigoth during the rule of HONORIUS (395–423), when Britain was lost to the empire (407), and Goths and Franks settled in Gaul, Vandals in Spain. Under VALENTINIAN III. (423–55) the Vandals conquered Africa; in 451 the Huns under ATTILA were defeated at Châlons, one of the decisive battles of the world, but in 455, after Valentinian's murder, R. was sacked by the Vandal Genseric. The Visigoths then took possession of what remained of the W. empire, and after for a while appointing the emperors, deposed Romulus 'Augustulus' in 476, and established ODOACER as king of Italy, nominally vassal of the Byzantine emperor. For the later history of R., see ITALY.

Mommsen, *History of Rome* (Eng. trans., new edit., 1894); Gibbon, *Decline and Fall of the Rom. Empire* (Bury's edit., 1897–1900); Bury, *Later Rom. Empire* (1889); Middleton, *Remains of Ancient R.* (1892); Platner, *Topography and Monuments of Ancient R.* (1904). A good text-book is Myers' *History of Rome*.

Law.—In their system of Civil Law the Romans have supplied the civilised world with a model for its codes (the term Civil Law in England means Roman Law), a legal terminology, and an inexhaustible mine of principles which are the direct source of much of the law of modern Europe. The history of Rom. Law fascinates, because one can watch its gradual development for 1000 years from the times of patriarchal Rome to the Emperor JUSTINIAN, who reduced and arranged the unwieldy mass of legislation, decisions, and commentaries.

In the earliest stage notions of law and religion were mixed, and the guiding principle of the lawgiver was to consider what would be pleasing or displeasing to the gods. The kings, as chief pontiffs, were the supreme judges, and all legal proceedings were elaborate and solemn ceremonies which lost their effect by a wrong word or a misplaced gesture. The way for the development of the law was cleared when, on the expulsion of the kings, the connection between law and religion disappeared and the magistrates were secular officials.

The Twelve Tables.—The first landmark in the history of Rom. Law is the Twelve Tables, which were drawn up by Decemvirate in 450 B.C. under pressure of plebeian agitation. The Twelve Tables state the customary law of the community, and at the same time indicate that some of the institutions of patriarchal Rome were beginning to change. They established the *patria potestas*, the supreme power of the head of the family even over the lives of his children, but provided that a son sold thrice should be emancipated from the power of the paterfamilias. A wife who stayed away from her husband's home for three nights in succession prevented his acquiring over her by prescription rights similar to a father's rights over a daughter. Both these provisions came to be used as regular modes of escaping the patriarchal powers of the father and husband. The solemn forms of transferring property and the principle of ownership being acquired by prescription were set forth, and a provision ostensibly for the protection of the debtor postponed the day on which he might be killed by his creditor or hewn in pieces by his creditors.

The principal part in developing the law and ridding it of its rigidity was played by the PRÆTOR, the chief magistrate, elected for a year. Rome's conquests made her acquainted with other systems of law, and her growing trade brought within her gates many strangers who were debarred the legal rights and remedies of a Roman citizen. These two facts forced a comparison between Rom. Law and the law of other states; a notion of a *jus gentium*, a law of nations, entered the minds of the Roman jurists. At the same time the idea of a law of the universe was imported from the philosophy of the Grecian Stoics. The combined force of these two ideas was powerful enough to warrant the Prætor in supplementing the law where the law would not do justice, and a body of equitable rules was in this way built up. The Prætor could not give full ownership in Rome to an alien, but he gave him possession and prevented any one disturbing his possession. The principal work of the Prætor was to make the tie of blood supersede the artificial tie of the *patria potestas* in the law of succession.

In adding to the law the Prætor was greatly aided by the labours of the jurisconsults. The JURISCONSULTI, or JURISPRUDENTES, were men of distinction who devoted themselves to the study of the law, founded schools, and advised clients. The Prætor was not a permanent legal officer, but a politician, and the skilled interpretations of the jurisconsults were naturally welcome to him. The jurisconsults were responsible for supplying Rom. Law with its chief glory, wealth of principle. In addition to their *responsa* in particular cases, the jurisconsults wrote authoritative commentaries on the Prætor's jurisdiction, and so created a vast mass of legislation which is naturally greater than Eng. case-law, made by judges who are limited to particular sets of facts. The interpretations of five of the greatest of the jurisconsults were made by THEODOSIUS (in 426 A.D.) binding on the the magistrates and judges. These authorities were Gaius, Papinian, Ulpian, Paul, and Modestinus, and it was decreed that the opinion of 'the illustrious PAPINIAN' should prevail if those who dealt with any particular point were equally divided. Papinian, the greatest of all the Roman jurists, and famous for his eloquence as well as his learning, accompanied the Emperor Severus to Britain, and was with him when he died at York. GAIUS is noted for his commentary on the Twelve Tables and his Institutes, on which the Institutes of Justinian were modelled. ULPIAN, PAUL, and MODESTINUS were pupils of Papinian.

The Prætor did not, as a rule, decide cases himself. He heard the parties and then sent a formula to a number of judges who tried the case. The formula was the means by which the Prætor modified the law. The formulary system was gradually replaced by the direct administration of the magistrate, a jurisdiction that had earlier been styled *extraordinaria*. By the time of Diocletian, at the end of the III. cent., the magistrates had become judicial officers, and imperial enactments were the only mode of changing the law.

Code of Justinian.—Before the time of Justinian attempts had been made to codify the law—by the jurists GREGORIANUS (in A.D. 306) and HERMOGENIANUS (in A.D. 365) and the Emperor THEODOSIUS II. (in

A.D. 438). The Code of Theodosius, which was a compilation of the imperial decrees since the time of Constantine, was taken as a model by Justinian.

The Emperor JUSTINIAN, who was born in Bulgaria, ascended the throne in 527 A.D., and in the first year of his reign started on the work of reducing and harmonising the enormous volume of the civil law. His lieutenant was TRIBONIAN, Quæstor of the palace, a remarkable man whose all-embracing knowledge and supposed venality led Gibbon to compare him with Bacon. He is said to have written in prose and verse on a variety of subjects, from the nature of happiness to the different kinds of metre. Justinian's first work was a revised code of the imperial laws, founded on that of Theodosius. A commission of ten, with Tribonian at the head of it, completed the work in fourteen months. A far greater task was to extract the essence from the writings of the jurists. About two thousand treatises were examined by Tribonian and sixteen associates, and summarised into fifty books in the space of three years. This work, known as the DIGEST, or PANDECTS, became law in 533 A.D. The INSTITUTES, an elementary work giving an outline of the law, was published at the same time. His enthusiasm unabated, Justinian next prepared a book of Fifty Decisions on debated points, and combined this with a new edition of the Code, the first being carefully suppressed. Many of the most important changes that Justinian made are contained in the 165 *Novellæ Constitutiones* which he promulgated after 534, the date of the new Code.

Justinian adopts the following classification of the law: Persons, things, succession, obligations, actions. The LAW OF PERSONS was, naturally, dominated by the idea of the *patria potestas*, the supreme power of the head of the family over the lives and property of his sons—and their wives and children—and his unmarried daughters. A daughter who married fell under the *potestas* of her father-in-law. Only the head of the family could bring an action, and a child, having no property, could not make a will. Though he had full civic rights, a son *in potestate* was in private law much in the position of a slave. Children were gradually allowed some small rights of property—for example, over things acquired on military service and over the profits of certain high offices. The power of putting a child to death disappeared soon after the publication of the Twelve Tables, and Constantine made the father who killed a child as guilty as a child who killed a father. Justinian freed from the *patria potestas* sons who reached the rank of bishop, consul, or quæstor of the palace, and reduced the father's rights over the property of a son *in potestate* to a life-interest.

In early Rome a legal marriage had the effect of placing the wife in the *manus* of the husband. She was like a daughter: she could own no property and make no will. But, as has been stated, the practice became general of a wife staying from her husband's home for three nights in succession and thus escaping the disabilities of the *manus*. A result was that the wife, in theory, was still in her father's *potestas* and he was bound to support her. The anomaly gave rise to the institution of the *dos*, or dowry, the father, in a lump sum given to the husband, compounding for the liability for his daughter's maintenance. A wife who was not under the *manus* of her husband was still legally married. All that was required to make the tie binding was consent and some indication that the woman passed into the possession of the man—her reception into his house, for instance. Marriage, being looked on only as a contract based on mutual consent, could be dissolved at the wish of either party up to the time of Constantine, who only allowed divorce where there had been misconduct.

In its classification of THINGS Rom. Law regarded the seashore as a *res communis*, free to all, and recognised no private ownership of rivers. The riparian owner in those days had to submit to his land being used by any one who wished to do so for the purposes of navigation.

The law of SUCCESSION saw the completest change in the thousand years between the Twelve Tables and Justinian. In the earliest times the making of a will was a public ceremony performed before a special assembly of the *comitia curiata*. This was superseded by a fictitious sale to the heir, the ceremony requiring the presence of a man to hold a pair of scales and five Roman citizens as witnesses. The essential thing was the appointment of an heir—a survival of the ancient notion that at all costs there must be some one to discharge the funeral rites and give peace to the dead man's spirit. The distribution of the property was a secondary matter. Under the Prætorian system the fictitious sale was dispensed with, but the parties to that ceremony figured as witnesses and had to affix their seals to the written testament. Theodosius II. made the witnesses subscribe as well as seal the will. The heir, who succeeded to the testator's personality, had to discharge all his debts. The prospect, in certain cases, might well cause an heir to hesitate, and to prevent an intestacy, of which the Romans always had a horror, the *Lex Falcidia* in 39 B.C. secured him in a fourth of the estate after the payment of debts and funeral expenses. Justinian made a great change, converting the heir into a mere executor.

Rom. Law always considered a testator's rights over his property limited by his duty to his immediate relatives. If a father wished to disinherit a son he had to do so expressly and to have a just cause. A child who was disinherited or omitted from the will without just cause, or who received less than a fourth of what would have been his share had his father died intestate, could have the will set aside. The fiction was that the testator was insane, but there was no need to prove insanity. Justinian allowed brothers and sisters to attack a will. He also specified the legal grounds on which a testator might disinherit relatives, and declared that the reason of disinheritance should be expressly stated in the will.

The gradual breaking-down of the *patria potestas* had an important effect on the laws of intestate succession. Emancipated sons, who were not in their father's 'power,' could not succeed until the Prætor gave them 'possession' of what ought to have been their share. Justinian regularised intestate succession. All the kindred of the same degree shared equally, the shares of those who were dead going to their children. There was never any hint in Rom. Law of the feudal system of primogeniture.

In the law of CONTRACT the Rom. jurists never got as far as the doctrine of valuable consideration, which is the basis of the Eng. law of contract, but the principle of part performance was adopted by the Prætor. Where one party to an agreement performed his part he could bring an action to compel the other party to fulfil his engagement. The jurists classified contracts under the heads according to the subject-matter or the form of the agreement. Agreements which fell outside this classification and which were not enforceable by reason of one party having done his part were called *pacts*. The Prætor allowed a pact to be a good defence to an action, though it could not be enforced by an action. Afterwards certain pacts, such as an agreement to give and an agreement to pay what was owing, were made enforceable by action. A promise extorted by force or intimidation was invalid, as were contracts for an illegal purpose and contracts against public morality or public policy. Fraud did not vitiate a contract unless an action for damages could not give an adequate remedy. A contract of sale became binding directly the price and subject were fixed. *Caveat vendor*, not *caveat emptor*, was the rule in Rom. Law. The vendor was liable for an undisclosed fault in the thing sold, and even for a fault of which he was ignorant. In either case the buyer could rescind the contract or claim damages. The rule was derived

from the custom of the slave-market. A slave's defects could be so easily hidden that a warranty was implied in all sales and the principle was extended to every other kind of property.

CRIMINAL TRIALS always took the form of civil actions. Many acts now treated as crimes, such as theft and robbery with violence, were regarded as civil wrongs, the injured party bringing an action for damages. The punishment of death—which was prescribed in the Twelve Tables for the false witness, the incendiary, and the nocturnal devastator of crops—could only be inflicted by the king, and later by the *comitia centuriata*. A regular system of criminal procedure came into being towards the end of the Republic. Different sets of judges were appointed to deal with different kinds of offences. The penalties were set forth in the decrees creating the judges. Many minor offences were left to the summary jurisdiction of the magistrates, and this jurisdiction was by degrees extended until it embraced all crimes.

The principal CIVIL ACTION in ancient Rome was the *actio sacramenti* heard in public in the Forum. Gaius describes the action where both parties claim a slave. Each party repeats a solemn form of words and seizes the slave. This is symbolic of the struggle which the appeal to the law averts. At the magistrate's command the parties then let go their hold of the slave, and in further formal words make the *sacramentum*, or wager, challenging each other to deposit a certain sum. The magistrate sends the case to the judges, and the loser pays the wager to the public treasury to be used for sacrifices. If the matter in dispute could not be brought into court it was represented by a part, for example, a brick instead of the house, or one sheep instead of the flock. Only Rom. citizens could take part in these formal actions, and the Prætor devised simpler proceedings for cases to which foreigners were parties. The Prætor's procedure eventually became general. The distinction between the magistrate and the judge disappeared, the magistrates trying all cases themselves. By the time of Justinian there was a president and vice-president of each province who tried the more important cases, and a staff of inferior judges who heard minor cases. The emperor was supreme judge until Hadrian made the Senate the final Court of Appeal.

Maine, *Roman Law*.

Religion.—Rom. religion is difficult to study and to understand, for what was essentially Rom. was only formal survival or had been buried beneath foreign accretions when Rome had won her conquests and the so-called 'classical' period was reached. Nevertheless, archæology and anthropology and survival give some due to its earlier stages. The earliest form of religion, 'fetishism,' is shown to have once existed by the reverence paid in later times to some sacred objects, but it was soon displaced by 'animism,' in which everything worshipped enshrines a 'spirit.' A definite anthropomorphism was hardly reached—what there was, was borrowed in the later days from Gk. mythology. Roman religion was above all things an affair of the State, and ritual forms had to be punctiliously observed. After the Punic Wars there was much borrowing of Oriental rites, and under the Empire this reached a climax of weird cults and wild emotionalism. A revival of religion was attempted by Augustus, but the real innovator was the cult of the Cæsars which became the dominant and unifying cult of the Empire, and was only displaced by Christianity.

Warde Fowler, *Roman Festivals*.

Roman Architecture, see ARCHITECTURE.

Roman Literature and Language, see LATIN LITERATURE and LATIN LANGUAGE.

ROME (43° 12′ N., 75° 32′ W.), formerly Fort Stanwix, city, on Mohawk, Oneida County, New York, U.S.A.; iron and brass manufactures. Pop. (1910) 20,497.

ROMFORD (51° 35′ N., 0° 10′ E.), town, Essex, England; breweries. Pop. (1911) 16,972; parliamentary constituency (312,864) is largest in U.K.

ROMILLY, SIR SAMUEL (1757–1818), Eng. legal reformer; persistently advocated reform of the criminal law by closer restriction of capital punishment, and reduction of penalties for lesser crimes; M.P. and Solicitor-General.

ROMILLY-SUR-SEINE (48° 32′ N., 3° 45′ E.), town, Aube, France; hosiery. Pop. 10,000.

ROMNEY, NEW ROMNEY (50° 59′ N., 0° 52′ E.), decayed town, on English Channel, Kent, England; one of the old *Cinque Ports*.

ROMNEY, GEORGE (1734–1802), Eng. portrait painter; worked first at his father's trade of carpenter, also taking lessons in painting; went to London, 1762, where he became so successful with his portraits that Lord Thurlow remarked: 'Reynolds and Romney divide the town.' The most famous of his sitters was Lady Hamilton, whom he painted in more than 30 characters.

ROMNEY, HENRY SIDNEY, 1ST EARL OF (1641–1704), general of Brit. forces in Dutch service, 1681; one of the seven who sent invitation to William of Orange.

ROMORANTIN (47° 21′ N., 1° 44′ E.), town, on Sauldre, Loir-et-Cher, France; here edict was passed refusing admission to France of Inquisition, 1560; asparagus. Pop. 8500.

ROMSDAL (62° 40′ N., 7° 30′ E.), valley of river Rauma, Norway; celebrated scenery; on W. coast is R. Fjord. Pop. (1910) 144,736.

ROMSEY (50° 59′ N., 1° 30′ W.), town, Hampshire, England; fine Roman church. Pop. (1911) 4671.

ROMULUS AND REMUS were, according to tradition, twin sons by Mars of the vestal virgin Rhea Silvia, dau. of Numitor, king of Alba Longa. Exposed at their birth, they were suckled by a she-wolf and adopted by a shepherd Faustulus and his wife Acca Laurentia. Romulus founded Rome, 753 B.C., slew Remus (who showed his scorn of the city by leaping over its wall), secured wives for its citizens by the Rape of the Sabine Women, reigned nearly forty years, was translated in a thunderstorm, and afterwards worshipped as QUIRINUS.

RONCESVALLES, RONCEVAUX (42° 59′ N., 1° 20′ W.), village, in Pyrenees, Navarre, Spain; Charlemagne's army defeated and Roland killed here by Saracens, 778.

RONDA (36° 49′ N., 5° 18′ W.), town, summer resort, Malaga, Spain; famous bull-fights. Pop. (1910) 22,525.

RONDEAU, a form in poetry, consisting of 13 lines made up of 3 unequal strophes. The form is old, but was revived, notably, by Swinburne.

RONDO, a musical form; name derived from Fr. poem in which first verse, after being followed by a second, is repeated; embraces many varieties, but in every case the essential feature is the frequent repetition of the principal theme.

RONSARD, PIERRE DE (1524–85), Fr. poet; chief of the *Pléiade* (R., Dubellay, Remi, Belleau, Jodelle, Dorat, Baïf, and Pontus de Thiard), which aimed at introducing the Renaissance into France. R. was of noble family (near Vendôme); page to François I., afterwards to James V. of Scotland; spent some years in England, Flanders, Germany, Piedmont. Becoming deaf at twenty he devoted himself to lit.; speedily won fame in France and abroad. Among friends and admirers were Henri II. and his sister Marguerite de France, Charles IX., Mary Stewart, and Elizabeth. His productions include *Odes* (1550), *Les Amours de Cassandre* (1552), *Le Bocage Royal* (1554), *Hymnes* (1556), *Les Discours des Misères de ce Temps* (1560), and an unsuccessful and unfinished epic, *La Françiade* (1572). Some of his sonnets are exquisite. His poetry shows rich fancy, a charming blend of mediæval and classical spirit, and beauty and variety of rhythm; he sought to make Fr. idioms more classical. The 'Prince of Poets' died surrounded with honours. A reaction set in under Malherbe, and

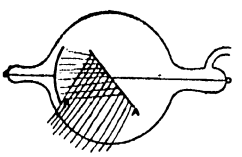
R. was forgotten until the Romantic Revival, two centuries later.

Wyndham, *Ronsard and La Pléiade* (1906).

RONSDORF (51° 15′ N., 7° 12′ E.), town, Rhineland, Prussia; iron- and steel-works. Pop. (1910) 15,376.

RÖNTGEN, DAVID (1743–1807), Ger. cabinet-maker; b. Herrenhag; inherited his father's business at Neuweid; opened shop in Paris; patronised by Marie Antoinette; delighted in mechanical contrivances to change shape or function of furniture, which he carried to excess; master of marquetry; goods confiscated by Revolutionary Government, 1793.

RÖNTGEN RAYS.—If a glass bulb similar to that shown in the figure be fitted with two platinum discs, A and K, the latter being spherical and concave towards A, and if the discs be connected to the terminals of a powerful induction coil, an interesting series of phenomena is displayed as the air in the bulb is gradually removed by an air pump. At first, a series of sparks, following zig-zag paths resembling lightning, pass between the discs. As the exhaustion proceeds, these sparks spread out into a luminous brush-like discharge which fills the intermediate space. Later on, this brush discharge shows striations perpendicular to its length: then a dark space appears at K and extends until it reaches to A and to the walls of the bulb, which then become phosphorescent. The dark space contains lines of faintly luminous matter, and these, since they proceed from the disc K (known as the *kathode*), are termed kathode rays. When these rays fall upon the *anode* A, they produce there disturbances which travel outwards in all directions from the face of the anode, and these disturbances are termed *Röntgen rays*. They were discovered by Röntgen in 1895 and were first known as X-RAYS.



They are believed to be due to pulsations in the luminiferous ether and to travel through that medium with a speed approaching that of light. The kathode rays consist of streams of negatively charged particles, or electrons, and when an electron strikes the anode its course is suddenly arrested, and this gives rise to the pulsational disturbance known as the R. r. The chief property of these rays is that they can pass through matter which is opaque to light, and as a rule the less dense such matter is, the greater is the ease with which they are transmitted. The rays are also capable of affecting a photographic plate, and of producing phosphorescence on a screen coated with barium platinocyanide. This, together with the absorption of the rays by denser substances, makes it possible to show on a photograph or screen the structure of different parts of the human body, the bones being distinguished by their darker shade. Another important property of the rays is that they are capable of ionising a gas (see CONDUCTION, ELECTRIC). R. r's differ from light in several important respects. They cannot be refracted or polarised; their reflection from any surface is a diffuse reflection which does not follow the laws of reflection in light; and phenomena of interference and diffraction have not, so far, been observed in them.

R. r's are employed by surgeons not only for diagnostic purposes, as in the diagnosis of fractures, dislocations, calculi, foreign bodies, but in the treatment of various conditions. Cancers and sarcomas treated by application of R. r's diminish in growth, and rodent ulcer, which is a form of cancer, may be completely cured if it has not progressed too deeply. In many skin diseases, especially ringworm and chronic skin conditions, it generally effects a cure, and it has a valuable influence on lupus, although a relapse is common in that disease. The swollen condition of the spleen in *leukæmia* is reduced by application of the R. r's, and the enlargement of lymph glands in tuberculosis (scrofula) and *lymphadenoma* can also be reduced by this method. The rays have a destructive effect upon the normal healthy tissues, and they must be protected both by careful regulation of the quantity of rays emitted and by enclosing the R. r's tube in an impermeable box with a suitable opening in it for the passage of the rays.

ROOFS, the chief purpose of r's is to exclude moisture. In very dry countries flat r's are used, but for rainy climates r's sloping sharply are necessary. So-called flat r's have a slight slope, enough for water to run off. They are made of wooden joists laid across from one wall to the other, and covered with asphalt, zinc, lead, or copper. Pent or lean-to r's are built similarly to flat r's, but the joists are laid at an angle, and covered with slates, corrugated iron, or tiles. The double-slope r. is mostly used. In the simple

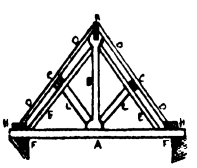


FIG. 1.

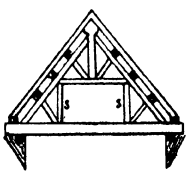


FIG. 2.

form for small spans, two sets of rafters slope upwards from the walls and meet against a ridge-piece. For larger spans the king-post r. is largely used (**Fig. 1**). A is a tie-beam to prevent a tendency to push the walls outward; B, the king-post to prevent sagging; CC, purlins to support common rafters; DD, common rafters; EE, principal rafters. FF, wall-plates to distribute pressure of trusses; HH, pole-plates against which feet of common rafters rest; K, ridge-piece; LL, struts, extra supports for rafters. **Fig. 2** shows a queen-post r. for still larger spans, SS. being queen-posts. Roofing felt is useful for temporary buildings, and to go below other coverings as a non-conductor of heat. Copper is lighter and more durable than zinc or sheet-lead, but more costly. Corrugated iron is used for temporary structures and out-buildings. Slate is the commonest covering, but tiles give more artistic effects. Slates are fixed by nailing, and tiles are hung upon battens or nailed. Asbestos tiles are used for lightness and fire-resisting power. Very large r's, for stations, etc., are metal framework structures.

ROOK, see under CROW FAMILY.

ROON, ALBRECHT THEODOR EMIL, COUNT VON (1803–79), Pruss. soldier and military author; instructor in Military Cadet School, Berlin, 1827; prof. in Military Academy, Berlin, 1835; on commission for reorganisation of army, 1859; Minister of War, 1859–73, of Navy, 1861–71, and carried out reforms; general of infantry, 1866; field-marshal and pres. of council, 1873.

ROORKEE, RURKI (29° 52′ N., 77° 55′ E.), town, Sharanpur district, United Provinces, India. Pop. 17,500.

ROOSEVELT, THEODORE (1858–), Amer. statesman, writer, soldier, and sportsman; ex-Pres. (26th) of U.S.A.; b. New York, of Dutch-Scottish descent; ed. Harvard; member of New York State Legislature, 1882–84; Civil Service Commissioner, 1889–95; head of Police Department, New York, 1895–97; assistant sec. of Navy, 1897; organised and led 'Rough Riders' in Cuba during Spanish-American War; elected gov. of New York State, 1898; Vice-Pres. of U.S.A. (Republican), 1901; on M'Kinley's assassination succ. as Pres., 1901; elected Pres. for second term, 1904, by great majority; on retirement, 1909, secured election of friend and lieutenant Taft (*q.v.*). Estranged from Taft, R. organised new Progressive party and came forward as independent candidate for presidency, 1912, but without success.

Colonel R. is the most prominent American of his day; everywhere admired—or detested—as a strong

and fearless reformer. His tenure of office was distinguished by the carrying of many notable statutes and schemes and prosecution of vigorous Anti-Trust Campaign. America owes to him, *inter alia*, Pure Food and Drugs Act, Meat Inspection Act, Employers' Liability Act, Act to regulate railway rates, etc., and adoption of Panama Canal project. R. acted as peacemaker in Russo-Japanese War, 1905. An exponent of the 'strenuous life,' R. has not confined his energies to politics, war, and diplomacy. In his books he appears as a keen sportsman, rancher, student of men and of natural history. Big-game shooting (in Rockies and E. Africa) is a favourite recreation. On relinquishing presidential office he became Associate-Editor of New York *Outlook*. Exercising, when necessary, remarkable tact, 'Teddy' is also an expert wielder of the 'Big Stick,' and his oratory is sometimes more forcible than polished. R. officially adopted 'Reformed Spelling.' His addresses to Congress were remarkable for length as well as strength, and persistently laid down such planks as conservation of national natural resources (forests, etc.) and 'trust-busting.' R. is unquestionably a great leader of men.

J. Morgan, *Theodore Roosevelt: the Boy and the Man.*

ROOT, that part of a vascular plant which normally grows downward into the soil, acting as an anchor and also as the agent of food absorption from that medium. In ferns and most monocotyledons the r. system is secondary or adventitious, but in dicotyledons consists of a main or tap r. from which lateral r's arise endogenously in acropetal succession. R's are distinguished from stems by absence of buds and leaves, by possession of an apical, protective r.-cap, and production of absorptive r.-hairs immediately behind the apex.

ROOT AND BRANCH MEN, Puritan party (including Vane and Hampden) which demanded that Episcopacy should be destroyed.

ROPE AND ROPE-MAKING, rope is name for all varieties of cordage over 1 inch in circumference. Ropes are made of strong vegetable fibres, such as hemp, flax, cotton, and coir. Sometimes ropes are made from iron, steel, or other metal wires. Hempen rope is the most common, being both strong and durable; cotton ropes are more flexible than hempen, and are generally used for transmitting the power of textile machinery, hemp being too stiff. Manilla hemp, which belongs to quite a different order of plants to the common hemp, gives a fibre very much in demand for the manufacture of strong ropes and hawsers, while coir fibre, which is obtained from the cocoa-nut and is lighter than hemp or manilla, has long been used by natives of India for making ropes; it is, however, generally necessary to tar coir rope in order to preserve it—a proceeding unnecessary with hemp. In rope-making, the hemp, etc., arrives in bales and is cleaned and twisted by machinery. It is then spun into yarn, wound on bobbins, and is ready for twisting into cordage. The ends of the threads to be twisted are attached to a hook which revolves and draws the yarns from the bobbins. The finished ropes are then wound on large reels. Hawser-laid rope is composed of three strands twisted left-hand; cable-laid rope has three strands of hawser-laid rope twisted right-hand; while shroud-rope has a central strand slightly twisted with three other strands twisted around it. Flat rope is a series of hawser-laid ropes placed side by side and fastened by sewing.

RORKE'S DRIFT, on Tugela River, Zululand; scene of heroic defence of Brit. hospital and stores by remnant of 24th Regiment against 4000 Zulus, Jan. 22–23, 1879.

RORQUAL, see under WHALES.

RORSCHACH (47° 28′ N., 9° 29′ E.), watering-place, on Lake of Constance, canton St. Gall, Switzerland; trade in grain; manufactures lace. Pop. (1910) 12,677.

ROSA, CARL AUGUST NICHOLAS (1843–89), Ger. impresario; founded Carl Rosa Opera Company.

ROSA, MONTE (45° 56′ N., 7° 52′ E.), mountain, on borders of Swiss canton Valais and N. Italy; highest peak, Durfourspitze, 15,217 ft.

ROSA, SALVATOR (1615–73), Ital. painter; b. Naples; practically self-taught; attracted the notice of Lanfranco by some landscapes of S. Italy, and was encouraged to go to Rome, where he attained fame by a picture, *Tityus tortured by the Vulture*. He excelled in his landscapes, which deal chiefly with wild and savage scenes, but he also treated historical subjects, and executed numerous etchings. His versatility was astonishing, for he was a good musician, an improvisatore, and an actor; and as a poet he proved himself by his *Satires*, published in 1719.

ROSACEÆ, large natural order of dicotyledons, the majority of which are perennials, and comprising trees, shrubs, and herbs. Vegetative propagation by runners (strawberry) or stem suckers (raspberry) is frequent. The leaves are characteristically stipulate, and may be simple or compound. The flowers are extremely variable, being hypogynous in the strawberry, showing varying degrees of epigyny in cherry, rose, etc., and true epigyny in the apple. Calyx and corolla are pentamerous, the former showing also an epicalyx. There are numerous stamens. The fruits may be achenes (Potentilla), an aggregate of drupes (raspberry), a single drupe (cherry, plum), or a pome (apple, pear).

ROSAMOND, FAIR (d. *c.* 1176), dau. of Walter of Clifford; mistress of Henry II.

ROSARIO (32° 59′ S., 60° 39′ W.), city, on Paraná, port of entry, Santa Fé, Argentina; railway terminus; commercial centre; exports grain, hides. Pop. (1911) 208,990.

ROSARY, a string of beads used by Catholics for assisting the memory in the counting of prayers. R's from very ancient times were used for such purposes by Eastern peoples, and were probably introduced thence into the Catholic Church.

ROSAS, JUAN MANUEL ORTEZ DE (1793–1877), dictator of Buenos Aires; took advantage of anarchy to proclaim himself gov., 1828; dismissed Assembly, crushed liberty; accepted dictatorship, 1835; driven out, 1852.

ROSCOE, WILLIAM (1753–1831), Eng. historian; b. Liverpool; s. of a market gardener; wrote Liberal pamphlets and verses which procured him notice; author of *Life of Lorenzo de' Medici*, 1796, praised for 'Grecian simplicity' by Horace Walpole and trans. into many languages; *Leo the Tenth*, 1805, was variously received; works no longer regarded as classic.

ROSCOFF (48° 45′ N., 3° 58′ W.), town, watering-place, on Eng. Channel, Finistère, France. Pop. (commune) 5200.

ROSCOMMON (53° 38′ N., 8° 11′ W.), inland county, Connaught, Ireland; level or undulating; drained by the Shannon; generally fertile with fine pastures; some coal worked; pursuits chiefly agricultural; contains some interesting remains of antiquity. Pop. (1911) 93,904.

ROSCOMMON (53° 38′ N., 8° 11′ W.), county town, Roscommon, Ireland; fine mediæval castle.

ROSCREA (52° 57′ N., 7° 48′ W.), town, County Tipperary, Ireland; agricultural centre.

ROSE (*Rosa*), a very variable genus, including several indigenous Brit. species (e.g. *Rosa canina*). The stem is thorny, the thorns representing hooked outgrowths of the epidermis, which, in the case of 'rambler' r's at least, enable the shoots to attain a more favourable position than they otherwise would do. The fruit or *hip* consists of a hollow fleshy receptacle containing a number of hairy nutlets. To get good results r's should be grown in a rich, loamy soil with plenty of light and shelter. Rampant and weak growths should be carefully pruned, and, like others of their family, the plants should be plentifully supplied with liquid manure.

H. R. Darlington, *Roses*.

ROSE CHAFERS, see CHAFERS.

ROSE FINCH, see under FINCH FAMILY.

ROSEBERY, VISCOUNTY, EARLDOM, AND BARONY OF, Scot. honours. Archibald Primrose, son of Sir Archibald Primrose, Bart., of Dalmeny (Scotland), was created viscount of R., Lord Primrose and Dalmeny, 1700, Earl of R., etc., 1703; one of commissioners for Union; ancestor of present earl.

ROSEBERY, 5TH EARL OF, ARCHIBALD PHILIP PRIMROSE (1847–), Brit. statesman; Liberal Imperialist, taking independent line on many party questions; Under-Sec., Home Office, 1881–83; First Commissioner of Works, 1884; Foreign Sec., 1886, 1892–94; Prime Minister, 1894–95 (succeeding Gladstone); resigned owing to party dissensions; resigned leadership of Liberal party, 1896; Pres. of Liberal League, 1902; makes sporadic returns to political arena, as independent critic of both parties. R. early advocated Reform of House of Lords; definitely opposed Home Rule (1905); supported Unionist Foreign policy (*e.g.* Egypt, Transvaal); preached imperialistic ideals; attacked both Tariff Reform and Socialistic legislation.

A devotee of Local Government, R. was first Chairman of London County Council (1889); Lord-Lieutenant of Linlithgow (since 1873), of Midlothian (since 1884). Keenly interested in Univ. work, he was elected Rector of Aberdeen Univ. (1878), Edinburgh Univ. (1880), Glasgow Univ. (1899), St. Andrews Univ. (1911); Chancellor of London Univ. An ardent sportsman, he won the Derby, 1894, 1895, 1905. He succeeded his grandfather as Earl of R., 1868; cr. Earl of Midlothian (U.K.), 1911. A brilliant speaker, he has been called 'Orator of the Empire.' Among other literary works he has written *Napoleon, the Last Phase* (1900), and monographs on Pitt, Peel, Cromwell, Randolph Churchill, Chatham.

Coates, *Lord Rosebery: his Life and Speeches* (1900); Jeyes, *Life* (1905).

ROSECRANS, WILLIAM STARKE (1819-98), Amer. general; fought for Union in Civil War; at first won successes; saved by Grant when invested by Bragg, 1863, and superseded.

ROSEMARY (*Rosmarinus*), genus of plants, order Labiatæ; leaves yield *Oil of R.*, a hair-wash; flowers are bluish.

ROSENHEIM (47° 51′ N., 12° 7′ E.), watering-place, on Inn, Upper Bavaria; salt-works. Pop. 15,696.

ROSES, WARS OF THE, Eng. civil wars of XV. cent. between houses of York and Lancaster; name taken from badges of combatants (white and red rose respectively). Yorkists won *St. Albans*, 1455; *Storeheath*, 1459; *Northampton*, 1460; *Mortimer's Cross*, 1461; *Towton*, 1461; *Hedgeley Moor* and *Hexham*, 1464; *Barnet*, 1471; *Tewkesbury*, 1471. Lancastrians won *Wakefield*, 1460; *St. Albans*, 1461; *Bosworth*, 1485. Dispute settled by marriage of Henry VII., victor at Bosworth, with Elizabeth of York. See YORK, DUKEDOM OF; LANCASTER, HOUSE OF; ENGLAND (HISTORY).

ROSETTA (31° N., 30° 30′ E.), town, Egypt, on Rosetta arm of Nile, in delta. The *Rosetta Stone* (discovered 1799) with its triplicate inscription opened the way to the interpretation of Egyptian hieroglyphics.

ROSEWOOD (*Dalbergia*), found in Brazil; varieties come from Jamaica, New South Wales, Honduras, Burma; best r. (Brazilian and Indian) takes a high polish and is much used in furniture-making.

ROSICRUCIANISM, name given to a school of Ger. thinkers who about 1610 began publishing works devoted to progressive ideas, with a suggestion of secrecy and supernaturalism; had a short vogue in England during reign of Anne.

ROSIN, RESIN, COLOPHONY, residue after distilling turpentine; brittle; M.P. 100–140° C.; contains much abietic anhydride, $C_{44}H_{62}O_4$; used for soap-making, varnishes, etc., and to give 'grip' to violin bow-strings.

ROSKILDE, ROESKILDE (55° 38′ N., 12° 4′ E.), town, on R. Fjord, island of Zealand, Denmark; cathedral; formerly capital of the kingdom. Pop. (1911) 9696.

ROSMEAD, HERCULES GEORGE ROBERT ROBINSON, 1ST BARON (1824–97), Brit. colonial governor; pres. of Montserrat, 1854; lieut.-gov. of St. Kitts, 1855–59; gov. of Hong-Kong, 1859–65, Ceylon, 1865–72, New South Wales, 1872–79, New Zealand, 1879–80; gov. of Cape Colony, and high commissioner for S. Africa, 1881–89, 1895–97.

ROSMINI-SERBATI, ANTONIO (1797–1855), Ital. philosopher; b. Ital. Tyrol; took part in struggle for Ital. freedom from Austria; founder of modern idealism in Italy. From objective and true notion of being presupposed in our acquired cognitions, follows perception of external world.

ROSS (51° 55′ N., 2° 35′ W.), market town, on Wye, Hertfordshire, England; chief building is the church (1316), with tomb of John Kyrle, Pope's 'Man of Ross.' Pop. (1911) 4682.

ROSS AND CROMARTY (57° 40′ N., 5° W.), northern county, Scotland; bounded by Sutherland, North Sea, Inverness, Atlantic; area, 3089 sq. miles; includes Lewis proper (Outer Hebrides); Ross and Cromarty were united, 1889. Coasts are much indented, having Dornoch, Cromarty, and Moray Firths on E., Loch Broom, Loch Torridon, and other sea lochs on W.; most easterly point is Tarbat Ness; great part of surface mountainous; highest peaks are Mam Soul, Ben Dearg, Ben More, and Ben Wyvis, all above 3400 ft.; county town, Dingwall; chief lake, Loch Maree. Sheep are extensively reared, and various crops are grown on the lower ground; there are important fisheries; and whisky is manufactured. Pop. (1911) 77,353.

ROSS, ROBERT (1766–1814), Brit. soldier; in Corunna retreat, 1808; defeated Americans at *Bladensburg* and captured Washington, 1814; mortally wounded at *Baltimore*.

ROSS, SIR HEW DALRYMPLE (1779–1868), Brit. field-marshal; fought in Peninsula, 1809–14, Waterloo campaign, 1814–15; organised artillery for Crimea.

ROSSANO (39° 34′ N., 16° 40′ E.), city, Cosenza, Italy; ancient *Roscianum*; abp.'s see; marble and alabaster quarries. Pop. 13,600.

ROSSBACH, village, Prus. Saxony; noted for Frederick the Great's defeat of Austrian and Fr. allies on Nov. 5, 1757.

ROSSE, VISCOUNTY AND EARLDOM OF, Irish honours.—Sir RICHARD PARSONS, Bart., was created viscount, 1681; his son Richard, earl, 1718; extinct 1764. Lawrence Harman HARMAN (formerly Parsons), was created earl, 1806; title descended to his nephew, Lawrence PARSONS, whose descendant now holds it.

ROSSE, WILLIAM PARSONS, 3RD EARL OF (1800–67), Irish astronomer and telescope constructor; b. York; ed. Dublin and Oxford; made reflecting telescope with which certain nebulæ resolved into groups of stars, and numerous binary and trinary stars discovered.

ROSSETTI, CHRISTINA GEORGINA (1830–94), Eng. poetess; dau. of Gabriele Rossetti and sister of D. G. Rossetti (*q.v.*); published *Goblin Market* (1862) and *Sing-Song* (1872). She ranks high among lyric poets.

ROSSETTI, DANTE GABRIEL (1828–82), Eng. painter and poet; b. London; s. of Gabriele Rossetti, Ital. patriot, who had settled in England and become prof. of Ital. at King's College, London; ed. privately, King's College School, Cary's Art Academy, and finally at Royal Academy Antique School. His artistic and poetic careers were, to a great extent, contemporaneous. Both gifts were displayed early, and under the teaching of Ford Madox Brown he soon became familiar with the technicalities of painting; his first exhibited picture was *The Girlhood of Mary, Virgin* (1849). This was followed by *The Laboratory*, a lurid visualisation of Robert Browning's poem, magnificent in colour

and striking in design, and *Ecce Ancilla Domini*, a beautiful conception of the Annunciation, in which white is the predominating shade. This last picture was harshly criticised and was, for the time, quite unsaleable. The critics could not understand the Pre-Raphaelite Brotherhood, an artistic fraternity founded by R. and including Holman Hunt and Millais. It stood for lofty ideals, expressed in appropriate design and coloration. A series of Arthurian scenes was published in 1857. *Rosa Triplex*, *Dante's Dream*, *Veronica Veronese*, are other well-known pictures by R., while his designs for stained-glass windows (from 1861 onwards) did much to revive interest in that branch of art. R.'s work is reminiscent of the early Italian masters and has little in common with modernity.

As a writer, R. was essentially romantic and mystic. His earliest published poems appeared in the *Germ* (1850) and the *Oxford and Cambridge Magazine*; the *Poems* were printed in 1870, *Ballads and Sonnets* in 1881. His scope ranges from the ethereal dreaminess of the *Blessed Damozel* to the despairing cry of *The Woodspurge*. Like his painting, his poems are mediæval, and, for the most part, dissociated from the present.—A. C. Benson, *Rossetti*.

ROSSETTI, WILLIAM MICHAEL (1829–), Eng. author, bro. of above; wrote *Life of Keats* (1887), etc.

ROSSINI, GIOACCHINO ANTONIO (1792–1868), Ital. composer; excelled in opera. He wrote five operas before he was twenty, and at twenty-one *Tancredi* brought him success at Venice. In 1816 he had his crowning triumph with *The Barber of Seville*; and *William Tell* was produced in 1829. Though he wrote a vast number of operas, only these two survive. A *Stabat Mater* is occasionally performed.

ROSSLAND (49° N., 118° W.), city, Brit. Columbia, Canada; gold region. Pop. 6000.

ROSSLAU (51° 50′ N., 12° 13′ E.), town, on Elbe, duchy Anhalt, Germany; paper, sealing-wax. Pop. (1910) 11,304.

ROSSLYN, ALEXANDER WEDDERBURN, 1ST EARL OF (1733–1805), Brit. Lord Chancellor; of acknowledged ability, but character praised by no one; satirised early in life in the *Rosciad*, 'Guilt in his heart and famine in his face'; deserted Tories for Whigs; Chancellor, 1793–1801; presided at trial of Warren Hastings, 1793–95; one of suggested authors of *Letters of Junius*.

ROSSTREVOR (54° 6′ N., 6° 12′ W.), seaport, watering-place, County Down, Ireland.

ROSSWEIN (51° 5′ N., 13° 10′ E.), town, on Freiburg Mulde, Saxony; textiles. Pop. (1910) 9210.

ROSTAND, EDMOND (1864–), Fr. dramatist; author of *Cyrano de Bergerac* (1898); best known for his *Chantecler* (1910).

ROSTOCK (54° 5′ N., 12° 9′ E.), seaport, on Warnow, Mecklenburg-Schwerin, Germany; seat of university (1419); other features of interest are the Church of St. Peter and grand-ducal palace; one of the chief Baltic ports; important commercial centre; fisheries; manufactures machinery; exports grain; was a member of the Hanseatic League; birthplace of Blücher. Pop. (1910) 65,383.

ROSTOV (57° N., 39° E.), town, Yaroslavl, Russia, on Lake R.; manufactures textiles. Pop. 15,200.

ROSTOV-ON-THE-DON (47° 12′ N., 39° 42′ E.), seaport, Don Cossacks, Russia, on Don; commercial centre; flour-mills; trade in agricultural machinery. Pop. (1910) 121,300.

ROSTRA, in Rom. antiquities, a scaffold or raised platform where orations, etc., were delivered. 'Rostrum' is modern term, but Romans used plural form.

ROTATORIA, see ROTIFERA.

ROTCHE, or LITTLE AUK, see under GUILLEMOT AND AUK FAMILY.

ROTHE, RICHARD (1799–1867), Ger. Lutheran divine; prof. at Wittenberg, 1832, Heidelberg, 1854; influenced by Pietistic school, then specially studied relation of ethics and religion; pub. *Die Anfänge der Christlichen Kirche und ihrer Verfassung* and *Theologische Ethik*; an able thinker who has left his mark on Ger. theology.

ROTHENBURG-OB-DER-TAUBER (49° 23′ N., 10° 11′ E.), old town, Bavaria, with well-preserved mediæval houses, walls, towers, and gateways. Pop. 8600.

ROTHERHAM (53° 26′ N., 1° 21′ W.), town, on Don, Yorkshire, England; iron- and steel-works. Pop. (1911) 62,507.

ROTHERHAM, THOMAS (1423–1500), bp. of Worcester, 1468, Lincoln, 1472; chancellor, 1475; abp. of York, 1480.

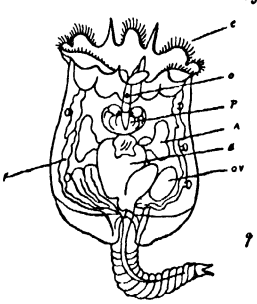
ROTHES, EARLDOM AND DUKEDOM OF.—GEORGE LESLIE of Rothes, Moray, Scotland, was created earl in or before 1458.—ANDREW LESLIE, 5th earl (d. 1611), became P.C. of Mary, Queen of Scots, and joined association for her support, 1568; supported Arran, 1585.—JOHN LESLIE, 6th earl (1600–41), Covenanter leader and commander in invasion of England, 1640.—JOHN LESLIE, 7th earl (1630–81), Royalist; captured at *Worcester*, 1651; imprisoned till 1658; Lord Chancellor for life, 1667; cr. Duke of R., 1680; d. childless.—JOHN LESLIE, 10th earl (*c.* 1698–1767), major-general at *Dettingen*; led cavalry at *Rocoux*, 1746; general, 1765.

ROTHESAY (55° 50′ N., 5° 3′ W.), county town, Bute, Scotland, on Isle of Bute; favourite watering-place; ruined castle; fisheries. Pop. (1911) 9299. **Dukedom of Rothesay** (first dukedom in Scot. peerage) was created 1398, and conferred on David, Earl of Carrick, Robert III.'s eldest son (killed by uncle, Duke of Albany, 1402); since held by Scot. sovereign's eldest son; now by Brit. sovereign's eldest son, as collateral title to Prince of Wales for England.

ROTHSCHILD, Jewish family of bankers; founded by MAYER ANSELM ROTHSCHILD (1743–1812), s. of Anselm Moses Bauer; took surname from red shield, sign of his bank at Frankfort-on-the-Main; eldest of five sons succeeded to Frankfort bank, the others founded houses at Vienna, Paris, London, Naples; all made Austrian barons, 1822. NATHAN, founder of London house, financed England in crisis, 1813; represented now by grandson Nathan, raised to Eng. peerage, 1885.

ROTHWELL (53° 45′ N., 1° 29′ W.), town, Yorkshire, England; ropes, matches. Pop. (1911) (dist.) 14,279.

ROTIFERA, ROTATORIA, 'WHEEL-ANIMALCULES,' a class of microscopically minute animals, related on one side to Arthropods, and on the other to Annelid Worms, although their resemblance to neither is apparent. They are favourite objects for microscopic examination owing to the readiness with which they can be obtained in any stagnant, greenish, fresh-water pool. Rotifers have usually a top-shaped transparent body, within which the internal organs can easily be distinguished. The head of the top is furnished with a crown of cilia, which lash in unison, giving rise to the appearance of a revolving wheel, and enabling the animal to swim. The opposite end of the body, known as the 'foot,' is also used for locomotion or more often for attachment, bearing two or more pincer processes, or an adhesive patch with cement glands.



ROTIFERA, *Brachionus Urceolaris*. *C*, cilia; *O*, eye; *P*, pharynx; *A*, appendages to stomach; *E*, stomach; *OV*, ovarium; *F*, branchial canal; *q*, tail.

Rotifers are common in almost any pool of stagnant water, fixed on water weeds or swimming near the surface; some occur in the sea, and at least one floating form is phosphorescent; while many species

lurk amongst the roots and leaves of moist Sphagnum and mosses. The majority are free living, but a considerable number build beautiful tubes, of semi-transparent horny material, or of a mosaic of selected sand grains. Others are parasitic in water weeds or in aquatic animals such as worms and crustacea.

Rotifers occur all the world over, even in the coldest regions, for they are able to withstand intense heat (water at 158° F.) or intense cold (−4° F., *i.e.* 36° of frost). This resistance is due to their power of sealing their bodies by gelatinous secretions to prevent desiccation. The sexes are separate and the females lay three kinds of eggs, small eggs which produce males, and thin-shelled summer or thick-shelled, resting winter eggs which produce females only, the resting eggs carrying the species through times of stress. Many Rotifers lay parthenogenic eggs.

ROTORUA (38° 10′ S., 176° 10′ E.), town, N. Island, New Zealand, on R. Lake; hot springs.

ROTROU, JEAN DE (1609–50), Fr. poet; one of Richelieu's five poets. Corneille called him his father, but became his pattern. When only nineteen he had a play acted at the *Hôtel de Rambouillet*; chief works, *Saint-Genest* (1646), *Don Bernard de Cabrères* (1647), *Venceslas* (1647), *Cosroës* (1649), among thirty-six comedies and tragedies; greatest member of Corneille's school.

ROTTENBURG (48° 28′ N., 8° 57′ E.), town, on Neckar, Württemberg, Germany; machinery. Pop. (1910) 7603.

ROTTERDAM (51° 55′ N., 4° 29′ E.), chief commercial city of Netherlands, at junction of Rotte and Meuse; intersected by dyke; canals along leading streets; extensive quay called the Boompjes; quaint gabled houses built on piles; Grootekerk completed, *c.* 1475 (fine organ); Boyman museum, town hall, palace of justice, etc.; shipbuilding, furniture, clocks, chocolate, distilling, chemical products, etc.; trades with Dutch East Indies, America, and European ports; birthplace of Erasmus and Cornelius van Tromp. Pop. (1910) 436,018.

ROTTWEIL (48° 10′ N., 8° 37′ E.), town, Württemberg, Germany; manufactures gunpowder. Pop. (1910) 9643.

ROTUMAH (12° S., 177° E.), small island, S. Pacific; dependency of Fiji Islands.

ROUBAIX (50° 38′ N., 3° 12′ E.), town, Nord, France; cloths, velvets. Pop. (1911) 122,723.

ROUBILIAC, LOUIS FRANÇOIS (1695–1762), Fr. sculptor; settled in London, and became famous by his statues of Handel, Shakespeare, and Sir Isaac Newton, and by monuments in Westminster Abbey.

ROUEN (49° 26′ N., 1° 6′ E.), chief town, Seine-Inférieure, France, on Seine; important industries, shipping, and commerce. Old R., with mediæval appearance, contains Gothic and Renaissance buildings, famous churches including cathedral (begun XIII. cent.), St. Ouen (founded, 1318), St. Maclou (begun, 1437), St. Vincent (XVI. cent.); palace of justice; Musée-Bibliothèque and other museums; monument to Jeanne d'Arc. R. became capital of Normandy, X. cent.; taken by Henry V. of England, 1419; by Charles VII. of France, 1449; Jeanne d'Arc burnt, 1431; surrendered to Germans, 1870; birthplace of Corneille, Boieldieu, Fontenelle; chief industries are spinning and weaving of cottons, velvets, woollens, linens, mixed silk, machinery, shipbuilding, refining of petroleum, chemicals, etc. Pop. (1911) 124,987.

Cook, *Rouen* (Mediæval Town Series).

ROUERGUE (44° 15′ N., 2° 30′ E.), ancient province, France; now included in department of Aveyron; capital, Rodez.

ROUGE ET NOIR, see TRENTE ET QUARANTE.

ROUHER, EUGÈNE (1814–84), Fr. statesman; won over from republicanism by Napoleon III., whose mainstay he became; called 'vice-emperor'; defended empire after its fall.

ROULERS, ROUSSELAERE (50° 56′ N., 3° 7′ E.), town, W. Flanders, Belgium; manufactures linen. Pop. (1910) 25,026.

ROULETTE, game of chance; played on table with depression containing movable bottom; ball flung into cavity and spun round, eventually landing in one of the 38 holes marked round bottom; various modes of staking; biggest odds, 38 to 1; played extensively at Monte Carlo.

ROUMANIA, see RUMANIA.

ROUMELIA, see RUMELIA.

ROUND TABLE, THE, in Arthurian cycle of romances. First mention is found in *Roman de Brut*, where Wace recounts that Arthur made R.T. so that his knights should have no disputes as to precedence, but already many fables had arisen; founding of order of Christian knights of R.T. became ascribed to Merlin. See ARTHUR, KING.

ROUND TOWERS, see TOWER, ROUND.

ROUNDELS, see FORTIFICATION.

ROUNDERS, ball game; object of striker to run round whole or part of course after stroke; Amer. base-ball derived from R.

ROUND-WORMS, see NEMATHELMINTHES and NEMATODA.

ROUSSEAU, JEAN BAPTISTE (1670–1741), Fr. poet; s. of a shoemaker, but rose in society; has long since lost readers, but was regarded in his time as the foremost lyric poet.

ROUSSEAU, JEAN JACQUES (1712–78), Fr. philosopher and writer, pioneer of Romantic Movement, precursor of Fr. Revolution, and preacher of 'Return to Nature' creed. A Geneva watchmaker's son, young R. was in turn engraver's apprentice, vagabond, candidate for Holy Orders, lackey, copyist of music, and what not. In Madame de Warens he found a patroness and lover for some years at *Les Charmettes*. Making his way to Paris, 1741, R. associated with the Encyclopædists; won Academy of Dijon's prize for *Discours sur les Arts et les Sciences*, 1749; awakened interest of Louis XV., who ordered representation of *Le Devin du Village*, opera of R.'s composition, 1752; compiled *Dictionnaire de Musique*, 1767; formed liaison with servant-girl, Thérèse Levasseur, whom he eventually married. R. published *Discours sur l'Inégalité*, 1755, *Julie, ou La Nouvelle Héloïse* (a novel), 1760, *Émile, ou de l'Education*, and *Le Contrat Social* (political), 1762. His deism forced him to leave France; from Switzerland he wrote *Lettres de la Montagne*; visited England under Hume's patronage; returned to France and spent miserable years obsessed with idea of persecution; died at Ermenonville; buried in Panthéon. His autobiographical *Confessions* shed much light on his irregular life and morbid character. R. proclaimed the rights of individuality, denounced the evils of artificial civilisation, revolted against rules and schools and sought to reinstate Nature in education, literature, and life generally; government, he held, depends on consent of the people. He taught Fr. mothers to nurse their own children—and sent his own offspring to a foundling hospital.

Lord Morley, *Life* (1886); Hudson, *Rousseau and Naturalism in Life and Thought* (1903); Texte, *Rousseau and the Cosmopolitan Spirit in Literature*; Mrs. Macdonald, *Jean Jacques Rousseau* (1906).

ROUSSEAU, PIERRE ÉTIENNE THÉODORE (1812–67), Fr. painter; studied in Paris, and exhibited in the Salon there from 1831 onwards. He reproduced landscapes in various parts of France; but, having settled in the village of Barbizon, in 1848, the Forest of Fontainebleau became his favourite painting-ground. His works had a prominent place in the Expositions of 1855 and 1867, and now command high prices.

ROUSSELAERE, see ROULERS.

ROUSSILLON (42° 32′ N., 2° 30′ E.), ancient province, France, bordering Pyrenees; capital, Perpignan; corresponds nearly to Pyrénées Orientales.

ROUVIER, MAURICE (1842–1911). Fr. states-

man; pres. of Council, 1887 and 1905–6; removed Boulanger from War Office; successful Minister of Finance; implicated in Panama scandals, 1892.

ROVER, see THEFT.

ROVERETO, ROVEREDO (45° 53′ N., 11° 3′ E.), town, Tyrol, Austria, on Leno, near Adige; silk manufactures. Pop. (1911) 11,655.

ROVIGNO (45° 4′ N., 13° 39′ E.), seaport, Istria, Austria; cathedral; active trade. Pop. (1911) 12,326.

ROVIGO (45° 3′ N., 11° 47′ E.), capital, Rovigo province, Italy; XVII.-cent. cathedral; beer, silk, leather. Pop. c. 10,750.

ROVIGO (45° 3′ N., 11° 47′ E.), town (and province), Italy; picture gallery; library. Pop. 11,200; (prov.) (1911) 258,096.

ROVUMA (11° S., 40° E.), river, bounding Portug. and Ger. E. Africa; flows into Indian Ocean.

ROWAN TREE, MOUNTAIN ASH, QUICKEN TREE (*Pyrus aucuparia*), tree, order Rosaceæ; its bitter red berries are used in preserves; wood valuable for furniture.

ROWE, NICHOLAS (1674–1718), Eng. dramatist; best-known plays are *Tamerlane*, *The Fair Penitent*, and *The Tragedy of Jane Shore*. His reputation as a dramatist was eclipsed by his edition of *Shakespeare*.

ROWING, sport popular in every English-speaking country, but though its introduction into other countries has been effected, it does not seem to thrive there.

Amateur.—'Bumping races' were held at Oxford shortly after beginning of XIX. cent. They were intercollegiate in character and have now developed into an annual contest. 'Bumping,' in which the object of the rear boat (separated at the start from the first by a certain distance) is not to pass but to touch, is used on narrow rivers. The Oxford *v.* Cambridge race has been held annually since 1865 although held intermittently since 1829. Oxford were winners, 1913. Henley regatta, one of the events of the rowing year, is a three-days' meeting held in July; prizes include 'Diamond' for sculling, 'Silver Goblet' for pair, 'Stewards' Cup' for 1st class four, 'Grand Challenge' for 1st class eight. There are other races for school and second class teams.

Harvard first rowed against Yale (1852) on Lake Winnipiseogee and beat them; from 1855 to 1875 races were intermittent on different courses, and in 1876 eight-oared race over a four-mile course began; now at New London, Ct. A Columbia University four won the Visitors Challenge Cup at Henley (1878), but otherwise Amer. have had little success against Brit. crews. An intercollegiate regatta is held, but Yale and Harvard do not compete; there are many important regattas.

Professional races developed from watermen's matches; fostered by growth of professionalism. Sculling is principal form: World's Champion, 1912, Ernest Barry.

Racing boats differ from ordinary in that they are narrower and lighter; 'out-riggers' are used to obtain leverage and decrease beam; the shell is made of thin cedar. Sliding seats are almost universal. In an 'eight' the stroke sets the time and 'cox' steers; fours are now rowed without a cox.

Lehmann, *The Complete Oarsman* (1910).

ROWLAND, HENRY AUGUSTUS (1848–1901), Amer. physicist; prof. at Baltimore; made diffraction grating; redetermined mechanical equivalent of heat.

ROWLANDSON, THOMAS (1756–1827), Eng. caricaturist; pictures of broadly humorous character, depicting lower orders, *e.g.* famous Vauxhall drawing.

ROWLEY REGIS (52° 28′ N., 2° 4′ W.), town, Staffordshire, England; iron. Pop. (1911) 37,000.

ROWLEY, THOMAS, see CHATTERTON, THOMAS.

ROWLEY, WILLIAM (*c.* 1585–*c.* 1642), Eng. actor and playwright; collaborated with Webster, Massinger, Ford and others, and left four plays of his own.

ROWTON, BARON, MONTAGUE WILLIAM LOWRY-CORRY (1838–1903), private sec. to Beaconsfield, 1866–80; first of his model lodging-houses opened in London, 1892; **Rowton Houses** Co. Ltd. formed, 1894.

ROXBURGHE, BARONY, EARLDOM, AND DUKEDOM OF.—Sir Robert KER of Cessford, Roxburghshire, Scotland, was cr. baron, 1599, earl, 1616; settled remainder of earldom (barony becoming extinct) on grandson, William Drummond (afterwards Ker), whose grandson, John, 5th earl, was cr. duke, 1707; descent in female line to Henry John INNES-KER, present duke.

ROXBURGHE, JOHN KER, 1ST DUKE OF (*c.* 1680–1741), promoted Union; one of lords regents of realm on Queen Anne's death; one of lords justices who ruled realm during George I.'s absences.

ROXBURGHE, JOHN KER, 3RD DUKE OF (1740–1804), collector of rare books (sold 1812); **Roxburghe Club** founded in commemoration, 1812; collection of ballads purchased by Brit. Museum, 1845, and edited for Ballad Soc.

ROXBURGHE, ROBERT KER, 1ST EARL OF (*c.* 1570–1650), belonged to most turbulent family of Scot. border in reigns of Henry VIII. and Elizabeth; rose through personal liking of James I.

ROXBURGHSHIRE (55° 25′ N., 2° 35′ W.), Border county, Scotland; area, 666 sq. miles; surface hilly in S., more level in N.; highest points are Ruberslaw and the Eildons; drained by Tweed, with Teviot and other tributaries, and Liddel; county town, Jedburgh; monastic remains at Jedburgh, Melrose, and Kelso; scene of Border strife; has associations with Sir Walter Scott. Sheep are raised, and woollens manufactured; other industries are tanning, ironfounding, fisheries. Pop. (1911) 47,192.

ROXBURY, formerly city, Massachusetts, U.S.A.; now incorporated in Boston.

ROYAL ACADEMY, see under ACADEMY.

ROYAL MARINES, military force trained for both land and sea service. An Order in Council, 1664, directed training of regiments for service at sea; further marine regiments were created in later times, though not yet permanently maintained; were organised after plan of army, not navy, but were often transferred to navy, with idea of improving *morale* of navy, but chief function was to aid by land in naval sieges; often considered useless at sea, eulogised by Nelson; control transferred from War Office to Admiralty, 1747; army organisation abandoned, 1755; famous corps of *Royal Marine Artillery* formed 1804; two corps in service now.

U.S.A. adopted system, 1775; France has no corps, but divides coast defence between land-service and sea-service, and drafts soldiers for naval wars.

ROYAL SOCIETY, see SOCIETIES, LEARNED.

ROYAN (45° 39′ N., 1° 1′ W.), seaport, watering-place, Charente-Inférieure, France, at mouth of Gironde; sardine fisheries. Pop. 9000.

ROYAT (45° 45′ N., 3° 4′ E.), watering-place, Puy-de-Dôme, France; hot springs.

ROYER-COLLARD, PIERRE-PAUL (1763–1845), leader of Fr. *doctrinaries*; exercised great influence on Revolution; no sympathy with mob violence, but wished to abolish every institution not in accordance with Liberal 'reason.'

ROYSTON (52° 3′ N., 0° 3′ W.), town, Hertfordshire, England. Pop. (1911) 3985.

ROYTON (53° 33′ N., 2° 8′ W.), town, Lancashire, England; cotton manufactures. Pop. (1911) 17,069.

RUABON (52° 59′ N., 3° 3′ W.), town, Denbighshire, Wales; ironworks; collieries. Pop. 3500.

RUBBER is the *latex* from several tropical trees (*e.g. Hevea braziliensis*, *Manihot Glaziovii*, *Ficus elasticus*) growing in Brazil (Para rubber), Central America, E. and W. Africa, Ceylon, etc. Incisions made in the bark, beneath which the laticiferous vessels occur, and latex, an emulsion, runs out. Coagulation yields r.

Production.—In 1909, 70,000 tons of r. were produced; more than half came from America, about one-third from Africa, the rest from Asia, including 3000 tons of plantation r. from Ceylon and Malaya. Owing to exhaustion of natural resources, wild r. is likely to be gradually replaced by plantation r. The world's estimated annual consumption of r. is (1913) 100,000 tons, whereas in 1875 only 5000 tons were required.

This increase is largely due to the demand for motor and cycle tyres. Increased demand caused great r. 'boom,' 1910.

Nature.—The essential constituent of r. is *caoutchouc*, which is present to the extent of 70–90 %, mixed with resin, proteid matter, ash, and moisture. Caoutchouc is a soft, elastic solid, insoluble in water and alcohol, little acted on by acids and alkalis, but soluble in carbon disulphide, benzene, carbon tetrachloride, chloroform, etc., forming r. solutions; it softens above 100° C. and melts at 150–200° C.; it consists of unsaturated hydrocarbons of the composition $(C_5H_8)_n$, which on destructive distillation yield isoprene. Caoutchouc absorbs oxygen, forming a brittle substance; it also combines with ozone, halogens, and sulphur (vulcanisation).

Manufacture.—Crude r. is washed with hot water, and passed between rollers together with sulphur, pigment, and mineral matter, such as whitening or barium sulphate. Vulcanisation, which involves combination with the sulphur, is effected by heating the mixture for half an hour to 135–150° C. in closed iron vessels. Chloride of sulphur is sometimes employed for vulcanising. Vulcanised r. is harder than caoutchouc, and is unaltered at 160° C. Commercial r. contains 12–60 % caoutchouc, 1–2 % combined sulphur, and 25–70 % mineral matter. Excessive vulcanisation produces *vulcanite* or *ebonite*, which can be polished.

Synthetic Rubber.—As early as 1882 Bouchardat and Tilden had shown that isoprene is converted into r. by contact with certain catalytic agents; and this fact has recently assumed practical importance on account of the cheap production of isoprene and the simpler hydrocarbon butadiene, together with the discovery by F. E. Matthews (July 1910) that metallic sodium is a rapid catalyst.

The Process.—Fernbach has discovered a method of fermenting grain or potato starch so as to produce isoamyl or butyl instead of ethyl alcohol; and W. H. Perkin and his co-workers have converted these alcohols into corresponding unsaturated hydrocarbons. Isoamyl alcohol is converted into its chloride by dry hydrogen chloride, and this, by careful chlorination, yields as the chief product a dichloride, thus—

$$\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH.CH_2.CH_2.OH \longrightarrow \underset{\text{Isoamyl alcohol.}}{\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH.CH_2.CH_2Cl} \longrightarrow$$

$$\longrightarrow \underset{\text{1·3 Dichlorethyl dimethyl methane.}}{\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CCl.CH_2.CH_2Cl}$$

Isoamyl chloride.

When the vapour of this dichloride is passed over hot soda lime it is converted almost quantitatively into isoprene. Butyl alcohol similarly yields butadiene.

The hydrocarbons are sealed up in tubes with about 3 % of thin sodium wire, and heated at 60° C. for several days. The brown product is treated with acetone to precipitate the rubber, which after washing is found to possess properties qualifying it to become a serious rival of natural r.

RUBENS, PETER PAUL (1577–1640), most celebrated of Flemish painters, b. in Westphalia; in 1587 moved with his widowed mother to Antwerp, with which his art-life became chiefly associated; began study at 13, having several masters until, at 19, he went to Othon van Keen, court-painter to the Archduke Albert. In 1600 he proceeded to Venice to study the works of Titian and Veronese; and presently became gentleman of the chamber and court-painter to the Duke of Mantua. In 1605 he went on a semi-diplomatic mission to the Court of Spain, and at Madrid painted several portraits and historical pictures. Returning to Italy, he remained there till 1608, when he settled in Antwerp. Next year he was made court-painter to the Archduke Albert; and in 1611 began his master work, 'The Descent from the Cross,' now in Antwerp Cathedral. This occupied him for three years. In 1620 he went to Paris, where he painted for Marie de' Medici twenty-one large pictures, now in the Louvre. Diplomatic missions followed, first to Philip IV. of Spain, of whom he executed five portraits, and second to Charles I. of England. All the while his brush was busily employed; and by the time of his death his works numbered several thousands. Many of the best of these remain at Antwerp, but the first collection is in the Pinakothek at Munich. Rubens was great as subject-painter, animal painter, portraitist and landscapist. His pictures are notable for their marvellous spontaneity, creative vigour, superb animation, and magnificent colouring.

RUBIACEÆ, trees, shrubs, or herbs with leaves possessing prominent stipules, in some cases as large as leaves (e.g. *Galium*). *Coffæa* (coffee) and *Cinchona* (quinine) are most important economically.

RUBICON (44° 10′ N., 12° 28′ E.), small river, ancient Italy, falling into Adriatic; identified with modern Fiumicino; crossed by Cæsar, 49 B.C. See Rome (History).

RUBIDIUM (Rb=85·45), rare alkali metal, discovered by spectrum analysis (Bunsen, 1860); compounds occur in mineral waters, sea water, siliceous minerals, beet, tobacco, and other plants. Metal rapidly decomposes water, strongly electropositive, salts very soluble.

RUBINSTEIN, ANTON (1829–94), Russ. pianist and composer of Jewish extraction; became music-teacher in St. Petersburg, 1848, and there he founded the Russ. Musical Soc., 1861, and Conservatoire, 1862, of which he became director; toured much, giving recitals; his operas are less known than his symphonies *Ocean* and *Dramatic*; he opposed Wagnerianism and had much in common with Schubert and Mendelssohn; his technique as a pianist was great, and he played with marvellous emotion.

Autobiography (Eng. trans., 1891).

RUBRIC (Lat. *rubrica*, red earth used by carpenters to mark wood), titles (in red ink) to chapters in classical law books; later, directions in prayer-books, hence its meaning of 'rules for Divine Service and administration of the Sacraments'; modern r. is often printed in italics instead of red ink.

RUBRUQUIS, WILLIAM OF, Rubruck, mediæval explorer. The authorities for his life are his own works and those of Roger Bacon. R. became a Franciscan friar and travelled in the East by command of Louis IX. of France on an embassy to the Grand Khan. Expedition started from the Crimea in May 1253 and, crossing the Don and Volga, reached the Grand Khan's camp in Dec., having gone about 5000 miles; returned through Armenia and Cilicia to Cyprus, thence to Tripoli. R.'s account is a most valuable description of the topography and ethnology of Asia in his time, and is brightly written, though in bad Latin.

Beazley, *Dawn of Modern Geography*.

RUBY, precious stone of deep red colour. The *Oriental* r. is composed almost entirely of alumina, is very hard, and most valuable of precious stones; obtained from Burma, Siam, etc. *Spinel* is not so hard; composed of magnesium aluminate; obtained from Burma, Ceylon, China, and Afghanistan. True r. occurs in crystalline limestone or alluvial deposits. Spinel occurs in alluvial deposits and in river beds.

RUBY MINES (c. 22° 46′ N., 96° 20′ E.), district, Burma, on Irrawadi; chief town, Mogok; centre of ruby-mining industry. Pop. 92,000.

RÜCKERT, JOHANN MICHAEL FRIEDRICH (1788–1866), Ger. poet; b. Schweinfurth; wrote excellent lyrics; *Die Weisheit des Brahmanen* (didactic poem), besides Chin., Arab., and Persian translations.

RÚDAGÍ, see Persia (Language and Lit.).

RUDD, see under Carps.

RUDDER, part of ship, hanging on sternpost, by which the course is steered. It is moved by chains operated by a spoked wheel or helm. In Levant and Indian Ocean, steering-oar frequently replaces r., or

rather survives from ancient times, for r. is developed from steering-oar.

RUDDIMAN, THOMAS (1674–1757), Scot. Latin grammarian; printer to Edinburgh Univ.; author of well-known *Rudiments of the Latin Tongue.*

RÜDESHEIM (49° 59′ N., 7° 54′ E.), town, on Rhine, Hesse-Nassau, Prussia; noted wine. Pop. (1910) 4556.

RUDINI, ANTONIO STARABBA, MARQUIS DI (1839–1908), Ital. statesman; Pres. of Council and Foreign Minister, 1891; renewed Triple Alliance; again premier, 1896–98; failed in dealing with demands for reforms.

RUDOK (33° 30′ N., 79° 43′ E.), village, Western Tibet.

RUDOLF, Basso Norôk (4° N., 35° 40′ E.), lake, British E. Africa, near S. Abyssinian highlands; no outlet; altitude, 1200 ft.; area, 3250 sq. miles; receives the Omo from N.

RUDOLPH I., Rudolf (1218–91), First Hapsburg king of the Romans; ancestor of the Austrian royal house; 'pauper count' of Hapsburg; elected king, 1273, chief ground being his weakness; abandoned all claim to Italy, and consolidated power in S. Germany; occupied Austria, Styria, Carinthia, and Carinola, 1276, and, despite general alarm, obtained their definite cession, 1278; wielded little authority in central Germany.

RUDOLPH II. (1552–1612), Austrian emperor; succ. f., Maximilian II., 1576; scholarly and artistic but incapable ruler; persecuted Protestants; occupied Cleves duchies in Catholic interest, 1609, brought about Thirty Years War; supplanted by bro. Matthias.

RUDOLSTADT (50° 43′ N., 11° 20′ E.), capital of principality, Schwarzburg-Rudolstadt, Germany, on Saale; porcelain. Pop. (1910) 12,949.

RUE (*Ruta*), genus of plants, order Rutaceæ; Common R. (*R. graveolens*), a quondam charm against witches, is a Brit. garden-flower, yellowish and strongly smelling; used medicinally as a stimulant; r. is Shakespeare's *Herb of Grace.*

RUEIL (48° 50′ N., 2° 10′ E.), town, Seine-et-Oise, France; photographic material works. Pop. 12,600.

RUFF, see under Plover Family.

RUFFO, FABRIZIO (1744–1827), Neapolitan statesman; cr. cardinal, 1791; supported Royalists, then friendly with Napoleon, but at restoration in royal favour again.

RUFIJI (8° 15′ S., 39° E.), river, Ger. E. Africa; flows into Ind. Ocean.

RUFINUS, TYRANNIUS (*c.* 340–410), theologian; became a monk; settled in Jerusalem to study, and became friend of St. Jerome; trans. Pamphilus and Origen, and became suspected of heterodoxy; among other works wrote an Ecclesiastical History.

RUGBY, see Football.

RUGBY (52° 23′ N., 1° 16′ W.), town, on Avon, Warwickshire, England; railway junction; seat of famous public school founded by Laurence Sheriff in 1567. Pop. (1911) 21,762.

RUGELEY (52° 46′ N., 1° 56′ W.), town, Staffordshire, England; iron foundries; tanneries. Pop. (1911) 4504.

RUGEN (54° 30′ N., 13° 30′ E.), island, in Baltic, Pomerania, Prussia, separated from mainland by Strelasund; well-wooded; fertile; beautiful scenery; fishing industry. Pop. 50,000. Capital, Bergen; favourite sea-bathing resort.

RUHLA (50° 52′ N., 10° 20′ E.), town, summer resort, duchy of Saxe-Coburg and Saxe-Weimar, Germany; manufactures pipes. Pop. (1911) 7828.

RUHNKEN, DAVID (1723–98), classical scholar of the Netherlands; edited Plato, and Timæus's *Lexicon vocum Platonicarum*; published *Epistolæ Criticæ* (1749–51), an edition of Rutilius Lupus (1768) and of Muretus (1789). He was one of the finest scholars of the XVIII. cent.

RUHR (51° 24′ N., 8° 7′ E.), river, Prussia; joins Rhine at Ruhrort.

RUHRORT (51° 28′ N., 6° 44′ E.), town, at junction of Ruhr and Rhine, Rhineland, Prussia; large harbour; exports coal; was united to Duisburg, 1905.

RUISDAEL, see Ruysdael.

RUIZ, JUAN (*c.* 1283–*c.* 1350), the most famous poet of mediæval Spain; most representative work is the famous *Libro de Buen Amor.*

RUKWA, Rikwa (8° S., 32° E.), lake, Ger. E. Africa.

RULE, ST, see Regulus, St.

RULLION GREEN, see Covenanters.

RULLUS, PUBLIUS SERVILIUS, Rom. tribune of the plebs, 63 B.C.; proposed agrarian law, which Cicero opposed in three orations.

RUM, see Spirits.

RUMANIA, Roumania (43° 37′ to 48° 13′ N., 22° 30′ to 29° 42′ E.), kingdom, S.E. Europe; bounded N.E. and E. by Russia, from which it is separated by the Pruth and Danube; E. by Black Sea; S. by Bulgaria, from which it is separated by the Danube to a little N. of Turtukai, from where the line runs S.E. to the Black Sea S. of Ekrene; W. by Servia; N.W. by Austria-Hungary; area, *c.* 52,000 sq. miles; surface slopes upward from plain of Danube to Carpathians and their continuation, the Transylvanian Alps, in the N.W. Northern part is called Moldavia, and southern Wallachia; and in the E. between the lower Danube and the Black Sea is the district of the Dobruja, which has an average height of 500 ft. and an extreme height of over 1760 ft. The drainage is by the Pruth and Danube and their tributaries, numbers of which dry up in summer.

The Carpathians are an intensely folded range of comparatively recent upheaval, and the basin of the Danube is an alluvial plain covered with Tertiary and later deposits. Climate is strongly continental, with a great daily and seasonal range—from 10° F. in winter to 95° in summer; the winter mean is 27°, and the summer, 72°; there is a rainfall of over 25 inches, and a snowfall of 28 inches. Flora includes oak, beech, elm, lime, sycamore, and other trees, as well as the plants common to temperate and subtropical regions; and among the Fauna are wolves, foxes, and many kinds of birds and molluscs.

History.—R. was inhabited in early times by the Getæ, and later by the Dacians, who were subdued by Rome in 101–6 A.D., when the country became the Rom. province of Dacia. It was abandoned by Aurelian in 274 A.D., and henceforth was for many cent's overrun by successive hordes of barbarians—Goths, Huns, Gepidi, Avars, Slavs, Bulgars, Magyars, Tatars.

The independent principalities of Moldavia and Wallachia were established in the XIV. cent. Among the most notable rulers or voivodes of Moldavia were Alexander I., who reigned in the early part of the XIV. cent., and acknowledged Polish overlordship; Stephen the Great, who between 1460 and 1475 inflicted defeat on Poles, Hungarians, and Turks in turn, and subsequently captured Pokutia from the Poles; and Bogdan III., who in 1513 acknowledged the sovereignty of Turkey, agreeing to make a yearly payment to the sultan in return for protection. Early in the XVII. cent. Moldavia was temporarily united with Wallachia under Michael the Brave, but it soon afterwards again came under Turk. control. Under Basil Lupul, voivode in 1634–54, a number of legislative reforms were carried out. The last remains of even nominal independence disappeared in 1711, when the voivode, Demetrius Cantemir, was compelled to fly to Russia by an invading Turk. army; and henceforth the office of ruler was sold by the Turk. government to the highest bidder, generally a Greek from the Phanar district of Constantinople, whence the name *Phanariot*, applied to the period between 1712 and 1821.

Meantime in Wallachia, which had been originally a dependency of Hungary, history had followed a course resembling at many points that of the northern principality. The most important voivodes were Mircea I.,

who was defeated by the Turks in 1396 and was subsequently compelled to acknowledge the overlordship of the Porte (1411), and MICHAEL THE BRAVE, who reigned in 1593–1601, and combined Moldavia, Wallachia, and Transylvania under his sway. The last elected voivode was CONSTANTINE BRANCOVAN, whose wealth and prosperity roused the jealousy of his Turk. overlord; he was accordingly deposed and executed in 1712, and henceforth, here as in Moldavia, the voivodes were nominated by the Turk. government.

The PHANARIOT PERIOD in both states was marked by the oppression of the native population, and by extortionate taxation, the voivodes naturally aiming at reimbursing themselves for the sums with which they had bought their position. During this epoch also both Austria and Russia made encroachments upon Rumanian territory; thus Bukowina was transferred to Austria in 1775, and in 1812 a large part of Bessarabia was annexed by Russia. In 1821 the provinces took part in Gk. rising, and were harshly handled by the Turks; and in 1829 they were placed under Russ. protection by the Treaty of Adrianople.

The influence of Russia was for some time of great importance; in 1848 she aided Turkey in suppressing an insurrection, and her troops occupied the country in 1853; but after the Crimean War she had to restore Bessarabia to the principalities, which were declared neutral territories by the Congress of Paris in 1856. Three years later the election of ALEXANDER CUZA to the thrones of both Moldavia and Wallachia united the whole of R. under one ruler; the union was publicly proclaimed and the present name adopted in 1861. Alexander carried out a great number of legislative reforms, but he was not popular in the country and was eventually deposed in 1866, when Prince CAROL of Hohenzollern-Sigmaringen was chosen to succeed him. Carol married Elizabeth of Neuwied (CARMEN SYLVA), whose influence on Rumanian art and letters deserves mention. When war broke out in 1877 between Russia and Turkey, R. supported the former; and by the Treaty of Berlin in 1878 it was recognised as an independent state, but had to cede Bessarabia to Russia, receiving the Dobruja in exchange. It was declared a hereditary kingdom in 1881, when Carol was crowned as the first king. Various modifications were made in the constitution in 1884. In recent years R. has several times broken off relations with Greece; she took, however, no part in the war of 1912 between Turkey and the other Balkan states, but on war breaking out between the latter she invaded Bulgaria and claimed a strip of territory as compensation for her neutrality. This was confirmed to her by the Treaty of Bukharest (Aug. 1913).—See TURKO-BALKAN WAR.

Language and Literature.—The language is one of the Romance group, but has a large proportion of Slavonic words. Early forms of lit. were religious writings and translations from the Bible, the first of which were produced in the XVI. cent.; and a number of hist. chronicles appeared in the XVII. cent. This early period was marked by Slavonic influence. During the Phanariot epoch Gk. influence was all-important; to this time belong the poets Aaron and Vacarescu and the historians Klain and Neculcea. A great revival of national feeling occurred in first half of XIX. cent., one of the greatest names of this renaissance period being that of Eliade Radulescu. Poets of the XIX. cent. include Bolintineanu and Alexandri; and historians, Hasden and Xenopol. There are some fine collections of folk-songs and legends.

Government.—The government is a limited monarchy, a constitution dating from 1866; executive is in hands of a Cabinet, consisting of Premier and 8 ministers of state; legislative power is vested in a Senate of 120 members elected for eight years, and a Chamber of Deputies of 183 members, elected for four years. The country is divided for local administrative purposes into 32 districts (13 in Moldavia, 17 in Wallachia, 2 in the Dobruja). The administration of justice is carried out by 266 justices, 34 tribunals, 4 appeal courts, and 1 court of cassation. The revenue of the state was estimated at £19,135,809 in 1911–12; the principal sources of revenue are the public services, indirect taxes, and state monopolies; and the chief expenses are those connected with the departments of finance, public works, and war. The field army has a total strength of *c.* 170,000 men, and military service is compulsory. The navy consists of 1 protected cruiser, 7 gunboats, 6 coastguard vessels; 6 first-class and 2 second-class torpedo boats; a training-ship and a dispatch vessel; and there are 12 police boats.

Resources.—The most important towns are BUCHAREST, the capital, Jassy, Galatz, Braila, Plœsti, Craiova, and Botosani. There were 2328 miles of railway in 1911, all state-controlled, but there are no canals. The chief industry is agriculture; maize, wheat, barley, oats, rye, hemp, linseed are grown, and plums, peaches, and other fruits as well as tobacco and sugar-beet are cultivated; large numbers of sheep, cattle, pigs, and horses are raised. A large area is forested with oak, beech, and other timber. Minerals include coal, petroleum, and salt; petroleum springs are worked at Bacau, Dambovitza, and elsewhere, and salt-mining is a government monopoly. There are many medicinal springs. Apart from agriculture the chief industries are the manufacture of beet-sugar, woollens, leather, boots and shoes, and cement, and there are important fisheries; the manufacture of tobacco is a government monopoly. Chief imports are textiles, metals and metal goods, machinery, chemicals, pottery, glass, silks; and the chief exports, cereals, petroleum, timber, fruit, animal products; imports were valued at £16,276,320, exports at £24,414,480 in 1910.

Education is gratuitous and obligatory; Bucharest and Jassy are Univ. towns. The state religion is Gk. Orthodox, and the national church is recognised as an independent institution; there are two abp's and six bp's. There is complete religious toleration, and the inhabitants include many Jews, Muhammadans, R.C's, Prot's, and Armenians. Pop. estimated (1911) 7,086,000.

Miller, *The Balkans* (1896); Samuelson, *Rumania, Past and Present* (1882); Stratilesco, *From Carpathian to Pindus* (1906); Benger, *R. in 1900* (1900).

RUMELIA, ROUMELIA (41° 20′ N., 23° E.), former name for that part of European Turkey comprising ancient Thrace and Macedonia; Eastern Rumelia was united to Bulgaria, 1885.

RUMFORD, BENJAMIN THOMPSON, COUNT (1753–1814), soldier and physicist; b. Woburn (Massachusetts); during War of Independence sent with dispatches to England where he received Government appointment; entered Bavarian service, 1784; cr. count and held various high offices; finally settled Paris; made important discoveries in heat; helped poorer classes by spreading culinary, agricultural, and other useful knowledge.

RŪMĪ (1207–73), Persian poet; b. Balkh, Khorasan; a keen student of mystic theosophy. His poems are all richly tinged with mysticism; the best is *The Spiritual Mathnawi.*

RUMINANTIA, SELENODONTIA, a group of Even-toed (*Artiodactyle*), Hoofed Mammals, including Chevrotains, Camels, Deer, Giraffes, the Prong-Buck, and Cattle. The first name indicates their habit of ruminating or regurgitating swallowed food from the stomach to the mouth and chewing it again, a process accompanied by a complex stomach; the second name refers to the crescentic folds on the chewing surface of the teeth, which are known as selenodont.

RUMINATION, see above, and under PECORA.

RUNCORN (53° 21′ N., 2° 45′ W.), town, river port, on Mersey, Cheshire, England; shipbuilding-yards; iron foundries. Pop. (1911) 17,354.

RUNEBERG, JOHAN LUDWIG (1804–77), Swedish poet; b. Jakobstad, Finland. His best works

are *Elgskyttarne* ('The Elk-Hunters'), *Hanna, Kung Fjalar*, and his tragedy *Kungarne po Salamis* ('The Kings at Salamis').

RUNES, from the Gothic *runa*, 'mystery,' used to denote the ancient Norse alphabet. Runic inscriptions are found scattered over Scandinavia and more sparsely over other regions of N. Europe. The earliest extant Runic inscriptions are on metal (*e.g.* the Thorsbjerg Shield-buckle), belonging to the IV. and V. cent's; the earliest stone records are of the VI. cent. These runes are of immense philological value.

RUNN OF CUTCH, see CUTCH.

RUNNING, one of the oldest forms of athletic contest, formed an important part of ancient Games. In modern times there has been a great revival of long-distance r., and since 1909 'Marathon Races' have frequently been held. The most popular form of r. is cross-country r.—'Hare and Hounds,' 'Harriers,' etc. The first event of this kind was held at Wimbledon, 1867, and international contests are now held annually. The following are some of the *Olympic Games* records (1912): 100 metres, R. C. Craig (U.S.A.), 10⅘ sec.; 400 metres, C. D. Reidpath (U.S.A.), 48⅕ sec.; 800 metres, J. E. Meredith (U.S.A.), 1 min. 51⅕ sec.; 1500 metres, A. S. N. Jackson (U.K.), 3 min. 56⅘ sec.; Marathon Race (nearly 25 miles), K. K. M'Arthur (S. Africa), 2 hrs. 36 min. 54⅘ sec. At the *Amateur Athletic Association Championships* (1912), the 100 yds. was won by G. H. Patching in 9⅘ sec.; ¼ mile, C. N. Seedhouse, 49⅘ sec.; ½ mile, H. Braun, 1 min. 58⅕ sec.; 1 mile, E. Owen, 4 min. 21⅘ sec.; 10 miles, W. Scott, 52 min. 35 sec.

RUNNING BIRDS, RATITÆ, a division of large birds possessing wings altogether too small for flight, but used as sails to flap them along in running. The lack of strong flight muscles is correlated with the presence of a smooth, shield-like, unkeeled breast-bone, and the want of flying power is compensated by their agility in running. There are four distinct genera: The strong, swift AFRICAN OSTRICH (*Struthio*) is the largest of all living birds, the wings and tail of which supply the ostrich plumes of commerce. The male takes the larger share in hatching the eggs, for the reception of which it digs shallow hollows in the sand. The SOUTH AMERICAN OSTRICH (*Rhea*) is much smaller and is furnished with three instead of two toes as in the African Ostrich. The feathers are also less abundant and less valuable. The Australian deserts and plains are the natural home of the EMU (*Dromæus*), now becoming scarce. Two species are known—the Emu of the E. plains (*D. novæ hollandiæ*), almost equalling the African Ostrich in size, with long, brownish-grey plumage, and BARTLETT'S or the SPOTTED EMU (*D. irroratus*) of W. Australia, distinguished by its speckled plumage.

The KIWI (so called on account of its cry) or APTERYX of New Zealand, forms a very distinct genus of Running Bird. Not much larger than farmyard fowls, they are characterised by their dark brown, hair-like plumage, valued as an adjunct of dress, long, slender beak, and four-clawed toes. Nocturnal in habit, the Kiwis feed mainly on earthworms. They live in pairs, constructing a rough nest in holes, wherein the female lays her solitary egg, almost as large as that of a goose.

Among the extinct Running Birds are the giant New Zealand MOAS (*Dinornis*), which stood 10 feet high and possessed very large hind legs, the thigh bones being thicker than those of a horse.

RUNNYMEDE, RUNNIMEDE (51° 27′ N., 0° 32′ W.), meadow, on Thames, Surrey, England; where King John signed Magna Carta, 1215.

RUPAR (30° 57′ N., 76° 33′ E.), town, on Sutlej, Punjab, India; cotton cloth, hardware. Pop. 9000.

RUPEE, see MONEY.

RUPERT, PRINCE (1619–82), Count Palatine of the Rhine, Duke of Bavaria, Duke of Cumberland (cr. 1644); nephew of Charles I. of England, being son of Elector Frederick V. by Elizabeth, dau. of James I.; commanded royal forces in Civil War; skilful, though often rash, cavalry officer; distinguished as admiral against Dutch under Charles II.; pioneer in mezzotint engraving.

RUPERT'S LAND, former district, Canada, secured by Hudson's Bay Co., thanks to Prince Rupert; now included in N.W. territories and province of Manitoba.

RUPPIN, NEURUPPIN (52° 56′ N., 12° 44′ E.), town, Brandenburg, Prussia, on Lake R.; manufactures cloth. Pop. (1910) 18,714.

RUPTURE, see HERNIA.

RUSELLÆ (c. 42° 50′ N., 11° 10′ E.), ancient city, Etruria, Italy; taken by Romans, 294 B.C.

RUSH (*Juncus*), genus of plants, order Juncese; Common R. (*J. conglomeratus*) and the Soft R. (*J. effusus*) are used for making carpets, mats, chair-bottoms; the *pith* in centre of rush stems was much used for candle-wicks.

RUSH, BENJAMIN (1745–1813), Amer. physician; b. Philadelphia, ed. there and at Edinburgh Univ. A friend of Franklin's, he was a signatory to the Declaration of Independence, and a prominent anti-slavery advocate; prof. of Med. in medical coll., later prof. of Physiology and Clin. Med. and afterwards of Theory of Med. in Univ. of Pennsylvania; author of medical and other works.

RUSHDEN (52° 17′ N., 0° 35′ E.), town, Northamptonshire, England; boots and shoes. Pop. (1911) 13,354.

RUSHWORTH, JOHN (d. 1690), Eng. historian; his *Historical Collections* are valuable as record of the Civil War.

RUSKIN, JOHN (1819–1900), Brit. art critic, teacher and writer, and social reformer; b. London (Feb. 8); s. of prosperous wine merchant from Scotland; ed. by mother and private tutors, then at Christ's Church, Oxford; graduated, 1842; from childhood devoted to art, poetry, and science; gained Newdigate prize. R. early became self-constituted champion of J. M. Turner (*q.v.*). Repeated continental tours matured his creed as art expounder—Italy, Switzerland, and France being his chief inspirations. Appointed Slade prof. of Fine Art, Oxford, 1869, he removed from Denmark Hill, London, to Coniston, 1872, where he spent his closing years, latterly with clouded mind. His views on art, education, social and moral questions, are embodied in many books and lectures, among others, *Modern Painters* (1843–60), *Seven Lamps of Architecture* (1849), *Stones of Venice* (1851–53), *Notes on the Constitution of Sheepfolds* (1851), *Lectures on Architecture and Painting* (2 vols., 1854), *Political Economy of Art* (1857), *Munera Pulveris* (1862–63), *Unto this Last* (1862), *Sesame and Lilies* (his most popular work, 1865), *Crown of Wild Olive* (1866), *Queen of the Air* (1869), *Fors Clavigera* (1871–84), *Aratra Pentelici* (1872), *Laws of Fesolé* (1877–79); at *Præterita*, his autobiography, he worked till 1888. R.'s style is remarkable—long, rhythmical sentences; he paints pictures with words; he ranks among greatest modern prose-writers. As art-appreciator he was far ahead of his times, although now his message often seems obsolete or marred by narrowness; he insisted dogmatically on literal truth, extolled the pre-Raphaelites, attacked Whistler, had no liking for Impressionism. But he gave Art its due place in Eng. lit. for the first time. In political economy he still exerts a powerful influence; he advocated what has been called an aristocratic type of Socialism.

Life, by Collingwood (1893), Frederic Harrison (1902), Mrs. Meynell, E. T. Cook (2 vols., 1911); Symon, *John Ruskin: His Homes and Haunts*; Hobson, *Ruskin, Social Reformer*.

RUSSELL, family name of Duke of Bedford and Earl R. Earliest known ancestor is Henry R., burgess of Weymouth, which he represented in Parliament, 1425; he or his ancestors came from Gascony; his son John represented Weymouth in Parliament, 1450,

when he was Speaker, and left son James, whose son John was cr. Earl of Bedford (*q.v.*), 1550.

RUSSELL, 1ST EARL, LORD JOHN RUSSELL (1792–1878), Brit. Whig statesman; 3rd son of 6th Duke of Bedford; M.P. for family borough of Tavistock, 1813; started agitation for electoral reform, 1819; supported Catholic emancipation; chief promotor of Reform Bill, 1832; Home Sec., 1835–39; Colonial Sec., 1839–41; converted to Free Trade, 1845; Premier, 1846–52; Foreign Sec., 1853; pres. of Council, 1854; Colonial Sec., 1855; Foreign Sec., 1860; cr. Earl R., 1861; Premier, 1865–66; author of memoirs, etc.; solid, able, but lacked brilliance. *Life*, by Reid (1895).

RUSSELL, LORD WILLIAM (1639–83), Eng. politician; s. of 5th earl of Bedford; M.P. for county of Bedford, 1678–79, and attacked policy of Cabal as member of Country party; P.C., 1679; backed Shaftesbury's opposition to Duke of York; presented York as recusant and carried Exclusion Bill up to Lords; helped to form association to compel king to summon Parliament, 1682; denied charge of complicity in Rye House Plot, but executed after mock trial; pious, patriotic character; revered as Prot. martyr. *Life* by Lord John Russell. His devoted wife, Lady Rachel Wriothesley (1636–1723), wrote beautiful *Letters*.

RUSSELL OF KILLOWEN, CHARLES, 1ST BARON (1832–1900), Lord Chief Justice of England; b. Ireland; M.P. for Dundalk, 1880–85, South Hackney, 1885–94; knighted, 1886; Attorney-General, 1886, 1892–94; did great service to Britain as counsel in Bering Sea Arbitration, 1893; cr. baron, 1894, and made lord of appeal; Lord Chief Justice, 1894; presided at trial of leaders of Jameson Raid, 1896, Venezuela Arbitration Commission, 1899; obtained wonderful successes in private actions (*e.g.* Parnell trial, 1888–90); possessed of Irish good looks and charm, conscientious industry, and effective eloquence; although R.C., opposed Home Rule. *Life*, by O'Brien.

RUSSELL, SIR WILLIAM HOWARD (1821–1907), noted Eng. war correspondent; his letters from Crimea to *Times* exposed bad commissariat, etc.; wrote accounts of Mutiny, Amer. Civil War, Königgrätz, Franco-Prussian War, Zulu campaign, 1879, Egyptian campaign, 1882, etc.; knighted, 1895.

RUSSELL, WILLIAM CLARK (1844–1911), Eng. novelist; wrote sea stories, *e.g. Wreck of the Grosvenor*.

RUSSIA (36 to 77° 30′ N., 18° E. to 169° 44′ W.), occupying the whole E. half of Europe and the whole N. half of Asia; bounded N. by Arctic Ocean, E. by Bering Strait, Bering Sea, and Sea of Okhotsk; S. by Chinese Empire, Afghanistan, Persia, Turkey in Asia, and Black Sea; S.W. by Rumania and Austria-Hungary; W. by Germany, Baltic, Gulf of Bothnia, and Sweden; area, *c.* 9,176,900 sq. miles, of which 2,095,616 are in European Russia (including Finland and Poland), 180,843 in Caucasia, 1,548,825 in Central Asia, and about 5,350,000 in Siberia.

European R. has on N.W. and S.W. the boundaries already given, on E. Asiatic Siberia along the Ural Mts. and Ural R., and on S. the Caspian, Turkey in Asia, and Black Sea. It has a length and width of about 1600 miles. The surface is an undulating plain; average height, 500–900 ft.; extreme elevation of 1100 ft. in the Valdai Hills, midway between St. Petersburg and Moscow, with a plateau of 1000 ft. for some distance S. of them. The ground also rises on the E. border in the Urals and on the S. in the Caucasus. Although the Valdai Hills are neither far-spreading nor high they are very important, owing to the number of large rivers that rise in or near them and approach each other sufficiently to give facilities for intercommunication. All the S.E. is drained by the Ural and Volga and their tributaries into the Caspian; the S. by the Don, Dnieper, and Dniester and their tributaries into the Black Sea; the W. by the Bug, Vistula, Niemen, Düna, Neva, etc. into the Baltic and Gulf of Finland; and the N. by the Onega, Northern Dwina, and Mezen into the White Sea, and the Petchora into the Arctic Ocean.

The name **Siberia** is given to all the territories of Russia in Asia (except the Trans-Caucasus, Caspian and Turkestan [*q.v.*] regions)—that is, the whole expanse between Urals and Pacific, and between Arctic Ocean and Chinese Empire; area, *c.* 5,350,000 sq. miles, about 1½ times the size of Europe. The S.E. forms a great tableland, 2000 to over 3000 ft. high, with mountains rising above it to heights of over 7000 ft.; from it the region slopes N. and W. The drainage is carried off mainly by the great N. rivers already mentioned and by the Amoor.

The great plain of R. is composed of horizontal strata resting on the volcanic and metamorphic rocks which appear in Finland, and in the banks of streams. In Poland and in a long narrow strip of land from the White Sea to Tula, Carboniferous strata are superimposed on the gneiss. A narrow strip of Cambrian Rocks appears on the S. shore of the Gulf of Finland. Silurian Rocks appear S. of this and again in the Caucasus. S. of the Cambrian and Silurian Rocks is a large Devonian tract; Quaternary and Tertiary Rocks follow, going S. There are Quaternary Rocks round the N. of the Caspian Seas and the S. of the Arctic Ocean. Trias and Permian Rocks are found in the N.E.

The CLIMATE of the greater part of European R. is typically continental—a hot summer, a cold severe winter with sharp changes and dry winds, these conditions becoming more marked in the centre and towards the E. Considering the range of latitude the differences between N. and S. are less than might be expected, the temperature often falling in winter to 20° Fahr. in the S. and rising in summer to over 85° in the far N. In the N. the rivers are frozen for over 6 months, in the centre for 3½ to 4½, and in the S. for 2½ to 4. The rainfall varies from 25 in. along the Baltic to 14 in the S. and S.E. and 6 at N. end of Caspian.

In the *tundras* bordering the Arctic Ocean no VEGETATION grows, except dwarf trees, shrubs, and mosses, but the district S. of this belt and extending round the Baltic Sea is a great forest region; wheat is grown round the Baltic. The Black Sea is surrounded by pasture, arable land, and vineyards; the district round the Caspian is chiefly pastoral. The beech does not flourish in the N. farther W. than Poland, but the oak and ash are found. To the usual N. European FAUNA may be added wolves, bears, bisons, and wild boars, and many varieties of sea-birds not met with elsewhere.

HISTORY.—Remains of palæolithic man have been found in R., and there are numerous relics of neolithic and Bronze Age man, especially of the Lake-Dwellers. Turkish and Finnish stocks from the Far E. had been established in R. for centuries when, possibly in the VIII. cent., Slavonic tribes from the Danube and Elbe migrated into S. and N. R. respectively. The Finns were ultimately driven into Finland, the Turks S. and E.-ward, and it is uncertain how far those races mixed with the Slavs. The Russ. tribes—*Great*, *Little*, and *White Russians*—apparently came first in the Slavonic invasion, and filled the E. of this territory; Bulgarians, Czechs, Huns, Poles, etc., followed, or were sent by Russ. pressure, W. and S. They were an agricultural, pastoral people at this time, congregated in *gentes* which, it is believed, were originally matriarchal.

The Line of Rurik.—There was no kingdom of R. until the XVI. cent., but wide districts were joined under one ruler long before that date. According to Nestor's Chronicle, supposed to have been drawn up in the XII. cent. from earlier sources, the N. Slavs, who were gathered in Novgorod and its neighbourhood, in 862 invited Varangians from Scandinavia to be their leaders. This was the supposed origin of the line of Rurik, which ruled R. until 1598; its former principality was **Rus** (whence 'Russia'), the precise locality of which is uncertain.

The first rulers were the brothers RURIK, **Sineus**

and Travor and Oleg, who made Kieff the capital, and also acquired Smolensk. Oleg's widow, Olga, Regent for her son SVYATOSLAV, a famous warrior, was baptized at Constantinople in mid-X. cent. Svyatoslav's more famous son, VLADIMIR I. (980–1015), *the Saint*, was baptized at Kieff in 988 and largely followed by his subjects. He commenced the evil practice of dividing the principality between the sons of the



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ruler. This led to sanguinary civil wars. YAROSLAV THE WISE (1019–54) made himself supreme over all R., had relations with foreign kings, and compiled the first Russ. legal code. A period of political disturbance endured from his death until the rule of VLADIMIR II., *Monomachus* (1113–25), under whom R. appears as a prosperous mediæval community of thriving cities; but another century of civil war followed and led to the imposition of the Mongol yoke. Genghis Khan and his hordes seized the Crimea (1222) and won a great victory near the Sea of Azof (1224); Batu Khan in 1238–40 overran R. as far as Novgorod, but retreated and allowed the Russ. princes to continue in power as tributary vassals of the Golden Horde. They were unable, however, to maintain their authority, and there were set up various principalities, among which Moscow ultimately came to the front.

IVAN I., *Kalita* (1328–40), made Moscow (where the metropolitan see was established in 1325) his residence (building the *Kreml*), and won recognition as chief prince. His grandson, DMITRI DONSKOI (1359–89), made the first effort at throwing off the Mongol yoke, and won the battle of *Kulikovo* on the Don in 1380; the Khan, however, burned Moscow, and the prince submitted. Dmitri introduced primogeniture as the law of succession. VASSILI I. (1389–1425) and VASSILI II., *the Blind* (1425–62), contented themselves with strengthening their hold over R., but IVAN III., *the Great* (1462–1505), finally shook off the Khan's authority. He conquered and sacked Novgorod and its colonies, and an invasion of the Golden Horde, to extract tribute withheld, ended in its final retreat.

Ivan called himself Lord (*Hospodar*) of all R., and his s., VASSILI III. (1505–33), assumed the title of Tsar. He annexed the independent provinces of Smolensk, Ryazan, Novgorod-Syeversk, and Pskov, thus uniting R. His mother, niece of the last Gk. emperor, Constantine Palæologus, introduced into R. the autocratic ideals which have ever since been associated with the Russ. monarchy. The *boyars* ruled during his young son's minority, but when IVAN THE TERRIBLE (1533–84) came of age he established the strongest despotism in Europe, making turbulent cities and provinces the scenes of wholesale massacres, and conquered Kazan (1552) and Astrakhan (1556). His general, Yermak, conquered Siberia (1582). With his son FEODOR (1584–98) ended Rurik's line.

Feodor's brother-in-law, BORIS GODUNOFF (1598–1605), succeeded. He climbed through blood to the throne and was deeply detested. He had already in 1597 passed a law of which the effect was to tie Russ. peasants to the soil, and thus introduced serfdom. The FALSE DMITRI, who pretended to be Feodor's murdered brother, succeeded, but was deposed by Prince VASSILI SHOUISKY (1606–10).

House of Romanoff.—The strife of numerous

pretenders was ended by the first ruler of the house of Romanoff, MIKHAEL (1613–45), a Russ. candidate elected in the face of Polish candidates, at that time very powerful. War with Sweden was satisfactorily ended by the Treaty of Stolbova (1617), but the Poles were only satisfied by the surrender of Smolensk (1634). His son ALEXEII (1645–76) roused great discontent by confirming serfdom (1648), but a rising of the Cossacks was suppressed, and a legal code was issued. FEODOR ALEXEIOVITCH (1676–82) concluded the war with Turkey by which Little Russia was acquired (1681). His sister SOPHIA established her regency for her idiot brother Ivan and their stepbrother Peter, but after a disastrous war with the Turks Peter secured the throne and immured Sophia in a cloister.

PETER THE GREAT (1689–1725) raised R. to the important position she has ever since held in Europe. He gave R. a seaport (1696) by conquering Azov, which, however, he was forced to resign in 1711. By the Treaty of Nystadt (1721) he received from Sweden Esthonia, Ingria, and Livonia, and acquired Persian territory by the war of 1722-23. He replaced the independent patriarchs by the Holy Synod, made his new city of Petersburg his capital, and gave the Tsar the right of appointing his successor. He bequeathed the throne to his second wife, CATHERINE I. (1725–27), who elected Peter's grandson, PETER II. (1727–30). On his death Dolgorouki, his powerful minister, appointed ANNA, Duchess of Courland (1730–40), who was led by Ger. favourites and kept down the nobles. She named her great-nephew IVAN V. (1740–41), displaced for ELIZABETH (1741–62), dau. of Peter I. Elizabeth peacefully obtained possession of Finland (1743), and her armies played a respectable part in the SEVEN YEARS WAR (*q.v.*).

House of Romanoff-Holstein.—Her nephew, PETER III. of Holstein-Gottorp, ruled for a short space in 1762, but was deposed and murdered in favour of his wife, CATHERINE II. (1762–96). By the three PARTITIONS OF POLAND (1772, 1793, 1795) Catherine considerably extended Russ. territory, and in the two TURKISH WARS conquered the Crimea, won the passage of the Dardanelles, extended her territory to the Dniester, and established a protectorate over Moldavia and Wallachia; the war with Sweden (1788–90) left the *status quo ante*. PAUL I. (1796–1801), her son, was successful against France in Italy; he was murdered and his s., ALEXANDER I. (1801–25), made peace with France (1801), joined the Third Coalition against Napoleon (*q.v.*), suffered several defeats, and again made peace with the emperor at Tilsit (1808), receiving Pruss. territory. War with Sweden (1808–9) resulted in Russ. acquisition of Finland (1809); by the THIRD TURKISH WAR (1806–12) R.'s territory was extended to the Pruth, while she acquired Baku from Persia. Alexander having again joined the anti-Napoleonic alliance, R. was invaded by NAPOLEON, who was obliged to retreat after the burning of Moscow. Alexander took a prominent part in the War of Liberation and Treaties of Paris. The Vienna Congress gave Poland to Alexander, who in 1818 granted it a constitution. He was the ruling spirit of the conservative Holy Alliance (*q.v.*).

His younger son, NICHOLAS I. (1825–55), was despotic and apparently fanatical. He acquired the provinces of Nahitchevan and Erivan after the PERSIAN WAR (1826–28), the protectorate of the Danube States and the freedom of Greece after the TURKISH WAR (1828–29). A Polish insurrection was punished by loss of independence (1832). Turkey closed the Dardanelles to all but Russ. ships in 1833. After controlling E. Europe for thirty years Nicholas died during the humiliation of the CRIMEAN WAR (*q.v.*).

His son, ALEXANDER III. (1855–81), gave up by the Treaty of Paris (1856) the mouth of the Danube and conceded the neutrality of the Black Sea. He completed the subjugation of the Caucasus (1859), obtained Amur from China (1860), and established the provinces of Turkestan and Ferghana. His abolition of serfdom in 1863 made the condition of the serfs on the whole worse, and NIHILISM (*q.v.*) became at this time a political danger. Panslavism was revolted by A.'s treatment of Poland after rising of 1863, and by Alexander's policy of Asiatic expansion, and there was strong feeling against the alliance of 1872 with Germany and Austria (the *Dreikaiserbund*). R. was successful in the TURKISH WAR of 1877–78, but the Treaty of San Stefano was set aside by the Berlin Congress and R. gained little. One of many attempts at assassinating the Tsar succeeded.

ALEXANDER III. (1881–94), his son, renewed the *Dreikaiserbund* (1887), but gradually drew away towards France, with whom he made an alliance (1891). R. at this time lost her influence over the Balkan peninsula. His s., NICHOLAS II. (1894–), continued an ultra-Conservative policy. Mild agitators and political assassins were alike ruthlessly punished, but unrest only increased and culminated during the reverses of the JAPANESE WAR (see JAPAN). In Dec. 1904 the Tsar published a manifesto promising reform. The Peace of Portsmouth brought much loss of territory and was a serious blow to Russ. prestige. In Oct. 1905 the Tsar was forced to grant a CONSTITUTION; it led to great disputes, however, and massacres and counter-massacres took place in 1906 in R., Poland, Finland, etc., while in various parts famine reigned. In March 1913 the Romanoff Tercentenary celebrations were held.

After the Turco-Balkan War the Servian territorial claims were supported by R. In June 1913, when strained relations between Servia and Bulgaria first showed themselves, the Tsar sent a personal letter to the king of each, offering to arbitrate on the questions at issue.

The Government is now theoretically a constitutional monarchy, but actually an absolutism. The elective Council known as the DUMA was created in 1905 with control of legislation; half its members represent the seven largest cities and the provinces. There is also a Council of the Empire; half its members are elected, half appointed by the Tsar; it also has control of legislation and the executive. Laws are promulgated by the chief governmental department, the Senate. The empire is divided into 78 GOVERNMENTS for administration; among these governments Finland has had since 1905 almost complete autonomy; in the rest the governor has almost regal powers. The governments are subdivided into provinces which have representative assemblies, *zemstvos*, as have the towns; the provincial zemstvos, however, are controlled by the nobles. Trial by jury was adopted in 1864 when elective justices of the peace were instituted, but this reform has since been largely abolished.

Army and Navy.—Conscription was introduced in 1874. There are three armies, that of European R., that of the Caucasus, and that of Asiatic R. The Cossacks hold the S.W. frontier of European R. by military tenure. Fortresses exist round the immense frontier. R. has four fleets, the chief being the Baltic and the Black Sea Fleets. Almost entirely destroyed at Port Arthur, the navy is being rebuilt.

Towns.—St. Petersburg (pop. (1910) 1,907,708) is the capital; other towns are Moscow (1,481,240), Odessa (478,900), Kiev (446,800), and Lodz (395,670).

Communications.—The rivers are frozen in winter and low in summer, but excellent highways in spring and autumn; of 51,800 miles of available waterway in European R. and 52,200 in Asiatic R., only about 1400 are artificial. The basin of the Volga is connected with that of the Neva by the three systems of Vishni-Volotchok, Tichvin, and Maria, and with that of the N. Dwina by the system of Duke Alexander of Württemberg; the Dnieper is connected by the Berezin system with the Düna, with the Niemen by that of the Ogin, and with the Vistula by that of the Dnieper-Bug; the Niemen and Vistula are connected by the Augustov system. In Jan. 1911 there were

34,581 miles of railway open in European R., 10,497 in Asiatic R.; the state owns over 33,000 of this.

Industries.—European R. is an agricultural country, although mining and manufactures are rapidly becoming valuable. Along the Volga, in centre and in S. of R. there is a great manufacture of flour, the centres being Nizhniy-Novgorod, Kazan, Kostroma, Rybinsk, Odessa, Rostov, Krementz, Elisabethgrad, and Ekaterinoslav. Flax is cultivated for fibre round the lakes, along the Baltic provinces, and about Iver and Jaroslav, and with hemp for seed through Bessarabia, Kherson, Tauris, Ekaterinoslav, and the Don province. Rape is also grown, poppies for oil in the S.W. and S. centre, sunflowers in Voronezh, Saratov, Tambov, Samara, Kursk, the Don, and Kharkov. Fruit is grown in considerable quantities and made into preserves; the vine is cultivated and wine made in Bessarabia, Kherson, Ekaterinoslav, Taurida, S. Podolsk, and Astrakhan, the Don province, S. Saratov, and the Caucasus in Europe, and the Trans-Caspian and Syr Daria regions in Asia. The best beet regions are Kiev, Podolsk, Kharkov, Kursk, and along the Vistula. Tobacco is grown all over the S. The sheep number over 70,000,000, the cattle over 43,000,000, the horses some 26,000,000, and the pigs some 14,000,000. Butter, milk, poultry, eggs, feathers, down, hides, wool, bristles, hair, and horns are exported, besides fish-products (including *c.* 2000 tons of caviare).

R. is exceedingly rich in minerals. The total value of pig-iron produced is over £10,000,000; of the naphtha, coal, and gold from £4,000,000 to £6,000,000 each; of the salt, copper, platinum, manganese, and zinc from £700,000 to £1,000,000 each; 70 % of the coal comes from the Donetz basin, 29 % from Poland. The wood exported is valued at over £5,000,000, the chief timber ports being Riga, St. Petersburg, Cronstadt, Archangel, Odessa, Novorossisk, Batoum, and Poti. There are sawmills, manufactures of furniture, cottons, and yarns, dye and print works (Moscow, Vladimir, and St. Petersburg), making of carpets and other woollens (Moscow, Kiev district, Warsaw), linens, ropes, silks, and silk embroidery (Moscow), iron and steel (Tula, Moscow, Warsaw, Kazan), cutlery (Nizhniy-Novgorod, Tula, and Zlatoust), niello wares (Tula), samovars (Moscow, St. Petersburg, Tula), paper, leather, etc. The imports are valued at some £125,000,000, the exports at some £168,000,000.

Education is not flourishing. There are about 92,550 elementary schools, of which nearly half are under the Holy Synod; the majority are under the ministry of public instruction. There are ten univ's (see UNIVERSITIES).

The established religion is that of the Orthodox Greek Church. The Russ. branch is under the control of the Russ. Holy Synod. There are 66 bishoprics in the empire. Muhammadans number *c.* 14,000,000, R.C.'s over 11,000,000. The total population of the empire (one-seventh of the world's land-surface) was estimated in 1910 at 166,107,700, that of European R. by itself at 118,690,600. See also FINLAND, POLAND, SIBERIA, CAUCASUS.

Wallace, *Russia* (new edit., 1912); Rambaud, *Hist. of Russia* (2nd Eng. edit., 1887); Morfill, *History of Russia* (1902); Nisbet Bain, *The First Romanoffs* (1905); Kluchersky, *A History of Russia* (3 vol's, 1911).

Language and Literature.—The language is Slavonic, many dialects being spoken. R. has various cycles of rhythmical romances. There are a few chronicles, beginning with that of Nestor mentioned above. Literature was scanty until the XVIII. cent. TREDIAKOVSKI (1683–1769) and KANTEMIR (1708–44) the poets, SUMAROKOV (1718–77) the playwright, TATISTCHEV (1686–1750) the historian, and LOMONOSOV (1711–65) the scientist and poet, started a new movement. Kheraskov, Kniazhnin, Bogdanovich, Visin, and the great DERZHAVIN and KARAMZIN followed. The Romantic movement, introduced by Zhukovski, was illustrated by the famous PUSHKIN (1799–1837). The later realistic school—TOLSTOI, GORKI, TURGENIEFF, Anton Tckekhoff, etc.—has produced novels read all over Europe; their chief notes are pessimism, seriousness, and subtlety. Pogodin and Solovieff are notable historians. Even more widely famed than the Russ. novelists are the composers Rubinstein and Tschaikovsky, and Russ. artists are coming to the front.

RUSSO-JAPANESE WAR, see under JAPAN.

RUSSO-TURKISH WARS, 1768–74.—The Russians conquered the Crimea in 1771, won the battle of Tschesme in the island of Chios. By the treaty of Kutshuk Kainardji (1774) Russia extended her territory to the Bug, and obtained the protectorate of Moldavia and Walachia and the passage of the Dardanelles. The Crimea was ceded, 1784.

1787–92, in which the Turks lost over 200,000 men. Suvarov was victorious at Focsani and Rimnik in 1789, and in 1791 Oczacow was conquered. In 1792 Turkey agreed to Treaty of Jassy, ceding Oczacow and the territory between the Bug and Dniester.

1806–12.—Russia was defeated at Silistria (1809), but the tide turned, and by Treaty of Bucharest Russ. territory was extended to the Pruth.

1828–29.—Britain, in supporting Greeks in War of Independence, weakened Turkey; Russ. support to Greece had been with this view, and Russia could not be held back from further attack; to surprise of Europe, Turkey offered valiant resistance; wearisome campaign with little result, 1828; but in 1829 Russ. general Diebitsch captured Silistria, defeated the grand vizier, crossed the Balkans, captured Adrianople, and forced Turkey to make peace.

1853–56.—See CRIMEAN WAR.

1877–78.—Similar occasion to last, *i.e.* national risings against Turkey; cruel suppression of Bulgarian revolt roused indignation of Europe and gave Russia pretext for interference on behalf of Christian subjects of Turkey; fierce outcry in Britain under Gladstone; international conference at Constantinople presented Porte with ultimatum, rejected Jan. 1877; conference of London in March failed, and Russia invaded European and Asiatic Turkey in April; Roumania declared her independence, and the Tsar's army under Gurko captured capital of Bulgaria, crossed Balkans, and took Shipka Pass, but could get no farther; siege of Plevna lasted July 20 to Dec. 10, when starvation forced heroic defender, Osman Pasha, to surrender; meanwhile Turks were expelled from Montenegro and lost Nikshich and Kars, and Servia again declared war. Gurko captured Sofia and won battles of *Philippopolis*, Jan. 1878; SULEIMAN, now commander-in-chief of Turks, was cut off from Adrianople and forced to retreat and return to Constantinople by sea; he was not a skilful general, and had scattered his forces needlessly; Russians entered Adrianople and brutally drove Turks in flight. The Servians won victories of *Pirot* and *Vranya*, and Montenegrins captured Spizza (an old ambition), Antivari, and Dulcigno; hostilities ceased on news of armistice of Adrianople, Jan. 31. Britain had undergone reaction on hearing of Russ. successes, and Conservative government, which returned to power under Disraeli, restored policy of protecting Turkey; movement of Brit. fleet to scene of war for protection of Brit. interests aided in ending conflict; terms of Treaty of San Stefano, March 3, were modified by Treaty of Berlin, July 3.

RUST, see IRON, and also FUNGI.

RUSTCHUK (43° 51′ N., 25° 56′ E.), town (and department), at junction of Danube and Loni, Bulgaria; tobacco manufactures. Pop. (1910) 36,255; (dep.) 406,309.

RUSTENBURG (25° 39′ S., 27° 48′ E.), town (and district), Transvaal, S. Africa; tobacco. Pop. (dist.) (1911) 64,689.

RUSTIC, see PALÆOGRAPHY.

RÜSTOW, FRIEDRICH WILHELM (1821–78),

military writer; Prussian by birth; escaped to Switzerland, on condemnation by court martial; companion of Garibaldi; committed suicide on refusal of military professorship at Zürich.

RUTEBEUF, RUSTEBEUF (fl. XIII. cent.), Fr. poet; history unknown except from his own allusions to bitter poverty; none of his contemporaries mention even his name; writings probably pub., 1255–80, in purest dialect of Ile-de-France; wrote *chansons, fabliaux, satires*, and *mystères*.

RUTH, BOOK OF, in Old Testament, gives story of Ruth the Moabitess, who becomes wife of Boaz and ancestress of King David. Its date is uncertain, but probably pre-exilic as the Hebrew is good, but may be exilic or post-exilic; in Hebrew part of *Megilloth* (Rolls).

RUTHENIANS, see SLAVS.

RUTHENIUM (Ru=101·7), rare metal of platinum group, found in Urals; hard, brittle; S.G. 12·06; fusible in oxy-hydrogen flame, oxidisable when fused, slowly attacked by *aqua regia*; allied to osmium in types of compounds: $RuCl_3$, Ru_2O_3, $RuCl_3$, $RuCl_4$, K_2RuO_4, $KRuO_4$, RuO_4.

RUTHERFURD, SAMUEL (1600–61), Scot. Calvinist divine; prof. at Edinburgh and Aberdeen; wrote *Free Disputation against Pretended Liberty of Conscience*, defending persecution.

RUTHERGLEN (55° 50′ N., 4° 13′ W.), town, Lanarkshire, Scotland, near Clyde; collieries, chemical works. Pop. (1911) 24,411.

RUTHIN (53° 7′ N., 3° 19′ W.), market town, Denbighshire, Wales; agricultural produce.

RUTHVEN, BARONY OF.—Sir William Ruthven of Ruthven (Scotland) was cr. lord of parliament, 1488; barony held till attainder of 6th lord (Earl of Gowrie, *q.v.*), 1600. Barony conferred on descendants of 2nd lord, 1651, supposed to have become extinct, 1701. Ruthvens have ever since assumed title; claim ruthlessly crushed by Mr. Round.

RUTHVEN, RAID OF, see GOWRIE, WILLIAM, 4TH LORD RUTHVEN, EARL OF.

RUTICILLA, a genus of THRUSH (*q.v.*).

RUTILIUS CLAUDIUS NAMATIANUS, Rom. poet; native of Gaul; lived at the beginning of the V. cent. A.D.; *præfectus urbis* c. 414. By some authorities he is reputed to be the author of a poem on Mount Ætna. He is the author of an itinerary called *De Reditu* (descriptive of his return to Gaul), which was published by Burman in the *Pœtæ Latini minores*.

RUTLAM, see RATLAM.

RUTLAND.—(1) (52° 40′ N., 0° 40′ W.) smallest county of England; borders on Leicestershire, Lincolnshire, and Northamptonshire; area, 150 sq. miles; surface generally hilly; drained by Welland and its tributary, Wash; chief towns, OAKHAM (cap.) and Uppingham; live stock raised; wheat and other crops cultivated; cheese manufactured. Within county was fought battle of *Stamford* (q.v.), 1470. Pop. (1911) 21,168. (2) (43° 35′ N., 72° 59′ W.) city, Vermont, U.S.A., on Otter Creek; marble quarries. Pop. (1910) 13,546.

RUTLAND, EARLDOM AND DUKEDOM OF.—Edward PLANTAGENET, s. of Edmund, Duke of York, 5th s. of Edward III., first earl, 1390; became Duke of York, 1402; his great-nephew Richard, slain with his father at *Wakefield*, 1460, was styled earl. Thomas MANNERS, Lord Ros, descendant of Richard, Duke of York, was cr. earl, 1525; descent, with dukedom (cr. 1703), in direct male line to John Manners, present duke; one of oldest Eng. houses.

RUTLAND, EARL OF, HENRY MANNERS (c. 1516–63), commanded against French, 1556–57; lord pres. of North, 1561; bro. Sir John, who is said to have eloped with Dorothy Vernon, thereby acquiring Haddon Hall, was grandfather of 8th earl.

RUTLAND, 1ST DUKE OF, JOHN MANNERS (1638–1703), raised forces for Prince of Orange, 1688; Princess Anne fled to Belvoir Castle; hence in 1703 cr. Marquess of Granby and Duke of Rutland.

RUTLAND, 3RD DUKE OF, JOHN MANNERS (1696–1779), one of lords justices who governed realm, 1755; eldest s. JOHN, Marquess of Granby, fought at *Minden*, 1759, became commander-in-chief of forces in Germany, and commander-in-chief of land forces, 1766–70.

RUTLAND, 7TH DUKE OF, LORD JOHN MANNERS (1818–1906), leader of Tory 'Young England' party; chairman of committee of works with seat in cabinet, 1858–59, 1868; postmaster-general, 1874–80, 1885–86; chancellor of duchy of Lancaster, 1886–92; author of verses much mocked by political adversaries; appears as 'Lord Henry Sydney' in Disraeli's *Coningsby*.

RUVO (41° 6′ N., 16° 28′ E.), town, prov. Bari, Italy; ancient *Rubi*. Pop. 24,500.

RUWENZORI (0° 30′ N., 30° 3′ E.), range of mountains, equatorial Africa, situated near river Semliki between Albert Nyanza and Albert Edward Nyanza; reaches height of c. 17,000 ft. Was first discovered in 1888 by Stanley, after whom one of principal peaks is named; summits are covered with perpetual snow.

RUYSBROEK, JOHANNES, RUYSBROECK (1293–1381), Flemish mystic, 'Ecstatic Teacher'; inspired by his life, Groot founded the order *Brothers of the Common Life*, which helped on the Reformation.

Maeterlinck, *R. and the Mystics* (Eng. trans., 1897).

RUYSDAEL, JAKOB VAN, RUÏSDAEL (c. 1628–82), the most celebrated of Dutch landscape painters. He died in the almshouse of his native Haarlem.

RUYTER, see DE RUYTER.

RYAZAN, RIAZAN (54° 30′ N., 40° E.), government, Central Russia; generally level; fertile; traversed by the Oka; much covered with marshes and forests in the N.; minerals include coal, iron, limestone; chief occupation, agriculture. Pop. (1910) 2,408,400. Capital, Ryazan.

RYAZAN (54° 42′ N., 39° 50′ E.), chief town, R. government, Russia, on Trubezh; abp.'s see; active trade. Pop. (1910) 48,500; (government) 2,408,400.

RYAZHSK (54° N., 40° E.), town, Russia; trade in corn. Pop. 15,500.

RYBINSK, RUIBINSK (58° 2′ N., 39° 1′ E.), town, Yaroslavl, Russia, on Volga, opposite mouth of Shekena; centre of transit trade. Pop. 30,000.

RYDE (50° 44′ N., 1° 10′ W.), town, watering-place, Isle of Wight, England. Pop. (1910) 10,608.

RYE (*Secale cereale*), a grass extensively cultivated in Russia, Germany, and Scandinavia; r. flour produces 'black' bread.

RYE (50° 37′ N., 0° 44′ E.), town, on Rother, Sussex, England; one of the Cinque Ports; has a fine Norman and Early English church; fishing and shipbuilding. Pop. (1911) 4229.

RYE HOUSE PLOT (1683), conspiracy to murder Charles II. and James, Duke of York, on their way from Newmarket Races; deed was to be done at Rye House farm, near Hertford; plan failed owing to Charles's leaving Newmarket earlier than expected. Lord William Russell and Algernon Sidney were executed; Monmouth fled the country.

RYE-GRASS (*Lolium*), see under GRASS.

RYEZHITSA (c. 56° 10′ N., 26° 10′ E.), town, Vitebsk, Russia. Pop. 11,500.

RYLE, EDWARD (1856–), s. of John Charles R.; bp. of Exeter, 1901, Winchester, 1903; dean of Westminster, 1911.

RYLE, JOHN CHARLES (1816–1900), bp. of Liverpool, 1880; of Evangelical sympathies.

RYLSK (51° 30′ N., 34° 40′ E.), town, Kursk, Russia; oil-works. Pop. 12,000.

RYMER, THOMAS (1641–1713), Eng. antiquary; s. of Yorkshire country gentleman; good classical scholar; wrote *Edgar, or the English Monarch: an*

Heroic Tragedy, 1677, a classical drama of no merit; succ. Shadwell as Historiographer Royal, 1692; engaged in important compilation of *Fœdera* (pub. 1704–13); these vol's of treaties between England and foreign powers came down to 1586 at R.'s death and were continued from R.'s transcripts by Robert Sanderson to 1625.

RYSWICK, TREATY OF, 1697, treaty by which Louis XIV. of France, abandoning James II., recognised William III. as king of England and restored all continental towns (save Strasburg) captured since 1678.

RZHEV (56° 30′ N., 34° 30′ E.), town, on Volga, Tver, Russia; hemp manufactures. Pop. 22,500.

S, the 19th letter of the Eng. alphabet, and corresponding to the Gk. *sigma* and the Semitic *shin*. S is a hard, open sibilant, produced by bringing the blade of the tongue near the front of the palate.

'S HERTOGENBOSCH, Bois-le-Duc (51° 42′ N., 5° 18′ E.), town, capital of province, S. Holland, Netherlands; bp.'s see; manufactures woollens, cutlery. Pop. (1911) 35,157.

SÁ DE MIRANDA, FRANCISCO DE (1495–1558), Portug. poet, descendant of noble family; ed. for the law at Lisbon Univ., where he graduated Doctor, 1516, and for a time acted as professor, at the same time having the entrée to Court. After spending four years in Italy (1521–25), he brought back Ital. modes—Petrarch's sonnets, Dante's tercets, etc.—and in 1527 produced the first Portug. prose play, the *Estrangeiros*, thus replacing the popular *autos*; this was followed by several books of poems and his second comedy, the *Vilhalpandos* (1538). He had retired from the Court four years before, and spent the rest of his life in retirement in company with his wife. His claim to greatness rests rather on his example to his successors than on intrinsic merit, for his verse, being an essay of new forms, was not lacking in imperfections. Other poems include *Fabula de Mondego* (in Spanish), *Alexio*, *The Cartas*, and *Basto*.

SAADIA, see Seadiah.

SAALE (52° N., 11° 42′ E.), river, Germany; joins Elbe above Barby.

SAALFELD (50° 39′ N., 11° 21′ E.), town, on Saale, duchy Saxe-Meiningen, Germany; manufactures machinery. Pop. (1910) 14,368.

SAAR (49° 19′ N., 6° 45′ E.), river, Alsace-Lorraine and Rhineland, Germany; joins Moselle above Trèves.

SAARBRÜCKEN (49° 13′ N., 6° 59′ E.), town, on Saar, Rhineland, Prussia; incorporated with it are Sankt-Johann and Malstatt-Burbach (1909); coal-mining centre. Pop. (1910) 105,101.

SAARBURG.—(1) (48° 45′ N., 7° 3′ E.) town, on Saar, Lorraine, Germany; manufactures watch-springs. Pop. (1910) 15,376. (2) (49° 30′ N., 6° 40′ E.) town, on Saar, Rhineland, Prussia; ruined castle.

SAARDAM, see Zaandam.

SAARGEMÜND, Sarreguemines (49° 8′ N., 7° 5′ E.), town, at junction of Blies and Saar, Lorraine, Germany; pottery. Pop. (1910) 15,376.

SAARLOUIS (49° 17′ N., 6° 45′ E.), town (former fortress), on Saar, Rhineland, Prussia; manufactures porcelain. Pop. (1910) 15,262.

SAAZ, Bohem. Zatec (50° 20′ N., 13° 32′ E.), town, on Eger, Bohemia; trade in hops. Pop. (1911) 17,117.

SABA (17° 40′ N., 63° 20′ W.), small Dutch W. Indian island; part of Curaçao colony.

SABA, ST. (439–531), monk; founder of monastery of Mar Sâba, near Dead Sea.

SABADELL (41° 32′ N., 2° 3′ E.), town, Barcelona, Spain; textiles. Pop. (1910) 28,125.

SABÆANS, ancient inhabitants of S. Arabia; mentioned in the Old Testament, *Genesis* 10, in the reference to the pedigree of Sheba; *1 Kings* 10, the visit of the Queen of Sheba. Passages in *Isaiah*, *Jeremiah*, *Ezekiel*, and *Job* refer to the trading capacity of the S'a. Pliny and other classical writers extol the people of Yemen for their wealth and nobility and their great qualities as merchants. Dated inscriptions, coins, and cuneiform inscriptions afford the best information concerning the S'a. Five cent's B.C. they were a highly developed race of traders—the route from Egypt to the Far East passing through Yemen. Gold, precious stones, perfumes, spices, incense, horses and camels, the chief articles of commerce. Several independent 'kings' divided the country between them, and women held a high position in the state. The language was Semitic, akin to Arabic and Ethiopic. It is held by some authorities that the Phœnicians learnt the use of the alphabet from the S'a.

SABAH, district of Brit. North Borneo. See Borneo.

SABAKI (3° S., 39° 47′ E.), river, Brit. E. Africa; enters Indian Ocean.

SABBATAI SEBI (1626–76), Jewish mystic and pseudo-messiah. His eloquence and religious fervour attached to him vast crowds of followers. His disquieting influence was apprehended by the Sultan, and Sabbatai was imprisoned and put to death.

SABBATH, a Hebrew word, meaning rather a day of cessation than of pleasure or repose. It has always been observed by Jews, and at the time of Christ was hedged about with a large number of regulations. All work was strictly forbidden, even the plucking of ears of corn; only the saving of life was allowed. Though its observation sometimes developed into mere formalism it was dearly loved by many pious Jews. Still, Christ had to declare, 'The S. was made for man, and not man for the S.' In the Christian Church the idea of a sacred day was taken over from Judaism, but the day was not Saturday (the Jewish S.) but Sunday, when Christ rose from the dead. Hence the strict application of Jewish precedent about the S. to the Christian Sunday which some Christians have insisted on is based on a mistaken identity. For the relation of S. to Sunday, see Sunday. The origin of the S. is lost, but as a similar observance of one day in seven is found elsewhere it is probably connected with the four quarters of the moon.

SABELLARIA, a Bristle-Worm; see under Chætopoda.

SABELLIUS (early III. cent.), early Christian divine, and leader of 'Modalistic' party in Church, *i.e.* those who held that the Son was a manifestation of the Father. S. taught that the three persons of the Trinity were only different modes of apprehension or revelation of God. *Sabellianism* had more influence in East than West.

SABIANS, Oriental sect with Christian elements, something like Mandæans; term also used of people of Harran, who inherited Hellenic culture with other elements.

SABINES, people of ancient Italy, of Umbro-Sabellian stock; territories to the N.E. of Rome extended from sources of Nar to the Anio—some 85 miles; brave, austere, and religious; conquered by M. Curius Dentatus, 290 B.C., and enrolled in the Rom. *tribus Quirina*, 240 B.C.; fully enfranchised by Rome, 268 B.C. Nothing remains of Sabine lit. or language. The dialect disappeared very quickly under pressure of the Latin tongue. The legendary *Rape of the Sabine Women* occurred when Romulus, having founded Rome and seeking wives for its citizens, invited his Sabine neighbours to games, during which the Romans seized the unsuspecting maidens.

SABLÉ (47° 52′ N., 0° 20′ W.), town, Sarthe, France, on Sarthe; marble quarries. Pop. (commune) 5600.

SABLE, see Weasel Family.

SABLE ANTELOPE (*Hippotragus niger*), with maned neck, tufted tail, and stout horns; S. and E. African.

SABLE ISLAND (44° N., 60° W.), sandy island, in Atlantic, off Nova Scotia, Canada.

SABRE FENCING, see under FENCING.

SABRE-TOOTHED TIGER, see under CAT FAMILY.

SACCHARIN, $C_6H_4\begin{matrix}SO_2\\CO\end{matrix}>NH$, O-sulphobenzoic imide. White, crystalline powder, soluble in weak alkali; 500 times as sweet as sugar, for which it is a substitute.

SACHEVERELL, HENRY (c. 1673–1724), Eng. politician and clergyman; in 1709 denounced Revolution Settlement and Act of Toleration; impeached by Whigs, he was found guilty, but popular opinion in his favour forced Whigs to resign.

SACHEVERELL, WILLIAM (1638–91), Eng. politician and anti-Catholic agitator; originator of Exclusion Bill, etc.; famous orator; prominent at revolution, 1688.

SACHS, HANS (1494–1576), Ger. cobbler-poet, dramatist, and meistersinger; b. Nürnberg; wrote innumerable Meisterlieder, Spruchgedichte, and about 200 plays.

SACHS, JULIUS VON (1832–97), one of the greatest of recent German botanists; b. at Breslau; passed a large part of his life as professor at Würzberg; carried out investigation on physiology, and wrote the standard history of botany.

SACHS, MICHAEL (1808–64), Ger. Rabbi; wrote *Religiöse Poesie der Juden in Spanien*, 1845, *Stimmen von Jordan und Euphrat*, 1853, and *Mahzor*, trans. of Hebrew songs and prayers, 1855.

SACKETT'S HARBOR (43° 55′ N., 76° 15′ W.), village, on Lake Ontario, summer resort, Jefferson County, New York, U.S.A.; formerly important naval station.

SACKING, heavy fabric woven from hemp or jute; hemp better quality; three- or four-leaf twill; chief seat of manufacture in Britain is Dundee.

SACKVILLE, see DORSET, EARLDOM OF.

SACKVILLE, GEORGE, 1ST VISCOUNT (1716–85), commander-in-chief of Brit. forces in Germany under Prince of Brunswick, 1758–59; dismissed for disobedience at *Minden*; pres. of Board of Trade, 1775–79; Colonial Sec., 1779–82.

SACKVILLE, THOMAS, EARL OF DORSET, see DORSET, DUKEDOM AND EARLDOM OF.

SACO (43° 30′ N., 70° 34′ W.), city, Maine, U.S.A., on Saco; cotton manufactures. Pop. (1910) 6583.

SACRAMENT, the Latin word originally denoted the *oath* taken by a Rom. soldier on entering the army. It was adopted by the early Christians as the name for the most sacred rites of the Church. The R.C. Church and the Eastern Churches have seven s's—Baptism, Confirmation, the Eucharist, Penance, Holy Orders, Matrimony, and Extreme Unction. The Prot. Churches generally only recognise Baptism and the Supper of the Lord as 's's of the gospel' and as 'generally necessary to salvation,' although the Church of England recognises in addition the five 'minor s's.' In the R.C. Church s's are defined by the Council of Trent as 'outward signs of inward grace instituted by Christ for our sanctification,' and the Church of England definition is very similar: 'An outward visible sign of an inward spiritual grace given unto us, ordained by Christ Himself, as a means whereby we receive the same, and a pledge to assure us thereof.' The Eucharist is first in dignity of the s's in the Catholic Church.

SACRAMENTARIANS. — (1) reformers who separated from Luther on question of Eucharist; leaders—*e.g.* Carlstadt—held with Zwingli that the bread and wine were symbols only. (2) in Church of England those holding 'high' doctrine of sacraments.

SACRAMENTARY, see MISSAL.

SACRAMENTO (38° 30′ N., 121° 25′ W.), city, on Sacramento River, capital of California, U.S.A.; has R.C. and Prot. Cathedrals; public buildings include state capitol, county court, magnificent state library; several charitable institutions; has works of Southern Pacific Railway; manufactures flour, furniture, pottery, woollens. Pop. (1910) 44,696.

SACRED BEETLE, see CHAFERS.

SACRED HEART.—R.C. cult of Sacred Heart of Jesus existed centuries before formal authorisation; fixed as feast by Pius IX. in 1856.

SACRIFICE, 'the offering or destruction of anything as a religious rite' is a possible definition, but the idea, though in a measure familiar to every one, is a difficult one to focus, for the term is used ethically besides. Ritual s. is very important in nearly all religions,—Buddhism is an important exception,—but its original significance is disputed. It may have started in more than one way, and a given act of ritual s. may have different aspects. Thus (1) a s. is a gift to the deity; (2) *Totemism*, a feature of early religion and society, the importance of which was first brought out by Robertson Smith, explains s. A s. was a sacred meal shared by a god and his worshippers, or a rite in which the worshippers fed on their god himself, or of an expiatory s. of the totem animal. Dr. Frazer has suggested that the s. of a god is connected with the idea of the renewal of life, and this again with the s. of a king in the guise of a god. Human s., however, does not seem so ancient, though it has been practised at various times all over the world. Many religions have developed elaborate sacrificial rituals, *e.g.* the Jewish, in which various forms, sin-offering, peace-offering, etc., were distinguished. Hindu s. has likewise a complicated ritual. Christianity has no place for animal s., though it has still lingered in the Armenian Church. The *Epistle to the Hebrews* represented Christ as culminating Jewish s., which typified Him. In Catholic theology the Mass is a s. in which Christ participates as priest and victim. That the Eucharist is a s. is denied by extreme Protestants, but of course is admitted by Anglo-Catholics and the Eastern Churches. 'S.' in the Communion service is applied also to that of 'praise and thanksgiving.' Whether the Eucharist be itself a s. or not, it certainly is in memory of the self-s. of Christ. This leads on to the ethical: thus, it has been said, 'Christianity teaches self-realisation through self-sacrifice,' or 'self-realisation is self-s.'

See Frazer, *Golden Bough*; Robertson Smith, *Religion of the Semites.*

SACRILEGE, the crime of injuring sacred things has been accounted serious in most religions. In primitive religion it is connected with the idea of *taboo* (*q.v.*). It was accounted very serious among the Jews. In Catholicism all things connected with the Church were sacred, and the severest ecclesiastical penalties pronounced against those who robbed or injured them. The worst s. of all was the defiling of the Sacred Host. In various civil codes it was severely punished.

SACRUM, see SKELETON.

SACY, SILVESTRE DE, see SILVESTRE DE SACY.

SADDLERY AND HARNESS, an important branch of leather trade, established as separate craft in XIII. cent. by foundation of London Saddlers' Company; main parts — bridle, martingale, bit, reins, and saddle proper. The bit may be *snaffle* or *curb*, or both combined. The saddle comprises *tree* or skeleton (pommel, ribs, and side-bars), usually of beechwood, canvas, and steel; *stirrup-bars*; leather covering of seat, skirt, and hanging flaps. Continental and American saddles have high pommels; Eastern saddles, concave seats; ladies' side-saddles have two pommels or one pommel and a *leaping-head.*

SADDLEWORTH (53° 35′ N., 1° 59′ W.), town, Yorkshire, England; woollens. Pop. (1911) 12,605.

SADDUCEES, Jewish party, frequently mentioned in New Testament. They were aristocratic and had considerable political power; disbelieved in a future life and in the existence of spirits and angels, etc.; rationalists, tainted by materialism and continually opposing Christ, *e.g.* trying to entangle Him about

giving tribute to Cæsar and about marriage after resurrection.

SADE, MARQUIS DE, DONATIEN ALPHONSE FRANÇOIS (1740–1814), Fr. writer of prurient romances, e.g. *Justine, Juliette, Les Crimes de l'Amour.*

SA'DI, SHEIKH MUSLIH ADDIN (c. 1184–1292), most famous of Persian poets; b. Shiraz. The latter half of his life was spent in retirement—a period fruitful in literary work. His most famous book is the *Gulistan,* a medley in prose and verse. His 'Bostan' or Tree Garden ranks next—a poem religious in sentiment. The *Pend-Nameh* is a didactic work, exquisite in finish.

SADIYA (27° 50′ N., 95° 41′ E.), frontier outpost, on Brahmaputra, Lakhimpur district, Assam, India. Pop. 4500.

SADLER, SIR RALPH, SADLIER (1507–87), Eng. statesman; agent of Thomas Cromwell and Henry VIII.; P.C., 1547, 1558; frequent envoy to Scotland under Elizabeth; keeper of Queen of Scots, 1584–85.

SADO (38° N., 138° 30′ E.), island, Japan; area, 335 sq. miles. Pop. 122,000.

SADOLIN, JÖRGEN (1499 ?–1559), Dan. bp.; promulgated Dan. version of Luther's catechism, 1532, and trans. of Confession of Augsburg, 1533; became reforming bp. of Fyen, 1537.

SADOWA (50° 20′ N., 15° 40′ E.), village, Bohemia; scene of Prussian victory over Austrians, 1866.

SÆPINUM (41° 25′ N., 14° 35′ E.), modern Altilia, ancient city, Etruria; taken by Romans, 293 B.C.

SAETERSDAL (59° N., 7° 30′ E.), valley, S.W. of Norway.

SAFED KOH (34° 40′ N., 64° E.), range of mt's, Eastern Afghanistan; highest peak, Sikaram, 15,600 ft.

SAFES.—To be of real service s. must be both burglar- and fire-proof. The door and body of modern s. are made of such thickness that it is impossible to cut a hole large enough to give access to the contents, and of such strength that the locks and attachments of the door cannot be destroyed by drilling. Safety from fire is attained by the constructional strength of the safe and by placing between the outer and inner shells a steam-generating mixture which will keep the interior in a moist condition even during the prolonged heat of a serious fire. STRONG ROOMS are similar to s., except that they are larger and built into position instead of being portable. They are built on various plans, specially prepared steel plates and reinforced concrete being largely employed. SAFE DEPOSIT VAULTS are like strong rooms, but are fitted with other smaller s. which are rented by different people. The locks of these s. are so arranged that each hirer requires the assistance of the vault attendant in order to open his safe.

SAFETY LAMP (or DAVY LAMP, from its inventor, Sir Humphry Davy) is used in coal mines as illuminant and indicator of explosive gases. It consists of an oil lamp, the flame being completely enveloped with wire gauze, which so rapidly conducts the heat away on the large surface exposed that the flame cannot pass through at a sufficiently high temperature to ignite explosive gases. These it can be made to detect by turning down the flame to a blue point, when a light flame cap appears if over 2 or 3 % of gas is present.

SAFFI, ASFI (32° 18′ N., 9° W.), seaport, Morocco, on Atlantic. Pop. 14,500.

SAFFLOWER (*Carthamus tinctorius*), composite plant, native to India; its large red flowers yield the dye *carthamine,* used in preparation of rouge.

SAFFRON, an orange-yellow dye extracted from the dried stigmas of *Crocus sativus*; formerly used commercially, but now only employed as a colouring and flavouring ingredient in cookery.

SAFFRON WALDEN (52° 2′ N., 0° 15′ E.), market town, Essex, England; ruined castle; agricultural centre. Pop. (1911) 6311.

SAGA, prose epic of Iceland; originally an oral account of heroic deeds of hist. persons recited by professional minstrel (cf. the Teutonic *Beowulf*). The first s. *writer* was Ari Frothi (d. 1148). *Njala* is perhaps the greatest s.; it deals with law and belongs to the Islendinga s's. In XIV. cent. Sturla Thordsson, assisted by his brother Olaf Hritaskald, made his *Sturlungasaga* collection. See ICELAND (LITERATURE).

William Morris and E. Magnússon, *Saga Library* (6 vols.).

SAGAING (21° 54′ N., 96° 2′ E.), district and division, on Irrawadi, Upper Burma. Pop. (dist.) 288,000; (div.) 1,000,000. Capital, SAGAING. Pop. 10,500.

SAGALLO (11° 40′ N., 43° E.), small seaport, on Gulf of Tajura, Fr. Somaliland.

SAGAN (51° 37′ N., 15° 19′ E.), town, on Bober, Silesia, Prussia; cottons, woollens. Pop. (1910) 15,077.

SAGAR, SAUGOR (21° 40′ N., 88° 20′ E.), island, at mouth of Hugli, Bengal, India; place of pilgrimage.

SAGASTA, PRAXEDES MATEO (1827–1903), Span. Liberal statesman; assisted revolution, 1868; led opposition to restored Bourbons, 1875–81; premier, 1881, and again, 1885; introduced trial by jury and male suffrage; later administrations marked by excessive caution at home and disastrous foreign policy.

SAGE (*Salvia*), genus of plants, order Labiatæ; Common S. (*S. officinalis*) is used as a tonic and gargle; Meadow S. (*S. pratensis*) has blue flowers.

SAGHALIEN, see SAKHALIN.

SAGINAW (43° 50′ N., 83° 40′ W.), city, on S. River, Michigan, U.S.A.; sawmills; iron manufactures. Pop. (1910) 50,510.

SAGO, edible substance obtained from pith of certain palms. See PALM.

SAGUENAY (49° 25′ N., 74° W.), river, Quebec, Canada; enters St. Lawrence at Tadousac.

SAGUNTUM (39° 45′ N., 0° 15′ W.), ancient city, eastern Spain; taken by Hannibal, 219 B.C.; modern MURVIEDRO.

SAHARA (c. 15° to 33° N., 10° W. to 30° E.), the great belt of desert stretching eastward from Atlantic to Nile and southward towards the Niger and Lake Chad. Practically the whole region (over 1,500,000 sq. miles) is in the Fr. sphere of influence. Its northern edge is the hinterland of Morocco, Algeria, Tunis, and Tripoli. S. of Algeria and Morocco and in the centre are important mountain ranges, seamed with valleys in which water is to be found below the surface; mts. of the central plateau—Ahaggar—are covered with snow three months of the year, and reach a height of over 8000 ft. The S. is crossed by many caravan routes, which follow the oases; routes from Mirzuk in Tripoli to Lake Chad and from Morocco to Cairo *via* Tafilat are of particular importance.

A process of desiccation or drying is in progress over whole area of S.; extreme heat by day and excessive cold by night, combined with the great evaporation that takes place, tend to break up the rock and thus to produce fragments which the wind reduces to sand. Vegetation is scarce except in the oases, in some of which it attains great luxuriance, fig trees and date palms being the principal trees. The camel is principal animal used by the nomads of the desert, owing to its powers of going for a long period without water; but horses, cattle, and sheep are raised in many of the valleys.

The inhabitants are chiefly Berbers and Arabs, all of whom profess Muhammadanism. It is a mistake to suppose that the S. as a whole lies below sea-level, although lagoons exist in N. Algeria, which have been surveyed with a view to forming them into an inland sea by connecting them with Mediterranean. A trans-Saharan railway has been proposed. Pop. (estimated) 2¾ millions.

Visoher, *Across the Sahara* (1910).

SAHARANPUR (29° 58′ N., 77° 35′ E.), district,

Meerut division, United Provinces, India. Pop. 1,050,000. Capital, SAHARANPUR. Pop. (1911) 66,254.

SAHIB, title meaning 'Sir' or 'Mr.' used by Ind. natives addressing Europeans.

SAHYADRI (15° N., 74° 20′ E.), mountain range, Bombay, India (Western Ghats).

SAIDAPET (13° 1′ N., 80° 15′ E.), town, Chingleput district, Madras, India. Pop. 15,000.

SAIGA (*Saiga tartarica*), an antelope found on the steppes of Europe and Asia, with large inflated nose, and yellow, lyre-shaped horns; a prehistoric inhabitant of Britain.

SAIGON (10° 50′ N., 106° 48′ E.), capital, French Indo-China, on Saigon; commercial centre; exports rice. Pop. 64,845.

SAILCLOTH is made from flax, cotton, or hemp; yarn is washed and boiled to purity, 10 % weight lost in process, then spun, generally with double warp; pieces are usually 24 in. wide by 40 yds. in length; sixteen qualities made; more popularly known as 'canvas.'

SAINFOIN, SAINTFOIN (*Onobrychis sativa*), plant, order Leguminosæ; pink flowers; one-seeded pods; excellent fodder.

SAINT (Latin *sanctus*, 'holy'), title given to great Christians, especially martyrs; in New Testament means sanctified ones rather than (in our sense) saintly; from about VI. cent. specially applied as now to the dead. Honour paid to s's is an important side of Catholic piety, but is generally rejected as superstitious by Protestants. In R.C. Church the dead are *canonised*, i.e. officially entitled saints.

ST. AFFRIQUE (43° 57′ N., 2° 53′ E.), town, on Sorgues, Aveyron, France; woollen cloths. Pop. 6500.

ST. ALBANS (51° 46′ N., 0° 21′ W.), Rom. *Verulamium*, city, Hertfordshire, England; seat of a bp. since 1077; the cathedral, formerly abbey church, is a famous specimen of Norman architecture, and contains some notable monuments and brasses; in St. Michael's church is the tomb of Lord Chancellor Bacon; silk and straw-plait manufactures; scene of two battles in the Wars of the Roses (1455 and 1461). Pop. (1911) 18,132.

ST. ALBANS (44° 47′ N., 73° 5′ W.), city, summer resort, Vermont, U.S.A.; exports dairy produce. Pop. (1910) 6381.

ST. ALDEGONDE, PHILIPS VAN MARNIX VAN (1538–98), Dutch Protestant; fled from Flanders, 1567; joined republicans, 1570; blamed for surrender of Antwerp, 1585; writings (theology and sacred verse) important in vernacular lit.

ST. ALDWYN, 1ST VISCOUNT, MICHAEL EDWARD HICKS BEACH (1837–), Brit. statesman (Conservative Free Trader); pres. of Board of Trade, 1888–92; Chancellor of Exchequer, 1895–1902; reduced charge for National Debt and increased taxation for war; raised to peerage, 1905.

ST. AMAND-LES-EAUX (50° 27′ N., 3° 24′ E.), town, at junction of Scarpe and Elnou, Nord, France; mineral springs. Pop. (commune) 14,600.

ST. AMAND-MONT-ROND (46° 43′ N., 2° 31′ E.), town, on Cher, France. Pop. 8600.

ST. ANDREWS (56° 20′ N., 2° 48′ W.), royal burgh, E. coast of Fife, Scotland; the 'Mecca' of golfers. Univ. is oldest in Scotland (founded, 1411; St. Salvator's Coll., 1455; St. Leonard's, 1512; St. Mary's, 1537). There is a ruined cathedral dating from XII. cent., and remains exist of the old church of St. Regulus, generally ascribed to X. cent. The castle, or Bishop's Palace, is also in ruins, and traces of an old monastery remain. Madras College was founded by Dr. Andrew Bell (*q.v.*). St. A. figures prominently in Scot. history, especially in religious troubles; long the Scot. ecclesiastical metropolis. Pop. (1911) 7851.

Lang, *St. Andrews* (1893).

ST. ARNAUD (36° 37′ S., 143° 16′ E.), town, Victoria, Australia; gold-mining and agricultural district. Pop. 3850.

ST. ASAPH (53° 16′ N., 3° 26′ W.), cathedral city, Flintshire, Wales; bp.'s see.

ST. AUGUSTINE (29° 51′ N., 81° 30′ W.), city, on peninsula of Matanzas and San Sebastian Rivers; seaport, winter resort; capital, St. John's County, Florida, U.S.A.; chief building is old Span. fort of San Marco, now Fort Marion; settled by Spaniards, 1565. Pop. (1910) 5494.

ST. AUSTELL (50° 21′ N., 4° 48′ W.), market town, near Eng. Channel, Cornwall, England; china-clay works. Pop. (1911) 3365.

ST. BARTHOLOMEW, ST. BARTHÉLEMY (17° 50′ N., 62° 45′ W.), small island, Lesser Antilles, Fr. W. Indies. Pop. 3000. Capital, Gustavia.

ST. BENOÎT-SUR-LOIRE (47° 48′ N., 2° 17′ E.), village, on Loire, Loiret, France; fine abbey church.

ST. BERNARD, GREAT (45° 51′ N., 7° 11′ E.), Alpine pass (8130 ft.), leading from Martigny, Valais, Switzerland, to Aosta, Italy; its hospice was founded by St. Bernard de Menthon in 962.

ST. BERNARD, LITTLE (45° 40′ N., 6° 51′ E.), Alpine pass (7178 ft.), leading from Bourg St. Maurice, in Isère valley, France, to Aosta, Italy.

ST. BERTRAND-DE-COMMINGES (43° 1′ N., 0° 34′ E.), village, Haute-Garonne, France; Rom. *Lugdunum Covenarum*; cathedral.

ST. BRICE'S DAY, MASSACRE OF, Nov. 13, 1002; device of Ethelred the Unready to get rid of Danes, whom it merely rendered ferocious; the massacre fell on day of **St. Brice** (fl. V. cent.), bp. of Tours.

ST. BRIEUC (48° 33′ N., 2° 45′ W.), town, on Eng. Channel, Côtes-du-Nord, France; bp.'s see; iron and steel works Pop. 23,500.

ST. CATHARINES (43° 11′ N., 79° 17′ W.), city, Ontario, Canada; iron manufactures; mineral springs. Pop. (1911) 12,484.

ST. CHAMOND (45° 30′ N., 4° 33′ E.), town, on Gier, Loire, France; coal mines; silk manufactures. Pop. 14,600.

ST. CHARLES (38° 50′ N., 90° 40′ W.), city, on Missouri, Missouri, U.S.A.; boots and shoes; carriages. Pop. (1910) 9437.

ST. CHRISTOPHER, see ST. KITTS.

ST. CLAIR.—(1) (42° 28′ N., 82° 50′ W.) lake, between Michigan, U.S.A., and Ontario, Canada; discharges by Detroit into Lake Erie. (2) (42° 45′ N., 82° 37′ W.) river, Canada, flows from Lake Huron; enters Lake St. Clair. (3) (40° 45′ N., 76° 12′ W.) town, on Mill Creek, Pennsylvania, U.S.A.; coal mines. Pop. (1910) 6455.

ST. CLAUDE (46° 25′ N., 5° 52′ E.), town, on Bienne, Jura, France; cathedral; manufactures toys. Pop. 11,100.

ST. CLOUD.—(1) (48° 50′ N., 2° 18′ E.) town, Seine-et-Oise, France, 1 mile W. of Paris; favourite residence of kings of France; Sèvres porcelain. Pop. 8600. (2) (45° 35′ N., 94° 20′ W.) city, on Mississippi, Minnesota, U.S.A.; flour-mills; granite quarries. Pop. (1910) 10,600.

ST. CROIX, SANTA CRUZ (17° 44′ N., 64° 41′ W.), island, Dan. W. Indies; capital, Christianstad; chief product, sugar. Pop. 18,000.

ST. CYR-L'ÉCOLE (48° 46′ N., 2° 3′ E.), town, Seine-et-Oise, France; seat of military school. Pop. 3800.

ST. DAVIDS (51° 53′ N., 5° 16′ W.), town, Pembrokeshire, Wales; has large cathedral (dating from XII. cent., but several times added to and restored in different architectural styles). Ruins of the bp.'s palace and of St. Mary's Coll. remain. The bishopric was held by Laud in 1621–27. Pop. (reg. sub-dist.) (1911) 5398.

ST. DENIS (48° 56′ N., 2° 21′ E.), town, on Seine, Seine, France; its abbey church, founded by Dagobert I., in VII. cent., became burial-place of kings of France; manufactures chemicals; scene of victory of Fr. Catholics over Huguenots, 1567. Pop. (1911) 71,759.

ST. DIÉ (48° 17′ N., 6° 57′ E.), town, on Meurthe, Vosges, France; bp.'s see; textiles. Pop. 22,000.

ST. DIZIER (48° 38′ N., 4° 58′ E.), town, on Marne, Haute-Marne, France; iron manufactures. Pop. 14,800.

ST. DOMINGO, see HAITI, SANTO DOMINGO.

ST. ELMO'S FIRE, see CASTOR AND POLLUX.

ST. ÉMILION (44° 55′ N., 0° 10′ W.), town, Gironde, France; wines. Pop. 3500.

ST. ÉTIENNE (45° 26′ N., 4° 23′ E.), town, capital, Loire, France; industrial centre; coalfields; manufactures fire-arms, ribbons; has school of mines and palace of arts. Pop (1911) 148,656.

ST. EUSTATIUS (17° 29′ N., 62° 55′ W.), volcanic island, Dutch W. Indies; capital, Orangetown.

ST. FLORENTIN, Roman *Castrodunum* (48° N., 3° 45′ E.), town, on Armance, Yonne, France.

ST. FLOUR (45° 2′ N., 3° 6′ E.), town, Cantal, France; cathedral; woollens. Pop. 5100.

ST. GALL.—(1) (47° 25′ N., 9° 23′ E.) canton, Switzerland, bordering Rhine and Lake of Constance; hilly and mountainous; chief industries, cattle-rearing and cotton-spinning; prevailing language, German. Pop. (1910) 301,141. (2) (47° 25′ N., 9° 23′ E.) capital of above; manufactures embroidery and cotton goods; bp.'s see; cathedral and large library; famous VII.-cent. Benedictine abbey, suppressed, 1805, was for long a centre of learning; joined the Swiss Confederacy, 1454. Pop. (1910) 37,657.

ST. GAUDENS (43° 6′ N., 0° 43′ E.), town, Haute-Garonne, France. Pop. (commune) 7100.

ST. GAUDENS, AUGUSTUS (1848–1907), the greatest of Amer. sculptors; officer of the Legion of Honour.

ST. GEORGE (d. 303), tutelary saint of England, Portugal, and Aragon, and patron saint of chivalry in Europe in mediæval times. Reputed native of Cappadocia; rebuked Diocletian for his persecution of Christians; was arrested, tortured, and killed at Nicomedia. Dragon tradition dates from VI. cent.

ST. GERMAIN-EN-LAYE (48° 54′ N., 2° 4′ E.), town, on Seine, near Paris, France; favourite summer resort; fine forest; historic castle. Here James II. died (1701) in exile. Treaty of St. G., 1570, made peace between Catholics and Huguenots. Pop. 17,300.

ST. GERMANS (50° 24′ N., 4° 19′ W.), small town, Cornwall, England. Pop. (rural dist.) (1911) 12,274.

ST. GILLES (43° 42′ N., 4° 27′ E.), town, ancient *Vallis Flaviana*, Gard, France; noted abbey church. Pop. 6300.

ST. GIRONS (42° 59′ N., 1° 9′ E.), town, Ariège, France. Pop. (commune) 6000.

ST. GOAR (50° 15′ N., 7° 35′ E.), town, Rhine prov., Prussia, on Rhine.

ST. GOTHARD PASS, see ALPS.

ST. HELENA (15° 56′ S., 5° 42′ W.), Brit. island, S. Atlantic, 1200 miles off W. coast of Africa; area, 47 sq. miles; of volcanic origin; mountainous and rocky; highest point, 2700 ft.; healthy climate; capital and port, Jamestown (*q.v.*); coaling and cable station; cattle, fruit, vegetables, flax, lace; dwindling trade since Suez Canal opened. St. H. was discovered by Portuguese, May 21, 1502; held temporarily by Dutch, XVII. cent.; finally acquired by Brit. East India Co., 1673; rendered famous as scene of Napoleon's exile, at Longwood, 1816–21; Crown Colony, 1834; Boer prisoners sent here, 1900, during South African War; garrison (island's chief support) withdrawn, 1905–6; administered by gov. Pop. (1911) 3520.

Jackson, *St. Helena, the Historic Island* (1903).

ST. HELENS (53° 27′ N., 2° 44′ W.), town, Lancashire; glass-works. Pop. (1911) 96,566.

ST. HELIER (49° 11′ N., 2° 6′ W.), seaport, resort; capital of Jersey, Channel Islands. Pop. 31,000.

SAINT HILAIRE, see BARTHÉLEMY.

ST. HUBERT (50° 1′ N., 5° 3′ E.), town, Luxemburg, Belgium; noted abbey church. Pop. 3500.

ST. HYACINTHE (45° 37′ N., 72° 58′ W.), city, on Yamaska, capital, St. Hyacinthe County, Quebec, Canada; woollens. Pop. (1911) 9797.

ST. IGNATIUS (*c.* 110), see APOSTOLIC FATHERS.

ST. IGNATIUS'S BEANS, see IGNATIUS'S BEANS.

ST. INGBERT (49° 18′ N., 7° 5′ E.), town, Bavaria, Germany; collieries; iron- and steel-works. Pop. (1910) 17,278.

ST. IVES (50° 12′ N., 5° 30′ W.), seaport, watering-place, on St. Ives Bay, Cornwall, England; winter resort; pilchard and herring fisheries. Pop. (1911) 7179.

ST. IVES (52° 19′ N., 0° 5′ W.), market town, on Ouse, Huntingdonshire, England; agricultural trade. Pop. (1911) 3015.

ST. JEAN-D'ANGÉLY (45° 57′ N., 0° 29′ W.), town, capital, Charente-Inférieure, France; remains of Benedictine abbey; trade in wine. Pop. 7100.

ST. JEAN-DE-LUZ (42° 23′ N., 1° 39′ W.), town, sea-bathing resort, Basses-Pyrénées, France; fisheries. Pop. 3200.

ST. JOHN.—(1) (18° 20′ N., 64° 45′ W.) island of Virgin group, Danish W. Indies. Pop. 6500. (2) (45° 17′ N., 66° 2′ W.) seaport city, capital St. John County, at mouth of St. John, New Brunswick, Canada; fishing centre; shipbuilding; cotton manufactures. Pop. (1911) 42,511.

ST. JOHN (45° 20′ N., 66° 10′ W.), river, New Brunswick, Canada; flows E.; enters Bay of Fundy.

ST. JOHN, HENRY, see BOLINGBROKE.

ST. JOHN, KNIGHTS OF, see HOSPITALLERS.

ST. JOHN, OLIVER (1598–1673), Eng. statesman and lawyer; defended Hampden, 1638; solicitor-gen., 1641; supported parliamentarians as member of Short and Long Parliaments.

ST. JOHN OF JERUSALEM, KNIGHTS OF THE ORDER OF THE HOSPITAL OF, see HOSPITALLERS.

ST. JOHN'S (47° 36′ N., 52° 54′ W.), fortified city, seaport, capital, Newfoundland; exports fish; manufactures seal-oil. Pop. (1911) 32,292.

ST. JOHN'S (45° 19′ N., 73° 19′ W.), town, port entry, capital St. John's County, Quebec, Canada, on Richelieu; trade in lumber. Pop. 6500.

ST. JOHN'S WORT (*Hypericum*), genus of plants, order Hypericineæ; flowers yellow; easily distinguished by lemon-like smell when leaves are crushed; formerly worn as charm against evil and used medicinally.

SAINT JOHNSBURY (44° 24′ N., 72° W.), town, on Passumpsic, Vermont, U.S.A.; large scale factory. Pop. (1910) 6695.

ST. JOHNSTOUN, old name for PERTH (*q.v.*).

SAINT JOSEPH (42° 5′ N., 86° 30′ W.), city, summer resort, on Lake Michigan, Michigan, U.S.A.; fruit-growing centre. Pop. (1910) 5936.

SAINT JOSEPH (39° 49′ N., 94° 52′ W.), city, on Missouri, port of entry, capital, Buchanan County, Missouri, U.S.A.; important railway centre; slaughtering and meat-packing industries; iron manufactures. Pop. (1910) 77,403.

ST. JUNIEN (45° 54′ N., 0° 54′ E.), town, on Vienne, Haute-Vienne, France; gloves. Pop. (commune) 11,600.

ST. JUST (50° 8′ N., 5° 42′ W.), town, Cornwall, England; tin and copper mines. Pop. (1911) 5753.

ST. KILDA.—(1) (57° 49′ N., 8° 34′ W.) rocky island, Outer Hebrides, Scotland; circumference, 7 miles. (2) (37° 53′ S., 145° 2′ E.) watering-place, southern suburb of Melbourne, Australia. Pop. 21,500.

ST. KITTS, ST. CHRISTOPHER (17° 18′ N., 62° 43′ W.), island, Lesser Antilles, Brit. W. Indies; area, 65 sq. miles; mountainous; chief product, sugar. Pop. (1911) 26,283. Capital, Basseterre.

ST. LAWRENCE (48° N., 69° W.), great river of Canada, carrying off surplus waters of great lakes; length from Lake Ontario to opening into Gulf of St. L., *c.* 750 miles; gives access to navigation of some 2200 miles to head of the Lakes. Chief tributaries from N. are Ottawa, St. Maurice, Saguenay, Portneuf, Betsiamites, Bustard, and Manicouagan; and from S., Richelieu and Chaudière. Eight important canals

have been constructed to avoid the falls and rapids, and of these the Welland Canal, which avoids Niagara Falls, is most famous.

Browne, *The St. L. River* (1905); Dawson, *St. L. Basin and its Borderlands* (1905).

ST. LEGER, SIR ANTHONY (1496–1559), Brit. statesman; as Lord Deputy of Ireland, 1540–51, 1553–56, he continued introduction of Eng. land tenure; author of Act by which Henry VIII. was declared king of Ireland.

ST. LEONARDS, see HASTINGS.

ST. LIZIER-DE-COUSERANS (43° 1′ N., 1° 9′ E.), village, ancient *Lugdunum Consoronorum*, Ariège, France; contains cathedral and episcopal palace.

ST. LÔ (49° 6′ N., 1° 5′ W.), town, on Vire, capital Manche, France; manufactures cloth. Pop. 12,300.

ST. LOUIS (38° 36′ N., 90° 18′ W.), city, Missouri, U.S.A. Founded by Fr. traders in 1764; was included in the territories ceded to Spain in 1762, retransferred to France in 1800, and sold to U.S. in 1804 (see LOUISIANA PURCHASE); was Federal stronghold during Civil War; damaged by storms and fire in 1896; site of great international exhibition held during spring and summer of 1904 to commemorate Louisiana Purchase.

St. L. is principal city of Mississippi valley, and stands on right bank of river a few miles below its junction with Missouri; has frontage of 19 miles along river, which is here crossed by two magnificent bridges of 800 yds. in length. Town is regularly laid out, with fine streets and beautiful parks; public buildings include the Four Courts, Court-House, Cotton Exchange, Merchants' Exchange, fine art museum, public library, and various charitable institutions; seat of Washington Univ., St. Louis R.C. Univ., and Christian Brothers' R.C. Coll. St. L. is great trading centre both by railway and river, and is leading tobacco market of the world; important grain and cotton market; has meat-packing establishments, printing works; manufactures machinery, beer, flour, boots, etc. Pop. (1910) 687,029.

ST. LOUIS (16° N., 16° 30′ W.), town, on Senegal, capital, French Senegal, W. Africa; active commerce; contains cathedral and governor's palace. Pop. 25,000.

ST. LUCIA (13° 50′ N., 60° 53′ W.), largest and northernmost of Brit. Windward Islands, W. Indies; several times changed hands between French and English, finally coming to English in 1814; area, 233 sq. miles; surface hilly and forested; famed for beautiful scenery; capital, Castries; produces sugar, cocoa, tobacco, spices. Pop. (1911) 48,637.

ST. MACAIRE (44° 34′ N., 0° 12′ W.) (ancient *Ligena*), small town, on Garonne, Gironde, France; interesting church.

ST. MAIXENT (46° 23′ N., 0° 11′ W.), town, Deux-Sèvres, France; woollen hosiery. Pop. 5500.

ST. MALO (48° 39′ N., 2° 1′ W.), strongly fortified seaport, Ille-et-Vilaine, France; built on rocky islet communicating with mainland by causeway, at mouth of Rance, Brittany; episcopal see, has cathedral dating in part from XII. cent.; exports cereals, vegetables, fruit, eggs, wine, meat. Pop. 10,600.

ST. MARTIN (18° N., 63° W.), island, Lesser Antilles, W. Indies, divided between France and Netherlands; exports salt. Pop. 7000.

ST. MARYS (40° 33′ N., 84° 20′ W.), city, on St. Marys, Ohio, U.S.A.; woollen and lumber manufactures. Pop. (1910) 5732.

ST. MARY'S LOCH (55° 29′ N., 3° 12′ W.), lake, Selkirkshire, Scotland; length, 3 miles.

ST. MAUR-DES-FOSSÉS, ancient *Castra Bagandurum*, S.E. suburb of Paris. Pop. (1911) 33,852.

ST. MAUR-SUR-LOIRE (47° 7′ N., 0° 37′ W.), village, Maine-et-Loire, France.

ST. MAWES (50° 10′ N., 5° W.), fishing town, Cornwall, England.

ST. MICHAEL'S, SÃO MIGUEL (37° 40′ N., 25° 30′ W.), largest island of the Azores; volcanic; contains several hot springs; exports wine, fruit. Pop. *c.* 130,000. Capital, Ponta Delgada.

ST. MICHAEL'S MOUNT, ancient *Ictis* (50° 8′ N., 5° 29′ W.), rock, in Mounts Bay, Cornwall, England.

ST. MIHIEL (48° 53′ N., 5° 34′ E.), town, on Meuse, Meuse, France. Pop. 5600.

ST. MORITZ (46° 30′ N., 9° 30′ E.), village, Grisons, Switzerland; mineral springs; centre for winter sports.

ST. NAZAIRE (47° 16′ N., 2° 12′ W.), seaport, on Loire, Loire-Inférieure, France; shipbuilding yards. Pop. (1911) 38,267.

ST. NEOTS (52° 14′ N., 0° 16′ W.), town, on Ouse, Huntingdonshire, England. Pop. (1911) 4171.

ST. NICOLAS (51° 10′ N., 4° 7′ E.), town, E. Flanders, Belgium; cottons, woollens; capital, ancient district of Waes. Pop. (1910) 34,774.

ST. NICOLAS (48° 38′ N., 6° 16′ E.), town, on Meurthe, Meurthe-et-Moselle, France; salt-works. Pop. 5600.

ST. OMER (50° 45′ N., 2° 15′ E.), town, on Aa; capital, Pas de Calais, France; fine Gothic cathedral; manufactures textiles; taken by Louis XIV. in 1677. Pop. 21,500.

ST. OUEN, town on Seine department, Seine, France; suburb of Paris; river-port. Pop. (1911) 41,904.

ST. PANCRAS, parliamentary and metropolitan borough, in N. of London, England. Pop. (1911) 218,453.

ST. PATRICK, see PATRICK, ST.

ST. PAUL (38° 42′ S., 77° 34′ E.), volcanic island in Indian Ocean, belonging to France.

ST. PAUL (44° 55′ N., 93° W.), capital, Minnesota, U.S.A., on Mississippi near its junction with Minnesota R.; founded by Fr. priest, 1840; capital, 1849; damaged by terrible hurricane, 1904. Important railway and transit centre for upper Mississippi basin and Red R. Valley; trades in furs, clothing, boots; meat-packing and butter-making carried on. St. P. is seat of Macalister Coll. and Hamline Univ.; has great number of educational institutions. There is a R.C. cathedral. Public buildings include State Capitol and city hall. Pop. (1910) 214,744.

ST. PAUL DE LOANDA, see LOANDA.

ST. PAUL'S CATHEDRAL, centre of life of mediæval London; invocation given at time of its foundation, perhaps on site of Rom. temple of Diana, by Ethelbert of Kent between 601 and 624; new building constructed after Conquest; finished early XIV. cent., and showed Norman, Early Eng., and Decorated work; Perpendicular additions; spire fell, 1561; destroyed in Great Fire, 1666. Rebuilt by Christopher Wren. For present cathedral, see ARCHITECTURE.

ST. PAUL'S ROCKS (0° 55′ N., 29° 20′ W.), group of islets, in Atlantic, E. of S. America.

ST. PETER (44° 20′ N., 93° 55′ W.), city, on Minnesota, capital, Nicollet County, Minnesota, U.S.A.; trade in lumber and grain. Pop. (1910) 4176.

ST. PETER PORT (49° 32′ N., 2° 38′ W.), seaport, watering-place, capital, Guernsey, Channel Islands. Pop. 18,600.

ST. PETERS, suburb of SYDNEY (*q.v.*).

ST. PETERSBURG (59° N., 30° E.), government, Russia, at head of Gulf of Finland; country generally flat; much covered by marshes and forests; has some dairy-farming, fishing, and cotton-weaving; chief export, timber. Pop. (1910) 2,882,900.

ST. PETERSBURG, PETERSBURG (59° 56′ N., 30° 26′ E.), capital of Russia, at junction of Neva and Gulf of Finland; a modern city with broad streets, beautiful parks, and striking edifices, built on a peninsula and several islands, formed by division of Nova into numerous branches before flowing into Gulf of Finland. Greater part of St. P. stands on mainland; innumerable stone, wooden, and floating bridges connect the different parts of the city; chief features—cathedrals of St. Isaac and Kazan; Winter, Marble, and Anitchkoff palaces; Hermitage (rich art collection), Admiralty House, monument of Peter the Great,

Royal Theatre, museums, univ., imperial public library, fortress of St Peter and St. Paul (now state prison), Nevsky Prospect (principal street), and fine surroundings with several imperial palaces; great sledge traffic during winter; seat of government and Duma, also revolutionary centre.

Leading industries are cotton textiles, machinery, metals, leather, shipbuilding, chemicals, printing, soap, sugar refineries, breweries, tobacco, etc. St. P. was founded by Peter the Great, 1703; Peace of St. P. between Russia and Prussia, 1762. Great fires, 1736, 1780. Pop. (1910) 1,907,708. See RUSSIA.

ST. PIERRE, see RÉUNION.

ST. PIERRE (46° 46′ N., 56° 14′ W.), rocky island, in Atlantic, S. of Newfoundland, forming with Miquelon Islands the Fr. colony of St. Pierre and Miquelon; fisheries; connected by cable with France and U.S.A. Pop. (resident) 6700.

ST. POL-DE-LÉON (48° 41′ N., 3° 59′ W.), town, Finistère, France; fine XIII.-cent. cathedral. Pop. (commune) 8300.

SAINT PRIVAT (49° 12′ N., 6° E.), village, Lorraine, Germany.

ST. QUENTIN (49° 50′ N., 3° 17′ E.), town, Aisne, France; here French were defeated by Spaniards in 1557, and here in 1871 the Germans under Goeben defeated French under Faidherbe. St. Q. has fine Gothic church dating from XII. cent., and town hall dating from XIV. cent.; manufactures cottons, woollens, and other textiles, paper, leather. Pop. (1911) 55,571.

ST. REMY (43° 47′ N., 4° 50′ E.), town, Bouches-du-Rhône, France; stone-quarries. Pop. 6300.

ST. RIQUIER (50° 10′ N., 1° 46′ E.), town, Somme, France; noted abbey church.

ST. SERVAN (48° 38′ N., 2° W.), seaport, watering-place, on Rance, Ille-et-Vilaine, France. Pop. 10,000.

ST. SEVER (43° 40′ N., 0° 25′ W.), town, on Ardour, Landes, France. Pop. (commune) 4700.

ST. STEPHENS, see WESTMINSTER.

ST. SWITHIN, see SWITHUN, ST.

ST. THOMAS (0° 20′ N., 6° 40′ E.), volcanic island belonging to Portugal, in Gulf of Guinea; first settled by Portuguese, *c.* 1485; occupied by Dutch, 1641–44, when restored to Portugal. Area, *c.* 380 sq. miles; surface mountainous; capital, St. T.; produces cacao, coffee, rubber, cinchona. Pop., with San Principe, with which it forms province of Portugal, 68,221.

ST. THOMAS (18° 20′ N., 65° W.), island, Virgin group, Danish W. Indies; surface hilly. Pop. (1911) 10,684. Capital, Charlotte Amalie, is fine harbour and coaling station.

ST. THOMAS (42° 49′ N., 81° 16′ W.), city, capital Elgin County, Ontario, Canada; railway centre; railway workshops; car-works. Pop. (1911) 14,054.

ST. TROND (50° 48′ N., 5° 13′ E.), town, Limburg, Belgium; breweries, distilleries. Pop. 16,500.

ST. VINCENT (13° 25′ N., 61° 11′ W.), island, Windward group, Brit. W. Indies; mountainous; chief export, sugar. Capital, Kingstown; ceded by France to Britain in 1763. Pop. (1911) 41,877.

ST. VINCENT, BATTLE OF, naval battle between England and Spain, 1797. Sir John Jervis, Eng. admiral, attacked Span. fleet of nearly twice as many, but ill-manned, ships; victory due to Nelson boldly taking initiative; first great success against Napoleonic party.

ST. VINCENT, JOHN JERVIS, EARL OF (1735–1823), Eng. admiral; commander-in-chief of West Indies fleet, 1793–95, assisting in conquest of Martinique, etc.; commander-in-chief in Mediterranean, 1795–99; won great victory off Cape St. Vincent, 1797, largely owing to Nelson's independent action, prevented Fr. and Span. invasion of England; cr. admiral of the fleet, 1821.

Tucker, *Memoirs* (1844).

ST. VITUS'S DANCE, see under CHOREA.

ST. YRIEIX (45° 31′ N., 1° 12′ E.), town, Haute-Vienne, France; kaolin quarries. Pop. (commune) 8000.

STE ANNE DE BEAUPRÉ (47° 5′ N., 70° 55′ W.), pilgrimage resort, on St. Lawrence, Quebec, Canada.

SAINTE-BEUVE, CHARLES AUGUSTIN (1804–69), Fr. critic and guide to the Romantic movement; b. Boulogne-sur-Mer; started new school of criticism based on study of history and all sources of information bearing on his subject; produced some 300 *portraits* of literary people under various titles. His works include mediocre poetry, a novel, *Volupté* (1834); *Tableau de la Poésie française au XVI. siècle* (1828); *Histoire de Port-Royal* (1840); *Portraits Littéraires* (1844); *Causeries du Lundi* and *Nouveaux Lundis* (1849–69); *Chateaubriand et Son Groupe* (1860). These afford delightful reading, though later generations think that in them gossip overpowers criticism. S. was Hugo's friend and Ronsard's champion; admitted to *Académie,* 1845; prof. at Collège de France, 1854; Senator, 1865; perhaps greatest modern literary critic.

Harper, *Sainte-Beuve* (1909).

SAINTE-CLAIRE DEVILLE, ÉTIENNE HENRI (1818–81), Fr. chemist; discovered toluene, nitric anhydride, sodium method for aluminium; authority on 'thermal dissociation.'

SAINTE-PALAYE, JEAN BAPTISTE LA CURNE DE (1697–1781), Fr. antiquary; member of the *Académie des Inscriptions* at twenty-seven; compiled more than 4000 notices of MSS. concerning Fr. language and institutions.

SAINTES (45° 44′ N., 0° 38′ W.), ancient *Mediolanum,* town, on Charente, Charente-Inférieure, France; cathedral; iron foundries; noted Rom. remains; was capital of the Santones and later of the old province Saintonge. Pop. 19,500.

SAINT-ÉVREMOND, SEIGNEUR DE, CHARLES MARGUETEL DE SAINT-DENIS (1613–1703), Fr. author; served in Thirty Years War, etc., till age of forty-eight; wrote *La Comédie des Académistes* (1644), a clever satire on the forthcoming dictionary of the Fr. Academy.

SAINT-HILAIRE, AUGUSTE DE (1799–1853), Fr. botanist, anthropologist, and Brazilian explorer.

SAINT-JUST, ANTOINE-LOUIS-LÉON DE RICHEBOURG DE (1767–94), Fr. revolutionary leader, saintly, brave, fanatic; despite his youth, perhaps chiefly responsible for Reign of Terror; pres. of Convention, 1793; guillotined with Robespierre: powerful orator; author of *Esprit de la Revolution.*

SAINT-MARTIN, LOUIS CLAUDE DE (1743–1803), Fr. philosopher and mystic; held that materialism is overcome by deeper insight into the human mind.

SAINTONGE (45° 30′ N., 0° 35′ W.), ancient province, France; capital, Saintes; now forms greater part of department Charente-Inférieure.

SAINT-PIERRE, JACQUES HENRI BERNARDIN DE (1737–1814), Fr. writer; in navy and army, and finally director of the Jardin des Plantes, Paris; Rousseau's last friend and follower; best-known work, novel, *Paul et Virginie,* 1787.

SAINT-PRIEST, COMTE DE, FRANÇOIS EMMANUEL GUIGNARD (1735–1821), Fr. royalist *émigré*; distinguished as soldier and ambassador; member of Necker's administration, 1788; Sec. of Household and Minister of Interior, 1789; bitterly opposed democrats.

SAINTS, BATTLE OF THE, BATTLE OF DOMINICA, April 12, 1782; named from Saints' Islands between Dominica and Guadaloupe. Fr. fleet, in aid of Amer. rebels, was sailing to attack Jamaica when it was intercepted by Eng. admiral, Rodney, who won important victory.

SAINT-SAËNS, CHARLES CAMILLE (1835–), Fr. composer, organist, and pianist. He early made a name by his symphonic poems and his *Danse Macabre,* which he has followed by notable works in several departments. Of his operas, *Samson and Delilah* has received chief attention.

SAINTSBURY, GEORGE EDWARD BATEMAN (1845–), Eng. critic and literary historian; prof. of Eng. Lit. and Rhetoric, Edinburgh Univ. (1895–); authority on prosody and prose rhythm.

SAINT-SIMON, COMTE DE, CLAUDE HENRI DE ROUVROY (1760–1825), founder of social creed of St. Simonism; served in America against England, showing energy and valour; as *philosophe* greeted outbreak of Fr. Revolution with enthusiasm; during brief imprisonment soul of ancestor Charlemagne appeared and predicted for him as great a career as philosopher as his own as conqueror; fell into bitter poverty; mutilated himself by attempt at suicide, 1823; last work, *Nouveau Christianisme*, was foundation of XIX.-cent. socialism.

Booth, *Saint-Simon and Saint-Simonism* (1871).

SAINT-SIMON, DUC DE, LOUIS DE ROUVROY (1675–1755), Fr. author; lived for twenty-five years at courts of Louis XIV. and Louis XV., but belongs to the end of reign of Louis XIV.; famous *Mémoires*, from notes gathered day by day, are marked by some partiality and jealousy, but he knows how to use words graphically.

SAINT-WANDRILLE, village, Seine-Inférieure, France, 30 m. N.W. of Rouen; ruins of Benedictine Abbey.

SAIS (30° 57′ N., 30° 47′ E.), ancient city, in delta, on Rosetta arm of Nile, Egypt.

SAISSET, BERNARD (d. *c.* 1314), Fr. ecclesiastic, abbot, then bp. of Pamiers; defender of Languedoc feeling against Fr. domination; quarrelled with Philip IV.

SAITH, name for COAL FISH (*q.v.*).

SAJO, TOBA (1053–1140), Jap. artist; noted for pictures of animals in violent action.

SAKAI, aboriginal tribes of the Malay peninsula. They are intelligent and receptive of civilisation; sharp-featured, with long wavy hair and light brown skins.

SAKHALIN, SAGHALIEN (50° N., 143° E.), long, narrow island in N. Pacific, E. of Siberia, the N. half belonging to Russia and the S. to Japan; traversed N. to S. by forest-clad mountain ranges; climate severe; about one-half of inhabitants are Russian convicts; natives consist of Gilyaks, Orochons, and Ainus; coal-mines; some fishing and hunting. Pop. (1910) 13,800.

SAKI MONKEYS (*Pithecia*), a genus of New World Monkeys of family *Cebidæ* (q.v. under PRIMATES), with non-prehensile tails, and projecting incisor teeth; occur especially in Amazon Valley.

SAKURA-JIMA (31° 40′ N., 130° 40′ E.), island of Japan, in Gulf of Kagoshima; hot springs.

SAL AMMONIAC, AMMONIUM CHLORIDE (NH_4Cl), prepared by neutralising ammonia (from gasworks) with hydrochloric acid, $NH_3+HCl=NH_4Cl$. A fibrous mass, or white, crystalline powder; sharp, saline taste; solubility at 10° C.=32·8 : 100 water; sublimes when heated, and vapour dissociates. Used in medicine, dyeing, soldering, and in the laboratory.

SAL PRUNELLA, fused nitrate.

SAL VOLATILE, see AMMONIA.

SALA, GEORGE AUGUSTUS (1828–95), Brit. journalist and novelist; long connected with the *Daily Telegraph* as special correspondent and leader-writer.

SALADIN, SALAH-ED-DIN-YUSSUF-IBN-AYUB (1138–93), sultan of Egypt and Syria; founder of Ayubite house; aided Noureddin in attacks on Fatimites of Egypt; as grand-vizier defeated crusaders of Syria and Palestine; after Noureddin's death, 1174, became sultan of Egypt and Syria; won great victory over Christians at Tiberias, captured Jerusalem, etc., 1187; defeated by Richard I. of England, 1191–92; praised by western invaders as possessor of every quality of mediæval knight-errant.

Reinaud, *Life of S.* (in French, 1874); Sir Walter Scott, *The Talisman.*

SALAMANCA,—(1) (40° 45′ N., 6° W.) province, in ancient Leon, Spain; mountainous in S. Pop. (1910) 330,633. (2) (40° 59′ N., 5° 39′ W.) old walled town, capital of above; captured from Moors, 1055; occupied by French in Peninsular War, 1811–12; in neighbourhood French were defeated by Wellington, 1812. S. has two cathedrals, of which one is late Romanesque and dates from XII. cent., while the other is Gothic and was begun in XVI. cent.; there are Augustinian and Dominican religious houses. Seat of one of oldest univ's of Europe, founded *c.* 1240; now comparatively unimportant, having only 1200 students in 1910; fine library. Pop. (1910) 29,830.

SALAMANCA (42° 10′ N., 78° 43′ W.), village, on Allegheny, Cattaraugus County, New York, U.S.A.; railway repair-shops. Pop. (1901) 5792.

SALAMANDERS, small Amphibians, with rounded, plump, commonly spotted bodies, without dorsal crest; widely distributed in Europe, rare in U.S., and absent from the Brit. Islands.

SALAMIS.—(1) (37° 57′ N., 23° 30′ E.) mountainous island, in Saronic Gulf, ancient Greece (modern *Kollouri*); scene of great naval victory of Greeks over Persians, 480 B.C. (2) (37° 57′ N., 23° 30′ E.) ancient city, E. coast of Cyprus; scene of victory of Demetrius Poliorcetes over Ptolemy I., 306 B.C.

SALARIA, VIA (42° N., 12° 35′ E.), ancient high-road, Italy, leading from Rome to Adriatic coast.

SALAS (43° 25′ N., 6° 25′ W.), town, Oviedo, Spain. Pop. (commune) 18,000.

SALAYER, SALEIJER (6° 30′ S., 120° 30′ E.), group of islands, Dutch East Indies. Pop. 85,000.

SALDANHA BAY (33° S., 17° 33′ E.), inlet of Atlantic, in Cape Province, S. Africa.

SALE (53° 26′ N., 2° 18′ W.), town, Cheshire, England. Pop. (1911) 15,046.

SALE (38° 6′ S., 147° 5′ E.), town, on Thomson River, Tanjil County, Victoria, Australia. Pop. 4000.

SALE, a contract acting as conveyance of the property from the seller to the buyer. Where goods have been sold, and the buyer does not pay up, the seller may sue for the price; but where an agreement to sell is broken, by the buyer refusing to take the goods, the seller cannot sue for the price; all that he can obtain is damages for breach of contract. If an agreement to sell is broken by the seller, the only remedy for the buyer is to sue for damages. He cannot claim the goods, for they still belong to the seller. But if there has been an actual sale, and the seller fails to deliver the goods, not only can the buyer obtain damages from him for breach of contract, but in some cases he can claim the goods. All contracts for the sale of goods of the value of £10 or upwards must be in writing, unless part of the goods have already been accepted.

SALE, GEORGE (*c.* 1697–1736), Eng. Orientalist; translator of the *Koran.*

SALE, SIR ROBERT HENRY (1782–1845), Brit. general; hero of Afghan Wars, storming Ghazni, 1839, defending Jalalabad, and driving off investing force, 1841–42; d. from wound at Mudki; his wife, captured at Kabul, was released.

SALEIJER, see SALAYER.

SALEM.—(1) (11° 39′ N., 78° 12′ E.) town, on Tirumanimuttar; capital, district **Salem,** Madras, British India; textiles, cutlery. Pop. (1911) 59,153; district, 2,215,000. (2) (44° 59′ N., 122° 47′ W.) city, on Willamette; capital, Oregon, U.S.A.; manufactures flour, woollens. Pop. (1910) 14,094. (3) (40° 54′ N., 80° 53′ W.) city, Columbiana County, Ohio, U.S.A.; flour-mills; canneries. Pop. (1910) 8943. (4) (39° 33′ N., 75° 27′ W.) city, on Salem Creek; capital, Salem County, New Jersey, U.S.A.; fruit-canneries. Pop. (1910) 6614. (5) (37° 17′ N., 80° 4′ W.) town, summer resort; capital, Roanoke County, Virginia, U.S.A.; seat of Roanoke College. Pop. (1910) 3849.

SALEM (42° 28′ N., 70° 59′ W.), town, Massachusetts, U.S.A., founded 1626; scene of witchcraft agitation in 1692, when great numbers of people were tried and nineteen put to death. S. is situated on Massachusetts Bay, and has good harbour, but the

trade, which was formerly very extensive, has now declined. Public buildings include city hall, courthouses, armoury; and there are many institutions, including Athenæum, Peabody Academy and Marine Soc., Essex Institute. Birthplace of Prescott and Hawthorne. Pop. (1910) 43,697.

SALEMI (37° 48′ N., 12° 44′ E.), town, Trapani, Sicily. Pop. 17,200.

SALERNO (40° 41′ N., 14° 47′ E.), ancient *Salernum*, seaport, on Gulf of Salerno, capital, **Salerno** province, Italy; abp.'s see; cathedral; manufactures textiles; in mediæval times famous for its medical school. Pop. (1911) 43,426; (province) 554,030.

SALERNO, SCHOOL OF, see MEDICINE.

SALERS (45° 7′ N., 2° 30′ E.), village, Cantal, France.

SALES, FRANCIS DE, see FRANCIS OF SALES.

SALFORD (53° 29′ N., 2° 16′ W.), town, on Irwell, Lancashire, England; suburb of Manchester; cotton and iron industries. Pop. (1911) 231,380.

SALIC LAW, the law that excluded women from the throne of France. Probably derived from the code of Sabian Franks among whom women were debarred from inheriting certain lands known as *Salic lands*. One of its first applications to the crown was in opposition to the claim of Edward III. of England to the crown of France. The law remained in force from that time to the end of the Fr. monarchy. It prevailed in other continental countries, but has never been recognised in England.

SALICIN ($C_6H_{11}O_5.OC_6H_4.CH_2OH$), colourless, bitter, odourless, crystalline substance obtained from the bark of several species of trees of the classes *salix* and *populus*, employed in med. for the same purposes as salicylic acid (*q.v.*) and salicylates, and believed to have a less depressant action than they have on the heart.

SALICYLIC ACID ($C_6H_4.OH.COOH$), an aromatic acid obtained by treating with hydrochloric acid the salt obtained by the action of carbon dioxide on sodium carbolate; a colourless, inodorous, light, prismatic crystalline substance, tasting at first sweetish and then acid, used in med. externally as an antiseptic and for removing corns and warts, and internally as a specific remedy for rheumatic fever, and also for chronic rheumatism and for sciatica. *Sodium salicylate*, obtained by action of salicylic acid on caustic soda, is used internally for same purposes.

SALII, Rom. priests, traditionally founded by Numa; there were two coll's each of 12 priests; ceremonies were observed in March.

SALINA (38° 50′ N., 97° 40′ W.), city, on Smoky Hill River; capital, Saline County, Kansas, U.S.A.; flour-mills. Pop. (1910) 9688.

SALINA CRUZ (16° 10′ N., 95° 15′ W.), seaport, Oaxaca, Mexico. Pop. (1910) 6138.

SALINS (46° 57′ N., 5° 53′ E.), town, Jura, France; salt-springs. Pop. 5300.

SALISBURY.—(1) (35° 41′ N., 80° 20′ W.) city, capital, Rowan County, N. Carolina, U.S.A.; railway repair-shops; foundries. Pop. (1910) 7153. (2) (38° 23′ N., 75° 35′ E.) town, on Wicomico, Wicomico County, Maryland, U.S.A.; manufactures lumber, flour. Pop. (1910) 6690. (3) (41° 58′ N., 73° 25′ W.) town, Litchfield County, Connecticut, U.S.A.; iron-works. Pop. (1910) 3522. (4) (18° 51′ S., 30° 55′ W.), capital of S. Rhodesia.

SALISBURY (51° 4′ N., 1° 48′ W.), town, Wiltshire, England; famous for beautiful Early Eng. cathedral, founded 1220, and dedicated to St. Mary, 1260; spire, a XIV.-cent. addition, is highest in England; close also contains bp.'s palace, dating from 1220, cloisters and chapter house dating from 1270, library and deanery. Town has several old churches and other interesting buildings; and in neighbourhood are remains of early Brit. stronghold of Old Sarum and Druidical monument of Stonehenge. Pop. (1911) 21,217.

SALISBURY, EARLDOM OF.—Patrick de S. was cr. Earl of S. or Wiltshire in or before 1149; Cokayne writes, 'Doubtless at this early period the earldom was that of the *county*, tho' called by the name of the residence of its possessors'; held by (1) first earl's line till 1226; (2) Montacutes, Nevills, and Plantagenets, 1337–1539; (3) Cecils, 1605 to present time.

SALISBURY, JOHN OF, see JOHN OF SALISBURY.

SALISBURY, 3RD MARQUESS OF, ROBERT ARTHUR TALBOT GASCOYNE-CECIL (1830–1903), Viscount Cranbourne on death of his bro., 1865; Eng. Prime Minister; Conservative M.P. for Stamford, 1853–68; opposed extension of franchise and attacks on Established Church; Sec. of State for India in Derby ministry, 1866–67; resigned on question of Parliamentary Reform Bill, 1867, and bitterly attacked it when introduced; severely criticised Gladstone's resolutions on Irish Disestablishment, 1868, but dropped opposition after an appeal to country returned Liberals to power, 1868; chancellor of Oxford Univ., 1869. Conservatives returned to power, 1874, and S. became Sec. for India in Disraeli ministry; Public Worship Regulation Bill, 1874, was occasion of Disraeli's characterisation of S. as 'a great master of gibes and flouts and jeers'; Salisbury's fame as speaker rested on great powers of attack and oratory never adorned with 'flowers of speech.'

When Gladstone roused Europe against Bulgarian 'atrocities,' 1876, S. was sent to Constantinople to conference of the Powers; England resolved not to weaken Turkey as against Russia, but S. by small concessions avoided offence to Russia; Minister of Foreign Affairs, 1878; represented England with Beaconsfield at Congress of Berlin; succeeded Beaconsfield as leader of Conservative party in Lords, 1881; Prime Minister, 1885–86; short Home Rule Parliament followed by return to power, 1886–92; last ministry, 1895–1902, in which Chamberlain was Sec. for Colonies; kept Foreign Office till 1900; strong imperialist; successful in Egypt; chief event, Boer War, after termination of which he resigned. Sons: (1) JAMES EDWARD HUBERT, present marquess (1861–), Privy Seal, 1903–5; pres. of Board of Trade, 1905; (2) WILLIAM (1863–), chaplain to the king; (3) ROBERT (1864–), K.C. and politician; (4) EDWARD (1867–), Under-Secretary for Finance, Egypt; (5) HUGH (1869–), prominent Conservative politician.

Life, by Traill (1891), Aitken (1901), How (1902).

SALISBURY, ROBERT CECIL (1563–1612), **1ST EARL OF** (cr. 1563), baron (cr. 1603), Viscount Cranbourne (1604), Eng. Lord Treasurer; younger s. of great Lord Burghley, and became his father's adjutant and statesman of same cautious school; great opponent of Essex and war party. One of Sec's of State, 1590–96; Privy Councillor, 1591; secured succession of James I.; principal Sec. of State, 1596–1612; Privy Seal, 1597–612; Lord Treasurer, 1608–12. Great statesman of Elizabethan pattern, but showed inability under James I. to cope with new independence of Parliament and no sympathy with democratic claim to control taxation; small, deformed body, but good head; exchanged estate of Theobalds, Herts, with king in 1607 for Hatfield Chase; designed Hatfield House.

SALISBURY, THOMAS DE MONTACUTE (1388–1428), **EARL OF** (1409), distinguished in Fr. wars, 1414; lieut.-gen. of Normandy, 1419; captain-gen. of Eng. army in France, 1428; mortally wounded at siege of Orleans; peerless soldier.

SALIVA, see DIGESTION.

SALLI (34° 3′ N., 11° 26′ W.), seaport, on Atlantic, Morocco. Pop. 11,000.

SALLOW, tree of Willow family (*q.v.*); Common S. (*Salix cinerea*), abundant in copses, is used in manufacture of gunpowder charcoal.

SALLUST, CAIUS SALLUSTIUS CRISPUS (86–34 B.C.), Rom. historian; quæstor, c. 59; tribune, 52, and led popular attack on Milo; expelled from Senate, 50; joined Cæsar; prætor-elect, 47; gov. of Numidia, 46; removed for misgovernment; authentic works, *Bellum Catilinarium*, *Bellum Jugurthinum*, written on Gk. model, polished and graphic.

SALMASIUS, CLAUDIUS (1588–1653), Latin name of CLAUDE DE SAUMAISE, Fr. scholar; his *Defensio Regia pro Carolo I.* evoked Milton's *Pro Populo Anglicano Defensio.*

SALMO, see under SALMON FAMILY.

SALMON FAMILY (Salmon, Trout, etc.—*Salmonidæ*), a family of bony fishes, interesting and valuable on account of the sport and food afforded by its members. The body is long and covered with scales, but the head is naked and has no barbel. Most characteristic is the second dorsal fin, which is small, fleshy, and without rays. Apart from a few Antarctic and New Zealand forms, all are found in the rivers and seas of north temperate and Arctic regions. Of about 80 species, about 11 or 12 occur in Britain. The most important of these is the hook-jawed, pink-fleshed Salmon (*Salmo salar*), weighing sometimes 60 lb., which dwells and grows in the sea, but regularly visits rivers for spawning. There are many local names for its various stages: a young salmon is a 'parr' or 'smolt'; one newly entered fresh water, a 'grilse'; and a spawned or spent fish a 'kelt,' or a 'kipper' if male. The familiar brown Trout (*Salmo fario*) is common in most Brit. rivers, and much smaller than, though in colour resembling, the Salmon. Its weight seldom exceeds 5 lb. There are many varieties, such as the Sea Trout and the Bull-Trout, Sewin or Peal, sometimes regarded as distinct species. The gregarious Powan (*Coregonus clupeoides*) lives in some British lakes, and weighs up to 4 lb.; the Pollan (*C. pollan*) is found in the Shannon and some Irish loughs, only 6 inches long; and their relative the 9-inch Vendace (*C. vandesius*) is confined to Scottish lochs. The pale-green and silvery Smelt or Sparling (*Osmerus eperlanus*) lives, like the Salmon, in the sea, ascending rivers only to spawn. It reaches a length of 12 inches and is closely related to the Capelin (*Mallotus villosus*) and the Candle-Fish or Eulachon (*Thaleichthys pacificus*), two of the most important food fishes on the coasts of Arctic America. Other well-known Brit. Salmonoids are the Char and the Grayling (*q.v.*). Fraser River (*q.v.*) is the great centre of salmon-canning industry.

SALMONIDÆ, see SALMON FAMILY.

SALOL ($C_6H_4OH.COO.C_6H_5$), colourless, almost tasteless, slightly aromatic crystalline substance, obtained by the action of phenol on salicylic acid: employed in med. externally as an antiseptic, and internally as a mouth wash, and as an intestinal and urinary disinfectant.

SALOMON-IBN-GABIROL, see IBN GABIROL.

SALON (43° 38′ N., 5° 10′ E.), town, Bouches-du-Rhône, France; olive oil, soap. Pop. (commune) 14,100.

SALONICA.—(1) (40° 38′ N., 22° 56′ E.) vilayet, European Turkey; area, 13,510 sq. miles. Pop. about 1,130,800. (2) capital of vilayet of S.; an important seaport on Gulf of S.; was the ancient Thessalonica, the importance of which was due to its position on Rom. road to Byzantium; has interesting Gk., Rom., and Byzantine antiquities; visited by St. Paul, 53; captured by Saracens, 904; after various vicissitudes, came into possession of Turks in 1430; since great fire of 1890 business quarter has been modernised. Gk. archiepiscopal see; several old churches, including Mosque of St. Sophia. Trading centre; manufactures cotton, flour, carpets, silk, leather, etc. Besieged by Balkan Allies and captured, Nov. 1912. Pop. *c.* 174,000.

SALOP, Shropshire (*q.v.*).

SALPA, a genus of TUNICATA (*q.v.*).

SALSETTE (19° 15′ N., 72° 49′ E.), island, N. of Bombay Island, Brit. India; noted for its cave temples.

SALSIFY, SALSAFY (*Tragopogon*), genus of plants, order Compositæ; cultivated in Britain as vegetable—Purple Goat's-beard and Yellow Goat's-beard; root, which resembles carrot, is cooked.

SALSOMAGGIORE, village, watering-place, Emilia, Italy.

SALT.—Chemically, a salt is a compound formed by the interaction of a base and an acid, with elimination of water, thus: B.OH + H.A = B.A + HOH.
Base. Acid. Salt. Water.

B and A are the basic and acidic radicals, respectively, and BA is a normal salt. 'Acid' or hydrogen salts contain H; basic salts contain OH (see CHEMISTRY).

Common salt is sodium chloride, NaCl. It occurs as rock salt in Cheshire, Lancashire, etc., and exists in solution in sea-water and in brine springs. Rock salt is sometimes mined solid, but more often converted into brine, which is pumped up and evaporated, sometimes first by 'graduation,' *i.e.* atmospheric evaporation promoted by trickling over walls of faggots, and then by boiling. 'Bay salt' is obtained from sea-water by solar evaporation.

Salt usually crystallises in cubes, of S.G. 2·16; it is diathermous; M.P. 815° C.; solubility at 20° C. = 35·94, scarcely more soluble in hot than in cold water. Common salt contains small quantities of sodium sulphate, calcium sulphate, and magnesium chloride; the latter causes dampness in moist air. Besides its dietic use, salt is employed in manufacturing hydrochloric acid, chlorine, washing soda, caustic soda, etc.

SALT LAKE CITY (40° 50′ N., 112° 2′ W.), capital, Utah, and centre of Mormonism; stands at foot of Wasatch Mts., *c.* 4000 ft. above sea-level, and was founded by Brigham Young, 1847. Seat of Univ. of Utah; contains Mormon Temple, completed 1893, Tabernacle, Prot. and R.C. cathedrals, and various educational and philanthropic establishments; commercial centre; manufactures glass, woollens, paper, cutlery, pottery, etc. Pop. (1910) 92,777.

SALT OF SATURN, lead acetate or sugar of lead. See LEAD.

SALT OF SORREL, binoxalate of potash, a salt of oxalic acid (*q.v.*).

SALT OF TARTAR, potassium carbonate in its crude state. See POTASSIUM.

SALT RANGE (32° 54′ N., 71° E.), mountain range, Punjab, India; salt mines.

SALT, SPIRITS OF, common name for hydrochloric acid.

SALTA (24° 32′ S., 66° 14′ W.), province, Argentina, bordering on Bolivia; generally mountainous; rich in minerals; chief occupation, agriculture; pop. 150,000. Capital, **Salta**; pop. 17,000.

SALTA (24° 32′ S., 66° 14′ W.), city, Salta, Argentina; bp.'s see. Pop. 17,000; (prov.) 150,000.

SALTASH (50° 24′ N., 4° 13′ W.), seaport town, on estuary of Tamar, Cornwall, England. Pop. (1911) 4130.

SALTBURN-BY-THE-SEA (54° 35′ N., 0° 58′ W.), watering-place, N. Riding, Yorkshire, England. Pop. (1911) 3324.

SALTIER, SALTIRE, see HERALDRY.

SALTILLO (25° 28′ N., 101° 2′ W.), city, capital of Coahuila, Mexico; commercial centre; cottons, woollens. Pop. (1910) 35,063.

SALTIRE, see HERALDRY.

SALTO (31° 23′ S., 57° 27′ W.), town, port, department of Salto, Uruguay, S. America, on Uruguay; trade in salted meats. Pop. 17,656; (dep.) 54,159.

SALTPETRE, NITRE, POTASSIUM NITRATE (KNO_3), white crystals, dimorphous, M.P. 339°; solubility, 20·9 : 100 water at 10° C., 246 : 100 at 100° C.; bitter, saline taste. Generally obtained from 'Chili saltpetre' by reaction with potassium chloride: $NaNO_3 + KCl = KNO_3 + NaCl$. *Uses*: gunpowder, as an oxidising agent, for pickling meat, and medicine.

SALTWORT (*Salsola*), genus of plants, order Chenopodiaceæ; Prickly S. (*S. kali*), a Brit. seaside plant, yields soda when burnt.

SALUTATION of persons meeting each other is almost universal, and is accompanied by various kissing, and embracing. Many Orientals 'rub noses,' or at any rate sniff each other. The kiss is properly a gesture of tasting; from New Testament times it appears as a salutation

among Christians; its use among men has gradually declined, but is still common in France and among monarchs when meeting ceremonially. Orientals bow profoundly or even prostrate themselves before superiors. The modern custom of shaking hands is mediæval, but not ancient. Various formulas of greeting are used which tend in time to become meaningless.

SALUZZO (44° 38′ N., 7° 28′ E.), city, Cuneo, Italy; castle and cathedral; birthplace of Silvio Pellico. Pop. 11,000.

SALVADOR (13° 40′ N., 89° W.), smallest but most densely populated state of Central America; area, 7225 sq. miles; surface generally high tableland, with hills rising above it to 7900 ft.; mean temperature, 80° Fahr.; earthquakes frequent. S. belonged to Spain, 1526–1822, and from 1823–39 was member of Central Amer. Federation, after dissolution of which it became independent republic. Executive power held by Pres., legislative authority by Congress of 42 members. Capital, San S.; chief port, Acatjutlo; produces coffee, sugar, rubber, tobacco, indigo, timber; minerals include gold, silver, antimony. Education free and compulsory; chief religion, R.C. Pop. (1912) 1,161,426.

SALVAGE, money paid in case of shipwreck by the ship owner, or the cargo owners, or both. The salvor is only entitled to this reward when his work has been done voluntarily, and he has been under no obligation to do it. It must be shown that but for his services the ship or goods would probably have been lost, and that some skill was shown or danger faced in the performance of these services. The salvor has a maritime lien on the property salved, and this claim ranks before all others. Disputes as to the amount of salvage are decided in the Admiralty Division of the High Court. In the case of fire in London a SALVAGE CORPS is a body of men engaged to assist the Fire Brigade in the preservation of insured property. London Salvage Corps was established 1865, and now acts from five stations.

SALVATION ARMY, see BOOTH, 'GENERAL.'

SALVATOR ROSA, see ROSA, SALVATOR.

SALVIAN (fl. IV. cent.), Christian author of good family and probably of Christian birth; m. dau. of heathen parents and went with his wife to monastery at Lerins; wrote *De Gubernatione*, in which he vigorously attacks vices of his time, and *Ad Ecclesiam*, sometimes called *Contra Avaritiam*, about almsgiving.

SALVINI, TOMMASO (1829–), famous Ital. tragedian.

SALVINIA, genus of floating plants of order Heterosporous Ferns; spores, on under side of leaf, drop to the pond bed in winter. See PTERIDOPHYTA.

SALWEEN, SALWIN (20° N., 98° E.), river, Burma; rises in Chin. province of Yunnan; flows into Gulf of Martaban; estimated length, 1750 miles.

SALWIN, SALWEEN (18° N., 97° E.), district, Tenasserim, Lower Burma, India; area, 2666 sq. miles. Pop. 40,000.

SALYANY (39° 35′ N., 49° E.), town, Baku, Russ. Transcaucasia; fishing centre. Pop. 12,000.

SALZBRUNN (50° 50′ N., 16° 16′ E.), watering-place, Silesia, Prussia; manufactures porcelain. Pop. (1910), Ober-S., Neu S., and Kieder S., 12,585.

SALZBURG, duchy and crown-land of Austria; surrounded by Upper Austria, Bavaria, Tyrol, Carinthia, and Styria; area, 2767 sq. miles; surface mountainous; highest peaks in Hoher Tauern, over 12,000 ft.; forests and pastureland; numerous lakes; watered by Salzach; rich in minerals, especially salt. Pop. (1910) 214,737. Capital, **Salzburg**; beautifully situated on Salzach, with fine castle of Hohen-Salzburg on Mönchsberg; cathedral (begun 1614), Benedictine and Capuchin monasteries, Franciscan church, town-house (1407), Duke of Tuscany's palace museum, etc.; S. stands on site of ancient *Juvavum*; destroyed, 448; ceded to Austria, 1797; birthplace of Mozart; manufactures of musical instruments and marble ornaments. Pop. (1910) 36,188.

SALZKAMMERGUT (47° 40′ N., 13° 40′ E.), Alpine district, Upper Austria; watered by the Traun; salt mines. Pop. 18,500.

SALZWEDEL (52° 51′ N., 11° 9′ E.), town, Saxony, Prussia, on Jeetze; damask cloth. Pop. (1910) 14,426.

SAMANA RANGE (*c.* 33° 30′ N., 70° 50′ E.), mountain range, N.W. Frontier Prov., India.

SĀMĀNIDS, Persian house descended from Samani; won most of Persia and Transoxiana from Caliph and ruled as independent princes, 874–1005.

SAMANUD, town, EGYPT (*q.v.*).

SAMARA.—(1) (*c.* 52° 30′ N., 51° E.) government, S.E. Russia, in basin of Volga, which has course of over 500 miles along W. border; area, 58,320 sq. miles; surface consists chiefly of forest land and fertile prairie; produces cereals, vegetables, tobacco, honey; poultry and live stock raised; manufactures leather, soap, tobacco, flour, spirits, beer. Occasionally suffers from famine. Pop. (1910) 3,544,500. (2) (53° 10′ N., 50° 9′ E.) town, capital of above, at junction of Samara and Volga; bp.'s see; trade in grain; flour-mills. Pop. (1910) 120,980.

SAMARIA (32° 15′ N., 35° 15′ E.), ancient city, Palestine; founded by Omri *c.* 925 B.C. (*I. Kings* 16[24]); taken by Assyrians, 721 B.C.; by Alexander the Great, 331 B.C.; destroyed by John Hyrcanus *c.* 110 B.C.; rebuilt by Herod the Great, who renamed it Sebaste (Augusta) in honour of Emperor Augustus.

SAMARITANS, a religious sect and fragment of a people, living at Shechem (now called Nablus); they are supposed to be descended from the ten tribes, but are separate from orthodox Judaism. Their sacred book is the Pentateuch, but as this was not in its present form till the time of Ezra, they must have received it from Jewish sources. According to Nehemiah their assistance in rebuilding the Jewish temple was refused; there was probably foreign admixture in their blood. Bitter hostility grew up between the Jews and Samaritans, to which the Gospels are witness. They have a little other religious but hardly any secular lit. Though suffering many vicissitudes they have continued in the same place, and a remnant still exists. Their language was a form of Aramaic; now Hebrew is their sacred and Arabic their ordinary tongue.

Montgomery, *The Samaritans*; Cowley, *The Samaritan Liturgy*.

SAMARKAND.—(1) (*c.* 39° 49′ N., 67° 18′ E.) province, Russ. Turkestan. Formerly included in dominions of Jenghiz Khan and Timur; transferred from Bokhara to Russia in 1868. S. has area of 26,627 sq. miles; surface mountainous in S. and E., steppe and desert in N.; watered by Zarafshan and other streams; considerable area forested; soil fertile, producing large crops of grain, besides wines and cotton; manufactures cottons, silk, leather. Pop. (1910) 1,169,900. Chief town, Samarkand. (2) (39° 49′ N., 67° 18′ E.) town, capital of above; connected by railway with Caspian; many beautiful architectural remains, including finest mosque in Central Asia and tomb of Timur. Was conquered by Alexander of Macedon, and in later times by Jenghiz Khan and Timur; captured by Russians, 1868. Manufactures cloth, leather. Pop. (1910) 79,530.

SAMAS, see BABYLONIA (Religion).

SAMBALPUR (21° 27′ N., 84° 1′ E.), town, on Mahanadi, Sambalpur, Brit. India. Pop. 13,000; (dist.) 646,000.

SAMBHAR LAKE (26° 52′ N., 74° 57′ E.), salt lake, Rajputana, India, in states of Jaipur and Jodhpur.

SAMBUCA, a mediæval stringed instrument of the harp kind; term also applied to a wooden pipe.

SAMLAND (54° 53′ N., 20° 20′ E.), district, E. Prussia, between Frisches Haff and Kurisches Haff; produces amber.

SAMNAN, SEMNAN (35° 30′ N., 53° 20′ E.), town, Persia. Pop. 16,500.

SAMNITES, Ital. race inhabiting Samnium (or Sabinum), the mountainous region of middle and S.

Italy, offshoot of Sabini. Waged war against Rome for over fifty years, 343–290 B.C., and their final defeat left Rome the conqueror of Italy.

SAMOA, NAVIGATORS' ISLANDS (*c.* 12° S., 170° W.), group of fourteen volcanic islands surrounded by coral reefs in S. Pacific; area, *c.* 1080 sq. miles; generally mountainous and fertile. In 1899 Britain relinquished claim to the islands, and consented to arrangement whereby Germany took two largest and U.S. the remainder. The chief ports are Apia in Upolu, Pago Pago in Tutuila. R. L. Stevenson is buried on top of mountain near his home of Vailima. Exports copra, cocoa beans. Pop. *c.* 40,000.

SAMOS (37° 45′ N., 26° 50′ E.), island, Ægean; area, 180 sq. miles; surface mountainous, with fertile valleys; was independent in VI. cent. B.C.; subsequently passed under control of Persia and then of Athens; was included in Rom. dominions, and in XII. cent. was captured by Venice; conquered by Turkey, 1459; ruled by Gk. prince, but tributary to Turkey. Declared for Greece, 1912. Produces wine, oil, tobacco. Pop. 53,400.

SAMOSATA (37° 30′ N., 38° 35′ E.), mod. *Samsat*; chief town, ancient Commagene, Syria, on Euphrates; birthplace of Lucian.

SAMOTHRACE, SAMOTHRAKI (40° 27′ N., 25° 35′ E.), small mountainous island, in Ægean Sea, belonging to Turkey; sponge fisheries; in ancient times seat of the worship of Cabiri.

SAMOYEDES, Mongolian race, Finno-Ugrian stock, inhabiting tundras of N.E. Europe and Siberia; nomadic, dwelling in tents or huts; fishers and hunters; strongly Mongoloid in appearance; estimated at 17,000, of whom one-third are in European Russia.

SAMPHIRE (*Crithmum*), genus of plants, order Umbelliferæ; Common S. (*C. maritimum*), a rock-plant, makes an excellent pickle.

SAMPIERDARENA, SAN PIER D'ARENA, western suburb of Genoa, Italy; shipbuilding yard. Pop. 35,000.

SAMSON, Bible character; performs various deeds of strength; his name (Hebrew for *sun*) and points in the story suggest that he is partially mythical, originally perhaps a Danite hero.

SAMSUN (41° 18′ N., 36° 21′ E.), town, ancient *Amisus*, seaport, vilayet Trebizond, Asiatic Turkey; exports cereals, tobacco. Pop. 14,900.

SAMUEL, Biblical character; devoted as a child to the service of God, under charge of Eli. Two different accounts of his life seem to be interwoven in I. Samuel; according to one, the leader of his people, according to the other, a local prophet.

SAMUEL, BOOKS OF, at first formed one book together with the two books of Kings, so that in the Septuagint and Vulgate they were numbered instead of, as with us, I. and II. Samuel and I. and II. Kings, I., II., III., IV. Kings, comprising in all a history of Judah and Israel.

I. Samuel starts with the birth of Samuel and gives an account of his work as judge (chaps. 1–7). Chaps. 8–14 describe the reign of Saul, in which two different narratives are combined, one representing Samuel as willing, the other as unwilling, that there should be a king in Israel. Chaps. 15–31 trace the struggle between Saul and David, whose again in parts two narratives are combined, ending with the death of Saul and Jonathan and the establishment of David as king.

II. Samuel 1–8 narrates the main events of David's reign, including the establishment of the capital at Jerusalem, and his various wars; 9–20 describe the family life of the king and his troubles with his sons; 21–24 have been described as an 'appendix,' giving miscellaneous information about his reign, a famine in Israel, wars against the Philistines, and a census of the kingdom.

Like other Old Testament books I. and II. Samuel are composite and not all of one date. The later parts have been pub. about 700 B.C., but the main body of the narrative is early, and perhaps in parts only written a short time after the events it describes. Most of it is fine classical Hebrew.

Driver, *Introduction to Lit. of O.T.*; Commentaries by Kennedy (*Century Bible*), Kirkpatrick (*Cambridge Bible*).

SAN ANTONIO (29° 28′ N., 98° 28′ W.), town, on S. A. River, Texas, U.S.A.; originally a Span. town; attacked and occupied on various occasions by Mexicans; XIX.-cent. episcopal see of R.C. and Prot. Episcopal churches; has R.C. cathedral; public buildings include Federal Government building, arsenal, various educational and philanthropic establishments; several beautiful parks; manufactures flour, beer, etc. Pop. (1910) 96,614.

SAN ANTONIO DE LOS BAÑOS (21° 50′ N., 85° W.), city, Havana, Cuba; mineral baths. Pop. 8300.

SAN BERNARDINO (34° 9′ N., 116° 50′ W.), city, resort, capital, San Bernardino County, California, U.S.A.; important fruit-growing centre. Pop. (1910) 12,779.

SAN CATALDO (37° 27′ N., 14° 2′ E.), town, Caltanissetta, Sicily; sulphur mines. Pop. *c.* 18,000.

SAN CRISTOBAL (16° 25′ N., 92° 42′ W.), town, Chiapas, Mexico; bp.'s see. Pop. (1910) 16,523.

SAN DIEGO (32° 47′ N., 117° 8′ W.), city, health-resort, on Pacific, capital, San Diego County, California, U.S.A.; good harbour; exports fruit. Pop. (1910) 39,578.

SAN FERNANDO (36° 27′ N., 6° 13′ W.), seaport, Cadiz, Spain, on Isla de Leon, in Bay of Cadiz; exports salt. Pop. (1910) 25,371.

SAN FRANCISCO (37° 47′ N., 122° 25′ W.), largest city in California, and greatest commercial town on W. coast of America; founded by Franciscan monks in 1776; its prosperity dates from discovery of gold in California, *c.* 1849, after which there was a great influx of miners and other settlers, while the city rapidly increased in size and importance. Several great fires in 1850 and 1851 destroyed most of the wooden buildings of which it was originally composed, and the business part was subsequently rebuilt in stone, although wood was still used for residences; damaged by earthquakes in 1868 and 1872. In 1906 there occurred a terrible earthquake and fire, which caused great loss of life and destruction of property, and left about 300,000 people homeless; has since been rebuilt.

S. F. stands at point of a peninsula separating S. F. Bay from Pacific, with San Pablo Bay stretching to the N., and with the opening of Golden Gate giving access to Pacific; now built chiefly of brick, stone, iron and steel, and concrete; public buildings include town hall, post-office, and merchants' exchange, but there are few examples of fine architecture; numerous hotels, several museums, and libraries; seat of several departments of California Univ. and of various educational establishments; fine system of parks. S. F. is terminus of two lines of railway crossing continent to Atlantic, and is connected with China, Japan, Australia, and Hawaiian Islands by regular lines of steamers; value of imports in 1909–10 amounted to over 10½ million sterling, exports to nearly 7½ million; exports treasure, wheat, flour, tinned fruits and vegetables, timber, wine, etc. Pop. (1910) 416,912.

SAN GERMAN (18° 8′ N., 67° 1′ W.), city, Mayaguez, Porto Rico; exports sugar, coffee. Pop. 4100.

SAN GIMIGNANO (43° 28′ N., 11° 2′ E.), town, Siena, Italy. Pop. 10,000.

SAN JOSÉ (9° 56′ N., 83° 52′ W.), capital, Costa Rica; bp.'s see; trade in coffee. Pop. (1911) 121,162.

SAN JOSÉ (37° 16′ N., 121° 50′ W.), city, health-resort, capital of Santa Clara County, California; fruit centre; canneries. Pop. (1910) 28,946.

SAN JUAN (31° S., 69° W.), mountainous province, Argentina; rich in gold, silver, copper; chief industry, agriculture. Pop. 117,000. Capital, San Juan (31° 2′ S., 68° 57′ W.), exports wine and dried fruit. Pop. 11,000.

SAN JUAN (18° 25′ N., 66° 7′ W.), fortified city, capital, Porto Rico, on N. coast; excellent harbour; chief port of the island. Pop. (1910) 48,716.

SAN JUAN ISLANDS (48° 30′ N., 123° W.), group of islands, in Strait of Georgia, belonging to U.S.A.

SAN LUIS (33° 32′ S., 66° 3′ W.), province, Argentina; rich in minerals. Pop. (estimated) 199,500. Capital, San Luis. Pop. 14,500.

SAN LUIS POTOSÍ (22° 5′ N., 100° 48′ W.), city, capital of San Luis Potosí, Mexico; railway centre; cotton and woollen goods; active trade. Pop. (1910) 82,946; (state) 624,728.

SAN MARINO (43° 57′ N., 12° 27′ E.), republic, N. Italy; area, 38 sq. miles; capital, San Marino; its independence, dating from Middle Ages, was confirmed by the Pope in 1631. Pop. (1910) 10,489.

SAN MARTIN, JOSÉ DE (1778–1850), S. Amer. patriot; commander of forces against Spain, 1814; won great victories and set up Chilian republic, 1817–18; drove Spaniards from Peru, 1820–21; became protector of Peru, but, being mistrusted, retired to France, 1822.

SAN MIGUEL (13° 35′ N., 88° 10′ W.), town, capital, San Miguel department, Salvador; trade in rubber, indigo. Pop. 22,000; (department) 60,000.

SAN MIGUEL DE MAYUMO (15° 14′ N., 121° E.), town, Luzon, Philippine Islands; produces iron, cotton. Pop. 20,500.

SAN MINIATO (43° 41′ N., 10° 51′ E.), town, Florence, Italy; cathedral; manufactures glass. Pop. (commune) 21,000.

SAN NICOLAS DE LOS ARROYOS (33° 14′ S., 60° 35′ W.), town, river port, on Paraná, Buenos Aires, Argentina; exports wheat, frozen mutton. Pop. 12,550.

SAN PABLO (14° 10′ N., 121° 20′ E.), town, Laguna, Philippine Islands. Pop. 22,000.

SAN REMO (43° 50′ N., 7° 46′ E.), seaport, health-resort, Porto Maurizio, Italy. Pop. 25,000.

SAN SALVADOR (13° 45′ N., 89° 10′ W.), capital of Salvador Republic; contains univ. and cathedral; manufactures silk and cotton goods. Pop. (1912) 59,136.

SAN SEBASTIAN (43° 19′ N., 1° 56′ W.), seaport, watering-place, capital of Guipuzcoa, Spain, on Bay of Biscay; bp.'s see; contains bull-ring and casino; breweries, flour-mills. Pop. (1910) 49,008.

SAN SEPOLCRO (43° 33′ N., 12° 10′ E.), cathedral town, Arezzo, Italy; birthplace of Piero della Francesca. Pop. (commune) 10,000.

SAN SEVERINO (43° 15′ N., 13° 10′ E.), town, ancient *Septempeda*, on Potenza, Macerata, Italy. Pop. 3500.

SAN SEVERO (41° 42′ N., 15° 23′ E.), town, Foggia, Italy; bp.'s see. Pop. (commune) 32,000.

SAN SHUI (23° 10′ N., 112° 45′ E.), town, treaty port, Kwangtung, China. Pop. (1910) 6000.

SAN VICENTE (13° 42′ N., 88° 43′ W.), town (and department), Salvador; manufactures cloths, cigars. Pop. (1912) 20,400.

SANA (15° 22′ N., 44° 12′ E.), town, capital, Yemen, Arabia; surrounded by wall 5½ miles in circuit; trade in coffee, dried fruit; devastated by famine. Pop. *c.* 19,000.

SANCERRE (47° 20′ N., 2° 49′ E.), town, Cher, France.

SANCHI (23° 28′ N., 77° 46′ E.), village, India; remarkable Buddhist remains.

SANCROFT, WILLIAM (1616–93), abp. of Canterbury, 1677–91; one of the 'Seven Bishops' (*q.v.*).

SANCTI SPIRITUS (21° 40′ N., 79° 30′ W.), city, on Yayabo, Santa Clara, Cuba. Pop. 13,500.

SANCTUARY was the protection afforded to an offender against the law who took refuge in a church or other consecrated place. It dates back in England and on the Continent to very early times, and was recognised throughout the Middle Ages. From XIV. cent. complaints are frequent against debtors taking sanctuary, and the privilege was more and more limited. The rule was that the offender, having made confession of guilt to the coroner, must flee the country within 40 days. If he remained in sanctuary after that time he would be starved into surrender. Westminster Abbey and Durham Cathedral were famous s's. All statutes affecting sanctuary were repealed in James I.'s reign, but certain notorious quarters of London were treated as sanctuaries as late as the XVIII. cent.

SAND, fine particles of stone, not so fine as dust and not larger than grit; mostly grains of quartz. It differs in colour, according to the rock from which it originates; it is spread by wind—as in deserts—or washed up by sea. S. due to volcanic action is generally grey or blackish. Pure white s. is used in glass manufacture.

SAND, GEORGE, Lucile Aurore Dupin, afterwards Madame Dudevant (1804–76), Fr. novelist. Dau. of Lieutenant Dupin; spent part of childhood with her father, who was in the army of Murat; her father, who had made a *mésalliance*, finally gave his daughter into charge of his mother, who kept her at Nohant in Berry at her country house; there the child imbibed great love for the country, with her tutor, Deschâtre, also her grandmother's overseer, a disciple of Rousseau, who believed in the education of nature, but taught her Latin, music, and natural history; played much with the village children, and stored up rustic tales and ghost stories which she inserted so skilfully in her pastoral novels; sent at thirteen to convent of Eng. Augustinians at Paris, where she remained three years; so great was her power of adaptation that she settled down and even thought of taking veil; dissuaded, and at eighteen married Dudevant, retired officer turned farmer. After nine years, in which s. and dau. were born, they separated, Dudevant keeping Nohant while wife went to Paris with her daughter and small allowance; after struggles in garret, often without a fire, she tried literature; discouraged by Balzac and other well-known literary people, but editor of *Figaro*, Delatouche, took pity on her, and gave her work at low rate; Jules Sandeau, an old acquaintance, collaborated in publication of works under name Jules Sand; when *Indiana*, which she wrote alone, appeared (1832), it was under name of **George Sand**, which she kept. She adopted dress and life of student, travelled with Alfred de Musset, Chopin, and others, imposing, as she said, no constancy upon herself, and publishing a vast number of novels, some of which came out in the *Revue des Deux Mondes*. At revolution of 1848 she mixed in politics for a short time, wrote speeches, and started a newspaper.

For over twenty-five years, at end of life, lived at Nohant with her children and grandchildren, where a great number of friends came to visit her as well as many celebrities of the time (amongst them Matthew Arnold).

Her pastoral novels (the best of her production), *La Mare au Diable* (1846), *La Petite Fadette* (1848), *François le Champi* (1850), *Le Meunier d'Angibault*, *Marion*, are idylls written in easy felicitous prose; her style was stronger than her psychology, but the emotion, which in her work, as in that of most members of early Romantic school, swamped analysis, has truth and restraint and retains its charm.

Life, by Revon (1896), Karénine (1901); Gribble, *G. S. and her Lovers* (1907).

SAND STORM, Simoon, see Wind.

SANDAL, see Boot.

SANDALWOOD, wood of trees, order Santalaceæ; pale and fragrant; native to India and E. Indies.

SANDBACH (53° 9′ N., 2° 22′ W.), town, Cheshire, England; manufactures boots and shoes. Pop. (1911) 5723.

SAND-EELS, Launces (*Ammodytidæ*), small, long-bodied fishes related to the Cod family; found burrowing in sand on the coasts of the N. hemisphere; favourite fishing-bait.

SANDEFJORD (59° 34′ N., 10° 17′ E.), seaport, watering-place, Norway; mineral springs. Pop. 4800.

SANDEMANIANS, see GLASITES.

SANDERS, NICHOLAS (*c.* 1530–81), Eng. historian and rebel; prof. of Theology at Louvain; pub. *De Visibili Monarchia Ecclesiæ*, 1571; one of chief R.C. plotters against Queen Elizabeth.

SANDFORD, FULK, abp. of Dublin, 1256–71.

SANDFORD, JOHN DE, abp. of Dublin, 1284–90; d. 1294.

SANDGATE (51° 4′ N., 1° 9′ E.), watering-place, Kent, on English Channel.

SAND-GLASS, see CLOCK.

SAND-GROUSE (*Pteroclididæ*), inhabits desert regions. One variety, **Pallas's Sand-grouse**, known by its long tail-feathers and feathered legs, is an occasional migrant to Britain.

SAND-HOPPER, see MALACOSTRACA.

SANDHURST (51° 22′ N., 0° 49′ W.), village, Berkshire, England; Royal Military Coll.

SAND-LAUNCE, see SAND-EELS.

SANDOMIR, SANDOMIERZ (50° 44′ N., 21° 47′ E.), town, on Vistula, Radom, Russ. Poland; bp.'s see. Pop. 6500.

SANDOWAY (18° 27′ N., 94° 24′ E.), town, Sandoway, Arakan, Lower Burma. Pop. 13,500; (district) 96,000.

SANDOWN (50° 48′ N., 1° 8′ W.), watering-place, Isle of Wight, England. Pop. (1911) 5551.

SANDPIPERS, see under PLOVER FAMILY.

SANDRINGHAM (52° 52′ N., 0° 32′ E.), village and royal estate, Norfolk, England.

SANDROCOTTUS, see CHANDRAGUPTA MAURYA.

SANDSTONE, a rock generally formed of grains of quartz; colours—white, yellow, brown, red, or green; varieties—coarse and fine grained. Sometimes the grains of former are as large as eggs,—these are then called conglomerates,—while grains of the latter may be so pure as to be invisible to naked eye; used for building and monumental purposes. **Old Red Sandstone** is name given to series of strata lying between Silurian and Devonian, although they are at times thought to be the same as the latter. In either case they fall below the Carboniferous, and the name 'Old' was given to distinguish them from the red sandstone ('New') included in the Permian and therefore resting upon the Carboniferous. Old Red Sandstones probably stretch across the whole of central Scotland, and they occur in Tweed, Usk, and Wye valleys.

SANDUR, SANDOOR (15° N., 76° E.), native state, Bellary, Madras, India. Pop. 12,600.

SANDUSKY (41° 23′ N., 82° 43′ W.), city, port entry, on Sandusky Bay, Ohio, U.S.A.; large trade in fish, coal, wine. Pop. (1910) 19,989.

SANDWICH (51° 17′ N., 1° 20′ E.), seaport, on Stour, Kent, England; one of the Cinque ports; important in Middle Ages. Pop. (1911) 3040.

SANDWICH, EDWARD MONTAGU (1625–72), **1ST EARL OF** (1660), Eng. admiral; member of Cromwell's 'House of Lords,' 1657; with Monk took fleet over to Charles II., 1660; defeated Dutch, 1665; slain in Dutch War.

SANDWICH ISLANDS, see HAWAIIAN ISLANDS.

SANDWORT (*Arenaria*), genus of plants, order Caryophyllaceæ; small white flowers.

SANGERHAUSEN (51° 29′ N., 11° 38′ E.), town, on Gonna, Saxony, Prussia; manufactures sugar; agricultural machinery. Pop. (1910) 12,032.

SANGLI (17° 28′ N., 75° 30′ E.), native state, Bombay, India. Pop. 230,000. Capital, SANGLI. Pop. 16,800.

SANGUINARIA, genus of plants, order Papaveraceæ; Blood-Root (*S. canadensis*) is used by Amer. Indians as 'red paint.'

SANHEDRIM, see JEWS.

SANHITA, SAMHITÂ, see SANSKRIT.

SANITATION, see HOUSE AND HOUSING.

SANJAK, see TURKEY (GOVERNMENT).

SANKARA ACHARYA (789–820), Hindu philosopher.

SANKEY, IRA DAVID (1840–1908), Amer. evangelist; sang his famous hymns at meetings when touring with D. L. Moody (*q.v.*).

SANKT JOHANN (49° 15′ N., 7° E.), town, on Saar, Rhine province, Prussia; machinery. Incorporated with Saarbrücken, 1909.

SANKT PÖLTEN (48° 12′ N., 15° 38′ E.), town, on Traisen, Lower Austria; bp.'s see; iron manufactures. Pop. (1911) 21,661.

SANLÚCAR DE BARRAMEDA (36° 47′ N., 6° 22′ W.), fortified seaport, watering-place, on Guadalquivir, Cadiz, Spain; trade in wine. Pop. (1910) 22,645.

SANPO (31° 30′ N., 82° 5′ E.), head-stream of Brahmaputra, in Tibet.

SANQUHAR (55° 23′ N., 3° 54′ W.), town, Dumfriesshire, Scotland; coal mines; birthplace of The Admirable Crichton (*q.v.*).

SANRAKU, KANO (1559–1635), Jap. artist; founder of the Kyo-Kano school, the style of which was largely influenced by the old Chin. manner. See JAPAN: *Japanese Art.*

SANS-CULOTTES (Fr., without breeches), name which the Fr. aristocrats applied contemptuously to the revolutionaries who, in 1789, adopted pantaloons and trousers in place of the knee-breeches of society.

SANSETSU (1599–1651), Jap. artist; pupil of Sanraku (*q.v.*); regarded as one of the greatest exponents of the Kyo-Kano style; his 'Rainstorm' is in the Brit. Museum.

SANSKRIT, the name given to the ancient sacred tongue of the Hindus, derived from two words—*sam*=together (Greek *syn*), and *krita*=done, is the nearest to the original parent tongue and is the only one of the original offshoots which has a surviving literature. The whole word signifies something which is thoroughly done. Sanskrit belongs to the family of Indo-European, or Indo-Germanic, or Aryan languages, which includes the Indian, Medo-Persian, Græco-Latin, Germanic, Lithuanian, Slavonian, and the Gallo-Celtic families. Another mode of classification is to place Sanskrit amongst the Asiatic or East Aryan group of the Aryan languages, which comprises, besides Zend, Persian and Armenian.

The purest form of the language has been spoken for more than 3000 years by the learned and priestly families among the Hindus, while various dialects have at different times been adopted by the masses, revealing various deviations from the parent tongue.

Yet, in spite of its antiquity, it is only in comparatively recent times that modern scholarship has thrown light upon this section of the East. Charles Wilkins, a pioneer of the time of Warren Hastings's rule in India, compiled the first Sanskrit grammar. Students of Sanskrit were struck by the resemblance of that tongue to many of the Eastern languages and even to the classical languages.

There was a time when it was believed that Sanskrit was the mother tongue to which all languages could be traced. It is almost certain that Sanskrit was introduced into India when the Brahminical races settled there, and that it largely took the place of the languages of the aboriginal inhabitants, which are now only spoken in the South.

Mention may be made of other dialects—Hindi, Hindustani, Bengali, Punjabi, Mahratti, and Gujeratti.

Sanskrit has come down to us in a well-preserved and developed state, which, at least, can compare very favourably with other languages of that branch. Hence it has been of great assistance to ethnologists and philologists in solving the many problems which beset the study of the formation of languages.

It is difficult to ascertain what is the precise relationship of the Aryan to the Semitic languages—whether, for example, Sanskrit has any close ties with Hebrew or Arabic. There is, at least, a connection in the prevalence of guttural and other sounds which are found in Semitic tongues.

The characters in which Sanskrit is written vary according to the dialects, but the alphabet is known as Nágari or Devanágari, and consists of the following sounds: (*a*) fourteen vowels—ten simple and four diphthongs; (*b*) thirty-three consonants—*k, h, kh, g, gh, ṅ, c, ch, j, jh, ñ, ṭ, ṭh, ḍ, ḍh, ṇ, t, th, d, dh, n, p, ph, b, bh, m*, three '*s*' sounds, and four semi-vowels—*y, r, l, v*. In addition there are three derivatives from these original sounds.

Sanskrit Literature.—Very little is definitely known as to the actual dates of the literature which has survived, but from the language of *The Vedas*, a collection of hymns setting forth the religion of the Brahmins, it would seem that this is the earliest extant work.

The full name is Rig-Veda-Samhitâ. The last word means 'collection.' It is contended that this is the oldest book of the Aryan family of nations, and probably the latest of these hymns dates from a time before 1000 B.C., and a study of the contents and language of the hymns suggests that these do not represent the earliest form of the language.

They contain many obsolete words and forms. There are 1028 songs, divided into ten separate collections (*mandalas*), and again subdivided into smaller collections, with the authorship attributed to some well-known saint or priest. It is, of course, impossible to say whether these personages are historical or mythical, though it is possible that the names commemorate successive generations of priestly families.

The oldest known manuscripts of the Rig-Veda do not date back from before 1500 A.D. Yet it is well known that as early as 600 B.C. the art of memorising was so far advanced that every verse, word, and syllable were counted to ensure an accurate text. It is clear that there could be much room for alterations and corruptions of the text. The care which has been expended is responsible for the remarkable condition of the text. This careful guarding of the text demanded skilful interpretation of the contents, and this led to the writing of commentaries. The Rig-Veda was translated into English by R. H. T. Griffith (1896-97), and also by Professors H. H. Wilson and E. B. Cowell.

The numerous theological works comprised under the heading *Brahmanas*, which were written by Brahmans for the use of Brahmans, formed the literature of the Hindus for many centuries. This literature marks a sort of transition stage.

The *Vedas* were divided into four books, each one of which had several Brahmanas attached to it. There were many different schools, each with its own method of interpretation. All the Brahmanas are not extant, many have been lost. To each Brahmana there is an appendix, called Âranyaka, *i.e.* 'belonging to the forest,' for the use of those members of the community who had betaken themselves to the forest to spend the last years of their lives as hermits. Of these Âranyakas, at least four are known.

It must be borne in mind that a distinction is drawn between *Shruti*, i.e. what was heard, and *Smriti*, i.e. what was remembered. All the law-books, including the Code of Manu, are *Smriti*, as are also the Itihâsas and the Purânas.

Smriti, which is almost synonymous with tradition, includes a great variety of subjects. There is one special class which must be mentioned.

It is one that comprises manuals which contain certain principal subject-matters which come under the following headings: (1) Phonetics (pronunciation and accentuation)—*i.e.* Siksha; (2) Metre—Chhandas; (3) Grammar—Vyâkarana; (4) Explanation of words (etymology, homonyms, and the like)—*i.e.* Nirukta; (5) Astronomy—Jyotisha; (6) Ceremonial—Kalpa. If one wishes to have a thorough understanding of the Veda, a knowledge of these six branches of learning is essential.

In this necessarily brief outline, full reference cannot be made to the various branches of Sanskrit literature. Yet it has its epic poems—the *Mahâbhârata* and the *Râmâyana*, the former being attributed to Vyâsa. It consists of more than 100,000 couplets and is divided into 18 books. The latter is ascribed to Valeniki; it is divided into 7 books consisting of about 48,000 lines.

Another work of importance is *The Purânas*, i.e. old or prehistoric documents—a sort of scripture of the Brahmans. This work is of comparatively modern origin, dating probably from about the X. cent. A.D., though some of the Purânas may go back to a very early time, even before the Christian era.

There are also many romances and a vast dramatic literature. Of poetry proper there are many lyrics, didactic poems including moral maxims, fables and narratives, and popular stories. In addition there is a large literature of scientific and technical subjects, including, of course, law and theology, and philosophy, and there are also treatises on music and kindred subjects. Medicine, astronomy, and mathematics are well represented.

Roughly speaking, Sanskrit literature comprises two distinct periods, Vedic and Post-Vedic, the former comprising works written in an ancient form of Sanskrit which is to the later form much the same as the language of Chaucer is to the English of to-day.

The range of subjects covered is remarkable, and to this is added the difficulty of the almost inordinate length of some of the books. Curiously enough, sciences like Grammar were cultivated by the Hindus long before serious attention was given them by the most ancient nations of Europe. Yet in spite of this enormous stretch of literature most of the works worthy of consideration have been edited and translated and are accessible to students.

English scholars have been prominent in the work, and there are both grammars and lexicons in English.

SANSOVINO, JACOPO (1477–1570), Ital. sculptor and architect; pupil of Andrea Sansovino, the Florentine sculptor, and adopted his surname.

SANTA ANA.—(1) (33° 27′ N., 117° 50′ W.) city, California, U.S.A.; fruit-producing district. Pop. (1910) 8429. (2) (13° 58′ N., 89° 36′ W.) town, capital of Santa Ana department, Salvador; exports coffee. Pop. (1912) 50,500.

SANTA BARBARA.—(1) (34° 27′ N., 119° 50′ W.) city, watering-place, California, U.S.A., on Pacific; fruit-growing centre. Pop. (1910) 11,659. (2) (10° 50′ N., 122° 40′ E.) town, Panay, Philippine Islands. Pop. 16,000.

SANTA CATHARINA (27° S., 50° W.), maritime state, Brazil; mountainous, forest-covered; watered by numerous streams; coal and iron found; capital, Florianopolis (Desterro). Pop. 353,000.

SANTA CLARA (22° 24′ N., 80° 2′ W.), town, Cuba. Pop. 15,000.

SANTA CLAUS, see NICOLAS, ST.

SANTA CRUZ.—(1) (36° 58′ N., 122° 1′ W.) city, seaside resort, California, U.S.A., on Bay of Monterey. Pop. (1910) 11,146. (2) (14° 20′ N., 121° 30′ E.) town, La Laguna, Philippine Islands; palm-wine. Pop. 13,000. (3) (10° S., 167° E.) group of Brit. islands, Melanesia, S. Pacific. Pop. 5500. (4) (17° 22′ S., 62° 23′ W.) department, Bolivia; surface is mostly level or undulating; watered by Rio Grande and San Miguel; chief product, sugar. Pop. 240,000. Capital, Santa Cruz de la Sierra. Pop. 21,000.

SANTA CRUZ, ALVARO DE BAZAN, 1ST MARQUIS OF (1526–88), Span. admiral; defeated Portugal off Terceira, 1583; planned Armada against England and might have averted Span. disasters, but could not win king's confidence.

SANTA CRUZ DE TENERIFFE (28° 32′ N., 16° 28′ W.), capital and leading port of Canary Islands; situated on N.E. coast; good coaling station; here Nelson lost his arm in unsuccessful attack, 1797. Pop. (1910) 65,615.

SANTA FÉ.—(1) (31° 40′ S., 61° W.) province, Argentina, S. America; flat; drained by Paraná; chief

industries, agriculture and stock-raising. Pop. 841,700. (2) (31° 45′ S., 60° 38′ W.) city, capital of above, on Salado; cathedral; seat of Jesuit Coll.; exports wheat. Pop. (1912) 48,928. (3) (35° 39′ N., 106° 2′ W.) capital, New Mexico, U.S.A.; one of oldest towns of N. America; has old Span. buildings; R.C. archiepiscopal see; has cathedral and episcopal palace; public buildings include state capitol and armoury; important railway and trading centre; exports wheat, linseed, quebracho. Pop. (1910) 5072.

SANTA MARIA (29° 30′ S., 54° 18′ W.), town, Brazil, in Rio Grande do Sul. Pop. 14,600.

SANTA MARIA (37° 0′ N., 25° W.), island, Azores, belonging to Portugal.

SANTA MARIA DI LICODIA, town, Catania, Sicily, 10 miles N.W. of Catania. Pop. 4300.

SANTA MARTA (11° 12′ N., 74° 16′ W.), seaport, capital of Magdalena, Colombia, on Caribbean Sea; bp.'s see. Pop. 8200.

SANTA MAURA (38° 50′ N., 20° 42′ E.) (anc. *Leucadia*), one of the Ionian Islands, Greece; traversed N. to S. by a chain of mountains terminating in the promontory famous as 'Sappho's Leap'; produces currants, wine. Pop. 33,000. Chief town, Santa Maura. Pop. 5500.

SANTA ROSA (38° 29′ N., 122° 42′ W.), city, California, U.S.A.; wine-growing centre. Pop. (1910) 78 7.

SANTA TECLA, see NUEVA SAN SALVADOR.

SANTA-ANNA, ANTONIO LOPEZ DE (1795–1876), Mexican governor; several times dictator of Mexican republic, 1822–53; led gallant opposition to French and U.S. invasions.

SANTAL PARGANAS, THE (24° 30′ N., 87° E.), district, Bhagalpur division, Bihar and Orissa, Brit. India. Pop. 1,815,000. Capital, Naya Dumka.

SANTALS, aboriginal tribe of Bengal, India; little is known of their history; nomadic in character, but amicable in disposition; they approach the negroid type.

SANTANDER.—(1) (43° N., 4° W.) maritime province, in Old Castile, N. Spain; mountainous. Pop. (1910) 303,152. (2) (43° 27′ N., 3° 48′ W.) seaport, ancient *Portus Blendium*, watering-place, capital of above, on Bay of Biscay; abp.'s see; exports iron ore. Pop. (1910) 65,209.

SANTAREM.—(1) (2° 43′ S., 55° 33′ W.) city, on Tapajos, Para, Brazil; trade in rubber. Pop. 5000. (2) (39° 14′ N., 8° 40′ W.) town, ancient *Scalabis*, or *Præsidium Julium*, on Tagus, Estremadura, Portugal; trade in olive oil, wine. Pop. 9200.

SANTAROSA, ANNIBALE SANTORRE DI ROSSI DE POMAROLO, COUNT OF (1783–1825), Ital. patriot; organised Piedmontese rising, 1821; afterwards lived in Paris, Belgium, and London; slain in Greece.

SANTERRE, ANTOINE JOSEPH (1752–1809), Fr. revolutionary general; his brewery was meeting-place of Jacobins; headed attack on Assembly, 1792; defeated by army of Vendée, 1793, and fell into obscurity.

SANTIAGO DE CHILE (33° 30′ S., 70° 30′ W.), city, on Mapocho; capital Chile and of province Santiago; public buildings include cathedral, university, national library, art, agricultural, military, and medical schools; abp.'s see; commercial centre; founded by Valdivia in 1541. Pop. 335,000.

SANTIAGO DE COMPOSTELLA (42° 50′ N., 8° 30′ W.), town, Galicia, Spain; archiepiscopal see, has Romanesque cathedral, dating from 1078 and still visited by pilgrims as shrine of St. James; seat of Univ.; has ruins of many religious houses. Headquarters of the Knights of S. of the Sword, a Span. military order. Pop. 25,500.

SANTIAGO DE CUBA (20° N., 75° 48′ W.), seaport, S.E. coast, Cuba; originally a Span. town; figured prominently in SPANISH-AMERICAN WAR (*q.v.*); archiepiscopal see, has cathedral. Harbour is fortified; carries on considerable trade with Europe and America; chief exports are sugar, tobacco, timber, fruit, cacao, coffee, rum, iron ore. Pop. 45,800.

SANTIAGO DE LAS VEGAS (22° 40′ N., 82° 15′ W.), city, Havana, Cuba; manufactures tobacco. Pop. 9000.

SANTIAGO DEL ESTERO (27° 43′ S., 64° 23′ W.), province, Argentina, S. America; flat; chief crops, sugar-cane and wheat. Pop. 216,500. Capital, Santiago del Estero. Pop. 10,500.

SANTLEY, SIR CHARLES (1834–), Eng. baritone; wrote *Reminiscences* (1909).

SANTO DOMINGO (19° N., 71° W.), republic, eastern portion of island of Haiti, W. Indies; area, 18,050 sq. miles; surface generally mountainous, with fertile valleys between ranges; chief town, **Santo Domingo**, on south coast. Climate is hot in low districts, cooler in higher lands. Exports are coffee, cocoa, logwood, mahogany, cotton, hides, copper; inhabitants are of mixed European and African descent; religion, R.C.; education free and obligatory. Country formerly belonged to Spain, became independent republic, 1821. Pop. 677,000.

SANTO DOMINGO (18° 30′ N., 69° 50′ W.), city, at mouth of Ozama; capital, Dominican Republic, W. Indies; abp.'s see; exports tobacco, sugar. Pop. *c.* 19,000.

SANTONIN, drug, consisting of yellowish flat prisms, obtained from the unexpanded flowers of the plant *Artemisia maritima*; used medicinally to kill parasitic round-worm (*Ascaris lumbricoides*), being administered on an empty stomach and followed by a purgative.

SANTORIN (36° 22′ N., 25° 28′ E.), one of Sporades Islands (Greek), Ægean Sea; of volcanic formation; frequently suffers from earthquakes; shores outlined by precipitous rocks; chief town, Thera; has prehistoric remains and some ruined Gk. temples; produces wine; water very scarce. Pop. 20,000.

SANTOS (24° S., 46° 21′ W.), city, on Santos Bay; seaport, state of São Paulo, Brazil; exports coffee. Pop. 78,000.

SANUTO, MARINO, THE ELDER (1260–1338), Venetian statesman, traveller, and author; travelled over Scandinavia, Asia Minor, Palestine, etc.; wrote three books of *Historia Hierosolymitana*, completed 1321, accompanied with maps and intended as military guide for crusaders; MS. versions exist under various names; maps probably from Pietro Vesconte.

SANUTO, MARINO, THE YOUNGER (1466–1533), Venetian historian, archæologist, and statesman; collections of MSS. copies of inscriptions and histories of contemporary events invaluable; chief work, *Diarii*, which extend from 1496–1533.

SÃO FRANCISCO (10° S., 42° W.), river, E. Brazil, rises in Minas Geraes; flows generally N.E., enters Atlantic; length, 1800 miles; navigable to falls of Paulo Affonso, and for about 1000 miles above them.

SÃO LEOPOLDO (29° 50′ S., 51° 10′ W.), city, on Sinos, Rio Grande do Sul, Brazil; seat of Jesuit Coll.; various manufactures. Pop. 8500.

SÃO LUIZ DE MARANHÃO, MARANHÃO, MARANHAM (2° 30′ S., 44° 10′ W.), seaport, on island of São Luiz; capital, state Maranhão, Brazil; bp.'s see; exports cotton, sugar. Pop. 32,000.

SÃO PAULO.—(1) (*c.* 21° S., 50° W.) state, S. Brazil; has coast-line of 300 miles, whence it extends inland to Paraná R.; area, 112,307 sq. miles. Surface consists of plateau in interior, crossed by several ranges, and low-lying coastal strip; much of surface forested; drained by Grande and other affluents of Paraná; produces coal, iron, gold, silver, marble. Chiefly an agricultural state; large cultivation of coffee, considerable crops of sugar-cane, cotton, tobacco, cereals, grapes. Manufactures cottons, wine, tobacco. Pop. 3,397,000. (2) (23° 30′ S., 46° 33′ W.) city, capital of above; among principal edifices are the cathedral, several monasteries, convents, governor's and bishop's palace, schools of law and theology; military hospital; bp.'s

see; coffee centre; founded by Jesuits, 1554. Pop. 400,000.

SAÔNE (46° 2′ N., 4° 45′ E.), river, France; rises in Faucilles Mountains, passes Auxonne, Chalon, Mâcon, and joins Rhône at Lyons; length, 301 miles; navigable.

SAÔNE-ET-LOIRE (46° 40′ N., 4° 30′ E.), department, France, formed of part of old Burgundy; mountainous; watered by the Saône, Loire, and Arroux; produces wine, coal, cattle; flourishing manufactures. Pop. (1911) 604,446. Capital, Mâcon.

SAPAJOU MONKEYS, see CAPUCHIN.

SAPINDACEÆ, natural order of trees, mostly tropical; genera include Soapberry (*Sapindus*).

SAPONIN, glucosides contained in certain plants, *e.g.* Soapwort, Horse Chestnut, Soapbark; forms lather with water; used in cleaning kid gloves, wool, etc.

SAPOTACEÆ, natural order of trees and shrubs; includes gutta-percha tree, and Sapota.

SAPPERS, see ROYAL SAPPERS AND MINERS.

SAPPHIC METRE, form of verse employed, and, according to tradition, evolved by Sappho (*q.v.*); developed by Horace; attempted in English, notably by Campion, Cowper, and Swinburne. Sapphics consist of four lines, the first three of five feet and the last of two. In the first three lines, the first and fourth feet were always trochees, the second and fifth, spondees or trochees, the third a dactyl; in the last line there is a dactyl and trochee (or spondee). The Eng. sapphic is metrically more elastic than the classical.

SAPPHIRE, blue precious stone, second in value and hardness to the diamond, is a variety of corundum; sometimes found in gneiss, but generally in alluvial soils in Burma, Ceylon, and Asia.

SAPPHO (fl. *c.* 620 B.C.), Gk. lyric poetess. A native of Zesbos, she established at Mytilene a lyric school for maidens, among whom was Erinna of Telos. Round her character many legends have been woven, and it is impossible to give any proved historical details, except that she was intimate with Alcæus. S. was absolute mistress of her art, and the greatest lyricist of ancient Greece. The bulk of her works has perished, but the extant fragments (especially the incomparable *Ode to Aphrodite*) show a marvellous combination of sound and sense, a perfect knowledge of technique, and an extraordinary power of passionate description.

SAPPORO (43° N., 141° 20′ E.), town, capital of Yezo, Japan; flour- and saw-mills. Pop. 70,084.

SAPROLEGNIA, see under FUNGI.

SAPROPHYTIC, see FUNGI.

SARACENS, mediæval term for Muslims. See CRUSADE, ARABS, MOORS.

SARAGOSSA, ZARAGOZA.—(1) (41° 35′ N., 0° 53′ W.) province, in Aragon, Spain; mountainous in N. and W. Pop. (1910) 448,995. (2) (41° 40′ N., 0° 58′ W.) town, capital of above; famous for gallant defence against French during Peninsular War, though eventually forced to capitulate, 1809. Archiepiscopal see, has two cathedrals built in XIV. and XVII. cent's; seat of Univ.; public buildings include the old citadel, exchange, various charitable institutions; manufactures beer, spirits, woollens, leather, iron goods. Pop. (1910) 113,729. See SPAIN (*History*).

SARAJEVO, SERAYEVO (Turkish *Bosna-Serai*) (43° 54′ N., 18° 30′ E.), fortified town, on Miljacka, capital, Bosnia; has a college, numerous mosques; seat of a R.C. bp. and of an Orthodox metropolitan; manufactures metal-wares. Pop. (1910) 51,919.

SARAN (26° 10′ N., 84° 30′ E.), district, Tirhut division, Bihar and Orissa, India; capital, Chapra. Pop. (1911) 2,409,509.

SARANSK (54° 12′ N., 45° 10′ E.), town, Penza, Russia; leather, soap. Pop. 14,000.

SARAPUL (56° 30′ N., 53° 30′ E.), town, on Kama, Vyatka, Russia; tanneries; leather manufactures. Pop. 23,000.

SARASATE, PABLO MARTIN MELITON (1844–1908), Span. violinist of genius; composed Span. dances.

SARATOGA SPRINGS (43° 4′ N., 73° 43′ W.), village, health-resort, Saratoga County, New York, U.S.A.; mineral springs; destroyed by French and Indians, 1745; near scene of surrender of English to Americans, 1777. Pop. (1910) 12,693.

SARATOV.—(1) (*c.* 52° N., 45° E.) government, S.E. Russia; area, 32,624 sq. miles; steppe lands in S., hilly in N.; drained by affluents of Don and Volga; soil fertile, producing cereals, flax, linseed, sunflowers, mustard; manufactures flour, leather, oil; has fish-curing works, sawmills, distilleries. Pop. (1910) 3,094,700. (2) (51° 31′ N., 46° E.) town, capital of above, on Volga; commercial centre; distilleries; trade in corn. Pop. (1910) 193,600.

SARAVIA (10° 55′ N., 123° E.) town, Negros, Philippine Islands. Pop. 14,000.

SARAVIA, ADRIAN (1531–1613), Anglican divine.

SARAWAK (*c.* 3° 30′ N., 110° 8′ E.), state, Brit. N. Borneo, ceded to Sir James Brooke by Sultan of Brunei in 1842; territory extended at various dates; under Brit. protection since 1888; area *c.* 42,000 sq. miles; surface generally mountainous; produces timber, rubber, sago, pepper; minerals include coal, gold, silver, mercury; diamonds and sapphires found. Chief towns, Kuching and Sibu. Governed by rajah, Sir Charles Brooke. Pop. *c.* 500,000. See BORNEO.

SARCOCYSTIS, a genus of SPOROZOA (*q.v.*).

SARCODE, name for protoplasm (*q.v.*).

SARCODINA, GYMNOMYXA, one of the four classes of Protozoa, containing individuals characterised by the presence of blunt, mobile extensions of protoplasm (*pseudopodia*). Many, such as the *Foraminifera* and *Radiolaria*, are protected by shells of limy or siliceous material. The class includes the sub-classes RHIZOPODA and ACTINOPODA.

SARCOMA, see TUMOUR.

SARCOPHAGUS (Gk. 'flesh-eater'), stone coffin; originally of stone from Assos in Troas supposed to consume body within 40 days; oldest are Egyptian, square or oblong.

SARCOPSYLLA, see FLEAS.

SARCOPTES, see under MITES AND TICKS.

SARCOSPORIDIA, a group of SPOROZOA (*q.v.*).

SARDANAPALUS (classical myth.), last Assyrian king; effeminate; besieged in Nineveh by Medes, he burned himself, his wives, and treasure on a pyre.

SARDES, see SARDIS.

SARDHANA (29° 9′ N., 77° 39′ E.), town, United Provinces, Brit. India. Pop. 12,700.

SARDICA, COUNCIL OF, held at Sofia, Bulgaria, 343, to settle Arian controversy. Eastern bp's declined to act, and Western pronounced for Athanasius.

SARDINE, see HERRING FAMILY.

SARDINIA (38° 53′ to 41° 15′ N., 8° 7′ to 9° 52′ E.), large island in E. Mediterranean, belonging to Italy; lies about 120 miles distant from mainland of Italy and immediately S. of Corsica, from which it is separated by Strait of Bonifacio; area, 9308 sq. miles; surface almost entirely mountainous plateau, reaching height on E. side of 4200–6200 ft.; almost equally divided between forest, arable land, and pasture; drained by Tirso, Samassi, Flumendosa, and other short streams. There are one or two islands off coast. Chief towns are Cagliari, Sassari, Iglesias. Climate is unhealthy in lower districts.

Sardinia was subdued by Carthaginians towards close of VI. cent. B.C., and remained in their possession until the III. cent. B.C., when it passed under Rom. control. After the break-up of the Rom. empire it was captured by the Vandals and subsequently by the Ostrogoths; but in VI. cent. A.D. it was reconquered by the Byzantines, in whose hands it remained for about four cent's, although frequently overrun by Saracens. The latter were ultimately expelled early in XI. cent. by the Pisans and Genoese, who for some time continued to struggle for possession of the island. Conquered by Aragonese, *c.* 1326, S. remained in hands of Aragon and afterwards of Spain till 1713, when it

was transferred to Austria by Treaty of Utrecht. In 1720 it was given to Victor Amadeus, Duke of Savoy, in exchange for Sicily, and formed kingdom of S. with Piedmont and Savoy. In 1848 a constitution was granted by King Charles Albert, and in 1861 Victor Emmanuel II. of S. became king of Italy, with history of which the further history of S. is coincident.

Island is divided for local administrative purposes into the two provinces of Cagliari and Sassari. The religion is R.C., and the island has three archbishoprics and eight bishoprics. Education is in a backward state, but Cagliari and Sassari are univ. towns. The island has prehistoric and Rom. remains.

Sardinia produces lead, zinc, silver, lignite, and blende. Forest products—apart from oak, olive, and other timber—are cork, tanning bark, charcoal. Principal industry is agriculture; wheat, barley, and other crops are grown, and fruit is largely cultivated; horses are bred in considerable numbers, and cattle, sheep, and goats are reared for food and export. Wine is largely produced, and there are tunny, sardine, anchovy, and coral fisheries. Manufactures sea-salt, tobacco, gunpowder, wooden pipes, matches, macaroni. Inhabitants are Italians with admixture of Span. blood; various Ital. and Span. dialects are used. Pop. (1911) 852,934.

Edwardes, *Sardinia and the Sardes* (1889).

SARDIS, SARDES (38° 30′ N., 28° E.) (modern SART), ancient city, on Pactolus, capital, Lydia, Asia Minor; famous wool-dyeing centre; after its capture by Cyrus, 546 B.C., became residence of the satrap of Persia; later a Rom. city; in the Middle Ages it was several times destroyed.

SARDOU, VICTORIEN (1831–1908), Fr. dramatist; great success due to vogue of somewhat heavy problem play with melodramatic issue; succeeded best in comedies of manners, though he attempted all kinds; fortunate in way his plays were staged; wrote *Fédora* (1882) and other plays for Sarah Bernhardt; others are *Nos Intimes* (1862), *La Famille Benoîton* (1865), *Rabagas* (1872), *Daniel Rochat* (1880), *Divorçons* (1880), *Robespierre* (1899), *La Piste* (1900).

SARGASSO SEA (25° N., 30° W.), tract, N. Atlantic; covered with floating seaweed (*Sargassum bacciferum*).

SARGENT, JOHN SINGER (1856–), Amer. artist; settled in England, 1883; R.A., 1897; a brilliant portrait painter.

SARI (36° 33′ N., 53° 6′ E.), town, capital of Mazandaran, Persia. Pop. c. 9000.

SARIPUL (36° 2′ N., 65° 58′ E.), town, Afghan Turkestan. Pop. 19,000.

SARIPUTTA (d. 480 B.C.), one of chief followers of Buddha; attained Arahatship; his teaching is contained in *The Perfect Way*.

SARK (49° 27′ N., 2° 22′ W.), smallest of Channel Islands (*q.v.*), consists of Great and Little S., connected by isthmus; 3 mls. long, 1½ broad; area, *c.* 2 sq. mls.

SARLAT (44° 53′ N., 1° 13′ E.), town, Dordogne, France; distilleries; coal and iron mines. Pop. 6300.

SARMATIANS, SARMATÆ, quondam nomad race of S.E. Europe; spoke Scythian; women were warriors; conquered Scythians, IV. cent. B.C.; crushed by Goths, IV. cent. A.D.

SARNEN (46° 49′ N., 8° 14′ E.), town, Unterwalden, Switzerland, on Lake of Sarnen. Pop. (1910) 4640.

SARNIA (42° 59′ N., 82° 33′ W.), town, port, on St. Clair, Ontario, Canada; oil refineries. Pop. 10,100.

SARNO (40° 48′ N., 14° 38′ E.), town, ancient *Sarnus*, Salerno, Italy; manufactures paper, textiles. Pop. 18,700.

SARONNO (45° 37′ N., 9° 5′ E.), town, Milan, Italy. Pop. 10,500.

SARPI, PAOLO (1552–1623), Venetian churchman, scientist, and historian; entered Servite order, 1562, and became renowned for learning and skill in disputation; app. ecclesiastical adviser to Venetian Council on outbreak of dispute with pope, 1606, and made famous report suggesting that the Senate should either forbid publication of papal decrees or postpone action to appeal to general council; led able attack on pope's secular jurisdiction, and sought to separate Venetian from Rom. Church; papalists attempted to assassinate him, 1607; hist. works not always reliable; as scientist welcomed discoveries of Galileo.

SARPSBORG (59° 30′ N., 11° 20′ E.), seaport town, on Glommen, Smaalenene amt, Norway; manufactures calcium carbide. Pop. 7300.

SARREGUEMINES, see SAARGEMÜND.

SARSAPARILLA, drug prepared from the dried roots of several plants of the genus *Smilax* (e.g. *S. officinalis* and *S. medica*), which grow in Mexico, Central and South America, the extract being used medicinally as a mild tonic; regarded by profession as of little therapeutic value.

SARSFIELD, PATRICK (d. 1693), Irish Jacobite; major-general of forces of James II. in Ireland, 1689, showed desperate valour; Fr. field-marshal, 1692–93.

SARSINA, see SASSINA.

SARTHE (48° N., 0° 15′ E.), department, France, formed of old Maine and portions of Anjou and Perche; hilly; generally fertile; traversed by Sarthe; minerals include coal, iron, marble. Pop. (1911) 419,370. Capital, Le Mans.

SARTI, GIUSEPPE (1729–1802), Ital. composer; trained by Padre Martini, Bologna; Cherubini's teacher; operas—*Le Gelosie Villane*, *Giulio Sabino*, etc.

SARTO, ANDREA DEL, ANDREA D'AGNOLO (1486–1531), Florentine artist, known as 'the faultless painter'; s. of a tailor (*sarto*); pupil for many years of Piero di Cosimo, though he was more influenced by the work of Leonardo da Vinci and Michelangelo; won fame early in life by his facile touch, breadth of handling, and mellow colouring. Judged by his portraits, he stands beside Giorgione and Titian. His *Portrait of a Sculptor*, now in the National Gallery, long supposed to be a portrait of himself, is one of the supreme portraits of the Ital. Renaissance. Another famous work is the *Portrait of a Lady*, supposed to have been his wife; while the known portraits of himself, no less than his *Last Supper*, are recognised masterpieces. S.'s artistic life and personal happiness were both wrecked by his marriage with Lucretia del Fede, a hatter's widow—a beautiful, extravagant, and entirely heartless woman. His infatuation for his wife dragged him into manifold dishonours, and to supply her extravagance he neglected the more spiritual side of his art, and merely concerned himself with money-getting. Last of all, he flung up his lucrative employment under the Fr. king, Francis I., whose confidence he is accused of betraying by embezzling large sums entrusted to him by the king for his own purposes. Lucretia sat for the face of most of his Madonnas, and in the Holy Family (Borghese Gallery). S.'s relations with his wife form the subject of one of Browning's best-known poems.

SARUM, OLD, see SALISBURY.

SARZANA (44° 6′ N., 9° 57′ E.), town, Genoa, Italy; bp.'s see; exports wine. Pop. 12,200.

SASKATCHEWAN (*c.* 55° N., 106° W.), western province, Canada, containing greater part of old districts of S. and Assiniboia, and half the former territory of Athabasca; formed, 1905; area, 250,650 sq. miles. In S. the province is crossed by S. River, and a considerable area is under wood; many lakes; several Indian reserves; capital, Regina; produces wheat, oats, barley, flax in great quantities, and has excellent fisheries; live stock raised; trades in furs. Saskatchewan is developing with extraordinary rapidity; railway communications are being greatly improved; enormous quantities of wheat exported annually. S. has a Lieut.-Gov. and Legislative Assembly. Pop. (1911) 492,432.

SASKATCHEWAN (54° N., 104° W.), river, Canada; rises in two branches in Rocky Mountains; joining near Prince Albert, flows E. into Lake Winnipeg.

SASSARI (40° 43′ N., 8° 34′ E.), town, capital, province Sassari, Sardinia; cathedral and university; trade in oil, grain. Pop. (1911) 43,240; (province) 331,778.

SASSERAM (24° 57′ N., 84′ 3° E.), town, Shahabad, Bihar and Orissa, India. Pop. 24,000.

SASSINA (43° 50′ N., 12° 10′ E.) (modern **Sarsina**), ancient town, on Sapis, Umbria, Italy; birthplace of Plautus (*q.v.*).

SATAN, see DEVIL.

SATARA (17° 41′ N., 74° 2′ E.), town, capital, Satara district, Bombay, Brit. India. Pop. 27,000; (district) 1,145,000.

SATELLITES, see ASTRONOMY.

SATI, SUTTEE (*q.v.*).

SATIN SPAR, see ARAGONITE.

SATINWOOD, a light-coloured furniture wood; obtained from *Chloroxylon swietenia* of India and Ceylon, and from W. Indies.

SATIRE (Lat. *satura*, a mixed dish), a form of literary composition (prose or verse) that exposes, ridicules, and censures particular or general vices and follies. S. may be fierce or kindly, but it must always be humorous. The 'father of s.' was Archilochos of Paros (VII. cent. B.C.); the inventor of Rom. s. was Gaius Lucilius (116 B.C.); famous Rom. satirists were Horace, Juvenal, and Perseus. Many great dramatists, novelists, etc., have strong satiric vein (*e.g.* Aristophanes, Molière, Cervantes, Thackeray). Among greatest modern satire writers are Butler, Dryden, Pope, Swift, Byron; Rabelais, Régnier, Pascal, Boileau, Voltaire, and Heine. The *Satire Ménippée* (1594) is a good example of political s.; written by several hands against the League.

SATPURA (21° 50′ N., 74° 30′ E.), range of hills, India, between valleys of Nerbudda and Tapti.

SATRAP, Persian provincial governor of ancient times. Darius I. (d. *c.* 485) organised empire into twenty satrapies.

SATRICUM, modern CONCA (41° 35′ N., 12° 50′ E.), ancient town, Latium, Italy.

SATSUMA ISLANDS (31° 40′ N., 129° 40′ E.), group of islands, W. of Kiushiu, Japan.

SATURN, second largest planet; remarkable for system of rings which surround its globe, but do not touch it. The diameter of the planet, according to Prof. Barnard, is 76,470 miles, while that of the rings is 172,000 miles, but they are only 13 miles thick. S. is the sixth planet in order of distance (some 886 million miles) from the sun. Its revolution period around the sun is 29 years 6 months. S. has ten satellites, named Mimas, Enceladus, Tethys, Dione, Rhea, Titan, Hyperion, Japetus, Phœbe, and Themis.

SATURN, a god of ancient Italy associated with agriculture; supposed to have reigned in Latium, taught civilisation, and established the Golden Age. The legend of S. was confused with the Gk. myth of Cronus, hence S. was said to have been deposed by Zeus, and came as an outcast to the Saturnian hill, where he was received and welcomed by Janus. In ancient art he is represented with a pruning-knife or sickle.

SATURNIA (42° 40′ N., 11° 30′ E.), ancient town, Etruria, Italy.

SATURNIAN VERSE, ancient Rom. verse loose in scansion, depending largely upon accent; some fragments are extant; was entirely superseded by classical metres.

SATURNINUS, LUCIUS APPULEIUS, Rom. demagogue, supporter of Marius; twice tribune, and brought forward an agrarian law, a corn law (reducing the price), and a law for founding new colonies; won popular favour. During his 3rd tribunate he had Memmius murdered to prevent his election to the consulship, but this action proved his ruin. The mob turned against him and eventually stoned him to death.

SATYRS (classical myth.), goat-like, half-human creatures attendant on Dionysus (Bacchus); dreaded by men.

SAU, see SAVE.

SAUCHIEBURN, see JAMES III.

SAUERLAND (51° 17′ N., 8° E.), mountainous region, Westphalia, Prussia.

SAUGOR (23° 50′ N., 78° 48′ E.), town, cantonment, capital, Saugor district, Central Provs., Brit. India. Pop. 43,000; (district) 475,000.

SAUJBULAGH, SUJBULAH (36° 45′ N., 45° 30′ E.), town, Azorbaijan, Persia; dried fruit. Pop. 6510.

SAUL, Old Testament character, king of Israel. The narratives contain divergent traditions about him. In one he is informed by Samuel, a local prophet, that he is divinely appointed to lead Israel against the Philistines; in the other he is chosen by lot when the Israelites desire a king. His dynasty was supplanted by David, friend of Saul's son Jonathan.

SAULT SAINTE-MARIE (46° 25′ N., 84° 16′ W.), city, on St. Mary's, capital, Chippewa County, Michigan, U.S.A.; manufactures flour, lumber. Pop. (1910) 12,615.

SAUMAREZ, JAMES SAUMAREZ, BARON DE (1757–1836), Brit. admiral; second in command at Battle of Nile; won great victory over Franco-Span. fleet near Cadiz, 1801.

SAUMUR (47° 15′ N., 0° 4′ W.), town, on Loire, Maine-et-Loire, France; seat of cavalry school; XI.-cent. castle; manufactures rosaries; trade in wine. Pop. 16,500.

SAUROPSIDA, a group erected by Huxley to include the vertebrate classes of Reptiles and Birds, and thus emphasise their many resemblances. Some of these are the presence of epidermic scales or feathers; of a lower jaw composed of one cartilage and four or five membranes, bones articulating with the skull through the quadrate; of a cloacal vent; of oval, nucleated, red blood corpuscles; and of large eggs, with much yolk, protected by a limy shell.

SAUROPTERYGIA, extinct REPTILE (*q.v.*).

SAUSSURE, HORACE BÉNÉDICT DE (1740–99), Swiss physicist and geologist; b. Conches, near Geneva; prof. of Physics and Philosophy, Geneva, 1762; made brilliant physical, botanical, geological, and meteorological observations in the Alps; invented and improved number of scientific instruments.

SAUSSURE, NICHOLAS THÉODORE DE (1767–1845), Swiss botanical physiologist.

SAVAGE ISLAND, NIUE (*q.v.*).

SAVAGE, RICHARD (d. 1743), Eng. poet; alleged to be illegitimate s. of Lord Rivers and the Countess of Macclesfield. His works include *Miscellanies*, *The Bastard*, and *The Wanderer*.

SAVAH (35° 10′ N., 50° 30′ E.), town, Persia; produces wheat, rice. Pop. 7500.

SAVAII, one of Samoa Islands (*q.v.*); area, 700 sq. miles.

SAVANNAH (32° 3′ N., 81° 7′ W.), seaport, Georgia, U.S.A.; regularly laid out; has many fine public buildings and great number of parks; episcopal see of Prot. and R.C. Churches, has R.C. cathedral; has fine harbour, with several miles of quays and wharfs; is second cotton port of U.S.A., and exports also timber, rice, flour, tobacco; taken by Federalists under Sherman in 1864. Pop. (1910) 65,064.

SAVARY, ANNE-JEAN-MARIE-RENÉ, DUKE OF ROVIGO (1774–1833), Fr. diplomatist and general; devoted aide-de-camp of Napoleon, 1800; won brilliant victory at Ostrolenka, 1807; succ. Fouché as Minister of Police, 1810; became reconciled to restored Bourbons.

SAVE, SAU, ancient *Savus* (44° 52′ N., 19° E.), river, Austria-Hungary; joins Danube at Belgrade.

SAVIGLIANO (44° 39′ N., 7° 38′ E.), town, Cuneo, Italy; manufactures iron and textiles. Pop. 5100.

SAVIGNY, FRIEDRICH KARL VON (1779–1861), Ger. jurist; prof. of Law at Berlin, 1810–42; author of *Das Recht des Besitzes* (1803), *Vom Berufe unsere Zeit für Gesetzgebung und Rechtswissenschaft* (1815), *Geschichte des Römischen Rechts im Mittelalter* (1826–31), *System des heutigen Römischen Rechts* (1840–48), *Das Obligationenrecht* (1851–53); these and other writings demonstrate that, historically, there is no absolute rule of right; first to detach scientifically Rom. contribution to jurisprudence.

SAVILE, GEORGE, see HALIFAX, MARQUIS OF.

SAVILE, SIR HENRY (1549–1622), warden of Merton Coll., Oxford, and founder of the Savile chairs of Geometry and Astronomy at Oxford. His works include editions of Tacitus and Chrysostom.

SAVINGS BANKS, see BANKS.

SAVOIE (45° 25′ N., 6° 30′ E.), department, France, formed part of old duchy Savoie; mountainous; chief occupation, agriculture; capital, Chambéry. Pop. (1911) 247,890.

SAVONA (44° 19′ N., 8° 28′ E.) (ancient *Savo*), seaport, in the Riviera, Genoa, Italy; cathedral possesses some fine works of art; iron and steel manufactures. Pop. 59,000.

SAVONAROLA, GIROLAMO (1452–98), Ital. friar; b. Ferrara, of noble family; ascetic in youth, joined the Dominican Order at Bologna, 1474; prior of San Marco, Florence, 1491. S. preached vehemently against the paganism and worldliness of the time in Italy, denounced the Medici, the Papal Curia, and Pope Alexander VI. By his influence Florence became a kind of theocratic republic; and the moral life of the citizens was regenerated. S.'s support of the French king, Charles VIII., whom he looked upon as an avenger of God for the cleansing of the Church, more than anything else brought him under the censure of Rome, for the pope was with nearly all Italy opposed to France. Summoned to Rome, 1495, S. excused himself from going on the ground of ill-health and danger.

Forbidden to preach, he refused to obey, and was excommunicated for disobedience, May 1497. Challenged by the Franciscans to the ordeal by fire for the proof of error, he was subsequently brought to trial, imprisoned, tortured, and with two other Dominicans, Fra Domenico and Fra Silvestro, condemned to death, 'on account of the enormous crimes of which they had been convicted.' On May 25, 1498, the three were hanged and their bodies burned. Fanaticism, the constant thought of the approaching judgment of God, of a new era, and of the subsequent regeneration of the Church, drove him to refuse obedience to Rome. In matters of faith he was entirely orthodox, and he was not condemned as a heretic. An ardent social and political reformer, S. cannot be claimed as a 'forerunner of the Reformation.'

Villari, *Life and Times of S.*

SAVORY, SIR WILLIAM SCOVELL, Bart. (1826–95), Eng. surgeon, lecturer on anatomy and physiology (1859), and later surgeon (1867) and lecturer on surgery (1869) at St. Bartholomew's Hospital, London; pres. Royal Coll. of Surgeons (1885–88); author of papers on surgical subjects.

SAVOY, HOUSE OF.—First hist. member of house of Savoy is Humbert of the White Hands (*c.* 1025–51); his son Otto (d. 1060), through his wife Adelaide, added Piedmont to Savoy; Amadeus III. (1103–48) was called Count of Savoy, and like his descendants played prominent part in European affairs; many of them were staunch imperialists in struggle of Guelphs and Ghibellines; younger members, Boniface and Peter, played part in England in XIII. cent. Amadeus V., 'the Great' (1285–1322), was confirmed by the emperor as Duke of Chablais and of Aosta, Marquis of Italy, perpetual vicar and prince of the empire; he decreed indivisibility of Savoy and descent to males, 1307. Savoy became duchy, 1416; the counts had established parliament and courts of justice, and in 1430 the *Statuta Sabaudiæ* were promulgated; Amadeus of Savoy was pope, as Felix V., 1439–48; Charles I. became king of Cyprus, 1485.

The Reformation was introduced into the Vaudois, 1525; France sent aid to Geneva and became mistress of Savoy, 1536–59; Emmanuel Philibert, restored by Treaty of Câteau-Cambrésis, initiated cautious policy of future rulers, 'the Gatekeepers of the Alps'; frequently occupied by France in XVII. cent., when dukes won character of able, unscrupulous schemers. Victor Amadeus II. became king of Sicily, 1713–1718, when he exchanged Sicily for Sardinia; steady encroachment on Lombardy; Savoy occupied by Spain, 1742–48. Extortions of Victor Amadeus III. (1773–96) led to risings; the *légion allobroge* aided Fr. Revolution; the duke joined Austrian invasion of France, with result that he was defeated and deposed, 1792, while Savoy became Fr. department of Mont Blanc. Victor Emmanuel I. was restored by Treaties of Paris, 1814–15; constitution granted, 1848. Savoy was ceded to France, 1860, by almost unanimous popular vote of Savoyards and consent of king of Sardinia, Victor Emmanuel II., who was crowned king of Italy, 1861; Victor Emmanuel was succeeded, 1878, by son Humbert (assassinated, 1900), father of Victor Emmanuel III. See PIEDMONT, SARDINIA, ITALY (*History*).

Vitelleschi, *Romance of Savoy.*

SAW FISHES, see under RAYS.

SAWANTWARI (16° N., 74° E.), small native state, Bombay, India. Pop. 220,000. Capital, SAWANTWARI. Pop. 10,500.

SAW-FLIES (*Tenthredinidæ*), family of Hymenopterous Insects, the members of which are most common in temperate regions. The female is armed with a saw-edged ovipositor, with which it pierces leaves, fruits, etc., afterwards depositing an egg. The larvæ of some forms do considerable damage to gooseberry and currant bushes, to the shoots of trees, and to turnips.

SAXE, HERMANN MAURICE, COMTE DE (1696–1750), natural s. of Augustus II. of Poland; distinguished in Franco-Pruss. invasion of Bohemia, 1741; conquered Austrian Netherlands, 1744–46; defeated British and Dutch, 1747–48; wrote *Mes Rêveries*, on art of war, and introduced new methods; 'the Turenne of Louis XV.'

SAXE-ALTENBURG (50° 50′ N., 11° 40′ E.), duchy, in Thuringia, Germany; consists of two nearly equal portions separated by the Reuss; traversed in E. by offshoots of the Erzegebirge; in W. by the Thingerwald; agriculture and cattle-rearing; varied manufactures. Pop. (1910) 216,128. Capital, Altenburg.

SAXE-COBURG-GOTHA, sovereign duchy of central Germany, comprising the two separate duchies Coburg and Gotha and eight small detached fragments. Coburg is surrounded by Bavaria and Saxe-Meiningen; Gotha lies between Prussia and northern slopes of Thuringian Forest; leather industries; agriculture, cattle-rearing, etc.; capitals, Coburg (*q.v.*) and Gotha (*q.v.*). Coburg became an independent duchy, 1680; Gotha, 1641; they were united, 1826; ruled by branch of Ernestine line of house of Saxony (Wettin). Leopold, bro. of Duke Ernest I., was made king of Belgium, 1831; Ferdinand, Ernest's nephew, married Maria da Gloria, queen of Portugal, 1836; Ernest's son, Albert, married Queen Victoria, 1840; succession was renounced by Prince of Wales (Edward VII.) and Duke of Connaught; passed to Charles Edward, Duke of Albany (1900). Area, 764 sq. miles. Pop. (1910) 257,177.

SAXE-MEININGEN (*c.* 50° 45′ N., 10° E.), duchy of central Germany; area, 953 sq. miles; surface generally mountainous; capital, Meiningen; chief industries, agriculture and mining; live stock raised; fruit and vegetables cultivated; iron, coal, and marble produced; represented by one member in Bundesrat, two deputies in Reichstag; duchy is overwhelmingly Protestant. Pop. (1910) 278,357.

SAXE-WEIMAR-EISENACH (*c.* 50° 45′ N., 12° E.), grand-duchy, Germany; comprises the three divisions of Weimar, Eisenach, and Neustadt; area, 1397 sq. miles; great part of surface forested; watered by tributaries of Elbe; capital, Weimar; other important towns are Eisenach, with famous Wartburg, and Jena, an old-fashioned Univ. town; became an independent principality in 1641, and was created grand-duchy by Congress of Vienna, 1815; sends one member to Bundesrat, three to Reichstag; chief

industry, agriculture; manufactures woollens, pottery, beer. Prot. faith prevails. Pop. (1910) 417,554.

SAXHORN is the name, derived from Adolphe Sax, the inventor, of a family of musical instruments evolved from the old bugle-horn by the employment of valves instead of keys.

SAXICAVA, see under LAMELLIBRANCHIATA.

SAXICOLA, WHEATEAR, see under THRUSH FAMILY.

SAXIFRAGACEÆ, natural order of plants, having flowers generally of 5 sepals, 5 petals, 10 stamens; mountain-dwellers; a genus is *Saxifrage*, a species of which, London Pride, is a common Brit. garden flower.

SAXO GRAMMATICUS (*c.* 1150–1206), Dan. chronicler; completed great work, *Gesta Danorum*, *c.* 1208; little known of life; said to have been Zealander and a 'clerk'; chronicle is history and legend welded together.

SAXONS, see TEUTONIC PEOPLES.

SAXONY (50° 54′ N., 13° E.), kingdom and state of the Ger. Empire; bounded N. and E. by Prussia, S. by Bohemia, W. by Bavaria, Reuss, Saxe-Weimar, Saxe-Altenburg, and province of Saxony; length, 130 miles, breadth, 93 miles; total area, 5787 sq. miles. The country is flat in N.W., belonging to great North German plain; mountain ranges mainly in S. and S.E.; Erzgebirge, on Bohemian border, with Fichtelberg (3979 ft.); Elbsandsteingebirge, on both sides of Elbe, containing the picturesque Saxon Switzerland, Lausitzer, and Elstergebirge in S.E. and E. Chief rivers are Elbe, Mulde, Schwarze Elster, Pleisse, Spree, Neisse. Climate is generally healthy; severe winters in Erzgebirge, where mean winter temperature is from 23° to 24°. Mean January temperature of Dresden, 31° F. Saxony has extensive forests (mainly fir and pine), and fine arable and pasture-land.

History.—Old Saxony occupied a large part of N. Germany; conquered by Charlemagne, 804, and accepted Christianity; passed to Louis the German, 843; erected into a duchy, IX. cent.; Thuringia annexed, 908; Henry I., the Fowler, Duke of Saxony, became king of Germany, 919. Duchy passed (1453) to Margrave of Meissen, of house of Wettin, whose entire dominions came to be known as Saxony. On death of Elector Frederick the Mild, Saxony was divided (1485) between the brothers Elector Ernst and Duke Albrecht, from whom descended the Ernestine and Albertine lines. By capitulation of Wittenberg (1547), the larger part of electoral dominions was given to Albertine Duke Maurice, ancestor of present royal family. Lausatia was acquired at Treaty of Prague, 1635; several Swedish invasions occurred until 1650; Frederick August I. (1694–1733) became R.C., and accepted Polish crown as August II. Frederick August II. (1733–63), ultimately siding with Maria Theresa, was defeated, 1745, in War of Austrian Succession. Saxony was invaded by Frederick the Great in Seven Years War, 1756; lost Poland, 1763; defeated with Prussia at Jena, 1806; afterwards supported Napoleon, made a kingdom, 1806, and joined Confederation of Rhine. King Frederick August I. (1763–1827), formerly Elector Frederick August III., was captured by Allies at Leipzig, 1813, and N. part of Saxony ceded to Prussia by Congress of Vienna, 1815; joined Zollverein, 1834; sided with Austria against Prussia in Seven Weeks War, 1866; joined Prussia in Franco-German War, 1870–71, and became state of German Empire. Under Albert, 1873–1902, George (1902–4), and Frederick August III. (1904–), Saxony has enjoyed peace and prosperity.

Government.—Saxony is a constitutional hereditary monarchy, with Landtag (Parliament), consisting of Upper Chamber, comprising princes, officials, etc., and Lower Chamber (91 members, elected for 6 years); the kingdom sends 23 members to the Reichstag and 4 to Bundesrath. For local administration it is divided into 5 governmental divisions: Dresden, Leipzig, Chemnitz, Zwickau, Bautzen. Principal towns are Dresden (capital), Leipzig, Chemnitz, Plauen, Zwickau.

Religion is mainly Lutheran, although royal family are R.C.; in 1910 there were 4,500,000 Protestants, 234,000 Roman Catholics. Elementary **education** is compulsory; there is a celebrated univ. and Conservatoire of Music at Leipzig, famous mining academy at Freiberg, school of forestry at Tharandt, besides many industrial, agricultural, music, art, and other institutions.

For **defence**, see GERMAN EMPIRE.

Saxony is one of the greatest industrial centres of the Ger. Empire, and an important agricultural and mining country. Chief products are wheat, rye, barley, potatoes, oats, hay, vegetables, fruit, timber. Principal industries are textiles, machinery, porcelain, glass, chemicals, musical instruments, watches, printing, typefounding, lace, paper, toys, tobacco, beer, spirits, etc.; extensive cattle-rearing and fishing; coal, iron, zinc, lignite, silver, arsenic, copper, lead; numerous mineral springs (Schandau, Marienborn, Augustusbad, Tharandt, Elster, etc.). Saxony is the most densely populated country in Europe. Pop. (1910) 4,806,661.

SAXONY (51° 50′ N., 12° E.), province, Prussia, formed mainly of that portion of Saxony ceded to Prussia in 1815; watered by the Elbe; in W. are Harz mountains; produces cereals and sugar-beets; has salt, coal, and copper mines; extensive manufactures. Pop. (1910) 3,089,275. Capital, Magdeburg.

SAXOPHONE, modern musical instrument with conical brass tube and reed mouthpiece, invented by Adolphe Sax, 1840; the bore contains about twenty holes covered by keys; a transposing instrument, compass over two octaves.

SAY (13° 8′ N., 2° 5′ E.), town, Upper Senegal and Niger colony, Fr. W. Africa, on Niger. Pop. 9000.

SAY, JEAN BAPTISTE (1767–1832), Fr. economist; sec. to Clavière, Minister of Finance of Revolution; edited Liberal *La Décade*, 1794–1800; tribune, 1799; pub. *Traité d'économie politique*, 1803; opposed to empire, and retired, 1804; prof. of Industrial Economy at Conservatoire, 1819, of Political Economy at Collège de France, 1831; enthusiastic follower of Adam Smith, but expounded theories in new manner. His grandson **Léon** (1826–96) was Minister of Finance, 1872–73, 1875–79, 1882. A Liberal and free-trader, he lessened indirect taxation, and defeated attempt at income tax; pres. of Senate, 1880; editor of and contributor to *Dictionnaire des finances* and *Nouveau dictionnaire d'économie politique*.

SAYAN MOUNTAINS (52° 20′ N., 95° E.), range, between E. Siberia and N.W. Mongolia, Asia.

SAYBROOK (41° 18′ N., 72° 23′ W.), town, at mouth of Connecticut, summer resort, Middlesex County, Connecticut, U.S.A. Pop. (1910) 1907.

SAYCE, ARCHIBALD HENRY (1846–), Eng. philologist; deputy-prof. of Comparative Philology, Oxford, 1876; voluminous writer.

SAYE AND SELE, WILLIAM FIENNES, 1ST VISCOUNT (1582–1662), Eng. soldier and politician; the only Puritan peer; colonel of parliamentary regiment, 1642.

SAYRE (41° 58′ N., 76° 27′ W.), town, on Susquehanna, Pennsylvania, U.S.A.; car-works. Pop. (1910) 6426.

SBEITLA (35° 17′ N., 9° 4′ E.), ruined city, ancient *Sufetula*, Tunis, on Menasser.

SCABIES, ITCH, skin disease due to animal parasite, the *Sarcoptes scabei*, which burrows beneath the skin, most commonly at clefts of the fingers; it is treated by thorough cleansing, and then application of sulphur ointment.

SCABIOUS (*Scabiosa*), genus of plants, order Dipsaceæ; flowers have terminal head; the purple Devil's Bit or Primrose S. (*S. succisa*) is a common Brit. wild flower.

SCÆVOLA, Rom. patrician family. Chief members: (1) **Gaius Mucius**, attempted regicide in time of kings, and won patronymic (*Scævola* = 'left-handed') by destroying right hand as proof of constancy. (2) PUBLIUS MUCIUS, consul, 133, *pontifex maximus*, 130;

famous jurist. (3) **Quintus Mucius**, consul, 95; murdered by Marians, 82.

SCAFELL (54° 26′ N., 3° 14′ W.), mountain, Lake District, Cumberland, England.

SCALA, see Milan.

SCALA NUOVA, Turk. **Kush-Adasi** (37° 52′ N., 27° 15′ E.), seaport, Asia Minor. Pop. 7500.

SCALDS, see Burns and Scalds.

SCALE INSECTS (family, *Coccidæ*; order, *Hemiptera*), minute bugs, often injurious to fruit trees and plants; females are wingless and live beneath a scale composed of exuded matter, cast skins, etc. Many secrete valuable commercial products, such as Indian white wax and lac, and the manna of the Bible is probably the honeydew of a Mediterranean *Coccus*, while the body of another furnishes cochineal.

SCALES, see Weighing-Machines.

SCALIGER, JULIUS CÆSAR (1484–1558), prominent Ital. scientist and scholar; claimed to be son of Benedetto della Scala, of great Veronese family, but account of his own life not trustworthy; doctor at Agen, and engaged in learned disputes with Erasmus and Cardan, translated classics, and wrote Lat. verse. *Life*, by Mager (1880). **Josephus Justus Scaliger** (1540–1609), his son, the famous scholar, was firmly convinced of Scala connection, and in 1594 pub. *Epistola de vetustate et splendore gentis Scaligeræ*, to which Scioppius replied in *Scaliger Hypoloymœus*, feebly refuted by S. in *Confutatio stultissimæ Burdonis fabulæ*; prof. at Leiden, 1593, till death. Pamphlets *De emendatione temporum* and *Thesaurus temporum* mark epoch in science of chronology, as his criticisms of classical texts introduced new broader method of criticism in which intelligent interpretation assisted palæography; friend of Justus Lipsius, Grotius, Heinsius, Casaubon; praised by Mark Pattison as 'the most richly stored intellect which had ever spent itself in acquiring knowledge.' *Life*, by Bernays (1855).

SCALLOPS, see under Lamellibranchiata.

SCALP, term applied to the outer covering of the top of the skull, composed of *skin*, which is thick and has a great number of hair follicles; *superficial fascia*, with much fibrous tissue, containing arteries, which are very tortuous and bleed very freely when cut, veins, and nerves; a third layer comprising the anterior and posterior parts of the occipito-frontalis muscle with the flattened tendon or aponeurosis between them; a fourth layer of loose areolar tissue; and the external periosteum of the skull bones making a fifth layer. It was formerly considered that wounds of the scalp were especially liable to be followed by suppuration or erysipelas, but these conditions are due to the invasion of bacteria, and are prevented, as in wounds elsewhere, by treating all injuries strictly by aseptic and antiseptic methods. The most common tumours of the scalp are *Wens*, which are sebaceous cysts, and are treated by removal under a local anæsthetic.

SCAMMONY, a gum-resin from root of *Convolvulus Scammonia*, a plant of Asia Minor; a strong purgative and vermicide.

SCANDERBERG, 'Iskander (Alexander) Beg,' George Castriot (*c.* 1403–67), Albanian chief; kidnapped by Turks; he became a commander in Turk. army; renounced Islam and proclaimed independence of Albania; for over 20 years warred successfully against Turks.

SCANDEROON, Alexandretta (*q.v.*).

SCANDINAVIAN LANGUAGE, see Teutonic Languages.

SCANIA, S. part of Sweden (*q.v.*).

SCAPEGOAT, see Azazel.

SCAPHOID BONE, see Skeleton.

SCAPHOPODA, a class of Mollusca, including the miniature tusk-like Elephant's-Tooth Shell (*Dentalium*). The animal is comparatively simple, without distinct head, eyes, or heart, but the mantle-edges fuse to form a tube, which secretes the tubular shell, open at both ends. S. are entirely marine, and are found burrowing in sand usually some distance beneath the surface. They feed on microscopic organisms in sea water. Their fossil remains are found so far back as Devonian rocks.

SCAPOLITE, mineral group composed of aluminium, calcium, and sodium silicate; varieties: Wernerite of common s. and mizzonite. Colours: white and grey. Occurs generally in crystalline limestones, schists, and gneisses, and has metamorphic origin.

SCAPULA, see Skeleton.

SCARAB, Scarabæus, a species of dung-beetle, venerated by the Egyptians and engraved as a symbol of astronomical and mystic ideas on gems, etc.

SCARABÆIDÆ, see Chafers.

SCARBOROUGH (54° 16′ N., 0° 25′ W.), seaport, on North Sea, fashionable watering-place, N. Riding, Yorkshire, England; dominated by the ruins of its ancient castle; has churches, theatres, hospitals, aquarium, museum, and a fine promenade; mineral springs; fisheries. Pop. (1911) 37,204.

SCARLATINA, see Scarlet Fever.

SCARLATTI, ALESSANDRO (1659–1725), Ital. composer and teacher; b. Trapani; studied at Rome under Carissimi; lived at Naples, 1684–1702; app. *mæstro* to Santa Maria Maggiore, Rome, 1707. S. was the founder of the Neapolitan school; an intellectual musician with pure and vigorous style; prolific opera composer—*Mitridate Eupatore*, *Tigrane*, *Griselda*, etc.; chamber-cantatas, masses, and other works. His son Domenico (1683–1757) was also a composer of note.

SCARLET FEVER, Scarlatina, an infectious fever, characterised by sore throat, a red, diffuse eruption on the skin, followed by desquamation or shedding of the superficial part of the skin. The disease is caused by a micro-organism which is not yet known, and infection is conveyed by the breath, by discharges from the throat or nose, or by objects, or, very frequently, milk, which have come in contact with infected persons. It is believed that a micro-organism which causes a certain disease in cows causes scarlet fever in man, the infection being thus directly carried by milk.

The incubation period is short, two to three days, and the onset of the fever is usually sudden, with headache, shiverings, and sore throat, the face flushed, the pulse rapid, and the tongue coated with a thick, white fur. The eruption appears on the second day, as a red flush, in which are scattered small red pimples, first on the neck and chest, spreading over the body, and disappearing, with the fever, about the end of a week. Several varieties of scarlet fever are described, the *benign* type being a slight affection, the *malignant* characterised by very high temperature and very rapid pulse, and the *septic* or *ulcerative* type by ulceration of the throat and swollen glands of the neck, death often occurring in the last in the first or second week.

The treatment of the disease is rest in bed, a light, nourishing diet, gargling the throat with a boracic acid solution, cold packs for very high temperature; a patient must be isolated for six or seven weeks. The most important complications are inflammation of the kidneys and inflammation of the middle ear, both of which are treated as they arise.

SCARRON, PAUL (1610–60), Fr. comic writer; partly paralysed from age of twenty-eight; married, 1652, Françoise d'Aubigné, the future Mme de Maintenon; created a burlesque style partly imitated from Spanish; wrote the *Typhon* (1644), *Virgile travesti* (1648–52), in verse, and the *Roman comique* (1651) in prose—light, amusing burlesques from which Molière drew much.

SCAUP, see under Duck Family.

SCAURUS, MARCUS ÆMILIUS (*c.* 163–88 B.C.), Rom. consul, 115; involved in Jugurthine scandals, 112; censor, 109; built *Via Æmilia*. His son, of same name, was sent as quæstor to Judæa.

SCEPTICISM (Gk. *skeptomai*, I consider, reflect), strictly, the state of mind before reaching definite conclusions, but finally denying that knowledge is possible; not, as with Descartes, a preliminary step, but the last stage; found in the Sophistic antagonism to dogmatic philosophy, and more distinctly in Pyrrho,

who sought peace of mind by refraining from definite opinions and judgments, and in the Academics, under Arcesilaus and Carneades. Ancient arguments were based on differences in interpretation of same sense data at different times and by different men at the same time, dependence of appearance of objects on position and distance, variations in human customs and manners, and moral and religious beliefs, and the inadequacy of reason which bases demonstration on an endless chain of assumptions. Modern s. is a state of unrest and yearning; Hume shows it strongly; Reason powerless within as well as beyond experience; Kant denies knowledge of noumena; Hamilton's doctrine of Relativity of Knowledge leads to s. Of modern origin is s. in support of faith; thus Pascal (1623–62) introduces faith to warrant belief in cases where reason is full of insoluble contradictions.

SCEPTRE, oldest emblem of authority, borne by Hebrew kings and priests, by Persian eunuchs,—'bearers of the sceptre,'—Greek chieftains, Rom. kings, and consuls.

SCHADOW, the name of a distinguished family of Ger. artists. Johann Gottfried (1764–1850) executed numerous busts of great Germans. His son, Rudolf (1786–1822), produced several important works. Another son, Friedrich Wilhelm (1789–1862), succeeded Cornelius as head of the Düsseldorf School of Painting.

SCHÄFER, EDWARD ALBERT (1850–), Brit. physiologist; prof. of Physiology, Edinburgh Univ., since 1899; sec., Brit. Association, 1895–1900; as pres., 1912, he delivered, at Dundee, his famous address on the Origin of Life, anticipating an explanation of life on a physico-chemical basis. His publications include an edition of *Quain's Anatomy*, several text-books of physiology. A man of wide knowledge and deep research.

SCHAFF, PHILIP (1819–93), Amer. divine; ed. at Ger. univ.; prof. in Union Theological Seminary from 1869; tried to moderate rigorous Protestantism of Ger. reformed churches; wrote numerous works on theology, Church history, etc.

SCHAFFHAUSEN (47° 50′ N., 8° 40′ E.), canton, N. of Rhine, Switzerland; undulating, fertile; chief occupation, agriculture; joined the Swiss confederation in 1501. Pop. (1910) 46,097. Capital, **Schaffhausen** (47° 41′ N., 8° 38′ E.), on Rhine; contains castle of Munoth, cathedral, town hall, museum, and Imtherneum; manufactures iron and steel. Pop. (1912) 18,500.

SCHALL, JOHANN ADAM VON (1591–1669), Ger. missionary; became Jesuit, 1611; sent to China, 1622; revised Chin. imperial calendar.

SCHALMEI, see OBOE.

SCHANDAU (50° 55′ N., 14° 10′ E.), town, on Elbe, Saxony; tourist centre. Pop. (1910) 3413.

SCHARNHORST, GERHARD JOHANN DAVID VON (1755–1813), Pruss. soldier and military writer; Scharnhorst and Stein, though thwarted by Napoleon, were chief authors of reforms to which rise of Prussia was due; S. wrote much on art of war; taught at Military Academy, Berlin, and founded Berlin Military Association.

SCHÄSSBURG, see SEGESVÁR.

SCHAUMBURG-LIPPE (52° 10′ N., 9° E.), principality, Ger. Empire; capital, Bückeburg; area, 131 sq. miles. Pop. (1910) 46,652.

SCHEELE, KARL WILHELM (1742–86), Swed. apothecary who made great chemical discoveries; discovered oxygen; studied pyrolusite (MnO_2) and discovered chlorine; prepared phosphorus from bones, discovered hydrocyanic (Prussic) acid, arsenetted hydrogen and Scheele's green ($CuHAsO_3$), prepared glycerine and numerous organic acids from natural sources.

SCHEFFEL, JOSEPH VIKTOR VON (1826–86), Ger. poet and novelist; b. Karlsruhe; best works, *Trompeter von Säckingen* (epic), *Ekkehard* (historical novel).

SCHELDT, SCHELDE, ESCAUT (50° 10′ N., 3° 11′ E.), river, France, Belgium, and Holland; rises in Aisne department, and enters North Sea; passes Valenciennes, Oudenarde, Ghent, Antwerp; length, 250 miles; navigable to Cambrai; tolls imposed, 1648–1863.

SCHELLING, FRIEDRICH WILHELM JOSEPH VON (1775–1854), Ger. philosopher, founder of Objective Idealism; b. Württemberg; prof. at Jena, Munich, Berlin. His philosophy shows several stages of development; at first, an adherent of Fichte (*q.v.*); later, combined Subjective Idealism with Spinozism, producing a 'System of Identity.' The ego does not make the non-ego, nor the non-ego the ego; both are forms of the revelation of the Absolute Ego. The Absolute divides itself into polar opposites, positive, ideal, spirit, and negative, real, nature; reason being the 'Indifference Point.' Mind and matter are then two aspects of a higher unity; nature is visible spirit, spirit, invisible nature—an identity perceived by 'Intellectual Intuition.' Subject and object are in all things, combined in differing degrees. History shows three stages of development: a period of Nature, found in Gk. poetry and religion; of Fate, at end of the ancient world; and of Providence, commencing with Christianity. S.'s thought is influenced by Neo-Platonism, Boehme, and Bruno, and approximates to mysticism.

SCHENECTADY (42° 44′ N., 73° 59′ W.), city, on Mohawk; capital, Schenectady County, New York, U.S.A.; seat of Union College; knitted goods; agricultural implements; electrical machinery; burned by French and Indians, 1690. Pop. (1910) 72,826.

SCHENKEL, DANIEL (1813–85), Swiss Prot. divine; became advanced liberal in theology; prof. at Basel and Heidelberg; opposed Catholic tendencies.

SCHERER, EDMOND HENRI ADOLPHE (1815–89), Fr. scholar.

SCHEVENINGEN (52° 16′ N., 4° 18′ E.), fishing town, watering-place, on North Sea, S. Holland province, Netherlands; Brit. fleet defeated Dutch off S., 1653. Pop. 24,000.

SCHIEDAM (51° 54′ N., 4° 24′ E.), town, S. Holland province, Netherlands, at junction of Schie and Maas; manufactures gin. Pop. (1911) 33,235.

SCHILLER, JOHANN CHRISTOPH FRIEDRICH VON (1759–1805), Ger. poet and dramatist; b. Marbach; entered military school, Ludwigsburg, 1773, and Stuttgart, 1775; first drama, *Die Räuber*, appeared, 1781; followed by the tragedies, *Die Verschwörung des Fiesco zu Genua* (1783) and *Kabale und Liebe* (1784); visited Leipzig, 1785, then Dresden; formed intimate friendship with Körner. *Don Carlos* was completed, 1787; in the same year S. visited Weimar, where he began his two historical works on Thirty Years War, and Netherland's War of Independence. Prof. of History at Jena Univ., 1788; formed intimate and lasting friendship with Goethe, 1794. To S.'s last period belong fine ballads (*Der Ring des Polykrates*, *Der Taucher*, *Das Lied von der Glocke*, etc.), lyrics, the great classical drama *Wallenstein* (1800), and dramas *Maria Stewart*, *Die Jungfrau von Orleans* (1801), *Die Braut von Messina* (1803), *Wilhelm Tell* (1804); S. was unfortunate in money matters, and suffered from constant bad health during his latter years; a fine character and great dramatist, S. ranks next to Goethe in Sturm und Drang period.

Carlyle, *Life*; Nevinson, *Life*; Robertson, *S. after a Century*; Rea, *S.'s Dramas and Poems in England* (1906).

SCHILTBERGER, JOHANN (HANS) (1381–1440), Ger. traveller; captured by Turks while fighting for Hungarians, 1396, and travelled about for years as slave; finally escaped and wrote valuable, though occasionally untrustworthy, *Reisebuch*.

SCHIPKA PASS, SHIPKA PASS (*q.v.*).

SCHISM, separation from a church: GREAT S. was division between Gk. and Lat. Churches; WESTERN S. (XIV. and XV. cent's) was due to rival claims to papal chair. See ANTIPOPE, PAPACY.

SCHISTS (Gk. *schistos*, split), rocks of foliated

structure found in metamorphic or crystalline rocks as gneiss, mica-schist, hornblende-schist, and in such regions as Central Alps, Himalayas, Saxony, Scandinavia, Scot. Highlands, and N.W. Ireland. S. splits easily, hence name.

SCHIZOMYCETES, see BACTERIOLOGY.

SCHLAGINTWEIT, surname of five brothers (Germans) who became famous as scientific explorers :—HERMANN (1826–82), ADOLF (1829–57), EDUARD (1831–66), ROBERT (1833–85), and EMIL (1835–1904).

SCHLAN (50° 13′ N., 14° 3′ E.), town, Bohemia, Austria ; coal mines. Pop. (1911) 9683.

SCHLANGENBAD (50° 5′ N., 8° 5′ E.), watering-place, Hesse-Nassau, Prussia ; mineral springs.

SCHLEGEL, AUGUST WILHELM VON (1767–1845), famous Ger. critic and translator ; b. Hanover ; ed. Göttingen ; travelling companion to Madame de Stäel ; translated 17 of Shakespeare's plays ; celebrated for lectures delivered in Berlin and Vienna on lit. and art.

SCHLEGEL, KARL WILHELM FRIEDRICH VON (1772–1829), Ger. critic and poet ; b. Hanover ; wrote *Über die Sprache und Weisheit der Indier*, *Fragmente* (treatises), *Lucinde* (novel), etc.

SCHLEIDEN, MATTHIAS (1804–81), German botanist, devoted to plant histology.

SCHLEIERMACHER, FRIEDRICH DANIEL ERNST (1768–1834), Ger. theologian and philosopher ; b. Breslau ; s. of army chaplain ; ed. Moravian institutes at Niesky and Barby ; forsook orthodoxy and studied Plato, Spinoza, and Kant at Halle ; eminent preacher, critic, and translator of Plato ; champion of moral and political reforms ; brought about, in 1817, union of Lutheran and Reformed Churches in Prussia.

In epistemology, S. approximates to Kant, though with more practical interest. Knowledge implies a material factor from sense, and a formal, from the understanding. The highest knowledge, however, that of God, cannot be so derived, whence the supreme value of religion. Religion is to be considered not merely as a means to social order and individual morality, and as expressing certain views of nature and history, but as that feeling in which man becomes conscious of his own destination ; it is based on a feeling of absolute dependence on God, through which is revealed to man his own immortality. Historical religions depend on the communication to others of one's consciousness of God. This is particularly true of Christianity, which is essentially a religion to be realised through experience, centred in the personality of Christ the Redeemer. Faith in Christ depends on a pious disposition common to us and to Him ; through it we believe in the fundamental facts of Christianity. Doctrines of devil and of fall of wicked angels are rejected.

Munro, *Schleiermacher*.

SCHLEIZ (50° 34′ N., 11° 48′ E.), town, on Wiesenthal, principality of Reuss (younger line), Germany. Pop. (1910) 5564.

SCHLESWIG (54° 30′ N., 9° 34′ E.), town, seaport, on Schlei inlet ; capital of Schleswig-Holstein, Prussia ; has cathedral and ducal castle ; tanneries, flour-mills. Pop. (1910) 19,909.

SCHLESWIG-HOLSTEIN (54° 52′ N., 9° 9′ E.), province, Prussia, bordering on North and Baltic Seas ; area, 7338 sq. miles ; surface generally plains and moors ; drained by Eider and Elbe ; crossed by Kaiser Wilhelm Canal ; capital, Schleswig ; agriculture important ; live stock raised ; manufactures textiles, hardware, beer ; shipbuilding carried on.

History.—SCHLESWIG was inhabited in II. cent. B.C. by Cimbros. Afterwards Angles settled on E., Frisians on W., and Jutes on N. coast. Dan. inroads followed, and Dan. province of Schleiaswic or Hethaby founded. Henry I. of Germany established (934) mark of Schleswig in district wrested from Denmark between Eider and Schlei ; Otto I. formed bishopric of Schleswig, 849 ; reconquered by Canute, 1027, and became Dan. duchy. Gerhard, Count of Holstein, seized duchy, restored it, 1330, but stipulated that on death of Valdemar V. it should come to his family ; Gerhard VI. of Holstein was invested, 1386. HOLSTEIN, originally part of duchy of Saxony, had become separate county, 1106. When Christian I. succeeded to duchy and county, 1460, he promised to maintain union and observe liberties. Holstein, Schleswig, and Stormarn were erected into duchy by Emperor Frederick III., 1474. In partitions of possessions of house of Oldenburg (*q.v.*), 1544 and 1581, Schleswig became Dan. fief, while Holstein remained German, but they retained single administration under their respective rulers, the king of Denmark and Duke of Gottorp. Duke of Gottorp succeeded to Russ. empire as Peter III. (*q.v.*), 1762, and in 1767 Catherine II. renounced right in the duchy ; confirmed as Dan. state on dissolution of Roman empire, 1806, but Holstein with duchy of Lauenburg became member of Ger. Confederation by Treaty of Vienna, 1815.

Rise of national consciousness brought friction with Denmark ; claim was made that the duchies were not subject to feminine succession, and that if Denmark passed to female heir they should descend to male heir, Duke of Augustenburg ; revolt, 1848, sustained by Prussia, Schleswig being admitted into the Ger. Confederation. The Danes occupied Schleswig, were defeated by Prussian invaders, but forced Prussia to retreat, 1850, and stamped out revolt with aid of Austria. The powers agreed, 1852, that Prince Christian of Sonderburg-Glücksburg was heir of Denmark and the duchies. Renewed opposition caused Denmark to grant independence to Holstein and Lauenburg, 1863, but incorporate Schleswig. When king of Denmark died, 1863, a strong party supported Augustenburg's claims to duchies against Christian IX. of Denmark and installed him. Invasion of Prussia and Austria to enforce agreement of 1852 ended in subjugation of Denmark and cession of its rights in Holstein, Schleswig, and Lauenburg to Austria and Prussia, 1864 ; instead of establishing Augustenburg, they divided the duchies at Gastein, 1865, but soon quarrelled, and after great Prussian victory over Austria at *Königgrätz*, 1866, Prussia took all. The question of citizenship of Danes in the duchies was not settled till 1907, owing to Prussia breaking clauses of treaties of 1864 and 1866. Pop. (1910) 1,621,004.

SCHLETTSTADT, town, on Ill, Alsace-Lorraine, Germany ; centre of agricultural and vine-growing district. Pop. 10,610.

SCHLEY, WINFIELD SCOTT (1839–1911), Amer. admiral ; rescued Greely, 1884 (see POLAR REGIONS) ; second in command at *Santiago*, 1898 (see SPANISH-AMERICAN WAR).

SCHLIEMANN, HEINRICH (1822–90), Ger. archæologist, distinguished as the excavator of the sites of Troy and Mycenæ. The treasures he unearthed at Troy are now in the Ethnological Museum at Berlin, those from Mycenæ in the Polytechnic at Athens. The results of his work are described in *Schliemann's Excavations*, edited by Madame Schliemann.

SCHLOSSER, FRIEDRICH CHRISTOPH (1776–1861), Ger. historian ; b. Jever ; wrote *History of Iconoclastic Emperors of the East* ; *World History of the German People* ; *History of XVIII. Cent.*, etc.

SCHLÖZER, AUGUST LUDWIG VON (1735–1809), Ger. historian ; b. Gaggstedt, Württemberg ; best works are *Allgemeine Nordische Geschichte*, translation of Russian chronciler Nestor up to 980 ; *Weltgeschichte im Auszuge und Zusammenhang*.

SCHLÜSSELBURG (60° N., 32° E.), town, on Neva, St. Petersburg, Russia. Pop. 5600.

SCHMALKALDEN (50° 43′ N., 10° 28′ E.), town, summer resort, Hesse-Nassau, Prussia ; manufactures hardware ; scene of *Schmalkaldic League*, in defence of Protestantism, 1530. Pop. (1910) 10,020.

SCHMERLING, ANTON VON (1805–93), Austrian statesman and judge ; leader in attempted revolution, 1848 ; became pres. of diet, minister of

interior and of foreign affairs; resigned, 1851, and refused office till new constitution was granted, 1862; retired, 1865.

SCHNAPPER, THE AUSTRALIAN, see SEA BREAM.

SCHNEEBERG (50° 1′ N., 12° 10′ E.), town, kingdom of Saxony; embroidery and lace industries. Pop. 9200.

SCHNEEKOPPE (50° 46′ N., 15° 37′ E.), mountain (5200 ft.) in the Riesengebirge, Germany; meteorological station.

SCHNEIDEMÜHL (53° 9′ N., 16° 43′ E.), town, Posen, Prussia; iron manufactures. Pop. (1910) 26,129.

SCHNITZER, EDUARD, see EMIN PASHA.

SCHNORR VON KAROLSFELD JULIUS (1794–1872), Ger. painter; prof. at Munich and Dresden; and, among many other works, designed 180 pictures to illustrate Biblical narratives.

SCHOLASTICISM, a term applied to no fixed doctrine or school, but to philosophic work extending over several hundred years; an exposition of Christian dogma on Gk. principles, aiming at the reconciliation of faith and reason; according to some, commenced in VIII. cent.—so including the Britons Alcuin and Erigena (*qq.v.*)—according to others, as late as the mid-XI.; in either case, was most flourishing from this latter date till the middle of the XIV. The first scholastics had few Gk. philosophical writings. Plato was practically unknown to them, and the logical doctrines of Aristotle imperfectly understood till the XII. cent. In the XIII. his other works were available in Latin translations by Arabic and Hebrew scholars. See ARABS (ARABIAN PHILOSOPHY).

S. presents three points of view—the *theological*, dealing with Church dogma, the *mystical*, treating of personal piety, and the *classical*, referring to Gk. philosophy. From this third aspect, it was mainly the old problem of 'Universals' which occupied attention, the question of Realism and Nominalism (*qq.v.*). The issue once raised, its importance was immediately grasped, in its connection with the doctrines of the Trinity, the Real Presence, the Status of the Church. Discussion falls into three periods. First, the *Platonic*, in the XI.–XII. cent's, when ANSELM (1033–91), Abp. of Canterbury, affirms the real existence of the universal prior to the concrete things in which it exists. Anselm is the author of the doctrine 'Credo ut intelligam,' and of the 'ontological' argument for God's existence (see KANT). In this period also we find ROSCELLIN, an extreme Nominalist (general notions mere names, with no objective reality), ABELARD (1079–1142), intermediate between the opposing doctrines, BERNARD OF CLAIRVAUX, and PETER LOMBARD. The second period is the *Aristotelian*, the Stagirite's writings being now more widely known. THOMAS AQUINAS (1225–74) makes Aristotle a pillar of Christian dogma; reason is inadequate to discern the highest truths, *e.g.* of the Trinity and Incarnation, but is supplemented by revelation; the two are not opposed, but are different stages in the acquirement of knowledge. The third period, from the XIV. cent., shows this union of reason and faith broken. DUNS SCOTUS (1274–1308) contends that the Christian doctrine transcends reason and requires belief; he enlarges the sphere of authority and refers on many subjects to the will of God. The rival schools of *Thomists* and *Scotists* discuss which is greater, Will or Intellect. WILLIAM OF OCCAM revives the Nominalism of Roscellin; reason is powerless to establish any article of faith.

From the mystical aspect we find a movement towards the exaltation of personal holiness, most prominent in the later part of the period. Prominent are BERNARD OF CLAIRVAUX, BONAVENTURA the Seraphic Doctor, FRANCIS OF ASSISI (1182–1226), founder of the Grey Friars, and DOMINIC, founder of the Black Friars. The Christian ideal became the rapt contemplation of the sufferings of Christ, and a life of poverty and chastity. Later mystics were JOHN TAULER of Strassburg and THOMAS À KEMPIS (see IMITATION OF CHRIST).

The doctrine of S. was hastened by events outside the Church—the exploration of the East and the discovery of the West, the revolutionary Copernican theory of the heavens, the claim to the right of private judgment, the revival of learning after the fall of Constantinople, the

by the Italians TELESIO (*q.v.*) and BRUNO burnt, 1600). A period of transition extended from 1450 to 1600, and led up to the commencement of modern philosophy in the XVII. cent.

S. has been criticised as philosophising in support of a foregone conclusion, as exhibiting minute (and somewhat unjustly), puerile speculation, but making no advance on Aristotle, as neglecting history, experience, languages; it has been admitted, however, to be distinguished by great subtlety of thought and rare development of ontological notions. There has been a revival of S. among Roman Catholics, and there is a flourishing school of S. at Louvain Univ., where its adherents have shown that it is not averse to empiricism, and that only one of its sides is apologetic.

Father Rickaby, S.J., *Scholasticism*; De Wulf, *Scholasticism, Old and New.*

SCHOMBERG (SCHÖNBERG), DUKE OF, FRIEDRICH HERMANN (c. 1650–90), soldier; distinguished under Turenne and in Portugal, 1660–65; marshal of France, 1675, but fled at revocation of Edict of Nantes, 1685; second in command to Prince of Orange in invasion of England; captain-general of Eng. forces, 1689; slain at *Battle of the Boyne.*

SCHOMBURGK, SIR ROBERT HERMANN (1804–65), Eng. traveller of Ger. birth; sent by Royal Geographical Soc. to explore river Essequibo, he discovered lily *Victoria regia*; government surveyor of boundaries of Guiana, hence 'Schomburgk Line' between Guiana and Venezuela.

SCHÖNEBECK (52° 2′ N., 11° 44′ E.), town, Pruss. Saxony, on Elbe; manufactures chemicals. Pop. (1910) 18,305.

SCHÖNEBERG, town, Brandenburg, Prussia; suburb of Berlin. Pop. (1910) 172,823.

SCHÖNFELD, EDUARD (1828–91), Ger. astronomer; studied architecture, chem., and astron.; app. director Bonn Observatory, 1875.

SCHÖNINGEN (52° 8′ N., 10° 57′ E.), town, Brunswick, Germany; chemical works. Pop. (1910) 9773.

SCHOOLCRAFT, HENRY ROWE (1793–1864), Amer. traveller and ethnologist; lived for 30 years among Indians; married an Indian girl; discovered Mississippi source; wrote much on Indians and travels.

SCHOOLS, see EDUCATION.

SCHOPENHAUER, ARTHUR (1788–1860), Ger. philosopher; founder of modern pessimism; b. Dantzig; ed. Göttingen and Berlin; d. Frankfort; was morose, suspicious, egotistical; chief works, *The World as Will and Idea* (1819), *The Will in Nature* (1836).

S. reduces Kant's *à priori* sources of knowledge to one, and rejects the thing-in-itself. The essential form of thought is the principle of causation. The world of phenomena is an ideal representation, an appearance. The fundamental thing in us is will; intellect is secondary, and since what is essential to us is the ultimate principle of everything else, the entire universe is essentially a self-objectifying will. Will is to be taken in a wide sense, including every exertion of power with a purpose; it can exist without consciousness, and is shown in spontaneous animal actions, and in every force and power of the vegetable and inorganic worlds. Will expresses itself in forms equivalent to Plato's 'ideas,' inner essences of things forming a graduated series up to man, the highest form of life. Each member has its particular forces, and between individuals there is a perpetual conflict and the survival of the fittest. Hence pessimism; all willing comes from want and suffering, satisfaction is illusory; human life is endless pain, conflict, and struggle; the human 'virtues' are but

refined egoism, and pity is the sole virtue; the world contains infinitely more pain than pleasure, and is the worst possible world. Escape is provided (1) by dwelling in pure thought; (2) by overcoming the will-to-live; not suicide, but asceticism, and subduing of all bodily desires.

Wallace, *Life* (1890); Caldwell, *Schopenhauer's System* (1893).

SCHORL, compound of quartz and black tourmaline (*q.v.*); of igneous origin; occurs associated with granite and crystalline schists; is granular in texture and found in masses; colour grey; sometimes contains quantities of white mica and tinstone; fine-grained and splinters easily.

SCHOUVALOFF, see SHUVALOV.

SCHREIBERHAU (50° 40′ N., 15° 30′ E.), village, health resort, Silesia, Prussia; glass-works. Pop. (1910) 5656.

SCHREINER, OLIVE, MRS. S. C. CRONWRIGHT SCHREINER (1859–), S. African novelist; pseudonym, 'Ralph Iron'; became famous with her *Story of an African Farm* (1893).

SCHUBERT, FRANZ PETER (1797–1828), Austrian composer; b. and d. at Vienna. Having a fine voice, and being already well grounded in music, he obtained, in 1808, a place in the choir school of the Imperial Chapel, and his compositions soon figured in the concert programmes there. Later he had lessons from Salieri, the intimate of Mozart. For three years he assisted in his father's school, but this period produced some of his finest songs, including *The Erl King*, and music became his sole profession. For a time he was music-master in the household of Count Esterhazy, the only fixed appointment he ever held. Gradually his songs made an impression, and he extended his range, producing with feverish anxiety operas, cantatas, masses, symphonies, quartets, and chamber music of all kinds. His *forte*, however, was the *lied*. No fewer than 605 songs are credited to him, and in this department alone he was unquestionably the most fertile and original melodist who ever lived.

Life, by Frost (1885), Duncan (1905); Clutsam, *Schubert* (Masterpieces of Music).

SCHULTZE, MAX JOHANN SIGISMUND (1825–74), Ger. histologist; prof. of Anat. at Halle, 1854, and Bonn, 1859; most important work was on the cell theory.

SCHULZE-DELITZSCH, FRANZ HERMANN (1808–83), Ger. lawyer, politician, and philanthropist; established first Provident Soc. at Delitzsch, 1850; held first *Genossenschaftstag*, 1859; established *Genossenschafts-Bank*, 1865.

SCHUMANN, ROBERT ALEXANDER (1810–1856), Ger. composer; b. at Zwickau; d. at Endenich, near Bonn. Studying first for the law, he yielded to his musical leanings, and was in the way of becoming a pianoforte virtuoso when he lamed his hand by a self-contrived mechanism for producing suppleness of the fingers. Thenceforward he devoted himself almost entirely to composition and literary musical work. Beginning with songs, he gradually attempted larger forms, and his works include compositions for orchestra, chamber music, organ and pianoforte music, the latter of essential importance in its class. Among his vocal works should be mentioned the cantata *Paradise and the Peri* and the opera *Genoveva*. Latterly he became mentally unhinged, and after trying to drown himself, was confined in an asylum. His wife, CLARA SCHUMANN (1819–96), was a distinguished pianist.

Landon Ronald, *Schumann* (Masterpieces of Music, 1912); Fuller Maitland, *Life* (1884); Reissmann, *Life and Works* (1886). See also *Letters of Robert Schumann* (trans. by H. Bryant).

SCHÜRER, EMIL (1844–1910), Prot. divine; prof., Leipzig, 1873, Göttingen, 1895.

SCHURZ, CARL (1829–1906), Amer. statesman, general, and publicist. S. was expelled as revolutionary from Germany and France; became leader of Republican party in Wisconsin; important member of Republican National Convention, 1860; commanded Union division in Civil War; represented Missouri in U.S. Senate, 1869–75; Sec. of Interior in Hayes' Cabinet, 1877–81; reformed civil service; universally respected; author of excellent biographies and *Reminiscences*.

SCHUYLER, PHILIP JOHN (1733–1804), Amer. general and politician; commander of forces for invasion of Canada, 1776–77; owing to illness remained at Albany, but incurred blame for retreat from Crown Point and Ticonderoga; life written by GEORGE WASHINGTON SCHUYLER (1810–88), whose son, EUGENE (1840–90), was well-known author and diplomatist.

SCHWABACH (49° 20′ N., 11° 2′ E.), town, Bavaria, Germany; manufactures needles. Pop. (1910) 11,195.

SCHWÄBISCH-HALL, see HALL.

SCHWALBACH (50° 8′ N., 8° 4′ E.), watering-place, Hesse-Nassau, Prussia; mineral springs. Pop. (1910) 3211.

SCHWANN, THEODOR (1810–82), Ger. anatomist and physiologist; prof. of Anat. at Louvain, 1838, and later Liège, 1847; made important researches on nervous tissues, process of digestion, and initiated theory of the cellular origin and development of all the tissues.

SCHWANTHALER, LUDWIG MICHAEL (1802–48), Ger. sculptor; produced vast number of excellent works, including statues of Goethe, Jean Paul, and Mozart, and a colossal statue of Bavaria, 60 ft. high.

SCHWARZ, CHRISTIAN FRIEDRICH (1726–98), Prot. pastor; preached Christianity in India.

SCHWARZBURG-RUDOLSTADT (50° 40′ N., 11° 10′ E.), principality and state, in Thuringia, Germany; consists of several detached portions divided into upper and lower divisions. Pop. (1910) 100,702. Capital, Rudolstadt.

SCHWARZBURG-SONDERSHAUSEN (51° 20′ N., 10° 45′ E.), principality and state, in Thuringia, Germany; consists of two divisions, upper and lower. Pop. (1910) 88,917. Capital, Sondershausen.

SCHWARZENBERG, Ger. family founded by Erkinger von Seinsheim, who acquired Franconia, 1420, and became baron of empire. Chief member, ADAM (1587–1641), minister of George William of Brandenburg in Thirty Years War.

SCHWARZENBERG (50° 33′ N., 12° 34′ E.), town, kingdom of Saxony. Pop. (1910) 5367.

SCHWARZENBERG, KARL PHILIPP, PRINCE OF (1771–1820), Austrian general; fought against France, 1805–9; commanded Austrian contingent in Fr. invasion of Russia, 1812, but, perhaps purposely, gave little help; field-marshal, 1813; generalissimo of army of Allies; won battle of *Leipzig* and led two invasions of France.

SCHWARZERD, see MELANCHTHON.

SCHWARZWALD, see BLACK FOREST.

SCHWECHAT (48° 10′ N., 16° 30′ E.), town, Lower Austria; large brewery. Pop. (1911) 8501.

SCHWEDT (53° 3′ N., 14° 17′ E.), town, on Oder, Brandenburg, Prussia; tobacco, cigars. Pop. (1910) 9480.

SCHWEIDNITZ (50° 50′ N., 16° 28′ E.), town, on Weistritz, Silesia, Prussia; woollens. Pop. (1910) 31,320.

SCHWEINFURT (50° 3′ N., 10° 13′ E.), town, on Main, Lower Franconia, Bavaria; manufactures paint, 'Schweinfurt green.' Pop. (1910) 22,194.

SCHWEINFURTH, GEORG AUGUST (1836–), Ger. explorer and scientist; led expedition to E. Africa, 1869–71; discovered river Welle, but believed it to be tributary of Chad; contributed to knowledge of ethnology.

SCHWELM (51° 18′ N., 7° 20′ E.), town, Westphalia, Prussia; iron and steel goods. Pop. (1910) 20,432.

SCHWENKFELD, KASPAR (1490–1561), Ger. Prot. divine; a man of noble birth and refined

character; influenced by Luther's theology, but then diverged from it; tried, unsuccessfully, to mediate between Lutheran and Zwinglian views of Eucharist; later persecuted by Lutherans; his peculiar mystical theology made his Christology unorthodox.

SCHWERIN.—(1) (53° 38′ N., 11° 25′ E.) town, on Lake Schwerin; capital, Mecklenburg-Schwerin, Germany; chief buildings are the ducal palace and XV.-cent. cathedral; manufactures furniture. Pop. (1910) 42,519. (2) (52° 36′ N., 15° 30′ E.) town, on Warthe, Posen, Prussia; cigar factories. Pop. (1910) 7004.

SCHWERIN, KURT CHRISTOPH, COUNT VON (1684–1757), Pruss. general; entered army, 1720; commanded picked troops which overran Silesia, 1741, 1744, 1756–57; slain at battle of *Prague*; monument on field.

SCHWERTE (51° 27′ N., 7° 34′ E.), town, Westphalia, Prussia; iron goods. Pop. (1910) 13,702.

SCHWETZ (53° 24′ N., 18° 24′ E.), town, on Vistula, W. Prussia; manufactures sugar. Pop. (1910) 8045.

SCHWETZINGEN (49° 23′ N., 8° 35′ E.), town, Baden, Germany; cigars, beer. Pop. (1910) 7875.

SCHWIEBUS (52° 15′ N., 15° 30′ E.), town, Brandenburg, Prussia; manufactures cloth. Pop. (1910) 9333.

SCHWYZ (47° 5′ N., 8° 47′ E.), canton, Switzerland, bordering on Lakes of Zürich and Lucerne; area, 351 sq. miles; surface hilly, reaching extreme height of *c.* 9050 ft. in Kinzigkulm; S. was one of original cantons; formed league with Uri and Unterwalden in 1291, and defeated Austria, 1315; contains monastery of Einsiedeln; language is German; religion, R.C.; chief industry, agriculture; cattle, sheep, pigs, and goats raised. Pop. (1910) 58,428. Capital, Schwyz, has pop. 8100.

SCIACCA (37° 29′ N., 13° 6′ E.), seaport, Girgenti, Sicily; coral fisheries. Pop. 26,000.

SCIATICA, term applied to neuralgia of the great sciatic nerve, which passes from the pelvis down the back of the thigh to the foot. The neuralgia is often due to exposure to cold or wet, and may be associated with a constitutional tendency towards rheumatism or gout, while any pressure upon the nerve, as, for instance, by a tumour, may cause an attack. Pain is felt behind the hip-joint, increasing in severity and running down the back of the thigh, or, again, the pain may affect certain parts only, *e.g.* the knee; the pain is increased on moving the limb, and the nerve is tender to the touch. In regard to treatment, any constitutional cause must first be treated, while quinine or aspirin may be administered with benefit. Liniments containing belladonna or opium may be rubbed in to relieve pain, and counter-irritants and cupping are employed. Needling the nerve, injection of alcohol into the nerve, and cutting down upon the nerve and stretching it, and the employment of electricity are all measures which are carried out with good results.

SCIENCE is a systematic arrangement of demonstrative facts relating to the external world as recorded by our sense-impressions. The term is, however, variously employed. It is correctly used to denote the results of those inquiries into the phenomena of nature which can be pursued by means of observation, experiment, and disciplined reasoning founded thereon. It is also employed in connection with such studies as philology, ethics, religion, psychology, education, history, economics, and sociology. But the validity of the claim of such subjects to be seriously regarded as sciences depends on the extent to which the scientific method, referred to above, is applied to them; and in this respect they vary.

The question as to what constitutes, or is included within, the legitimate sphere of science is one which opens up the whole range of speculative discussion as to the nature of human knowledge, and cannot be more than indicated here. The method of science has been already pointed out. It collects facts, arranges them, attempts to establish the order of sequence among each group, and seeks for correlations between groups. It thus reaches conceptions which, embodying its results in abbreviated form, are termed scientific laws. Such expressions have, it is true, no greater validity than can be conferred upon them by the mass of particulars on which they are founded. But they have certain well-marked peculiarities which distinguish them from, or which are denied to, most other human judgments. In the first place, they are subjected to the severest criticism: the accuracy and sufficiency of the data, the method of their arrangement, and the rationality of the deductions made from them, can all be called in question by the numerous workers in the same field of inquiry. Secondly, the judgments so formed are impersonal and, as far as any product of the human mind can be, are free from bias. Thirdly, they command practically unanimous consent in all normally constituted minds which are capable of understanding the terms in which they are expressed. A sharp distinction has thus to be drawn between the region of ascertained data and that of speculation, more especially if the latter, by projecting pseudo-scientific methods into any possible realm beyond that of sense-impression, attempts to settle questions with which science has nothing in common. At the same time, the attempt to restrict scientific investigation must be resisted, for whatever is or claims to be positive knowledge falls legitimately within the scope of scientific method, and must justify its existence accordingly. It is impossible here to give any adequate illustration of the more particular methods of scientific inquiry. But much may be gleaned from a study of the genesis of such conclusions as Newton's laws of motion and gravitation, the method of spectrum analysis, Maxwell's electromagnetic theory of light, the conservation of energy, the conduction of electricity through gases and the electron theory, the kinetic theory of gases, the discovery of radioactive substances and their transformations, the investigations which led Darwin to the *Origin of Species* and the theory of natural selection, the rise of embryology and the manner in which it sheds light on the development of animal and vegetable forms, the germ theory of disease and especially the work of Pasteur, and the investigation of malaria and its mode of transmission.

Jevons, *Principles of Science*; Pearson, *Grammar of Science*; Merz, *History of European Thought in the Nineteenth Century*; Clifford, *Essays and Common Sense of the Exact Sciences*; Whetham, *Recent Development of Physical Science.*

SCILLITAN MARTYRS, twelve Christians martyred in N. Africa in persecution of 180 A.D.; contemporary account of their martyrdom is preserved.

SCILLY ISLES (49° 55′ N., 6° 20′ W.), group of several islands and numerous clusters of rocks lying 27 miles S.W. of Land's End, Cornwall, England; largest is St. Mary's, next in importance being Trescoe and St. Martin's; of granitic formation; mild climate; most of inhabitants employed in cultivating early vegetables and growing flowers for London market. St. Mary's contains the only town, Hugh Town. Pop. (1911) 2097.

Mothersole, *Isles of Scilly* (1910).

SCIPIO, Rom. family of *gens Cornelia*. Chief members: PUBLIUS, consul, 218, general against Hannibal, slain by Hasdrubal in Spain; the famous Elder and Younger PUBLIUS CORNELIUS SCIPIO, *Africanus* (*q.v.*); PUBLIUS, *Nasica Serapio*, consul, 138, led aristocracy against Gracchus; last of line, infamous PUBLIUS, consul, 56 A.D.

SCIPIO ÆMILIANUS, PUBLIUS CORNELIUS, AFRICANUS MINOR (185–29 B.C.), s. of Lucius Æmilius Paulus, adopted by P. Cornelius Scipio Africanus, son of Scipio Africanus the elder; destroyer of Carthage and conqueror of Numantia.

SCIPIO, PUBLIUS CORNELIUS, AFRICANUS MAJOR (237–183 B.C.), great Rom. general; restored Rom. courage after defeat by Hannibal, and finally defeated Carthaginians in 2nd Punic War; dau., CORNELIA, mother of the Gracchi.

SCISSOR-BILLS, see under GULL FAMILY.

SCISSORS, see CUTLERY.

SCIUROMORPHA, a sub-order of RODENTS (*q.v.*).

SCIURUS, SQUIRRELS (*q.v.*).

SCODRA, see SCUTARI.

SCOLIIDÆ, see WASPS.

SCOLOPAX, WOODCOCK, see PLOVER FAMILY.

SCOLOPENDRA, a genus of Centipedes; see MYRIAPODA.

SCOLYTIDÆ, see under RHYNCHOPHOROUS BEETLES.

SCOMBRIDÆ, see MACKEREL.

SCONE (56° 26′ N., 3° 26′ W.), village, 2 miles from Perth, Perthshire, Scotland; place of coronation of Scottish kings.

SCOPAS (fl. IV. cent. B.C.), Gk. sculptor; worked at Athens for 25 years, and assisted with the sculptures for the *Mausoleum* at Halicarnassus in Asia Minor.

SCORESBY, WILLIAM (1789–1857), Eng. Arctic explorer and scientist; s. of whale-fisher, William S., whom he succeeded as commander of *Resolution*, 1810; pub. *Arctic Regions*, 1820; explored east coast of Greenland, 1822; retired, wrote and preached; *Magnetical Investigations* important.

SCORPION FLIES (*Mecaptera*, or *Panorpidæ*), a separate order of Insects, long included with Neuroptera. The common name arises from the tail-like segments of the body, which in *Panorpa* can be curved over the back—Scorpion-wise—and which bear a terminal pair of pincer claws. They are carnivorous insects, furnished with a long beak, long antennæ, and four long wings, slightly net-veined. The larvæ are terrestrial and caterpillar-like. Two genera are British.

SCORPIONIDÆ, see SCORPIONS.

SCORPIONS (*Scorpionidæ*, an order of *Arachnida*), carnivorous, nocturnal Arachnids, which remain concealed during the day, but issue in search of prey at night. They feed on small creatures, insects, and spiders, which are seized by their huge 'nippers' or [illegible] and stung to death by means of the poison-laden sting which terminates the 'tail'; confined to tropical and subtropical countries.

SCOT AND LOT (old law term), rates paid by certain people; only payers had parliamentary and municipal franchise.

SCOT, MICHAEL (early XII. cent.), Scot. philosopher; studied in England, France, and Italy; learnt Arabic at Toledo, and trans. Aristotle into Latin; friend of Emperor Frederick II.; famed as wizard and astrologer. *Life*, by Brown (1897).

SCOT, REGINALD (1538–99), Eng. writer; wrote *The Discoverie of Witchcraft* (1584) to disprove existence of witches.

SCOTER, see under DUCK FAMILY.

SCOTISTS, see DUNS SCOTUS and SCHOLASTICISM.

SCOTLAND.—That part of Great Britain lying N. of England, embracing Outer and Inner Hebrides and other islands off the W. coast, also Orkney and Shetland in N.; bounded by England and Solway Firth on S., Atlantic Ocean on N. and W., North Sea on E.; greatest breadth, 154 miles; greatest length, 254 miles. Coast-line is *c.* 2300 miles and AREA 29,796 sq. miles (exclusive of some 600 sq. miles of inland waters). Capital is EDINBURGH (*q.v.*).

The COAST-LINE is exceedingly irregular—especially the W. coast, which is eaten away with estuaries and sea-lochs, of which the chief are: (from N. to S.) Lochs Broom, Torridon, Linnhe, Fyne, Long, and Firth of Clyde; on the S. is Solway Firth, on the N. is Pentland Firth; E. (from N. to S.) lie the large Dornoch, Cromarty, Beauly, and Moray Firths, also Firths of Tay and Forth. The principal CAPES on the W. are Mull of Galloway (most southerly point), Mull of Cantyre and Ardnamurchan Point (most westerly headland); in N. are Cape Wrath and Duncansby Head, with Dunnet Head (farthest N.) between them; on the E. are Tarbet Ness, Kinnaird Head, Buchan Ness (most easterly point), Fife Ness, and St. Abb's Head.

The coast is also dotted with numerous ISLANDS, especially the W. coast. Stretching almost the whole length of that coast lie the Hebrides or Western Isles, divided out into Outer and Inner Hebrides—the largest being Long Island (comprising Lewis with Harris, Benbecula, and N. and S. Uist), Skye, Mull, Jura, and Islay; farther S. in Firth of Clyde lie the islands Arran and Bute (together forming county of Bute). On the E. coast the islands are small and few—the Bass Rock, Inchkeith, and Isle of May in Firth of Forth. The islands on the N. are included in two groups—the Orkney Islands (with Pomona, the largest, and 67 small islands), separated from the mainland by Pentland Firth, and (some 55 miles farther N.) Shetland—a group of 28 islands (of which Mainland is the principal) and some 70 islets; both these groups constitute separate counties.

The INTERIOR of Scotland is divided into three natural geographical divisions—the Highlands, the Central Lowlands, and the Southern Uplands; these divisions are also in accordance with the geological structure of the country. The **Highlands** is the name given to the mountainous and picturesque region to the N. and W., occupying nearly one-half of the area of Scotland. Their southern boundary is roughly a line drawn N.E. from Dumbarton to Stonehaven. They consist of a succession of more or less parallel confluent ridges, cut by longitudinal and transverse valleys, the portions thus isolated rising as separate mts. The surface is exceedingly rugged—heather moors, woodlands, stony wastes, and rugged crags and rocks, and in many parts wild and even inaccessible. In the N.W. the watershed lies very near the shore. The heights are exceedingly uniform, with an average of some 1500 ft. in height. The loftiest MOUNTAINS are: Ben Nevis (4406 ft.), in Inverness, the highest mt. in the Brit. Isles; Ben Macdhui (4296 ft.), in Aberdeen; Brairiach (4248 ft.), in Aberdeen and Inverness; Cairntoul (4241 ft.), in Aberdeen; Cairngorm (4048 ft.), in Aberdeen and Inverness; Aonach Beag (4004 ft.) and Aonach Mor (3999 ft.), in Inverness. There are 46 other peaks over 3500 ft. in height (the word *Ben* is the Gaelic for mountain). For linguistic and other reasons low-lying coastal regions of Kincardine, Aberdeen, Moray, and Banff (E. of the Grampians), flat Caithness, and Orkney and Shetland Is. are reckoned as belonging to Lowland Scotland as opposed to Gaelic-speaking Celtic Highlands.

The second division is the **Central Lowlands**, lying immediately S. of the Highlands. The general elevation of the Central Lowlands does not exceed 350 or 400 ft. They include such heights as the Sidlaw or Ochil Hills, in Perth and Forfar, the Lomonds in Fife, and the Pentland Hills near Edinburgh. The principal hills form two interrupted belts which may be called the Northern and Southern Heights, with the low tract drained by the Forth and Clyde lying between. The two highest points are Ben Clough (2352 ft.), one of the Ochils, and Tinto (2335 ft.).

The third division, the **Southern Uplands**, lies S. of a line drawn N.E.-wards across Scotland from Irvine to Dunbar; for the most part, somewhat tame and monotonous; includes the Lammermuirs (chiefly in Haddingtonshire) and to the W. the Moorfoots (with two heights over 2000 ft.); the Moffat Hills, with Broad Law (2764 ft.); the Lowthers; and then mountain-masses (with Merrick, 2764 ft.) in Galloway; and the Cheviots—a belt of hills, rising along the Eng. border.

There are, properly speaking, no mountain 'ranges' in Scotland. The mountains are caused by denudation. The harder rocks (slates, schists, etc.) of the Highland regions have resisted erosion far more than the softer rocks (sandstone, etc.) of the Lowlands. The tablelands of the Highlands and Southern Uplands are of immense antiquity, valleys having been formed in them long before the Old Red Sandstone period.

An exceedingly important feature of Scotland is its VALLEYS, which run, generally, N.E. and S.W. longitudinally, and which have their trend defined by geo-

logical structure. The largest valley or geological fracture is the Great Glen (or Glen More) stretching from Loch Linnhe to Inverness. Other valleys are those of the Garry and Tay, in the S.E. Highlands; also the valleys of the Forth in S.E. and the Clyde in S.W., and many other glens and *straths* (Gaelic for a broad valley).

The principal RIVERS are the Tay (119¾ miles in length), flowing through Fife and Forfar, and for scenery one of the most beautiful valleys in Scotland; spanned at mouth by Tay Bridge (2 miles long); the Forth, farther S. (116½ miles long and tidal as far as Stirling, over 52 miles), with wide estuary crossed by stupendous steel cantilever bridge; the Clyde in S.W. (106 miles long, with Glasgow 14 miles from its mouth); the romantic Tweed (97 miles); the swift Spey, in the N. (110 miles); the Dee (87 miles), Don (82 miles), the Nith (over 70 miles), and the picturesque river Findhorn (62¼ miles).

The largest inland LOCHS include the famous and beautiful Loch Lomond (17,420 acres in area), situated in Stirling and Dumbarton; Loch Ness (12,355 acres in area, mean depth of 433 ft., and with the greatest volume), in Inverness; Loch Awe, in Argyll; and Lochs Shin, Maree, Tay, Arkhaig, Shiel, Lochy, Earn, Leven, Katrine, St. Mary's Loch, and (the deepest loch in the Brit. Isles) Loch Morar, with a maximum depth of 1017 ft.

Only about 5% of Scotland is covered with FOREST; the best-wooded shires are Aberdeen, Inverness, and Perth—Scots firs predominating. Animals and plants are mostly the same as those found in England; the wild cat may yet be seen in the Highlands, and also, occasionally, the golden and white-tailed eagle. Deer forests and grouse moors occupy many acres.

The **Climate** of Scotland is healthy, the temperature hovering for the greatest part of the year at about 50° or 60°. The prevailing wind is S.W., from which direction it blows very much oftener than from N.E., except in spring. This S.W. wind, and oceanic currents to N.E. resulting therefrom, give Scotland a much higher temperature than is due to its position on the globe. This is especially felt in winter, when the coast escapes many severe frosts experienced inland. Owing to the position of the mts. the climate on W. coast is wet, and on E. dry.



HISTORY.

The history of Scotland begins with the invasion of AGRICOLA (80 A.D.). The departure of the Romans from Britain again plunges the history of Scotland into obscurity till the close of the VI. cent. At that period the PICTS dwelt N. of the Firths of Forth and Clyde, the SCOTS from Ireland occupied *Dalriada* (Argyllshire), the Brit. kingdom of *Strathclyde* stretched southwards from Dumbarton, and the Anglian kingdom of *Bernicia* from the Forth to the Tees. Christianity was the main unifying force. The Scots were already Christians. ST. COLUMBA converted the Picts (*c.* 565), ST. MUNGO the Britons, and ST. CUTHBERT the Angles of Lothian, between the Forth and the Tweed.

The second impulse towards unity was furnished by the aggression, first of Northumbria, and later of the Northmen, who eventually settled in the N. and the Western Isles. In 844 KENNETH MACALPIN, king of Scots, became ruler of the Picts and Scots. His successors strove to extend their territory southwards. In 1018 MALCOLM II. (1005–34) by his victory at *Carham* acquired Lothian, and in the same year his grand-

son succeeded to the throne of Strathclyde. Thenceforward Strathclyde belonged to the Scot. Crown, though the southern part (Cumbria) was conquered by England in 1092.

Under MALCOLM III. (1057–93) Scotland was influenced by the Norman Conquest of England. Refugees from Northumbria rendered the Teutonic element in the Lowlands preponderant. Malcolm's marriage with the fugitive Eng. princess, MARGARET, began a process whereby the Scot. monarchy became detached from Celtic, and identified with Teutonic interests. This policy was furthered by Margaret's reform of the Celtic Church, and continued by her sons EDGAR (1097–1107), ALEXANDER I. (1107–24), and DAVID I. (1124–53). Under David, feudalism took root in Scotland. Norman officials, laws, and customs were introduced, and towns multiplied. Bishoprics were increased, parishes erected and tithes enforced. Celtic monastic bodies were expelled, and lavishly endowed abbeys were founded. David made good his claim to Northumberland, but his grandson, MALCOLM IV. (1153–65), was forced to surrender it. In an attempt to regain it, WILLIAM THE LION (1165–1214) was captured at Alnwick, and forced by the Treaty of Falaise (1174) to acknowledge Henry II. as his feudal superior; but he redeemed his independence from Richard I., and down to 1290 relations between the two countries remained friendly. The feudal organisation of Church and State became fully developed, and the Scot. monarchs were able to consolidate their kingdom. ALEXANDER II. (1214–49) reduced Argyll, and ALEXANDER III. (1249–86) recovered the Western Isles by the battle of *Largs* (1263).

On the death of the MAID OF NORWAY (1290), heiress of Alexander III., the succession was disputed. Edward I. of England decided in favour of BALLIOL (1292–96), all the claimants having acknowledged Scotland a fief of England. Edward, by exacting his feudal rights, provoked the Scots to resistance. WALLACE for a time maintained the struggle for independence, and finally under BRUCE (1306–29) it was won at *Bannockburn* (June 24, 1314), and recognised by the Treaty of Northampton (1328). In Bruce's reign the Scot. Estates, consisting of prelates, barons, and burghs, met for the first time. England's absorption in the Hundred Years War secured Scot. independence during the reign of DAVID II. (1329–71).

The accession of ROBERT II. (1371–90), the High Steward, son of Bruce's dau., begins the *House of Stewart*. His reign initiates the struggle between the Crown and the Barons, rendered too powerful by large grants of land by Bruce. At the death of ROBERT III. (1390–1406) the land was ruled by his bro., the Duke of Albany, James, Robert's s. and heir, having been captured by the English. JAMES I. (1424–37), on his return, overthrew the house of Albany, and repressed the barons by drastic punishments and forfeitures. These arbitrary measures led to the murder of the poet king. JAMES II. (1437–60) crushed the Douglases. JAMES III. (1460–88), in whose reign the Orkney and Shetland Islands were acquired, surrounded himself with unworthy favourites, and was defeated and killed at Sauchieburn. Under JAMES IV. (1488–1513) justice was reformed, commerce increased, a navy was built, and the introduction of printing and the rise of a Scot. lit. signalised the intellectual expansion of the country. In 1503 James married Margaret, dau. of Henry VII., but in the contemporary international struggles, James, true to the Auld Alliance dating from 1295, sided with France. This led to the battle of *Flodden*, where James and most of the nobility were slain. With the aid of the clergy JAMES V. (1513–42) maintained the Franco-Scot. alliance. The rout of the Scots at *Solway Moss* caused his death a few weeks later.

The reign of his dau., MARY STEWART (1542–67), is marked by the triumph of the REFORMATION. Scot. Protestants, owing to their Eng. sympathies, were at first deemed unpatriotic, and for a time the clerical Fr. party retained the ascendancy. Scotland tended to become an appanage of the Fr. crown, especially after the marriage of Mary with the Dauphin. Dread of Fr. domination swelled the ranks of the Protestants, who, aided by Elizabeth of England, were assured of victory by the Treaty of Edinburgh (1560). The religious revolution was accomplished in the same year. A confession of faith drawn up by KNOX and his colleagues was ratified by Parliament, and all connection with Rome severed. When Mary returned from France (1561) she was obliged to accept the situation. Her marriage with Bothwell, the reputed murderer of her second husband, Darnley, ruined her schemes for restoring Catholicism. She was imprisoned and forced to abdicate in favour of her infant s., JAMES VI. (1567–1625). Although she escaped, her adherents were defeated at *Langside* (1568), and she fled to England.

When James began his personal government Protestantism was the established religion. For the next hundred years the struggle lies between the Kirk and the Crown. In 1592 James, unable to control the nobles, sanctioned an Act confirming Presbyterianism. By 1600, however, the barons, enriched by crown grants of church lands, had sided with the monarchy, the power of the kirk had been checked, and three bp's had been appointed by the king, who regarded Episcopacy as more compatible with the royal prerogative. His accession to the throne of England (1603), through descent from Margaret, wife of James IV., increased his prestige, and before his death he had established Episcopacy. CHARLES I. (1625–49) estranged the baronage by the Act of Revocation annexing all crown and church lands alienated since 1542, and his attempts to impose an Eng. Service Book on the kirk roused an opposition which found expression in the National Covenant (1638). By the Bishops' War, Charles was forced to concede the demands of the Covenanters, and Episcopacy was abolished. In the Civil War the Scots, doubtful of the king's sincerity, joined the Parliamentarians by the Solemn League and Covenant (1643). Scot. hopes of establishing Presbyterianism in England were frustrated by the rise of the Independents, and mutual distrust ensued. Charles's partisans were thus enabled to raise a Scot. army in his support, but it was cut to pieces at *Preston* (1648) by Cromwell, who came to an understanding with the Covenanters. The execution of Charles dissolved this compact. After MONTROSE'S unsuccessful efforts on his behalf, Charles II. signed the Covenant and arrived in Scotland, but the defeat of the Scots at *Dunbar* (1650) and *Worcester* (1651) placed Scotland for nine years under the domination of the Protectorate and Commonwealth.

The Restoration was enthusiastically welcomed in Scotland. The nobles now supported the Crown, and Episcopacy was restored. The Covenanters refused to conform, and the history of the reigns of CHARLES II. (1660–85) and JAMES VII. (1685–88) is mainly concerned with their attempts to subdue the recusants. Administrative severities led to the Pentland Rising (1666), *Drumclog* (1679), and *Bothwell Bridge* (1679). A remnant held out against all 'Indulgences,' and were subjected to the cruelties of the *Killing Time*. Both Presbyterians and Episcopalians alike resisted James's attempts to restore Catholicism, and the flight of James found Scotland ripe for revolution. The Estates declared the crown forfeited, and offered it to William of Orange and his wife, Mary. Presbyterianism was re-established, and the Estates secured legislative independence by the abolition of the Lords of the Articles, a committee which had rendered Parliament an instrument of the royal will.

Ecclesiastical disputes having been settled, the nation became absorbed in commerce. The Darien Scheme evoked national enthusiasm. Its failure was ascribed to WILLIAM and the Eng. Parliament, and the disaster convinced statesmen that two independent legislatures under one Crown were impossible in view of foreign relations. Under ANNE (1702–14) the two

Parliaments were joined (1707), free trade being established between the two kingdoms. The consequent commercial prosperity during the next fifty years silenced Scot. objections to the UNION, and rendered abortive the Jacobite Risings of 1715 and 1745. From 1750 to 1800 industrial development coincided with an intellectual revival during which Scotsmen made important contributions to lit. and science. Since the Reform Bill (1832), Scotland, while preserving its own church, law, and educational systems, has become more closely assimilated to England, and Scotsmen have played an active part in the development of the Brit. Empire.

Hume Brown, *History of Scotland to the Present Time* 1911; also histories by Hill Burton, Mackintosh (1890), Andrew Lang (1900), Rait (1911), Macmillan (1911); Thomson, *Scotland's Work and Worth* (1910).

Products.—The staple CROPS grown in Scotland are, in order of importance, oats, barley, wheat, beans, rye. The total area under crops and grass is 4,845,835 acres; area of arable land, 3,348,568 acres, chief shires being Aberdeen, Forfar, and Kincardineshire; permanent grass, 1,497,267 acres; total corn crop, 1,218,055 acres, the principal shires being Aberdeen, Forfar, Perth, and Fife. As regards LIVE STOCK, the total number of cattle (in 1911) was 1,200,017, the chief shires being Aberdeen and Ayrshire; total number of horses, 206,474, including Shetland ponies and Clydesdale draught horses; of sheep, 7,164,342, notably Shetland, Highland blackfaced, and Cheviot breeds; of pigs, 171,115.

The principal MINERALS are coal, iron, shale, sandstone, granite, lead, etc., but especially coal and iron. The chief coal-fields are in Lanark and Fife, Ayr, Stirling, Midlothian, and Linlithgow. Iron is also found in these counties as well as in Renfrew and Dumbarton. Shale abounds in Linlithgow and Midlothian. Lead is found in the Lead Hills and elsewhere. Granite is extensively quarried—especially in Aberdeen. Limestone is also general, but is most abundant in Midlothian and Fife. Sandstone and freestone are quarried in nearly all parts of the country, and notably in Lanark, Dumfries, Ayr, and Forfarshire. Alumina is treated at works near Foyers in Inverness-shire. Vast numbers of people are employed in coal, iron, and shale mining; also in connection with the working of other metals and in quarrying operations.

Manufactures and Industries.—All great iron and steel foundries and engineering works are in close proximity to coal-fields and shipbuilding yards. Iron and steel goods and machinery are manufactured in Glasgow, Falkirk, and surrounding districts. Iron and steel shipbuilding—an industry of the greatest importance in Scotland—is carried on mainly on the Clyde (Glasgow, Renfrew, Clydebank, Dumbarton, Port-Glasgow, Greenock, etc.); there are also shipbuilding yards at Leith, Aberdeen, and Dundee. There are paraffin works in Bathgate neighbourhood. The manufacturing of cloth forms another extensive and important industry; tweeds are made in Tweed district—Galashiels, Hawick, Innerleithen, and Selkirk—and in various other towns, such as Aberdeen, Elgin, Inverness, etc.; tartans are mostly manufactured at Tillicoultry, Bannockburn, and Kilmarnock. Kilmarnock was the original producer of carpets, now also manufactured at Aberdeen, Ayr, Bannockburn, Glasgow, Paisley. Glasgow and Paisley and neighbouring towns are centres for cotton factories and seats of silk manufacture. An important Border manufacture is hosiery—the principal town being Hawick.

Other industrial centres are Dundee, for jute and hemp; Kirkcaldy, for linoleums and floorcloths; Alloa, for fingering and other woollens; Forfar, Perth, and Fife and Aberdeen, for linen; Dunfermline, for finer linen; Dundee, for coarser fabrics; Paisley, for sewing threads. Lanark and Renfrew are in the front rank in the cotton industry. Greenock is the chief seat for the refining of sugar. Preserves and confectionery are manufactured in Dundee, Aberdeen, Paisley, and Edinburgh. Glasgow is the centre for the production of chemicals. Paper, stationery, and printing are also important industries. Midlothian is the leading paper-producing county; stationery is manufactured at Glasgow; Edinburgh is famous for its printing. Brewing and distilling are valuable industries, although they do not give employment on any great scale; the foremost distilling counties are Argyll, Banff, Elgin, Inverness, Aberdeen, and Ross and Cromarty, and many others; a very large proportion of distilleries in the U.K. are in Scotland; the principal breweries are situated in Edinburgh neighbourhood.

The FISHING industry of Scotland is exceedingly extensive and important, and gives considerable employment; the seaboard is divided into 27 fishing districts, the most prolific being Shetland (N.), Fraserburgh, Peterhead, Aberdeen, Wick, and Anstruther (E.), and Stornoway (W.). Herring are caught off E., N., and W. coasts, as well as large quantities of haddock, whiting, sole, etc. There are also valuable coast and river salmon fishings. A few ships still go from Dundee to the Arctic Ocean for whale and seal fishing.

Shipping and Communications.—The principal PORTS in Scotland are Glasgow, Greenock, Leith, Grangemouth, Dundee, Methil, and Burntisland; much importation, however, is transacted through London. The chief imports are grain, raw fibres (flax, cotton, jute, hemp), timber, and tropical products such as tea, sugar, etc.; the exports include manufactured goods, coal, pig-iron, fish, live stock, granite, paving-stones.

The ROADS in Scotland are excellent, well-engineered, and with good general surface, although remarkably hilly. The RAILWAYS are also good; the principal companies are the *Caledonian*, the *North British*, the *Glasgow and South-Western*, the *Highland*, and *Great North of Scotland*. There are several CANALS, of which the chief are the Caledonian, stretching N.E. slantwise from Fort William to Inverness, and, like the Forth and Clyde Canal, uniting the North Sea and Atlantic Ocean; the Crinan Canal, which joins Loch Fyne and Jura Sound; and the Union Canal, which connects Edinburgh and Glasgow.

Religion.—The bulk of the population is Presbyterian a form of Church government accepted by the Established Church of Scotland, the United Free and Free Churches—all the clergy being equal. There are 84 presbyteries grouped into 16 synods; a General Assembly—attended by over 700 members—is held in Edinburgh annually. Roman Catholicism has a holding, especially in the Highlands; and there is also the Episcopal Church in Scotland.

Education.—There are four univ's—St. Andrews, Glasgow, Aberdeen, Edinburgh (see UNIVERSITIES). Elementary education is compulsory between 5 and 14. There are over 3000 public schools and several hundred denominational and private schools. The School Board system is in force. Attendance figures are remarkably high, and Scotland enjoys an enviable reputation for the standard and widespread distribution of its education (see EDUCATION).

About 200,000 persons speak Gaelic as well as English, and several thousands (a dwindling number) Gaelic only.

Government.—Scotland is represented by 16 peers in the House of Lords and 72 members in the House of Commons. The management of Scot. business is under the charge of the Sec. for Scotland. At the Anglo-Scottish Union (1707) Scotland retained many institutions of its own, and its old system of LAW, which, however, has gradually approximated to Eng. Law. The Supreme Court in civil cases is the Court of Session—with 13 judges, acting in an Inner and an Outer House; the Inner, with two divisions of 4 judges each, and the Outer with 5 judges, called Lords Ordinary and sitting in separate courts; appeals may be made from the Lords Ordinary to either

division of the Inner House, and decision is held as decision of Court of Session, from which appeals may be made only to the House of Lords. A High Court of Justiciary sits at Edinburgh, and is formed by the lord justice general, the lord justice clerk, and the other judges of the Court of Session. Circuit Courts meet in various towns throughout the country. Another court with criminal jurisdiction is the Sheriff's Court. The principal law officer for the Crown is the Lord Advocate, who is assisted by a Solicitor-General and Advocates Depute. Practical administration of law is under the control of Sheriff-Depute. The public prosecutor for counties is called the procurator-fiscal.

For LOCAL GOVERNMENT purposes Scotland is divided into 33 shires (or counties), viz.—Aberdeen, Argyll, Ayr, Banff, Berwick, Bute, Caithness, Clackmannan, Dumbarton, Dumfries, Edinburgh, Elgin (or Moray), Fife, Forfar, Haddington, Inverness, Kincardine, Kinross, Kirkcudbright, Lanark, Linlithgow, Nairn, Orkney, Peebles, Perth, Renfrew, Ross and Cromarty, Roxburgh, Selkirk, Shetland, Stirling, Sutherland, Wigtown. The cities of Edinburgh, Glasgow, Aberdeen, Dundee, are each a county of a city.

Scenery, Historic, and Literary Attractions.—Scotland is exceedingly popular as a holiday resort, and the Highlands afford splendid shooting, deer-stalking, fishing, etc., to a great number of summer and autumn visitors from England and abroad. The Royal Family resides at Balmoral when in the Scot. Highlands. Scotland also affords much interesting country for the tourist—the wild and picturesque Highlands, the romantic vale of the Trossachs, the Scott country in the Borders, Burns's country in Ayrshire. There are many ancient battlefields and ruined castles to attract the historian and much to interest the antiquary, including among other things a circle of standing stones in Orkney, and several ancient cathedrals, of which four have been restored or are in use—St. Mungo's, Glasgow; St. Machar's, Aberdeen; St. Magnus, Kirkwall (Orkney); St. Giles, Edinburgh, was erected as a collegiate church and became a cathedral in the XVII. cent. for a short time.

Groome, *Ordnance Gazetteer of Scotland* (1901); Geikie (Sir Arch.), *Scenery of Scotland viewed in connection with Physical Geology* (1901); Atkinson, *Local Government in Scotland* (1904); Dron, *The Coal-fields of Scotland* (1902); Murray's Handbook *Scotland* (1906); Henderson and Watt, *Scotland of To-day* (1907); Palmer and Moncrieff, *Bonnie Scotland* (1904); Eyre Todd, *Scotland, Picturesque and Traditional* (1906); Lauder, *Scottish Rivers* (1874); Dean Ramsay, *Reminiscences of Scottish Life and Character*; Census (1911) Bluebook.

Population.—Census of 1911: male, 2,307,603; female, 2,451,842—total for Scotland, 4,759,445. In 1707 (estimated), 1,050,000; census pop., 1811, 1,805,864; in 1861, 3,062,294; in 1901, 4,472,103.

Scotland, Church of, is Presbyterian, as have remained the offshoots from it. This type of Church government seems to be essentially Scottish; it has never flourished to the same extent elsewhere. It dates from the Reformation, and the Scot. Church was modelled on that of GENEVA, with CALVINISM as its doctrine. In 1557 the attack on Roman Catholicism was begun, and the first Covenant signed; and in 1560 the First Book of Discipline was published, which cleared all Catholic observances and laid great emphasis on preaching the Word. The Church was at first under the leadership of KNOX.

In 1578 appeared the Second Book of Discipline; the moderate episcopacy which existed was abolished, and PRESBYTERIANISM established. James I. tried to introduce Eng. ecclesiasticism into Scotland, episcopacy was reintroduced, 1592, but opposition was provoked by the Articles of Perth, drawn up in 1618, which commanded the observance of Christmas and Easter, kneeling, communion, etc. Charles I. did little at first, but in 1636 a liturgy was ordered. When this was read in St. Giles's, Edinburgh, in July 1637, an uproar, in which JENNY GEDDES figured, was provoked. In 1638 the NATIONAL COVENANT was drawn up, in which the nation bound itself to defend Presbyterianism, and the Articles of Perth and liturgy were abolished. Presbyterianism was now dominant in Scotland, and was also beginning to affect England, and in 1643 a SOLEMN LEAGUE AND COVENANT was entered into by the two countries, and a Confession was drawn up by the Westminster Assembly and accepted by Scotland too.

The Restoration produced the inevitable reaction, and the COVENANTERS were bitterly persecuted. With the accession of William and Mary persecution was at an end, and the Presbyterian Scot. Church once more on a safe footing. The House of Hanover was Protestant, hence Presbyterians were more favoured than Episcopalians.

A standing difficulty in the Church was the existence of lay patronage; unsuitable men were appointed to livings, and those of the parishioners who refused to recognise them founded meeting-houses. Hence a large number of dissenting chapels were founded in the XVIII. cent. The Secession Church formed by Ebenezer Erskine (*q.v.*), deposed in 1733, was the nucleus of the UNITED PRESBYTERIAN CHURCH. In the Highlands the churches were very poor, and much was done to strengthen them. At the end of the XVIII. cent. there came an evangelic revival and reaction against the 'Moderate' party. In 1843 took place the DISRUPTION and founding of the FREE CHURCH OF SCOTLAND, when 451 out of 1203 ministers went out. Patronage was abolished in 1874, and in the XIX. cent. the Church has improved its services with music, liturgy, etc., to which at first there was considerable opposition. Modern developments are a Disestablishment movement, and more recently negotiations for Union of the Presbyterian Churches in Scotland. In theology the Scot. Church has produced religious philosophers rather than Biblical critics.

Cunningham, *History of the Church of Scotland.*

Scotland, Episcopal Church in, the 'Church of England in Scotland'; but though in communion, the two are separate in organisation. Scot. bishops were consecrated in 1661, but Episcopalianism never predominated, and after the Revolution not immediately tolerated.

SCOTS FIR, see FIR, PINE.

SCOTS GUARDS, see GUARDS, THE.

SCOTS, MIDDLE, a purely artificial literary language used by Scot. poets from Barbour to Lyndsay; called by users 'Inglis' as opposed to Gaelic ('Scots').

SCOTT, DAVID (1806–49), Scot. artist; hist. pictures include *Queen Elizabeth at the Globe Theatre.*

SCOTT, ROBERT (1811–87), master of Balliol Coll., Oxford, 1854; dean of Rochester, 1870; famous for Gk. Lexicon he compiled together with Liddell.

SCOTT, ROBERT FALCON (1868–1912), see POLAR REGIONS.

SCOTT, SIR GEORGE GILBERT (1811–78), architect, a leading spirit in the Gothic revival; built or restored a vast number of cathedrals, abbeys, and churches; buried in Westminster Abbey.

SCOTT, SIR WALTER (1771–1832), Scot. novelist, poet, and man of letters; b. Edinburgh (Aug. 15); s. of Walter Scott, W.S.; sickly as a child, but later an active man, though lame; ed. Edinburgh High School and Univ., studying for Bar. Poetry and Romance, however, fascinated him early. His first literary work consisted in translating Goethe, Bürger, and other Ger. poets and collecting Scot. ballads (*Minstrelsy of the Scottish Border*, 1802). In 1797 he married Charlotte Charpentier (d. 1826), a Fr. refugee's dau.; app. sheriff-depute of Selkirkshire, 1799; lived at Ashestiel, 1804–12; removed to Abbotsford (*q.v.*), 1812. The *Lay of the Last Minstrel* (1805), followed by *Marmion* (1808), *Lady of the Lake* (1810), *Rokeby* (1813), *Lord of the Isles* (1815), etc., placed S. in the front rank of narrative poets.

Finding his place in popular favour threatened by

Byron, S. now turned to prose romance and published *Waverley* anonymously (1814). Other 'Waverley Novels' appeared with phenomenal success in quick succession, some being grouped as 'Tales of My Landlord': *Guy Mannering* (1815, written in six weeks), *Antiquary*, *Old Mortality*, *Black Dwarf* (1816), *Rob Roy* (1817), *Heart of Midlothian* (1818), *Bride of Lammermoor*, *Legend of Montrose*, *Ivanhoe* (1819), *Monastery*, *Abbot* (1820), *Kenilworth* (1821), *Pirate*, *Fortunes of Nigel*, *Peveril of the Peak* (1822), *Quentin Durward* (1823), *St. Ronan's Well*, *Redgauntlet* (1824), *Talisman*, *The Betrothed* (1825), *Woodstock* (1826), *Fair Maid of Perth* (1828), *Anne of Geierstein* (1829), *Count Robert of Paris*, *Castle Dangerous* (1831). Other works include *Life of Napoleon* (1827), *History of Scotland* (1830), *Tales of a Grandfather* (1828–31), editions of Dryden, Swift, etc., a *Journal* (1825–32: pub. 1890), and *Familiar Letters* (pub. 1894). In 1825 the failure of his printers and publishers, Ballantyne and Constable, involved S. as partner in debt amounting to *c.* £120,000, most of which he cleared ere his death (through overwork) on Sep. 21, 1832. He was buried at Dryburgh Abbey (*q.v.*).

His courageous, generous, healthy, genial character endeared S. to friends and fellow-countrymen; his works, especially his novels, won him lasting world-wide fame. 'He created the historical novel,' says Saintsbury. S. was an indefatigable and extraordinarily rapid writer, with an inexhaustible gift for character-drawing and wonderful narrative powers; his style is easy and careless, his plots diffuse. His master-pen vivified scenes, outdoor and indoor, Highland and Lowland, characters heroic and lowly, humorous and pathetic, History and Romance, Middle Ages and Modern Times. He exalted and purified the Novel. He made Scotland known throughout the world.

Many biographies (Hutton, Lang, Saintsbury, etc.) and editions. Standard *Life*, by Scott's son-in-law, Lockhart (*q.v.*); Husband, *Concordance of Waverley Novels*.

SCOTT, WILLIAM, see STOWELL.

SCOTT, WILLIAM BELL (1811–90), Scot. artist and poet; painted series illustrating *King's Quair* on Penkill Hall staircase; wrote *Hades, an Ode* (1846), *Poems of a Painter* (1854), *Autobiography* (ed. 1892).

SCOTT, WINFIELD (1786–1866), Amer. soldier; captured Fort Erie, commanded at *Chippewa* and *Lundy's Lane*, 1814; commander-in-chief, 1841; captured Vera Cruz, and took Mexico, 1847; military treatises still used in U.S.A. army.

SCRANTON (41° 22′ N., 75° 46′ W.), city, on Lackawanna; capital, Lackawanna County, Pennsylvania, U.S.A.; coal region; silk fabrics; iron-ware. Pop. (1910) 129,867.

SCREAMERS (*Palamedeidæ*), a family of Aquatic Birds with spurs on the wings; found in forest regions of S. America. The CHAJA or CRESTED S. is domesticated and trained to herd flocks of geese.

SCREW, a cone or cylinder of wood or metal having a spiral ridge (*thread*) running round it so as to form a uniform spiral groove. The distance apart of the turns of the thread is called the *pitch*. An external s. is a *male* s., an internal one (as in a nut), a *female* s. The s. is a modified form of the inclined plane, and may be called a mechanism for transforming rotatory motion into translatory motion, or *vice versa*. For this purpose two elements are required, a s., as ordinarily so called, and a nut, the spiral ridge of the former corresponding with the groove inside the latter. Then, if either element be fixed, the other will move forwards or backwards according to the direction in which it is rotated round the common axis. The most important application of the s. lies in the production of great pressure, as in the *screw-press* and *screw-jack*. It is also largely used for boring purposes, *e.g.* gimlet, augur, corkscrew, and common *screw-nail*. The fact that the distance traversed in one rotation may be varied through a wide range by altering the distance between the threads makes the s. of particular value in obtaining the delicate adjustments required in micrometers, microscopes, etc. The principle is also employed in the *screw propeller*. At one time there was no uniformity in s's, and those of one maker did not fit those of another. Chiefly owing to the efforts of Sir Joseph Whitworth, s. threads are now made to certain standards, identical all over the world.

SCREW PINE (*Pandanus*), genus of tropical plants, order Pandanaceæ, having aerial roots.

SCRIBE, AUGUSTIN EUGÈNE (1791–1861), Fr. playwright; wrote (with collaborators) about 400 plays of all kinds; little style and power of observation. Best-known works, *Bertrand et Raton*, *Adrienne Lecouvreur*, and *Bataille de Dames*, also libretto of *Les Huguenots*, *Le Prophète*, *L'Africaine*, and other operas.

SCRIBES, originally military tax-gatherers among the Jews, but subsequently copyists of the law and in New Testament times exegetists of the law. Some rose to important positions in the Temple, or made a livelihood by copying out the law and drawing up legal documents. They were for the most part Pharisees, holding to the letter of the law and impatient of foreign influence. Christ condemns their hypocrisy.

SCROFULA, term formerly applied to tuberculosis (*q.v.*), specially of lymphatic glands and of bones; *king's evil* (q.v.), old popular name for same condition.

SCROGGS, SIR WILLIAM (*c.* 1623–83), Eng. lord chief justice; s. of butcher; of extraordinary coarseness and corruption; presided at trial of persons denounced by Titus Oates; impeached for illegally discharging grand jury, 1681, but saved by king.

SCROPES OF BOLTON.—Sir Henry le Scrope (d. 1336), Eng. judge; Chief Justice of King's Bench, 1317–23; Chief Baron of Exchequer, 1330–36.—His bro., **Sir Geoffrey le Scrope** (d. 1340), was Chief Justice of King's Bench, 1324–27, 1328–38.—Sir Henry's s., **Richard le Scrope, 1st Baron** (*c.* 1326–1403), distinguished himself in Fr. and Scot. wars; Lord Treasurer, 1371; Lord Chancellor, 1378. WILLIAM, his c. s., was created Earl of Wiltshire (*q.v.*).—**Henry le Scrope, 9th Baron** (1534–92), was warden of West Marshes, 1562–92; Keeper of Queen of Scots, 1568; put down Rising of the North, 1569.

SCROPES OF MASHAM.—Richard le Scrope (*c.* 1350–1405), s. of 1st Lord Scrope of Masham; abp. of York (1398); shared in Revolution, 1399, and Percy revolt; surrendered at *Shipton Moor*; executed.—**Henry, 3rd Baron** (*c.* 1374–1415), Lord Treasurer, 1409; executed for treason.

SCROPHULARIACEÆ, herbaceous dicotyledons, including many familiar forms such as foxglove, snapdragon, speedwell, and calceolaria. Many are semi-parasites deriving nourishment from the roots of other plants (*e.g.* Euphrasia, Rhivanthus). The flower is pentamerous and usually zygomorphic, with from two to four stamens and a bilocular ovary with an immense placenta. Verbascum is exceptional in having an actinomorphic flower with five stamens.

SCROTUM, see REPRODUCTIVE SYSTEM.

SCRUB-BIRDS (*Atrichornithidæ*), a family of two small Perching Birds (*Atrichornis*) found only in Australia. They live in dense undergrowth or in grassy places, and are excellent mimics.

SCUDÉRY, MADELEINE DE (1607–1701), Fr. *précieuse* novelist; author of *Artamène, ou le Grand Cyrus* (1649–53), in 10 vol's, and *Clélie* (1656), in 10 vol's, much admired in their time; depicted contemporary Fr. society; wrote under the name of her bro., GEORGES DE SCUDÉRY (1601–67), writer of a forgotten epic and plays.

SCULPTURE, the most enduring medium of art, has always served as a faithful and a lasting record of the lives of nations. At even so remote a time as the early Egyptian dynasties s. had attained to an excellence remarkable. Though their implements were of flint, or of metal no harder than bronze, the

technical proficiency of the Egyptians was truly marvellous and their works gigantic.

Egypt.—Though we have no proof that the great *Sphinx* at Gizeh is the oldest example of s. extant, it has been considered as such, and it is undoubtedly the most ancient of colossal figures, and, beyond dispute, it is the largest in the world. Egypt, the cradle of the art, is strewn from end to end with the sculptured fragments of 6000 years, from the 1st dynasty, about 4777 B.C., up to the Middle Ages. Until the close of the XVIII. dynasty, about 1300 B.C., Egyptian s. had, like the country's civilisation, developed and declined, reviving with renewed vitality from time to time; but from this point the few short periods of renaissance that she enjoyed were stimulated by the administration of some foreign power.

This period of decline was brought to a close by Cambyses, who conquered Egypt in 525 B.C., and s. developed under PERSIAN influence until the entry of Alexander the Great two cent's later. The vigorous character of the Persians came as a revivifying element into the life of the nation. Through the preceding 4000 years, though suffering defeat and change of rulers, the Egyptian had proved adamant to the newcomers' influence in his arts, the defeated absorbing the conquerors and retaining their own art, but little modified. But to the overbearing Persian, Egyptian custom, for the first time in her history, bowed; the dominating character subdued the weaker and forced upon the decadent nation's art her own traditions.

With Alexander's conquest in 332 B.C. followed a GRÆCO-EGYPTIAN period, during which the influence of the Greeks is strongly marked. In particular this is so in the introduction of the naturally modelled eyes and mouth of their statues in place of the flat representations that characterised the traditional Egyptian work. This period, which is covered by the reign of Alexander and the dynasty founded by Ptolemy I., one of his leaders, terminated at the coming of Julius Cæsar in 48 B.C. and the importation of Roman ideas. At the death of Cleopatra VI., last of the Ptolemaic dynasty, in 30 B.C., Egypt was given over entirely to Roman administration, and its s., so far as it had been a world-wide influence, died, and for the succeeding seven hundred years the Græco-Roman and Byzantine took its place.

During the rule of Nero, 54–68 A.D., CHRISTIANITY became a new influence, and, with the subsequent growth of the religion and of monasticism, s. was enriched with forms and emblems pertaining to the new faith. This fusion continued until the close of the Roman Empire in Egypt and the Arab invasion of 639 A.D. With the withdrawal of the Romans in 642 and the establishment of the Saracens, s. practically ceased to exist. The coinage and metal-work for weapons and utilitarian purposes, which alone represented the art, were purely Saracenic, and as far as s. is concerned little interest attaches to these conditions, which continued to the Middle Ages and remain practically unchanged to-day.

Greece.—The Asiatic nations that occupied the countries watered by the Tigris and the Euphrates, and which were contemporary with dynastic Egypt, are so intimately allied that it would be difficult to discriminate between Babylonian and Chaldæan art, Assyrian, or Persian; nor is it necessary to do so, in a general survey of the history of s. Hence the work of China also and of India may be passed over together with the Jap. and Buddhist, for only in a limited measure are their effects felt in Western styles. What Asiatic or Egyptian influences can be detected in subsequent European s. have been transmitted through the Greeks.

The earliest records of Gk. s., which may be considered in the least reliable, refer to the works of a group of sculptors for whom may stand the names of DIPŒNUS and SCYLLIS, who came from Crete and settled on the Gulf of Corinth. The works of these men and their immediate followers in Corinth, Sparta, and Ægina, in Samos, Chios, and in Athens, were but attempts to make more lifelike the rude forms till then employed, by disengaging the limbs from the mass of the figure, an advance that was astonishing to those accustomed to a figure in one mass with limbs close joined to its sides.

These early sculptors advanced the art during the VI. and following cent's before Christ, working in wood, ivory, and gold. Fine marble was quarried in Chios and other spots, and this also served as the material for the sculptors. There is a legend that tells how, at this time, clay was first used by BUTADESA, sculptor of Corinth, in Greece for modelling, and tradition immortalises the names of RHŒCUS and THEODORUS, sculptors of Samos, in crediting them with the invention of bronze-casting.

As in all countries and in every age, art is affected by the three great factors, religion, climate, and materials at command, so was the s. of the Greeks confined almost entirely to figure-work representing their gods, their ideals, and their heroes, and as fresh marble districts were explored, so did the use of this material become more general. With ever-growing energy and refinement, s. emerged from the archaic period, and, with the impetus lent by the enthusiasm of Olympian games, it was advanced by PYTHAGORUS, CALAMIS, and MYRON at the close of the VI. cent. B.C., which at its death gave birth to PHEIDIAS and the finest period of s. the world has known. Pheidias was born at Athens about 500 B.C. This was ten years before the victory of *Marathon*, a circumstance that should be well remembered in view of the strenuous life of the Gk. nation at this time. That the best period of s. should coincide with that in which Greece reached the zenith of her greatness is not surprising. Hardship was present in the form of the attacking Persians, and at their final overthrow in 480 B.C., Athens, the greatest of Gk. cities, was left endowed with the energy and culture that produced the *Parthenon*. Argos, the school of the athletic type, produced the sculptor POLYCLEITUS, who reached his prime about the year 440 B.C., and in the following cent. s. was further enriched by the works of PRAXITELES and SCOPAS, by LYSIPPUS, the naturalistic sculptor, and DEMETRIUS.

Here began the decadence. With Alexander came the Hellenistic Age, which may be counted from 330 B.C. to 100 B.C., and which brought the art of Greece into contact with that of the East. It is amazing that two of the finest sculptured works of man should be produced in an age of decadence such as the II. cent. B.C. Yet to this period is ascribed the magnificent *Venus of Milo*, and the still more amazing *Victory of Samothrace* which, it is believed, was set up to commemorate a sea-fight of 306 B.C. It is improbable that the beauty of these works has ever been equalled, except by the sculptures on the Parthenon of Pheidias. At the decline of art in Greece a weakly wave of energy moved east, and Rhodes and Pergamum produced some fine examples.

Rome.—The balance of political power, however, now took a westward direction. Rome conquered Greece, and in 146 B.C. made of her a Roman province. To Rome were carried many fine examples of Gk. art, and towards the end of the II. cent. B.C. began the GRÆCO-ROMAN Age, a pale reflection of the Golden Age of Greece. One advance may be credited to Rome. Sculptured portraiture, seldom practised in Gk. art, was now developed, and by the many fine examples left to us we judge the Romans to have been supreme in this respect. Throughout the Roman Empire the influence of her s. spread to Egypt and Tripoli and the shores of the Mediterranean, over Central Europe, and westward to England at the close of the pre-Christian era.

Westward Movement.—In the IV. cent. the encouragement given to the Christian faith by the Emperor Constantine gave rise to the new forms in architectural and statuary s. that are characteristic of the Early Christian and Byzantine work. It may be said that geographically with the spread of Christianity s. advanced westward. The greatest centres of activity followed the Church with the cathedral-builders through the shores of the Mediterranean to Spain, where the Saracenic style seems to have proved

too strong to give the remnants of the Classic style fair footing, and by the north of Italy moved through France to the Rhine provinces and to England.

With the approach of the XI. cent., s. suffered in the general depression at the expectation of the world's demise, but, with the dawn of another age, the building and embellishing of cathedrals and palaces received fresh impetus, and, though no individual names have survived, the period between the XII. and XV. cent's is rich in the charming and ingenuous work of the GOTHIC sculptors. With the XV. cent. came the RENAISSANCE, that spread from Italy throughout the whole of Europe. While in the rest of Europe its effect on s. was immense, in England the movement found a more natural expression in lit., and, though the Renaissance affected in a small degree the country's s., it was but as the extremest ripple spent in its ever-widening progress from the centre.

Italy.—DONATELLO, VERROCCHIO, LEONARDO DA VINCI, MICHELANGELO, and CELLINI, each in his turn a master of the Renaissance, have left their masterpieces to influence in no mean measure the s. of succeeding cent's. Soon after the death of Cellini, the inevitable decadence set in. Least of the Renaissance sculptors from an artistic point of view, Cellini has never been excelled as a metal worker and goldsmith, and it is probable that to the debased and extravagant mannerisms of his followers, who admired and unintelligently copied him, was due much of the technically brilliant but decadent work of the Louis periods that followed.

Modern Revival.—At Possagno, Italy, in 1757, was born ANTONIO CANOVA, who, at the age of twenty-five, gave the first movement to a second Renaissance. Though the s. of his school was but a bare and lifeless imitation of the Greek, his work aroused that interest that gave to s. the encouragement it needed. Thirty years later he was followed by FRANCIS CHANTRY, the Derbyshire sculptor, who belongs more truly to the school of naturalism that now sprang up rather than to the pseudo-classic style of Canova, who inspired him. The naturalistic teaching provoked into activity sculptors in Italy, France, and Belgium, in Germany, England, and in North America. This phase, during which lived the great Frenchmen HOUDON, RUDE, and CARPEAUX, waned at the death of CARRIER-BELLEUSE in 1887, and with the rise to fame of AUGUSTE RODIN came a general rebellion that hugged the principle of free thought in art, and flung tradition to the winds.

Lübke, *History of Sculpture* (2 vols., 1872); Mrs. Bell, *Elementary History of Art, Architecture, Sculpture, and Painting* (1895); Marquand and Frothingham, *Text-Book of the History of Sculpture* (1896); Radcliffe, *Schools and Masters of Sculpture* (1902); Toft, *Modelling and Sculpture* (1910); Ruskin, *Aratra Pentelici* (1872).

SCURVY, SCORBUTUS, constitutional disease due to lack of fresh animal and vegetable food, characterised by anæmia, great weakness, spongy and swollen gums, and hæmorrhages. The symptoms come on gradually, with headache and a growing feeling of weakness and pains in the back, the gums then become swollen, bleed easily, the teeth are loosened, the breath is offensive, and there may be constipation or diarrhœa; swellings develop in different parts of the body, especially about joints, due to hæmorrhage into the subcutaneous tissue and muscles, and there is anæmia, with palpitation and breathlessness. The treatment is rest, a diet including fresh meat, green vegetables, and diluted lime or lemon juice (lime juice is served out to sailors to prevent scurvy), and the mouth should be washed out with dilute Condy's fluid or potassium chlorate solution. S. is a terror to explorers in polar regions.

SCURVY GRASS (*Cochlearia*), genus of plants, order Cruciferæ; Common S. G. (*C. officinalis*), a Brit. seaside plant, bears white flowers.

SCUTAGE (Lat. *scutum*, shield), feudal payment, introduced soon after Conquest, equivalent to military service due from knight's fee; forty days' service, or payment, were due from tenant of whole fee; encroachments of Crown were forbiddon by Magna Carta; s. died out, XIV. cent.

SCUTARI (41° 3′ N., 29° 2′ E.), town, on Bosporus; famous cemetery; manufactures silk; garrison town. Pop. 100,000. S. is built on the site of *Chrysopolis*.

SCUTARI, SCODRA (42° 1′ N., 19° 28′ E.), town, on Lake Scutari, capital, vilayet of same name, Albania; manufactures small-arms and exports grain and wool. Besieged by the Romans, 168 B.C., it fell during the Middle Ages into the possession of the Servians, who lost it to the Venetians; acquired by Turkey, 1479. During the TURKO-BALKAN WAR (*q.v.*) S. was besieged by Montenegrins and Servians, and the refusal of Montenegro to raise the siege led to an international naval demonstration at first ignored by Montenegro; the town fell, May 1913, and was handed over to the Powers.

SCUTIGERA, a genus of Centipedes; see MYRIAPODA.

SCYLLA AND CHARYBDIS (classical myth.), sea-monsters who dwelt on opposite sides of Messina Strait; allegory arose from dangerous navigation there.

SCYLLARIDEA, see LOBSTERS.

SCYLLIUM, see under SHARKS AND DOG-FISHES.

SCYPHOMEDUSÆ, ACALEPHÆ.—The Scyphomedusæ (Lat. *scyphus*, from Gk. *skuphos*, 'cup' or 'goblet,' and Gk. *Medousa*) or Acalephæ (from Gk. *akalepha*, 'nettle') form the second of the three great classes of Cœlenterates. They are jelly-fishes, and are generally relatively large in size, some forms attaining a diameter of 4 ft.; from Hydrozoon Medusæ they are distinguished by the presence of genital products situated in the endoderm, and by the absence of a *velum* or *craspedon* (hence the name ACRASPEDA, sometimes given to the group); while from the Actinozoa they are distinguished by the absence of a gullet and of mesenteries. The jelly-fishes consist in general of a disc-like mass of transparent jelly substance, phosphorescent in some species, within which the digestive cavity, the genital organs, and radial canals are visible. The edge of the disc is fringed with tentacles, and the mouth is placed at the end of a long process (the *manubrium*) which hangs from the centre of the under-surface and is often fringed with delicate filaments. On the margin between the tentacles are placed sense-organs, *tentaculocysts* or *statorhabs*, which are associated with a simple nervous system, and have to do with the balancing of the animal. Jelly-fishes swim slowly by gentle pulsations of the disc. They are extremely voracious, and capture with their tentacles prey varying from minute swimming-bells to comparatively large crustaceans and fishes. The sexes are separate, and the sexual products pass into genital sacs and thence into the gastric cavity, whence they escape to the exterior by the mouth. The life-history is complicated, the egg developing into a free-swimming embryo which develops into a sedentary polyp-like *hydratuba*. This may give rise to a larva like itself, but usually it divides horizontally into a pile of larvæ or Ephyræ, which float away and develop into adult sexual medusæ.

Jelly-fishes are marine animals occurring in all seas, and generally found in the open, most frequently in large shoals near the surface. A few occur in deep water, and some forms, included in the order STAUROMEDUSÆ, are temporarily attached to seaweeds and stones by means of a short stalk.

The shoals of jelly-fishes frequently cast on shore after a storm have been used by farmers as dressing for their fields. In China and Japan some are served as food; others are used as bait for fishes. On account of their stinging powers, many are obnoxious to bathers and divers.

A peculiar relationship exists between the larger individuals and small fishes, such as young whiting or horse mackerel. These swim in the neighbourhood of the jelly-fish, and at the least sign of danger seek shelter underneath the disc.

SCYROS (38° 50′ N., 24° 35′ E.), modern SKYRO, island, in Ægean Sea, ancient Greece; connected with Achilles myth.

SCYTHIA, name applied in ancient times to the steppe region between Caucasus and Danube; inhabited by nomadic and pastoral race, who acquired some measure of civilisation from the Greeks; authorities differ as to whether they were of Mongoloid or Aryan race. They invaded Media with success in the VII. cent. B.C., but were eventually expelled by Cyaxares; they repulsed the attempt at conquest of Darius late in the VI. cent. B.C.; decimated by the Sarmatians (*q.v.*), IV. cent. B.C. The eastern tribes established themselves by conquest in Persia in the II. cent. B.C., and in N. India in the I. cent. B.C.; and here they held sway for several cent's. The people are described by Herodotus, and seem to have been a degenerate race of unhygienic habits and addicted to cruelty when engaged in warfare; apparently subdivided into tribes, of which the Royal S's was most important and exercised suzerainty over the rest. They worshipped a number of gods and goddesses, and in India professed Buddhism.

SEA ANEMONE, a type of large solitary polyp found in the sea attached to rocks, in crevices or clefts, or burrowing in the sand of the seashore; may be readily distinguished by the brilliantly coloured tentacles, sometimes numbering 150, which surround the mouth, and to which is due their likeness to garden flowers. They may be minute creatures, but the PLUMOSE ANEMONE, or *Carnation Anemone* of British coasts, may reach a height of 9 inches. They are voracious feeders, killing minute shrimps or larger prey by means of the stinging cells in their tentacles, and engulfing the morsel in their capacious sac-shaped stomach. Some of them live in constant association with particular species of crabs. S. A's are enjoyed as delicacies on the coasts of Italy and South America; they belong to the *Zoantharian* group of the class ACTINOZOA (*q.v.*) amongst Cœlenterate animals.

SEA BEARS, see SEALS.

SEA BREAMS, PORGIES, etc. (*Sparidæ*), broad, compressed, 'bony' fishes, found inshore in all the oceans. Many are excellent food fishes, the most valuable being the AMER, SHEEPSHEAD and the AUSTRALIAN SCHNAPPER.

SEA BUTTERFLY, see under GASTEROPODA.

SEA CUCUMBERS, see ECHINODERMATA.

SEA EAGLE, a member of the HAWK FAMILY (*q.v.*).

SEA LILIES, see ECHINODERMATA.

SEA LIONS, see SEALS.

SEA LIZARD, see under LIZARDS.

SEA MAT, see POLYZOA.

SEA MOSSES, see POLYZOA.

SEA PERCHES, see BASSES.

SEA POACHER, see ALLIGATOR FISHES.

SEA SQUIRTS, TUNICATA (*q.v.*).

SEA SWALLOWS, TERNS, see under GULL FAMILY.

SEA TROUT, see under SALMON FAMILY.

SEA URCHINS, see ECHINODERMATA.

SEA WORMS, see under CHÆTOPODA.

SEABURY, SAMUEL (1729–96), Anglo-Amer. divine; originally Congregationalist, then took Anglican orders; went to America, 1754; Prot. Episcopal bp. of Connecticut, 1783, and of Rhode Island, 1790; an able ecclesiastical statesman and administrator.

SEA-CAT, name applied to various fishes, *e.g.* Wolf-Fish, Chimæra.

SEADIAH, BEN JOSEPH, SAADIA (892–942), Jewish scholar; first attained fame in long controversy, defending Rabbanite calendar against Qaraites; app. chief of school of Sura as reward, but quarrelled with exilarch; was dismissed, 930, and, refusing to submit, was commanded by caliph to retire, 933; restored, 938; much of his work is lost; rest, written in Arabic, had small circle of readers, and was unknown in mediæval Europe; valuable translation of books of Bible into Arabic; theological treatises of importance.

SEA-ELEPHANT, see under CARNIVORA.

'SEA-FIG,' see under SPONGES.

SEAFORD (50° 47′ N., 0° 5′ E.), watering-place, on English Channel, Sussex, England. Pop. (1911) 4787.

SEA-GULL, see GULL FAMILY.

SEAHAM HARBOUR (54° 50′ N., 1° 20′ W.), seaport, on North Sea, Durham, England; exports coal. Pop. (1911) 15,759.

SEA-HARE, see under GASTEROPODA.

SEA-HEDGEHOG, name given to Sea-Urchin, Globe-Fish, Porcupine Fish.

SEA-HORSE, see under PIPE FISHES.

SEA-KALE (*Crambe maritima*), a hardy perennial with succulent leaves, growing on Brit. coast. The young foliage is used as a vegetable.

SEAL (Lat. *sigillum*) was used in early Eastern civilisations as an authoritative stamp, but in the West the form has always been the impression of a design on some soft material, clay or wax, by an instrument of hard metal—commonly lead, gold, or silver. Without the s. in important documents the signature was usually considered worthless. The royal s. was formerly placed on the face of the document, but in the XI. cent. it became customary for the s. to be appended by thongs, and subsequently to be engraved on both sides. While some of the Anglo-Saxon kings certainly used s's, Edward the Confessor's is the first of the *Great Seals* of England which pertain to the sovereign. The idea of the s. was that it witnessed to the personal presence of the writer of the document, or at least to his or her personal authority for all that the document contained. From the time of the Middle Ages not only has the king had his private s., in addition to the 'Great Seal' of the Crown, but nobles and higher clergy, law courts, public bodies, cathedral chapters, monasteries, municipalities, and government officers all have had their s's to render legal documents authentic. Many of these s's were things of exceptional beauty and the rare creations of artists and craftsmen, especially from the XII. to the end of the XIV. cent's, the great period of s's. The ordinary shape was round or pointed oval. Bronze was the common material of the s. (or matrix)—silver being the choice of the wealthy, and lead of the poorer officials.

W. de G. Birch, *Catalogue of Seals in the British Museum*: A. Wyon, *Great Seals of England*.

SEAL-FISHERIES are prosecuted with two objects—the obtaining of the 'seal-skin' of commerce, valued at from £2 to £10 a hide, and the collection of oil. In the former case, the Fur or Eared Seals (*Otariidæ*) are the victims, and the fisheries, owing to the limited distribution of such seals, are confined mainly to the N. Pacific in the neighbourhood of Bering Sea and Alaska, and to the S. Pacific about Cape Horn and the sub-Antarctic islands to the south thereof. Oil fisheries are more widely distributed, for the majority of seals possess a valuable supply of blubber underneath the skin. The Earless Seals (*Phocidæ*) are killed in enormous numbers on the coasts of Newfoundland and Labrador, of Greenland, Spitzbergen, Novaia Zemlia, and almost all the shores bordering the Arctic Sea, as well as in several Antarctic islands. In addition to their oil supply, used for lighting and lubricating, and reaching an annual production of 90,000 barrels, Earless Seals also furnish hides, which are manufactured into leather.

SEALKOTE, see SIALKOT.

SEALS form two distinct families—the TRUE SEALS (*Phocidæ*) and the EARED SEALS (*Otariidæ*)—in the Pinnipedia group of CARNIVORES (*q.v.*). Their life is chiefly passed in the sea, for they come ashore only for repose or for breeding purposes. They feed mainly on fishes, crabs, and molluscs, but some Antarctic species catch and devour Penguins. The most salient distinctions between True and Eared Seals are that the former have no external ear, have hairy palms and soles, and hind-limbs permanently stretched behind; while the latter, which include FUR SEALS, HAIR SEALS, SEA

BEARS, and SEA LIONS, have a small external ear, naked palms and soles, and can turn their hind-limbs forwards in normal fashion. Seals are found in almost all seas, but are absent from the tropics, and Eared Seals from the North Atlantic.

SEAMAN, OWEN (1861–), Eng. journalist; edit. of *Punch* since 1906; writer of humorous verse.

SEAMANSHIP, see SHIP (SEAMANSHIP).

SEA-MEW, the sea-gull. See GULL FAMILY.

SEA-OWL, name for LUMP-SUCKER (*q.v.*).

SEA-PIES, see under PLOVER FAMILY.

SEA-PINK, see THRIFT.

SEA-SCORPION, see BULLHEADS.

SEA-SERPENT, name sometimes applied to the exceedingly poisonous aquatic Sea-Snakes belonging to the Reptilian family Hydrophidæ, which are found in tropical waters, especially of Indian and Pacific Oceans; but more often to an unidentified and perhaps non-existent monster alleged to have been seen, generally with small head, long neck, and body in loops, in the open sea. Such forms may exist, but rumours of sea-serpents are often due to inaccurate observations of such things as a school of Porpoises at play, the arms of some gigantic Cuttlefish (specimens of *Architenthis* more than 50 ft. in length have been captured), the 8-foot long Wolf-Eel of California (*Anarrhichthys*), the 15-foot Oar- or Ribbon-Fish (*Regalecus*), a phosphorescent chain of pelagic Tunicates or Salpæ, or even a flight of Ducks.

SEA-SICKNESS, conditions due mainly to disturbance of the nervous system by the pitching or rolling of a vessel at sea, the chief symptoms being giddiness, nausea, and intense vomiting; nerve sedatives, *e.g.* potassium bromide, and nerve stimulants, *e.g.* strong coffee, have both been found useful in preventing sea-sickness.

SEA-SLATERS, see under MALACOSTRACA.

SEA-SLUG, see under GASTEROPODA.

SEA-SNAILS, see LUMP-SUCKERS.

SEA-SNAKES, see NEMERTINE WORMS.

SEA-SPIDERS, see PYCNOGONIDA.

SEATTLE (47° 40 N., 122° W.), principal seaport of Washington, U.S.A.; has fine public buildings and many beautiful parks; seat of Washington State Univ. (founded, 1855); R.C. episcopal see; has fine cathedral; many educational and charitable establishments. S. has excellent communications by North Pacific and other railways, and a fine harbour; shipbuilding, fish-canning, glass-making, and lumber trade; coal found in district. Pop. (1910) 237,194.

SEA-UNICORN, the Narwhal. See under DOLPHIN FAMILY.

SEAWEED, see ALGÆ.

SEA-WOLF, WOLF-FISH (*Anarhichadidæ*), a family of large, voracious, blenny-like fishes, with strong, sharp teeth, and body sometimes 6 to 8 ft. long; occur in northern seas, the Common Wolf-Fish (*Anarhichas lupus*), 4 to 6 ft. long, being a common inhabitant of Brit. waters.

SEBASTIAN (1554–78), king of Portugal (1557); romantic figure; drove advisers to desperation by unworldliness; slain in crusade against Moors of Africa.

SÉBASTIANI, HORACE-FRANÇOIS-BASTIEN, COUNT (1772–1851), Fr. soldier of lowly birth; advanced by Napoleon, who employed him as diplomat; Naval and Foreign Minister, 1830.

SEBASTIANO DEL PIOMBO (1485–1547), Ital. painter; pupil of Giovanni Bellini and Giorgione; became intimate with Michelangelo, and collaborated with him in three famous pictures—*The Raising of Lazarus*, now in the National Gallery, London, and two scenes from the last days of Christ, in St. Peter's Church, Montorio, Rome.

SEBASTOPOL, see SEVASTOPOL.

SEBENICO (43° 44′ N., 15° 33′ E.), city, on Adriatic, Dalmatia, Austria; cathedral; active trade. Pop. (1910) 29,579.

SEBORRHŒA, condition of the skin, in which there is excessive secretion by the sebaceous glands, forming crusts with scales from the skin and dirt; the treatment is thorough cleansing of skin, and then application of sulphur ointment.

SEBZAWAR (33° 15′ N., 62° 15′ E.), town, Afghanistan. Pop. 16,000.

SEBZEWAR (36° 10′ N., 57° 40′ E.), town, Khorassan, Persia; trade in wool. Pop. 21,000.

SECKENDORF, FRIEDRICH HEINRICH, COUNT VON (1673–1763), Ger. general and diplomatist; commanded for Holland, Poland, Saxony, and Austria successively; Austrian envoy to Prussia, 1726–35, and earned enmity of crown prince, afterwards Frederick the Great; Bavarian field-marshal in War of Austrian Succession.

SECKENDORF, VEIT LUDWIG VON (1626–92), Ger. statesman and author; wrote *Commentarius historicus et apologeticus de Lutheranismo*.

SECKER, THOMAS (1693–1768), bp. of Bristol, 1735, Oxford, 1737; abp. of Canterbury, 1758.

SECOND ADVENTISTS, see ADVENTISTS.

SECOND SIGHT, the power of foreseeing the future, claimed by many persons, particularly the Scot. Highlanders; often believed to be a superstition, but, like other psychic phenomena, now thought by many to have a basis in fact. It often takes the form of an apparition of some one who is living, but whose death is imminent.

SECRETARY OF STATE, officer of Brit. government; originally 'secretary of the king'; duly recognised official by time of Edward III.; present five Sec's of State retain original position of go-between of Crown and Parliament. In U.S.A. S. of S. is Foreign Minister. There is a papal official so-called who deals with politico-ecclesiastical affairs.

SECRETARY BIRD (*Serpentarius sagittarius*), so named on account of the pen-like tuft of feathers stuck clerk-wise at the back of the head; crane-like African birds which feed on insects and reptiles.

SECULAR GAMES, held in Rome at beginning of new generation (*sæculum*), Etruscan in origin; lasted three days; first celebrated 249 B.C.

SECULARISM.—Any view which confines interest to present life, ignoring religion, and especially that which dissociates morals from religion, is called secularist.

SECUNDERABAD (29° 59′ N., 71° 24′ E.), military station, Hyderabad, India. Pop. 86,000.

SEDALIA (38° 43′ N., 93° 11′ W.), city, capital, Pettis County, Missouri, U.S.A.; railway shops; iron foundries. Pop. (1910) 17,822.

SEDAN (49° 42′ N., 4° 57′ E.), town, on Meuse, Ardennes, France; has remains of XV.-cent. castle, Prot. church (1593), statue of Turenne, etc.; great Prot. centre in XVI. cent.; annexed to France, 1642. Great battle of S. took place, Aug. 31, 1870, resulting in total defeat of French under Marshal Macmahon by Germans under king and crown prince of Prussia and crown prince of Saxony. Confusion arose in Fr. army by contradictory orders issued by Ducrot and General Wimpffen. Napoleon III. surrendered with over 80,000 men, guns, supplies, etc., capitulation being arranged at Château Bellevue, 3½ miles from S. Fr. casualties totalled 17,000, Germans about 10,000. Chief industries are machinery, metalware, woollens, flour, weaving, chocolate. Pop. 21,000. See FRANCO-GERMAN WAR.

SEDBERGH (54° 19′ N., 2° 31′ W.), town, W. Riding, Yorkshire, England; grammar school.

SEDGEMOOR, battlefield, Somerset. See MONMOUTH, JAMES SCOTT, DUKE OF.

SEDGLEY (52° 33′ N., 2° 8′ W.), town, Staffordshire, England; coal and iron mines. Pop. (1911) 16,529.

SEDGWICK, ADAM (1785–1873), Eng. geologist; Woodwardian prof. of Geol., Cambridge, 1818; mapped rocks of Lake District, 1822; elected pres., Geol. Society, 1829–30, and in 1831 began study of rocks in Wales. S. founded the Cambrian system at same time as Murchison (*q.v.*) founded Silurian; great controversy raged between the two, 1833.

SEDIMENTARY ROCKS, see PETROLOGY.

SEDITION is not known as offence in itself; but seditious intention is the intention to bring into hatred or contempt king, Parliament, and administration of justice, or to incite to alter the government other than by lawful means, or to disturb peace. There are also seditious libels, conspiracies, and meetings.

SEDLEY, SIR CHARLES, SIDLEY (1639–1701), Eng. poet and dramatist; plays are poor but lyrics are fine, cf. 'Phillis is my only joy'; figures in Dryden's *Essay on Dramatic Poetry*.

SEELAND, see ZEALAND.

SEELEY, SIR JOHN ROBERT (1834–95), Eng. essayist and author of *Ecce Homo*, a magnificent study of the humanity of Jesus; also wrote *Natural Religion*.

SEELY, COLONEL RIGHT HON. JOHN EDWARD BERNARD (1868–), Eng. Liberal statesman; Under-Sec. for Colonies, 1908–10; Under-Sec. of State for War, 1911; Sec. of State for War, 1912– .

SEES (48° 36′ N., 0° 10′ E.) (ancient *Saium*, or *Sagium*), town, on Orne, Orne, France; bp.'s see; cathedral. Pop. (commune) 4200.

SEGESTA (38° N., 13° E.) (Gk. *Egesta*), ancient town, Sicily; founded by Trojans; Rom. colony, 206 B.C.

SEGESVAR, SCHÄSSBURG (46° 10′ N., 24° 47′ E.), town, capital, Nagy-Küküllö, Hungary; textiles. Pop. 11,500.

SEGOVIA, province, Old Castile, Spain. Pop. (1910) 167,744. Capital, **Segovia** (40° 56′ N., 4° 8′ W.), was a Rom. town; interesting features are Trajan's aqueduct, mediæval walls and fortress, XVI.-cent. cathedral; manufactures paper. Pop. 15,700.

SEGRAVE, BARONY OF, Nicholas de Segrave of Segrave, Leicester, was summoned to Parliament in 1264, 1283, and 1295; his descendant Elizabeth (d. 1375 ?) m. John de Mowbray; the barony descended to MOWBRAYS and HOWARDS, and after long abeyance was revived, 1878, for STOURTONS, co-heir of last baron.

SEGREGATION, HYPOTHESIS OF, see MENDELISM.

SÉGUIER, PIERRE (1588–1672), chancellor of France (1635); master of Court of Requests, 1620; *président à mortier* of *parlement* of Paris, 1624–35; as chancellor infringed liberties of *parlement*, and Fronde obtained his dismissal, 1650.

SÉGUR, Fr. family; settled in Limousin in early Middle Ages; chief members: **Henri-François** (1689–1751), Comte de S., general in War of Austrian Succession; **Philippe-Henri** (1724–1801), Marquis de S., marshal of France, 1783; **Louis-Philippe** (1753–1830), Comte de S., *philosophe*; **Paul-Philippe** (1780–1873), general and author.

SEGURA (38° 20′ N., 2° 20′ W.) (ancient *Tader*), river, S.E. Spain; flows into Mediterranean.

SEGUSIO (45° 5′ N., 7° E.), modern SUSA, ancient city, *Liguria*; capital of the Cottian Alps.

SEHESTED, HANNIBAL (1609–66), Dan. statesman; m. king's dau. Christine, 1642; viceroy of Norway, 1642; won considerable autonomy for Norway, till death of Christian IV., 1648; exiled on conviction of peculation, 1651; troubles of Swed. War led to recall, 1660; negotiated Treaty of Copenhagen.

SEHORE (23° 12′ N., 77° 12′ E.), town, Brit. military cantonment, Bhopal, India; manufactures muslins; active commerce. Pop. 17,000.

SEIDLITZ POWDERS, see MINERAL WATERS.

SEIGNIORAGE.—In feudal times the king made a charge for the work of turning bullion into coin, and this charge, called 'seigniorage' (Norman-French word), was an important part of the royal revenue. It was not till Charles II.'s reign that the Crown ceased to take toll of all money coined, and coinage charges were abolished at the Mint.

SEINE (48° 50′ N., 2° 20′ E.), department of France; part of old province Île-de-France (*q.v.*); capital, Paris; area, 185 sq. miles. Pop. (1911) 4,154,042.

SEINE (49° 28′ N., 0° 15′ E.) (ancient *Sequana*), river, France, rises in Côte D'Or, flows with a winding course to N.W.; enters Eng. Channel at Havre; receives the Aube, Marne, Oise, Yonne, Loing, Essone; length, 470 miles; navigable for about 380 miles.

SEINE-ET-MARNE (48° 40′ N., 3° E.), department, France, formed from parts of Brie and Gâtinais; drained by the Seine; produces grain and 'Brie' cheese. Capital, Mélun. Pop. (1911) 363,561.

SEINE-ET-OISE (48° 50′ N., 1° 55′ E.), department, France, formed from part of old province Île-de-France; surface in parts hilly and forest covered; vineyards and good pastures; wheat, fruit, vegetables grown. Capital, Versailles. Pop. (1911) 817,617.

SEINE-INFÉRIEURE (49° 40′ N., 1° E.), maritime department, France, formed of part of old Normandy; undulating; generally fertile; drained by Seine; important textile industries; contains ports of Havre and Dieppe. Capital, Rouen. Pop. (1911) 877,383.

SEINING is fishing with a movable net—the seine—and is the oldest form in use amongst civilised peoples. A long strip of netting, with pockets, weighted at the bottom, and buoyed at the headline, and attached either to a boat at sea or to the beach, is the instrument of capture for smelts, pilchards, eels, plaice, and mackerel. Two boats go out with seines for a shoal of pilchards off the Cornish coast. The Dan. fisherman uses seines for catching eels and plaice, while in U.S.A., where the seine is used far more than it is in Britain, mackerel is the chief catch.

SEISIN, SASINE, old law term for 'possession.' See FEOFFMENT.

SEISMOLOGY, the scientific study of earthquakes, which may be earth tremors so slight as only to be detected by delicate seismographs. Earthquakes so recorded may last but a few seconds or persist for hours, or the earth may be shaken by successive shocks for days. Large earthquakes are recorded by seismographs, however distant they may be from the centre of disturbance. Such earthquakes commence by tremors (*preliminary tremors*), giving place to large waves which work up to a maximum. The preliminary tremors are thought to travel through the centre of the earth, and their speed (about 20 minutes from the Antipodes) proves the earth's effective rigidity to be about the same as that of the hardest steel. The large waves are supposed to traverse the circumference of the earth, and from the difference in time of arrival of the preliminary tremors and the largest waves (maximum) is deduced the distance of origin.

The simplest instruments are the seismoscope and seismometer. The *seismoscope* may be a column so balanced that it falls when earthquake occurs and shows direction of earth-waves. An early seismoscope was invented by Chinese, used at Chôko in 136 A.D. *The seismometer* measures intensity of shock.

The *seismograph* is the form of instrument mostly used at present day. Professor John Milne is the founder of modern seismology, and instruments of his design are generally used. The Milne seismograph consists of an upright column supporting without friction a horizontal boom, which, being therefore free to move, sways according to the intensity of earth movement communicated to it. A needle at the end of the boom is slit to allow a spot of light to fall on sensitised paper, which therefore shows a straight line when the instrument is at rest. The column is built into concrete sunk into the ground. The newest seismograph, the Galitzin, involves electromagnetic principles and gives both distance and direction of the shock.

Earthquakes are thought to be due to the shrinkage of the earth's crust and the necessary adjustments to the inner nucleus. About 60 great earthquakes are recorded annually. Among the great earthquakes of recent years are those of Valparaiso (following one off Alaska a few minutes earlier) and San Francisco (1906), Jamaica (1907), and Messina (1908).

Milne, *Earthquakes* and *Seismology*.

SEISTAN, SISTAN (31° N., 62° E.), region in S.W. Asia, deriving its name from Lake S., or *Hamun*, a large

swamp in W. of Afghanistan, near Khorassan, province of Persia; total area, 7000 sq. miles, of which considerably more than half belongs to Afghanistan, the remainder to Persia; surface is chiefly steppe-land, but large area is rendered fertile by periodic floodings of Lake Hamun; produces cereals, pulse, cotton, fruits; inhabited by various native tribes, some of which are nomadic. Persian S. is divided into the two districts of S. proper and Outer S., and has a total pop. of *c.* 250,000.

SEJANUS, Rom. soldier who aspired to be emperor. See TIBERIUS, CLAUDIUS NERO.

SEKONDI (4° 55′ N., 1° 45′ W.), port, on Gold Coast, W. Africa. Pop. 5500.

SELACHIANS (SELACHII, PLAGIOSTOMI), DOG-FISHES, SHARKS, and RAYS; an order of Cartilaginous or Elasmobranch Fishes (see under FISHES) with a transverse mouth on the under surface, furnished with highly specialised separate teeth, with a rostrum projecting in front of the mouth, 5, 6, or 7 external gill-clefts, claspers, and a heterocercal tail. The order is generally divided into two groups: the DOG-FISHES and SHARKS (*q.v.*), or SELACHOIDEI, with bodies almost cylindrical, lateral gill-clefts, and free fins; and the RAYS (*q.v.*), or BATOIDEI, with compressed bodies, ventral gill-clefts, and pectoral fins united with the head. Although in modern seas Bony Fishes far outnumber the Selachians, in prohistoric times the latter were more abundant. Fossil forms have been found in Silurian rocks, and are numerous in the Carboniferous and succeeding systems.

SELAGINELLACEÆ, see PTERIDOPHYTA.

SELANGOR, see MALAY STATES.

SELANIK, SALONIC (*q.v.*).

SELBORNE (51° 6′ N., 0° 57′ W.), village, Hampshire, England; birthplace of Gilbert White.

SELBORNE, 1ST EARL OF, ROUNDELL PALMER (1812–95), Eng. lord chancellor; s. of Rev. Wm. Jocelyn Palmer, rector of Mixbury; carried away by Oxford movement and remained pious High Churchman; Q.C., 1849; knighted, 1861; Solicitor-General, 1861–63; Attorney-General, 1863–66; refused chancellorship, 1868, disapproving of Irish disestablishment proposed by Gladstone; strongly opposed bill, 1869; opposed abolition of religious tests in univ's; P.C., 1872; Lord Chancellor, 1872–74, 1880–85; cr. Earl of S., 1882; author of Judicature Act, 1873, establishing supreme law court and principle that when case-law is contradictory question shall be settled by equity; author of ecclesiastical treatises and editor of hymn-books; eulogised as 'a pattern and standard of high-minded dignified public life.'

SELBORNE, 2ND EARL OF, WILLIAM WALDEGRAVE PALMER (1859–), Brit. statesman (Unionist); Under-Sec. for Colonies, 1895–1900; First Lord of Admiralty, 1900–5; high commissioner for S. Africa and gov. of Transvaal, 1905–10; gov. of Orange River colony, 1905–7; by moderation and good sense helped to pacify and unify S. Africa and mitigate racial feeling.

SELBY (53° 47′ N., 1° 4′ W.), town, on Ouse, W. Riding, Yorkshire, England; fine abbey church. Pop. (1911) 9049.

SELBY, VISCOUNT, see GULLY, WILLIAM COURT.

SELDEN, JOHN (1584–1654), Eng. lawyer and writer; b. Salvington, Sussex; M.P., 1623, and again, 1626; supported impeachment of Buckingham; imprisoned for share in tonnage and poundage incident, 1629, when Hollis and Strode held Speaker in his chair; sat in Long Parliament. His best work, *Table Talk*, compiled by his sec., is pioneer of Essay vogue; other books, *Titles of Honour* and *History of Tithes*, show great erudition, but laboured literary style; Selden Society (1887) promotes study of history of law.

SELENE, PHŒBE (classical myth.), goddess of Moon; dau. of Hyperion, and sister to Helios and Eos; drove in chariot with two white horses.

SELENGA-ORKHON (49° N., 103° E.), river, N. Mongolia and E. Siberia; flows into Lake Baikal.

SELENITE, see GYPSUM.

SELENIUM (Se = 79·2), non-metallic element, allied to sulphur, with which it occurs in pyrites; deposited in flues and chambers of sulphuric acid works in which pyrites is burnt. Selenic acid is thence obtained, and reduced thus: $H_2SeO_4 + 2HCl = H_2SeO_3 + H_2O + Cl_2$; $H_2SeO_3 + 2SO_2 + H_2O = Se + 2H_2SO_4$; known in three allotropic forms: amorphous red, S.G. 4·26; 'metallic' black, S.G. 4·8, M.P. 217° C.; used for photometric purposes; crystalline red, S.G. 4·47. Compounds: H_2Se (gas); SeO_2 (solid) and selenites; (SeO_3 unknown), selenates isomorphous with sulphates.

SELEUCIA.—(1) (36° 12′ N., 36° E.) ancient town, on Orontes, Syria, founded by Seleucus I., Nicator; important during war between Ptolemies and Seleucidæ. (2) (*c.* 33° N., 44° 35′ E.) ancient town, on Tigris, also founded by Seleucus I., Nicator; was important trading town and eastern capital of Seleucidæ. (3) (36° 22′ N., 33° 42′ E.) ancient town, in Cilicia; also founded by Seleucus; had famous oracle of Apollo; modern SELEFKEH.

SELEUCIDÆ, Macedonian rulers (312–65 B.C.) over Asiatic dominions formerly belonging to Alexander the Great; named from **Seleucus I.,** NICATOR, who, on second partition of Alexander's empire, obtained satrapy of Babylonia and acquired Susiana; secured possession, 312; assumed title of king, 306; always retained Gk. character. His s., **Antiochus I.** (*c.* 324–262), fought first Syrian War with Ptolemy; succ., 261, by s., **Antiochus II.,** who waged second Syrian War with Egypt. **Antiochus III.,** *the Great* (242–187), recovered revolted provinces of Asia; wrested Palestine from Ptolemies, 198; defeated at *Thermopylæ*, 191, by Romans, who drove him from Asia Minor, 190–88. **Antiochus IV.,** EPIPHANES (*i.e.* the Illustrious) (176–64), conquered Egypt, but was expelled by Romans, 168; his persecution of Jews and defilement of the Temple at Jerusalem by setting up therein an image of Jupiter caused revolt of the Maccabees. **Antiochus VII.** (138–29) once more crushed the Maccabees. The male line died out with murder of **Antiochus XIII.,** 65, and Syria became Rom. province, 64.

Bevan, *House of Seleucus* (1903).

SELF-CONSCIOUSNESS.—(1) perception of, or reflection on, oneself as distinct from objects not oneself; (2) popularly, a flustered condition, or sometimes a 'swaggering' attitude, due to concentrating attention on oneself.

SELF-DENYING ORDINANCE, see CROMWELL, OLIVER; GREAT REBELLION.

SELIM I., 'THE FEROCIOUS' (1467–1520), sultan of Turkey, 1512; conquered Persians and Armenians; annexed Egypt, 1517, and obtained from last Abbaside caliph renunciation of rank of Defender of the Faithful. —**Selim II.** (*c.* 1524–74), succ., 1566; worthless; Turks defeated at *Lepanto* (q.v.), 1571.—**Selim III.** (1761–1808), succ., 1789; unfortunate reformer; army, newly organised on European lines, defeated by Russia and Austria; badly treated by ally, Napoleon; deposed and murdered.

SELINUS (37° 36′ N., 12° 48′ E.), ancient town, S.W. Sicily; ruins remain, including those of a number of Doric temples, one of which is said to be the largest ever constructed. The town was originally a settlement of Dorian colonists, dating from *c.* 630 B.C.; ruined by the Carthaginians, 409 B.C., and again, 249 B.C.

SELJUKS, name of Turkish dynasties which ruled in Asia and claimed descent from **Seljuk,** a Turk, who belonged according to one tradition to tribe of Oughouz. Seljuks first appear as tribe of marauders in Transoxiana, whither they came from Turkestan in year 1000 of Hegira; under TOGHRIL BEG and DJAGHRI BEG attack on Ghaznevid dynasty of Persia commenced, 1037; Toghril became sultan of Bagdad, 1055, and chief power in empire; his nephew,

ALP ARSLĀN, captured Gk. emperor, Romanus Diogenes, 1071, and founded Seljuk empire of Roum. MALIK SHĀH came into contact with crusaders; his son and heir, BARKYAROUK (1092–1104), was so beset with rebellions that Antioch and Jerusalem fell in First Crusade, 1097. On death of Malik Shāh, his large empire had broken up among three Seljukian rulers: (1) KILIJ ARSLĀN turned his province of Roum into a sovereignty; he opposed crusaders who wished to traverse his territories, but his son, KILIJ ARSLĀN II., was completely subjugated by Frederick I., 1190. KAIKAOUS captured Emperor Alexius Comnenus in Sinope, 1214. KAIKOBĀD *the Great* ruled, 1219–34; wealth, conquests, and brilliant civilisation famed east and west; son, KAIKHOSRAN, became vassal of Mongols, and, its glories shorn by invader and rebel, the dynasty ended, 1300–15. (2) KERMAN dynasty founded by kinsman of Malik Shāh expired in XII. cent. (3) SYRIAN ended, 1118.

SELKIRK (55° 33′ N., 2° 51′ W.), town, on Ettrick, capital, Selkirkshire, Scotland; contains statues of Sir Walter Scott and Mungo Park; tweed manufactures. Pop. (1911) 5886.

SELKIRK, ALEXANDER, SELCRAIG (1676–1721), prototype of Robinson Crusoe; born at Largo, Fifeshire, where there is a life-sized statue of him as Crusoe; lived alone on Juan Fernandez from 1704–9.

SELKIRK MOUNTAINS (50° 30′ N., 118° W.), group of mountains, Brit. Columbia; highest peak, Sir Donald, 10,645 ft.

SELKIRKSHIRE (55° 30′ N., 3° W.), inland county, S.E. Scotland; area, 267 sq. miles; surface generally mountainous, highest points, Broad Law and Lochcraig Head; contains St. Mary's Loch and the old Forest of Ettrick; beautiful pastoral scenery; drained by Tweed, Ettrick, Yarrow; county town, Selkirk; has extensive sheep-farming and manufactures of woollen cloth; was scene of continuous warfare in XIV. and XV. cent's, and a stronghold of Covenanters in XVII. cent. Pop. (1911) 24,600.

SELLAR, WILLIAM YOUNG (1825–90), Scot. scholar; prof. of Greek, St. Andrews (1859), of Lat., Edinburgh (1863); uncle of Andrew Lang; great critic of Rom. poets.

SELMA (32° 26′ N., 87° 8′ W.), city, on Alabama, capital, Dallas County, Alabama, U.S.A.; cotton manufactures. Pop. (1910) 13,649.

SELMECZBANYA, SCHEMNITZ (48° 27′ N., 18° 52′ E.), town, Hungary; silver mines. Pop. 17,500.

SELOUS, FREDERICK COURTNEY (1851–), Eng. explorer and sportsman; guide to expedition of Brit. S. Africa Co. to Mashonaland, 1890; authority on big game shooting.

SELWYN, GEORGE AUGUSTUS (1809–78), bp. of New Zealand, 1841, of Lichfield, 1868; father of **John Richardson Selwyn** (1844–98), bp. of Melanesia; master of Selwyn Coll., Cambridge (erected in memory of his f.).

SEMAPHORE (34° 51′ S., 138° 32′ E.), town, watering-place, Adelaide County, S. Australia. Pop. 8500.

SEMAPHORE SIGNALLING, system by which the arms, with or without flags, convey messages; originally a s. was a tower with three pairs of arms on a pole.

SEMELE (classical myth.), mother of Dionysus (*q.v.*) by Zeus, whose wife Hera persuaded her to ask Zeus to reveal himself in all his glory; he came as the thunder god, and S. was consumed in flame; extensively worshipped in classical times.

SEMEN, see REPRODUCTIVE SYSTEM.

SEMENDRIA, Servian SMEDEREVO (44° 39′ N., 20° 53′ E.), town, on Danube, Servia; exports wine and cereals. Pop. 6800.

SEMINOLES, 'Wanderers,' N. Amer. tribes, branch of Creek Indians; led by Osceola (*q.v.*), warred against whites, 1835–42; now in Indian Territory, c. 3000 in number.

SEMIPALATINSK (50° 26′ N., 80° 13′ E.), province, Asiatic Russia, forming part of gen. governorship of the Steppes; traversed by several mountain ranges; watered by the Irtish; contains numerous lakes; cattle and horses are reared; some gold and silver mined. Pop., chiefly Kirghiz and Russians (1910), 842,200. Capital, **Semipalatinsk,** on Irtish. Pop. (1910) 32,000.

SEMIRAMIS (*c.* 800 B.C.), semi-mythical queen of Assyria; traditional dau. of fish goddess, Derceto; wife of Ninus; foundress of Babylon and many other Eastern cities; heroine of legendary luxury and military achievements; her tradition confused with that of Astarte; historical nucleus; ruled as regent for her son Ninyas.

SEMIRYECHENSK (44° N., 78° E.), province, Russian Turkestan; includes steppes and branches of various mountain ranges; contains several large lakes; traversed by the Ili, Chu, and Naryn; population mainly Kirghiz; chief occupation, cattle-breeding and agriculture. Pop. (1910) 1,188,200. Capital, Vyernyi.

SEMITES, see RACES OF MANKIND.

SEMITIC LANGUAGES.—The term 'Semitic' (according to some, *Shemitic*) is derived from Shem, one of the sons of Noah whose descendants are said to have spoken these languages. Though not scientific, this origin may be assumed to be correct. The Phœnician branch, however, traces its origin to Ham. It is usual to divide S. l's into various subdivisions.

(*a*) *S. Semitic.*—This includes Arabic, both classical and vulgar, and Ethiopic. Arabic developed and came into prominence later than the other languages. Muhammadan literature is chiefly Arabic, and many of the valuable philosophical and geographical books of the Middle Ages are written in this tongue.

(*b*) *Middle Semitic,* including *Hebrew* of the Bible, *Later Hebrew* (*i.e.* Mishna, etc.), Phœnician, etc., and inscriptions, cf. Moabite Stone. Bible Hebrew exhibits a language in process of development, *e.g.* the pure Hebrew of Deuteronomy and that of Ecclesiastes, when compared, will illustrate the change. The gradual development is more pronounced in post-Biblical, *i.e.* the Mishna and Rabbinic Hebrew generally. This is due partly to the spread of Aramaic as the popular tongue, and the introduction of foreign words. The grammar of post-Biblical Hebrew differs in many respects from that of Biblical.

(*c*) *N. Semitic.*—Under this heading are (1) E. Aramaic, *i.e.* Syriac, the language of the Syrian Christians, chiefly theological and, as Renan said, mediocre. Some consider the Aramaic of the Talmud to be akin to this. (2) W. Aramaic—this includes (*a*) two words in *Genesis* 31^{47}, a verse in *Jeremiah* 10^{11}, parts of the Books of Daniel and Esra; (*b*) Jewish literature—Targums, Palestinian Talmud, and included, too, is Samaritan (with its Pentateuch). Here we also class Nabatæan and Palmyrene inscriptions, etc.

(*d*) *E. Semitic,* i.e. Assyriological and Babylonian cuneiform inscriptions.

The S. l's are written from right to left. The existing form of writing is the development from an original crude state, when pictures expressed objects. S. l's are alike in exhibiting the triliteral root, the letters being all consonants. The vowels play a secondary part, merely expressing modification of the meaning. Other distinctive peculiarities are: (1) that there are guttural sounds difficult for a Western to produce; (2) the verb can really be reduced to two tenses, *i.e.* an action completed or incompleted; (3) there are only two genders (masc. and fem.); (4) the frequent use of case endings and inflections; (5) the adaptability of the pronouns and the suffixes; (6) the simplicity of construction, seen in the small number of particles, etc.; (7) the pronunciation is determined by vowel marks placed under or over the consonants. This is the work of the Massoretes (perhaps following the example of the Arabs).

The *age* of the extant literature of the S. l's varies. The cuneiform inscriptions are probably the oldest,

and in Old Testament there are fragments of very early date. The earliest non-Jewish Aramaic inscriptions are those of the king of Hamath, *c.* 800 B.C. Jewish Aramaic begins *c.* 500 B.C., *i.e.* time of Cyrus. In this connection the papyri recently discovered at Assuan, dated *c.* 471-411 B.C., and those three others of 407 B.C. (all of which are now edited), are important. The Babylonian Talmud was completed about the VI. cent. A.D. Hebrew has continued, and is spoken still, though it has kept pace with modern development by the introduction of words to express modern ideas.

It is interesting to note how the various dialects came into prominence. There is the Bible with its early fragments, and the highest development of the language is reached in the time of the Kingdom. Then gradually the classical Hebrew ceased almost to be spoken, and was displaced by language of populace —a sort of Aramaic. The Targums, or translations into Aramaic, soon became necessary, cf. Daniel, which has both Hebrew and Aramaic. This Aramaic developed till in the Talmud it becomes almost unrecognisable. The Aramaic of Syria assumes a different aspect, and gives birth to a vast literature. Arabic, as we have said, reached its culmination after the rise of Islam.

The difference between Moabite and Hebrew on the one hand and Phœnician on the other is very slight. The Moabite Stone, recording the wars of Mesha, king of Moab, dating from the IX. cent. B.C., substantiates this. Both in this inscription and that of Siloam (referring to Hezekiah's conduit of water) the words are divided by dots. There are innumerable books on the Semitic languages by Wright, Kautzch, Nöldeke, Dillmann, etc. etc.

SEMLER, JOHANN SALOMO (1725–91), Ger. theologian; prof. of Theol., Halle, 1751; director of theological institution, Halle, 1757; one of earliest Ger. rationalists; work now antiquated, but made important contributions to higher criticism.

SEMLIN (44° 55′ N., 20° 25′ E.), town, on Danube, Croatia-Slavonia, Hungary; transit trade. Pop. 15,500.

SEMMELWEISS, IGNATZ PHILIPP (1818–65), Hungarian physician and obstetrician; discovered cause of 'puerperal fever' in maternity hospitals to be septic infection, which he prevented by antiseptic methods, thus anticipating the discoveries of Lister (*q.v.*); his discovery was ignored; d. in an asylum.

SEMMERING PASS (47° 39′ N., 15° 48′ E.), Alpine pass (3219 ft.), on borders of Styria and Lower Austria.

SEMNAN, see SAMNAN.

SEMNOPITHECUS, see under CERCOPITHECIDÆ.

SEMO SANCUS, ancient Ital. god.

SEMOIS (49° 50′ N., 5° E.), river, Belgium; joins Meuse near Mouthermé.

SEMPACH (47° 8′ N., 8° 11′ E.), town, on Lake Sempach, Lucerne, Switzerland; scene of victory of Swiss over Austrians, 1386.

SEMPRINGHAM, see GILBERT OF SEMPRINGHAM.

SEMUR-EN-AUXOIS (47° 28′ N., 4° 20′ E.), town, on Armancon, Côte D'Or, France. Pop. 3400.

SÉNAC DE MEILHAN, GABRIEL (1736–1803), Fr. moralist, publicist, and literary man. In Paris at beginning of Revolution; went to London (1790), Aix-la-Chapelle, Russia (1792), Hamburg, and Vienna; chief work, novel, *L'Émigré* (1797), on the Revolution.

SÉNANCOUR, ETIENNE PIVERT DE (1770–1846), Fr. writer; ruined by Fr. Revolution; unhappy life gave melancholy tinge to writings; chief work, *Obermann*, trans. into Eng. by A. G. Waite, 1903; praised by Sainte-Beuve and Matthew Arnold.

SENATE (Lat. *senatus*, originally council of elders —*patres*).—(1) Rom. governing body in existence in time of earliest tradition; royal council of patricians whose duty was to protect *mos maiorum*, to give *auctoritas patrum* (sanction of the fathers, *i.e.* Senate) to decisions of popular assemblies, and to nominate the temporary ruler in *interregna*; became council of consuls on establishment of Republic, 509 B.C.; lost purely patrician character when plebeian magistrates passed into it; exercised almost entire control over consuls and magistrates until development of plebeian power and overthrow (except in name) under Empire. (2) applied by U.S.A. to Upper House of Legislature of the Union and different States, 1787–89. The present Senate of the Union consists of 96 members, 2 from each State, elected for 6 years; it has large control of executive. Name has been adopted by France, Italy, self-governing Brit. Colonies, and other countries for Upper Legislative Chamber. (3) name of governing body in some Brit. univ's; senate of Amer. College is associated with student self-government movement.

SENEBIER, JEAN (1742–1809), Swiss botanist, interested in plant physiology.

SENECA.—(1) ANNÆUS (*c.* 54 B.C.–*c.* 39 A.D.), Rom. rhetorician; b. Corduba; ed. in rhetoric, Rome; chief works, *Suasoriæ* and *Controversiæ*, rhetorical exercises. (2) **Lucius Annæus** (*c.* 3 B.C.–65 A.D.), statesman and writer; s. of above; ed. Rome; banished, 41; recalled, 49; became Nero's tutor; suspected of treason and ordered to commit suicide. Best-known works are the *Tragedies*, intrinsically of little importance, affected and pompous in style; *On Clemency*, *On Benefits*, and *Letters to Lucilius*. These latter works expound a lofty ethical system, the high-water mark of Stoicism, which in S. has, moreover, a religious trend.

SENECA FALLS (42° 56′ N., 76° 50′ W.), village, on Seneca, Seneca County, New York, U.S.A.; manufactures pumps. Pop. (1910) 6588.

SENEFELDER, ALOIS (1771–1834), Ger. inventor of lithography.

SENEGA, drug consisting of root of a plant, *Polygala Senega*, used as an expectorant and diuretic.

SENEGAL (10° 30′ to 20° N., 10° E. to 17° W.), region in Fr. W. Africa; includes colony of S. and colony of Upper S. and Niger. Senegal was visited by the Normans in the XIV. cent., and from 1446 onwards a number of trading posts were established by the Portuguese; but the country was first permanently colonised by the French, whose settlements were subsequently captured by the English at various dates, but were finally recovered by France in 1814. During Faidherbe's administration much of the surrounding country was conquered, and explorations in the Niger basin were carried out. The last two decades of the XIX. cent. were marked by frequent hostilities against some of the native chiefs, the most important of whom, Samory, chief of Wassulu, was finally defeated in 1898. In 1902 the protectorate dependent on Senegal was united with the territories of Upper Senegal and Middle Niger under one administration, and called the Territories of Senegambia-Niger; these were reorganised in 1904, when the colony of Upper Senegal and Niger was formed out of all these territories except the protectorate, which was restored to Senegal. Boundary between French and British possessions was fixed in 1904 and 1906. The two colonies are administered by lieut.-gov's under supervision of gov.-general of Fr. W. Africa.

The Colony of **Senegal** lies between Mauretania and Guinea, and comprises the communes of St. Louis, Dakar, Rufisque, and Goree, the district of Tivonano and other territories, and an extensive protectorate; area, 74,000 sq. miles; surface mountainous in E., flat in W.; watered by Senegal and Gambia; produces rubber, ground-nuts, oil-seeds, millet, maize, rice. Natives are of Berber or Negroid race. Pop. (1911) 1,247,000.

Upper Senegal and Niger lies to E. of Senegal; area, *c.* 300,000 sq. miles; surface generally tableland; drained by Senegal, Niger, and other rivers; chief towns, Bobo-Dioulasso, Bamako, Segou, Gao, Jenné, Timbuktu; produces cereals, fruit, timber; live stock raised; inhabited by Berbers and Negroids. Pop. (1910) 4,471,031; including 'Territoire militaire du Niger' (1911), 6,035,090. See FRENCH WEST AFRICA.

Haywood, *Through Timbuktu and Across the Great Sahara* (1912); Olivier, *Le Sénégal* (1908).

SENEGAL (12° N., 10° W.), river, Fr. W. Africa; flows through the colony of Senegal, to which it gives

its name, and empties itself into Atlantic near Fort St. Louis; has large number of tributaries from the southern Sudan; length, c. 1000 miles; navigation interrupted by Kayes rapids.

SENEGAMBIA (15° N., 15° W.), region between rivers Senegal and Gambia, W. Africa. See SENEGAL.

SENESCHAL, steward or major-domo — a great office at Fr. court, XI.–XII. cent's; the second person in the kingdom; abolished at the Revolution; in England, the Lord High Steward, but the position was never so important as in France.

SENIGALLIA, SINIGAGLIA (43° 45′ N., 13° 10′ E.) (ancient *Sena Gallica*), city, seaport, watering-place, on Misa, Ancona, Italy; bp.'s see; birthplace of Pope Pius IX.; destroyed by Pompey, 82 B.C. Pop. 24,000.

SENIOR, NASSAU WILLIAM (1790–1864), Eng. lawyer and economist; prof. of Political Economy, Oxford, 1825–30, 1847–52; member of Poor Law Commission, 1832; subsequently of National Education Commission; has wide knowledge and polished style; besides articles on economics and lit., wrote interesting *Conversations with Distinguished Persons during the Second Empire* (pub. 1878).

SENLAC, see BATTLE.

SENLIS (49° 12′ N., 2° 35′ E.) (ancient *Augustomagus* and *Sylvanectes*), town, on Nonette, Oise, France; has Gallo-Roman walls and a fine mediæval cathedral; brick- and tile-works. Pop. 7200.

SENNA, drug consisting of the leaves of two varieties of a shrub, *Cassia acutifolia* and *Cassia angustifolia*, the former growing chiefly in Northern Africa (*Senna Alexandria*), and the latter in Arabia and Western India (*Senna Indica*); used as purgative.

SENNACHERIB, king of Assyria (705–681 B.C.); defeated Babylonians, Elamites, and Phœnicians; laid waste Palestine; turned back from Jerusalem by terrible plague, 701; destroyed Babylon, 689; murdered by his sons.

SENNAR (13° 45′ N., 33° 45′ E.), district, Sudan, Africa, lying between Blue and White Nile; produces durrha, wheat, sesame, and other cereals, cotton, tobacco, vegetables; was an independent empire under the Funj from XVII. to XIX. cent's. The population is extremely mixed, and mostly of negroid descent. Capital, **Sennar**, a decayed town of c. 8200 inhabitants.

SENONIAN, see CRETACEOUS SYSTEM.

SENS (48° 11′ N., 3° 16′ E.), town, Yonne, France; encircled by old walls; archiepiscopal see, has fine XII.-cent. Gothic cathedral and old archiepiscopal palace. S. was conquered c. 52 B.C. by Romans, who fortified it and built aqueducts, theatres, etc.; here Becket found refuge in 1164; taken by Germans in war of 1870–71; artificial manures. Pop. 13,700.

SENSATION, see PSYCHOLOGY.

SENSATIONALISM, theory that all knowledge is derived from sensations, or that it consists in sensations and combinations of sensations.

SENSITIVE PLANT, name generally given to Mimosa; leaves close up on being touched.

SENTINUM (c. 43° 27′ N., 12° 52′ E.), ancient town, Umbria, Italy; scene of Rom. victory over allied Samnites and Gauls, 295 B.C.; modern SENTINO.

SENTRY, soldier posted as watch. In war, **Group Sentries** are now the rule; one stands on guard while others sleep under cover close by; system eliminates nervousness due to solitude.

SENUSSI, name of Arab family which founded Muhammadan sect of **Senussites**. First to bear name was Algerian sheikh who claimed descent from Muhammad; he went to Mecca and won adherents to his new teaching, and founded monastery at Abu Kobeis, 1835; returned, 1843, and built White Monastery in Cyrenaica; died, 1860 (?), and was succeeded by equally noted son, SENUSSI EL MAHDI, who spread Senussite teaching over North Africa; the creed is founded on new interpretation of Koran and moral revival which has had beneficial effect; monasteries founded all over Sahara countries; Senussi el Mahdi opposed claims of Muhammad Ahmed to be the *Mahdi*, 1881, but abstained from interference; took up arms against Fr. expansion in southern Saharan border, but was defeated, 1902; succ. on death, 1902, by nephew, AHMED-EL-SHERIF; French captured great stronghold of Wadai, Abeshr, 1909, after several years' fighting.

SEONI.—(1) (22° 7′ N., 79° 34′ E.) town, Jubbalpore division, Central Provinces, Brit. India. Pop. 12,000. (2) (22° 28′ N., 77° 29′ E.) town, Hoshangabad district, Central Provinces, Brit. India. Pop. 7700.

SEOUL, SEUL (37° 33′ N., 127° 10′ E.), city, capital of Korea, on Han. Pop. (1911) 278,958. Its seaport is Chemulpo.

SEPAL, see FLOWER.

SEPHARVAIM (33° 28′ N., 43° 45′ E.), ancient city, on Euphrates, Babylonia; the *Sippara* of Assyrian inscriptions.

SEPIA, dark brown pigment obtained from cuttle-fish; used much for monochrome sketching. See under CEPHALOPODA.

SEPOY, native Indian as distinguished from European soldier.

SEPSIS (Gk. *sepo*, to make putrid), is caused by a number of micro-organisms, the most common of which are the *staphylococcus pyogenes aureus* and *albus*, and the *streptococcus pyogenes*, which may have a greater or less effect upon the body, depending on the virulence of the micro-organisms and the resisting power of the tissues. If the micro-organisms from the point of local infection reach the circulation and are carried throughout the body there are serious results, the micro-organisms continuing to produce toxins in spite of treatment of the site of infection, the condition being known as *septicæmia*; in *sapræmia* the micro-organisms are confined to the site of local infection, and the toxins alone are diffused in the blood, immediate improvement following on local treatment; and in *pyæmia*, which is a more dangerous condition than the two former, abscesses are formed in various tissues or organs through the blocking of the minute veins by clots which have formed in connection with the infected local lesion. The treatment in all cases consists in treatment of the local lesion by antiseptic methods; nourishing fluids and stimulants are given to keep up the patient's strength; where the condition is due to the *streptococcus pyogenes* a serum prepared from several different strains of streptococcus (polyvalent serum) is administered; if abscesses form they are opened, if possible.

SEPTEMBER, 7th month in Rom., 9th in Julian calendar; in O.E., *Gerstmonath*, 'barley month.'

SEPTICÆMIA, see PARASITIC DISEASES, SEPSIS.

SEPTUAGINT, THE (abbreviated, LXX), the earliest and most famous translation of the Old Testament into Greek, traditionally made by 72 elders by order of King Ptolemy II. (Philadelphus); and very likely actually begun about his reign (285–247 B.C.). The prophets were translated in the II. cent. B.C., other books I. cent. B.C., and *Ecclesiastes* not till the I. cent. A.D. The LXX is of considerable importance for the textual criticism of the Old Testament, but presents a complicated problem, as there were recensions by Origen, Lucian, and Hesychius. When the original text is recovered by comparison, it has then to be compared with the Massoretic, for the Hebrew from which the LXX was translated differed from the Massoretic.

Swete, *Introduction to Old Testament in Greek*.

SEPULCHRE, THE HOLY, the tomb in which was placed the body of Jesus Christ; its exact site is uncertain. It is clear from the Gospel it was a rock tomb, and the remains of such are still visible around Jerusalem. There seems to have been no attempt made at first by Christians to remember the place. In 325 Constantine the Great determined to recover it, and a temple built by Hadrian in 135 was believed to be on the spot; a rock tomb found beneath was identified as the tomb of Christ. Here was built the still surviving Church of the Holy Sepulchre, a shrine visited by pilgrims to Jerusalem. Meanwhile doubts were raised

from the VIII. cent. as to whether this was the site, for more probably the tomb was outside the city walls, though the position of the walls at the time of Christ is uncertain. Some declare for a rock tomb outside the city walls near Jeremiah's grotto—this was accepted by General Gordon. Baedeker, *Guide to Palestine.*

SÉQUARD, see BROWN-SÉQUARD.

SEQUOIA, a coniferous tree confined to the western part of N. America. There are only two species, *S. gigantea,* the familiar 'mammoth tree' of California, and *S. sempervirens,* the redwood, also an immense form. The mammoth tree is the largest known plant and attains a great age, some being estimated to be 1500 years old. *S. sempervirens* is a timber tree of very considerable value.

SERAGLIO, see HAREM.

SERAING (50° 37′ N., 5° 30′ E.), town, on Meuse, Liège, Belgium; machinery. Pop. (1910) 41,015.

SERAMPUR (22° 45′ N., 88° 25′ E.), town, Bengal, Brit. India; contains a Baptist Coll. Pop. 46,000.

SERANG, Ceram (*q.v.*).

SERAO, MATILDE (1856–), Ital. novelist; trained on *Mattino* newspaper, Naples; her best works are *Farewell Love, On Guard,* and an account of Palestine, *Nel paese di Gesù.*

SERAPION, IV.-cent. bp. of Thmuis in Egypt and orthodox controversialist. S. is specially remembered because of a liturgy (discovered, 1894) bearing his name; it gives Eucharist order and services for ordination, baptism, etc.; it comes historically between the earlier *Egyptian Church Order* and later rites.

SERAPIS, Egyptian deity whose worship was introduced into Greece and Rome. The Egyptian S. was a bull by which Osiris manifested himself on earth, but gradually S. became regarded as an independent deity—especially associated with the underworld, and having Isis as his wife.

SERENA, LA SERENA (29° 50′ S., 71° 20′ W.), city, capital, Coquimbo, Chile; copper mines. Pop. 16,500.

SERENADE, a musical composition, generally for wind instruments, in which the march and the minuet are prominent features.

SÉRES (41° 5′ N., 23° 34′ E.), town, on Lake Takhino, Macedonia, European Turkey; abp.'s see; cottons, woollens. Pop. 31,000.

SERFDOM, see SLAVERY.

SERGEANT, see SERJEANT.

SERGIEVSKY POSAD (56° 25′ N., 38° 10′ E.), town, pilgrimage resort, Moscow, Russia; built around the Troitsk monastery; holy pictures, toys. Pop. 29,900.

SERGINSK, UPPER AND LOWER (*c.* 56° 30′ N., 59° E.), two towns, Perm, Russia; ironworks. Pop. (united) 16,000.

SERGIPE (10° 57′ S., 37° W.), maritime state, on Atlantic, Brazil; chief product, sugar. Pop. 415,000. Capital, Aracajú.

SERGIUS, four popes: **Sergius I.,** pope, 687–701; **Sergius II.,** pope, 844–47; **Sergius III.,** pope, 904–11; **Sergius IV.,** pope, 1009–12.

SERGIUS, ST. (date uncertain), martyr of Early Church.

SERICITE, see MICA.

SERIEMA, CARIAMA (*Cariama* and *Chunga*), S. Amer. crane-like birds, found in open districts, where they feed upon small mammals, reptiles, and insects. Their peculiarities of structure have caused the two known species to be grouped in a family by themselves.

SERIES, a mathematical expression in which the successive terms are formed according to some regular law and are to be added in the order in which they are written. If the series terminates at some assigned term, it is called a *finite series*; if the number of terms is unlimited, it is called an *infinite series.* Writing $s_n = a_1 + a_2 + \ldots + a_n$, we obtain the sequence $s_1, s_2, \ldots s_n \ldots$ This sequence may tend to a finite limit s. When, and only when, this is the case, we say the series is *convergent.* Otherwise it is *divergent.* A necessary and sufficient condition for the convergence of Σa_n is that, corresponding to *every* positive number ϵ given in advance, there shall exist a positive integer μ, such that the absolute value of $a_{n+1} + a_{n+2} + \ldots + a_{n+p}$ shall be less than ϵ for every integer n equal to or greater than μ, and for every positive integer p; *i.e.* $| s_{n+p} - s_n | < \epsilon$ when $n \geq \mu$. Various simple rules exist in agreement with the above, by which convergency of given series may be tested; *e.g.* series is convergent if from and after some fixed term the ratio $\frac{a_n}{a_{n-1}}$ is numerically less than some quantity which is itself <1. A series is *absolutely* convergent when its terms can be rearranged without altering the limit. For a variable ξ, the series $\Sigma f_n(\xi)$ is *uniformly* convergent in an interval if for each ϵ we can select a positive integer μ which is independent of ξ and such that $| r_n(\xi) | < \epsilon$ when $n \geq \mu$, whatever be the value of ξ in that interval; $r_n = s - s_n$.

Hobson, *Plane Trigonometry*; Chrystal, *Algebra*; Whittaker, *Modern Analysis*; Forsyth, *Theory of Functions*; *Elementary*: C. Smith or Hall and Knight, *Algebra.*

SERINAGAR, see SRINAGAR.

SERINGAPATAM (12° 24′ N., 76° 41′ E.), town, on island in Cauvery, Mysore, India; formerly famous fortress. Pop. 9300.

SERINGHAM, see SRIRANGAM.

SERINUS, CANARY, see under FINCH FAMILY.

SERJEANT, SERGEANT, term used in Middle Ages for all servants and developed into different meanings, such as s.-at-law (*q.v.*), formerly the highest degree in the Common Law, giving monopoly of leading in Court of Common Pleas (abolished, 1849); no judge has taken the degree since 1868; s.-at-arms (domestic official of Crown, of Chancellor in House of Lords and of Speaker in House of Commons); s. in army (non-commissioned officer); and s. in police force.

SERJEANT-AT-LAW, formerly legal order of highest rank of barristers; Serjeants-Inn was dissolved, 1877.

SERJEANTY, land-holding under the feudal system; of two distinct species: (1) *Grand serjeanty,* by which a man held ground of the king in return for personal services; (2) *Petite serjeanty,* by which a man holds land in return for a small gift.

SERMON, used only ecclesiastically, the discourse or oration delivered in church; it may be extempore or read, but is generally supposed to be the preacher's own composition. In Protestantism s's occupy a more prominent place than in Catholicism, and in the mediæval church s's were comparatively rare. Among XVII.-cent. Puritans s's reached enormous lengths.

SEROW, SARAU, GOAT ANTELOPE, genus of shaggy goats (*Nemorhædus*) found in mountainous districts of E. and S.E. Asia, up to 12,000 ft. in the Himalayas. They are shy, solitary creatures, closely allied to the Himalayan Gorals (*Cemas*).

SERPA PINTO, ALEXANDRE ALBERTO DE LA ROCHA (1846–1900), Portug. explorer; wrote *How I crossed Africa* (1881); gov. of Mozambique (1889).

SERPENT WORSHIP, a form of devotion found in many countries, and characteristic of, or a survival from, a primitive stage of religion. The explanation is no doubt largely psychological. Thus, as serpents kept to the ground and were found in caves, they were associated with the chthonian deities in ancient Greece. A serpent, too, has to a savage mind something essentially mysterious about it, and, when found near his tomb, was believed to be the spirit of a dead ancestor appearing in physical shape. Another primitive association was with healing. Thus Æsculapius in Greece was represented with serpents. Again, serpents were associated with water — Poseidon, the Gk. equivalent of Neptune, was a reptile, as was also an earthquake deity.

Serpents are found in various mythological and symbolical narratives, *e.g.* in Genesis. Like other

animals they were totems and connected with the worship of clans. Like other supernatural beings (and the serpent seemed to have something supernatural about it), they were imagined sometimes to be the parents of human children. Serpents became guardian spirits of certain places. Their connection with the water seems also to have suggested connection with the weather. Various legends seem to point to human sacrifices being formerly offered to serpents. The greatest celebration with which they are connected at the present day is that of Dahomey, where snakes inhabit the temples and are venerated as sacred. As serpent worship existed mostly in the early stages of society, and was ousted by other cults, so there are myths of strife between the gods and older reptilian protagonists. Thus Hercules as a child fought with snakes.

Serpent worship could not exist in Christianity, but there are many traces of the destruction of them or their deities by Christian missionaries. Thus St. Patrick banished snakes from Ireland. In France there were similar stories told of the first preachers of the Gospel. St. George and the Dragon is only a materialised version of a spiritual conflict. The most remarkable observance still kept up is that of St. Domenico at Foligno: on the first Thursday in May men carry live snakes, and the statues of the saint are draped with them. This is near the home of the ancient Marsi—associated with snakes.

Ferguson, *Tree and Serpent Worship*.

SERPENTARIUS, SECRETARY BIRD (*q.v.*).

SERPENTINE, an abundant mineral composed of silica and magnesia, in equal proportions, and water; occurs massive and also in winding veins—hence name; colours: green, red, brown, and yellow. Surface: dull, smooth, and soft. *Common* s. is colourless; *precious* s. is coloured and is used for making ornaments.

SERPENTS, see SNAKES.

SERPUKHOV (54° 59′ N., 37° 33′ E.), town, on Nara, Moscow, Russia; textiles. Pop. 27,000.

SERPULA, a BRISTLE WORM; see under CHÆTOPODA.

SERRANO Y DOMINGUEZ, FRANCISCO, DUKE DE LA TORRE (1810–85), Span. soldier and statesman; took part in *coups d'état*, 1841, 1843; Minister of War, 1843; marshal, 1856; imprisoned for plot against *moderados*, 1868, but released, and drove Queen Isabella from Spain; regent, 1869; retired on failure of revolution; Pres., 1874.

SERRASALMO, see CARIBA FISH.

SERTORIUS, QUINTUS (murdered, 72 B.C.), Rom. general; took part in war between Marian and Sulla factions, 88; withdrew with Marians to Spain, where he had brilliant military career against Rome.

SERTULARIA, see under HYDROMEDUSÆ.

SERVAL, see under CAT FAMILY.

SERVETUS, MICHAELIS, MIGUEL SERVETO (1511–53), Span. physician and martyr; studed under Œcolampadius at Basel, and attended lectures of Bucer and Capito at Strasburg; denied doctrine of Trinity; pub. *De Trinitatis Erroribus*, 1531, *Dialogues*, 1532, and was forced to fly; studied med. under assumed name, Michael de Villanueva, at Paris, and again got into trouble through his inquiring intellect; his scientific studies led him to foreshadow discovery of circulation of blood; raised controversy with Calvin, and fled; under the protection of Paulmier, abp. of Vienne, wrote *Christianismi Restitutio*, pub. 1553, which roused storm of indignation among Reformers; seized by Calvin in passing through Geneva, tried and burned as heretic.

SERVIA (*c.* 41° to 44° 59′ N., 19° 7′ to 22° 59′ E.), kingdom in N. of Balkan peninsula, Europe; is bounded N. by Austria-Hungary (Danube and Save), E. by Rumania and Bulgaria, S. by Greece, W. by Albania, Montenegro, and Bosnia-Herzegovina. Area, *c.* 36,000 sq. miles. Surface, mountainous, with flat ground along Save and Danube, and in Morava valley in centre; highest mountain peaks are Midzor (*c.* 7168 ft.), Pobyezdin Potok (*c.* 6940 ft.). Drained by Morava and tributaries flowing to Danube, by Drina and other streams flowing to Save, and by Timok and other streams flowing to Danube. Chief towns, Belgrade (capital), Nish, Kragonyevatz, Leskovatz. Climate varies with elevation; temperature has great range, falling below zero in winter, and rising above 100° Fahr. in summer.

Servia was first settled in by the Serbs, from whom its name is derived, in VII. cent. A.D.; for several cent's they formed a number of politically independent communities, between which constant struggle for supremacy went on. In XII. cent. united kingdom was established by Stephen Nemanya, who flourished 1159–95, and founded a dynasty which held sway in S. until 1371. Two of his successors, Milutin and Stephen Dushan, conducted successful campaigns against Greeks, at whose expense they increased their dominions. Stephen Dushan conquered Albania, Bulgaria, Macedonia, and Thessaly, and established a new Serb empire in 1345; after his death in 1355, this fell to pieces; and with death of his son Urosh in 1371, Nemanyich dynasty came to an end. In next reign occurred a Turk. invasion, which ended with defeat and death of the Tsar, Lazar, at Kossovo in 1389, after which Servia became a Turk. province; at first governed by native rulers, it came directly under Turkish control in 1459.

For over three cent's people were terribly oppressed by Turks, who killed and enslaved great numbers of them. Not until 1804 did a national rising occur; in that year the Serbs, led by Kara George, rose in rebellion, and succeeded in banishing the Turks, who, however, reconquered the country in 1812; a second rising under Milosh Obrenovich, in 1815, had more lasting results, and in 1817 Servia was granted self-government; Milosh, the first prince, was acknowledged as hereditary ruler by the Porte in 1830. Revolution occurred in 1842, when Alexander Karageorgevich was placed on throne; he reigned until 1859, when he was deposed in favour of Milosh, whose family henceforth ruled until 1903. The absolute independence of Servia was recognised by Treaty of Berlin in 1878. Under King Milan in 1885–86 occurred war with Bulgaria, resulting in Servian defeat. In 1903, Milan's son Alexander, king of Servia, and his wife Draga were assassinated, upon which Peter I., son of Alexander Karageorgevich, became king. In 1908, on Austria's annexing Bosnia-Herzegovina, Servia was hostile and war almost ensued. For later history, see TURKO-BALKAN WAR.

Literature.—Most remarkable production of early Servian lit. is perhaps Stephen Dushan's *Zakonik*, or Code of Laws, dating from 1349. During Turk. period little was written, but in modern times great efforts have been made to revive national lit. A collection of national songs made by Yuk Karajich, *c.* 1815, is one of finest Servian literary monuments. Among best-known modern poets are Milutinovich (d. 1847), Peter II. of Montenegro (d. 1851), Radichevich (d. 1853), Preradovic (d. 1872), Yovanovich (d. 1904).

Government is limited monarchy; executive power held by king aided by eight ministers; legislative power vested in king and National Assembly, which consists of 160 representatives chosen by popular vote; there is a State Council, members of which are appointed either by king or National Assembly. Elementary education gratuitous and obligatory. State religion, Gk. Orthodox Church. Military service compulsory.

Servia is largely an agricultural country; leading grains are wheat and maize; considerable quantities of barley, rye, and oats are produced, besides fruits and vegetables. Minerals include gold, copper, antimony, silver, coal, and other metals, but their full development awaits an increase of rail and road communications. A large area is under wood, valuable trees including oak, beech, and fir. Principal industry is flour-milling; carpet-weaving, distilling, brewing, and

tanning also carried on. Exports agricultural produce, live stock, animal produce, etc. Imports textiles, machinery, paper, salt, wine. Railway mileage, over 600.

Inhabitants include, besides Servians themselves, persons of Hungarian, Turk., and Austrian nationality, Jews, and Gipsies. Pop. (1910) 2,911,701.

Mijatovitch, *Servia and the Servians* (1908); Vivian, *Servia* (1897).

SERVITES, 'Religious Servants of the Holy Virgin,' religious order founded by seven merchants of Florence, 1233; like Dominicans, adopted rule of St. Augustine, but added their own constitution; habit is black; have houses in Italy, England, and America.

SERVITUDE, burden on property by which owner allows another certain rights. *Personal s's* are those given to a person in his own right, *e.g.* terce and courtesy.

SERVIUS, HONORATUS MAURUS (fl. *c.* 400 A.D.), Rom. grammarian, known as a commentator on Virgil.

SERVIUS TULLIUS, legendary sixth king of Rome (578–534 B.C.); probably eponymous ruler, like Romulus, invented to explain social progress of plebeians before republic.

SERVO-BULGARIAN WAR (1885), Bulgaria overthrew *Treaty of Berlin* (1878) by annexation of Rumelia, 1885. Servia took Bulgaria at disadvantage as her troops were on Turk. frontier expecting Turk. interference; Bulgarian forces raced back; Servian main army had crossed frontier, and on Nov. 17 commenced vain attack on Slivnitza; before end of month Servians were expelled and Servia invaded, but Bulgaria was satisfied with *status quo*.

SESAME, annual plant, order Bignoniaceæ; yields Gingelly or Gingili oil, used in East as substitute for olive oil.

SESAMOID BONES are small bones in tendons about a joint; patella (knee-cap) is best example.

SESSA AURUNCA (41° 14′ N., 13° 58′ E.), town, Caserta, Italy; bp.'s see; wine. Pop. 23,000.

SESSHIU (1420–1506), Jap. artist; visited China (1468), and was hailed as the greatest painter of his day. He achieved his most notable successes in landscape.

SESTRI LEVANTE (44° 15′ N., 9° 30′ E.) (ancient *Segesta Tigulíorum*), seaport town, Genoa, Italy. Pop. 3200.

SESTRI PONENTE (44° 23′ N., 8° 50′ E.), seaport town, Genoa, Italy; shipbuilding yards; manufactures tobacco. Pop. 18,000.

SETH, according to Genesis, s. of Adam; his name resembles that of Egyptian and Hittite deities; there were many legends about S.—Jewish and Christian.

SETIA (41° 30′ N., 12° 5′ E.) (modern Sezze), ancient town, Latium, on S. slope of Volscian Mountains.

SETON, BARONY OF (1448), Scot. honour; the Setons of Seton, East Lothian, claimed descent from Norman David de Say, to whom, according to the chronicles, King David I. (1124–53) gave Seton (Saytoun). There was a connection between the Scot. house, the Seatons of Seaton Carew, Durham, and the Seatons of Seaton, a lost place on the Yorkshire coast. GEORGE SETON was cr. lord of parliament, 1448; GEORGE, 3rd baron, was slain at Flodden, 1513; Seton was burned in Hertford's invasion, 1544; GEORGE, 5th baron, ancestor of Earls of Dunfermline, was devoted adherent of Mary, Queen of Scots, and a daughter of this house was one of the maids of honour, known as the Four Maries; ROBERT, 6th lord, was cr. Earl of Wintoun, 1600. Younger branch became Barons of Gordon (*q.v.*).

SETTERS, see DOG FAMILY.

SETTLE (54° 4′ N., 2° 17′ W.), town, Yorkshire, England.

SETTLE, ELKANAH (1648–1724), Eng. poet and dramatist; wrote a 'heroic' play, *The Empress of Morocco*; the 'Doeg' of Dryden's *Absalom and Achitophel*.

SETTLEMENT, act of giving possession to another, as a jointure is granted to a wife. Also the transfer of property to trustees for the use of one person for his life, and after his death for the absolute use of another person.

SETTLEMENT, ACT OF, Act of Parliament (1701) settling succession of Eng. throne; provided that sovereign should always be of Established Church, have no power to pardon persons impeached by Commons, or remove judges, except after address of both houses.

SETUBAL (38° 32′ N., 8° 55′ W.), seaport, on Bay of Setubal, Estremadura, Portugal; important commerce; sardine fisheries. Pop. *c.* 25,000.

SEUL, see SEOUL.

SEVASTOPOL, SEBASTOPOL (44° 34′ N., 33° 28′ E.), seaport, on Black Sea, Taurida, Russia; important naval station for Black Sea fleet; famous for its siege by the allied British, French, and Turkish armies in 1854–55. Pop. (1910) 64,800.

SEVEN BISHOPS, the bishops who were tried (1687) for petitioning James II. of England against his order to read the Declaration of Indulgence during service; acquitted amid enthusiasm of the nation.

SEVEN CHAMPIONS OF CHRISTENDOM, name given by Richard Johnson in his book bearing that title (1597) to the patron saints of England, Scotland, Wales, Ireland, Italy, France, and Spain.

SEVEN SLEEPERS, seven Christians of Ephesus, who, fleeing from Decius's persecution, took refuge in a cave; the enemy built up the entrance, and they fell into a trance for 200 years, awaking in 447. They convinced Theodosius II. of life after death, and forthwith sank into sleep again to await the resurrection. A similar story obtains in many lands.

SEVEN WEEKS WAR, war between Austria (and German allies) and Prussia, June to July 1866. Bismarck, dissatisfied with Schleswig-Holstein arrangement of 1865, made offensive alliance with Italy, April 1866; practically forced on war against wish of his own state and every other power; Austrian ambassador recalled from Berlin, June 11; Moltke, Prussian chief of staff, divided forces into two divisions, larger to attack Austrians and Saxons in Bohemia, smaller under Falkenstein to deal with Germany; Hanoverians defeated at Falkenstein, June 29; larger force marched in two divisions, from Saxony under Prince Frederick Charles and General von Bittenfeld, and from Silesia under crown prince, towards Gitschin in Bohemia. Austrian commander-in-chief, Benedek, sent troops to repel crown prince, while he himself stopped progress of Prince Frederick; but former secured passage at Nachod, June 27; Skalitz and Burkersdorf, June 28; and latter won victories of Hühnerwasser, June 26; Münchengrätz, 27; Prodol, 28; and arrived at Gitschin, 30; retreated S.E. to Elbe; overtaken by the two Prussian armies at Königgrätz, and suffered fatal defeat of SADOWA, July 3.

Falkenstein occupied N. Germany as far as Main (July 16); France fiercely indignant at Napoleon's neutral attitude, but reconciled by Bismarck to Prussian aggrandisement; Napoleon agreed, July 22, to Prussia's annexation of Schleswig-Holstein, Hanover, Hesse-Nassau, Saxony, and dismissal of Austria from Germany; King William, however, refused to annex Saxony.

Armistice, July 22; preliminary treaty of Nikolsburg, July 26; Bismarck refused European arbitration; final *Treaty of Prague* with Austria, August 24; war went on with Ger. allies; individually defeated, and ended in Oct. Besides Prussians, Austria, during this war, had to face third Ital. War of Independence.

SEVEN WONDERS OF THE WORLD were Pyramids of Egypt; Hanging Gardens of Semiramis, at Babylon; Temple of Diana, at Ephesus; Statue of Jupiter, by Phidias, at Athens; Mausoleum, in Caria; Colossus, at Rhodes; Pharos lighthouse, at Alexandria. They are described by Philo of Byzantium.

SEVEN YEARS WAR, war primarily between Britain and Prussia on one side and France and Austria on the other, carried on in Europe, Asia, Africa, and America, 1756–63. Chief causes Brit. and Fr. colonial

jealousy and continental mistrust of Prussia. In 1754–55, Brit. and Fr. colonists warred on each other in N. America, but France hesitated to declare war; Prussia, expecting French to aid Austria to recover Silesia, made *Treaty of Westminster*, Jan. 1756, to aid Britain, should France attack Hanover; France replied by *Treaty of Versailles* with Austria, whereupon Frederick the Great, without declaring war, invaded Saxony, occupied Dresden in Sept., shut up Saxon army in Poina, and defeated Austrian force at Lobositz. Saxony was conquered, but Frederick was unable to proceed against Austria.

Britain and France had meanwhile declared war. French captured Minorca, 1756. France, Sweden, Austria, Russia, and Saxony signed treaties for partition of Prussia, May 1757, France neglecting danger from Britain, which proceeded to conquest of Canada. Louisbourg fell, 1758; Quebec, 1759; Montreal, 1760; while Boscawen, Hawke, and Rodney prevented invasion of Britain, and won crushing victories at *Lagos*, QUIBERON BAY, etc., and Clive (*q.v.*) overthrew Fr. supremacy in India. Prussia defeated coalition at Prague, but was defeated at Kolin and forced to retreat, June 1757; Hanover invaded; Cumberland defeated by Estrées and capitulated at *Kloster Seven*; Russians won victory of *Gross-Jägersdorf*, Aug., and fortunately for Prussia did not follow up advantage; Austrians occupied Berlin, Oct., and Silesia; Frederick recovered position at ROSSBACH; French expelled from Germany; Frederick recovered Silesia after battle of Leuthen, Dec.

Britain, inspired by Pitt, assisted Prussia with all her power. Russ. force occupied E. Prussia, Jan. 1758, but Frederick determined to strike at heart of coalition, which was now Austria; he failed in siege of Olmütz, May to July, on account of skill of Loudon, but performed skilful retreat, arrived in Brandenburg in time to face Russ. invasion and fought bloody battle of *Zorndorf*, Aug.; defeated at Hochkirchen, Oct.; Frederick retained Silesia.

Duke of Brunswick, who had aided in expulsion of French, was defeated at Bergen, but won victory of MINDEN, 1759; Frederick was defeated by double numbers of Russians and Austrians at *Kunersdorf*, Aug., but again victory was not followed up; Austrians merely occupied Saxony. Loudon, the only great general on that side, after several victories in Silesia was defeated at *Liegnitz*, Aug. 1760; Frederick recovered Saxony by victory of *Torgau*, Nov. Brunswick won fresh victory over French at *Villingshausen*, July 1761, but Prussia again lost Saxony and Silesia. Russia came over to side of Prussia after death of Czarina Elizabeth, Jan. 1762, and helped to drive Austrians from Silesia, while they retreated from Saxony after defeat at *Wilhelmstal*, June. Peace, 1763, gave Britain colonial and Prussia European preponderance.

SEVENOAKS (51° 17′ N., 0° 12′ E.), town, Kent, England. Pop. (1911) 9183.

SEVERIANA, VIA (41° 40′ N., 12° 20′ E.), ancient coast road, Italy, between Ostia and Terracina.

SEVERN (51° 55′ N., 3° W.) (Rom. *Sabrina*), river, England, rises on Plinlimmon, Montgomeryshire; traverses Shropshire, Worcestershire, and Gloucestershire; chief tributaries, Terne, Upper and Lower Avon, Teme, and Wye; length, 210 miles; navigable to Welshpool; noted for its 'eagre' or 'bore.'

SEVERUS, LUCIUS SEPTIMIUS (A.D. 146–211), Rom. emperor; prætor, 178; provincial governor of Gallia Lugdunensis and other provinces; on hearing of murder of Emperor Pertinax and accession of Julianus, 193, caused himself to be proclaimed emperor, marched to Rome at head of his legion; Julianus was put to death, and Severus made the dangerous Clodius Albinus Cæsar; defeated Pescennius Niger at Issus, 195; Byzantium fell after three years' siege; revolt of Clodius Albinus put down, 197; Parthians defeated and Ctesiphon sacked, 198; marched through Britain to stamp out revolt, 208; commenced wall which bears his name between Tyne and Solway, thus marking abandonment of much territory to Caledonians; d., York; strong ruler, but did nothing to check deterioration of Romans, keeping people in good humour by games and gifts, and showering rewards on all-powerful soldiery; f. of evil-famed Caracalla.

SEVERUS, SULPICIUS (363–425), Christian author; b. in Aquitaine, then seat of Lat. culture; friend of St. Martin, who induced him to lead life of piety and renunciation; wrote *Chronica*, valuable for his own times, as describing Priscillianism; *Life of St. Martin*, relating his miracles; *Dialogues*, describing monasticism, and some letters.

SEVIER, JOHN (1745–1815), Amer. general; fought against English, and led several expeditions against Indians; gov. of new state of Frankland, 1785–88, of Tennessee, 1796–1801, 1803–9.

SÉVIGNÉ, MARIE DE RABUTIN-CHANTAL, MARQUISE DE (1626–96), Fr. letter-writer; lost her parents at age of six; brought up by uncle, the abbot of Coulanges; sound education under Chapelain and Ménage, who taught her Italian and Spanish, then spoken at the Fr. court, as well as a little Latin; her favourite authors were Montaigne, Pascal, Virgil, Quintilian, and Tasso, as well as St. Augustine and Bossuet. At eighteen she married the Marquis of Sévigné, who was killed in a duel, and left her a widow at twenty-five, after having squandered great part of her fortune; very beautiful, and a great favourite at court, Mme de Sévigné devoted herself to bringing up of her children; her son entered army, and gave her great deal of trouble in spite of his affectionate nature; her daughter, most beautiful woman of France, though colder, was easier to manage; love for this dau., to whom large number of the famous letters were written, knew no bounds; accused of judging people according to the way they behaved to her daughter. Mlle de Sévigné married the Count de Grignan, and lived in Provence, while her mother lived in her place of *Les Rochers* in Brittany, or at abbey of Livry, near Paris, and therefore began the wonderful *Correspondence* which is so valuable for history of time; she relates the intrigues of court, news of church, theatre, war, receptions, feasts, dress; among most perfect ever written; style based on real genius of the Fr. language; to her dau. she said she let her pen trot with a loose bridle; to others it ploughed; hence those to her dau. have most of her characteristic fluency and felicity; she died of the smallpox at Grignan.

Miss Thackeray (Lady Ritchie), *Madame de Sévigné* (1881).

SEVILLE (37° 25′ N., 5° 35′ W.), province, Spain, traversed by the Guadalquivir. Pop. (1910) 597,194. Capital, Seville.

SEVILLE (37° 22′ N., 5° 52′ W.), town, on Guadalquivir, Spain, cap. of Andalusia; has many beautiful moorish buildings, finest of which is the Alcazar or Moorish royal palace, built in late XII. cent.; the Giralda tower is chiefly of Moorish architecture, and was begun in 1196, but the upper part was added in XVI. cent.; archiepiscopal see; has fine cathedral which dates from 1403, and is the largest in Spain, containing paintings by Murillo and other masters; univ. was incorporated in 1502; S. is centre of Span. sport of bull-fighting, and has large circus capable of accommodating 14,000 spectators; exports lead, quicksilver, olives, olive oil, cork, oats, wine, etc.; manufactures iron goods, machinery, pottery, silk, cotton, cigars. Pop. (1910) 158,366.

SÈVRES (48° 49′ N., 2° 12′ E.), town, Seine-et-Oise, France; porcelain. Pop. 8500.

SEWALL, SAMUEL (1652–1730), Anglo-Amer. judge; emigrated, 1661; chief justice of Superior Court of Boston, 1718–28; extreme Puritan; author of fervent theological works; fostered Indian missions.

SEWANEE (35° 12′ N., 85° 52′ W.), village, summer resort, Franklin County, Tennessee, U.S.A.; seat of univ. (Episcopal); coal mines. Pop. 1200.

SEWARD, WILLIAM HENRY (1801–72), Amer. lawyer and statesman; anti-masonic member of

New York senate, 1830–34; governor, 1839–43, and pursued ardent anti-slavery policy; member of U.S. senate, 1849; Sec. of State in Lincoln's administration, 1860, and at first opposed Civil War; made anti-slavery treaty with England, 1862; wounded, with several members of his family, 1865, by would-be assassin; carried out purchase of Alaska, 1867.

SEWELL, WILLIAM (1804–74), Anglican divine, fellow of Exeter Coll., and prof. of Moral Philosophy, Oxford; in early days associated with Tractarian movement.

SEWERAGE, term applied to the systematic collection and disposal of the fouled water, refuse liquids, and human and animal excrements of a community. In the country and in villages and small towns refuse is often collected in pails, transferred to ashpits or tank carts, and deposited upon the land; the dry-earth system, in which a quantity of thoroughly dried soil is thrown over the excreta in the pail, taking advantage of the deodorant and oxidising action of such a substance as dried earth, is a valuable and suitable means of sanitation in such circumstances where no system of water-carriage sewerage exists. The pneumatic method, which is in common use on the Continent, consists in draining the closets to a closed cesspit, which is emptied at intervals by suction, while in Liernus's method, employed in Amsterdam, St. Petersburg, and other low-lying continental cities, the cesspits are connected by pipes to a central reservoir, to which their contents are sucked by powerful suction engines.

The water-carriage system is, however, undoubtedly the best method of drainage; in the *separate system* one set of sewers conveys the sewage of houses and other buildings, while another set of drains carry off storm-water and surface water into a stream, this system being said to be more readily self-cleansing; in the *combined system*, which is the more usual and the most suitable for urban districts, the same sewers carry off both sewage and surface water.

House drains, or the pipes which join house soil-pipes and waste-pipes to the sewer, are usually made of glazed fire-clay, with a diameter of from 4 to 12 inches, and a length of 2 to 3 feet, the joints being secured with cement; cast iron pipes, 6 to 9 feet long, are also used, and are preferable, as they are stronger, while the joints, fastened with oakum and lead, are more secure. The drains must be water-tight, their interiors must be quite smooth, to prevent accumulations of solid matter, they must be laid in straight lines, with any junctions at acute angles, and they must have a uniform fall corresponding to ten times the diameter of the drain, *i.e.* a fall of 1 in 40 for a 4-inch drain. They should never be laid beneath a house, or, if this is absolutely necessary, iron drains should be used with disconnecting manholes at each side of the house. There must be complete disconnection, by means of manholes or traps, between the pipes inside and outside a house, and there must be thorough ventilation, by admission of air freely, of all parts of the drainage system.

Newly laid drains should be tested, before being covered in, by the *water test*, the different sections being plugged and filled with water and the level noted after an interval of an hour or two, or by the *smoke test*, the ends of the drain being plugged and smoke introduced by a smoke-producing machine, or by *air* or *scent tests*, carried out in much the same way.

Sewers are the larger pipes conveying the sewage from a number of drains, the smaller types being circular, those up to 18 inches in diameter made of earthenware, and those up to 42 inches in diameter of moulded concrete. Small sewers may be built of one layer of impervious bricks resting on a solid base and imbedded in hydraulic cement, while larger sewers should be two layers of thick bricks, made water-tight by a covering of Portland cement outside. While the circular form of sewer is cheaper to build and is a good form where the amount of sewage does not vary much in amount, the egg-shaped form of sewer is preferable if there is considerable variation in amount of sewage; the sewage, when there is only a small quantity, gravitates down to the narrow part, and, friction being diminished, the flow is more rapid.

The size of a sewer depends on the maximum discharge which is estimated, and also upon the fall which is available, as the larger the sewer the less the fall that is necessary. In order to avoid unnecessarily large sewers storm-water overflow pipes are connected, so that when the sewage is over a certain height, as after heavy rain, the water overflows into these pipes and is carried away into a stream or river. The velocity of the sewage should be between 2 feet and 4½ feet per second, and if it is greater than this the sewer should discharge into manholes at intervals, so as to break the force of the flow. Sewers should be flushed out periodically and should be well ventilated by shafts leading to gratings in the street or road above.

DISPOSAL OF SEWAGE.—Sewage contains, on an average, about 50 grains of suspended matter per gallon, about half the suspended matter being mineral and half organic. Towns situated upon the coast get rid of their sewage by pouring it into the sea, sufficiently far from the shore to prevent it being carried back towards it, and in sufficiently deep water to ensure adequate mixing and dilution by the sea-water, which has been shown to have a purifying effect upon sewage.

In the case of towns situated inland, or on an estuary some distance from the sea, there is greater difficulty in disposing of sewage, and various methods are employed. In London and Manchester, for instance, the sewage is led into large tanks, where the solid constituents sink to the bottom as sludge, which is afterwards carried by tank steamers out to sea and discharged there, the purified liquid being poured into the neighbouring estuary. A development of this method is the addition of chemicals to the sewage before it is led into the settling tanks, insoluble compounds being formed which precipitate with the suspended matter. Lime with alum, as is used in Glasgow, or with ferrous sulphate, are the most usual agents employed.

The land is frequently made use of as a purifying agent for sewage, the *broad irrigation system*, consisting in distributing the sewage over a large area of agricultural land, on which grasses and taproots for feeding cattle are grown. The soil should be sandy or loamy, and the surface should have a gradual slope, the sewage being distributed over it by narrow trenches. Purification is brought about by the sewage percolating through the soil, not by merely flowing over it. In the *downward intermittent filtration* method the flow of sewage is concentrated for a certain number of hours on a small area of land, and is then turned on for the same time to another equal area, and so on, each of the areas resting, while air enters it, during the time the sewage is filtering through the other areas.

The *bacterial method* of treating sewage is the method which is now becoming generally employed. The sewage is first conducted to a *septic tank*, where suspended matter sinks to the bottom, and is broken down by anaerobic organisms, and is then led to filter beds consisting of cement walls containing lumps of coke or stones with rough surfaces on which aerobic bacteria flourish and break down the organic matter into harmless products, the water flowing away through perforated tiles at the bottom of the filter beds.

Purification by *electrolysis* has been carried out experimentally with some success, and, as the effluent liquid is very pure after this treatment, it may yet come into more general use.

Parkes, *Sewerage and Sewage Disposal*; Folwall, *Sewerage*.

SEWIN, see under SALMON FAMILY.

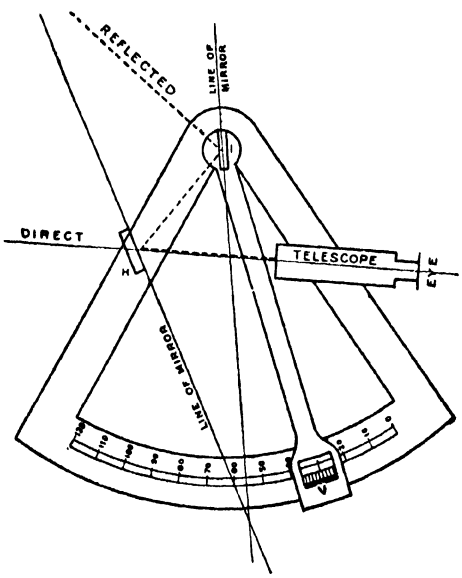
SEWING-MACHINES.—The first s.-m's were based upon the idea of performing the operations of

ordinary hand sewing, and they failed because of their cumbersome movements. One of the first practical machines had a needle with a point at each end and an eye in the middle, and it produced what was known as the shoemaker's stitch. Later machines produced the chain-stitch, but the whole seam became undone if one end of the thread was pulled. A great improvement was made by the use of two threads, one passing through the eye of the needle and the other contained in a shuttle; each stitch was locked so that it could not come undone when the thread was pulled, and hence the name lock-stitch. This double-thread stitch is used in most modern machines.

Urquhart, *Sewing Machinery.*

SEX, the quality of maleness or femaleness possessed by many animals, and at a different level by many plants. Among animals, to which the term is most frequently applied, femaleness consists essentially in the harbouring of immobile, well-fed cells—eggs or ova—within the body, and maleness in the harbouring of minute, active spermatozoa, one of which unites with an egg, and, fertilising it, stimulates the growth of a new individual. Generally the sexes are separate (dioecious); but in some groups of animals, *e.g.* amongst Snails, Liver Flukes, and others, a single individual combines male and female functions—is monœcious or hermaphrodite. Since the essentials of sex are minute internal cells, it is obvious that there can be no primary and universal external difference between male and female individuals, and yet sex is almost always associated with distinctive external characters. These vary extraordinarily in various groups: the male may be the smaller (as in many Spiders and Worms) or the larger (as in most Mammals); he is generally more gaudily coloured, bears more magnificent appendages, often used to settle matrimonial battles with his fellows, and is almost always more active than the female. More essential than such secondary characters are those which have actual value in the sexual life: in males—the modified pedipalps of Spiders, the specialised arms of Cephalopods, the intromittent organs of Reptiles and Mammals all used in depositing spermatozoa within the female aperture, the claspers of Elasmobranch Fishes, and innumerable other modifications; such organs as the highly developed mammæ of Mammals are distinctively female in character.

SEXTANT, instrument for measuring angular



distance between two objects, by means of reflection; name derived from its form, a sector of a circle bounded by an arc of 60°; principle depends upon the optical theorem that if an object is seen by repeated reflection from two mirrors which are perpendicular to the same plane, the angular distance of the object from its image is double the inclination of the mirrors; s. employed for many purposes, notably for finding altitude of heavenly bodies, the images of which are brought into coincidence with the horizon viewed directly.

SEXTUS EMPIRICUS (II. and III. cent's A.D.), Gk. physician and philosopher; lived at Alexandria and at Athens; the greatest of the later Sceptic school of philosophers.

SEXUAL SELECTION, name given by Darwin to his theory that females' choosing gaudily coloured males (or, in some birds, males with great song-power) has great effect on evolution of animals.

SEYCHELLES (3° 45′ to 6° S., 53° to 57° E.), Brit. crown colony, comprising about 90 volcanic islands, situated in Indian Ocean to N. of Mauritius, and surrounded by coral reefs; total area, *c.* 160 sq. miles; principal island is Mahé, which has an area of 55½ sq. miles, and contains the capital Victoria, an important seaport and coaling station; surface generally mountainous, reaching an extreme height of about 3000 ft.; climate tropical but healthy; produces maize, manioc, cocoa-nuts, vanilla, cloves, fruit, rubber; in Praslin, the second largest island, hats and basket-work are produced by the natives. The S. have belonged to Britain since 1814; dependency of Mauritius till 1903, when they became crown colony; administered by governor, assisted by executive and legislative councils; principal religion, R.C. Pop. (1911) 26,000.

SEYDLITZ, FRIEDRICH WILHELM, BARON VON (1721–73), Pruss. general; famous cavalry leader; colonel (1755) of 8th Cuirassiers, which became noted regiment; commander-in-chief of cavalry in Seven Years War, and distinguished himself at Zorndorf, Hochkirch, Kunersdorf, Freiberg.

SEYMOUR, ST. MAUR, family name of Duke of Somerset; first heard of in XIII. cent.; Sir Roger m. coheir of Lord Beauchamp of Somerset (d. 1361) and became ancestor of later Dukes of Somerset; his grandson, Roger, m. heiress of Wolf Hall, Wiltshire, where Seymours then established themselves; Sir John Seymour, favourite courtier of Henry VIII., was father of Queen Jane, Protector Somerset, Thomas, Lord Seymour of Sudeley (Lord High Admiral of England, who m. Katherine Parr); Protector's grandson was made baronet, 1611; from him descended Sir Edward Seymour, who approved of Revolution, 1688, but became Tory and was Speaker; his grandson became Duke of Somerset; Protector's son by second marriage was cr. Lord Beauchamp and Earl of Hertford, 1559, and was grandfather of William, Duke of Somerset, and Francis, cr. Baron Seymour of Trowbridge, 1641.

SEYMOUR (38° 53′ N., 85° 48′ W.), city, Jackson County, Indiana, U.S.A.; railway workshops; manufactures woollens. Pop. (1910) 6305.

SEYMOUR, HORATIO (1810–86), Amer. statesman; governor of New York State, 1852–54, 1863–65; incurred unpopularity for vetoing Temperance Bill.

SEYNE-SUR-MER (43° 6′ N., 5° 52′ E.), seaport town, Var, France; shipbuilding yards. Pop. 19,750.

SFAX (34° 48′ N., 10° 46′ E.), seaport town, on Gulf of Gabes, Tunis; exports fruits, oil; taken by the French, 1881. Pop. *c.* 48,000.

SFORZA, Ital. family, important in XV. and XVI. cent's; founded by Giacomo Muzio (1369–1424), a peasant who rose as *condottiere* under Count Alberigo de' Barbiano, and obtained title SFORZA THE STRONG. His s., Francesco, m. dau. of Duke of Milan, and himself became duke, 1450; extinction of male line, 1535, when Austria annexed duchy.

SFORZA, CATERINA (1463–1509), Countess of Forlì; natural dau. of Galeazzo Maria Sforza (1444–76); m. Girolamo Riario, Count of Imola, s. of Pope Sixtus IV.; cruel and warlike; Girolamo was murdered, 1488; Caterina, after desperately defending Forlì, surrendered to Cesare Borgia, 1500.

SHABATS (44° 45′ N., 19° 43′ E.), town, on Save, Servia; bp.'s see; agricultural trade. Pop. 11,500.

SHACKLETON, SIR ERNEST HENRY (1874–), see POLAR REGIONS.

SHAD, see under HERRING FAMILY.

SHADDOCK, see CITRUS.

SHADOW, the figure of an opaque body projected as the result of its interception of light rays. An opaque body illuminated by a source of light like the sun—which is not a point of light—has numerous s's undistinguishable from one another which cause a *penumbra* or partial s. to be formed round the *umbra* or s. proper. *Astronomical* s's, cast by planets and their satellites in space from the sun's light, cause eclipses (*q.v.*).

SHADWELL, THOMAS (1640–92), Brit. playwright; succeeded Dryden as poet-laureate, and though successful as a dramatist in his day survives now by the stinging satire of Dryden, who nicknamed him 'MacFlecknoe.'

SHAFTESBURY (51° 1′ N., 2° 12′ W.), town, Dorsetshire, England.

SHAFTESBURY, ANTHONY ASHLEY COOPER, 1ST EARL OF (1621–83), Eng. politician; succ. father, Sir John Cooper, Bart., of Rockbourne, Hants, 1631; studied law; fought for king, 1643, but went over to Parliament, 1644, and captured Sturminster and Shaftesbury; councillor of state, 1653–60; member of Cromwell's council, 1653–54, but afterwards led opposition and aided in Restoration; actions under Commonwealth abused by both parties; Cromwell found him an obstacle, while Dryden calls him 'the loudest bagpipe of the squeaking train'; S. held high position under Charles II.; created baron, 1661; Chancellor of Exchequer, 1661–67; Lord of Treasury, 1667–72; member of Cabal, whose foreign policy was odious to country; earl and Lord Chancellor, 1672; finding feeling in country dangerously strong against Cabal, sought popularity by leading anti-popery movement; imprisoned, 1677–78; pres. of Council, 1679; imprisoned, 1681, but vindicated of treason by a jury reported to have been packed by his supporters; trial was subject of Dryden's *Medal*; escaped to Holland, where he died; character immortalised in Dryden's *Absalom and Achitophel*, where unstinted blame for the cynical schemer is mixed with admiration for the

> 'fiery soul, which, working out its way,
> Fretted the pigmy body to decay.'

Life, by Christie (1871), Traill (1886).

SHAFTESBURY, ANTHONY ASHLEY COOPER, 3RD EARL OF (1671–1713), moral philosopher. Grandson of the 1st earl; ed. under Locke's supervision, travelled abroad, was for a time M.P. for Poole, but was prevented by ill health from taking much part in politics. His collected Essays, entitled *Characteristicks of Men, Manners, Opinions, and Times*, were pub., 1711. Against the 'selfish' theory of Hobbes, S. argues that the individual is always a member of a social system, and has social affections as natural as 'self-affections.' Virtue lies in a proper balance of the affections, and Shaftesbury maintains (truly, but on rather shallow grounds) that the pursuit of the public good coincides with the private happiness. His well-known comparison of goodness with beauty, and his introduction of a moral sense apprehending goodness as the æsthetic sense does beauty, and leading to disinterested love of goodness, are characteristic of his attitude towards life. See ETHICS.—Rand, *Life* (1900).

SHAFTESBURY, ANTHONY ASHLEY COOPER (1801–85), 7TH EARL OF (1851), 'Liberal Conservative' politician; as member of Commons (from 1826) carried through Ten Hours Bill; author of many subsequent labour regulations.

SHAFT SINKING is employed in mining for working mineral deposits which cannot be reached by tunnelling. Shafts are generally cylindrical or rectangular in cross section, and are lined with steel, concrete, masonry, or timber. They may be either vertical or inclined, the latter invariably rectangular. Rectangular shafts may be divided into four or more compartments, but cylindrical shafts rarely have more than two. The sinking of a shaft in dry rock is not difficult, but where the ground is soft and wet the process is troublesome and expensive. Vertical shafts may be 5000 feet in depth, and inclined shafts are sometimes more than 6000 feet long. Shafts are used for hoisting and ventilating purposes, and for pumping and transmitting underground steam or other power.

SHAG, see CORMORANT.

SHAGIA, an African tribe of Hebrew origin inhabiting both banks of the Nile in the region of the third cataract. Their blood is now very mixed.

SHAGREEN, leather made from skin of sharks, rays, etc.; the nodules polish well and resist wear.

SHAH JEHAN (1592–1666), emperor of Delhi; built the Taj Mahal (see AGRA), a magnificent palace at New Delhi, and the Pearl Mosque at Agra; imprisoned, 1658–66, by his son Aurangzeb (*q.v.*).

SHAH NAMA, see FIRDAUSI.

SHAHABAD (25° N., 84° E.), district, Patna division, Bihar and Orissa, India; capital, Arrah. Pop. (1911) 1,969,696.

SHAHJAHANPUR (27° 53′ N., 79° 57′ E.), city, cantonment, United Provs., Brit. India; manufactures sugar. Pop. (1911) 71,778.

SHAHPUR (32° 16′ N., 72° 31′ E.), town, Rawal Pindi, Punjab, India. Pop. 9500.

SHAHRUD (36° 25′ N., 55° E.), town, Persia. Pop. *c.* 10,000.

SHAKERS, Amer. religious denomination, with full title, 'The United Society of Believers in Christ's Second Appearing.' The term Shakers was formally applied to the Quakers, from whom the S. split off. Their leader was Ann Wardley, who, with some followers, migrated to America, 1774. S. believe God to be bisexual, and they reject the deity of Christ; they practise communism and live industriously.

SHAKESPEARE, WILLIAM (1564–1616), Eng. dramatist and poet; generally regarded as the greatest imaginative and intellectual force the world has yet known; b. April 23, 1564, at Stratford-on-Avon, Warwickshire, S. grew up in the 'spacious times' of Elizabeth, an age of great national triumphs in literary as in other fields (see ENGLAND: *History* and *Literature*). S.'s father was JOHN SHAKESPEARE (d. 1603), a Stratford merchant and burgess; his mother, MARY ARDEN (d. 1608), a wealthy farmer's daughter. William was their eldest son, but third child; of his younger brothers, Richard died in 1613, and Edmund in 1607.

At Stratford Grammar School (*c.* 1570–78) S. acquired 'small Latin and less Greek'; he learned much of nature in his native county, and of man in London, whither he moved, *c.* 1586, having, it is said, offended the local landowner, Sir T. Lucy, by deer-stealing and lampoons. S. left behind him his wife, ANNE HATHAWAY (b. 1556), a local husbandman's daughter, whom he had married in haste, Nov. 1582. Their children were SUSANNA (b. May 1583; m. Dr. John Hall), and twins (b. 1585)—JUDITH (m. Thomas Quiney) and HAMNET (d. 1596), S.'s only son.

In London, S. found employment about the theatres, and had risen by 1592 from call-boy to actor, playadapter, and dramatist. In that year his position was such as to incur a savage attack by the jealous, dying Robert Greene. S. belonged to the company under the Burbages called Earl of Leicester's men, afterwards Lord Chamberlain's Company and King's Players.

Early Plays.—With Marlowe and others, S. revised or rewrote the three parts of *Henry VI.* and touched up *Titus Andronicus*, *c.* 1589–90. *Love's Labour's Lost* (*c.* 1590), probably the earliest of S.'s own plays, gives promise of the great romantic comedies of a later period. *Two Gentlemen of Verona* (1591) shows S.'s remarkable powers of giving fresh treatment to a borrowed plot. To the same date belongs a third comedy—the *Comedy of Errors*, which, abounding in

boisterous farce, follows classical models. In *Richard III.* (*c.* 1592) he returned to Eng. history, and achieved a great tragedy which still holds the stage; an even greater tragedy, *Richard II.*, followed, *c.* 1593.

From now onwards S. dares more and more to be himself; shaking off the influence of Marlowe he found expression in a great lyric outburst. Turning to non-dramatic poetry, he wrote *Venus and Adonis* (pub. 1593), followed, with equal success, by the *Rape of Lucrece* (1594); fine narrative poems, but cold in comparison with his plays. S.'s star was in the ascendant; he had become warmly attached to the Earl of Southampton, and in 1594 he had the honour of acting before the queen.

Second Period.—What is generally called S.'s second period lasted from *c.* 1594–1601. In 1597 he was sufficiently well-off to buy New Place in Stratford, among his sources of income being a share in the profits of the Globe Theatre. From 1598 onwards (according to evidence discovered by Prof. C. W. Wallace in 1909) he lived in London with a Huguenot family called Mountjoy, in Monkwell Street. In 1601 S. was deeply affected by his friend Southampton's imprisonment for complicity in the Essex Plot, as is reflected in the plays of his third and most serious period. The plays of his second period are full of exuberance; they include the beautiful *Romeo and Juliet* (in its maturer form *c.* 1594), three of S.'s greatest romantic comedies—*A Midsummer Night's Dream* (1594), *Merchant of Venice* (1595), and *As You Like It* (1599); the glorious dramatic histories, *Henry IV.* (2 parts: 1596–98) and *Henry V.* (1599), which showed Prince Hal as king; while Falstaff reappeared (tradition says at Elizabeth's command) in the *Merry Wives of Windsor* (1599). Other merry plays—*Taming of the Shrew* (*c.* 1596), *Much Ado about Nothing* (1599), *Twelfth Night* (1600), and *All's Well that Ends Well* (*c.* 1601)—also belong to this bounteous period, when S.'s art developed and his wonderful imagination found vent in sunny comedies and stirring patriotic plays.

Third Period.—The great Rom. tragedy of *Julius Cæsar* (*c.* 1601) fittingly ushers in the period of gloom and tragedy, to which belong such masterpieces as *Hamlet* (1602), *Othello* (1604), *King Lear* (*c.* 1605), *Macbeth* (1606). The blow of Southampton's imprisonment, combined with changing political conditions, the passing of the glowing Elizabethan age, and the poet's maturer years, to produce a mental struggle and crisis, clearly revealed in the plays mentioned and in others which are included in this short but extraordinarily fertile period (1601–9) of sublime and almost unrelieved tragedy—*Troilus and Cressida* (*c.* 1608), a cynical comedy, satirising Greek and Trojan heroes; *Measure for Measure* (*c.* 1603), another sombre comedy; *Timon of Athens* (1607), a bitter tragedy; *Pericles* (1608) with its loathsome scenes; *Antony and Cleopatra* (1608) and *Coriolanus* (1609), great tragedies both.

S.'s third period, or period of maturity, says Oliphant Smeaton in his *Life*, 'not only saw his genius at its zenith of power, but it saw him in consequence of that very fact driven, by the sheer propulsive force of imperious intellectual necessity, to grapple with the highest and the deepest themes, of life, death, and futurity, analysing the mysteries of being, the origin of evil, the law of human atonement for sin; all these, and other profound problems as well, were faced by him, during that soul-searing epoch of mental and moral self-examination and appraisal.' The public, it should also be added, seemed also to favour tragedy at this period, and S. gave them of his best.

Sonnets and Last Period.—In 1609 appeared S.'s *Sonnets*—poetical gems round which much controversy has raged. Critics have disagreed as to the identity of the poet's friend 'Mr. W. H.' (who is described as the 'onlie begetter' of the Sonnets), and of the 'dark lady' who inspired the second series; Southampton and Pembroke are among those identified with the former, while Mary Fitton is by many identified with the latter.

S.'s last period is marked by a calmer, happier atmosphere; the crisis is past. Prosperous days favoured the poet's closing years. His last plays, *Cymbeline* (1610), *A Winter's Tale* (1611), *The Tempest* (1611), are rich and mellow, beautiful and romantic, tinged with the sweet sorrow of one who has found peace when on the eve of parting with life. About 1611 S. was able to bring his business connection with the stage to an end, and retire, with prematurely failing health, to his native Stratford, where at New Place he resided till his death (April 23, 1616). He lies buried in Stratford Church. In addition to the plays mentioned, S. is known or believed to have collaborated with other dramatists in such plays as *Henry VIII.* (*c.* 1613) and *The Two Noble Kinsmen* (*c.* 1613).

The magnitude and inexplicability of S.'s genius, the diversity and depth of his knowledge, and the meagreness of the known details of his life have given rise not only to an enormous body of lit. dealing with the man and his work, but to an extraordinary theory, that the plays bearing S.'s name are not his, but the work of Francis Bacon. The contemporary evidence of his friends—and rivals—ought, however, to be sufficient answer to Baconians; men like Ben Jonson, who knew him well, while disapproving of much in S.'s methods and productions, could not but love and honour him 'this side idolatry.' And so with succeeding generations. There have been times, as in the XVIII. cent., when devotees of classical rules and models have frowned upon S.'s romantic irregularities; but S. has never lacked enthusiasts, and to-day he is firmly established as the greatest name in Eng. literature, if not in the literature of the world.

Since the *First Folio* of S.'s plays (now exceedingly rare and valuable) was issued by his old colleagues, Heminge and Condell, in 1623, down to the sumptuous and scholarly editions of the XX. cent., scores and scores of editions of S.'s works have been published, and the critics, not of Britain alone, but of the whole world, have united in paying tribute to the universality and splendour of his genius; while it has ever been the height of the ambition of the greatest actors and actresses to interpret fitly S.'s leading rôles.

The passing of three centuries has failed to make obsolete or antiquated the master-dramatist's works in tragic and in comic vein alike. No writer in English or any other language has furnished posterity with so many current lines and phrases. S.'s vocabulary was extraordinarily rich; his knowledge of Mankind and of Nature amazingly varied and profound. His plots are not original; but his treatment of the stories he borrowed from other writers was essentially his own. His boundless imagination rose triumphant over the limitations of the Elizabethan theatre, and refused to be restricted by classical unities and traditions. Blank verse, Shakespeare the poet used with a sublimity, a harmony, a dramatic fitness which others may at times have equalled, but have never excelled.

XX. cent. criticism of S. deprecates idolatry, and, while hailing him as a master, boldly proclaims his faults.

Life, by Sidney Lee (1898), Smeaton (1911); Herford, *Shakespeare* (1912: People's Books); Raleigh, *Shakespeare*; Goldwin Smith, *Shakespeare the Man*; Hudson, *Life, Art, and Characters of Shakespeare*; Bradley, *Shakespearian Tragedy*; Dowden, *Shakespeare's Mind and Art*; Hazlitt, *Characters of Shakespeare's Plays*; Gervinus, *Commentaries*; Mrs. Jameson, *Shakespeare's Heroines*; Seccombe and Allan, *The Age of Shakespeare*; Schelling, *The Elizabethan Drama*; *Concordance*, by Cowden Clarke and by Bartlett; and works by Coleridge, Lamb, Schlegel, and other critics.

SHALE, see CLAY.

SHALMANESER, name of kings of Assyria (*q.v.*).

SHAMANISM, religion of Tartar races.

SHAMASH, sun-god of Babylonia and offspring of Nannar, the moon-god, administer of justice and giver of laws to men.

SHAMO, see GOBI.

SHAMOKIN (40° 50′ N., 76° 36′ W.), town, North-

umberland County, Pennsylvania, U.S.A.; coal-mines. Pop. (1910) 19,588.

SHAMROCK, Irish national emblem; the name is given to Wood-Sorrel, Bird's Foot Trefoil, and Lesser Yellow Trefoil.

SHANGHAI (31° 15′ N., 121° 26′ E.), town, Kiang-su, China, near the mouth of the Yang-tse-kiang; chief commercial city of China; central and walled parts of town consist of narrow and dirty streets, but a number of well-built suburbs have grown up outside the walls, those in the N. forming the residential quarters of the foreign population, which numbers about 7000, chiefly English and French. S. is situated in midst of great plain, producing rice, cotton, and fruits, and is important centre of trade; it is a Treaty port, and was opened to foreign trade in 1842. Pop. (1910) 651,000.

SHANHAI-KWAN (40° N., 119° 50′ E.), frontier town, near the Great Wall, Chili, China. Pop. *c.* 33,000.

SHANKLIN (50° 37′ N., 1° 11′ W.), watering-place, Isle of Wight, England. Pop. (1911) 4751.

SHANNON (53° 6′ N., 8° 6′ W.), principal river of Ireland, flows through Loughs Allen, Ree, and Derg; enters Atlantic; length, 250 miles.

SHANNY, see BLENNIES.

SHANS, Mongol tribes of China, Burma, Siam; of same kin as Laos (*q.v.*); semi-barbarous; noted for chased work; many are under Brit. protection; resemble Siamese in institutions and religion.

SHAN-SI (37° 30′ N., 112° E.), province, N. China; mountainous; rich in coal, iron ore, salt. Pop. (approximate, 1911) 9,950,175. Capital, Tai-yuen-fu.

SHAN-TUNG (36° 30′ N., 118° 30′ E.), maritime province, China, bordering on Yellow Sea and Gulf of Pe-chi-li; mountainous in the E.; extensive deposits of coal, iron, and other minerals; produces grain, silk. Pop. (approximate, 1911) 26,889,360. Capital, Tsinan-fu.

SHAPUR I. (241–72), king of Persia; won great victories in Armenia and Syria, and captured Rom. emperor, Valerian, 260.—**Shapur II.**, king of Persia, 310–79; waged war with Rom. Empire, 337–63, in which Emperor Julian was slain, 363, and Romans driven from Armenia; recolonised Susa with Rom. captives.

SHAREHOLDER, see COMPANIES, LIABILITY.

SHARI (11° N., 16° E.), river, Central Africa; enters Lake Chad.

SHARKS AND DOG-FISHES.—These form the group Selachoidei among the SELACHIANS (*q.v.*). All can be easily recognised by the firm, round, tapering body with projecting snout and unsymmetrical tail, by the external gill-openings, the rough, sandpaper-like skin, and the strong, sharp, triangular teeth set in many rows, the hinder of which are ready to replace a worn or damaged series in front. All are carnivorous, devouring other fishes or offal, or occasionally man, but a few, like the Basking Shark, which feeds on seaweeds and medusoids, are harmless. The majority lay their eggs in horny 'purses,' sometimes attached to seaweeds, but several, such as the Hammer-Head and the Porbeagle, the 'Hounds,' the Piked Dog-Fish, bring forth living young.

There are many kinds of Dog-Fishes and Sharks, names which indicate no natural groups, but refer rather to size than to essential characters; it will suffice to mention a few typical examples. The Dog-Fishes proper (*Scylliidæ*) are mostly small in size, and occur in all seas. Two species of *Scyllium* are common in Brit. waters, and are sometimes used for food—the Nurse, Bounce, or Larger Spotted Dog-Fish, and Rough or Row Hound or Lesser Spotted Dog-Fish, the former reaching a length of 4 ft., the latter of 3½ ft. About the same size is the Picked or Piked Dog-Fish (*Acanthias vulgaris*), all common in Brit. waters. Rarer and less welcome are the Blue Shark (*Carcharias glaucus*), which every summer destroys many nets and fishing-lines off the Cornish coast; and the fierce Porbeagle (*Lamna cornubica*), 10-foot examples of which have been caught off Britain. Closely related to the last is the most vicious of all—the man-eating, or Great White Shark (*Charcharodon rondeletii*), a dreaded inhabitant of all tropical and subtropical seas, sometimes reaching a length of 40 ft. A great contrast is afforded by the Basking Shark (*Cetorhinus maximus*), which, equally large, is a lazy, inoffensive creature, useful on account of the oil in its liver, and an occasional visitor to Britain. One cannot omit another rare British wanderer, the Hammer-Head (*Sphyrna zygæna*),—characterised by remarkable lateral processes of the head, at the end of which the eyes are placed,—a vicious and voracious creature.

SHARON (41° 15′ N., 80° 32′ W.), town, on Shenango, Mercer County, Pennsylvania, U.S.A.; iron manufactures. Pop. (1910) 15,270.

SHARP, JAMES (1618–79), Scot. ecclesiastic; ed. Aberdeen; a man of ability, he soon rose to the front and joined the 'resolutioners,' as against the 'protestors' (uncompromising Covenanters); taken prisoner by Cromwell, he was kept some time in London, but in 1659 was selected by Monck to reconcile Presbyterians to the Restoration; he played a double game, and, being appointed abp. of St. Andrews, 1661, persecuted the Presbyterian Church; much hated; murdered on Magus Moor, near St. Andrews, by Balfour of Kinloch, Hackston of Rathillet, and other Covenanters.

SHARP, JOHN (1645–1714), abp. of York, 1691; intimate friend of Queen Anne.

SHARP, WILLIAM (1856–1905); Scot. poet, critic, and novelist; wrote also as FIONA MACLEOD.

SHARPSBURG (40° 30′ N., 79° 56′ W.), town, on Allegheny, Pennsylvania, U.S.A.; manufactures foundry products and paint. Pop. (1910) 8153.

SHASI, SHAHI (30° 17′ N., 112° 17′ E.), treaty port, on Yang-tse-kiang, Hupeh, China; cotton goods. Pop. (1911) 90,000.

SHAT-EL-ARAB, see EUPHRATES.

SHAW, GEORGE BERNARD (1856–), Brit. dramatist, critic, and socialist; b. Dublin; attained considerable success with dramatic criticisms in *Saturday Review*; became associated with the Fabian Society, of which he is one of the most brilliant members. Among his plays are: *Man and Superman, John Bull's Other Island, Candida, You Never Can Tell, Fanny's First Play.* Several (*Mrs. Warren's Profession, The Showing-up of Blanco Posnet*) have been banned by the censor, a circumstance which has given S. the opportunity for writing some brilliant prefaces. A remarkably clever dramatic critic, an advocate of the 'sanity of art,' a charming wit, and a truly ingenious theorist.

SHAW, RICHARD NORMAN (1831–), Scot. architect; built New Scotland Yard; R.A., 1877.

SHAW-KENNEDY, SIR JAMES (1788–1865), Scot. general and author; performed feats of bravery in Light Brigade in Peninsular War; pub. *Defence of Great Britain and Ireland*, 1859, *Notes on Waterloo.*

SHAWNEE (35° 18′ N., 96° 55′ W.), city, Oklahoma, U.S.A.; cotton. Pop. (1910) 12,474.

SHEAR, see ELASTICITY and STRENGTH OF MATERIALS.

SHEARWATER FAMILY (*Puffinidæ*), a family of strong-flying marine swimming-birds, with very long and slender beaks hooked at the tip. The SHEARWATER (*Puffinus*) is found all over the world, whereas the FULMAR is confined to the N. hemisphere, having fled within recent years to northern Scot. islands.

SHEATH-BILLS (*Chionis*), so called on account of a horny plate projecting over the base of the bill; 3 species of white pigeon-like birds which inhabit the coasts of Antarctic and sub-Antarctic seas.

SHEBIN EL-KOM, town, EGYPT (*q.v.*).

SHEBOYGAN (43° 43′ N., 87° 41′ W.), city, on Lake Michigan, capital, Sheboygan County, Wisconsin, U.S.A.; dairy-farming centre; manufactures furniture. Pop. (1910) 26,398.

SHECHEM (32° 11′ N., 35° 17′ E.) (modern Nablus), ancient city, between Mounts Ebal and

Gerizim, Palestine; became capital of the Samaritans; in early Christian times called Neapolis.

SHEE, SIR MARTIN ARCHER (1770–1850), Brit. portrait painter; b. Dublin; settled in London; attained some contemporary fame; made P.R.A., 1830.

SHEEP GROUP (*Caprinæ*), a sub-family of BOVIDÆ, in Pecora section (*q.v.*) of the Even-Toed Ungulates. The group includes the closely allied SHEEP (*Ovis*) and GOAT (*Capra*) with their connecting link—the curious MUSK OX (*Ovibos moschatus*). They are distinguished by the presence of ridged, curved, or spiral horns in both sexes, those of the female being small, a somewhat hairy muzzle, and a short and flattened tail. They are widely distributed over all the higher mountains of Southern Europe, Central Asia, and North Africa.

Of the Goats (*Capra*), which are recognised by their bearded chins, one of the best known is the ALPINE IBEX, or STEINBOK, living in herds on the Ital. side of Monte Rosa, the male having strongly ridged horns often 2 ft. in length, which curve boldly backwards from the forehead. More familiar is the DOMESTIC GOAT (*C. hircus*), with many forms found almost all over the world, including the valuable CASHMERE, ANGORA and COMMON varieties. The animal known as the MUSK OX (*Ovibos*), equalling in size small Welsh or Scotch cattle, and covered with long, thick, brown hair, is closely related to the Goats, and is confined to the most northern parts of North America.

The true Sheep (*Ovis*), distinguished from Goats by the absence of a chin beard, are in their wild state chiefly inhabitants of Asia, but representatives are also found in N. Africa and N. America. Though essentially an inhabitant of high mountainous parts of the world, the sheep as a domestic animal flourishes in the temperate regions of both hemispheres, the different breeds varying greatly in external characters. Horns may be present, as in Blackfaced Sheep of the Scot. Highlands of both sexes, or altogether absent in the female, as in the Whitefaced Welsh Mountain Sheep, the Soay of St. Kilda, and the MOUFFLON (*O. musimon*) of Corsica and Sardinia, or absent in both sexes, as in the heavy breeds of the Leicester, South, or Oxford Down Sheep of the Brit. Isles. Long-woolled sheep are usually distributed in mountain and heath districts, while the short, fine-fleeced animals, as the Lincoln and Leicester breeds of England, are reared on pastoral or arable land.

The Fat-tailed Sheep of Barbary, with long, pendulous ears, are well known. In common with many goats, sheep possess between the two front toes a small sac, which secretes an oily odorous substance, and this, tainting the tracks of the animal, enables other individuals to recognise by their strong sense of smell the presence of numbers of their species.

No other animal possesses relatively greater economic value than the sheep. Their flesh constitutes a large proportion of the food-supply of communities, while their fleeces supply the raw material for one of our greatest manufactures.

SHEEPSHEAD, AMERICAN, see SEA BREAM.

SHEERNESS (51° 27′ N., 0° 45′ E.), fortified seaport, dockyard, naval arsenal, at junction of Medway and Thames, on Isle of Sheppey, Kent, England. Pop. (1911) 17,494.

SHEFFIELD (53° 28′ N., 1° 28′ W.), town, W. Riding, Yorkshire, England; chief seat of Eng. cutlery trade, manufacturing every kind of cutting tool; other industries include conversion of iron into steel and the production of armour-plates, rails, Britannia metal, and electro-plated goods. Has fine public buildings, including municipal buildings and Cutlers' Hall. Its chief magistrate is now styled Lord Mayor, and in 1905 it received a charter for establishment of a univ. Mary, Queen of Scots, was confined in the castle (destroyed by order of Parliament in 1646) in 1570–84. Pop. (1911) 454,653.

SHEFFIELD PLATE is made by coating copper with silver, a process discovered by accident, 1742; silver first imposed directly on utensil, later sheets of silver and copper heated and rolled together, cooled and shaped; ornaments of S. p. were popular till discovery of electro-plating, 1837. The recent demand for S. p. has produced many imitations.

SHEIL, RICHARD LALOR (1791–1851), Irish lawyer, statesman, and author; produced successful plays, 1814–22; commenced *Sketches of the Irish Bar*, 1822; joined O'Connell's Catholic nationalist agitation; master of Mint, 1846; ambassador to Tuscany, 1850.

SHEKEL, Hebrew standard of weight for valuing metal; subsequently a gold, silver, or copper coin; the gold s. probably weighed 252⅜ grains troy (value, *c.* £2, 4s. 8d.), the silver s. 224½ grains troy (value, *c.* 2s. 10d.). S. OF THE SANCTUARY was possibly a post-exilic name for the silver s.

SHEKINAH, Hebrew word originally meaning 'the dwelling,' and which afterwards came to be used as a synonym for God. The use of such a synonym is the result of the Semitic fear of limiting God in space or time—hence the vagueness of the term.

SHELBYVILLE (39° 32′ N., 85° 45′ W.), city, on Big Blue River, capital, Shelby County, Indiana, U.S.A.; manufactures furniture. Pop. (1910) 9500.

SHELD-DUCK, see under DUCK FAMILY.

SHELDON, GILBERT (1598–1677), bp. of London, 1660; abp. of Canterbury, 1663.

SHELL, see AMMUNITION.

SHELLAC, see LAC.

SHELLEY, MARY WOLLSTONECRAFT (1797–1851), Eng. writer; dau. of William Godwin; second wife of the poet Shelley. As an author she is remembered chiefly for her novel *Frankenstein*.

SHELLEY, PERCY BYSSHE (1792–1822), Eng. poet; b. Field Place, Sussex; s. of a wealthy squire; ed. Eton and Univ. Coll., Oxford. Much of his early youth was devoted to writing worthless novels and poems, and he was expelled from Oxford for a pamphlet on atheism. Soon afterwards he eloped with Harriet Westbrook, a school-friend of his sister's, and dau. of a retired publican, and was disowned by his family. With her he led a wandering life, visiting Southey at Keswick, and taking part in various political and philanthropical undertakings in Ireland and Wales. In 1813 he pub. his first poem of promise, *Queen Mab*. In 1814 he fell in love with Mary Godwin, dau. of William Godwin, the philosopher, and Mary Wollstonecraft, and, being by now estranged from Harriet, eloped with Mary to the Continent.

On his return he pub. his first great poem *Alastor*, followed, in 1816, by the fine but tedious *Revolt of Islam* in Spenserian stanza. Various circumstances, bad health, the suicide of his first wife, and the decision in Chancery that he was unfit to bring up her children, drove him abroad to Italy in 1818. Here he wandered about for four years, to Venice, Rome, Naples, and Pisa, and here also his greatest poems were composed, *Prometheus Unbound* (1818–19), the finest lyrical drama in European lit., the magnificent but gloomy tragedy of the *Cenci* (1819), *Ode to the West Wind* (1819), *Witch of Atlas* (1820), *Epipsychidion* (1820), and *Adonais* (1821), an elegy on the death of Keats.

In the summer of 1822 he was drowned in the Gulf of Spezia; his body was afterwards burned in the presence of Byron, with whom he had been living, and the ashes were deposited in the Prot. Cemetery at Rome. Shelley's work is inspired by an ardent love of humanity, and contains the most purely and intensely lyrical poetry of all Eng. lit.

Life, by Symonds (Eng. Men of Letters, 1878), Sharp (1887), Dowden (1886), Clutton-Brock (1909).

SHELL-HEAPS, KITCHEN-MIDDEN, prehistoric mounds of refuse found in all parts of the world. They contain the shells of edible shell-fish, bones of animals, fragments of utensils made from stone and bone. Archæological evidence seems to prove that these heaps belong to the earlier half of the Neolithic Age.

SHELL-MONEY preceded use of metal in every

civilisation, and is still employed in central Africa; favourite form is *Cyprœa moneta* (cowry money). Superseded in Brit. possessions by metal currency, 1913.

SHEM, in Genesis, s. of Noah; term 'Semitic' derived thence.

SHEMAKHA (40° 35′ N., 48° 38′ E.), town, Baku, Russ. Transcaucasia; manufactures silks. Pop. 23,000.

SHENANDOAH (41° 50′ N., 76° 11′ W.), city, Schuylkill County, Pennsylvania, U.S.A.; coal-mining centre. Pop. (1910) 25,774.

SHENANDOAH VALLEY CAMPAIGNS (1862–65), Amer. Civil War.—Shenandoah Valley, between two chains of Appalachian Mountains, was of great importance in Virginia campaigns in War of Secession, as it formed protected route from Richmond to Washington, and supplied provisions; good turnpike road led from one end of valley to the other. Federal forces under Banks invaded the valley, 1862, while M'Clellan advanced on Richmond; Confederates, under Jackson, defeated at *Kernstown* and driven steadily up the valley, but received reinforcements, captured Front Royal, and would have trapped Banks in Newmarket had he not made skilful retreat; Jackson's pursuit stopped by M'Dowell and Frémont, but he defeated Federals at *Port Republic*. Jackson was called away, but returned to valley and drove Federals from *Harper's Ferry* and *Martinsburg*, 1862.

Ewell led Confederate troops in capture of Martinsburg and Winchester, 1863. When Grant prepared for capture of Richmond, 1864, Federal attacks were made on Staunton and Lynchburg; Hunter won victory at Piedmont, June 5, but was forced to retreat; Confederates under Early then marched down the valley towards Washington, but help came in time to save the panic-stricken city, July 13; Early withdrew into the valley, which became his base for raids; Unionists under Sheridan defeated Early at *Opequan*, Sept. 19, and at *Fisher's Hill*, Sept. 22, and then laid waste from S. to N.: attempt of Early to recover valley foiled by great defeat at CEDAR CREEK, Oct. 19; valley, no longer important, was finally secured for Union by victory of WAYNESBORO, March 1865.

SHENDI (16° 40′ N., 33° 26′ E.), town, on Nile, Nubia, Egypt. Pop. 12,000.

SHÊNG-KING (41° 30′ N., 123° 30′ E.), province, Manchuria, bordering on Gulfs of Korea and Liao-tung; includes the peninsula of Liao-tung. Pop. (1910) 5,830,819. Capital, Mukden.

SHEN-SI (36° N., 109° E.), inland province, China; mountainous; watered by the Wei-ho; has coal mines; produces wheat, cotton. Pop. (approximate, 1911) 8,037,220. Capital, Singan-fu.

SHENSTONE, WILLIAM (1714–63), Eng. poet; chiefly remembered for *The Schoolmistress*, a pleasing poem in the Spenserian stanza. His *Pastoral Ballad* is perhaps finer from a literary standpoint.

SHEPHERD'S PURSE (*Capsella bursa pastoris*), plant of order Cruciferæ; has pinnatifid root-leaves, white flowers; the 'purse' is its flat, heart-shaped seed-pouch.

SHEPPEY (51° 24′ N., 0° 50′ E.), island, between estuaries of Thames and Medway and the Swale, Kent, England. Pop. (1911) 4427.

SHEPSTONE, SIR THEOPHILUS (1817–93), Eng. S. African statesman; Brit. resident in Kaffraria, 1839; agent 1845, sec. for native affairs, Natal, 1856–77; proclaimed annexation of Transvaal at Pretoria, 1877; administrator of Transvaal, 1877–79; retired, 1880.

SHEPTON-MALLET (51° 12′ N., 2° 32′ W.), town, Somersetshire, England. Pop. (1911) 5011.

SHERATON, THOMAS (*c.* 1751–1806), one of the most celebrated Eng. furniture designers.

SHERBORNE (50° 57′ N., 2° 31′ W.), town, Dorsetshire, England; has a XII.-cent. abbey church, grammar school (founded 1550), and remains of an old castle; silk-mills. Pop. (1911) 5954.

SHERBROOKE (45° 25′ N., 71° 57′ W.), city, port of entry, capital, Sherbrooke County, Quebec, Canada; woollens, cottons. Pop. (1911) 16,455.

SHERBROOKE, ROBERT LOWE, VISCOUNT (1811–92), Eng. statesman; Chancellor of Exchequer and Lord of Treasury, 1868–73; Sec. of State, 1873–74; little political ability; his proposed tax on matches gave rise to riots of match-makers, 1871, and pun *ex luce lucellum*; chiefly famed as wit with bitter tongue.

SHERIDAN, PHILIP HENRY (1831–88), Amer. soldier; became commander of cavalry of army of the Potomac in Civil War, conducted Shenandoah campaigns, won final battle of Five Forks, and forced Lee to surrender; commander-in-chief of U.S.A. army, 1883–88; united dashing qualities of cavalry officer with capacity for organisation and discipline.

SHERIDAN, RICHARD BRINSLEY (1751–1816), Anglo-Irish dramatist, politician, and orator; b. Dublin; grandson of Swift's friend, THOMAS SHERIDAN, D.D. (1687–1738); son of Swift's biographer, THOMAS SHERIDAN (1719–98), elocution master; ed. Harrow; made romantic marriage with beautiful singer, Elizabeth Linley (*q.v.*) of Bath, for whom he fought two duels; removed to London from Bath, and with his father-in-law took Drury Lane Theatre, where *The School for Scandal* was produced (1777), and *The Critic* (1779). S. had already achieved fame with *The Rivals* (1775).

Turning politician, S. entered Parliament as a Whig; became Under-Sec. for Foreign Affairs, 1782; Sec. to Treasury, 1783. Of his eloquent speeches those impeaching Warren Hastings (1787) and vindicating the Fr. Revolution (1794) are specially memorable. But as a playwright his highest distinction lay. His is the last great name in XVIII.-cent. drama; his are among the few plays of the older comedy of manners still frequently acted; wit, humour, Irish sparkle have preserved their charm and freshness.

Careless, improvident, S. was a likeable character, despite his failings.

Sichel, *Life* (1909); monographs also by Fraser Rae (1896), Mrs. Oliphant (1883).

SHERIFF, chief official of a shire and subsequently of a borough which enjoyed special privileges. Relation of s. to earl is unsettled question; description of s. in mediæval Latin as *vicecomes* seems to point to his being representative of earl; this view is disapproved of by high authorities, as functions of pre-Conquest earl are not known, but is upheld by others who believe that when an caldorman (called earl, XI. cent. onwards) received several shires to administer he appointed a deputy—shire reeve—in each shire.

The name occurs in laws of Ina (XII. cent.), but, like earl, may then have had somewhat different significance. In historical times sheriff is king's deputy in shire; powers gradually transferred to lord-lieuts. and J.P.'s; sheriff's tourn long disused, abolished, 1887. See SCOTLAND (GOVERNMENT).

SHERIFFMUIR (56° 11′ N., 3° 55′ W.), battlefield, Stirlingshire; scene of indecisive battle between Royalists and Jacobites, 1715.

SHERLOCK, THOMAS (1678–1761), bp. of Bangor, 1728, Salisbury, 1734, London, 1748.

SHERLOCK, WILLIAM (1641–1707), dean of St. Paul's, 1691.

SHERMAN (53° 34′ N., 96° 23′ W.), city, capital, Grayson County, Texas, U.S.A.; cotton manufactures. Pop. (1910) 12,412.

SHERMAN, JOHN (1823–1900), Amer. statesman; younger bro. of General Sherman; chairman of Committee of Ways and Means, 1860; Senator, 1861–77; chairman of Committee of Finance, 1867; opposed paper money and brought in Resumption Bill; Sec. of Treasury, 1877; Sec. of State, 1897–98.

SHERMAN, ROGER (1721–93), Amer. politician; member of committee which drew up Declaration of Independence; belonged to Connecticut party which exercised important influence on U.S. Constitution.

SHERMAN, WILLIAM TECUMSEH (1820–91), one of greatest Amer. generals; retired from army, 1853; head of Louisiana 'State Seminary of Learning and Military Academy,' 1860–61; left to fight for

Union in Civil War; distinguished at Bull Run, 1861, Shiloh, 1862; as general of army of Tennessee took part in victory of Chattanooga, 1863; commander of Mississippi forces, 1864, and carried out brilliant campaign, marching through Georgia to Atlanta and the sea; marched, ravaging, through North Carolina, 1865, and secured Johnston's surrender.

SHERRY, see WINE.

SHERWOOD FOREST (53° 9′ N., 1° 7′ W.), forest, Nottinghamshire; traditional retreat of Robin Hood (*q.v.*).

SHETLAND (60° 15′ N., 1° 15′ W.), group of nearly 100 islands and rocks lying N.N.E. of mainland of Scotland, and forming with Orkneys a Scot. county; there are about 27 inhabited islands, of which largest are Mainland, Yell, and Unst; area, *c.* 352,889 acres, of which Mainland has *c.* 240,000; surface comparatively level, reaching extreme height of 1472 ft. in Ronas Hill in Mainland; chief town, Lerwick; principal industry is fishing (herring, cod, ling, tusk); sheep, cattle, and ponies are raised, and there are household industries in knitting shawls, stockings, etc. The islands were taken by Magnus of Norway in 1099, and remained in Scandinavian hands until 1468, when, on the marriage of James III. of Scotland to Margaret of Norway, they were transferred to Scotland as the dowry of the latter. Pop. (1901) 27,911.

Goudie, *The Celtic and Scandinavian Antiquities of S.*

SHEVAROY HILLS (11° 55′ N., 78° 30′ E.), hill range and plateau, Salem district, Madras, Brit. India.

SHIBERGHAN (36° 40′ N., 65° 35′ E.), town, Afghan Turkestan. Pop. *c.* 13,000.

SHIEL, LOCH (56° 47′ N., 5° 35′ W.), lake, on borders of Inverness and Argyll, Scotland; length, 18 miles.

SHIELD, see HERALDRY.

SHIELD SHRIMPS, see under ENTOMOSTRACA.

SHIELDS, see NORTH SHIELDS, SOUTH SHIELDS.

SHIFNAL (52° 41′ N., 2° 23′ W.), market town, Shropshire, England; ironworks.

SHIGATSE (29° 17′ N., 88° 42′ E.), sacred town, at junction of Nyang-chu and Sangpo, in vicinity of Tashilunpo monastery, Tibet. Pop. *c.* 13,000.

SHI'ITES (Arabic for 'sect'), name of one of the two sects into which Muhammadans have split; the others, Kharigites, declared the caliphate to be elective among all Arab Moslems, but the S. defended an absolute and hereditary caliphate in the descendants of Ali, the son-in-law of Muhammad. This caliphate descended among the Eastern Moslems from father to son till IX. cent. Shi'ite theology somewhat modified the original Islamic creed—the vicegerency of Ali is added. Several sects have split off from them, and the modern Babaiism is a Shi'ite movement.

Browne, *A Year among the Persians.*

SHIKARPUR (27° 57′ N., 68° 40′ E.), town, Sind, Brit. India. Pop. 51,000.

SHILDON (54° 38′ N., 1° 39′ W.), town, Durham, England; railway shops; coal-mines. Pop. (1911) 13,488.

SHILLONG (25° 33′ N., 91° 55′ E.), town, Khasi Hills district, Assam, India. Pop. 8500.

SHILOH, modern SEILUN (32° 3′ N., 35° 18′ E.), ancient town, Ephraim, Palestine; contained the sanctuary of the ark.

SHILOH, BATTLE OF, BATTLE OF PITTSBURG LANDING, 1862, incident in Amer. Civil War; named variously from Shiloh church, by which the battle was fought, and Pittsburg Landing, farther away; technically victory for Union, but both sides suffered terrible losses.

SHIMOGA (13° 55′ N., 75° 36′ E.), district, Mysore, India. Pop. 535,000. Capital, Shimoga, on Tunga. Pop. 6200.

SHINTOISM, see JAPAN (RELIGION).

SHIP.—The Development of Ships.

Ancient Ships.—The primitive boat, made by hollowing out a tree-trunk by fire or by rough tools, must have been among the first inventions of man. Upon the clumsy dug-out, the canoe of bark or skin marks a great advance, being light yet sufficiently strong. The construction of larger vessels, however, involves new difficulties—questions of strength to resist the strains that grow with increase of dimensions, and with the use of sails, difficulties in securing watertightness and the perfect jointing of many parts.

Yet the art of shipbuilding on this larger scale was known in ancient Egypt over 6000 years ago. The ships of the Egyptians were built of a great number of small pieces of wood dovetailed and bolted together or held by wooden pegs, the joints made watertight by caulking the seams with papyrus. They had no ribs, but beams were fitted across the top on which a deck was laid. A large sail was carried, but the principal means of propulsion was rowing. Some of these vessels were upwards of 100 ft. long, with high ornamented ends. In these ships they made adventurous expeditions to strange lands and carried home their merchandise; they had their ships of war also, and special barges to transport huge obelisks of stone for monumental work.

The ships of the Phœnicians, in which they made long ocean voyages, and those of the Greeks and Romans, are chiefly remarkable for the tendency to increase the number of oars by adding tier above tier of rowers.

Their warships were provided with formidable rams of hard wood to penetrate the enemy's ships.

A ship of the Vikings, unearthed in a wonderful state of preservation, has been described. It is of particularly 'fine' form, with waterlines curving gently to a sharp angle fore and aft; built of oak, and the sizes and disposition of the parts indicate a large experience.

Ships of the Middle Ages.—During the Middle Ages many improvements were effected in naval architecture owing to the keen rivalry among European nations in war and commerce. The oar remained for long a means of propulsion, particularly for manœuvring in battle, but the sail was relied upon for ocean voyages.

On the comparatively peaceful waters of the Mediterranean oar propulsion was perfected in the large galleys which were used by the nations of Southern Europe, but the northern countries tended more towards the sole use of sails.

In sail-propelled warships the ram was abandoned, only to be introduced when steam gave a means of propulsion more under control. Turrets, giving elevated platforms for the fighting men, were erected fore and aft, and no doubt they saved the ship from the inroads of high waves.

The modern form of rudder was introduced instead of the large side-oar formerly used. The number of masts was increased to three or four and the size of bowsprit was increased.

The introduction of cannon also influenced the form of ships largely. These being at first introduced in galleys, it was necessary to place them high in order to carry their fire clear over the men at the oars. The result of adding considerable weight so high in the ships tended to make them top heavy. This tendency was counteracted by increasing the breadth at the waterline to give greater stability, thus making the ship broad in beam. Moreover, as the extra breadth was only necessary on the region of the waterline, the deck remained narrow, the sides sloping inward. The effect of this was to reduce the top weight and also to give a stronger structure. This inward inclination of the sides, technically known as the 'tumble home,' remained a characteristic feature of ships up to modern times.

Ships, both of war and commerce, were formerly short in relation to their breadth, the length being usually from 3 to 4 times greater than the beam. It was not until the middle of the XIX. cent., when the

steamboat made its appearance, that a better proportioned ship was designed. The famous Amer. 'clippers' were nearly 6 times as long as broad, and this improvement enabled them to attain speeds which are still regarded as wonderful.

In all wooden ships, however, a limit of length was imposed by the weakness of the material. The length could not be increased without setting up severe strains on the ship, due to longitudinal bending. These ships suffered particularly from a tendency to arch upwards in the middle and droop at the ends. This tendency is known as hogging. The pointed ends of the ship are not fully supported by the water under them, and the full middle portion obtains more lifting force than it requires. While the length is thus restricted the breadth must be sufficient to give the required stability so that the ship may stand up under canvas.

The Introduction of Steamboats.—Towards the end of the XVIII. cent. many experiments were made on steam propulsion of ships in France, America, and Britain. Among the most successful of the early experimenters was WILLIAM SYMINGTON. In 1788 a little boat, produced by Miller & Symington, was propelled by steam power upon Dalswinton Loch, Scotland.

In 1801, under patronage of Lord Dundas, the famous *Charlotte Dundas* was built to the designs of Mr. Symington. She was intended to act as a tug on the Forth and Clyde Canal, and proved successful. These experiments attracted the attention of FULTON, an American inventor who was interested in steam propulsion of ships. He visited Scotland and sailed on the *Charlotte Dundas*, and in 1807 the *Clermont*, a much larger steamer, was built under Fulton's direction and sailed on the Hudson. About the same time the steamer *Phœnix* was built in America by STEVENS. This was the first steamer to navigate the open sea.

Another who noted with interest the experiments of Symington was HENRY BELL. He afterwards became the owner of the *Comet*, which, in 1812, began her regular daily sailings on the Clyde, carrying passengers between Glasgow and Greenock.

Steamboats soon began to be common on the Clyde and later on the Mersey and the Thames, and in 1816 the steamer *Hibernia* was built for service between Great Britain and Ireland. Many improvements were made in marine engineering by DAVID NAPIER of Glasgow. His engines were successful in the *Rob Roy* (1818), a Channel steamer, sailing at first to Ireland, but later in service between Dover and Calais. Previous to the building of this steamer, Napier made some experiments in the resistance and speed of models which led to the introduction of much sharper forward lines.

In 1819 the *Savannah*, a vessel with steam as auxiliary motive power, was built in America, and sailed across the Atlantic. She was fitted with an engine and paddles, but was quite independent, of these, being fully rigged as a sailing ship. She relied upon her sails to carry her across the Atlantic, as her engine was only moving for a fraction of the time of the voyage, and, indeed, the paddles, which could be unshipped, were, for the most part, carried on board. Other ships made the ocean voyage, partly under steam, but until 1838 no ship had steamed all the way across the Atlantic. This feat was accomplished by the *Sirius* and almost simultaneously by the *Great Western*—two British-built ships.

The Rise of the Turbine.—From these early days progress has been remarkably rapid, leading not only to higher speeds but to economy of fuel. The paddle became mainly restricted to river steamers, and twin screws came to be fitted in all the larger and faster liners and warships.

The introduction of the turbine has largely increased the speed possibilities of ships. This new engine was the invention of SIR CHARLES A. PARSONS. In 1894 the *Turbinia* (100 ft. long) was built to test the capabilities of the marine steam turbine, and after a number of experiments and improvements a speed of 34½ knots was obtained. In 1899 the British Admiralty built the torpedo-boat destroyers *Viper* and *Cobra*, and had them fitted with turbines. These proving satisfactory, it was not long before the larger classes of warships were being similarly engined. The turbine commended itself for use in these ships partly because of its small height as compared with reciprocating machinery. It could be kept low in the ship and thus easily protected.

The turbine is also well suited to the requirements of channel steamers which must make their runs at highest speed. The Clyde steamer *King Edward* (1901) was the first turbine merchant vessel. She was built by Messrs. Denny, at Dumbarton, and attained 20·48 knots speed. This firm also built the turbine channel steamer *Queen* (1903) for the Dover-Calais route, and this class of ship is now nearly always turbine-driven. In its earlier history the turbine was the subject of careful tests, and sister-ships were built—one with reciprocating engines and the other with turbines—to give comparative results. That these results were favourable to the newer engine is made evident by its adoption in all vessels of high speed. In the Allan liner, *Virginian*, it found its first application to this class of ship, and in the turbine Cunarders, *Lusitania* and *Mauretania* (26·6 knots), the liner has reached, for the present, its maximum of speed.

Oil Engines.—Of late oil engines have been fitted in several cargo vessels. In this engine the combustion of the fuel takes place in the engine cylinders, thus boilers are not required and valuable cargo space is gained. Compared with coal, oil has certain advantages in stowing, as it may be carried mainly in the double bottom.

Iron and Steel Ships.—Several causes led to the introduction of iron as a shipbuilding material. The tendency to increase the length of ships with increase of speed was checked by the inherent weakness of wood; the scarcity of suitable timber began to be felt, and the strains due to the working of the machinery (particularly at the sterns of screw steamers) could not be properly met with wooden structures.

A small iron canal boat, the *Vulcan*, had already been built in 1818, near Glasgow, but for some time an almost superstitious dislike existed to the use of such a 'heavy' material, and the progress of iron shipbuilding was slow at first. The superiority of iron gradually came to be recognised, however; its greater strength allowed the use of much thinner parts, so that the metal structure was actually lighter than the wooden one of the same size. The first iron vessels were indeed much stronger than was necessary, and in cases of accidental grounding proved their superiority over the wooden ships.

By the middle of the XIX. cent. iron became established in favour, and dimensions impossible before now became common. The capabilities of this material was demonstrated by the building of the *Great Eastern* (1858), 680 ft. long, under the direction of Messrs. I. K. Brunel and J. Scott Russell. Although commercially a failure, the mere construction of so large a ship was in itself a great engineering feat.

Certain disadvantages are attached to the use of iron in ships. The fouling of the bottom, by the attachment of barnacles to the surface below the waterline, seriously reduces the speed. Wooden ships are protected by nailing sheets of copper to the planking; on this metal the sea-growths can obtain no permanent hold. It is not possible to use the same means on iron hulls, as the two metals, when immersed together in sea water, set up a galvanic action which rapidly corrodes the iron.

The composite system of construction is an attempt to combine the advantages of iron and wood. In this system, while the ribs, beams, and certain tie-plates, etc., are of iron, the skin is of wood-planking copper-sheathed. This arrangement was used in some of the fast tea-clippers which could not afford to lose any part of their speed by fouling. Nowadays excessive fouling

is prevented by the regular application of antifouling compositions applied to the bottom plating in dry dock. Some naval vessels have their bottom plating covered with wood-sheathing which is coppered. This is, of course, a heavy and expensive arrangement and has been used only in cases where the ship must remain at sea for long periods without docking.

The Admiralty was somewhat slow to adopt iron for warships. Firing experiments in 1845 had shown that the splintering effect was greater with iron plating than with wood; hence they continued to use wood until the introduction of armour. When they put armour on their new ship, *Warrior*, in 1860, they followed the example of the French, but they went a step further and built the hull entirely of iron.

Steel Ships.—Not long after iron had obtained a footing as a material for shipbuilding steel was proposed. This material, as first manufactured, was harder and more brittle, though stronger than iron. It was also very expensive. An improved 'mild' steel was used in the building of the French warships in 1873, but the Brit. Admiralty considered it unreliable and asked for a better material. Steel makers of this country rose to the occasion and almost immediately succeeded in producing a material which met the exacting requirements of the naval constructors. Mild steel is better described as homogeneous iron, whereas wrought-iron has a fibrous structure, due to the process of its manufacture, and is stronger with the grain than across; mild steel is nearly uniform in quality in every direction. It is also much stronger than iron, so that steel plates are allowed (20 %) thinner. For some time iron continued to be the principal material in merchant shipbuilding owing to the greater cost of steel, but steel is now universally adopted except for certain parts. Iron is less liable to corrosion and is used in places which have been found to suffer badly in this way. A careful system of testing material is employed to ensure that a high standard of strength and ductility is maintained.

Types of Ships.—Experience and the rigour of competition have produced a variety of types of steamers, each type being peculiarly suited to its special work. Many of the modifications have affected the arrangement of decks and erections on deck. At first the arrangement of sailing ships was followed and steamers were flush-decked, *i.e.* the side showed a continuous line fore and aft. For a short distance at the fore end the deck was sometimes set at a higher level, giving a platform called a 'monkey forecastle' or 'anchor deck,' on which the seamen stood when working the anchors. This platform was in later vessels raised sufficiently high to give a space under it for accommodation above the level of the upper deck. Such an erection is termed a 'topgallant forecastle.' Similarly at the stern an 'aftercastle' or 'poop' was developed to protect the steering-gear or raise it higher above the water.

At first the openings on deck over the machinery space were not sufficiently guarded, but later an iron house or casing was erected on deck above which the engine skylight was fitted. As a further protection some vessels have their side-plating extended upwards over a part of the length, shielding the casing and the doors leading down to the engine- and boiler-rooms. This part being covered in by a deck forms a complete erection. It is called a 'bridge,' but is quite distinct from the navigating bridge, which is a light, elevated structure for navigating purposes. A ship having these three erections, viz. poop, bridge, and forecastle, is often referred to as a 'three-island' steamer on account of the isolated appearance of the erections.

If the three separate erections be joined by decking over the intervening spaces and plating the sides, a new type is produced which is simply one 'storey' higher than the flush-deck ship. This latter would have two, an upper and a lower, so that the new class may be called a 'three-deck' ship. The name 'three-decker,' however, was only applied to the strongest of this class, viz. to that type which was designed to carry a heavy cargo and load to a deep draught. There are actually three types—the 'three-deck,' the 'spar-deck,' and the 'awning-deck' ship—which are the same in outward appearance. The spar-decker was at first designed to carry passengers in the space under the spar, or top deck, and this upper part was regarded as a light erection built upon the hull proper. Afterwards it was found desirable to carry cargo in the passenger space, and the upper part of the ship was strengthened to meet the increased stresses due to the heavier burden. In the case of the awning-decker the history of the spar-decker repeated itself, with the result that the three types differ from each other only in the degree of their strengths and the relative weight of cargo which they may carry. The spar-decker is intermediate between the three-deck and awning-deck types, and within these limits the draught to which it may load will depend on the structural strength provided.

The 'shade-deck' type is similar to those above mentioned, but in this class the space between upper- and shade-decks is distinctly a passenger space and correspondingly light in construction, with long openings in the side for ventilation.

A variation of the 'three-island' type is produced by joining two of the erections—for example, the bridge and poop—to form a long continuous erection. The gap between this and the forecastle is called the 'well,' on account of its being often inundated by the sea.

The raised quarter-deck ship resembles the above type in having a forward well, but the part abaft the bridge is not raised quite up to the level of the bridge and remains about 4 ft. lower.



FIG. 1.

By raising the after-deck in this way greater hold space aft is obtained. This is needed because the propeller-shaft, passing through from the engine to the stern, is enclosed in a trunk or tunnel, and the space so occupied is a considerable deduction from the space available for cargo. The volumes of the fore- and after-holds being thus equalised, a proper balance is obtained.

Returning to the three-decker we find that this type in its turn has been modified by the addition of poop, bridge, and forecastle. Again a junction of these three erections has been made, in certain cases, forming a complete fourth deck termed the 'shelter-deck.' Originally intended for the protection of cattle, this upper shelter was at first lightly built, but in later designs it has been strengthened and incorporated in the main structure of the vessel. The shelter-deck being then a continuous strong deck has again received additions in the form of poop, bridge, and forecastle. The original distinctions between the spar-decker and its companion types have tended to disappear as time went on, the chief remaining differences being in the relative draughts or weight of cargo carried, and the corresponding strength which must be provided.

A notable feature of modern large passenger vessels is their high, towering erections. These give promenading space at the sides in which the passengers may have fresh air and exercise, the central portion being occupied by state-rooms, lounge, smoking-rooms, etc. The highest of all is the boat deck, which carries the rows of lifeboats, and leaves an excellent promenade open to the sky.

Patent Ships and Specialised Types.—While decks have been added above, they have been eliminated to some extent below. This has been done to give clear holds for cargo, and has led to changes in construction. Large single-deck cargo vessels have thus been evolved with depths up to about 30 ft. The nature of the cargo carried has influenced the design of certain ships.

This is particularly so with cargoes such as grain, which are liable to shift to one side and give the vessel a dangerous list. Even if the holds were at first quite full the cargo would gradually settle down, leaving a space under the deck, with possibilities of a large flow from side to side. The effect of such movement depends greatly on the width at the surface of the grain, so that if this width be reduced sufficiently the flow is restricted and all danger is removed.

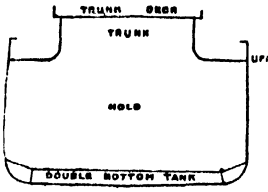


Fig. 2.—Trunk Deck Steamer.

The 'trunk' type is like the ordinary cargo vessel up to the upper deck; along the central portion of this deck runs a deep trunk or casing, extending over the greater part of the ship's length. This trunk forms the upper portion of the hold space, the cargo is filled into it, and in the limited breadth the transverse shift is restricted.

The 'turret' vessel resembles the above type in having the central trunk, but here the upper deck, instead of meeting the ship's side sharply at an angle, curves gently into it with an easy rounded form.

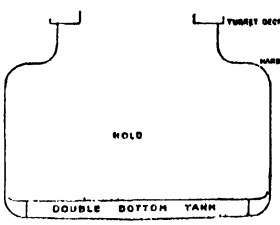


Fig. 3.—Section of Turret Steamer.

Another matter which has greatly affected ship-design is the question of *ballast*. When a ship is compelled to undertake a voyage without cargo, it is necessary to take a certain weight on board in order that her propeller may be sufficiently immersed. Water ballast was first introduced in the steamers carrying coal from Newcastle which had to return light. It supplanted the awkward stone ballast which had formerly been used, and could be quickly run in and pumped out. At first the water was contained in separate tanks in the bottom of the hold, but afterwards an inner bottom was fitted, forming with the outer shell a double-bottom ballast tank. In addition to the double bottom it has been found necessary to provide in some ships a hold compartment for ballast. A vessel which carries all her ballast in the bottom has this disadvantage that when heeled over to an angle her great stability causes her to return to the upright with a sharp and sudden motion. This gives a quick, uncomfortable roll not only disagreeable to those on board, but tending to strain the structure and fittings. To avoid this, several designs have been produced in which the ballast is carried high up in the ship. Thus in the M'Glashan type the inner skin is extended right up to the deck, giving a double side, as well as a double bottom, for carrying water.

In the Harroway-Dixon design, the ballast is contained in triangular spaces—one on either side of the ship under the deck. Each space is divided from the hold by a sloping wall of plating, extending from the ship's side up to the edge of hatchway or deck opening. It will be noticed that the shape of hold in thus narrowing towards the top gives advantages for bulk cargoes similar to those in 'trunk' and 'turret' steamers. Moreover, in filling an ordinary rectangular hold by pouring in through the hatchway, a cargo such as coal will heap itself up in the centre and leave the triangular spaces at the side empty. These spaces would have to be filled or trimmed by hand. In 'self-trimming' designs like that mentioned above, the coal, flowing in, naturally adjusts itself to fill all the available space.

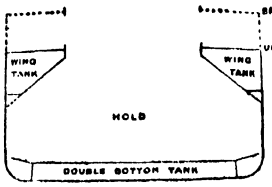


Fig. 4.—Harroway-Dixon Design.

The oil-tank vessel, built to carry petroleum in bulk, has special features. At first the oil was carried in casks or cases, then in separate tanks, then within an inner skin, but now only the shell-plating separates it from the outside water.

A liquid cargo presses on the sides as well as on the bottom of the enclosing tank, and even when the hold is completely full this pressure is increased by the motion of the ship. In oil-tank vessels the hold space is divided into a number of spaces by transverse divisions or 'bulkheads,' which extend, oil-tight, across the ship at intervals of about 28 ft. In addition, each space or tank is bisected by a fore-and-aft bulkhead erected on the centre line. In this way the large mass of oil cargo is divided into a number of smaller units of mass, and when in motion the momentum is correspondingly subdivided, each bulkhead taking its share in checking the lurch of the contained liquid. When a tank is not quite full the forces on the dividing walls are very much increased owing to the blows of the oil which is moving about inside. It is impossible to keep the tank full, as oil contracts and expands greatly with variations of temperature. To meet the difficulty, a casing called the 'expansion trunk' is built, extending fore and aft, along the middle of the ship. In this trunk, which extends to the next deck, the level of the liquid rises and falls with expansion or contraction of the bulk, and within its narrow bounds the oil finds a much restricted surface for its play. Special precautions are also necessary owing to the dangerous nature of the cargo. At the end of each range of oil tanks a space about 4 ft. long is left between two transverse bulkheads, one of which forms the end of the oil tanks. This space is called a 'cofferdam,' and is sometimes filled with water. The engines and boilers are usually placed at the stern with a cofferdam insulating them from the oil. Otherwise two cofferdams are necessary, and the screw shafting would have to be led through an oil space and enclosed in an oil-tight tunnel.

Warships.—Since its first introduction great improvements have been made in warship armour. At first wrought-iron was used, then compound armour composed of hard steel plate welded to a wrought-iron back plate. Afterwards by the Harvey, and still later by the Krupp process, a hard protecting face was produced on iron plate. Thus armour became more effective against projectiles and thinner plate could be used. With improvements in armour, however, there have come corresponding improvements in the destructive power of guns, and now it is possible to send a 14-inch projectile clean through a 12-inch Krupp plate from a distance of 7½ miles. Armour was successfully introduced by the French on their floating batteries during the Crimean War, and they proceeded to add this protection to their ships. The first sea-going armoured warship was the French *Gloire*. The British Admiralty quickly followed with the *Warrior*, which had armour 4½ inches thick.

At first only a part of the side was protected, but afterwards an armour-belt extended along the water-line. As the power of guns increased armour was made thicker and reduced in extent, being concentrated in an enclosed citadel of moderate length. The old *Inflexible* was of this type, with 24 inches of armour. A thick lower deck protected the ends under the water, but above this and outside the citadel was ordinary thin plating which could easily be pierced.

To retain some floating power, however, several of the unprotected side compartments were filled with cork. When it became possible to use lighter armour it was once more extended. It is usually fitted in a belt along the waterline, reaching under the water far enough to protect the side which will emerge as the ship rolls. Towards the ends it is made thinner, and sometimes it is not carried the full length of the ship.

The heaviest guns were mounted in pairs in two revolving armoured turrets which rose above the citadel armour. Turrets gave place to 'barbettes' (fixed turrets), containing the revolving machinery for the guns which point over the edge of the barbette armour. A thick covering shield was added which revolves with the guns. The lighter guns project through holes in the armoured side, or are carried in separate armoured houses called 'casemates.'

Horizontal protection is provided by decks covered with thinner armour, particularly the lower protective deck, which is situated near the waterline. Under shelter of this deck are placed all the magazines and important machinery. Its central portion is above the level of the waterline, but its sides slope down to the lower edge of the side armour. A projectile striking on the waterline must pass not only through the side armour, but also through the sloping protective deck before entering the lower part of the ship. To add to the protection, the ship's coal is stowed at the side both above and below the deck, thus providing a considerable resistance to the shell. The bottom of the ship under the protective deck is open to the attack of torpedo and mine. In view of this danger the hold is subdivided into a large number of watertight compartments. In addition to the inner bottom which, in the battleship class, extends up to the lower protective deck, longitudinal protective bulkheads are fitted, giving watertight spaces between the boilers and the ship's side, while the engines are placed in separate compartments.

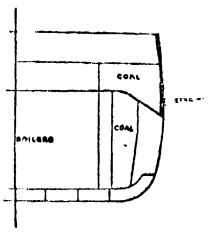


FIG. 5.—HALF-SECTION OF BATTLESHIP.

Warship Types.—The BATTLESHIP is the most heavily armed and armoured type of warship. The latest *Orion* and *King George V.* classes carry ten 13·5-inch guns, mounted in pairs in five barbettes, and sixteen 4-inch guns as secondary armament. Their greatest thickness of armour is 12 inches on waterline belt.

The CRUISER is, in general, inferior to the battleship in offensive and defensive power, but faster. The BATTLE-CRUISER approaches the battleship type, being, in fact, more powerful than the earlier battleships. The *Lion* is 660 feet long, with 28 knots speed, and carries eight 13·5-inch and sixteen 4-inch guns. Its maximum thickness of armour is 9 inches.

The armoured cruiser of pre-Dreadnought times is less powerful. The *Minotaur* (23 knots) has four 9·2-inch and ten 7·5-inch guns, with 6-inch armour on the waterline.

Cruisers, without armour-belt, which have protective decks, are called '*protected* cruisers.' The largest of these, called 'first-class cruisers,' are not now built. The *Bristol* is an example of the 'second-class cruiser.' She is 430 feet long, of 25 knots speed, and carries two 6-inch and ten 4-inch guns. 'Third-class cruisers' are smaller, 360 feet long, and the fast SCOUT class are similar to the third-class cruisers.

TORPEDO BOATS are small, swift boats, carrying torpedoes which they can discharge against battleships, trusting, by their speed and smallness, to escape the fire of the larger ship.

TORPEDO DESTROYERS are larger and faster vessels, armed, and capable of overtaking and overpowering torpedo boats. They also carry torpedoes with which to attack the larger warships.

SUBMARINES are designed to approach their object and discharge a torpedo unnoticed, by travelling for some distance under water. By taking in water the vessel is made to sink until almost submerged, when, being set in motion, she is forced downward by the action of inclined planes or rudder just as a vertical rudder turns the ship to port or starboard.

Structure—Strain.—In considering its strength, the ship is regarded as a great beam supported by the water and loaded with cargo and its own weight. As she rides over long waves the support varies, now concentrating at the middle and leaving the ends mainly unsupported, now lifting the ends and deserting the middle. The actual bending which results from such an uneven distribution of load and support may indeed be small, but even a slight yield makes great demands upon the material. It is impossible to foretell exactly the strains which may come upon a ship in the course of its existence, but a knowledge of the straining action allows us to compare one ship with another as regards the resistance which they are able to offer. A ship which has stood the test of ocean travel offers a standard of comparison for new ships.

In making the calculation of strength, the most trying conditions of load and support are assumed. Suppose the ship is balanced upon a wave of her own length. This will produce a tendency to 'hog' or arch upward in the middle, and as a result of this bending the upper parts must stretch slightly and the lower parts contract. These opposite strains of extension and compression will reach their maxima at the extremities—deck and keel respectively. In the converse condition the ship is supposed to span the hollow of a wave from crest to crest. The support will now be reduced over the middle part and increased at the ends. The result will be a tendency to sag with compression at deck and extension at keel. The distribution of material in the ship must be such as to offer sufficient resistance to the stresses so produced, and the theory of beams suggests a certain concentration of material near the upper and lower extremities. Towards the ends a reduction in thickness is permissible, as the bending stresses are more intense over the middle part.

In addition to the stresses produced by longitudinal bending, provision must be made to resist the collapsing pressures on bottom and sides (which come upon any submerged body), and the tremendous blows of waves striking on the vertical wall of side-plating. This comparatively thin wall must be stiffened by 'ribs' (frames) at short intervals (the deck beams also give rigid support). Across the bottom, where the pressure is greatest, the frames are developed into deep webs which also support concentrated loads of engines, boilers, and cargo.

The earliest iron ships were built like their wooden predecessors, with closely spaced ribs curving upward on either side from a massive keel. Immediately above the keel and extending along the middle line ran a strong girder arrangement called a 'keelson'; the keel and keelson are a sort of backbone. The 'skin' or shell-plating is attached to the frames; it is put on in strips ('strakes') running lengthwise and riveted together at their edges. Each strake is composed of a number of plates, as long as practicable, and well riveted together at their ends.

The decks are supported by cross-beams attached at their end to the frames. In many cases decks are simply wooden floors laid on the beams, but sometimes they are plated.

The above arrangement of frames, etc., is called the 'transverse system' and is still common. Where double bottoms are fitted they are usually arranged on the 'cellular system.' The space between the outer and inner bottoms is subdivided by longitudinal and transverse vertical plate-divisions which intersect, forming rectangular cells. This arrangement gives great stiffness to the surfaces of plating.

In the design of the *Great Eastern* a striking depar-

ture was made. This vessel was without transverse frames. She had an inner skin carried well up the side, and longitudinal girders, extending from inner to outer bottom, took the place of frames in stiffening the shell. A modification of this system is adopted in the larger classes of warships, which have also a set of transverse frames worked in pieces between the longitudinals.

In the well-known ISHERWOOD system the longitudinal arrangement of framing has been applied to merchant ships. In this system the closely spaced frames are disposed longitudinally instead of transversely, and at intervals along the length deep transverse webs support the sides and bottom.

Bulkheads are vertical partitions within the ship. The most important are watertight. They are plated surfaces supported by stiffeners just as the shell is supported by frames.

A transverse vertical bulkhead, called the 'collision bulkhead,' is fitted near the stem to isolate the flooded part in case of collision. In steamers the compartment containing the engines and boilers is enclosed by bulkheads, and one is placed near the stern in case of leakage where the screw shaft enters the ship. The line of shafting is enclosed in a watertight tunnel leading into the engine-room through a watertight door which can be closed from the deck. This is the minimum number of watertight divisions, but additional bulkheads are fitted according to the length of ship. Watertight subdivision and strength of bulkheads were considered by the BULKHEAD COMMITTEE of 1890. The loss of the *Titanic* (q.v.) destroyed faith in bulkheads, and new liners added a double hull.

The flooding of a compartment near the middle will cause the ship to sink deeper in the water until the buoyancy lost at the middle has been regained at the ends. If the flooded space were situated near the forward end, besides the direct bodily sinkage there would be produced a longitudinal inclination which would bring the deck at that end nearer to the water.

Bulkheads should extend up to a watertight deck, so as to prevent the water overflowing from a damaged to an intact compartment. Besides the transverse bulkheads longitudinal ones are sometimes fitted forming side coal-bunkers. These have been made watertight, in some cases giving an inner skin. The extensive subdivision in warships has already been mentioned. In merchant vessels a close spacing of bulkheads interferes with cargo stowage.

Displacement of Stability.—A ship, floating freely in still water, obtains all its support from fluid pressures. If the ship were absent its place (under the water-level) would be occupied by water. The water-volume which she displaces would be identical in its lower shape with the wetted surface of the ship, and its upper boundary would be the water-level. This water-volume is called the 'displacement,' and its weight is obviously equal to the weight of the ship, seeing that it would receive the same support. If, therefore, we know the dimensions and form of the ship exactly we can calculate the volume of this displacement and its weight. In this way, by noting its draught of water, we are able to tell the weight of a ship just as if she were placed in the scale-pan of a huge balance.

In considering the question of a ship's stability, or power of recovering the upright position, we have to deal with two forces—weight and buoyancy. They are equal in magnitude and their lines of action are vertical. It is convenient to consider each as acting at a point, the weight pulling downward at the *centre of gravity*, and the buoyancy thrusting upward at the *centre of buoyancy*. The position of the centre of gravity (C.G.) depends solely on the distribution of weights in the ship. The centre of buoyancy (C.B.) is the C.G. of the displacement, and its position depends on the shape of the under-water form. When this shape changes, the C.B. must alter its position, but we may assume the C.G. to be fixed in the ship.

If the ship be inclined from the upright by the push of the wind on her sails, the C.B. immediately takes up a new position, moving outward towards the low side. The two opposing forces are not now on the same line, and they will operate to turn the ship back to the upright. The amount of this turning effort will depend partly on the magnitude of the forces acting, and partly on the distance between their lines of action. This distance is called the 'righting lever,' and it is a measure of the ship's stability at the angle considered.

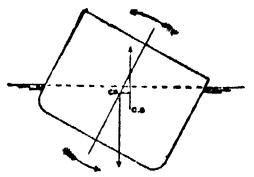


FIG. 6.

An excessive inclination might result in a disposition of forces shown in Fig. 7 which would turn the ship farther from the upright and upset it. The effect on stability of 'freeboard' or high side above water should be noted. Fig. 7 shows water coming in upon the deck. If the side were carried farther up, as shown by the dotted lines, the water would still be excluded from the deck, and the centre of buoyancy would be farther out to the low side, giving increased stability.

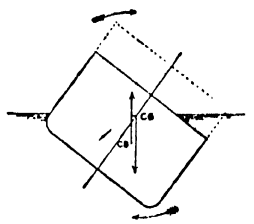


FIG. 7.

Though the centre of buoyancy changes its position as the ship heels over, it is found that for small inclinations the upward force always passes through the same point (nearly). It is called the *metacentre* (M) and the ship is virtually supported at that point.

The advantage of having a fixed point of support is obvious, for once G and M are known, the righting lever can readily be found for any moderate inclination. The distance between G and M is important; the greater it is the greater will be the righting lever. GM is called the 'metacentric height,' and it is usually quoted as indicating the stiffness of the vessel or its resistance to inclination from the upright.

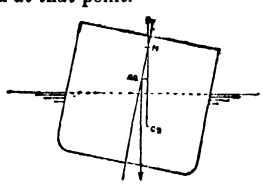


FIG. 8.

Laws relating to Shipping, etc.—The Merchant Shipping Act of 1894 (as amended in 1906, etc.) makes certain provisions for the comfort and safety of seamen and passengers, for the seaworthiness of ships, the measurement of tonnage, and other matters connected with shipping. The Board of Trade is empowered to fix the freeboard, or clear side of ship above the deepest waterline (load-line). This is permanently shown on the ship's side by a line-and-circle mark—the *Plimsoll Mark*—at mid-length. The freeboard is determined so as to leave sufficient reserve buoyancy above the waterline, and to limit the weight of cargo to correspond with the structural strength.

The basis for fixing dock dues is the net tonnage of the ship. The tonnage is intended to be a measure of cargo-carrying or money-earning power of the ship. For this purpose the internal volume is calculated, including the closed-in parts above deck. This, reckoned at 100 cubic ft. to the ton, gives the *gross tonnage*. After deductions have been made for machinery spaces (including an allowance for coal bunkers), and for crew and master's spaces, etc., the remainder is called the *net tonnage*. It is the policy of the owner to keep this as low as possible.

The space to be occupied by seamen must fulfil the requirements of the Act, otherwise a fine is incurred; it will also be added to the net tonnage unless, in addition, proper privy accommodation is provided. It must be protected from the weather and carefully

ceiled from effluvium arising from cargo, etc., in the hold. It must be kept separate from the lamp- and oil-room, and must satisfy certain requirements as to light and ventilation. The space allowed per man is 120 cubic ft., with 15 sq. ft. of floor space (for Lascars, 72 cubic ft. and 12 sq. ft. respectively). No goods may be carried in the space under a penalty.

Seamanship, the actual practice of pilotage in sight of land and astronomical navigation on the high seas, is a term generally used in connection with sailing-ships, the setting of sails, steering, etc. Technical terms relating to seamanship are: *starboard*, right side of a ship when spectator is looking towards bow; *port* (formerly *larboard*), left side; *windward side*, side facing the wind; *lee side*, side away from wind; *to tack*, change ship's course so that wind acts from port side and starboard side alternately, *e.g.* against a N. wind she can sail E.N.E. and then W.N.W.; *to wear*, bringing wind from one side to the other by way of the stern, used only in very bad sea; *heave-to*, placing sails aback sufficiently to deaden the ship's way—in heavy wind a ship is 'hove to' against the wind; *close-hauled*, sailing as closely as sails allow in direction from which wind blows. See NAVIGATION, RIGGING.

SHIPKA PASS (42° 40′ N., 23° 15′ E.), pass, Balkans, Bulgaria; scene of unsuccessful attacks by Turks in Russo-Turkish War, 1877–78.

SHIPLEY (53° 50′ N., 1° 46′ W.), town, on Aire, W. Riding, Yorkshire, England; woollens. Pop. (1911) 27,710.

SHIPLEY, JONATHAN (1714–88), bp. of Llandaff and St. Asaph, 1769.

SHIP-MONEY, Eng. tax for raising fleet, levied by Crown; uncertain whether inland counties might legally be assessed; resistance to general writs, 1628; writs of 1634–35 and 1639 resisted (notably by John Hampden, *q.v.*) because issued in time of peace, although judges decided for Crown; illegal by Act of Parliament, 1641.

SHIPPARD, SIR SIDNEY GODOLPHIN ALEXANDER (1838–1902), Brit. administrator; sent to organise Bechuanaland, 1885; through Rhodes obtained promise from Lobengula not to alienate any part of Matabeleland to other powers.

SHIPTON, MOTHER, URSULA SHIPTON, *née* SOUTHIEL (*c.* 1488–1561), Knaresborough witch; lived near Dropping Well, where her cave is still shown; said to have prophesied Fire of London.

SHIRAZ (29° 30′ N., 52° 40′ E.), town, capital, Fars province, Persia; has some fine mosques and good bazaars; trading centre; manufactures wine; founded about VII. cent. B.C.; was at one time capital of the Empire; in Middle Ages a famous literary centre; contains tombs of poets Sadi and Hafiz. Pop. *c.* 52,000.

SHIRÉ (16° 5′ S., 35° 5′ E.), river, S.E. Africa; issues from Lake Nyassa, joins Zambesi near Shamo.

SHIRLEY, SIR ANTHONY (1565–1635 ?), Eng. soldier; served in wars in Netherlands, France, Africa, Italy, Turkey; went to Russia as representative of Persia and became Span. admiral; wrote *Travels into Persia*, 1613. Bro., SIR THOMAS, typical Elizabethan privateer, was f. of dramatist Henry.

SHIRLEY, JAMES (1596–1666), Eng. dramatist; b. London; a prolific playwriter, but the suppression of the theatre in 1642 broke his fortunes. Among his plays are *The Brothers*, *The Wedding*, *The Traitor*, *The Gamester*, *The Lady of Pleasure*, and *The Cardinal*.

SHIRVAN (37° 20′ N., 58° E.), district, province Khorasan, Persia. Pop. *c.* 13,000. Capital, Shirvan. Pop. *c.* 7500.

SHOA (9° 30′ N., 39° 40′ E.), division (formerly kingdom), Abyssinia; capital of division and of Abyssinian Empire is Addis Abeba.

SHOCK is a condition of depression of vitality due to violent derangement of the nervous system, caused by powerful mental emotions, such as horror or joy, by extreme irritation of the peripheral nerves through injury, or by certain poisons. There is loss of control over the vasomotor nerves (or nerves of the blood vessels), the blood leaving the brain and superficial parts of the body and accumulating in the blood vessels of the internal organs, and the heart's action may also be inhibited. The patient may feel faint or become insensible, pale and cold, perspiration often appearing on the forehead; the pulse is at first slow then rapid and irregular, the breathing at first weak and short and later deeper and gasping, the temperature is subnormal, and the pupils dilated. There are, however, many degrees of the condition, from a slight and transient faintness to sudden death. The treatment is to keep the patient lying horizontally, or with the head lower than the body, with hot blankets and hot bottles to keep him warm. Alcohol, in the form of brandy, and strychnine are given as stimulants, followed by or combined with beef-tea, while in severe cases saline injections, up to two or three pints, are given per rectum or intravenously.

SHODDY, inferior substitute for woollen fabrics, made by teasing out woollen rags and clippings; frequently used as generic term for any inferior fabric.

SHOE, covering for feet, generally made of leather in England and America, but in Holland and France often made of wood, and called *sabot*. In China and Japan sometimes made of paper. S's are combination of sandal and moccasin, and were used among the early Jews. Romans used *calceus*, which covered the whole foot and was tied with a lace. Those used by their soldiers were shod with nails. In Henry I.'s time long, pointed shoes were fashionable; present form of shoe was first used in XVII. cent. Rubber s's or galoshes are sometimes used as an overshoe to keep out wet.

SHOE-BILL or **WHALE-HEADED STORK** (*Balæniceps rex*), a large and rare Wading Bird, with huge, broad, flattened bill; found only in the neighbourhood of the White Nile and its tributaries.

SHOEBURYNESS (51° 31′ N., 0° 46′ E.), headland and small town, on Thames, Essex, England; school of gunnery. Pop. (1911) 5006.

SHOLAPUR (17° 39′ N., 75° 54′ E.), city, capital, Sholabur district, Bombay, Brit. India. Pop. (1911) 61,345; (district) 715,000.

SHOOT, see PLANTS (MORPHOLOGY).

SHOOTING.—The use of the gun in sport is a late development. There is mention of the use of firearms in the middle of the XV. cent. for the purpose of finally killing quarry after it had been brought to bay by the hounds, but it was not till the close of the XVIII. cent. that s. as a pure sport was commonly practised. S. falls into two divisions—game and big game. Roughly, game consists of such wild birds and animals as are edible, *e.g.* grouse and hares; big game consists of such wild animals as are not good for food, *e.g.* lions and elephants. In the game laws for Scotland the following animals are classified as game: hares, pheasants, partridges, grouse, ptarmigan, moor-game, black-game, bustards, woodcock, snipe, quails, landrails, and wild duck. In Britain trespassing with a gun is criminal, and subject to heavy penalties. Trespassing for the purpose of shooting game by night is a much more serious offence, because the trespasser may use the offensive weapon against those seeking to arrest him. Such a trespasser is liable to from three to fourteen years' penal servitude. These trespass laws are framed to secure exclusive rights to the landowners. But a close season is also enforced by law to prevent the extermination of game, during which time it is illegal to kill certain species. Game is usually shot with a gun; big game with a rifle. A game gun normally weighs about 6½ lb. The bore varies for different species of game. For shooting wild fowl double-barrelled guns of 8 and 12 bore or oven of 20 bore are employed. In the sporting rifle, accuracy and penetrative power are required. In shooting dangerous game (*e.g.* lions, tigers, elephants, buffaloes) the small-bore rifle (·303) is both handy and effective, and is now superseding the heavy types of gun formerly used for such game. Rifles used in deer-stalking are

usually ·400 bore. The best bore for rabbit-shooting is ·300.

In s. good eyesight is essential. Steady nerves are also an invaluable asset. Correct gauging of the angle and speed is only acquired by practice. The crack shot knows, too, exactly in what position to take the animal.

SHORE, JANE (d. *c.* 1528), mistress of Edward IV.; forced by Richard III. to walk in her kirtle, holding a taper (an incident of Shakespeare's *Richard III.*); ballads tell of her death in a ditch, hence name Shoreditch.

SHOREDITCH, metropolitan borough, London, England. Pop. (1911) 111,463.

SHOREHAM, NEW (50° 50′ N., 0° 16′ W.), seaport, Sussex, England. Pop. (1911) 5731.

SHORING, the supporting of buildings which have settled in some part, or which require additional support during alterations. Raking shores are the commonest, and consist of timbers with their lower ends resting upon a sole-piece, or plate of timber, to prevent them from sinking into the ground. They slope upwards at a suitable angle, their upper ends resting upon wall-plates attached to the wall. The supporting pressure must be applied only where a floor or roof provides a counterbalancing thrust from inside. The timbers rise fanwise, so as to press against the wall at different points. Raking shores are open to the objection that the feet are liable to be disturbed. Horizontal or flying shores are used during the rebuilding of a house, to support the adjoining walls. They are more effective than raking shores, and also cheaper. There is also vertical shoring, used to support the higher parts of a wall while the lower parts are being altered, or during work at the foundations.

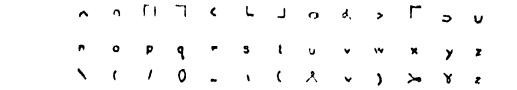
SHORNCLIFFE (51° 4′ N., 1° 8′ E.), military station, near English Channel, Kent, England.

SHORTHAND, a system of writing words by means of signs which can be more rapidly written than ordinary letters, the object being for the writer to keep pace with a speaker. Also known as *tachygraphy* (quick-writing), *brachygraphy* (short-writing), *stenography* (compressed writing), and *phonography* (sound-writing).

S. was used by the Greeks and Romans not only for the sake of brevity, but also to ensure secrecy. Some 200 different systems of s. have been invented since 1588, but many are of little practical value. All knowledge of the art was lost between the X. and XVI. cent's, but in 1587 Dr. Bright published his *Characterie*, and used signs for *words*, a hopeless method for a growing vocabulary.

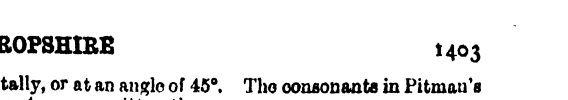
J abound. ⌊ about. ⌋ accept. ⌊ accuse. ⌋ advance.

In 1590 Peter Bales wrote *The Arte of Brachygraphie*, and he also used separate signs for each word, as did Bright. In 1602 John Willis published *The arte of Stenographie*, and his system was perhaps the first of any practical value. It was fairly popular, and much used until Pitman's system was introduced. In Willis's system signs were used for letters as follows:—



In 1620 Skelton imitated Willis's system, and his method was used by Samuel Pepys (*q.v.*). Jeremiah Rich in 1640 brought out a system which was commended by Locke, and in 1753 Thos. Gurney published his *Brachygraphy*.

The most popular method, and that in general use by all classes of shorthand writers at the present time, was the Phonetic system of Pitman, first brought out in 1837. Its principle is entirely dependent on sound, as the name implies. Words are written as they sound, not as they are spelled; thus *cough* becomes 'cof,' *though*, 'tho.' Straight and curved lines indicate consonants, while vowels are shown by dot and dash. The same line is used to represent a different sound as it is thick or thin, written vertically, horizontally, or at an angle of 45°. The consonants in Pitman's system are written thus:—



Many abbreviations are used, and contractions are often employed in that branch of the system known as the *Reporting style*. An expert writer is able to take down a verbatim report at the rate of about 180 words per minute.

SHOSHONG (23° S., 26° 30′ E.), town, Bechuanaland; former capital of Bamangwato.

SHOTTS (55° 51′ N., 3° 52′ W.), parish, Lanarkshire, Scotland; coal mines; ironworks. Pop. (1911) 18,434.

SHOVEL, SIR CLOUDSLEY (1650–1707), Eng. admiral; fought in battles of *Bantry Bay* (1689), *Vigo* (1702), *Malaga* (1704); his ship, the *Association*, struck a rock near Scilly Isles and all hands were lost.

SHOVELLER, see under DUCK FAMILY.

SHREVEPORT (32° 28′ N., 93° 47′ W.), city, on Red River, Louisiana, U.S.A.; cotton manufactures. Pop. (1910) 28,015.

SHREW FAMILY (*Soricidæ*), a large family of Insectivora, with about 230 species, found in the tropical and temperate regions of the Old World and N. America; small creatures, often mistaken for mice, from which their insectivore teeth, their long sharp snouts, and their close-lying rounded ears distinguish them. A few examples are: the Common Shrew (*Sorex*), the Short-Tailed Shrews (*Blarina*) of America, the Water-Shrew (*Crossopus*), not uncommon in Great Britain but absent from Ireland, and the Old World Musk Shrews (*Crocidura*), with scent glands producing a musky odour.

SHREWSBURY (52° 43′ N., 2° 46′ W.), county town, on Severn, Shropshire, England; there are remains of the old city walls and of a Norman castle; famous school was founded by Edward VI., 1551; many interesting old churches, public buildings, and black and white houses; Parliaments assembled here in 1283 and 1397; and in 1403 Henry IV. defeated Hotspur and Douglas in the neighbourhood. Pop. (1911) 29,389.

SHREWSBURY, CHARLES TALBOT, DUKE OF (1660–1718), succ. his f. as Earl of Shrewsbury, 1668; dismissed by king from lord-lieutenancy of Staffordshire, 1687; signed invitation to Prince of Orange; great figure in politics and society after Revolution; one of lord-justices of realm, 1695–96, 1697, 1714; last Lord High Treasurer, 1714.

SHREWSBURY, ELIZABETH TALBOT, COUNTESS OF (1518–1608), 'Building Bess of Hardwick'; owed epithet partly to construction of Hardwick Hall, partly to systematic improvement of fortune; dau. of John Hardwick, she m. (1) Robert Barley, (2) Sir William Cavendish (becoming an ancestress of Earls and Dukes of Devonshire), (3) Sir William St. Loe, (4) (1568) Lord Shrewsbury.

SHREWSBURY, JOHN TALBOT, EARL OF (1390–1453), Eng. baron; famous in Fr. wars of Henry V. and Henry VI.; said to have won 40 battles; put down Irish revolt, 1414–19.

SHRIKES, LANIIDÆ, small birds with varying characters, but often with compressed, hooked, serrated bills, suitable for seizing and tearing the small birds and animals upon which they often feed. Found all over the world, except in S. America. Of the true Shrikes (*Lanius*), also known as BUTCHER-BIRDS, one breeds in Britain. The PIED- and WOOD-SHRIKES (*Hemipus* and *Tephrodornis*) are Indian representatives.

SHRIMPS (for general relationship, see under MALACOSTRACA), small, translucent, grey Crustacea, common on sandy places on the Brit. coasts, where at ebb-tide they are caught for food by means of a push-net.

SHROPSHIRE (52° 45′ N., 2° 45′ W.), county of

western England, near centre of Welsh border; surrounded by Flint, Cheshire, Stafford, Worcester, Hereford, Radnor, Montgomery, and Denbigh; area, 1342 sq. miles; surface mountainous in S. and W.; crossed by Clee Hills, Caradoc Hills, and other ranges; drained by Severn and a number of its tributaries; capital, Shrewsbury.

County was part of kingdom of Mercia in early times, and suffered from Dan. invasions of IX. and X. cent's.; scene of hostilities in Civil War of XII. cent., Barons' War, and Great Rebellion; has remains of several old castles, some of which date from Norman times, and ruins of many religious houses. Agriculture is principal industry. There are several small detached coal-fields, of which Coalbrookdale is most important; other minerals found include iron, lead, limestone, and small quantities of zinc and barytes; blast furnaces, iron manufactures. Pop. (1911) 246,306.

SHUMLA (43° 17′ N., 26° 58′ E.), fortified town, Bulgaria; manufactures slippers, clothes; occupied by Russians, 1878. Pop. (1910) 22,275.

SHUSHA (39° 48′ N., 46° 44′ E.), town, Yelisavetpol, Russ. Transcaucasia; formerly important fortress. Pop. 26,000.

SHUSHTER, SHUSTER (32° 8′ N., 48° 45′ E.), town, on Karun, Shushter district, Arabistan, Persia; manufactures carpets; exports grain. Pop. *c.* 16,000.

SHUTTLE, pointed instrument used from earliest times in weaving to carry weft thread between warp; modern s's are about 12 in. long.

SHUVÁLOV, PETER ANDREIVICH, COUNT, SCHOUVALOFF (1827–89), Russ. general and diplomat; governed Baltic provinces, 1864–66; ambassador to Britain, 1874–79.

SHUYA (57° N., 41° 30′ E.), town, Vladimir, Russia; cotton-manufacturing centre. Pop. 21,000.

SHWEBO (22° 30′ N., 95° 40′ E.), town, capital, Shwebo district, Upper Burma; rice-growing centre. Pop. 10,500; (district) 295,000.

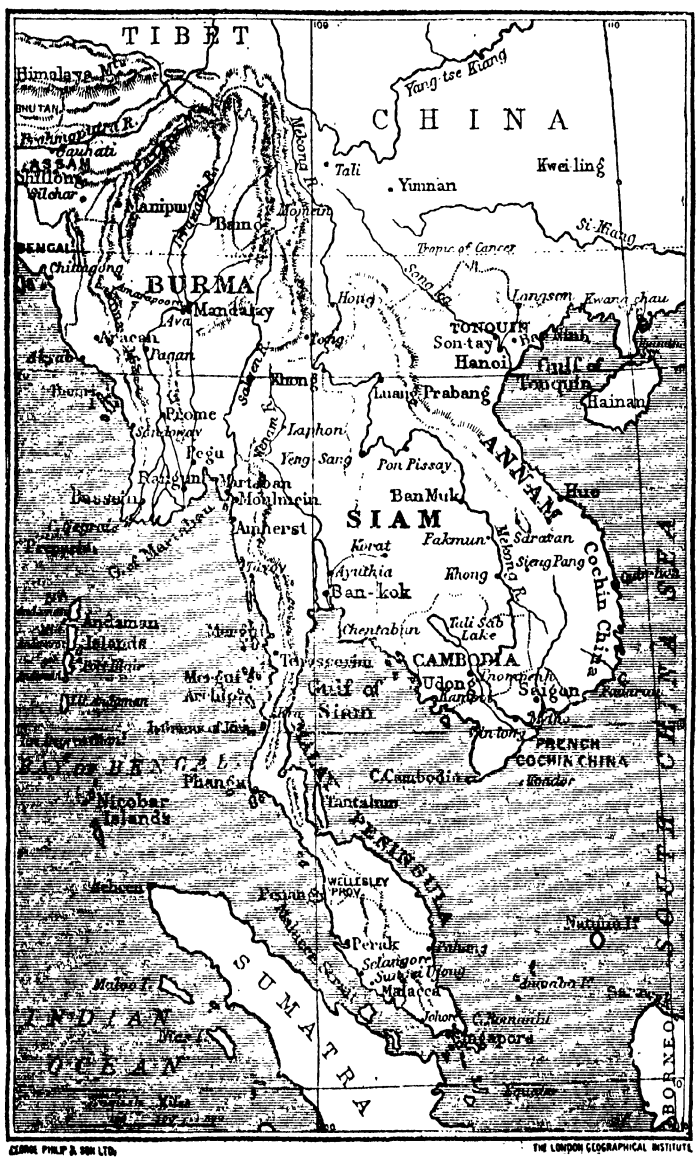
SIALKOT, SEALKOTE (32° 31′ N., 74° 36′ E.), town, cantonment, capital, Sialkot district, Punjab, Brit. India; extensive commerce; manufactures paper and cloth. Pop. 61,000; (district) 1,090,000.

SIALOGOGUES, see PHARMACOLOGY.

SIAM (4° 10′ to 20° 18′ N., 96° 35′ to 106° E.), kingdom, Indo-China; lies mainly in centre of Indo-China Peninsula, with Brit. Burma on the N. and W., and Fr. Indo-China on the N.E., E., and S.E.; it has a long strip running down northern half of Malay Peninsula between Strait of Malacca and Gulf of Siam, with the Brit. Malay possessions to the S. Western half of main portion consists of valley of the Menam and eastern half of Korat plateau which stretches to Mekong basin. Area, 195,000 sq. miles. The N. is mountainous, rising to heights of 6000 to 8000 ft. The S. is an alluvial plain, drained by rivers mentioned and their tributaries, chief of which is the Meping, joining the Menam. Chief towns, Bangkok, Puket.

Climate not unhealthy; mean temperature in lower ground is about 80° F., and average rainfall 54 in.; wet season, May to October.

In early times there existed various independent states in Siam, but by middle of XIV. cent. Siamese had established their power over whole country, making Ayuthia, built *c.* 1350, seat of government. For long time struggle with Cambodia was carried on, and that country was for some time a tributary state. The XV. and XVI. cent's were marked by Burmese invasions, and in 1555 the country temporarily lost its independence, regaining it under Phra Naret not long afterwards. In XVII. cent. Phaulcon, a Cephalonian Greek, became chief minister of Siamese king, whom he persuaded to send an embassy to Fr. court. About 1685, as a result of this, a number of Frenchmen and some Jesuits arrived in Siam, only to be banished from the country some five years later. The XVIII. cent.



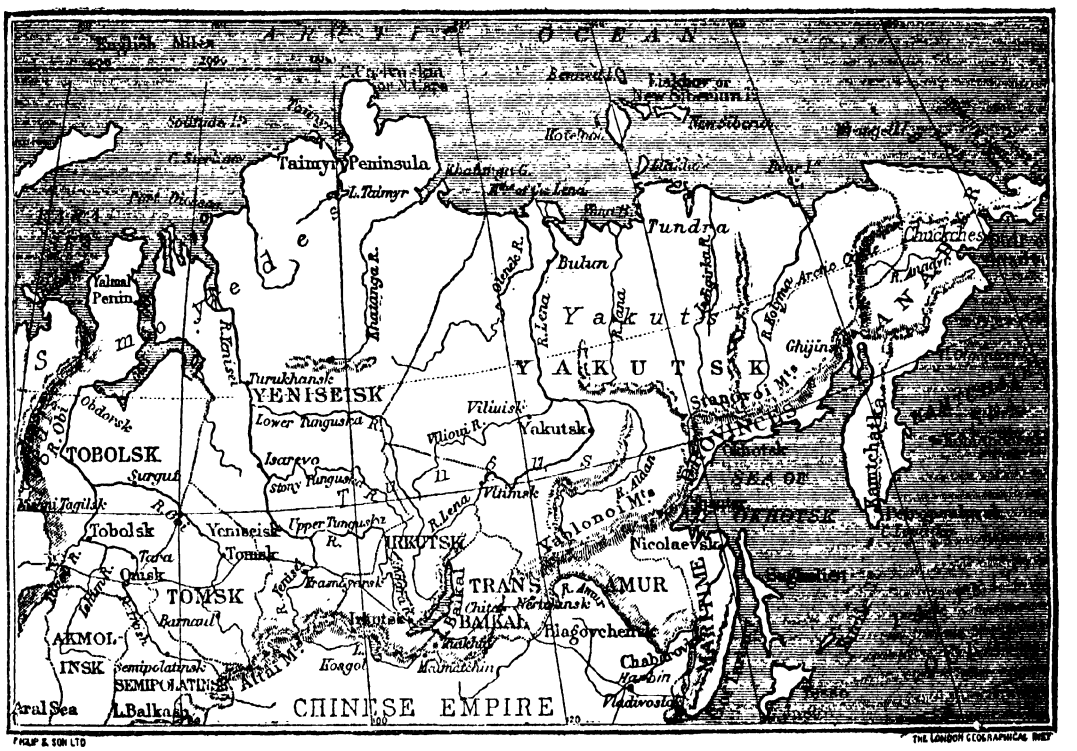
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was marked by an invasion of Burmese, who destroyed Ayuthia by fire in 1768; they were defeated and expelled by a Chin. general, Phaya Tak, who usurped the throne c. 1768 and removed seat of government from Ayuthia to Bangkok. He was subsequently killed, whereupon the ruling dynasty was established by another general, Tschakri, who became king in 1782. His descendant Chowfa Maha Vajiravudh, succeeded his father, Chulalongkorn, in 1910. Boundary treaties with France were signed in 1893 and 1904, and with Britain in 1891.

Government is absolute monarchy; king is advised by Cabinet of Ministers, and there is a legislative council of 40 members, some of whom are Ministers of State, while remainder are chosen by king. Siam is divided for administrative purposes into 17 districts, 16 of which are under High Commissioners, while Bangkok is directly controlled by Minister of Local Government. Buddhism is principal religion; education chiefly carried out by priests. Military service compulsory.

SIBERIA (c. 42° to 77° 35′ N., 60° E. to 170° W.), Russ. territories in Asia, stretches between Urals and Pacific, and between Arctic Ocean and Chin. empire. Total area is c. 4,786,730 sq. miles. Much of N. consists of waste ground, but there is a sufficiency of good ground to provide for surplus population of European Russia. The S.E. forms a great tableland from 2000 to 3000 ft. high, with mountains rising above it to heights of over 7000 ft., and from this the region slopes northward and westward. Principal mountain ranges are Stanovoi Mountains, between Yakutsk and Maritime Provinces, and in Amur, in the E.; Verkhoyansk Mountains, extending in a north-westerly direction from the Stanovoi; Little Khingan in S.E.; Yablonga, Sayan, and Altai Mountains in S.; Taibagatai and other ranges in extreme S.W.

Principal rivers are Obi (with affluent Irtysh), Yenesei (with affluent Tunguzka), Lena (with affluents Vitim and Aldan), all of which flow across great plain to Arctic coast; and Amur, draining the S.E.; of smaller streams, Kolyma, Indigirka, and Yana, in N.E., may be



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Chief wealth of Siam lies in the rice of the south, teak and other timber trees of the north. Rice to value of nearly £7,000,000 was exported in 1910–11, other exports, including teak, hides, pepper, silk. Chief imports are textiles, machinery, provisions. Mineral resources are hardly known, but gold, coal, petroleum, tin, and iron occur in various places, and rubies and sapphires are found. Railway mileage about 700.

The population, besides Siamese themselves, includes large number of Shans or Laos, Chinese, Malays, and other Eastern races. Pop. estimated at 6,300,000.

A. W. Graham, *Siam* (1912).

SIAMESE TWINS, see under TERATOLOGY.

SIBBALD, SIR ROBERT (1641–1722), Scot. physician; practised med. in Edinburgh, helped to found the botanical garden (1667), and to establish the Royal Coll. of Physicians, of which he became pres. (1684); first prof. of Medicine at Edinburgh University (1685); wrote extensively on antiquarian, as well as on medical, subjects.

mentioned. Siberia has many lakes, of which Lake Baikal, in the S., is largest.

Little known of early history; in XI. cent. Turk. race established a kingdom here, but they were overcome by Jenghiz Khan, Mongol leader, in XIII. cent. Russians first entered S. in XVI. cent. in search of furs; and eventually most of country was annexed to Russia in reign of Ivan the Terrible (1533–84). Further territories were acquired from China in 1858 and 1860.

Siberia is divided for administrative purposes into the five governments of Irkutsk, Tobolsk, Tomsk, Yakutsk, Yeniseisk, and the four provinces of Amur, Sakhalin, Transbaikalia, Maritime. Largest towns are Tomsk (western capital) and Irkutsk (eastern capital), both of which have populations over 80,000; Vladivostok and Krasnoyarsk, both with populations over 62,000. Climate is excessively cold, but there is a warm summer of short duration. Verkhoyansk, in N.E., is coldest place.

Natural resources are great; coal abundant, but of

poor quality; gold, silver, lead, iron, copper, graphite, naphtha also exist, but have not been fully developed. There are enormous forests, stretching from the S. to Arctic tundras, and from N. of Tobolsk and Tomsk to E. Siberia—pine, fir, cedar, poplar, aspen, willow, birch. Grain is chief source of wealth and export, but meat, hides, wool, dairy produce are also exported to considerable value. Fishing and hunting afford remunerative occupation to many of inhabitants.

Fauna includes sables, foxes, bears, reindeer, and many other valuable fur-bearing animals. Siberian Railway, constructed 1892–1903, stretches right across from Ural Mountains to Vladivostok. Gk. Orthodox Church is principal religion, and education is in backward state. Siberia is used as penal settlement for Russ. convicts and political prisoners. Population chiefly Russians, but there are tribes of Turk. and Mongolian stock, representing earlier inhabitants. Pop. (1910) 8,220,100.

Wright, *Asiatic Russia* (1903).

SIBI (29° 30′ N., 67° 59′ E.), town, Sibi district, Brit. Baluchistan; important junction on Sindh-Peshin railway. Pop. 5000; (district) *c.* 78,000.

SIBONGA (10° 5′ N., 123° 40′ E.), coast town, Cebu, Philippine Islands. Pop. 27,000.

SIBPUR (22° 34′ N., 88° 16′ E.), town, Hugli district, Bengal, Brit. India.

SIBSAGAR (26° 59′ N., 94° 38′ E.), town, on Dikhu, capital, Sibsagar district, Assam, Brit. India; tea-planting industry. Pop. 6300; (district) 610,000.

SIBTHORP, JOHN (1758–96), Eng. botanist.

SIBYLLINE ORACLES, body of writings written from II. cent. B.C. to I. cent. A.D.; of partly Jewish and partly Christian origin.

SIBYLS, prophetic women of ancient Rom. legend. The Cumæan S. conducted Æneas to the lower regions, and brought the Sibylline books to Tarquinius.

SICILIAN VESPERS, see VESPERS, SICILIAN.

SICILY (38° N., 14° E.), Ital. island, largest and most fertile in Mediterranean; about 2 miles from S.W. extremity of Ital. mainland, from which it is separated by the deep, narrow Strait of Messina; 80 miles from African coast; area, *c.* 10,000 sq. miles, 180 miles long, 120 wide. S. is triangular in shape, hence old name *Trinacria*; at N.E. corner is Cape Faro (ancient Pelorus), N.W., Cape Bœo (Lilybæum), S.E., Cape Passaro (Pachynus).

S. was divided from Italy in Tertiary period, and was once joined to Africa by tableland. Surface is mountainous; most of island over 500 ft. above sea-level. Steep mountains (attaining height of over 6000 ft.) continue Apennine range along N. coast, which faces Tyrrhenian Sea; highest point, Etna (*q.v.*), *c.* 10,800 ft.; other volcanoes are extinct, dormant, or incipient.

Good harbours are provided by bays and headlands on north but not on south coast. Rivers are unimportant, mostly intermittent. Summer is hot and dry, winter mild and rainy; rainfall, *c.* 30 inches; S. suffers from earthquakes, eruptions, sirocco in summer, and malaria in parts.

The flora is rich; chief crop is wheat; fruit trees and olives, especially on N. and E. coasts, vines mainly in W.; soil fertile, but agricultural methods backward; trees scarce, only 4 % of island forested; principal exports, oranges and citrous fruits, almonds, nuts, wine (Marsala, etc.), preserved vegetables, sulphur (from Girgenti, etc.), salt, silk, tunny, and sardines, sumach (for dyeing).

Thanks to its situation and surroundings, S. figures prominently in mythology, literature, and history. Here are Scylla and Charybdis; here Proserpine was seized and hurried to the underworld; Vulcan plies his forge 'neath Etna; here Acis loved Galatea; here is the fountain of Arethusa; here Odysseus escaped from Polyphemus. Here lived Theocritus, Pindar, Empedocles, Archimedes among others. Here architectural remains of every age and style witness the island's wondrous, chequered career. Here nature has been too kind and anon too cruel; rich soil, beautiful scenery, glorious climate have been counterbalanced by earthquakes, volcanoes, famine, pestilence, oppression, bloodshed.

The earliest recorded inhabitants were Sicani, Siculi, Elymi, Phœnicians; then came Gks., VIII. cent. B.C.; Eubœans founded Naxos (*q.v.*), 735 B.C.; Corinthians, Syracuse (*q.v.*), 734 B.C. Tyrants arose; Phalaris (*q.v.*) made Akragas (Roman Agrigentum, modern Girgenti) supreme in S., *c* 560 B.C.; cities combined to withstand Carthaginian inroads in V. cent. B.C.; Gelon of Gela became ruler of Syracuse, and defeated Carthaginians at *Himera*, 480 B.C.; Syracuse became chief city of S.; great Athenian expedition against Syracuse (415–413 B.C.), defeated with Lacedæmonian aid. Dionysius I. made Syracuse leading European city, 405–367 B.C.; waged long war against Carthaginians, who secured footing in island; Republic restored by Timoleon, and overthrown again by Agathocles, who continued Carthaginian war. S. was battleground of Romans and Carthaginians during First Punic War, 264–241 B.C., and consequently fell into Rom. power; rebellious Syracuse taken by Marcellus, 212 B.C.; slaves' revolt ruthlessly crushed, 135–132 B.C., 102–99 B.C.; under the avaricious Sextus Pompeius Verres (indicted by Cicero) island further declined; pirate régime ended by Octavianus, 36 B.C.

In the V. cent. A.D. S. came under the Vandals and Goths; recovered by Belisarius, 536. With conquest of island by Saracens in IX. cent., N. coast replaced E. as predominant region; Saracens overcome by Normans under the Guiscards, 1060–90; prosperity was restored, all customs, creeds, legal systems, languages being tolerated under Normans. United Sicily thus became great European power; after 1130, Naples (*q.v.*) and S. were subject to same king; Charles of Anjou conquered S. and Naples, 1266; his misrule avenged by *Sicilian Vespers*, March 30, 1282, all French being massacred, and Pedro of Anjou made king. Ferdinand the Catholic (1479–1515) seized Naples (continental Sicily), and became King of the 'Two Sicilies.' Spanish greed and intolerance impoverished S.; Duke of Savoy made King, 1713, but exchanged it to Austria for Sardinia, 1720; Charles III., King of Spain's son, became King of Two Sicilies, 1735; disastrous earthquakes, 1693, 1783. In 1806 French took Naples, but Britain protected S.; Ferdinand I. restored as King of Two Sicilies, 1815; abortive revolutions against Bourbons, 1836, 1848; Neapolitans defeated, and S. finally freed by Garibaldi and united to Italy, 1860. Her ambition realised, S. cannot be said to be peaceful; brigandage and bloodshed (see MAFIA), earthquakes (*e.g.* 1908), eruptions (*e.g.* 1910), still disturb the island.

The population, which is very mixed, is densest on N. coast; inhabitants mostly uneducated, proud, jealous, and intensely passionate. Capital is Palermo (*q.v.*); other towns, Messina, Catania, Syracuse, Girgenti, Marsala, Trapani, etc. Poverty and unsettled conditions have caused great stream of emigration in recent years. Pop. (1911) 3,683,380.

Freeman, *History of Sicily* (1891–94); Jackson, *Sicily* (1894).

SICKINGEN, FRANZ VON (1481–1523), Ger. Ritter; served under Charles V., whose election as emperor he helped to secure; supported Reformation; mortally wounded at Ebernburg.

SICULI, SICELS, ancient tribe of E. Sicily, from which name of island is derived; migrated thither from Italy, probably in XI. cent. B.C.

SICYON (38° N., 22° 45′ E.), ancient city, near Corinthian Gulf, Greece; important seat of Gk. art; ruled by the dynasty of the Orthagoridæ in VII. and VI. cent's B.C.; in time of Aratus (251 B.C.) became one of the chief cities of the Achæan League.

SIDDONS, SARAH (1755–1831), Eng. actress; b. Brecon, Wales; dau. of Roger Kemble. Her private performances attracted the notice of Garrick, but her first London performances were unsuccessful. The rôle best adapted to her powers was that of Lady Macbeth.

SIDE (36° 45′ N., 31° 25′ E.) (modern *Eski Adalia*), ancient town, on Gulf of Pamphylia, Pamphylia, Asia Minor.

SIDEBOARD, table fitted with drawers and shelves, used as receptacle for food; later became decorative; fine specimens extant by Sheraton and Hepplewhite.

SIDERIAL CLOCK, see OBSERVATORY.

SIDERITES, see METEORITE.

SIDEROLITES, see METEORITE.

SIDGWICK, HENRY (1838–1900), Eng. philosopher; b. Skipton, Yorkshire; app. prof. of Moral Philosophy, Cambridge, 1883. Chief works are *Methods of Ethics*, *History of Ethics*, *Principles of Political Economy*.

SIDI-BEL-ABBES (35° 9′ N., 0° 35′ W.), town, on Mekerra, Oran, Algeria; trade in grain; military centre. Pop. (1911) 30,942.

SIDMOUTH (50° 41′ N., 3° 14′ W.), seaport, watering-place, on English Channel, Devonshire, England. Pop. (1911) 5612.

SIDMOUTH, HENRY ADDINGTON, 1ST VISCOUNT (1757–1844), Brit. statesman; b. Reading; ed. Winchester and Oxford. M.P., 1784; friend of Pitt; Speaker of Commons from 1789 to 1801, when he became Prime Minister; pres. of Council and peer, 1805; Home Sec., 1812; retired from public life, 1822.

SIDNEY (40° 17′ N., 84° 10′ W.), city, on Miami, capital, Shelby County, Ohio, U.S.A.; iron foundries. Pop. (1910) 6607.

SIDNEY, ALGERNON, SYDNEY (1622–83), Eng. politician; younger s. of Earl of Leicester; fought (1641) in Ireland, of which his father was Lord-Lieut; one of judges app. to try king; disapproved of assumption of power by Cromwell and went into retirement; returned to Parliament, 1659; went abroad at Restoration; allowed to return, 1677, but never reconciled to monarchy; leader of opposition to Duke of York; joined Russell and the Country Party in agitation for assembling of new Parliament, 1682; accused of part in Rye House Plot; executed. Wrote *Discourses concerning Government*, a learned, passionately republican work.

Life, by Meadley, Ewald (1873).

SIDNEY, SIR HENRY (1529–86), Eng. statesman; in Ireland as vice-treasurer to his bro.-in-law, Lord Sussex, 1556–59; Lord-Deputy, 1565–78; tried hard to establish peace and order in the country under Elizabeth; set up county divisions; pres. of the Welsh Marches after his recall, 1578.

SIDNEY, SIR PHILIP (1554–86), Eng. poet, soldier, and courtier; s. of Sir Henry S., Lord-Lieut. of Ireland; b. Penshurst, Kent; ed. Shrewsbury and Christ's Church Coll., Oxford; in France during massacre of St. Bartholomew; travelled in Germany, Austria, and Italy; engaged in numerous diplomatic missions and won friendship of many famous men abroad and at home, including Spenser; held various posts at court, where he enjoyed high favour; m. Frances, dau. of Walsingham; interested himself in classical metres, Amer. colonisation, repression of Jesuits, thwarting of Spain, and other literary and political questions; app. gov. of Flushing; received mortal wound at *Zutphen* as volunteer against Spaniards; died as he had lived, a gallant, generous gentleman, giving his own cup of water to a common soldier. S.'s works, which enjoyed great popularity, were all pub. after his death, viz. *Arcadia*, a romance written for his sister's diversion; *Apologie for Poetrie*; *Astrophel and Stella* (fine sonnets dedicated to Penelope, dau. of Earl of Essex).

Grosart's edit. (1873); *Life*, by Addleshan (1906), Fox Bourne (1891), Symonds ('E.M.L.,' 1886).

SIDON (33° 33′ N., 35° 22′ E.) (modern *Saida*), ancient city, on Mediterranean, Phœnicia; extensive commerce; famed for its glass; conquered by Artaxerxes, 351 B.C.; destroyed several times during the Crusades.

SIDONIUS APOLLINARIS, see APOLLINARIS SIDONIUS, CAIUS SOLLIUS.

SIEBENGEBIRGE (50° 43′ N., 7° 13′ E.), range of hills, on Rhine, Rhenish Prussia; noted scenery.

SIEBOLD, CARL THEODOR ERNST VON (1804–85), Ger. zoologist, famous entomologist and parasitologist.

SIEBOLD, PHILIPP FRANZ VON (1796–1866), Ger. scientific explorer of Japan; b. Würzburg; medical officer to Dutch East Ind. Army.

SIEDLCE (52° N., 22° 30′ E.), government, Russ. Poland; generally flat; watered by Vistula and Bug. Pop. (1910) 981,900. Capital, **Siedlce**. Pop. 25,000 (mostly Semitic).

SIEGBURG (50° 48′ N., 7° 11′ E.), town, Rhineland, Prussia; manufactures firearms. Pop. (1910) 17,280.

SIEGECRAFT as a science was first developed by the **Greeks**. Before their time, however, there were various methods of attack, of which the earliest was the *escalade* by ladders. When this became impossible owing to height of walls two methods were invented, one being to batter down the walls by means of a ram and the other to undermine the walls. Other developments were the use of engines for throwing heavy stones, and of movable towers, both of which were known to the Babylonians in the VI. cent. B.C. The methods invented by the Greeks were brought to great perfection by the Romans, who successfully carried out a great number of sieges; all Rom. troops could be turned into miners, masons, or carpenters, and the whole army worked at the approaches, earthworks, etc., at the same time as they made attacks on, and defended themselves against, the enemy. In the course of many of their sieges they had to erect enormous works. They made use of various rams, catapults, movable towers, etc.; in Britain many of their sieges were conducted by blockade, as they found that to attack by assault cost too many lives. During the Middle Ages *battering-rams* continued to be employed, and are indeed mentioned as late as the XVI. cent. In late XII. and early XIII. cent's methods of attack were greatly improved, and engineers were employed especially to construct the necessary engines. Wooden towers, which moved on rollers, were much used; and there was a movable platform called the *gate*, which was placed against the foot of the walls and gave cover to the besiegers when they were undermining, filling up the moat, or using the ram. Mines have been employed since the earliest times, and have undergone little change. An engine called a *cat* was used for filling up the moat, and there were wooden towers with drawbridges by which attack was made.

The introduction of gunpowder and of cannon made great changes in system of attack. Cannon were first used to destroy hoardings by throwing stones. Towards middle of XV. cent. great improvements were made by the brothers Bureau, who were first to employ iron instead of stone missiles. These were able to penetrate stonework, and by their use an increase of velocity was attained, as equal weight could be obtained with less volume. Before long the improved artillery was able to destroy gates and walls in very short time. As, however, the besieged were also in possession of effective artillery, the besiegers had to provide themselves with protective trenches, in order to approach the battery positions. Siegecraft, however, was in a chaotic state until systematised by Vauban in such a way that the result of a siege came to be a mere matter of time. His method was still employed until end of XIX. cent., and was used in the Peninsular War. In modern siege, besiegers should number three or four times as many as the besieged; the place is first surrounded and all communications between it and outer world are cut off. The weakest side is then chosen as the point of attack, and the artillery is brought up and placed beyond range of gun-fire from the besieged. Armed batteries are established to subdue the enemy's fire over the space which the besiegers have to cross. This is called the first artillery position. Trenches called parallels are excavated at intervals, the last of which is to contain

the forces who make the final assault through the breaches made by the artillery. Mines are employed wherever possible, and are generally met by countermines laid by the besieged. See also FORTIFICATION.

SIEGEN (50° 53′ N., 8° 1′ E.), town, on Sieg, Westphalia, Prussia; manufactures iron, leather; birthplace of Rubens. Pop. (1910) 27,415.

SIEGFRIED, SIGURD, hero of the old Ger. mythological poem, the *Nibelungenlied*. Wagner has immortalised the name in one of his great music-dramas. See NIBELUNGENLIED.

SIEMENS, ERNST WERNER VON (1816–92), Ger. scientist; b. Lenthe, Hanover; military career till 1848; made electrical discoveries in connection with telegraphy; bro. of Sir Wm. S.

SIEMENS, SIR WILLIAM, KARL WILHELM (1823–83), scientist, inventor, and engineer; b. Lenthe, Hanover; settled in England; naturalised Brit. subject, 1859; knighted, 1883; practised as engineer, especially in applications of heat and electricity; made important improvements in steam engine, furnaces, telegraph, dynamo, electric lighting, locomotion, etc.

SIENA, SIENNA (43° 20′ N., 11° 19′ E.), town, Tuscany, Italy; capital of province S., about 60 miles from Florence. S. has a mediæval appearance, with old walls and gateways, narrow steep streets, splendid churches and palaces, and ranks next to Florence, Rome, and Venice in the history of art. Outstanding features are the magnificent Gothic cathedral of black and white marble (begun XIII. cent.), with pulpit by Niccola Pisano and fine mosaic marble floor; churches of San Giovanni (wonderful font with bas-reliefs by Donatello, Ghiberti, and others) San Domenico, Sant' Agostino (XIII. cent.), Servites (XV. cent.), San Francesco, San Martino, Fontegiusto, etc., all with paintings and sculptures by famous Sienese artists; palaces, Publico (municipal palace, XIII. cent., with fine paintings), Tolmei, Buonsignori (XIV. cent.), Marsilii, Spinnochi, Piccolomini (now containing state archives), Monte de' Paschi, Loggia del Papa, Loggia di Merzanzai (XV. cent.); Opera del Duomo (with famous art collection), once celebrated univ. (XIII. cent.), now only faculties of law and medicine; Institute of Fine Arts (with good collection of Sienese school), Fonte Gaia and Fontebranda (fountains). Chief industries are machinery, furniture, leather, silk, cloth, hats, etc. S. was probably founded by Etruscans; a Rom. colony, *Saena Julia*, under Augustus; one of most important and flourishing cities of Italy in art, lit., and commerce during Middle Ages; continuous strife between S. and Florence during XII. to XIII. cent's, which ended with defeat of Florentines at *Montaperto*, 1260; under Duke of Milan, 1399; Charles V., 1524; passed to Cosimo de Medici, 1557, and annexed to Tuscany; great Sienese school of painting arose in XIII., flourished in XIV., and declined in XV. cent. The well-known Pallio della Contrada (public festivals), dating back XV. to XVI. cent's, take place once a year and consist in horse races, formerly bull-fights and buffalo races. Pop. (1911) 41,659; (prov.) 241,470.

Langton Douglas, *History of Sienna* (1902).

SIENKIEWICZ, HENRYK (1846–), Polish novelist; author of *Quo Vadis*; Nobel prize for literature, 1905.

SIERADZ (51° 35′ N., 19° 55′ E.), town, Kalisz, Russ. Poland; agricultural machinery. Pop. 7300.

SIERO (43° 25′ N., 5° 40′ W.), town, on Nora, Oviedo, Spain; tanneries. Pop. (1910) 25,075.

SIERRA LEONE (8° N., 12° 30′ W.), Brit. colony, W. Africa, with large inland protectorate; area of colony, 515 sq. miles; of protectorate, *c.* 31,110 sq. miles; surface is very variable, some parts being low and swampy, others mountainous, rising over 3000 ft.; watered by Mano, Bum, Jong, Rokelle, Little and Great Scarcies; chief town, Freetown, the most important port of W. Africa. The climate is unhealthy, especially on coast; rainy season from May to October. S. L. was first permanently settled by the British in 1791; at first in hands of a company, and was a settlement for escaped slaves; became a Crown colony in 1807. Protectorate was established in 1896; administered by a governor, assisted by executive and legislative councils. There are about 104 schools belonging to missions, and assisted by the Government, besides 5 Muhammadan schools. The principal products are palm oil and kernels, kola-nuts, rubber, copal, hides, ginger, ground-nuts. A railway runs from Freetown to Baiima, and there are about 300 miles of telegraph line. Pop.: colony (1911), 75,572; protectorate, *c.* 1,320,000.

SIERRA MORENA (38° 15′ N., 4° 30′ W.), mountain range, between valleys of Guadiana and Guadalquivir, S. Spain.

SIERRA NEVADA.—(1) (39° N., 120° W.) mountain range, California, U.S.A.; highest summit, Mount Whitney, 14,500 ft. (2) (37° N., 3° W.) highest mountain range, Spain, between valley of Guadalquivir and Mediterranean Andalusia; highest peak, Mulá-hacen, 11,500 ft.

SIEYÈS, EMMANUEL-JOSEPH (1748–1836), Fr. cleric and statesman, canon, diocesan chancellor, vicar-gen.; Liberal opinions; deputy to States-General from Paris, 1789; urged constitution as National Assembly; Pres., 1790; a great constitution-maker. He retired from Paris under the Robespierre terror; member of Five Hundred, and of Directory, 1799. Consul with Napoleon and Ducos, 1799; elected member of the Academy, 1830.

SIFAKAS (*Propithecus*), a genus of *Lemuroidea* (*q.v.* under PRIMATES); fur generally white, tail long, snout short; confined to Madagascar.

SIGEL, FRANZ (1824–1902), Ger. soldier; rebel leader in Baden, 1848–49; subsequently became Federal general in Amer. Civil War.

SIGER DE BRABANT (fl. XIII. cent.), Fr. philosopher; taught at Sorbonne; passed from kind of Scotism to Thomism.

SIGFRID, see NIBELUNGENLIED.

SIGHTS, see ORDNANCE.

SIGILLARIA, see under PALÆOBOTANY.

SIGIRI (8° N., 81° E.), rocky height, Ceylon, on summit of which Kasyapa the Parricide built palace in V. cent. A.D.

SIGISMUND (1368–1437), Holy Rom. emperor; succ. to margravate of Brandenburg, 1378; acquired Hungary by marriage with Mary, d. of Louis the Great; conducted crusade against Turks, who routed him at Nicopolis, 1396; Rom. king, 1410; instrumental in summoning Council of Constance (*q.v.*), 1414; king of Bohemia, 1419; blamed for death of Huss, which resulted in Hussite War, 1419–36; crowned at Rome, 1433.

SIGISMUND I., THE GREAT (1467–1548), king of Poland; succ., 1506; drove Russians from Lithuania after victory at Orsza, 1508; repelled invasion of Moldavians and Walachians, over whom he established suzerainty, and drove back Tatar hordes; second Russ. invasion defeated with great slaughter, 1514; expelled Teutonic knights from Polish Prussia, which he formed into duchy, 1525; tolerated Lutheranism; mild, just ruler.

SIGISMUND II. (1520–72), king of Poland; grand-duke of Lithuania, 1544; king of Poland, 1548; acquired Livonia, 1561; united Lithuania and Poland as single state by Union of Lublin, 1569; granted religious toleration; d. childless.

SIGISMUND III. (1566–1632), king of Poland and Sweden; s. of John III. of Sweden; chosen king of Poland, 1587; succ. to Swed. throne, 1592; reign marked by frequent revolts among nobles, whom he ultimately subdued at Guzow; deposed in Sweden, 1604; allied himself with emperor at beginning of Thirty Years War; his troops, under Chodkiewicz, gained brilliant victory over Turks at Khotin, 1622.

SIGMARINGEN (48° 4′ N., 9° 12′ E.), town, capital, Hohenzollern, Prussia, on Danube; interesting art collections. Pop. 5450.

SIGNALLING.—Marine sight signals are made chiefly by flags or semaphores, and sound signals

by fog-horns, steam whistles, sirens, or guns. Commands used in the ordinary operations of a squadron are signalled by two alphabetical flags, and words or short sentences by three alphabetical flags. Manœuvring orders are signalled by a combination of alphabetical and numeral flags. Flag s. is of necessity a rather slow process. Semaphore s. is usually done by the movements of a man's arms, a flag generally being held in each hand to facilitate reading. Mechanical semaphores are also used, the signals being visible for several miles. At night signals are made by flashing, by means of the exposure and eclipse of a single light for short or long periods representing the dots and dashes of the code. There are also methods of s. by means of coloured lights. For flashing over long distances the search-light is used. During fogs, signals are transmitted by short or long sounds standing for dots and dashes, or by the intervals between the shots, in the case of signalling by guns. A century ago Napoleon's escape from Elba was signalled by 'telegraph' to Paris, but the so-called telegraph was a system of semaphores. Our navy established a similar 'telegraph' at Torres Vedras in 1810. Nelson's order to his fleet at Trafalgar was conveyed by flag signals. For the interchange of signals between ships of all nations a special international code is employed. Wireless telegraphy is largely used for long distance s., and wireless telephony is employed to some extent.

Military s. is usually done by Morse system with flags (see TELEGRAPH), or by Semaphore s. (*q.v.*) with or without flags. Section commanders convey messages by rifle, *e.g.* rifle held above head horizontally is signal for 'Halt.' Bugle and trumpet calls are used for well-known messages, *e.g.* 'Pioneers,' 'Fall in,' 'Cease fire,' etc.

The heliograph was first used in the Afghan War of 1879–80; the cable line (field telegraph) was first used by the Federals in December 1862. The telephone was first seen on the battlefields in Manchuria, 1904–5.—For railway signalling, see RAILWAYS.

SIGNET, see SEAL.

SIGNIA, SEGNI (41° 45′ N., 13° 5′ E.), ancient town, near Volscian mountains, Latium; founded by Tarquinius Priscus, 495 B.C.

SIGNORELLI, LUCA (*c.* 1442–*c.* 1524), Ital. painter; b. Cortona, where he left many specimens of his art. Pope Julius II. called him to Rome in 1508 to assist in decorating the Vatican. His greatest works are a number of frescoes on the walls of a chapel in Orvieto Cathedral.

SIGONIUS, CAROLUS, CARLO SIGONIO (SIGONE) (*c.* 1524–84), Ital. classical scholar; b. Modena; was engaged in a fierce literary controversy as defender of the Ciceronian authorship of the *Consolatio de Tullia*; wrote some important works on classical antiquities.

SIGOURNEY, LYDIA HUNTLEY (1791–1865), Amer. poet.

SIGURDSSON, JÓN (1811–79), Icelandic writer and politician; largely instrumental in obtaining constitution for Iceland from Christian IX. of Denmark; wrote *Diplomatarium Islandicum* and other works on Icelandic history and lit.

SIKH WARS, Brit. conflicts with Sikhs of India, 1845–46, 1848–49. Death, 1839, of peaceful Runjeet Singh was followed by anarchy; Sikh war party invaded Brit. territory; defeated at *Mudki*, *Aliwal*, and *Sobraon*; Britain annexed district between Sutlej and Beas, 1846.

War of 1848, after indecisive *Chillianwalla* and capture of Multan, resulted in Brit. annexation of Punjab, 1849.

SIKHISM, originated as reforming monotheistic religion in revolt against Brahmin orthodoxy. Founded by Nānak, Hindu preacher (b. 1469 A.D.); principal disciples were Panjabi Jats, who became known as Sikhs (from *siksha* = pupil). Nānak condemned caste, idolatry, asceticism, proclaimed one personal God and spiritual equality of men, and aimed at reconciling Hinduism and Islam; selected successor as *Guru*, or spiritual guide. Nine *gurus* followed Nānak. Under Arjun, 5th guru, sacred code '*Granth*' was compiled, written in Gurmukhi, and based upon *Adi-Granth* or psalms of Nānak, and upon teachings of various Hindu and Muslim reformers. Under Mughal persecution, Sikhs, under 6th guru, Har Govind, became soldiers. Govind Singh, 10th guru, converted them into religious military commonwealth, *Khalsa*, abolished guruship, called them Singhs or lions, and gave them distinctive outward appearance. Every true Sikh must have five things, whose names all begin with *k*: *kes* (hair; Sikhs never cut hair or beard); *kanghi* (comb); *kachh* (breeches reaching to knee); *kard* (knife); *kirpan* (sword). Sacred city, Amritsar.

M'Auliffe, *Granth*.

SIKKIM (27° 30′ N., 88° 25′ E.), feudatory state, Himalayas, India, situated between Tibet and Darjeeling; area, 2818 sq. miles; watered by Tista, affluent of Brahmaputra; capital, Gantok; produces maize, rice, fruit, timber, copper, ivory-carving, silks, gold and silver embroidery. Religion, Lamaism. Brit. protectorate established, 1890. Pop. (1911) 88,169.

SILA (39° 15′ N., 16° 30′ E.), wooded mountain region, Calabria, Italy; highest point, Botte Donato, 6330 ft.

SILAS accompanied St. Paul to Philippi, Thessalonica, etc.; perhaps identical with Silvanus.

SILAY (10° 55′ N., 123° E.), town, W. Negros, Philippine Islands. Pop. 23,000.

SILBURY HILL, see AVEBURY.

SILCHAR (24° 50′ N., 92° 51′ E.), town, on Barak, cantonment, capital of Cachar district, Assam, Brit. India. Pop. 10,000.

SILCHESTER (51° 22′ N., 1° 5′ W.) (ancient *Calleva Atrebatum*), village, Hampshire, England; interesting Roman remains.

SILESIA (49° 50′ N., 18° 10′ E.), small duchy, N. Austria, between Moravia and Pruss. Silesia; area, 1987 sq. miles; has Sudetic Mountains in N., spurs of Carpathians in E.; drained by upper waters of Oder and Vistula; capital, Troppau; has small coal-field, and deposits of lignite, iron, sulphur; manufactures machinery, textiles. Represented in Reichsrath by 15 members. Pop. (1910) 756,949.

SILESIA (51° N., 17° E.), province in extreme S.E. of Prussia, with Austrian Silesia, Bohemia, and Saxony along the south; area, 15,569 sq. miles; hilly in S., where Sudetic Mountains reach extreme height of 5260 ft.; elsewhere surface is flat; drained by Oder; large area wooded; has coal-field in S.E.; produces also zinc, iron, silver-lead; agriculture is carried on, and sugar-beet, cereals, fruits, and oil plants are cultivated; manufactures linens, cottons, woollens, zinc and iron goods, paper, etc. The capital is Breslau. Silesia was independent in the XII. cent.; afterwards came under the dominion of Bohemia, and so of Austria, by whom it was finally transferred to Prussia in 1763. Pop. (1910) 5,225,962.

SILICA, silicon oxide $(SiO_2)_n$; white amorphous powder, also crystallised and vitreous; insoluble in water and all acids except fluoric; soluble in alkalies.

SILICON (Si = 28·3), non-metallic element, related to carbon, especially in atomic configuration; prepared from its oxide, silica, by reduction with magnesium: $SiO_2 + 2Mg = Si + 2MgO$; or by the reaction $K_2SiF_6 + 4K = 6KF + Si$; shows allotropy; amorphous s. is a brown powder, S.G. 2·35, insoluble in acids, but dissolved by molten metals, whence crystalline s. separates, S.G. 2·49; burns to SiO_2.

COMPOUNDS.—SiO_2, silica: H_2SiO_3, H_4SiO_4, and silicates, many and complex; SiH_4, spontaneously inflammable gas; SiF_4, gas: $3SiF_4 + 3H_2O = 2H_2SiF_6 + H_2SiO_3$; $SiHCl_3$, silicichloroform; $SiCl_4$, liquid, B.P., 59·6° C.; $SiCl_4 + 3H_2O = H_2SiO_3 + 4HCl$.

SILIQUARIA, see under GASTEROPODA.

SILISTRIA, SILISTRA (44° 7′ N., 27° 14′ E.) (Rom. *Durostorum*), town, former fortress, on Danube, Bulgaria; abp.'s see; active trade; manufactures

cloth; frequently besieged and taken in Middle Ages; successfully held against Russians, 1854. Pop. (1910) 11,646.

SILIUS ITALICUS, Titus Caius S. I. (*c.* 26–101 A.D.), Rom. poet and orator; birthplace unknown; attained considerable forensic success, although he is said to have bartered his oratorical powers to Nero in exchange for his personal safety. His political caution saved him from the fate of most of his prominent contemporaries; obtained consulship, 68, followed by proconsulship of Asia, after which he retired into private life and devoted himself to literature and patronage of art; idolised Cicero and Vergil.

His extant work, the *Punica*, is an epic of some 14,000 lines, in close imitation of the *Iliad* and *Æneid*; though smooth and at times graceful in style it can claim no originality, and Vergilian touches appear constantly. The plot deals with the Punic War; Hannibal and Scipio are protagonists, but, as the poem seldom frees itself from the trammels of conventional epic, it is of little interest to the ordinary student.

SILK, a very fine and glossy thread spun by the caterpillar of certain moths and manufactured by man into fabric.

History.—There is no doubt that the cultivation of s.-spinning moths was practised in China for many centuries before the Christian era. Native records show that the industry is of very remote antiquity. For instance, the Empress Si Ling (2640 B.C.) 'encouraged the cultivation of the mulberry tree, the rearing of worms, and the reeling of s.' During the reign of Justinian (550 A.D.) two Persian monks brought some eggs, secreted in a hollow cane, to Constantinople from China. Having studied s.-making in the East, they supervised the first s. manufacture in Constantinople and so brought the industry to the West. Aristotle mentions 'a great worm which has horns and so differs from others . . .; from this animal women separate and reel off the cocoons and afterwards spin them.' S. manufacture did not commence in England until the reign of Henry VI.; in 1585 some Flemish weavers came over and settled in the country, and so s.-spinning in England was assured.

The Silk Worm belongs to the family of *Bombycidæ*, of which that group known as *Bombyx mori* are the most common; distinguished by the small size of the proboscis; thick, hairy body, and large, broad wings. The female deposits the eggs on leaves, and in s. cultivation they are artificially hatched in rooms heated to about 80° F. In about eight or ten days from the laying, the young caterpillars make their appearance, being black in colour and about ¼ in. in length. They thrive best on the leaves of the white mulberry. In six or eight weeks the worms are fully developed, and during this period they cast their skins four times. Ten days after the final moult the worm is ready to spin its cocoon; it is then about 3 in. long, and of a greenish-white colour; its body is divided into twelve segments with six anterior fore-legs and ten pro-legs. The s. with which the cocoon is spun is a glutinous secretion contained in two tubular glands, one on each side of the body. The threads issue from spinnerets, and harden on coming into contact with the air. Three to five days are occupied in spinning, and if the cocoon were left, the perfect insect or *imago* would emerge in about three weeks. However, the cocoons are not left thus, for in its exit the moth would eat through all the s. threads and destroy their continuity. The worms are therefore killed, after the cocoons have been sorted into sizes and qualities. They are placed in a heated chamber and slightly roasted, then dipped into basins of warm water to loosen the gummy substance which binds the threads together, and the ends of several are brought together and wound or twisted into *raw silk*. The average length of thread from a single cocoon is 300 yards, while 12 lb. of cocoons are needed to furnish 1 lb. of raw s.

Diseases of eggs and larvæ are many, the commonest being *muscardine*, due to a development of fungus in the body of the caterpillar, both contagious and infectious; *pebriné*, a disease first noticed in France; while *grasserié* appears just before or after the first moult and is a form of dropsy.

Silk Spinning.—S. is spun from the raw material, and complex machinery is used in large establishments. The raw s. is first cleaned, twisted, doubled, and wound on bobbins for the weaver. Before winding, flossy s. is removed from the cocoons, and, until the XIX. cent., it was regarded as waste and used by engineers for cleaning purposes. Mr. Lister of Bradford (Lord Masham, 1891), in 1857, discovered a method of spinning from this waste.

About 40 % of the whole supply of raw s. comes from China, and 30 % from Italy. France is the greatest s.-spinning country, although the industry is extensively carried on in the Midlands of England. Leek (Staffs.) is famous for the dyeing of s.

SILK-WORM MOTH, see under Lepidoptera.

SILL, intrusive masses of igneous rocks, common in stratified or sedimentary rocks, also occurring in different forms of lava; a characteristic s. is whin-s., which runs from Kirkby Stephen to Bamborough, England; the river Tees crosses it at High Force; it is formed of dark green diabase. S's have close connection with dykes (*q.v.*), but former are horizontal, the latter vertical.

SILLOTH (54° 52′ N., 3° 23′ W.), town, Cumberland, England; watering-place; port for summer sailings to Isle of Man and Dublin.

SILO, see Ensilage.

SILURIAN, name proposed by Murchison in 1835 for the lowest sedimentary strata of the Palæozoic or Primary period. These strata consist of grits, slates, shales, sandstones, flagstones, and conglomerates, and lie on the Cambrian Rocks, and under the Old Red Sandstones and Devonians.

They are divided into

Upper S. { Ludlow Group. / Wenlock Group. / Upper Llandovery Group.

Lower S. { Lower Llandovery Group. / Bala or Caradoc. / Llandeilo Group. / Lingula Beds.

Deposits are *c.* 20,000 ft. in thickness, and are found in Wales, Westmoreland, Cumberland, Scot. Highlands, Ireland, Europe, and other places.

SILUROIDS, see Cat-Fishes.

SILVA, ANTONIO JOSÉ DA (1705–39), Portug. dramatist; b. Rio de Janeiro. A Jew by birth, he suffered violent persecution, culminating in his execution. His best comedies are *Alecrim e Mangerona* and *Don Quixote*.

SILVER (Ag = 107·88), metallic element, allied to copper and gold; known to the ancients; associated by alchemists with Luna ☽. Occurs native, as s. glance Ag_2S, horn s. AgCl, in galena (PbS), etc.

Extraction.—(1) Alloyed with lead, which is removed by oxidation; (2) amalgamated with mercury, and mercury distilled (Mexico); (3) extracted in wet way after preliminary treatment of ore.

Properties.—Pure white; takes high polish; best-known conductor of heat and electricity; tough; malleable; forms, by reduction of salt solutions, bright deposit on glass, which transmits blue light; dull grey when precipitated in bulk; may become colloidal; S.G. 10·49, M.P. 960·5° C.; molten metal occludes oxygen, which it evolves by 'spitting' on solidification; vapour bright blue, monatomic. Dissolved by dilute nitric acid, unattacked by fused caustic alkali, tarnished by hydrogen sulphide. Silver coinage contains 92·5 % silver, 7·5 % copper.

Compounds.—Oxide Ag_2O, precipitated from salt solutions by alkali, chocolate colour, faintly alkaline, gives silver and oxygen when heated;—halides AgF,

soluble in water; AgCl, AgBr, AgI, practically insoluble in water, but show progressive insolubility in water and ammonia, and deepening of colour from white to yellow; sensitive to, and darkened by, light; AgCl and AgBr used in photography, soluble in potassium cyanide and sodium thiosulphate ('hypo') solutions (fixing);—sulphide Ag_2S, black precipitate;—sulphate Ag_2SO_4, sparingly soluble in water;—nitrate $AgNO_3$, Lunar caustic, crystallises in rhombic plates, fusible, poisonous, blackens organic matter, hence used for marking-ink, in chemical analyses, surgery, and photography;—cyanide AgCN, white, curdy precipitate, soluble in KCN, forming $KAg(CN)_2$ solution, used in electroplating. Silver is detected by the precipitate its salts give with solution of chloride, and estimated by weighing as chloride, or titrating with standard chloride or thiocyanate solution.

SILVER FISH (*Lepisma saccharina*), a minute bristle-tailed or *Thysanurous* insect, found in damp corners, amongst old papers and books. It feeds on starchy or sugary substances—hence the specific name—and is recognised by silvery scales.

SILVER GLANCE, see ARGENTITE.

SILVER KING, see under HERRING FAMILY.

SILVERIUS, pope, 536–37, when deposed.

SILVES (37° 10′ N., 8° 28′ W.), town, on Silves, Algarve, Portugal; cathedral; Moorish relics; manufactures corks. Pop. 10,500.

SILVESTER I., pope, 314–35; traditionally (but falsely) said to have baptized Constantine the Great.

SILVESTER II., pope, 999–1003; his personal name was Gerbert; was introduced to the emperor and studied at Reims, and soon became famous as a scholar; abbot of Bobbio, *c.* 981, then abp. of Reims; for a time tutor to Emperor Otto III. After his election to papacy he continued to be active as an ecclesiastic and a politician; a letter which may not be genuine seems to anticipate the position of Hildebrand. He was a very learned man, and in science in advance of his age; wrote theological and mathematical works and numerous letters.

SILVESTRE DE SACY, ANTOINE ISAAC, BARON (1758–1838), Fr. scholar; prof. of Arabic at the School of Eastern Languages, and of Persian at the *Collège de France*; founded *Société Asiatique* with Abel Rémusat, 1822; wrote *Chrestomathie Arabe*, *Exposé de la Religion des Druses*.

SILVESTRINES, small religious order, with rule of St. Benedict, existing since 1231.

SIMANCAS (41° 37′ N., 4° 51′ W.), town, on Pisuerga, Valladolid, Spain.

SIMBIRSK (54° 15′ N., 47° E.), government, Russia; consists in general of an extensive and fertile plain; drained by Volga and tributaries; has deposits of sulphur, salt, and asphalt; exports grain and fish; trade in timber. Pop. (1910) 1,931,700. Capital, **Simbirsk** (54° 17′ N., 48° 26′ E.), river port, on Volga; trade in grain; annual fair. Pop. (1910) 52,240.

SIMEON, Israelite tribe; according to Genesis S. was one of sons of Jacob and Leah; placed, according to Chronicles, in N., according to Joshua, in S. Palestine. According to some, the events in Genesis reflect an early stage of conquest about 1400 B.C., before the entry of the remaining tribes.

SIMEON, CHARLES (1759–1836), Anglican clergyman, of strong Evangelical sympathies.

SIMFEROPOL (44° 56′ N., 34° 5′ E.), town, on Salghur, capital, Taurida government, Russia; cathedral; exports fruit. Pop. (1910) 70,420.

SIMIA, see ORANG.

SIMIIDÆ, a family of PRIMATES (*q.v.*).

SIMLA (31° 6′ N., 77° 11′ E.), town, sanatorium, on spur of the Himalayas, capital, Simla district, Punjab, Brit. India; seat of government during hot season. Pop. (winter) 16,000; (summer) 45,000; (district, resident) 45,000.

SIMMS, WILLIAM GILMORE (1806–70), Amer. poet, novelist, and historian.

SIMNEL, LAMBERT (fl. 1477–1534), Eng. pretender; a youth trained to impersonate the young Earl of Warwick, Yorkist claimant to the throne against Henry VII.; captured and made a scullion in the royal kitchen.

SIMON MAGUS, a curious character mentioned in *Acts* 8. He seems to have been a sorcerer, converted or partially converted by Philip, and then trying to buy the gift of the conferring the Holy Spirit from the Apostles. In the post-apostolic lit. he appears as a false Messiah, and, according to Justin Martyr, was born in Samaria and lived at Rome under Claudius. Irenæus includes in his work against the heretics (*Centra heresios*) a Gnostic fragment in which Simon is described as a divine power, and even as God Himself, and emanating from him Helena (a woman with whom he had become traditionally associated); through her the world is created.

He appears again in Celsus, Origen, the pseudo-Clementine literature, now as a sorcerer, now as a sort of embodiment of the Samaritan religion, now as the upholder of Marcionite theology. Sometimes the references to him have been interpreted as a veiled attack on St. Paul, but this view is now generally abandoned. Sometimes he has been thought to be the beast of Revelation, and there have been several other guesses. The original idea that he was a sorcerer is probably true, and he proclaimed himself to be divine, thus forming a basis for Gnostic speculations. Finally he was identified with the sun-god, and Helena becomes the moon-goddess, his partner. His cult continued some time after his death; Simonists are mentioned by Origen, but seem soon after to have disappeared in the East, but lasted longer in the West. Different Gnostic theologies called after him developed in Alexandria and Syria.

Hort, *Notes Introductory to Clementine Recognitions*.

SIMON OF ST. QUENTIN, Fr. dominican; went with Pope Innocent IV.'s unsuccessful embassy to Baigre, the Mongol ruler of Armenia.

SIMON, SIR JOHN (1816–1904), Eng. surgeon and public health reformer; surgeon and lecturer on Pathology at St. Thomas's Hospital, London (1847), medical officer of health to City of London (1848), and later to the Government; pres., Royal College of Surgeons (1878); had a very great share in the development of sanitary science.

SIMON, JULES FRANÇOIS (1814–96), Fr. politician and philosopher; b. Lorient; lectured on philosophy at Sorbonne, Paris, 1839–51; entered National Assembly, 1848; member of Legislative Assembly, 1863; Minister of Education, 1870; Academician, 1875; Prime Minister, 1876–77; wrote *Le Devoir*, *Le Travail*, and other works.

SIMON, RICHARD (1635–1712), R.C. scholar and divine; studied at College of the Oratory in Paris, becoming interested in Oriental languages; involved in controversy with ecclesiastics of Port Royal, which lasted most of his life; his real work was on the text of the Old and New Testament, and S. was for his day a radical critic; pub. works, some of which are still valuable.

SIMONIDES OF CEOS (*c.* 556–469 B.C.), Gk. lyric poet who celebrated the events of the Persian War. In 489 he conquered Æschylus in the contest for an elegy on those who fell at Marathon.

SIMON'S TOWN (34° 11′ S., 18° 26′ E.), fortified seaport, naval station, on False Bay, Cape of Good Hope, S. Africa. Pop. 4800.

SIMONY, the buying and selling of spiritual offices was from early times regarded as a grievous sin in the Church: It is so called from Simon Magus (*q.v.*), who, according to *Acts* 8, wished to buy spiritual power from St. Peter. Sometimes to accept money at all for the performance of spiritual functions was held to be S.; but it was seen that this was hardly just. More difficult was the buying and selling of patronage, which, though not contrary to canon law, has been to some an offence. S. is now an ecclesiastical but not a criminal offence.

SIMOOM, SIMOON, see under WIND.

SIMPLICIDENTATA, a division of RODENTS (*q.v.*).

SIMPLON PASS (46° 16′ N., 8° 3′ E.), mountain pass (6590 ft.), between Switzerland and N. Italy; the Simplon railway tunnel is 12¼ miles in length.

SIMPSON, MATTHEW (1811–84), Methodist bp. in U.S.A.

SIMPSON, SIR JAMES YOUNG (1811–70), Scot. physician; b. at Bathgate; ed. Edinburgh Univ.; became assistant to prof. of Pathology, 1837, and prof. of Midwifery, 1840; he advocated the use of acupressure to stop bleeding from arteries, and introduced many improvements in obstetrical and gynecological methods; his greatest achievement was his discovery of the anæsthetic power of chloroform, which was applied, through his advocacy, for the relief of pain in obstetrical and surgical practice; author of works on obstetrics, diseases of women, and other medical subjects, and on archæology; baronet, 1866.

E. B. Simpson, *Life* (1896); Gordon, *Sir J. Y. S. and Chloroform* (1897).

SIMPSON, THOMAS (1710–61), Eng. mathematician; b. Market Bosworth; app. prof. of Mathematics, Woolwich Military Academy, 1743; author of numerous treatises on algebra, geometry, trigonometry, etc.

SIMSBURY (41° 53′ N., 72° 50′ W.), town, on Farmington, Hartford County, Connecticut, U.S.A.; manufactures fuses. Pop. (1910) 2537.

SIMSON, MARTIN EDUARD VON (1810–99), Ger. jurist and politician; b. Königsberg; was made a judge, 1846; pres. of Imperial Tribunal, 1879–91.

SIN, that which in man is contrary to the will of God; according to Genesis, man was created sinless, but fell; a school of modern theology tends to minimise or deny the existence of sin.

SINAI.—The Jewish records of the wanderings in the wilderness were undoubtedly written long after the events they relate, and no mountain corresponds exactly to the Biblical Mt. Sinai. It must have been in the peninsula of Sinai—probably the mountain mass now called Jebel-al-Tūr.

Flinders Petrie, *Researches in Sinai.*

SINAIA (45° 17′ N., 25° 33′ E.), town, summer resort, Prahova, Rumania; mineral springs.

SINALOA (26° N., 108° 25′ W.), state, on Gulf of California, Mexico; well watered; mining and agricultural industries. Pop. 323,642. Capital, Culiacán.

SINCLAIR, SAINT CLAIR, Scot. family. Sir William S. (1260–1303) was descendant of long line of Anglo-Norman barons, active in revolt against Edward I. His great-grandson obtained the Earldom of Orkney. William, 3rd earl, became Earl of Caithness; eldest s. slain at Flodden.

SINCLAIR, SIR JOHN, Bart. (1754–1835), Scot. writer; first pres., Board of Agriculture; founder of Brit. Wool. Soc.; wrote *History of Public Revenue of Brit. Empire*, 1784; *Statistical Account of Scotland* 1791–99; *Code of Agriculture*, 1819.

SIND, SINDH, SCINDE (25° 29′ N., 69° E.), province, Bombay, India, bounded on N. by Baluchistan and Punjab, on S. by Indian Ocean, on E. by Rajputana, on W. by Baluchistan. Chief river, the Indus; land near it is fertile and watered by irrigation. Climate very dry and hot. Chief occupation is agriculture and wheat; rice, sugar, tobacco, indigo, hemp, cotton are grown. Chief towns are Karachi (large export trade) and Hyderabad.

Sind was taken by Akbar, 1592, and on break-up of his empire it became a semi-independent state as it had been before. During Brit. Afghan War, 1838, Britain made treaties with Sind; these were repudiated, and Napier defeated Sind army at *Meeanee*, 1843. Annexation followed. Area, 53,116 sq. miles. Pop. (1911) 3,513,435.

SINDBAD THE SAILOR, hero of Arab. romance, whose adventures are akin with incidents of the *Iliad*, *Odyssey*, the book of Sir John Mandeville, etc.

SINECURE, ecclesiastical benefice or living without any 'cure' or care of souls, or secular office yielding revenue without duties or responsibilities attached; formerly very common political gifts; one of few surviving s's is Stewardship of Chiltern Hundreds (*q.v.*).

SINEW, a tendon, or the fibrous tissue attaching a muscle to its insertion on a bone. See CONNECTIVE TISSUES.

SINGAN-FU, SIAN-FU (34° 15′ N., 108° 50′ E.), town, capital, Shen-si province, China; enclosed by walls; of great strategic importance; commercial and trading centre; rich in antiquities. Pop. *c.* 700,000.

SINGAPORE (1° 15′ N., 103° 51′ E.), island, Straits Settlements, S.E. Asia; area, 206 sq. miles; surface is generally rolling and forested; climate hot, but healthy. Has belonged to Great Britain since 1819. Pop., including whites, Eurasians, and Asiatics (1911), 311,985. The town **Singapore**, in S.E., is seat of government and contains governor's palace, Protestant and R.C. cathedrals, and Raffles Museum. Has fortified harbour and is important trading centre. Pop. (1911) 303,321.

SINGER, SIMEON (1846–1906), Jewish divine; minister of Borough Synagogue, 1867, West End Synagogue, 1878; translated and edit. *Daily Prayer Book.*

SINGGORA, SONGKLA (7° 6′ N., 100° 30′ E.), town, port, capital, Singgora district, Siam; exports tin. Pop. 10,500.

SINGHBUM (22° 40′ N., 85° 40′ E.), district, Chota Nagpur, Bihar and Orissa, Brit. India; capital, Chaibasa. Pop. 625,000.

SINGLE-STICK, Eng. sport similar to fencing; ash sticks about a yard long are used; popular from early times to XIX. cent.

SINOPE, SINOB (42° 2′ N., 35° 20′ E.), seaport, on Black Sea, Asia Minor; founded by a colony from Miletus, 630 B.C.; became a centre of Gk. trade on the Euxine; taken by Pharnaces, 183 B.C., and made capital of Pontus; birthplace of Mithridates and of Diogenes. Pop. 8700.

SION (46° 14′ N., 7° 21′ E.) (Rom. *Sedunum*), capital, on Sionne, canton Valais, Switzerland; cathedral; two ruined castles. Pop. (1910) 6519.

SIOUX, see INDIANS, RED.

SIOUX CITY (42° 35′ N., 96° 30′ W.), city, on Missouri, capital, Woodbury County, Iowa, U.S.A.; meat-packing establishments; carriage-works. Pop. (1910) 47,828.

SIOUX FALLS (43° 35′ N., 96° 30′ W.), city, on Big Sioux, capital, Minnehaha County, S. Dakota, U.S.A.; granite quarries. Pop. (1910) 14,094.

SIPHANTO (36° 58′ N., 24° 45′ E.) (ancient *Siphnos*), island of the Cyclades, Greece; mountainous; fertile; noted for its pottery. Pop. 4000.

SIPHONAPTERA, see FLEAS.

SIPHONOPHORA, see under HYDROMEDUSÆ.

SIPPARA, see SEPHARVAIM.

SIPUNCULOIDEA, a class of unsegmented worm-like animals, the relationships of which are uncertain. Sipunculids are stout, cylindrical, soft-bodied 'worms,' with a large body cavity, and a curious retractile organ—the introvert, furnished with a fringe of tentacles—at the end of which the mouth is situated. They live in the sea, burrowing in sand or mud, or hiding in rock crevices or shells, and feeding upon the organic matter contained in the mud they swallow. The sexes are separate, and the larva is very unlike the adult.

SIQUIJOR (9° 10′ N., 123° 40′ E.), town, on island Siquijor, W. Negros, Philippine Islands. Pop. 20,000; (island) 48,000.

SIR (Lat. *senior*, through Fr. *seigneur*), a common term of respectful address, is now used officially only before the Christian name of knights and baronets. Formerly it was commonly used in speaking of or to parish priests in Great Britain; 'sire,' an older form, exclusively reserved for addressing royalty.

SIRACH, see ECCLESIASTICUS.

SIRAJGANG (24° 27′ N., 89° 47′ E.), town,

Pabna district, Bengal, Brit. India; trade in jute. Pop. 26,000.

SIREN, MUD-EEL, genus of eel-like tailed Amphibians found in S.E. United States, where they burrow in the mud of ponds and ditches; distinguished by 3 external gills and 3 gill-openings; and though fore-legs each with 4 fingers are present, hind-legs are absent.

SIRENIA, SEA COWS, an order of aquatic mammals, which differ from Whales in being vegetable feeders, in having no snout, but large, thick, mobile lips furnished with bristles, and broad teeth, sometimes developed as tusks. The teats are on the breast, and the flippers are furnished with claws. The order is divided into two families: TUSKED DUGONGS (*Halicoridæ*), found in herds on the shores of the Indian Ocean, often speared by the native Malays, who value them as food; and the MANATEES (*Manatidæ*), inhabiting the warm shores and great river mouths of S. America and W. Africa. These live chiefly on aquatic plants and algæ, which they graze under water. They are harmless and inoffensive, and have been much reduced in number by native hunters, who spear them easily by means of the harpoon. The supposed fantastic resemblance to the human figure of Manatees half raised out of the water gave origin to the belief in sirens and mermaids. The largest member of the order, STELLER'S SEA COW (*Rhytina*), used to inhabit Bering Island, but was exterminated by hunters within a short period of its discovery.

SIRENS (classical myth.), sea-nymphs, who sat on the shore and sang with a ravishing sweetness which lured the passing sailor to their presence, only to meet with death.

SIRGUJA (23° N., 83° E.), feudatory state, Chota Nagpur, Bihar and Orissa, Brit. India. Pop. 357,000. Capital, Bisrampur.

SIRHIND (31° 20′ N., 76° 25′ E.), district, Punjab, India, between Sutlej and Jumna. Pop. 6000.

SIRICIUS, pope, 384–99.

SIRIUS, see CANIS MAJOR.

SIRMIO (45° 30′ N., 10° 35′ E.), promontory, on S. shore of Lake of Garda (*Lacus Benacus*), Italy.

SIRMUR, NAHAN (30° 25′ N., 77° 10′ E.), native state, Punjab, India. Pop. (1911) 138,564. Chief town, Nahan.

SIROCCO, see WIND.

SIROHI (14° 36′ N., 74° 54′ E.), native state, Rajputana Agency, India. Pop. 155,000. Capital, Sirohi. Pop. 5800.

SIRSA (29° 32′ N., 75° 7′ E.), town, Punjab, Brit. India. Pop. 16,500.

SIS (37° 24′ N., 35° 30′ E.), ancient *Flaviopolis*, town, vilayet Adana, Asiatic Turkey. Pop. 4800.

SISAL HEMP, or HENEQUEN, the fibre obtained from a variety of *Agave rigida*, cultivated for that purpose in Mexico, the Bahamas, and other places.

SISKINS, see under FINCH FAMILY.

SISMONDI, JEAN CHARLES LÉONARD DE (1773–1842), Swiss historian; b. Geneva. His output was tremendous. *Tableau de l'Agriculture Toscane, Traité de la Richesse Commerciale, A History of France* (29 vols.), *Nouveaux Principes d'Economie Politique, Histoire de la Renaissance de la Liberté en Italie*, are some of his famous works.

SISSEK (45° 30′ N., 16° 23′ E.), town, at junction Save and Kulpa, Croatia-Slavonia, Hungary. Pop. 7800.

SISTAN, see SEISTAN.

SISTERHOODS, a prominent feature of Eng. mediæval Catholicism, were swept away by Henry VIII. and only restored in the XIX. cent. But they continue to grow in number and influence, and do good charitable and educational work.

SISTOVA, SVISHTOV (43° 37′ N., 25° 21′ E.), town, on Danube, capital, Sistova department, Bulgaria; trade in grain and wine. Pop. (1910) 13,101.

SISYPHUS (classical myth.) was condemned, for certain indefinite crimes, to roll huge stone from bottom to top of hill; stone always rolled down again, and thus the labour had to be renewed.

SITAPUR (27° 34′ N., 80° 43′ E.), town, Sitapur district, Lucknow division, United Prov., Brit. India; trade in grain. Pop. 24,000; (district) 1,185,000.

SITKA (formerly NEW ARCHANGEL) (57° N., 135° 20′ W.), city, on Baranof Island, Alaska; U.S. naval station; magnetic observatory, industrial training-school and Russo-Greek church; salmon fishing and canning industry; was Russ. capital from 1804–67. Capital of Alaska till 1906. Pop. 1396.

SITTIDÆ, NUTHATCHES (*q.v.*).

SITTINGBOURNE (51° 21′ N., 0° 44′ E.), town, Kent, England. Pop. (1911) 8382.

SIVA, see HINDUISM.

SIVAGANGA (9° 51′ N., 78° 32′ E.), town, Madura district, Madras, Brit. India, capital of small state. Pop. 10,000.

SIVAS (39° 37′ N., 37° 3′ E.) (ancient *Scbasteia*), town, on Kizil-Irmak, capital, Sivas vilayet, Asiatic Turkey; manufactures coarse woollen goods; in Middle Ages belonged to Seljuks and Turks. Pop. c. 63,000; (vilayet) c. 165,000.

SIVRI-HISSAR (38° 15′ N., 26° 50′ E.), town, vilayet Angaro, Asia Minor; trade in opium.

SIWA (29° 5′ N., 25° 30′ E.), oasis, Libyan Desert, Egypt; well watered and fertile, with groves of date-palms; contains ruins of the oracle temple of Zeus Ammon and many other antiquities.

SIWALIK HILLS (30° 10′ N., 77° 50′ E.), mountain range, Dehra Dun district, United Prov. and Punjab, India.

SIX NATIONS, see IROQUOIS.

SIXTUS IV., FRANCESCO DELLA ROVERE, pope, 1471–84; b. 1414; a Franciscan; general of order, 1464; after his election to papacy embarked in expensive wars and wasted vast sums on nepotism, though personally of fine character; patron of lit. and art.

SIXTUS V., FELICE PERETTI, pope, 1585–90; b. 1521; a Franciscan; cardinal, 1570; after his election suppressed brigandage in Papal States; spent much on building, and carried through administrative reforms; formed schemes of foreign conquest; a very able man.

SKAGER-RACK (57° 50′ N., 9° 30′ E.), arm of North Sea, between Jutland and Norway.

SKAGWAY (59° 15′ N., 135° 30′ W.), city, at mouth of Skagway, Alaska; distributing point for Yukon goldfields. Pop. (1910) 872.

SKAT, Ger. card-game, played with cards above seven; suits differently valued, hearts count highest; knaves regarded as trumps. Player may play or 'pass.' *Ramsch* means no trumps except knaves, *matadores*, an unbroken sequence.

SKATE, MONGREL (*i.e.* Mongrel Skate), see ANGEL FISH.

SKATES, see under RAYS.

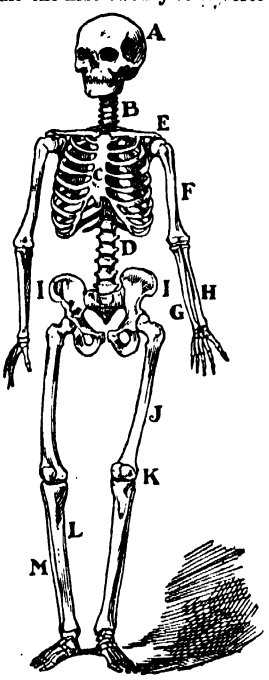
SKATING, see SPORT, WINTER.

SKEAT, WALTER WILLIAM (1835–1912), Eng. philologist; prof. of Anglo-Saxon, Cambridge, 1878–1912; voluminous writer and editor; issued his *Etymological Dictionary*, 1882, 4th edit. 1910.

SKEGNESS (53° 8′ N., 0° 21′ E.), popular watering-place, Lincolnshire, England. Pop. (1911) 3775.

SKELETON, term applied to the more or less hard and rigid framework of an animal supporting the soft tissues and protecting the internal organs; in invertebrates this structure is usually external to the soft parts, the *exoskeleton*, while in vertebrates it is chiefly internal, the *endoskeleton*, supplemented by external structures, among which must be considered the scales of fishes and the scales and scutes of reptiles, the bony plates of armadillos, the quills of porcupines, the claws and feathers of birds, the claws and nails and even the hair of mammals. The s. of a typical vertebrate, such as man, may be subdivided into the *axial skeleton*, comprising the skull (with the hyoid bone and thyroid cartilage), the spinal column, ribs, and sternum or breast-bone; and the *appendicular skeleton*, including the bones of the limbs along with the bony girdles which support them.

Axial Skeleton.—The skull (*q.v.*) is treated separately elsewhere, so that the spinal column, ribs, and sternum only will be considered here. The SPINAL or VERTEBRAL COLUMN is composed originally of thirty-three vertebræ, but in the adult the first twenty-four vertebræ remain separate, the next five join together to form the sacrum, and the last four fuse more or less completely to form the coccyx. The vertebræ differ in the different regions of the spinal column, but their main characteristics are the same, each possessing a cylindrical body, which is united by cartilage to the bodies immediately above and below, a neural arch, enclosing the nervous structure termed the spinal cord, formed by two pedicles springing from the body and closed behind by the junction of the lamina on each side, while from the arch a spinous process projects backwards, transverse processes on each side, and above and below on each side articular processes project, in articulation with similar processes of the immediately adjacent vertebræ. The first and second vertebræ are, however, peculiar — the first, which is termed the *atlas*, being in the form of a ring, without the usual body, and upon its articular facets the skull rests; the second vertebra, or *axis*, has a vertical prolongation of its body which goes through the ring of the atlas, acting as a pivot for many of the movements of the head. The spinal column is divided into five regions: the *cervical*, with seven vertebræ; the *dorsal*, with twelve, with which the ribs articulate; the *lumbar*, with five; and the fused *sacrum*, which forms part of the bony girdle of the pelvis, and *coccyx*, originally five and four respectively.



A, skull (*q.v.*) made up of 22 bones; *B*, cervical vertebræ; *C*, sternum or breast-bone; *D*, lumbar vertebræ; *E*, clavicle or collar-bone; *F*, humerus; *G*, ulna; *H*, radius; *I*, pelvis; *J*, femur; *K*, patella; *L*, tibia; *M*, fibula.

The RIBS are flat, elastic bones, curved in the form of an arch, and compose a protection for the chest. Numbering twelve on each side, the first seven pairs are connected by bars of cartilage with the sternum, while the lower five pairs are more or less free, the first three of them being attached by cartilage to the ribs above but not to the sternum, while the last two are quite free in front, and termed 'floating.' The articulations with the vertebræ behind freely allow of the movements of respiration, which are not hindered by the rib cartilages or the sternum in front.

The STERNUM, or BREAST-BONE, is flat and points slightly forwards, consisting of three parts—the *manubrium*, the upper, flat, and somewhat square portion, the *gladiolus*, the middle, flat, and rather elongated portion, and the *ensiform process*, which is short, pointed, and cartilaginous. The rib cartilages of the first pair of ribs are joined to the manubrium, and those of the next six pairs to the gladiolus.

Appendicular Skeleton.—The upper limb may be divided into the shoulder, upper arm, forearm, and hand. The bones of the shoulder are the CLAVICLE, which stretches from the scapula to the sternum, with both of which it forms articulations, and is curved, thick and somewhat triangular at the sternal, and flattened at the scapular end, and the SCAPULA, which is triangular and flat, with a prominent spine projecting right across its posterior aspect and ending in a broad process termed the *acromion*, which articulates with the clavicle, while from the border just above the antero-superior angle juts a curved process, the *coracoid*, the articular cup for the humerus, or *glenoid fossa*, lying below and between the two processes.

The HUMERUS is the bone of the upper arm and is a long bone with a rounded shaft, an upper extremity with a convex articular surface and two prominent tuberosities, and a flattened lower extremity with a rounded articular surface at its lowest part, a tuberosity or *condyle* at each side, and a hollow behind into which the olecranon process of the ulna fits, on extension of the arm.

The forearm has two bones, the RADIUS on the outer side, a long bone, with a shaft sharp on the inner side and rounded on the outer, a cup-like articular head or upper extremity below which is a tuberosity, and a broad lower extremity, articulating at its lower surface with the bones of the wrist; while the ULNA, on the inner side, is also a long bone, the shaft having two surfaces with sharp edges; the upper extremity has a deep notch for articulation with the humerus, with one prominent tuberosity above and behind, the *olecranon*, and another below and in front, the *coronoid*, while the lower extremity is round, articulating with the radius and the triangular fibro-cartilage of the wrist, and having a prominent styloid process behind.

The skeleton of the hand includes the bones of the *wrist*, CARPAL BONES, eight in number, arranged in two rows—the *scaphoid*, *semilunar*, *cuneiform*, and *pisiform* above, and the *trapezium*, *trapezoid*, *os magnum*, and *unciform* below; the bones of the palm, or METACARPAL BONES, are five in number, with a shaft compressed in the middle, the extremity nearest the wrist concave, and the farther extremity convex; the bones of the fingers, or PHALANGES, number three in each finger and two in the thumb, resembling the metacarpal in shape, except that the terminal phalanges have no articular surfaces at their farther extremities.

The lower limb may be divided into the haunch, thigh, leg, and foot. The bone of the haunch, or INNOMINATE BONE, forms part of the bony girdle of the pelvis, the innominate bone of each side joining the sacrum behind and articulating with its fellow of the opposite side at the *symphysis pubis* in front. It is an irregular, curved, flat bone, consisting in its earlier stages of development of three bones, the *ilium*, *ischium*, and *pubis*, which only unite completely to form the innominate bone about the twenty-third to twenty-fifth year of life. The three parts join together at the *acetabulum* (also called the *cotyloid cavity*), or socket of the hip-joint.

The thigh has one bone, the FEMUR, which is a long bone, the longest bone, indeed, of the body, with a smooth rounded shaft, the upper extremity consisting of a rounded, convex head, which articulates with the innominate bone, joined to the shaft by a neck, two prominent tuberosities or *trochanters* being situated at the junction, while the lower extremity has, behind, a large tuberosity on each side, the *condyles*, and in front and below is a smooth articular surface, taking part in the formation of the knee-joint.

In front of the lower extremity of the femur is a small triangular flat bone, developed in the tendon of the extensor muscles on the front of the thigh, termed the PATELLA (commonly known as the *knee-cap*), its posterior surface being smooth and forming part of the knee-joint.

There are two bones of the leg, the TIBIA, which has a shaft with three surfaces and sharp borders, a broad, flat, articular upper extremity, having a tuberosity on each side of the external with a small smooth surface to articulate with the fibula, and the lower extremity with a smooth articular surface below, and prolonged

into a prominence, the *internal malleolus*, on its inner side; and the FIBULA, which is a thin, slender, long bone with a ridged shaft, a small smooth surface on the upper extremity to articulate with the tibia, and a process forming the *external malleolus* at the lower extremity.

The foot includes the TARSAL bones, seven in number, arranged in three rows, that nearest to the bones of the leg consisting of the *astragalus*, which has a smooth surface for articulation with the bones of the leg, and the *os calcis*, the middle row consisting of the *scaphoid*, and the farthest including *cuboid*, *external cuneiform*, *middle cuneiform*, and *internal cuneiform*; the *metatarsal bones* and *phalanges* of the toes are the same in number and in their general form as the corresponding metacarpal bones and phalanges in the hand.

See BONE, FOOT, JOINT, LEG, SKULL.

SKELTON AND BROTTON (54° 33′ N., 0° 59′ W.), town, N. Riding, Yorkshire, England; iron-mines. Pop. (1911) 15,202.

SKELTON, JOHN (*c.* 1460–1529), Eng. poet; M.A., Cambridge, 1484; Poet Laureate of Oxford Univ.; took orders, 1498, and became tutor to Henry VIII.; satirised Wolsey in *Why come ye not to Court?* and *Book of Colin Clout*; other poems are *Speak Parrot*, *Book of Philip Sparrow*; famous for his 'Skeltonic Metres'—burlesque, and often doggerel, but a break-away from aureate diction and conventional metres of Chaucerians.

SKIBBEREEN (51° 33′ N., 9° 15′ W.), small market town, on Ilen, County Cork, Ireland.

SKIEN (59° 13′ N., 9° 38′ E.), seaport town, Bratsberg amt, Norway; birthplace of Ibsen. Pop. (1910) 11,870.

SKIERNIEWICE (51° 55′ N., 20° 15′ E.), town, Warsaw, Russ. Poland; has imperial castle; manufactures cloth. Pop. 10,500.

SKI-ING, see SPORT, WINTER.

SKIMMERS, see under GULL FAMILY.

SKIN is the complete covering of the whole body, and consists of two main layers, the *epidermis*, or *scarf-skin*, being the outer, and the *dermis*, or *true skin*, the inner. The epidermis, on microscopical examination, is seen to be composed of five layers, the *first* of horny scale-like cells, the *second*, or *stratum lucidum*, is a thin layer of scale-like cells without horny material, the *third* a thin layer of more swollen cells containing granules, the *fourth*, or *stratum mucosum*, is a deeper layer of polygonal cells connected with one another by minute 'prickles,' and in them is found the pigment of the skin of the coloured races, while the *fifth* consists of one layer of elongated cells.

The dermis is a vascular structure, a network of white fibrous tissue with some elastic fibres, and is composed of two layers, that nearer to the epidermis being raised into projections, or papillæ, which project into corresponding depressions in the under surface of the epidermis. These papillæ contain loops of blood vessels, and many of them also contain a *touch corpuscle*, in which nerve filaments end, and which is one of the special sense-organs of touch. In certain parts of the body, *e.g.* the tips of the fingers, the papillæ are specially prominent, and cause the epidermis to fall into parallel ridges, characteristic of those parts. In the deeper layer of the dermis the structure is looser and there is usually a considerable deposit of fat; there are many blood vessels and nerves present, while the *hair follicles* and the *sebaceous glands*, which pour their secretion into the hair follicles, are situated in this layer. A hair follicle is divided into an inner and an outer sheath, enlarges at the foot to form a bulb into which a loop of blood vessel projects, and is attached to the skin by a band of muscle fibres the *erector muscle* of the hair, which, by contracting, causes a hair to stand on end.

SWEAT GLANDS consist of minute tubes, the lower ends of which form spherical coils in the deeper parts of the dermis, or in the subcutaneous tissue immediately below. The sweat, like the urine, is an excretion of the body, the secreting glands getting rid of substances which have been formed elsewhere in the body, and it contains, in the same relative minute amount, practically the same salts as the urine. About 2 lb. of sweat are excreted by a man in twenty-four hours.

The NAILS are specially modified parts of the epidermis to protect the sensitive ends of the fingers; beginning at the root, which is covered by a fold of skin, a nail lies upon a very sensitive and very vascular part of the dermis, the *nail-bed*, and ends at a free margin.

The FUNCTIONS OF THE SKIN include the sense of *touch* (q.v.); the excretion of sweat; the regulation of the heat of the body, as when more blood passes through the skin the greater is the loss of heat by radiation, conduction, and evaporation; and respiration, carbonic acid gas being exhaled and oxygen inspired, both, however, to a very small extent in man.

Skin Diseases are of many different varieties, the chief of which are treated elsewhere under their separate heads, and may be due to many different causes. These causes include *animal parasites*, e.g. scabies; *vegetable parasites* (fungi), *e.g.* ringworm; *micro-organisms*, e.g. impetigo contagiosa, due to a streptococcus; *general infections*, with local manifestations in the skin, *e.g.* syphilis, scarlet and other fevers; *general toxæmias*, with local manifestations in the skin, *e.g.* gout, sometimes causing urticaria; *nervous affections* (*a*) affecting the vasomotor nerves, *e.g.* herpes; (*b*) affecting the sensory nerves, *e.g.* pruritus; (*c*) with trophic lesions, *e.g.* perforating ulcer. *Diseases of certain organs* may cause skin eruptions, especially the organs connected with digestion; *certain drugs* cause eruptions, *e.g.* copaiba.

SKIPPON, PHILIP (d. 1660), Eng. general; served in Netherlands; Roundhead in Civil War; distinguished at Newbury and Naseby; commander in New Model army.

SKIPTON (53° 58′ N., 2° 1′ W.), town, on Aire, W. Riding, Yorkshire, England; woollen goods. Pop. (1911) 12,981.

SKITTLES, game in which player knocks over pins arranged in group of 9 forming a square.

SKOBELEV, MIKHAIL DIMITRIEVICH (1843–82), Russ. soldier; served with distinction in Central Asia and Caucasus; took Geok Tepe, 1880.

SKOPTSI, Russ. religious sect practising mutilations; known since 1771; frequent efforts have been made to suppress it, and its members have been transported, but without much avail.

SKOWHEGAN (44° 46′ N., 69° 50′ W.), town, on Kennebec, capital, Somerset County, Maine, U.S.A.; paper and pulp-mills. Pop. (1910) 5341.

SKRAM, PEDER (*c.* 1500–81), Dan. admiral; distinguished in war against Sweden, 1518–20; commanded Dan. fleet in Dano-Swedish War, 1562.

SKUAS (*Stercorariidæ*), a family of 7 species of swimming birds closely related to Gulls, with upper mandible of beak longer than under, and strongly hooked at the tip; strong crooked claws and completely webbed toes. They are large, predaceous marine birds, which fed on fish, smaller birds, and carrion. They occur on all the oceans, but are absent from a great part of the Pacific and Indian Oceans.

SKULL.—The bones of the skull of a human being are 22 in number, 8 of them taking part in the formation of the cranium, and 14 in the formation of the skeleton of the face. The bones of the cranium include, in front, the *frontal* bone extending across the forehead, from one side of the skull to the other; the *parietal* bones, one on each side, forming the lateral walls of the cranium; the *temporal* bones, one on each side, the chief parts of each bone being the *squamous* portion, which forms part of the wall of the cranium, and the *petrous* portion, in which the internal ear is situated; the *occipital*, behind and at the base, through a circular opening, the *foramen magnum*, in which the spinal and vertebral arteries pass.

The base of the cranium is composed, in addition to the occipital bone, of the *sphenoid*, the wings of which

are seen at each side coming up to meet the parietal and frontal bones, and the *ethmoid*, a light, spongy bone of somewhat cubical shape with a sharp crest, which rises up in the interior of the cranium.

The bones of the face surround the cavities of the nose and mouth, and take part, with certain bones of the cranium, in the formation of the cavities of the orbits. They include the two *nasal* bones, plate-like little bones at the base of the nose; the two *superior maxillary* bones, which form the upper jaw and bound the nasal cavity and the internal margin of the orbit, their lower border being armed with the teeth of the upper jaw; the two *lachrymal* bones, little bones taking part in the formation of the orbit; the two *malar* bones, which form the outer part of the orbit, and are the prominent bones of the cheek; the two *inferior turbinated* bones, slight, spongy bones of the nasal cavity; the *vomer*, a sharp-edged triangular bone dividing the posterior part of the nasal cavity in two; the two *palate* bones, which form the hard palate; and the *inferior maxillary* bone, a large, hinge-like bone, articulating on each side with the temporal bones, its upper surface armed with the teeth of the lower jaw. The teeth (*q.v.*) themselves, and the ossicles of the ear (*q.v.*), are not included with the bones of the skull. All the bones of the skull, with the exception of the inferior maxillary bone, which forms a diarthrodial joint with the temporals, articulate with one another by *sutures*, many of which become completely ossified in adult life and disappear.

As regards the early development of the skull we find that the brain is, at an early stage of existence, enclosed in a membranous capsule on each side of which arises a cartilaginous bar, along with cartilaginous capsules round the early auditory (hearing), olfactory (smelling), and ocular (seeing) sense-organs. The auditory and olfactory capsules unite with the cartilaginous bars, which join below and at the sides to form the base of the case for the brain. Below this are some seven cartilaginous arches surrounding the mouth and pharynx, which, in water-breathing vertebrates, develop into the supports of the gills.

In man, the first arch develops into the upper and lower jaws, with the palate and malar bones, and the projecting internal pterygoid plate of the sphenoid, the ends of the first and second arches are developed into the tympanic ring and the ossicles of the ear, the second and third arches become the *hyoid bone* and its supports, from the fourth and fifth is developed the *thyroid cartilage*, and the rest disappear. The *hyoid bone* is united by a strong ligament to the styloid process of the temporal bone, and lies in the upper part of the neck beside the root of the tongue, an arched bone with a small body, and a wing at each side; the *thyroid cartilage* consists of two plates of cartilage united at an acute angle in front, forming practically the whole of the front and side walls of the larynx. Thus, we find that the superior maxillary, palate, and malar bones, internal pterygoid plate of the sphenoid, tympanic ring and ear ossicles, with the inferior maxillary and hyoid bones and the thyroid cartilage are all developed from the cartilaginous arches of the so-called visceral skeleton, the basal portions of the cranium and the other bones of the face are developed from cartilage, and the vault of the cranium is developed from a membranous structure. At birth several parts of the vault of the cranium are still uncovered except by membrane, those parts being termed the *fontanelles*, the most important being the space between the parietal and frontal bones, and those fontanelles may not be completely closed by bone until the second year of life. See SKELETON, BRAIN, EAR, LARYNX, and similar articles.

SKUNK, see WEASEL FAMILY.

SKY, the apparent arch or vault of heaven extending from horizon to horizon. Many theories have been framed to account for the blue colour of the s. This is really but a secondary problem, for the fundamental question is, Why is there any light or colour there at all? Clearly, if there were nothing or nothing opaque above us, the s. would show black; that it does not is due evidently to the presence of finely divided matter capable of reflecting light, and if we admit that tiny particles are there we can readily understand that their dispersion of light causes the blue of the s., which becomes deeper at higher altitudes. The presence of these particles is answerable, too, for the phenomena of twilight and everything else which involves reflective and refractive effects in the atmosphere.

SKYE (57° 20′ N., 6° 15′ W.), island, Inner Hebrides, Scotland; area, 535 sq. miles; surface is mountainous, reaching 3000 ft. in Cuillin Hills, of which highest point is Scoor Dearg; chief town, Portree. Has fine pasturage, cattle and sheep being extensively raised; excellent fisheries off coast; exports live stock, fish, wool. Has associations with Young Pretender and Flora Macdonald. Pop. (1911) 13,317.

SKYLARKS, see LARKS.

SLANDER, see LIBEL AND SLANDER.

SLANG, the name given to the use of words not found in a standard dictionary, and not recognised as current verbal coin in the interchange of language between persons of average culture. Almost all professions, trades, and classes use slang terms, inexplicable to the uninitiated; but many of these terms are approved, and become sufficiently familiar to society in general, so that in time they are standardised, finding their way at last into official speech. The Stock Exchange has its own slang, which appears in financial newspapers. Military and naval slang is found in the novels, stories, and poems relating to the services. Sporting slang abounds in the description of racing and athletic contests; the prize ring had a slang of its own. A great deal of gipsy and Yiddish slang is merely the corruption or survival of ancient forms of speech. Amer. slang is so vast and wonderful a thing that it has become practically a new language; many of its expressive phrases are now incorporated in common speech in England. Purity of taste and good manners can alone decide how far the incursions of slang are permissible in letters and in speech.

SLATE, ARGILLITE, a well-known variety of splintery rock, is a form of clay; splits into very thin plates; varies in colour from grey to blue, and is found in all countries where metamorphic rocks occur. The s. quarries of N. Wales are famous for blue s., while Cumberland gives green s., much sought after on account of its colour. Drawing s., sometimes called black chalk, contains about 10 % of carbonaceous matter, and is obtained from Italy and Spain. S. pencils are made of a soft s.

Davies, *Slate and Slate-Quarrying*.

SLATE ISLANDS (56° 12′ N., 5° 40′ W.), group of islands, Argyllshire, Scotland; includes Luing, Shuna, Torsay, Seil, and Easdale.

SLATERS, see WOOD-LICE.

SLATIN, SIR RUDOLF, CARL VON, SLATIN PASHA (1857–), Egyptian administrator; served in Sudan under Gordon; imprisoned eleven years in Omdurman; Inspector-General of Sudan, 1900.

SLAUGHTER-HOUSE, ABATTOIR.—Not until the XIX. cent. was any serious attempt made to establish public s's. Napoleon I., by a decree in 1807, ordered their erection in France, and now both in France and Germany municipal abattoirs have long been the rule. In Germany not only does the municipality erect and maintain the s., but the slaughtering of meat elsewhere is forbidden. In Great Britain municipalities are empowered to provide s's, and the town councils of Edinburgh (in 1851) and of Manchester (in 1872) early took the matter in hand. But there is no compulsion, and the erection of a municipal s. rests entirely on local option.

It is of the greatest importance to the public health that the slaughtering of animals, and the preparation of meat for food, should be under careful inspection. Hence the demand for public s's. In U.S.A. municipal

s's are not customary, but the meat inspection law of 1906 imposes a very stringent and comprehensive official inspection of all meat and meat products for human consumption, and requires the presence of inspectors in all abattoirs. Apart from the urgent need of cleanliness and the guarding against the slaughter of animals, diseased or otherwise unfit for human food, by the authorised inspection and control of all s's, humanitarian feeling prompts the necessity of conducting the slaughter of animals with the minimum amount of suffering to the victims, and urges inspection for the prevention of cruelty.

C. Cash, *Our Slaughter-House System*; H. Heiss, *The German Abattoir.*

SLAVE COAST (6° N., 3° E.), region, W. coast Africa, extending from the Benin to the Volta; divided between Great Britain, Germany, and France.

SLAVE-MAKING or **AMAZON ANT** (*Polyergus rufescens*), a European ant—the most fierce of robber-ants, specialised for fighting, of great size and strength. They attack colonies of other ants and carry off the pupæ, which, hatched in the captors' nest, become their slaves. On these slaves the Amazons altogether depend for existence, even being fed by them.

SLAVERY.—In the Mycenæan age, capture in war was synonymous with loss of personal liberty; prisoners were either employed by their captor in agricultural or domestic duties or were sold; kidnappers were not unknown. In classical Greece additional causes of servitude were sale in infancy and accident of birth; slaves in a State sometimes outnumbered citizens, and, in addition to private service, were employed in minor public offices, *e.g.* the Scythian police of Athens. They were regarded as 'living chattels' (*zoa organa*), but their condition was usually tolerable. The Helots (*q.v.*) of Sparta were in a position of serfdom and were harshly used by the Spartiates.

The Rom. State had its slave system, originating as in Greece, but producing more disastrous effects. Gangs of servile labourers supplanted the Rom. farmer, while the slaves were often treated with cruelty. The town slaves were in a much better position, and were occasionally treated as friends and at times manumitted, though there were legal restrictions to prevent this practice becoming common. Under the Empire, the lot of slaves improved; they were granted the right of appeal to magistrates, while the power of life and death was taken from their masters.

Christianity, while unable to abolish the practice, gained for slaves such concessions as facilities for manumission, validity of marriage, and full citizenship for freedmen. The slave traffic was one of the chief branches of commerce in classical times; Greeks and Asiatics fetched highest prices.

Villeinage.—The hereditary attachment of the lower classes to the land was the natural successor to absolute slavery. A serf (the Anglo-Saxon *ceorl*, or Norman *villein*) was neither slave or freeman; he was bound to the soil and compelled to give his labour in his master's service, but was permitted certain legal rights and privileges, such as exemption from military duties and right of appeal to the king's court against cruelty or oppression, although he could not own land of his own nor choose his master. He could not become a knight or clerk or make his children clerks without his lord's consent. Freedom could be won by residence in a town as a member of a guild for a year and a day unclaimed by his lord. Later the villein gave money payments instead of service, *i.e.* commenced to pay rent. By the middle of XIV. cent. villeins were no longer serfs. The Peasants' Revolt, 1381, demanded abolition of villeinage, and it completely disappeared in Elizabeth's reign. The condition of the villeins in France gradually improved after several rebellions, but up to 1789 the peasants were compelled to perform onerous services (*the corvée*) for their overlords.

In Russia an elaborate system of serfdom was established at the beginning of the XVII. cent., of much the same nature as that of mediæval Europe; Russian serfs were emancipated as late as 1861.

Modern slavery began in 1442, when one of the captains of Prince Henry the Navigator brought back from Africa 10 negroes whom he had purchased. The traffic rapidly developed, largely to supply labour for the Spanish colonies in the New World, and England became one of the chief participants; Sir John Hawkins was the pioneer of British slave-trading. It is calculated that, in 1791, 38,000 negroes were taken as slaves by British traders. Many writers, including Steele and Cowper, inveighed against the traffic, and the Quakers did all in their power to check it. In 1785 Thomas Clarkson wrote his 'Prize-Essay' (on the ethics of slavery) at Cambridge, and in 1788 a Parliamentary Committee was appointed to look into the matter. **Wilberforce** was the slaves' champion, but for long was foiled by public opinion.

In 1807 a Bill was passed prohibiting the slave trade, but the Act was systematically evaded. In 1834 all slaves in British colonies were freed, but were compelled to apprentice themselves to their former masters; £20,000,000 was paid in compensation to slave-owners; in 1838 they were fully emancipated.

Other powers followed Britain's lead—France in 1848, Holland, 1863; Denmark had abolished its slave trade in 1802.

In the United States the number of slaves was steadily increasing, especially in the Southern States. The *Fugitive Slave Laws*, passed by Congress in 1793 and 1850 to provide for the return of escaped slaves, were particularly stringent. The great American thinkers—Franklin, Jefferson, and later Emerson and Longfellow—were strenuously opposed to the system, but it fell to **Abraham Lincoln** to be the moving force in freeing the slaves by the Civil War of 1861. In 1865 slavery was finally abolished in the United States.

Shortly after the middle of the XIX. cent., voluntary labour was imported into Queensland from the South Sea Islands, but this soon degenerated into little better than the old slave trade; it was known as 'Black-birding,' but was stopped after the inquiry of 1884. (The 'Kanakas' have since been deported from Queensland.)

By the efforts of the British, the Arab slave-traders have been almost entirely exterminated, but what is practically slavery still exists in the Congo, although the Belgian Government is taking steps to rectify this.

In connection with the rubber industry in the Putomayo district of S. America several outrages have lately been reported, and a Commission of the House of Commons has been appointed to inquire into the conditions of labour.

Ingram, *History of Slavery and Serfdom* (1895); Thomas, *The American Negro* (1901); Washington, *Up from Slavery* (1902).

SLAVONIA, see CROATIA-SLAVONIA.

SLAVONIC, name given to languages spoken by Slavs. These are of two branches, E. and W.; the first comprehending Russian, Prussian, Polish, Bohemian, Servian, and Bulgarian; the second, Lithuanian, Lettish, and obsolete Old Prussian.

SLAVS, the largest race in Europe, estimated according to extent of Slavonic language at about 140,000,000 persons; have also spread in Siberia, and emigrated to America; chief divisions are the Russians, 100,000,000; the Poles, Kashubes, Wends (Lusatia), Czechs (Bohemia), Moravians, *Slovaks* (Hungary) Polabs (Slavs on the Elbe)—about 20,000,000, all north of the Danube; the *Slovenes* (Carinthia and Styria), Serb-Croats (Servia), Bulgarians, Montenegrins, Macedonians—about 20,000,000 from the Danube to the Adriatic and Ægean Seas.

Originally settled north-east of Carpathian Mountains in basins of Vistula, Pripet, and Upper Dniester, a peaceful race subject in first cent's A.D. to Goths

and Huns, they overran the Balkan Peninsula in VI. cent., and Russia under leadership of Swedes in IX. cent.; converted to Christianity (chiefly) by the great missionary enterprise of SS. Cyril and Methodius in IX. cent. Methodius instituted Slavonic prayer books, was abp. of Moravia, and d. in 885 A.D. Cyril invented a Slavonic alphabet, and with Methodius translated much of the Bible into Slavonic. In addition to the Cyril alphabet, which is used by all Orthodox Slavs, there is a Lat. alphabet used in Dalmatia, Croatia, and generally where the people are Roman Catholic, and a Glagolitic, the oldest form of all, and, like the Cyril, of Gk. foundation.

The Slavonic language really covers a number of kindred languages of the Aryan family, and may be divided as follows: (1) Russian—subdivided again into Malo Russian and White Russian; (2) Bulgarian; (3) Serbo-Croatian; (4) Slovenish; (5) Polish; (6) Bohemian or Czech; (7) Lusatian Wendish or Sorbish. In Russia and Poland and (in XIX. cent.) in Servia and Bulgaria there is a Slavonic lit. both of prose and poetry. Whilst the Slavonic language varies amongst the various Slav nations certain words are found to have a wide existence: *e.g.* the old Slavic *dumn*, house (Gk. *domos*, Latin, *domus*), is *dom* in Russia, Servia, Bulgaria, and Slovenia, and *dum* in Czech and Polish. *Zima*, again, the old Slavonic for 'winter,' is the same word in Russian, Serbian, Bulgarian, Sloven, Polish, and Czech. In Lithuanian it is *zëmd*. 'Widow' is *vidova* in old Slavonic, *vdova* in Russian and Czech, *udova* in Serbian, *vdovica* in Bulgarian (Latin, *vidua*, and Gothic, *widuwō*).

Slavonic music in Russia, notably in the folk-songs, has been largely influenced by the church music. The words are metrical, the melodies are commonly unaccompanied, and are either sung in unison to dance tunes, or in harmony, in a minor key.

There is no 'Slav type,' for too many races are interblended, but generally the Slav is broad headed, short in stature, and of pale white, swarthy, or light brown skin.

The government of the early Slavs was patriarchal, the chiefs being chosen by the assemblies of the tribes. Contact with feudalism on the west, with Mongols and the Imperial throne of Byzantium on the east, changed this, and the free peasants became serfs, and the Slavonic princes despotic. Hereditary nobility became the rule in Slavonic states about XII. cent., and the people fell to the lowest serfdom. No middle class existed, and the nobility were too powerful to allow the rise of any cities of commerce. To-day Russia, Servia, Bulgaria, and Montenegro are the independent Slavonic countries, while Bohemia, Moravia, and Croatia are part of the Austrian Empire, and Poland is distributed between Russia, Germany, and Austria.

The various Slavonic peoples are treated separately.

The Slovaks are a Slavic people dwelling in N.W. Hungary and S. Moravia. They are closely akin to the Czechs, and number about 2,000,000. Like certain of the Croats and Poles, and unlike the great mass of Slavs, they are R.C. and not Orthodox Gk. in religion. The Ruthenians of E. Austria and S. Poland use the Gk. liturgy.

The Slovenes, a South Slavic people, form the great bulk of the population in Carniola (Austria-Hungary), and are found in the neighbouring districts of Carinthia and Styria. Their migration from the home of the race in the Carpathian Mountains took place in VI. cent. For the tendency of S. towards unity, see PANSLAVISM.

W. R. Morfill, *Slavonic Lit.*

SLAVYANSK (48° 52′ N., 37° 45′ E.), town, on Torets, Kharkov, Russia; soap- and tallow-works. Pop. 17,000.

SLEAFORD (53° N., 0° 24′ W.), town, Lincolnshire, England. Pop. (1911) 6428.

SLEDGING, see SPORT, WINTER.

SLEEP, a normal condition of more or less complete unconsciousness, occurring periodically, and usually lasting each night for from six to eight hours, although children sleep normally for a much greater period. It is a period of rest and repair for all the tissues of the body, and especially for the brain, spinal cord, and nervous system generally. The onset of s. is gradual, the eyelids feel heavy, yawning is common, the head droops, there is a feeling of fatigue and a desire for s., while the intelligence and the senses are less alert.

Activity becomes lessened first in the highest centres, that is to say, the motor centres, of the brain, and this lessening of activity progresses until the lower centres in the medulla oblongata and spinal cord are involved. S. is most profound an hour after its onset, the intensity increasing rapidly up to this point, and then decreasing during the next three hours, after which period it decreases more slowly, or may even become for a time more profound until waking.

The cause of s. is not exactly known, various theories having been advanced, such as that the condition is due to asphyxia of the brain through deficiency of oxygen, but without sufficient proof of their truth. Various drugs cause s., but their effects are dangerous, and they should only be used under the supervision of a medical practitioner.

SLEEPING-SICKNESS, disease characterised in its early stages by fever and a tired feeling, tremors of the tongue and limbs, and a shuffling gait, and later by profound lethargy and wasting. It occurs in tropical Africa, and is due to a minute, worm-like parasite, *Trypanosoma gambiense*, found in the blood and cerebro-spinal fluid of affected persons, and transmitted to man by the tse-tse fly. The condition is treated with some success by injections of the arsenical compound atoxyl (or soamin, which is said to be a purer form of the same compound), best given in combination with another drug, such as mercury. See under TRYPANOSOMES.

SLEEVE VALVE, see ENGINE.

SLESWICK, SCHLESWIG (*q.v.*).

SLIDE RULE, see CALCULATING MACHINES.

SLIGO (54° 16′ N., 8° 28′ W.), county, Connaught, Ireland, bordering on Atlantic; surface is diversified, the well-wooded hills being interspersed with lakes, bogs, and fertile tracts of level land; occupations chiefly pastoral. Pop. (1911) 78,850. Capital, **Sligo** (54° 16′ N., 8° 28′ W.), on Sligo Bay; has a R.C. cathedral; ruined XV.-cent. abbey; exports cattle and agricultural produce. Pop. (1911) 11,163.

SLING, weapon for throwing missiles; fastened to the end of a short pole, it could discharge a bolt 500 yards; favourite weapon of experts in Rom. army, and later with semi-savage races. Inhabitants of Balearic Islands were famous as slingers, and were extensively employed in mediæval warfare.

SLIVEN, SLIVNO, SELIMNIA (Turk. ISLINIYE), (42° 40′ N., 26° 38′ E.), town, Bulgaria; manufactures cloth, military clothing. Pop. (1910) 25,142.

SLOANE, SIR HANS, Bart. (1660–1753), Irish physician and naturalist; studied med. at London and on the Continent, commencing practice in London, where he eventually had great success; went to Jamaica as physician to the Duke of Albemarle, 1687, making a large collection of the flora of the island, on which he wrote a valuable work; pres., Coll. of Physicians, 1719–35; pres., Royal Soc., 1727–40; first physician to the king, 1727; on his death his large library and varied collection were sold to the nation by the terms of his will, this forming the beginning of the Brit. Museum.

SLOE, BLACKTHORN (*Prunus spinosa*), plant of order Rosaceæ; flowers resemble hawthorn; fruit is black and bitter.

SLONIM (53° 4′ N., 25° 23′ E.), town, on Shchara, Grodno, Russia. Pop. 26,000.

SLOTHS, see under EDENTATES.

SLOUGH (51° 31′ N., 0° 35′ W.), town, Buckinghamshire, England. Pop. (1911) 14,985.

SLOUGHING, see REPTILES.

SLOVAKS, see SLAVS.

SLOVENES, see SLAVS.

SLOW LEMURS, see LORIS, POTTOS.

SLOW WORMS, see under LIZARDS.

SLOYD, Finnish system of manual training; much practised in Sweden, whence it came to Britain; its influence is seen in modern technical education, especially 'Woodwork' in schools.

SLUGS, see GASTEROPODA.

SLUYS, BATTLE OF, naval battle, June 24, 1330, when English under Edward III. defeated Fr. fleet commanded by Quiéret and Béhuchet.

SMALL HOLDINGS, term given to portions of land possessed by peasants, separate from their own dwellings, and cultivated to increase their incomes. It has long been recognised that the agricultural labourer could expect not only payment in money, but certain privileges on the land. In the Middle Ages this was obtained by the curious 'open field' system. In the XIV. cent., after the Black Death, there were many enclosures, but most was still unenclosed till the XVIII. cent., when great enclosures were made, so that by the middle of the XIX. cent. there was little common land left. This was on the whole a good thing, but the villagers were often hard hit, as it was not they but the landlord who was compensated.

Various acts were passed from 1806 onwards to encourage the granting of allotments, but they were not really successful, being taken advantage of in very few places. The most important were the Allotments Act, 1887, the Small Holdings Act, 1892, and the Small Holdings and Allotments Act of 1907. Meanwhile, in several places more has been achieved by private enterprise than by legislation, the experiments of the Marquess of Lincolnshire on his Sleaford estate having been particularly successful. There are many more small holdings in France, Germany, Belgium, and Denmark than in England.

SMALL ISLES (57° N., 6° 25′ W.), Hebridean parish, Inverness-shire, Scotland, comprising islands of Canna, Sanday, Rum, Eigg, Muck. Pop. (1911) 396.

SMALL-POX, VARIOLA, acute contagious disease, caused by a micro-organism not yet discovered, characterised by fever and the appearance on the body of an eruption, which passes through the stages of papule, vesicle, pustule, and scab. The early history of the disease is obscure, but it has been known in Asia from a very early period, and seems to have spread throughout Europe at the time of the Crusades, was known in England before XIII. cent., and was introduced into America by the early Span. explorers.

The incubation period is about twelve days, the first symptoms being sudden onset of fever, with headache, often vomiting, and severe pain in the back. Although a prodromal rash may appear in the stage of primary fever, the eruption proper appears about the third day after the symptoms of the disease have become evident, as papules which are hard to the touch, first appearing on the face, and spreading over the trunk and extremities, the lower part of the body being least affected. The papules become vesicular in a day or two, and in a week the vesicles are pustular. A few days later the pustules commence to dry up into scales, which eventually fall off, sometimes leaving pitted scars. Several varieties of the disease are described, varying with the extent and character of the eruption, *mild, discrete, confluent, hæmorrhagic,* and *malignant,* death usually resulting in the last at an early stage.

The case mortality in s. of persons who have been vaccinated is about 5 %, while of the unvaccinated it is 37 %; and the disease is no longer a disease of childhood, as it was before vaccination was introduced, but a disease of adult life. These facts are sufficient to show the benefit of vaccination, and this is also borne out by the statistics of cases of s. in those countries where the population is well vaccinated, compared with those where vaccination is incompletely carried out. Vaccination modifies the severity of the disease even after the person has been exposed to infection, so that it should be performed in all persons who have been exposed to infection when a case occurs.

The treatment of a case of s. is simply the administration of salines, light and nourishing food, *e.g.* milk and soups, antiseptic gargles for sore throat, and to watch for and treat complications as they arise. Compresses, soaked in cold water, with a few drops of carbolic acid, are sometimes applied to the face to prevent pitting.

The preventive treatment includes isolation of cases, thorough disinfection of rooms, and anything with which affected individuals have come in contact, and vaccination of all persons exposed to infection.

SMALRIDGE, GEORGE (1663–1719), bp. of Bristol, 1714.

SMART, CHRISTOPHER (1722–71), Eng. poet; his mind gave way, 1751, and in an asylum he wrote his only notable poem, *A Song to David.*

SMELL, the sensory apparatus, stimulation of which occasions olfactory sensations; consists of end-organs in the olfactory epithelium, which occupies part (in man a small part) of the mucous membrane of the nose. The stimulus consists of vaporised particles which pass from odoriferous substances to the nose. Total *anosmia* (inability to smell) is not very uncommon; partial anosmia is frequent, *e.g.* when due to catarrh or smoking. Congenital inability to smell certain odours only has been recorded, and prolonged stimulation by any odour fatigues the nose for that odour. No satisfactory classification of odours has been made; Zwaardemaker suggested the following: (1) Ethereal, (2) Aromatic, (3) Balsamic, (4) Amber-musk, (5) Allyl-cacodyl (*e.g.* asafœtida), (6) Burning, (7) Caprylic (*e.g.* cheese), (8) Repulsive, (9) Nauseating.

SMELT, see under SALMON FAMILY.

SMELTING, see METAL (METALLURGY).

SMERDIS, s. of Cyrus, assassinated by brother Cambyses (*c.* 525). Gaumata, a priest, personating him, usurped throne, 522 B.C., but was killed next year.

SMETANA, FRIEDRICH (1824–84), Bohemian pianist and composer; wrote several notable operas and symphonic poems.

SMETHWICK (59° 29′ N., 1° 58′ W.), town, Staffordshire, England; glass and chemical works. Pop. (1911) 70,681.

SMILES, SAMUEL (1812–1904), Brit. author; first practised medicine; later took to journalism, and became known for a series of books, of which *Self-Help* had the most notable success.

SMITH, ADAM (1723–90), Brit. economist; b. Kirkcaldy, Scotland; ed. Glasgow Univ. and Balliol Coll., Oxford; prof. of Logic at Glasgow, 1751, and of Moral Philosophy, 1752; pub. his *Moral Sentiments,* 1759; travelling tutor to Duke of Buccleuch, 1763–66, visiting chief cities of France. S. began his great work, *The Wealth of Nations,* at Toulouse, and saw it published, 1776. He was commissioner of customs at Edinburgh, 1778–90. S. held that 'moral sentiments' were founded on fellow-feeling rather than on self-interest.

The *Wealth of Nations* stands as one of the world's greatest economic works. S. defines political economy as 'an inquiry into the nature and causes of the wealth of nations.' Human commodities, necessaries, and conveniences are seen to be the 'nature' of the wealth, and labour to be the 'cause.' In spite of the 'moral sentiments' the great argument of the *Wealth of Nations* is the freedom of the individual to sell his labour and his goods where he will, 'and to bring both his industry and capital into competition with those of any other man.' The influence of the book was not immediate, but when once its economic teaching had been grasped by public men it was enormous. The Free Trade and *laissez-faire* doctrines expounded by Bright and Cobden, and put into operation by Huskisson, Peel, and Gladstone, had Adam Smith for their founder. The *Wealth of Nations* has been translated into every important language.

Life, by Rae, Haldane, Hirst, Macpherson.

SMITH, FREDERICK EDWIN (1872–), Eng. politician (Unionist) and lawyer; P.C., 1911;

authority on international law; brilliant speaker; M.P. since 1906; rose rapidly in party politics, becoming one of most uncompromising leaders in House of Lords and Home Rule controversies.

SMITH, GEORGE (1840–76), Brit. Assyriologist; engaged first at the Brit. Museum; went later to Nineveh on a mission of discovery, with important results; author of several authoritative works.

SMITH, GEORGE ADAM (1856–), Presbyterian Biblical scholar; principal of Aberdeen Univ. since 1909.

SMITH, GERRIT (1797–1874), Amer. philanthropist, who gave away 200,000 acres, in holdings of 50 acres, to poor men; strong supporter of emancipation; member of Congress, 1852.

SMITH, GOLDWIN (1824–1910), Brit. historian; sec. to Oxford Commission, 1854; Education Commissioner, 1858; held chair of Modern History, Oxford, 1858–66; prof. of Eng. History at Cornell, New York, 1868; Senator, Toronto Univ., 1871; wrote political histories of Great Britain and U.S.A.; suggested annexation of Canada by U.S.A.

SMITH, HENRY BOYNTON (1815–77), Congregationalist minister; prof. at Union Theological Seminary, New York, U.S.A.

SMITH, HENRY JOHN STEPHEN (1826–83), Brit. mathematician; b. Dublin; ed. Rugby and Oxford; Savilian prof. of Geometry, 1861; F.R.S., 1861; author of important works on theory of numbers, elliptic functions, and geometry.

SMITH, JAMES, and **HORACE** (1775–1839, and 1779–1849), brothers; b. London, noted for *Rejected Addresses*, a parody of certain distinguished writers, suggested by an advertisement of the management of the new Drury Lane Theatre, inviting an address for the opening of that house in 1812.

SMITH, JOHN (1579–1631), Virginian colonist; b. Willoughby, Lincolnshire, of humble parents; led life of marvellous adventures, described by himself in his *Generall Historie*, about which an Eng. gentleman of the time wrote: 'The author hathe not spared to appropriate many deserts to himself which he never performed, and has stuffed his relacyons with many falsetics and malycyous detractyons.' As leader in Virginian expedition, 1606, S. showed himself valiant and capable, but again embellished history in *True Relation of such Occurrences and Accidents of Note as hath passed in Virginia since the first planting of that Colony*, 1608; explored Chesapeake, made maps of bay, etc.; befriended by Indian maiden Pocohontas; app. pres. of colony, 1608; arrival of fleet of new colonists led to his resignation, 1609; made map of New England coast, 1614; app. Admiral of New England, 1617, for expedition which never came off; author of numerous tracts to be found in Arber's reprints; romantic, attractive character.

Bradley, *Life* (1905).

SMITH, JOSEPH, see MORMONS.

SMITH, SIR HENRY GEORGE WAKELYN, Bart. (1787–1860), Brit. general; served in Peninsular and Amer. Wars; distinguished in Kaffir War, 1834–36, and Sikh War, 1845–46; won brilliant victory at Aliwal, 1846; High Commissioner of S. Africa, 1847; conducted second Kaffir War, 1851–52. Harrismith (*q.v.*) and Ladysmith (*q.v.*) perpetuate his name and his wife's.

SMITH, SIR WILLIAM SIDNEY (1764–1840), Brit. sailor; served in Fr. wars; imprisoned in Paris, 1796–98; successfully conducted defence of St. Jean d'Acre when besieged by Napoleon, 1799; admiral, 1841.

SMITH, SYDNEY (1771–1845), Eng. scholar, divine, and wit.; ed. at Winchester and New College, Oxford, where he became a fellow; went to Edinburgh and studied philosophy; started *Edinburgh Review*, 1802; app. incumbent of Foston-le-Clay in Yorkshire, 1806, where he settled, 1808, doing much good work; prebend. of Bristol, 1828; rector of Combe-Florey (Somerset), 1829; canon of St. Paul's, 1831. S. was a vigorous upholder of Catholic emancipation, which he advocated in famous *Peter Plymley's Letters* (1807–8); *Three Letters to Archdeacon Singleton on the Ecclesiastical Commission* appeared (1837–39). But for his outspokenness he might have become a bp. He originated the story of Mrs. Partington and her broom, and was noted for his brilliant, audacious wit.

Reid, *Life and Times* (1884); Russell, *Life* (1905).

SMITH, THOMAS SOUTHWOOD (1788–1861), Eng. physician; practised med. at Yeovil and afterwards in London, where he became physician to London Fever Hospital; author of a standard work on *Fever*; an authority on fever epidemics and sanitary affairs.

SMITH, WILLIAM (1769–1839), Eng. geologist; known as 'the father of Eng. geology'; started as farmer; took up surveying and land draining; engineer for Somerset Coal Canal, 1794; prepared valuable geological maps of England; awarded Wollaston medal by Geological Society, London, 1831.

SMITH, WILLIAM FARRAR (1824–1903), Amer. soldier; Federalist; distinguished at *Antietam*; commanded division at *Fredericksburg*; major-general, 1864.

SMITH, WILLIAM ROBERTSON (1846–94), Scot. philologist and Biblical critic, etc.; b. Keig, Aberdeenshire. In 1870 he became prof. of Oriental Languages and Old Testament at the Free Church Coll., Aberdeen, but certain articles of his on the higher Biblical criticism so offended the Church authorities that he lost his chair. In 1882 he became editor of the *Encyclopædia Britannica*; app. prof. of Arabic at Cambridge, 1883.

SMITH'S FALLS (44° 57′ N., 76° 20′ W.), town, Lanark County, Ontario, Canada; lumber. Pop. 6700.

SMITHSONIAN INSTITUTION was created at Washington by Act of Congress, 1846, in accordance with the will of JAMES SMITHSON (1765–1829), a wealthy Englishman and Fellow of the Royal Society, who bequeathed $515,000 to the U.S.A. to the 'increase and diffusion of knowledge among men.' The trust was not accepted for ten years, but in 1847 the plan was adopted for 'increasing knowledge' by an institute for scientific research. A National Museum, Research Library, Bureau of American Ethnology, Zoological Park, and Astrophysical Observatory are now attached to the Institution. See Goode's *The Smithsonian Institution* (1897).

SMOKE, visible vapour which rises from a burning substance; gaseous exhalations charged with minute particles of carbonaceous matter or soot. S. is the product of imperfect combustion of such substances as wood or coal. The s. nuisance in large manufacturing towns charges the atmosphere with soot and dirt particles which penetrate everywhere.

Brit. Acts of Parliament (Public Health (London) Act, 1891, etc.) prohibit the discharge of s. from factory chimneys, but this is not enforced although several methods of s. combustion have been invented. These chiefly deal with introducing oxygen to the particles of carbon so as to make them burn. In warm weather the s. of towns gets away and is unnoticed in the atmosphere, but in winter or cold weather, when the atmosphere is charged with moisture, the s. is kept down and, mixing with the moist atmosphere, causes the black or brown fogs so common in our large towns. The s. of coal is black and of an oily and tarry nature, peat s. is azure blue, while burning wood gives off an almost invisible smoke, mainly composed of carbonic acid.

Smoke Abatement, by Graham, and by Nicholson (1906); *Smoke Prevention*, by Kershaw (1904), Nicholson (1902), Popplewell (1901), and Bar.

SMOKELESS POWDER, see GUN-COTTON, CORDITE, EXPLOSIVES.

SMOLENSK (55° N., 33° E.), government, Russia; hilly or undulating; forest-clad; principal river is the Dnieper; chief occupation, agriculture. Pop. (1910) 1,949,600. **Capital, Smolensk** (54° 49′ N., 32° 3′ E.), on Dnieper; has an old citadel, cathedral,

and numerous churches; scene of a victory by French under Napoleon in 1812. Pop. (1910) 59,000.

SMOLLETT, TOBIAS GEORGE (1721–71), Scot. novelist and man of letters; b. Dalquhurn, Dumbartonshire; of good family and education; studied med. but early aspired to literary fame; went to London at eighteen to make fortune with tragedy *The Regicide*, but naturally failed; sailed as surgeon's mate on warship to West Indies, 1746; failing as physician, took to novel-writing and hack-work with marked success, although financially S. never flourished; cynical, but warm-hearted. His three best-known works are *Roderick Random* (1748), *Peregrine Pickle* (1751), and his masterpiece, *Humphrey Clinker* (1771). All are 'picaresque' romances, with no plot worth mentioning, full of personal experiences, humour, and observation. S. had great narrative faculty; *Random* is written in first person, *Pickle* in usual biographical fashion, and *Clinker* in form of letters. All are tainted with coarseness. S. also wrote a *History of England*, *Count Fathom*, *Sir Launcelot Greaves*, *The Adventures of an Atom* (political lampoon), *Travels through France and Italy*, trans. of *Don Quixote*, etc.

Works, edit. by Henley and Seccombe (1899–1902); *Life*, by Smeaton (1897).

SMOLT, see under SALMON FAMILY.

SMUGGLING is the secret importation into any country of goods liable to Customs duty, for the purpose of escaping the Customs. It is an offence punishable by fine or imprisonment. Formerly s.—chiefly of spirits, tea, and tobacco—was carried on by organised and armed bands, and was a serious business, requiring the maintenance of an extensive Preventive Service (king's cutters and land officers). It has been often described in fiction (notably in *Guy Mannering*).

SMUT, see FUNGI.

SMYRNA (38° 26′ N., 27° 7′ E.), chief port of Asia Minor, situated at head of Gulf of S., on arm of Ægean Sea; built on amphitheatre of hills rising from head of gulf; partly Turkish and partly European; seat of R.C., Gk., and Armenian archbishoprics; headquarters of Turk. provincial gov.; important depôt for Turkey carpets. S. was founded by Gk. colonists, and was a flourishing commercial centre in VII. cent. B.C.; pillaged by Lydians in 630 B.C.; subsequently belonged to Romans and Byzantines; taken by Turks, 1424. Pop. *c.* 250,000.

SMYTH, CHARLES PIAZZI (1819–1900), Brit. astronomer; b. Naples; app. assistant at Cape Observatory (S.A.), 1835; Astronomer-Royal, Scotland, 1845; ascended Peak of Teneriffe, 1856.

SMYTH, JOHN (1570–1612), Eng. Nonconformist theologian; first Anglican, then went to Amsterdam and became Mennonite; next became Baptist, rejecting infant baptism; baptized himself, hence called *Se-Baptist*; wrote several works; a man of fine character.

SMYTH, WILLIAM (1460–1514), bp. of Coventry and Lichfield (1493), of Lincoln (1496).

SNAILS, see GASTEROPODA.

SNAKE BIRDS, or DARTERS (*Plotidæ*), a family of Cormorant-like birds, with long, slim necks and small heads (hence their second name). They occur near rivers, lakes, and sea lochs in tropical and subtropical regions, where they prosecute their fishing during twilight and at night.

SNAKE-FLIES, CAMEL-FLIES (*Raphidiidæ*), a family of Neuropterous insects, named on account of a neck-like prolongation of head and thorax. The larvæ live in rotting wood, where they feed upon insects; found in Europe, Asia, and N. America.

SNAKE RIVER, LEWIS FORK (42° 30′ N., 114° W.), longest tributary of Columbia (*q.v.*), N. America; length, *c.* 1000 miles; rises in Shoshone Lake; flows through deep cañons.

SNAKES AND SERPENTS, constituting the order Ophidia, while absent from many islands, including Ireland, Iceland, and New Zealand, are distributed all over the world, but are most abundant in the tropics. They are well known by their elongated, limbless form, adapted for their creeping mode of life. Except in Pythons, Boas, and a few others where external spurs representing hind-legs are present, there is no trace of any exterior structures or appendages. The skin, shed periodically, is covered with scales, which in the head portion are so developed as to form protecting plates. The vertebræ are very numerous, amounting in some Pythons to over 400. The teeth are fused to the jaw; no external ear and no eyelids are present, the latter feature distinguishing the snake-like and limbless Lizards from true Snakes. The bifurcated tongue is specially sensitive both to touch and air vibrations. Within the mouth there is sometimes present a poison gland, associated, in the forward part of the upper jaw, with fangs attached to a movable bone, the whole serving as successful weapon of defence and instrument for killing prey.



VENOMOUS SNAKE'S HEAD. *F*, poison fang; *L*, lower jaw; *M*, upper jaw; *S*, sheath of fang; *T*, tongue.

One of the most striking characteristics of the snake is its ability, by means of the movable bones of the skull and elasticity of skin, to swallow animals much larger than the normal size of its mouth and throat.

The great majority of snakes lay limy-shelled eggs, but in a few, such as the British Adder, the young are born alive; yet some normally egg-laying species have been known to become viviparous in confinement.

Snakes move with great agility and grace by means of the broad, flattened scales which lie along their under-surface. By moving these forwards and backwards with a lever-like motion, they are enabled to glide over rough and smooth ground, while many are expert climbers, and pass most of their time on trees, feeding on birds' eggs and young birds. Some species (*Typhlopidæ*), with eyes hidden under scales, have adopted a burrowing habit, while in the Indian Ocean and tropical Pacific exceedingly poisonous SEA-SNAKES or SEA-SERPENTS (*Hydrophiinæ*) are found, which, with their flattened tails, paddle on the surface in crowds numbering several dozens.

Snakes may be roughly grouped according to their prey and mode of capturing it. There are the simple insectivorous burrowers, such as *Typhlops*, which feed only upon termites and insect larvæ. There are the great Constrictors, the largest of snakes; one, the RETICULATED PYTHON (*Python reticulatus*), reaching a length of 30 ft. The Constrictors, which include Boas and Pythons, are mostly arboreal; some, however, are quite small, and a few have taken to burrowing habits. These creatures live almost entirely on birds or mammals, some of the large forms having been known to swallow small antelopes. They have no poison fangs, and all kill their prey by squeezing it to death. A well-known type of Python is the CARPET SNAKE (*Python spilotes*) of New Guinea and Australia.

Apart from the Constrictors, there are other non-venomous snakes which live upon small mammals swallowed directly. To this group belong the BRITISH GRASS-SNAKE (*Tropidonotus natrix*) and the SMOOTH SNAKE (*Coronella*). Lastly, there may be mentioned the venomous snakes, which poison their prey before swallowing. Many are brilliantly coloured, and they include such forms as the English ADDER or VIPER, the only British poisonous snake, the Indian COBRA, and the N. American RATTLESNAKE, distinguished by a series of loose horny rings at the tip of its tail.

It has been recently proved also that S. African BOOMSLANG or TREE SNAKE (*Dispholidus typus*), long considered an almost harmless species, possesses highly active venom, and can inflict dangerous wounds.

'SNAKE-STONES,' fossil Cephalopoda (*q.v.*).

SNAPDRAGON (*Antirrhinum*), genus of plants, order Scrophulariaceæ (*q.v.*); name derived from corolla closing with a snap on pressure.

SNEEK (53° 2′ N., 5° 39′ E.), town, Friesland, Netherlands; butter and cheese mart. Pop. 13,010.

SNIATYN (48° 27′ N., 25° 32′ E.), town, on Pruth, Galicia, Austria; horse market. Pop. 12,500.

SNIDER, see RIFLES.

SNIPE, see under PLOVER FAMILY.

SNORRI STURLASON (1179–1241), Icelandic historian; undertook to secure submission of Iceland to Haakon of Norway; afterwards lost royal favour; killed, 1241; wrote *Heimskringla*, history of Norwegian kings, and prose *Edda* (q.v.).

SNOW, frozen water-vapour which crystallises round nuclei of dust, assuming hexagonal shape.

SNOW LEOPARD, see under CAT FAMILY.

SNOWDON (53° 5′ N., 4° 4′ W.), loftiest mountain (3560 ft.) of Wales; in Carnarvonshire.

SNOWDROP (*Galanthus*), genus of plants, order Amaryllideæ; Common s. (*G. nivalis*) flowers in Feb. or March.

SNUFF, see TOBACCO.

SOAPS are metallic salts of stearic, palmitic, and oleic acids. Only the alkali s's are soluble in water. S's are made by decomposing natural fats by caustic alkali solution. These are the glyceryl $(C_3H_5)'''$ salts or esters (glycerides) of the above fatty acids; and their *saponification* yields glycerol (glycerine) as a by-product; thus, *e.g.* :—

$$(C_{17}H_{35}COO)_3C_3H_5 + 3HONa = 3C_{17}H_{35}COONa + C_3H_5(OH)_3$$

Glyceryl stearate (=stearine). Sodium stearate (=soap). Glycerol.

The fats employed are tallow, bone grease, house grease, palm oil, cocoa-nut oil, linseed oil, cotton-seed oil, etc.; and usually they are heated with caustic soda solution till saponification is complete; then common salt is added to separate the s., which is insoluble in brine (salting out), and the glycerine may be recovered from the liquor. *Soft* s. is produced when potash is substituted for soda, and the glycerine and water remain. S. is also made by neutralising with alkali carbonate the fatty acids obtained from fats by decomposition with lime or sulphuric acid, or, more recently, by enzyme fermentation.

Hurst, *Soaps*; Gadd, *Soap Manufacture*; Watt, *Soap-Making*.

SOAP-STONE, see TALC.

SOAPWORT (*Saponaria*), genus of plants, order Caryophyllaceæ; Common S. (*S. officinalis*) contains Saponin (*q.v.*).

SOBAT (8° 36′ N., 33° 35′ E.), river, N.E. Africa; rises in Abyssinian highlands, flows W.N.W.; joins White Nile.

SOBIESKI, JOHN, see JOHN III.

SOCIAL WASPS, see WASPS.

SOCIALISM, an economic theory for regulating the production and distribution of goods by getting rid of competition and making the community the sole proprietors of the land, the machinery, and all mechanical instruments of wealth production. ROBERT OWEN in England, 1835, and LEROUX, ST. SIMON, and FOURIER in France, 1838, were the first to use the term. The S. of these men is called *Utopian*, because it was preached as a new order of society that would come into operation by the goodwill of men, and only waited for that goodwill. The modern S., which dates from KARL MARX and ENGELS, is called *scientific*, because it is alleged by its founders and their followers that S. will be brought about, as an inevitable process of human evolution, by the working class, who, perceiving they are deprived of the greater part of the wealth they create, will unite to obtain that political power which will place them in command of the forces of government and thereby enable them to displace the capitalists and landowners.

A still more recent school of Socialists, called *Revisionists* on the Continent, and represented in England by the LABOUR PARTY, are content to extend gradually the scope of government activity, and to legislate in Parliament for the protection of the working class and the raising of the labourers' standard of comfort. The *Fabian Society* (founded 1883) co-operates with the Independent Labour Party, preaches intellectual S., and deprecates revolutionary methods approved by the Brit. Socialist Party (formed 1911). A sort of aristocratic S. was expounded by Ruskin; and other great Eng. thinkers have supported the Socialist movement by their writings. In France the *Commune* (*q.v.*) was a Socialist insurrection. The Socialists under Jaurès are influential in the Fr. Parliament, supporting Radicals and 'Radical-Socialists' on many questions. In Germany the Social Democratic Party has since Lassalle's time (d. 1864) been making rapid strides; in 1912 they gained 110 seats (as against 53 in 1907) and polled 4¼ million votes. Socialism is also strong in Belgium, Russia, Austria, Denmark, Italy, and other parts of Europe; and Socialistic legislation is promoted by Labour governments in Brit. Australasia.

The essence of S. is the abolition of poverty, by securing an even distribution of the total amount of wealth produced, and by making it impossible for one or more persons to make profit out of the employment of others. The obvious ills of the industrial system of the XIX. cent., and the doctrine of *Laissez-Faire*, brought the theory of S. into existence and won popularity for it. The claim of the Socialists is that the establishment of their teaching would end not only poverty, but all unemployment and all disputes between labour and capital, and secure for all a worthy livelihood.

Apart from the State Socialists who look to government regulation, there are Christian Socialists who seek to apply the principle of association by voluntary co-operation.

Ramsay Macdonald, *Socialism*; Flint, *Socialism* (1908); Kirkup, *An Inquiry into Socialism* (1907) and *History of Socialism* (1906); Ellis Barker, *British Socialism* (1908); Snowden, *Socialism* (1913).

SOCIETIES, LEARNED, are associations for the promotion and propagation of lit., science, and art, through the converse of learned men and from purely disinterested motives. Soc's originated with the schools of Greece and notably the *Academy*.

The first or 'old' Academy (347–270 B.C.), mainly Pythagorean in doctrine, was said to embrace all culture and learning. Its leaders were Spensippus, Xenocrates, Polemon, Cantor, and Crates. The second or 'middle' Academy dates from 316–241 B.C., and was founded by Arcesilaus. It emphasised probability rather than reality, and this tendency ultimately produced the extreme scepticism of the third or 'new' Academy (214–129 B.C.), under Carneades. The Museum of Alexandria, founded at the beginning of the III. cent. B.C. by the first of the Ptolemies, became the meeting-place of the votaries of all the arts and sciences. At Constantinople in the early IX. cent. A.D. Cæsar Bardas founded a State institute for the promotion of science, in rivalry probably of the Western centres of learning at Granada, Corduba, etc. In 782 Charlemagne founded his *Palatine Academy*, with Alcuin at the head; it was instituted to foster the studies of math's, history, and letters. The Academy founded by Alfred the Great at Oxford is now an exploded myth.

More modern in organisation were the soc's of the Troubadours in the early XIV. cent., of which the *Académie des Jeux Floraux* is a direct descendant. In Italy of the Renaissance we see the nearest approach to the modern learned soc. The most celebrated association was the *Academia Platonica*, founded 1442, by Cosimo de' Medici. In 1582 the *Academia della Crusca* was founded at Florence with the specific aim of purifying the Ital. language. Most celebrated of all Academies is the famous *Institut de France*.

In Germany the most famous associations are the *Collegium Curiosum* (1672) and the *Akademie der Wissenschaften*.

The chief Brit. learned soc's are the *Royal Society of London*, founded by the followers of Bacon (1660), the

Dublin Philosophical (or Royal Dublin) (1684), the Royal Physical, of Edinburgh (1771), Highland and Agricultural (1784), the Linnæan (for the promotion of Bot. and Zool.) (1788), Royal Medical and Chirurgical (1805), Royal Geographical (1830), Brit. Association (1831), the Brit. Association for the Advancement of Sciences (1831), Brit. Medical Association (1832), Royal Botanical (1834), Royal Soc. of Arts (1847).

Amer. societies are: Amer. Philosophical (1743), Connecticut Academy of Arts and Sciences (1799), New York Academy of Sciences (1817), Boston Soc. of Natural History (1830), Smithsonian Institution (1846), Amer. Association for Advancement of Science (1847), Amer. Geographical (1852), National Academy of Sciences (1863), Social Science Association (1865), Amer. Chemical (1876), Amer. Folklore (1888).

Since the XVIII. cent. the tendency has been towards specialisation. See ACADEMY.

SOCIETY ISLANDS (17° 39′ S., 149° 30′ W.), archipelago, in Polynesia, S. Pacific, belonging to France; volcanic and fertile. Total area, c. 800 sq. miles. Pop. (estimated) 20,000. Chief island, Tahiti; exports copra. Capital, Papeete.

SOCINUS, two Ital. Prot. theologians, called SOZZINI.—**Lælius** (1525–62), threatened by the Inquisition, settled at Zürich and became leader of Swiss and Ger. reformers. Though not openly denying the doctrine of the Trinity, he was suspected of unorthodoxy, and found it prudent to keep quiet; the Inquisition seized the family property on his f.'s death, and he lived latterly under the protection of King Sigismund II. of Poland.—His nephew, **Faustus** (1539–1604), studied law, living at Lyons and Zürich, then at Medician court in Florence, then in Transylvania and Poland, becoming leader of new Unitarian or anti-Trinitarian movement called after him *Socinian*. Like Anabaptists, Socinians objected to government authority, whether civil or military. After S.'s death his movement continued in Poland, where it was finally crushed out, and in Transylvania, where it still exists.

Gordon, *Faustus and Lælius Socinus* (Heroes of Reformation Series).

SOCIOLOGY (Lat. *socius*, companion, and Gk. *logos*, science), term introduced by Comte (1839) for comprehensive study of fundamental laws of social phenomena; the science of man in society: not identical with political science, as Sidgwick supposes, since the social consciousness is wider than the political, nor merely the sum of the separate social sciences, but a common basis for all these, investigating the first principles taken by them as their postulates.

The beginnings of a scientific observation of social facts are found in Plato's *Republic* and Aristotle's *Politics*; both philosophers interpret the society organised in the city state as the best means to the most perfect life, a political view of the science influencing even recent theories. In the Middle Ages fragmentary studies of social phenomena are found, economic, legal, political, ecclesiastical, the *De Regimine Principum* of Aquinas enjoying a reputation almost as great as Aristotle's *Politics*, but the work was left incomplete. Montesquieu and the physiocrats developed an objective explanation through race, heredity, historical conditions; Grotius, Hobbes, Locke, Hume, Bentham, and Kant attempted a subjective, through human nature, utility, and ideals. Comte, however, first viewed society as indivisible and organic, and social science as positive in method, based on wide observation, and freed from metaphysical and supernatural elements. Since Comte, s. has developed on evolutionary lines, making use of the writings of Darwin, Huxley, Wallace, and Spencer; it interprets human society as bound by the laws of natural causation, refusing to regard humanity as a law unto itself. For Spencer, society, like the living organism, passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity, these changes making for equilibration of energy between the organism and its surroundings. Perfect equilibrium is never reached, and society is a 'moving equilibrium.' Spencer attempts to trace the religious and political sanctions to fear respectively of the dead and of the living, and to show that militarism and industrialism create diverse types of national character, employing extensively anthropological and ethnological data to establish these propositions.

More recently, inquirers tend to form different schools, according to the method pursued. The Biological school (Schäffle, Réné-Worms) regards society as an organism, and social reform as needing a social pathology based on a sound knowledge of the anatomy of society. The anthropologists, Letourneau, Gumplowicz, M'Lennan, Bachofen, Tylor, Frazer, and Karl Pearson, have investigated primitive forms of society, the evolution of the family, clan, tribe, and nation. Galton, Pearson, and Levasseur have adopted a statistical method to examine the distribution of races, nationalities, crime, pauperism, and religion. Much emphasis has been placed on psychological analysis, to discern the fundamental fact on which social phenomena depend. This distinctive fact is taken by Novicow to consist of a progressive modification of struggle by alliance; by De Greef, of contract; by Tarde, of imitation, preceding all mutual aid and division of labour; by Durkheim, of coercion of individual minds by external modes of thought and action; by Giddings, of 'consciousness of kind.'

The problems of S. include those of aggregation, of association and mutual aid, of the social character of the population, of the mental activity of individuals and of masses, of the evolution of society, and of the development of the interaction between conscious motives and physical forces.

Giddings, *Principles of Sociology* (1896); Herbert Spencer, *Study of Sociology*; Granger, *Historical Sociology* (1911); Ferri, *Criminal Sociology* (1895).

SOCOTRA, see SOKOTRA.

SOCRATES (c. 470–399 B.C.), Gk. philosopher; b. Athens; s. of a mason-sculptor. S. did not long follow his f.'s trade, but managed, though poor, to live frugally without a regular trade. He took little part in public affairs, though both in battle and in the Assembly he performed necessary civic duties with courage; but spent his time among friends and acquaintances talking, discussing, searching after knowledge. Though popularly reckoned a Sophist, he neither wrote nor professed to teach, or even to possess, knowledge, but only to be a learner conscious of his ignorance, yet able by a mental 'midwifery' through question and answer to bring forth, from his friends' minds, truths lying there unknown to them. Whilst his dialectical subtlety and power of repartee were unusual, his friends were still more impressed, firstly, by his self-control and force of character, and, secondly, by his belief that a divine voice within him checked him from acting wrongly. In 399 B.C. he was accused (1) of corrupting young men—a charge doubtless due to the oligarchic activities of some of his friends; and (2) of not recognising the city's divinities and introducing others. Found guilty by a small majority, he was condemned to death, though he might have avoided the penalty had he not appeared to flout the court, or had he subsequently taken an opportunity of escaping from prison.

The exact nature of his philosophical position is disputed. Though he was acquainted with the 'physical' speculations of Anaxagoras and others, he early ceased to take much interest in them, his chief concern being man and human conduct. The usual view is that, as against contemporary scepticism, he maintained the possibility of finding a firm basis for morality in knowledge, going so far as to say that no one who knows what is right will act wrongly; and therefore he was led to a search for definitions, especially of the virtues, by means of question and answer, and of inductive arguments from experience. On this view he indicated a method rather than formulated

a systematic doctrine. It has recently been contended, however, that he was greatly influenced by the Pythagoreans, and that many doctrines usually called Platonic should be ascribed to Socrates, whom Plato himself represents as voicing them, *e.g.* the 'ascetic' morality of the *Phædo*, the doctrine of Recollection, the theory of Ideas as presented in the *Phædo* and the *Republic*, and perhaps even much of the political theory of the latter dialogue. See PLATO.

Benn, *The Greek Philosophers*, vol. i.; Gomperz, *The Greek Thinkers*, vol. ii.; Grote, *History of Greece*, ch. 68; A. E. Taylor, *Varia Socratica*; Zeller, *Socrates and the Socratic Schools*.

SOCRATES (b. *c.* 380 A.D.), ecclesiastical historian. Little is known of his life, for which his own *Church History* is the sole authority; latterly he lived in Paphlagonia and Cyprus. His *Church History* deals with the IV. and early V. cent's, and he occupies himself mostly with controversies, theological and political; largely uses Rufinus, Eusebius, Athanasius, and other sources; generally copies, but sometimes criticises; neither a great scholar nor a great thinker; valuable as a source, though to be used with caution.

Gwatkin, *Studies of Arianism*.

SODEN, SODEN AM TAUNUS (50° 10′ N., 8° 30′ E.), watering-place, Hesse-Nassau, Prussia; saline springs.

SODEN, HERMANN, FREIHERR VON (1852–), Ger. divine; prof. at Berlin; author of several works on New Testament criticism. His most important work is in textual criticism: S. developed a fresh theory of three recensions.

SÖDERHAMN (61° 17′ N., 17° 5′ E.), seaport, on Gulf of Bothnia, Gefleborg, Sweden; exports timber and iron. Pop. (1911) 11,439.

SÖDERTELGE (59° 14′ N., 17° 42′ E.), town, summer resort, on Lake Malar, Sweden. Pop. (1911) 11,271.

SODIUM (Na=23·0); metallic element of the alkali group; occurs in rock salt and sea water, Chili saltpetre ($NaNO_3$), in silicates, etc.; metal first obtained by Davy (1807) by electrolysis of NaOH, prepared later by reducing the carbonate (Na_2CO_3) or hydroxide (NaOH) with carbon, now again by electrolysis of NaOH. *Properties:* silvery white, soft, crystallisable, S.G. 0·971, M.P. 95·6°, B.P. 742°, colours bunsen flame bright yellow, spectrum a double line (D), tarnishes in moist air, decomposes water rapidly, burns to mon- and di-oxide; used for manufacture of cyanide and peroxide, magnesium, indigo, etc., and in form of amalgam as a reducing agent; monovalent. Important compounds: chloride, common salt (NaCl); hydroxide, caustic soda (NaOH), peroxide (Na_2O_2); carbonate, washing soda ($Na_2CO_3+10H_2O$), bicarbonate ($NaHCO_3$); sulphate, Glauber's salt ($Na_2SO_4+10H_2O$); phosphate ($Na_2HPO_4+12H_2O$).

SODOM AND GOMORRAH, two 'cities of the plain' destroyed by God for wickedness; site supposed to be near Dead Sea.

SODOMA, IL (1477–1549), Ital. painter of religious and historical pictures, who worked chiefly at Sienna. Some frescoes in the Villa Farnesina at Rome are regarded as his crowning achievement.

SODOR AND MAN, name of the Anglican diocese of the Isle of Man; in mediæval times included the Scot. Hebrides.

SOEST (51° 35′ N., 8° 7′ E.), town, Westphalia, Prussia; contains several interesting old churches; manufactures iron; was an important Hanse town. Pop. (1910) 18,466.

SOFALA (26° 10′ S., 34° 29′ E.), decayed seaport, at mouth of Sofala, Portug. E. Africa; taken by Portuguese, 1505.

SOFIA (42° 32′ N., 23° 23′ E.) (ancient *Serdica*), town, capital of Bulgaria; seat of R.C. abp.; Gk. bp.; also of a university (1888); has cathedral and several mosques; taken by Bulgarians, 809; by Turks, 1382. Pop. (1910) 102,812.

SOFT CHANCRE is a local infection of the genital organs without the accompaniment of constitutional symptoms, due to a micro-organism, *Ducrey's bacillus*. A papule forms twenty-four hours after infection, becoming vesicular in two or three days, and a sharply outlined ulcer in four or five days. The lymphatic glands in the neighbourhood become enlarged and suppuration may take place (*bubo*). The treatment is either to destroy the organisms and make the ulcers healthy by touching them with pure carbolic acid, or to dress them with the mercurial preparation 'black wash,' healing taking place in a week or two. The prepuce may require to be slit open to ensure adequate treatment of the ulcers.

SOGDIANA (39° 30′ N., 68° E.), ancient region, between the Oxus and Jaxartes, Central Asia; corresponds to modern Bokhara and Samarkand.

SOGNE FJORD (61° 6′ N., 6° E.), longest fjord in Norway; on W. coast.

SOHAM (52° 21′ N., 0° 20′ E.), town, Cambridgeshire, England.

SOIGNIES (50° 34′ N., 4° 3′ E.), town, Hainault, Belgium; granite quarries. Pop. 11,500.

SOIL constitutes the major portion of the most superficial layer of the earth's crust, and its importance lies in the fact that it is the reservoir of water and mineral food for the whole of the vegetation of the globe. All primary s's, that is, s's unmodified by vegetable growths, are produced by the disintegration of rocks by various natural agencies, and may be grouped under two heads: (*a*) SEDENTARY s's, derived from the rock they overlie, and having essentially the same characters; (*b*) TRANSPORTED s's which have been removed from the place in which they were formed (*e.g.* boulder clay). Between the s. proper and the underlying rock mass there is usually a layer of intermediate character termed the *subsoil*. The chief agents in the weathering or disintegration of rocks to form s. are air, water, and dissolved gases, temperature variations, frost, burrowing animals, and subterranean plant organs.

As s's are derived from different rocks they will naturally differ both in chemical composition and in physical and physiological properties, and these will be found to have a large influence in determining the type of vegetation. Once a carpet of vegetation is produced, the original character of the s. is, to a certain extent, modified, by the accumulation of partially decayed and disintegrated plant remains, or *humus*. The gradual breaking-up of plant matter is accomplished by various fungi, its final restoration to the s. as reavailable raw material being the work of certain definite groups of nitrifying bacteria, viz. Nitrosomonas, Nitrococcus, and Nitrobacter. S. ultimately consists of minute particles of matter, each surrounded by an aqueous film, and between which there is usually air, except in water-logged s's. It is part of this water which is utilisable by plants, since it tends to distribute itself equally through the s. layers, although each particle also retains a certain amount. S's may be briefly classified as follows: (1) *Loam*, in which the chief constituent is clay, variously mixed and forming sandy loam, calcareous loam, gravelly loam, etc.; (2) *Sand*, other constituents below 10 %; (3) *Marls*, calcareous and otherwise; (4) *Humus* s's (*e.g.* peat).

A. D. Hall, *The Soil*.

SOISSONS (49° 23′ N., 3° 20′ E.), town, Aisne, France; episcopal see; has cathedral dating from XII. cent., and remains of several religious houses, including Abbey of St. Jean des Vignes, which has associations with Thomas à Becket. S. came in I. cent. B.C. to possession of Romans, under whom it was an important town and fortress; gave name to countship from X. cent. onwards; has been frequently besieged. Pop. 14,000.

SOKE, a manor or lordship with jurisdiction over free tenants, or *soc men*; often originating in royal grant.

SOKOTO (10° N., 10° E.), an inland district of 35,000 sq. miles in Niger basin, formerly administered by the Royal Niger Company, but included

in 1903 in Brit. protectorate of N. Nigeria; controlled by resident officials app. by Colonial Office; centre of administration, Zungeru; the native (Fula) rulers are still allowed to govern, subject to Brit. control. Palm oil and kernels are exported. Pop. c. 520,000.

SOKOTRA, Socotra (12° 30′ N., 53° 45′ E.), island belonging to Britain in Ind. Ocean, off E. extremity of N. Africa; area, 1382 sq. miles: surface mountainous, reaching height of over 4500 ft.; climate healthy; soil fertile. Inhabitants are a mixed race, of two principal types, one dark, one light in colour; those in interior are a pastoral people, raising large numbers of cattle, sheep, and goats; and those on the coasts engage in fishing. S. came under British protection in 1876, and was formally annexed to Britain by treaty with Sultan in 1886. The island is famous for aloes, and produces also dragon's blood, dates, and various gums; and butter is made and exported. Pop. c. 12,000.

SOLAN GOOSE, see under Gannets.

SOLANACEÆ, sympetalous dicotyledons, usually herbaceous or shrubby, which show, in many genera, a complex branch system derivable from a dichasial cyme; flowers pentamerous and bicarpellary, and fruit a berry, or capsule. Most important genera are: *Solanum tuberosum* (Potato), *Lycopersicum esculentum* (Tomato), *Nicotiana* (Tobacco), and *Atropa belladonna* (Deadly Nightshade).

SOLAR SYSTEM, number of planets (of which earth is one), comets, and meteors revolving round the sun. It is supposed the solar system developed from a single large nebula.

SOLDERING, see Brazing and Soldering.

SOLE (*Solea*), genus of Flat-Fishes (*q.v.*); main supply comes from North Sea.

SOLEN, Razor-Shell, see under Lamellibranchiata.

SOLENT, THE (50° 45′ N., 1° 25′ W.), strait, separating Isle of Wight from Hampshire, and extending between the Needles and W. Cowes.

SOLESMES (47° 52′ N., 0° 20′ W.), village on Sarthe, Sarthe, France; Benedictine XI.-cent. abbey.

SOLETO (40° 15′ N., 18° 10′ E.), town, Lecce, Italy. Pop. 3500.

SOLEURE, Solothurn (47° 20′ N., 7° 35′ E.), canton, Switzerland; belongs to basin of Rhine; traversed by the Jura Mountains; fertile, containing rich pastures; manufactures include watches, shoes. Pop. (1910) 117,040. Capital, **Soleure,** Solothurn (47° 12′ N., 7° 32′ E.), on Aar; has a cathedral (XVIII. cent.), museum with a rich collection of Jura fossils, and the finest armoury in Switzerland; was admitted to the Swiss Confederacy in 1481. Pop. (1912) 11,900.

SOL-FA, Tonic Sol-fa, a system of musical notation founded by Miss Glover and Rev. John Curwen (*q.v.*); the scale is Doh', Te, Lah, Soh, Fa, Me, Ray, Doh, written thus—d' t l s f m r d; chromatic notes add *a* (if lower), *e* if higher, e.g. *fe*=f, a semitone higher, *ta*=t, a semitone lower. In transcribing *Staff* into *Sol-fa* Doh stands for the keynote in major keys, *e.g.* in an A key A is doh. Time is represented by dots and dashes; a dot indicates a half-beat, a comma a quarter-beat.

SOLFATARA, volcanic crater, ½ mile E. of Pozzuoli, Italy.

SOLFERINO (45° 22′ N., 10° 33′ E.), village, Mantua, Italy; scene of victory of French and Sardinians over Austrians, 1859.

SOLI.—(1) (36° 50′ N., 34° 35′ E.) ancient city, on coast of Cilicia, Asia Minor; destroyed by Tigranes; rebuilt by Pompey and called Pompeiopolis. (2) (35° 10′ N., 33° E.) ancient city, on N. coast of Cyprus.

SOLICITOR, a lawyer of the lower branch of the profession, akin to the Writer to the Signet (W.S.) in Scotland; can only plead in county and police Courts; employs the barrister for the higher courts and prepares the case for him. The Law Society is the authority over the profession. It holds the preliminary and final examination and grants the admission certificate, and can obtain the striking off the roll of solicitors guilty of unprofessional conduct.

SOLIMAN, see Suleiman.

SOLINGEN (51° 11′ N., 7° 4′ E), town, Rhineland, Prussia; cutlery. Pop. (1910) 50,536.

SOLIPSISM, strictly the doctrine that only the self exists, or can be known; but also applied to any theory which denies the independent existence of the external material world.

SOLITARY WASPS, see Wasps.

SOLMONA, see Sulmona.

SOLO, Solo Whist, card game; eldest hand has right of declaration and may elect to play alone (solo) or with another; *misère* is effort to avoid trick-taking.

SOLOGNE (47° 30′ N., 2° E.), ancient district, France, now included in departments of Loiret, Loire-et-Cher, and Cher.

SOLOLA (14° 59′ N., 90° 59′ W.), town, on Lake Atitlan, capital, Solola department, Guatemala; manufactures cloth; ancient capital of the Cakchiquel Indians. Pop. *c.* 22,000.

SOLOMON, Old Testament character, king of Israel; David's successor and son by Bathsheba, the death of whose husband (Uriah, the Hittite) David had contrived. S. was famous for his wisdom and his worldly splendour. His kingdom grew in power and prosperity and he accumulated vast quantities of gold and silver. He built the Temple at Jerusalem. But there are signs that in the Biblical narrative divergent traditions are interwoven. The mere splendid tradition is not the only one, and some modern scholars think the history has been written from a later standpoint which idealised an earlier age. The exact facts are perhaps irrecoverable. **Odes of Solomon.**—Forty-two hymns discovered in 1908, though known earlier by name; probably written I. cent. A.D.; may be Jewish, with Christian interpolations. **Psalms of Solomon.**—Book of Old Testament Apocrypha, corresponding to Psalter; there are eighteen psalms which can hardly all be by one author. They contain references to Pompeius' taking of Jerusalem in 63 B.C. and cannot be much later; Psalm 17 contains a Messianic prophecy.

For **Song of Solomon,** see Canticles; **Wisdom of Solomon,** see Wisdom, Book of.

Conway, *Solomon and Solomonic Literature* (1900).

SOLOMON ISLANDS (6° S., 15° 6′ E.), group of islands, belonging partly to Germany, partly to Great Britain, 500 miles E. of New Guinea in W. Pacific; volcanic; temperature ranges from 75° to 95° Fahr.; heavy rainfall; export copra, ivory, turtle-shell, nuts, sandalwood, pearl-shell. Brit. portion includes Guadalcanar, Malaita, Isabel, Choiseul, and Kansagi; total area, 14,000 sq. miles. Pop. (1911) 150,300. Principal Ger. islands are Bougainville and Buka. Total area, 4200 sq. miles. Pop. *c.* 12,000.

SOLOMON'S SEAL (*Polygonatum multiflorum*), Brit. plant of order Liliaceæ; flowers, white with green tips, hang from long stem.

SOLON (fl. VI. cent. B.C.), Athenian statesman and one of Seven Sages of Greece; of noble family but reduced by poverty to trade; wrote poems; recovered Salamis from Megara; proposed internal reforms and was elected archon *c.* 594 to carry them out. Chief reforms (of which there is no contemporary record) were: repeal of laws by which person of debtor might be sold and his land seized; reconstitution of Athenian society into *Pentacosiomedimni* (whose lands produced 500 measures of corn and oil), *Hippeis* (whose lands produced 300 measures), *Zeugitæ* (200 measures), *Thetæ* (less than 200); archon and treasurer chosen from Pentacosiomedimni, but election and trial of magistrates was given to entire population; establishment of Council of Four Hundred (Boulê), etc.

SOLUNTUM (38° 10′ N., 13° 36′ E.), ancient Phœnician town, Sicily.

SOLUTION, a homogeneous mixture of substances that cannot be separated by mechanical

means. In the wider sense the term includes gases and solids as well as liquids.

Gaseous Solutions.—Gases that do not interact chemically mix in all proportions by agitation or diffusion. The total pressure of a mixture of gases is the sum of the partial pressures of the constituents. Liquids dissolve in gases by evaporation, solids by sublimation.

Liquid Solutions.—Some liquids, *e.g.* alcohol and water, mix in all proportions; otherwise s. in liquids is limited in extent. The liquid receiving a substance into s. is called the *solvent*; the dissolved substance is the *solute*. The amount of solute which will dissolve in a fixed amount of solvent is its *solubility*; the degree of solubility depends partly on physical conditions. A solution is *saturated* when its concentration will remain constant in contact with the solute.

(i.) SOLUTIONS OF GASES IN LIQUIDS.—The solubilities of different gases differ greatly; they vary with different liquids, and diminish with rising temperature, till at the B.P's of liquids they are zero; and the quantity of a gas which will dissolve in a given quantity of a liquid, *e.g.* water, at a given temperature, is proportional to the pressure of the gas; its volume is independent of the pressure. The volume of a gas which will dissolve in unit volume of a liquid at 0° C. is its *absorption coefficient*. The relative quantities of the constituents of a gaseous mixture (*e.g.* air) which will dissolve in water thus depend on their absorption coefficients and their partial pressures.

(ii.) SOLUTIONS OF LIQUIDS IN LIQUIDS.—Most pairs of liquids dissolve in each other to a limited extent. Ether and water, for instance, separate into two layers after being shaken together; the upper layer is a saturated solution of water in ether, the lower of ether in water.

(iii.) SOLUTIONS OF SOLIDS IN LIQUIDS.—Different solids dissolve in liquids to widely different extents. The solubility of a solid in a liquid thus depends on the nature of the solid and of the liquid, as well as upon the latter's temperature. For inorganic salts water is the usual solvent; for many carbon compounds alcohol, ether, benzene, etc., are better. The solubilities of solids are conveniently expressed in grammes per 100 grammes of solvent. Solubility generally increases with temperature; consequently a solution saturated at a given temperature may be made, not only by agitating the solid with the liquid at that temperature, but by heating it with the liquid to a higher temperature, and allowing the s. to cool to the required temperature in contact with the solid.

If a hot saturated s. cools in entire absence of the solid, separation of the latter may not take place, the s. remaining *supersaturated*. If, then, a fragment of solid is added, rapid separation occurs till equilibrium between s. and solid results.

S's of substances may or may not conduct an electric current. Aqueous s's of acids, bases, and salts conduct whilst they undergo electrolysis; they are electrolytes. S's of other substances are non-conductors, and non-electrolytes (see CHEMISTRY).

Solid Solutions are formed (i.) by the simultaneous separation of two or more solids from a liquid s., *e.g.* mixed crystals; (ii.) by the solidification of a liquid s., *e.g.* alloys, glasses, cryohydrates.

SOLWAY FIRTH (54° 50′ N., 3° 30′ W.), inlet of Irish Sea, separating Cumberland from Scotland; length, *c.* 50 miles; fisheries; rapid tides; long frequented by smugglers.

SOLYMAN, see SULEIMAN.

SOMA, a god of Hinduism, equivalent to Bacchus; name *Soma*, or *Homa*, was given to a nectar (the juice of *Asclepias acida*), drunk by gods and men.

SOMALILAND (*c.* 0° to 12° 20′ N., 40° to 51° E.), triangular district of E. Africa, S. of Gulf of Aden and extending along coast of Ind. Ocean. Mountains reaching height of over 7000 ft. run from Cape Guardafui to S.W. of Abyssinia; rest is undulating plateau with a good deal of desert. Largest rivers are Webi Shebeli, which rises in Abyssinian hills and flows across Abyssinian and Ital. Somaliland in a south-easterly direction; and Juba, which forms part of boundary between Italian Somaliland and Brit. E. Africa, and enters sea near equator. Political divisions are Fr., Brit., and Ital. Somaliland along coast, and Abyssinian Somaliland in interior.

French Somaliland or **Somali Coast** (10° to 12° 20′ N., 41° 53′ to 43° 25′ E.), lies between Eritrea and Brit. Somaliland in N.W.; area, 46,320 sq. miles. Chief towns are Jibuti and Obok, latter of which was bought by France *c.* 1855, although not occupied until 1884. France acquired Sagallo and Tajurah in 1884, Ambado in 1885; and limits of Fr. protectorate were defined by Anglo-Fr. treaty in 1888. It is administered by a gov. and Privy Council; produces coffee, ivory, skins. Pop. (1911) 213,396.

Ferrand, *Les Somalis* (1903).

British Somaliland or **Somaliland Protectorate** (*c.* 8° to 11° 30′ N., 42° 40′ to 49° E.), lies between Fr., Abyssinian, and Ital. Somaliland; area, 68,000 sq. miles. Chief towns are Berbera, Zeila, Bulhar. Brit. Protectorate was established here between 1884 and 1886; limits were defined by Anglo-Fr. and Anglo-Ital. treaties in 1888 and 1894 respectively; and by an Anglo-Abyssinian agreement in 1897, when Britain gave up about 15,000 sq. miles to Abyssinia. Administration of Brit. S. was carried out by Indian Office till 1898, Foreign Office, 1898 to 1905, Colonial Office since 1905. Punitive expeditions were undertaken against the 'Mad Mullah' in 1901–5; since 1910, Britain has restricted its administration to the coast. Gums, coffee, ivory, etc., are produced. Pop. (1911) *c.* 300,000, nomadic, except on coast.

Somaliland, by Pease (3 vols., 1902), Peel (1903), Hamilton (1911).

Italian Somaliland (0° to 11° 56′ N., 42° 20′ to 51° E.), lies between Brit. and Abyssinian Somaliland, Brit. E. Africa, and Ind. Ocean; area, 139,430 sq. miles; chief towns, Mogadisho, Marka, Brava; includes Somali sultanates of Obbia and Miguertini, and colony of Benadir. Limits were defined by Anglo-Ital. and Ital.-Abyssinian treaties, 1894 and 1908. Administration is carried out by civil gov. Cattle, sheep, and camels are raised. Pop. *c.* 400,000.

Abyssinian Somaliland has an area of *c.* 130,000 sq. miles.

Somalis are of Hamitic descent, with an admixture of Arab and Negro blood. They are a warlike race, and are generally dark brown in colour, and of good stature. They are Muhammadans.

SOMATERIA, EIDER DUCK; see under DUCK FAMILY.

SOMBRERETE (23° 33′ N., 103° 29′ W.), town, Zacatecas, Mexico; silver mines. Pop. 10,000.

SOMERS ISLANDS, see BERMUDAS.

SOMERS, JOHN SOMERS, BARON (1651–1716), Brit. statesman; b. Claines; called to Bar, 1676; junior counsel for defence in trial of seven bp's, 1688; became successively Solicitor-General, Attorney-General, Lord Chancellor of England; prominent member of Whig party in reigns of William III. and Anne; Declaration of Rights largely attributable to S.

SOMERSET, EARLDOM AND DUKEDOM OF.—JOHN BEAUFORT (d. 1410), 1st earl, was s. of John of Gaunt; family afterwards held dukedom but became extinct, 1471. Dukedom was afterwards held by SEYMOUR family: EDWARD, 1st duke (d. 1552), Protector in Edward VI.'s reign (see below); WILLIAM, 2nd duke (1588–1660), supported Charles I.; CHARLES, 6th duke (1662–1748), held appointments under Anne and George I.; EDWARD, 12th duke (1804–85), held office under William IV. and Victoria.

SOMERSET, EDWARD SEYMOUR, DUKE OF, (*c.* 1506–52), Protector of England; elder bro. of Jane, 3rd queen of Henry VIII.; cr. Earl of Hertford, and led party of New Learning until close of reign; distinguished general; one of Council of Regency app. in king's will;

assumed position of Protector of the Realm, with consent of rest of Council, and was cr. Duke of S., 1547; invaded Scotland, and won victory of *Pinkie Cleugh*, 1547; allowed free hand to Cranmer and Prot. Reformers; sympathised with sufferings of peasantry through enclosure of commons, but forced to send Warwick to put down Kett's rebellion; compelled by Warwick to resign, 1549; executed.

SOMERSET, ROBERT CARR, EARL OF (*c.* 1590–1645), Scots politician, whose great personal attractions won favour of James I.; held various offices of state; married notorious Countess of Essex; both convicted of poisoning Overbury.

SOMERSETSHIRE (51° 10′ N., 2° 50′ W.), coast county, S.W. England; bounded N. by Bristol Channel and Gloucestershire, E. by Wilts, S. by Dorset and Devon, W. by Devon; area, 1640 sq. miles. Surface is varied; crossed by various ranges of hills, including the Mendips, Polden, Quantock, and Brendon Hills; drained by Bristol Avon, Frome, Yeo, Parret, and other streams; county town, Taunton. The county is chiefly of Carboniferous formation; has fine orchards, and is noted for cider and Cheddar cheese; agriculture is carried on and live stock raised; manufactures include silks and woollens, lace, gloves, pottery, beer. There are many traces of Roman occupation; Bath and Ilchester were well-known cities in Roman times; Druidical remains occur in various places, and human bones belonging to the Stone Age have been discovered in caves in the Mendips. S. was scene of Alfred's struggle with the Danes, and in later times of Monmouth's rebellion. Pop. (1911) 407,345.

SOMERSWORTH (43° 15′ N., 71° 1′ W.), city, Strafford County, New Hampshire, U.S.A.; cottons, woollens. Pop. (1910) 6704.

SOMERVILLE.—(1) (42° 25′ N., 71° 5′ W.) city, on Mystic, Middlesex County, Massachusetts, U.S.A.; slaughtering and meat-packing establishments. Pop. (1910) 77,230. (2) (40° 15′ N., 74° 40′ W.) town, on Raritan, capital, Somerset County, New Jersey, U.S.A.; iron foundries. Pop. (1910) 5060.

SOMME (50° N., 2° 10′ E.), department, France; formed from old province of Picardy; traversed by Somme; surface slightly undulating, fertile and well-cultivated, yielding cereals, sugar-beets; textile industries. Pop. (1911) 520,161. Capital, Amiens.

SOMMERFELD (51° 47′ N., 15° E.), town, Brandenburg, Prussia; manufactures cloth. Pop. (1911) 11,880.

SOMNAMBULISM, SLEEP-WALKING, a disorder of sleep in which the motor powers are active, but the controlling centres are dormant. The somnambulist consciousness varies in different individuals; some remember the facts of their sleep-walking, others entirely forget.

SOMNATH (22° 4′ N., 71° 26′ E.), town, on Arabian Sea, Bombay, India; famous for its temple. Pop. 8300.

SONATA, one of the most important of the many forms of musical composition; indeed, it has been described as 'the mainstay of instrumental music.' The term is derived from the Ital. *sonare*, to sound. Thus Prætorius (1614) says: 'Sonata is so called, as it is not sung by human voices, but solely *sounded* by instruments.' The modern s. usually consists of three of four sections, technically termed *movements*; in this respect differing from the earlier forms, some of which had one movement, and many more two movements only. It was EMANUEL BACH (1714–88) who fixed the present form. The first movement is used to determine the general character of the composition; the second is variable as to its musical 'content,' but, as a rule, may be fittingly described by its general designation of the 'slow movement'; the third is either a minuet or a scherzo, something light and lively; while the fourth, called the *Finale*, gathers up, as it were, and develops in a higher degree, the elements enunciated or indicated in the first movement. This is the classical s. —a logical form, an organic whole, pervaded by a general feeling of unity; modern examples are often marked by violent contrasts which disturb the psychological sense.

The s. has always been designed chiefly for a solo instrument. Earlier writers, such as Corelli, favoured the violin for this purpose; later came organ s's, such as those of MENDELSSOHN. The invention and perfection of the pianoforte, with all its variety of resources, led composers more and more to favour it as the instrument *par excellence* of the s.; and from the times of HAYDN, MOZART, and BEETHOVEN (the supreme master of this form) the larger number of s's have been written for pianoforte. A *sonatina* is a smaller and simpler form of s.

Shedlock, *The Pianoforte Sonata* (1895).

SONCINO (45° 22′ N., 9° 55′ E.), town, Cremona, Italy. Pop. 6300.

SONDERBURG (54° 55′ N., 9° 48′ E.), seaport, seaside resort, on island of Alsen, Schleswig-Holstein, Prussia. Pop. (1910) 10,040.

SONDERSHAUSEN (51° 22′ N., 10° 52′ E.), town, capital, Schwarzburg-Sondershausen, Germany; manufactures woollens. Pop. (1910) 7759.

SONDRIO (46° 10′ N., 9° 52′ E.), town, on Adda, capital, Sondrio province, Italy; manufactures silk. Pop. (1911) 9113; (province) 130,073.

SONE, SON (25° N., 84° E.), river, India, joins Ganges above Patna; length, 460 miles.

SONG is a term opening to varying definitions. Thus we speak not only of the musical modulations of the human voice as a song, but also of the 'song' of the blackbird or thrush. Again, the term is applied to a short poem or to its musical setting; and it may further be extended so as to become synonymous with the lyric and the ballad. In common usage, however, it indicates a short poem set to music for rendering by a single voice. For general purposes the form may be conveniently divided into three classes, represented by (1) folk-songs; (2) popular songs chiefly by known writers or composers; (3) art-songs by great composers.

The **Folk-Song**, so called because it has sprung from the people, neither poet nor composer being usually known, is a product of many nations. It may be regarded as the truest expression of national life and sentiment, influenced by geographical and climatic conditions. Thus it has been pointed out that nations inhabiting a mountainous country have folk-songs of a livelier, richer, and more variedly expressive character than the inhabitants of a flat region generally possess. Again, the folk-songs of Northern nations—Russians, Swedes, Danes, and Norwegians, are mostly of a melancholy cast; while Southern nations, like the Spaniards and Italians, and to some extent the Hungarian, Bohemian, and Slavonic races, combine their songs with dancing. The folk-songs of Britain, particularly those of Scotland and Ireland, are justly celebrated; so also are the *Volkslieder* of Germany and Switzerland. The term NATIONAL SONG is sometimes loosely used in this connection: it is more strictly applicable to such airs as *God save the King*, the *Marseillaise*, and *God preserve the Emperor*. Folk-songs have been adapted and utilised by several of the great composers.

As regards **Popular Songs** by known composers, a long list stretches from the days of HENRY PURCELL (1659–95), and earlier, down to the latest vapid composition in the 'drawing-room' style. Before Purcell's time, songs were mostly written to existing and well-known airs. With the development of opera, composers began to write for the stage, and as a fashion had been set for ballad opera, so many songs were composed directly for the theatre. Vauxhall Gardens also gave birth to popular songs. DR. ARNE (1710–78) wrote for this resort, and it was in a stage piece that his *Rule Britannia* first appeared. HENRY CAREY (1685–1743), to whom *God save the King* is doubtfully attributed, also wrote for Vauxhall, and added *Sally in our Alley* to the list of favourites. RICHARD LEVERIDGE (1670–1758), a theatrical bass singer, pub. a large number of

songs, which included settings of Gay's *Black-Eyed Susan, All in the Downs,* and *The Roast Beef of Old England.* WILLIAM SHIELD (1748–1829) was a prolific song writer, whose settings of *The Wolf, The Thorn,* and *The Arethusa* were long popular. CHARLES DIBDIN (1745–88) is said by his biographer to have composed over 1300 songs. He excelled in nautical ballads, and his *Tom Bowling* has taken a permanent place in Brit. minstrelsy. Another voluminous writer was HENRY RUSSELL (1812–1900), who is credited with some 800 songs. He wrote chiefly for his own vocal entertainments, and in his settings largely favoured Longfellow, Eliza Cook, and Charles Mackay. Many of his songs, such as *Cheer, Boys, Cheer, A Life on the Ocean Wave, Woodman, spare that Tree,* and *The Old Arm-Chair,* enjoyed an immense vogue; nor should his setting of Dickens's *Ivy Green* be forgotten. To SIR HENRY R. BISHOP (1786–1855) we owe *Home, Sweet Home*; JOHN BRAHAM'S memory is kept green by *The Death of Nelson,* as is CHARLES HORN'S by *Cherry Ripe.* Other popular songs can only be named—such as *My Pretty Jane, The Village Blacksmith, The Lass of Richmond Hill, Hearts of Oak,* and *Kathleen Mavourneen*: the list is practically endless.

The **Art-Song** so-called differs from the popular song in its more serious musical purport and content. Here the composer aims at the most intimate relation with the poet. He may write so simply as to resemble the folk-song, or so elaborately that the term 'song' seems almost a misnomer. In the latter case the setting is usually a 'composed throughout' setting, each stanza having its own music, and much of the meaning and effect is put into the accompaniment. The class embraces indeed a wide range of styles, though the feeling of 'art' as against 'popularity' is always apparent. SCHUBERT was the first great exponent of the art-song, of which his *Erl King* is a noble example. SCHUMANN, BRAHMS, LOEWE, and HUGO WOLF are other outstanding classics of the form.

S. J. A. Adair-FitzGerald, *Stories of Famous Songs*; Harold Simpson, *A Century of Ballads, 1810–1910.*

SONG THRUSH, see under THRUSH FAMILY.

SONGHOI, SOURHAY, SURHAI, a negro people occupying a large tract of country on both sides of the Middle Niger, below Timbuktu. They number *c.* 2,000,000.

SONNEBERG (50° 22′ N., 11° 10′ E.), town, Saxe-Meiningen, Germany; manufactures toys. Pop. (1910) 15,878.

SONNET, a short poem, consisting of fourteen lines, devoted to a single theme (often amatory). The metre used is iambic pentameter. The s. originated in Italy (some say Provence) and the Ital. or *Petrarchian* s. was divided into an *octave* and a *sestet.* The rhymes followed fixed rules, the octave being always *a b b a, a b b a,* while the sestet might be of two or three rhymes arranged in almost any way, *c d e c d e, c d c d c d,* etc. etc.

The s. was imported into England by the Early Elizabethans; and by Shakespeare and contemporaries hard-and-fast laws regarding division of lines and order of rhymes were discarded; thus Spenser runs octave and sestet into one another, with rhymes—*a b, a b, b c, b c, c d, c d, e e.*

Milton, Wordsworth, and later sonneteers adhered more closely to Ital. models, but retained much freedom. The greatest Fr. sonnet writer is Ronsard.

Sharp, *Sonnets of this Century*; O'Neill, *Pure Gold* (The People's Books).

SONNINO, SIDNEY, BARON (1847–), Ital. politician; Finance Minister, 1893; Treasury Minister, 1894; Prime Minister and Minister of Interior, 1906.

SONORA (30° N., 110° W.), state, Mexico; mountainous in E.; silver-mining and stock-raising industries; some grain, tobacco, and sugar-cane produced; climate very dry. Pop. (1910) 265,383. Capital, Hermosillo.

SONPUR (20° 40′ N., 83° 20′ E.), small native state, Bihar and Orissa, India. Pop. 175,000. Capital, **Sonpur.** Pop. 9500.

SONSONATE (13° 47′ N., 89° 48′ W.), town, capital, Sonsonate department, Salvador; agricultural centre; manufactures cotton cloth. Pop. 18,000.

SONTHALS, SANTALS (*q.v.*).

SOOT, composed mainly of carbon and hydrocarbon particles, is the result of imperfect combustion of coal, etc.; s. of coal or wood contains ammonium sulphate and is used as manure.

SOOTHSAYERS, PRAYING INSECTS (*q.v.*).

SOPHIA, SOFIA (*q.v.*).

SOPHIA (1630–1714), electress of Hanover; dau. of James I.'s dau. Elizabeth, queen of Bohemia. Succession to Eng. throne was settled on her and her heirs, 1701; George I. was her eldest son. See Ward's *Electress Sophia* (1903).

SOPHIA ALEKSYEEVNA (1657–1704), Russ. grand-duchess; usurped royal authority and governed as regent during minority of her bro. Peter, whom she plotted to depose; ultimately compelled by Peter to enter nunnery.

SOPHISTS, THE.—About the middle of V. cent. B.C. there arose in the cities of the Gk. world, and especially in democratic cities such as Athens, a demand for broader, more liberal, and less traditional education, that would fit young men to take part in public affairs and would extend their horizon beyond the bounds of their native cities. This demand was met by men who were popularly known as *Sophists* (*i.e.* wise men), and who, often travelling from city to city, made a livelihood by imparting instruction. They did not form a philosophical school or community, but were simply individual teachers, often widely at variance with one another in their opinions. Yet it may be said of them generally that they were not interested in the physical and metaphysical speculations of the earlier philosophers, and that the tendency of their teaching was increasingly towards scepticism in logic and extreme individualism in morals. That the word *sophistry* has a bad signification to-day is largely due to the unfavourable light in which Plato represents the later Sophists, such as THRASYMACHUS (V. cent. B.C.); but it is to be noted that, though he differs strongly from their opinions, and dislikes their habit of receiving payment for teaching, he makes no personal attacks on the earlier Sophists, such as PROTAGORAS (*c.* 480–411 B.C.) and GORGIAS (*c.* 480–375 B.C.).

Protagoras aimed at producing 'civic excellence' in his hearers, *i.e.* at making cultured and capable citizens, Gorgias more particularly at training orators. The famous Protagorean maxim, 'Man is the measure of all things,' was probably intended first as a protest against uncritical acquiescence in moral and political customs or institutions because referred to divine command: they are of human origin and are justified only by their utility. But it was also open to the interpretation that a common truth is unattainable, and one man's opinions are as true (even though not as advantageous) as another's. Applied to morals, this leads to ethical scepticism, and later Sophists spoke of moral and political duties as conventional, implying that the absence of principles is a more 'natural' condition, and therefore superior. Gorgias's theory of knowledge was frankly sceptical, and the later sophistry of rhetoric degenerated into verbal quibblings.

The importance of the Sophistic movement lay in its humanist tendency: it centred interest upon man and man's institutions. But in it, as in the beginnings of most movements towards freedom of thought, destructive criticism outran the capacity for reconstruction.

Benn, *The Greek Philosophers,* vol. i.; Gomperz, *The Greek Thinkers,* vol. i.; Grote, *History of Greece,* chap. 67; Zeller, *Pre-Socratic Schools.*

SOPHOCLES (495–406 B.C.), Gk. poet; s. of Sophillus; b. Colonus, Attica; at age of fifteen led dance of boys in celebrations after defeat of Persian fleet at Salamis (480); appointed one of the generals (*strategoi*) in Samian campaign (440–439), but the S. mentioned as one of the ten officials created after

collapse of Athenian expedition against Syracuse (413) is probably not the poet.

S. wrote more than a hundred works, mostly dramas, and is said to have vanquished *Æschylus* (*q.v.*) in tragedy competition at the age of twenty-eight, although he carried off the first prize less often than might be expected from the excellence of his work. He lacked the rugged grandeur and inspired prophetic utterance of his older rival, but excelled in his exquisite style and marvellous command of language. His early musical training provided him with that keen sense of rhythm which is characteristic of his choral odes. In all his extant tragedies he quickly introduces his principal character and acquaints his audience with the circumstances of the plot. He rises highest in dramatic force in *Œdipus Rex* (lately produced in Britain by Prof. Max Reinhardt, with Mr. Martin Harvey in the title-rôle); it is the story of a man doomed before his birth to pollution and disgrace, and the contrast between the proud monarch of Thebes and the distraught man who discovers his incest and patricide, and, above all, the magnificent irony of the play, raise this tragedy to the highest place. In *Œdipus Coloneus* the subsequent history of the former king is related, how he wanders, blind and poor, till he finds a resting-place at Colonus. The *Antigone* is the pathetic tale of how a girl is doomed to death for giving her brother burial after it had been forbidden by King Creon; it contains, in addition, much sound political wisdom, and is said to have gained S. the military appointment mentioned above. Other extant tragedies are *Trachiniæ*, *Ajax*, *Electra*, and *Philoctetes* (408). Unlike Euripides (*q.v.*) S. had firm faith in Gk. religion, which inspires some of his finest lines.

SOPHRONIUS, patriarch of Jerusalem, 634; d., 636.

SOPRANO, highest species of female voice; *mezzo-soprano* voice is of lower range.

SOPRON, ODENBURG (47° 41′ N., 16° 36′ E.), town, capital, County Sopron, Hungary; manufactures sugar; trade in cattle. Pop. (1910) 33,932.

SORA (41° 44′ N., 13° 37′ E.), city, Caserta, Italy, on Liris; cathedral; manufactures paper; an ancient Volscian town; taken by the Romans and colonised, 303 B.C. Pop. 6200.

SORACTE (42° 14′ N., 12° 42′ E.) (modern *Monte Sant' Oreste*), mountain, Etruria; sacred to Apollo.

SORANUS (c. A.D. 98–138), Gk. physician; practised med. at Alexandria and later at Romo; his treatises on *Fractures* and *Diseases of Women* and a Latin trans. of his *Acute and Chronic Diseases* are extant, while his biography of *Hippocrates* is the only extant authority for the life of the latter.

SORAU (51° 38′ N., 15° 9′ E.), town, Brandenburg, Prussia; manufactures textiles. Pop. (1910) 18,014.

SORBONNE, educational institution, Paris; founded by ROBERT DE SORBON, chaplain to St. Louis; 1257, as society of clergy for study of, but not instruction in, theology; called *Domus Sorbonnæ*, or commonly *La Sorbonne*; became centre of intellectual activity in France; reconstructed by Richelieu in XVII. cent.; faculty of theology given up at Fr. Revolution; present buildings, *La Nouvelle Sorbonne* —completed 1889—are the quarters of Faculties of Letters and Science of Univ. of Paris; more than 10,000 students.

SORBS, a Slavonic people inhabiting W. Saxony and the neighbouring territory, numbering about 180,000, and maintaining the rights of their language and administration.

SORDINO, SORDONI, SORDUNI, Ital. musical terms used in three distinct significations: (1) devices for muting or damping sound in musical instruments; (2) an obsolete species of wind instrument having a double blow-reed; (3) a species of stringed instrument.

SOREL (46° 1′ N., 73° 1′ W.), town, port of entry, on Richelieu, capital, Richelieu County, Quebec, Canada; manufactures iron; shipbuilding yards. Pop. 8500.

SOREL, AGNES (c. 1422–50), a beautiful French-woman who became the mistress of Charles VII. of France.

SOREL, ALBERT (1842–1906), distinguished Fr. historian; member of *Académie française*; prof. of Diplomatic History at School of Political Sciences, 1872; pub. *L'Europe et la Révolution française* (1885–92).

SOREX, see SHREW FAMILY.

SORGHUM, see MILLET.

SORIA (41° 40′ N., 2° 30′ W.), province, Spain, in Old Castile. Pop. (1910) 156,354. Capital, **Soria** (41° 45′ N., 2° 26′ W.); manufactures flour, leather. Pop. 7200.

SORICIDÆ, see SHREW.

SOROKI (48° 10′ N., 28° 25′ E.), town, on Dniester, Bessarabia, Russia. Pop. 27,000.

SORREL (*Rumex*), genus of plants, order Polygoneæ; Common S. (*R. acetosa*) has arrow-shaped leaves and reddish-green flowers; Wood Sorrel (*Oxalis acetosella*) is of family Oxalideæ and has white flowers.

SORRENTO (40° 38′ N., 14° 23′ E.) (ancient *Sorrentum*), town, watering-place, on Bay of Naples, Naples, Italy; abp.'s see; wood-laying industry; birthplace of Tasso. Pop. 7000.

SOSEN, MORI (1747–1821), Jap. artist; regarded as one of world's greatest animal painters, his especial study being monkeys.

SOTER, Pope, 167–74.

SOTHERN, EDWARD ASKEW (1826–81), Eng. comedian; created part of Lord Dundreary in *Our American Cousin*.

SOTO, FERDINANDO DE (1496 ?–1542), Span. explorer; b. Jeres de Caballeros; accompanied d'Avila on his expedition to Darien, 1529; one of the leaders in the conquest of the Incas. In 1538 he set out on a futile expedition in search of gold in Florida and never returned.

SOU (Lat. *solidus*), Fr. halfpenny (5 centimes); a gold coin in Merovingian times, then silver, finally copper.

SOUDAN, see SUDAN.

SOULT, NICOLAS JEAN DE DIEU, DUKE OF DALMATIA (1769–1851), Fr. soldier; devoted favourite of Napoleon; led decisive charge at *Austerlitz*; as gen. in Span. army conquered Portugal; commander-in-chief in Spain, 1809–13; rallied to Napoleon in Hundred Days, but fell from him after *Waterloo*.

SOUND, ACOUSTICS, the science which deals with the external or objective causes which give rise to the sensation of hearing. On investigation, they are found to consist in every case of a vibratory motion in some piece of matter, which motion is communicated, generally by the air, to the organ of hearing. We therefore require a vibrating body for the production of sound, and a medium for its transmission. The vibrating body acts on the medium by communicating to it a certain number of impulses every second, and these impulses give rise to waves of condensation and rarefaction, which travel through the medium. Nearly all acoustic phenomena may be elucidated by a study of these waves and their mode of progression. Being a periodic phenomenon, a sound-wave in air or other substance is subject to the ordinary kinematical and dynamical laws of harmonic motion, and thus we learn that one sound-wave may differ from another—and therefore one musical note from another—in respect of three essential properties. The first is its *frequency*, i.e. the number of vibrations per second, or what is commonly termed the *pitch* of a note. For instance, the note A^1 in a pianoforte has a pitch of 435 (according to 'standard' pitch)—that is, when this note is struck, the number of sound-waves which reach the ear of a listener is 435 per second. The range of frequency appreciable by the human ear is very considerable, being from about 33 up to about 40,000. The ear can also detect differences in frequency as minute as 1 in 400, but only for those notes which are within the compass of the human voice. Above or below that compass, the acuteness

of perception is much less. In music, 'standard' pitch has fixed 435 as the frequency of the note A^1. But concert pitch is higher, and has been rising for the last 150 years until, at present, the note A^1 is given a frequency of about 460.

The second essential property of a musical sound is its *loudness*, and this depends on the *amplitude* of vibration of the air in the sound-wave, *i.e.* on the extent to which each particle in the line of transmission oscillates to and fro about its mean position of rest. It can be shown that the intensity of a sound is proportional to the square of the amplitude. But loudness, tested subjectively, is difficult to measure, and differs with different persons, and even with the same person from time to time. It may, however, be mentioned that in the least audible sound the extent of motion of the air particles is about one ten-millionth of a centimetre on each side of the mean position. Apart from the vibrating body itself, there are several conditions which affect the intensity or loudness of a sound. The first of these is the obvious fact that loudness diminishes as we recede from a source of sound. Take the case of sound radiating from a point and travelling uninterruptedly in all directions. The first sound-wave spreads out over a spherical surface, whose radius is constantly increasing, and hence the energy per unit surface must diminish as this surface increases; but the surface increases in proportion to the square of the radius. Hence the intensity must diminish in proportion to the square of the distance from the origin of the sound. The loudest sounds known to have travelled through the air were those produced by the explosions accompanying the eruption of Krakatoa in 1883. They were heard at a distance of 2000 miles.

The second factor which tends to diminish loudness is reflection from solid surfaces such as hills, cliffs, buildings, etc.; from the surfaces of large masses of air which may have a distinctly different density from that of the air surrounding them; and, more irregularly, from smaller masses of air which are at different temperatures or are in different hygrometric states. Thirdly, wind has a peculiar action on sound. If, as is borne out by observation, the speed of wind increases as we ascend from the earth's surface, a sound travelling in the same direction as the wind tends to recurve towards the ground, but if travelling against the wind it tends to curve upwards and so be less audible to a listener at ground-level some distance off. Lord Rayleigh has also shown that when the atmosphere is in a steady state of convective equilibrium, when the temperature gradually diminishes as we ascend from ground-level, the path of a ray of sound assumes a form similar to that of a heavy chain suspended between two fixed points in a horizontal line with its middle point lowest. Sound-waves may also suffer diffraction as do light-waves, and this tends to diminish the intensity.

The third essential property of a sound-wave is its *quality*. It is not easy to give this property any numerical or quantitative representation, but its existence can be easily recognised in the differences which are observable in the same musical note when produced by two different instruments, such as a piano and a violin. We may, however, represent the property by a graphical method. Suppose a fine wire or bristle be fastened to the end of one prong of a tuning-fork, and, while the fork vibrates, that a smoked glass plate be drawn along at a uniform speed in contact with the end of the wire and at right angles to its direction of vibration. The vibrations of the tuning-fork will then be traced out on the smoked plate in the form of a wavy curve. If we could imagine the same thing done with a particle of air in a sound-wave, we should find that the curve obtained for the same note sounded by different instruments would differ. One might be a smooth, wavy curve; another might exhibit a series of lines sloped alternately up and down like the teeth of a saw. Indeed, all conceivable varieties of such motion are possible, consistent with the condition that the vibration in one wave is exactly superposable upon that in any other wave.

We have next to consider certain other properties of sound-waves. It is obvious that in passing through any medium which has a finite rigidity, the speed of transmission must be finite, and it can be shown that it is equal to the square root of the ratio of elasticity to density. Now, in the case of a gas, the elasticity is proportional to the pressure; so also is the density. Hence the ratio of elasticity to density cannot involve the pressure, and can only involve the temperature. Therefore the speed of sound in a gas is proportional to the square root of the absolute temperature and is independent of the pressure. In air at 0° C., it has been found to be 331 metres per second. According to theory, sounds of greater intensity should travel at a higher speed; and this has been confirmed experimentally. In liquids, provided the bulk is practically unlimited, we have to deal with the volume elasticity, and in water at 8° C. the speed has been found to be 1437 metres per second. Here again it has been proved that waves of greater intensity travel more quickly. In solids, the speed varies with the elasticity and density in the manner already noted. In cast-iron it is about 3500 metres per second. In such nonisotropic substances as wood it has different velocities along and across the grain or fibre.

Another phenomenon presented by sound-waves is that known as *beats*. When two musical notes whose frequencies are only slightly different are sounded simultaneously, a rising and falling in the intensity of the combined sound may be heard. A full explanation of this phenomenon and the conditions for its production requires the aid of the equations of harmonic motion. But it is perhaps sufficient to say that the rise in intensity is due to the vibration of both sound-waves being in the same direction at one time, so as to produce a wave of increased amplitude (and therefore of increased loudness). The fall in intensity is caused by the vibrations being in opposite directions so that the resultant amplitude, being the difference instead of the sum of the component amplitudes, is diminished. Another peculiarity may be mentioned. When the whistle of a locomotive engine is sounded while the engine is travelling towards an observer, the pitch of the whistle seems to increase as the engine approaches and to diminish as it recedes. The explanation is as follows: suppose the frequency of the whistle is n, the length of each sound wave l, the speed of sound v; that of the engine being V. The first sound-wave from the engine travels a distance (towards the observer) l in a time $\frac{1}{n}$. By the time it has done so, the engine has travelled forward a distance $V \times \frac{1}{n}$, and then gives out a second sound-wave. Hence the interval in length between the two waves will be $l - \frac{V}{n}$. But $l = \frac{v}{n}$, and therefore the interval is $\frac{v}{n} - \frac{V}{n}$, i.e. $(v - V) \div n$. If this interval is divided into the speed of sound, we get $vn \div (v - V)$, or $n \div (1 - \frac{V}{v})$, which is the number of waves which will reach the observer per second, and which is therefore the increased pitch of the whistle. Since the frequency n is divided by a quantity less than unity, the frequency must increase as the engine approaches, and if it approached with the speed of sound, the frequency would be doubled—that is, the pitch would rise by an octave. This change in frequency is known as DOPPLER'S PRINCIPLE, and when applied to light received from stars, it gives their velocity if we know the change in wave-length of the light emitted by them.

All that has been stated above applies only to musical sounds as distinguished from noises. A musical sound depends on a regular and periodic compression and rarefaction of the air, and has a definite frequency and quality. A noise, on the other hand, is produced by an irregular, non-periodic disturbance of the air, and has no definite frequency. There is, however, no absolutely sharp distinction between them. A single blow of a hammer on a heavy mass of iron produces what is undoubtedly a noise. But the sound produced by several hundred riveters at work in a shipbuilding yard might conceivably appear to be musical when heard at a distance.

Catchpool, *Textbook of Sound*; Barton, *Textbook of Sound*; Poynting and Thomson, *Sound*. For the theory of music, consult Sedley Taylor, *Sound and Music*; and Helmholtz, *Sensations of Tone* (trans. by Ellis).

SOUND, THE (Dan. ORESUND) (55° 30′ N., 12° 46′ E.), strait between Sweden and island of Zealand.

SOUNDING, operation of ascertaining depth of water, for navigation, cable-laying, and scientific purposes. For small depths s. is done by lowering a weight attached to a rope marked in fathoms. In deep s's machines are used, wire taking the place of rope. From the reel the wire passes over a wheel which registers the amount run out, an automatic brake stopping the reel when bottom is reached. In hauling in the wire, sudden tensions caused by movements of the ship are relieved by an automatic compensating device. At great depths the weights are not recovered, but are slipped by a contrivance which also brings up a specimen of the bottom. Self-registering thermometers are fixed to the wire at intervals.

SOUSA, LUIZ DE (1555–1652), Portug. author; devoted himself to study and served in Order of Malta; married, but he and his wife took vows, 1614; wrote *Chronicle of St. Dominic, Life of the Archbishop*, etc.

SOUTH AFRICA (15° to 35° S., 13° to 40° E.).—The term South Africa is generally applied to that part of Africa which lies S. of the Zambezi. The 'Subcontinent,' as South Africans often call it, comprises the Union of South Africa (*i.e.* Cape of Good Hope, Transvaal, Natal, and Orange Free State), a Brit. Overseas Dominion; Southern Rhodesia, the Bechuanaland Protectorate; Swaziland, and Basutoland, all under Brit. control; Ger. South-West Africa and the lower half of Portug. East Africa. In Brit. South Africa the whole of Rhodesia is often included, although the northern districts belong rather to Central Africa; Walfisch Bay (*q.v.*), in the centre of Ger. South-West African coast, and the Colonial Islands are also British. The area of Brit. South Africa in its widest sense is *c.* 1,250,000 sq. miles.

The South African coast is regular, and exposed to rough seas. Excluding Madagascar, there are no islands of any size, and not many good harbours; chief ports are Walfisch Bay, Port Nolloth, and Cape Town (Table Bay) on W.; Simon's Town (naval base in False Bay), Mossel Bay, Port Elizabeth (Algoa Bay), and East London on S.; Durban, Lourenço Marques (Delagoa Bay), and Beira on E. Perennial rivers are scarce, and with few exceptions unimportant. The only large rivers are: Orange, flowing W.; Limpopo and Zambezi (both partly navigable), flowing E.; there are numerous shallow *vleis*, and salt pans, but no large lakes. A narrow belt of low-lying coast-land gives place, from 50 to 100 miles inland, to continuous ranges of mountains (Nieuwveld, Drakensberg, etc.), rising to over 6000 ft., and in Basutoland attaining an altitude of over 11,000 ft. On plateaus between successive ranges of mountains in the Cape Province is the Karoo, which rains and irrigation transform from bare wilderness to a fertile garden. A great part of interior of S. A. consists of *veld*, undulating pasture-land with grass and scrub. In Bechuanaland lies the Kalahari Desert, a great sandy waterless waste. The climate, on the whole, warm but healthy; S. A. is essentially a 'white man's country.' In coast districts temperature is more equable than inland, but high altitudes of interior make heat dry and more tolerable; there are practically only two seasons—summer (October to March), winter (April to September). In so vast a country as S. A. the climate of course varies in different parts (see CAPE OF GOOD HOPE, NATAL, TRANSVAAL, etc.).

HISTORY.

Herodotus tells of a Phœnician expedition which circumnavigated Africa *c.* 600 B.C.; but this *Periplus* lacks confirmation, and not till Portug. mariners of XV. cent. sought a sea-route to the East Indies round Africa, does S. A. figure in authentic history. The Zimbabwe (*q.v.*) ruins, however, in Rhodesia, bear witness to ancient civilisation. Cam reached Cape Cross near Walfisch Bay, 1484; Diaz rounded the Cape of Good Hope (*q.v.*) and landed in Algoa Bay, 1486; Da Gama reached and named Natal (*q.v.*), 1497, whence he sailed up the east coast and across the ocean to India. The Portuguese discovered S. A.; the Dutch first colonised it. Van Riebeek founded Cape Town, 1652, and established a half-way house to the East for the Dutch East India Co. Britain occupied Cape Colony, 1795–1803, and permanently, 1806. Raids had already been made on the European settlement by Kaffirs, who supplanted and decimated the earlier native inhabitants—Bushmen and Hottentots. Kaffir wars began in earnest, 1811, and ended in the establishment of the Kei River as boundary between whites and natives.

Discontent with Brit. rule led to the Great Trek (1836–37), which in turn resulted in the colonisation of Natal (annexed by British, 1844) and the foundation by Boers of the South African Republic, 1849 (see TRANSVAAL), and Orange Free State (*q.v.*), 1854. Constant disagreements ensued between the two Republics, between Boers and British, and between the Brit. Colonies and the Home Government. Attempts by Pretorius (1857) to unite the Transvaal and Orange Free State, and by Sir George Grey, Gov. of the Cape, to federate the S. African States (1858), alike proved premature and futile. Brit. Kaffraria, colonised by Eng. and Ger. settlers, was annexed to Cape Colony, 1865. Basutoland (*q.v.*) came under Brit. protection, 1868.

The discovery of diamonds near Kimberley (*c.* 1869), and simultaneous opening up of the Transvaal goldfields, brought about a great influx of immigrants from Britain and Europe, and accentuated the long-standing rivalries of Dutch-speaking and English-speaking S. Africans. In 1872, Lord Carnarvon, Sec. of State, proposed confederation of the S. African States, but again without avail. The Transkei was annexed to Cape Colony, 1878. The first *Boer War* broke out, 1880, and ended 1881 without permanently settling the variances of Boers and British (see TRANSVAAL).

Damaraland was annexed by Germany, 1883; Britain annexed Bechuanaland, 1885, Zululand, 1887; Cape Colony annexed Kaffraria, 1886. In 1888 the first S. African Customs Union Conference was held. In 1889 the Brit. S. Africa Co. received a Charter, and the development of Rhodesia (*q.v.*) began. Railways were now pushed inland from Cape and Natal ports and Delagoa Bay (*q.v.*); and rivalry for Rand carrying trade commenced.

The Jameson Raid, 1895, embittered Boer and Brit. relations. The Dutch found a strong champion of their position in Kruger (*q.v.*), the Brit. side was vigorously urged by Rhodes, Milner, and Chamberlain (*qq.v.*). Finally the Uitlander franchise question led to a Boer ultimatum, and the **South African War** broke out, Oct. 12, 1899. The allied Transvaal and Free State forces, commanded by Joubert (*q.v.*), invaded Natal and Cape territory, and laid siege to Ladysmith, Kimberley, and Mafeking. At first British met with series of reverses. At *Modder River* (Nov. 28) and *Magersfontein* (Dec. 12), Cronje defeated Methuen, who undertook relief of Kimberley (defended by Kekewich); Gatacre

was beaten at *Stormberg* (Dec. 10, 1899); while Buller in attempting to relieve White in Ladysmith suffered disaster at *Colenso* (Dec. 15). In January, 1900, Lord Roberts and Kitchener arrived, and the tide began to turn in Britain's favour. French relieved Kimberley (Feb. 15); Cronje was forced to surrender at *Paardeberg* (Feb. 27); Ladysmith was relieved (Feb. 28). Roberts entered Bloemfontein (March 13), and annexed the Orange Free State (May 24); entered Johannesburg (May 31), Pretoria (June 5), and annexed Transvaal (Sept. 1). Mafeking (defended by Baden-Powell) was relieved, May 17.

By guerilla tactics—constant skirmishes, attacks on communications, etc.—the Boers (under Botha, Beyers, Delarey, De Wet, and others) gallantly held out till Kitchener (in supreme command since Roberts' return) organised 'drives,' block-houses, barbed-wire defences, etc., and Concentration Camps for women, children, and refugees. Finally peace was signed at Vereeniging, May 31, 1902. The Boer forces were estimated at *c.* 100,000; when war closed over 200,000 Brit. troops (including many volunteers and colonial contingents) were in the field.

After a period of Crown Colony Government the Transvaal and Orange River Colony received responsible Government (1906–7). Racial, railway, tariff, and other difficulties pointed the advisability of closer union of the S. African States. A National Convention met Oct. 12, 1908, and drew up a Constitution for the **Union of South Africa**, which found acceptance. Natal favoured federation in preference to unification, but accepted the Constitution by referendum (1909). Imperial Parliament passed the S. A. Act, 1909, and Union came into force, May 31, 1910. Lord Gladstone, first Gov.-Gen., invited Botha to form a ministry, which he did from members of Dutch-speaking parties united to form Nationalist party. Sir Leander Starr Jameson (succeeded, 1912, by Sir Thomas Smartt) became leader of Unionist party. The elimination of Hertzog (*q.v.*) from the Cabinet caused a split (1913) between ministerial moderates and extremists.

The Union of South Africa is a self-governing Brit. Dominion, formed (1910) by the legislative Union of Cape Colony, Transvaal, Natal, and Orange River Colony, now the original Provinces of Cape of Good Hope, Transvaal, Natal, and Orange Free State. The Union has a Gov.-Gen. and Parliament consisting of Senate and House of Assembly. Each province elects 8 senators (for 10 years) and the Gov.-Gen. nominates 8. The Cape has 51 seats in House of Assembly, Transvaal 36, Natal and O.F.S. each 17; representation will change according to growth of population. Maximum duration of each Parliament is five years. Pretoria is Seat of Administration; Cape Town the Seat of Legislature; there is no Union 'capital.' Provincial capitals are Cape Town, Pretoria, Pietermaritzburg, and Bloemfontein. Other important towns are Johannesburg, Durban, Port Elizabeth, Kimberley. For local administration purposes each province has an Administrator (app. for 5 years), and a Provincial Council (elected for 3 years), which can pass 'ordinances' dealing with such matters as roads, bridges, etc., and school education (till 1915). Higher Education and all national questions are reserved for the Union Government and Parliament. Under the Constitution, English and Dutch languages enjoy equal rights. The Univ. of the Cape of Good Hope is an Examining Body; various Colleges in the different provinces prepare students for its degrees. A central teaching Univ. for South Africa is under consideration (1913).

Law.—South African Law is mainly Roman Dutch. Criminal Law resembles that of England. The seat of the Supreme Court is Bloemfontein.

Religion.—There is no State Church. Principal denominations are Dutch Reformed Church, Church of England, Methodists, Presbyterians, and Roman Catholics.

Defence.—In addition to a permanent army the Defence Act, 1912, provides for a Citizen Force, all men between 21 and 25 being liable to military training. The Union makes an annual money contribution to the Brit. Navy. There is a Royal Naval Volunteer Reserve, and at Simon's Town an important Naval Station.

Railways.—The South African Railways (like the principal harbours) are State-owned. The mileage exceeds 7000. They include former Cape Government Railways, Natal Government Railways, and Central South African Railways.

Finance and Trade.—The financial relations between Union and Provinces are not yet (1913) definitely settled. In 1912–13 Revenue totalled £17,314,000; expenditure, £17,196,000. Imports were valued at £37,000,000 (1911); exports over £57,000,000 (1911), £63,262,000 (1912). Chief imports are articles of food and drink, cotton manufactures, clothing and manufactured goods of all kinds. Chief exports are gold, diamonds, wool, ostrich feathers, hides and skins, mohair, maize, coal, copper, tin, etc. Chief industries are agriculture, sheep and ostrich farming; mining (gold, diamonds, coal, copper, etc.); fruit-growing, sugar-planting, etc. There are as yet few manufactures in South Africa.

Inhabitants.—Whites are outnumbered by nearly 4 to 1. About half the white pop. are of Dutch descent. English-speaking inhabitants are chiefly centred in towns. Many colonials are of Fr. Huguenot and of Ger. descent. Inhabitants of non-European descent include over 4,000,000 natives (i.e. pure-blooded Kaffirs, Zulu, etc.), besides coloured people (half-castes), Indians, Malays, etc. The area in sq. miles and pop. of the Union are as follows:—

	Area.	Pop. (1911).
Cape . .	276,995	2,564,965 (583,177 whites)
Transvaal .	119,000	1,686,212 (420,831 whites)
Natal . .	35,371	1,194,043 (98,582 whites)
Orange Free State .	50,000	528,174 (175,435 whites)
Union .	481,366	5,973,394 (1,278,025 whites)

The united pop. of the Colonies now forming the Union was at 1904 census 5,175,824, including 1,116,806 whites. See also CAPE OF GOOD HOPE, TRANSVAAL, NATAL, ORANGE FREE STATE, BASUTOLAND, ZULULAND, SWAZILAND, BECHUANALAND, RHODESIA, TRANSKEIAN TERRITORIES, GERMAN SOUTH-WEST AFRICA, PORTUGUESE EAST AFRICA.

Worsfold, *Union of South Africa* (1912); Colvin, *Romance of South Africa*, and *The Cape of Adventure*; Theal, *History of South Africa*; Bryce, *Impressions of South Africa*; Amery, *"Times" History of the War, 1899–1902*; Stow, *Native Races of South Africa*; *Native Races of South Africa*, edit. by Native Races Committee; Mendelssohn, *South African Bibliography*.

SOUTH AFRICAN REPUBLIC, see TRANSVAAL.

SOUTH AMBOY (40° 30′ N., 74° 18′ W.), city at mouth of Raritan, Middlesex County, New York, U.S.A.; manufactures pottery; port for shipping coal. Pop. (1910) 7007.

SOUTH AMERICA, see AMERICA.

SOUTH AUSTRALIA (26° to 38° S., 129° to 141° E.), central state of Australia; extended right across the continent from N. to S. till 1911, when Northern Territory was ceded to Commonwealth; bounded E. by Queensland, New South Wales, and Victoria; S. by the Ind. Ocean; W. by Western Australia; area, 380,070 sq. miles. The S. coast on the E. has the estuary of Murray River at Encounter Bay, Gulf of St. Vincent (with Kangaroo Is. at its mouth), and Spencer Gulf; the last runs inland for over 200 miles, and from its head northward are the basins of Lake Torrens and Lake Eyre; to W. of Lake Torrens is Lake

Gairdner. Along Northern Territory coast is a flat strip; interior forms part of great central plateau of continent; desert region in W.; crossed by various mountain ranges (Flinders, Stuart, Gawler, Musgrave); S.E. drained by Murray River. There is a considerable variation in temperature and rainfall; mean summer temperature is 73° Fahr., winter mean, 53°; annual rainfall at Adelaide averages about 20 inches; in interior it is as low as 5 inches.

The Northern Territory was discovered by the Portuguese, and S. A. first permanently colonised by the British in 1836; the discovery of copper in 1843 led to increased prosperity, and the colony became an autonomous state in 1856; joined Commonwealth of Australia, 1900; sends 6 Senators and 7 Representatives to Federal Parliament. State administration is carried out by a gov., nominated by Brit. Government and assisted by an executive council; there is a Parliament consisting of a Legislative Council and a House of Assembly (elected by adult suffrage). The capital is Adelaide. Over 2000 miles of railways (State) are in operation; laying of Trans-Continental Railway from Port Augusta to Western Australia (Kalgoorlie) was begun, 1912; N. to S. trans-Australian railway is also projected. Agriculture is principal industry; live stock largely raised; wheat, oats, and barley produced; oranges, olives, and other fruits are grown. Minerals include copper, iron, silver-lead, gold; manufactures wines, olive oil, flour; exports wool, wheat, flour, copper, skins and hides, frozen meat, live stock, gold, wine, dairy produce, fruit. Education is free and obligatory; principal religious denominations, Anglican, R.C., Wesleyan, Presbyterian. Pop. (1911) 408,558.

Ryan, *South Australia* (1911); Searcy, *In Australian Tropics* (1909); Gordon, *Handbook of South Australia* (1908).

SOUTH BEND (41° 36′ N., 86° 14′ W.), city, on St. Joseph, capital, St. Joseph County, Indiana, U.S.A.; carriage and wagon works. Pop. (1910) 53,864.

SOUTH BETHLEHEM (40° 38′ N., 75° 20′ W.), town, on Lehigh, Northampton County, Pennsylvania, U.S.A.; seat of Lehigh University (1865); iron and steel manufactures. Pop. (1910) 19,973.

SOUTH CAROLINA, see CAROLINA.

SOUTH DAKOTA, see DAKOTA, SOUTH.

SOUTH GEORGIA (54° 30′ S., 37° W.), uninhabited Brit. island, S. Atlantic.

SOUTH HADLEY (42° 20′ N., 72° 35′ W.), town, on Connecticut, Hampshire County, Massachusetts, U.S.A.; manufactures paper. Pop. (1910) 4894.

SOUTH HOLLAND (52° N., 4° 30′ E.), province, Netherlands, bordering on North Sea; generally flat; much of it below sea-level; fertile and well cultivated; flourishing manufactures; contains cities of The Hague (capital), Rotterdam, and Leiden. Pop. 1,390,774.

SOUTH MELBOURNE (37° 51′ S., 144° 58′ E.), town, on Yarra-Yarra, Victoria, Australia. Pop. 45,000.

SOUTH MOLTON (51° 1′ N., 3° 49′ W.), town, on Mole, Devonshire, England.

SOUTH NORWALK (41° 7′ N., 73° 25′ W.), city, on Long Island Sound, Fairfield County, Connecticut, U.S.A.; manufactures machinery, hardware. Pop. (1910) 8968.

SOUTH OMAHA (41° 14′ N., 95° 55′ W.), city, Douglas County, Nebraska, U.S.A.; slaughtering and packing industries. Pop. (1910) 26,259.

SOUTH ORANGE (40° 45′ N., 74° 17′ W.), residential town, Essex County, New Jersey, U.S.A.; contains Seton Hall College (R.C.). Pop. (1910) 6014.

SOUTH, ROBERT (1634–1716), Anglican divine; staunch defender of monarchy after Restoration, and engaged in controversy with Walter Sherlock.

SOUTH SEA BUBBLE, Eng. scheme for liquidating national debt. Harley, opposed by Walpole, advocated incorporation of South Sea Company, 1711, which, in return for monopoly of trade to Spanish America, took over floating debt of £10,000,000; and later national debt of over £30,000,000. Only one voyage was made to South Seas, but public, encouraged by government, eagerly took up shares, which rose from £100 to £1000; crash came at close of 1720, when chief shareholders and promoters sold out; widespread ruin followed; members of government found guilty in inquiry that followed; result, Walpole attained chief power, and restored country's credit.

SOUTH SHETLAND ISLANDS (62° S., 60° W.), volcanic archipelago, in Antarctic Ocean.

SOUTH SHIELDS (54° 59′ N., 1° 26′ W.), seaport, at mouth of Tyne, Durham, England; manufactures glass; shipbuilding; exports coal. Pop. (1911) 108,649.

SOUTHALL NORWOOD, market-town, Middlesex, England, 9 miles W. of London; chemical works. Pop. (1911) 26,327.

SOUTHAMPTON.—(1) (50° 54′ N., 1° 23′ W.) seaport, parliamentary and county borough, Hampshire (Southampton is also the census title of county), England; situated between Itchen and Test Rivers; has remains of old fortifications, including the Bar Gate, dating from XI. cent.; public buildings include Domus Dei Hospital and Hartley University College; in neighbourhood are Netley Military Hospital and ruins of Netley Abbey; has splendid harbour, with large docks; most important mail-packet station in England. The Royal Southern and Royal Southampton Yacht Clubs have their headquarters here. Pop. (1911) 119,039. (2) (40° 52′ N., 72° 55′ W.) town, summer resort, on Long Island, Suffolk County, New York, U.S.A. Pop. (1910) 2509.

SOUTHAMPTON, COUNTY OF, see HAMPSHIRE.

SOUTHAMPTON, EARLDOM OF.—The first earl was Eng. admiral, WILLIAM FITZWILLIAM (*c.* 1490–1542). The first earl of second creation, THOMAS WRIOTHESLEY (1505–50), held office under Henry VIII.—**Henry Wriothesley**, 3rd Earl of Southampton (1573–1624), Eng. courtier and patron of Shakespeare and other poets; to him were addressed both *Venus and Adonis* and *Lucrece*, and he is believed by many critics to have been the W. H. to whom the *Sonnets* were dedicated; imprisoned for complicity in Essex's plot against Elizabeth.—THOMAS WRIOTHESLEY, 4th earl (1607–67), Royalist in Civil War.

SOUTHBRIDGE (42° 5′ N., 72° 3′ W.), town, on Quinebaug, Worcester County, Massachusetts, U.S.A.; cotton and optical goods. Pop. (1910) 12,592.

SOUTHCOTT, JOANNA (1750–1814), Eng. religious mystic who became mad, wrote books and had many followers.

SOUTHEND-ON-SEA (51° 32′ N., 0° 43′ E.), seaside resort, at mouth of Thames, Essex, England. Pop. (1911) 62,723.

SOUTHERN CROSS, see under CROSS.

SOUTHEY, ROBERT (1774–1843), Eng. poet and prose-writer; b. Bristol; ed. Westminster and Balliol Coll., Oxford; m. (1) Edith Fricker, Mrs. Coleridge's sister, 1795; (2) Caroline Bowles, the poetess, 1839; a hard worker; unfortunate married life; children died and first wife went mad; S.'s mind also failed before his death; lived at Keswick, and included among 'Lake Poets'; long supported Coleridge's family; app. Poet Laureate, 1813. His poems include—*Joan of Arc* (1795), *Thalaba* (1801), *Madoc* (1805), *Curse of Kehama* (1810), *Roderick the Goth* (1814), *Vision of Judgment* (1821); narrative faculty, rhythmic swing, ballads, and Oriental subjects gave S. certain vogue as poet. His greatest work, however, is in prose—*Life of Nelson* (1813: his masterpiece), *History of Brazil* (1810–19), *History of Peninsular War* (1822–32), *Lives* of Bunyan, Wesley, Cowper, etc., and contributions to *Quarterly*. S. is a master of plain, vigorous, straightforward prose. Dowden, *Life* (1879: E.M.L.).

SOUTHGATE, residential town, 8 miles N. of London, Middlesex, England. Pop. (1911) 33,613.

SOUTHINGTON (41° 7′ N., 72° 51′ W.), town, on Quinnipiac, Hartford County, Connecticut, U.S.A.; manufactures cutlery, hardware. Pop. (1910) 3714.

SOUTHOLD (41° 5′ N., 72° 25′ W.), town, summer resort, on Long Island, Suffolk County, New York, U.S.A.

SOUTHPORT (53° 38′ N., 3° 1′ W.), watering-place on Irish Sea, Lancashire, England. Pop. (1911) 51,650.

SOUTHSEA (50° 47′ N., 1° 5′ W.), seaside resort, Hampshire, England, forming part of Portsmouth.

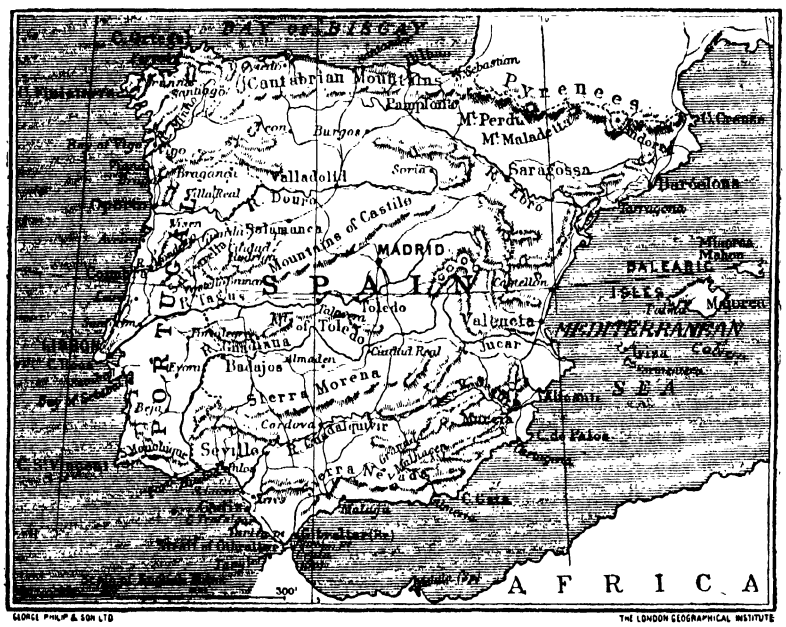
SOUTHWARK, municipal borough, on S. side of Thames, London, England; cathedral. Pop. (1911) 191,951.

SOUTHWELL (53° 4′ N., 0° 58′ W.), city, Nottinghamshire, England; cathedral, founded VII. cent.

SOUTHWELL, ROBERT (*c.* 1561–95), Eng. priest and poet; became R.C. priest of Society of Jesus, 1584, but in 1595, after prolonged imprisonment, he was tried on the charge of treason and hanged at Tyburn. Most of his poems and tracts were written in prison; euphuistic in style.

SOUTHWOLD (52° 20′ N., 1° 41′ E.), seaport, watering-place, on North Sea, Suffolk, England.

SOUZA-BOTELHO, ADELAIDE FILLEUL, COUNTESS DE (1755–1836), Fr. authoress; wrote novels of analysis and observation; best are *Adèle de Sénange, Emile et Adolphe, Eugène de Rothelin.*



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SOVEREIGN, Brit. gold coin, worth £1 sterling; originally issued by Henry VII., bearing his effigy, hence name; present value fixed, 1817; standard weight, 123·274 grains troy; $\frac{11}{12}$th pure gold.

SOWERBY BRIDGE (53° 53′ N., 1° 55′ W.), town, W. Riding, Yorkshire, England; cotton and woollen mills. Pop. (1911) 11,350.

SOW-THISTLE (*Sonchus*), genus of plants, order Compositæ; Common S. (*S. oleraceus*), 2–3 ft. high, has yellow flowers.

SOYER, ALEXIS BENOÎT (1809–58), Fr. cook; settled in London; sent by Government to control public kitchens during Irish famine (1847); reformed food-supply in Crimean War; wrote books on cookery.

SOZOMEN, Hermeias Sozomenus (*c.* 400–43), advocate and ecclesiastical historian; wrote *Ekklesiastike Historia*, in nine vol's, giving history of Church, 324–439; borrowed largely from Socrates' *Church History.*

SPA (50° 28′ N., 5° 52′ E.), watering-place, Liège, Belgium; mineral springs. Pop. 8500.

SPACE.—Philosophy treats the problem as to whether any objective reality corresponds to the conception of s. The objective method treats s. (like time) as really existing, like things of the world. Modern philosophy, beginning with Berkeley, follows subjective method; existonce only in the mind. Kant affirms s. and time the conditions of experience, referring to phenomena, not noumena, and belonging to mind's own constitution. See Psychology.

SPADIX, see Spathe.

SPAIN, España (36° to 43° N., 9° W. to 3° E.), kingdom in S.W. Europe, forming larger part of Iberian peninsula; bounded on N. by Bay of Biscay and France, W. by Atlantic Ocean and Portugal, S. and E. by Mediterranean; length from N. to S. about 560 miles; breadth, 650 miles; area, 190,050 sq. miles; Spain is separated from African coast by Straits of Gibraltar (minimum width about 90 miles); seaboard, 1400 miles; coast rocky in N. and N.W.; S. and E. coasts generally flat; few indentations (Gulf of Cadiz, Gulf of Valencia); several prominent Capes, *e.g.* Tarifa (most southerly point), Gata, and Palos, S.E.; Nao, Tortosa, and Creux, N.E.; Peñas, N.; Ortegal, N.W.; Finisterre, Roca, W.; São Vicente and Trafalgar, S.W.

Surface generally is mountainous; interior consists mainly of tableland known as the *Meseta* with average elevation of 2000–3000 ft., and divided by several mountain ranges running mostly from E. to W. The Meseta consists chiefly of Archæan and Palæozoic rocks, covered to a large extent with Mesozoic strata. Fold mountains lie to N. (Cantabrian-Pyrenean system) and S. (Andalusian system) of Meseta. Chief Mountain Ranges are Pyrenees in N.W. (forming boundary between France and Spain), with Maladetta, or Pico Nethou (11,165 ft.), Mt. Perdu (10,994 ft.); Cantabrian Mts. in N., a continuation of Pyrenees, with Peñas de Europe (8745 ft.); Sierra de Guadarrama, with Pico de Peñalara (7890 ft.), and Montes de Toledo in central region; Sierra de Gredos, with Plaza Almanzor (8730 ft.) and Sierra de Gata, W.; Sierra Nevada, with lofty Mulahaçen (11,420 ft.), S. Principal Rivers are Douro (*Duero*), Tagus (*Tajo*), Guadiana, and Guadalquivir flowing into Atlantic; Ebro, Guadalaviar, Juçar, Segura, Llobregat, Almanzora, Almeira, Guadalfeo, flow into Mediterranean; Bidassoa, Nalon, and Rivideo in N.; few Lakes—Mar Minor in Murcia, Albufera in Valencia, Laguna de la Janda in Cadiz.

Climate of tableland is dry and hot with frequent hot winds and scanty rainfall (10 to 20 in.); N. and N.W. are mild, with rainfall of 40 to 156 in.; districts are sub-tropical and have the mildest winters in Europe. Flora is varied; N. maritime provinces have central European vegetation; most of the central region contains steppe-like vegetation, chiefly esparto grass; flora of Mediterranean districts is tropical. Fauna belongs to the Mediterranean subregion of the Palæarctic region and includes wolf, bear, lynx, fox, chamois, ibex, genet, Barbary ape on Gibraltar (*q.v.*), porcupine, etc.; numerous reptiles,

amphibians, and beautiful butterflies; many birds —eagles, vultures, falcons, kites, snipe, partridge, flamingo, quails, etc.

HISTORY.

The earliest inhabitants of Spain were IBERIANS. Their language and blood are preserved in the Basque Provinces (*q.v.*). The Basques claim to be the oldest race in Europe. Phœnician traders, passing the Pillars of Hercules (Gibraltar), founded Cadiz, *c.* 1100 B.C., and other towns. Celtic tribes crossed the Pyrenees, *c.* 500 B.C., and mingling with Iberians begot 'Celtiberians.' Gk. settlements on the Mediterranean shores were taken by Carthaginians who invaded Spain, IV. cent. B.C.; Hasdrubal founded Cartagena, 242 B.C. Then came ROMANS, who expelled the Carthaginians *c.* 200 B.C., after the Second Punic War (*q.v.*). Spain became a Rom. province (Numantia resisted gallantly till 133 B.C.); its inhabitants became Latinised and contributed famous names to Rom. history and lit. To-day magnificent Rom. remains (*e.g.* at Segovia) and the Span. language testify the thoroughness and durability of Rome's conquest. In V. cent. A.D. Vandals and Suevi overran Spain. On Rome's invitaton, VISIGOTHS followed, overcame these invaders, adopted the Rom. faith and tongue, and ruled the whole peninsula till VIII. cent., when Moslem inroads began. RODERICK, the 'Last of the Goths,' fell (711) at *Xeres*, fighting Berber hordes under Tarik.

The 'MOORS,' or Saracens, quickly mastered most of Spain, and during eight cent's of possession made an indelible impression on race, language, place-names, customs, commerce, art, architecture, and culture, at the same time themselves becoming Europeanised and absorbed to a large extent. The enervated Goths were powerless to resist. The down-trodden Jews welcomed the Arabs. On the whole the native Spanish accepted the conquest placidly. PELAYO, the Goth, however, maintained Span. independence in Asturias (the cradle of Span. liberty), where he ruled (718–37). In 755 Abd-er-Rahman established the great Ommayad Caliphate of CORDOBA, independent of the Muhammadan Empire across the Mediterranean. Under ALFONSO I. of Asturias (739–57), GALICIA (*q.v.*) was recovered. Charlemagne failed to rescue Saragossa and was defeated at *Roncesvalles*, 778, but Louis I. recovered Barcelona, 801. CATALONIA (*q.v.*) became independent, 874, and NAVARRE (*q.v.*) soon after.

In 924 Asturias was united with Galicia in the kingdom of LEON, which in turn was united with CASTILE under FERDINAND I., 1037. Toledo was recaptured, 1085; *New Castile* was added to Old Castile; and ALFONSO VI. (1072–1109) became 'Emperor of Spain.' The valiant CID took Valencia (1094). Meanwhile the Caliphate of Cordoba had been dismembered, and fresh bands of invaders from Africa overran Spain; Christians were hard pressed, but on the whole held their own. The Almoravides came *c.* 1090, the fanatical Almohades, *c.* 1150, to succour their fellow-Muslims in Spain. The Moors gained several victories, but lost Saragossa (1118), which became capital of kingdom of ARAGON (*q.v.*). In 1139 PORTUGAL (*q.v.*) became a separate kingdom under Alfonso I., whose father, Henry of Burgundy, had received from Castile the Countship of *Portucalia* for services against the Moor. The Almohades were crushed by ALFONSO VIII. at *Las Navas de Tolosa*, 1212. Castile and Leon were firmly united (1230) under FERDINAND III., Saint Fernando, who took Cordova (1235), Murcia (1243), and Seville (1248). Cadiz fell to his son Alfonso X., *the Learned*, 1262, and Jeréz, 1264.

JAIME I. of Aragon, who had extended his rule to Balearic Isles (*c.* 1230), conquered Valencia, 1238, which Moors had recaptured after the Cid's death. Barcelona, which with CATALONIA had been united to Aragon, 1149, became a great Mediterranean port, with a famous code of maritime law (*Consulado del Mar*). Aragon's eyes were generally turned towards the sea and Europe—away from Spain; Sicily came under its House, 1282. Castile, therefore, had the chief part in reclaiming Spain from the infidel. Before the end of XIII. cent. Granada (*q.v.*) alone remained under Moorish domination.

The XIV. and XV. cent's were marked by constitutional struggles in the Span. kingdoms between monarchs, nobles, and people. The rights of Aragonese nobles were embodied in the *Fueros de Sobrarbe*, which empowered them to depose any king who broke its provisions. Alfonso the Learned (1252–84) drew up the *Siete Partidas*, codifying Castilian Law. Towns banded themselves together to protect their privileges, but royal power gradually increased, and by XVI. cent. had gained the day. PEDRO THE CRUEL (1350–69), the Black Prince's ally, was murdered and succeeded by his half-bro., HENRY OF TRASTAMARA, whose descendants ruled Castile badly for 100 years.

ISABELLA of Castile (d. 1504), who had secretly married FERDINAND of Aragon (1469), succeeded her half-bro., Henry IV., in 1474. Ferdinand (d. 1516) became king of Aragon in 1479, and the two great Span. kingdoms were thus firmly united. The reign of these 'Catholic kings' is memorable. They unified Spain; they captured Granada, the Moor's last stronghold (1492); expelled the Moors and Jews, introduced the Inquisition, and under Ximenes' guidance kindled Span. bigotry; they sent out Columbus and inaugurated Spain's conquest of the New World. Naples and Sicily were conquered, 1504 (thanks to Gonsalvo de Cordova), and Navarre annexed, 1515. In Italy Ferdinand was defeated at *Ravenna* (1512) by French. Ferdinand and Isabella had no son; of their daughters, Isabel had married the Prince of Portugal; Catherine had married Henry VIII.; Joanna the Mad had married Philip of Austria, and their son, CARLOS I. (1516–56), inherited all Spain, Burgundy, Netherlands, Two Sicilies, and Sardinia. Carlos was soon elected Emperor CHARLES V. At *Villalar* (1521) was crushed the Communers rising against the Hapsburg king, and despotism was firmly established. Great conquests were made in America—Mexico, Peru, Chile, West Indies, Florida (1520–40). France was humbled and Francis I. captured at *Pavia* (1525); Charles was crowned king of Italy, 1529; Tunis was taken, 1535; Charles abdicated, 1556, and died, 1558.

Under his grandson, PHILIP II. (1556–98), husband of Mary, Queen of England, Spain's glory was further enhanced; Portugal, with its oversea possessions, was incorporated (1580) on failure of the male line of the royal house; the French were defeated at *St. Quentin* (1557) and *Gravelines*, and made peace of Câteau-Cambresis (1559). The Turks were crushed at *Lepanto* by Span. and Venetian fleets, 1571. With Cervantes and Velasquez Span. lit. and art were at their zenith. The fanatical king of Spain was recognised as champion of Catholic Christendom—sworn enemy, therefore, of Prot. England. Signs of approaching downfall, however, were not lacking; under Alva's regency the Netherlands revolted, 1568, and United Provinces were formed, 1581; the Grand Armada was destroyed, 1588, and Cadiz burned by Eng. seadogs, 1596. The southern provinces of Netherlands were made a separate kingdom under Philip's nephew, Archduke of Austria.

Under PHILIP III. (1598–1621), Spain's power waned. The expulsion of Moriscos (*q.v.*), 1609, greatly reduced population in numbers and industry. Under Philip IV. (1621–65) Netherlands renounced allegiance, 1621; independence recognised, 1648. Heavy taxation for Fr. wars and Olivare's attempts to impose Castilian institutions on rest of Spain provoked Civil War; Portugal revolted and set up house of Braganza, 1640; Catalonia also rebelled, 1640; French won victories at *Rocroi* (1643), *Dunkirk* (1658), etc.; by *Treaty of Westphalia* (ending Thirty Years War) Spain recognised independence of Netherlands, 1648; Jamaica was captured by English, 1653. Feeble-minded Carlos II. (1665–1700) continued Fr. wars, and dying without issue bequeathed the War of Spanish Succession (*q.v.*) 1701–14.

The Fr. candidate, PHILIP V. (1700–46), was finally recognised by *Peace of Utrecht* (1713), and Bourbon dynasty succeeded Hapsburg. Britain, which had opposed Philip's claim, retained Gibraltar, taken 1704. The Quadruple Alliance (Britain, France, Austria, Holland) was formed, 1718, to counteract Span. minister Alberoni's schemes. After exhausting wars in Italy, Spain recovered Two Sicilies (1735) from Austrians.

FERDINAND VI. (1746–59) had a more peaceful reign, and CARLOS III. (1759–88) gave illusory promise of a period of revival. Many sadly needed internal reforms were introduced. British captured Manila and Havana, and helped to repel Span. invasion of Portugal, 1762. Gibraltar triumphantly resisted combined Fr. and Span. siege (1779–82), and Rodney defeated Span. fleet off *Cape St. Vincent* (1780). CARLOS IV. (1788–1808) waged war against France (1793–95), then with France and Holland against Britain (1796–1802), sustaining second defeat off *Cape St. Vincent*, 1797. At *Trafalgar*, 1805, Fr. and Span. fleets were destroyed.

Portugal refusing to observe Berlin Decrees, Napoleon, hoodwinking Godoy, entered Spain, forced Charles IV. to resign, set aside his son, Ferdinand V., installed Joseph Bonaparte as king, 1808, and began Peninsular War (*q.v.*), 1808–14. FERDINAND V., on his restoration, 1814, abolished new constitution framed at Cadiz, 1812, and reinstituted the Inquisition. The XIX. cent. saw Spain's Amer. Empire dispersed; Florida was sold to U.S.A., 1819; Peru and Central States revolted, 1821; Bolivar freed Venezuela, New Granada, and Bolivia; Chile became independent, 1822, Mexico in 1825. Meanwhile Civil War shook Spain at home, 1820–23. With Fr. support Ferdinand suppressed revolution and established despotism; and on birth of daughter, Isabella (1830), abolished Salic Law (established 1713). On Ferdinand's death (1833), Civil War broke out between supporters of ISABELLA II. (1833–68) and *Carlists*, who upheld claims of Don Carlos, Ferdinand's brother; Carlists, strong in N., were subdued, 1840. Queen mother, Maria Cristina, acted as regent till 1841, Espartero till 1843, when Isabella came of age. Continual constitutional troubles reached a head, 1868, when Prim and Serrano led revolution which ended in Isabella's flight to France. After a provisional Government, AMADEUS of Savoy, son of Victor Emanuel, was chosen king, 1870, only to abdicate, 1873, owing to Carlist insurrections.

A republic was declared 1873, during second Carlist War (1872–76), on behalf of Don Carlos' son, but in 1875 Bourbons were restored, Isabella's son, ALFONSO XII. (1875–86), becoming king; constitutional monarchy was established, 1876. ALFONSO XIII. (1886–), Alfonso XII.'s posthumous son, came of age 1902, his mother, Maria Cristina, acting as regent meanwhile. Insurrections arose in Cuba, 1895, against Span. misgovernment, and, Spain refusing U.S.A.'s demand for Cuban independence, the SPANISH-AMERICAN WAR (*q.v.*) broke out, 1898, when the last of Spain's great oversea possessions (Cuba and Philippines) were lost. Of late years campaigns in Morocco (*q.v.*), religious, labour, and other troubles have retarded progress, and Portug. Revolution (1910) has encouraged republican hopes in Spain; Carlists anticipate a republic, followed by restoration of monarchy and establishment of Carlist dynasty in person of Don Jaime de Bourbon.

Burke, *History of Spain to Death of Ferdinand the Catholic* (1900); Hume, *Spain, 1479–1788* (1898); *Modern Spain, 1788–1898* (1899).

Language.—The Span. language is a Romance tongue, descended from Latin. Celtic and Germanic invaders adopted it; the Moors failed to obliterate it; from all the conquerors of Spain, it borrowed words and enriched its vocabulary. Various dialects arose owing to political and geographical causes, in Asturias, Galicia, Navarre, Castile, Aragon, Catalonia, etc. CASTILIAN triumphed and became the standard literary language of Spain (XIII. cent.). The CATALAN tongue and LIMOUSIN of the old troubadours are akin to Provençal (*q.v.*), GALICIAN to Portuguese. Spanish, carried to the New World, where millions in S. and Central America speak it, has developed local peculiarities. The vocabulary is very wealthy and the language euphonious. The BASQUE language, quite apart, preserves the tongue of the Iberians, if not even earlier aborigines; some 500,000 people speak it and guard it jealously.

Spanish Literature may be said to begin with Spain's Latinisation (II. cent. B.C.). The Senecas, Lucan, Martial, Quintilian, are among Span. contributors to Latin lit. Between the disruption of the Rom. Empire and the struggle for Span. independence, lit. in Spain was confined to the Moors, who greatly promoted learning by Arabic treatises on philosophy, science, etc., and translations of classics (*e.g.* Averroës' *Aristotle*).

The Cid's exploits against the Saracens at length inspired Span. minstrels, especially the Castilian writer of the epic *Poema del Cid* (c. 1150). The first Span. poet whose name we know was GONZALO DE BERCEO (fl. *c.* 1225). Some early bards used Catalonian, Limousin, and Galician (see **Language**), but ALFONSO X., *the Learned* (d. 1284), who greatly fostered Span. lit., assured Castilian linguistic supremacy. For him were prepared in Castilian the *Siete Partidas* (code of laws), and *Grande y Generale Historia*, which, though comparatively sober, reflects the heroic age, like the chronicles, romances, etc., of this mediæval period. Didactic and satiric verses, songs, hymns, etc., were also composed by such XIV.-cent. poets as DON JUAN MANUEL, JUAN RIZ, LOPEZ DE AYALA. But, above all, Romances, prose and poetic, captivated the Span. imagination—cycles of Troy, Alexander, Arthur, Charlemagne, and particularly Amadis de Gaul; Spain simply revelled in supernatural Romances of Chivalry, whose extravagance affected England and other countries.

Marquis ENRIQUE DE VILLENA, MARQUIS DE SANTILLANA, JUAN DE MENA, PEREZ DE GUZMAN, and other poets adorned the Court of John II. (1406–54). But the dawn of the Golden Age of Span. lit. was heralded by BOSCAN and GARCILASO (d. 1536), the lyric poets who introduced the Ital. Renaissance influence into Spain, and with it more grace, artistry, and variety of form and subject. DIEGO DE MENDOZA (d. 1575) wrote classical poems and history; MONTEMAYOR of Portugal produced in Spanish an elevated pastoral romance—*Diana*, imitated in Cervantes' *Galatea*; FERNANDO DE HERRERA composed classical odes, LUIS DE LEON, lyrics of great dignity and purity; CASTILLEJO (d. 1556) championed the old romantic style.

The absurdities of the heroic romance, however, were soon to be laughed to scorn by CERVANTES (1547–1616), the greatest figure in Span. lit.; while the writer of the famous *Lazarillo de Tormes* (*c.* 1550)—perhaps Diego de Mendoza—established the popularity of the realistic *Picaresque novel* (q.v.), the type afterwards favoured by Lesage, Defoe, Fielding, and others.

Religious representatives (relieved by farcical interludes), pastoral plays, eclogues, and dramatic novels (*e.g.* Fernando de Rojas' *Celestina*, *c.* 1500) had paved the way for real Drama, in which Span. genius found natural expression, for a time surpassing all Europe. Erudite dramatists copied the ancients; others used the stage to enforce morals; national Span. drama came with the XVI. cent., ushered in by TORRES NAHARRO, and popularised by LOPE DE RUEDA, whom Cervantes admired. Cervantes himself wrote plays (at first eschewing the involved and unnatural plots then becoming fashionable); but in fertility was far excelled by LOPE DE VEGA (1562–*c.* 1635), whose inventive, dramatic, poetic gifts were displayed in 2000 plays and in other works. The Span. Comedy as he shaped it has been described as a 'dramatic novel' in principle.

Other famous dramatists and poets of this illustrious period are the 'Span. Horaces,' the brothers ARGENSOLA (b. *c.* 1565); the classical poet, VICENTE ESPINEL

(d. 1634); the fantastical GONGORA (1561–1627), the Span. Marini or Lyly, who introduced the *Estilo Culto*; JUAN DE MARIANA (d. 1623), the historian; QUEVEDO (1580–1645), the great satirist, who mocked the Gongorists' 'New Art'; VILLEGAS (1595–1669), the graceful Span. Anacreon; and CALDERON (1600–81) who, in fine poetry, maintained the glories of Span. drama. ANTONIO DE SOLIS, AUGUSTIN MORETO, FRANCISCO DE ROJAS, TIRSO DE MOLINO, GUILLEN DE CASTRO are among Calderon's many contemporaries, followers, and fellow-dramatists.

After this great national outburst came a period of decadence in the XVIII. cent., when Fr. models were greatly copied. MELENDEZ VALDEZ wrote graceful poetry, MORATIN (1737–80), praiseworthy tragedies, RAMON DE LA CRUZ, estimable comedies.

About the mid-XIX. cent. a Revival began. ESPRONCEDA, SAAVEDRA, and others introduced Romanticism; and a number of recent and living writers have attained European reputation as poets, dramatists, novelists, and scholars. Here mention can only be made of ZORRILLA (1817–93), PEDRO ALARCON (1833–98), DE VALERA (1824–1905), PEREZ GALDOS, RAMON DE CAMPOAMOR, JOSÉ ECHEGARAY, the dramatist, MENANDEZ Y PELAYO, ARMANDO PALACIO VALDES, and EMILIO FERRARI, the poet.

Fitzmaurice-Kelly, *History of Span. Literature* (1898).

Art, see PAINTING, ARCHITECTURE.

Colonies.—Spain's once vast colonies have almost all been lost (see HISTORY). A few possessions in Africa alone remain. The Canary Islands are treated as an integral part of Spain; Ceuta forms a province with Cadiz. In Morocco, Spain also occupies Melilla, Alhucemas, Gomera, Chaferinas Islands, and various 'presidios.' On W. coast of Africa Spain has Rio de Oro and Adrar; Span. Guinea (Muni River Settlements); Fernando Po, Elobey, Annabon, Corisco, and other islands in Gulf of Guinea.

Defence.—Military service is compulsory; before 1912 conscription prevailed. Peace strength of ARMY (1912) was *c.* 116,000 men; war strength *c.* 500,000. NAVY, destroyed in Span.-Amer. War, is being reconstructed. Fleet consisted (1912) of 1 battleship, 3 first-class cruisers, 1 second-class, 2 third-class, 4 destroyers, besides small and obsolete vessels.

Products and Industries.—Agriculture is the main occupation; 60 per cent. of the total area is under cultivation. Principal products are wheat, barley, oats, rice, maize, olives, oil, flax, hemp, esparto grass, raisins, fruits (oranges, grapes, almonds, etc.); important wine industries—famous sherries made in south and red wines in north; manufactures of cotton and woollen goods, silks, machinery, paper, tobacco (a state monopoly), preserves, etc.; fine horses are bred in Andalusia; sheep and swine in Estremadura, cattle in Galicia; extensive fisheries (tunny, sardines, cod, etc.); total value caught annually about £1,500,000; rich in minerals; coal, iron, copper, lead, zinc, cobalt, salt, mercury, sulphur, etc.; numerous mineral springs. Railway mileage (1912) was 9200 (all private companies).

Government is a hereditary constitutional monarchy with Cortes, composed of Senate (360 members) and Congress (406 deputies). Spain comprises the following ancient kingdoms or provinces: Castile (Old and New), Aragon, Basque Provinces, Asturias, Galicia, Leon, Estremadura, Andalusia, Granada, Murcia, Valencia, Catalonia, Navarre. Andorra (*q.v.*) in the Pyrenees is a Republic under joint suzerainty of Spain and France. For local government purposes it is now divided into 49 PROVINCES, viz. (on Span. mainland) Alava, Alicante, Albacete, Almeria, Airla, Badajoz, Barcelona, Burgos, Cáceres, Cadiz and Ceuta, Castellon, Ciudad-Real, Córdoba, Coruña, Cuenca, Granada, Gerona, Guadelajara, Guipúzcoa, Huesca, Huelva, Jaen, Leon, Lèrida, Lugo, Logroño, Madrid, Málaga, Murcia, Navarra, Orense, Oviedo, Palencia, Pontevedra, Santander, Salamanca, Sevilla, Segovia, Soria, Tarragona, Teruel, Toledo, Valencia, Valladolid, Vizcaya, Zamora, Zaragoza, Baleares, Canarias. Each province has a *Diputacion Provincial* (meeting annually); each commune has an *Ayuntiamento* presided over by an *Alcalde*.

Chief Towns are Madrid (capital), Barcelona, Valencia, Seville, Malaga, Murcia, Saragossa.

State RELIGION is Roman Catholic; until 1910 public worship of any other religion was forbidden. Since 1857 primary EDUCATION has been nominally compulsory, and free for most children; public and primary schools are maintained chiefly by local taxation; Spain has 10 univ's (see UNIVERSITIES), besides schools for engineering, agriculture, architecture, arts, music, etc. Pop. (1910) 19,588,688.

Calvert, *Spain* (2 vols., 1911), and other works; Baedeker, *Spain and Portugal* (1908); Murray's *Handbook*; Borrow, *Bible in Spain*.

SPALATIN, GEORGE, GEORGE BURKHARDT (1484–1545), scholar and promoter of Reformation; sec. and adviser to Frederick the Wise, elector of Saxony; greatly influenced by Luther; organised church in Saxony.

SPALATO, SPALATRO (43° 30′ N., 16° 25′ E.), city, seaport, on Adriatic, Dalmatia, Austria; contains ruins of vast palace of Diocletian and other Rom. antiquities; bp.'s see; exports wine and oil. Pop. (1910) 27,494.

SPALAX, MOLE RATS (*q.v.*).

SPALDING (52° 48′ N., 0° 9′ W.), market town, on Welland, Lincolnshire, England; agricultural centre. Pop. (1911) 10,309.

SPALLANZANI, LAZARO (1729–99), Ital. scientist; studied at Bologna; brilliant all-round scholar; made important contributions to meteorology, physiology, etc.; first to explain digestion correctly.

SPAN, distance from tip of thumb to tip of little finger when hand is expanded; reckoned as 9 inches.

SPANDAU (52° 34′ N., 13° 10′ E.), fortified town, at junction of Spree and Havel, Brandenburg, Prussia; manufactures small-arms, artillery. Pop. (1910) 84,855.

SPANGENBERG, AUGUST GOTTLIEB (1704–92), Moravian religious leader; ed. at Jena, where he lectured on theology, but got into trouble for his views; joined Moravians, 1733, and devoted his life to organising Moravian Church, ably assisting founder, Count Zinzendorf; wrote several works and hymns.

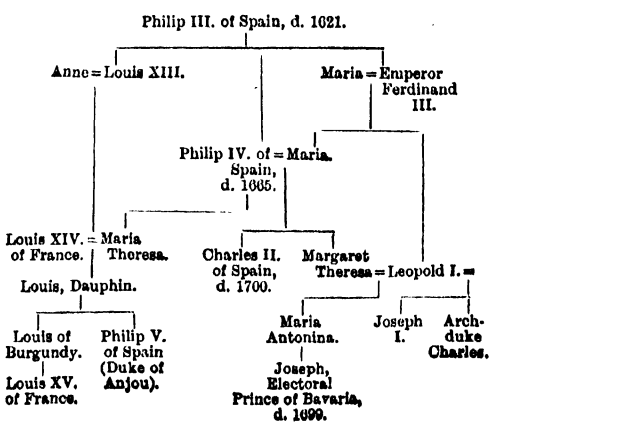
SPANIELS, see DOG FAMILY.

SPANISH FLIES, see CANTHARIDEA.

SPANISH GUINEA, see MUNI RIVER SETTLEMENT.

SPANISH REFORMED CHURCH, body of Span. Protestants, since 1871 under episcopal government on Anglican lines. A petition was sent to the Anglican Church to send a bp. to ordain, then to the Irish bp's, who ordained Señor Cabrera, bp. elect, 1894. A Portug. church is affiliated to the Spanish.

SPANISH SUCCESSION, WAR OF THE, 1701–14.



On death of Charles II. of Spain, childless, 1700, succession was doubtful. When Maria Theresa, his elder sister and co-heir, m. Louis XIV., she disclaimed all title to Spain, receiving in return as dower settlement of 500,000 crowns; as dower was never paid, it was questionable whether quitclaim remained in force. Her half-sister, Margaret Theresa, left a dau., Maria Antonia, who also, on marrying elector of Bavaria, disclaimed title to Span. succession for herself and heirs, but, it was said, under compulsion.

Next natural heirs were descendants of Anne and Maria, daughters of Philip III.; of these Anne had quitclaimed right, but Maria had not; Emperor Leopold I., son of Maria, therefore claimed inheritance. Succession, however, was of international interest; re union of Spain and Empire was dangerous to Balance of Power; therefore, in 1668 Louis XIV. arranged with Leopold to partition Span. territories on death of Charles II.; question lapsed till close of cent. when England interfered.

By First Partition Treaty, 1698, Louis XIV. agreed to allow electoral prince of Bavaria to succeed to Spain, Netherlands, and Indies, while the Archduke Charles and the dauphin were to share rest; Charles II. agreed, but electoral prince died, 1699. Second Partition Treaty, 1700, between England, Holland, and France, substituted archduke for electoral prince, but Charles II. on deathbed bequeathed entire dominions to dauphin's younger son Philip, Duke of Anjou, and Louis XIV. accepted bequest; Holland forced to acquiesce in Fr. occupation of Netherlands, 1701; England and Holland alienated by continued restrictions on Span. trade and Fr. recognition of Pretender; Grand Alliance formed, 1701, by England, Holland, Prussia, the Emperor and Grand-Duke of Hesse to wrest Italy and Indies from Bourbons. French under Catinat forced to retreat before Prince Eugene in Italy, 1701; Villeroy defeated and captured, 1702, but Philip V. drove Eugene back beyond Adige. English and Dutch under Marlborough defeated Boufflers in Netherlands, capturing Liège, 1702; Marlborough occupied Köln, 1703, but Dutch refused to besiege Antwerp and hampered Marlborough's movements.

In 1703 Louis XIV. assumed the aggressive; Villars, in conjunction with elector of Bavaria and Hungarians, advanced on Austria; elector turned aside to co-operate with Vendôme against Eugene; he was driven back by Savoyards (Savoy having joined Allies), joined Villars, and captured Augsburg. New attack on Austria, 1704, necessitated arrival of aid from Allies in Netherlands; Marsin superseded Villars, while Villeroy took over command in Netherlands and Tallard was stationed on Rhine; Marlborough determined to escape to Danube unknown to Dutch, who would not have suffered abandonment of United Provinces; he deceived Villeroy by feigned attempt to invade France, joined Eugene on Upper Danube, and cut off Bourbon forces from Austria; Tallard at once joined Marsin and elector and offered battle at Blenheim; annihilation of Fr. army; after this battle England took place of France as chief military power; meanwhile Eng. Mediterranean fleet captured Gibraltar, 1704.

Leopold d. 1705; Austrians gave little further help, and Dutch again hampered Marlborough in Netherlands. In 1706 Marlborough defeated Villeroy at Ramillies and drove French back to frontier, while Eugene, after winning battle of Turin, drove them from Italy. England had made treaty with Portugal, 1703; Allied forces under Schomberg failed in invasion of Spain, 1704, but Peterborough overran Aragon, 1705; Galway occupied Madrid, 1706, and proclaimed Archduke king, but opposition of Spaniards necessitated withdrawal. French under Vendôme advanced victoriously through Flanders, 1708, but were defeated at Oudenarde and cut off from France now open to invasion; Lille fell, Oct. 1708; last Fr. army defeated at Malplaquet, 1709, by Marlborough and Eugene, who then captured Mons.

Allies under Stanhope and Stahremberg again occupied Madrid, 1710, but were again opposed by Spaniards and forced to withdraw by Vendôme; treaty agreed to between England and France, 1711, and signed at Utrecht, 1713. Archduke Charles, who succ. as emperor, 1711, held out until successive defeats of Eugene, 1712–13, after which he made peace at Rastadt and Baden, 1714. Philip V. was confirmed king of Spain and Indies, Bourbons accepting condition that crowns of France and Spain were never to be united; France lost acquisitions on right bank of Rhine and banished Pretender; emperor received Naples, Milanese, Sardinia, and Netherlands, though Dutch garrisoned Fr. frontier; Duke of Savoy had Sicily; Prussia obtained Upper Guelderland; England acquired trading rights with Span. Indies, and sovereignty of Acadia, Newfoundland, Hudson's Bay, S. Kitts, Gibraltar, Minorca. Great naval and colonial advance of England.

SPANISH-AMERICAN WAR, 1898.—Spain retained last relics of her Amer. empire, Porto Rico and Cuba, despite their efforts to obtain independence, long after the rest had split up into republics. Cuban revolt, 1868, was put down, 1878, although Monroe Doctrine (*q.v.*) had become very powerful in U.S.A.; fresh revolt, 1895, was punished by Span. military occupation of the island and measures of excessive severity; Amer. sympathy with rebels perhaps caused mysterious destruction of Amer. warship *Maine* with officers and men in Havana Bay, Feb. 1898; 2 months later U.S.A. and Spain declared war, the former determined to expel Spain from America. U.S.A. confined themselves to naval defence of their coast and aggressive action against Cuba.

Amer. commodore, Dewey, destroyed Span. squadron and captured Cavite at end of April; Spaniards victorious at *Cardenas*, May 11, breaking Amer. blockade of Havana; on May 19 Span. fleet under Cervera arrived at Santiago de Cuba, evading Amer. ships watching for it; Schley, ordered to blockade Santiago, declared it impossible; Sampson sent with reinforcements and closed harbour; attack on land side by troops under General Shafter at close of June; Spaniards stoutly contested hills and hamlets round Santiago; both sides suffered greatly; destruction of Span. fleet and capture of Cervera, July 3; fall of Santiago, July 17.

Rebel Span. subjects proclaimed Philippine Republic and attacked Manila, which was carried by Dewey and Merritt, Aug. 13; U.S.A. annexed Philippines and Porto Rico and occupied Cuba until independent state was set up.

SPARKS, JARED (1789–1866), Amer. educationist; b. Wellington, Connecticut; editor of the *North American Review* (1823–30); prof. of History at Harvard (1839–49). His greatest work was his edition of *The Writings of George Washington*.

SPARLING, see under Salmon Family.

SPARROW, see under Finch Family.

SPARROW HAWK, a member of the Hawk Family (*q.v.*).

SPARTA (37° 5′ N., 22° 25′ E.), city of ancient Greece, capital of Laconia in the Peloponnesus; famous for the warlike prowess of its citizens; the *Laws of Lycurgus* laid the foundations of the city's greatness; inhabitants were distinguished for simplicity of life, terseness of speech, and courage in battle. Weakly children were not allowed to live; boys were trained from the age of 7 under supervision of the State and apart from their mothers; they were taught to endure hardships and suffer pain without complaint; both sexes went through a rigorous course of gymnastics, with the object of producing a physically perfect race.

In early times two kings, who were also priests, were at the head of the State, and exercised absolute authority over the army; but in the V. cent. B.C.

their powers came to be limited by the *ephors*, magistrates elected annually by the people. The State was entirely a military organisation.

S. came into the possession of the Dorians towards close of VII. cent. B.C.; waged war against and subdued Messenia, 668 B.C., and after a long war against Arcadia, gained the upper hand about 600 B.C. At time of the Persian invasion of the V. cent. B.C., S. obtained the chief command in the war, with the consent of all the Greeks. Subsequently S. and Athens fought for supremacy, and after the great struggle of the Peloponnesian War Athens was overthrown and Sparta became the leading state in Greece. In the following cent., however, she was defeated by Thebes (371 B.C.), and henceforth her power declined. With the rest of Greece, S. fell under the domination of Macedon, *c.* 340 B.C., and passed under Rom. rule, 146 B.C. Subsequent history is coincident with that of Greece (*q.v.*) as a whole.

SPARTACUS, leader in Italian slave rising (73–71 B.C.); Thracian captive; escaped with others from gladiatorial training-school; with discontented agricultural population defeated Rom. legions for two years; slain, 71.

SPARTANBURG (34° 55′ N., 81° 49′ W.), city, capital, Spartanburg County, S. Carolina, U.S.A; cotton-growing region; cotton-mills; ironworks. Pop. (1910) 17,517.

SPASMODIC SCHOOL, group of mid-XIX.-cent. Eng. poets who, trying to improve on Tennyson's form, achieved gush and bathos; members were P. J. Bailey, Dobell, Alexander Smith.

SPATHE, a bract enclosing flower or flowers. A **spadix**, spike of flowers so enclosed, is elaborate in Palms.

SPATHIC IRON ORE, see IRON.

SPEAKER, title first given to pres. of House of Commons in 1377; must be a member, and chosen by the House to enforce rules of order. The office is non-political and held during successive and opposing ministries. On retirement a peerage is usually conferred. As representative of House the Speaker is first commoner of England. In U.S.A. the office is highly political. The Speaker's chair in the House of Commons has, since 1905, been occupied by the Rt. Hon. J. W. Lowther.

SPEARWORT, name of certain plants of order Ranunculaceæ growing in moist places.

SPECIFIC DENSITY, see DENSITY, HYDROMETER.

SPECIFIC GRAVITY, see HYDROMECHANICS (HYDROSTATICS), DENSITY.

SPECKLE, DANIEL, see FORTIFICATION.

SPECTACLES, mechanical aids to defective vision worn close to the eye (*q.v.*), consisting of lens; invented *c.* 1280. To correct short-sight, when focus of image lies in front of retina, concave lenses are worn; in cases of long-sight, convex lenses focus image in retina instead of behind it; prismatic glasses used to remedy squinting; darkened spectacles worn by weak-eyed people.

SPECTROHELIOGRAPH, instrument for photographing the sun in calcium, hydrogen, or other chemical light; invented (1892) by Prof. Hale, of Yerkes Observatory; consists of a direct vision spectroscope (*q.v.*) with a slit which may be so adjusted as to exclude all other light but that of desired part of spectrum; appearances invisible to the eye, or by ordinary solar photography, may thus be recorded.

SPECTROSCOPE.—NEWTON (1666) proved the composite nature of sunlight by allowing a beam of sunlight to pass through a circular hole in a shutter of a darkened room, then through a glass prism, and allowing it to fall on a screen. The screen showed a series of coloured images of the circular hole, thus proving that the light had suffered varying amounts of refraction. The *spectrum* thus obtained was not, however, *pure*, for the images due to each kind of light overlapped those next to it. WOLLASTON (1802) improved the arrangement by using a narrow slit instead of a circular hole, and, on examining the spectrum so produced, observed several dark bands or lines crossing it in a direction parallel to the slit. FRAUNHOFER investigated these bands very closely, and from his observations and results there has sprung that branch of optics known as spectroscopy. His first improvement was to pass the beam of light from the slit through a convex lens, so placed with reference to the slit and prism that it formed on the screen a well-marked image of the slit. He also used a telescope in order to examine the spectrum more minutely. In this way he was able to identify several hundreds of lines, and his most important contribution to knowledge at this stage was the fact that each line has a definite place in the spectrum.

A spectroscope thus consists essentially of (1) a narrow slit, (2) an arrangement of lenses termed a *collimator*, (3) a prism which can turn about an axis parallel to the slit, (4) a telescope for examining the rays after passing out of the prism. The beam of light to be examined enters the slit; is converted into parallel rays by the collimator; enters the prism, where it undergoes refraction; and lastly is brought to a focus by the telescope so as to be closely examined. The different parts of the instrument are attached to a pillar resting on a heavy tripod base. One radial arm, supported by the pillar, carries the collimator with the slit at its outer end. The prism rests on a plate at the top of the pillar, and this plate (or the prism on the plate) is generally capable of rotation about an axis parallel to the slit. The prism is generally one of dense glass, fluorite, rock-salt, or quartz. Occasionally a hollow prism filled with carbon bisulphide is used. The telescope is carried on another radial arm which can revolve round the pillar so that different rays may be examined, the position of the telescope being read on a graduated circle.

In the order of historical development after Fraunhofer's discovery of the dark lines, the first advance was the establishment of the connection between the bright line spectrum of a chemical element and the dark lines of the solar spectrum. This can best be explained by an analogy from sound. Suppose that from a certain point there issues steadily a continuous stream of musical sound, including sounds of every variety of pitch within a wide range. Also that between this point and the ear of a listener there be placed a frame of piano wires all tuned to the same particular pitch. The sound-waves from the point pass through the frame and affect the listener's ear. But if any of these waves have a frequency equal to that of the piano wires when these are struck, such waves are stopped by the frame because they are absorbed there, and that particular note will not pass on to be heard by the listener. In other words, a vibrating system can absorb the energy of vibrations of its own proper frequency. Suppose now we have an arrangement as follows: (1) a source of white light at a high temperature, *e.g.* an electric arc-light; (2) a low temperature flame to which, ordinarily colourless, a yellow tinge has been given by allowing some sodium salt to vaporise in it; (3) a spectroscope. Examining (1) by the spectroscope, a continuous spectrum from violet to red, with no dark lines in it, is seen. Examining (2), its spectrum is seen to consist of a single (in reality, multiple) *bright* line in the yellow region. Now pass the light from (1) through (2) and examine its spectrum. It will show a *dark* line occupying exactly the same position as the bright line of (2) when seen alone. KIRCHHOFF explained this 'reversal' (as it is termed), and applied it to the dark lines in the solar spectrum. He supposed the hotter main body of the sun to be giving out light of all kinds, but that the cooler vapours which surround the sun absorb those rays whose frequencies correspond to the chemical elements in these vapours. Hence the existence of a dark line in the solar spectrum indicates the presence in the sun of that particular

element which, when incandescent, gives rise to light of that kind.

This discovery led to the examination of the spectra of the different chemical elements, the determination of the wave-length for each line in each spectrum, and the comparison of the spectra of different celestial bodies with the data so obtained. In order to identify a given line, it is sufficient to know the wave-length of the light to which it corresponds. This is usually expressed in terms of the **Augström unit**, viz. one ten-millionth of a millimetre; *e.g.* one of the lines of yellow sodium light has a wave-length of 5896·62 Augström units.

The spectroscope has been applied in many branches of physics, terrestrial and cosmical, but space forbids any detailed statement of the methods or results. The following may, however, be mentioned: velocity of stars, velocity in different parts of a nebula, rotation of the sun, velocity of solar prominences, detection of chemical elements, Zeeman effect.

Landauer, *Spectrum Analysis*; Baly, *Spectroscopy* (1905).

SPECTRUM, see SPECTROSCOPE.

SPECULAR IRON ORE, see IRON.

SPEEDWELL (*Veronica*), genus of plants, order Scrophulariaceæ; Common S. (*V. officinalis*) and Germander Speedwell (*V. chamædrys*), both azure blue flowers, are common on waysides.

SPEKE, JOHN HANNING (1827–64), Eng. explorer; b. near Ilchester, Somersetshire. In his first expedition he explored Lake Tanganyika; discovered Victoria Nyanza and became certain that it was the source of the Nile. In 1860 he made a second expedition to corroborate his conjecture, and from the lake followed the course of the Nile for a considerable distance. His works are: *Journal of the Discovery of the Source of the Nile* and *What Led to the Discovery of the Source of the Nile.*

SPELL, see INCANTATION.

SPELLO (43° N., 12° 40′ E.) (ancient *Hispellum*), small town, Perugia, Italy. Pop. 5700.

SPELMAN, SIR HENRY (*c.* 1564–1641), Eng. antiquary; for Speed's *Theatre of Great Britain* he wrote an account of Norfolk. His masterpiece was his *Concilia, decreta, leges, constitutiones in re ecclesiarum orbis Britannici*, an examination of the documents relative to Church history.

SPELTER, see ZINC.

SPENCER (42° 15′ N., 72° W.), town, Worcester County, Massachusetts, U.S.A.; boots, wire. Pop. (1910) 6740.

SPENCER, HERBERT (1820–1903), Eng. philosopher; b. Derby; sub-editor of *Economist*, 1848–53; first studies were principally on political and social questions; expounded *Synthetic Philosophy* in voluminous writings from *First Principles* (1862) to *Data of Ethics* (1879); endeavoured to include all sciences in one comprehensive system.

S.'s philosophy is based on evolution; he accepts the associationist psychology, but seeks to explain all types of being and activity by a broader law, of which association is only a special case. All organic development is a change from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity; a law not self-evident, but amply verified from experience; applicable to all kinds of phenomena, since these are component parts of one universe. Assumptions are, knowledge limited to relations, behind phenomena an inscrutable absolute, the postulates of space, time, matter, motion, force, all traceable to persistent force. The goal of evolution is equilibrium, the balance of contending forces. See SOCIOLOGY.

Spencer, *Autobiography* (2 vol's, 1904); Duncan, *Life and Letters* (1908).

SPENCER, JOHN CHARLES SPENCER, 3RD EARL (1782–1845), Brit. statesman; M.P. for Northampton, 1806–32; Chancellor of the Exchequer and leader of House of Commons, 1830; took important part in carrying through Reform Bill; brought in Poor Law Amendment Bill, 1834; main support of Melbourne administration, 1834; universally trusted.

SPENCER, JOHN POYNTZ SPENCER, 5TH EARL (1835–1910), Brit. (Liberal) statesman; Lord-Lieut. of Ireland, 1868–74, 1882–85; Pres. of Council, 1880, 1886; First Lord of Admiralty, 1892–95.

SPENER, PHILIPP JAKOB (1635–1705), Ger. Lutheran divine; lecturer at Strassburg; Lutheran pastor at Frankfort-on-Main, Dresden, and Berlin; helped to found Halle Univ.; leader of Pietist movement; a voluminous writer.

SPENNYMOOR (54° 42′ N., 1° 35′ W.), town, Durham, England; collieries, ironworks. Pop. (1911) 17,914.

SPENSER, EDMUND (1552–99), Eng. poet; b. London; ed. Merchant Taylors' School and Pembroke Coll., Cambridge. After distinguishing himself at Cambridge he became known to Sir Philip Sidney, published his *Shepheard's Calendar*, and was at once hailed as the coming poet. In 1580 he received an appointment in Ireland, followed in 1586 by a grant of land near Cork. In that year he published *Astrophel*, an elegy on Sidney, and in 1590, at Raleigh's instance, came to court and issued the first part of his long allegorical poem, the *Faërie Queene* (begun 1580), with a dedication to Queen Elizabeth, followed by a collection containing *The Teares of the Muses* and *The Ruins of Time*. Returning to Ireland, he married Elizabeth Boyle in 1594, in whose honour he wrote the magnificent *Epithalamion*. Once more in England he published in 1596 the second part of the *Faërie Queene*, and the *Prothalamion*, written to celebrate a marriage in the Earl of Worcester's family. In 1598 he was appointed Sheriff of Cork, but after having his castle burnt and one of his children killed by rebels, he returned to London and died there in poverty and disappointment. His poetry is remarkable for grace and melody and a sumptuous imagination, and he has enriched Eng. lit. with a stanza, called after him, the *Spenserian* stanza (eight lines of Iambic Pentameter, followed by an Alexandrine; rhyming *a b a b b c b c c*). For the influence he has exercised upon succeeding poets he has been well named 'The Poet's Poet.'

Grosart's edition of the poems, 10 vol's (1882–84); Globe Edition (1899); Dean Church, *Life* (in the E.M.L. Series, 1879).

SPENSERIAN STANZA, a stately form of Eng. verse, so called from its use in Spenser's *Faërie Queene*. Byron adopted it in *Childe Harold*.

SPERANSKI, COUNT MIKHAIL MIKHAILOVICH (1772–1839), Russ. politician; favourite minister of Tsar Alexander I.; drew up new constitution; charged with treason, 1812, and dismissed for time; afterwards became gov. of Siberia; councillor of state, 1821.

SPERM WHALE, CACHALOT, see WHALES.

SPERMATOZOA, see REPRODUCTION.

SPERMBERG (51° 34′ N., 14° 23′ E.), town, on an island of the Spree, Brandenburg, Prussia; manufactures cloth.

SPESSART (50° N., 9° 28′ E.), wooded region (rising to height of about 2000 ft.), Hesse-Cassel, Prussia.

SPEUSIPPUS (d. 339 B.C.), a nephew of Plato; became on latter's death head of the Academy.

SPEY (57° 40′ N., 3° 7′ W.), swift river, Scotland; rises in Highlands and enters Moray Firth; length, 110 miles; extensive salmon fisheries.

SPEZIA (44° 6′ N., 9° 48′ E.), fortified town, watering-place on Bay of Spezia, Genoa, Italy; chief Italian arsenal and naval station; docks and shipbuilding yards; exports olive oil; near remains of ancient Luna. Pop. (1911) 66,263.

SPHÆROTHERIUM, a genus of Millipedes; see MYRIAPODA.

SPHAGNALES, see under BRYOPHYTA.

SPHEGIDÆ, see WASPS.

SPHENISCIDÆ, PENGUINS (*q.v.*).

SPHENODON, HATTERIA, TUATARA, a scaly, lizard-like animal with comb-like crest, found only in

New Zealand. It is a living fossil, the only modern representative of the great Reptilian order *Rhynchocephala*, which began in Permian times.

SPHENOID BONE, see SKULL.

SPHENOPHYLLALES, see PALÆOBOTANY, PTERIDOPHYTA.

SPHERE, a solid bounded by a single surface, every point of which is the same distance from a fixed point, called the centre of the s. Any plane through the centre cuts the surface in a *great* circle. Volume of s. $=\frac{4}{3}\pi r^3$; surface area $=4\pi r^2$, where r is the radius.

SPHERES, MUSIC OF THE.—The Pythagoreans held that the ten heavenly bodies revolving round the central fire (viz. the counter-earth, earth, moon, sun, five planets, and heaven of the fixed stars) produce musical notes.

SPHERES OF INFLUENCE.—The provisional appropriation of territories by one power is recognised as a sphere of influence by other powers. A boundary of this sphere is agreed upon, and every form of aggrandisement in that region must be abstained from by each power that is a party to the agreement, which is really a reciprocal acknowledgment of abstention from territorial expansion in certain directions. Sometimes the sphere of influence is acknowledged by an agreement that territory shall not be alienated, as in the agreements by China with Britain in 1898, and with France in 1897. The granting of leases of territory by one country to another gives the lessee a sphere of influence over that territory, as does also the right by treaty of protectorate and administration.

SPHERICAL HARMONICS.—A *solid spherical harmonic* of the mth degree may be defined as a homogeneous rational integral algebraic function of x, y, and z, $S_m(x, y, z)$ of the mth degree satisfying the equation $\nabla^2 S_m(x, y, z)=0$; and a *surface spherical harmonic* of the mth degree as such a function divided by $(x^2+y^2+z^2)^{\frac{m}{2}}$, that is by r^m. Here ∇^2 stands for the differential operator $\left(\frac{d^2}{dx^2}+\frac{d^2}{dy^2}+\frac{d^2}{dz^2}\right)$.

The equation $\nabla^2 V=0$ is known as *Laplace's equation*, and when transformed to spherical co-ordinates it takes the form

$$rD_r^2(rV)+\frac{1}{\sin\theta}D_\theta(\sin\theta\,.\,D_\theta V)+\frac{1}{\sin^2\theta}D_\phi^2 V=0 \quad . \quad \text{(i.)}$$

where D_r is put for $\frac{d}{dr}$, etc. Important particular solutions of (i.) are

$$V=r^n\,(A\cos n\phi+B\sin n\phi)\sin^n\theta\frac{d^nP_m(\mu)}{d\mu^n} \quad . \quad \text{(ii.)}$$

$$\text{and } V=\frac{1}{r^{m+1}}(A\cos n\phi+B\sin n\phi)\sin^n\theta\frac{d^nP_m(\mu)}{d\mu^n} \quad . \quad \text{(iii.)}$$

where m and n are positive integers, and $n<m+1$.

$P_m(x)$ is a *Legendre Coefficient*, or *Surface Zonal Harmonic*, and is a solution of Legendre's equation

$$D_x[(1-x^2)D_x P]+m(m+1)P=0.$$

$$P_m(x)=\frac{(2m-1)(2m-3)\ldots 1}{m!}\left[x^m-\frac{m(m-1)}{2(2m-1)}x^{m-2}+\frac{m(m-1)(m-2)(m-3)}{.4\,.\,(2m-1)(2m-3)}x^{m-4}-\ldots\right].$$

The function of $P_m(\mu)$ occurring in (ii.) and (iii.) $\sin^n\theta\frac{d^nP_m(\mu)}{d\mu^n}$ is an associated function of the nth order and mth degree, and may be represented by $P_m^n(\mu)$. Cos $n\phi P_m^n(\mu)$ and $\sin n\phi P_m^n(\mu)$ are called *Tesseral Harmonics* of the mth degree and nth order, and satisfy the equation

$$m(m+1)V+D_\mu[(1-\mu^2)D_\mu V]+\frac{1}{1-\mu^2}D_\phi^2 V=0 \quad . \quad \text{(iv.)}$$

There are $2m+1$ Tesseral Harmonics of the mth degree—

$$P_m(\mu),\ \cos\phi\sin\theta\frac{dP_m(\mu)}{d\mu},\ \sin\phi\sin\theta\frac{dP_m(\mu)}{d\mu},$$

$$\cos 2\phi\sin^2\theta\frac{d^2P_m(\mu)}{d\mu^2},\ \sin 2\phi\sin^2\theta\frac{d^2P_m(\mu)}{d\mu^2},$$

$$\ldots\ldots\ldots\ldots\ldots$$

$$\cos m\phi\sin^m\theta\frac{d^mP_m(\mu)}{d\mu^m},\ \sin m\phi\sin^m\theta\frac{d^mP_m(\mu)}{d\mu^m}.$$

If each of these is multiplied by a constant and their sum taken, we get a *Surface Spherical Harmonic* of the mth degree, and this is a solution of equation (iv.). It is represented by $Y_m(\mu, \phi)$, or by $Y_m(\theta, \phi)$. Hence we have

$$Y_m(\mu_1\phi)=\sum_{n=0}^{n=m}\left[A_n\cos n\phi\sin^n\theta\frac{d^nP_m(\mu)}{d\mu^n}+B_n\sin n\phi\sin^n\theta\frac{d^nP_m(\mu)}{d\mu^n}\right].$$

Any homogeneous rational integral algebraic function $S_m(x, y, z)$ of the mth degree in x, y, and z, which is a value of V satisfying $\nabla^2V=0$, contains $2m+1$ arbitrary constant coefficients. In general it has $\frac{1}{2}(m+1)(m+2)$ coefficients; but $\nabla^2S_m(x, y, z)=0$ gives rise to $\frac{1}{2}m(m-1)$ equations of condition between these coefficients, leaving $2m+1$ coefficients undetermined. We can therefore choose the coefficients in $r^mY_m(\mu_1\theta)$, so that it will transform into any given $S_m(x, y, z)$. Hence the definition given at first.

In finding the Potential Function in problems in electrostatics or gravitation, if we have the value given as a function of θ and ϕ for some given value of r (*i.e.* on surface of some sphere with centre at origin), and if we can express it in terms of spherical harmonics of θ and ϕ, we have only to multiply each term by the proper power of r to get the solution of the problem; for we then have a value of V satisfying Laplace's equation, and reducing to the given function of θ and ϕ on the surface of the given sphere; *e.g.* suppose we require to find the value at an external point of the potential function due to the attraction of a solid sphere, whose density at any point is proportional to the product of any power of the radius vector by a Surface Spherical Harmonic.

Let $\rho=Cr_1^kY^m(\mu_1, \phi_1)$; then we have

$$V=\int_0^a dr_1\int_0^{2\pi}d\phi_1\int_{-1}^{1}\frac{Cr_1^kY^m(\mu_1, \phi_1)r_1^2d\mu_1}{\sqrt{r^2-2rr_1\cos\gamma+r_1^2}}$$

which reduces finally to $\frac{4\pi C}{2m+1}\cdot\frac{a^{m+k+3}}{n+k+3}\cdot\frac{Y_m(\mu, \phi)}{r^{m+1}}$.

Another problem is the following: A conducting sphere, radius a, earth-connected by a wire, is placed in the field of an electrified point charged with m units; find the potential function due to the induced charge. The solution is easy in terms of Zonal Harmonics, and shows the effect of the induced charge is the same at an external point as if the sphere were replaced by ma/b units of electricity at the point $r=a^2/b, \theta=0$, where b is the distance of the centre of the sphere from the point charge.

Ferrers, *Spherical Harmonics*; Todhunter, *Laplace's, Lamé's, and Bessel's Functions*; Byerly, *Fourier's Series and Spherical Harmonics*; Thomson and Tait, *Natural Philosophy*.

SPHERULITES, small rounded bodies, a mixture of quartz and acid-feldspar, found in vitreous igneous rocks, common in acid glassy rocks, and also in basic rocks such as tachylyte; visible in obsidian as tiny rounded bodies of different colour from obsidian.

SPHINX (classical myth.), she-monster of Bœotia who propounded the riddle: 'What animal has four feet, two feet, three feet, and one voice; when it has most feet it is weakest?' Œdipus answered: 'Man; he crawls on all fours when a child, and in age uses a third foot—a staff.' On hearing the answer she

slew herself. The Sphinx in Egypt is a huge figure with lion's body and paws, woman's face and breast.

SPHYGMOGRAPH, see FLIGHT.

SPHYRNA, see under SHARKS AND DOG-FISHES.

SPIDERS (Order *Araneæ*, *Araneida*, or *Araneina* in Class ARACHNIDA).—Spiders are easily to be distinguished from their Arachnid relatives by their narrow 'waist' and by the presence at the hinder end of the body of a cluster of spinnerets, usually six or eight in number. Apart from these their most striking characters are a pair of grasping two-jointed cheliceræ above the mouth, the last joint of which is sharp and bears the opening of a poison gland; the presence for respiration of tracheæ and of two or four 'lung-books'—leaf-like plates within which blood circulates while an air current washes them; and in the male the modification of pedipalps as depositors of spermatozoa. Most spiders have eight eyes. In some cases the males are smaller than the females, which occasionally punish an undesirable suitor by devouring him.

S's have exceedingly small mouths and can consume only liquid food, sucked from their prey. This consists mostly of insects, caught in the familiar webs, or by lurking and stealth as in the giant MYGALE, which has been seen to catch small birds, or by active pursuit, as in the WOLF SPIDERS (*Lycosidæ*), which include the TARANTULAS, and JUMPING SPIDERS (*Salticidæ* or *Attidæ*).

S's are perhaps best known, however, on account of their spinning, silken threads being woven into galleries, as in the nest of the TRAP-DOOR SPIDERS (e.g. *Atypus* and *Cteniza*), into rough protections for the eggs, or simple platforms before the nest, as in the HOUSE SPIDER (*Tegenaria domestica*), into beautiful orb-webs built in Brit. gardens, generally by the COMMON GARDEN SPIDER (*Epeira diademata*), or into air-storing, thimble-shaped huts in which the WATER SPIDER (*Agyroneta aquatica*) lives beneath the surface of ponds. Young spiders often use a silken thread as a balloon, the threads being wafted by the wind and forming the well-known 'gossamer' of autumn.

The eggs of spiders are protected in cocoons, and the young moult about eight times before adult life is reached.

SPIKENARD, perfume used in unguents by Oriental races; made from nard (*Nardostachys jatamansi*); contained balm and myrrh; popular in Rome; for Biblical reference see *John* 12^{3-5}.

SPILLIKINS, ancient game played with small sticks flung in a heap; object to draw out one stick without disturbing the rest.

SPINACH (*Spinacia*), genus of plants, order Chenopodiaceæ; Common S. (*S. oleracea*), the vegetable, is cultivated for its tender leaves, which are cooked.

SPINAL ACCESSORY, see NERVOUS SYSTEM.

SPINAL CORD is the term applied to that part of the central nervous system within the spinal or vertebral canal. It is from 16 to 18 inches in length, extending from the opening in the base of the skull, where it becomes continuous with the medulla oblongata, to the upper border of the second lumbar vertebra, below which point it is represented by a thread-like structure, not of nervous tissue, termed the *filum terminale*. Like the brain it is enclosed in three membranes: the *pia mater*, closely applied to the cord; the *arachnoid mater*, a delicate middle membrane; and the *dura mater*, less closely applied, however, to the vertebral column than that of the brain is to the skull.

The s. c. is a somewhat flattened cylinder, thicker in the cervical region where the nerves forming the brachial plexus leave it, and in the lumbar region where the nerves forming the lumbar and sacral plexuses have their origin from it. It is divided into halves by the anterior median fissure in front and the posterior median septum behind, which are best observed in a transverse section of the cord, the anterior median fissure being wider but much less deep than the posterior median septum.

Like the brain, the s. c. consists of *grey* and *white matter*, the grey matter being arranged, as is seen on transverse section of the cord, in a crescentic form in the centre of each lateral half of the cord, the two being joined by a bar in the middle, so that the whole has roughly the shape of the letter H. In the centre of the middle bar, or *grey commissure*, is the central canal, which extends throughout the length of the cord and is continuous above with the fourth ventricle of the brain. The anterior limbs of the H-shaped grey matter are termed the *anterior horns*, and are larger and broader than the posterior limbs, or *posterior horns*. With the anterior horns the anterior nerve roots, containing motor nerve fibres taking origin from the nerve cells of the anterior horn, are connected, while with the posterior horns the posterior nerve roots are connected, containing sensory nerve fibres taking origin from the nerve cells in the ganglia outside the cord and linking up with the nerve cells of the posterior horn.

The white matter of the cord surrounds the grey, passing in front of the grey commissure to join the white matter of the other side and forming the *white commissure*. It is composed of nerve fibres and of neuroglia and is arranged in definite longitudinal tracts which have been mapped out by various experimental methods, but which are not visible in a transverse section of the cord on examination by the naked eye or by the microscope. The posterior column, between the posterior nerve roots and the posterior median septum, is composed of the *tract of Goll*, next to the septum, and the *tract of Burdach*, next to the posterior nerve roots, while in the middle of the latter tract is the *comma tract of Schultze*. The lateral column, on the external aspect of the cord between the posterior and the anterior nerve roots, is composed (from behind forwards) of, first, the *tract of Lissauer*, on the surface beside the tip of the posterior horn; then, externally, the *direct cerebellar tract*; internally, the *crossed pyramidal tract*; farther forward, externally, the *tract of Gowers*; and, internally, the *antero-lateral ground bundle*, which includes part of the column on the internal side of the anterior nerve roots. On the side of the anterior fissure is the *direct pyramidal tract*. The direct and the crossed pyramidal tracts contain the motor fibres from the cortex of the brain running to the anterior horn of grey matter, forming the upper segment of the path of motor impulses, while the other tracts conduct sensory nervous impulses upwards to the brain, or contain fibres which form connections for nerve cells at different levels in the cord.

The **nervous system** is built up of an aggregation of *neurons*, a neuron consisting of a nerve cell which gives off a number of branching processes and also one branch which is a nerve fibre, termed the *axon*, or *axis cylinder*; by means of the processes nervous impulses are conducted to the cell, and are then transmitted by the axis cylinder away from the cell, either so as to come into relation with the collecting processes of another cell or to the termination of the axis cylinder in a sense-organ. The path of motor impulses from the brain is in two segments, each composed of a neuron, the axis cylinder of the upper extending from a nerve cell in the motor area of the cortex of the brain to the anterior horn of grey matter in the spinal cord; the axis cylinders conducting the impulses compose the direct pyramidal tract, which is on the side of the anterior fissure, and the crossed pyramidal tract, which is situated internally in the lateral column of the spinal cord. The lower segment of the motor path is composed of a neuron which has an axis cylinder extending from a nerve cell in the anterior horn of grey matter of the spinal cord, the processes of which come into relation with the axis cylinder of the upper neuron, to the termination in a muscle.

The path of sensory impulses is in three segments, the lowest being a neuron, with its nerve cell (from which a process goes to the muscles, skin, or mucous membranes), in the ganglion of the posterior root of a spinal nerve, and the axis cylinder going into the

spinal cord, where it takes part in the composition of one of the tracts of white matter, ending eventually in the medulla oblongata. In the medulla oblongata it comes into relation with the processes of the nerve cell of the neuron of the second segment of the path, and the impulse is transmitted by the axis cylinder of this nerve cell to the brain, where it ends in one of the internal nuclei of grey matter. The upper segment of the path consists of a neuron composed of a nerve cell in the nucleus of grey matter, the processes of which come into relation with the termination of the axis cylinder of the second neuron, which sends an axis cylinder to come into relation with the processes of one of the motor nerve cells of the motor area of the brain cortex.

REFLEX ACTION, as, for instance, when the foot is moved automatically in response to tickling the sole, is brought about by the nervous impulse travelling by the afferent sensory fibres to the nerve cells in the ganglion of the posterior root of the spinal nerve, and being then short-circuited by a branch from this nerve cell to the nerve cell of the lower segment of the motor path in the anterior horn of grey matter of the spinal cord, and being then transmitted by the efferent motor fibres to the muscles.

Diseases of Spinal Cord.—The s. c. may be affected by *meningitis* (*q.v.*), or inflammation of the membranes which enclose it, designated as external or internal, according as it commences outside or inside the dura mater, while it may take an acute or a chronic form. *Myelitis*, or inflammation of the substance of the cord, may follow exposure, may be due to the toxins of measles, enteric fever, and other infections, or may be an extension of disease of the vertebral column or of the spinal membranes. There is loss of feeling and weakness and eventually paralysis of the muscles below the level of the part of the cord affected, further symptoms depending upon the extent of the lesion. The treatment is rest and application of fomentations, with tonics, massage, and electricity in the later stages if the condition becomes more chronic.

Acute anterior poliomyelitis is a condition of inflammation of the anterior horn of grey matter of the cord, usually occurring in childhood, due to cold, injury, or the toxins of infectious diseases. There is usually pain, fever, and paralysis of one or more limbs, the muscles of which become flabby and wasted. With rest, fomentations, and, after the acute stage, plenty of fresh air, tonics, and massage, there is generally great improvement, but complete recovery is unusual. *Syringomyelia* is a condition in which a cavity is formed in the s. c., usually from dilatation of the central canal, with increase of neuroglia. The condition is incurable, but the person affected may live for many years; the general health should be kept up, and tonics, especially strychnine, given. See BRAIN, NERVOUS SYSTEM, MUSCLE (for connection of nervous system with muscular contraction), LOCOMOTOR ATAXIA, SCIATICA.

SPINAL NERVES, see NERVOUS SYSTEM.

SPINAZZOLA (40° 58′ N., 16° 4′ E.), town, Bari, Italy; fruit and oil. Pop. *c.* 11,900.

SPINEL, group of minerals, and variety of corundum occurring in regular crystals; composed of alumina, magnesia, silica, and protoxide of iron; colours—red, black, blue, yellow, and green; used for ornamental stones as jewellery; found in river beds of Ceylon and Siam, and embedded in carbonate of lime in N. America. See RUBY.

SPINET, predecessor of pianoforte (*q.v.*); small keyboard, single string to each note; used in XVII. cent. *Virginal* (or 'pair of Virginals'), small spinet without legs.

SPINIFEX, PORCUPINE GRASS (*Triodia irritans*), coarse Australian grass growing in tufts 2–4 ft. high.

SPINNING, the twisting of fibres of cotton, flax, silk, wool, etc., into threads of uniform size ready for weaving. S. was formerly accomplished by means of a distaff round which the fibres were coiled; a spindle was turned by the operator, whose left hand guided the fibres while the finger and thumb of the right fashioned them into a thread; later the spindle was placed in a frame and revolved from a large wheel, worked by a treadle. Such apparatus only produced a single thread at a time; the inventions of Arkwright (*q.v.*), Crompton (*q.v.*), and Hargreaves (*q.v.*) revolutionised spinning.

SPINOLA, AMBROSE, MARQUIS DE LOS BALBASES (1569–1630), Span. soldier; b. Genoa; served in Low Countries; successfully besieged Ostend, 1604, and other towns; relieved Ghent, 1605; supported Emperor Ferdinand II. in Palatinate in beginning of Thirty Years War; returned to Netherlands, 1621; took Jülich, 1622, Breda, 1624.

SPINOZA, BARUCH, or BENEDICT (1632–77), philosopher; b. Amsterdam, of Jewish parents; ed. in Hebrew faith, but expelled as a heretic; supported himself by polishing lenses, while occupying leisure in philosophical studies; principal works, *Principles of the Philosophy of Descartes* (1663), *Tractatus Theologico-Politicus* (1670), *De Intellectus Emendatione, Ethica* (posthumous).

S. retains the dualism of mind and matter, but as an opposition of attributes, not of substances, as with Descartes (*q.v.*). This method is mathematical, following a hint given by Descartes. From definitions of Substance, Attribute, Mode, he deduces a system of parts logically connected, claiming for it the certainty of geometrical deductions. Substance is the great reality underlying phenomena (*substans*); eternal, infinite, cause of itself and of all things, identical with God. God is the ultimate principle from which all things proceed; His essence is expressed by the 'Attributes,' mind and matter, thought and extension, through which substance is revealed to the human mind; independent of each other, and needing in the case of man a 'law of parallelism' to explain their apparent interaction. Modes, which with attributes explain things as we find them, are modifications of the attributes; of thought,—idea, wish, feeling; of extension,—every visible thing.

S.'s aim is practical; the way to perfection is intellectual, through a mind cleared of all illusions, and wholly absorbed in the divine substance. God is denied personality; freedom is replaced by absolute necessity; we are free only as sharing the nature of God, who everywhere acts necessarily, by the laws of His own nature.

Caird, *Spinoza* (1888); Pollock, *Spinoza, Life and Philosophy* (1880).

SPION KOP (28° 30′ S., 29° 40′ E.), hill, near the Tugela, Natal, S. Africa; scene of a British repulse in Transvaal War, Jan. 1900.

SPIRÆA, genus of plants, order Rosaceæ; includes Meadow Sweet or Queen of the Meadows (*S. ulmaria*), famous for its scent, and many cultivated flowers.

SPIRE (O.E. *spir*, a blade of grass), a tapering pointed roof, crowning a tower of church or other building; favourite feature of Gothic architecture; great variety of forms; common type, octagonal s. on square tower; *broach* s. has no parapet at base; many s's are exceedingly high, and some (*e.g.* St. Stephen's, Vienna) ornamented with elaborate tracery. The highest s's are Ulm, 532 ft.; Cologne, 512; Rouen, 483. Other famous s's are St. Nicholas, Hamburg (480), Strassburg (464), St. Peter's, Rome (440), Salisbury Cathedral (404), Chartres, and St. Mary's, Oxford.

SPIRES, SPEYER (49° 18′ N., 8° 26′ E.) (ancient *Augusta Nemetum* or *Noviogamus*), town, on Rhine, Bavaria, capital of the Palatinate; bp.'s see; cathedral (1030); the Reformers first were called Protestants at the famous Diet of 1529. Pop. (1910) 23,045.

SPIRIGERA, a group of INFUSORIA (*q.v.*).

SPIRITS are distilled alcoholic liquids. The alcohol is produced by fermentation of fruit juices, cane sugar, molasses, beet sugar, and starchy products (grain, potatoes).

Brandy, when genuine, is distilled from fermented grape juice (wine). The best Fr. brandy is made in and around *Cognac* (whence name) from a small, white grape. Inferior brandy comes from Spain, Portugal, and Italy. The colourless, distilled s. is diluted and matured in oaken casks, whence it derives a pale colour; a deeper colour is sometimes imparted by caramel. The characteristic aroma and flavour of brandy depend on the wine from which it is distilled, but are developed by maturing, through the slow formation of esters (*q.v.*). Besides alcohol and water, the chief constituents of brandy are acetic acid, ethyl acetate, ethyl œnanthate, volatile oil, colouring matter, and tannin derived from the storage cask. Average brandy contains 45 to 55 % alcohol by weight, and 80 to 100 milligrammes esters to 100 c.c. alcohol. Special brandies, *e.g.* plum brandy, cherry brandy, are distilled from fruit. Much brandy is factitious, being made by adding the necessary esters, colouring matter, etc., to *silent spirit*, *i.e.* pure diluted alcohol.

Whisky, which contains about 55 % alcohol, is the s. distilled in a pot still from the fermented wort of malted barley or other grain. Scotch w. has a special flavour derived from the peat used in drying the malt. Freshly distilled w. contains fusel oil (*q.v.*), which disappears on storage in casks. Factitious w. is made from silent spirit, suitably diluted, coloured and flavoured.—**Gin**, which contains about 40 % alcohol, is a grain s., uncoloured, but flavoured by distillation with juniper berries, or other aromatic substances.—**Rum**, containing 50 to 60 % alcohol, is distilled from fermented molasses (see SUGAR). Its characteristic flavour is due to ethyl acetate and butyrate. Factitious rum is made by adding these flavourings to diluted grain s.—**Liqueurs and Cordials**, which contain 20 to 60 % alcohol, are mixtures of alcohol, water, flavouring essences, and sugar.—**Absinthe** is grain s. flavoured with wormwood.—**Arrack** is the spirit obtained from rice and the cocoanut palm.

Alcohol to be employed for making factitious spirits, or for various industrial purposes, is obtained from the starch of barley, rice, corn, rye, or potatoes, or from molasses. The starch extracted from the grain is converted into maltose at about 63° C.; and the wort is fermented at 20°–25° C. during three days The turbid product, or mash, containing 10 to 13 % alcohol, is submitted to continuous distillation, generally in Coffey's still. In this process the alcohol is removed as vapour from the mash by means of steam, from which it is separated by dephlegmation, *i.e.* fractional condensation. The product is rectified spirit. By repeated rectification the alcohol in the distillate may reach 95 %. To prepare absolute alcohol a drying agent is necessary.

Proof Spirit contains 49 % alcohol by weight; at 51° F. 13 volumes weigh the same as 12 volumes water. The strength of s. was originally 'proved' by gunpowder; s. *under proof* failed to ignite the powder when it burnt out. Spirit 30 degrees under proof contains 70 volumes of proof spirit and 30 volumes of water; 100 volumes of spirit 50 degrees over proof diluted with water to 150 volumes would give proof spirit.—**Rectified Spirit** (Brit. Pharmacopœia) contains 85·65 % alcohol by weight.—**Methylated Spirit**, sold duty free, contains 90 % ethyl alcohol with 10 % crude wood s. (methyl alcohol).

Duty-free alcohol is now sold under special permit for purposes of scientific teaching and research in recognised institutions. Alcohol is used for making tinctures, perfumes, transparent soap, varnishes, dyes, ether, chloroform, fine chemicals, celluloid, collodion, and artificial silk; also for preserving anatomical specimens, and as a means of heat, light, and motive power.

SPIRITUALISM, name given to a movement, in existence since 1848, which might be called religious, philosophical, or scientific, and which believes in the communication with 'another world' and the existence of phenomena which cannot be explained by ordinary physical laws. The reality and validity of s. has been hotly discussed, and whatever opinion be held it cannot be denied that, although there has been much both of unconscious self-deception and of conscious fraud, there are admittedly phenomena for which no adequate explanation has been given outside the spiritualistic assumptions. *Séances* with *mediums* are often very unsatisfactory, and a medium is admittedly not quite reliable and may give false information or no information at all. The physical phenomena of s., such as table-turning, which involve not communication with the departed but the existence of forces in nature otherwise unknown, are disputable. It cannot be denied that here, as with communication though mediums, there has been much deception. Much good work in exposing fraud and sifting evidence has been done by Society for Psychical Research (1882), in which the late F. W. Myers was prominent.

Myers' *Human Personality and its Survival of Bodily Death.*

SPITALFIELDS, district, Stepney, London, England, 1 mile N.E. of St. Paul's; seat of silk-weaving industry.

SPITHEAD (50° 44′ N., 1° 4′ W.), roadstead, English Channel, between Portsmouth and Isle of Wight.

SPITI (32° N., 78° E.), district, Kangra division, Punjab, India; traversed by river Spiti. Pop. 3500.

SPITZBERGEN (76° to 80° 48′ N., 10° to 30° E.), archipelago of five large islands and several smaller ones, situated in Arctic Ocean about 400 miles N. of Norway; largest are West Spitzbergen, North-East Land, and Edge Island; total area *c.* 22,000 sq. miles; surface is generally mountainous, reaching an extreme height of over 5500 ft. in island of Prince Charles Foreland. The summits are covered with perpetual snow, and there are many glaciers. There is little vegetation, chiefly mosses and sedges. Animals include reindeer and polar bears. During the short summer the islands are visited by Norweg. and Russ. walrus-hunters; seals and whales were formerly numerous, but are now fast disappearing. The islands have no permanent population, and have not been taken possession of by any country; first discovered by a Dutch explorer, 1596.

SPLEEN, a solid vascular organ, situated deeply in the upper part of the abdomen at the left side, behind the stomach, with which a large part of its interior surface is in contact. It has no duct, and does not produce any secretion, communicating with the rest of the body by its blood-vessels, nerves, and lymphatics. It is covered with a strong capsule; and internally is of a soft, pulpy consistence, with little white patches, composed of lymphoid tissue investing the blood-vessels, scattered through it. The arteries open into the loose tissue which composes the pulp, and the blood flows through it before entering the veins. The functions of the spleen are, probably, the destruction of worn-out red blood corpuscles, certainly the formation of new corpuscles, white and red, chiefly the former variety, while it acts as a blood filter, and has a controlling influence upon the blood stream. It has been shown that the spleen is not essential to life, and that, when it has been excised, its functions have been assumed to some extent by the lymphatic glands and bone-marrow. In certain diseases, particularly in blood diseases, *e.g.* splenic leucocythæmia, and in fevers, the spleen may become enlarged, sometimes to an enormous extent, and to reduce its size the application of the X-rays has been employed with success. See DUCTLESS GLANDS.

SPLÜGEN PASS (46° 30′ N., 9° 20′ E.), Alpine pass (6946 ft.), between canton Grisons, Switzerland, and Lombardy, Italy.

SPODUMENE, a mineral belonging to pyroxene group; colours—lilac, green, grey; used as gem stones; occurs in granite and crystalline schists.

SPOHR, LUDWIG (1784–1859), Ger. composer and brilliant violinist; b. Brunswick; composed and appeared in public from earliest childhood; app. director of Theater an der Wien, Vienna, 1813; visited London, 1820; composed *Faust*, *Jessonda* (operas), *Die letzten Dinge* (oratorio), nine grand Symphonies, violin concertos, etc.; wrote a complete and invaluable *violinschule*; an original composer and master of form, but utterly lacking in critical faculty.

SPOIL-FIVE, Irish card game; five cards dealt; suit followed with certain exceptions; ace of hearts always trump; game of three tricks.

SPOKANE (47° 45′ N., 117° 25′ W.), city, on Falls of Spokane, capital, Spokane County, Washington, U.S.A.; seat of Gonzaga College and other collegiate institutions; extensive trade in lumber; flour- and saw-mills. Pop. (1910) 104,402.

SPOLETO (42° 44′ N., 12° 44′ E.), town, Umbria, Italy; archiepiscopal see; has XI.-cent. cathedral containing frescoes by Filippo Lippi, and fine church dedicated to St. Agostino. Rom. remains include ruined theatre and triumphal arch; was seat of government of dukes of S. in early times; passed into possession of popes, XIII. cent. Pop. 25,500.

SPONDEE, see PROSODY.

SPONDYLUS, see under LAMELLIBRANCHIATA.

SPONGES, PORIFERA (Lat. *porus*, 'a passage'; *fero*, 'I bear').—On account of their use in the economy of mankind, sponges have been known from earliest times. There were many early guesses at their nature, but now it is agreed that sponges are sedentary, plantlike animals of low organisation, the habits of which have impressed upon them a vegetative form. They stand apart from all other groups of animals—the simplest type of many-celled creatures (*Metazoa*).



TOILET SPONGE (after Lydekker), with Flagellated Chambers.

From other groups of animals they may be distinguished by their simplicity. Many of them possess a porous, 'spongy' texture, but apart from this they have only lack of character to characterise them. They have no definite external organs. They vary in shape from encrusting masses, such as the BREADCRUMB SPONGE (*Halichondria*) of British coasts, to giant cups 4 ft. high, as NEPTUNE'S CUP (*Poterion*) of Pacific seas. Their colour varies from pale yellow and brown to rich browns and reds. Many are tough and fleshy like the BATH SPONGE (*Euspongia*), others are hard and stony, or leathery, or net-like, or resembling spun glass, but in each case the essential structure is the same.

The sponge body consists of a mass of cells of various kinds, forming a delicate tissue, and this is supported on a skeleton formed of minute rods, or spicules, of calcite (carbonate of lime), of silica (oxide of silicon), or of a horny organic substance—spongin.

In spite of the fact that neither muscular nor nervous systems are present, the sponge body still exhibits an indefinite sensibility, for changes in the surrounding water cause openings and contractions of pores and of the 'mouth' opening, or osculum. Only in connection with its nourishment does the sponge show activity, and even then in a restricted sense. Exceedingly active, whip-like flagella, by their lashings to and fro, cause an inflow of water from the exterior through the pores to internal chambers, and out again by the larger openings, or oscula, visible on the sponge surface. The constant stream of water furnishes the chief means of aeration and respiration, and from it also the food-supply—diatoms and Protozoa—is obtained. It has recently been asserted that the sponge can also utilise as food the organic compounds dissolved in the water. The flagellate cells act, besides, as excretory organs, the rejectamenta being borne away by the exhalant currents.

Three methods are utilised by sponges in propagating their kind. The simplest method, found in all lowly types of animals and in plants, is that of budding. A bud arises on the parent sponge like it in all essential characters; it grows, and finally, becoming detached, starts life as a new individual. The second, a less common method, is also asexual, and occurs in, for example, the Freshwater Sponges common in canals in Britain. In the autumn the sponge tissue becomes crowded with minute shot-like yellow grains, and when in early winter the sponge itself dies down and decays, the grains or gemmules are set free, and in the succeeding spring burst into life and give origin to new growths of sponge. Most general, however, is sexual reproduction. The majority of sponges are unisexual, but some types are hermaphrodite. As the result of fertilisation the egg develops, by complete and regular segmentation, within the body of the parent into a larva which escapes, and after a short free life settles down and gives rise to a fixed sponge. It is only during the ciliated larval stages that the sponge has an independent power of movement.

All sponges are aquatic, some preferring the quiet slow-moving fresh waters of lochs and canals, but the vast majority live in the sea, distributed therein in every part of the globe. In favourable localities, generally where the normal temperature is high, as on coral reefs, they grow in great abundance. Most are to be found firmly attached to stones, corals, or shells; others simply anchor themselves in the mud by means of long glassy 'root' threads, as the GLASS-ROPE SPONGE (*Hyalonema*); while still others, like the British SEA-FIGS (*Subarites*), lie rolling upon the sea-bottom. Other animals are sometimes found in friendly and constant association with sponges. Around the stalk of the Glass-Rope Sponge grows a colonial Sea Anemone, *Palythoa*; small shrimps and sea-slaters often inhabit the cavity of VENUS'S FLOWER-BASKET, imprisoned, as it were, in a cage of spun glass, and feeding on the organisms borne to them by the water current created by the sponge; and Hermit Crabs dwell in the cavities of the British Fig Sponge and others.

Sponges are amongst the oldest animals known, their fossil remains having been found in rocks of Cambrian age. From time immemorial they have been used by man. Commercial sponges (*Euspongia officinalis*) are found in the Mediterranean, where the finest varieties occur, and in the West Indies. They are obtained by pronged forks with long handles, by divers, or in deeper water by a drag-net. The sponges, once procured, are left for a few days in the open air to decay, then sunk in the ocean in an open crate for a week; thereafter they are beaten and squeezed clean from fleshy matter and hung in the sun so that the fibrous skeleton may dry.

Sponges fall into three main groups, distinguished by the nature of the spicules composing their skeletons.

Class I. CALCAREA, with calcareous spicules, includes the familiar PURSE SPONGE (*Sycon compressum*) of Brit. coasts.

Class II. HEXACTINELLIDA, or TRIAXONIA, with sex-radiate siliceous spicules, includes the beautiful deep-sea Glass Sponges—Venus's Flower-Basket (*Euplectella*) and the Glass-Rope Sponge (*Hyalonema*).

Class III. DEMOSPONGIÆ, with either siliceous spicules (never sex-radiate), or spongin fibres, or both together, or neither, includes the majority of well-known forms, such as the Sea-Fig (*Subarites*), the encrusting CRUMB-OF-BREAD SPONGE (*Halichondria panicea*), the MERMAID'S GLOVE (*Isodictya palmata*), of Brit. Seas, FRESH-WATER SPONGES (*Spongilla*), and the BATH SPONGE of commerce (*Euspongia*).

SPONGILLA, see under SPONGES.

SPONSOR, person taking responsibility for another's obligation, in especial, godfather or godmother

in baptism (also in confirmation in R.C. Church), who makes the vows in infant's name.

SPONTANEOUS GENERATION, see ABIOGENESIS.

SPONTINI, GASPARO LUIGI PACIFICO (1774–1851), Ital. composer, obtained much contemporary fame for his operas, especially for his masterpiece, *La Vestale*, produced in 1807. His compositions, forgotten now, influenced such diverse natures as Wagner and Meyerbeer.

SPOONBILL, or SHOVELLER; see under DUCK FAMILY.

SPOONBILLS (*Platalcidæ*), a family of stork-like wading birds, with very wide and flat bills; found near shallow fresh waters all over the world, except in Northern Europe, Asia, and America. The White S. (*Platalea leucorodia*) is an occasional visitor to Britain.

SPORADES (37° N., 27° E.), islands of the Gk. Archipelago, consisting of two groups surrounding Cyclades, the northern group belonging to Greece, the southern to Turkey. Pop. *c.* 25,000.

SPORADOPORA, see under HYDROMEDUSÆ.

SPORANGIA, see under MYCETOZOA.

SPORES, see PLANTS (PHYSIOLOGY).

SPOROZOA, a class of Protozoa, the members of which have of recent years assumed great importance to man on account of their agency in malarial fever and in several cattle diseases. Some of their number cause destructive epidemics among fishes, and to one was due the silkworm disease, the ravages of which cost France almost £40,000,000.

All Sporozoa live as parasites in the bodies of other animals, but their tastes in parasitism differ; for while such as the *Gregarines* occur in the food canal and body cavity of Invertebrate animals, the *Coccidians* have both Invertebrate and Vertebrate hosts, and others, for example the *Hæmosporidia*, *Myxosporidia*, and *Sarcosporidia*, are in the main confined to Vertebrate animals.

Besides their inveterate parasitism, Sporozoa are characterised by the definite rind which surrounds the body; by their sluggishness, for, although young stages may be mobile, the adults are generally without locomotor appendages such as the pseudopodia, flagella, or cilia of other Protozoa; and by the fact that they are propagated by means of spores, protected during periods of danger in a cyst or capsule. To this characteristic mode of reproduction is due the name Sporozoa.

But although the typical reproduction is by spore formation, which is preceded by a union of two (male and female) individuals, alternation of this with an asexual generation or series of generations is common, the individuals breaking up into numerous daughter individuals (*merozoites*). The spore-forming mode is known as sporogony, the individuals which increase thus are sporonts; the asexual dividing is schizogony, the partakers in such division schizonts.

Many of the Sporozoa are exceedingly minute, but some attain a large size for Protozoa, the cysts of *Sarcocystis tenella* reaching a length of 16 or even 50 millimetres in the muscles of Sheep or Roedeer.

The Class Sporozoa is divided into two sub-classes: Sub-Class I., ECTOSPOREA or TELOSPORIDIA. In these the minute individuals which germinate from the spore are elongated, rod- or sickle-shaped; flagellate male individuals (*sperms*) are often present; the individuals have only one nucleus and become full-grown before spore formation begins; and spore formation develops by a splitting off from margin of parental individual.

Amongst the Ectosporea are the GREGARINES (*Gregarinoidea*), a group of parasites which live in the gut of Invertebrates, their chief hosts being Insects, Worms, Echinoderms, and Molluscs. At first they live within a cell of the host, but soon protrude outwards, almost or altogether lying free in the gut or body cavity. In the former case they are attached by means of an anchor-like head (*epimerite*). Gregarines are apparently harmless parasites compared with the majority of their relatives. *Monocystis* occurs in the seminal vesicles of Earthworms, and *Gregarina* in the Earwig and Cockroach.

Other Ectosporea are the COCCIDIANS (*Coccidia*, *q.v.*) and the Hæmosporidia, the former of which spend the growing part of their existence within a cell of an Invertebrate or Vertebrate animal. They are much more dangerous than Gregarines, causing the disease coccidiosis, which occurs in Rabbits, Cattle, and even man, sometimes resulting in the death of the host. The HÆMOSPORIDIA (*q.v.*) live in the red blood corpuscles and fluid of many Vertebrates (Monkeys, Bats, Squirrels, Birds, Reptiles, Fishes, etc.), and include the parasites (*Plasmodium*) of tertian, quartan, and tropical malaria. These parasites, by disrupting the blood corpuscles, cause serious and sometimes fatal fevers, and while they swarm in the blood may be ingested by a mosquito (*Anopheles*). Within this new host a sexual reproduction takes place, finally rendering the mosquito capable of carrying infection at about its fourth feed after it has first sucked the germ-laden blood. *Piroplasma* and its relatives give rise to 'red-water,' Texas fever in cattle, and similar diseases in many kinds of domesticated animals, and perhaps even in man.

Sub-Class II., ENDOSPOREA or NEOSPORIDIA: in the Sporozoa the minute individuals which germinate from the spore are amœba-like; flagellate individuals are never present; the individuals have more than one nucleus, the commencement of spore formation is noticeable in young individuals, and the spores develop by an internal dividing up of the parent individual. Some Endosporea possess curious ejaculatory cells (*polar capsules*) similar to the stinging cells of Cœlenterates.

Many members of the group are of great interest. Amongst the MYXOSPORIDIA, which generally occur in the tissues of cold-blooded Vertebrates, some cause severe and fatal epidemics in Fishes, *Lentospora* being responsible for a kind of 'staggers' in members of the Trout family. MICROSPORIDIA cause harmful epidemics among Invertebrates; *Nosema apis* is the cause of the 'Isle of Wight' hive-bee disease, and *N. bombycis* of silkworm disease; while *Thelohania* is responsible for the death of many fresh-water Crayfishes. Of the SARCOSPORIDIA, *Sarcocystis* occurs in the muscles of many Vertebrates, and *S. tenella* has recently been discovered to be the cause of the itching disease 'scrapey' in sheep. Harmful HAPLOSPORIDIA are represented by *Ichthyosporidium*, which gives rise to rapidly spreading and highly fatal epidemics amongst various Fishes.

SPORT, WINTER, term to include popular winter pastimes, generally with special reference to organised games in Norway and Switzerland, especially at Davos and St. Moritz.

Skating was long employed in Holland and the Fens as mode of progression; metal blades supplanted bones tied under feet; for speed-skating blade of skate, *c.* $\frac{1}{16}$ inch thick, is slightly convex, blades for figure-skating are broader and much more convex. Premier club in Britain is Edinburgh Skating Club (1642).

Ski-ing is the national sport of Norway; ski is a long, narrow board, pointed and curved in front, with socket for boot; used for military purposes in Scandinavia and France. *Tobogganing* and *sledging* are popular in all cold countries; tobogganing is applied to coasting down long inclines, sledging to short runs. The vehicle used is the *sled*, a wooden platform equipped with steel runners; *sledge* or *sleigh* is larger and drawn by animal traction; toboggan is flat without runners. *Curling* (*q.v.*) has been introduced into Switzerland by British travellers.

SPORTS, see under EVOLUTION.

SPOTTED FEVER, cerebro-spinal Meningitis (*q.v.*).

SPOTTISWOODE, JOHN (1565–1639), Scot. historian; abp. of St. Andrews (1615); assisted

James I. in introducing Anglican Church settlement into Scotland.

SPOTTISWOODE, WILLIAM (1825–83), Eng. mathematician and physicist; pres. Mathematical Soc. (1871), Brit. Association (1878), Royal Soc. (1879); wrote on polarisation of light, geographical and astronomical subjects.

SPOTTSYLVANIA (38° 9′ N., 75° 35′ W.), county, Virginia, U.S.A.; scene of several battles in Civil War. Pop. (1910) 9035. Capital, **Spotsylvania Court House.**

SPRAIN, STRAIN, laceration of ligaments round a joint (*q.v.*), with effusion of blood; s. of ankle or wrist is treated by holding in cold water, bandaging, and elevation of the limb; massage prevents stiffness.

SPRAT, see under HERRING FAMILY.

SPRAT, THOMAS (1635–1713), dean of Westminster, 1683; bp. of Rochester, 1684.

SPREE (52° 23′ N., 14° E.) (ancient *Sprea*), river, Germany, rises in E. Saxony; joins Havel at Spandau; length, 230 miles.

SPREEWALD (52° N., 14° E.), wooded and marshy region, Brandenburg, Prussia; traversed by Spree.

SPRENGTPORTEN, GÖRAN MAGNUS, COUNT (1740–1819), Swed. soldier and politician; served in Seven Years War; subsequently entered service of Catherine of Russia.

SPRING, see WATER.

SPRING EQUINOX, see ARIES.

SPRING VALLEY (41° 20′ N., 89° 18′ W.) city, on Illinois, Bureau County, Illinois, U.S.A.; coal-mining industries. Pop. (1910) 7035.

SPRING-BALANCE, see WEIGHING-MACHINES.

SPRINGBOK (*Gazella euchore*), S. African antelope of great beauty; it can leap to height of 12 ft.

SPRINGFIELD.—(1) (42° 5′ N., 72° 35′ W.) town, on Connecticut River, Massachusetts; fine public buildings, including town library, Federal Government building, Art and Science Museums; has government arsenal for manufacture of rifles; railway centre; manufactures iron goods, cars, machinery, textiles, paper, needles, organs, etc. Fine system of parks, of which Forest Park is largest; several philanthropic establishments. Pop. (1910) 88,926. (2) (39° 47′ N., 89° 35′ W.) city, on Sangamon, capital of Illinois, U.S.A., and of Sangamon County; railway repair-shops; flour and coal-mining industries; manufactures watches; burial-place of Abraham Lincoln. Pop. (1910) 51,678. (3) (39° 53′ N., 83° 45′ W.) city, at junction of Lagonda Creek and Mad River, capital, Clark County, Ohio, U.S.A.; manufactures agricultural machinery. Pop. (1910) 46,921. (4) (37° 17′ N., 93° 22′ W.) city, capital, Greene County, Missouri, U.S.A.; manufactures flour, wagons. Pop. (1910) 35,201.

SPRING-GUN, firearm with trigger attached to wire, which, on being touched, fires the gun; illegal since 1827, but still allowed indoors against burglars.

SPRUCE, see FIR.

SPRUE, tropical disease, characterised by inflammation of mucous membrane of the mouth, anæmia, diarrhœa, extreme debility, and loss of flesh; cause is obscure and it is treated by rest and a light milk diet.

SPUR, instrument fastened to horseman's heel to goad horse; in Middle Ages s's were emblem of knighthood, hence phrase 'winning his spurs'; knights wore gold, squires silver, s's.

SPURGE (*Euphorbia*), genus of plants, order Euphorbiaceæ (*q.v.*); Wood S. (*E. amygdaloides*), a yellow flower, becomes red-leaved in autumn.

SPURGEON, CHARLES HADDON (1834–92), Eng. Baptist divine; converted 1851, and began as popular preacher, drawing enormous crowds; minister at the Tabernacle (London) from 1861; intensely religious, with narrow Calvinistic theology. See *Autobiography* and *Life*, by Ray (1903).

SPURN HEAD (53° 34′ N., 0° 7′ E.), headland, at mouth of Humber, Yorkshire, England.

SPURREY (*Spergula*), genus of plants, order doubtful; Common S., or Yarr (*S. arvensis*), a white flower, is a common weed in pasture and corn.

SPURS, BATTLE OF, see COURTRAI.

SPURZHEIM, JOHANN CHRISTOPH (1776–1832), Ger. phrenologist, at first assisted Gall (*q.v.*) and later lectured on phrenology in Europe and America.

SPY.—Employment of spies by belligerents is recognised by international law, but if captured the spy is liable to capital punishment by martial law.

SPY (50° 58′ N., 4° 42′ E.), village, near Namur, Belgium; two prehistoric human skeletons (male and female) were discovered here, 1886.

SQUADRON.—(1) military term; 120 to 200 mounted troops; four s. to division. (2) naval term; part of division, or ships on special duty.

SQUALL.—A gust is a single increase of the wind's velocity which comes suddenly and unexpectedly, whereas a squall is a series of such gusts lasting for at least several minutes. 'Line squalls' are those which visit a number of places situated in a straight or slightly curved line extending across the country. Such a squall was that known as the Eurydice (March 24, 1878), because it capsized H.M.S. *Eurydice*. The highest record of wind force is 106·5 miles per hour. Gale force is an average velocity of 38 miles per hour, while a s. may be sudden gusts of 40 to 100 miles per hour.

SQUARE ROOT, see INVOLUTION.

SQUARING THE CIRCLE, see QUADRATURE.

SQUID, a cuttlefish. See under CEPHALOPODA.

SQUILL, drug consisting of inner part of the bulb of *Urginea scilla*, a plant of natural order Liliaceæ, growing on the Mediterranean coast, cut into slices and dried; it is pink in colour, odourless, and bitter, the chief constituent being a glucoside, scillitoxin; employed medicinally as an expectorant in chronic bronchitis, and, usually combined with digitalis (*q.v.*), as a heat stimulant and diuretic.

SQUIRRELS (*Sciurus*), a genus of Rodents, with climbing feet and long, bushy tails, most common and most highly coloured in tropical regions, but occurring also in temperate parts. They are arboreal and vegetarian. The Common Brit. S. (*S. vulgaris*) hibernates in winter and is destructive to young trees.

SRINAGAR (34° 6′ N., 74° 55′ E.), town, capital, Kashmir state, India; manufactures carpets. Pop. (1911) 126,344.

SRIRANGAM, SERINGHAM (10° 52′ N., 78° 44′ E.), town, Trichinopoly district, Madras, India; noted temple of Vishnu. Pop. 24,000.

SRYETENSK, STRYETENSK (53° N., 116° E.), town, on Amur, Transbaikalia, Russia. Pop. 9000.

STAAL DELAUNAY, BARONNE DE, MARGUERITE JEANNE CORDIER (1684–1750), Fr. writer; attendant of Duchesse du Maine; pub. *Mémoires* in witty style, picturing society of regency and recalling that of La Bruyère; married Baron de Staal, 1735.

STABIÆ (40° 40′ N., 14° 30′ E.), modern *Castellamare*, ancient seaport, Campania, Italy; destroyed along with Pompeii and Herculaneum by Vesuvius, 79 A.D.

STABILITY, see EQUILIBRIUM.

STACHYS, genus of plants, order Labiatæ (*q.v.*); Hedge Nettle (*S. sylvatica*) has purple flowers and disagreeable smell; Woundwort (*S. palustris*) is the tallest of Brit. species.

STADE (53° 36′ N., 9° 27′ E.), town, on Schwinge, Hanover, Prussia; manufactures iron. Pop. (1910) 11,081.

STADE, BERNHARD (1848–1906), Old Testament scholar; prof. at Giessen, 1875.

STADIUM, Gk. standard of length, about 606 Eng. feet; length of foot-race course at Olympia, hence localisation of word.

STADTHOLDER, viceroy of a province or group of provinces in Holland; most important was s. of Holland, Zealand, and Utrecht. See HOLLAND (HISTORY).

STAËL, MADAME DE, Anne Louise Germaine, Baronne de Staël-Holstein (1766–1817), Fr. novelist; dau. of financier, Necker (*q.v.*); b. Paris. Her wit and rare qualities were developed in her mother's distinguished salon. At twenty she married Baron de Staël-Holstein, Swed. ambassador to France, but not finding happiness gave herself up wholly to lit.; encouraged classicists and also new school of J. J. Rousseau, and welcomed dawn of Fr. Revolution; soon disappointed and left Paris; returned under *Directoire*; mixed in politics; was exiled under the Consulate and went first to Switzerland, afterwards to Italy. She had already published, in 1800, a notable work on literature in connection with the moral and political state of nations; her novels, *Delphine* (1802) and *Corinne* (1807), are supposed to be autobiographical. In *Corinne* there are fine descriptions of Ital. monuments and scenery. In Germany she wrote *De l'Allemagne* (1810), which, by praise of Ger. lit., arts, etc. (then, for political reasons, little appreciated in France), prepared Romantic movement in France.

On Napoleon's fall she returned to France and died after publishing *Considérations sur la Révolution Française* (1817), in which she reiterated faith in democratic institutions; after Châteaubriand, the greatest promoter of *Romantisme*.

Duffy, *Madame de Staël*.

STAFF.—Staff officers of an army are distinguished from other combatant officers in that they can exercise no 'command' over troops in action. The s. is divided into two great branches, viz. the general s. and the administrative s. The former in peace attend to training, and in war to the operations against the enemy; the latter, both in peace and war, is concerned with the supply of food and quarters, with discipline, equipment, etc. S. officers are distributed throughout the army by being attached to brigades and divisions and to areas such as coast defences and 'districts.' The administrative s. is classed as adjutant-general's or quartermaster-general's s., according to their duties: the former dealing with personnel, and the latter with the material of the army. The general s. assists the generals by interpreting their wishes, and subordinate commanders by explaining what is required of them. In the Brit. army the duties of the s. in peace are detailed in *The King's Regulations*; war duties are detailed in *Field Service Regulations*.

STAFFA (56° 27′ N., 6° 24′ W.), small island, Inner Hebrides, Scotland; remarkable for its natural caverns, of which the largest is *Fingal's Cave*.

STAFFORD (52° 49′ N., 2° 7′ W.), county town, on Sow, Staffordshire, England; manufactures boots and shoes; birthplace of Izaak Walton; in vicinity is Stafford Castle.

STAFFORD, noble English family of Norman descent. Ralph, 1st earl of S. (d. 1372), and Hugh, 2nd earl (d. 1385), were distinguished in Fr. wars; Humphrey, 6th earl (1402–60), became Duke of Buckingham; his successors, Henry, 2nd duke, and Edward, 3rd duke, were attainted in 1483 and 1523, respectively. Latter's son Henry became Baron S.; this title subsequently came to Howard family through an heiress.

STAFFORDSHIRE (52° 20′ N., 2° 5′ W.), midland county, W. England, with chief town Stafford (*q.v.*); bounded by Cheshire, Derbyshire, Leicestershire, Warwickshire, Worcestershire, and Salop; area, 1170 sq. miles. Surface is generally level in centre, with hills in N. and S.; drained by Trent and its affluents, of which most important is the Dove. There are large deposits of coal in N. and S., the former area being almost entirely covered with towns engaged in manufacture of pottery; in S., which is called the 'Black Country,' there are large manufactures of iron and iron goods; agriculture is carried on, oats being the chief crop; and beer is largely manufactured at Burton. There are many Rom. and early Brit. antiquities, and several ruined religious houses. The county as a whole supported Parliament in the Great Rebellion of Charles I.'s reign. Pop. (1911) 739,105.

STAGE, technically, platform in theatre whereon the play is performed. 'The Stage' is equivalent to 'the Theatrical Profession,' hence 'going on the stage' is usual phrase for 'becoming an actor (or actress).'

Acting, branch of the fine arts dependent on human speech and gesture; one of the oldest, possibly because it requires no appliances, using only the human body as a means of expression. It is doubtful whether pageantry, which has its own place, is a useful accessory of acting. A great imaginative actor can create the illusion of scenery; Greek, mediæval, and Shakespearean drama were played with merely conventional scenery. In quite recent times, however, a movement has started by which dumb show is to replace acting; immense effect was obtained by *Sumurûn*, in which a wordless tragedy is carried out among carefully planned scenery. Extension of symbolism in scenery is advocated by Gordon Craig in *Art of the Theatre*. Ital. marionettes are an illustration of the dumb-show school. The old tradition is predominance of the actor; what actors to-day call a 'good stage presence' has always been important, but it has sometimes been notably absent, as in the case of Garrick, and the chief quality of acting is interpretative imagination, and personality on the stage more than person. The actor's face—pale, mobile, with prominent bones and restless, expressive eyes—is well seen in Edmund Kean. Miss Ellen Terry in her memoirs subtly remarks, when mentioning Irving's marvellous personal effects, that her own face was never any good to her. A more important modern case than that of the marionette *versus* the actor, has been that of the natural actor *versus* the rhetorician. Exaggeration to some extent, in acting as in make-up, is a necessary law of the stage. It is the equivalent of the painter's emphasis of a salient trait in his subject. But the best modern school aims at representing, with normal emotion, life as it is. Fr. acting is naturally light, and the severe naturalistic school may be found in Paris at the Renaissance Theatre. In England the companies of Granville Barker and Miss Horniman have led the way in this direction. The only danger is that fear of melodrama ('curtain') may bring in too rigid realism. Actors can generally be divided into tragedians and comedians. Coquelin aspired to absolutely plastic temperament, but it is questionable how far this is possible or desirable. The pliable temperament of actors led Plato to condemn them *a priori* as immoral. Actresses rested under the repute of Alexandrian Thaïs until quite recently. The large remuneration obtained has served in modern times to give social standing to acting as a profession. See also Drama, Music Halls.

STAGE-COACH, see Coaching.

STAGGERS, see Tapeworm.

STAGIRITE, see Aristotle.

STAHL, GEORG ERNST (1660–1734), Ger. physician and chemist; court physician to Duke of Weimar (1687); prof. of Med. at Halle (1694); physician to king of Prussia (1716); propounded the phlogiston theory, and other theories in chem. and med.

STAINER, SIR JOHN (1840–1901), Eng. musician; knighted, 1888; prof. of Music, Oxford Univ., 1889; oratorios, *Gideon* and *Crucifixion* are his best works.

STAINES (51° 26′ N., 0° 29′ W.), market town, at junction of Colne and Thames, Middlesex, England; breweries. Pop. (1911) 6756.

STAIR, Viscounty and Earldom of, Scot. honours. James Dalrymple of Stair in Kyle (1619–95), judge, an ardent royalist; cr. baronet, 1664; as anti-catholic, lost favour in closing years of Charles II.; retired, and wrote *Institutions of the Law of Scotland*, etc.; cr. viscount by William III., 1690. His wife, known as 'Witch of Endor,' was supposed to have put evil eye on their children, Janet ('Lucy Ashton' in *Bride of Lammermoor*) and John, who, as Master of Stair,

carried out Glencoe Massacre, 1692, winning lifelong infamy; great outcry arose when John was cr. earl, 1703. JOHN, 2nd earl (1707–47), killed his elder bro. by accident; rose to be general in war of Span. Succession; field-marshal, 1742; his beautiful wife was heroine of 'My Aunt Margaret's Mirror,' in *Chronicles of the Canongate.*

Murray Graham, *Stair Annals* (1875).

STAIRCASE.—S's are of ancient origin, being found in Egyptian and Gk. temples, but it was not until the Middle Ages that they became a prominent architectural feature. They were then generally of stone, built about a circular newel, for church towers, etc. In modern staircases the rise and width of tread of the steps are carefully proportioned. There are various forms, the simplest being the straight flight, having from 4 to 12 steps. If more are necessary they are arranged in two flights with a landing between. Winding steps are frequently dangerous. A handrail should be provided, and the whole staircase should be well lighted, the minimum head room being 7 ft. In Great Britain wooden house staircases are usually made in the workshop and fitted into position. Concrete resists fire better than stone, and it is often strengthened by steel or iron, which may be embedded in it. Concrete steps are frequently encased with marble or tiles. A modern innovation is the **Moving Staircase**, an inclined endless platform kept in continual motion, usually by an electric motor. On stepping on to the bottom of the staircase a person is carried upwards without the inconvenient waiting which is inevitable with the ordinary lift.

STALACTITES, masses of calcareous matter hanging in caves, formed by the filtration of water, containing particles of carbonate of lime, through holes or pores in the roof. The evaporation of the water leaves behind it a deposit of lime, which continues to increase in size so long as the water drops. S. may also be seen under bridges and arches and in form of icicles. —**Stalagmites** are of similar formation, but grow upward from cave floors, generally below stalactites, where drops of water, charged with carbonate of lime, fall, and, evaporating, leave lime deposit. In course of time the stalagmites may rise and join the stalactites, thus forming columns.

STALYBRIDGE (53° 29′ N., 2° 3′ W.), town, Cheshire, England; cotton-manufacturing centre. Pop. (1911) 26,514.

STAMBHAS, see ARCHITECTURE, INDIAN.

STAMBOL, see CONSTANTINOPLE.

STAMBOLOV, STEFAN (1854–95), Bulgarian politician; Pres. of Sobranye, 1884; regent after abdication of Alexander, and after election of Frederick of Coburg became Premier, holding office until 1894, when he had to resign; assassinated, 1895.

STAMENS, see FLOWER.

STAMFORD.—(1) (52° 40′ N., 0° 29′ W.) town, on Welland, Lincolnshire, England; contains ruins of a Benedictine abbey, founded VII. cent.; iron foundries. Pop. (1911) 9646. (2) (40° 3′ N., 73° 31′ W.) city, Long Island Sound, Fairfield County, Connecticut, U.S.A.; manufactures hardware. Pop. (1910) 25,138.

STAMFORD, HENRY GREY, 1ST EARL OF (*c.* 1599–1673), Eng. parliamentary general, Civil War. THOMAS, 2nd earl (d. 1720), held office under William III.

STAMMERING, STUTTERING, a spasmodic affection of the organs of speech, mainly due to the patient's difficulty in harmonising the oral and laryngeal actions—thus a consonantal sound may be freely produced, but a spasm intervenes before the production of the following vowel-sound. The sufferer should be taught phonetically, and the habit should be cultivated of taking a deep breath before speaking, and speaking slowly.

STAMP DUTY, see NEWSPAPERS.

STAMPS, see PHILATELY.

STANDARD, see FLAG.

STANDARDS DEPARTMENT of Brit. Board of Trade, cr. 1866, when responsibility for imperial standards of weights and measures was transferred from the exchequer.

STANDERTON (26° 56′ S., 29° 15′ E.), town, on Vaal, Transvaal. Pop. 5000.

STANDING STONES, from time immemorial raised by man in commemoration of some person or event. Solitary standing stones, pillars, or monoliths, called *menhirs*, were often erected to mark a boundary or a battle site, and are found particularly in Scotland, Wales, Ireland, and Brittany. Sometimes the stones are placed in lines (called alignments), as at Carnac in Brittany, where there are no fewer than eleven lines of stones ranging from 4 ft. to 13 ft. high. When the stones form a circle or some sort of enclosure, it is generally called a *cromlech*; three or more stones with a capstone on the top (as at Kit's Coty House, in Kent) is known as a *dolmen*. But the two terms cromlech and dolmen are used very interchangeably in Great Britain. The old notion that these stone monuments were of Celtic origin, built by Druids, and that the monoliths were altars, has of late been given up in favour of the belief that they were tombs of far greater antiquity belonging to the Stone Age. The finer surface of the capstone is always on the underside, which is against the altar theory. No chronological evidence as yet exists to allow dates to be assigned to such prehistoric monuments as Stonehenge, the great group of stones on Salisbury Plain, the remarkable Avebury circles, Kit's Coty House, Stennis (Orkney) and other circles in Scotland, the alignments at Carnac, and similar remains in Brittany and elsewhere.

Fergusson, *Rude Stone Monuments.*

STANFIELD, WILLIAM CLARKSON (1794–1867), Brit. painter; began life in the navy. From theatrical scene-painting he went on to easel work, dealing mostly with marine subjects.

STANFORD, SIR CHARLES VILLIERS (1852–), Brit. composer and conductor; b. Dublin; has written operas and oratorios, and much orchestral and chamber music.

STANHOPE, EARLDOM OF.—James, 1st earl (1674–1721), Eng. statesman and soldier; commander-in-chief in Spain, 1708; Foreign Secretary, 1715; cr. viscount, 1717, earl, 1718. Charles, 3rd earl (1753–1816), scientist, improved printing-press, invented a microscopic lens, and was an able politician; Philip Henry, 5th earl (1805–75), historian, wrote *Life of Pitt, History of Wars of Succession in Spain*, etc.

STANHOPE, LADY HESTER LUCY (1776–1839), exercised great influence over her uncle, the younger Pitt; adopted Muhammadan life in East, 1810; *Memoirs.*

STANIMAKA (42° N., 24° 48′ E.), town, E. Rumelia, Bulgaria; trade in wine. Pop. (1910) 12,936.

STANISLAU (48° 55′ N., 24° 40′ E.), town, Austria; railway workshops; tanneries. Pop. (1910) 33,328.

STANISLAUS I. (1677–1766), king of Poland; election secured by Charles XII., after whose defeat at *Poltava* S. lost his throne; made an unsuccessful attempt to recover it, 1733.

STANISLAUS II., AUGUSTUS (1732–98), last king of Poland; election secured by Catherine II. of Russia, whose favourite he was; during his reign occurred first and second partitions of Poland; forced to abdicate, 1795; d. in captivity in St. Petersburg; brilliantly accomplished, but of weak character.

STANLEY, Eng. family, one branch of which has held earldom of Derby since 1485. Sir Edward, son of 1st earl, distinguished himself at *Flodden*; became Lord Mounteagle, 1514. Another family of Stanleys has held barony of Stanley of Alderley since 1839.

STANLEY, ARTHUR PENRHYN (1815–81), Anglican divine; tutor of Balliol College, Oxford, 1840–50; canon of Canterbury, 1850; prof. of Ecclesiastical History at Oxford, 1856; dean of Westminster, 1863. S. was very liberal in theol. and aimed at a comprehensive Church; a great preacher, he

became interested in philanthropic, social, and other work; greatly respected; wrote numerous works—*Memorials of Westminster Abbey, Jewish Church, Eastern Church, Sinai and Palestine, Christian Institutions*, etc.

Prothero, *Life and Letters*.

STANLEY, EDWARD (1779–1849), bp. of Norwich, 1837.

STANLEY, SIR HENRY MORTON (1840–1904), Brit. explorer of Africa; s. of Denbigh farmer; real name, John Rowlands (Rollant); on f.'s death sent, at age of seven, to workhouse; after some years of hardship, adopted by Amer. merchant, whose name he assumed; enlisted after adopted parent's death; captured in Amer. Civil War; returned to Wales, where his mother refused to receive him. S. sought consolation in adventures by land and sea, and wrote articles to Amer. papers. Given the task of finding Livingstone, 1869, S. left Zanzibar for interior, March 1871, and found Livingstone at Ujiji in Nov.; returned, 1872; pub. *How I found Livingstone*; obtained funds for second expedition, 1874-77, in which he discovered source of Congo, etc.; sent by Leopold II. of Belgium, 1879, and established Congo Free State; undertook Brit. expedition to east equatorial region, 1887; recounted terrible sufferings in *In Darkest Africa*, 1890; knighted, 1899; entered Parliament, 1895. See *Autobiography* (1909), edit. by wife.

STANLEY, SIR WILLIAM (1548–1630), Brit. soldier; served in Ireland; afterwards plotted with Spain for invasion of England.

STANLEY, THOMAS (1625–78), Brit. poet and philosopher; pub. translations from Gk., Lat., Fr., Span., and Ital. poets, but is distinguished by his translation of Æschylus, and his *History of Philosophy*.

STANNARIES, term specially associated in England with tin mines of Devon and Cornwall; by Act of Edward II., Prince of Wales (as Duke of Cornwall) holds title of Lord Warden of the S.

STANS (46° 57′ N., 8° 22′ E.), town, capital, canton Unterwalden, Switzerland. Pop. 3000.

STANTON, EDWIN M'MASTERS (1814–69), Amer. politician; Attorney-General, 1860; War Minister, 1862; resigned, 1868; became judge, 1869.

STANTON, ELIZABETH CADY (1815–1902), Amer. social reformer; b. Johnstown, New York, U.S.A.; secured the passing of a Bill at New York granting married women property rights. From 1865 to 1890 she was president of the National Woman Suffrage Association.

STANYHURST, RICHARD (1547–1618), Irish writer; translated the *Æneid*; championed 'quantity' theory of Eng. prosody.

STAPLEDON, WALTER DE (1261–1326), bp. of Exeter, 1307; treasurer of England, 1320.

STAR CHAMBER, COURT OF, Eng. judicial body (XV.–XVII. cent's); formed by statute 3 Hen. VII. from king's council; named from meeting-place, a chamber decorated with gilt stars in Westminster Palace; members were chancellor, treasurer, keeper of privy seal, chief justices, one ecclesiastical and one lay lord; famed at first for pure justice, but became instrument of king's arbitrary will; abused by Charles I.; abolished, 1641.

STAR OF BETHLEHEM (*Ornithogalum*), genus of plants, order Liliaceæ; Common S. of B. (*O. umbellatum*) has white fragrant flowers in corymbs.

STAR OF INDIA, ORDER OF THE, see KNIGHTHOOD.

STARA ZAGORA, ESKI-ZAGRA, Rom. *Augusta Traiana* (42° 27′ N., 25° 41′ E.), town, on S. slope of Balkans, Bulgaria; mineral springs; manufactures cloth. Pop. (1910) 22,003.

STARAYA-RUSSA (57° 58′ N., 31° E.), town, health-resort, on Polista, Novgorod, Russia; saline springs. Pop. 16,000.

STARBOARD AND LARBOARD, see SHIP (SEAMANSHIP).

STARCH ($C_6H_{10}O_5)_n$, a carbohydrate stored in plants; obtained chiefly from rice, wheat, maize, and other cereals, and from potatoes by crushing, macerating with water, sieving, and drying; white powder consisting of striated, microscopic granules, characteristic of source; insoluble in cold, soluble in boiling water because of rupture of starch cellulose envelope; deep blue colour with iodine. S. is of value as a food, for dressing linen, and in various manufactures.

STARFISHES, see ECHINODERMATA.

STARGARD (53° 21′ N., 15° 1′ E.), town, Pomerania, Prussia; tobacco factories. Pop. 27,540.

STARLINGS (*Sturnidæ*), an Old World family of passerine birds containing the familiar European Starling (*Sturnus vulgaris*), with dark plumage shot with purple, green, and blue specks, an inhabitant of and a constant migrant to Britain; and the rare British visitor from Europe and Asia, the Rose-Coloured Pastor.

STARNBERG (48° N., 11° 20′ E.), village, health-resort, on Starnberger See. See GERMANY.

STAR-NOSED MOLE, see MOLE FAMILY.

STARODUB (52° 33′ N., 32° 44′ E.), town, Chernigov, Russia; manufactures leather. Pop. 26,000.

STARS, see ASTRONOMY.

STARS AND STRIPES, see under FLAG.

STARVATION, see FASTING.

STARWORT, STITCHWORT (*Stellaria*), genus of plants, order Caryophyllaceæ; 5 sepals, 5 deeply cleft petals, 10 stamens, 3 styles; Greater S. (*S. holostea*), Lesser S. (*S. graminea*), and Chickweed (*S. media*), are common white flowers.

STAS, JEAN SERVAIS (1813–91), Belg. chemist; studied under Dumas, in Paris; prof., Royal Military School, Brussels; held post in Royal Mint; best known for his determination of atomic weights of many elements, and for his method, afterwards modified by Otto, of detecting alkaloidal poisons (Stas-Otto process).

STASSFURT (51° 53′ N., 11° 35′ E.), town, on Bode, Pruss. Saxony; salt mines; chemical works. Pop. (1910) 16,785.

STATE.—According to Hobbes the S. is 'one person for whose acts a great multitude by mutual covenants, one with another, have made themselves every one the author, to the end he may use the strength and means of them all as he shall think expedient for their peace and common defence.' This definition happily emphasises the arbitrary power of all governments, but the theory of original 'social contract' is not now accepted; primitive man is never found without some sort of government. Fixed territory and entire international independence are not necessarily characteristics of a State; an army under certain conditions is recognised as a State, and States may be either sovereign or vassal. When a number of States are joined in a political Confederation (*e.g.* U.S.A., Australian Commonwealth), each State reserves to itself certain **State Rights** with which the federal or central government cannot interfere; the question of State Rights was one of principal points on which Amer. Civil War was fought, and to guard or increase their powers a constant tug-of-war between Federal and State authorities goes on in America, Australia, and other lands where Federation has been adopted in preference to Unification.

STATEN ISLAND (40° 35′ N., 74° 10′ W.), island, forming Richmond County, New York, U.S.A.; separated by the narrows from Long Island; surface undulating, rising to over 300 ft. in the N.; length, 13 miles. Pop. (1910) 85,969.

STATES-GENERAL, ÉTATS GÉNÉRAUX, parliament of monarchical France; representative government of France dates back to time of Philippe le Bel (1268–1314), contemporary of Edward I. of England, with whose Model Parliament of 1295 Philip's Assembly of 1302 may be compared. It is both stated and denied that preceding Fr. court of peers or great council was merely consultative, and that Assembly of 1302 was also deliberative, but a great change in 1302 was the introduction of the Third Estate; large towns were always summoned henceforth to make election of

representatives, *procureurs*; country districts divided into *baillages* for purposes of representation; the peers and prelates might also appear by *procureurs*. The States-General controlled taxation in XIV. cent., but chief sources of revenue were appropriated to Crown in XV. cent.; attempt of Estates to regain control, 1484, came to nothing; not summoned again till 1560; dissolved, 1614, and not summoned again till year 1789; transformed into National Constituent Assembly; never possessed statutory powers.

STATES OF THE CHURCH, dominions in Italy, varying in extent from time to time, which for nearly 1000 years were directly under rule of pope; greater part was added to kingdom of Italy in 1859; Rome was retained for pope by the French till 1870.

STATICS, see MECHANICS, DYNAMICS.

STATIONS OF THE CROSS, pictures in church depicting stages of Christ's Passion.

STATISTICS are particulars of social phenomena expressed in figures for the purposes of study. The first point is the collecting of these figures, and the second the use made of the figures. Statistics supply the facts relating to people—the number of births, deaths, and marriages, of criminals, lunatics, unemployed persons, etc., and to the affairs of people—wages, prices of commodities, amount of trade, etc. The accuracy of these figures depends on the capacity and honesty of the statistician, and generally to-day the collecting of statistics has become an important branch of government work. Given accurate statistics, the use of the figures depends again on the honesty and capacity of the individual in possession. Accurate tabulation and analysis are essential if the figures are to be used wisely. The statistics of crime, for instance, without the figures of increase or decrease of population, may give an utterly wrong impression. The statistics of lunacy and of disease require the additional knowledge of the increase of official regulations concerning these social phenomena. Statistics of wages require to be supplemented by statistics as to the cost of living. Statistics of the birth-rate are wisely compared with statistics of the death-rate. Hence the presentation of great bodies of facts concerning human life requires the scientific mind for their arrangement and for their interpretation.

R. Mayo-Smith, *Science of Statistics* (1895); A. L. Bowley, *Elements of Statistics* (1901); Elderton, *Primer of Statistics* (1910); Webb, *New Dictionary of Statistics* (1911).

Vital Statistics cover the returns of births, deaths, and marriages in those regions of the civilised world where these events are officially recorded. From them may be learnt whether a nation is increasing in population, or falling back, and they supply the data for comparisons between nations. The *Registrar-General* for Births, Deaths, and Marriages is the statistical authority for the U.K. in these matters, but before his figures are considered the Census Returns for 1871 and 1911 may be given for our knowledge of the total population.

	1871.	Increase per cent.	1911.	Increase per cent.
England .	21,495,131	13·4	34,043,076	10·5
Wales .	1,217,135	9·5	2,032,193	18·1
Scotland .	3,360,018	9·7	4,759,445	6·4
		Decrease per cent.		Decrease per cent.
Ireland . .	5,412,377	1·7	4,381,951	1·7
Total, U.K. .	31,845,379		45,365,599	

The number of inhabitants per square mile is 619. In England and Scotland there is a marked decline in the birth-rate, that is, the increase of population is not at so rapid a rate as formerly. In Wales the increase is faster, while in Ireland the population is still declining. Various reasons are offered in explanation of these figures. In the case of Ireland emigration continues to draw off the young, and therefore the marriageable proportion of the population is diminished. In Great Britain, as elsewhere, when the standard of living is raised, men and women are often reluctant to marry, unless they have the means to bring up their children to the expected social standard. In certain cases—viz. want of accommodation in rural parts, and the refusal to employ married persons with children—economic reasons explain the falling off. It is also generally true that education and high intellectual interests do not make for large families.

That our birth-rate is still in excess of the death-rate may be seen from the following table for 1910:—

	Births.	Illegitimate, per cent.	Deaths.	Marriages.
England and Wales	897,100	4·1	483,321	267,416
Scotland . .	124,000	6·85	72,245	30,866
Ireland . .	101,963	2·8	74,894	22,112

A comparison of the birth- and death-rates over a period of years, gives the following figures:—

BIRTH-RATE PER 1000.

	1861-70.	1900-5.	Decline per cent. 1861-1904.
England and Wales.	36·0	29·0	19·4
Scotland . .	34·8	29·7	14·7
Ireland . . .	26·1	23·2	11·1
Germany . .	37·2	35·5	4·6
France . . .	26·3	21·7	21·7

DEATH-RATE PER 1000.

	1861-70.	1900-5.	Decline per cent. 1861-1904.
England and Wales.	24·0	17·2	28·3
Scotland . .	21·8	17·3	20·6
Ireland . . .	16·6	18·0	+8·4
Germany . .	16·9	20·8	22·6
France . . .	23·6	20·4	13·5

Taking all Europe, the rate per thousand stands as follows:—

	Births.	Deaths.	Increase.
1801-1850 .	38·6	31·2	7·1
1850-1900 .	38·0	29·4	8·2

the general fall in the death-rate making a real increase of population.

Vital statistics for 1910 of some of the chief cities of the world:—

	Population.	Birth-rate per 1000.	Death-rate per 1000.
London . . .	4,872,702	23·6	12·7
Edinburgh . .	391,167	27·8	18·6
Dublin . . .	402,928	28·3	19·9
Belfast . . .	391,167	27·8	18·6
Birmingham . .	570,113	26·3	13·7
Glasgow . .	884,520	25·1	15·1
Leeds . . .	490,985	22·2	13·7
Liverpool . .	767,606	30·1	17·7
Manchester . .	716,534	27·1	16·1
Sheffield . .	478,763	26·5	13·4
Amsterdam . .	570,057	23·6	12·2
Berlin . . .	2,053,040	21·5	14·7
Brussels . .	720,030	16·8	13·6
New York . .	4,803,264	26·0	16·0
Paris . . .	2,722,731	18·0	10·7
Rome . . .	590,113	23·6	18·5
St. Petersburg .	1,577,892	27·8	24·1
Sydney (N.S.W.) .	613,500	26·4	10·4
Vienna . . .	2,107,981	19·9	15·8

See Registrar-General's Returns. Newsholme, *Elements of Vital Statistics*.

STATIUS, PUBLIUS PAPINIUS (*c.* 45–96 A.D.), Rom. poet of post-Augustan age; b. Naples; early displayed power of extemporising; gained olive-wreath thrice at Alban games and won patronage of Domitian. Works include *The Thebäis*, a conventional epic devoted to story of Thebes, loose in construction and often strained, but redeemed by exquisite passages; one book and a fragment of the *Achillëis*—tedious because subject is too cramped and stereotyped; the *Silvæ*, thirty-two poems full of beauty, his masterpiece; marred in parts by fulsome flattery of the emperor.

STATUTES, written laws which, with customary law, make common law. Concurrence of the three estates of the realm was made necessary by statute 15 Edw. II., but *Statutory Orders* may be issued by departments of government, which have 'statutory powers' from Parliament. S. are known as Acts of Parliament; enrolled on special statute roll, 1278–1485, afterwards entered in Chancery; printed sessionally XVI. cent. onwards; Record Commission commenced publication of s. 1235–1713 in 1810; laws in force,

1886, are listed in *Revised Statutes*, printed by Statute Law Revision Committee, and duly authorised by Interpretation Act, 1889. Short Titles Act, 1896, provides for naming s.; previously known by place at which Parliament was held, or first words of preamble. Preamble is not law. S. are abrogated only by repeal, express or implied in subsequent Act.

STAUNTON (38° 7′ N., 78° 59′ W.), independent city, formerly capital of Augusta County, Virginia, U.S.A.; manufactures flour, iron. Pop. (1910) 10,604.

STAVANGER (59° N., 5° 39′ E.), seaport, capital, Stavanger amt, Norway; bp.'s see; manufactures preserved goods. Pop. (1910) 37,261.

STAVELEY (53° 16′ N., 1° 21′ W.), town, Derbyshire, England; collieries, ironworks. Pop. 11,500.

STAVELOT (50° 20′ N., 5° 55′ E.), town, on Amblève, Liège, Belgium. Pop. 5200.

STAVROPOL (45° N., 44° E.), government, Russ. Caucasia; largely occupied by arid steppes; numerous salt lakes and marshes; watered by Kuma; agricultural and live-stock breeding industries; exports grain. Pop. (1910) 1,231,100. Capital, **Stavropol** (45° 2′ N., 41° 58′ E.); bp.'s see; flour-mills. Pop. (1910) 55,300.

STAWELL (37° S., 142° 45′ E.), town, Victoria, Australia; gold-mines. Pop. 6000.

STAWELL, SIR WILLIAM FOSTER (1815–89), Brit. Australian politician; Attorney-General, Victoria, 1851; helped to draw up constitution of Victoria; Chief Justice, 1857.

STEAD, WILLIAM THOMAS (1849–1912), Eng. journalist; succ. Morley as editor of *Pall Mall Gazette*, 1883; initiated the 'new journalism' in sensational exposure of Naval weakness and of the white slave traffic; founder and editor of *Review of Reviews*, 1890; devoted to psychic research; in journalism he introduced the 'interview' and pictorial illustration; went down with the *Titanic*.

STEALING, see THEFT.

STEAM, the vapour of water when heated to boiling-point (212° F.), dry, invisible, and transparent; when superheated becomes moist and opaque.

STEAM ENGINE, see ENGINE.

STEAM NAVIGATION.—Probably the first method of assisting a vessel by steam-engine power was that invented by Jonathan Hulls, in 1736. He used a single paddle wheel, placed at the stern of the ship, and coupled direct with the engine crank. In 1786 Rumsey and Fitch, two Americans, made several steam-driven vessels; while in 1788 a boat 25 ft. long and 7 ft. broad was made at Edinburgh, under the supervision of Symmington. It had two paddles, and attained a maximum speed of 5 miles per hour. The following year a still larger vessel was built on the Forth, with increased engine power.

The first steam-driven vessel in Great Britain to carry passengers was the *Comet*, built at Glasgow in 1812. It was 42 ft. long and 11 ft. broad. In 1818 the *Rob Roy* commenced to ply regularly between Greenock and Belfast, while a service between Liverpool and Glasgow was also run about this time. In 1819 the *Talbot* sailed regularly between Holyhead and Dublin, and in this same year the *Savannah*, a sailing vessel assisted by steam, accomplished a voyage to America in twenty-six days. 1826 saw the *United Kingdom*, 'a leviathan steamship,' as she was called, running regularly between London and Edinburgh.

No doubt the first steamship company was the City of Dublin Steam Packet Company, founded 1823, while in the following year three companies were floated, viz. the General Steam Navigation Company, the St. George Steam Navigation Company, and the British and Irish Steam Packet Company. The Great Western Steamship Company built and launched on July 19, 1837, the *Great Western*, whilst on Oct. 4 of same year the Atlantic Steamship Company launched the *Liverpool*, and in May 1838 the British and American Steam Navigation Company launched the *British Queen*. It was not until 1838 that any regular steamship service across the Atlantic was run, although isolated voyages were made at odd times. Of these, that of the *Sirius*, from London to New York in 17 days, is worthy of mention. The *Great Western* sailed from Bristol to New York (a few months after sailing of *Sirius* in 1838) in 15 days.

All these steamboats were fitted with paddles, but in 1839 the *Archimedes* was built on the Thames, and this is the first boat to be fitted with a propeller. In 1840 the Cunard Line came into being, and was greatly assisted by the fact that Mr. Samuel Cunard, the founder, secured the Government contract for carrying the mails from Liverpool to Halifax (N.S.) and to Boston. The Cunard Line then built four ships identical in every respect, and commenced a regular steamship service from England to America. This regularity soon outdid the smaller companies with their irregular and erratic sailings, and many companies failed in consequence. The *Liverpool* was sold to the 'P. & O.' Company, and the *Great Western* to the West Indian Royal Mail Company. Late in the 'fifties the *Great Eastern*, a ship fitted with both paddle and screw, was built, and in 1861 the *Scotia*, a Cunarder, sailed from Liverpool to New York in 9 days. She was 366 ft. long and 47 ft. broad, and her cylinder capacity was 100 in., with a 12-ft. stroke.

After the 'fifties the development of steamship service advanced with rapid strides, and almost every year added to its efficiency; more and more attention was paid to the safety, comfort, and luxuries of passengers. The most notable steps, however, were:—

1850. Screw propellers and iron hulls introduced.
1860. Invention of compound steam-engine.
1870. Better passenger equipment; state rooms, etc.
1880. Twin screw and steel hulls introduced.
1890. Boat trains, Liverpool and Southampton.
1900. Turbine engines, wireless telegraphy.
1910. Oil engines and motor liners.

Among leading **steamship lines** are:—

ALLAN LINE: began regular service England to Canada, 1815; now ply U.K. ports to Canada, U.S.A., and South America.

AUSTRIAN LLOYD: first sailed Trieste to Levant, 1837; now serves Levant, India, S. America.

BOOTH LINE: founded 1866, when ran to Brazil; now ply to Brazil and New York, also to Portugal.

CASTLE LINE: founded 1872, when carried mails to Cape in 37 days; amalgamated with UNION LINE, 1900. UNION-CASTLE LINE now sails to all ports in South Africa. Carried troops and stores to South Africa during war in 1899–1902.

CITY OF DUBLIN STEAM PACKET COMPANY: commenced sailings in 1824 to Dublin from Liverpool. Commenced carrying mails Holyhead to Dublin, 1859.

COMPAGNIE GÉNÉRALE TRANSATLANTIQUE: founded 1855 for European and N. African sailings from Rouen; now sails to New York, West Indies, Mexico.

CUNARD LINE: first Cunarder *Britannia* sailed July 4, 1840, with 63 passengers and mails, from Liverpool to Boston, in 14 days; now sails Liverpool to New York.

ELDER, DEMPSTER, & COMPANY: carried mails, 1852, to West African ports; developed banana trade by importing from Canary Islands.

GENERAL STEAM NAVIGATION COMPANY: the oldest existing line, established 1824, and sails to Continent.

HAMBURG-AMERICAN LINE: founded 1847; first sailed Hamburg to New York, 1848; now serves Far East, N., Central, and S. America.

MESSAGERIES MARITIMES: equipped Fr. mail service, 1851; fresh mail contracts, Bordeaux to Brazil, India, and China, 1857–61; since included Japan and Australia.

NORDDEUTSCHER LLOYD: formed from four pre-existing companies, 1857; since absorbed other companies; sails Bremen and Hamburg to Far East, and N. and S. America.

PACIFIC STEAM NAVIGATION COMPANY: founded 1840, with sailings to South America.

PENINSULAR AND ORIENTAL: carried mails, 1829, to Mediterranean ports, Egypt, India, and Far East.

ROYAL MAIL STEAM PACKET COMPANY: founded 1839, with sailings to West Indies; now ply between Southampton and West Indies, Brazil and Far East.

WHITE STAR LINE, taken over by Ismay, 1867; Liverpool, Southampton, and Mediterranean ports to New York, Boston, Canada, Australia, and New Zealand.

WILSON LINE: founded 1835; sails between Hull and Continent (Gothenburg) and Norway.

STEAMING, see COOKERY.

STEARIC ACID ($C_{17}H_{35}COOH$); M.P. 69°; occurs, combined with glycerine, in tallow, etc.

STEATITE, see TALC.

STEATOPYGIA, term applied to an accumulation of fat in the region of the buttocks and thighs, a characteristic of the Bushmen, Pygmies, and Hottentots of Central and S. Africa.

STEATORNIS, GUACHARO (*q.v.*).

STEEL, see IRON.

STEEL CONSTRUCTION is now very largely used as a substitute for wood in the erection of large buildings. There are two main types, 'skeleton' and 'cage.' The former has a skeleton framework not intended to carry the required weight alone, but with the support of the walls; the cage structure is made strong enough to carry every part of the building. Among the advantages of cage construction are speed in erection, small amount of materials, and less weight on the foundations, while the masonry may be begun anywhere. Safety depends upon the strength and rigidity of the cage framework. The parts of the frame are fixed together with hot rivets of iron or soft steel, the columns are of steel rather than cast iron, and the column bases are bolted to the foundations or grouted with cement. The surface of the steel must be rustless, and two coats of paint are applied to it, first red lead and then oxide paint. A preliminary coat of boiled linseed oil is sometimes used. In structures of this kind the wind-pressure has to be carefully calculated. Steel and iron alone are not fire-proof, and are therefore given a protective coating, which generally consists of one of the many patent fire-resisting materials.

STEELE (51° 25′ N., 7° 30′ E.), town, Rhineland, Prussia; collieries; ironworks. Pop. 13,400.

STEELE, SIR RICHARD (1672–1729), Brit. essayist, dramatist, and man of letters; b. Dublin; ed. Charterhouse and Oxford, where met lifelong friend, Addison (*q.v.*); joined army without taking degree, but resigned, 1706, to follow lit.; already had written a devotional work, *The Christian Hero*, and several comedies; app. Gazetteer, 1707; ardent Whig M.P.; knighted by George I.; warm-hearted, improvident nature. S.'s greatest title to fame is as founder of Queen Anne Essay; he established *Tatler* (1709), followed later by *Spectator*, *Guardian*, etc.; contributed bright essays on social, literary, and political subjects; graceful in style and elevating in tone; comedies (*Conscious Lovers*, etc.) amusing, but inclined to sentimentality and moralising.

Editions, with Memoirs, by Dobson, and Aitken (1898).

STEELTON (40° 15′ N., 76° 52′ W.), town, on Susquehanna, Dauphin County, Pennsylvania, U.S.A.; steel-works. Pop. (1910) 14,246.

STEELYARD, see WEIGHING-MACHINES.

STEEN, JAN (1626–79), Dutch painter, began life as a brewer at Delft. His genre pictures, in the style of Rembrandt, were drawn from all phases of life.

STEENKIRK, STEENKERKE (50° 38′ N., 4° 4′ E.), village, on Senne, Hainaut, Belgium; scene of defeat of William III. by Duke of Luxembourg, 1692.

STEEPLECHASE, see RACING.

STEERING, see SHIP (SEAMANSHIP), NAVIGATION.

STEEVENS, GEORGE (1736–1800), Brit. Shakespearean commentator; collaborated with Johnson in an edition of Shakespeare (1773), but attained celebrity by his own monumental edition.

STEFANIE, BASSO-EBOR (4° 50′ N., 36° E.), lake, E. Africa; has no outlet; elevation, 1900 ft.; length, 37 miles.

STEFFANI, AGOSTINO (1653–1728), R.C. priest and musician; supported by the Elector Maximilian, then entered the Elector of Hanover's service; in 1692 carried through important diplomatic work; composed *Servio Tullio* (opera), chamber and church music.

STEFFENS, HENRIK (1773–1845), Ger. philosopher; prof. of Nat. Science, Halle, Breslau, Berlin; assented finally to philosophy of Schleiermacher (*q.v.*).

STEIN, HEINRICH FRIEDRICH KARL, BARON VON (1757–1831), Prussian statesman; one of builders of modern Germany; head of department of taxation, etc., 1804; formed general plan for union of Germany under hegemony of Prussia, but directed chief attention to military, administrative, and financial reform at home. Humiliated by Treaty of Tilsit, Frederick William III. gave S. an absolutely free hand to carry out his Liberal ideas. S. resolutely carried through Edict of Emancipation of Serfs (1807), which came into force, 1810; also various agrarian and military reforms, for which Schön and Scharnhorst had long been agitating; incurring Napoleon's wrath, fled, 1809; returned, 1812, but never regained influence.

Seeley, *Life and Times* (1878, 3 vols.).

STEINER, JAKOB (1796–1863), Swiss mathematician; prof. of Geometry, Berlin, 1834, till death; founder of modern synthetic geometry.

STEINMETZ, KARL FRIEDRICH VON (1796–1877), Pruss. general; distinguished in war with Denmark, 1848; commanded an army against Austria, 1866, winning brilliant victories at *Nachod*, *Skalitz*, and *Schweinschädel*; commanded one of Prussian armies in 1870; was defeated at *Gravelotte* and recalled; became gov.-gen. of Silesia and Posen; resigned in 1871; field-marshal, 1871.

STELLARIA, see STARWORT.

STELLENBOSCH (33° 54′ S., 18° 48′ E.), town, Cape Province, S. Africa; has a college, theological seminary, schools of agriculture and mining; wine- and fruit-growing centre. Pop. (1911) 6155.

STEM, typically the aerial, ascending axis of a plant, the principal functions of which are: (1) to carry the leaves in such a manner that they are advantageously placed for the performance of their functions (respiration, transpiration, carbon assimilation); (2) to transmit to the leaves nutritive material absorbed by the roots from the soil; and (3) to conduct the elaborated food formed by the leaves to the storage areas. In a monocotyledon the s. is normally unbranched, and the conducting strands are distributed throughout the ground tissue, whilst in dicotyledons branching is the rule, and the bundles are arranged in a ring, the separate members being eventually united, in perennials, by cambial activity, so that a solid mass is formed, as in trees. In addition to erect s's there are climbing and twining forms (vine, convolvulus), prostrate (creeping Jenny), or underground, when they are often modified for food storage as in the iris rhizome, crocus corm, tulip bulb, and potato tuber, and bear an adventitious root system.

STENCILLING, painting by means of thin plate of metal, paper, etc., having design cut out.

STENDAL (52° 36′ N., 11° 51′ E.), town, Pruss. Saxony; cathedral; railway-workshops. Pop. 27,250.

STENO, NICOLAUS (1638–86), Swed. divine and physiologist; authority on geology and crystallography.

STENOGRAPHY, see SHORTHAND.

STENTOR, see under INFUSORIA.

STEPHAN, HEINRICH VON (1831–97), Ger. politician; carried out postal reforms in Schleswig-Holstein, 1864; became Postmaster-General of Ger. Empire, 1871; Sec. of State for post department, 1878; chief share in founding International Postal Union.

STEPHEN, whose death by stoning is related in *Acts* 7, was the first martyr of the Christian Church.

STEPHEN (c. 1097–1154), **king of England**; s. of Adela, William I.'s dau., and Count of Blois; successfully claimed throne in opposition to Matilda, Henry I.'s dau., 1135; waged war against Matilda for several years; taken prisoner, 1141; on release, successfully besieged Oxford, 1142; Matilda gave up struggle, 1147; her s. Henry acknowledged as Stephen's heir, 1153.

STEPHEN I., ST. (STEPHEN) (977–1038), king of

Hungary; introduced Christianity into Hungary; defeated emperor, Conrad II., 1030.

STEPHEN I. (*c.* 258), pope, opposed Cyprian concerning baptism of heretics; **Stephen III.** (*c.* 752) was aided against Aistulf by Frankish king, Pippin; **Stephen X.** (*c.* 1057) aimed at papal independence.

STEPHEN, SIR JAMES FITZJAMES, Bart. (1829–94), Eng. jurist; s. of historian, Sir James Stephen; member of Apostles' society at Cambridge, and great friend of Sir Henry Maine; pub. *General View of the Criminal Law of England*, 1863; succ. Maine (*q.v.*) as legal adviser of council in India, 1869, and continued his work of codification; pub. *Liberty, Equality, and Fraternity*, 1873–74, *History of the Criminal Law of England*, 1883; judge of Queen's Bench, 1879–91; contributor for many years to *Saturday Review*, *Pall Mall Gazette*, etc.; reputation that of just judge and diligent, conscientious legal student, eminent but not brilliant. See *Life*, by Sir Leslie Stephen.

STEPHEN, SIR LESLIE (1832–1904), Eng. biographer and critic; ed. Cambridge, and his life as a fellow is recounted in his *Sketches from Cambridge: By a Don*; contributed regularly to the best periodicals of his day. His enthusiasm for Alpine climbing found expression in his *Playground of Europe*; edit. of the *Cornhill* (1871); edit. of the *Dictionary of National Biography* (1882), to which he contributed some of the finest articles. His works include *The History of English Thought in the Eighteenth Century*, *The Science of Ethics*, *The Agnostic's Apology*, and *The English Utilitarians*.

STEPHEN BATHORI (1533–86), prince of Transylvania, 1571; king of Poland, 1575; put down all internal insurrection; warred against Ivan of Muscovy, acquiring Livonia and other territory.

STEPHENS, ALEXANDER HAMILTON (1812–83), Amer. politician; entered Congress, 1843; on secession of his native state, Georgia, from Union, he became vice-pres. of Confederate states; afterwards gov. of Georgia, 1882.

STEPHENSON, GEORGE (1781–1848), Brit. engineer; inventor of the locomotive; b. Wylam, near Newcastle. When an engineer in Killingworth colliery he built his first locomotive. In 1815 he invented a safety mine-lamp. He was chief engineer for construction of Stockton and Darlington Railway; constructed Liverpool and Manchester Railway, where his *Rocket* proved fastest locomotive.

STEPHENSON, ROBERT (1803–59), Eng. engineer; s. of George Stephenson, the inventor of the locomotive. He was chief railway engineer of England, and built the famous bridges at Newcastle, Montreal, and Menai Strait.

STEPNEY, metropolitan borough, London, England, 2 miles E. of St. Paul's. Pop. (1911), 280,024.

STEPNEY, GEORGE (1663–1707), Eng. poet and diplomatist; b. Westminster; acted for many years as ambassador for William III. in Germany. Dr. Johnson includes Stepney in his *Lives of the Poets*.

STEPNIAK, SERGIUS (1852–95), pseudonym of Sergius Michaelovitch Kravchinski, Russ. author and revolutionary; wrote *Underground Russia*.

STEPPES, pastoral plains in S. Russia and W. Siberia.

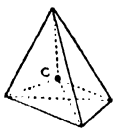
STEPPES, THE (48° N., 60° E.), gen. government, Russ. Central Asia, comprising provinces of Akmolinsk, Semipalatinsk, Turgai, and Uralsk (*qq.v.*); capital, Omsk.

STERCORARIIDÆ, Skuas (*q.v.*).

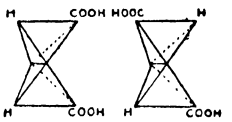
STERCULIACEÆ, natural order of trees and herbs; Baobab (*q.v.*) is a species of suborder Bombaceæ; all are tropical.

STEREOISOMERISM is that kind of isomerism (*q.v.*) which depends on the different relationships of the atoms or radicles of chemical compounds to each other in space. It is shown by differences of physical properties, and frequently by optical activity, *i.e.* rotation of the plane of polarised light.

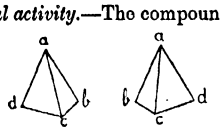
S. occurs chiefly among carbon compounds, and is then accounted for by the theory of the carbon tetrahedron, in which the carbon atom is supposed situated within a tetrahedron, towards the angles of which its four valencies (*q.v.*) extend thus—



S. without optical activity is shown by maleic and fumaric acids, whose stereochemical formulæ are respectively—

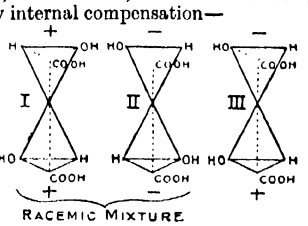


S. with optical activity.—The compounds—



have no plane of symmetry, but are related to one another as object to image, or right to left hand. Such isomerism of molecules is accompanied by optical activity; and a carbon atom to which are attached four dissimilar atoms or groups is called an asymmetric carbon atom.

There are two tartaric acids, each containing two asymmetric carbon atoms; I. is dextro-, II. is lævo-rotatory. Racemic acid, an equimolecular mixture of I. and II., is inactive; mesotartaric acid, III., is inactive by internal compensation—



Salts of the two former acids form asymmetric crystals, related as object and image; they are enantiomorphous. Many vital products are optically active, but artificial compounds are racemic, *i.e.* equimolecular mixtures of oppositely active molecules.

Recently, optically active compounds of nitrogen, sulphur, selenium, silicon, tin, phosphorus, chromium, iron, and cobalt have been prepared.

STEREOSCOPE.—When we look at any solid object, such as a cubical box, an image of the object is formed in each eye, and these two images are slightly different. The reason for this is that the image formed in one eye is produced by a system of rays which proceed from a set of points which are different from those which give rise to the image in the other eye. The combination of the two produces the sense of solidity in the object, and enables us to appreciate those parts of an object which stand out in relief from the rest. In a photograph of the object, this idea of solidity is not conveyed, because the photograph is taken with a single lens—that is, it is not the binocular vision of two eyes. If, however, two photographs are taken by two lenses placed close together (an arrangement known as a *stereoscopic camera*), and converging in the same way as the visual directions of a pair of eyes, then the pair of photographs will differ in the same way as the two images in the eye differ. But if this pair of photographs be viewed by a pair of lenses which combine the rays from both photographs into an image which appears to come from one photograph, we obtain a picture which gives the same impression of solidity or depth that

we obtain in direct vision of the object itself. This arrangement of lenses is termed a *stereoscope*. The lenses are generally half-lenses with their thinner edges turned inwards towards each other. They are mounted on a frame to which is attached a holder for the stereoscopic photographs.

STERILITY, barrenness in reproduction; may be due to altered environment, *e.g.* many cultivated flowers never seed; some animals do not breed in captivity; in human beings s. is caused by disease, age, defective development of reproductive orders, etc. See HYBRIDS, REPRODUCTION, MENDELISM, GYNECOLOGY, IMPOTENCE.

STERLING (41° 47′ N., 89° 45′ W.), city, on Rock River, Whiteside County, Illinois, U.S.A.; iron foundries. Pop. (1910) 7467.

STERLING, legal coin of standard weight and purity. Some derive word from *Easterling* money of Hanse merchants in demand in Richard I.'s time. Sterling silver contains ·075 copper.

STERLING, JOHN (1806–44), Brit. writer; b. Kames Castle, Bute; s. of Edward Sterling of the *Times* staff; pub. *Poems* and *Strafford* (a tragedy). His *Essays and Tales* were collected, 1848. Carlyle wrote a life of Sterling, which chiefly preserves his memory.

STERN, DANIEL, see AGOULT, MARIE CATHERINE.

STERNA, a genus of Terns; see under GULL FAMILY.

STERNBERG (49° 44′ N., 17° 18′ E.), town, Austria; centre of textile industry. Pop. 14,580.

STERNE, LAURENCE (1713–68), Brit. novelist; b. Clonmel, Ireland; ed. Halifax School and Cambridge; took orders and obtained livings of Sutton and Stillington; from obscurity S. suddenly rose to fame by publication in 1760 of first vol. of *Tristram Shandy*. Other eight vol's of the same whimsical novel followed at intervals until his death; and in addition S. issued collection of *Sermons* and *A Sentimental Journey* (1768). S.'s character was far from admirable, but he ranks high in the history of Eng. fiction. He mingled genuine humour with clownish eccentricities, originality with plagiarism, delicacy with gross indecency; his Uncle Toby, Corporal Trim, and Widow Wadman are immortal characters of fiction.

Cross, *Life and Times* (1909); Sichel, *Life* (1910).

STERNE, RICHARD (1596–1683), bp. of Carlisle, 1660; abp. of York, 1664.

STESICHORUS (*c.* 630–555 B.C.), the 'lyric Homer'; Dorian poet of Sicily; struck blind for libelling Helen.

STETHOSCOPE, instrument employed in med. for the purpose of listening to the sounds produced in the body (auscultation); may be *single*, consisting of a wooden tube flattened at one end, for the ear, and cup-shaped at the other, or *binaural*, with two rubber tubes leading from the cup, for the ears.

STETTIN (53° 27′ N., 14° 33′ E.), town, on Oder, capital of Pomerania, Prussia; important shipping and commerce; churches of St. Peter and St. Paul (XII. cent.), St. James (XIV. cent.), royal palace, Königsthor, Berlinerthor, etc.; taken by French, 1806–13; became Prussian, 1814; shipbuilding, machinery, chemicals, oil-refining, sugar, paper. Pop. (1910) 237,419.

STEUBENVILLE (40° 23′ N., 80° 41′ W.), city, on Ohio, capital, Jefferson County, Ohio, U.S.A.; manufactures iron, glass. Pop. (1910) 22,391.

STEVENAGE (51° 55′ N., 0° 13′ W.), town, Hertfordshire, England; straw-plaiting. Pop. (1911) 4856.

STEVENS, ALFRED (1818–75), Brit. sculptor and decorative artist; trained in Italy, partly under Thorwaldsen. His greatest work is the monument of Wellington in St. Paul's Cathedral.

STEVENS, ALFRED (1828–1906), famous Belgian painter.

STEVENS POINT (44° 30′ N., 89° 28′ W.), city, on Wisconsin, capital, Portage County, Wisconsin, U.S.A.; lumber industries. Pop. (1910) 8692.

STEVENS, THADDEUS (1792–1868), Amer. politician and barrister; entered Congress as Whig, 1849; advocated abolition of slavery; led Republican party in Congress, 1859–68; chairman of Reconstruction Committee, 1865.

STEVENSON, ROBERT (1772–1850), civil engineer; b. Glasgow; of Scot. parents; authority on lighthouse construction; built several, including the Bell Rock Lighthouse; improved systems of lighting.

STEVENSON, ROBERT LOUIS BALFOUR, 'R.L.S.' (1850–94), Brit. novelist, essay writer, and poet; b. and ed. Edinburgh; grandson of Robert S., lighthouse engineer; travelled extensively, seeking health and experience; settled finally at Samoa, where he died of consumption. Among his works are *An Inland Voyage* (1878), *Travels with a Donkey* (1879), *Virginibusque Puerisque* (1881), *Familiar Studies of Men and Books* (1881), *New Arabian Nights* (1882), *Treasure Island* (1883), *A Child's Garden of Verse* (1885), *Prince Otto* (1885), *Dr. Jekyll and Mr. Hyde* (1886), *Kidnapped* (1887), *Underwoods* (1887), *Black Arrow* (1888), *Ballads* (1889), *Master of Ballantrae* (1889), *Catriona* (1893); left unfinished *St. Ives* and *Weir of Hermiston*, which promised to be his masterpiece. S., among last and greatest XIX.-cent. novelists, combined finished style with powerful imagination and remarkable narrative faculty. See *Life*, by Graham Balfour (1901).

STEVENSTON (55° 39′ N., 4° 45′ W.), town, Ayrshire, Scotland; collieries; ironworks; manufactures explosives. Pop. (1911) 10,773.

STEVINUS, SIMON (1548–1620), Dutch mathematician; b. Bruges; complete edition of works pub. at Leiden, 1608 and 1634; they include optics, geography, astron., etc.; advocated use of decimal systems for coinage, weights and measures (1586).

STEWART, STUART, or STEUART, Scot. (and Eng.) royal family.—David I. (1124–53) granted the stewardship (*senescallia*) of Scotland to Walter (d. 1177), an Anglo-Norman. His descendants were hereditary *stewards*. Walter the third, who married Marjory Bruce, was father of King Robert II. (1371–90). Various families of Stewart sprang from illegitimate children of this line. From Robert II. descended dynasty which ended with Mary, Queen of Scots, whose son, James VI., became king of England. The last Stewart ruler of Britain was Queen Anne, dau. of James II. The Pretender's line died out, 1807, but there are still descendants of James I. and Charles I.

Thornton, *Stuart Dynasty* (1891).

STEWART, BALFOUR (1828–87), Scot. physicist; app. director of Kew Observatory, 1859; prof. of Physics, Owens Coll., Manchester, 1870; one of founders of spectrum analysis; authority on terrestrial magnetism; wrote treatises on Heat, Physics, Conservation of Energy.

STEWART, DUGALD (1753–1828), Scot. philosopher; b. Edinburgh; prof. at Edinburgh; classifies intellectual powers of man; recognises 'association' more clearly than Reid (*q.v.*), and resolves belief in extension of coloured visible things into 'inseparable association.' Generally follows Reid in metaphysics; approaches Hume in his doctrine of causation.

STEWART, ROBERT, see LONDONDERRY, ROBERT STEWART, 2ND MARQUESS OF.

STEWARTON (55° 42′ N., 4° 30′ W.), town, on Annick, Ayrshire, Scotland; exports dairy produce.

STEWING, see COOKERY.

STEYN, MARTINUS THEUNIS (1857–), S. African statesman; pres., Orange Free State (1896–1900); joined Transvaal in Boer War; member of National Convention, which unified S. Africa (1910); potent force in politics, although retired; a leader of Dutch-speaking population.

STEYNING (50° 33′ N., 0° 20′ W.), small town, Sussex, England.

STEYR, STEIER (48° 2′ N., 14° 25′ E.), town, at junction of Enns and Steyr, Upper Austria; manufactures iron and steel. Pop. 18,000.

STICHOMETRY, the method adopted by the Greeks and Romans for measuring the lines of a literary work. In prose, as the writing of the copyists varied, a standard line was fixed, which consisted of 36 letters.

STICK INSECTS, see under LEAF INSECTS.

STICKLEBACKS (*Gasterosteidæ*), small, scaleless fishes, with three or four sharp dorsal spines, and bodies often covered with bony plates. The males build a nest for the protection of the eggs, which they guard until hatched. Found in fresh water or in the sea only in the N. hemisphere.

STIGAND, bp. of Elmham, 1043; Worcester, 1047; abp. of Canterbury, 1052–70; d. 1072.

STIGMA, see FLOWER.

STIGMATISATION, the impression of the 'stigmata' or marks resembling the wounds of Christ, in feet, and hands, and side, and those caused by the crown of thorns and scourging. St. Francis of Assisi was the first upon whom the stigmata were seen (if we except a disputed passage in St. Paul's epistles), and there have been many cases of s. since his death. More than 100 were reported in the XIX. cent. By certain schools of medicine, hypnotic suggestion is held to produce the phenomenon. Many Catholics hold it to be generally miraculous and preternatural.

STILES, EZRA (1727–95), Amer. divine; preached at Yale, Newport, etc.; prof. at Yale, 1778; student of astron., meteorology, electricity, etc.

STILICHO, FLAVIUS (d. 408), Barbarian general of Rom. Empire; ruled empire during youth of Honorius; by military genius kept back Goths and Vandals, defeating Alaric and Radagaisus.

STILL, JOHN (*c.* 1543–1608), Anglican divine; master of St. John's and Trinity Coll., Cambridge; bp. of Bath and Wells, 1593; *Gammer Gurton's Needle* (1575), early Eng. comedy, is sometimes attributed to him.

STILLINGFLEET, EDWARD (1635–99), Anglican divine; dean of St. Paul's, 1678; bp. of Worcester, 1689; wrote *Irenicum* and other works; an able controversialist.

STILL'S DISEASE, see RHEUMATOID ARTHRITIS.

STILLWATER (45° N., 92° 47′ W.), city, on St. Croix, capital, Washington County, Minnesota, U.S.A.; seat of lumber trade. Pop. (1910) 10,198.

STILTS, see under PLOVER FAMILY.

STILUS, see PALÆOGRAPHY.

STINK FLIES, see LACEWING FLIES.

STIPA, see FEATHER GRASS.

STIPENDIARY MAGISTRATE, see MAGISTRATE.

STIRLING (56° 7′ N., 3° 56′ W.), royal burgh, on Forth, Stirlingshire, Scotland; birthplace and residence of early Stewart kings; fine old fortified castle, with Heading Hill; parish church (XV. cent.), Guildhall, Smith Institute (with picture-gallery and museum), old four-arch bridge (*c.* XIV. cent.), Cambuskenneth Abbey (founded 1147), Wallace Monument on neighbouring Abbey Craig. S. is surrounded by battlefields (*Bannockburn*, etc.); Wallace defeated English at *Stirling Bridge*, 1297; besieged by English under Edward I., 1304; taken by Monk, 1651; unsuccessful siege of Jacobites, 1746. Chief industries are carpets, tartans, tweeds, rubber goods, agricultural implements. Pop. (1911) 21,200.

STIRLING, JAMES (1692–1770), Scot. mathematician; b. Garden, Stirling; chief work, *Methodus differentialis, sive tractatus de summatione et interpolatione serierum, infinitarum*, 1730.

STIRLING, JAMES HUTCHISON (1820–1909), Scot. philosopher; introduced Hegelianism into England; *Secret of Hegel* (1865), *Textbook of Kant* (1881); attempts to show intimate connection of Kant and Hegel.

STIRLING, WILLIAM ALEXANDER, EARL OF (*c.* 1567–1640), Scot. statesman, dramatist, and poet; favourite at James I.'s court; friend of Drummond of Hawthornden; received vast grants of land in America—Nova Scotia; King's Sec. for Scotland, Master of Requests, and judge of the Court of Session; author of various tragedies, poems, and an *Encouragement to Colonies*. Nova Scotia, after being a heavy drain on S., was ceded to France, 1632.

STIRLINGSHIRE (56° 3′ N., 4° 15′ W.), midland county, Scotland; area, 450 sq. miles; surface is hilly in N.W. and centre, while in E. are wide fertile plains called Carses of Stirling and Falkirk; drained by Forth; large deposits of coal and iron; has ironworks and manufactures of textiles and chemicals. County town, Stirling. Has Rom. remains and associations with Wallace, Bruce, and the Young Pretender. Pop. (1911) 161,003.

STITCHWORT, see STARWORT.

STOAT, see WEASEL FAMILY.

STOCK, see GILLYFLOWER.

STOCK DOVE, see under PIGEON FAMILY.

STOCK EXCHANGE.—Stock is the capital of a company, divided into shares, of a given amount, which are transferable. Stock is always fully paid up, shares need not be, but the latter cannot be divided into parts. S. E. means (*a*) the place where merchants and bankers assemble to buy or sell stock and shares, and more usually (*b*) persons composing the assembly. The London S. E. is the largest in the world, and those of Manchester, Liverpool, Leeds, Sheffield, Newcastle, Birmingham, Bristol, Aberdeen, Edinburgh, Glasgow, and Dublin put together do not equal the 'House' (as it is called) in membership or amount of business transacted. In XVIII. cent. London dealers in public securities met in 'Change Alley and Sweetings Alley, and the public were not excluded. There were 500 subscribers in 1802, the year of its formal beginning.

A dealer ('jobber') may not sell to the outside public except through a broker, and a broker must not sell unless he has purchased from a jobber. *Settlement* takes place fortnightly. On the 1st day of settlement —*Contango* or *Making-up Day*—payment and delivery of stock may be postponed until the next fortnightly account by the seller ('backwardation') on buyer paying interest. On the 2nd day of settlement—*Ticket Day*—the broker hands to the jobber a ticket bearing the security amount, and the names of seller, buyer, and broker. Tickets pass from jobber to jobber and often bear many names. On the last day of settlement—*Settling Day*—the buyer hands over the purchase money. The S. E. is, in fact, a strictly regulated club, to which visitors are never admitted. It has committees for house management and settlement of disputes. It can expel members who offend against the rules. A member joining the S. E. requires three members of four years' standing as sponsors, and pays £500. See BEAR, BULL, OPTION.

Poley, *History, Law, and Practice of the Stock Exchange* (1911).

STOCKBRIDGE (42° 17′ N., 73° 20′ W.), town, summer resort, on Housatonic, Berkshire County, Massachusetts, U.S.A.; associated with Jonathan Edwards.

STOCKHOLM (59° 20′ N., 18° 3′ E.), capital of Sweden; beautifully situated on rocky islands and mainland at outlet of Lake Mälar to Baltic; busy port and large industrial centre. Staden (old town) has narrow steep streets, quaint gabled houses, royal palace (with collection of armour and costumes), Storkyrka (great church, founded XIII. cent.), Tyskakyrka, Riddarhus (XVII. cent.), Riddarholms-kyrka (with royal tombs, including that of Gustavus Adolphus); Norrmalm, residential quarter, has fine broad streets, large squares, parks, univ., Royal Opera-House, national museum (valuable Swed. antiquities and art collection), national library, statues of Gustavus Adolphus and Charles XII., Northern Museum, Skansen (open-air museum). S. was founded, 1255; taken by Danes, 1389, 1520; frequent fires, XVII.–XIX. cent. Chief industries are shipbuilding, iron foundries, machinery, cotton, linen, leather, sugar, breweries, etc. Pop. (1911) 346,599.

STOCKINGS, see HOSIERY.

STOCKPORT (53° 25′ N., 2° 10′ W.), town, at junction of Tame and Mersey, Cheshire, England; cotton and hat-making industries. Pop. (1911) 108,693.

STOCKS, obsolete wooden apparatus of punishment; board pierced to receive wrists and ankles of

prisoner; used in Britain from Anglo-Saxon period to XIX. cent.

STOCKTON (37° 56′ N., 121° 13′ W.), city, capital, San Joaquin County, California, U.S.A.; commercial centre; manufactures agricultural implements, flour. Pop. (1910) 22,253.

STOCKTON-ON-TEES (54° 33′ N., 1° 19′ W.), seaport, on Tees, Durham, England; iron and steel manufactures. Pop. (1911) 52,158.

STODDARD, RICHARD HENRY (1825–1903), Amer. poet; wrote *Songs of Summer* (1857), *The Book of the East* (1867), *Recollections* (1903).

STOICHIOMETRY, term applied by B. Richter to all processes for determining ultimate composition of substances; embraces all methods for determining atomic and molecular weights. The atomic weights of elementary gases are derived from their densities observed under regulated conditions. Analysis yields accurate values for equivalent weights of all elements (except argon, etc.), and the laws of specific heat and isomorphism, with the periodic law, furnish other necessary evidence for fixing atomic weights. Otherwise the least weight of an element within molecular weight of any compound is atomic weight. Molecular weights are derived from vapour densities, and physical properties of liquids and solutions.

STOICS, THE, a philosophical school founded by ZENO of Citium, a philosopher possibly not of Gk. descent, who *c.* 300 B.C. began to teach in a *Stoa* or colonnade at Athens. On his death about 265 B.C. the leadership of the school passed to the poet CLEANTHES, and then to CHRYSIPPUS of Soli (d. *c.* 206 B.C.), who consolidated its doctrines. In II. cent. B.C. Panætius of Rhodes won for Stoicism much attention in Rome, where many men of importance became its adherents; and during I.–II. cent's A.D., though it lost in speculative value as expounded by EPICTETUS, SENECA, MARCUS AURELIUS, and others, it was, as a system of popular Puritan morals, the most restraining force amid the vagaries of pseudo-religious exuberance and moral decadence of that period.

In its earlier shape, however, as formulated by Chrysippus, Stoicism was more than a system of morals, though its interest was predominantly ethical. The Stoic metaphysic has been described as a 'materialistic pantheism,' and it certainly tried to combine two views, commonly held apart, that whatever is real is corporeal, and that the world and everything in it is informed by reason and expressive of the world-soul, or God. Thus the Stoics regarded the universe as a rational, though material, whole, and were opposed to the crude atomism of the Epicureans.

The difficulty of such a pantheism is its apparent implication that everything, just as it is observed, is equally rational, an implication which brings forward the problem of evil in a very aggravated form, and seems inconsistent with those moral principles on which the Stoics laid much stress. Of physical evil they made light, as being no real evil to the wise man; but their attempt to account for moral evil as necessary to the goodness of the whole was not very successful.

Their ethical ideal seems at first sight to be in out spoken opposition to Epicureanism. Whilst the latter exalts Feeling, the Stoics bid us follow Reason alone. The life of reason is the life of wisdom and virtue and spiritual health, and the wise man alone is free, having liberated himself from care about external conditions and the vicissitudes of fortune, and especially from the passions, which he wholly extirpates. Nothing seems vile to him but that which is within his own control—an evil will; and in its early uncompromising form the Stoic view was that there are no degrees of virtue, but a man is either perfectly wise or utterly depraved. Since the perfect Sage is not to be found, it follows that we are all equally 'sick fools,' utterly mad and bad, but it came to be allowed that the man who strives after good is good in his degree.

Despite their opposition, however, there is this resemblance between the Stoics and the Epicurean ethics, that both found the ideal in a wise unruffled calm, and both represent that tendency of the individual to find a refuge from the world within his own breast, which arose upon the downfall of the free city-state. The Stoic statement of the ideal offered a possibility of greater dignity, but also a risk of ungracious rigorism and self-righteousness. This risk, however, was somewhat lessened by the Stoic's doctrine of the unity of all men as reasonable beings; and their consequent insistence on the duty of philanthropy saved the best of them from a too stony-hearted heroism.

Epictetus, *Discourses*, trans. by Long; Marcus Aurelius, *Meditations* (Long's or other trans.); Caird, *The Evolution of Theology in the Greek Philosophers*; Capes, *Stoicism*; Dill, *Roman Society from Nero to Marcus Aurelius*; R. D. Hicks, *Stoic and Epicurean*; Zeller, *Stoics, Epicureans, and Sceptics*.

STOKE NEWINGTON, metropolitan borough, London, 3 miles N.E. of St. Paul's. Pop. (1911) 50,683.

STOKE POGES (51° 33′ N., 0° 37′ W.), village, Buckinghamshire, England; burial-place of Thomas Gray.

STOKE-ON-TRENT (53° 1′ N., 2° 10′ W.), town, on Trent, Staffordshire, England; centre of pottery and porcelain manufacture; includes (since 1910) Tunstall, Burslem, Hanley, Longton, Fenton, Stoke. Pop. (1911) 234,553.

STOKES, SIR GEORGE GABRIEL (1819–1903), Brit. mathematician; b. Sligo; ed. Bristol and Cambridge; senior wrangler and first Smith's prizeman (1841); app. Lucasian prof. of Math's, Cambridge, (1849); F.R.S. (1851); pres. of Brit. Association, 1869, and of Royal Soc., 1885 to 1888; cr. baronet, 1889; received Rumford medal for investigations on light; contributed many important papers to various societies. The correspondence between S. and his intimate friend Kelvin brought out many new scientific ideas.

STOKESLEY, JOHN (1475–1539), bp. of London, 1530.

STOLBERG (50° 45′ N., 6° 16′ E.), town, on Vichtbach, Rhineland, Prussia; manufactures brass, iron. Pop. 15,470.

STOLBERG, FRIEDRICH LEOPOLD, GRAF ZU (1750–1819), Ger. poet; b. Bramstedt (Holstein); wrote *Leben Alfred des Grossen*, besides ballads, odes, translations, etc.

STOLE, a narrow strip of stuff; liturgical vestment, worn by bp's, priests, and deacons, the latter wearing it over left shoulder and fastened under right side; priests at mass wear it crossed on the breast; sometimes confused with the scarf, a band of silk (specially Anglican).

STOLE, GROOM OF THE, see BEDCHAMBER, OFFICIALS OF THE.

STOLP, STOLPE (54° 29′ N., 17° 1′ E.), town, on Stolp, Pomerania, Prussia; manufactures machinery. Pop. (1910) 33,762.

STOMACH, a dilated sac-like part of the digestive tract, situated in man in the upper part of the abdomen on the left side, in which the early stage of digestion takes place. (See DIGESTION, DYSPEPSIA, GASTRIC ULCER.) Cancer of the s. is a comparatively common disease, the most usual situation being at the outlet or pylorus, when the symptoms generally include discomfort an hour or two after food, distension of the stomach, vomiting, loss of flesh, and a hard lump may be felt at the pylorus. The treatment is radical operation as soon as diagnosed, while a palliative operation may give great relief for a considerable time when the growth is too advanced for removal.

STOMATA, see LEAF.

STONE, a hard, compact mass of earth, as limestone, sandstone, etc.; generally obtained by quarrying rock. The principal components of s. are silex, aluminia, zirconia, glucinia, lime, and magnesia. When oxides such as iron and copper enter into its composition they generally give it a colour. S. varies in hardness

and weight. Some s's (*e.g.* granites) are extremely hard; others are so soft (*e.g.* sandstones) as to be acted upon by rain and wind. Coarse-grained s's, where the particles exceed the size of a pea, are generally known as *conglomerates*. Some s's are exceedingly brittle; and others are fusible; none are malleable, ductile, or soluble.

Artificial s's generally consist of burnt clay, which is formed into firebricks, and bricks for building purposes. Portland cement is mixed with sand and s's, and when set forms an artificial s. much used for piers, breakwaters, and other marine works. For *precious* s's, see GEMS. See also SLATE.

Merrill, *Stones for Building and Decoration.*

STONE (52° 55′ N., 2° 9′ W.), town, on Trent, Staffordshire, England. Pop. (1911) 5690.

STONE AGE, see ANCIENT HISTORY.

STONE CIRCLES, see STANDING STONES.

STONE, EDWARD JAMES (1831–97), Brit. astronomer; b. London; made accurate redeterminations of many astronomical constants, also two great star catalogues: *Cape Catalogue*, 1880, *Radcliffe Catalogue*, 1890.

STONE, GEORGE (1708–64), Irish ecclesiastic; dean of Ferns, 1733; bp. of Ferns, 1740, Kildare, 1743, Derry, 1743; abp. of Armagh, 1747. His work was more political than religious, upholding Eng. interest in Ireland, though tolerant to Roman Catholics; an able, but worldly man.

STONE MONUMENTS, PREHISTORIC, see STANDING STONES.

STONECHAT, see under THRUSH FAMILY.

STONEHAM (42° 29′ N., 71° 15′ W.), town, Middlesex County, Massachusetts, U.S.A.; boots and shoes. Pop. (1910) 7090.

STONEHAVEN (56° 58′ N., 2° 13′ W.), county town, watering-place, on North Sea, Kincardineshire, Scotland; herring-fishing centre; tanneries. Pop. (1911) 4266.

STONEHENGE (51° 11′ N., 1° 49′ W.), remarkable group of huge stones in Salisbury Plain, in Wilts, England, 7 miles N. of Salisbury. When entire it consisted of two circles of stones, many of which now lie on the ground; those remaining show that the general arrangement was in groups of three, two upright stones being joined by a third, which they supported. Largest stone is 22 ft. high, 7½ broad, and 4 thick. Their erection is generally attributed to the late Stone or the Bronze Age, and their use was probably both monumental and sacrificial.

STONES, PRECIOUS, see GEMS.

STONES, STANDING, see STANDING STONES.

STONINGTON (41° 20′ N., 71° 57′ W.), town, seaport, New London County, Connecticut, U.S.A.; manufactures foundry products. Pop. (1910) 9154.

STONY POINT (41° 15′ N., 73° 58′ W.), town, on Hudson River, Rockland County, New York, U.S.A.; taken by British, recaptured by Gen. Wayne, and subsequently reoccupied by British, 1779.

STOOL, portable seat without back; much used in Middle Ages, when chairs were cumbrous; three- or four-legged, sometimes folding like modern camp-stool; often skilfully carved; ducking-stool was contrivance for immersing shrews.

STORACE, STEPHEN (1763–96), Brit. musical composer; b. and died in London; wrote 18 musical dramas and some harpsichord pieces.

STORKS (*Ciconiidæ*), a family of long-necked, long-legged wading birds, found everywhere except in Northern Europe, Asia, and America. The WHITE and BLACK STORKS (*Ciconia*) occasionally visit Britain; the large ADJUTANTS, or MARABOUS, occur in Eastern Asia and Africa.

STORM, see METEOROLOGY, WIND.

STORNOWAY (58° 11′ N., 6° 22′ W.), town, seaport, island of Lewis, Hebrides, Scotland; centre of Outer Hebrides fishery district. Pop. (1911, resident) 3806.

STORRS, RICHARD SALTER (1821–1900), Congregationalist minister in U.S.A.

STORY, JOHN (1510–71), R.C. martyr.

STORY, JOSEPH (1779–1845), Amer. lawyer and statesman; Justice of Supreme Court of U.S.A., 1811–45; decisions important in case law; son was well-known artist and author, WILLIAM WETMORE STORY.

STORY, ROBERT HERBERT (1835–1907), Presbyterian minister, principal of Glasgow University, 1898.

STORY, WILLIAM WETMORE (1819–95), Amer. sculptor and poet; spent his professional life in Italy; produced many fine works in sculpture and several volumes of verse.

STOTHARD, THOMAS (1755–1834), Brit. designer and painter; b. and died in London; became famous as an illustrator of books, some 3000 of his designs having been engraved. His best-known painting is *The Canterbury Pilgrims.*

STOUGHTON, JOHN (1807–97), Congregationalist minister; wrote several books.

STOUR.—(1) (51° 15′ N., 1° E.) river, Kent, England; enters North Sea by two arms at Isle of Thanet. (2) (51° 57′ N., 1° 12′ E.) river, between Essex and Suffolk, England; enters North Sea. (3) (50° 47′ N., 2° 2′ W.) river, Dorsetshire and Hampshire, England; joins Avon at Christchurch. (4) (52° 30′ N., 2° 15′ W.) river, Staffordshire and Worcestershire, England; joins Severn at Stourport.

STOURBRIDGE (52° 28′ N., 2° 9′ W.), town, on Stour, Worcestershire, England; ironworks. Pop. (1911) 17,316.

STOURPORT (52° 21′ N., 2° 25′ W.), town, at junction of Stour and Severn, Worcestershire, England. Pop. (1911) 4432.

STOUT, see BREWING.

STOW, JOHN (*c.* 1525–1605), Eng. chronicler; followed trade of tailor till age of forty; *Summary of English Chronicles* first pub., 1561; *Annals of England*, 1580; chief work, *Survey of London*, 1598; collector and copier of MSS.; writings noted for local colour; died destitute.

STOWE, HARRIET E. BEECHER, see under BEECHER, LYMAN.

STOWELL, WILLIAM SCOTT, BARON (1745–1836), Eng. lawyer; eldest bro. of Lord Eldon; judge in Consistory Court, 1788, and in Court of Admiralty, 1798; the real creator of present admiralty law in England; twenty years M.P. for Oxford.

STOWMARKET (52° 12′ N., 1° E.), market town, Suffolk, England; chemical works. Pop. (1911) 4230.

STRABANE (54° 49′ N., 7° 27′ W.), town, at junction of Mourne and Finn, County Tyrone, Ireland; linen and shirt-making industries. Pop. 5100.

STRABO (*b. c.* 63 B.C.), Gk. geographer; b. Amasia, Pontus; ed. Nysa by Aristodemus and Tyrannion; at Rome, *c.* 29 B.C.; travelled in Arabia, Asia Minor, and Armenia, 24 B.C., returned to Rome, 20 B.C.; compiled a *Geography* in 17 books, dealing with Europe, Asia, and Africa, and a *History* in 43 books—a supplement to Polybius; only fragments of this work remain.

STRACHAN, JOHN (1778–1867), Canadian-Anglican divine; emigrated to Canada, 1799; joined Episcopal Church; ordained, 1803; rendered much help to Brit. government during war of 1812; became interested in education, which he endeavoured to keep under Church control; bp. of Toronto, 1840.

STRACHEY, SIR JOHN (1823–1907), Brit. Indian administrator; b. London; rose to be gov.-gen. of India on the assassination of Lord Mayo. He wrote *India: Its Administration and Progress.*

STRACHEY, SIR RICHARD (1817–1908), Eng. soldier; held various government posts in India; joint-author of work on Ind. finance.

STRADELLA, ALESSANDRO (*c.* 1645–82), Ital. musical composer; b. Naples; murdered, through jealousy, at Genoa. The murder and the incidents leading up to it are the subjects of Flotow's opera *Stradella*, and of a novel by Marion Crawford. His compositions include oratorios, operas, cantatas, and other works.

STRADIVARI, ANTONIO (1644–1737), Ital. violin-maker; b. Cremona; pupil of Amati; violins most perfect in world. See VIOLIN. *Life*, by Petherick (1900), Hill (ed. 1909).

STRAFFORD, EARL OF, THOMAS WENTWORTH (1593–1641), Brit. statesman; e. s. of Sir William Wentworth, Bart.; early alienated Savile through various rivalries, 1617 onwards; opposed Buckingham and sneered at Puritans; imprisoned for refusing forced loan, 1627, and became leader of constitutional party, again and again declaring that his opposition was to ministers, not king; cr. viscount, 1628, and pres. of Council of north; P.C. 1629.

Lord-Deputy (subsequently Lord-Lieut.) of Ireland, 1632, S. declared that his motto would be '*Thorough*.' He restored order, 1633, but being ardent Prot., roused bitter resistance; established Crown claim to Connaught, 1635; not wilfully unjust, but regarded Irish as obstacles to orderly government. Returning to England, 1639, he became king's chief adviser. Bitter jealousy was aroused by his acquisition of barony of Raby and earldom, 1640. When he put Irish army at disposal of Crown, he received title of Black Tom Tyrant; attainted as traitor to the State; Charles I. broke his word and gave deepest stain to his reputation by assenting to his execution.

Traill, *Life of Strafford* (1889).

STRAIN, see ELASTICITY.

STRAITS SETTLEMENTS (5° N., 100° E.), Brit. colony in Malay Peninsula, comprising Singapore, Malacca, Penang, Dindings, and Province Wellesley, with the dependencies of Cocos, or Keeling, Islands, Christmas Island, and several native states. Pop. (1911) 714,060; white, 7368. Capital, Singapore.

STRALSUND (54° 20′ N., 13° 5′ E.), seaport, on Strelasund, Pomerania, Prussia; chief architectural features are four Gothic churches and a XIV.-cent. town hall; exports grain; manufactures machinery; was an important Hanse town; unsuccessfully besieged by Wallenstein in the Thirty Years War (1628); passed to Prussia, 1815. Pop. (1910) 33,988.

STRAMONIUM, drug obtained from seeds and leaves of the thorn-apple, *Datura stramonium*, the chief constituent being an alkaloid daturine or hyoscyamine; medicinally the leaves are smoked and the drug given internally to relieve the bronchial spasm in asthma.

STRANGE, SIR ROBERT (1721–92), line engraver; b. Kirkwall, Orkney; fought at Culloden, and engraved Charles Edward's banknotes. Settling in London, he attained front rank in his profession.

STRANGFORD, VISCOUNTY, Irish title. PERCY SMYTHE, 6th viscount (1780–1855), Brit. ambassador to Portugal, Sweden, Turkey, Russia. PERCY, 8th viscount (1826–69), was noted for his linguistic acquirements; wrote on philology, politics, etc.

STRANGLES, disease of young horses; symptoms —cough, nasal discharge, swelling of lymph glands in throat; treatment—fomentations and tonics; infectious.

STRANGULATION, see under HERNIA.

STRANRAER (54° 54′ N., 5° 2′ W.), seaport, watering-place, on Loch Ryan, Wigtownshire, Scotland; has a ruined castle (XV. cent.); manufactures dairy utensils; exports agricultural produce. Pop. (1911) 6432.

STRASSBURG, STRASBURG (48° 35′ N., 7° 46′ E.), capital of Alsace-Lorraine, Germany, on Ill; first-class fortress of high strategical importance; R.C. bp.'s see; famous cathedral (1015 onwards) with remarkable astronomical clock, Church of St. Thomas (Romanesque and Gothic arch.), library, episcopal palace (now museum and art gallery), imperial palace, univ. (founded, 1567); housetops frequented by storks. S. took prominent part in mediæval history; annexed by France, 1681; severely bombarded, 1870; ceded to Germany, 1871. Chief products are machinery, printing, jewellery, hardware, tanning, tobacco, *pâté de foie gras*, breweries, etc. Pop. (1910) 178,891.

STRATA-FLORIDA (52° 17′ N., 3° 53′ W.), parish, Cardiganshire, Wales; remains of a Cistercian abbey (1194).

STRATEGUS (Gk. *strategos*, 'general'), in Athens designated the highest magistrate of the state. There were normally ten strategi in Athens. The strategi summoned the assembly and laid the propositions before the people. To them were entrusted foreign administration and finance, and they also commanded the home forces. Their authority in regard to military jurisdiction was supreme. Till the year 325 B.C. these functions were performed collectively by the college of strategi; after that year their various spheres of action were assigned on election.

STRATEGY.—The term strategy is derived from Gk. *strategia* (i.e. office of commander, generalship), and denotes that department of war which is concerned with the planning and directing of great military operations. S. is often confounded with *tactics* (q.v.). Now tactics means the actual conduct of the battle which it has been the object of the strategist to bring about or to avoid under certain conditions. S. may, and, indeed, in these days when the growth of naval armaments goes on apace and Europe is an armed camp, *must* be exercised even in times of peace. Thus s. dictated the withdrawal of Brit. warships from outlying stations and their concentration in home waters. As *The Times* remarked (June 1912): 'The North Sea is now the centre of our naval s., because it has witnessed within the last ten years a development of foreign naval strength which touches imperial security to the roots. No victories in other seas could retrieve a failure there, and victory there would leave us with an easy mastery in other European seas.' The purpose of s., then, is so to dispose one's available fighting material that a war or a battle, if undesired, may be avoided, or if it does take place, may be fought under the most advantageous circumstances. Tactics, therefore, is the method of combat; s., according to Clausewitz's definition, is the use or employment of combat.

As Lieut.-Col. James points out in *Modern Strategy* (1903), the ties between s. and tactics are practically indissoluble. S. deals with the military considerations which determine the choice of the offensive or defensive, the selection of the country in which to fight, the objects against which the armies or navies should be directed, and embraces the plan of campaign or general idea dominating the conduct of operations. 'Broadly speaking, s. is concerned with the movement of troops before they come into actual collision, while tactics deal with the leading of troops in battle or when battle is imminent.' S. seeks to win more than the battle: it aims at drawing the greatest advantage from battle.

S. has developed with the art and science of war, and the modern strategist has to take into account not only the physical features of the theatre of war, but the progress of civilisation and all the latest inventions of man. Battles are now fought on sea and land with long distances between the combatants. Means of communication are now very much better than they were, say, in Napoleon's time. News circulates far more quickly in these days of telegraphy and alert newspaper correspondents. Conscription has revolutionised the armies of Europe. The size and composition of navies change continually. Submarines, aeroplanes, new weapons, defensive and offensive, make war ever more and more formidable and alter the strategist's calculations. International alliances, arbitration treaties, and all the ins and outs of the world's politics have an important bearing on s. More and more great wars call for master-strategists to draw up a definite plan of campaign, select suitable bases and lines of operations, lines of defence and lines of retreat, pick out strategical points and safeguard the lines of communications—in a word, to ensure that their country's armies and navies go into battle under the most favourable auspices. In these days of mighty fleets, colonial expansion, and international commercial

rivalries, the strategist's outlook must cover the whole wide world, for the theatre of war is the province of s., as the field of battle is that of tactics (*q.v.*).

STRATFORD (43° 21′ N., 81° 7′ W.), city, on Avon, port of entry, capital, Perth County, Ontario, Canada; railway repair-shops; saw- and flour-mills. Pop. 12,946.

STRATFORD, JOHN DE (d. 1348), Eng. Churchman; bp. of Winchester, 1323; helped to depose Edward II.; Chancellor, 1330; abp. of Canterbury, 1333; quarrelled with Edward III., but reconciled.

STRATFORD-DE-REDCLIFFE, VISCOUNT, STRATFORD CANNING (1786–1880), Brit. diplomatist; cousin of George Canning (*q.v.*), who appointed him ambassador extraordinary to Turkey, 1825, to press cause of Greece; afterwards frequently minister at Constantinople and won remarkable influence over Turk. mind; inspired Turk. resistance to demands of Tsar Nicholas, and by representations at home was largely responsible for Brit. aid to Turkey in Crimean War.

STRATFORD-ON-AVON (52° 12′ N., 1° 43′ W.), town, on Avon, Warwickshire, England; birthplace of Shakespeare; contains church of the Holy Trinity, with the tomb of Shakespeare and a celebrated bust of the poet; the house in which he was born (now Shakespearean museum); the grammar school where he was educated; the New Place, the site of the house where he spent his latter years and died; the old Guild Hall and some modern memorial buildings; about one mile W. of Stratford is Shottery, with Anne Hathaway's cottage. Pop. (1911) 8532.

STRATHAVEN (55° 41′ N., 4° 3′ W.), town, Lanarkshire, Scotland; silk and cotton goods.

STRATHCLYDE, ancient Celtic kingdom, extending from Clyde to Solway; capital, Alclyde (Dumbarton); annexed to Scotland, 1124; at a later period known as Cambria.

STRATHCONA AND MOUNT ROYAL, BARON, DONALD ALEXANDER SMITH (1820–), Canadian politician; became clerk in Hudson's Bay Co., 1838; rose in company's service, and became chief commissioner and gov. at Montreal, 1868–69; completion of Canadian Pacific Railway largely attributable to him; high commissioner for Canada, 1896; cr. baron, 1897; raised cavalry regiment for British in S. African War, 1900.

STRATHNAIRN, 1ST BARON, HUGH HENRY ROSE (1801–85), Brit. soldier; distinguished himself in Syria against Mehemet Ali of Egypt, 1840; consul-general of Syria, 1841; served in Crimean War; during Mutiny won many victories as commander of Central India army; chief Indian command, 1860; commander-in-chief in Ireland during Fenian unrest; cr. baron, 1866.

STRATHPEFFER (57° 36′ N., 4° 30′ W.), village, health-resort, Ross and Cromarty, Scotland; mineral springs.

STRATUM, see GEOLOGY.

STRAUBING (48° 53′ N., 12° 34′ E.), town, on Danube, Bavaria, Germany. Pop. (1910) 22,021.

STRAUSS, DAVID FRIEDRICH (1808–74), Ger. scholar and theologian; ed. Tübingen, where he lectured; pub. *Life of Jesus*, 1835; *Life of Jesus for the German People* appeared 1864; an able critic, but rationalist and devoid of spiritual sympathy.

STRAUSS, JOHANN (1804–49), Austrian composer; the 'Waltz King'; conducted famous Strauss Orchestra. His son, JOHANN (1825–99), conducted orchestra, 1849–63; composed operettas, e.g. *Fledermaus* (1874), and waltzes (e.g. *Blue Danube*).

STRAUSS, RICHARD (1864–), Ger. composer; b. Munich; a prodigy from babyhood; Hofkapellmeister, Berlin, since 1899. Earlier works show classical tendencies; then (e.g. *Tod und Verklärung* and *Guntram*) influence of Liszt and Wagner prevailed; later works (e.g. *Salome, Elektra*) bristle with eccentricities and strange and violent effects; a master of orchestration and composer of some beautiful songs. *Life*, by Newman (1908).

STRAW, stalks of wheat, oats, etc.; used for thatching and plaited work, especially for hats; Tuscany is largest centre of straw-plaiting industry; best material grown there; Luton is centre of Brit. straw industry.

STRAWBERRY (*Fragaria vesca*), a member of the Rosaceæ, cultivated varieties of which are often grown for their fruit; plant possesses tripartite, compound leaf with well-marked stipules, and reproduces vegetatively by means of runners; flower bends downwards on fertilisation and develops into so-called s. fruit. This is really the fleshy, succulent head of the flower stalk, and bears the actual fruits (*achenes*) studded over its surface.

STREATHAM, residential district, Wandsworth, London, England.

STREATOR (41° 1′ N., 88° 57′ W.), city, on Vermilion, Lasalle County, Illinois, U.S.A.; brick- and tile-works; coal mines. Pop. (1910) 14,253.

STREET, GEORGE EDMUND (1824–81), Eng. architect; designed and restored many churches, but is chiefly remembered for the new Law Courts in London.

STRENGTH OF MATERIALS, the science that deals with the nature and size of the stresses in engineering structures and machines, so as to determine the proportions of members. The subject includes a mathematical investigation of the nature and effect of stresses.

Stress can be explained as a mutual action between two bodies, each one exerting force upon the other. Stresses upon any surface may be normal, tangential, or oblique, and may be divided under the following headings: (1) compressive or 'push' forces; (2) tensile or 'pull' forces; (3) shear sliding forces tending to slide one layer of a body upon another; (4) bending forces; (5) twisting or torsional forces.

Any number of forces acting upon a body may be resolved into simple compressive or tensile stresses, acting upon 3 distinct planes of reference at right angles to each other. These forces are called principal stresses, and the planes on which they act are called axes of greatest and least principal stress. Stress is always considered as tons or pounds per square inch. In the design of structures, assumptions as to the safe stress carried by materials—steel, cast-iron, wrought-iron, wood, concrete, etc.—are based upon practical experimental tests. When a material suffers deformation under the action of a given stress it is said to suffer strain. Elasticity is the property of a material by which it tends to regain its original formation when the stress has been removed. When a material is strained it retains its elasticity up to a certain limit called the elastic limit or yield point; if the operation be continued the material loses its elasticity, becomes more or less ductile, and finally breaks. In the case of a pull or tension metals contract at the point of fracture, in compression they expand, while when 'sheared' the layers are slid one over another.

The relation that within the elastic limit stress is proportional to strain is known as **Hooke's Law.** In tension, then, if l represent strain, L the original length of a member, and P the stress or load, then $\frac{l}{L} = \frac{P}{E}$ where E is Young's Modulus of Elasticity, the value of which varies with materials.

Tension.—Tensile stress is of the nature of a 'pull.' The calculation of a suitable section for a member is easy. The product of the cross-sectional area of a member and of the safe stress used, must equal the load; or taking initial letters of symbols, $A \times S = L$. The safe stress to be used is derived by dividing the stress at yield point or elastic limit of a given material by a factor 1, 2, 3, 4, or even 7. The choice of this factor is a matter of experience, and varies with the purpose for which the member is to be used.

Compression.—Compressive stress is a 'push' force. It is obvious that compressive stresses, acting at the ends of a bar, tend to bend it. Experiments and

research by Wohler, Euler, Rankine, and Gordon have produced definite formulæ that the buckling stress of a member varies according to the equation.

$$\text{Buckling stress per sq. inch} = \frac{F}{1 + \frac{1}{N}\left(\frac{l}{r}\right)^2} \quad \text{where}$$

F and N are constants varying with the material used, and $\frac{l}{r}$ is the only variable quantity.

Shear Force tends to slide one layer of a body upon another. The best example of shear is to slide one-half of a pack of cards over the other half, one-half of the pack being sheared off the other.

Bending and Twisting stresses are easy to conceive, and require no illustration. The theories connected with them are, however, too wide to admit of discussion here.

Reinforced Concrete.—The theory of bending has, however, laid the foundations for a practice which has now become general, that of reinforcing concrete with metal bars. Considering a beam in equilibrium under the action a force, if the beam rest upon two supports, the upper fibres of the beam are being compressed, while the lower fibres are in tension. Many structures are in states of tension and compression. Now concrete has high compressive resistance but little or no resistance to tension. The object of using metal reinforcements in concrete structures is to increase the tensile resistance of a structure. In the case of the beam mentioned the reinforcements would be about the lower force.

Strengths of Various Materials:—

Material.	Ultimate Strength in tons per sq. inch.			Working Stress in tons per sq. inch.		
	Tension.	Compression.	Shearing.	Tension.	Compression.	Shearing.
Steel	45	70	30	9	9	5
Cast-iron	7½	48	14	1½	9	3
Wrought-iron	25	17	20	5	3½	4
Oak	6½	3½	1	1	½	⅛
Teak	6½	5	—	1	1	—
Brick in cement	¼	½ to ⅞	—	50 to 180 lb.		
Concrete (1 part sand to 1 cement).	8478 lb.					

STREPSILA, Turnstones; see under Plover Family.

STREPTOCOCCUS, see Parasitic Diseases.

STRESA (45° 50′ N., 8° 34′ E.), village, on Lago Maggiore, N. Italy.

STRICTURE, contraction of a tube, *e.g.* urethra, intestine, gullet; usually result of former ulceration; may be due to a growth in the passage wall.

STRIEGAU (50° 58′ N., 16° 22′ E.), town, Silesia, Prussia; cigar factories. Pop. (1910) 14,574.

STRIGIDÆ, Barn Owls; see under Owls.

STRIKES AND LOCK-OUTS, see Labour (Labour Disputes).

STRINDBERG, AUGUST (1849–1912), Swed. author; b. Stockholm. His *Röda rummet* ('The Red Room'), an exposure of the hardships of journalistic life, roused a torrent of indignation. *Giftas* ('Married'—1884) was the commencement of a prolonged attack on the feminist movement.

STRINGED INSTRUMENTS, a large number of instruments producing sound from stretched strings of gut, wire, etc., in various ways, such as: (1) striking with hammers, *e.g.* piano, dulcimer; (2) plucking with fingers or plectrum, *e.g.* harp, mandoline, guitar; (3) friction of bow, *e.g.* violin, viola, 'cello, double-bass; (4) by current of air, *e.g.* Æolian harp. The term stringed instruments or 'strings' is often restricted to those under (3).

STRINGOPS, Owl Parrot; see under Parrot Tribe.

STRODE, WILLIAM (1598–1645), Eng. politician; M.P. from 1624 onwards; conspicuous member of opposition in struggle between king and Parliament; one of five impeached members, 1642.

STROMATOPOROIDS, see under Hydromedusæ.

STROMBOLI, see Volcanoes.

STROMBUS, a mollusc; see under Gasteropoda.

STROMNESS (58° 57′ N., 3° 17′ W.), seaport, W. coast of Pomona, Orkney Islands, Scotland.

STRONGBOW, see Pembroke, Earldom of.

STRONTIUM (Sr=87·63), alkaline earth metal occurring in strontianite ($SrCO_3$) and celestine ($SrSO_4$); crystalline, silvery, tarnishes, decomposes water; divalent. Compounds: SrO, $Sr(OH)_2$ (strong base), $SrCl_2$, SrS (phosphorescent), $SrSO_4$ (insoluble), $SrCO_3$, $Sr(NO_3)_2$ used for red fire.

STROPHANTHUS, genus of plants, of natural order *Apocynaceæ*, growing chiefly in equatorial Africa and in Farther India. The dried seed of a species, *S. kombé*, is employed as a drug. The chief constituent of the seed is a glucoside, strophanthine. An extract and tincture of the seeds are used medicinally to stimulate and regulate the heart, especially in mitral disease.

STROSSMAYER, JOSEPH GEORGE (1815–1905), Croatian prelate; bp. of Djakovo, 1849; leader of Slavonic national movement against Hungarian influence.

STROUD (51° 15′ N., 2° 13′ W.), town, Gloucestershire, England; cloth manufacturing centre. Pop. (1911) 8772.

STRUCTURES.—Without attempting a scientific discussion this article will touch lightly upon the general principles of structural engineering and the more important discoveries of the day. During the last 50 years the use of concrete with and without reinforcements and the development of steel for bridge work and roofs have rendered possible schemes that were previously impossible. Concrete has almost superseded masonry work in the construction of large works, docks, breakwaters, large buildings, arches, etc. Its advantages include economy, rapidity and ease of construction, and strength. Steel bridges and girders are now in constant use throughout the world, combining strength, economy, good appearance, and lightness. The large ironworks and bridge-building firms standardise their productions, rendering the bridging of obstacles a mere matter of specification. The scientific investigation of the phenomena connected with earth and water press has evolved a complete scheme for the foundations of buildings, bridges, etc.

Theory of Structures.—There are two general types of structures: (1) framed structures the members of which are subject to tension and compression only; (2) structures the members of which are subject to bending stresses as well. The various parts which go to form a structure are called pieces or members; such are the stones of an arch or the girders of a bridge.

Design of Structures.—The first consideration in the design of a structure is the loads that the structure has to carry. These are standardised in any engineering text-book. Loads, speaking generally, are of two kinds—dead loads and what are known as live loads. Dead loads are those which are constantly imposed on a structure, such as its weight. Live loads are the traffic which a structure is designed to carry, or wind-pressure. Proceeding, then, the type of the structure must then be determined, the selection varying with the nature of the work, loads, site, economy, and other details. Having assumed, then, the type of structure and the loading, the stresses in the members are obtained by Graphic Statics combined with mathematical calculation. The stresses are of two kinds—stresses due to dead load and those due to live load. With regard to the stresses due to live load it is usual to allow for impact, or sudden application of a load,

such as the rolling of a train upon a bridge or gusts of wind upon a roof.

Impact or sudden loading increases the stresses produced in any member, and as the result of experiment and experience well-established coefficients or factors are used to determine the stress due to sudden loading from the stresses due to live load. This factor, called an 'impact' factor, varies in value from ½ to 1. The product of it with the ordinary stress due to live load represents the increment of stress due to sudden loading. The sum of this increment and the stress due to dead and live load give the total stress for which the member must be designed.

Concrete and Reinforced Concrete.—All masonry and concrete structures are capable of withstanding great compressive stresses, but have a low tensile resistance. The object of reinforcing concrete with steel or iron bars is to increase the tensile strength of structures. Without the use of reinforced concrete the giant buildings and sky-scrapers of America would have been impossible. The usual method adopted is the formation of a steel frame composed of girders and columns. These are encased in concrete, thereby combining preservation of the steel with strength, economy, and lightness. Upon this frame the walls are built. The whole building, in comparison with its size, is wonderfully light. See also STRENGTH OF MATERIALS.

Rankine, *Manual of Civil Engineering*; Warren, *Engineering Construction*; Goodman, *Applied Mechanics*; Husband and Harby, *Structural Engineering*; Andrew, *Design of Structures*; Rivington, *Building Construction*.

STRUENSEE, JOHAN FREDERICK, COUNT (1737-72), Dan. economist, philosopher, and statesman; b. Halle, Saxony; app. private physician to King Christian VII. of Denmark, and gained great authority at court. By an intrigue with the queen he had the king removed from active rule and became Prime Minister. The crown prince and the dowager queen headed an opposition party. In 1772 this party secured from the king a warrant for the arrest of the queen and her minister; S. was executed.

STRUTHIO, OSTRICH; see under RUNNING BIRDS.

STRUTT, JEDEDIAH (1726–97), Brit. inventor; b. S. Normanton, Derbyshire; invented Strutt's Derby ribbing machine (for the manufacture of stockings); helped Arkwright in his invention and became a partner in the first cotton-mill; invented a species of calico made entirely from cotton.

STRUVE, FRIEDRICH GEORG WILHELM (1793–1864), Ger. astronomer; director of Dorpat observatory, 1817; of observatory at Pulkova, near St. Petersburg, 1839, where he continued his work on nebulæ and double stars.

STRYCHNINE ($C_{21}H_{22}N_2O_2$), an alkaloid obtained from dried seeds of nux vomica and other species of *strychnos*, in colourless, odourless, extremely bitter, minute prisms; employed medicinally in very small doses ($\frac{1}{30}$ to $\frac{1}{15}$ gr.), as a stomachic and tonic, and as a stimulant for the heart. In poisonous doses it causes violent convulsions, asphyxia, and death.

STRYPE, JOHN (1643–1737), Eng. Church historian; rector of Low Leyton, Essex; studied history of Reformation, and produced many monuments of learning, *Ecclesiastical Memorials* being chief.

STUART, JAMES EWELL BROWN (1833–64), Amer. general; confederate in Civil War; distinguished in Shenandoah Valley, Maryland, and Gettysburg campaigns; present at *Bull Run* (first and second), *Fredericksburg*, *Chancellorsville*, *Brandy Station*; defeated and killed at *Yellow Tavern*.

STUART, LADY ARABELLA (1575–1615), dau. of Lord Lennox and cousin of James I. of England; was imprisoned by king in 1610 for marrying William Seymour without royal consent; afterwards escaped, but was recaptured and imprisoned for life in Tower.

STUART, SIR JOHN, COUNT OF MAIDA (1759–1815), Eng. general; served in America, Low Countries, France, Portugal; defeated French at *Maida*, 1806.

STUBBS, WILLIAM (1825–1901), Eng. bp. and historian; b. Knaresborough; ed. Christchurch, Oxford; librarian to abp. of Canterbury at Lambeth, 1862; regius prof. of Modern History, Oxford, 1866–84; bp. of Chester, 1884, of Oxford, 1889; wrote standard *Constitutional History of England*, etc.

STUCCO, mixture of plaster of paris and size; used for decorating walls.

STUCK, FRANZ (1863–), Ger. painter; one of the leaders of the Secessionist school.

STUCLEY, THOMAS, STUKELY (*c.* 1525–78), Eng. privateer; 3rd s. of Sir Hugh S. of Devonshire; imprisoned in Tower, 1553; turned privateer, 1563–65; employed in Ireland, but ultimately fled to Spain; commanded three vessels at *Lepanto*, 1571, and was killed fighting for Sebastian of Portugal at *Alcazar* in Morocco; hero of many ballads and plays.

STUPAS, see ARCHITECTURE, INDIAN.

STURDZA, ALEXANDER, STURZA (1791–1854), Russ. diplomat and writer.—DIMITRIE (1833–), Rumanian politician; opposed Cuza; premier four times.—JOHN (d. 1828), prince of Moldavia; reformed education.—MIKHAIL (1795–1884), prince of Moldavia; carried out industrial and educational reforms.

STURE, STEN (d. 1503), regent of Sweden, 1470–97, 1501–3; defeated Danes under Christian I. at *Brunkeberg*, 1471. STEN (*c.* 1492–1520), regent of Sweden, 1512–20; defeated Danes at *Vedla* and *Brenkyrka*; d. from wounds received at *Bogesund*. SVANTE (*c.* 1452–1512), regent of Sweden; warred against Danes.

STURGEONS (*Acipenseridæ*), a family of Chondrosteous Fishes, with rows of bony scutes, and a rounded, toothless mouth. About twenty species are found in the seas and freshwaters of sub-Arctic and temperate portions of the N. hemisphere. The roes or ovaries form caviare, and the inner layer of the swim-bladder is used as isinglass. The COMMON S. (*Acipenser sturio*) is occasionally found in Brit. seas and rivers.

STURM UND DRANG, see GERMAN EMPIRE (LITERATURE).

STURNIDÆ, STARLINGS (*q.v.*).

STUTTGART (48° 46′ N., 9° 10′ E.), capital of kingdom of Württemberg (*q.v.*), Germany; has some old churches (Stiftskirche, Hospitalkirche, Marienkirche, etc.), and many fine modern buildings in Renaissance style; Königsbau, theatre, palace, museums, library, town hall, art academy, conservatoire of music, etc.; great publishing centre; also woollens, pianos, chemicals, furniture, artists' colours, etc. Pop. (1910) 286,218.

STUYVESANT, PETER (1592–1672), Dutch soldier; administrator of Dutch N. Amer. colonies, 1646; greatly furthered prosperity of New Amsterdam (now New York), which he had to surrender to British, 1664.

STYE, see EYE.

STYLASTER, see under HYDROMEDUSÆ.

STYLASTERINA, see under HYDROMEDUSÆ.

STYLE, OLD and NEW, see CALENDAR.

STYLITES, ST. SIMEON (V. cent.), Syrian monk who lived for 30 years on the 4 ft. square top of a 70 ft. pillar from which he preached.

STYRIA, STEIERMARK (47° N., 15° 20′ E.), duchy and crownland, Austria, divided into northern or Upper Styria and southern or Lower Styria; belongs to the Eastern Alps; traversed by Mur, Drave, and Enns; rich mineral deposits (iron, coal, copper); extensive forests; fertile mountain valleys; contains numerous mineral springs; manufactures iron and steel; population mostly German-speaking and R.C.; capital, Graz; became a duchy about 1180; united with Austria, 1192; passed to the Hapsburgs, 1282. Pop. (1910) 1,444,157.

STYROLENE, phenylethylene ($C_6H_5.CH:CH_2$), colourless liquid, B.P. 145° C.; distils when cinnamic acid is heated with lime: $C_6H_5.CH:CH.COOH = C_6H_5.CH:CH_2 + CO_2$. Resembles ethylene chemically.

STYX (classical myth.), river in lower world over which Charon ferried the souls of dead (*manes*); frequently used in poetry for Hades.

SUAKIM, Sawakin (19° 6′ N., 37° 23′ E.), seaport, on Red Sea, Egyptian Sudan; exports cotton, ivory. Pop. 11,000.

SUAREZ, FRANCISCO (1548–1617), Span. Jesuit theologian; upheld Scholasticism; wrote *Tractatus de legibus ac deo legislatore*, dealing with government, and *Defence of the Catholic Faith* against Anglicanism.

SUBARITES, see under Sponges.

SUBIACO (41° 56′ N., 13° 6′ E.) (ancient *Sublaqueum*), town, on Traverone, Rome, Italy; has an XI.-cent. castle and remains of one of Nero's villas; ironworks; in vicinity are two Benedictine abbeys, founded VI. cent. Pop. 7200.

SUBJECTIVE, adjective applied to introspective thoughts; opposed to **objective,** which refers to external things. Subjectivism limits the mind to consciousness of its own phenomena.

SUBLIMINAL SELF, a term used since the work of the late F. W. Myers. According to him, the conscious portion of our personality is only the smaller part of the whole. He would explain most so-called 'psychic' phenomena—telepathy, automatic writing, etc., as manifestations of the *subconscious* portion of the personality, that below the threshold (Lat. *limen*) of consciousness. Our ordinary consciousness was only able very imperfectly to express the greater whole; the 'spurts' of genius are uprushes of that which is submerged, and so are other abnormalities. Myers' theories are not by any means yet entirely accepted.

Myers' *Human Personality and its Survival of Bodily Death.*

SUBMARINE MINES, see Mines.

SUBMARINES, see under Ship.

SUCCESSION.—The power or right to an estate inherited from ancestors. In all cases the law of the descent of real property is governed by the Inheritance Act, 1833. Male issue is admitted before the female. Where two or more of the male issue are in equal degree of consanguinity to the person owning the estate, the eldest only shall inherit, but the females all together. A kinsman of half blood is capable of being heir, and such kinsman shall inherit next after a kinsman in the same degree of the whole blood, and after the issue of such kinsman, when the common ancestor is a male, and next after the common ancestor when such ancestor is a female. On a total failure of heirs, the estate shall descend (and descent must be traced) to the heir of the person last entitled to the land, as if he had been its purchaser (Law of Property Amendment Act, 1859). Succession to the crown of England is governed by similar laws of inheritance. But no Salic Law prevents female succession on the failure of male issue. Profession of the R.C. faith or marriage with a Rom. Catholic exclude from succession to the throne.

Succession Duty varies in amount from 1 % in case of a child succeeding to a parent, to 10 % in case of succession to a stranger in blood, upon real or personal property to which any person succeeds on death of another. Calculated on capitalised value for the life of the successor.

SUCCESSION, for Wars of Succession see under countries.

SUCCINIC ACID ($C_2H_4(COOH)_2$), crystals with an unpleasant taste; M.P. 185°, occurs in amber, lignite; produced by fermentation and in oxidation of fat.

SUCHET, LOUIS GABRIEL, Duc d'Albufera da Valencia (1770–1826), Fr. soldier; won chief fame in Spain, conquering Valencia, 1812; cr. peer by Louis XVIII., but rallied to Napoleon later; wrote *Mémoires.*

SU-CHOW, Soochow (31° 26′ N., 120° 31′ E.), city, Kiang-su, China; extensive silk manufactures. Pop. *c.* 475,000.

SUCKLING, SIR JOHN (1609–42), Eng. poet; b. Whitton, Middlesex; a great favourite in court circles, beloved for his wit and prodigality, but his attempt to enlist Fr. and Irish troops for a far-reaching plot in 1642 ruined his career. His fame now rests entirely on his ballads, such as the *Ballad upon a Wedding,* and his lyrics, such as *Why so pale and wan, fond lover?*

SUCRE, Chuquisaca (19° 3′ S., 64° 25′ W.), city, capital of Bolivia (since 1826), and of department Chuquisaca; contains cathedral (1553), university (1624), president's palace; founded in 1529. Pop. *c.* 25,000.

SUCROSE, see Sugar.

SUCTORIA, a sub-class of Infusoria (*q.v.*).

SUCZAWA (47° 40′ N., 26° 14′ E.), town, on Suczawa, Bukowina, Austria; manufactures leather. Pop. 11,550.

SUDAN, vast region in Africa with no strictly defined limits, but roughly extending S. from Egypt and Sahara, and from Atlantic in W. to Red Sea and Abyssinia on E.; includes Upper Senegal and Niger Colony (formerly embraced in Fr. Sudan), N. Nigeria, Bagirmi, Kanem, Wadai, and Anglo-Egyptian Sudan. There is a great diversity of physical features, but Sudan is chiefly an elevated region, mountainous in parts, with grassy, steppe-like plains and considerable forest-land; region is watered by several great rivers, including Senegal, Niger, and Nile; in centre is Lake Chad; climate is hot and in many parts very unhealthy.

Anglo-Egyptian Sudan, situated in Upper Nile valley, is bounded on N. by Egypt, on E. by Red Sea, Eritrea, and Abyssinia, on S. by Uganda Protectorate and Belgian Congo, and on W. by Fr. Congo; area, *c.*950,000 sq. miles; district is divided into Darfur and provinces of Halfa, Red Sea, Dongola, Berber, Khartum, Blue Nile, White Nile, Kassala, Sennar, Kordofan, Bahr-el-Ghazal, Upper Nile, and Mongalla; chief towns are Khartum (capital), on junction of White and Blue Niles; Omdurman, situated opposite capital; Halfa, Merowi, Berber, El Obeid, Suakin, Port Sudan, Kassala, and Damir. The coast along Red Sea has few good harbours and no deep indentations; beyond the sandy stretch lying along shores is mt. range running parallel to Red Sea and joining highlands of Abyssinia in S.; chief summits are Jebel Erba and Jebel Soturba; another elevated part is Darfur; in N. between the Red Sea and Nile is Nubian Desert, a bare, desolate tract with little vegetation; in the neighbourhood of Nile and its tributaries the soil is rich and fertile, and in some places thickly wooded; western section of Sudan consists chiefly of grassy plains, and the S. is a swampy, unhealthy district. Besides the Nile and its tributaries the most important rivers are Gash and Baraka. Among many wild animals are the lion, leopard, elephant, hippopotamus, giraffe, and antelope; snakes and birds of brilliant plumage are numerous; forests yield rubber, gum, and much valuable timber; iron, gold, copper, and lignite are produced. Inhabitants are mainly Egyptians, Arabs, and negro tribes, with a few Europeans. Pop. *c.* 2,750,000.

The Egyptian Conquest of Sudan began in Nubia, *c.* 1820, and gradually spread over surrounding districts; in 1874 Darfur was taken; some years later, revolts were crushed in Darfur and Kordofan by General Gordon, and in Bahr-el-Ghazal by Gessi; the Mahdi revolted *c.* 1882, and rapidly overpowered the Egyptian army, their first important victory being over Hicks Pasha's forces in 1885; Gordon was isolated in Khartum, and before assistance arrived he was killed, and the town captured (1885); the Mahdi died in same year, and was succeeded by the Kalifa, who ruled till 1898, when he was completely defeated at *Omdurman* by Anglo-Egyptian army under Kitchener. Sudan contains remains of many pyramids, temples, churches, monasteries, towns, and fortresses. By agreement signed in 1899 Anglo-Egyptian Sudan is under joint-management of Great Britain and Egypt; Gov.-Gen. is appointed by Egypt with assent of Britain; each province has a governor of its own; Darfur is controlled by its Sultan, but pays tribute; the Lado enclave was included in 1910. Anglo-Egyptian Sudan has over 1000 miles of railway; a line to El Obeid was opened in 1912.

Chief occupations are ostrich-farming, sheep-, goat-,

and camel-rearing, cultivation of cotton, durra, barley, wheat, and dates; exports include cotton, gum, rubber, ivory, ostrich feathers, and dates.

SUDBURY.—(1) (52° 2′ N., 0° 43′ E.) town, on Stour, Suffolk, England; manufactures matting. Pop. (1911) 7141. (2) (46° 30′ N., 80° 50′ W.) town, Nipissing district, Ontario, Canada; manufactures explosives. Pop. 4700.

SUDBURY, SIMON OF, bp. of London, 1361; abp. of Canterbury, 1375; Chancellor of England, 1380.

SUDD, SADD, mass of river weed obstructing navigation on White Nile; some are 20 ft. thick; removed by cutting; utilised as fuel.

SUDERMANN, HERMANN (1857–), Ger. dramatist and novelist; b. Matziken, E. Prussia; began life as journalist; among works are novels, *Frau Sorge* (1888), *Der Katzensteg* (1889), *Das Hohe Lied* (1908), and dramas *Die Ehre* (1890), *Sodoms Ende* (1891), *Heimat* (1892). Several of S.'s works have been trans. into English.

SUDORIFICS, DIAPHORETICS (*q.v.*).

SŪDRAS, see CASTE.

SUE, JOSEPH MARIE (EUGÈNE) (1804–57), famous Fr. writer; author of *Mysteries of Paris*, etc.

SUEBI, SUEVI, people who occupied large part of Germany in Rom. times. They lived E. of the Ubii and Sugambri, and W. of the Cherusci.

SUECA (39° 7′ N., 0° 15′ W.), town, on Jucar, Valencia, Spain. Pop. 15,000.

SUESSULA (41° N., 14° 20′ E.), ancient town, Samnium, Italy.

SUET, solid fat about kidneys of sheep and ox; pure s. is used in preparation of ointments.

SUETONIUS TRANQUILLUS, GAIUS, Rom. historian (fl. *c.* 75–160 A.D.); chief sec. of Hadrian, friend of younger Pliny; author of *Lives of the Cæsars*.

SUEZ (29° 56′ N., 32° 35′ E.) (ancient *Kolzum*), seaport, on Gulf of Suez, at S. terminus of Suez Canal, Egypt. Pop. 20,000.

Suez Canal.—Mediterranean and Red Sea have been linked by canal since very early times; Egyptians made canal from Nile *c.* 600 B.C.; Darius and Ptolemy followed. In modern times, Venetians in XVI. cent. and Napoleon projected canals; canal from Port Said to Suez eventually constructed by Ferdinand de Lesseps (*q.v.*) & Company, 1859–69; original cost, £20,000,000; enlargements since cost several millions more.

Canal is *c.* 100 miles long; cuts Isthmus of Suez; runs through Lakes Menzaleh, Ballah, Timsah, and Bitter Lakes; depth *c.* 31 ft., bed width *c.* 121 ft.; lit by electric light; time of passage, 16–24 hrs.; controlled by Council of 32 Administrators (ten British); British Government bought Khedive's shares for £4,000,000 (value since increased nearly tenfold); canal neutralised and blockade prohibited by international agreement, 1887–88; concession expires, 1968; 4533 vessels passed through in 1910, 63 % British, receipts being £5,348,000. Canal reopened ancient highway to East (blocked by Turk. capture of Constantinople, 1453); London to Bombay, *via* Suez, is half the distance *via* Cape of Good Hope.

SUFFOCATION, see CHOKING, ASPHYXIA.

SUFFOLK (52° 12′ N., 1° 3′ E.), coast county, E. England; bounded N. by Norfolk, E. by North Sea, S. by Essex, W. by Cambridgeshire; area, 1531 sq. miles; surface generally level or slightly undulating, with low ridge of hills in N.W.; drained by Stour, which forms S. boundary, Little Ouse and Waveney in N., Blythe, Alde, Orwell, and other streams; county town, Ipswich. County is chiefly of chalk formation; principal industry is agriculture; there are important fisheries on coast; malting is carried on; manufactures include railway plant, gun-cotton, bricks and tiles, chemical manures, agricultural implements. Suffolk has various traces of Roman occupation; suffered from invasions of Danes in early times. The county is divided for administrative purpose into E. and W. Suffolk. Pop. (1911) 320,141.

SUFFOLK, EARLDOM AND DUKEDOM OF.—Earldom held by Ufford family, XIV. cent., Pole family, XIV.–XVI. cent's, Howards, from 1603 onwards. Dukedom held by Poles, XV. cent., Brandons and Greys, XVI. cent.

SUFFOLK, 1ST DUKE OF, CHARLES BRANDON (*c.* 1484–1545), s. of William Brandon, standard-bearer of Earl of Richmond at Flodden; personal friend of Henry VIII.; cr. Viscount Lisle, 1513; handsome, accomplished soldier; risked king's wrath by marrying his sister, dowager queen of France, 1515; ardently supported Henry VIII. in matter of divorce.

SUFFOLK, 1ST EARL OF, THOMAS HOWARD (1561–1626), fought against Span. Armada; admiral, 1599; cr. Lord Howard de Walden, 1597; Lord Chamberlain, 1603–14, Lord Treasurer, 1614–18; embezzlements discovered brought about fall; dau. Frances m. Robert Carr, Earl of Somerset; s. Edward cr. Lord Howard of Escrick, 1628.

SUFFOLK, WILLIAM DE LA POLE, DUKE OF (1396–1450), distinguished in Fr. wars: captured by Joan of Arc, 1429; deputy of Henry VI. for marriage with Margaret of Anjou; cr. marquess, 1444; unpopular in country as promoter of Fr. alliance, accused in later times of *liaison* with queen; enemies secured his banishment, 1450; murdered on way to France.

SUFFREN SAINT TROPEZ, PIERRE ANDRÉ DE (1729–88), Fr. admiral, of noble Provençal family; distinguished as naval officer in Seven Years War, and did good service against Moors as knight of Malta, becoming commander of order; sailed under Estaing to aid of Amer. colonies, 1778; sent as commander to Cape, 1781; defeated Eng. force sent to attack it; won great fame by capture of Trincomalee, 1782, and various brilliant attacks on Sir Edward Hughes' fleet, 1782–83.

SUFIISM, Arab. term for Muhammadan mysticism, appeared in VIII. cent. A.D., but there was a quietistic or mystical element in Islam from the beginning. With its insistence on material conquest and its bare, rigid dogmatism, the personal and devotional side of religion fell into abeyance. The effort to restore it was due to Christian influences from Syrian monasteries, to Buddhism, and to later Gk. Neoplatonic thought from Alexandria. S., systematised in IX. cent., still exists. Sufis somewhat resemble Christian monks; from them the Dervishes developed.

SUGAR is the general name given in chemistry to a class of crystallisable, optically active carbohydrates, occurring in solution in plant juices and animal secretions. The chief s's are classified as *monoses* ($C_6H_{12}O_6$) and *bioses* ($C_{12}H_{22}O_{11}$).

MONOSES are open-chain poly-hydroxyaldehydes—(*aldoses*) or ketones (*ketoses*), *e.g.*—

$CH_2OH.CHOH.CHOH.CHOH.CHOH.CH:O$
Aldose (=*dextrose*).

$CH_2OH.CHOH.CHOH.CHOH.CO.CH_2OH$
Ketose (=*levulose*).

Glucose, dextrose, or grape s. ($CH_2OH.(CHOH)_4.CH:O$) crystallises with 1 molecule of water, M.P. 86°, and anhydrous, M.P. 146°; occurs in grapes, and with *fructose* (levulose) in fruit juices, roots and leaves of plants, and honey; easily soluble in water, almost insoluble in alcohol; not so sweet as cane s.; scarcely darkened by warm sulphuric acid, but turned brown by hot, strong, caustic alkali (difference from cane s.); reduces gold, silver, and alkaline cupric (*Fehling*) solutions; fermented by yeast, etc., at 20° to 30°, yielding, besides alcohol and carbon dioxide, small quantities of glycerol and succinic acid; yields an acetyl derivative, $C_3H_6(OCOCH_3)_5.CHO$; may be reduced to sorbitol $CH_2OH.(CHOH)_4.CH_2OH$, and oxidised to saccharic acid $COOH.(CHOH)_4.COOH$; gives an osazone $CH_2OH.(CHOH)_3.C.CH:N.NHC_6H_5$ / $N.NHC_6H_5$, identical with that of levulose.

Fructose, levulose, or fruit s. ($CH_2OH.(CHOH)_3.CO.CH_2OH$) crystallises anhydrous, M.P. 95°; occurs with glucose in fruit juices and honey, and in invert s.; separated from glucose by means of its sparingly soluble compound with slaked lime; ferments less rapidly than glucose; reducing power similar.

Invert sugar is an equimolecular mixture of dextrose and levulose formed by the hydrolysis of sucrose. It is levorotatory (*i.e.* rotating the plane of polarisation to the left), and owes its name to the inversion of activity of dextrorotatory (*i.e.* rotating plane of polarisation to right) sucrose which takes place in its formation.

Commercial glucose is a solid or syrup prepared by the hydrolysis of starch: $(C_6H_{10}O_5)_n+nH_2O=nC_6H_{12}O_6$; besides dextrose it contains maltose, dextrin, etc.

Bioses.—*Sucrose* (cane sugar): s. was known in early times, but did not come into general use till the XVI. cent. It occurs with other s's in many plants, and is obtained from the s.-cane, the s.-beet, the s.-maple, or the date-palm; nearly all the s. of commerce is cane or beet s. *Cane sugar*: the s.-cane is cultivated in warm, moist climates, *e.g.* the U.S., W. Indies, Philippines, Australia. S.-cane juice contains about 18 % of sucrose. To obtain s. the stripped cane is crushed between revolving rollers, and the juice is strained. Organic acids and nitrogenous substances are neutralised and removed by adding lime, heating with a steam coil, and separating the scum (*defecation*). Excess of lime is removed by carbon dioxide, and the purified juice is evaporated in vacuum pans until crystals separate. After cooling in storage tanks, the crystals are separated from the mother liquor (*molasses*) by centrifugal machines. They are light brown, and contain 95 to 97 % of sucrose. The molasses, which contain 45 to 50 % of sucrose, are further purified and concentrated, yielding another crop of s. The remaining molasses are used for making rum, feeding cattle, or for fuel. Crude s. is refined by being dissolved in water in large tanks heated with steam coils. Gums, organic acids, etc., are removed by defecation and filtration through cotton cloth. The straw-coloured filtrate is decolorised with animal charcoal (bone black), and from the colourless liquor white s. is crystallised by evaporation *in vacuo*. The crystals are dried in hot tubes, and the different sizes separated by sifting. *Loaf* s. is made by running the magma of crystals and syrup into conical moulds, and afterwards draining off the uncrystallised syrup.

Beet sugar was discovered by Marggraf in 1747, and first manufactured in 1769. This industry exists in many continental countries, and is being commenced in England. The roots are cleansed and thinly sliced, and the s. is extracted either by water through dialysis at 60° C., in a series of cylinders (diffusion process), or by maceration with successive quantities of water. In the former process the crystallisable s. diffuses through the cell walls, leaving colloidal substances behind. The liquor is defecated, and otherwise treated as in the manufacture of cane s. From the mother liquor much of the remaining s. is obtained by forming and separating the sparingly soluble strontium saccharate, which is then decomposed by carbon dioxide. Beet s. is identical in chemical composition and properties with cane s. About 16 million tons of s. are now made annually.

Sucrose crystallises in monoclinic prisms, well seen in s. candy. It is very soluble in water, sparingly so in alcohol; melts at 160° to 161°, forming barley s., which slowly crystallises; about 200° forms caramel or burnt s., used for colouring purposes; quickly charred by concentrated sulphuric acid; does not reduce Fehling solution.—*Milk sugar, lactose* ($C_{12}H_{22}O_{11}$, H_2O), occurs in the milk of mammals (about 4 %); much less sweet than cane s.; reduces Fehling solution slowly; readily undergoes lactic fermentation; hydrolysed by dilute acid.—*Malt sugar, maltose* ($C_{12}H_{22}O_{11}$, H_2O), produced by the action of diastase on starch during germination of cereals (as in malting), and by the action of malt extract on starch paste at 60° C.; reduces Fehling solution; readily undergoes alcoholic fermentation (brewing); hydrolysed by dilute sulphuric acid, producing only glucose.

Constitution and Synthesis of Sugars.—The constitutions of glucose and fructose were established by Kiliani, by means of the cyanhydrin reaction:

$$>C=O+HCN=>C\begin{matrix}OH\\CN\end{matrix}$$, followed by hydrolysis:

$$>C\begin{matrix}OH\\CN\end{matrix}+2H_2O=>C\begin{matrix}OH\\COOH\end{matrix}+NH_3.$$

The resulting carboxylic acids when reduced yielded different products, thus:—

$$\underset{\text{Glucose.}}{CH_2OH.(CHOH)_4.CH:O}\longrightarrow CH_2OH.(CHOH)_4.CH\begin{matrix}OH\\COOH\end{matrix}\longrightarrow \underset{\textit{n}\text{. Heptylic acid.}}{CH_3.(CH_2)_4.CH_2.COOH}$$

$$\underset{\text{Fructose.}}{CH_2OH.(CHOH)_3.CO.CH_2OH}\longrightarrow CH_2OH.(CHOH)_3.C(OH)\begin{matrix}CH_2OH\\COOH\end{matrix}\longrightarrow \underset{\text{Methylbutylacetic acid.}}{CH_3.(CH_2)_3.CH(CH_3).COOH}$$

The synthesis of numerous s's by E. Fischer forms a brilliant chapter in organic research. His first synthetic s., α-Acrose, resulted from the following reaction:—

$$\underset{\text{Glycerose.}}{CH_2OH.CHOH.CH:O}+\underset{\text{Dihydroxyacetone.}}{CH_2OH.CO.CH_2OH}=\underset{\textit{a}\text{-Acrose (=inactive fructose).}}{CH_2OH.CHOH.CHOH.CHOH.CO.CH_2OH}$$

SUGGESTION, the communication from without to a mind by which it is uncritically accepted and acted upon of a belief, doubt, expectation, command, or the like. A person who readily accepts what is suggested is said to be in a 'suggestible' state. M'Dougall enumerates four conditions of unusual suggestibility: (1) abnormal states of the brain, as in hypnosis or fatigue; (2) deficiency of knowledge which might oppose the suggested thought—compare the credulity of children; (3) impressiveness of the source of the suggestion; (4) individual peculiarities. The term is also used more widely; *e.g.* when the spectator of dancing unreflectively moves rhythmically, his movements are said to be 'suggested' by what he sees.

SUHL (50° 37′ N., 10° 41′ E.), town, Pruss. Saxony; manufactures firearms. Pop. 14,465.

SUICIDE, self-murder; in former times a suicide was buried at cross-roads, with a stake through his breast, and his property forfeited to the Crown. The latter penalty was abolished many years ago; the former in 1823.

SUIDUN (44° N., 81° 20′ E.), town, capital, province Kulja, China.

SUITE, an old musical form, brought to perfection by Bach and Handel. The name is French, and means a succession or series of pieces. Usually the s. is composed of several dance movements written in the same key.

SUJBULAH, see Saujbulagh.

SUKHUM-KALE (42° 59′ N., 41° E.) (ancient *Dioskurias*), seaport, on Black Sea, Kutais, Russ. Caucasia; exports grain. Pop. 17,000.

SUKKUR, Sakhar (27° 42′ N., 68° 54′ E.), town, on Indus, Sindh, Bombay, India. Pop. 34,000.

SULA, a genus of birds, see Gannets.

SULA ISLANDS, Xulla (1° 40′ S., 125° E.), group, Dutch E. Indies; chief islands are Taliabo, Mangola, and Besi.

SULCI (39° 55′ N., 9° 40′ E.), ancient city, on E. coast of Sardinia.

SULEIMAN I., SOLIMAN (1494–1566), sultan of Turkey; called the Magnificent; conquests made Turkey great realm; played prominent part in Europe; reorganised law courts; enlightened ruler.

SULEIMANIEH, SULEMANIA (35° 35′ N., 45° 26′ E.), town, capital, sanjak Suleimanieh, Asiatic Turkey. Pop. 14,000.

SULIDÆ, GANNETS (*q.v.*).

SULIMAN MOUNTAINS (32° N., 70° E.), range of mountains, on borders of Afghanistan and N.W. India; highest point, Takht-i-Suliman, 11,000 ft.

SULINA (45° 12′ N., 29° 41′ E.), town, at mouth of Sulina, branch of Danube, Rumania. Pop. 5800.

SULITELMA (67° 25′ N., 16° 20′ E.), mountain, Norway; highest point, 6155 ft.

SULLA, LUCIUS CORNELIUS, 'FELIX' (138–78 B.C.), Rom. dictator; showed great military qualities in wars against Jugurtha, 107, Teutones and Cimbri, 104–101; consul, 88; reduced Mithradates to submission, 87–84; found himself proscribed by Marian party in Senate and retained army; defeated younger Marius at Prænesto, 82; won battle of Colline Gate and entered Rome; as dictator carried out wide proscriptions and confiscations; made Senate supreme, limiting power of tribunes.

SULLIVAN, SIR ARTHUR SEYMOUR (1842–1900), Eng. composer; studied in London and Leipzig; became director of the National Training School for Music, London, 1876. He wrote overtures and incidental music for several of Shakespeare's plays; works for orchestra; popular songs, including *The Lost Chord*; three oratorios and three cantatas, one of which, *The Golden Legend*, is frequently performed; and a grand opera, *Ivanhoe*. His name is, however, chiefly associated with the long series of comic operas, written mostly to libretti by Gilbert, and of which *H.M.S. Pinafore*, *The Pirates of Penzance*, *The Mikado*, *The Gondoliers*, and *The Yeomen of the Guard* are the best known.

SULLIVAN, JOHN (1740–95), Amer. soldier; commanded in War of Independence and received thanks of Congress, 1779; pres. of New Hampshire, 1786–89; judge, 1789–95.

SULLY, DUC DE, MAXIMILIEN DE BÉTHUNE (1560–1641), Fr. statesman; succ. father as Baron de Rosny, 1575; Huguenot; wounded, fighting for Henry of Navarre at Ivry, 1590; became superintendent of finances, fortifications, etc., after Henry's accession; abolished farming-out of taxes and export duties on corn and wine; built roads and canals, and commenced construction of great frontier fortresses; marshal of France, 1634.

SULLY-PRUDHOMME, RENÉ FRANÇOIS ARMAND PRUDHOMME (1839–1907), Fr. poet; first amongst Parnassiens, but after a time adopted other methods, and expounded nature, duty, and destiny of man. *Stances et Poèmes* (1865), *Les Epreuves* (1866), *Les Solitudes* (1869), *Les Destins* (1872), and *Le Bonheur* (1888) are his chief volumes of poems; great gift of melody recalls Musset.

SULMONA, SOLMONA (ancient *Sulmo*) (42° 3′ N. 13° 55′ E.), town, on Gizzio, Aquila, Italy; manufactures paper; was a city of the Peligni; birthplace of Ovid. Pop. 14,500.

SULPHONIC ACIDS are stable, monobasic acids derived from sulphuric acid through the replacement of one OH group by an element or compound radicle; *e.g.* ethyl-sulphonic acid $=C_2H_5.SO_2.OH$, phenyl- or benzeno-sulphonic acid $=C_6H_5.SO_2.OH$.

SULPHUR (S=32·07), non-metallic element; called *brimstone*=burning stone; thought by alchemists to be the principle of combustibility; occurs uncombined in volcanic districts, and combined with oxygen or hydrogen in volcanic gases; also as sulphides, *e.g.* iron pyrites FeS_2, copper pyrites $CuFeS_2$, galena PbS, cinnabar HgS; and sulphates, *e.g.* gypsum $CaSO_4+2H_2O$, Epsom salts $MgSO_4+7H_2O$.

S. is found chiefly in Sicily, and is obtained from the stony material with which it is mixed by heating in a furnace. Some burns, but most of it melts and runs away. It is purified by distillation. Condensation of vapour below 110° yields *flowers of s.* (*s. snow*); above, liquid s., which is cast in moulds. Also obtained from coal, as a by-product in manufacture of coal-gas, and recovered from the calcium sulphide which forms alkali-makers' waste.

PROPERTIES: s. shows allotropy. *Rhombic octahedra*, M.P. 114°·5, S.G. 2·05–2·07, form at atmospheric temperature from state of vapour, fusion, or solution in carbon disulphide. *Monoclinic prisms*, M.P. 119°, S.G. 1·96, crystallise from fusion at 96° or above. Prismatic crystals, kept at atmospheric temperature, break down internally to the more stable octahedral form. *Amorphous s.* is precipitated from polysulphide solution by acid. *Plastic s.*, amorphous but unstable, is formed by dropping molten s. near its B.P. into cold water. S. melts to a yellow, mobile liquid, which at 160° grows darker and thicker, till at 260° it is dark red and very viscous; above 260° it becomes more mobile, and boils at 448°·5, forming an orange vapour which contains S_8 molecules and simpler forms. S. burns in air with a blue flame, forming s. dioxide gas.

SULPHURIC ACID, OIL OF VITRIOL (H_2SO_4).—The most important acid is a colourless, oily liquid; S.G. 1·84; crystallises at 10°·5; dissociates partially when heated into SO_3+H_2O, but boils at 338°, yielding distillate containing 98·5 % H_2SO_4; very hygroscopic and corrosive; employed in many manufactures.

S. a. was originally prepared by heating green vitriol: $4FeSO_4+O_2=2Fe_2S_2O_9$; $Fe_2S_2O_9+2H_2O=Fe_2O_3+2H_2SO_4$.

Two processes of manufacture are now in use: (i.) lead chamber process (England); (ii.) contact process (Germany).

Lead chamber process.—Sulphur dioxide, obtained by roasting iron pyrites in special burners, reacts with nitric acid vapour, formed by decomposing Chili saltpetre with sulphuric acid in nitre pots, and afterwards with nitrous fumes and steam in leaden chambers.

Probable reactions:—

$$\left.\begin{aligned} 4FeS_2+11O_2&=2Fe_2O_3+8SO_2\\ 3SO_2+2HNO_3+2H_2O&=3H_2SO_4+2NO\\ 2NO+O_2&=2NO_2\\ SO_2+NO_2+H_2O&=H_2SO_4+NO \end{aligned}\right\}$$

Nitric oxide (NO) is oxidised by air to NO_2, and is again reduced; thus it serves as an oxygen carrier to oxidise SO_2 catalytically in presence of water.

The chamber acid reaches a concentration of 62 to 70 %, and is further concentrated in glass or platinum.

Contact process.—Sulphur dioxide and oxygen unite to form sulphur trioxide in presence of hot platinised asbestos (catalysis). The product dissolves in water yielding sulphuric acid ($2SO_2+O_2+2H_2O=2H_2SO_4$), now manufactured on a large scale by this means.

SULPICIUS, RUFUS PUBLIUS (c. 124–88 B.C.), Rom. statesman; tribune, 88; with Marians led opposition to Sulla; put to death after Sulla's march on Rome.

SULTANPUR (26° 16′ N., 82° 7′ E.), town, capital, Sultanpur district, United Provinces, Brit. India. Pop. 10,000; (district) 1,090,000.

SUMACH (*Rhus*), genus of trees and shrubs, order Anacardiaceæ; Sicilian S. (*R. coriaria*), yields *sumac* or *shumac*, used in tanning and dyeing.

SUMATRA (5° 40′ N. to 6° S., 95° 30′ to 106° E.), great island of Malay Archipelago, belonging to Holland; separated from Malay Peninsula by Strait of Malacca, and from Java by Sunda Strait; area, 161,612 sq. miles; surface is crossed by a line of volcanic mountains running lengthwise along S.W., and reaching heights of from 11,000 to 12,000 ft., the highest point being Mt. Korinchi; from these mountains the greater part of the N.E. undulates rapidly down to marshy and sandy plains; watered

by Palembang, Jambi, Indragiri, and other streams; principal ports, Padang, Palembang, Benkulen, Achin; there are many small islands off the coasts. Climate is hot, but healthy, except in the lower districts; rainfall heavy; average temperature in low ground, 80° F.

S. was reached by Marco Polo, 1292. It was settled early in the XVI. cent. by the Portuguese, and in the following century settlements were made by the Dutch and later the English. In 1824 the English settlements were ceded to the Dutch; and the Dutch victory over Achin in 1874 brought the whole island to the possession of Holland, although native risings continued to occur from time to time. Administered by a governor. S. has dense forests of teak, oak, and other timber trees; produces rice, maize, sugar, coffee, pepper, millet, sago, cocoa-nuts, tobacco, betel, guttapercha, ginger, gums; minerals include coal, gold, petroleum, tin, iron, salt, sulphur. Pop. (1905) 3,447,328.

SUMBA, CHENDANA, SANDALWOOD (10° S., 120° E.), one of Lesser Sunda Islands, Dutch E. Indies; edible birds' nests. Pop. *c.* 220,000. Chief town, Waingapu.

SUMBAWA (8° 30′ S., 118° E), one of Sunda Islands, Dutch E. Indies; mountainous, volcanic, fertile; comprises states of Sumbawa, Dompo, Sangar, and Bima; exports rice, horses. Pop. *c.* 85,000.

SUMBUL, drug consisting of dried slices of the fibrous root of a plant, *ferula sumbul*, of natural order *umbelliferæ*, growing chiefly in Asiatic Russia; has a musk-like odour and bitter taste, the chief constituents being a volatile oil and two resins; employed as a stimulant for the stomach and intestines, and in hysteria.

SUMMARY JURISDICTION is the jurisdiction of a court to give judgment summarily, a court that consists of justices of the peace or magistrates empowered to deal with various offences and complaints without the intervention of a jury. It can commit to prison for contempt, punish malpractice in a solicitor, and deal generally with petty misdemeanours or infractions of police rules. It can also deal with affiliation cases and bastardy proceedings, grant matrimonial separation orders, and orders between employers and employees. Youthful and juvenile offenders must be tried summarily. The highest penalty that can be inflicted under summary jurisdiction is three months' imprisonment or a fine of £20.

SUMMIT (40° 47′ N., 74° 19′ W.), city, Union County, New Jersey, U.S.A.; residential suburb of New York; silk industry. Pop. (1910) 7500.

SUMMONS.—A justice of the peace, a stipendiary magistrate, or a metropolitan police magistrate, has the power to grant a s. on information being laid before him, or on complaint being made to him. On the issue and delivery of the s. the person named therein must appear at a certain time and place to answer the charge stated in the s. On failure to appear a warrant may be issued for arrest.

SUMMUM BONUM.—The highest good: that which has greatest worth. See ETHICS.

SUMNER, CHARLES (1811–74), Amer. statesman; as lawyer acquired legal knowledge then considered unequalled; Boston speech, 1845, on 'The True Grandeur of Nations' first established his fame as orator; devoted himself, with Horace Mann, to social reform and abolition of slavery; Free Soil member of Senate, 1851, and by vehement speeches largely responsible for Civil War; murderously attacked by southerner, 1856; chairman of committee on foreign relations, 1861–71; insisted on emancipation after war; became fanatical as time went on, and at last health was broken by political controversy.

SUMNER, CHARLES RICHARD (1790–1874), bp. of Llandaff, 1826, Winchester, 1827–69.

SUMNER, EDWIN VOSE (1797–1863), Amer. general, distinguished in Civil War.

SUMNER, JOHN BIRD (1780–1862), bp. of Chester, 1828; abp. of Canterbury, 1848.

SUMNER, WILLIAM GRAHAM (1840–1910), Episcopal clergyman in U.S.A.; prof. of Political Science, Yale, 1872; wrote economic works.

SUMPTUARY LAWS, enactments to check private extravagance.

Plato's *Republic* praises Lacedæmonian regulations enforcing simplicity of life; early Romans possessed Spartan frugality, but sumptuary laws became necessary by close of III. cent. B.C.; mediæval kingdoms limited expense in dress, food, retinue, etc., first important Eng. laws being passed, 1336 and 1363; disused in XVI. cent.; statute of Livery and Maintenance passed by Henry VII. with political purpose; later laws purely for purposes of revenue.

SUMTER (33° 55′ N., 80° 20′ W.), city, capital, Sumter County, S. Carolina, U.S.A.; cotton manufactures. Pop. (1910) 8109.

SUMTER, THOMAS (1736–1832), Amer. general of War of Independence; thanked by Congress, 1781.

SUMY (50° 53′ N., 34° 59′ E.), town, on Psiol, Kharkov, Little Russia; sugar refineries. Pop. 29,000.

SUN.—The sun may be regarded as a huge sphere 867,000 miles in diameter, surrounded by a brilliant layer of gases, and composed of materials on the average about 1·4 times heavier than water; but the temperature of the sun is so great that its constituents must be far above the 'critical temperature,' and so must be in the gaseous state. These gases are under enormous pressure, give a continuous spectrum, and have a sharp boundary. This portion of the sun is known as the *photosphere*, and when viewed through a telescope is seen to have a 'granular' structure; it shows at times depressions (*sun-spots*), which occur in greater numbers periodically, the period being 11 years; more rarely eruptive prominences are observed. Outside the photosphere there is the gaseous 'reversing layer' of the *chromosphere*, of average thickness about 5000 miles, and giving a bright line spectrum. Outside the chromosphere again is the gaseous envelope of the *corona*, extending to a great distance, and of very small density. Its spectrum shows, in addition to others, a brilliant green line of unknown origin.

Observations of the sun-spots show that the sun rotates in about 25 days, but the lower latitudes rotate faster than the higher. The continuous spectrum yielded by the photosphere is crossed by thousands of dark lines (*Fraunhofer lines*) due to absorption by the gases of the chromosphere. Comparison of these with the spectra of terrestrial substances has led to the identification of many elements in the sun. The lower layers of the chromosphere consist chiefly of metallic vapours, which give the so-called 'flash' spectrum of bright lines at total solar eclipses. Prominences are now observed by means of the *K* line of calcium, which element is present to a notable extent in the chromosphere. Quiescent prominences, consisting chiefly of hydrogen and helium, are of various forms and may reach an altitude of 70,000 miles. Eruptive prominences show metallic lines at their bases, and rush upwards at enormous speeds, sometimes to a height of 360,000 miles. Various theories have been advanced to account for the persistence of the sun's heat. It seems probable that in addition to the heat from contraction the energy of radioactive transformations plays an important part.

Sunshine.—Owing to the large variations in the intensity of the sun's light, due to such causes as mist or cloud, for recording purposes it is necessary to adopt an arbitrary definition of what is meant by bright s. The minimum standard usually taken is that which will produce scorching on certain specially prepared papers. The recording instruments are automatic, the sun's rays being either focused by means of a spherical crown-glass lens on to a strip of paper inside portion of a hemisphere (as in the *Campbell Stokes recorder*), or admitted through a small hole and allowed to trace a line on sensitised paper carried on a revolving drum (as in the instrument used by the U.S. Weather Bureau).

Sunstroke, term applied to effect of sun's heat or

of artificial heat; is of three types: *heat exhaustion*, in which there is a feeble pulse and prostration; the patient should be put in a cool place, his clothing loosened, and stimulants may be necessary; *heat apoplexy*, or s. proper, in which the face is flushed, the breathing stertorous, the pulse bounding, and death may result sometimes suddenly; the patient should be douched with cold water and put in a cool room on light diet; and *thermic fever*, in which the temperature may rise to over 110° with rapid full pulse, pain in the limbs, nausea, and other signs of high fever; the onset is generally gradual; this form is the most dangerous; the temperature should be reduced by a cold bath or ice pack, and a mustard blister applied to the nape of the neck. A person once affected with s. should seek a cooler climate.

SUN ANIMALCULÆ, see HELIOZOA.

SUNBIRDS (*Nectariniidæ*), a family of small perching birds with a long, curved, compressed beak, and a moderately long tail. Their colours are bright, and in their grace they resemble Humming-Birds; found in Africa, S.E. Asia, and Australasia.

SUN-BITTERNS (*Eurypyga*), so called from their fondness for the warmth of the sun; two species of long-necked, slender-billed, marsh-loving birds, found only in Central and S. America.

SUNBURY (40° 50′ N., 76° 53′ W.), town, on Susquehanna, capital, Northumberland County, Pennsylvania, U.S.A.; manufactures silk. Pop. (1910) 13,770.

SUNBURY-ON-THAMES (51° 25′ N., 0° 24′ W.), village, on Thames, Middlesex, England. Pop. (1911) 4607.

SUNDA ISLANDS (8° S., 115° E.), collective name for group of islands, Malay Archipelago; divided into the Great S. (Borneo, Sumatra, Java, Celebes, etc.) and the Little S. (Bali, Lombok, Sumbawa, etc., E. to Timor).

SUNDAY.—By the S. Observance Act, 1677, on 'the Lord's Day, commonly called Sunday, no tradesman, artificers, workmen, labourers, or other person whatsoever shall do or exercise any worldly labour, business, or work of their ordinary callings, works of necessity and charity only excepted.' This Act is still in force, but can only be put into operation with the consent of chief officer of police, two justices of the peace, or stipendiary magistrate. Rent may be paid and cheques and promissory notes dated on a S., and arrests for crime made, but no other legal proceedings can be taken on that day. S. entertainments open to the public for money are forbidden by the S. Observance Act, 1781. Public houses of refreshment may only be opened within certain hours on S., except to travellers. In Scotland, and Wales, and where a 'six-day licence' only has been granted, entire S. closing is required.

Certain unrepealed statutes of Charles I. forbid boating and other sports on S., but these Acts are largely obsolete. By the Factory and Workshop Act of 1901 the S. employment of women, young persons, and children is forbidden, but exemption is granted to Jews. Bread may not be baked on S. by bakers, but it may be delivered till 1.30, and bakers' shops may be opened from 9 till 1 for the sale of bread and the baking of S. dinners. Law courts and public bodies cannot meet on S., and a contract made and completed on S. is void. Prisoners whose term of sentence expires on Sunday are discharged the previous day. In France the Civil Code contains no reference to S. observance, and, while customs vary, generally throughout the Continent in Catholic and Lutheran countries S. observance is regulated not by law but by public feeling and religious practice.

SUNDAY SCHOOLS, see under EDUCATION.

SUNDERBUNDS, SUNDARBANS (22° N., 89° E.), tract of swamps, jungle, and forest, in lower part of Ganges-Brahmaputra delta, India; intersected by a labyrinth of channels and creeks.

SUNDERLAND (54° 54′ N., 1° 23′ W.), seaport, mouth of Wear, Durham, England; large trade in coal; shipbuilding centre; includes, besides Sunderland proper, Bishopwearmouth and Monkwearmouth. Pop. (1911) 151,162.

SUNDERLAND, CHARLES SPENCER, EARL OF (1674?–1722), Eng. statesman; member of Whig Junta, under Queen Anne, who dismissed him, 1710; First Lord of Treasury, 1718; fell through South Sea Bubble; s., Charles, succ. as Duke of Marlborough, 1733.

SUNDERLAND, ROBERT SPENCER, EARL OF (1640–1702), Eng. statesman of personal and intellectual distinction, but dishonoured by political treachery; as Sec. of State, 1679–81, hot anti-Papist; became submissive minister of James II. on his accession, but intrigued with France and William of Orange; forced to retire amid general obloquy, 1697.

SUNDEW (*Drosera rotundifolia*), an insectivorous plant found in bogs; leaves, spoon-shaped and reddish, capture prey by tentacles with glistening secretion.

SUNDIAL, instrument for measuring time of day from sun's shadow cast by a style or gnomon upon a graduated surface. S's were used from early times (mentioned *Isaiah* 38[8]), while the Arabs were familiar with the principle in 700 B.C.; also used by Egyptians, Chaldeans, Hebrews, Greeks; introduced into Rome c. 290 B.C.

S's may be horizontal, vertical, or inclined, but the effect of all is to show the distance of the sun from the meridian. The style, which is generally a metal plate, points to the earth's pole, and must therefore be parallel with the earth's axis to coincide with the axis of diurnal rotation, so that, as the sun moves to the westward, the shadow moves in the opposite direction, falling on the plate which is marked with graduations, showing the hours, half-hours, and quarters; these have to be marked off by trigonometrical calculations based on the latitude of the place where the dial is used. S's give solar time only, which differs slightly from clock time except on four days in the year. S's were the only means of telling time before clocks and watches were invented; cheap clocks and watches have now done away with s's altogether, and they are only kept as curiosities. Dial-making is essentially a branch of mathematics.

S's are named from the position of the dial plane, as—north, south, east, west, polar, declining, or equinoctial dials. Cylindrical and ring dials have also been used, while dials for use at night have been made. Owing to the absence of the moon on many nights per annum, and its irregular motions when it is visible, moon dials were found to be most unsatisfactory and were little used.

SUNDSVALL (62° 20′ N., 17° 11′ E.), seaport, on Gulf of Bothnia, län of Vesternorrland, Sweden; sawmills; exports timber, iron. Pop. (1911) 16,894.

SUN-FISHES (*Molidæ*), round, laterally flattened bony fishes, with body so shortened that the fins appear to arise from the back of the head; found in tropical and temperate seas.

SUNFLOWER (*Helianthus annuus*), member of the *Compositæ* (q.v.), which often attains height of 6 ft. and bears immense heads of yellow florets.

SUNIUM (37° 38′ N., 24° 1′ E.) (modern *Cape Colonna*), promontory, Attica, Greece; contains ruins of a temple of Poseidon.

SUNN, OR INDIAN HEMP, leguminous plant largely cultivated for stem, from which fibre somewhat similar to flax is obtained.

SUNNITES (Arab. *sunnah*, the custom or tradition), the most orthodox of Muhammadans; self-styled in contradistinction to the Shiites, who claimed peculiar authority for Ali, as sole legitimate successor of Muhammad, and developed views and secret societies. Struggle between Sunnites and Shiites was free-thinking, political, and theological, and lasted for 250 years. Sunnism, triumphant in Arabia, 1100 A.D., remains the predominant orthodoxy in the Ottoman Empire. Its chief exponents were Al Ashari (b. 882 A.D.) and Al Gazali. Politically Sunnism

is not attached to the Ottoman Sultan at Constantinople, who is merely Sultan by force of arms, and is unconcerned at the fall of the Ottoman Power, which has ceased to be theocratic, the Sheik-ul-Islam, of the Ulema, at Constantinople, being the chief spiritual authority in Islam. Four different schools of law exist amongst the Sunnites, and are permitted, Sunnism having ceased to be a compact body of doctrine.

SUPERANNUATION, see PENSION.

SUPEREROGATION, WORKS OF (in R.C. Church), works not essential for salvation, but done for greater perfection of spirit.

SUPERIOR (46° 43′ N., 91° 59′ W.), city, port of entry, on Lake Superior, capital, Douglas County, Wisconsin, U.S.A.; shipbuilding yards; flour- and lumber-mills; large commerce. Pop. (1910) 40,384.

SUPERIOR, LAKE (47° 40′ N., 88° W.), largest freshwater lake in the world, and most westerly of the five great lakes of N. America, lies between U.S. and Canada; length, 420 miles; breadth, 160 miles; area, 32,000 sq. miles; elevation above sea-level, 600 ft.; receives over 200 tributaries; discharges by St. Mary's into Lake Huron.

SUPPLY AND TRANSPORT, see TRANSPORT AND SUPPLY.

SUPPURATION, see PARASITIC DISEASES.

SUPRARENAL EXTRACT is extracted from the fresh suprarenal glands of sheep, and, as it is a powerful constrictor of the walls of blood vessels, is employed in med. to control and check hæmorrhage. In cases of surgical shock it may be injected to raise the blood-pressure; while it has also been used in the treatment of Addison's disease (*q.v.*).

SUPREME COURT OF JUDICATURE, see JUDICATURE ACTS.

SURABAYA (7° 14′ S., 122° 44′ E.), seaport, on N. coast, Java; has government dockyards and arsenals; exports coffee, rice. Pop. 160,000.

SURAJ-UD-DOWLAH (d. 1757), Nabob of Bengal who caused confinement of Brit. in Black Hole of Calcutta, 1756.

SURAKARTA, see JAVA.

SURAT (12° 10′ N., 72° 32′ E.), city, seaport, on Tapti, capital, Surat district, Bombay, India; was chief commercial centre of India in XVI. and XVII. cent's; became seat of an Eng. presidency, 1612; manufactures cotton and silk. Pop. (1911) 114,863; (district) 640,000.

SURBITON, residential suburb of Kingston-on-Thames, Surrey, England. Pop. (1911) 17,713.

SURD, in algebra, a quantity not expressible in rational numbers, *e.g.* $\sqrt{3}$ and $\sqrt[3]{7}$.

SURETY, see GUARANTEE.

SURFACE TENSION, see CAPILLARITY.

SURGERY.—The science of healing diseases, injuries, and deformities by operative or mechanical methods, is as old as the human race itself, the necessity for a certain skill in treating wounds or fractures being naturally an early discovery of man; and the art had reached a stage of some advancement when the sister art of med. proper was still in embryo. Among the ancient Egyptians s. was, comparatively, highly developed (see SURGICAL INSTRUMENTS), while their ophthalmic surgeons were particularly renowned. In India several cent's before the Christian era, abdominal conditions were treated by surgeons, who were also physicians, by laparotomy; lithotomy was performed, as well as minor operations, and numerous steel cutting and cauterising instruments were used.

Before the time of Hippocrates, the 'father of rational med.,' the Greeks had considerable skill in s., chiefly gained in the wars, and Hippocrates in his surgical treatises describes the instruments and preparations for surgical operations, including splints, bandages, measures for arresting hæmorrhage; he deals with dislocations, fractures, hernias, injuries of the skull, and other conditions, with their methods of treatment.

The Roman Celsus, although not a surgeon himself, gives an exhaustive account of the surgical procedures of his time, being the first of the ancient writers to describe an amputation. Galen added little new to s., and after him little progress was made up to the Byzantine period (*c.* 650 A.D.), Paulus of Ægina, who flourished at this time, covering in his writings the whole knowledge of ancient s. Of the Arab. school Abulcasim, who lived *c.* 1100, is the most noted as regards s., but the school as a whole neglected the art.

S., with all other arts, made a great advance at the Renaissance. Paracelsus (1493–1541) made valuable observations in surgical conditions; Paré (1510–90) introduced the ligature to arrest hæmorrhage of arteries, and substituted a simple bandage for boiling oil in the treatment of wounds; and Vesalius (1514–64) laid the foundations of modern s. in a sound knowledge of anatomy.

In England the Company of Surgeons of London was founded in 1511, uniting with the Company of Barbers in 1540; in 1745 the Surgeons were separated from the Barbers again, and in 1800 the Royal Coll. of Surgeons was founded. The Coll. of Surgeons of Edinburgh had an earlier foundation, its first charter being obtained in 1505, becoming the Royal Coll. in 1778. In the XVII. cent. s. shared in the fruits of scientific discovery, among which may be mentioned Harvey's discovery of the circulation of the blood. A notable figure in the development of the art was Richard Wiseman (*c.* 1620–76), who has been called the 'father of Eng. s.,' the author of valuable treatises on surgical subjects. In the XVIII. cent. s. made rapid advances along the broad lines which had been laid down, the increased attention paid to anat., physiology, and pathology as applied to s., rendering the art more exact as well as giving it a higher status. William Hunter (1718–83), the three Monros of Edinburgh, and, most notable of all, John Hunter (1728–93) had a great share in the development, the medical schools of London, Edinburgh, and Dublin being at this period esteemed above all others in Europe in regard to s. In the first half of the XIX. cent. the development of s. was still more advanced, due again to the discoveries in anat., physiology, and pathology, and the methods of teaching s. were greatly improved.

A revolution, however, took place in s. through the discoveries of Lord Lister (1827–1912). Influenced by the experiments of Pasteur regarding fermentation and putrefaction, he introduced carbolic acid, employed in various ways, as an antiseptic to prevent the septic infection of wounds, and immediately reduced the enormous death-rate from surgical operations. Another valuable discovery by Lister was that of absorbable ligatures. From the antiseptic s. of Lister developed the modern aseptic s., the basis of which is the prevention of the presence of micro-organisms as contrasted with the destruction of micro-organisms present, although antiseptics are used in conjunction with the measures taken to ensure asepsis.

One of the most valuable aids to s. is the application of the X-rays, by means of which fractures, dislocations, calculi, and other conditions can be exactly diagnosed.

Surgical Instruments, lancets, forceps, vaginal specula, and other instruments have been found in ancient Egyptian remains. The ancient Ind. surgeons practised laparotomy and lithotomy several cent's before the Christian era, and over a hundred steel instruments employed by them are extant. Hippocrates describes various s. i. in his writings, as also does Celsus. In mediæval times s. i. were often large and clumsy, and frequently decorated with relief work and chasing, which, although of much merit, would scarcely tend to cleanliness.

By the middle of the XIX. cent. ornament had been discarded and s. i. had a more business-like appearance and were well made, but still without any care for cleanliness. The importance of this only became recognised after the far-reaching discoveries of Lister, and to-day instruments are made from one piece of

steel, or at least entirely of metal, with as few joints as possible, smooth and easily cleansed, without the slightest possibility, when sterilised, of carrying infection.

All instruments before an operation are sterilised by boiling, with the exception of knives, the cutting edge of which would be spoilt by this method, and they are washed carefully, placed in an antiseptic lotion, and then dipped in distilled water before using.

See MEDICINE, LISTER, HUNTER (JOHN).

SURINAM, see GUIANA: *Dutch Guiana.*

SURMA, BARAK (25° N., 93° 30′ E.), river, Assam, India; N. branch of the Barak.

SURPLICE, ecclesiastical vestment, generally made of white linen, worn in Christian Church certainly since V. cent.; its origin is disputed, but it is probably a form of the alb, the regular vestment of the Anglican clergy, but not confined to those in orders.

SURRA, see under TRYPANOSOMES.

SURRENDER, see CAPITULATION.

SURRENTUM, Rom. name of Sorrento.

SURREY (51° 15′ N., 0° 20′ W.), inland county, S. England; bounded N. by Berks, Bucks, and Middlesex, E. by Kent, S. by Sussex, and W. by Hants; area, 708 sq. miles. Surface is generally undulating; crossed by the N. Downs; drained by Thames, Wey, Mole, and other streams; county town, Guildford. Geological formation is chiefly clay and chalk. Agriculture is important industry; wheat, oats, barley, and pulse are grown; hops and various vegetables cultivated; market-gardening is largely carried on; live stock raised. Minerals include fuller's earth, fireclay. Principal manufactures are hosiery, gloves, paper, beer, bricks. Has few historical associations except that Magna Charta was signed at Runnymede; a few Rom. remains and ruined abbeys of Waverley and Newark. Pop. (1911) 675,985.

SURREY, EARLDOM OF.—First holder probably William de Warenne, cr. earl, *c.* 1088; descendants, Warennes and Fitz Alans, held it till 1415; John Mowbray was cr. earl, 1451; it passed like other Mowbray possessions to Howards.

SURREY, HENRY HOWARD, EARL OF (*c.* 1518–47), Eng. poet and soldier; s. of Lord Thomas Howard (cr. Duke of Norfolk, 1524); m. Frances de Vere, 1532; one of Henry VIII.'s retinue in journey to France, 1532; Earl Marshal at trial of Anne Boleyn, 1536; took part in expedition against Pilgrimage of Grace; imprisoned for breach of peace, 1542; accompanied his father to war against Scotland; again imprisoned for misdemeanour; took part in war against France; governor of Boulogne, 1545; executed on slender charge of treason, 1546.

S., who was devoted to Ital. lit., wrote *Songs and Sonnets* (pub. 1557) in sweet and graceful style, abounding in love sentiment, though his sonnets are frequently faulty in construction; translated Vergil, *Æneid,* books ii. and iv., into blank verse.

SURVEYING, the art of determining accurately the position of the chief features of a certain area, in order to obtain data for the construction of a map or plan. In a rudimentary form the art must be very ancient, for as soon as land came to be divided up for purposes of agriculture some method of land measurement must have been necessary. S. in the modern sense of the term, however, does not date back further than the Middle Ages, when nautical charts based upon actual measurements replaced maps constructed from rough and often quite inaccurate astronomical observations. Land s. proper came later, and probably was the outcome of observations made for the purpose of ascertaining the exact size and shape of the earth.

Briefly stated, land s. comprises two main operations: the dividing up of the ground to be surveyed into a number of triangles, and the calculation of the area of these triangles. When the sides of a triangle are accessible they are measured with the chain, and the area may be found in terms of their length. Again, the height of the triangle may be measured, and the area stated as half the product of height and base. In s. on an extended scale a base line of convenient length is selected and measured with the utmost care, for upon this measurement depends the accuracy of the whole survey. Signals, such as poles or cairns of stones, are set up at each end of this line, and a third point, at some distance outside the base line, is chosen and similarly marked. From each end of the base line is measured the angle between the other end and the third point, and from these angles and the length of the base may be calculated the remaining elements and the area of the triangle. By the same method, using each of the sides of this triangle as a new base line, other triangles are constructed, and by continuing the process the whole area is covered with a network of triangles. These large triangles are then split up into smaller ones, from which are determined the positions of all the principal places. The operations are extremely complicated, for in addition to difficulties due to the physical features of the country such factors as refraction, height above sea-level, temperature, and the curvature of the earth have to be taken into account. In every case the points determined by observation and calculation are projected to scale upon paper.

An important branch of s. is levelling, or the determining of the relative heights of various points on the ground with reference to an ideal surface, everywhere cutting the direction of the plumb-line at right angles. The heights may be determined directly by observing how the horizontal plane passing through the eye of the observer cuts graduated staffs, which are placed vertically over the required points; or, if the distances apart of certain points are known, the relative heights of these points may be ascertained from measurements of their vertical angles. At one time the level of low-water at spring-tides was used as the zero plane for levelling purposes, but now the mean sea-level is used.

Nautical surveys are mostly carried on by Government ships, and are under the general direction of the Admiralty hydrographer. They are executed on similar lines to land surveys, but with less accuracy, astronomical observations being employed to check the triangulation. Amongst the important special features to be noted in nautical s. are soundings, currents, high- and low-water levels, submerged rocks, and shoals. The chain most used in land s. consists of 100 links, its total length being 66 ft. It is thus $\frac{1}{10}$ of a furlong, or $\frac{1}{80}$ of a mile, while 10 sq. chains equal 1 acre. The THEODOLITE (*q.v.*) is the most important instrument used in s. for measuring angles, horizontal or vertical.

SUS (30° 30′ N., 9° W.), province, Morocco, bordering Atlantic; mountainous; drained by Sus. Pop. *c.* 225,000. Chief town, Tarudant.

SUSA.—(1) (Biblical *Shushan,* modern *Sûs*) (32° N., 48° 24′ E.) ancient capital of Susiana or Elam and chief residence of the Achæmenian kings; between rivers Kerka (*Choaspes*) and Dizful; said to have been founded by Darius Hystaspes. (2) (Rom. *Segusio*) (45° 8′ N., 7° 2′ E.) town, Turin, Italy; XI.-cent. cathedral; Roman antiquities. Pop. 5100. (3) (ancient *Hadrumetum*) (35° 50′ N., 10° 34′ E.) fortified seaport, on Gulf of Hammamet, Tunisia; exports olive oil, phosphates. Pop. *c.* 30,000.

SUSANNAH, HISTORY OF, see APOCRYPHA.

SUSQUEHANNA, see under PENNSYLVANIA.

SUSSEX (51° N., 0°), coast county, S. England; bounded N. by Surrey, Kent, E. by Kent, S. by English Channel, W. by Hants; area, 1436 sq. miles; in S. surface is crossed by S. Downs, which run from Beachy Head to W. boundary; Weald of Sussex occupies interior, and in N.E. are the Forest Hills; drained by Rother, Brede, Ouse, Adur, Arun, and other streams; county town, Lewes. Geological formation is chiefly chalk. Chief industry is agriculture; principal crops, wheat, barley, pulse, potatoes; excellent pasturage, both in the marshland of the S.E. and on the Downs,

and great numbers of cattle, sheep, and horses are raised; market-gardening is carried on, and fruits and vegetables are extensively grown for London markets. Manufactures include paper, bricks, pottery, cement, leather, spirits. County suffered from inroads of Danes in IX. and XI. cent's, and was scene of William the Conqueror's final victory at Hastings. There are various traces of Rom. occupation, and a number of ruined castles and monasteries. In December 1912 a human (feminine) skull, supposed by experts to be the oldest that has yet been found, was discovered here. Pop. (1911) 418,476.

SUSSEX, EARLDOM OF, probably first granted to Roger de Montgomery by William I.; after passing through many families and repeatedly becoming extinct, was granted, 1874, to Prince Arthur of Connaught.

SUSSEX, KINGDOM OF, ancient kingdom, Anglo-Saxon Britain; founded by Ælle, who landed at Cymenes, 477; corresponded generally to modern Sussex; united to Wessex, *c.* 700.

SUSSEX, THOMAS RADCLYFFE, 3RD EARL OF (1525?–83), Eng. statesman; cr. Lord Fitzwalter, 1553; Lord Deputy of Ireland, 1556; annexed territory of future King's County and Queen's County; Lord-Lieut., 1560; took part of Matthew O'Neill against Shane O'Neill, but failed to subdue Shane, and obtained recall, 1564; as Lord Pres. of North put down northern rising of 1569; prominent courtier.

SUTHERLAND, EARLDOM AND DUKEDOM OF.—Earldom, first held by Freskin family, passed through heiress to Gordons, early XVI. cent.; and in XVIII. cent. through another heiress to Leveson-Gowers, who received ducal rank in 1833.

SUTHERLANDSHIRE (58° 15′ N., 4° 30′ W.), county, N. Scotland, extending from Atlantic to Moray Firth; area, 2028 sq. miles; surface is generally mountainous with wide moorlands and some fertile valleys; highest points are Ben More and Ben Clibreck, both over 3000 ft.; drained by Oykel, Brora, Helmsdale, and other streams; has numerous lakes, including Lochs Assynt and Shin; county town, Dornoch. Agriculture is carried on, and sheep are extensively raised; there are salmon, herring, and other fisheries, and a considerable area consists of deer forests and grouse moors; minerals include lignite. Pop. (1911) 20,180.

SUTLEJ (29° N., 74° E.), river, Punjab, Brit. India; rises in Tibet; flows generally W.; joins Indus at Mithankot; length, 900 miles.

SUTRI (52° 15′ N., 12° 15′ E.) (ancient *Sutrium*), town, Rome, Italy; cathedral; Etruscan and Rom. antiquities.

SUTTEE, Ind. custom by which a widow threw herself on her husband's funeral pyre; abolished by Lord Bentinck, 1829.

SUTTON (51° 22′ N., 0° 12′ W.), town, Surrey, England. Pop. (1911) 21,275.

SUTTON COLDFIELD (52° 35′ N., 1° 50′ W.), town, Warwickshire, England; residential suburb of Birmingham. Pop. (1911) 20,132.

SUTTON-IN-ASHFIELD (53° 7′ N., 1° 16′ W.), town, Nottinghamshire, England; manufactures hosiery. Pop. (1911) 21,707.

SUTURES, stitches in surgery; are removed when of wire, silk, horsehair; absorbed when of catgut.

SUVÁROV, ALEXANDER VASILIEVICH (1729–1800), Russ. soldier; rose in Seven Years War; captured Cracow, 1768; won fame against Turks, especially at Kosludscki, 1774; sacked Ismail with great cruelty, 1790; reduced Warsaw, 1794; won brilliant victories against French in Italy.

SUWALKI (54° 10′ N., 23° 30′ E.), government, Russ. Poland, bordering E. Prussia. Pop. (1910) 367,300. Capital, **Suwalki** (54° 10′ N., 22° 57′ E.); trades in timber and woollens. Pop. 26,000.

SUZERAINTY, term in common use in France in Middle Ages to express the relation of a feudal lord to his vassal, the king being the chief suzerain; in modern times it expresses the power of a country over a vassal state, or over a state independent subject to certain reservations, or a protectorate over native states.

SVANE, HANS, SVANING (1606–68), Dan. abp.; bp. of Copenhagen, 1655; led democratic royalist party in opposition to nobles and established despotism of Frederick III.

SVANETIA (42° 40′ N., 42° 30′ E.), mountainous region, on S. slopes of Caucasus, Kutais, Russia.

SVASTIKA, see under CROSS.

SVEABORG, town, Finland; the 'Gibraltar of the North'; taken by Russians, 1808.

SVENDBORG (55° 3′ N., 10° 36′ E.), seaport, on island of Funen, Denmark; manufactures tobacco; exports agricultural produce. Pop. (1911) 12,667.

SVERDRUP, JOHAN (1816–92), Norweg. democratic leader; Prime Minister, 1883–89.

SWABIA, SUABIA, SCHWABEN (48° 30′ N., 10° E.), ancient duchy, Germany; corresponded generally to Württemberg, Baden, and W. part of Bavaria; capital, Augsburg.

SWABIAN LEAGUE, federation of Swabian and other Ger. cities, 1488–1534; Ger. disunity proved social evil in XIII. cent. In 1331 twenty-two towns, including Augsburg, Heilbronn, and Ulm, formed union for defence; fought fiercely with baronial league; emperor succeeded in establishing S. L., 1488, against feudal forces; it did good service to cause of peace.

SWADLINCOTE (52° 46′ N., 1° 33′ W.), town, Derbyshire, England; manufactures earthenware. Pop. (1911) 18,676.

SWAFFHAM (52° 39′ N., 0° 41′ E.), town, Norfolk, England. Pop. (1911) 3234.

SWALLOW HOLE, a funnel-shaped cavity occurring in limestone regions; also known as 'sink-hole.'

SWALLOWS (*Hirundinidæ*), family of about 150 perching birds distributed all over the world except in New Zealand. They are typical migratory birds, and are distinguished by broad beaks, opening almost to the eyes, small, weak feet, and long, forked tails. Familiar British visitants are the Common Swallow (*Hirundo rusticus*) and the House and Sand Martins (*Chelidonaria* and *Clivicola*); the latter nests in burrows excavated by itself in sand-pits; these winter in Central Africa.

SWAN, SIR JOSEPH WILSON (1828–), Eng. physicist; b. Sunderland; made improvements in photography—rapid dry plates, carbon printing; invented incandescent electric lamp with carbon filament; knighted, 1904.

SWANAGE (50° 37′ N., 1° 58′ W.), town, watering-place, on Isle of Purbeck, Dorsetshire, England. Pop. (1911) 4689.

SWANS, see under DUCK FAMILY.

SWANSEA (51° 37′ N., 3° 56′ W.), port, Glamorganshire, S. Wales, at mouth of river Tawe; has fine public buildings, including the Royal Institution of S. Wales, public library with science and art schools, numerous churches and several philanthropic establishments; there are several fine parks, of which the largest are Llewellyn and Victoria Parks; the ruined castle dates from XIV. cent. S. has a fine harbour which takes the largest ships; there are four docks, of which the largest and most recent is the King's Dock, covering about 67 acres; total net tonnage of arriving and departing vessels, apart from coasting trade, was 3,835,408 in 1900. S. is also a great centre of copper trade, and has large copper-smelting and tin-plate manufactures; exports iron, and iron and steel manufactures, coal, zinc, alkali, arsenic, machinery, and mill-work; imports cereals, iron ore, silver, lead, zinc, copper, tin, etc. Pop. (1911) 114,673.

SWAT (35° N., 72° 40′ E.), region, N.W. Frontier Province, India, consisting of the upper valley of the Swat River, which flows with a southerly course of about 400 miles; joins the Kabul.

SWATOW, SHANTOW (23° 20′ N., 116° 43′ E.), treaty port, on Han, Kwangtung, China; centre of sugar industry. Pop. (1911) 66,000.

SWAZILAND (c. 26° 21′ S., 31° 35′ E.), part of Brit. S. Africa, in S.E. of Transvaal; area, 6536 sq. miles; surface is a plateau, drained by Komati and tributaries, and Maputa; climate, healthy; agriculture is carried on; chief crops are maize, millet, tobacco, beans; cattle and sheep raised; minerals include gold, tin, coal.

S. was formerly in subjection to the Zulus, but attained independence, 1843; placed under the rule of the S. African republic in 1894; now under the control of Brit. Government. Pop. (1911) 99,959, including 1083 whites.

SWEARING, see OATH.

SWEAT, see SKIN.

SWEATING SYSTEM, a phrase first used about 1848 to describe system of sub-contracting in tailoring trade. Orders from master-tailors were undertaken by sub-contractors, who farmed the work out to needy workers, who made the articles at home, receiving 'starvation wages.' A report by a Committee of the House of Lords was issued on the subject in 1890, and an Anti-Sweating League has been for some years in existence. Women workers are the chief victims.

SWEATING-SICKNESS, an acute fever, the first symptoms being headache and cold shivering, then rise of temperature followed by profuse sweating, delirium, and collapse; formerly occurred in epidemic form in England, the last outbreak in 1551 being attributed to the insanitary conditions in which the people lived. *Miliary fever*, which occurs from time to time in France, Italy, and Germany, resembles it, except that the sweating is accompanied by a rash.

SWEDEN, SVERIGE (69° to 55° N., 11° to 24° E.), kingdom of north-western Europe, occupying the E. and greater portion of the Scandinavian peninsula; bounded N.E. by Finland, W. by Norway, S.W. by Cattegat and Skager Rack, S. by Baltic, E. by Baltic and Gulf of Bothnia; extreme length, c. 1000 miles; greatest breadth, 300 miles; area, 173,547 sq. miles; coast-line (c. 1000 miles) with many large bays and *fjords*, and innumerable islands, largest of which are Gothland and Öland in Baltic, Orust and Tjörn on S.E. coast. Prominent bays are Laholms Bay, Skelder Viken, Kongsbackafjord, Hanö Bay, Norrköpings Bay, etc. Sweden is divided into three large regions: Norrland in N., Svealand, central region, and Götaland in S. Surface is generally undulating; mountainous regions in N.N.W., highest peaks, Kebnekaise (7004 ft.), Sarjektjakko (6972 ft.), Sulitelma (6158 ft.), etc., in N.W.; central region generally flat, with fertile plains, and fine arable land in S. The greater part of Sweden consists of Archæan formations (gneiss, granulite, etc.) overlaid by pre-Cambrian, Cambrian, and Silurian strata; in the S., Mesozoic formations (Triassic, Jurassic, Cretaceous) are found; during Glacial Period Sweden was completely covered by ice.

Sweden has numerous rivers and lakes and many fine waterfalls; about 14,000 sq. miles of the total area is under water. Principal rivers are Torneå and Muonio (forming boundary of Finland), Kalix, Luleå, Skellefte, Pieteå, Angerman, Indals, Mottala, Umeå, flowing into Baltic, Dal into Gulf of Bothnia, Klar and Göta-Elf into Cattegat; few navigable; fine waterfalls are Trollhätta (Göta-Elf), Harsprång, Akkatsch Fall (Luleå-Elf), etc.; largest lakes are Vener (area, 2100 sq. miles), Vetter, Hjelmar, Mälar, Siljan, Hornafvon, Storsjörn, Storafvon, etc.; numerous canals (Göta, Dalsland, Seffle canals, etc.).

Climate is variable, but mild in comparison with other northern countries; coldest in N., with rivers frozen about six months in the year; mean annual temperature from 26°·60 in N. to 44°·6 in S.; mean temperature of January at Stockholm, 24°·8; mean rainfall, 20·28 in. (greatest in S.W.). Fauna includes bear, wolf, fox, elk (rare), hare, lemming, red deer, badger; numerous aquatic birds, besides various grouse, ptarmigan, snipe, golden plover, golden eagle, crane, etc. Vegetation is generally poor; immense forests of pine, fir, birch, spruce, oak, elm, especially in N.

HISTORY.

In earliest times Sweden was probably inhabited by Lapps and Finns; these were conquered by Goths and Sver, the former settling in S., the latter in central regions, and first ruled by Ynglingar family until 623; then followed the Skoldungs, who produced some famous Vikings—Harold Hildebrand, Bjorn Jernsida, Olaf Skatkonung, etc. Christianity was first preached by St. Ansgar, IX. cent.; from 1250–1397 Sweden was ruled by the powerful Folkungar family; during this period Stockholm was founded, c. 1255, Finland conquered, 1293, and much was done to encourage trade and commerce. By Union of Kalmar, 1397, Denmark, Norway, and Sweden were united, and Eric (XIII.) of Pomerania, Margaret of Denmark's great-nephew, was proclaimed king; from the beginning the union was unsatisfactory, and eventually led to the Peasant Rising (1433), headed by Engelbrekt Engelbrektsson, and the election of Karl Knutsson Bonde as *Charles VIII.* of Sweden, 1436. Upsala Univ. was founded, 1477.

During tyrannical reign of *Christian II.* of Denmark (succ. 1513) the Stockholm *Blood Bath* (massacre of Swed. nobles, etc.) took place, 1520, and resulted in a successful revolution under Gustavus Vasa, 1521, who was proclaimed king of Sweden at Strengnäs Riksdag, 1523, as GUSTAVUS I. During his reign a hereditary monarchy was introduced, the Reformation (Lutheranism) gradually progressed, and a strong military army and navy were established. Civil war broke out, 1598, caused by religious differences; CHARLES IX., a strong Protestant, became king (1599–1611), after expelling the Catholic Sigismund; and began the wars with Russia, Poland, and Denmark, which were ended by Sweden's greatest king, GUSTAVUS ADOLPHUS (*q.v.*) (1611–32), who not only won for Sweden great military prestige in Europe, as the recognised champion of Protestantism, but also advanced education, commerce, and social well-being; Peace of Knäred (1613) ended war with Denmark (War of Kalmar); peace with Russia (1617) gave Sweden the provinces of Kexholm and Ingria; Livonia and Esthonia were acquired from Poland, 1629, and the provinces Halland, Herjedal, and Jemtland, and islands of Gotland and Ösel (in Baltic) from Denmark, 1645. From 1630 onwards Sweden took a prominent part in the Thirty Years War. Gustavus Adolphus was killed, 1632, and was succeeded by his daughter CHRISTINA, a minor, whose chief councillor was the great Oxenstjerna. By Peace of Westphalia, 1648, Sweden received Upper Pomerania, the islands of Rügen and Usedom, the town of Wismar, the secularised bishoprics of Bremen and Verden, etc. Christina abdicated, 1654; her half-cousin, CHARLES X. (1654–60) invaded Poland, and obtained from Denmark by Peace of Roeskilde (1658) Trondhjem, Bornholm, Schonen, Halland, etc.; under his son, CHARLES XI. (1660–97), who was only four on accession, Livonai was secured from Poland (1660), Trondhjem and Bornholm lost to Denmark; only Fr. support averted further territorial losses in unfortunate war with Brandenburg and Denmark (1675–79); the nobles' power was curbed, and finance reorganised. The chivalrous CHARLES XII. (1697–1718), after initial success against Denmark, Russia, and Poland in Northern War, was crushed at *Poltava*, 1709; escaping from Turkish captivity he renewed the war, but fell at Fredrikshald, 1718; absolute monarchy died with Charles, whose sister, Ulrike Eleonore, ushered in the *Frihetstiden* (period of freedom), and resigned the crown to her husband, FREDERICK I. (1720–51); Sweden obtained a constitution, but lost territory and prestige, weakened by the continuous party strife between *Caps* and *Hats*; the war policy of the *Hats* brought fresh humiliation to Sweden. ADOLPHUS FREDERICK (1751–71) was first of the Holstein-Gottorp house; his son, GUSTAVUS III. (1771–92), restored absolute monarchy, checked Russ. aggression, promoted literature and industry, supported Louis XVI. of France against Revolutionaries, provoked a conspiracy, and was assassinated. Under

Gustavus III.'s son, GUSTAVUS IV., ADOLPHUS (deposed 1809), and brother, CHARLES XIII. (1809–18), Sweden lost Finland to Russia, and Pomerania to Prussia, but secured Union of the crown with Norway, 1814. Napoleon's general, Bernadotte, Prince of Ponte Corvo, was elected crown prince, 1810; succeeded as CHARLES XIV., JOHN, and made good Sweden's claim to Norway as against Denmark. OSCAR I., his son (1844–59), helped to bring about Truce of Malmö (1848) in Danish-German War over Schleswig-Holstein; made a defensive alliance with Britain and France, 1855; under his son, CHARLES XV. (1859–72), religious freedom was established, and the present constitution of Sweden adopted, 1866. OSCAR II., brother of Charles XV., ruled over Sweden till 1907, over Norway till 1905, when Norwegians at last succeeded in severing the crowns. GUSTAVUS V., Oscar II.'s son (1907–), now reigns.

Language.—Swedish belongs to the Scandinavian group of Teutonic languages, and is closely akin to Danish and Norwegian. See TEUTONIC LANGUAGES.

Literature.—Before the Reformation there are few names of importance in Swedish lit. In the old Scandinavian Sagas, Sweden has a certain share. Runic inscriptions preserve a few early metrical fragments. Christianity produced a number of religious and historical works—mostly in Latin, and mediæval romances of chivalry were translated into Swedish. In the XIV. cent., when Danish triumphed over Old Norse, Swedish held its own. Most notable writer of this period is St. Bridget (d. 1373). The XV. cent. saw the foundation of Upsala Univ. (1477), and the XVI. cent. the Reformation. Olaus Petri (1493–1552) and Laurentius Petri (1499–1573) translated the Bible; Olaus also wrote a chronicle of Sweden, and Laurentius wrote plays. The XVII. cent., Sweden's most glorious age, found an ardent patron of learning in Queen Christina (1632–54), who invited scholars (including Descartes) to Sweden. The 'father of Swedish Poetry,' George Stjernhjelm (1598–1672), adorned and entertained her court. In the XVIII. cent. the Academy of Science (1753) and Academy for the Improvement of the Swedish Language (1786) were founded. Among writers of this period may be mentioned the religious poet, Peter Lagerlöf (d. 1699), Jakob Frese (d. 1729), the lyrist, Olof von Dalin (1708–63), historian and poet, who followed Fr. and Eng. models. The poet-counts Creutz (1731–85) and Gyllenborg (1731–88) frequented the distinguished *salon* of Carlotta Nordenflycht (1718–63). Under Gustavus III., himself a scholar and dramatist, the classical school reached its height in the poet Oxenstjerna (1750–1818), the critic Kellgren (1751–95), and the satirist Leopold (1750–1829). In his truly national ballads and songs Karl Michael Bellman (1740–95) and others threw off Fr. influence, and the XIX. cent. brought reaction, and saw the introduction of a Romantic movement with Ger. influence predominant. Of this school may be mentioned the 'Phosphorists,' Atterbom (1790–1855), Dahlgrén, and Hammarsköld. The 'Gothic Union,' however, which included Esias Tegnér (1782–1846), author of celebrated *Frithjofs Saga*, and the historian Geijer (1783–1847), turned from foreign patterns and devoted itself to purely national themes. Swedish modern writers may be mostly divided into two groups, neo-romantics or idealists, and realists; to the former belong Victor Rydberg (1829–96) and Count Snoilsky (1841–1903), while pre-eminent among the latter is August Strindberg (1849–1912). Among Swedes who have won European fame as philosophers, scientists, explorers, etc., are Swedenborg, Linnæus, the Nordenskiölds, Sven Hedin, etc.

Defence.—Swedes are liable to military service between 21 and 40; army consists partly of volunteers, partly of conscripts; peace strength, c. 70,000. Navy consists of small coast-defence vessels, but larger battleships (6800 tons) are now under construction. Chief fortresses are Stockholm, Boden, Karlskrona, Karlsborg; principal naval stations, Karlskrona and Stockholm.

Government.—Sweden is a hereditary monarchy whose sovereign must be a Lutheran. Legislation is carried out by Diet, consisting of First Chamber (150 members elected for 6 years) and Second Chamber (230 members elected for 3 years). For local administration Sweden is divided into 25 *Län* or governments, each with a prefect and *Landsting* (council); the larger towns have separate municipal councils; the 25 län are Blekinge, Cristianstad, Elfsborg, Göteborg and Bohus, Gottland, Gefleborg, Halland, Jemtland, Jönköping, Kopparberg, Kalmar, Kronoberg, Malmöhus, Norrbotton, Ostgotland, Örebro, Södermanland, Stockholm (län), Stockholm (city), Skaraborg, Upsala, Wermland, Westerbotten, Westernorrland, Westermanland. Principal towns are Stockholm (capital), Göteborg, Malmö, Norrköping, Hälsingborg, Gäfle, Örebro, Eskilstuna, Karlskrona, Upsala, Jönköping. Protestant (Lutheran) religion predominates. Primary education is free and compulsory, and maintained chiefly by local taxation; univ's at Upsala (1477) and Lund; private univ's at Stockholm (faculties of Philosophy and Law) and Göteborg (faculty of Philosophy), Caroline Institute for Medicine (Stockholm), besides naval and military schools, agricultural, mining, commercial, art, music, and other institutions.

Total railway mileage (1910), 8594 miles, over 2500 belonging to the State. Over 50 % of total area is under forest. Principal products are rye, oats, barley, potatoes, live stock, timber, wool, bacon; rich in minerals—iron ore, zinc, copper, manganese, silver, cobalt, sulphite of iron. Mining is one of chief industries; also lumbering, manufacturing of woodwork, iron and steel smelting, flour-milling, sugar-refining, cotton and wool weaving, machinery, distilling and brewing, etc.; important fisheries; chief exports—wood, wood-pulp, iron, butter, paper, matches, skins, fish. Total value of imports (1910), £37,000,000; exports, *c.* £32,500,000. Pop. (1900) 5,136,441; (1911) 5,561,799. For Map, see NORWAY.

Sundbärg, *Sweden, its People and Industries* (1904); Baedeker, *Norway, Sweden, and Denmark* (1903); Bain, *Scandinavia: A Political History of Denmark, Norway, and Sweden, 1513–1900*; Nordlund, *The Swedish-Norwegian Crisis* (1905).

SWEDENBORG, EMANUEL (1688–1772), Swed. theologian and founder of sect bearing his name, studied at Upsala, then in England and elsewhere; assessor to Swed. board of mines, 1716; became able scientist, anticipating many modern discoveries. At first not profoundly religious, but became an intense mystic; devoted himself entirely to religious work after 1747; his supernatural experiences rest on good authority. He lived latterly partly in London. S. wrote numerous scientific works; his religious works include *Arcana Celestia, Apocalypse Revealed, Apocalypse Explained, New Jerusalem, Canons of the New Church, Heaven and Hell, The Last Judgment.* He did not intend to found a new denomination, but one, still existing, grew up after his death (*Swedenborgians*, or *New Jerusalem Church*). See Warren, *Compendium of the Theological Writings of Emanuel Swedenborg*; *Life*, by Hyde, Swainson, Trowbridge.

SWEET BAY, see LAUREL.

SWEET PEA (*Lathyrus odoratus*), annual plant of order Leguminosæ; Everlasting Pea (*L. latifolius*) is scentless; both are of many colours.

SWEET POTATO (*Batatas*), genus of plants, order Convolvulaceæ; *B. edulis*, of many tropical countries, is nourishing.

SWEET WILLIAM (*Dianthus barbatus*), plant of order Caryophyllaceæ; one of pink genus.

SWEETBREAD, see PANCREAS.

SWELLENDAM (33° 59′ S., 20° 23′ E.), town, Cape Province, S. Africa.

SWEYN I. (d. 1014), king of Denmark; s. of King Harold Bluetooth; forced Ethelred the Unready to pay tribute, 994; avenged Massacre of St. Brice's Day, 1002, by ravaging England till his death.

SWIFT, JONATHAN (1667–1745), Brit. satirist,

novelist, essayist, pamphleteer; greatest prose-writer of XVIII. cent.; b. Dublin; of Eng. parents; ed. Kilkenny and Trinity Coll., Dublin; studied desultorily, but granted degree by special grace; app. sec. to Sir Wm. Temple, 1688; ordained in Ireland, 1694; returned to Temple, on whose death (1699) S. was app. chaplain to Lord-Lieut. of Ireland; received livings of Laracor and Rathbeggin (Meath). During visits to London he met Addison, Steele, and other Whigs; his *Dissensions of Athens and Rome* (a pamphlet) defended Whig ministers, 1701. In allegorical *Tale of a Tub*—pub. 1704, with *Battle of the Books* (written 1697), a brilliant mock-heroic prose epic on quarrel of Ancients and Moderns—S. satirises in masterly fashion the shams and excesses of the Churches of Rome, England, and Scotland (Peter, Martin, and Jack). Leaving Whigs for Tories (1710), S. raked his former political friends with telling pamphlets (e.g. *Conduct of the Allies*, 1711; *Public Spirit of the Whigs*, 1714), and received Deanery of St. Patrick's (1713), instead of expected bishopric. On fall of Tories (1714) S. returned to Ireland, hopelessly embittered. Here he married 'Stella' (Esther Johnson), whom he had met at Temple's and to whom his remarkable *Journal* was addressed. A disappointed admirer was Esther Vanhomrigh, the 'Vanessa' of S.'s poem (*Cadenus and Vanessa*). By *Drapier's Letters* (1724) he saved Ireland from 'Wood's halfpence' and became a national champion. *Gulliver's Travels*, his best-known work, appeared 1726, anonymously, like almost all his writings. His last years were darkened by insanity.

S.'s satirical power was colossal. Nothing escaped his merciless scourge. *Gulliver* is all-embracing in its lash; every human weakness and vice is subjected to his savage irony and sarcasm. His splendid imagination, story-telling gift, and command of language, rank him among foremost writers of fiction. Circumstantiality (by means of vivid, minute details) and simplicity of language are among his chief effects. The imaginary travels of Captain Lemuel Gulliver fascinate young and old alike. S.'s poetry is mediocre; as Dryden said, 'Cousin Swift, you will never be a poet.' He aimed at purifying the Eng. language (cf. Letter on *Correction of Language*). For S. the times were out of joint. He is one of the most tragic, one of the greatest figures in Eng. lit.

Life, by Craik (1894), Churton Collins (1898), Leslie Stephen (1889), Herbert Paul (1901), Smith (1910); Moriarty, *Life and Writings* (1893).

SWIFTS (*Cypselidæ*), a family of 100 species of Picarian Birds found throughout the world; insectivorous and typically birds of the air; swallow-like, with long, narrow wings, forked tail, and beak slit to the level of the eyes. *Collocalia* builds the edible birds' nests used by the Chinese; the Common Swift (*Cypselus apus*) is familiar in the Brit. Isles.

SWIM-BLADDER, AIR-BLADDER, outgrowth of gut found in many Fishes, and generally used as a hydrostatic organ, *e.g.* in balancing, and in regulating internal pressure to compensate external pressures in water. Sometimes its function is respiratory, and it is lung-like in the case of the Lung-Fishes or DIPNOI (see under FISHES).

SWIMMING, method of progression practised from earliest times by man, though not natural to him; chief styles are *breast stroke* (used for long distances), in which arms are stretched in front of body and deliberately swept round till at right angles to direction, movement accompanied by strong kick with both legs, which are drawn up during stroke; *overhand stroke* (for speed), in which arm is carried out of water and over swimmer's head; *side stroke*, swimming on side, thereby offering less resistance. Swimming on back is generally used as rest from side stroke, to which it is similar in action.

As pastime, s. has long been popular in Britain; cross-Channel s. frequently attempted. Webb swam from Dover to Calais, 1875; after many attempts, feat was repeated by Burgess (*q.v.*), 1911.

SWIMMING-BELL, see under HYDROMEDUSÆ.

SWINBURNE, ALGERNON CHARLES (1837–1909), Eng. poet; b. London; s. of Admiral S.; ed. France, Eton, and Balliol Coll., Oxford. In 1860 he pub. *The Queen Mother* and *Rosamund*, which attracted little attention. After travelling in Italy, he returned to London and lived in Chelsea with Rossetti, Meredith, and the pre-Raphaelites. In 1864 appeared his masterpiece, *Atalanta in Calydon*, which at once brought him recognition as a master of lyrical expression. This was followed by *Chastelard*, and in 1866 by *Poems and Ballads*, which, in spite of their lyrical power, aroused a storm of criticism on the score of immorality, against which charge S. defended himself with customary vigour. Thenceforward he continued writing almost to the last, living always in or near London. Among his later works were *Songs of Italy* (1867), *Songs before Sunrise* (1871), *Erectheus* (1876), *Poems and Ballads*, second series (1878), *Tristram of Lyonesse* (1882), *Locrine* (1887), *Astrophel* (1894), and *A Channel Passage* (1908). He also wrote several essays (on Shakespeare, Hugo, Byron) of flamboyant and often violent prose.

S. is admittedly the greatest master of metre in Eng. lit., and his poetry always shows great fire and energy. Sometimes, however, his love of mere musical expression leads him to allow sense to swoon into mere melody, and in his earlier poems his passion is erotic.

Life, by Woodberry, MacKail.

SWINDON (51° 33′ N., 1° 46′ W.), town, Wiltshire, England; large railway works. Pop. (1911) 50,771.

SWINE, a name applied indiscriminately to the members of the Ungulate group SUINÆ, to the PIG FAMILY (*q.v.*) in general, or to Domestic Pigs.

SWINEMÜNDE (53° 56′ N., 14° 14′ E), fortified seaport, watering-place, on island of Usedom, Pomerania, Prussia; shipbuilding yards. Pop. 14,200.

SWING DAVID (1830–94), Presbyterian minister in U.S.A.

SWINTON (53° 29′ N., 1° 19′ W.), town, W. Riding, Yorkshire, England; manufactures glass, iron. Pop. (1911) 13,586.

SWINTON AND PENDLEBURY (53° 30′ N., 2° 20′ W.), town, Lancashire, England; cotton-mills; coal-mines. Pop. (1911) 30,759.

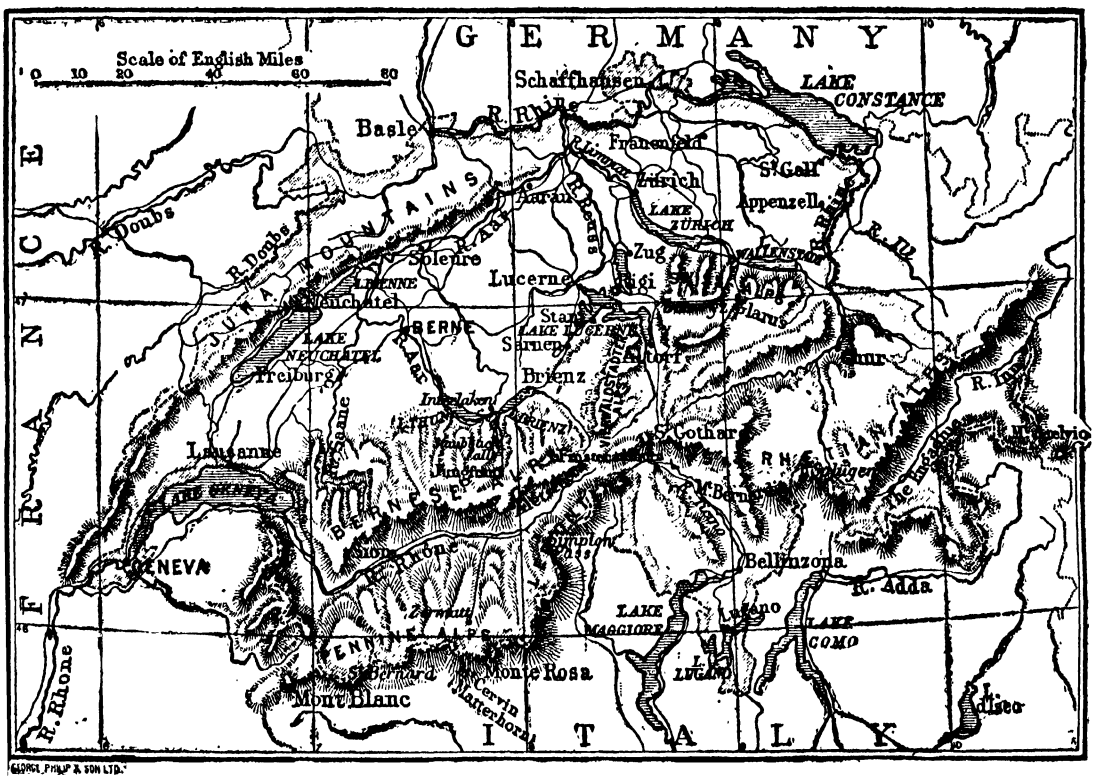
SWISS GUARDS, body of mercenaries serving in Fr. army from 1616 on; distinguished themselves at the Tuileries, Aug. 10, 1792.

SWITHUN, ST., bp. of Winchester; d. 862, according to *A.S. Chronicle*; his association with rain probably signifies attachment to his day of some pagan festival.

SWITZERLAND, a Central European republic, called sometimes the 'Swiss Confederation.' Its dimensions are roughly 230 by 140 miles, its area, nearly 16,000 sq. miles. It is bounded S. by the Alps, N. by the Rhine and other mountains, but it extends S. of the Alps in some places; comprises the valleys of the Rhine, Rhone, and Jura; abounds in lakes and mountains and is hardly a geographical unity; ethnologically and linguistically comprises several different races. Of a population of (1910) 3,741,971, about 70 % are German-speaking, French 22 %, and Italians 6 %, while in the Grisons, Romansch is spoken. The capital is Bern, though it is smaller than Zürich, Basel, and Geneva. Foreign visitors give employment to 33,000 people and spend about £7,500,000. The land itself is pastoral rather than agricultural; there are about 1,500,000 cattle, 500,000 swine, 360,000 goats, and 200,000 sheep. Most of the corn is imported. Vineyards are on the decrease. Of manufactures the chief is textiles, especially silk. Watchmaking has for some centuries been carried on at Geneva. In 1911 the exports were about 50 millions, and imports 71 millions.

History.—The origin of the Swiss Confederation is to be found in the special political circumstances of a part of the Middle Kingdom (as it was in the early Middle Ages)—the debatable land between France and Germany, and in the South, equally closely related

with Italy. It remained normally a part of the Holy Rom. Empire long before its real independence. The first definite step was the alliance of the men of Uri, Schwyz, and Unterwalden against the power of the House of Hapsburg, which tried to crush out local liberty. Albert of Hapsburg became emperor in 1298, but did not attack the rights of the cantons as it was later said that he had done. The League was renewed in 1315 after the victory at Morgarten over Leopold of Hapsburg and an agreement made with the Hapsburgs in 1318 in which the Hapsburg possessions of certain lands was recognised: their political authority was not alluded to. Lucerne joined the League in 1332, and Zürich in 1351. Glarus joined in 1352 on an inferior footing, and Zug just afterwards. Bern, which had made a treaty with the forest cantons in 1323, joined in 1353. Thus there were now eight cantons instead of three. Meanwhile there was continued friction with Austria, and in 1386 war broke



GEORGE PHILIP & SON LTD.

out afresh, but the Austrian forces suffered a crushing defeat at Sempach.

In 1394 a treaty was made by which the freedom of the League from Hapsburg interference was guaranteed, and all feudal powers were finally relinquished by the Hapsburgs by the 'Everlasting Compact' in 1474. In the XV. cent. the League steadily progressed. In 1411 Appenzell came under its protection, obtaining full membership in 1513. The town of St. Gall, which had a struggle with its overlord, the abbot, was likewise protected in 1512, but did not become a member until 1803. In the XV. cent. also the beginning of Ital. conquest took place.

But, like other communities which have themselves become free, the Confederate cantons often treated their subject lands harshly. Disputes began with the Confederates, and Zürich, quarrelling with Schwyz, called in Austrian aid. An alliance was made with France in 1452, and in 1458 war broke out between the Confederates and the Empire. In 1474 the Burgundian War began. An alliance had been formed between various Rhine cities, the Confederates, and the Emperor Sigismund against Charles the Bold, Duke of Burgundy. Charles was defeated, and the Confederate victories greatly increased the prestige of the cantons. Switzerland was now practically independent of the Empire, but an attempt of the Emperor Maximilian to enforce his imperial rights led to a war in 1499. Relations were still undefined, but there was no further interference, though independence was not recognised till 1648. The new members in the XV. cent. were Freiburg and Solothurn in 1481, Basel and Schaffhausen in 1501. Thus, with Appenzell, there were now thirteen. The Swiss Confederation extended its influence south of the Alps in the early XVI. cent.

The Reformation opens a fresh period in Swiss history. The reformer Ulrich Zwingli was a man not only of religious but of political importance, and under his leadership the city of Zürich rose into prominence. Zwingli's Protestantism was of the more extreme type; from his time onwards Switzerland has been religiously divided, and in 1529 the principle was recognised that each centre could choose its own faith. Bern won conquests in Vaud, and Geneva passed for a time beneath the political and religious sway of John Calvin. At the Counter-Reformation some parts were won back to Catholicism. The Confederation kept itself clear of the conflicts of the Thirty Years War, and by the Peace of Westphalia in 1648 its independence of all imperial authority was recognised. From this time to 1798 three important facts stand out: (1) the predominant Fr. influence, with the result that France almost held towards the Confederation the position formerly held by the Empire; (2) continual religious quarrels among the Confederates. The result was that in each parish religious equality was recognised, (3) though the Confederation owed its rise to a movement in favour of popular freedom burgership became hereditary in a few families, and thus an aristocratic rather than a democratic government arose; also the cities tended to oppress the country districts. A peasant rising broke out in 1653 which was sternly suppressed, but no reforms followed. Switzerland,

therefore, at this time was not politically progressive; the country was becoming famous, and it was at Lausanne that Gibbon wrote part of his *Decline and Fall*.

The Fr. Revolution could not be without its influence on Swiss affairs, and the ideas of the revolutionaries were re-echoed in Switzerland. Fr. troops entered the country and it was soon won for the Revolution. The 'Helvetic Republic' was established in 1798. The capital was fixed at Lucerne and a new constitution was formulated. This consisted of a great council, senate, and five directors. But the Fr. government was overbearing, Geneva was annexed, and an executive committee was established instead of the Directory. The constitution was reorganised by Napoleon in 1803 with the addition of other cantons, Graubünden and St. Gall, which till then had only been associated, the rest, Aargau, Thurgau, Ticino, and Vaud, subject cantons; in some cantons the government was placed in the hands of a legislative assembly under an executive and legislative council. This constitution was really more in accordance with Swiss tradition than that of the Helvetic Republic. But this state of things was modified by the fall of Napoleon, and in 1813, on Austrian instigation, the Swiss Diet annulled the constitution. In 1814 Geneva, Valais, and Neuchâtel were raised from associateship to membership of the Association. Basel got its territory increased by the Congress of Vienna with the lands of the old prince-bp. A new constitution was formulated in 1815. Subject territories and class privileges were abolished, and each of the 22 cantons got practical autonomy. The European Powers declared Switzerland neutral, and so the Confoderation was loosed from the leader-strings of France.

The Fr. Revolution of 1830 made its influence felt in favour of recasting the constitution of the cantons. For several years there were violent quarrels between the Radicals on one side and the Catholics on the other. In 1843 a league was formed by the R.C. cantons of Uri, Schwyz, Unterwalden, Lucerne, Valais, Freiburg, and Zug, by way of protest against the suppression of the monasteries in the Prot. canton of Aargau. The league became an armed alliance in 1845, and war broke out in which the forces of the league (or Sonderbund) were defeated. Several schemes were now put forward for revising the Federal constitution. This was actually accomplished in 1848. A Council of 2 deputies from each of the 22 cantons was set up, and a National Council of elected deputies. A judicial court of 11 was likewise established. French, German, and Italian were recognised as official languages; all Christian denominations were tolerated, but members of any religious order were forbidden to enter the Confederation. Coinage, the post telegraphs, roads, canals, and railways have gradually been brought under national control. In 1857 Neuchâtel became a member of the Confederation on the same footing as the other cantons, whereas previously she had been a principality of which the king of Prussia was prince. Part of Savoy was ceded to France in 1860. The constitution was again revised in 1874 and various reforms introduced, among them the referendum and national elementary education.

Also a citizen going into another canton could in three months obtain rights in the canton where he settled. The initiative was introduced in 1891. Thus Switzerland became really a state, not merely a group of states. Centralisation if not carried so far have left her too disunited to be efficient, if carried further would have robbed her of not only her peculiar character but of her peculiar value for the Swiss themselves. Owing to the referendum and the group system of parties the government of Switzerland is directly democratic and not simply by representatives. There are really four important parties, the Liberal and Conservative being split into a moderate and extreme wing. The initiative has not resulted in very much, rather contrary to expectation. There have been several experiments in State Socialism which have tended to centralisation. The nationalisation of railways, which took place partly in 1898 and partly later, may have important effects on future strikes. In 1909 two new schemes were rejected, one for 'proportional representation,' the other for the members of the Federal Council to be elected from the country as a whole and not separately in the cantons.

Switzerland has recently become strongly protectionist, and the money acquired by the tariffs has been spent in various national works. Railways are very important economically and even politically, and the construction of several lines through the Alps has attained a vast expenditure, and cantonal rivalries are influenced by railway exploit.

Literature.—There is no Swiss language peculiar to the country, but four languages are spoken. Until 1798 all the Swiss cantons were almost entirely German speaking. The earliest vernacular lit. was that of the Minnesingers in the XIII. and XIV. cents. Various monastic chronicles are mediæval. Most learned works were until the XVII. cent. written in Lat., but Johannes Stumpf wrote a great work on Switzerland in German. Zürich was the centre of literary activity in the XVIII. cent. Literature of all sorts was written—much about Switzerland itself. Among the most famous of Swiss (writing in German in the XIX. cent.) have been Albrecht Bitzius, Jakob Burckhardt, and Gottfried Keller, all novelists.

Fr. lit. begins in the XIV. cent. Much was written in the XVIII. cent., particularly by the Huguenot refugees. Several famous men lived and wrote in Switzerland at the end of the XVIII. cent.—among them Gibbon, Voltaire, and Rousseau—though their works can hardly be said to belong to Fr. lit. Of the large subsequent Fr. lit. much has been written on the geography and history of Switzerland itself.

Ital. lit. is not so extensive—what there is consists mostly of poetry.

The Romansch and Ladin dialects of Grisons have little original lit., though some lyric poetry, but there are a fair number of translations.

Government.—Switzerland is made up of 22 cantons, which are largely independent, and is therefore a Confederation of states and not a closely centralised unity. Each canton is divided into a number of *Gemeinden* (communes) which are the units of all local government—largely, indeed, of government as a whole. Every male citizen over 20 is a member. The cantons have their own assemblies, in which a magistrate is annually elected, and also their own judicatures. The central or Federal government of the Swiss Confederation has a Council of Estates with two members from each canton, and also a National Council of representatives, elected from the whole population on the principle of one member to 20,000 inhabitants. The two houses elect the Federal executive of seven members, the president, and vice-pres. There is a Federal Supreme Court. The present system of Federal government only dates from about 1848.

The annual receipts and expenditure are about £5,000,000. The relation of Church and State varies in different cantons, either Catholicism or Protestantism being established; in some both.

Education.—Primary education is free and compulsory, and is administered separately in each canton. The 'religious question' is solved by the majority in any one commune teaching their religion. Secondary schools, as they are called, are generally free, but above these are 'middle schools,' corresponding to our grammar and technical schools. Switzerland has seven univ's, which are supported by the cantons.

Army.—Military service is compulsory from 20 to 40 years of age. Recruits have to pass a medical and gymnastic examination. The length of training varies in the different arms, in the first year from 65 to 90 days. Men serve 12 years in the *Elite*

(*Auszug*), 8 in the *Landwehr*, and 8 in the Reserve. The training in each is only for a few days a year. The total in 1911 was about 211,567 (Élite and Landwehr), and the cost nearly £1,720,000. Certain taxes have to be paid by those who are for any reason exempt from service.

Baker, *The Model Republic* (1895); Crawford, *Switzerland of To-day* (1911); Dawson, *Social Switzerland* (1897); MacCrackan, *The Rise of the Swiss Republic*.

SWORD is the most ancient of all weapons now in use, and in the hands of an expert, against sword or bayonet, it takes the place of armour as well as proving a means of attack. The heavy infantry ('hoplites') of the Greeks used the s. as well as the spear. A short cut and thrust s. was the common weapon of the Rom. legion. The Norman invaders of England overcame with s.-thrusts the host of Harold, who fought with bills and practised a cleaving stroke; yet the cutting sword has always been favoured by Oriental armies. Damascus, in Syria, was famous for its steel, which was kept in a magazine for the making of s's. Solingen and Toledo were noted for blades for duelling purposes. The s. is found in many types, *e.g.* the sabre, the cutlass, the rapier.

Sir R. Burton, *Book of the Sword* (1884).

SWORD-FISHES (*Xiphiidæ*), family of bony fishes, containing six species; remarkable on account of their 'sword,' an enormous prolongation of the upper jaw, which forms an effective weapon of attack; distributed in warm seas throughout the world, and generally found in open waters following schools of mackerel; flesh considered excellent food.

SWYNFORD, KATHARINE (*c.* 1350–1403), mistress, afterwards wife, of John of Gaunt, and mother of Beauforts (*q.v.*).

SYAGRIUS (d. 487), Rom. gov. of Gaul, 464–86; defeated by Clovis at Soissons, and fled, 486.

SYBARIS (40° 22′ N., 18° 10′ E.), ancient city, on Gulf of Tarentum, Magna Græcia; founded by Achæans, 720 B.C.; famed for its wealth and luxury, hence term *Sybarite*, a voluptuary.

SYBEL, HEINRICH VON (1817–95), Ger. historian; b. Düsseldorf; ed. Berlin; prof. at Bonn, Marburg, Munich; app. director of Pruss. Archives, 1875. S. took an active part in politics; wrote *Geschichte des ersten Kreuzzugs*, *Die Entstehung des Deutschen Königtums*, *Geschichte der Revolutionszeit*, *Die Begründung des Deutschen Reiches durch Wilhelm I.*, etc.; founded the *Historische Zeitschrift*.

SYCAMORE (*Sycomorus*), genus of trees, order Moraceæ; Egyptian S. (*Ficus Sycomorus*) is grown as a shade. See MAPLE, PLANE.

SYCON, see under SPONGES.

SYCOPHANT (Gk. *sukophantes*, etymology doubtful), one who brought a public charge against another, generally with a view to pecuniary advantage. The system arose from the fact that, by the Athenian constitution, any citizen could act as public prosecutor, but it became open to abuse, although restrictions against blackmail, etc., existed. In modern usage, a flatterer or parasite.

SYDENHAM, southern suburb, Lewisham, London; near it is the Crystal Palace.

SYDENHAM, THOMAS (1624–89), Eng. physician; b. Wynford Eagle, Dorsetshire; fought for Parliament in Civil War; afterwards studied at Montpellier, and practised med. in London, bei licensed in 1666; grad. M.D. of Pembroke Ha Cambridge, 1676. S. wrote *Observationes Medicæ*, a treatise on fevers, works on various other diseases, particularly gout, on which he was an authority, and *Processus Integri*, an outline of pathology and therapeutics. He is most famous for his ideals of practice, his conceptions of the physician's first duty being to get his patient well, and his methods, watching and assisting nature's efforts, treating chronic diseases by changing the patient's dietary and mode of life, and paying little attention to contemporary theories.

SYDNEY.—(1) (33° 52′ S., 151° 14′ E.) chief town, New South Wales, Australia; situated on Port Jackson, one of the finest natural harbours in the world; newer part is regularly laid out with wide streets and fine public buildings, including the governor's residence, National Art Gallery, fine library, museum; seat of univ. (1850); has Anglican and R.C. cathedrals; fine system of parks; there are natural deep-water frontage and wharves, and S. is chief station of Brit. navy in southern hemisphere; outlet for great coal-field; manufactures joinery-ware, coaches, wagons, machinery, iron goods, tweeds; climate very healthy. Pop. (1911) 636,353. (2) (64° 6′ N., 60° 11′ W.) seaport town, Cape Breton, Nova Scotia; coal-mining industries. Pop. (1911) 17,617.

SYENITE, a granitoid igneous rock of deep-seated origin; composed of hornblende and orthoclase felspar, and sometimes traces of quartz, oligoclase, sphene, and zircon; found in veins and bosses in Upper Egypt. The ancients obtained it from Syene, hence name.

SYLHET (24° 53′ N., 91° 54′ E.), town, on Surma, capital, Sylhet district, Assam, India. Pop. 16,000; (district) 2,260,000.

SYLLABUS (outline or scheme), *Syllabus errorum*; document pub. (1864) by Pius IX. appended to encyclical *Quanta cura*, condemning 80 'principal errors of our time'; mainly concerned with pantheism, naturalism, rationalism, indifferentism, socialism, communism, secret societies, liberalism, the temporal power, civil society, marriage, and ethics; not universally held to be *de fide*.

SYLLOGISM, process by which from two propositions (premises) containing a common term as the bond of connection, we pass to a third proposition (conclusion), the truth of which follows from the truth of the premises. Every syllogism must contain a universal proposition, whence the reasoning is from the more to the less general; this is deduction as distinguished from induction, where we reach a more general proposition. See LOGIC.

SYLT (54° 54′ N., 8° 21′ E), island, North Sea, belonging to province Schleswig-Holstein, Prussia.

SYLVESTER, JAMES JOSEPH (1814–97), Eng. mathematician; b. London; ed. Liverpool and Cambridge; second wrangler, 1837; app. Savilian prof., Oxford (1883). Author of numerous and brilliant papers on mathematical analysis, especially theory of invariants, reciprocants, etc.

SYLVIIDÆ, WARBLERS (*q.v.*).

SYME, JAMES (1799–1870), Scot. surgeon; b. Edinburgh; ed. Edinburgh High School and Univ.; established Minto House Hospital, where he put into practice his method of clinical lecturing, the patients being brought into a lecture-room in front of the students, who took notes of the cases; had a large surgical practice, and was app. (1833) prof. of Clinical Surgery at Edinburgh Univ.; when Liston went to London (1835) was recognised as the leading surgeon in Scotland; author of many surgical works, and greatly promoted surgical and medical education.

SYMMACHUS, Rom. family of *gens Aurelia* (fl. IV.–VI. cent's A.D.); QUINTUS AURELIUS S. (*c.* 340–402), consul, 391, was noted for eloquence and old Rom. spirit; works often show turgid rhetoric. Descendants held curule offices till execution of historian, Q. AURELIUS MEMMIUS S., 525.

SYMONDS, JOHN ADDINGTON (1840–93), Eng. poet and critic; b. Bristol. Of a very delicate constitution, his studies were prosecuted with a severe physical strain. His *magnum opus* was an exhaustive study of the *Renaissance in Italy*, pub. in 7 volumes.

SYMOND'S YAT, hill (740 ft.), on Wye, 4¼ miles N.W. of Monmouth, England; noted view-point.

SYMPATHETIC INKS, see INK.

SYMPATHETIC SYSTEM, see NERVOUS SYSTEM.

SYMPHONY, a composition for full orchestra consisting of several movements (*e.g.* adagio, allegro,

andante, scherzo, finale); in the XVII. cent. term applied to purely orchestral parts of masses, cantatas, operas, etc., also to overtures and ritornelli. See HAYDN, MOZART, BEETHOVEN, SCHUMANN.

Symphonic Poem, TONE POEM (*poème symphonique, tondichtung*), an orchestral composition, generally in one movement, expressing a poem or literary idea, *e.g.* Strauss' *Don Juan*, Saint-Saens' *Roust d'Omphale*, Tschaikowsky's *Manfred*, Elgar's *Cockaigne*, and Debussy's *L'Après-Midi d'un Faune*. The term was first used for Liszt's twelve *Symphonische Dichtungen*.

SYNAGOGUE, a religious assembly of the Jews, as distinct from the Temple; dates from about time of Ezra; now used of place of worship.

SYNAGOGUE, UNITED, London Jewish society incorporated, 1870: centre of work for Eng. Jews.

SYNASCIDIA, suborder of TUNICATA (*q.v.*).

SYNAXARIUM, term for martyrology (*q.v.*) in Eastern churches.

SYNCARIDA, see under MALACOSTRACA.

SYNCARPOUS, see FLOWER.

SYNCELLUS, chaplain of Gk. bp.

SYNCOPE, heart failure. See DEATH.

SYNCORYNE, see under HYDROMEDUSÆ.

SYNCRETISM, union of conflicting principles on the basis of some common ground; denotes principles of a Lutheran sect in the XVII. cent., under Calixtus, aiming at agreement between Lutherans and the Reformed, through common tenets; came to imply indifferentism through opposition of Catholics.

SYNDERESIS, scholastic term meaning innate power towards good.

SYNDICALISM aims at control of the means of production by trade unions; socialism is political. S. is opposed to parliamentary reform; its weapon is the general strike, which will compel capitalism to hand over control of industry to the workers. See books by J. Ramsay Macdonald and by J. H. Harley.

SYNDICATE, company of persons formed to promote a business or undertaking, cf. TRUST (*q.v.*).

SYNESIUS (373–414), elected bp. of Ptolemais, 410, when still a pagan; philosopher, but was unsuccessful; wrote oration *On Kingship* and other works.

SYNGE, JOHN MILLINGTON. See DRAMA (p. 495).

SYNOD, term for various ecclesiastical assemblies.

SYNTHESIS.—(1) The act of putting together; (2) the resulting combination; opposed to analysis. Mental s.—(1) The act of mentally combining, *e.g.* in comparison; (2) the mental combination.

SYPHILIS, an infective disease due to a specific micro-organism, the *Spirochæte pallida*, which is a microscopic thread-like spirilla, infection taking place either by direct contact, most commonly in sexual intercourse, although other modes of infection are not unknown, such as touching infected articles or in the medical examination of syphilitic patients, *acquired s.*; or the disease may be due to infected persons transmitting it to their children, *inherited s.*

There are three stages of the disease, the FIRST STAGE lasting from four to eight weeks, and including the period of incubation, usually about three or four weeks, the development of the primary lesion, which is a hard, shiny nodule, becoming later a sharply cut ulcer with a hard base, accompanied by the swelling of the nearest lymphatic glands.

The SECOND STAGE lasts from one to two years, the general health may not be affected, or the patient may be feverish, anæmic, there may be headache, loss of appetite, and a feeling of tiredness; a rose-coloured rash usually appears on the skin, becoming brownish, and then disappearing, and followed by a scaly, papular eruption, which may less commonly become pustular; whitish, rather sodden-looking, raised papules termed *condylomata* may occur in such positions as the corners of the mouth, the arms, or external genitals; the hair becomes dry and brittle, and may fall out, and the nails also become brittle and easily broken; there are frequently mucous patches and ulcers on the mucous membrane of the mouth and throat, while the eyes may be affected, most commonly with *iritis*, the bones or joints may be affected, and the blood vessels are affected by proliferation of their internal lining, or *endarteritis*, so that they are narrowed.

The THIRD STAGE of the disease has no time limit, and occurs generally only in such persons as have neglected the treatment of the disease, or whose powers of resistance to the virus is weak through debility; the chief characteristic is the development of granulation tissue, usually as a definite tumour-like mass termed a *gumma*, or the granulation tissue may infiltrate through the connective-tissue of an organ; the gumma usually becomes soft in the centre, and, if on the surface, may develop into an ulcer.

The treatment of s. differs in the various stages, and few diseases are so amenable to treatment if it is properly carried out. In the first stage the primary lesion has applied to it a dusting powder of zinc carbonate and calomel, but if it is ulcerous it has a dressing of 'black wash,' while mercury is administered by the methods mentioned below. In the second stage the person affected should have a nourishing diet and plenty of fresh air, and mercury is administered either by the mouth (in the form of grey powder or the liquid perchloride), or by inunction (rubbing it into the skin in the form of an ointment), or by injection (an oily emulsion injected into the muscles of the buttock); in addition the mouth should be rinsed and the throat gargled with an antiseptic mouth-wash.

Ehrlich has recently introduced the compound dioxy-diamido-arseno-benzol, also termed *salvarsan* or *606*, for the treatment of s. in the first, second, or third stages; it is a yellowish powder, which is dissolved, diluted, and injected intravenously, and causes a rapid disappearance of the manifestations of the disease, the spirochætes disappearing completely in from twenty-four to thirty-six hours; it is not, however, suitable for the treatment of all cases, and, being of a poisonous nature, requires careful administration in the hands of skilled medical men. In the third stage of the disease the drugs employed are either, as just noted, salvarsan, or potassium iodide, which causes absorption of the gummata or the infiltrations of granulation tissue; an ulcerating gumma should have a dressing of 'black wash' applied to it, while the general health should be looked after as in the second stage. Potassium iodide has a depressing effect, to neutralise which ammonium carbonate is prescribed along with it, while in cases where the system cannot tolerate the potassium iodide, sodium or ammonium iodide is administered in its place.

Inherited s. is manifested by a discharge in the nasal passages causing 'snuffles,' by the typical skin eruptions and condylomata, inflammation and mucous patches of the mouth, throat, and nose, swelling of the ends and thickening of the long bones, and the joints or eyes may be affected. At a later stage there may be gummata, the teeth are typically notched and peg-shaped, the nose has a sunken bridge (saddle-nose), and there may be a haziness of the cornea of the eye due to keratitis. The treatment is the administration of mercury (grey powder internally and mercury ointment externally, *e.g.* rubbed on the infant's binder), salvarsan, in smaller amount than in the cases of adults, and treatment of the general health with cod-liver oil and iron.

SYRA, SYROS (37° 26′ N., 24° 55′ E.), island of the Cyclades, Greece; rocky, mountainous; exports sponges. Pop. 18,150. Chief town, Hermoupolis.

SYRACUSE:—(1) (37° 3′ N., 15° 15′ E.) ancient city, on E. coast of Sicily, founded by Corinthians, 733 B.C.; at first the settlers only occupied small island of Ortygia, but later extended area gradually till it included the quarters of Achradina, Tyche, Neapolis, and Epipolæ; grew steadily in power and splendour until it became chief Gk. city in the W.; earliest history is not fully known; in V. cent. Gelo of Gela

established tyranny, and under him the city increased in strength and prosperity; at Himera he defeated the Carthaginians. His successor, Hiero, encouraged art and culture; during democratic period which followed, famous Athenian siege took place, when, after hard struggle for two years, the Syracusans completely defeated the Athenians (415–413 B.C.); despotic government restored by Dionysius the Elder, who enlarged city and constructed fortifications, docks, and warships. S. was now at zenith of its greatness; reigns of next two tyrants were unsettled, but peace and liberty were restored by Timoleon, 343 B.C. Agathocles revived tyranny in 317 B.C. The city prospered greatly in long reign of Hiero II., who established friendliness with Rome; his grandson, Hieronymus, joined Carthaginians against Rome and so helped to bring on celebrated siege (214–212 B.C.), which resulted in destruction of S. by Romans; many of the finest works of art were carried off by the enemy, and S. became subject to Rome; though city never recovered its greatness, it still continued to be centre of art and culture; in 878 A.D. S. was plundered by Saracens, and since then has been of very little importance.

Ruins of ancient S. are extensive and of great interest; among most notable are two Doric temples (cath. built into one in 640 A.D.); fountain of Arethusa; Agora, with remains of Rom. colonnade; vast fortress, believed to be Euryalus; Necropolis, containing hundreds of tombs; Christian catacombs, Gk. theatre, Rom. amphitheatre, Olympieium, foundations of great altar of Hiero II., quarries, aqueducts, ancient roads, Rom. houses, and many other buildings; church of San Giovanni (XII. cent.) is one of finest mediæval remains.

Modern S., capital of province of S., mainly occupies Ortygia, which is now an isthmus; streets are mostly crooked and dirty; exports fruits, wine, and oils. Pop. (1911) 40,587; (province) 476,991.

(2) (43° 2′ N., 76° 10′ W.) city, on Erie and Oswego Canals, midway between Albany and Buffalo, New York, U.S.A.; public buildings include Federal Government building, city hall, free library, and various philanthropic institutions; seat of Methodist Episcopal Univ. (1870); fine system of parks; great railway centre; has well-known brine springs, but the production of salt is less important than formerly; manufactures typewriters, boilers, engines, machinery, iron and steel goods, saddlery, boots. Pop. (1910) 137,249.

SYR-DARYA.—(1) (44° N., 65° E.) province, Russ. Turkestan, bordering Sea of Aral; includes part of the Tian-shan range and Karatau chain; traversed by the Syr-Darya; generally infertile; inhabitants mainly Kirghiz; pursuits chiefly pastoral. Pop. (1910) 1,858,200. Capital, Tashkend. (2) JANARTES (46° N., 61° 25′ E.), river, W. Turkestan, Asiatic Russia; has its source in Tian-shan Mts., flows W. and N.W. through Ferghana and Syr-Darya, and enters Sea of Aral by three channels; has a length of *c.* 1600 miles, and drains an area of *c.* 325,000 sq. miles; joined by many tributaries.

SYRIA (*c.* 31° to 37° 30′ N., 34° 15′ to 39° 45′ E.), part of Turkish Empire in Asia, generally understood to extend from Mt. Taurus in N. to Arabian Desert in S., and from Levant in W. to Euphrates and Syrian Desert in E. This region, *c.* 114,530 sq. miles, includes Palestine and Phœnicia (*qq.v.*), and some of the most ancient cities of the world. Surface generally is elevated; the Lebanon and Anti-Libanus mountain-ranges extend along Mediterranean coast; E. of these is a plateau which slopes gradually downwards to the eastern desert; chief river is the Jordan, which flows through a deep valley running N. and S. through Palestine; lakes include Dead Sea and Sea of Galilee. Damascus, the chief city, is mentioned in Abraham's time, and, though situated near border of desert, lies among gardens and orchards and still remains centre of great caravan trade with Persia and the East. Aleppo, Beirut, and Jerusalem also continue to flourish, but Tyre and Sidon have sunk into obscurity.

Syria belonged partly to Egyptians, partly to Hittites, about middle of II. millennium B.C.; Phœnicians became powerful a few cent's later, and a kingdom was founded by the Hebrews; country came successively under the domination of Assyria, Babylonia, Persia, Macedon, the Seleucids, Rome, Byzantium, and the Arabs; it was taken by Turks in 1516.

Chief ports are Jaffa, Acre, and Beirut. Syria produces wheat, olives, grapes, and other fruits; sheep and goats are raised; exports silk, cereals, fruit, olive oil. Inhabitants are mostly Muhammadans, but in Palestine there is an increasing number of Jews, and near Mt. Lebanon a sect of Christians called Maronites. Pop. *c.* 3,675,000.

SYRIAC LANGUAGE is the Eastern dialect of Aramaic, which was prevalent in Mesopotamia and the surrounding territory, and was used by many early Christian writers. The language is much more elastic than Hebrew, owing probably to the influence of the more flexible Gk. tongue, from which Syriac also borrows a large portion of its vocabulary; alphabet differs slightly from Hebrew; the accent shifts from last syllable to penultimate. S. is now dead, and remains chiefly in ecclesiastical writings.

SYRINGE, cylindrical instrument having nozzle at one end; fitted with piston; place nozzle in water, draw back piston, and atmospheric pressure forces water to follow piston. Force down piston to eject water.

SYRNIUM, TAWNY OWL, see under OWLS.

SYRPHIDÆ, see HOVER-FLIES.

SYRUP, see SUGAR.

SYRUS, EPHRAEM, see EPHRAEM SYRUS, ST.

SYZRAN (53° 13′ N., 48° 37′ E.), town, Simbirsk, Russia; manufactures leather; active commerce. Pop. (1910) 41,300.

SZABADKA, MARIA THERESIOPOL (46° 8′ N., 19° 42′ E.), town, Bacs-Bodrog, Hungary; agricultural centre. Pop. (1910) 94,618.

SZALAY, LADISLAS (1813–64), Hungarian patriot who wrote early history of Hungary (pub. 1856–60).

SZARVAS (46° 52′ N., 20° 34′ E.), town, on Körös, Hungary; horse fairs. Pop. (1910) 25,879.

SZATMAR-NEMETI (47° 49′ N., 22° 51′ E.), town, on Szamos, Hungary; cathedral; pottery, wine. Pop. (1910) 34,892.

SZÉCHENYI, ISTVAN, COUNT (1791–1860), Hungarian soldier and statesman; one of founders of Hungarian academy, Danube navigation company, and other schemes for developing Hungary; political caution led him to oppose Kossuth; minister of ways and communications after revolution, 1848.

SZE-CH'UEN (29° 50′ N., 104° 20′ E.), largest province of China, in centre of W.; area, 218,480 sq. miles; surface mountainous, reaching an extreme height of *c.* 19,000 ft.; drained by Yang-tse-kiang and its affluents Min, Kialing, and Fu-sungho; capital, Cheng-tu; Chung-king is a treaty port on the Yang-tse-kiang; soil fertile; produces oil, sugar, tea, cotton, opium, tobacco, rhubarb, white wax, silk; minerals include coal, iron, salt, copper, zinc. Pop. (1911) *c.* 16,392,105.

SZEGED, SZEGEDIN (46° 16′ N., 20° 10′ E.), town, at junction of Theiss and Maros, capital, County Csongrad, Hungary; manufactures soap, cloth, leather; held by Turks from 1541–1686. Pop. (1910) 118,328.

SZÉKESFEHÉRVÁR, STUHLWEISSENBURG (Lat. *Alba Regalis*) (47° 10′ N., 18° 24′ E.), town, Hungary; cathedral; was place of coronation of Hungarian kings from X. to XVI. cent's; trade in horses, wine. Pop. (1910) 36,625.

SZENTES (46° 40′ N., 20° 16′ E.), town, on Theiss Hungary; wine. Pop. (1910) 31,593.

SZOLNOK (47° 10′ N., 20° 12′ E.), town, on Theiss, Hungary; thread, tobacco, salt. Pop. (1910) 28,778.

SZOMBATHELY, STEINAMANGER (47° 12′ N., 16° 36′ E.) (Rom. *Sabaria*), town, capital, County Vas, Hungary; cathedral; Rom. antiquities; manufactures agricultural machinery. Pop. (1910) 30,947.

T, 20th letter of alphabet; a dental mute; derived from Semitic *tau*, a 'cross.'

TAAFE, Irish-Austrian family; Irish knight, Sir John T., cr. viscount, 1628, was f. of royalist, Theobald, cr. Earl of Carlingford, 1661; Francis, 3rd earl (1691), count of Holy Rom. Empire, was prominent European figure; earldom became extinct, 1738, while viscounty descended to Nicholas, Count T. (Germany), imperial field-marshal and chamberlain; family continue important in Austria, of which 11th viscount, Edward Francis Joseph, Count von T., was premier, 1879–93.

TAAL (13° 50′ N., 120° 50′ E.), seaport, on Balayan Bay, Batangas, Luzon, Philippine Islands; agricultural produce. Pop. 20,000.

TABACO (13° 15′ N., 123° 50′ E.), town, on Gulf of Tabaco, Albay, Luzon, Philippine Islands. Pop. 23,000.

TABANIDÆ, see Gad-Flies.

TABARI (838–923), Arab. scholar who wrote important annals and commentary on Koran.

TABASCO (17° 20′ N., 92° 40′ W.), maritime state, Mexico; surface generally low, forest covered and marshy, soil fertile. Pop. (1910) 187,574. Capital, San Juan Bautista.

TABERNACLE, sacred tent traditionally erected by Moses for the worship of Jehovah in the wilderness; it was divided into a 'holy place' and a 'holy of holies' (wherein lay the ark containing the two tables of stone). According to the critical view a tabernacle such as this was impossible in early times. It was certainly realised in Solomon's temple.

Tabernacles, Feast of, agricultural feast of Judaism, ranking with Pentecost and Passover as three greatest; its origin may be Canaanitish. F. of T. is connected with harvest, and was specially a time of joy. One part of its celebration was to dwell in booths, a custom some Jews still attempt to follow.

TABES DORSALIS, Locomotor Ataxia (*q.v.*).

TABLE, originally flat stone, then of wood or metal. Greeks and Romans reclined at meals and used low t.; cumbrous mediæval t. replaced by 'flap-t.' with hinged sides; legs elaborately shaped and carved; with use of mahogany gradually came more massive types.

TABLE MOUNTAIN (33° 58′ S., 18° 24′ E.), mountain (3550 ft.), Cape Colony, overlooking Cape Town and Table Bay; named from its peculiar shape and flattened summit.

TABLETS, WRITING, see Palæography.

TABLE-TURNING, name given to movement of a table on which people seated around put their hands, supposedly due to spiritual action, really to automatism of the people.

TABOO, Polynesian word meaning 'sacred, sanctified,' also with the opposite significance 'impure' or 'unclean'; these two apparently opposite conceptions are really the same, as, specially among savage peoples, various objects are thought to possess supernatural qualities. A supernatural force, *mana*, may be in a thing naturally, or it may be got by contagion from some other thing. Thus certain foods are forbidden, or, if partaken of, have a bad effect, and men, having eaten what was forbidden, and finding out their mistake, have died of fright. Purity was at first ceremonial, not physical or moral.

T. is often royal or priestly, and a king is hedged about with a complicated ritual. He is forbidden to do anything which might injure the crops, of which he is imagined to be the protector. Often t. is permanent, but that which has been acquired can be cast off by lustration.

T. is found all over the world, and exists, too, in the higher forms of religion, *e.g.* Judaism. The ritual law is largely concerned with t., though the term has come to be associated rather with the Gentile religions; thus certain animals were forbidden as food, ritual uncleanness was acquired by the touch of a corpse, certain diseases, etc.

Robertson Smith, *Religion of the Semites*; Frazer, *The Golden Bough*.

TABRIZ, Tauris (38° 2′ N., 46° 12′ E.), town, capital, Azerbaijan province, Persia; most notable architectural features are the citadel and the 'Blue Mosque'; important transit trade; several times destroyed by earthquakes. Pop. *c.* 195,000.

TACHEOMETRY, a system of rapid surveying in which the positions of points are measured in regard to one another by means of a theodolite, the size of which depends on the nature of the work, and a pole which is marked with heights from its base to top. This is held by a man at the required spot, while the observer determines the difference between the uniform level and the level of the pole.

TA-CHIEN-LU, Ta-tsien-lu (30° N., 120° 20′ E.), town, Sze-chuen, China.

TACHYLYTE, a natural glass, formed by rapid cooling of molten basalt; black and dark brown, with a greasy appearance like pitch; very brittle; occurs in basaltic obsidians in dikes, veins, and intrusive masses.

TACHYPETES, Frigate Bird (*q.v.*).

TACITUS, MARCUS CLAUDIUS (d. 276 A.D.), Rom. emperor, 275–76; patron of lit.

TACITUS, PUBLIUS, or **CAIUS CORNELIUS** (*c.* 55–*c.* 120), Rom. historian; s.-in-law of Agricola; quæstor, 79; prætor, 88; consul, 97; nothing known of family, and little of private life, but intimate friend of younger Pliny, and held favour of successive emperors; orator of best type, but chiefly famed for literary work; writings, besides hist. value, are among prose masterpieces. *Life of Agricola*, written *c.* 76, giving account of Britain, is model biography; *Germania* (*c.* 98) is political treatise of which hist. part bears some traces of being merely hearsay; *Annals*, account of events, 14–68, part lost; *Histories*, events, 69–97, greater part destroyed. Style shows marked Vergilian influence.

TACNA (19° S., 70° W.), province, Chile, bordering Peru; largely occupied by desert; nitrate of soda, silver, copper obtained. Pop. 43,000. Capital, **Tacna** (17° 59′ S., 70° 16′ W.), on Tacna; scene of victory of Chilians over Peruvians and Bolivians, 1880. Pop. *c.* 14,000.

TACOMA (47′ 12° N., 122° 19′ W.), city, on Puget Sound, capital, Pierce County, Washington, U.S.A.; railway terminus and one of most important seaports on N. Pacific coast; excellent harbour; exports lumber, flour; large smelting-works; seat of University of Puget Sound. Pop. (1910) 83,743.

TACTICS.—The manœuvres by which a general seeks to defeat his enemy in battle are called Grand T., the methods of fighting adopted by the several arms and units are called Minor T. The two broad principles on which Grand T. are based are that a superior force can surround an inferior one by dispersing its units (*envelopment*), and that an inferior force kept together can break through a cordon at its centre (*penetration*). All battles are won, when skill is employed at all, by the application of these principles to situations created by ground, weather, morale, and equipment. An inferior force will generally allow its opponent to take the initiative, and will act defensively until an opportunity occurs to deliver its counter-attack

(*e.g.* Wellington at Salamanca). The battle formations of armies at various epochs tend to show which principle was in vogue: linear formations favoured envelopment, column formations favoured penetration. Similarly envelopment implies great reliance on fire action, penetration on shock action.

The general having formed his plan of battle must distribute his troops so that each arm may develop its characteristics. Cavalry desires to display its mobility, artillery its destructive power at long ranges, and infantry its capacity for coming to grips with the enemy. The three arms must co-operate. Infantry will discover a target for artillery, while the artillery bombardment in its turn enables the infantry to get to close quarters. Cavalry is the weapon of opportunity, and will exploit any situation in which the enemy can be taken at a disadvantage. Finally, the general must retain a reserve with which to deliver a decisive blow at any point discovered to be vulnerable. The combinations are infinite in variety, and, as tactical situations change rapidly, the field telegraph and telephone are utilised to convey information to the rear, and orders to the front, of a battlefield which covers many square miles.

TADORNA, Sheld Duck; see under Duck Family.

TADPOLE, see Frogs.

TAEL.—(1) Chin. weight (also called *liang*) = 1⅓ oz. avoirdupois by treaty. (2) Chin. silver coin—value 2s. 10⅝d. A Haikwan (*i.e.* Customs) tael weighs 575·642 grains; a K'up'ing (*i.e.* Treasury) tael weighs 581·47 grains, and is now standard scale.

TÆNIA, a Tapeworm (*q.v.*).

TAFILALT, Tafilet (31° 10′ N., 2° W.), oasis, Morocco; noted for its dates. Pop. *c.* 95,000. Chief village, Abuani.

TAFT, WILLIAM HOWARD (1857–), 27th Pres. of U.S.A.; Solicitor-Gen., 1890; circuit judge, 1892; dealt severely with railway strikers, 1894; administered Philippines, 1900–4, and skilfully established new civil government, 1901; Sec. for War in Roosevelt Cabinet, 1904; Republican nominee at elections, 1908; Pres., 1909, elected by large majority; mainly through Roosevelt's influence; Payne-Aldrich Act, tariff reform measure, passed, 1909; pledged to discountenance abuses of Trusts, etc.; stood for re-election, 1912, but was defeated by Dr. Woodrow Wilson (*q.v.*); Professor at Yale University, 1913.

TAGANROG (47° 13′ N., 38° 56′ E.), seaport, on Sea of Azov, Don Cossacks, Russia; bp.'s see; exports grain; tanneries; bombarded by the Anglo-Fr. fleet, 1885. Pop. (1910) 70,330.

TAGLIACOZZI, GASPARO (1546–99), Ital. surgeon; prof. of Surgery, later of Anatomy, at Bologna; author of once famous work on surgery.

TAGLIACOZZO (42° 5′ N., 13° 14′ E.), town, Aquila, Italy; scene of defeat, Charles of Anjou by Conradin, 1268. Pop. (commune) 9500.

TAGLIONI, MARIA (1804–84), famous Ital. dancer.

TAGUS (38° 40′ N., 9° 18′ W.), largest Span.-Portug. river; rises in Sierra de Abarracín, passes Aranjuez, Toledo, Abrantes, Santarem; enters Atlantic Ocean at Lisbon; length, 550 miles; navigable to Abrantes.

TAHITI, Otaheite (17° 44′ S., 149° 28′ E.), largest of Society Islands, Pacific Ocean; belongs to France; area, 600 sq. miles; irregular in shape and of volcanic formation. Surface is mountainous, reaching extreme height of 7340 ft.; surrounded by coral reefs; fertile lands along coast; chief town, Papeete; produces bread-fruit, oranges, bananas, and other fruits, sugar, coffee, cocoa, vanilla, cotton; principal exports are copra, pearl-shell, vanilla, cocoanuts. The native inhabitants belong to the Polynesian group; most of them have been converted to Christianity by R.C. and Protestant missionaries. T. came under French protection 1843, and became a Fr. colony 1880. Pop. 11,691.

TAILLE, Fr. tax imposed on the ordinance of the States-General, 1439, as a land tax (or in some cases on presumed profits of land) for support of standing army. The nobles were exempt, and the tax became merged in general revenue. By the XVIII. cent. practically all were exempt except the agriculturists, upon whom it fell with excessive harshness.

TAILLESS HARES, see Picas.

TAILOR, cutter and maker of clothes; in mediæval times formed guilds, *e.g.* Merchant Taylors Company. Nowadays much sweated labour in connection with tailoring.

TAIN (57° 48′ N., 4° 3′ W.), town, on Dornoch Firth, Ross and Cromarty, Scotland.

TAINE, HIPPOLYTE ADOLPHE (1828–93), Fr. historian and critic; b. Vouziers, in the Ardennes; studied at the *École Normale*, Paris; early evolved plan for scientific treatment of hist. events; idea not new, but T. was first to insist on its application; he expounded the theory in his *Histoire de la Littérature Anglaise* (1864); weak point was that moral side was left out; this the author felt and tried to introduce it in his æsthetic studies, *Travels in Italy* (1866), *The Ideal in Art* (1869), and in his great hist. work, *Origines de la France contemporaine* (1876–90), for first time analyses minutely causes of Fr. Revolution; other works are the essays on Livy, Fr. philosophers of XIX. cent., criticism, history, and on La Fontaine; admirable concise writer, whose influence will be lasting.

T'AIPING REBELLION, see China (History).

TAIREN, Dalny (38° 57′ N., 121° 34′ E.), seaport, on Talienwan Bay, Manchuria; large commerce; taken by Japanese, 1904. Pop. 43,000.

TAIT, ARCHIBALD CAMPBELL (1811–82), abp. of Canterbury; b. Edinburgh, and brought up a Presbyterian; ed. Glasgow Univ., and Balliol, Oxford. Headmaster of Rugby, 1842; bp. of London, 1856; supported Divorce Bill, 1857, Irish Church Disestablishment, Public Worship Regulation Act (against ritualists), 1874, and Burials Bill, 1880. Opposed use of Athanasian Creed in public service; abp., 1869.

TAIT, PETER GUTHRIE (1831–1901), Scot. physicist; b. Dalkeith; senior wrangler and Smith's prizeman, Cambridge, 1852; prof. of Math's, Belfast, and later, of Natural Philosophy, Edinburgh; works on *Properties of Matter* (1885), and, with Kelvin, *Treatise on Natural Philosophy.* His s., **Lieut. F. G. Tait** ('Freddie Tait'), the noted golfer, was killed in S. African War.

TAIWAN, see Formosa.

TAJ MAHAL, see Agra, Shah Jehan.

TAJIK, Parsiwan, Afghan, possibly Aryan, race, scattered over rural Asia; dull and brachycephalic.

TAKHTSINGJI (1858–96), Maharaja of Bhaunagar, India; introduced Western institutions, and maintained friendship with Britain.

TAKLA MAKAN (39° N., 83° E.), W. section of the Gobi Desert, lies N. of the Kuen-lun ranges and is bordered N.W. and E. by the Tarim River, Chin.-Turkestan; area, 115,000 sq. miles.

TAKU FORTS (38° 58′ N., 117° 40′ E.), on Pei-ho, Chi-li, China; taken by European Allies, 1900.

TALAVERA DE LA REINA (39° 55′ N., 4° 45′ W.), town, on Tagus, Toledo, Spain; Rom. and Moorish relics; scene of defeat of French by Wellington, 1809. Pop. 10,800.

TALBOT, family of Welsh descent; John, first Earl of Shrewsbury (*c.* 1388–1453), spent the greater part of his life in the Fr. wars.

TALBOT OF HENSOL, Charles Talbot, 1st Baron (1685–1737), Eng. lord chancellor; of family of Earls of Shrewsbury; patron of Thomson and Butler.

TALC, soft, soapy-feeling, silver-white, or greenish mineral, silicate of magnesium, with traces of potash, alumina, etc.; sometimes with slaty structure and sometimes transparent, with a pearly lustre; a lubricant; a variety, Steatite or Soapstone, is used as tailors' chalk.

TALCA (35° 5′ N., 71° 55′ W.), province, Chile; fertile; manufactures woollens. Pop. 135,000. Capital, **Talca.** Pop. 40,000.

TALCAHUANO, Talcaguano (36° 48′ S., 73° 5′ W.), seaport, on T. Bay, Concepción, Chile. Pop. 16,000.

TALENT, Gk. weight; varied in different states; Attic t. *c.* 58 lb.; value in silver about £211; Æginetan t., commercial measure of weight; term also used for sum of money.

TALGARTH (51° 59′ N., 3° 14′ W.), market town, Brecknockshire, Wales.

TALIENWAN (39° N., 121° 50′ E.), bay, on E. coast, Liaotung Peninsula, Manchuria; important in Russo-Japanese War.

TALISMAN, an astrological charm, usually a figure engraved upon stone or cast in metal; cf. modern 'mascot'; one of most notable, the Abraxas Stone.

TALLADEGA (33° 26′ N., 86° 10′ W.), city, capital, Talladega County, Alabama, U.S.A.; cotton manufactures. Pop. (1910) 5854.

TALLAGE, tax levied by Eng. kings on royal cities, boroughs, and demesnes; abolished, 1340.

TALLAHASSEE (30° 16′ N., 84° 18′ W.), city, winter resort, capital, Florida state, U.S.A., and of Leon County; seat of Florida state college; cotton manufactures. Pop. (1910) 5018.

TALLEYRAND-PÉRIGORD, CHARLES MAURICE DE (1754–1838), Fr. statesman; e. s. of prominent courtier, Lieut.-Gen. Charles Daniel de T. P.; lamed by accident as child, and by family consent inheritance of family honours was settled on younger bro.; sad, neglected youth explains cynicism of later years; adopted ecclesiastical career and received rapid promotion; bp. of Autun, 1789; representative of diocese in States-General, 1789, as ardent democrat and reformer; helped to draft new constitution and advocated confiscation of church lands, 1789; resigned bishopric, 1791, and was excommunicated; drew up scheme of educational reform; disliked rising anti-monarchical feeling, and accepted mission to England, 1792; placed on list of émigrés, 1792; expelled from England, 1794; allowed to return to France, 1795; foreign minister, 1797–99; brief period of disgrace, for accepting bribes from U.S.A., 1797; foreign minister under Napoleon from establishment of consulate till 1807; doubtful how much influence he exercised as to plans, but invaluable as to their execution; vainly opposed invasion of Russia and deserted to Bourbons, 1814; in his relations with Napoleon he showed every treachery; upheld democratic cause and supported Louis Philippe, 1830; after further diplomatic usefulness retired, 1834. His political ability was invaluable to France, but exposed him to charge of being mere opportunist; mysterious character; few illusions and many vices; dubbed by De Quincey, 'eminent knave.'

TALLIEN, JEAN LAMBERT (1769–1820), Fr. revolutionist; pub. and posted twice weekly on walls of Paris *Ami des citoyens*, Jacobin periodical, 1791; voted for death of king; member of committee of Public Safety; fell in love with victim of proscription, his future wife, Thérese de Fontenay, henceforth prominent republican figure; pres. of Convention, 1794.

TALLIS, THOMAS (*c.* 1515–85), Eng. composer; 'the father of Eng. cathedral music'; organist of Waltham Abbey until 1540; T. and William Byrd obtained Letters Patent (1575), giving them 'the exclusive right of printing music and ruled music paper for 21 years'; famous forty-part song, anthems, motets, etc.

TALLOW, fat of sheep and ox; extracted by melting; used in soap and candle manufacture and as lubricant; solidity due to stearin. See OILS.

TALLY, stick formerly used in keeping accounts. It was split in two longitudinally, the pieces receiving corresponding notches, and debtor and creditor each took half. Old Exchequer Tallies are preserved in museum at Record Office, London.

TALMA, FRANÇOIS JOSEPH (1763–1826), Fr. tragedian; as Proculus, in Voltaire's *Brutus*, he appeared in a toga, thus breaking the absurd tradition of playing in 'modern' costume.

TALMAGE, THOMAS DE WITT (1832–1902), Amer. Presbyterian minister.

TALMUD, the sacred Jewish book and commentary on the Old Testament, was of gradual growth and attained its present form about 500 A.D. It exists in two versions, the Palestinian (sometimes called the Jerusalem T.) and the Babylonian. It is composed of the *Mishnah*, 'teaching a drawing out and elaboration of the law of the Old Testament,' and the *Gemara* (legal and other matter). The Mishnah is divided into six Orders, themselves divided into chapters, and deals with many different matters—agriculture, festivals, the position of women, criminal law, sacrifices, ritual, etc. Additional matter is found in the Babylonian T. The date is uncertain. As the Mosaic law in its present form is only V. cent. B.C., though compiled from older material, so the T., though compiled much later, contains traditional material, much of it probably handed down orally and modified in the course of centuries.

After the fall of Jerusalem and the dispersion of the Jews the law continued to be studied. The work of Ezra had been followed by the age of the scribes; to *c.* 200 A.D. is the age of the 'teachers,' and from then is to be dated the growth of the Mishnah; 200–500 is called the age of the 'interpreters,' when the Gemara grew up as a sort of commentary on the Mishnah. The Palestinian T. has partially perished, but the Babylonian exists in full. The arrangement of material seems confused, for it is more like an encyclopædia than a Biblical commentary. The basis is strictly legal and to some it has seemed trivial. Naturally, it is uneven, but it is an invaluable storehouse for Jewish lore. Many of its elaborate discussions deal with ritual and legal details of great intricacy and, as it seems to us, of little importance. But to the devout Jew there was no separation of the moral and ceremonial side of religion.

Rodkinson, *History of the Talmud*; Herford, *New Testament in Talmud and Midrash*; Montefiore, *Synoptic Gospels*.

TALPA, see under MOLE FAMILY.

TALPIDÆ, see MOLE FAMILY.

TAMAQUA (40° 46′ N., 76° 6′ W.), town, on Little Schuylkill, Schuylkill County, Pennsylvania, U.S.A.; coal-mining industries. Pop. (1910) 9462.

TAMARIND (*Tamarindus*), tropical tree of order Leguminosæ; pods contain sweet pulp and are valued as fruit and medicinally as a laxative.

TAMARISK (*Tamarix*), genus of plants, order Tamaricaceæ; Common T. (*T. gallica*) is a Brit. seaside tree.

TAMATAVE (18° 3′ S., 49° 11′ E.), seaport, Madagascar; chief commercial centre of the island. Pop. *c.* 7500.

TAMAULIPAS (24° N., 98° 30′ W.), maritime state, Mexico; surface low on E., and occupied by a series of lagoons; chief industry, agriculture; copper, asphalt, petroleum obtained. Pop. (1910) 249,641. Capital, Ciudad Victoria.

TAMBOURINE, percussion instrument of ancient origin; hoop covered with vellum and furnished with bells or jingling metal plates; played by beating, rubbing, and shaking; popular in S. Europe and among negroes. The Provençal *tambourine* is a long, narrow drum.

TAMBOV (53° N., 41° 30′ E.), government, Russia; level and undulating; belongs to Don and Oka basins; very fertile; cereals, hemp, flax, sugar-beets grown; horses and cattle reared; minerals include iron, coal, gypsum; chief export, grain. Pop. (1910) 3,412,900. Capital, **Tambov** (52° 41′ N., 41° 30′ E.), on Tsna; manufactures woollens. Pop. (1910) 68,400.

TAMBUR, see PANDURA.

TAMERLANE, see TIMUR.

TAMIL, principal Dravidian language (see INDIA, LANGUAGE). Spoken by *c.* 20 millions in S.E. part of Indian peninsula and northern half of Ceylon. Writing is modified square form of Devanâgari (Sanskrit). Literary language, SEN-TAMIL, differs widely from

spoken language, KODUN-TAMIL. Lit., more or less independent of Sanskrit, has attained to high degree of ethical and artistic beauty. Chronology of extant works is very uncertain. Madura is chief early literary centre and seat of *Sangam* (Board of Censors). Augustan age (II. and III. cent's A.D.), period of greatest *Sangam* activity under royal patronage and principally under Jain and Buddhist influences. Many extant classics belong to Pallava period (V.–IX. cent's A.D.), showing Hindu revival. Principal compositions: Tiruvallavan's *Kural* (ethical apothegms); his sister Avvaiyār's poems; *Silappadhikāram* ('Epic of the Anklet'); *Manimēkhalai* ('Jewel-Belt'); *Nāladiyār* (ethical poem); *Chintāmani* and Kamban's *Rāmāyanam* (romantic epics); *Pattupāttu* ('Ten Idylls').

See *Linguistic Survey of India.*

TAMLUK (22° 18′ N., 87° 58′ E.), town, Midnapore district, Bengal, Brit. India; formerly a famous maritime city. Pop. 9000.

TAMMANY HALL, political association of New York, U.S.A., founded as democratic organisation, having its headquarters in Tammany Hall, which belongs to the Tammany Society or Columbian Order. T. H. was established in New York, 1789; incorporated as a benevolent society, 1805; seat from 1867, in Fourteenth Street, where meets separate organisation of T. H. In theory T. H. has no relation to T. Society, but both are branches of one political system, which is usually paramount in New York city politics.

TAMMERFORS (63° N., 22° E.), town, capital, Tavastehus province, Finland; textile industries. Pop. (1910) 44,147.

TAMPA (27° 55′ N., 82° 25′ W.), city, seaport, winter resort, on Tampa Bay, capital, Hillsborough County, Florida, U.S.A.; manufactures and exports cigars. Pop. (1910) 37,782.

TAMPICO (22° 16′ N., 97° 50′ W.), seaport, Tamaulipas, Mexico; exports ores, fibres. Pop. 25,000.

TAMSUI KAI, see FORMOSA.

TAMWORTH.—(1) (52° 39′ N., 1° 42′ W.) town, at junction of Tame and Anker, Staffordshire and Warwickshire, England; its ancient castle was the residence of the kings of Mercia; coal- and fire-clay mines. Pop. (1911) 7738. (2) (31° 10′ S., 150° 57′ E.) town, on Peel and Cockburn Rivers, Inglis County, New South Wales; gold- and diamond-fields. Pop. 6500.

TAN, FLOWERS OF, see MYCETOZOA.

TANA (1° 40′ S., 40° E.), river, Brit. E. Africa, rises near Mt. Kenia; enters Indian Ocean.

TANAGERS (*Tanagridæ*), family of New World Finch-like passerine birds, with nearly 900 species; especially characteristic of tropical forest areas; exceedingly diverse and brightly coloured; feed on fruits and insects.

TANAGRA, city on Asopus, Bœotia, site of many battles in ancient Greece; numerous terra-cotta statues unearthed.

TANAIDACEA, see under MALACOSTRACA.

TANAIS, see DON.

TANAUAN (14° 10′ N., 121° 10′ E.), town, Batangas, Luzon, Philippine Islands. Pop. 19,000.

TANCRED (1078–1112), Prince of Galilee on taking of Jerusalem; famous for exploits in First Crusade, 1096; immortalised by Tasso in *Gerusalemme Liberata*; Prince of Antioch on death of his uncle, Bohemund.

TANDY, JAMES NAPPER (1740–1803), Irish politician; first sec. of Soc. of United Irishmen, founded 1791; became popular and attacked Eng. officials; forced to fly after coalition with Defenders, 1793; with Fr. troops invaded Ireland, 1798, capturing Rutland; sentenced to death, but liberated.

TANEGA-SHIMA (30° 35′ N., 131° E.), island, S. of Kiushiu, Japan.

TANEY, ROGER BROOKE (1777–1864), Chief-Justice of U.S. Supreme Court (1836–64); advocate of States' rights; delivered famous judgment, in Dred Scott case, 1857, in favour of Southerners.

TANGA (5° 6′ S., 39° 5′ E.), seaport, Ger. E. Africa; terminus of the Usambara railway; exports copra, rubber. Pop. 6000.

TANGANYIKA (6° S., 30° E.), lake, Central Africa, surrounded by high mountains; length, 420 miles; breadth, 15–18 miles; 2700 ft. above sea-level and 600 miles from coast. W. part borders on Belgian Congo, S. on Rhodesia, N. and E. on German E. Africa; discovered by Burton and Speke, 1858; explored by Livingstone, Stanley, Cameron, Thomson, Weissmann, Grogan, etc.; on Cape-to-Cairo route; sleeping-sickness rife; steamer-service; railways approaching from Rhodesia and Dar-es-salaam.

TANGENT, line at right angles to point where radius of a circle meets circumference. See GEOMETRY.

TANGERMÜNDE (52° 32′ N., 11° 55′ E.), town, at junction of Elbe and Tanger, river-port, Pruss. Saxony; manufactures iron; shipbuilding yards. Pop. 14,000.

TANGIER (Rom. *Tingis*) (35° 42′ N., 5° 55′ W.), seaport, on Strait of Gibraltar, Morocco; chief centre of commerce in Morocco; diplomatic headquarters; was capital of Rom. province of Tingitana; taken by the Portuguese in 1471; formed part of dowry of Catharine of Braganza; abandoned by the British, 1648. Pop. 46,300.

TANJORE (11° N., 79° E.), district, Madras, Brit. India. Pop. 2,260,000. Capital, **Tanjore** (10° 47′ N., 79° 10′ E.), on Cauvery; literary and religious centre; contains palace of former rajahs and famous XI.-cent. pagoda; manufactures jewellery. Pop. 60,000.

TANNAHILL, ROBERT (1774–1810), Scot. poet and weaver; b. Paisley; drowned himself; wrote *The Bonnie Wood o' Craigielea* and *Jessie the Flower o' Dunblane.*

TANNHÄUSER, in Ger. legend a knight who in his wandering comes to the Venusberg, the abode of sensual love; after tarrying there he repents and sets out to seek pardon from Rome; Pope tells him that he has as little chance of mercy as his staff has of budding again; T. returns to Venus and a few days later the Pope's staff bears leaves. A minnesinger of the name flourished in XIII. cent. Story is elaborated in Wagner's *Tannhäuser.*

J. Cuthbert Hadden, *Tannhäuser* ('*The Great Operas*' Series).

TANNIN, TANNIC ACID ($C_{14}H_{10}O_9$), gallic anhydride, extracted from galls, sumach, etc., by boiling water; occurs in tea; crystalline, astringent; uses—tanning, dyeing, ink-making.

TANNING, see LEATHER.

TANN-RATHSAMHAUSEN (earlier **TANN**), **LUDWIG SAMSON ARTHUR, BARON VON DER** (1815–81), Bavarian soldier; blamed for disasters of Austro-Prussian campaign, 1866; distinguished in Franco-Ger. War.

TANSA (19° 30′ N., 73° E.), river, Salsette Island, Bombay, India; reservoir for water-supply of Bombay is on its course.

TANSY (*Tanacetum*), genus of plants, order Compositæ; flowers yellow and corymbose; Common T. or Buttons (*T. vulgare*) was formerly used as a tonic.

TANTA (30° 48′ N., 31° 1′ E.), town, capital, Gharbieh province, in Delta, Egypt; noted for its fairs. Pop. 57,000.

TANTALUM (Ta=181·5), silvery-looking, rare metal obtained by strongly heating oxide *in vacuo*; S.G. 16·64, M.P. 2250–2300° C.; made into wire for electric lamps. Compounds (no basic oxide), TaO_2, Ta_2O_5 (acidic), TaF_5.

TANTALUS (classical myth.), son of Zeus and king of Corinth or perhaps Argos; punished in Hades by being placed so that water rose to his chin and receded as he tried to drink; fruit hanging overhead drew back as he grasped; his name gives the verb 'tantalise.'

TANTIA TOPI (d. 1859), Ind. rebel, second in rank to Nana Sahib (*q.v.*); executed.

TANTRA, see LAMAISM.

TANYU, KANO (1602–74), Jap. artist and poet; painter of strong individuality; the last of the four great masters of the Kano school; landscapes and figures.

TAOISM, a development of Chin. religion.

TAORMINA (37° 50′ N., 15° 17′ E.) (ancient *Tauromenium*), town, winter resort, Messina, Sicily; founded 397 B.C.; ruins of theatre founded by the Greeks and rebuilt by the Romans. Pop. 4000.

TAPESTRY, ornamental cloth used as curtains and as covering for furniture, walls, etc.; two kinds—*haute lisse* (high warp), with warp-threads stretched vertically, and *basse lisse* (low warp), horizontally, the former being most elaborate in pictorial designs; t. was made of silk or wool, and designs represented historical scenes, animals, etc. (cf. the Bayeux t., a record of Norman Conquest); Arras in Flanders produced much of the best t. of the Middle Ages.

TAPEWORMS, CESTODA, long, tape-like, creamy-white worms of considerable importance on account of their parasitism in the higher animals and man, to which habit most of their distinctive features may be traced. The head is furnished with hooks for adhesion; there is neither mouth nor food canal, for the animals simply absorb the nutritive fluids of the host; they are hermaphrodites and self-fortilising, and great adaptations occur for the carrying on of the race. A T. is (with a few exceptions) divided into many, sometimes thousands of joints (*proglottides*), which are budded off from the neck, and are set free, laden with ripe eggs, to carry infection farther afield. The eggs are swallowed by an intermediate host, within the organs of which a larva develops (often a Bladder-Worm, or *Cysticercus*); the intermediate host is eaten by another vertebrate, and in the latter the Larval T. develops into the segmented adult. 'Measly' beef—beef containing bladder-worms—is eaten raw or half-cooked by man, and in his food canal there develops the adult Beef T. (*Tænia saginata*), the commonest human T. in Western Europe.

A solid (*Pterocercoid*) larva occurs in freshwater fish—Trout, Perch, etc.; the fish is eaten by man, and there results an adult Broad T. (*Bothriocephalus latus*), which may reach a length of 60 ft. The Pork T. (*Tænia solium*) is also a formidable human parasite, known wherever the pig is domesticated. Almost all vertebrates are infested by T's, which are sometimes so numerous in fishes, birds, and mammals, as almost to block the food canal. They are especially frequent in fish and flesh-eating creatures and cause much trouble amongst domestic animals—one brain-dwelling larval form, *Cœnurus cerebralis*, causing the fatal disease of 'staggers' or 'gid,' most common in sheep, but occurring also in horses, oxen and goats, in the dromedary, and in deer.

Cestodes form a class (*Cestoda*) in the group of FLAT WORMS—*Platyhelminthes* (q.v.).

TAPIOCA, starchy food obtained from root of Cassava or Manioc by drying on hot plates.

TAPIRS (*Tapiridæ*), a family of Odd-Toed, Hoofed Mammals; shy, nocturnal, forest-loving, vegetarian animals, with short, mobile proboscis, four toes in fore feet, and three in hind. One species is found in S.E. Asia and four in Central and S. America.

TAPTI (21° 6′ N., 72° 42′ E.), river, W. India, flows into Gulf of Cambay; length, 450 miles.

TAR, see COAL-TAR, DYEING.

TARA (53° 34′ N., 6° 37′ W.), village, County Meath; an early residence of the Irish monarchs.

TARAI, TERAI (29° N., 79° E.), district, near the Himalayas, Kumaun division, United Provs., India; covered with marshes and jungle. Pop. 120,000.

TARANTO (40° 28′ N., 17° 15′ E.) (ancient *Tarentum*), fortified seaport, Lecce, on Gulf of Taranto, Italy; castle, cathedral, and museum antiquities; taken by Robert Guiscard, 1063. Pop. 61,000.

TARANTULA, genus of Arachnid Pedipalpi, but usually applied to T. spiders, members of family Lycosidæ; fabulous accounts of danger of their bite being prevalent in S. Europe. In America, BIRD-CATCHING SPIDERS (*Mygale*, etc.) are known as T's.

TARAPACÁ (20° 3′ S., 69° 58′ W.), maritime province, Chile; rainless desert region; rich nitrate deposits. Capital, Iquique. Pop. 120,000.

TARARE (45° 53′ N., 4° 16′ E.), town, on Turdine, Rhône, France; manufactures muslins, silks. Pop. 12,400.

TARASCON (43° 49′ N., 4° 39′ E.) (ancient Tarasco), town, on Rhône, Bouches-du-Rhône, France; various industries; trade in fruit. Pop. 9200.

TARAXACUM, term applied in medicine to the dandelion (natural order *Compositæ*), from the root of which extracts are made, which are bitter and are used medicinally as slight stimulants for the stomach.

TARBERT (55° 52′ N., 5° 25′ W.), fishing village, at head of peninsula of Kintyre, Argyllshire, Scotland.

TARBES (43° 14′ N., 0° 6′ E.) (ancient *Turba*), town, on Ardour, Hautes-Pyrénées, France; has a cathedral and museum; horse-breeding centre; manufactures leather; was capital of old province Bigorre; an Eng. possession, 1360–1406. Pop. 26,000.

TARDIGRADA, SLOTHS, see under EDENTATES, ARACHNIDA.

TARE, see VETCH.

TARENTUM.—(1) TARANTO (40° 28′ N., 17° 15′ E.), ancient city, on Gulf of Tarentum, Italy; founded by Spartans, c. 705 B.C.; became chief city of Magna Græcia; taken by Romans (272 B.C.), by Hannibal (212 B.C.); retaken by Fabius (209 B.C.); subsequently formed part of the Byzantine Empire. (2) (40° 38′ N., 79° 45′ W.) town, on Allegheny, Allegheny County, Pennsylvania, U.S.A.; manufactures glass. Pop. (1910) 7414.

TARGET, mark to shoot at; objective for shooting; in rifle practice t. is of paper, divided by concentric circles, called the bull's eye, inner, magpie, and outer; figure t's have largely superseded plain bull's-eye pattern; for sea-firing, floating screens are towed along. Word was formerly name of a shield.

TARGUM, term applied to translations which are also expansions and commentaries on the Old Testament. The T's were written in Aramaic, which became the ordinary language of the people when Hebrew was practically a dead language—about the time of Christ. The Hebrew Scriptures were read in the synagogue, and the custom grew up of translating what had been read into Aramaic, and with translation came interpretation. The T's were handed down orally for some time, and can hardly have assumed their present form before about 400 A.D. Of T's on the Pentateuch there are (*a*) T. of Onkelos (c. V. cent. A.D.), (*b*) T. of Jerusalem (only fragmentary), T. of Jonathan ben Uzziel—these both derived from an earlier Jerusalem T. The T. on the Prophets is called by the name of Jonathan, and is probably IV. cent.; there was probably a Jerusalem T. on the prophets too. Less important T's also exist on the Hagiographa (except Daniel, Ezra, and Nehemiah).

TARIFA (36° 1′ N., 5° 37′ W.) (ancient *Josa*, or *Julia Traducta*), seaport, on Strait of Gibraltar, Cadiz, Spain; tunny and anchovy fisheries. Pop. 13,800.

TARIFF, a duty on imports, levied either for revenue or to protect home industry from foreign competition. It was not till 1824 that Great Britain began to abandon tariffs in favour of free trade, and between 1842 and 1860 a complete change was effected. The Corn Laws were repealed in 1846, after the Income Tax had been introduced in 1842 for revenue purposes. The following is a complete list of all articles subject to Import Duties in the U.K.: beer, blacking, chicory, chloral hydrate, chloroform, cocoa, chocolate, coffee, collodion, condensed milk, ether, ethyl, fruits—dried (currants, figs, French plums, prunes, and raisins), and bottled or canned fruit jellies, glucose, jams, marmalade, marzipan, molasses, motor spirit, playing cards, saccharin, spirits (including naphtha, brandy, rum,

Geneva liqueurs, and cordials), sugar (including confectionery, ginger, liquorice, sweetmeats, and all crystallised fruits), tamarinds, tea, tobacco (cigars, cigarettes, and snuff), and wine. In each case where these articles are also produced within the U.K. an excise duty equal to the tariff is also imposed. In the above list it is from tea, sugar, beer, coffee, cocoa, spirits, tobacco, and wine that substantial customs revenue is drawn. Mr. Joseph Chamberlain proposed (1903) that there should be placed upon foreign grain (except maize) a duty of 2s. per quarter; upon foreign manufactured goods, 10 %; upon foreign meat (except bacon) and dairy produce, 5 %. A preferential tariff would be employed towards Colonial goods. A Tariff Reform Amendment to the Address was defeated (258 to 193), Feb. 1912. See PROTECTION.

TARIJA, TARIXA (21° 50′ S., 64° 40′ W.), town, on Tarija, Bolivia. Pop. 8000; (department) 120,000.

TARIK, HILL OF, see GIBRALTAR.

TARIM (40° 12′ N., 87° 10′ E.), river, Central Asia; has its source near Mt. Godwin-Austin in Karakorum Mountains, and after crossing Kuenlun Range flows E. through Turkestan and empties itself into the Lop Nor; receives waters of the Khotan, Aksu, Cherchen, etc., and has a total length of *c.* 1000 miles.

TARKINGTON, NEWTON BOOTH (1869–), Amer. novelist.

TARN.—(1) (43° 50′ N., 2° 10′ E.) department, France, formed from part of ancient Languedoc; hilly or mountainous; belongs chiefly to basin of Garonne; produces wheat, wine; principal mineral, coal. Pop. (1911) 324,090. Capital, Albi. (2) Rom. *Tarnis* (43° 55′ N., 1° 55′ E.), river, S. France; joins the Garonne; length, 230 miles.

TARN-ET-GARONNE (44° N., 1° 10′ E.), department, France, formed from parts of ancient Guienne, Gascony, and Languedoc; mostly tableland; watered by Garonne, Tarn, and Aveyron; cereals, fruit, and wine largely grown. Pop. (1911) 182,537. Capital, Montauban.

TARNOPOL (49° 34′ N., 25° 37′ E.), town, Galicia, Austria; trade in horses, grain. Pop. (1910) 33,871.

TARNOW (50° 3′ N., 21° 1′ E.), town, Austria; cathedral; agricultural implements. Pop. (1910) 36,731.

TARNOWSKI, JAN (1488–1561), Polish soldier; won victories over Moldavians, Tartars, and Turks, and upheld crown against peasants; wrote work on tactics.

TAROM (37° N., 51° E.), district, Persia; exports alum; inhabited by Turks.

TARPAULIN, TARPAULING, canvas covering for ships' hatches, wagons, etc.; rendered waterproof by tarring or painting.

TARPEIAN ROCK, see ROME.

TARPON, see under HERRING FAMILY.

TARQUINII, CORNETO (42° 15′ N., 11° 45′ E.), ancient town, Etruria; one of chief cities of Confederacy; native place of Tarquinius Priscus, king of Rome: became Rom. colony.

TARQUINIUS SUPERBUS, LUCIUS (534–510 B.C.), 7th king of Rome. His reign was a period of cruel despotism and violence. The rape of Lucretia by his son Sextus resulted in the abolition of the kingship and the banishment of the family.

TARRAGONA (42° N., 1° 30′ E.), province, Catalonia, Spain, bordering Mediterranean; mountainous; produces wine, grain, fruit. Pop. (1910) 334,535. Capital, **Tarragona** (41° 8′ N., 1° 12′ E.), on Mediterranean coast; abp.'s see, has XII.-cent. cathedral and abp.'s palace; old walls still surround town, and there are Rom. remains including aqueduct, ruined amphitheatre, and palaces; manufactures silks, wine; large shipping trade; successfully besieged by French, 1811. Pop. (1910) 23,292.

TARRASSA (41° 35′ N., 1° 59′ E.), town, Barcelona, Spain; manufactures textiles. Pop. 16,300.

TARRING AND FEATHERING, method of punishment formerly popular in U.S.A.; obnoxious persons were dipped in tar, coated with feathers, and ridden through the town on a rail.

TARRYTOWN (41° 4′ N., 73° 27′ W.), village, on Hudson, Westchester County, New York; scene of Major André's capture, 1780; later residence and burial-place of Washington Irving. Pop. (1910) 5600.

TARSUS (36° 54′ N., 34° 43′ E.), town, on the Cydnus, S.E. Asia Minor; chief town of Cilicia in ancient times; passed into possession of Greece at time of Alexander's conquest of Persia; noted for learning in Rom. times; birthplace of St. Paul; came into possession of Turks after decline of Byzantine Empire. Exports hides, skins, cotton, wool, etc. Pop. *c.* 28,000.

TARTAGLIA, NICCOLO, TARTALEA (*c.* 1506–59), Ital. mathematician; b. Brescia; self-educated; taught math's chiefly at Verona and at Venice; discovered solution of cubic equations usually known as Cardan's solution.

TARTAN, woollen cloth of square pattern spun and worn in Scot. Highlands; coloured patterns indicative of clan; t. kilt, Highland costume; uniform of Highland regiments; also used for making plaids and rugs.

TARTAR, refined argol, a crystalline deposit in wine casks. When pure known as CREAM OF TARTAR, potassium hydrogen tartrate ($KHC_4H_4O_6$).

TARTARIC ACID ($H_2C_4H_4O_6$), crystalline, M.P. 170° C., obtained from argol. Is dihydroxy-succinic acid: $\begin{matrix}CH(OH).COOH\\|\\CH(OH).COOH\end{matrix}$; known in dextro- and levo-rotatory and inactive forms. Chars when heated; dibasic; salts, *e.g.* $KHC_4H_4O_6$ (cream of tartar), $K_2C_4H_4O_6$.

TARTARS, see TATARS.

TARTARUS (classical myth.), deep gulf below Hades, into which Zeus hurled the Titans; place of torture for the dead.

TARTINI, GIUSEPPE (1692–1770), Ital. composer and violinist; app. solo violinist at famous Capello del Santo, 1721, and founded a violin school in Padua, 1728; best composition, *The Devil's Sonata*; wrote a treatise on music; discovered 'differential tones.'

TASHKEND, TASHKENT (41° 12′ N., 68° 52′ E.), town, capital, Russ. Turkestan; has an observatory and museum; manufactures silk and cotton goods. Pop. (1910) 192,000.

TASHKURGAN, KHULM (36° 30′ N., 68° 18′ E.), town, fort, Khulm district, Afghan Turkestan; trade centre. Pop. 11,000.

TASMAN, ABEL JANSZOON (*c.* 1603–59), Dutch sailor and explorer; b. Lutgegast; became a sailor; commanded Van Diemen's expedition to circumnavigate Australia, 1642, and discovered Tasmania (calling it Van Diemen's Land), New Zealand, and Friendly and Fiji Islands; pub. account of this (reprinted 1722 and 1860), and made second voyage to East Indies, discovering the Gulf of Carpentaria; also made two important voyages of discovery in the Pacific.

TASMANIA (40° 34′ to 43° 40′ S., 144° 40′ to 148° 23′ E.), island, off S. extremity of Australia; bounded N. by Bass Strait, E. and S. by Pacific, W. by Indian Ocean; area, 26,215 sq. miles. Surface is crossed by numerous mountain ridges, between which are fertile valleys and plains; highest points, Cradle Point and Ben Lomond, both over 5000 ft.; large area forested; drained by Arthur, Pieman, Gordon, Derwent, Tamar, and other streams; numerous lakes, including Great Lake, Arthur and Sorell Lakes; coast much indented. Climate fine, and healthy. Flora and fauna resemble those of Australia; animals peculiar to T. include the Tasmanian devil and the thylacine.

T. was first visited in 1642 by Tasman, who named it Van Diemen's Land; it was subsequently surveyed and explored by various travellers, including Cook and Bass, and in 1803 a penal settlement was established near Hobart. T. was administered as part of New South Wales until 1825, when it became a separate colony; it received its present name in 1853. Ad-

ministration is carried out by a governor, who is appointed by the Crown, and assisted by a council of Ministers; legislative power is vested in a Legislative Council of 18 members and a House of Assembly of 35 members.

Chief towns are Hobart (capital), Launceston, Zeehan, Ulverstone. Agriculture is principal industry; wheat and other crops produced; sheep and cattle extensively raised. Minerals include gold, silver, copper, tin, lead, coal. Chief exports are wool, timber, fruits, various metals. Education is free and obligatory. Chief religions, Anglican, R.C., Methodist, Presbyterian. Pop. (1911) 190,898.

TASMANIAN DEVIL, see DASYURES.

TASSIE, JAMES (1735–99), Scot. gem-engraver; made some 15,000 copies of famous ancient and modern gems, and cameo portraits of many distinguished contemporaries.

TASSO, TORQUATO (1544–95), Ital. poet; b. Sorrento; ed. Naples and Padua; forsook study of law for lit., and wrote *Rinaldo*, a narrative poem, 1562; became courtier at Ferrara, 1565. Diffidence and inexpert criticism prevented his publishing his masterpiece, *Gerusalemme Liberata* (completed, 1574), although *Aminta* (1573), a simple pastoral drama, had won him fame. Worn out by overwork he became fretful, subject to delusions, a burden to his friends and a laughing-stock to his detractors. A passionate devotion to Leonora d'Este heightened this malady. Leaving Ferrara, he wandered from place to place, always well received but discontented. Returning a third time to Ferrara, he so provoked Duke Alfonso that he was incarcerated as a lunatic (1579–86), and while he was confined others edited his *Gerusalemme Liberata* and minor poems. After his release he again wandered from place to place, and his later poems (*Monte Oliveto, Gerusalemme Conquistata*, a mangled version of the *Liberata*, *Le Sette Giornate*) show but little genius. In 1594 he was befriended by Cardinal Aldobrandini and again journeyed to Rome, only to die before he could take full advantage of his patron's generosity.

T. was a master lyricist, but a genius who blossomed young and lacked stability. *Gerusalemme Liberata* exercised a strong influence on other poets, notably Milton.

Boulting, *Tasso, Torquato: Life and Times* (1907).

TASTE is the function of special sense-organs situated mainly in the tongue. The mucous membrane of the tongue has on it a great number of little projections, or papillæ, which are of three kinds—*filiform*, scattered over the whole of the superior surface of the tongue, comparatively long projections, with several fine filaments at their free ends; *fungiform*, chiefly present towards the point, and at the sides of the tongue, rounded mushroom-like projections; and *circumvallate*, about ten or twelve in number, situated at the back of the tongue, arranged in a V pointing backwards, which, instead of being actual projections, are simply little areas of the mucous membrane separated off by little circular trenches, in the inner walls of which are situated the *taste-bulbs*.

The t.-bulbs are minute circular bodies, from an opening in one end of which fine hairs project, while an end filament of a nerve enters at the other end. In addition to the t.-bulbs there must be other sense-organs of t. in the tongue which have not yet been recognised, for the sensation of t. can be perceived elsewhere on the tongue. Many so-called t's are, however, in reality smells, the olfactory sense being much more sensitive than the sense of t.; if the nose is closed an apple cannot be distinguished from a potato by t. alone. The nerves from which branches come to the t. sense-organs are the lingual, which supply the front of the tongue, and the glosso-pharyngeal, which supply the back.

TATAR PAZARJIK, TATAR BAZARJIK (42° 6′ N., 24° 26′ E.), town, on Maritza, E. Rumelia, Bulgaria. Pop. (1910) 18,098.

TATARS (less correctly **Tartars**), inhabitants of Central Asia, were a Slavonic people akin to the Mongols, and seem to have occupied part of Manchuria in the X. cent. The name was given by Europeans to the followers of Jenghiz Khan, who took Pekin and overran Russia in XIII. cent., and afterwards to members of all the Mongol hordes which appeared in W. Asia and E. Europe; at present amount to 2 to 3 millions, mostly Muslim, inhabitants of European or Asiatic Russia.

TATI (21° 24′ S., 27° 50′ E.), district, Brit. Bechuanaland Protectorate, S. Africa, in S.W. of Matabeleland; gold mines.

TATIAN (fl. II. cent.), Christian writer; b. Mesopotamia; lived in Rome, but returned to the East on adopting Encratite heresy that matter was essentially evil; wrote several books, of which survive the *Diatessaron*, a parallel harmony of the Gospels, and *Speech to the Greeks*.

TATRA MOUNTAINS (49° 12′ N., 19° 40′ E.), group of the Carpathians in N. Hungary, and on frontier of Galicia; highest point, Gerlsdorf, 8737 ft.

TATTA (24° 44′ N., 68° E.), town, Sind, Bombay, Brit. India; formerly important city. Pop. 10,500.

TATTOOING, custom of ornamenting the skin by inserting colouring material through small punctures. The practice seems to be universal among savage peoples, and isolated examples of it are still found among civilised people—notably sailors. Among the Polynesians, Maoris, and Japanese, t. became a high art—the body being completely covered with elaborate designs.

TAUNG-GYI (97° N., 25° 50′ E.), town, S. Shan states, Burma; political and official centre. Pop. *c.* 14,000.

TAUNTON.—(1) (51° 2′ N., 3° 7′ W.) county town, on Tone, Somersetshire, England; has a Norman castle and fine Gothic church; manufactures silk, gloves; here the Duke of Monmouth was proclaimed king, 1685, and Judge Jeffreys held the 'Bloody Assize.' Pop. (1911) 22,563. (2) (41° 52′ N., 71° 10′ W.) city, on Taunton, Bristol County, Massachusetts, U.S.A.; manufactures locomotives, silver-plated goods. Pop. (1910) 34,259.

TAUNUS (50° 12′ N., 8° 20′ E.), wooded mountain range, Germany, extending 55 miles E. to W. between Rhine and Main on S., and Lahn on N.; highest point, Grosser Feldberg, 2887 ft.; the vine is cultivated on lower slopes; contains numerous mineral springs.

TAUPO (38° 46′ S., 176° 10′ E.), town, health-resort, N. Island, New Zealand: hot springs, geysers, and mud volcanoes in district.

TAURIDA (46° N., 34° E.), government, Russia, bordering Black Sea and Sea of Azov, drained by Dnieper; mainly low steppes; agriculture and cattle-breeding; fisheries; chief mineral, salt. Pop. (1910) 1,876,200. Capital, Simferpol.

TAUROBOLIUM, sacrificial rite in Mithraism, in which the devotee was purified by being bathed in blood of bull.

TAUSEN, HANS (1494–1561), Dan. reformer; b. a peasant, lived for some time as a monk; as prisoner at Viborg, converted town; released and preached reformed faith; Frederick I. summoned him to Copenhagen, 1529; bp. of Ribe, 1542.

TAVASTEHUS (60° 55′ N., 24° E.), län of Finland. Pop. (1910) 324,321. Capital, **Tavastehus**. Pop. 5300.

TAVERN, see INN.

TAVERNIER, JEAN BAPTISTE (1605–89), BARON D'AUBONNE, Fr. traveller; pub. *Six Voyages*, 1676; additional, *Recueil*, 1679. The six journeys were: (1) Constantinople, Persia to Ispahân, back by Bagdad, Malta, Italy, 1631–33; (2) Aleppo, Persia, India (as far as Golconda), 1638–43; (3) Persia, Java, Cape, 1643–49; (4–6) Explored Persia and India, 1651–68; important commercial results to France.

TAVIRA (37° 7′ N., 7° 32′ E.), seaport, Algarve, Portugal; fisheries; coasting trade. Pop. 12,500.

TAVISTOCK (50° 33′ N., 4° 8′ W.), town, on

Tavey, Devonshire, England; has remains of an abbey, founded X. cent.; copper-mining centre; arsenic refinery. Pop. (1911) 4392.

TAVOY (14° 7′ N., 98° 18′ E.), seaport, on Tavoy, Tennasserim, Burma; silk-weaving industry. Pop. 23,000; (district) 115,000.

TAXATION.—Nowadays t. takes the form of a money payment in civilised countries, but in feudal times military service and forced labour were both forms of t. The rent of the royal dominions was sufficient for the Crown in Anglo-Saxon times. No definite principle is seen in England till Parliament controlled taxes, and not till the XVIII. cent. was there any serious attempt to define the proper methods of t. Adam Smith's four maxims are still sound—

(1) Subjects of every state should contribute towards the support of the government in proportion to the revenue they respectively enjoy under state protection; (2) form, manner, and quantity of payment ought to be clear to all; (3) taxes should be levied at the time, or in the manner, in which it is most likely to be convenient for the contributor to pay it; (4) taxes should be so contrived as to take out and keep out of the people's pockets as little as possible over and above what it brings into the public treasury.

The main thing is that t. should be profitable to the community; that is, the money taken from the people should be so expended as to ensure greater security, freedom from disease, less crime, and a higher standard of education. Collection should be as inexpensive as possible. Heavy t. by checking personal expenditure and by reducing to poverty will inflict lasting hurt on a community.

T. is either *direct* on income, or *indirect* on commodities. In the former case it will be levied on land, houses, or on the actual income in salary, or from investments. In the latter it will be raised by customs, taxes on foreign imports, and by excise, a tax on commodities of home production. Import duties are a convenient form of t. in young rising countries, distributing the burden over the whole population. Such duties may be levied either for revenue purposes or to protect home industries and producers against foreign competition, and by rebates or remission give preference to colonial goods. 'Food taxes' are duties levied on imported food-stuffs; even in Free Trade Britain tea, coffee, cocoa, dried fruits, sugar, wines and spirits, and several other articles of imported food and drink pay customs duties (see TARIFF). A certain amount of direct taxation also takes the form of government duty on various articles of luxury or comfort and on agreements that require a stamp.

Bastable, *Public Finance*; M'Culloch, *Principles of Taxation.*

TAXIDERMY, the skinning and stuffing of birds and beasts; skins are treated with arsenical soap, but chloride of lime, alum, soft soap, camphor, corrosive sublimate are all used in various preparations; feathers are cleaned with plaster of Paris. Birds are stuffed with tow supported on wires. See books by Oliver Davie and Paul Hasluck.

TAXIS, THURN UND, name of noble Ger. family, members of which were hereditary postmasters of parts of the Holy Rom. Empire from the late XV. cent., until right was ceded to Pruss. government in 1867.

TAY (56° 28′ N., 3° 22′ W.), longest Scot. river; rises in Ben Lui, traverses Loch T., passes Aberfeldy, Dunkeld, Perth, Dundee, and enters German Ocean by Firth of T.; length, 118 miles; navigable to Perth; fine scenery; excellent salmon fisheries.

TAY, LOCH (56° 30′ N., 4° 10′ W.), lake, Perthshire, Scotland; length, 14½ miles; traversed by river Tay.

TAY BRIDGE, railway bridge (opened 1887), crossing Tay at Dundee; 3600 yds. long; earlier bridge blown over, with passing train (about eighty lives lost), during gale, Dec. 28, 1879.

TAYABAS (14° 10′ N., 121° 30′ E.), town, Tabayas province, Luzon, Philippine Islands; fertile district. Pop. 16,000; (province) 160,000.

TAYGETUS (37° N., 22° 21′ E.), mountain range, Peloponnesus, separating Laconia and Messenia; highest point, 7900 ft.

TAYLOR (30° 35′ N., 97° 21′ W.), town, Williamson County, Texas, U.S.A.; railway-shops; cotton industries. Pop. (1910) 5314.

TAYLOR, BAYARD (1825–78), Amer. author and traveller; b. Kennett Square, Pennsylvania. His travels were world-wide and were recorded by him in many interesting books. His best poems are *Rhymes of Travel, Book of Romances, etc., Poems of the Orient,* and *Lars.*

TAYLOR, BROOK (1685–1731), Eng. mathematician; b. Edmonton; ed. Cambridge; secretary of Royal Soc., 1714–18; discovered *Taylor's Theorem,* of extensive application in higher math's. Chief work, *Methodus Incrementorum Directa et Inversa.*

TAYLOR, JEREMY (1613–67), Eng. clergyman; b. Cambridge; Fellow of All Souls, Oxford, 1636; obtained rectory of Uppingham, 1638; probably chaplain in Royalist army; spent 12 years in Wales, where he was schoolmaster for a time; imprisoned for his political and religious views during protectorate; at Restoration became Bp. of Down, Connor, and Dromore, and Vice-Chancellor of Dublin Univ. T. wrote *Liberty of Prophesying,* 1647, *The Life of Christ,* 1649, *Holy Living,* 1650, *Holy Dying,* 1651; his glory lies in form rather than matter; he is a poor logician, and is lacking in originality, but his rhetoric is magnificent and his description great.

TAYLOR, JOHN (1580–1654?), the 'Water-poet,' was a waterman on the Thames; wrote *Penniless Pilgrimage,* a description of a walk from London to Edinburgh.

TAYLOR, PHILIP MEADOWS (1808–76), Anglo-Ind. governor; rose from position of clerk to that of administrator of Shorapore; wrote novels of Ind. life.

TAYLOR, RICHARD (1826–79), s. of Zachary T. (*q.v.*); confederate general in Amer. Civil War.

TAYLOR, SIR HENRY (1800–86), Eng. poet and civil servant; author of *Philip van Artefelde,* a remarkable drama which had no success on the stage, and *The Statesman*; held appointment in the Colonial Office, and wrote for the *Quarterly* and *London Magazine*; opposed abolition of slave laws and West Ind. legislative assemblies.

TAYLOR, TOM (1817–80), Eng. dramatist, prof. of English (London Univ. Coll.), lawyer, politician; editor of *Punch,* 1874; wrote *Our Amer. Cousin, Still Waters Run Deep,* etc.

TAYLOR, ZACHARY (1784–1850), 12th Pres., U.S.A. (1849–50); as captain in army inflicted defeats on Indians, 1812 onwards, and in 1832 was given command against Illinois; made general of brigade after crushing Seminoles, 1837; sent to protect newly annexed territory of Texas, repelled Mexican invasion, 1846, and seized Matamoros and Victoria; enormously outnumbered, but defeated Santa Anna at Buena Vista, 1847. The 'rough and ready' general now turned Whig politician; election as Pres. enthusiastically received, but he was soon involved in disputes on slavery in newly acquired territories; during brief office successfully maintained balance between Whigs and Democrats.

TAYPORT, formerly FERRY-PORT-ON-CRAIG (56° 27′ N., 2° 52′ W.), town, watering-place, on Firth of Tay, Fifeshire, Scotland; manufactures linen and jute; imports much esparto grass. Pop. (1911) 3273.

TAYUG (16° N., 120° 40′ E.). town, Pangasinan, Luzon, Philippine Islands. Pop. 11,500.

TAZIEH, see PERSIA (LANGUAGE AND LIT.).

TCHELYABINSK, see CHELYABINSK.

TCHERINGOV, see CHERNIGOV.

TE DEUM, Lat. hymn; so called from opening words, *Te Deum laudamus,* 'We praise Thee, O Lord.'

TEA, commonest beverage; consists of the dried leaves and shoots of a tropical shrub of the order Ternstrœmiaceæ, called *Thea sinensis*; two distinct varieties—*T. viridis,* attaining considerable height,

and *T. bohea*, a dwarf. The leaves of the t. plant are spear-shaped; the flowers somewhat resemble those of the strawberry plant. T. is chiefly grown in China, Japan, India, and Ceylon, and thrives best on sunny slopes; first introduced into England in early XVII. cent., and it was for more than a cent. regarded with suspicion.

Duty paid on t. was until within quite recent history enormously high, and consequently various unpalatable methods of infusing it economically were taken. The leaves were boiled and reboiled, and the strong flavour of tannin was highly appreciated. Even the old leaves were cherished and eaten with salt. Domestic science has now made t.-making a high art. The t. should be kept in an air-tight caddy or canister. The t.-pot is heated and the dry t.-leaves are placed in it. The boiling water is then poured on the leaves and allowed to stand from three to five minutes. A scientific t.-pot should be used by which the leaves can then be stranded to prevent a longer infusion; otherwise the infusion should be poured off into another vessel. T. infused for a longer period has bad effects on the nerves. T. contains 2 to 4 % of caffeine which stimulates the heart and kidneys, and c. 10 % of tannin, but t.-poisoning is not entirely understood.

The method of drying and preparing the newly gathered leaves in the plantations is interesting. The leaves are laid out on trays and tossed in the sun, which induces a saccharine fermentation. The leaves thus treated give off a peculiar odour, and at this stage they are placed in iron vessels and roasted. The leaves are then rolled and finally dried over a charcoal fire. *Green t.* is prepared by a different process. The leaves are placed in the iron vessel as soon as they are gathered, and are immediately roasted. They are then rolled and replaced in the vessel for the final drying. Various precautions are taken in the preparation of green t. to prevent fermentation, *e.g.* the leaves are constantly stirred and fanned.

TEAK (*Tectona grandis*), included in the Verbenaceæ; indigenous to the Indo-Malasian region, and now extensively cultivated for its valuable timber. The tree is high, and bears paniculate inflorescences composed of small white flowers; wood principally used in shipbuilding, owing to extreme hardness and durability. Its close texture makes it very heavy, and before it is fit for use thorough drying and seasoning are essential. For this purpose a ring of the bark and green wood is removed from the basal part of the trunk ('girdling'), thus causing its speedy death. The tree is not felled for two years after girdling.

TEAL, see under Duck Family.

TEANO (41° 15′ N., 14° 6′ E.) (ancient *Teanum Sidicinum*), town, Caserta, Italy. Pop. 6200.

TEANUM APULUM (41° 50′ N., 15° 10′ E.), ancient town, on Frento, Apulia, Italy.

TEAR, see Eye.

TEASEL (*Dipsacus*), genus of plants, order Dipsaceæ; Fuller's T. (*D. fullonum*) is used in cloth-dressing.

TEATE (42° 20′ N., 14° 10′ E.) (modern Chieti), chief town of the Marrucini, Italy.

TEBESSA (35° 25′ N., 8° 5′ E.) (ancient *Theveste*) town, Constantine, Algeria; Rom. ruins. Pop. 7300.

TECHNICAL EDUCATION, see Education.

TECK (48° 30′ N., 9° 28′ E.), small duchy, belonging to Württemberg, Germany.

TECUCIU (45° 53′ N., 27° 25′ E.), town, on Berlad, capital, department Tecuciu, Rumania. Pop. 14,500; (department) 130,000.

TECUMSEH, Tecumthe, Tecumtha (c.1768–1813), Shawnee Indian chief; with his bro. organised Indians against Americans, who by obtaining concessions of territory were driving Indians to north and west; defeated by Harrison at Tippecanoe, 1811; aided British, 1812; slain at battle of Thames.

TEDDINGTON (51° 24′ N., 0° 20′ W.), town, near Thames, Middlesex, England. Pop. (1911) 17,840.

TEES (54° 37′ N., 1° 12′ W.), Eng. river, flows between Durham on N., Westmoreland and Yorkshire on S., to North Sea.

TEETH are the organs of mastication, grinding down the food so that it can be easily swallowed. Situated in the upper and lower jaws they are developed not from bone but from the same tissue as the dermis, or true skin. The body of a tooth is formed of a somewhat hard substance termed *dentine*, composed of minute tubules containing earthy matter closely packed together; the dentine body is hollow, the cavity being termed the *pulp cavity*, and containing arteries, veins, and a branch of a nerve which supplies the t. Covering the dentine in the region of the root of the tooth, contained within the gum, is a layer of *cement*, which protects the lower part of the body, while covering the body towards the crown, outside the gum, is a layer of *enamel*, the hardest tissue in the human body, composed almost entirely of earthy matter, enabling the tooth to carry out its functions effectively.

The different types of t. are adapted for different purposes: the *incisors*, for cutting the food, have a single root and a somewhat thin vertical crown which is bevelled behind so as to present a sharp cutting edge; the *canines*, for tearing, are highly developed in carnivorous animals such as the dog, and have a single deep root and a rounded, pointed crown; the *premolars* or *bicuspids* have single or sometimes two roots, and a rather square crown on which are two slight projections; the *molars*, with the *premolars*, for grinding down the food, are much larger than the other t., and have from two to five roots, which are comparatively short, square crowns, on which are from three to five slight projections or cusps.

A child has only 20 teeth, termed 'milk teeth,' which begin to appear at the age of 6 months and persist till about the age of 7 years, when they fall out and begin to be replaced by the permanent teeth. An adult has 32 teeth, comprising, in each half of each jaw, 2 incisors, 1 canine, 2 premolars, and 3 molars.

The most common disease of the teeth is *caries*, consisting of a progressive decay of the substance of a tooth, predisposed to by hereditary weakness in the tissues of the tooth substance, by debilitated conditions, disorders of the digestive system, or neglect and consequent retention of putrefying particles of food between the teeth; caries has been shown to be caused by a micro-organism, and should at once be treated by a properly qualified dentist.

See Dentistry.

TEETOTALISM, see Temperance.

TEGEA (37° 28′ N., 22° 26′ E.), town, Arcadia, ancient Greece; contains remains of famous temple of Athena Alea, built by Scopas; frequently engaged in warfare against Sparta; eventually destroyed by Alaric.

TEGERNSEE (47° 42′ N., 11° 44′ E.), lake, Upper Bavaria; drained by Mangfall to the Inn; length, 4 miles.

TEGETTHOFF, WILHELM VON, BARON (1827–71), Austrian naval commander; employed in Dan. War, 1863; won brilliant victory over Italians at Lissa, 1866; commander-in-chief of navy, 1868.

TEGGIANO (40° 20′ N., 15° 30′ E.) (ancient *Tegianum*), town, Salerno, Italy. Pop. 5000.

TEGNER, ESAIAS (1782–1846), Swed. writer of eminence; his *War-Song* (1811) brought him fame. This was followed by the *Song of the Sun* and *Axiel*. His masterpiece is *Frithiof's Saga*, a cycle of Scandinavian epics.

TEGUCIGALPA (14° 8′ N., 87° 7′ W.), capital of Honduras; cathedral and university; in vicinity, gold mines. Pop. 38,000.

TEHERAN, Tehran.—(1) (35° 30′ N., 51° E.) province, Persia; capital, Teheran. (2) (35° 44′ N., 51° 25′ E.) city, capital, Persia; strongly fortified; the citadel contains the Shah's palace, with its kiosks, beautiful gardens, and museum with many priceless jewels; there are many mosques, and both Armenian

and Muhammadan baths; trading centre for caravans; newer part of town is well laid out with wide streets and fine buildings. Pop. *c.* 280,000.

TEHRI (22° 44′ N., 78° 53′ E.), native state, in Himalayas, India. Pop. 275,000. Capital, **Tehri**, on Bhagirathi; trades in rice. Pop. 3500.

TEHUANTEPEC.—(1) (17° 30′ N., 95° W.) isthmus, between Gulfs of Campeche and Tehuantepec, Mexico; width at narrowest part, 125 miles. (2) (16° 30′ N., 95° 25′ W.) town, on Tehuantepec, state Oaxaca, Mexico. Pop. 8300.

TEIGNMOUTH (50° 33′ N., 3° 29′ W.), seaport, watering-resort, at mouth of Teign, Devonshire, England; herring fisheries. Pop. (1911) 9221.

TEINDS, Scot. name for Tithes (*q.v.*).

TELAV (41° 55′ N., 42° 25′ E.), town, Tiflis, Russ. Transcaucasia; trade in wine; founded 893; capital of Kakhetia till 1797. Pop. 12,500.

TELEGONY, theory that the offspring of a female may be born under the influence of a mate preceding its immediate father. This theory, in spite of the firm adhesion of many practical breeders, cannot be corroborated by any satisfactory scientific proof. Indeed, scientific experimental work, such as that carried out with horses and zebras by Prof. Cossar Ewart, has failed to furnish evidence of pre-paternal influence on offspring.

TELEGRAPH, any form of signalling, but lately the word has become confined in its application to the electric t. solely. Although practical telegraphy only dates from the middle of the XIX. cent., the idea of utilising the electric current for signalling arose quite early in the history of electricity. Since the t. has come into daily use, inventions and improvements of apparatus connected therewith have been very numerous, and as a result various systems have arisen and come into practice.

If a galvanometer be connected with an electric circuit the needle will be deflected either to the right or left according to the direction in which the current is flowing. The direction of the current can, at will, be altered by means of a reversing key or switch, and a *galvanometer needle* thus be utilised for signals by means of some prearranged code. This was the method employed in the early days of telegraphy. Later, an *electromagnet* was used; on the current passing through its coils a lever was attracted, and released again by a spring when the current was cut off. This lever worked a stylus embossing a mark on moving paper, the length of the mark depending on the time during which the current was *on*. Thus very short marks became dots, and the present *dot-and-dash* method of signalling arose. It was found in practice that the operators could read the signals by means of the clicks of the lever against the magnet, and the old form gave way to the present *Morse sounder* (described below) which is now in common use, except where written records are required for reference.

For working an electric t. the requisites are: an electric current (produced by a battery of cells), a transmitting apparatus for completing and breaking the circuit, a wire or 'line' for conveying the current, and a receiving instrument for reproducing the signals.

The *battery* consists of a number of cells (from 20 to 60) either of the Daniell, bichromate, or Leclanché form—the first named being the one most commonly used in Britain. In large offices accumulators are used.

The *transmitter* is merely a key so connected that on being pressed down it completes the electric circuit, and when released springs back and thus breaks the circuit.

The *line* is either overhead or underground. In both cases the wire must be thoroughly *insulated*. For the 'return' portion the earth is used, one pole of the battery being connected to a plate fixed in the ground; the end of the line at the receiving station is similarly 'earthed.' The wire is of copper, which offers a small resistance to current. As copper is expensive, iron is coming largely into use, especially since methods have been discovered of greatly reducing its electrical resistance. In the overhead system the wire is bare and supported on insulating cups made of porcelain or other non-conducting substance, these cups being attached to wooden cross-bars nailed to upright poles fixed in the ground. In the underground system the wire is wrapped in carefully dried paper of a special kind, and a large number of such wires are placed *loosely* together in leaden pipes laid in the ground. The insulator here is really the air between the wires, the paper coverings preventing actual contact.

The Morse sounder *receiving apparatus* consists of a small electromagnet. When the current passes through the instrument a light, soft-iron armature or hammer is attracted to the pole, making an audible click, and is released again by a strong spring when the current is cut off. A short interval between two clicks represents a dot and a longer interval a dash. The code of dots and dashes, known as the **Morse Code**, is as follows:—

A . —	J . — — —	S . . .	2 . . — — —
B — . . .	K — . —	T —	3 . . . — —
C — . — .	L . — . .	U . . —	4 . . . . —
D — . .	M — —	V . . . —	5 . . . . .
E .	N — .	W . — —	6 — . . . .
F . . — .	O — — —	X — . . —	7 — — . . .
G — — .	P . — — .	Y — . — —	8 — — — — . .
H	Q — — . —	Z — — . .	9 — — — — .
I . .	R . — .	1 . — — — —	0 — — — — —

For long-distance signalling *relays* have to be employed, as the resulting current, after traversing a long wire, is too small to affect the 'sounder.' The relay is a local battery whose circuit is closed or broken by a light delicately poised armature of an electromagnet controlled by the sending current—and it is this local battery which works the receiving apparatus.

Duplex Telegraphy.—A device whereby two messages, one in each direction, can be sent simultaneously over the same wire (*Duplex Telegraphy*) is now in common use. The requisite is an arrangement of connections such that the operator's receiving instrument is unaffected by his own key and at the same time free to respond to signals from the other end of the line.

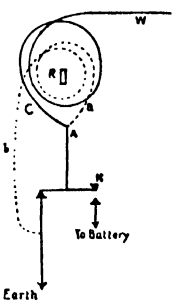


DIAGRAM 1.

In both cases, on pressing the key K the current divides at A and travels along paths A*a*b (dotted) and ACW. In System I. (Diagram 1) the resistances of the two circuits are made equal, and hence the currents in them, and since the currents traverse the instrument R in opposite directions they neutralise each other and do not affect it. In System II. (Diagram 2) resistances are arranged along ACP, and A*a*P so as to bring P_1 and P_2 to the same potential, in which case no current will flow through R. On the other hand, a signal sent along W from another station *will* affect the instrument, since in the one case the current travels through one of the coils only and in the other along P_1RP_2.

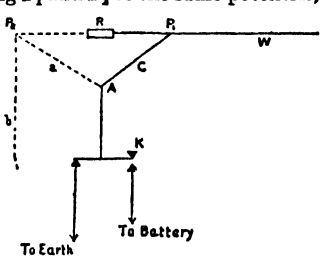


DIAGRAM 2.

In *Multiplex Telegraphy* complicated arrangements are in use whereby many messages can be sent in both directions simultaneously along the same wire.

Mention must also be made of *Hughes' Type-Printing Telegraph*, wherein an electric current works automatically one or more typewriters.

Submarine Telegraphy.—In *submarine telegraphy* precisely the same principles apply as in land telegraphy. Very great care is taken to insulate the wire (a strand of copper wire laid on the sea-bed) from contact with the water; the wire and surrounding protecting coverings form the 'cable.' The coverings consist of gutta-percha, jute, brass tape, and tarred tape, and vary in thickness according to the wear and tear the cable is liable to be subjected to—thus experience has shown it to be more quickly worn away in shallow water than in deep. The laying of the cable is done from a ship, the cable being paid out and allowed to sink under its own weight as the vessel slowly steams on its course. The signals are read by means of a sensitive mirror galvanometer, an instrument having a small, very light mirror attached to the fibre from which the needle is suspended. A spot of light is reflected from this mirror on to a screen, and the movements of the needle are thus greatly magnified. Motions of the spot of light to right and left take the place of dashes and dots respectively in the Morse Code.

Wireless Telegraphy, which has proved itself of vital value to ocean-going vessels especially, is the outcome of Hertz's investigations on electric waves (*q.v.*). MARCONI (*q.v.*) devoted himself to perfecting a system whereby the scientific results obtained could be applied to practical purpose. At first he only succeeded in signalling over short distances, but as experiment succeeded experiment he quickly increased the distances until he finally bridged the Atlantic.

In this form of telegraphy the transmitting apparatus is an induction coil producing sparks between two small copper balls a few millimetres apart. One of these balls is 'earthed' and the other connected to a long upright wire, called the *aerial*, insulated at the upper end. The production of the sparks causes a surging of electricity up and down the wire and results in the liberation of loops of electric waves travelling through space in all directions. These waves can be sent out in long or short trains corresponding to the dashes and dots of the Morse Code. At the receiving station, the detecting instrument, called a *coherer* (see ELECTRIC WAVES) has one end connected to earth and the other to an aerial similar to the one at the transmitting station. The electric waves impinging on the aerial set up oscillations which affect the coherer. The last is arranged in series with a battery relay, which in turn works an ordinary telegraphic receiving instrument and also an electromagnet to do the necessary tapping of the coherer.

Marconi is also the inventor of *Syntonic Electric Wave Telegraphy*, in which the receiver will respond only to waves of certain length; it is then said to be in 'tune' with the transmitter producing such waves. The arrangement is analogous to that of a swinging pendulum given an impetus from an outside source. If the impetus be given each time at the correct phase of the swing, the result will be to aid and increase the amplitude of the swing, whereas if given at the wrong moment the motion will be impeded. This form of Wireless Telegraphy has the twofold advantage of preventing a message being intercepted by any for whom it is not intended, and of requiring less powerful electric waves for successful transmission.

Marconi has further succeeded in solving the problem of *Directive Telegraphy*, i.e. how to limit the radiations to any one direction. This is done by constructing the aerial so that only a small part of it is vertical and the remainder horizontal, the latter end being the insulated one. The electric waves then travel *in the plane of the wire* and in a direction opposite to that to which the free end is pointing. If such a wire acts in the capacity of a receiver the greatest effect is obtained when the free end is pointed directly away from the transmitting station. Consequently, such a wire, fixed so as to be capable of being turned to point in any required direction, provides also a means of locating the direction of an unknown signalling station.

Preece and Sivewright, *Telegraphy*; J. A. Fleming, *The Principles of Electric Wave Telegraphy and Telephony*; O. Lodge, *Signalling across Space without Wires*.

Earth Currents.—Ever since the institution of telegraphy it has frequently been observed that the lines are traversed by momentary currents (due to some outside cause) which have sometimes been sufficiently great to interfere seriously with the transmission of messages. These currents, called earth-currents, not only occur in telegraphic circuits, but also affect all magnetic and electrical instruments. They are supposed to be due to electromagnetic induction, caused by changes in the earth's magnetism—a hypothesis based on the following observations: they are of more frequent occurrence in lines running due N. and S.; both aerial and underground lines are similarly affected; they are of great intensity during magnetic storms, when they are accompanied by brilliant aurora; periods of great activity synchronise with periods of maximum sun-spots. Earth currents may also be due to purely local and artificial causes, such as electric traction, the transmission of electric power in great quantity, or the presence of generating stations. Local causes have in many cases so seriously interfered with instruments in magnetic observatories as to necessitate a change of site. See ELECTRICITY.

TELEGU, see DRAVIDIAN, INDIA (LANGUAGE).

TEL-EL-KEBIR, see EGYPT (HISTORY).

TELEMARK, THELEMARK (59° 50′ N., 9° E.), mountainous region, amt of Bratsberg, Norway.

TELEMETER, see RANGE-FINDER.

TELEOLOGY.—(1) The study of the end or purpose of things as explaining them; (2) the theory that what is has an end or purpose by which it may be explained.

TELEOSTEI, see under FISHES.

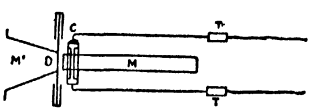
TELEOSTOMI, see under FISHES.

TELEPATHY, called also 'thought transference,' is the communication of minds which are apart in space. It has been much studied recently, and its existence generally, though not universally, admitted. Images, whether voluntary or involuntary, are generally conveyed from one brain to another. One form of telepathic appearances are apparitions of a dying person to friends far distant, of which many seem authentic.

TELEPHONE, an instrument for reproducing speech at a distance from the source. It is to Graham Bell that it owes its present commercial importance.

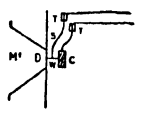
The telephone consists of two pieces of apparatus—(*a*) the transmitter, which is spoken into, and (*b*) the receiver, which reproduces the sound, the two being joined by wires to form an electric circuit.

Bell's transmitter consisted of a steel magnet M, suitably encased, with one pole close to the mouthpiece M′, over which was clamped a thin soft-iron diaphragm D. Surrounding this pole was a coil C, having its ends connected to the terminals TT, from which ran wires to the terminals of an exactly similar instrument (the receiver). The magnet M magnetically affects the diaphragm D, which in its turn reacts on the magnet, causing lines of magnetic induction to thread the coil C. On speaking into the mouthpiece the diaphragm is set vibrating and causes changes in the magnetic induction of the coil, resulting in a current being set up in the circuit. This current affects the magnetism of the magnet in the receiver in such a way as to set *its* diaphragm in



motion exactly in unison with that of the diaphragm in the transmitter. The receiver thus sets up vibrations in its neighbourhood exactly similar to those produced at the transmitter, and since sounds are produced by vibrations of the air falling on the tympanum of the ear, the result is an exact reproduction of the words spoken into the transmitter.

Blake's receiver is now universally used. The transmitter is, however, obsolete, being replaced by a microphone—the invention of Prof. Hughes—which necessitates an electric current in the circuit from an outside source. The Blake form of microphone transmitter contains a platinum wire W, supported by a spring S, so as to touch both the diaphragm D and a piece of carbon C. The vibrations of the diaphragm cause this wire to press against the carbon with varying pressure, which introduces changes in the electrical resistance of the circuit, with consequent changes in the current, which in turn affect the magnet in the receiver in the way already described. The current required in each telephonic circuit is supplied by dynamos from a central station.



For long-distance telephony, the granulated carbon transmitter—especially the 'solid back' form—is used. This contains a small cylindrical brass box placed in an upright position with one face clamped to the diaphragm. The curved surface of the box is insulated, and to each of the circular faces is attached a thin carbon disc, the space between being almost filled with granulated carbon. These granules form microphonic contacts, and the large number of them produce the strong changes of current necessary to be effective over long distances.

Users of telephones (subscribers) are put into communication with each other by means of exchanges. The wires of all subscribers in a neighbourhood are brought to a central station, where any two sets of wires can be joined up.

Recently great advances have been made in wireless telephony, electric waves being utilised in the same way as in wireless telegraphy (see TELEGRAPH). This promises to become of extensive use, especially over long distances and to enable ships to communicate with lighthouses and each other.

J. Poole, *Practical Telephone Handbook*; W. J. Hopkins, *Telephone Lines and their Properties*.

TELESCOPE, an instrument which magnifies distant objects. T's are of two kinds—the refractor and reflector. The former was the first to be invented, and the principle was discovered by a watchmaker's apprentice in 1609. The lad was playing with some of his master's spectacle glasses and happened to so arrange them as to magnify a distant church tower. The discovery was taken up by the watchmaker, Hans Lippershey, and a report of it reached the ears of Galileo, who constructed a t. of his own on the same principle. This he applied to a study of the heavenly bodies and was so encouraged that he made several larger and more powerful instruments, and in 1610 discovered the satellites of Jupiter and the mountains on the moon.

A refracting t. consists of an object-glass which collects the rays of light, from a star, to a focus where a tiny image is formed. Here is placed an eyepiece which magnifies this image, and through this eyepiece the observer looks. In Galileo's time the object-glass consisted of a single simple convex lens, but owing to the dispersion of light, objects seen through these early t's were seen to have a fringe of colours surrounding them. The power of a t. depends on the size of the object-glass, and as this was increased so did this chromatic aberration increase. Early astronomers tried to overcome the defect by making their t's very long; for instance, some of the instruments constructed by Huygens and Cassini in the XVII. cent. were over 100 ft. in length, and so unwieldy that little or no scientific work could be done with them. Isaac Newton decided that it was impossible to overcome chromatic aberration in refracting telescopes, and determined to devise a new form of instrument, and he invented the Reflecting Telescope.

In this type a mirror is placed at the bottom of an open tube. The mirror being ground to a certain curvature, the rays of light from a star are reflected back up the tube to a prism, suspended near the top in such a manner as not to interfere with the passage of the light rays from the star to the mirror. This prism diverts the rays to an eyepiece placed in the side of the tube, through which the observer looks. Sir William Herschel further improved the reflector, and in 1789 constructed an instrument, the focal length of which was 40 ft., and with this he discovered the inner satellites of Saturn.

Attention was again turned to the despised refractor, and in the XVIII. cent. it was found that, by constructing the object-glass in two pieces (the outer piece convex and made of crown glass, the inner piece concave, and made of flint glass), chromatic aberration was largely overcome. The difficulty now was the obtaining of suitable glass discs, of a size large enough for the requirements of the makers, while also the polishing and grinding of four separate surfaces had to be done only by the highest skilled workmen. However, in 1823, a lens of 12 in. diameter was manufactured by a firm of Swiss opticians, and in 1847 a t. having a 15-in. lens was set up at Harvard Univ. Observatory, U.S.A. A 23-in. lens was made by an Eng. amateur astronomer in 1868, whilst a few years later, Alvan Clark, of America, succeeded in making a 26-in. lens for the Washington Observatory, and with this instrument Prof. Hall discovered the two satellites of Mars. The observatories of Nice and Pulkowa followed the making of this t. by erecting instruments having object-glasses of 29½ in. and 30 in. respectively, and for some years the latter was the largest refractor in the world. James Lick, an Amer. millionaire, left a sum of money for erecting a 36-in. t. on Mount Hamilton (Cal., U.S.A.), and in 1888 the work was completed, and for ten years the Lick t. was the biggest in the world; but in 1898 another huge t., the money for which was provided by Mr. Yerkes, was set up at the observatory of the Chicago Univ. at Williams Bay (Wis., U.S.A.), the diameter of the object-glass being 40 in.

The largest reflecting t. of modern times, until a few years ago, was an instrument of 72-in. aperture, made by Lord Rosse and kept in his grounds at Parsonstown, Ireland. It was erected in 1845 and is over 54 ft. in length, but, owing to the climate of Ireland, has been of little value in research, and is little more than an astronomical curiosity. The National Observatory of France, Paris, has a 48-in. reflector, whilst the Carnegie Solar Observatory at Mount Wilson near Pasadena (Cal., U.S.A.) has a 60-in. mirror recently made by Professor Ritchie. The mirror is made from a great disc of glass, and is 7⅞ in. thick and weighs some 1900 lb. The total weight of the huge instrument is something like 23 tons, but the bearings are relieved of the great strain by an ingenious plan, for the instrument is fixed to a hollow drum, which floats in a metal bath of mercury.

The reflector is cheaper and easier to make than the refractor, whilst not only can it be made much larger, being less cumbersome to mount, but a very accurate rendering of the natural colours of the object observed is given, and this is not the case with the refractor. On the other hand, the closed tube of this latter type of t. is a great advantage when any air currents are present in the observatory, for they tend to disturb the vision in the open tube of a reflector. The reflecting t. is generally employed in celestial photography, for the visual and chemical focal points are identical, and this is not the case with the other type.

TELESE (41° 14′ N., 14° 30′ E.) (ancient *Telesia*), village, Italy; hot sulphur springs.

TELESIO, BERNARDINO (1509–88), Ital. philosopher and scientist; attacked Aristotelianism prevalent at Padua; proposed an inquiry into sense data; forerunner of Bacon.

TELFORD, THOMAS (1757–1834), Scot. civil engineer; b. Eskdale. His works include the Caledonian and Ellesmere Canals, the Gota Canal in Sweden, a system of main roads in Scot. Highlands, the Menai Bridge, and the Clyde Bridge at Glasgow.

TELL, WILLIAM, a peasant of Uri, Switzerland, prominent in the resistance to Austria, XIV. cent. According to legend, T., taken prisoner by the Austrian governor Gessler, was promised his liberty if with an arrow he could hit an apple on his son's head. T. accomplished the feat, but avowed that a second arrow was ready for Gessler if he had failed. Gessler thereupon seized him and carried him off to prison. But T. made his escape and subsequently shot Gessler through the heart. The general revolt which followed against Austria ended in the victory of Switzerland. A monument stands to his memory at Altorf.

TELL-EL-AMARNA (27° 30′ N., 31° E.), ruins of a residence of Amenophis IV., near Nile, Upper Egypt; in 1887–88 about 300 clay tablets with important cuneiform inscriptions were discovered here.

TELLER, WILHELM ABRAHAM (1734–1804), Prot. theologian; prof. at Helmstedt, 1761; became a rationalising theologian, issued various works, and tended to substitute for distinctively Christian rites and doctrines a purely ethical system.

TELLICHERRY (11° 45′ N., 75° 32′ E.), seaport, Malabar, Madras, Brit. India; exports coffee. Pop. 29,000.

TELLURIUM (Te=127·5), a silvery, brittle, rare non-metal in sulphur group; occurs native, and as metallic tellurides; S.G. 6·27, M.P. 452° C., B.P. 478° C., molecule Te_2.—Compounds: TeH_2, combustible gas (cf. SH_2); TeO, $TeCl_2$; $TeCl_4$; TeO_2, H_2TeO_3, and tellurites; TeO_3, H_2TeO_4, H_6TeO_6, and tellurates.

TELOSPORIDIA, a sub-class of SPOROZOA (*q.v.*).

TEMENOS (Gk.), sacred precinct of a god, sometimes containing a temple.

TEMESVÁR (45° 47′ N., 21° 14′ E.), town, on Bega, capital, County Temes, Hungary; XVIII.-cent. cathedral (R.C.); manufactures tobacco; active trade. Pop. (1910) 72,555.

TEMPE, VALE OF (39° 50′ N., 22° 35′ E.), valley, Thessaly, Greece.

TEMPERA, DISTEMPER, process of spreading mixture of paint and glutinous material on flat surface; used by artists, especially of early Ital. school, for applying to canvas, and by house painters.

TEMPERANCE, from its original meaning of 'moderation,' t. has come to mean almost exclusively 'moderation in the use of alcoholic liquor,' or total abstinence from such liquor. Throughout the ages the records of civilised man contain references to the want of t., and deal with it both as a shameful thing and as a matter for ridicule. From earliest times men and women have been found to deny themselves the use of alcoholic liquors. Wine in the grape-growing countries, ale and mead in the more northerly regions were the common liquors that called for t., until the XVIII. cent. when spirits by the process of the distillery came into general use throughout the north of Europe. The absence of all Excise Duty in Great Britain on spirits enabled gin to be sold so cheaply that drunkenness—always a failing of the races in the colder climates of the world—was conspicuous in London, and according to Smollett the gin sellers advertised that their customers might be 'Drunk for a Penny, and Dead Drunk for Twopence; clean straw provided.' The rise in the price of spirits ended these incitements to intemperance, and with the early years of the XIX. cent. the t. movement, at first entirely directed against the drinking of spirits, came into being.

New York claims to have started the first t. society (1808), and Ireland the second. Father Mathew preached his great t. crusade in Ireland, 1838–42, with marked results in the decrease of consumption of alcoholic liquors, and soon after 1830 t. societies are found in Lancashire and Yorkshire. These societies are the first teetotal societies, requiring *total* abstinence from their members, and their inauguration made a great cleavage in the t. parties. To-day, however, the 'temperance' man is generally understood to be a teetotaller, though occasional exceptions are found.

The U.K. Alliance was started in 1853 for the 'total and immediate suppression' of the trade in alcoholic liquor, and for 60 years has pushed a demand for Local Veto and Prohibition. Besides the U.K. Alliance, the chief t. societies are the Church of England T. S.—with two sections, one for teetotallers and one for moderate drinkers—the Independent Order of Good Templars (Friendly Society), the Brit. Women's T. Assoc., and the League of the Cross (R.C.).

In America several states have adopted *Prohibition*, forbidding all sale and purchase of alcoholic liquor, but success of the policy in promoting t. is disputed. In 1912 Kansas, Maine, Mississippi, N. Carolina, N. Dakota, Oklahoma, Tennessee, Virginia, and W. Virginia were prohibition states, and there was local prohibition in several others. The International Order of Good Templars and the Order of the Sons of Temperance are the chief societies in U.S.A. Consumption of alcoholic liquors has increased as it has declined in Britain.

The difficulty of obtaining reliable statistics on the growth of t. is very great. The most sober countries are admittedly Italy, Spain, and Portugal, and generally it is true that t. belongs to the wine-drinking lands, and intemperance to the country where spirits are the popular beverage. Many t. reformers have claimed that alcohol is a source of crime and disease; but against that must be placed the fact that many persons have only abstained from alcohol to indulge in excessive tea-drinking and drug-taking, both disastrous to health and sanity. The indulgence that t. would restrain weakens the will, and whatever form the self-indulgence takes, t. is necessary for the preservation of body and soul.

Formerly mere drunkenness was punished by a fine of 5s. and confinement in the stocks in lieu of distress. To-day, drunkenness in a public place and drunken disorderliness are punishable by fine or imprisonment with hard labour. A habitual drunkard, *e.g.* a 'person who, not being amenable to any jurisdiction in lunacy, is notwithstanding by reason of habitual intemperate drinking of intoxicating liquor, at times dangerous to himself or herself, or to others, or incapable of managing himself or herself, and his or her affairs,' may be detained, by the Act of 1898, if convicted of an offence when drunk, in a certified inebriate reformatory for a term not exceeding three years. There are also 'Retreats' licensed by county and borough councils, and in such retreats habitual drunkards voluntarily submitting themselves may be detained compulsorily for not more than two years.

Drunkenness is no excuse in law for a crime; but a contract made by a person too drunk to understand what is being done is voidable in law, if the other person was aware of the fact, but may be ratified when the drunken person becomes sober.

Rowntree and Sherwell, *T. Problem and Social Reform*; A. Shadwell, *Drink, T., and Legislation.*

TEMPERATURE, see HEAT.

TEMPIO PAUSANIA (40° 53′ N., 9° 10′ E.), town, Sassari, Sardinia. Pop. 6500.

TEMPLARS, KNIGHTS (*Pauperes commilitiones Christi templique Salomonici*), military religious order, founded XII. cent.; named from mosque known as 'temple of Solomon' at Jerusalem by which their house was at first established. Originated in necessity of protecting bands of pilgrims who

after First Crusade sought Holy Land; like Hospitallers (*q.v.*), essentially Fr. order; in 1119, Hugues de Payns and Godeffroi de St. Omer formed nucleus of future order; they and six other Western knights accepted rule of St. Benedict, swore to devote their lives to protection of pilgrims, and received their quarters in palace of Baldwin I., king of Jerusalem, near above-mentioned mosque; like Hospitallers, at once received grants of territory in all countries; by command of council of Troyes, 1128, and of St. Bernard, abbot of Clairvaux, the rule was drawn up; privileges confirmed by papal bull, 1163.

Order was divided like that of Hospital into knights, chaplains, and servants (*fratres servientes armigeri* and *fratres servientes famuli*). Poverty and absence of ostentation were salient principles of rule, but figure on seal (also stamped with Temple) of two riders on one horse represents knight and rescued pilgrim, not two knights. Dress of knights and higher chaplains was white robe, white girdle, red Maltese cross on left shoulder; married men, admitted under certain conditions, might not, however, wear white, but, with lower chaplains and servants, black or brown mantle with red cross; robe of chaplains closed; standard half black, half white, with inscription, *Non nobis, non nobis, Domine, sed nomini tuo da gloriam*; primitive order puritanical rather than ascetic, but rule emphasised need for shunning companionship of women; among functions was that of public treasury, which brought considerable banking profits; wide privileges and independence of local control led to subsequent corruption; already roused bitter jealousy and gave rise to criticisms in XII. cent.; failure of crusaders' attacks on Damascus and Ascalon, 1148–49, charged to their falsity and avarice, while they were suspected by Frederick II. of betraying his plans to sultan, 1229; nevertheless, played great part in XII. and XIII. cent's.

Grand Master Odo de St. Amand in 1177 avenged at *Ascalon* previous disaster, though Saladin's power was not seriously diminished; Gerard de Riderfort, his successor, secured throne of Jerusalem for Guy de Lusignan, 1186, but in following year Jerusalem was captured by Saladin and all members of military orders taken were slain; those who escaped garrisoned Acre till it fell, 1191; with aid of T's and in Templar robe, Richard Cœur de Lion escaped from Palestine. Acre, recovered, was T's next home, where ruined Castle Pilgrim, built *c.* 1217, is still to be seen; T's won great fame at capture of Damietta, in Fifth Crusade, 1219; civil wars with Frederick II. and Hospitallers closely followed by final Muhammadan capture of Jerusalem, 1244, when nearly all members of military orders were slain; T's assisted crusade of Louis IX., 1250; almost confined to Acre by 1268; Acre fell, 1291, and T's made final settlement in Cyprus; opposition to order now came to a head; Philip IV. of France took advantage of popular feeling to secure suppression, probably in interests of strong government, to which its riches and immunities made it enemy; heresies and nameless sins ascribed, not known on how much foundation, to order; warrants for arrest obtained from pope, 1307; confessions made under extreme torture; numbers, including grand master, burned; example of arrest followed in other countries (England, 1308); order suppressed by council of Vienne, 1312; possessions granted to Hospitallers.

Froude, *Templars* (1886).

TEMPLE, term used to describe a place of worship of ancient Hebrew and pagan religions as opposed to 'church' of Christianity or synagogue of later Judaism; the Hebrew has been translated 'god-house' (better than 'house of God'), but the existence of such cannot have been characteristic of the primitive phase of Semitic religion. Only when the nomads had settled down were the gods housed in permanent abodes. A t. always had an altar, for sacrifice was the central act of worship. In Judaism the first great t. was that of Solomon, described in *1 Kings* 6 and 7, itself probably drawn from earlier sources of information. Its site is now marked by the Mosque of Omar (or Dome of the Rock) (this is not mentioned in Kings, but is supported by the evidence of archæology and tradition). Mount Moriah, on which it is built, was artificially levelled at the top, and the spot had probably been sacred from prehistoric times.

The T. proper was divided into the 'Holy Place' and the Holy of holies, only entered once a year by the high priest. Outside was a porch, and all around a lower building consisting of small chambers. It was magnificently built and overlaid with gold. In the Holy Place were the table of shewbread and the golden candlesticks, and in the Holy of holies the ark. East of the T. was the altar of burnt-offering—a great slab of rock. The whole T. is architecturally typical of Syrian art.

Solomon's T. was destroyed by Nebuchadnezzar, 86 B.C., and was succeeded by that of Zerubbabel, built on similar lines. It had, however, a large square outer court, then an inner court, for the priests alone. The altar was larger than in Solomon's T., and there was an arrangement for draining off the blood of the slaughtered animals into the Kidron. Zerubbabel's T. was built 520–516 B.C., but before the return from exile an ideal T. had presented itself to the mind of Ezekiel, and Zerubbabel generally followed Ezekiel's idea. It was outraged by Antiochus Epiphanes in 168 B.C. and by Pompeius. The last T. was that of Herod the Great, begun about 20 B.C. It contained a large outer court. The eastern part of the interior building was the Court of the Women; a door led thence to the Court of the Israelites, then the Court of the Priests containing the altar of burnt-offering, then the T. porch proper, Holy Place, and Holy of holies. It was destroyed at the siege of Jerusalem, A.D. 70.

Gk., Rom., Egyptian, and Assyrian t's were built on somewhat similar plans, containing a sanctuary with chambers at either end and colonnades.

Fergusson, *The T's of the Jews* (1878); Bannister, *T's of the Hebrews.*

TEMPLE (31° 5′ N., 97° 20′ W.), city, Bell County, Texas, U.S.A.; agricultural region; cotton industries. Pop. (1910) 10,993.

TEMPLE BAR, famous London 'barrier' erected (1670) between Strand and Fleet Street; city boundary; removed, 1878, and replaced by commemorative monument.

TEMPLE, EARLDOM OF, Hester I., Viscountess Cobham, heiress of T's of Stowe, was cr. Countess T., 1749; succ. by s., Richard (*q.v.*); his nephew and heir, George, cr. Marquess of Buckingham, 1784, was f. of Richard, cr. Duke of Buckingham and Earl T. of Stowe, 1822; earldom of first creation became extinct, 1889, but that of T. of Stowe descended to William Stephen Gore-Langton, descendant of T's and f. of present earl.

TEMPLE, FREDERICK (1821–1902), Anglican divine; ed. Oxford; ordained, 1846; became a school inspector, 1858, and headmaster of Rugby, 1858; bp. of Exeter, 1869, of London, 1885; abp. of Canterbury, 1896. A man of strong and noble character, he became very popular as headmaster, though his force and fire alarmed some people in London; his s., Rev. William T. (1881–), became headmaster of Repton, 1910.

TEMPLE, INNER and MIDDLE, see INNS OF COURT.

TEMPLE, RICHARD GRENVILLE-TEMPLE, EARL (1711–79), Eng. statesman; s. and heir of Richard Grenville of Wootton by Hester, dau. of Sir Richard T., Bart. William Pitt m. his sister and advanced him; Privy Seal, 1757; on bad terms with bro., George, First Lord of Treasury, 1763 (see GRENVILLE), and ultimately worked mischief to Pitt; incapable, bad-tempered, of restless ambition.

TEMPLE, SIR WILLIAM, Bart. (1628–99), Eng. statesman and writer; e. s. of Sir John T., Master of Rolls, Ireland; m., 1655, Dorothy Osborne, whose *Love Letters* were edited by Gollancz, 1903; ambassador

to Brussels, 1665; deeply imbued with Country Party's mistrust of France; negotiated Triple Alliance (1668) of England, Holland, and Sweden to resist encroachments of France in Netherlands, nullified by Charles's secret Treaty of Dover; ambassador at Hague, 1668, and opposed war with Holland; arranged marriage of William and Mary; returned home, 1679; retired to Sheen on King's dissolution of Parliament; essays praised by Lamb.

TEMRYUK (45° 17′ N., 37° 22′ E.), seaport, on Sea of Azov, Kuban, Russ. Caucasia; flour-mills; exports grain. Pop. 16,000.

TENAILLE, see FORTIFICATION.

TENANT, see LANDLORD AND TENANT.

TENASSERIM.—(1) (13° 30′ N., 98° 30′ E.) division, Lower Burma, between Siamese mountains and Bay of Bengal. Pop. 1,170,000. Capital, Moulmein. (2) (12° 6′ N., 99° 3′ E.) town, on Tenasserim, Tenasserim division, Lower Burma. Pop. 10,000.

TENBURY (52° 18′ N., 2° 36′ W.), market town, on Teme, Worcestershire, England. Pop. (1911, in rural district) 4727.

TENBY (51° 41′ N., 4° 42′ W.), town, watering-place, on Carmarthen Bay, Pembrokeshire, Wales; fisheries. Pop. (1911) 4362.

TENEBRÆ, Passion Week service in R.C. Church.

TENERIFFE (28° 25′ N., 16° 40′ W.), largest of Canary Islands (*q.v.*); traversed by volcanic mountains with famous Peak (highest point—El Piton—12,000 ft.; crater, 300 ft. in diameter and 70 ft. deep); capital, Santa Cruz de T. (*q.v.*); drawn linen, maize, wheat, potatoes, wine, tropical fruit, etc.; area, 7828 sq. miles; tourist and invalid resort. Pop. 150,000.

TENIERS, two Flemish artists, f. and s., both b. Antwerp. DAVID TENIERS, the elder (1582–1649), a pupil of Rubens, dealt chiefly with homely subjects; distinguished for charm of colour and a pleasing freedom of handling. DAVID TENIERS, the younger (1610–90), enjoyed great distinction, and painted, it is calculated, about 700 pictures. His forte lay in scenes of happy outdoor life.

TENISON, THOMAS (1636–1715), Anglican divine, of Prot. sympathies; bp. of Lincoln, 1691; abp. of Canterbury, 1694; upheld Hanoverian dynasty, crowning George I.

TENNESSEE (35° to 36° 40′ N., 81° 50′ to 90° 13′ W.), S.E. central state, U.S.A.; bounded N. by Virginia, Kentucky, W. by Missouri, Arkansas, S. by Mississippi, Alabama, Georgia, E. by N. Carolina; area, 42,050 sq. miles. Surface is mountainous in E., where the Great Smoky and other ranges of the Appalachians separate the state from N. Carolina, and reach an extreme height of 6636 ft. in Mt. Guyot; in centre is valley of E. Tennessee, and in W. is the great plateau of the Cumberland Mountains. Drained by Mississippi, which forms W. boundary; and the Ohio receives waters of Cumberland and Tennessee Rivers and their tributaries, and unites with Mississippi in lat. 37° N. Cambrian formation prevails in E.; centre is Silurian and the W. is chiefly of Cretaceous and Tertiary date; extreme W. is more recent, being of Pleistocene formation. Climate is healthy, with long, fine summer. Flora includes pine, oak, beech, and other valuable timber trees, persimmons, crab-apples, and other fruits. Fauna includes bears, deer, rattlesnakes.

T. was first visited by Spanish explorers, *c.* 1541; settled by English in middle of XVIII. cent. Organised as a territory in 1790, it was admitted as a state to Union, 1796; seceded from Union on outbreak of Civil War, although a large party in the state was in favour of the Federal Government; readmitted to Union, 1866.

Executive power is in hands of a governor and four other officers of state; legislature consists of a Senate of 33 members and a House of Representatives of 99 members, all of whom are elected for two years by popular vote. T. sends 2 Senators and 10 Representatives to Federal Congress. State is divided into 96 counties for purposes of local administration. Chief towns are Nashville (capital), Memphis, Knoxville, Chattanooga. Agriculture is important industry, large crops of maize and wheat being grown as well as oats and vegetables; fruit is extensively grown; tobacco and cotton are cultivated. Live stock raising is less important than formerly. Minerals include coal, petroleum, iron, copper, zinc, limestone. Principal industries are lumbering, flour-milling, manufacture of iron and steel goods, cotton-seed oil and cake, furniture, leather, textiles. Railway mileage (1912), 4193. Education is free and in some parts obligatory, and there are separate schools for white and coloured; Knoxville, Nashville, Chattanooga, Sewanee, and Cumberland are univ. towns. Principal religions are Baptist, Methodist, Presbyterian, R.C. Pop. (1910) 2,184,789.

TENNESSEE RIVER (35° N., 88° W.) is formed by union of two streams in E. part of Tennessee, U.S.A.; flows S.W. through Tennessee, then N.W. through Alabama, W. Tennessee, and Kentucky; enters Ohio at Paducah; length, 1200 miles; most of its course navigable.

TENNIEL, SIR JOHN (1820–), Eng. caricaturist; widely and familiarly known by his cartoons in *Punch*, the staff of which he joined in 1851; notable also as a book-illustrator, his most successful work in this line having been done for *Alice in Wonderland*, and *Through the Looking-Glass*.

TENNIS, development of a game, *longue paume*, played by French and Italians and now represented by Fives (*q.v.*); popular in France and England by XIV. cent.; retained favour till ousted by lawn-tennis (*q.v.*) towards end of XIX. cent.; still played, although expense of building courts make the game impossible for most.

T. is played by two or four players in rectangular court, partially covered by penthouse roof directly beneath which lie openings, the *dedans*, *grille*, and *galleries*; and net, 5 ft. high at ends, 3 ft. in middle, separates 'service' from 'hazard' side; racket is of ash, strung with gut, about 16 oz. in weight and 2 ft. 2 in. long. A series of lines one yard apart is drawn across floor at each end of court.

The server, standing on service side of court, delivers ball so as first to strike lateral penthouse and then to drop into service court; the striker-out may return it by volleying or on first bounce; stroke is scored when ball is hit into last gallery on hazard side, dedans, or grille, or lost when ball is hit out of court, into net, or when *chase* is lost (when ball enters any gallery except last or bounces for second time between lines drawn across court) note is taken, and, when opponent makes chase, results are compared, stroke nearest end wall wins.

The first point is 15, second 30, third 40, fourth game. 'Love' means that player has not scored; 40 all is known as 'deuce,' and for next point, two consecutive strokes must be scored. Player who scores six games first wins set.

Julian Marshall, *Tennis* (1889).

TENNYSON, ALFRED, LORD (1809–92), Eng. poet; b. Somersby, Lincolnshire, s. of a clergyman; ed. at Louth and Trinity Coll., Cambridge. With his bro., Charles, he pub., in 1826, *Poems by Two Brothers*, in 1830 and 1833 two volumes of *Poems* that met with very unfavourable criticism. In 1842, however, the publication of a third volume brought him instant recognition, and thenceforward his life was one of uninterrupted success. His chief works were *The Princess* (1847), interspersed with charming lyrics; *In Memoriam* (1850), an elegy begun in 1833 on the death of his college friend, Arthur Hallam; *Maud* (1855), *Idylls of the King* (1859, 1869, 1872), *Enoch Arden* (1864); *Queen Mary* (1875) and *Harold* (1876), plays; *Locksley Hall* (1886), *Demeter* (1889), and *The Death of Œnone* (1892). In 1850 he became Poet Laureate and m. Emily Sellwood, and in 1884 he was raised to the peerage. He was buried in Westminster Abbey.

In his lifetime his poetry was almost extravagantly admired, and has, in consequence, suffered in its popularity since his death. His work always shows beauty of expression and purity of thought, but is marred, especially in his longer poems, by too much refinement and too little passion. His lyrics rank among the best of Eng. lit.

Life, by his s. (2 vols., 1897); works by Waugh (1892), Stopford Brooke (1894), Sir A. Lyell (E.M.L.).

TENT, portable shelter; a light shelter made of animal skins and leaves of trees, before production of canvas; bark, hides, straw, and mud used by Rom. soldiers; always a necessary habitation for military forces, from the time of Gk. and Macedonian wars; common dwelling-place of Arabs and Persians.

TENTERDEN (51° 4′ N., 0° 42′ E.), town, Kent, England. Pop. (1911) 3376.

TENTHREDINIDÆ, see SAW-FLIES.

TENURE, see LANDLORD AND TENANT, SMALL HOLDINGS.

TEPIC (21° 22′ N., 104° 52′ W.), territory, on Pacific coast, Mexico; fertile; agricultural and mining industries. Pop. (1910) 171,173. Capital, **Tepic**. Pop. (1910) 16,805.

TEPLITZ, TEPLITZ-SCHÖNAU (50° 39′ N., 13° 43′ E.), town, watering-place, Bohemia, Austria; warm mineral baths; manufactures machinery, textiles. Pop. (1910) 26,777.

TERAI, TARAI (*q.v.*).

TERAMO (42° 40′ N., 13° 43′ E.) (ancient *Interamnium*), town, at junction of Tordino and Vezzola, capital, Teramo province, Italy; cathedral; Rom. antiquities; manufactures silk. Pop. (1911) 24,538; (province) 307,284.

TERATOLOGY, the science concerned with the occurrence of monstrosity in organic life. The term 'monster' is applied to creatures which depart greatly from the normal parental appearance, and is thus in part synonymous with the terms 'freak,' 'sport,' and 'discontinuous variation.' But it also includes defective states which are not true variations at all. A monster, in short, is a greatly abnormal specimen whether its condition be due to germinal variation or to defective nutrition. Monstrosities may be divided into those characterised by superabundance of parts, by deficiency of parts, or by transposition or confusion of parts. Human examples of deformities of excess are those where more than five fingers occur on each hand (*polydactylism*), or where the head (*macrocephalia*) or body (*macrosomatia*) is abnormally large. Defect is illustrated by the presence of only one eye-orbit (*cyclopia*), by the absence of a heart (*acardia*), or by diminutive head (*microcephalia*).

Imperfect separation of parts is well seen in, for example, the Siamese twins, where two bodies remain united during life. Such junctions of bodies, altogether or in varying degree, is commonly exhibited by the embryos of trout or salmon bred in hatcheries.

The true causes of monstrosities are mostly unknown, but it has been shown that in times of stress, such as war periods, or periods of famine, many monstrous children, with deformities of defect or imperfect development, due to malnutrition, are born.

TERCEIRA (38° 38′ N., 27° 20′ W.), island, Azores, belonging to Portugal. Pop. 55,000. Capital, Angra.

TEREBELLA, a Bristle-Worm, see under CHÆTOPODA.

TEREDO, see LAMELLIBRANCHIATA.

TEREK.—(1) (43° N., 45° E.) province, Russ. Caucasia, on N. slopes of Caucasus; chief occupation, agriculture. Pop. (1910) 1,182,700. Capital, Vladikavkaz. (2) (43° 48′ N., 47° 10′ E.) river, Russ. Caucasia; rises on Mt. Kasbek, flows by delta into Caspian Sea.

TERENCE, PUBLIUS TERENTIUS AFER (*c.* 192–158 B.C.), Rom. playwright, though not of Rom. birth, probably African; brought to Rome as slave of Terentius Lucanus and soon obtained freedom after being kindly treated and well educated by his master; first play produced, 166, last in 160, after which he left Rome to travel in Greece; mode of death uncertain, there are varying accounts, all of doubtful value. In spite of his foreign origin, T.'s Latin is pure and elegant and was admired by such severe critics as Cicero and Quintilian. He drew his plots from Menander and other Gk. playwrights of New Comedy. Unlike Plautus (*q.v.*) he did not adapt his plays to contemporary Rom. life, but portrayed Gk. manners of the time in which the originals were written. He wrote six plays, *Andria*, *Hecyra*, *Heauton Timorumenos*, *Eunuchus*, *Phormio*, *Adelphæ*. Molière (*q.v.*) has copied Phormio in *Les Fourberies de Scapin*.

TERESA, see THERESA, ST.

TERGESTE, ancient name of TRIESTE (*q.v.*).

TERLIZZI (41° 8′ N., 16° 32′ E.), town, Bari, Italy. Pop. 25,000.

TERM, day fixed for payment of rent; term days in England are Lady Day (March 25), Midsummer Day (June 24), Michaelmas Day (Sept. 29), Christmas Day (Dec. 25); in Scotland are two—Whitsunday (May 15) and Martinmas (Nov. 11), while Candlemas (Feb. 2) and Lammas (Aug. 1) are purely conventional term-days; Scot. removal t's are May 28 and Nov. 28; Oxford Univ. has four t's—Michaelmas, Hilary, Easter, Trinity (formerly legal t's), Cambridge has three—Lent, Easter, Michaelmas; Scot. univ's have a three-term session.

TERMINI IMERESE (37° 58′ N., 13° 41′ E.) (ancient *Thermæ Himerenses*), seaport, Palermo, Sicily; warm mineral springs. Pop. 23,000.

TERMITES, WHITE ANTS (*Isoptera*, Gk. *isor*, equal; *pteron*, wing), or (*Termitidæ*), separate order of Insects, till recently included with Neuroptera. Of greatest interest on account of their complex social habits. There are wingless and winged forms; latter possess four long, equal membranous wings, which lie flat on the back, and can be readily cast off. The larva is either like the adult, or becomes adult-like by slight, gradual changes. T. build 20-foot high domes of nests, constructed of earth or chewed wood. Within are rooms and galleries for distinct purposes, palaces, nurseries, store-rooms, etc.

The t. themselves are of various orders, king, queen, workers, and soldiers, each with its own duties; and within the nest, in which they remain except during the swarming flight, social order in perfectly established. T. are most common in tropical and sub-tropical regions, but a few are found beyond this limit.

TERMONDE, DENDERMONDE (51° 2′ N., 4° 6′ E.), town, E. Flanders, Belgium; fortified. Pop. 10,000.

TERNATE (1° 15′ N., 127° 45′ E.), residency, Dutch E. Indies; including Ternate Island, part of Celebes, Dutch New Guinea, and the N. islands of the Moluccas; Capital, **Ternate**, on E. coast, Ternate Island. Pop. *c.* 210,000; (town) 4000.

TERNI (42° 34′ N., 12° 40′ E.) (ancient *Interamna*), town, Perugia, Italy; iron- and steel-works; Rom. antiquities; scene of defeat of Neapolitans by French, 1798. Pop. 22,000.

TERNS, see under GULL FAMILY.

TERPANDER (VII. cent. B.C.), Gk. musician and poet; a Lesbian; invented 7-stringed lyre.

TERPENES are hydrocarbons, $C_{10}H_{16}$ or $(C_5H_8)n$, occurring in turpentine and essential oils derived from plants. They are liquid or solid, inflammable, and possess characteristic odours, and solvent and other valuable properties.

Crude Turpentine, obtained from stems of pine trees, yields, by steam distillation, oil of turpentine and colophony resin. OIL OF TURPENTINE is a colourless, odorous liquid, S.G. 0·86, B.P. 158–160° C., gradually oxidised by moist air to a kind of resin; used for varnishes and paints; does not mix with water, but dissolves phosphorus, sulphur, iodine, resins, and caoutchouc.

Pinene, $C_{10}H_{16}$, a colourless liquid, S.G. 0·858, B.P. 155°, smelling like turpentine, occurs in pine trees, and essential oils of eucalyptus, lemon, thyme, etc. Pinene

from Amer. turpentine is dextro-rotatory, that from Fr. turpentine levo-rotatory. Forms with bromine $C_{10}H_{16}Br_2$, and with HCl $C_{10}H_{17}Cl$. When heated, the dibromide yields cymene, $C_{10}H_{14}$.

Camphene, $C_{10}H_{16}$, is a solid, M.P. 48°, B.P. 160°, occurring in oil of ginger, etc.; forms the dibromide $C_{10}H_{16}Br_2$, and hydrochloride, $C_{10}H_{17}Cl$; oxidised by chromic acid to camphor.

Limonene, $C_{10}H_{16}$, B.P. 175°, occurs in oil of lemons, lime, lavender, caraway, bergamot, turpentine, etc.; forms the tetrabromide, $C_{10}H_{16}Br_4$, and dihydrochloride, $C_{10}H_{18}Cl_2$, optically active.

Constitution: that terpenes combine directly with bromine shows them to be unsaturated; and their conversion into cymene shows them to be closely related thereto. Pinene, which unites with two bromine atoms, contains one double linkage.

These compounds are said to contain bridged rings on account of the mode of linkage across the ring. Limonene contains no bridged ring, but two double linkages. The constitution of the terpenes has in some instances been proved by actual synthesis; *e.g.* inactive limonene has been prepared by Perkin. Closely related to the terpenes are camphor (a ketone), menthol (an alcohol), and thymol (a phenol).

TERRA DEL FUEGO, see TIERRA DEL FUEGO.

TERRACINA (41° 17′ N., 13° 17′ E.) (ancient *Anxur* or *Tarracina*), town, on Mediterranean, Rome, Italy; bp.'s see; cathedral and ruins of temple of Venus. Pop. 11,300.

TERRA-COTTA, Ital. term for clay, moulded and baked; uses are varied—statuettes, vases, and ornaments; bas-reliefs and groups; cornices, friezes, and other architectural ornaments; in its coarser processes, bricks, tiles, and rough pottery. T. may be glazed (see POTTERY). Prevalent colours are natural brown, yellow, or red, but t. is often impregnated with various colour-pigments. Greeks, Etruscans, Phœnicians, and Romans specialised strongly in t. work. Mediæval, and especially Renaissance times, produced much fine work; a distinct revival is noticeable in XX. cent. in Germany, France, and Britain for large decorative purposes, and the materials wear very slowly. Some of the best XVII.-cent. work is English, notably by Doulton and Tinworth. Coarser terra-cotta work is a rising industry in Flanders.

Davis, *Manufacture of Brick and Terra-cotta* (1889).

TERRANOVA (37° 3′ N., 14° 16′ E.), seaport, on site of ancient Gela, Caltanisetta, Sicily; tunny and sardine fisheries. Pop. 23,000.

TERRANOVA PAUSANIA (40° 54′ N., 9° 30′ E.), small seaport, on N.E. coast, Sardinia. Pop. 4500.

TERRAPIN, see under TORTOISES.

TERRA HAUTE (39° 24′ N., 87° 27′ E.), city, on Wabash, capital, Vigo County, Indiana, U.S.A.; coal-mining and distillery industries. Pop. (1910) 58,157.

TERRELL (32° 40′ N., 96° 10′ W.), city, Kaufman County, Texas, U.S.A.; cotton industries. Pop. (1910) 7050.

TERRESTRIAL MAGNETISM, see MAGNETISM.

TERRIERS, see DOG FAMILY.

TERRITORIAL WATERS, see under FISHES.

TERRITORIALS, see VOLUNTEERS.

TERRY, ELLEN ALICIA (1848–), Eng. actress; famous for greatness of her acting with Irving; mother of Edward Gordon Craig (1872–), actor and master of the Art of the Theatre.

TERTIAN FEVER, see MALARIA.

TERTIARIES, persons connected with the monastic orders, but not under vows of poverty, chastity, and obedience; they developed owing to the work of St. Francis, who did not admit to the order all who sought for admission, but organised them as T's.

TERTIARY, CAINOZOIC, all rock strata above Cretaceous system, and including Eocene, Oligocene, Miocene, and Pliocene.

TERTULLIAN, Q. SEPTIMUS FLORENS TERTULLIANUS (*c.* 155–222 A.D.), Christian theologian; s. of a Rom. centurion; became a presbyter in the Carthaginian Church when about forty; early began work as a controversialist, and most of his writings have fortunately been preserved; though at first a passionate defender of Catholic tradition against heresy, his very bitterness against laxity led him into heresy, and he became a Montanist. Lat. Christianity has been said to start with him, and he deals with practical problems in contrast to the speculative tendency of Gk. theologians. Though earnest, he is violent and harsh and extremely rhetorical; among his most famous works are *Apologeticum*, *De Præscriptionibus*, *De Baptismo*.

See English trans. in *Ante-Nicene Fathers*; Harnack, *History of Dogma*; Glover, *Conflict of Religions in the Early Rom. Empire*.

TERUEL (40° 30′ N., 1° W.), province, Aragon, Spain; mountainous. Pop. (1910) 254,998. Capital, **Teruel** (40° 22′ N., 1° 5′ W.), on Guadalaviar; bp.'s see; XVI.-cent. cathedral. Pop. 11,200.

TERVUEREN (50° 50′ N., 4° 30′ E.), town, Brabant, Belgium. Pop. 4200.

TESCHEN (49° 45′ N., 18° 38′ E.), town, Austria; ruined castle; manufactures furniture; was capital of ancient duchy of Teschen. Pop. (1910) 22,489.

TESLA, NIKOLA (1857–), Servian physicist and electrician.

TESSIN, CARL GUSTAF, COUNT (1695–1770), Swed. statesman; leader of the 'Hats,' representatives of national dignity, against 'Caps,' who desired peace at any price; great personal distinction, cultured speaker and writer; chief minister, 1746–52.

TEST ACTS, Eng. laws under which oath of religious conformity was tendered. Corporation Act, 1661, directed members of corporations to receive sacrament according to ritual of established church; same for magistrates by Test Act, 1673; Scot. Act, 1681; Test Act, 1685, extended test to all holders of public offices; repealed, 1829; univ. tests remained till Univ. Tests Act, 1871.

TESTAMENT OF THE THREE PATRIARCHS, THE TESTAMENT OF ABRAHAM, a Gk. apocryphal work, written in Egypt, *c.* 150 A.D.; T's of Isaac and Jacob also exist.

TESTAMENTS OF THE TWELVE PATRIARCHS, apocalyptic work and pseudonymous, written in the name of the Patriarchs, and in Hebrew, according to Dr. Charles, *c.* 109–106 B.C. The author, probably a Pharisee, extols the dynasty of John Hyrcanus, but a second writer vehemently attacks the vices of the later Maccabees. Its influence on the New Testament has been considerable; some passages supply close parallels to the teaching of Our Lord, who may have known the book, and it is quoted by St. Paul in *Rom.* 1^{32}, *1 Thess.* 2^{16}. The Hebrew original only exists in fragments, but there are Gk., Slavonic, and Armenian versions.

Charles, *Testaments of XII. Patriarchs.*

TESTAMENTUM DOMINI, TESTAMENT OF THE LORD, an early Christian apocryphal book, only fragments of which were known till recently, but now fully (in Syriac). It purports to have been spoken by Christ in the post-Resurrection period; it is partly eschatological and partly concerned with ecclesiastical discipline; exact date uncertain, but must be II. or III. cent.; first edit. by the Syrian patriarch, Rahmani, 1899; since then by Eng. scholars, last by Maclean.

TESTES, TESTICLES, see REPRODUCTIVE SYSTEM.

TETANUS, see PARASITIC DISEASES.

TETRABRANCHIA, a sub-order of Cephalopoda.

TETRAHEDRON, figure formed by joining by straight lines four equidistant points in space, three of the points forming an equilateral triangle.

TETRAO, see GROUSE.

TETRAODONTIDÆ, see GLOBE-FISHES.

TETRAZINES, compounds containing a ring of two carbon and four nitrogen atoms.

TETRAZZINI, LUISA (1874–), Ital. soprano, has won brilliant success in colorature rôles.

TETSCHEN (50° 46′ N., 14° 14′ E.), town, on Elbe, river port, Austria; chemical works. Pop. 10,650.

TETUAN (35° 32′ N., 5° 22′ W.), seaport town, on Martil, Morocco; manufactures slippers, firearms. Pop. 30,450.

TETZEL, JOHANN (*c.* 1465-1519), Catholic theologian; famed as seller of indulgences, 1517, to raise money for rebuilding St. Peter's; the abuse of these indulgences produced Luther's revolt. T. was at length denounced from the Catholic side.

TEUTOBURGER WALD (52° N., 8° 15′ E.), range of hills, Germany; extending for 70 miles from near Osnabrück, Hanover, S.E. through Westphalia and Lippe.

TEUTONIC KNIGHTS, ORDER OF, an Order similar to the Templars and Knights of St. John, but restricted to Germans; founded at Acre in 1190, originally to tend wounded Crusaders, it soon took up aggressive warfare against the heathen, and in the XIV. and XV. cent's was constantly at war with Wends and Lithuanians. On the conversion of these races the Order, which had become possessed of large landed possessions, steadily declined, and it was entirely suppressed in Germany by Napoleon in 1809. A Prot. branch still exists at Utrecht, and it has survived in Austria, where the Order has resumed its care for the wounded in war. The headquarters of the Order were formerly at Marienbad, and its rule extended to the Gulf of Finland. The Order never numbered more than 1000 knights, and now it numbers only 20 knights in Austria.

TEUTONIC LANGUAGES.—A group of languages some of which have fallen into disuse, others being widely prevalent now. They belong to the Indo-European family, and are marked by their adherence to Grimm's Law. The oldest Teutonic language in which documents are still extant was Gothic (*e.g.* Ulfila's translation of the Bible, IV. cent.); the modern representatives of the group may be classed as follows: (1) Germanic, (2) Scandinavian, and (3) Anglo-Saxon. The Germanic class comprises modern German, and its high and low dialects, Flemish, Frisian, Dutch, and Cape Dutch; the Scandinavian numbers four members, Danish, Swedish, Norwegian, and Icelandic; the Anglo-Saxon class is perpetuated in English, which has undergone more changes than the others, due mainly to additions from Lat. and Fr. sources. The modern representatives of Teutonic languages vary markedly, though some are mutually intelligible, *e.g.* Flemish and Dutch in their purer forms. Norwegian and Danish show almost complete similarity save in pronunciation.

TEUTONIC PEOPLES, general term, with no present-day geographical significance, for those peoples who speak one of the languages of the Teutonic group; originally massed together in Northern and Central Europe, they have become widely dispersed, and there are now important settlements of Teutonic peoples in America, Australia, and Africa. While the test of language is a convenient one, and broadly true, it is no arbitrary one; important sections of the Brit. people are of undoubted Celtic origin, while large portions of Germany and Austria are inhabited by German-speaking Slavs. The geographical area held by Teutonic peoples before the IV. cent. is doubtful, though archæological research points to an area comprising Schleswig-Holstein, the continental part of Denmark, some of the Baltic islands, southern Sweden, Mecklenburg, Frisia, and the whole basin of the Elbe. In Cæsar's time the Teutonic boundaries seem to have been roughly the North Sea, the Rhine, the Alps, and the Vistula, with offshoots in Scandinavia. The decay of the Rom. Empire and pressure of new races from the East brought about a great westward and southward expansion, part of which (*e.g.* Britain, Holland, and Flanders) was of a permanent character, while in France, Spain, and Italy the Teutonic elements did not long withstand the higher culture of the native races. By the VIII. cent. the Teutonic area, with the exception of Britain and the Low Countries, had returned broadly to the state of affairs in Cæsar's time. In the IX. cent. the Scandinavian branches expanded by a series of raids, and founded a number of new kingdoms none of which permanently altered the situation, excepting Iceland and Finland. With the growth of Dutch and English sea-power there came a notable extra-European expansion in the XVI. cent., which has lasted to the present day. The Teutonic peoples of the present day may be roughly divided into three groups: the Scandinavian, comprising Danes, Swedes, Norwegians, Finns, and Icelanders; the German, comprising Germans proper, Austrians, Dutch, Boers, and the populations of part of Belgium and Switzerland; the Anglo-Saxon, comprising the inhabitants of Great Britain, and its daughter-countries across the seas. The population of U.S.A. may be reckoned, if Latin and Slavonic elements be deducted, as partaking of all three groups.

TEVIOTDALE, name given to part of Roxburghshire in valley of Teviot, Scotland.

TEWFIK PASHA (1852-92), khedive of Egypt; succ. f., Ismail, who was deposed by the Powers, 1879; later in year, England and France established Dual Control; greatly assisted Sir Evelyn Baring in introducing reforms and in development of Egypt.

TEWKESBURY (51° 59′ N., 2° 9′ W.) (Rom. *Etocessa*), town, at junction of Avon and Severn, Gloucestershire, England; the abbey church (XII. cent.) is a fine specimen of Norman architecture; scene of a battle in Wars of Roses, 1471. Pop. (1911) 5287.

TEXARKANA.—(1) (33° 18′ N., 93° 57′ W.) city, Bowie County, Texas, U.S.A.; cotton manufactures. Pop. (1910) 9790. (2) (33° 22′ N., 94° 2′ W.) city, Miller County, Arkansas, U.S.A.; lumber and oil mills. Pop. (1910) 5655.

TEXAS (25° 50′ to 36° 30′ N., 93° 27′ to 106° 43′ W.), south-westerly state, U.S.A.; bounded N. by Oklahoma and Indian Territory, E. by Arkansas and Louisiana, S.E. by Gulf of Mexico, S.W. by Mexico, and W. by New Mexico; area, 265,896 sq. miles. Surface consists of a mountainous district in the W., where an extreme height of 8382 ft. is reached in Baldy Peak, prairie lands and forests in the centre, and coastal plain in the E. Drained by Grande, Guadalupe, Colorado, Brazos, Trinity, Neches, Sabine, and other rivers. The greater part of the state is of Cretaceous and Tertiary Age, but in the W. older Archæan rocks occur. Climate is healthy, except in some of the low-lying districts. Flora includes many kinds of cactus and a large variety of valuable timber trees. Fauna includes the opossum, armadillo, bear, coyote, and numerous insects.

T. was first discovered by Span. explorers early in XVI. cent.; included in the Span. province of Mexico, and remained in the possession of Mexico after the emancipation from Spain in 1821; in 1835 T. proclaimed its independence, and for 10 years retained its separate existence as a republic, after which it was admitted as a state to the Union, 1845. Was one of the seceding states in the Civil War, and was readmitted to the Union, 1870.

Executive power is in hands of a governor, assisted by a lieutenant-governor and five other officers of state. Legislature consists of Senate of 31 members and a House of Representatives of 142 members, all of whom are elected by popular vote—Senators for 4, and Representatives for 2, years. Sends 2 Senators and 18 Representatives to Federal Congress.

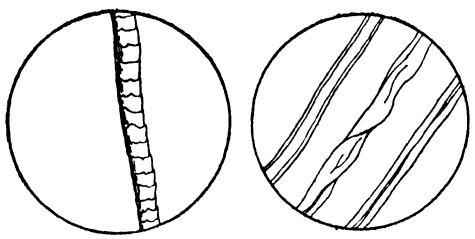
Chief towns are San Antonio, Dallas, Houston, Fort Worth, El Paso, Galveston. Agriculture is a highly important industry; maize, wheat, oats, rice, and potatoes are extensively cultivated; cattle, horses, sheep, and pigs raised in great numbers; cotton is largely produced, T. being the principal cotton-producing state of Union. Other important products are timber, tobacco, fruits. Minerals include coal, petroleum, mercury, salt, cement, gold, and silver. Principal manufactures are lumber, flour, cotton-seed oil and cake, beer, hardware; and meat-packing is carried on. Railway mileage (1911), 14,777. Education is free, and there are separate schools for whites and blacks; Austin,

Fort Worth, Waco, Georgetown, and Waxahachie are univ. towns. Chief religions are Baptist, Methodist, R.C. Pop. (1910) 3,896,542.

TEXAS FEVER, see under MITES AND TICKS.

TEXTILE FIBRES.—The term 'fibres' in general indicates the threads or filaments of which the tissues of animals or plants are composed, but textile fibres constitute a limited assortment of such or similar threads used commercially in the manufacture of cloth. Regarded from this point of view fibres fall into two great groups—animal fibres and plant fibres—each characterised by different properties and values.

Animal fibres consist of two classes—the most important containing hair and its varieties, growths originating in the outer skin or epidermis and forming



HIGHLY MAGNIFIED WOOL AND COTTON FIBRES.

the natural coverings of mammalian animals. The most valued and most widely used of these is wool, such as that of the many breeds of domestic sheep, Cashmere, alpaca, and vicuna goats. Wool varies in length, texture, and felting properties, the last depending on the development of microscopic ridges characteristic of such fibres. Hair, such as that of camels, is also much used. The second class contains animal secretions, the most important being the silk fibres spun into a cocoon by the larva of the silkworm moths (*Bombyx*).

Useful plant fibres consist of elongated complex fibrovascular bundles from the stems of such plants as flax, jute, and hemp, or of the simpler hairs which protect the seeds of such as the cotton plant.

In general quality animal fibres are distinguished from vegetable fibres by the greater non-conducting properties of the former—their greater power of retaining and excluding warmth. The former are nitrogenous in nature, the latter are composed of a carbohydrate-cellulose.

A simple discriminating test is that of fire—animal fibres frizzling with a horny odour, vegetable fibres blazing without smell. More delicate is that of boiling in a weak solution of caustic soda in water, wherein animal fibres dissolve while vegetable fibres remain. Microscopic structure also furnishes a sure guide to the nature of fibres.

TEXTILE PRINTING, see PRINTING.

TEXTUAL CRITICISM, that branch of literary science which deals with the actual verbal condition of documents. Before the invention of printing all texts were either MSS. or inscriptions; inscriptions could be and often were defaced, and the skill and knowledge of the textual critic had to be called in to supply what was wanting (*i.e.* so far as it could be supplied). When MSS. are examined it will generally be found that if there are several MSS. of a given work they differ in a number of points, possessing different readings. It is often possible to divide MSS. into groups or families; sometimes several will be seen to be derived from a lost copy or 'ancestor'; a proper pedigree of MSS. can then be constructed, and thence the original document can be reconstructed. Often there are various complications which render the reconstruction of the original MS. extremely different; *e.g.* known MSS. will contain readings from a number of different sources.

Sometimes important works of Gk. and Rom. writers are preserved only in a few very late MSS., or even in a single one. There are, however, many opportunities left open for error and corruption. Thus a scribe may misunderstand a rare word, and put a more intelligible one in its place; what is written in the margin may get incorporated in the text. Sometimes when the same word occurs twice running it will be omitted, or conversely the same will be written twice over. Words may get transposed, or be divided wrongly; whereas, as with ancient MSS., there is hardly any space left between words; passages may be interpolated to fill up where there seems something wanting.

One problem of textual criticism is 'conjectural emendation.' When by comparison of MSS., and removal of all possible errors, an effort has been made to get as near the original text as possible, there still remain points in which all known MSS. have a reading which is not merely unusual, but presents very serious difficulties, the critic suggests that the author must have written something else. One test that can be applied is intrinsic probability, whether an author would have been likely to write a given passage or not. Many critics are too 'conservative,' *i.e.* allow an impossible reading to stand rather than emend.

Textual criticism is a specially important branch of Biblical study. The New Testament, it has been said, presents a more complicated literary problem than any other known book. Even here more work is left for conjectural emendation than is often imagined.

TEZPUR, TEJPUR (26° 37′ N., 92° 53′ E.), town, on Brahmaputra, capital, Darrang district, Assam, India; tea industry. Pop. 5200.

THACKERAY, WILLIAM MAKEPEACE (1811–63), Brit. novelist and humorist; b. Calcutta; f. in Company's Service; ed. Charterhouse and Trinity Coll., Cambridge; m., 1836, Isabella Shawe, who went mad; abandoned law for journalism; studied painting in Paris; pub. *Paris Sketch Book* (1840), *Irish Sketch Book* (1843). With *Vanity Fair* (1848) he attained celebrity as a novelist; *Pendennis* followed (1850), *Henry Esmond* (in XVIII.-cent. style, 1852), *Newcomes* (1855), *Virginians* (1858). Other works are *Hoggarty Diamond*, *Book of Snobs* (1848), *Barry Lyndon*, and an unfinished story, *Denis Duval*; Lectures on *Eng. Humorists of XVIII. Century* (1851), and *The Four Georges* (1855). T. edited *Cornhill Magazine* (1860–62), and was earlier a contributor to *Punch*.

Like Dickens, T. is a master of humour and pathos combined. He affects cynicism and satirises the upper ranks of Victorian Society. He does not exhale the same kindly humanity as Dickens, but he is a better and more cultured craftsman. No finer hist. novel than *Esmond* has been written. His style is easy but always gentlemanly.

Monographs by Trollope, Merivale and Marzials, Melville, Whibley, Chesterton; Mudge and Sears, *Thackeray Dictionary*.

THALASSICOLA, a genus of RADIOLARIA (*q.v.*).

THALE (51° 45′ N., 11° 5′ E.), watering-place, on Bode, Pruss. Saxony; saline springs; manufactures ironware. Pop. 13,260.

THALEICHTHYS, see under SALMON FAMILY.

THALES of Miletus is usually accounted the first Western philosopher. His exact date is uncertain, but he was contemporary with Crœsus and Solon, and is said to have predicted an eclipse of the sun, *c.* 585 B.C. He was a politician of some note, and was reckoned one of the Seven Sages; he is said to have introduced Egyptian geometry into Greece. The chief philosophical (or physical) problem which he tried to solve was that of the substance of which the world is composed, and his answer was that all things are made of water.

THALIA, see MUSES.

THALIACEA, an order of TUNICATA (*q.v.*).

THALLIUM (Tl=204·0), a bluish-white crystalline metal discovered by spectrum analysis (Crookes, 1861), occurs in pyrites and blende; colours gas flame green; spectrum is one green line; S.G. 11·8 marks paper; tarnishes, M.P. 290°; thus resembles lead physically, and lead, silver, and potassium chemically. Forms thallous (Tl′) and thallic (Tl‴) compounds, TlO strongly

basic, TlOH alkaline, salts stable; Tl_2O_3 behaves as basic peroxide, salts unstable.

THALLUS, see PLANTS (ANATOMY).

THALWEG, lowest part of valley; watercourse.

THAMES.—(1) (51° 30′ N., 1° E.) river, S. England; length, 240 miles, and a basin, including that of Medway, of over 6000 sq. miles. From the N. the chief tributaries are the Cherwell, Thame, Colne, Lea; from the S., the Kennet, Mole, and Medway; but of these only the Medway is of importance. The river flows between Oxon, Bucks, Middlesex, and Essex on N., and Berks, Surrey, and Kent on S. Breadth at Gravesend is *c.* 800 yds., and from this to the Nore the distance from bank to bank gradually widens to 6 miles. Communicates by canal with Severn, Bristol, Midland Counties, and S. coast. (2) (37° 30′ S., 175° 40′ E.) seaport, on Thames, N. Island, New Zealand; gold-mining centre. Pop. 4000.

THANA, TANNA (21° 34′ N., 71° 50′ E.), town, on Salsette Island, Bombay, India. Pop. 17,000; (district) 815,000.

THANE, see THEGN.

THANESAR (29° 59′ N., 76° 52′ E.), town, on Saraswati, Punjab, Brit. India; place of pilgrimage. Pop. 5100.

THANET, ISLE OF (51° 22′ N., 1° 22′ E.), district, Kent, England, at N.E. extremity; insulated by the Stour. Pop. (1911) 12,929.

THANN (47° 47′ N., 7° 7′ E.), town, on Thur, Alsace-Lorraine; textile industries.

THAPSACUS (35° 50′ N., 38° 12′ E.) (Biblical *Tiphsah*), ancient city, Babylonia; most important crossing-station on Euphrates.

THAPSUS (37° 10′ N., 15° 20′ E.) (modern MAGNISI), peninsula, on E. coast of Sicily.

THAR AND PARKAR, THUR AND PARKER (25° N., 70° E.), district, Sind, Bombay, Brit. India. Pop. *c.* 400,000. Capital, Umarkot.

THARANDT (50° 58′ N., 13° 35′ E.), town, on Wilde Weisseritz, kingdom of Saxony; seat of an academy of forestry (1811). Pop. 3000.

THARRAWADDY (17° 40′ N., 95° 51′ E.), town, Pegu division, Lower Burma. Pop. 17,000; (district) *c.* 400,000.

THARROS (39° 50′ N., 40° 25′ E.), ancient town, on Gulf of Oristano, Sardinia.

THASOS (40° 42′ N., 24° 38′ E.), mountainous island, Ægean Sea; trade in timber and oil; noted in antiquity for its gold-mines; colonised by Parians, VIII. cent. B.C.; belonged to the Delian Confederacy; revolted, 465 B.C.; subdued by Cimon, 463; made free city by the Romans, 197. Pop. *c.* 8400.

THATÔN (16° 53′ N., 97° 23′ E.), town, Tenasserim division, Lower Burma; was capital of the Talaing kingdom. Pop. 15,500; (district) *c.* 350,000.

THAYETMYO (19° 18′ N., 95° 15′ E.), town, on Irrawadi, Minbu division, Lower Burma. Pop. 16,000; (district) *c.* 240,000.

THEATRE.—The Rom. theatre followed the Gk. theatre (*q.v.* under DRAMA) as to plan, but introduced innovation; it abolished the chorus, and the 'orchestra,' *i.e.* part set aside for chorus, became the equivalent of the modern 'stalls.'

In England *Mysteries* and *Miracle Plays* were played 'on tour' from a small stage on wheels. During Elizabethan period plays were produced in courtyards of inns, tennis-courts, etc., and theatres like the Globe or the Swan were yards on promotion. There was no roof; the common folks stood in the 'pit,' while the aristocrats sat in boxes; a few gallants sat on the edge of the stage which jutted out into the pit. There was no curtain—hence Shakespeare's habit of introducing people who will carry off the corpses. Scenery was practically unknown; Shakespeare's characters paint their own scenery in words. Cards, dice, etc., were played while the play proceeded; the stage fights were real fights—the audience took sides, and a stage duel would sometimes end in a general scrap.

The advent of excellent lighting and the modern 'box' stage, *i.e.* a room with one wall removed, revolutionised the theatre; artificial lighting killed the 'aside' and half-killed the soliloquy. Hydraulic power and electricity enable producers to represent anything from a thunder-storm to a railway smash; and fire-proof curtains, dividing stage from auditorium, render disaster from fire almost impossible.

THÉATRE FRANÇAIS, COMÉDIE FRANÇAISE, Parisian theatre; dates from 1680, when Louis XIV. ordered Molière's company of actors to amalgamate with those of the Théâtre du Marais; has produced the greatest drama from Molière's works to present day; destroyed by fire, 1900, and rebuilt with State aid.

THEBES.—(1) (25° 38′ N., 32° 38′ E.) ancient capital of Upper Egypt, situated on both banks of Nile, 300 miles from Cairo; founded *c.* 2500 B.C.; reached the height of its power during the years 1600–1100 B.C.; began to decline as the Delta region became more important, and finally the capital was transferred to Memphis; site is now marked by the village of Luxor, in neighbourhood of which are many magnificent ruins of temples, tombs, and obelisks; principal temples are those at Karnak and Luxor on E. bank of Nile, and those of Rameses II. and III. on W. bank. (2) (38° 19′ N., 23° 19′ E.) ancient city of Bœotia, Greece; was for a long time leading member of Bœotian League; supported Persians against Greeks in invasion of V. cent.; sided with Sparta against Athens in Peloponnesian War, but subsequently became rival of Sparta, whom she defeated at Leuctra, 371 B.C., thus obtaining supremacy among Gk. states; came under domination of Macedon, 338 B.C., destroyed by Alexander, 335; subsequently rebuilt. Modern town has pop. of *c.* 3600.

THEFT in its simple form is known to the law as LARCENY, the act of dealing with anything capable of being stolen, with the intention of permanently converting the thing to the use of any other person than the owner. Thus, if a carter converts his master's cart to his own use; or a man finds lost property, and, knowing the owner, converts it to his own use; or if a man finds money in a bureau sent to him for repairs, and appropriates it; or if a post-office clerk destroys letters to hide his mistake in sorting—all these acts amount to larceny. To receive stolen goods, or money, knowing them to have been stolen or unlawfully obtained, is a crime. It is also a crime to take any money or reward directly or indirectly, on the pretence of helping any person to recover any stolen property, unless the receiver uses due diligence to cause the offender to be brought to trial. T. from buildings was formerly treated as a separate offence of many kinds—stealing in a dwelling-house, church-breaking, house-breaking, burglary, etc.

Burglary is the breaking and entering a dwelling-house between 9 p.m. and 6 a.m., with intent to commit a felony, or the breaking out after having committed one inside, or after having gone in with the intention of committing one. 'Breaking means the breaking of any part, internal or external, of the building itself, or the opening by any means whatever of any door, window, shutter, or other place of entry. 'Entering' means entrance into the house of any part of the offender's body, or of any instrument used for the purpose of intimidation, or for removing goods. The maximum penalty upon conviction is penal servitude for life.

House-breaking between 6 a.m. and 9 p.m. is not burglary, and includes t. from outhouses, shops, schools, etc.; the slighter nature of the offence probably dates from O.E. legislation—maximum punishment, 14 years' penal servitude. Burglary may also be **Robbery**, which is theft with violence or the show of violence, and formerly a capital felony.

Highwaymen, mounted road-robbers of XVII. and XVIII. cent's, glorified by romantic fiction as 'gentlemen of the road'; famous highwaymen were Claude Duval (1643–70), John Nevison (hanged at York, 1684),

Jack Sheppard (1702–24), Dick Turpin (1705–39), Jerry Abershaw (1773–95).

Brigandage (O.Fr. *brigand*, irregular soldier), robbery by armed bands of outlaws, is historically important in Italy, Spain, and Greece. Similar bands appear in early history of all countries, *e.g.* Robin Hood and 'merry men' in England, 'broken men' of debatable land, or borders. B. grew up in Greece under Turk. rule and flourished in early days of independence; brigands of Naples and Sicily are notable. Famous brigands are 'Jack the Skinner' (Johann Buckler), Pietro Mancino and his banditti, and Roque Guinart (character in *Don Quixote*).

Piracy is 'robbery within the jurisdiction of the admiralty.' The Act now in force is that of 1837, by which piracy, accompanied by attempt to murder, is felony. According to Coke a pirate is *hostis generis humani*, and therefore (Blackstone) every community may inflict punishment upon him; he is distinguished from privateer, who carried letters of marque. Masters of Eng. ships of certain size were forbidden to surrender to pirates without resistance by statute 22 & 23 Charles II. In the course of history various bands of pirates have attained celebrity; they were frequently formed by outlaws; the chief are—(1) The pirates who infested the Mediterranean, 67 B.C. (2) Barbary pirates. (3) Buccaneers of Span. Main. (4) Irish 'sea tories' of XVII. cent. Eng. colonial governments of XVII. and XVIII. cent's lived in continual dread of piratical descents. West Indies and North Africa remained homes of daring and famous pirates till beginning of XIX. cent.; lingered in Sicily and Gk. islands; now relegated to Far East. Those of North Africa were famous as the BARBARY PIRATES, whose chief port was Algiers, but who also sailed from Tripoli, Tunis, Salle, and other places. Their depredations were most widespread during the XVI. cent., and their power was not finally broken until 1830. They preyed upon the shipping of all nations, and their captives were condemned to slavery. Many of the richer victims were enabled to buy their freedom, but few of the ordinary captives ever escaped from the clutches of their cruel masters. Many attempts were made to suppress the pirates. Blake led an expedition against Tunis in 1655, and during the reign of Charles II. both the English and Dutch undertook frequent operations against their common enemy. The French bombarded Algiers in 1682–83; the English, under Admiral Neal, in 1824; but not until 1830 did France finally reduce it.

The name **Buccaneers** was given to pirates who infested Span. territory in XVII. cent. The term was originally applied to Fr. hunters of St. Domingo, who dried and smoked flesh on *boucan*, then to freebooters of all nations, for whom St. Domingo was original centre and illicit trade in meat first started; Tortuga, Span. island, N.W. of Hispaniola, final headquarters, and all b's united in enmity to Spain, whose trading monopolies they infringed with the connivance of England, Holland, and France. Span. colonies plundered by b's under Britons, Mansfield and Morgan, 1654; Panama sacked with view to capturing Span. ingot, 1671; Span. merchantmen driven from the seas, 1680–85. Political changes put an end to buccaneering: England and France became enemies, while both sought alliance of Spain; but b's had played important part in commercial and colonial decline of Spain. Lloyd's still insure against 'pirates, rovers, and thieves,' for whose depredations the shipowner is not liable.

The **Camorra**, a Neapolitan secret society, was formed about 1820 for purposes of murder, robbery, and blackmail. It had twelve centres in Naples and branches in all the chief Ital. towns. At first its energies were directed against private individuals, but acquired political scope. In March 1911 the famous C. trial commenced at Viterbo, and, after over 300 sittings, closed in July 1912, the prisoners receiving sentences of from 4 to 30 years' imprisonment.

Bushrangers, the name given to bands of robbers who formerly infested parts of Australia and Tasmania. They first appeared in Tasmania c. 1815, but were most troublesome in New South Wales and Victoria 20 years later. Earliest were escaped convicts; they terrorised whole districts, robbing and [illegible]rs and stealing cattle. In several cases martial law had to be proclaimed to rid the infested districts of them. The last to give any trouble was the Kelly gang in 1879.

THEGN, THANE, an Anglo-Saxon word signifying a retainer; ranked beneath the *æthel*, but above the *ceorl*. The status of t. was either inherited or acquired by service. The order was subsequently divided into king's t's and t's ordinary.

THEINE, see CAFFEINE.

THEINNI (23° 30′ N., 98° E.), Shan state, Upper Burma. Area, 8730 sq. miles. Pop. *c.* 200,000.

THEISM may be roughly defined as belief in a God or gods, but it is important at the outset to distinguish T. and related or contrasted theories of the universe. At the present time T. is generally used of belief in a *personal* God as distinct from an *impersonal* God, belief in which is called Deism. In the ordinary sense therefore T. may be either Christian or non-Christian; thus Jews and Muhammadans, like Christians, are Theists, while, *e.g.*, Buddhists are not. Besides this usual sense, T. was employed (1) in the XVIII. cent. to mean what we mean by Deism; (2) by certain XIX.-cent. thinkers, such as F. W. Newman and Charles Voysey, to mean non-Christian T.—a type of religion naturally finding in England few adherents. Atheism signifies the absolute denial of God's existence, and Agnosticism the attitude 'We do not know.'

T. may be, but is not generally, used to cover *polytheism*—belief in many gods—or *pantheism*, a philosophical religious theory according to which God has no existence outside the universe which contains Him, and in which, so to speak, He is imprisoned.

The existence of God, according to some thinkers, came under the domain of 'Natural Religion' as distinct from what was distinctively Christian and therefore the special subject of revelation. But the term now employed is 'Philosophy of Religion.' Though for the Christian the Theistic and distinctively Christian elements can hardly be sundered, one is primarily metaphysical, the other primarily historical, and the theologian who wishes adequately to treat of T. has to deal not only with philosophy and dogma but with Comparative Religions.

But T. not only has to be brought into relation with other aspects of religion, it has several problems to face in itself. We cannot believe in God at all without some idea of what God we worship, even though He be largely incomprehensible. Our belief in God is modified according as we believe in (1) human immortality, or (2) freedom of the will. (1) If we be immortal beings and of like spiritual nature with God the fact cannot be without its significance for our relation to Him. (2) Are we free agents who can help or hinder God, or creatures set here with divine foreknowledge of our future lot? One must remember that certain aspects of the Divine nature which we are wont to assume cannot be accepted without question. Thus, in what sense can we say that God is omnipotent? Or how far is He capable of sacrifice or suffering? We have no right to assume that He is not. In the XVIII. cent. the tendency was to make an external view of God: He created the universe and then left it to itself. In reaction from this there is the tendency as in the New Theology to regard God as only a Spirit acting in and through the world; the difficulty is to balance the transcendent and the immanent. The one ends in the idea either of an autocratic monarch acting only from the outside—or else in materialism, the other in pantheism.

T. can be studied in relation to the various philosophical theories by which it is defended or attacked. Thus *Empiricism* furnishes the 'argument from design'

which colours XVIII.-cent. thought. *Intuitionalism* stands between this and *Idealism*. These cannot be discussed in detail, but this last raises some important points. The idealistic argument for T. is not a very safe one, though it was defended by Bp. Berkeley. His position is: the world only really exists in so far as it exists in the mind of God. An Idealist is not necessarily a Theist nor a Theist an Idealist.

A rigid scientific Materialism, if combined with Determinism, leaves no room for God. A spiritual interpretation is not necessarily Theism or at any rate Monotheism: James is really Polytheistic.

The historical development of t. cannot here be treated, but we may note (1) Christian T. owes much to Gk. philosophy—for a theistic theory was evolved by Gk. thinkers. (2) The spirit of any age affects the method of thought of all thinkers, whatever side they may take. Thus the XVIII., XIX., and XX. cent's all give the problem of T. a fresh complexion. It must never be forgotten that we are too apt to conceive of God as like ourselves—this applies especially to thinkers whose conception of God is personal, and while we are bound to speak in accents of our time they cannot be ultimate as the truths they seek to express.

Flint, *Theism, Antitheistic Theories, Agnosticism*; Martineau, *Study of Religion*; Caldecott and Mackintosh, *Selections from the Lit. of T.*

THEISS, Tisza (ancient *Tissus* or *Tisia*) (47° 58′ N., 21° E.), river, Hungary, formed by the union of Black and White T.; flows with a winding southerly course of 800 miles to the Danube, near Titel.

THELOHANIA, a genus of Sporozoa (*q.v.*).

THEMISTOCLES (*c.* 515–449 B.C.), Athenian statesman and general; in many ways formed model for later unprincipled Athenian Alcibiades (*q.v.*), though without his birth and culture; builder of Athenian sea-power, securing ostracism of conservative Aristides, 483; won great naval victory of *Salamis* over Xerxes, 480, and restored Athens; ostracised, *c.* 476.

THEOBALD, prior of Bec, 1127; abbot, 1137; abp. of Canterbury, 1138.

THEOBALD, LEWIS (1688–1744), Eng. writer and Shakespearean critic; in 1726 pub. pamphlet attacking Pope's edit. of Shakespeare, to which Pope replied by making him the hero of the *Dunciad*. His edit. of Shakespeare is, however, much superior to Pope's.

THEOCRITUS (III. cent. B.C.), Gk. pastoral poet; b. Syracuse. There are few reliable details regarding his life, save that he lived at Cos, Alexandria, and Syracuse, and was a friend of the poet-astronomer Aratus and the physician Philinus. Many poems attributed to him, some of doubtful authenticity; all written in Doric dialect. Like Burns, T. sang the simple life and rustic pleasures of the peasant, but he also wrote short epics on mythological subjects, and sketches of contemporary life and events. His most famous idyll is his 15th, which describes the festival of Adonis at Alexandria. Vergil imitated him (see Vergil), and there is much of similar nature in Romaic ballads.

THEODOLITE, surveying instrument used for measuring horizontal and vertical angles; really an altitude and azimuth instrument, consisting mainly of a small telescope mounted on a vertical segment of a graduated circle, which again is mounted on a horizontal graduated circle, the whole supported on a light tripod.

THEODORA (fl. VI. cent.), Byzantine lady, said to have been disreputable dancer and actress, but it was 'impossible for unaided man to describe or portray her beauty'; m. Justinian, 525, and on his accession, 527, became empress with equal powers and *de facto* sole ruler; high-spirited woman; chid Justinian when he wished to fly at outbreak of Nika revolt, 532; differed from emperor as to Monophysite heresy; character vilified by Procopius in biased *Anecdota*.

THEODORE, name of three tsars of Russia: Theodore I. (1557–98), tsar, 1584; governed by boyar Boris Godunov, who succ. and left s., Theodore II. (1589–1605), tsar, 1605; was murdered. Theodore III. (1661–82), tsar, 1676; great reformer.

THEODORE (602–90), abp. of Canterbury, 668; often called 'T. of Tarsus,' from name of birthplace.

THEODORE LASCARIS (d. 1222), founder and emperor of new Rom. state of Nicæa, 1206; captured Byzantine emperor, Alexius III., 1210; grandson, Theodore II. of Nicæa, wrested Thrace from Bulgarians, 1255–56.

THEODORE OF MOPSUESTIA (350–428), Christian writer of Antiochene school; bp. of M. in Cilicia, 392; very learned; T. wrote commentaries on nearly all Biblical books; he interpreted them historically, more like modern scholars than men of his time, who allegorised; of his dogmatic writings some were condemned after his death and some lost. Some were preserved by the Nestorians in Syriac translation.

THEODORET (*c.* 393–457), theologian; b. Antioch. As bp. in Syria devoted himself to the conversion of Marcionites, and built numerous churches, bridges, etc. Active in the Antioch school of theology on behalf of Nestorius against Cyril of Alexandria. Deposed by the Robber Council of Ephesus, but reinstated by Council of Chalcedon.

THEODORIC (*c.* 455–526), king of the Ostrogoths; ed. at Byzantine court, but returned when about eighteen to Pannonia and commenced series of semi-mythical victories; perhaps at emperor's invitation invaded Italy to displace Odoacer, 488; conquered Italy except Ravenna, 489; took Ravenna and slew Odoacer, 493; established Ostrogothic kingdom; long, peaceful reign of great benefit to Italy; executed Symmachus and Boethius (*q.v.*).

THEODOSIA (formerly Kaffa) (45° 3′ N., 35° 20′ E.), seaport, watering-place, Taurida, Russia; large export trade in grain; founded by a colony from Miletus; in Middle Ages became chief port on Black Sea; taken by Turks, 1475. Pop. 29,000.

THEODOSIUS I., 'the Great' (*c.* 346–95), Byzantine emperor; s. of Theodosius (d. 376), general in Britain; became joint-emperor with Gratian, 379, receiving eastern division; subdued Goths, 382; defeated rebel Maximus at Aquileia, 388, and confirmed Valentinian II. as Western emperor; defeated Arbogast and Eugenius, 394; f. of Emperors Honorius and Arcadius. **Theodosius II.** (401–50), Byzantine emperor, 408; met encroachments of Huns weakly. **Theodosius III.** seized Eastern empire, 716–17.

THEODOSIUS OF TRIPOLIS (*c.* I. cent. B.C.), Gk. mathematician; wrote treatise on pure geometry of surface of a sphere, probably derived from similar work of IV. cent. B.C.

THEODULF, bp. of Orleans, 781–818; minister of Charles the Great; d. 821.

THEOGNIS OF MEGARA (VI. cent. B.C.), Gk. poet; b. Megara; banished by oligarchs. Of his elegiacs only a few lines remain, quoted by Plato.

THEOLOGY, may be defined as the science of religion, in its narrower significance being concerned simply with the being and attributes of God; also ordinarily confined to Christian t., but scientifically this is not admissible. T. can only be valid if we believe in spiritual realities; otherwise it is either philosophy or mere speculation, or a jumble of words devoid of meaning. If t. is a science at all, it is the queen of sciences. The student of t. is met at the outset by many religions, some local or national, some, pre-eminently Christianity and Buddhism, claiming to be universal. In the earlier stages of any religion t. is implicit rather than explicit; the working out of dogma as of ecclesiastical authority only comes with time. But religion without t. is impossible; men cannot, except during a short period of intense excitement, believe without knowing what they believe.

The t. of the non-Christian is best studied separately under each religious system, or together as part of the new science of Comparative Religion. Christian t. is a unity in itself and of obviously special importance. T. being first and foremost the science of God, and Christianity being monotheistic (if such a phrase be admitted), we should expect to find in the forefront theories about the Deity, but Christian t. has naturally focused itself on the person of Christ. The doctrines of the Trinity and the Incarnation are both attempts to state and reconcile the unity of God, the deity of Christ, and the unity of His person. Hence the first stage in the development of Christian t. was marked by Christological controversies; the great landmarks here are the Councils of Nicæa (325) and Chalcedon (451); disputes have continued at intervals ever since. Our own day has seen fresh outbursts of Christological controversy.

Christian theologians were only endeavouring to develop what was in Scripture, but t. was growing before the canon was completed. St. Paul was the first Christian theologian, but after the Johannine writings there is a lull, till we come to the Gk. thinkers Origen and Clement of Alexandria, and also Irenæus and Tertullian. But none approached St. Paul till St. Augustine. Inheriting the Gk. thought in which Christianity had been steeped almost from the outset, he fused it in his own spiritual experience and founded Western t. He had little influence in the East, which remained fossilised at an earlier stage of development. St. Augustine stands at the meeting-point of the ancient and mediæval worlds, and there were no great theologians after him till the scholastics of the XII. and XIII. cent's.

Nothing can be more unfair than to condemn scholastic thought as futile; in many ways it shows as much intellectual power as that of any age or time, but it moved entirely within certain lines. Though mediæval t. moved in Orthodox lines, there are more than slight traces of rationalism in Abelard and others. The Renaissance opened up an old world and created a new one, and the Reformation t. started with practical rather than theoretical points. The idea of 'justification by faith' lay at the root of Reformation disputes, but it has lost much of its interest at the present day, other points being the centre of controversy. On the Prot. side Luther and Calvin were the greatest men. Catholic t. was the outcome of the Church as a whole rather than the work of individuals. Eng. t. in the XVI. and XVII. cent's was occupied with the struggle of Puritanism with other types of religion.

The XVIII. cent. was for the most part a period of theological stagnation, but the XIX. has seen important work done in all Churches. The two main lines have been the return to tradition, witnessed by the Oxford Movement and the growth of Catholicism; on the other side, with the growth of science and the rise of hist. criticism, a liberal movement.

T. can also be approached from the side of psychology, as by William James and others.

T. in an academic sense includes everything that has any bearing on Christianity or other religions, doctrine and history and the sacred languages in which the Scriptures are written. See RELIGION, CHRISTIANITY, THEISM.

Gwatkin, *The Knowledge of God*; James, *Varieties of Religious Experience*; Bethune Baker, *Introduction to Study of Christian Doctrine*.

THEOPHANES, THE CONFESSOR (758–817), Gk. monk, persecuted by iconoclasts; exiled to Samothrace; wrote *Chronographia*; rebuked by Emperor Leo. IV. for his extreme unworldliness.

THEOPHANO (956 ?–91), dau. of Byzantine emperor Romanus II.; exercised strong influence on her husband, Otto II.

THÉOPHILE DE VIAU, VIAUD (1590–1626), Fr. poet; b. Gascony; disapproved of reforms of Malherbe (*q.v.*); wrote play, *Pyrame et Thisbé*; *L'Histoire Comique* shows him as critic; died after long imprisonment; influenced several great authors.

THEOPHILUS (829–842), Byzantine emperor; suffered great disasters from Muhammadans at *Dasymon* and in sack of Amorium, 838, but fortunate in internal policy.

THEOPHRASTUS (fl. IV. cent. B.C.), Gk. philosopher; b. Eresus, Lesbos; for thirty-five years head of Peripatetics at Athens after Aristotle's death.

Jebb, *Characters of Theophrastus* (text and trans.).

THEOPHYLACT, Gk. theologian; d. early XII. cent.

THEOPOMPUS (b. c. 380), of Chios; Gk. historian and rhetorician; became a pupil of Isocrates; banished from Chios, 305 B.C. His works, now lost, were a *History of Greece* and a *History of Philip of Macedon*.

THEORBO, lute-like instrument with double neck and sets of pegs; used especially XVI.–XVII. cent.

THEOSOPHY (Gk. 'wisdom of God'), term used of certain forms of thought which claim special contact with the Divine. The theosophist makes the Divine the centre of everything and believes he can come into special contact with God. On its speculative side it merges into mysticism, and theosophists formulate fantastic theologies. T., however, is a loose term and includes various systems, such as that of the Kabbalah, also forms of Gnosticism and Neo-Platonism. Of a similar nature are the systems of the mystics Eckhart and Boehme (*qq.v.*).

In 1875 the Theosophical Society was founded, and thus the term has acquired a special meaning. Its chief purposes are to encourage the brotherhood of man, and to follow up the world-religions, particularly Oriental mysticism and occultism. The chief source of its inspiration is Buddhism—indeed, it may almost be said to represent Buddhism in the West. Its leading spirit was Mme Blavatsky (*q.v.*), who developed occult powers, and the Society has been rather one of propagandism than of study. Theosophists also have Brahman elements in their belief, and their central doctrines are those of Karma, and the 'Path,' or way of emancipation, culminating in the attainment of Nirvana.

Annie Besant, *Theosophy* (Jack, 1912); *The Ancient Wisdom: An Outline of Theosophical Teaching* (1897).

THÉOT, CATHERINE, Fr. religious fanatic; d. 1794.

THERALITE, group of rare Plutonic rocks, nepheline, basic plagioclase, augite, and olivine; found in West Alps, Madagascar, and Montana, U.S.A.

THERAMENES (d. 403 B.C.), Athenian statesman and general; leader of anti-democratic movement which followed misfortunes in Peloponnesian War; proposed to restrict franchise; distinguished himself at battles of *Cyzicus*, 410, and *Arginusæ*, 406; negotiated peace, 404; failed to establish moderate democratic constitution; forced by Critias to drink hemlock.

THERAPEUTÆ, ancient Jewish ascetic order closely resembling Christian monks and also the Essenes. They lived in Egypt and are only known to us from the description by Philo in *De Vita Contemplativa*. They spent their time studying the Scriptures and fasted severely; abstained from meat and drank only water.

THERAPEUTICS, term applied to that branch of med. which deals with the means employed for the maintenance of health or the cure of disease. Some remedies are used without any knowledge of how they act upon the system, merely because they have proved of benefit before in similar conditions, such as colchicum for gout. But the more valuable remedies are employed in a rational manner, their mode of action having been ascertained by observation and experiment, so that, by understanding the action of the remedy, the condition may, to some extent, be prevented; such a remedy is thyroid extract, which has a striking effect in myxœdema, a child who, through

deficiency in the thyroid gland, is a stunted idiot, becoming, under its influence, both healthy and intelligent.

The most important cause of disease is the action of micro-organisms, which enter the body in various ways, grow and multiply, and produce toxins or poisons which injure or even destroy the tissues. The skin and mucous membranes act as barriers against the micro-organisms, while after they have gained access to the blood and to the tissues they are attacked by the white blood corpuscles, which ingest and destroy them, while antitoxins are formed by the blood to neutralise their toxins. In order to assist nature, various methods are employed. The amount of blood at the affected part is increased by hot fomentations, or by bandages or suction bells passive congestion of the veins is brought about (Bier's method), so that more white blood corpuscles are brought to the part to resist the invading micro-organisms. In addition, antitoxins and antiserums are prepared artificially from bacteria and bacterial products of various diseases, and are injected to overcome the effect of the toxins of the specific bacteria; by modern research and experiment the number of diseases which can be treated in this way is gradually growing larger.

Following the results which have been obtained by the use of the thyroid extract of sheep in cases of myxœdema and cretinism, due to deficiency of thyroid secretion, certain other organs or extracts from them have been made use of in t., such as pepsin, extracted from the stomach of calves, for dyspepsia, bone marrow for anæmia, pituitary gland extract for acromegaly, suprarenal gland extract for Addison's disease.

The term t. must be understood as meaning much more than the application of drugs for the cure of disease; fresh air and nourishing food are often far better therapeutic agents than any drugs, and suitable exercises, dietary, and health resorts have the most valuable effects in different conditions. The following articles should be consulted: DIETETICS, GYMNASTICS, HYDROPATHY, HYPNOTISM, ELECTRO-THERAPEUTICS, BATHS, PHARMACOLOGY, HOMŒOPATHY, MASSAGE, TUBERCULOSIS (treatment), INSANITY (treatment), and the treatment of other diseases under their different headings.

Cushing, *Text-Book of Pharmacology and Therapeutics* (1910); Bruce, *Materia Medica and Therapeutics* (1907).

THERESA, ST., TERESA (1515–82), Span. mystic; entered Carmelite convent of Incarnation, 1533; converted, 1554, and fell into a trance, after which she constantly had visions. Finding discipline not strict enough, she started a new order at Avila, 1562, obtaining a bull from the pope; later she founded new houses; canonised, 1622. A great mystic, she was also a very able woman of affairs.

THEREZINA (5° 47′ S., 41° 58′ W.), city, on Parnahyba, capital, Piauhy state, Brazil; manufactures cotton, soap. Pop. *c.* 45,000.

THERMAL SPRINGS, see MINERAL WATERS.

THERMOBIA, 'FIRE-BRAT' (*q.v.*).

THERMO CHEMISTRY, see CHEMISTRY.

THERMODYNAMICS—branch of ENERGETICS (*q.v.*)—treats of the relation between Heat and Work. The subject is governed by two laws. The first is the result of experiments carried out by Joule, who measured the heat developed by the performance of a known amount of work on various substances, and stated that 'Whenever work is converted into heat or heat into work the ratio of the work to the heat is constant.' This ratio, called *Joule*, is equal to 42,000,000 *ergs*.

The second law has been expressed by Lord Kelvin thus: 'It is impossible, by means of inanimate material agency, to derive mechanical effect from any portion of matter by cooling it below the temperature of the coldest of surrounding bodies.' Clausius stated this more simply: 'It is impossible for a self-acting machine, unaided by any external agency, to convey heat from one body to another at a higher temperature.' This is in accordance with experience, for 'unaided by any external agency' heat cannot be transferred from the condenser of an engine to the boiler. When considering Lord Kelvin's statement it must be remembered that it only refers to a *cycle* of operations, that is, a series of operations in which the substance acted upon is finally brought back to its initial state. For example, a gas may, by expansion, do work and become cooled below the temperature of surrounding bodies, but if it is brought back to its initial state work will have to be done *on* it and the law will then be found to hold.

These laws find practical application in the heat engine, which is a contrivance for changing heat, supplied by some source like the boiler, into work. It is proved mathematically that in the case of a 'perfect' engine (one where no heat is lost through friction, etc.), the heat utilised for mechanical work depends on the difference in temperature between the source and condenser. Since the efficiency of the engine is the extent of its ability to do work, it follows that its efficiency depends on the range of temperature between which it is working. The advantage of a steam-engine in which superheated steam can be used at once becomes obvious.

THERMO-ELECTRICITY, see ELECTRICITY.

THERMOMETERS are instruments which indicate on some definite scale the temperature of their surroundings, and that branch of the science of heat which deals with the determination of temperature is known as **Thermometry.**

With one exception, to be noted presently, all SCALES of temperature and all methods of determining temperature are based on changes which take place in one or other of the physical properties of matter in consequence of a change in temperature. That most commonly used is the fact that, generally, a body increases in dimension when heated. For example, the *mercurial* t. depends on the fact that mercury, when heated through a given range of temperature, increases in volume by a greater amount than does the glass envelope in which it is contained. Ordinarily, the instrument consists of a glass tube of very fine bore, at one end of which a bulb is blown. Mercury fills the bulb and a portion of the stem. Air is expelled from the remainder of the stem, the upper end of which is hermetically sealed. The instrument is *graduated* in the following manner: the bulb is immersed in a mixture of ice and water, and when the mercurial column in the stem has reached a steady position, a mark is made on the stem at that position. The instrument is then placed in the steam issuing from water which is boiling under a pressure of 760 mm. of mercury (accurately 760 mm. in latitude 45°), and another mark is made at the point reached by the mercurial column. The length of stem between the two marks so determined is then divided into 100 equal parts if the scale to be used is the *Centigrade* scale, or 180 if the *Fahrenheit* scale is adopted. In the former case the ice point is marked 0 and the steam point 100; in the latter these are 32 and 212 respectively. Each unit on the scale is referred to as 1 degree, Centigrade (C.) or Fahrenheit (F.), as the case may be. Obviously, 1° C. equals $\frac{9}{5}$ degrees F., or 1° F. equals $\frac{5}{9}$ degrees C.

In order that the readings of one mercurial t. may be comparable with those of another, precautions must be taken as regards method of graduation and conditions in which readings are taken. To eliminate all possible sources of error, *corrections* have to be applied to the readings. Among these, the correction for change of zero has to be noticed. The bulb of a thermometer contracts for some time after it has been blown, and this causes a rise in the ice point, which must be allowed for. Again, if the instrument is exposed to a high temperature, the ice point will fall slightly. These changes are minimised by the use of Jena borosilicate glass in the construction of t's. Any good t. may be examined for corrections

necessary, and standardised at the National Physical Laboratory. The mercurial t. is applicable through a range of temperature extending from about −40° C. to + 330° C. For lower temperatures, *alcohol* and *toluol* are used instead of mercury. The upper limit may be extended to about 500° C. by filling the stem with nitrogen under pressure.

The expansion of gases is much greater than that of liquids, and (with certain restrictions) their coefficients of expansion are nearly equal. These facts have led to their employment as thermometric substances. They expand almost equally for equal rises in temperature when kept at constant pressure, and similarly increase in pressure when kept at constant volume. The *hydrogen* t. of the International Bureau of Weights and Measures is now the standard t. for scientific purposes. The use of *Gas* t's is restricted to scientific investigations.

Another property of matter whose variation with temperature has been used for thermometric purposes is the electric resistance of metals. It has been found that in pure metals the resistance increases nearly in proportion to the increase in temperature. This method has been successfully applied to the determination of temperature through a much wider range than is possible with a mercurial or other liquid t. The metal generally employed is platinum. The wire used for the purpose is coiled upon a mica frame inside a bulb, and the t. is calibrated by finding its resistance when placed in melting ice, in steam, and in boiling sulphur. From the data so obtained it is possible to find the temperature corresponding to any other resistance. Temperatures may also be measured by properly calibrated thermo-electric junctions. See THERMO-ELECTRICITY.

The exception to the usual practice of basing thermometry on some physical property of a particular substance is that known as the *thermodynamic* or *work scale* of temperature, first proposed by Kelvin. An ideal heat engine takes in a certain amount of heat from a source of supply, transforms a certain fraction of this amount into useful work, and passes the remainder into a receiver. (In the case of the ordinary steam engine the boiler is the source and the condenser is the receiver.) The fraction converted into heat depends, not on the substance which conveys the heat, but on the temperatures of receiver and condenser, and, in an ideal engine, these temperatures are in the same ratio as the quantities of heat taken in and given out. If all the heat received were transformed into work, no heat would be passed into the receiver, and the temperature of the receiver would be zero on a scale which is in no way dependent on the properties of the particular substance used. This is termed the absolute zero, and it corresponds to −273° C. Temperatures cannot be determined practically and directly on this thermodynamic scale, but it is possible to reduce temperatures otherwise observed and expressed in other scales to the equivalent on that scale.

Preston, *Theory of Heat*; Edgar, *Heat*; Chatelier and Burgess, *Measurement of High Temperatures*; Maxwell, *Theory of Heat*.

THERMOPYLÆ (38° 48′ N., 22° 32′ E.), pass, from Locris to Thessaly, Greece; scene of famous resistance of Spartans under Leonidas against invading Persians, 480 B.C.; Antiochus defeated here by Romans, 191 B.C.

THÉROIGNE DE MÉRICOURT, ANNE JOSÈPHE (1762–1817), handsome Fr. courtesan, who during Revolution devoted herself to inciting mob to violence; seized by women, stripped, and flogged, 1793; went mad, 1794.

THEROMORPHA, extinct REPTILE (*q.v.*).

THEROPITHECUS, see under CERCOPITHECIDÆ.

THESEUS, legendary hero of Attica; s. of Ægeus of Athens; reared at Trœzen, and on reaching maturity proceeded to Athens. During this journey he showed his prowess by slaying various giants and robbers. From Athens T. went to Crete along with the seven youths and seven maidens who were sent as prey to the Minotaur. Ariadne, daughter of Minos, gave him a sword and clue by which to overcome the Minotaur. Theseus abandoned Ariadne at Naxos on the homeward voyage. He was subsequently slain by the treachery of Lycomedes.

THESMOPHORIA, Gk. festival, lasting in all for five days; said by Herodotus to have been imported from Egypt; origin probably *thesmoi*, 'things set down, *i.e.* on the altar,' and *phera*, 'I carry'; celebrated in honour of *Demeter Thesmophorus* by women; during feast prisoners were released and law courts closed. One rite was to throw into caverns flesh or figures of pigs in memory of Eubuleus, who, with his herd, was engulfed in the chasm through which Pluto carried off Persephone (such a chamber with remains has been unearthed at Cnidos). The flesh was afterwards drawn up and divided among the worshippers, who, to ensure a successful harvest, sowed it in the fields. This custom probably represents decay of crops and an appeal for their renewal.

J. G. Frazer, *Golden Bough* (vol. ii.).

THESPIÆ (38° 18′ N., 23° 10′ E.), ancient city, Bœotia, Greece; noted for its mythological associations.

THESSALONIANS, EPISTLES TO THE, chronologically the earliest of St. Paul's writings—the earliest, therefore, of all New Testament books; undoubtedly genuine. In *I. T.* St. Paul writes to strengthen the converts in love; this epistle is specially important for its eschatological teaching (4^{13} *et seq.*), wherein he teaches that at the Second Advent those who are still alive will be caught up to meet the risen dead. *II. T.* is also eschatological, and expounds the doctrine of Antichrist, the man of sin (or lawlessness). The epistles represent the earlier stage of St. Paul's theology.

Milligan, *I. and II. Thessalonians*; Frame in *International Critical Commentary*.

THESSALY (39° 40′ N., 22° 20′ E.), N.E. district, Greece, lying between Ægean Sea and Epirus; surface generally level, plain bordered by mountains, which include Olympus and Pindus. T. was subdued by Philip of Macedon, 344 B.C.; remained under Macedon till 197 B.C., when it had passed into hands of Rome; captured by Turks, 1355, who had to yield most of it to Greece, 1881. During the Turko-Balkan War (*q.v.*) the Greeks invaded Turkish T., and marching through it besieged and captured Salonica.

THETFORD (52° 25′ N., 0° 45′ E.), town, at junction of Thet and Little Ouse, Norfolk and Suffolk, England; breweries; was capital of East Anglia. Pop. (1911) 4778.

THÉVENOT, JEAN DE (1633–67), Fr. Orientalist; b. Paris; travelled widely in Egypt, Palestine, Persia, and India. His *Voyages*, though superficial in observation, contain much interesting information.

THIAZINES, compounds containing a ring of 1 nitrogen, 1 sulphur, and 4 carbon atoms; among their derivatives are dyes.

THIBAUDEAU, ANTOINE CLAIR, COMTE (1765–1854), Fr. politician; pres. of Convention and member of Committee of Public Safety; assisted Napoleon, and fled after 1815; important *Histoire de Napoléon*.

THIBAUT IV., THEOBALD IV. (1201–53), count of Champagne and Brie, and king of Navarre, Fr. soldier and poet; admirer of Queen Blanche of Castille, for whom he wrote most of his *Chansons*; went on crusade, 1239; poetry graceful and delicate.

THIBAUT, ANTON FRIEDRICH JUSTUS (1774–1840), Ger. jurist; ed. Göttingen, Königsberg, and Kiel; prof. of Civil Law at Kiel, 1798; at Jena, 1802–6, and friend of Goethe and Schiller; at Heidelberg, 1806; pub. several important legal works.

THIBAW (22° 15′ N., 97° 28′ E.), Shan state, Upper Burma; area, 5090 sq. miles. Pop. 115,000.

THIBET, see TIBET.

THIELT (50° 59′ N., 3° 23′ E.), town, W. Flanders, Belgium; lace, wool, cotton, linen. Pop. 12,300.

THIERRY, AMÉDÉE (1797–1873), bro. of Augustin; also historian, but of less importance; wrote books on early Fr. history.

THIERRY, AUGUSTIN (1795–1856), Fr. historian; b. at Blois; skilled narrator and accurate, as far as resources of time permitted; set example of research into sources of early Fr. history; blind and partially paralysed for thirty years, but continued to dictate his works.

THIERS (45° 51′ N., 3° 33′ E.), town, Puy-de-Dôme, France; cutlery. Pop. 13,000.

THIERS, LOUIS ADOLPHE (1797–1877), Fr. statesman and historian. In 1830 T. commenced contributions to *National* which prepared July revolution; successively Minister of Interior, of Commerce and Public Affairs, and of Foreign Affairs, 1832-36; won great influence as epigrammatic speaker and sensible politician; adopted aggressive war-policy—a grave mistake; pres. of Council, 1836 and 1840, when he became Foreign Minister again and encouraged Mehemet Ali; unfavourable to Revolution, 1848; opposed Second Empire, and after release from imprisonment led constitutional opposition. His unwise patriotism was largely responsible for the Franco-Ger. War, but he atoned by negotiating 'liberation of the territory,' 1871; Pres. of Republic, 1871–73, did good service in its organisation against opposition of Gambetta, etc.; diffuse, partial, often inaccurate historian, but enthusiastically received at the time.

Rémusat, *Thiers* (Eng. trans., 1892).

THIOPHENE (C_4H_4S), a liquid with a faint odour, found in benzene extracted from coal tar.

THIRLBY, THOMAS (1506–70), bp. of Westminster, 1540, Norwich, 1550, Ely, 1554.

THIRLWALL, CONNOP (1797–1875), Eng. bp. and historian; ed. Charterhouse and Trinity, Cambridge; fellow of coll. and tutor, then barrister; ordained, 1827; liberal theology; author of *History of Greece*; bp. of St. David's, 1840; learnt to preach in Welsh; supported removal of Jewish disabilities, 1848, and Irish Church Disestablishment, 1869; buried in Westminster Abbey, in same grave with Grote.

THIRSK (54° 14′ N., 1° 20′ W.), market town, N. Riding, Yorkshire, England; manufactures agricultural implements.

THIRST, see HUNGER AND THIRST.

THIRTY-NINE ARTICLES, see ARTICLE.

THIRTY YEARS WAR, series of religious wars (1618–48).

Bohemian War, 1618-20.—Bohemian Protestantism threatened by emperor; Bohemians revolted and, in 1619, refused to accept Archduke Ferdinand as king, electing Frederick V., elector palatine, the 'Winter King'; Count Thurn, aided by Prot. Union (formed 1608), won several victories, 1618, and threatened Vienna; but Austria was saved by intervention of Catholic League (formed 1609), under its great commander Tilly; Prot. states alienated by Frederick's accepting throne. Span. force, under Spinola, invaded Palatinate, while Bohemians were finally defeated at *Weisser Berg*, near Prague, 1620, and ruthlessly punished.

Palatinate War, 1621-24.—COUNT MANSFELD had already served Frederick with his mercenary army; joined by Protestant prince, margrave of Baden-Durlack, and famous Christian of Brunswick ('friend of God, enemy of priests'), he defeated Tilly at *Wiesbach*, 1622; but Tilly and Cordova won victories of *Wimpfen* and *Höchst*, conquered Palatinate, and put elector to flight; electorate bestowed on Maximilian of Bavaria. Mansfeld, however, did not disband, and ruthless quartering of his soldiery had much to do with exhaustion of Germany and Netherlands at close of war; he defeated Cordova at Fleurus and relieved Bergen-op-Zoom, 1622; Brunswick's army, however, was nearly annihilated by Tilly at *Stadtlohn*, 1623.

Danish Intervention, 1624-29.—England and France now began to intervene, England as Prot. country and elector palatine being s.-in-law of James I., France because she was uneasy at Hapsburg successes; most Ger. princes alienated by excesses of Mansfeld, but Christian IV. of Denmark insisted on maintaining the struggle; James I. sent no substantial aid, though Eng. volunteers sailed to aid cause, but Danes, with aid of Mansfeld and Christian of Brunswick, marched south to invade territory of League. WALLENSTEIN, Duke of Friedland, brilliant general lately acquired by the League, finally defeated Mansfeld at Dessau, 1626, while Tilly conquered Danes, under Christian IV., at Lutter; Mansfeld made a rapid attack on Austrian dominions, but soon afterwards died; Christian IV. was forced to agree to terms of *Peace of Lübeck*, 1629.

Swedish Intervention, 1630-36.—Aggression of emperor in N. Germany caused Sweden to take up leadership of Prot. resistance, and his Restitution Edict as to church lands alienated many of his own party who had acquired monastic spoils. Occasion of war was Wallenstein's occupation of towns of duchy of Mecklenburg, granted to him, 1628; he failed in siege of Stralsund, and Swedes overran Mecklenburg and Pomerania, 1630. King GUSTAVUS ADOLPHUS of Sweden becomes central figure of war; Magdeburg was sacked by Tilly and Pappenheim, 1631, but Tilly suffered crushing defeat at Breitenfeld, 1631, and on the Lech, 1632; Gustavus occupied Munich, but forced by Wallenstein to retreat; won great victory, but was slain at LÜTZEN, 1632; despite efforts of Oxenstierna, Protestants then lost ground; they formed League of Heilbronn, 1633; Wallenstein, who wished to end war, was murdered, 1634, but Bernhard of Saxe-Weimar, now head of Prot. army, suffered crushing defeat at NÖRDLINGEN, 1634, and Saxony made peace with emperor at Prague, 1635.

French Intervention, 1636-48.—Entire lack of unity. Sweden retained some of conquests of Gustavus Adolphus and defeated imperialists at Wittstock, 1636, Breitenfeld, 1642, Janken, 1645, and threatened Vienna. Guiding spirit, however, RICHELIEU; CONDÉ and TURENNE invaded Netherlands and poured over Rhine, winning great victories at *Rocroi* and *Thionville*, 1643, and *Nördlingen*, 1645; conjunction with Swedes for capture of Vienna planned; Austrians and Bavarians (now their only allies) defeated at Zusmarshausen, and Condé repelled Span. invasion of France at Lens, 1648; war ended by *Treaty of Westphalia*, Oct. 1648.

THISBE, see PYRAMUS AND THISBE.

THISTLE (*Carduus*), genus of plants, order Compositæ; common specimens are: Scotch T. (*Onopordon acanthium*), Spear T. (*Cirsium lanceolatum*), Plume T. (*Cnicus arvensis*); national emblem of Scotland is no one variety.

THISTLE, ORDER OF THE, see KNIGHTHOOD.

THÖKÖLY, IMRE, PRINCE (1657–1705), Hungarian soldier and statesman; led Magyars against Emperor Leopold I.; became prince of Upper Hungary; supported Turks against Austria from 1683 onwards; twice imprisoned by Turks; d. in exile.

THOLUCK, FRIEDRICH AUGUST GOTTREU (1799–1877), Ger. Prot. divine; student of Oriental languages; prof. of Theology at Berlin, 1823, and at Halle, 1826; became leader of evangelical pietism, as against orthodoxy and rationalism, laying great emphasis on spiritual experience.

THOMAR (39° 58′ N., 8° 29′ W.), town, on Nabão, Santarem, Portugal; contains some interesting ecclesiastical buildings. Pop. 7200.

THOMAS, of Bayeux, abp. of York, 1070; d. 1100.

THOMAS À KEMPIS, THOMAS HAMMERKEN (*c.* 1380–1471), Augustinian writer; b. Kempen, Cologne; received orders at the convent of Mount St. Agnes, Zwolle. His monastic life was uneventful in the extreme, but his communion with his own soul gave birth to the *Imitatio Christi*, one of the world's most beautiful religious records.

THOMAS, ARTHUR GORING (1850–92), Eng. composer; studied in Paris, 1873, Royal Academy,

London, 1877; *Esmeralda, Nadeshda* (operas); cantata, *The Sun-Worshippers*, etc.

THOMAS, CHARLES LOUIS AMBROISE (1811–96), Fr. composer; well-known opera, *Mignon* (1866); *Hamlet* (1868), *Françoise de Rimini* (1882).

THOMAS, GEORGE HENRY (1816–70), Amer. soldier; commanded in Civil War on Union side, winning battle of *Mill Springs*, 1862; played prominent part in battles of *Stone River* and *Chickamauga*; general of army which stormed Missionary Ridge, 1863; won decisive battle of *Nashville*, 1864.

THOMAS, ST., apostle, mentioned with Matthew in Synoptic Gospels; in *John* doubting Christ's resurrection. Thomas in Aramaic means twin, and in Syriac legend he is called twin-brother of Our Lord. According to doubtful tradition he preached Christianity in India.

THOMAS, SIDNEY GILCHRIST (1850–85), Brit. inventor; b. Canonbury, London; became a police court clerk, but studied chemistry. His great discovery was a means of eliminating phosphorus from iron by means of the *Bessemer converter*.

THOMAS THE RHYMER, THOMAS OF ERCILDOUNE (fl. *c.* 1280), Scot. poet mentioned in *Sir Tristrem* and wrongly supposed author of this romance.

THOMAS, WILLIAM (1819–90), bp. of Gloucester and Bristol, 1861; abp. of York, 1862.

THOMASIUS, CHRISTIAN (1655–1728), Ger. jurist; b. Leipzig; first lecturer in German tongue, Leipzig, 1687; wrote *Historie der Weishert und Thorheit*, etc.

THOMASVILLE (30° 47′ N., 84° W.), city, winter resort, capital, Thomas County, Georgia, U.S.A.; lumber industries. Pop. (1910) 6727.

THOMOMYS, see POCKET GOPHERS.

THOMPSON, FRANCIS (1860–1907), Eng. poet; author of *The Hound of Heaven*, a poem full of gorgeous purple and gold, *Sister Songs* (1895), *New Poems* (1897), a prose monograph on Shelley. See Meynell, *Memoir*; *Works* (1913).

THOMPSON, SIR HENRY, Bart. (1820–1904), Eng. surgeon; ed. University Coll., London; practised as surgeon in London, specialising in the surgery of the bladder and genito-urinary system; surgeon to Univ. Coll. Hospital (1863), prof. of Clinical Surgery (1866), prof. of Surgery and Pathology in Royal Coll. of Surgeons (1884); first pres. of Cremation Society (1874); introduced new methods of surgical treatment, particularly for urinary calculi. In addition he was an artist of merit, wrote two novels, promoted study of astronomy by gifts of valuable instruments to Greenwich Observatory, and made a fine collection of old china.

THOMSON, JAMES (1700–48), Scot. poet; b. Ednam, Roxburghshire; ed. Jedburgh, and Edinburgh Univ.; became tutor in London, 1725; held various appointments, the chief being Surveyorship of the Leeward Islands; lived near Richmond. Like Coleridge, he lacked energy and initiative.

His best-known work, *The Seasons*, is famous historically rather than intrinsically. The poetry of the time followed Pope's 'correctness.' T. broke away from the couplet and wrote in Spenserian stanza and blank verse. *The Seasons* is not free from artificiality; it is marred by T.'s pseudo-Miltonic diction, but goes straight to nature, and is full of glorious descriptive pictures. *The Castle of Indolence* is better poetry; written in Spenserian stanzas it is almost of the highest in poetry. Besides some minor poems T. wrote tragedies, e.g. *Sophonisba*, which are frankly bad. His *Masque of Alfred* contains the song *Rule, Britannia*.

Macaulay, *James Thomson* (Eng. Men of Letters).

THOMSON, JAMES (1822–92), Brit. physicist and engineer; b. Belfast; graduated Glasgow; prof. of Engineering, Belfast, then Glasgow; contributed to thermodynamics, hydraulics, and geology.

THOMSON, JAMES (1834–82), Brit. poet of pessimism and despair; b. Port-Glasgow. To the *National Reformer* he contributed his famous poem, *The City of Dreadful Night*, which later he published in book form with other sombre poems.

THOMSON, JOHN (1778–1840), Scot. painter; minister of Duddingston; best landscapist of his day.

THOMSON, JOSEPH (1858–95), Scot. geologist and explorer; geologist on the Central African expedition for opening up route to northern shore of Victoria Nyanza, 1882–83; led expedition to Sekoti, 1885; explored Atlas Mts., 1888; made extensive additions to geological, zoological, and botanical knowledge of Africa; pub. various works on Africa.

THOMSON, SIR JOSEPH JOHN (1856–), Brit. physicist; Nobel prize, 1906; contributions to electrical theory.

THOMSON, THOMAS (1773–1852), Scot. chemist; prof. at Glasgow; popularised Dalton's atomic theory, investigated atomic weights, and supported Prout's hypothesis.

THOMSON, WILLIAM, see KELVIN.

THOR, ancient Norse god.

THORACIC DUCT, see LYMPHATIC SYSTEM.

THORACOSTRACA, see under MALACOSTRACA.

THORAX, the upper part of the trunk, containing the heart and lungs, and divided from the abdomen by the diaphragm.

THORBECKE, JAN RUDOLF (1798–1872), Dutch politician; prof. at Ghent, 1825, Leiden, 1831; interested in political reform, becoming leader of liberal reform party; wrote *Aanteekeningen op den Grondwet*; *Historische Schetsen*.

THOREAU, HENRY DAVID (1817–62), Amer. writer; b. Concord, Mass.; he graduated at Harvard and became a teacher. In 1839 he made a voyage down the Concord, and later recorded his experiences in *A Week on the Concord and Merrimac Rivers*. In 1845 he retired to the seclusion of a shanty in the woods at Walden, and there wrote his masterpiece, *Walden*.

THORFINN KARLSEFNI (fl. 1000), Norse explorer; voyaged as trader from Iceland to Greenland; thence to 'Markland'—Newfoundland, and Nova Scotia, with large contingent in three vessels; attempted colonisation with part of the company.

THORIUM (Th=232·4), rare, radioactive metal, allied to cerium, obtained from thorianite (Ceylon) and monazite sand (Brazil). S.G. 11·0; burns in air. Oxide, ThO_2, forms salts: $ThCl_4$, $Th(SO_4)_2$, also K_2ThF_6.

THORN (53° 3′ N., 18° 36′ E.), fortified town, on Vistula, W. Prussia; manufactures iron; trade in grain; was a flourishing Hanse town in Middle Ages; birthplace of Copernicus. Pop. (1910) 46,227.

THORNABY-ON-TEES (54° 39′ N., 1° 19′ W.), town, on Tees, N. Riding, Yorkshire, England; ironworks; shipbuilding yards. Pop. (1911) 18,605.

THORN-APPLE (*Datura*), genus of plants, order Solanaceæ; Common T. (*D. stramonium*) yields *daturin*, a drug used in asthma; Soft-Haired T. (*D. metel*) was used by Thugs to overpower victims; Red T. (*D. sanguinea*) is used by Peruvian Indians as an intoxicant.

THORNBACK, see under RAYS.

THORNE (53° 37′ N., 0° 58′ W.), town, on Don, Yorkshire, England; manufactures boats, agricultural implements. Pop. (1911, rural district) 8782.

THORNHILL.—(1) (53° 40′ N., 1° 37′ W.) town, W. Riding, Yorkshire, England; manufactures woollens. Pop. (1911, registration district) 11,305. (2) (55° 15′ N., 3° 46′ W.) village, Dumfriesshire, Scotland; quarries.

THORNHILL, SIR JAMES (1676–1734), Eng. painter; painted St. Paul's dome, parts of Greenwich Hospital and Hampton Court.

THORNY DEVIL, see under LIZARDS.

THORNYCROFT, WILLIAM HAMO (1850–), Brit. sculptor; made his first success with *Artemis*, 1880. The portrait statues of General Gordon, in Trafalgar Square, and of John Bright, at Rochdale, are his.

THORWALDSEN, BERTEL (1770–1844), Dan. sculptor; practised his art chiefly in Rome; excelled in classical and mythological subjects.

THOU, JACQUES AUGUSTE DE (1553–1617), Fr. historian; famous scholar of XVI. cent. His *Universal History*, written in Latin, embraces politics, war, manners, sciences, arts; learned, impartial, and conscientious. His son, **François-Auguste** (1607–42), was implicated in plot against Richelieu, and, although guiltless, was executed with his friend Cinq-Mars.

THOUARS (47° N., 0° 15′ W.), town, on Thouet, Deux-Sèvres, France; manufactures furniture; trade in wine. Pop. 6300.

THOURET, JACQUES GUILLAUME (1746–94), Fr. Girondist and political writer.

THOUROUT (51° 3′ N., 3° 4′ E.), town, W. Flanders, Belgium; linen and hats. Pop. 10,900.

THRACE (41° 25′ N., 26° 30′ E.), name applied in ancient times to extensive district N. of Macedonia, and given by Romans to province between Balkans on N. and Ægean Sea and Sea of Marmora on S.; surface mountainous; drained by Maritza. T. came under domination of Macedon, *c.* 358 B.C., and passed under control of Rome, 133 B.C.; became Rom. province, 46 A.D.; taken by Turks in XIV. cent. Scene of several battles in the Turco-Balkan War (*q.v.*).

THRASYMACHUS, see SOPHISTS.

THREAD, see YARN.

THREAD WORMS, see NEMATODA.

THREAT, if with intent to obtain goods or property, is punishable by law by from three years to penal servitude for life, according to degree of violence.

THREE RIVERS (46° 21′ N., 72° 29′ E.), city, at junction of St. Maurice and St. Lawrence, Quebec, Canada; exports lumber, grain, cattle. Pop. (1911) 14,441.

THRESHING-MACHINES are used to separate the grain from the straw, and to remove the husks or chaff. The process was carried out in early times by rolling the cereal under heavy rollers, by treading it out with oxen, or by beating it with sticks or *flails*; now done by mills operated by steam or water. In all machines the same principle is involved—the beating of the cereal by a revolving ridged roller so that the grain is separated from the straw and may be sieved off. It is then *winnowed*, and grain, chaff, and straw are delivered separately.

THRIFT (*Armeria*), genus of plants, order Plumbaginaceæ; Common T. (*A. vulgaris*) is Sea Pink of Brit. garden borders.

THRING, EDWARD (1821–87), Eng. educationist; app. headmaster of Uppingham, 1853. His high moral calibre, honourable example, and indefatigable energy were invaluable to his school; pub. *The Theory and Practice of Teaching* (1883).

THRIPS, see THYSANOPTERA.

THROAT, part of neck in front of vertebral column, containing pharynx, œsophagus or gullet, larynx, trachea or windpipe.

THROCKMORTON, FRANCIS, THROGMORTON (1554–84), Eng. conspirator; executed for share in plot for Span. invasion of England and restoration of Roman Catholicism.

THROCKMORTON, SIR NICHOLAS, THROGMORTON (1515–71), Eng. diplomatist; fought at *Pinkie*; imprisoned for share in Wyatt's conspiracy under Mary; ambassador to France and Scotland under Elizabeth; imprisoned for assisting northern earls, 1569.

THRUSH FAMILY (*Turdidæ*), large family of Perching Birds, with 600 species distributed throughout the world. They are characterised by their long, slender, somewhat flattened bills, slightly notched near the point—adapted for the soft animal or insectivorous food upon which they live. Their colouring is subdued, but the songs of some are surpassed by none in birdland. Many are residents throughout the year in Britain, such as the BLACKBIRD (*Turdus merula*), the SONG- and MISSEL- or MISTLETOE-THRUSH (*T. musicus* and *viscivorous*), the ROBIN or REDBREAST (*Erithacus rubecula*), and the HEDGE ACCENTOR or HEDGE SPARROW (*Accentor modularis*). Others visit Britain in summer for nesting purposes, among these being the NIGHTINGALE (*Erithacus luscinia*), the REDSTART (*Ruticilla phœnicurus*), the WHEATEAR (*Saxicola*), WHINCHAT and STONECHAT (*Praticola*), and RING OUSEL (*Turdus torquatus*). A few, for example the REDWING (*T. iliacus*), FIELDFARE (*T. pilaris*), and BLUE THROAT (*Erithacus suecicus*), simply winter in the Brit. Isles.

THUCYDIDES (*c.* 460–400 B.C.), Gk. historian; b. Athens of eupatrid parents, Olorus and Hegesipyle, and kinsman of Cimon. T. was a distinguished soldier as well as scholar, possessed gold mines in Thrace, suffered from plague during siege of Athens, 430, was one of ten *strategi*, 424. Deputed to relieve Amphipolis, besieged by Brasidas, he failed, and despite successful defence of Eion, was banished, not returning for twenty years; died before close of Peloponnesian War (*q.v.*), which was main fact of his life. His history of the Peloponnesian War goes down to 411. It is the first hist. work in modern sense of term. His predecessor Herodotus, 'the father of history,' was quite uncritical of legends. Before Thucydides' time Greeks did not distinguish between myth and history. T. was scrupulous about sources of information, and laid down rules of accuracy and impartiality; trustworthiness accepted as absolute (with exception of small school, now silent); great literary gifts of poetical feeling and elegance, conception of political science which has never become antiquated. The long speeches made by his characters were invented, a custom followed by historians till modern times.

Collins, *Thucydides*.

THUGS, N. Ind. professional murderers (usually by strangling); originally a caste; first generally known 1800—after an existence of 500 years; slew their victims in honour of the goddess Kali, wife of Siva, and retained the plunder; finally suppressed by Brit. Government, 1840.

THUGUT, JOHANN AMADEUS FRANZ DE PAULA, BARON (1736–1818), Austrian statesman; entered Austrian diplomatic service, and while at Constantinople acquired Bukowina for Austria; afterwards sent on diplomatic missions to France, Italy, and Belgium; became Foreign Minister, 1793; Chancellor of State, 1794. His chief object was to increase Austrian dominions. His selfish policy aroused anger in other European nations, and he had to retire in 1801.

THUIN (50° 22′ N., 4° 16′ E), town, on Sambre, Hainaut, Belgium; ironworks; shipbuilding-yards. Pop. 6500.

THUJA, see ARBOR VITÆ.

THUMB, TOM, see DWARF.

THUMBSCREW, see TORTURE.

THUN (46° 46′ N., 7° 38′ E.), town, on Aar, canton Bern, Switzerland. Pop. 7540.

THUN, LAKE OF (46° 46′ N., 7° 38′ E.), in canton Bern, Switzerland, traversed by Aar; length, 11½ miles.

THUNDER, see METEOROLOGY (ATMOSPHERIC ELECTRICITY).

THUN-HOHENSTEIN, Austrian noble family; lived at Tetschen, Bohemia, for more than 200 years; wealthy and conspicuous in public service. FRIEDRICH (1810–81), ambassador at Berlin and Petersburg. FRANZ ANTON, gov. of Bohemia, 1889–95. LEOPOLD (1811–88), Minister of Education and Religion, 1849–60, social reformer; supporter of Bohemian autonomy.

THURET, GUSTAVE ADOLPHE (1817–75), Fr. botanist; b. Paris; studied law, which he abandoned in favour of botanical science; travelled in Turkey, Syria, and Egypt; contributed much information on Cryptogams, especially Algæ; wrote *Notes algologiques* and *Études phycologiques* (both published posthumously). Biographical note by Bornet, his colleague, appeared in *Annales des sciences naturelles* (1876).

THURGAU (47° 33′ N., 9° 5′ E.), N.E. canton, Switzerland; area, 381 sq. miles; surface generally undulating; drained by Thur, a tributary of Rhine; capital, Frauenfeld; agriculture is principal industry;

live stock is raised, dairy-farming carried on; fruit and wine produced; manufactures leather, woollens, cottons, embroidery; most of inhabitants are Protestants; was organised as canton of Swiss Confederation in 1803. Pop. (1910) 134,917.

THURIBLE, Gk. word used in R.C. Church for censer.

THURII, THŪRIUM (39° 40′ N., 16° 22′ E.), ancient city, on Gulf of Tarentum, near ancient Sybaris, Magna Græcia; founded by Gk. colonists, 443 B.C.

THURINGIA, THÜRINGEN, region bounded by the Werra, Saale, Herz Mts., and Thuringian Forest; loosely, embracing Saxe-Weimar, Saxe-Meiningen, Saxe-Coburg-Gotha, Saxe-Altenburg, two Schwarzburg and two Reuss principalities, and fragments of Prussia, Saxony, and Bavaria. T. came under Frankish rule, VI. cent.; often split up and reunited; Louis the Springer (d. 1123) made the Wartburg (*q.v.*) seat of Thuringian margraves; passed to Saxony with Ernestine branch of Wettins, 1487; Prussian since 1815.

THURINGIAN FOREST, THÜRINGERWALD (50° 45′ N., 10° 40′ E.), range of hills, Germany; highest point, Grosser Beerberg, 3225 ft.

THURLES (52° 41′ N., 7° 48′ W.), market town, Tipperary, Ireland; abp.'s see (R.C.); scene of defeat of Irish by Danes, X. cent. Pop. 3900.

THURLOE, JOHN (1616–68), Eng. politician; Sec. of State under Cromwell, 1652; controlled postal and intelligence departments; opposed Restoration.

THURLOW, EDWARD THURLOW, 1ST BARON (1731–1806), Eng. statesman; made his name by powerful speeches in Douglas peerage case and other lawsuits; became successively Solicitor-General, Attorney-General, Lord Chancellor of England; held Great Seal under three administrations; retired in 1792.

THURN UND TAXIS, see TAXIS, THURN UND.

THURSDAY ISLAND (10° 33′ S., 142° 10′ E.), small island, Prince of Wales group, Torres Strait, Queensland; pearl fisheries.

THURSO (58° 36′ N., 3° 31′ W.), seaport, on Thurso Bay, Caithness, Scotland; exports flagstones. Pop. (1911) 3335.

THURSTAN, abp. of York, 1114; died 1140; disputed primacy of See of Canterbury.

THYME (*Thymus*), genus of plants, order Labiatæ; Common T. (*T. vulgaris*) of gardens has a stronger fragrance than Wild T. (*T. Serpyllum*).

THYMUS GLAND, temporary ductless gland, consisting of right and left lobes, at base of neck and top of chest; largest in second year, and disappears about puberty; sometimes persists in adult life.

THYROID (Gk. *Thuræides*, shield-shaped), term applied to the largest cartilage of the larynx, and also to the large ductless gland on the lower part of the front of the neck, a two-lobed structure connected by an isthmus across the front of the trachea. The gland is well supplied by blood vessels, the most important being the superior t. artery, a branch of the external carotid. The gland is composed of minute cavities, lined with cubical cells, and filled with an insoluble gelatinous material, while in the walls of the cavities the small blood vessels anastomose freely. The function of the gland is not yet precisely known, but it has been shown that if it is excised mucous degeneration is produced in various tissues of the body, accompanied by derangement of the nervous system. *Myxœdema* (q.v.) and *Cretinism* (q.v.) are conditions due to absence or great diminution of the gland or its internal secretion, while in the condition of *Goitre* (q.v.) the gland is enlarged. Preparations are made from the fresh or dried gland and used medicinally in the treatment of the above conditions.

THYROSTRACA, see ENTOMOSTRACA.

THYSANOPTERA, THRIPS, an order of minute insects with small, round bodies, usually less than a tenth of an inch long, furnished with four very narrow fringed wings, or without wings. They live on soil amongst plants, on flowers, bark, or amongst fungi, and occasionally do damage to corn and onions, by sucking the forming grains and buds, piercing the surfaces to extract the plant juices. There is no sudden change from larva to adult, for the former resembles the latter, but without wings, and feeds similarly. After a few moults the fully developed stage is reached.

THYSANOZOON, a TURBELLARIAN WORM (*q.v.*).

TIAN-SHAN MOUNTAINS, CELESTIAL MOUNTAINS (c. 43° 30′ N., 79° to 96° E.), mountain system, Central Asia, stretching N.E. from the Pamir towards Gobi Desert, and separating Russ. from Chin. Turkestan; the mountains are N. boundary of great Central Asian plateau, and form watershed between basin of Tarim on the S.E. and basins of Balkash and Syrdarya on N.W. Consist of numerous parallel ridges throughout, and reach an extreme height of c. 23,000 ft. in Khan Tengri, not far from which the two ranges of Kirgizin-ala-Tau and Kungi-ala-Tau enclose Issyk-Kul Lake and the river Narym. In province of Kansu range contains volcanic peaks of Turfan, Hochan, and Pidjan. Rivers having their source in the range are the Narym, Ili, Tarim, Zarafshan, Syrdarya. The T. rise to great distance above snowline; many vast glaciers; forest below, region of perpetual snow. Chief pass is Terek in S.W., between Kashgar and Ferghana.

TIARA, triple crown of the pope; a high cap of gold cloth, encircled by three coronets, and surmounted by a cross of gold; second coronet added about 1065, third about 1365; symbolises authority as 'father of princes,' 'ruler of the world,' and Vicar of Christ.

TIARET (35° 20′ N., 1° 18′ E.), town, Oran, Algeria, on site of the Rom. Tingurtia; agricultural trade. Pop. 6000.

TIBBU, TEBU, nomads of E. Sahara; estimated at 70,000, and spread over area of 300,000 sq. miles; include Tedas, Dasas, Bedeyat, Zoghawa, and Bulzeda; Muhammadan in religion; actively engaged on caravan routes across the Sahara.

TIBER (41° 44′ N., 12° 14′ E.), chief river of central Italy; rises in Tuscan Apennines; passes Perugia, Orvieto, Rome, Ostia, and enters Mediterranean; length, 260 miles; navigable to confluence with Nera.

TIBERIAS (32° 47′ N., 35° 33′ E.) (modern TABARIYA), ancient town, on Sea of Galilee, Palestine; founded by Herod Antipas in I. cent. A.D.; was long a great centre of Jewish learning; taken by Saladin, 1187.

TIBERIUS, CLAUDIUS NERO (42 B.C. – 37 A.D.), second Rom. emperor; s. of T. Claudius Nero, Rom. officer, and of Livia, who afterwards m. Octavianus (Augustus); became quæstor, 23 B.C.; aided Tigranes in Armenia, 20; prætor, 17; with Drusus, reduced Rhætia and Vindelicia to submission, 15; consul, 13; suppressed Pannonian rebellion, 12–9 B.C.; divorced Vipsania Agrippina to marry Julia, the licentious dau. of Augustus, 11; withdrew to Rhodes, 6; wife banished from Rome, 2 B.C.

T. returned in 2 A.D. and was adopted by Augustus; waged war against Maroboduus of Bohemia, 6; suppressed risings in Pannonia and Dalmatia, 6–9; in 9 A.D. occurred total destruction of Varus's army by Germans, whereupon T. twice invaded Germany; succ. as emperor, 14; suppressed various risings in early part of reign; warred against Numidia and later against Parthia. His later years were marked by plots, suspicions, and murders. Many of his relatives and friends were put to death; withdrew to Capreæ, leaving conduct of affairs to Sejanus, whom, however, he ultimately put to death for treason; said to have been insane. Tacitus, upon whom we rely for details, is strongly biased against T. and is probably grossly unfair.

TIBESTI (19° N., 18° E.), mountainous region, Central Sahara, Africa; inhabited by the Tibbu.

TIBET, THIBET (c. 27° 30′ to 39° N., 79° to 102° E.), country included in empire of China, Central Asia; stretches from frontiers of China to Pamir, with

Himalayas on S. and Kuen-lun, Akka Tag, and Altyn-Tag on N.; area, 463,200 sq. miles. Surface generally consists of high mountains, plateaux, and great rolling plains traversed by long ridges of hills; and the great elevation of the whole country is its most remarkable physical characteristic. The highest peaks include Ulug-Mustagh (25,300 ft.), Aling-Gangri, and T'a-Chhab Gangri (c. 23,000 ft.). In the W. are desert lands. The great river of T. is the Tsang-po, length, 1300 miles, which traverses the country, and forms head-waters of the Brahmaputra; other rivers are the head streams of the Ganges, Indus, Sutlej, Yang-tse-Kiang, Hoang-Ho, Mekong, and Salwin. There are many lakes, including Horpa Ts'o, Mangtsa Ts'o, Bakka Namur Nor, and Ike Namur Nor, in N.W.; Kökö Nor in N.E., Tengri Nor in S. centre, Manasarowar in S.W. and Yamdok Ts'o to S.S.W. of Lhasa. Hot springs frequently occur, and are one of most noteworthy features of the country. The climate is very severe, and there is a great want of moisture in the air, which renders the fall of rain and snow very small; in summer intense heat by day is followed by great cold at night. Flora includes such characteristic plants as the delphinium, pedicularis, astragalus, ranunculus, gentian, saxifrage. Fauna includes wolves, bears, lynxes, foxes, yaks, goats, antelopes, rodents, and numerous animals peculiar to T.

History.—T. was included in the dominions of Jenghiz and Kublai Khans, the latter of whom granted the chief power to the lama Phagspa in 1270. In 1645 sovereign power was granted by Kushri Khan, conqueror of T., to the Dalai-Lamas, who have continued to rule the country until the present time. Chin. control over foreign affairs dates from 1720; and until 1903 T. remained practically unknown to Europeans, who were forbidden on pain of death to enter the country. Expeditions were from time to time and at great risk undertaken by various travellers, among whom Przevalski, Rockhill, Bower, and Sven Hedin may be mentioned; while a number of 'pundits' from India carried out geographical surveys whereby a considerable amount of information concerning the country was obtained.

In 1903 Colonel Younghusband was sent at the head of a mission to Lhasa to secure the observance by the Tibetans of the terms of the Anglo-Chin. treaty of 1890; he reached Lhasa in 1904 and an agreement was signed by which facilities for trade between T. and Brit. India were granted by the Tibetans. A dispute with China occurred in 1909, and Lhasa was taken by a Chin. force, upon which the Dalai-Lama fled to India; deposed by the Chinese. The Tibetans forthwith rose against the Chinese, gained some successes, and petitioned the Dalai-Lama to return (June 1912). Intervention by the Brit. government prevented more bloodshed, but matters are still unsettled.

Government.—The Dalai-Lama is still nominally the head of the government, and exercises his authority through a regent appointed by China; but it is said that the government of China intends to exercise greater control over the affairs of T. than has hitherto been the case, although at present (1913), owing to the lack of a strong central authority, she has little influence over outlying provinces.

The capital is Lhasa (*q.v.*), and the markets open to Brit. traders are at Yatung, Gyantze, and Gartok. The Tibetans are of Mongoloid stock and are of good physique; they are generally classified in two divisions, dwellers in towns and villages, and a number of nomadic and pastoral tribes; among the former, polyandry is customary, but the nomads are generally monogamous; in some parts of E. and E. central T. polygamy is practised.

The principal industry is agriculture; barley, wheat, various vegetables and fruits are cultivated, and sheep, yaks, pigs, camels, and buffaloes are reared. Minerals found include salt, gold, borax; various precious stones occur; important industries are weaving, knitting, pottery-making, and metal working. Trade is chiefly with China and India, the principal exports being skins, wool, precious stones, live stock. Chief religion is Lamaism, a corrupt form of Buddhism. Pop. c. 6,500,000.

Sandberg, *Exploration of Tibet* (1904); *Tibet and the Tibetans* (1906); Grenard, *Tibet* (1904); Candler, *The Unveiling of Lhasa* (1905); Sven Hedin, *Adventures in Tibet* (1904).

TIBETO-BURMAN LANGUAGES, an important family of Indo-Chinese languages spoken in India; comprises series of dialects spoken from Tibet to Burma, and from Baltistan to Chin. provinces, Szechuan and Yunnan, by c. 20 million people, all Mongolians. Principal groups—Tibetan, Himâlaya, North Assam, Bodo, Nâga, Kachin, Kuki-Chin, Burmese; chief characteristics—real verb wanting; usual word arrangement—subject, object, verb; tones used as in Chinese; rich vocabulary, deficient in words expressing abstract ideas.

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TIBULLUS, ALBIUS (c. 54–19 B.C.), Rom. poet; became friend of Messala, under whom he saw military service, 29; returned to Rome to devote himself to literary pursuits; intimate with Vergil and Ovid; joined Messala in a voyage to Asia, but compelled to return through illness. Quintilian gives him highest place among elegiac poets; style is graceful and mellifluous; its lack of dramatic force is redeemed by a vein of melancholy. His first book of elegies was inspired by Plancia, a married woman whom he calls Delia; the second by 'Nemesis,' a courtesan. The authenticity of most of the third and the whole of the fourth book is extremely doubtful.

TIBUR (41° 58′ N., 12° 46′ E.) (modern TIVOLI), ancient town, on falls of Anio, Latium, Italy; favourite residence of many distinguished Romans.

TIBURTINA, VIA (41° 55′ N., 12° 35′ E.), ancient highway, Italy, leading from Rome to Tibur.

TICHBORNE CASE, THE.—Arthur Orton (1829–98), a butcher in Australia, laid claim to the Tichborne estates (worth about £24,000 a year) on the death of Sir Alfred Tichborne, 1866, and came forward as Sir Alfred's bro., supposed to have been lost at sea; was acknowledged by the dowager Lady Tichborne; nonsuited on his claim (which lasted 103 days, 1871–72). Orton was then tried for perjury and forgery, convicted, and sentenced to fourteen years' penal servitude.

TICINO.—(1) (46° 20′ N., 8° 45′ E.) S.E. canton, Switzerland; area, 1088 sq. miles; surface is mountainous in N., sloping to plain of Lombardy in S.; watered by Ticino and its affluents; contains part of Lakes Maggiore and Lugano; capital, Bellinzona; produces olives, grapes, and other fruits, cereals, tobacco, silk, wine; language, Italian; chief religion, R.C.; constituted a canton of Swiss Confederation, 1803. Pop. (1910) 156,166. (2) TESSIN (45° 14′ N., 9° E.) (ancient *Ticinus*), river, Switzerland and Italy; rises in Mt. St. Gothard; joins the Po, near Pavia.

TICINUM (45° 10′ N., 9° 10′ E.) (modern PAVIA), ancient city, on Ticinum, Gallia Transpadana; said by Pliny to have been founded by the Lævi and Marici; an important city under the Romans; in 572 taken by the Lombards, who made it their capital.

TICKET-OF-LEAVE.—Prisoners released from penal servitude before the completion of their term on the licence of the Home Sec. are released on a ticket-of-leave. This licence is forfeited if the prisoner fails to report himself to the police according to the conditions of release, or if he is convicted of another offence before the ticket-of-leave has expired.

TICKNOR, GEORGE (1791–1871), Amer. writer; b. Boston. During his travels in Europe he met many of the leading men of his age, and his journal is full of valuable reminiscences. The *History of Spanish Literature* is his *chef d'œuvre*.

TICKS, see MITES AND TICKS.

TICONDEROGA (43° 50′ N., 73° 30′ W.), town, on outlet of Lake George, Essex County, New York, U.S.A.; manufactures paper-pulp; captured from

British by Americans, 1775; retaken by British, 1777 and 1780. Pop. (1910) 2475.

TIDE, the periodic rise (*flow*) and fall (*ebb*) of the sea. NEWTON was the first to theorise on the causes of t's and fitted them into his gravitation theory. His explanation is simple. The earth must be imagined as consisting of a solid sphere, surrounded by a layer of water of uniform depth. This body is attracted by the moon. The resultant attraction on the solid earth core is the same as if the whole of its mass were concentrated at the centre (C). If points A and B on the earth and in the line joining the centres of the earth and moon, M, be taken, obviously the attraction at A (nearest the moon) is greater, and at B (on the other side of the earth) less than that at C. Consequently, as the water is free to move relatively to the solid earth, it is heaped up at A, and *hangs* away, as it were, from the earth at B.

To compensate for this, depressions take place at D and E (on a line at right angles to the line through the centre of the moon and A, C, and B), and the water as a whole thus takes the shape of a prolate spheroid (the figure obtained by the revolution of an ellipse about its major axis). Further, as the earth rotates (about an axis through C perpendicular to the paper) each point on its surface, such as *A*, will in turn come into line with the moon, resulting in a tidal wave travelling round the earth, the two crests of the wave always pointing directly towards and away from the moon. Were the moon always in the same position at M, two high and two low t's would take place in exactly 24 hours, but while the earth performs one rotation, the moon will have moved to some position such as M', during the course of its revolution about the earth, with the result that A will not experience a high t. when it has returned to its original position, but when it has moved to another position, F. Consequently, high t's follow each other at intervals of 12 hrs. 27 mins. (half a *lunar* day), and similarly with low t's.

The sun causes a similar result, but owing to its much greater distance from the earth, its effect is only about $\frac{4}{11}$th that caused by the moon. If there were no moon, we should still have t's, though much smaller than those actually experienced—high t's at noon and midnight, and low t's at 6 a.m. and 6 p.m. The actual t's are the resultant effects produced by both sun and moon. At New and Full Moon (when the moon is in the same straight line as the sun) these effects are in the same direction, and very high and low t's, called *spring tides*, are the result, while during the 1st and 3rd quarters (when the centre of the moon is at right angles to the line joining the centres of the sun and earth) the effects of the sun and moon are in opposition to each other, and low t's, called *neap tides*, obtain, the ratio of the heights of spring to neap t's being about 8 to 3.

The explanation just briefly sketched is known as the *Statical* or *Equilibrium Theory*, as the water is supposed at every moment to take up a position of equilibrium. Although acceptable as an explanation, it is inadmissible as a scientific theory, since calculations based on it are utterly falsified by observations. It was left to LAPLACE to take the next step. In his *Mécanique céleste* he showed that the problem was not statical, but dynamical. His theory involves much mathematics of an advanced order, but the important points of difference may be summarised thus: Newton's assumption of a layer of water surrounding the solid earth was unjustifiable. Further, he took no notice of the distribution of the land masses or of the varying depths of the ocean affecting the velocity of the tidal wave. Laplace assumed a canal round the earth's equator, took into account the attraction of masses of water on neighbouring masses, and also the fact that during 12 hours the water has not time to take up a position of equilibrium, but that after tending towards such a position it runs beyond it—shoots past the mark like a pendulum in its swing—and as a consequence tidal phenomena are greatly magnified owing to the inertia of the water. Since Laplace's time it has also been proved that t's are affected by winds and atmospheric pressure.

The height and manner of motion of t's vary greatly. In the open ocean the t. is from 3 to 8 ft. in height and is a mere up-and-down movement; in landlocked seas it is hardly perceptible; in narrow channels the tidal wave is one of translation, the water moving up the channel for a period and then down, the rise being greatest in inlets with broad openings and narrowing away from the sea; in river channels the interval between high and low water decreases in length with distance from the mouth, and when this interval becomes very short indeed, a *bore* is the result—the t. rushing up the river in the form of a wall of water.

No general means has so far been discovered for constructing a *tide table* for a port in the same way as an astronomical almanac can be drawn up. Tidal predictions *are* made, but only after a series of accurate observations have been obtained at the port itself, by means of a *tide gauge*, an instrument which automatically records on a revolving drum the height of water at any time of day. These records are analysed into elements which are the results of various causes, and from such analysis predictions of great accuracy as to times and heights of t's are then made for the following year or two. Lord Kelvin, in 1872, suggested a method for constructing a tide table by mechanical means—a suggestion which resulted in the construction of a *Tide Predicting Machine*, now in use at many places.

The effects of t's on the world itself are noteworthy. It is obvious that a resistance is offered to the motion of the tidal wave, and although its effect is very small indeed, it must, in the course of ages, result in increasing the length of the day. The enormous t's which must have been produced by the earth on the moon's surface are supposed to account for an ultimate reduction in the period of the latter body's axial rotation, until it corresponded with the period of revolution about the earth, in which event the same face of the satellite is always presented to the earth, resulting in bringing the tidal spheroid to rest and removing any further frictional resistance. The moon's action on the earth produces a reaction on the moon, having the effect of slowly pushing that body farther away from us. Tracing this effect back, there must have been a time when the moon was very close to the earth and when the t's then raised on the earth's surface were sufficient at high water to submerge the Brit. Isles and at ebb to leave the Eng. Channel dry. Such t's would sufficiently account for certain geological observations which had long puzzled scientists as to how such stupendous work could have been performed within admissible time by ordinary denuding agencies.

According to Lord Kelvin, if the earth were a fluid mass, surrounded by a thin crust of only about 20 to 30 miles' thickness, the earth itself would be sufficiently elastic to so *give* under the moon's attraction that the rise and fall of water would be nil relatively to the earth. The presence of t's, he thought, proved the earth as a whole to be very rigid throughout—more so than glass or steel. That there are actual tidal distortions in the crust of the earth itself has now been proved and the amount measured, and, while the theory Kelvin rejected must be admitted in some form, the earth's effective rigidity has been shown (*e.g.* by the rate of travel of the first tremors of an earthquake) to be, as he thought, similar to that of the hardest steel.

The power of the t's is enormous, and various suggestions have been made in recent times for harnessing this practically inexhaustible store of energy for the purpose of putting it to man's service—suggestions which have, however, not yet materialised into any practical form.

G. H. Darwin, *Tides*.

TIDORE (0° 45′ N., 127° 26′ E.), small volcanic island, Malay Archipelago, belonging to the Dutch. Pop. 9000.

TIECK, JOHANN LUDWIG (1773–1853), Ger. poet and novelist; b. Berlin; wrote *Dichterleben*, *die Verlobung*, *Des Lebens Überfluss* (novels), *Leben und Tod der heiligen Genoveva* (dramatic poem), *Der Gestiefelte Kater* (satirical drama), etc.; edit. Schlegel's trans. of Shakespeare.

TIEDEMANN, FRIEDRICH (1781–1861), Ger. anatomist; prof. of Anat. and Zool. at Landshut; of Anat. and Physiology at Heidelberg, 1816; performed important researches on brain development.

TIEL (51° 53′ N., 5° 27′ E.), town, on Waal, Gelderland, Netherlands; manufactures agricultural machinery; active commerce. Pop. 11,360.

TIELE, CORNELIUS PETRUS (1830–1902), Dutch Remonstrant pastor; prof. of History of Religions at Leiden, 1877; wrote works on history and religions of ancient East; delivered Gifford Lectures *On the Elements of the Science of Religion*, 1896–98.

TIENTSIN (39° 8′ N., 117° 16′ E.), city, treaty port, at junction of Poi-ho and Hun-ho, Chi-li, China; important centre of transit trade; cotton-mills; rice and salt marts; chief import, cottons; export, wool. Pop. (1910) 800,000.

TIEPOLO, GIOVANNI BATTISTA (1692–1769), Ital. painter; dealt chiefly with Old Testament subjects; provided fine series of frescoes for abp.'s palace at Würzburg.

TIERNEY, GEORGE (1761–1830), Eng. statesman; opposed Pitt, with whom he fought duel, 1798; prominent Whig till death.

TIERRA DEL FUEGO (52° 35′ to 56° S., 65° to 74° W.), archipelago off S. end of S. America; area, *c.* 27,100 sq. miles; separated from mainland by Strait of Magellan. Surface is mountainous, reaching an extreme height of 7000 ft. in Mt. Sarmiento; watered by Juarez Celman and other streams; produces timber; sheep raised. Natives are three tribes in a degraded state of barbarism, but are very hardy. Politically the archipelago belongs partly to Chile and partly to Argentina; discovered by Magellan, 1520.

TIFFIN (41° 7′ N., 83° 8′ W.), city, on Sandusky, capital, Seneca County, Ohio, U.S.A.; seat of Heidelberg University; manufactures iron. Pop. (1910) 11,894.

TIFLIS (41° 30′ N., 45° E.), government, Transcaucasia, Russia; mountainous, forested; watered by Kur; rich mineral deposits; chief occupation, agriculture. Pop. (1910) 1,163,600. Capital, **Tiflis** (41° 42′ N., 44° 48′ E.), on Kur; commercial centre; manufactures cotton and silk; formerly capital of Georgia; annexed to Russia, 1802. Pop. (1910) 188,400.

TIGER, see under CAT FAMILY.

TIGER BEETLES, see under CARABOIDEA.

TIGER CATS, see under CAT FAMILY.

TIGLATH-PILESER I. (reigned *c.* 1120–1105 B.C.), king of Assyria; conquered various districts of Mesopotamia. TIGLATH-PILESER III. or IV. (reigned 745–27 B.C.), subdued Babylonia, Syria, Media, Damascus.

TIGRANES, DIKRAN, king of Armenia (*c.* 95–56 B.C.); warred against Parthia; acquired Mesopotamia and Syria; allied himself with Mithridates; twice beaten by Lucullus; surrendered (66) to Pompey, who allowed him to retain kingdom under Rom. suzerainty.

TIGRÉ (14° N., 39° E.), division, Abyssinia, capital, Adowa; formerly independent kingdom.

TIGRIS (31° 30′ N., 47° 13′ E.), river, Turkey-in-Asia; rises in mountains of Kurdistan and Armenia; flows in S.E. direction and unites with Euphrates at Kurna, the united stream being henceforth known as Shat-el-Arab; receives waters of Dyala, Guakr, Zab, and other rivers; important towns and ruins on banks are Diarbekr, Nineveh, Ctesiphon, Mosul, Tekrit, Bagdad.

TILBURG (51° 33′ N., 5° 5′ E.), town, N. Brabant, Netherlands; manufactures woollens. Pop. (1911) 52,754.

TILBURY DOCKS (51° 29′ N., 0° 24′ E.), on Thames, Essex, England; extensive quays for vessels of deep draught; connected with several railways.

TILDEN, SAMUEL JONES (1814–86), Amer. politician; b. New Lebanon; leader of New York Democratic party, 1868; helped to overthrow Tweed, Tammany leader; governor of New York State, 1875.

TILE, plate of baked clay for roofs, walls, pavements, etc. *Wall tiles* were known in Europe in XIII. cent.; some were enamelled, others ornamented in relief; inlaid t's appeared in XIX. cent. See ENCAUSTIC, POTTERY.

TILIACEÆ, natural order of plants; includes *Corchorus capsularis*..

TILLANDSIA, see BROMELIACEÆ.

TILLICOULTRY (56° 10′ N., 3° 44′ W.), town, Clackmannanshire, Scotland; wool, shawls, tartans. Pop. (1911) 3105.

TILLOTSON, JOHN (1630–94), Anglican divine; dean of Canterbury, 1672, abp., 1691; attempted to remedy clerical abuses; renowned for his sermons.

TILLY, COUNT OF, JOHANN TZERCLAES (1559–1632), general who commanded army of Catholic League from 1618 to 1632; only commander of genius on imperialist side till appearance of Wallenstein. See THIRTY YEARS WAR.

TILSIT (55° 4′ N., 21° 53′ E.), town, on Memel, E. Prussia, Germany; iron foundries; treaty between Napoleon and Alexander signed here, 1807. Pop. (1910) 39,013.

TIMÆUS (*c.* 345–*c.* 250 B.C.), Gk. historian; b. Tauromenium, Sicily; most of life spent in exile at Athens; wrote history of Sicily, etc.

TIMARU (44° 23′ S., 171° 17′ E.), seaport town, South Island, New Zealand; exports wool. Pop. 8000.

TIMBER is got from trees of the 'exogen' class, which grow by the yearly addition of a new outer layer of wood. The best age for felling varies with different trees, but in every case the tree should have arrived at maturity. Trees should be felled in the middle of summer or winter, not during spring or autumn when the sap is moving. After felling, the logs are sawn up into planks, and the wood is then known as 'scantling t.' or 'lumber.' It is then stacked in yards to season. Artificial seasoning by boiling or steaming is sometimes adopted to hasten the process, but the t. is much less durable. Decay in t. may be due to several causes. Bad ventilation and alternate wettings and dryings produce wet rot; the wood shrivels up and finally falls to powder. Dry rot is caused by a fungus which makes wood brittle and liable to crumble. This disease spreads rapidly and is accompanied by a musty smell. It is favoured by damp and bad ventilation, but fresh air soon kills the fungus.

TIMBER-LINE, elevation above sea-level at which trees cease to grow.

TIMBUKTU (17° 48′ N., 3° 9′ W.), city of Fr. Sahara, in S. of Sahara, 9 miles N. of Upper Niger; stands 800 ft. above sea; fortified; has two fine mosques; important trading centre, exchanging gold dust, salt, kola-nuts, gums, ivory, ostrich feathers, and dates, for cottons, tea, and general African trade goods; has caravan trade with Algeria and Morocco. T. belonged to the Moors from late XVI. to early XIX. cent., and in the XIX. cent. was held by the Fulahs and Tuaregs in turn; has belonged to France since Dec. 1893. Pop. *c.* 5100.

TIME.—Time is measured by means of regularly recurring phenomena. The celestial sphere apparently revolves once a day, and the interval between two successive returns of a fixed point of the sphere is called a *sidereal day*. Sidereal time is reckoned from the time when the first point of Aries passes the meridian. A *solar day* is the interval between two successive transits of the sun's centre over the meridian. But owing to the varying speed of the earth in its orbit, and also to the inclination of the orbit to the equator, the sun's apparent motion is not uniform. Hence arises the necessity of introducing an imaginary *mean sun*,

which may be supposed to move in the equator with uniform velocity. The 'equation of time' is the difference between apparent (or true) solar time and mean solar time at any instant. It varies from day to day, and is given in the *Nautical Almanac*. A solar day is about 4 minutes longer than a sidereal day, for the sun moves eastward among the stars at the rate of about 1° a day, hence the earth has to turn nearly 361° about its axis to complete a solar day. About March 21 a solar clock agrees with a sidereal clock, but the sidereal clock gains nearly 4 minutes every day; in a year it thus gains just one day.

Time, Standard.—Greenwich time is the standard time throughout Great Britain, and in France, Belgium, Holland, and Spain. In countries of great extent it is impossible to adopt one standard time, and meridians 15° apart have been chosen, all places within 7½° of these meridians having the same standard. Thus at Quebec, Montreal, Toronto, Boston, New York, and Washington the time of 75° W.—five hours earlier than Greenwich—is the standard. See also CALENDAR, CHRONOLOGY.

TIMES, THE, see NEWSPAPERS.

TIMGAD (35° 30′ N., 6° 20′ E.), ruined city, Constantine, Algeria; Rom. Thamugas, founded by Trajan, 100 A.D.

TIMOLEON OF CORINTH (*c.* 411–337 B.C.), Gk. general; defeated Hicetas of Leontini; freed Syracuse from Dionysius; subsequently defeated Carthaginians at Crimissus, and expelled tyrants from other Gk. cities of Sicily.

TIMOR (9° S., 125° E.), one of Sunda Islands, Malay Archipelago; area, *c.* 12,430 sq. miles; surface mountainous; has a number of extinct volcanoes; exports coffee, sandalwood, wax; belongs partly to Holland, partly to Portugal; chief town of Dutch T., Kupang; of Portug. T., Deli. Pop. *c.* 450,000.

TIMOR LAUT (8° S., 131° E.), group of islands, Malay Archipelago, belong to Dutch. Pop. *c.* 25,000.

TIMOTHEUS (d. *c.* 357 B.C.), Athenian general; defeated Spartans, 375; captured Samos, 365; took Torone and other towns; d. at Chalcis.

TIMOTHY, friend of St. Paul, referred to in various places in Acts and Pauline Epistles.

TIMOTHY, FIRST EPISTLE TO, New Testament book, forms, with II. Timothy and Titus, group called 'Pastoral Epistles'; they were generally accepted in the Early Church, but rejected by Marcion; at present time their authenticity is doubted more than any other Pauline epistles. I. Tim. is largely directed against Gnosticism, hence is referred by those who deny Pauline authorship to *c.* 110 A.D.; in any case, part may be Pauline.

TIMOTHY, SECOND EPISTLE TO, New Testament book, and one of 'Pastoral Epistles'; like I. Tim., its authenticity is hotly disputed; it is directed against immoral and wildly speculative tendencies, such as were making themselves manifest in the Ephesian Church; even those who regard it as unauthentic admit that fragments by St. Paul have 'been worked up in it'; if not by St. Paul, its date is *c.* 110 A.D.

TIMOTHY GRASS, see under GRASS.

TIMUR, TAMERLANE (1336–1405), famous Eastern conqueror; b. Kesh; began military career *c.* 1358; subdued Khwarizm and Urganj; after varied adventures established himself as king at Samarkand; subsequently conquered most of Persia and Caucasia; warred against Toktamish, leader of E. and W. Kipchaks, finally defeating him in 1395. Successfully invaded India, 1398. Led expedition to Syria, capturing Aleppo and Damascus; defeated Sultan Bajazet at Angora, 1402; d. while marching to invade China.

TIN (Sn = 119·0). metallic element, allied to lead, occurring chiefly as tinstone or cassiterite in Cornwall, S. America, Australia, China, Nigeria, etc.

METALLURGY.—The crushed ore is roasted to volatilise sulphur and arsenic, and smelted with anthracite, which reduces oxide to metal; purified by 'liquation.'

PROPERTIES AND USES.—White, lustrous, fibrous, and crystalline, emitting crackling sound when rod is bent, may be hammered into foil; M.P. 232° C., S.G. 7·29. Forms allotropic, 'grey t.' at low temperature Displaced from chloride solution by zinc in crystals, constituting 't. tree.' Not oxidised in dry or moist air at ordinary temperature, therefore used for tinning iron goods (t. plate) and copper and brass wire (pins). Pewter, solder, gun-metal, bell-metal are t. alloys. T. amalgam is used for common mirrors. CHIEF COMPOUNDS, SnO, stannous oxide; $SnCl_2+2H_2O$, t. salt, used by dyers, concentrated hydrochloric acid on t.: SnO_2, stannic oxide; $H_{10}Sn_2O_{13}$, metastannic acid, nitric acid on tin; $SnCl_4$, stannic chloride, liquid, B.P. 113·9°.

TINAMIDÆ, TINAMOU FAMILY (*q.v.*).

TINAMOU FAMILY (*Tinamidæ*), partridge-like in appearance, the birds of this family are confined to S. America, where they take the place of ground game birds, their short wings possessing but small power of flight.

TINCAL, see BORAX.

TINCTURE, chemical preparation made by dissolving drug in alcohol or by placing it in alcohol and introducing solvent; *e.g.* T. of Iodine.

TINDAL, MATTHEW (1657–1733), noted Eng. deist; ed. Oxford; became R.C.; recanted after Revolution; held that religion is perfectly discernible by reason, and is the means given by a perfect God to know Him.

TINDER, inflammable material, shavings, charred linen, and touch-paper, used in lighting fires; ignition produced by impact of steel against flint.

TINEO (43° 20′ N., 6° 30′ W.), town, Oviedo, Spain. Pop. 20,000.

TINKAR'S ROOT, see FEVERWORT.

TINNÉ, ALEXANDRINE PETRONELLA FRANCINA (1839–69), Dutch leader of an expedition, which included Heuglin and Dr. Steudner, to Central Africa; explored White Nile region.

TINNEVELLY (8° 43′ N., 77° 44′ E.), district, Madras, Brit. India. Pop. 2,070,000. Capital, **Tinnevelly**; centre of Christian missions. Pop. 43,000.

TINTAGEL, TREVINA (50° 39′ N., 4° 44′ W.), village, Cornwall, England; has remains of Tintagel Castle, the traditional birthplace of King Arthur.

TINTERN ABBEY (51° 42′ N., 2° 41′ W.), ruin (XII. cent.), on Wye, Monmouthshire, England.

TINTORETTO, JACOPO ROBUSTI (1518–94), great Ital. painter; b. Venice, s. of dyer (*tintore*). He had some lessons from Titian, but was largely self-taught; painted pictures of prodigious size—two, *The Worship of the Golden Calf* and *The Last Judgment*, being 50 ft. high. One picture, *Paradise*, 34 ft. high and 74 ft. long, is the largest canvas done by any of the great masters. Many of his pictures are in the leading Continental galleries, and the National Gallery, London, contains his *St. George and the Dragon*. Ruskin celebrates him as one of the 'five supreme painters.'

TIPASA (36° 30′ N., 1° 40′ E.), town, port, Algiers, Algeria; founded by Phœnicians; subsequently Rom. colony. Pop. 3000.

TIPPERA.—(1) TRIPURA (24° N., 91° E.), district, Bengal, India. Pop. 2,130,000. Capital, Comilla. (2) HILL TIPPERA (23° 45′ N., 91° E.), native state adjoining Tippera district, India; chief village, Agartalá. Pop. (1911) 229,613.

TIPPERARY.—(1) (52° 40′ N., 7° 55′ W.) inland county, Munster, Ireland; area, 1659 sq. miles; surface is generally flat, but crossed by Galtee, Knockmeald own, and other hills; watered by Shannon, Suir, and other rivers; produces wheat and other cereals, butter, and dairy produce. Pop. (1911) 151,951. County town, Clonmel. (2) (52° 28′ N., 8° 9′ W.) market town, Tipperary, Ireland; trade in butter. Pop. 6300.

TIPPERMUIR, see GREAT REBELLION.

TIPPOO SAHIB (1753–99), Sultan of Mysore; slain by British at capture of Seringapatam.

TIPTON (52° 33′ N., 2° 3′ W.), town, Staffordshire, England; collieries; ironworks. Pop. (1911) 31,763.

TIRABOSCHI, GIROLAMO (1731–94), Ital. scholar; wrote valuable histories of Humiliati and of Ital. lit.

TIRAH (34° N., 71° E.), mountainous district, on N.W. Frontier, India; inhabited by Afridi and Orakzai tribes; scene of Tirah campaign of 1897.

TIRAH CAMPAIGN, war on N.W. frontier of India, 1897, when Sir William Lockhart led combined Brit. and native force against Orakzais and Afridis, who kept up constant guerilla fighting. Peace, 1898.

TIRANA (46° 13′ N., 10° 9′ E.), town, vilayet Scutari, European Turkey. Pop. c. 11,000.

TIREH (38° 10′ N., 27° 30′ E.), town, Asia Minor; trade in raisins. Pop. c. 15,000.

TIRGOVISHTEA, TERGOVISTE (44° 56′ N., 25° 28′ E.), town, on Jalomitza, Rumania; arsenal. Pop. 9500.

TIRGU JIU (45° N., 23° 20′ E.), town, on Jiu, Rumania; manufactures porcelain. Pop. 6800.

TIRGU OCNA (46° 18′ N., 26° 38′ E.), town, on Trotosh, Rumania; salt-mines. Pop. 8300.

TIRHUT (26° 30′ N., 85° 30′ E.), Bihar and Orissa, India; consisting of districts Darbhanga, Muzaffarpur, Saran, and Champaran.

TIRLEMONT, THIENEN (50° 48′ N., 4° 55′ E.), town, Brabant, Belgium; breweries, tanneries. Pop. 20,000.

TIRNOVO, see TRNOVO.

TIRSO DE MOLINA, pen-name of Gabriel Tellez (1571–1641), Span. dramatist of great eminence; b. Madrid. For many years he was one of the Brethren of Charity at Toledo, and subsequently became prior of the monastery of Soria. His comedies are brilliant and highly original. The most famous are *El Vergonzoso en Palacio*, *El Burlador de Sevilla*, and *Don Gil de las Calzas Verdes*.

TIRUPATI, TRIPETTY (13° 38′ N., 79° 28′ E.), town, pilgrim resort, N. Arcot, Madras, Brit. India; brass-ware. Pop. 16,000.

TIRYNS (37° 36′ N., 22° 47′ E.), ancient town, Peloponnesus, Greece; has remains of Cyclopean walls and of a wonderful citadel; excavations were carried out here by Schliemann, 1884, and brought to light remains of a Mycenæan royal palace of X. or XI. cent. B.C. The town is traditionally connected with Hercules; destroyed by Argives, c. 468 B.C.

TISCHENDORF, LOBEGOTT FRIEDRICH KONSTANTIN VON (1815–74), Ger. Biblical critic; b. Longenfeld; researches in New Testament subjects were epoch-making; discovered *Codex Sinaiticus*.

TISSANDIER, see BALLOON.

TISSAPHERNES (d. 395), Persian satrap with whom Alcibiades (*q.v.*) intrigued; badly defeated by Spartan general Agesilaus, 395; executed.

TISSERAND, FRANÇOIS FÉLIX (1845–96), Fr. astronomer; brilliant mathematician; in *Traité de mécanique céleste* unified researches of Laplace and others; revised Lalande's catalogue.

TISSOT, PIERRE FRANÇOIS (1768–1854), Fr. author; ardent Revolutionist, though admirer of First Consul and author of poems on his victories; prof. of Lat. Poetry at the *Collège de France*; member of Fr. Academy (1833); wrote hist. studies.

TISSUE, element of the body formed by cells.

TISTA (27° N., 88° 30′ E.), river, N. India; joins Brahmaputra; length, 300 miles.

TISZA, KÁLMÁN (1830–1902), Hungarian politician; b. Geszt; entered Hungarian Parliament, 1861; leader of Left Centre party from 1865 till 1875, when he formed new party by uniting with Deak's followers; Minister of Interior, 1875; became Premier same year, holding office almost unintermittently till 1890, when he resigned.

TITANIA, see OBERON.

'TITANIC,' THE, White Star liner, largest vessel in the world (tonnage, 46,382 tons), which struck an iceberg near Cape Race on her maiden voyage from Queenstown to New York, April 14, 1912; the *Carpathia*, summoned by wireless, arrived in time to save 712 of the 2201 souls on board. Among the lost were W. T. Stead (*q.v.*), Colonel John Jacob Astor, Captain Smith, F. D. Millet, the artist; as a result of Lord Mersey's inquiry new regulations concerning life-saving appliances on ships were made, and the White Star Company remodelled the *Titanic's* twin sister, the *Olympic*, increasing the amount of watertight bulkheads and building a double hull.

TITANIUM (Ti=48·1), somewhat rare metal allied to tin; occurs as rutile (TiO_2) in iron ores, etc.; obtained pure with difficulty, S.G. 4·87; brilliant white, hard, brittle; dissolves in acids, combines readily with nitrogen. Oxides and salts: Ti_2O_3, $TiCl_2$, Ti_2O_3, $TiCl_3$ (titanious chloride, reducing agent in analysis), TiO_2 (basic and acidic), $TiO(OH)_2$, $Ti(OH)_4$, $Ti(SO_4)_2$, K_2TiO_3, K_2TiF_6 (isomorphous with K_2SiF_6); TiO_3 (acidic peroxide) forms unstable salts.

TITANOTHERIUM, an extinct UNGULATE (*q.v.*).

TITANS (classical myth.), children of Ouranos and Gaia, against whom they rose, placing Kronos at the head of the gods. Zeus (*q.v.*) warred against them and hurled them into Tartarus.

TITHES (A.S. *teotha*, tenth part), taxes paid for religious purposes. Unit of enumeration, 10, naturally arising from number of fingers of hand, is found in earliest times as measure of offerings to deities or of taxation generally, as in Greece; use of term in *Pentateuch* helped religious appropriation; history of payments in early days of Christianity obscure; claimed by Church from IV. cent.; direct State endowment of Church not found, but State probably enforced payments, as it did other religious duties, from first adoption of new faith; Frankish Capitularies enact rendering of tithes, and Church established policy of excommunicating recalcitrant. Eng. Church and State accepted various papal recommendations, among which was establishment of tithe system, 786.

Tithes, like feudal services, originally paid in kind, became largely commuted by custom; Tithe Commutation Acts, 1836, 1860, and Tithe Act, 1891, arranged for payment of rent-charge in place of tithe in most cases, and rent-charge may be redeemed. Great tithes are prædial (grain, hay, wood, etc.), little tithes all others. Minerals were not subject to payment except by grant of owner of royalty, nor royal forests or chaces, lands of certain religious houses, etc. Selling tithes to laymen was considered an abuse in Middle Ages, but lay rectors became common.

TITIAN, the Anglicised form of TITIAN VECELLO (c. 1477–1576), one of the greatest of Ital. painters. He was sent at the age of ten to Venice, where he studied under Zuccato, the two Bellini, and Giorgione. He soon established himself as an independent artist, with plenty of commissions following, and produced a masterpiece when only 23. In 1532 Charles V. made him a count palatine, and later on he was created Knight of the Golden Spur, thus enjoying the right of *entrée* at Court, with which he was connected in various ways during succeeding years. He was on terms of intimate friendship with Charles V., whose Court he temporarily joined at Augsburg; had many distinguished patrons, including doges of Venice, cardinals, princes, and Pope Paul IV.; and the Venetian government treated him handsomely and with indulgence. His later work at Venice was done chiefly for Philip II. of Spain. T.'s pictures, vast in number, include portraits, religious and mythological subjects, and poetical or allegorical works. The religious pictures are especially grand and noble, and all show the highest technical skill in the matter of design and colouring. Certain continental collections are rich in Titians, and there are five in the National Gallery, London.

TITLE GUARANTEE COMPANIES, formed for the protection of titles to real estate, and successful in U.S.A. and countries where such titles are a matter of public record. First company incorporated, 1864.

TITLES are indicative of rank, dignity, or calling. In the ordinary sense t. means a t. of rank, which in Europe is commonly hereditary, knighthood being

the exception. In England, by the law of primogeniture, only one person can bear the title in a single generation; but in France the various titles are enjoyed by all the sons; and the Russ. title of 'prince' belongs to all male descendants of the great reigning houses of Russia, Poland, and Lithuania. In Germany and Austria the titles commonly pass to all the sons.

The oldest European title is 'count,' which dates from the early Rom. Empire. 'Baron' stood for 'man,' and applied to the king's tenants-in-chief. Then in England come, in ascending rank, earls, viscounts, marquises, dukes—all making up the peerage. Baronets, who are outside the peerage, were first created by James I. In the R.C. Church 'cardinal' is a title of honour, and its bestowal makes the recipient a prince of the Church. The univ's confer titles of honour when they give honorary degrees—usually D.D., D.C.L., LL.D.

TITMICE, see TITS.

TITS, TITMICE (*Paridæ*), a family of minute perching birds found in most parts of the world except S. America and the Arctic regions. They are small bodied, of active habit, with short sharp beaks, and feed mainly on insects.

TITUS, friend of St. Paul; Epistle to T. (*q.v.*) was written to him; see also *Galatians* 2^{1-3}, *II. Timothy* 4^{10}.

TITUS, FLAVIUS SABINUS VESPASIANUS (d. 81), Rom. emperor; took Jerusalem, 70; Arch of T. raised in commemoration; succ. Vespasian as emperor, built baths and gave gladiatorial shows.

TITUS, THE EPISTLE TO, New Testament book, bearing name of St. Paul, written to T., who presides over the Christian churches in Crete. It is uncertain when Christianity was introduced or when Paul went there. The authenticity of T. has been much disputed, but even those who deny it admit that it embodies Pauline ideas and may contain Pauline fragments; it is directed largely against Gnosticism.

TITUSVILLE (41° 40′ N., 79° 42′ W.), city, on Oil Creek, Crawford County, Pennsylvania, U.S.A.; oil-refineries; manufactures machinery. Pop. (1910) 8533.

TIVERTON (50° 54′ N., 3° 29′ W.), town, junction of Lowman and Exe, Devonshire, England; manufactures lace; taken by Parliamentarians, 1645. Pop. (1911) 10,205.

TIVOLI (ancient *Tibur*) (41° 58′ N., 12° 48′ E.), town, on Tiverone, Rome, Italy; bp.'s see; favourite resort in Rom. times; antiquities include ruins of so-called temple of Sybil and temple of Tiburtus; in the environs are remains of many villas. Pop. (commune) 13,500.

TJERIBON, see CHERIBON.

TLAXCALA (19° N., 98° W.), state, Mexico; belongs to central plateau; chief industry, agriculture. Pop. (1910) 184,171. Capital, **Tlaxcala** (19° 18′ N., 98° 2′ W.), on Atoyac.

TLEMCEN (34° 52′ N., 1° 18′ W.), chief town, Oran, Algeria; stands on high rock, surrounded by walls; has numerous splendid mosques, as well as R.C., Protestant, and Jewish places of worship; trading centre; exports cork, ostrich feathers, textiles, carpets. In neighbourhood vines, olives, and other fruits, tobacco, and cereals are cultivated. T. was held in turn by Berbers, Saracens, Spaniards, Turks; taken by French, 1842. Pop. (1911) 39,874.

TOADS (*Bufonidæ*, etc.), a group of Tailless Amphibians differing from true frogs in the wide space which separates the bones of the breast. They occur all the world over, and include terrestrial, aquatic, and even burrowing forms.

TOAST, to drink the health of any one; expression said to be derived from an episode at Bath in XVII. cent. T. was at that time dipped in wine to flavour it, and when one gallant drank his mistress's health in the water in which she was bathing, another swore 'though he liked not the liquor, he would have the toast.' Toasting is a custom of the greatest antiquity. It is believed that our 'three times three' was derived from the classical custom of drinking to the Nine Muses.

TOBACCO PLANT (*Nicotiana tobacum*), belongs to the family *Solanaceæ*, which includes the potato, tomato, nightshade, and many other familiar plants. It is an annual attaining a height of about 6 ft. and becoming branched towards top of the stem. The leaves are very large, sometimes 20 in. long. The flowers are large, tubular, and pink in colour. The whole plant is rendered sticky by a glandular excretion. The home of the t. p. is N. America, but it was brought to Europe by the earliest explorers, having been introduced into England in 1584. Its use in the Old World was strenuously opposed by the Church and frequently also by lay authorities, but it made steady progress, and is now universal.

The culture of the tobacco demands, for the production of the finer qualities, a warm and moderately moist climate, and a very rich soil. It is cultivated most largely in America, which produces half the world's supply, in India, Turkey, Egypt, Hungary, and S. Africa; also grown in Germany, but attempts to introduce it into Britain have hitherto failed, partly because the climate is not suitable for the production of a very high quality, and partly because of excise restrictions. Turkish tobacco is prepared from *Nicotiana rustica*, which, like the commoner *N. tobacum*, is a native of America.

The tobacco plant is ready for harvest about 3½ months after sowing, when it is cut down or has the leaves removed separately. The leaves are made into bundles and dried either in the open air or by means of artificial heat. In so doing they acquire their brown colour. They are then sorted and placed in heaps in closed rooms, where they undergo a process of fermentation. After this they are ready for manufacture into the various forms in which tobacco is used—pipe-tobacco, cigars, cigarettes, snuff, and chewing-tobacco.

The narcotic effect produced by tobacco is due to the presence of the two alkaloids *nicotin* and *nicotianin*.

Smoking 'mixtures' usually contain 2 or 3 of the following t's—York River, Latakia, Black Cut, Turkey (coarse cut), Virginia, Perique. Ground t. is sold as *snuff*.

TOBAGO (11° 16′ N., 60° 42′ W.), mountainous island, Brit. W. Indies; fertile; exports cotton. Pop. (1911) 20,762. Capital, Scarborough; joined administratively to Trinidad (*q.v.*).

TOBERMORY, see MULL.

TOBIT, THE BOOK OF, Old Testament apocryphal story (c. 150–100 B.C.) of T., a blind Jew, who, when taunted by his wife, prayed for death; a woman called Sara, taunted because she has lost her husband, likewise prays; finally T.'s s. Tobias marries Sara, and T. is cured; based on the story of Ahikar; versions in Gk., Lat., Hebrew, Syriac, Aramaic.

TOBOGGANING, see SPORTS, WINTER.

TOBOLSK (63° N., 70° E.), westernmost government of Siberia, extends from Akmolinsk and Semipalatinsk in S. to Yalmal peninsula and Gulf of Ob in N.; surface generally level; watered by Ob and tributaries; fertile in Tobol and Ishim steppes; chief pursuit agriculture. Pop., mainly Russians (1910) 1,818,400. Capital, **Tobolsk** (58° 12′ N., 68° 20′ E.), on Irtish; contains a kreml and cathedral; formerly capital of W. Siberia. Pop. 21,000.

TOBRUK (32° N., 24° E.) (ancient *Antipyrgos*), port, Tripoli; fine harbour; sponge fisheries.

TOCQUEVILLE, COMTE DE, ALEXIS HENRI CHARLES MAURICE CLÉREL (1805–59), Fr. historian; sent by government to study penitentiary system in U.S.A.; wrote *La Démocratie en Amérique* (1835), a work of social philosophy, *L'Ancien Régime et la Révolution* (1856), new generalisation on Revolution.

TODI (42° 47′ N., 12° 25′ E.) (ancient *Tuder*), town, Perugia, Italy; has a cathedral (XI.–XIV. cent.), and a fine Renaissance church; Rom. and

Etruscan antiquities; scene of victory of Narses over Goths, 552 A.D. Pop. (commune) 16,800.

TODIES (*Todus*), form a genus and family of minute red and green Picarian Birds confined to the West Indies, where they tunnel in banks; insectivorous.

TODLEBEN, COUNT, FRANZ EDUARD IVANOVICH, TOTLEBEN (1818–84), Russ. soldier; distinguished in defence of Sevastopol, 1854–55; general, 1860; captured Plevna from Turks, 1877, and became commander-in-chief in Turk. War.

TODMORDEN (53° 43′ N., 2° 6′ W.), town, Yorkshire, England; cotton. Pop. (1911) 25,455.

TOGA, see COSTUME (ROMAN).

TOGGENBURG, THE (47° 15′ N., 9° 5′ E.), upper valley of the Thur, canton St. Gall, Switzerland.

TOGO, COUNT HEIHACHIRO (1847–), Jap. admiral; ed. England; commanded Jap. fleet in Russo-Jap. war, 1904–5.

TOGOLAND (6° to 10° N., 0° to 2° E.), Ger. colony, W. Africa, to E. of Brit. Gold Coast Colony; area, 33,659 sq. miles; surface undulates from coast to extreme height of c. 2600 ft.; drained by Volta and Monu, which respectively form parts of W. and E. boundary; chief town, Lome. Produces dye-woods, caoutchouc, cocoa, oil-palms, maize, fruits; exports palm oil, gums, ivory, rubber, cotton. Administered by Imperial governor, assisted by two officials; German colony since 1884. Pop. (1911) 1,000,400.

TOISON D'OR, see KNIGHTHOOD.

TOKAT (40° 17′ N., 36° 37′ E.), town, vilayet Sivas, Asia Minor; manufactures copper. Pop. *c.* 33,000.

TOKAY, TOKAJ (48° 7′ N., 21° 24′ E.), town, Zemplen County, Hungary; noted wines. Pop. 5300.

TOKELAN, UNION ISLANDS (8° N., 170° W.), small group, in Pacific, belonging to Britain.

TOKYO (35° 40′ N., 139° 46′ E.), chief town of Japan, on S.E. coast of Honshiu; has imperial palace, Russ. cathedral, several temples, and univ.; great part of town built of wood; some beautiful parks; dockyards and manufactures of machinery, silk, lacquer, earthenware, china, and enamels. Pop. *c.* 2,220,000.

TOLAND, JOHN (1670–1722), b. Londonderry; first laid down Deistic principle to require simple and clear explanations of things. Christianity, not in itself mysterious, becomes so through pagan and Judaical influences. Revelation assists ordinary mortals; not necessary for those who exercise their reason.

TOLEDO (39° 50′ N., 4° W.), province, New Castile, Spain; mountainous. Capital, **Toledo** (39° 51′ N., 4° W.), on Tagus; surrounded by old walls; has XIII.-cent. cathedral with beautiful chapels; other churches include those of Santo Thomé and Santo Domingo; prevailing architecture is Moorish, and town has a mediæval appearance; there is an archiepiscopal palace, a former monastery, and a theological college. T. has long been famous for manufacture of swords; other manufactures are gold and silver church ornaments, cloth, beer. Was the Visigothic capital in Spain, and was in 714 seized by the Moors, in whose hands it remained till 1085, when it was conquered by Alfonso of Castile and Leon. Formerly site of a univ. (1498). Pop. (1910), province, 413,648; city, 23,116.

TOLEDO, city, capital of Lucas County, Ohio; important railroad centre; grain, lumber, iron. Pop. (1910) 168,497.

TOLEDO, COUNCILS OF.—Numerous mediæval synods held at this important Span. city exercised great influence on canon law.

TOLENTINO (43° 13′ N., 13° 17′ E.) (ancient *Tolentium*), town, Italy; cathedral; scene of peace treaty between Bonaparte and the pope, 1797. Pop. 13,800.

TOLERATION, liberty of worship granted to those holding beliefs different from the State religion. Peace of Westphalia (1648) gave freedom to Rom. Catholics, Calvinists, Lutherans of Germany; Act of T. (1689) excluded Rom. Catholics and anti-Trinitarians from its benefits, but gave t. to Quakers and Dissenters.

TOLFA (42° 10′ N., 11° 55′ E.), **town,** Rome, Italy; exports alum. Pop. 4100.

TOLL, originally any tax; but especially charge for landing at a pier, crossing a bridge, using a market-place for sale of goods; Eng. highway tolls abandoned in the XIX. cent.

TOLL, JOHAN KRISTOFFER (1743–1817), COUNT (1814), Swed. statesman and general; helped to organise and effect revolution, 1772; carried out reforms, but favoured absolutist schemes of Gustavus III.; successful war minister; after securing Swed. retreat from Rügen, 1807, made marshal.

TOLSTOY, LEO NIKOLAIEVITCH, COUNT (1828–1910), Russ. novelist and social reformer; b. Yasnaya Polyana, in government of Toula; ed. at home till 1843, when he entered Univ. of Kazan; here he studied Eastern languages and law, but without much success; in 1851 he entered the army, and later served in Crimean War; it was about this time that T. began his literary career by writing *Childhood, Boyhood, and Youth, The Cossacks, Sebastopol,* and other works; retired to St. Petersburg, 1855, where he mixed with many distinguished men.

T. now began to interest himself seriously in the peasants; between 1857 and 1861 he travelled over the Continent, and on his return from his last sojourn abroad, settled down at Yasnaya Polyana, and lived simply among the people; m. Sophia Behrs, dau. of a Moscow doctor, 1862; some years after his marriage appeared his two greatest works, *War and Peace,* and *Anna Karenina.* T. now devoted himself to the study of social and religious problems, and most of his works after this period were written with didactic aim; in 1888 he gave up all claim to his estates, and handed them over to his wife and family; during the famine of 1891–92 T. worked untiringly amongst the poor; in 1910 he died of pneumonia at Ustapova.

Among his other works are *Family Happiness, The Three Deaths, Polikushka, What the People Live by, My Confession, My Religion, Ivan Ilyitch, The Dominion of Darkness, Where Love is there God is also, Kreutzer Sonata, The Kingdom of God is within You, Master and Man, Politics and Religion, Patriotism and Christianity, What is Art?,* and *Resurrection.*

T. developed strong views on religion, and in order to discover reasonable faith studied Buddhism, Muhammadanism, and Christianity; he considered the Sermon on the Mount to be the highest law of Christian life, and particularly emphasised the command, 'Resist not evil'; certain doctrines of the Church, and all sacraments and ceremonies, repelled him, and in 1901 he was formally excommunicated; to Tolstoy the poor seemed the only happy and truly religious people.

Life, by Aylmer Maude (1910), Birnkoff (1911); Merejkowski, *Tolstoy as Man and Artist.*

TOLSTOY, PETS ANDREEVICH, COUNT (1645–1729), Russ. statesman; skilful, unscrupulous instrument of Peter the Great; greatly feared in Turkey, where he was ambassador and thrown into prison.

TOLTECS, semi-mythical people of Mexico, traces of whom are found at Tula, near Mexico City, in the serpent pillars erected to Quetzalcoatl, their chief god.

TOLUCA (19° 11′ N., 99° 25′ W.), city, Mexico; manufactures cotton fabrics; said to have been settled by the Toltecs. Pop. (1910) 31,247.

TOMAHAWK, small hatchet of Red Indians; originally of stone; later, steel handles had hollow stem and were used as tobacco pipes.

TOMASZÓW, TOMASHOV (50° 30′ N., 23° 20′ E.), town, Piotrkow, Russ. Poland; woollen-mills. Pop. 24,000.

TOMATO (*Lycopersicum esculentum*), plant of order Solanaceæ; native to S. America, but grown in Britain under glass.

TOMB, see BURIAL, BARROWS, CATACOMBS, CAIRN.

TOMPKINSVILLE, former village, Richmond County, New York, U.S.A., on Staten Island; now part of borough of Richmond, New York City.

TOMSK (56° N., 85° E.), government, W. Siberia; includes part of the Altai Mountains in S.E.; surface

mostly low towards N., with steppes and marshy tracts; drained chiefly by Ob and its tributaries; rich deposits of silver, gold; agriculture and cattle-breeding industries; climate severe. Pop. (1910) 3,170,300. Capital, **Tomsk** (56° N., 85° E.), on Tom; has a univ. (1888); tanneries; trade centre. Pop. (1910) 105,620.

TON, see WEIGHTS AND MEASURES.

TONALITE, igneous rock of granitic structure composed of plagioclase, biotite, and hornblende; of darker colour than granite.

TONAWANDA (42° 58′ N., 78° 54′ W.), village, on Niagara, Erie County, New York, U.S.A.; iron- and steel-works; lumber industries. Pop. (1910) 8290.

TONBRIDGE, TUNBRIDGE (51° 12′ N., 0° 17′ E.), town, on Medway, Kent, England; wooden articles, gunpowder. Pop. (1911) 14,797.

TONDERN (54° 56′ N., 8° 50′ E.), town, Schleswig-Holstein, Prussia. Pop. 4500.

TONE, THEOBALD WOLFE (1763–98), Irish agitator; b. Dublin; called to the Bar, 1789; became involved in political intrigue as sec. of Catholic committee; gave information about Ireland to a Fr. spy, and had to emigrate to America, 1795; thence he sailed to France, 1796, to obtain Fr. assistance for the United Irishmen, and urged a Fr. invasion of Ireland. Served under Hoche; captured on Fr. vessel; condemned, but committed suicide.

TONGA, OR FRIENDLY ISLANDS (15° to 23° 30′ S., 173° to 177° W.), islands in Pacific, under Brit. protection since 1900; number about 180, of which only 32 are inhabited; divided into Tonga, Haapai, and Vavau groups; area, 390 sq. miles; of coral and volcanic formation, with active volcanoes, one of which is over 2700 ft.; chief town, Nukualofa; climate healthy but damp. Produce and export, copra, candle-nuts, oranges, bananas, pines, pearl-shell, bêche-de-mer. Natives are Polynesians. Pop. (1911) 23,737.

TONGKING (*c.* 21° 40′ N., 105° 20′ E.), dependency of France, Fr. Indo-China; bounded N. by Kwangsi and Yunnan, E. by Gulf of Tongking, S. by Annam, W. by Laos; area, 46,400 sq. miles; surface consists of delta of Red R., with its great tributaries, Black R. and Clear R. in the S.E., plateaux in N., and forest region in W. Delta is very fertile, owing to soil brought down by rivers; two harvests yearly. Chief towns are Ha-noi (capital) and Hai-phong, an important port. T. produces great quantities of rice, as well as pea-nuts, castor oil, sugar-cane, spices, mulberries, coffee, tobacco, cotton; manufactures silk, beer, spirits, hardware, matches. Minerals include coal, iron, copper; acquired, 1885, by France, after struggle for possession with China. Pop. (1911) 6,117,954.

TONGRES (50° 47′ N., 5° 27′ E.), town, Limburg, Belgium; has spring mentioned by Pliny, also old cathedral. Pop. 10,250.

TONGUES, GIFT OF, a phenomenon the precise nature of which is not absolutely certain, but probably consisted in the emission of unintelligible sounds when in great excitement. It is referred to several times in the New Testament. St. Paul says he spoke with tongues more than any, but he discourages the view that it was to be thought better than other spiritual gifts. Similar phenomena have been witnessed during religious revivals. Some have thought it referred to speaking foreign languages.

TONIC SOL-FA, see SOL-FA.

TONITE, see BLASTING.

TONK (26° 11′ N., 75° 50′ E.), native state, Rajputana, India. Pop. 280,000. Chief town, **Tonk.** Pop. 41,000.

TONNAGE, load of a vessel, estimated by dividing number of cubic feet of space by 100; thus vessel whose capacity is 500,000 cubic feet would be 5000 tons register. Board of Trade officials are appointed to measure cubic capacity of all vessels to be registered. Amount payable in dues, etc., is determined by t.

TONNAGE AND POUNDAGE.—Tonnage, a duty of 3s. on each *tun* of wine, and poundage, a duty of 1s. on each pound of merchandise, were first levied in mid.-XIV. cent., and were payable to the king; Eng. Parliament granted t. and p. to Charles I. for one year only, instead of for life, but Charles II. and James II. obtained grants for life; abolished by Customs Consolidation Act, 1787.

TONNERRE (47° 53′ N., 3° 55′ E.), town, on Armançon, Yonne, France; produces wines. Pop. 4100.

TÖNSBERG (59° 15′ N., 10° 28′ E.), seaport, amt Jarlsberg and Laurvik, Norway; whale- and seal-oil refineries. Pop. 9000.

TONSILLITIS, inflammation of the tonsils, may be acute (quinsy) or chronic; in the former the onset of an attack is usually sudden, with pain, swelling, and redness of the tonsils, rise of temperature, and sometimes constitutional disturbances, and an abscess may form in a few days; the treatment is first to give a saline purge to reduce the temperature, steam inhalations and cold compresses externally to relieve congestion, sodium salicylate internally, and if an abscess forms it should be incised, improvement following immediately; in the chronic form the tonsils are enlarged, the condition often being associated with adenoids (*q.v.*), and the treatment is the administration of iron and other tonics, painting the tonsils with tannic acid or other astringents, and if the condition does not improve the tonsils should be removed.

TONSURE, minor order in R.C. and Eastern churches, shaving the crown or whole of the head; no one could enjoy clerical status without it. Cause of dispute between Celtic and Roman Churches, settled by Council of Whitby, 664.

TOOKE, JOHN HORNE (1736–1812), Eng. politician and scholar; senior optime, St. John's, Cambridge, 1758; ordained, but gave up clerical work; refused admission to the Bar, and on being made M.P. for Old Sarum, 1801, was excluded from Parliament by Act which made clergymen ineligible. A radical in politics, and a man of considerable wealth. Fined for political libels, but acquitted of high treason, 1794. Author of *Diversions of Purley,* a philological work.

TOOLE, JOHN LAWRENCE (1830–1906), Eng. comedian; toured U.S.A., 1874–75, Australia, 1890; became lessee of Folly Theatre (later Toole's Theatre), London, 1879.

TOOLS may be roughly divided into hand- and machine-t's. Hand-t's are held and manipulated entirely by the hands, as in the case of a hammer or chisel; machine-t's are those operated by some kind of mechanism. A further division is into cutting-t's, which include chisels; shearing and scraping t's; percussive and detrusive t's, represented by the hammer and the punch; and moulding t's, such as the trowel. If a cutting t. is intended for light work, as with the wood-cutting chisel, keenness of cutting edge is the most important consideration; but, if it is to cut steel or iron, strength and rigidity are the essential features, and to attain these it is often necessary to forgo a certain amount of keenness. Many cutting t's may be used either for cutting or scraping, the action depending upon the angle at which they are held. The exact form of a cutting t. depends upon the material for which it is to be used—that is, upon its hardness and its crystalline or fibrous nature.

T's vary also in shape according to the holder in which they are to be gripped. Roughing t's usually have a narrow edge, and finishing t's a broad one, but there are exceptions to this. T's may be solid or made for use only in a holder. In the former the cutting part is worked from a solid bar, and as the best steel is costly, such t's are more expensive than those of the latter class, which consist of the cutting portion only. A certain amount of shearing action takes place in the use of some cutting t's, and the cutting strain is thereby reduced.

The CHISEL group includes all chisels proper, gouges, and planes, and also chisels used percussively, such as the adze and stone-working chisels. BORING t's may be cutting t's proper or scrapers. Wood-working bits

act by cutting, but the common metal-working drill has really a scraping action. Amongst the true cutting borers are the twist-drills, while reamers have a scraping action. Boring t's may be supported at one end only or at each end, the latter having greater accuracy, especially for long bores. SAWS combine cutting and scraping action, and are used in many varieties for both wood and metal, the pitching of the teeth varying with the material to be cut. Closely allied to the circular saw is the milling cutter. FILES are strictly scrapers, but they have also a certain amount of shearing action. Shears and punches are similar in so far as both have a detrusive action. HAMMERS take a great variety of forms for different trades. To avoid bruising the t's or the work, wooden hammers are often used, and these are classed as mallets. In some cases hammers have flexible handles to lessen the shock to the hands, but mostly the handles are quite rigid. Moulding t's are operated by percussion or pressure according to circumstances.

One of the most important machine t's is the LATHE. Its essential feature is the rotating of the work against a fixed t.; it is used for all kinds of turning, boring, and screw-cutting. The many varieties of lathe may be divided into four groups: so-called engine lathes, turret lathes, special lathes, and hand lathes. Engine lathes are in most general use. Turret lathes have turrets carrying a number of t's, and many of them are capable of performing several separate operations simultaneously. In planing-machines, for producing flat surfaces, a table carries the work against the cutting t. and back again, while the t. has only the transverse movement required for feeding. The shaping-machine does similar work, but the arrangement is reversed, the cutting t. moving over the work. In the vertical shaper or slotting-machine the t. slide moves vertically. MILLING-MACHINES have rotary cutters with many cutting edges. The rotary planer is really a milling-machine, and has certain advantages over the ordinary planer. In some milling-machines the angle of the table can be altered for milling spirals. For boring or turning work of large diameter the vertical boring and turning mill is used instead of the engine lathe. There are also horizontal boring-machines (modified lathes) for boring at any angle, and special machines for boring the cylinders of engines or pumps.

DRILLING is mostly done by the upright drilling-machine. The ordinary form has the vertical axis of the spindle fixed, side adjustments being made by moving the work; but the universal radial drill will drill holes at any angle. Multiple drills are used for the simultaneous drilling of a number of holes. The superiority of cut gears to those with cast teeth has led to the universal employment of gear-cutting machines. There are plain hand-indexed machines, automatic gear-cutters in which cutting and indexing are done automatically, gear-shapers which automatically generate the tooth outline, and gear-planers for bevel gears. The thread-milling machine is used for producing specially accurate screw-threads, and the bolt cutter for large bolts not demanding great accuracy and finish. Pressure punching and shearing machines are largely used in sheet-metal working, and to a smaller extent in general machine-shops. Special types are made for embossing and pressing sheet-metal forms, punching holes in flanges, etc.

During the past few years emery-wheel grinding-machines have assumed great importance for accurately finishing metal parts, and particularly for surfacing chilled-iron or hardened steel parts, which resist the ordinary steel-cutting tool. Surface grinders produce plane surfaces only, and are generally used to remove thin layers of metal, as in finishing to size work which has been roughed out on the planing-machine. Other machines produce cylindrical or conical surfaces, as required for spindles and shafts, and special attachments allow inside grinding to be done. Grinding-machines are used for grinding twist-drills, milling-cutters, gear-cutters, and the t's of lathes, planers, slotters, and other machines. GRINDING may be done either wet or dry, according to the work in hand. Sawing-machines are used for cutting shafts, rails, girders, etc., and there are various types of steam, pneumatic, and other hammers.

The immense size of modern engineering constructions has led to the rapid development of portable machine t's, which can be applied to any part of the work at any time. These include drilling, screwing, planing, riveting, hammering, and other machines. Reciprocating movements, as in hammering, are usually obtained by the action of compressed air upon a solid piston working in a cylinder, and electric or pneumatic motors are used for rotary motions. Amongst the more important wood-working machines are the saws —reciprocating, band, and circular. Planing-machines may have a fixed blade or revolving cutters, and some combine the two, the work passing from a revolving cutter to a fixed t. There are also wood-working lathes, and sandpapering, boring, mortising, tenoning, and dovetailing machines. The various measuring instruments, such as gauges, ordinary and screw-thread, callipers, and micrometers, are also to be included amongst t's.

TOOMBS, ROBERT (1810–85), Amer. political leader, introduced Toombs bill concerning slavery, 1856; served in Confederate army, 1861–63.

TOOWOOMBA (27° 34′ S., 152° E.), town, on Darling Downs, Queensland, Australia; agricultural district; breweries; flour-mills. Pop. 10,300.

TOP, see GYROSCOPE.

TOPAZ, a gem-stone composed of alumina and silica; occurs in primitive rocks in Russia and Siberia, Scotland (blue), Saxony, and (the finest) Brazil (yellow). T. may also be colourless, green, pink, and orange; it is transparent and harder than quartz and occurs massive and in crystals.

TOPEKA (39° 5′ N., 95° 45′ W.), city, on Kansas, capital, Kansas, U.S.A., and of Shawnee County; seat of Washburn College (Congregational); Bethany College (Prot. Episcopal) and other educational institutions; railway-shops; manufactures flour, machinery. Pop. (1910) 43,684.

TOPES, see ARCHITECTURE, INDIAN.

TOPLADY, AUGUSTUS MONTAGUE (1740–78), Anglican hymnologist.

TOP-SHELL, see GASTEROPODA.

TORCELLO, small island, 6 miles N.E. of Venice; contains cathedral of Santa Maria (VII. cent.); church of Santa Fosca (XII. cent.).

TORDENSKJOLD, PEDER (1691–1720), Dan. admiral; b. Trondhjem; during Great Northern War distinguished himself by audacity and seamanship in engagements with Sweden. In 1716 destroyed Swed. fleet in strait of Dynekil and forced Charles XII. to raise siege of Fredrikshald.

TORENO, JOSÉ MARIA QUIEPO DE LLANO RUIZ DE SARAVIA, COUNT OF (1786–1843), Span. historian; held various State appointments; wrote *History of the Rising War and Revolution of Spain*.

TORGAU (51° 36′ N., 13° E.), fortified town, on Elbe, Pruss. Saxony; chief building is the Hartenfels castle; glove-making industry. Pop. 13,490.

TORMENTIL (*Potentilla*), genus of plants, order Rosaceæ; root of Common T. (*P. tormentilla*) is an astringent.

TORNADO, see WHIRLWIND.

TORO (41° 32′ N., 5° 26′ W.), town, on Douro, Zamora, Spain; important mediæval city; produces wine. Pop. 8700.

TORONTO (43° 41′ N., 79° 28′ W.), chief town, on shore of L. Ontario, 39 miles N.E. from W. end of lake, Ontario, Canada. Anglican bp.'s see; R.C. abp.'s see; has Anglican and R.C. cathedrals; seat of univ.; has provincial government buildings and law courts; important railway, lake-shipping, manufacturing, and trading centre, dealing in lumber, cattle, grain, and agricultural produce; coal and fruit. Pop. (1912) 421,387.

TORPEDO, see under RAYS.

TORPEDO, a movable submarine case charged with explosive which acts on contact with under part of a ship. Best known, Whitehead t., of steel, is 14½ to 18½ ft. long, cigar-shaped; driven by air-engine and propeller, it is automatically steered by a gyroscope. T's are either dropped into the water or discharged by a small charge of powder from a 'tube.' Dirigible t's may be guided by electric or mechanical wires, or by 'wireless.' The Brennen t., in which two reels of piano wire were unrolled by an engine on shore, has been abandoned by Brit. Admiralty. The latest (1913) t., if it misses, returns upon the mark aimed at and keeps circling around it. Modern t's are fitted with appliances for cutting through t. nets hung round a warship.

TORQUAY (50° 28′ N., 3° 31′ W.), seaport, watering-place, on Tor Bay, Devonshire, England; has remains of Tor abbey (XII.-XIV. cent's); manufactures terra-cotta ware. Pop. (1911) 38,772.

TORQUEMADA, THOMAS (1420-98), inquisitor-gen. of Spain; b. Valladolid; became prior of Dominican monastery; persuaded Ferdinand and Isabella to reorganise Inquisition; and on this being authorised by papal bull, he became head of the new tribunal, beginning his work in 1481. His methods of enforcing Catholic religion have left his name a by-word for fanaticism and intolerance. Torture was used as in other royal courts to induce confession; fines and confiscations brought large sums to the Inquisition; and at least 2000 persons were burnt in eighteen years. T. was also largely instrumental in causing the expulsion of the Moors and Jews from Spain.

TORRE ANNUNZIATA (40° 46′ N., 14° 28′ E.), seaport, at S. foot of Vesuvius, Naples, Italy; iron-works; manufactures macaroni. Pop. 29,000.

TORRE DEL GRECO (40° 48′ N., 14° 20′ E.), seaport, at S.W. foot of Vesuvius, Naples, Italy; coral industry. Pop. 36,000.

TORRES NOVAS (39° 30′ N., 8° 13′ W.), town, Estremadura, Portugal; manufactures textiles. Pop. 11,500.

TORRES VEDRAS (39° 3′ N., 9° 17′ W.), town, Estremadura, Portugal; noted for lines of fortifications constructed by Wellington in 1810. Pop. 7200.

TORREVIEJA (38° N., 0° 37′ W.), seaport, Alicante, Spain; salt mines; active trade. Pop. 8300.

TORRICELLI, EVANGELISTA (1608-47), celebrated Ital. mathematician and physicist; b. Piancaldoli; Galileo's successor as prof. at Florence; discovered value of atmospheric pressure.

TORRIDONIAN, pre-Cambrian arenaceous sedimentary rocks, well seen in neighbourhood of Loch Torridon, Scotland.

TORRIGIANO, PIETRO (1472-1522), Florentine sculptor; d. in the prisons of the Span. Inquisition. He was in England for some time, and executed the tomb of Henry VII. at Westminster. Cellini says it was he who broke Michelangelo's nose.

TORRINGTON (41° 15′ N., 73° 14′ W.), town, Litchfield County, Connecticut, U.S.A.; manufactures woollens, machinery. Pop. (1910) 15,483.

TORRINGTON, GREAT (50° 57′ N., 4° 8′ W.), town, on Torridge, Devonshire, England; manufactures gloves. Pop. (1911) 3041.

TORRINGTON, ARTHUR HERBERT, EARL OF (1647-1716), Eng. admiral; assisted William of Orange, subsequently obtaining command of fleet at home.

TORRINGTON, GEORGE BYNG, VISCOUNT (1663-1733), Eng. admiral; defeated Spaniards off Cape Passaro, 1718; instrumental in subduing Sicily, 1719.

TORSION, strain of a wire when one end is fixed and the other rotated; *torque* or torsional stress is the moment of forces acting; torsion pendulums are used in 365-day clocks.

TORSTENSSON, LENNART, COUNT (1603-51), Swed. soldier; won battles of Schweidnitz, Breitenfeld, and Jankau; ruled western provinces of Sweden, 1648-51.

TORT.—In contradistinction to a crime, which is the commission of an unlawful act, so fixed by law, a t. may be defined as a wrong which arises from (1) an act not justified by law, and intended to cause harm, and which actually does harm; (2) an act contrary to law which causes harm not intended by the doer; (3) an act or omission which causes harm not intended, but which should have been foreseen and prevented; (4) failure to prevent harm when bound, within certain limits, to prevent it. A t. may relate either to persons or property; may be breach of duty fixed by law, and for which redress can be obtained by a lawsuit, or wrong independent of contract.

TORTICOLLIS, see RHEUMATISM.

TORTOISES AND TURTLES. — The order CHELONIA, comprising the Tortoises and Turtles, forms one of the most distinct orders of Reptiles. While neither Tortoises nor Turtles are natives of Great Britain, they are fully represented in N. America, and are widely distributed in Europe and Asia. They may be distinguished from all other Reptiles by the 'shell' or *carapace* comprising a dorsal and ventral shield, formed of bones firmly cemented together, and enclosing the body as in a box, from which only head, limbs, and tail protrude. The horny scales overlapping the upper shield form the *tortoiseshell* of commerce. Chelonian limbs resemble those of Lizards, but the toes are shorter and blunter. The neck is extremely flexible, and is curiously long in the Snake-Necked Tortoises. The strong, hard, and horny jaws are without teeth, but possess great powers of mastication.

The term 'tortoise' is confined to the truly terrestrial species of Chelonia, while 'turtle' is usually applied to marine or aquatic members of the group. The Amer. term 'terrapin' has been used somewhat indiscriminately, but usually indicates the freshwater, hard-shelled edible species.

The members of the group, while generally sluggish in their mode of life, vary greatly in habits. Some are vegetable feeders, others are solely carnivorous. All are oviparous, the limy-shelled eggs being generally laid in hollows or furrows in sand. Amongst the best known may be mentioned the LAND TORTOISES, found in Asia, America, and Africa, comprising many marsh-loving web-footed species, as well as others, which, like the BURROWING GOPHER TORTOISE, inhabit arid and desert places. Others again are the well-known common EUROPEAN TORTOISE (*Testuda græca*), with olive-coloured and black-bordered shield; and the gigantic Tortoises, inhabiting the small islands of the Pacific and Indian Oceans, call for remark not only on account of their colossal proportions—for they weigh sometimes over 300 lb.—but also of the great age—in some instances over 150 years—which they may attain.

The aquatic Turtles include the SNAPPING TURTLE, common in N. and Central America—a very vicious species which lives on water-fowl and fish, which it crushes and eats with its powerful hooked jaws; the SOFT-SHELLED TURTLES, entirely lacking in horny scales, are known both in the Old and New Worlds, and are adapted for their aquatic life by the possession of broadly webbed feet; and *Sphargis*, the LEATHERY TURTLE, with flexible carapace, sometimes reaches a length of 6 ft.

TORTOISESHELL, see under TORTOISES.

TORTOLI (39° 54′ N., 9° 40′ E.), small seaport, on E. coast, Sardinia.

TORTONA (45° 53′ N., 8° 52′ E.) (Rom. *Dertona*), town, Alessandria, Italy; cathedral; manufactures silk. Pop. 17,600.

TORTOSA (40° 50′ N., 0° 30′ E.) (Rom. *Dertosa*), fortified town, on Ebro, Tarragona, Spain; cathedral (XIV. cent.); manufactures paper; fisheries; ex-

ports corn, wine; was an important Moorish stronghold; taken by the French, 1708 and 1811. Pop. (1910) 28,019.

TORTURE.—Torture has been used from earliest times either as punishment or to extract a confession in judicial proceedings from unwilling witnesses or accused persons. In Athens and under Rom. Republic only slaves could be tortured, but under the Empire it was extended to freemen, on the prerogative of the emperor, to obtain evidence of *læsa majestas*. Not recognised by the canon law of the Church till the XIII. cent., when sanction was given by Pope Innocent IV. (1282 A.D.) to civil magistrates to put persons accused of heresy to the torture, on the principle of Rom. treason law. Adopted by Ital. municipalities, and France in XIV. cent., then by Germany, XV. cent., and by every European government, except Sweden and England.

Although it had no place in the common law of England, t. was frequently employed by royal prerogative of the Eng. Crown both in State trials and ordinary crimes, under the Tudors (especially against religious offenders) and Stewarts. The first recorded case was in 1310, against the Templars, by reluctant consent of Edward II. The last case was in 1640 (Charles I.), in order to extract a confession of treason. Abolished in France, 1789, in Russia, 1801, in Württemberg, 1806, Bavaria, 1807, Hanover, 1822, and Baden, 1831. Prohibited by papal bull in all Catholic countries, 1816. Never legal in Eng. colonies, or in America. (Flogging, since it ordinarily causes neither mutilation nor permanent injury to the human body, is not held to be torture.) Leaving aside the cruelty and degradation involved, the unreliability of torture as a means of discovering the truth was long evident, since innocent persons in weakness and exhaustion would plead guilty and accuse other innocent persons, in order to obtain relief. Of course when evidence was wanted, and not truth, the use of torture was a valuable asset to base governments.

The chief instruments of torture were the rack, an oblong horizontal frame, on which the accused was stretched while cords, attached to his legs and arms, were gradually strained by a lever until in extreme severity the joints were dislocated; the thumb-screws; the boot; and the pincers. The scourge, and mutilation by hooks and torture by fire, were employed by the Romans. Perverted and diabolical ingenuity also devised many other means for the torture of human beings and animals.

Jardine, *Use of Torture in Criminal Law of England*; Stephen, *History of the Criminal Law*.

TORY, originally an Irish R.C. robber; term applied to Royalist party at time of Popish Plot, then superseded by 'Conservative,' c. 1830. See CONSERVATIVE PARTY.

TORZHOK (57° 6′ N., 35° E.), town, on Tvertsa, Tver, Russia; produces embroidered goods. Pop. 16,000.

TOSCANELLA (42° 20′ N., 11° 54′ E.) (ancient *Tuscania*), town, on Marta, Rome, Italy. Pop. 5000.

TOTANA (37° 46′ N., 1° 30′ W.), town, Murcia, Spain; agricultural district; manufactures linen. Pop. 14,000.

TOTANUS, a genus of PLOVERS (*q.v.*).

TOTEMISM, the superstitious veneration paid by savages to certain material objects, with which they believe their tribe has some peculiar relation, and which are called totems. Some tribes, indeed, believe themselves to be descended from their totem. It seems that at first only the ties of the clan were recognised as binding or even as existent among men. To kill a member of another clan was not murder; moral obligations, even of the most rudimentary sort, only bound those who were of one kin. If blood relationships could be extended, the sphere of moral obligation was correspondingly enlarged; commonly done by making a blood-covenant between different clans, which so became united—thus paving the way for the replacement of clans by nations. For the blood-covenant it was sufficient if a few drops of blood were mutually exchanged between the members of the different clans—a ceremony which is still practised in some parts of Africa.

The objects of the natural world were seen to fall into genera and species, much as the human race into clans and families. So was suggested the idea of forming a blood alliance with one or other of such species, which was deemed to possess supernatural power, and therefore meet to be conciliated. First, the animal species would be chosen, and the animal thus selected would become the totem (family mark), or kin to the human clan; afterwards the analogy would be extended to include plants and other natural objects. A moral obligation was thus established; the life of the animal or plant must be cherished equally as the life of one's brother-clansman; and so developed the domestication of certain animals, and the preservation and cultivation of certain plants.

Then imagination came into play, and the relationship between the clan and its totem was explained as not being artificial, but natural. A myth would be invented to explain that the kinship was real, and either the totem would be taken as being the ancestor of the clan (as in the earlier myths), or it would be shown how the man had at one period or another assumed the totem form (as in later rationalising myths). So arose the numerous myths of transformation into or from animals which have prevailed almost universally.

Essentially, the totem was an object of worship, for it was the abode of supernatural power. To procure the presence of this supernatural ally when needed, the blood-covenant must be renewed, the blood of the totem animal must be shed. This shedding of blood was next interpreted as the offering of the animal to the god. Finally, it was felt that the presence of the god, and communion with him, could best be secured by the worshippers consuming the totem in whole or in part, and so the sacrifice to the god became a meal in which the worshipper symbolised and realised his unity with the god.

But the blood must not be shed on the ground and so dissipated; that would be taboo; so a heap of stones was raised, or a simple stone pillar, on which the sacrifice was made. Thus an altar was originated; and again, by association of ideas, it became sufficient to procure the god's presence if the pillar was smeared with the blood. Then the pillar became the symbol and instrument of the god's presence, and was often carved into some resemblance of the god or the totem; and so, whether marble monolith or wooden asherah (the 'groves' of our Old Testament), the pillar became an idol, to which in turn sacrifices were often offered.

Totemism has not the same significance for Australian aborigines as it has for African tribes. Its connection with primitive marriage laws is also a field of wide conjecture.

J. G. Frazer, *Totemism*; A. Lang, *Secret of the Totem*.

TOTNES (50° 26′ N., 3° 41′ W.), town, on Dart, Devonshire, England; contains many antique buildings and a ruined Norman castle; exports cider, grain. Pop. (1911) 4128.

TOTONICAPAM, TOTONICAPAN (15° 9′ N., 91° 22′ W.), town, Guatemala. Pop. 31,000.

TOTTENHAM (51° 37′ N., 0° 4′ W.), N.E. suburb of London, in Middlesex, England. Pop. (1911) 137,457.

TOTTENVILLE, former village, Richmond County, New York, U.S.A., on Staten Island, now part of New York city.

TOUCANS (*Rhamphastidæ*), a family of brightly coloured Picarian Birds with about 60 species, found in the forests of Central and S. America. Their brilliant plumage—black and green, red, orange, and blue—and their enormously large saw-edged bills combine to give them an odd appearance of ungainly beauty. They live in societies and are said to resemble magpies

in their habits. By the natives they are much esteemed as food.

TOUCH, the sense of the perception of pressure on the surface of the body, often associated with the perception of heat and cold, with which the sensation is more or less combined. The organs of t. in man are of three different kinds, the *End Bulbs*, the *T. Corpuscles*, and the *Pacinian Corpuscles*, in all of which are the terminations of nerve filaments which join togother to compose the peripheral nerve trunks and carry sensations eventually to the brain. The *end-bulbs* are minute rounded bodies found in the conjunctiva, the lips, and the mucous membrane of the mouth, genital organs, and elsewhere. The *t. corpuscles* are oval bodies, rather smaller than the end-bulbs, situated usually in the papillæ of the dermis or true skin (*q.v.*), and most common in the palms of the hands and the soles of the feet. The *Pacinian corpuscles* are larger than the two former, being oval bodies, up to $\frac{1}{16}$th of an inch in length and about half that in breadth, situated in the subcutaneous tissue, and most common on the under surface of the hands and feet, near joints, and associated with the sympathetic nerves of the abdomen.

The purpose of these special organs of t. is that very slight variations of pressure may be rendered more perceptible by the peripheral nerve endings. It has not yet been definitely found whether there are separate nerve fibres for the perception of different temperatures, but it has been shown that there are different small areas on the skin where sensations of heat or cold are more keenly perceived than elsewhere, *cold spots* being more numerous than *hot spots*.

TOUL (48° 40′ N., 5° 53′ E.), town, fortress, on E. frontier, Meurthe-et-Moselle, France; manufactures porcelain; trade in wine; chief edifices are the former cathedral of St. Etienne and church of St. Gengoult; besieged by Germans, capitulated, 1870. Pop. 13,700.

TOULON (Gk. *Telonion*, Rom. *Telo Martius*) (43° 7′ N., 5° 56′ E.), first-class fortress and naval station (headquarters of Mediterranean fleet) in Var department, France; church of St. Marie Majeure, town hall, arsenal, Musée, large safe harbour, naval shipbuilding yards; trades in oil, wine, salt, etc.; British defeated by Span. and Fr. fleets, 1744; taken by Republicans from Royalists and British, 1793. Pop. (1911) 104,582.

TOULOUSE (43° 36′ N., 1° 27′ E.), town, on Garonne and Canal du Midi, France; capital of Haute-Garonne; numerous narrow streets and old houses in Renaissance style; fine church of St. Sernin (XI.–XIV. cent's), cathedral (XI. cent. onwards), capitole (town hall), palace of justice, museums, univ., art academy, XVI.-cent. bridge; large industrial and commercial centre; iron and copper foundries, cannon-making, powder factory, wire-drawing, stained glass, carriages, leather, paper, tobacco, brandy, famous liver and truffle pies. Ancient *Tolosa*, city of Rom. Gaul, became Visigoths' capital, 419 A.D.; rule of famous Counts of T. began *c.* 852; all-powerful in S. France XI. cent.; extinct, 1271, when T. was united to France; English under Wellington here defeated French, 1814; T. lies at gateway to Provence, and in Middle Ages was a centre of Provençal poetry and festivals. Pop. (1911) 149,576.

TOUNGOO, TAUNG-NGU (18° 55′ N., 96° 31′ E.), district, Tenasserim division, Lower Burma. Pop. 285,000. Chief town, Toungoo; formerly capital of an independent kingdom. Pop. 17,500.

TOUPÉE, see HAIR.

TOURACOUS, see TURACOS.

TOURAINE (47° 15′ N., 1° 20′ E.), ancient province, France; capital, Tours; now mainly included in Indre-et-Loire.

TOURMALINE, a mineral harder than quartz, composed chiefly of silica and alumina, found in granite, gneiss, and mica-slate, and sometimes in river sands and alluvial deposits of Ceylon, Burma, Brazil, and Siberia; of vitreous lustre, varying from transparent to opaque; black (see SCHORL), brown, blue-black, blue-green, and red.

TOURNAI, DOORNIK (50° 37′ N., 3° 25′ E.) (Rom. *Turnacum*), town, on Scheldt, Hainault, Belgium; has a fine cathedral containing paintings by Flemish masters; manufactures carpets, hosiery; was capital of the Nervii and an early residence of the Merovingian kings. Pop. (1910) 36,982.

TOURNAMENT, TOURNEY, a mediæval form of mimic warfare indulged in by nobles from XI. to XVI. cent. Combatants were drawn up at either end of a field (*the lists*), and at a signal dashed, with lance in rest, against their opponents. Weapons used in tournaments were generally blunted. T's gradually disappeared after the advent of firearms.

TOURNEUR, CYRIL (*c.* 1575–1626), Eng. playwright; won fame by the *Atheist's Tragedy* and the *Revenger's Tragedy*, a play which in tragic intensity is equal to Webster and second only to Shakespeare.

TOURNIQUET, instrument for stopping arterial blood flow in cases of limb accidents, snake-bites, etc.; in 'first aid' a cord or handkerchief tightened by screwing with a lead pencil makes an efficient t.

TOURNON (45° 5′ N., 4° 45′ E.), town, on Rhône, Ardèche, France. Pop. 5100.

TOURNUS (46° 35′ N., 4° 51′ E.), town, on Saône, Saône-et-Loire, France; XI.-cent. abbey church; trade in wine. Pop. 4000.

TOURS (47° 23′ N., 0° 42′ E.), town, on Loire, France; capital of Indre-et-Loire; magnificent Gothic cathedral (XII.–XVI. cent's), church of St. Julien, abp.'s palace, museum, library, palace of justice, art school, and ruined Château Plessis-les-Tours in vicinity; iron and steel industries, chemicals, leather, wine, woollens, silks, printing; ancient capital of the Turones, later of Touraine (*q.v.*); here Charles Martel defeated Saracens, 732; taken by Germans, 1870. Pop. (1911) 73,398.

TOURVILLE, ANNE HILARION DE COTENTIN, COMTE DE (1642–1701), Fr. admiral; distinguished himself at Palermo, 1677; rear-admiral (*chef d'escadre*), 1683; made successful attacks on Algerine pirates, 1682-88; was defeated by Dutch and English off La Hogue, 1692, but captured their Smyrna convoy, 1693.

TOWANDA (41° 46′ N., 76° 25′ W.), town, on Susquehanna, capital, Bradford County, Pennsylvania, U.S.A.; manufactures furniture. Pop. (1910) 4281.

TOWCESTER (52° 8′ N., 1° W.), town, on Tove, Northamptonshire, England; boots and shoes.

TOWER, ROUND, form of military arch. found VIII.–XIII. cent's; slopes inwards from base to apex; ladder entrance at first floor only; three or four one-roomed storeys; earliest had rubble walls; windows narrow slits.

TOWNELEY, CHARLES (1737–1805), Eng. archæologist; collector of marbles; Brit. Museum bought collection for £28,000.

TOWNSHEND, MARQUESSATE OF.—George, 4th viscount (1724–1807), Brit. commander in Canada after Wolfe's death (1759); Lord-Lieut. of Ireland (1764); cr. marquess (1787); succ. by s. **George** (1755–1811), a prominent politician and archæologist. The latter's notorious heir, George Ferrers (1778–1855), was succ. as marquess by his cousin, John T. (1798–1863), whose grandson, the 6th marquess, John James Dudley Stuart (1866–), was in 1906, declared incapable of controlling his estates.

TOWNSHEND, CHARLES (1725–67), Eng. statesman; M.P. for Great Yarmouth, 1747; Lord of Admiralty, 1754; Sec. for War, 1761; resigned, 1762, and opposed Grenville's administration; Chancellor of Exchequer under Pitt, 1766; taxed imports from America, which subsequently caused revolt of colonies.

TOWNSHEND, CHARLES TOWNSHEND, 2ND VISCOUNT (1674–1738), Brit. statesman; ambassador to States-gen., 1709; app. Sec. of State for northern department by George I., 1714; concluded

alliances with Emperor and France; pioneer of scientific agriculture.

TOWNSVILLE (19° 10′ S., 146° 58′ E.), town, port, on Cleveland Bay, Queensland, Australia; gold-mining and pastoral district. Pop. 17,000.

TOWTON, village, 2½ miles S. of Tadcaster, W. Riding, Yorkshire, England; scene of battle between Yorkists and Lancastrians, 1461.

TOXICOLOGY, term applied to that branch of science which deals with poisons, their nature, effects, treatment, detection, and laws relating to them. See POISON.

TOXINS, see BACTERIOLOGY.

TOYNBEE, ARNOLD (1852–83), Brit. social worker; Eng. social reformer; tutor at Balliol Coll., Oxford; lectured to working-class audiences on economics and industrial questions; Toynbee Hall, Whitechapel, erected to his memory.

TRACERY, see under ARCHITECTURE.

TRACHEA, see RESPIRATORY SYSTEM.

TRACHEOTOMY, term applied to the operation of making an incision into the trachea (windpipe) and inserting a tube to facilitate breathing when the normal air-passages are obstructed, as, for instance, in advanced cases of diphtheria.

TRACHIS, HERACLEA (38° 45′ N., 22° 20′ E.), ancient city, at foot of Mount Œta, Greece; strategic point; associated with Heracles.

TRACHOMA, granular form of inflammation of the conjunctiva of the eye (*q.v.*), to which unhealthy and dirty conditions predispose, common in the Near East (known as Egyptian ophthalmia) and the continent of Europe.

TRACHYMEDUSÆ, see under HYDROMEDUSÆ.

TRACHYPTERIDÆ, see RIBBON FISHES.

TRACHYTE, grey, yellow, brown, green, and red volcanic rock, often containing crystals of glassy felspar, mica, or hornblende; occurs in lava, intrusive sheets, and dykes from early Tertiary times.

TRACT (derived from Lat. *tractare*, to deal with), short argumentative treatise; a species of literature employed and developed by Luther (*q.v.*), whose tract on the captivity of Babylon has been followed by a continuous stream of similar lit. In the XIX. cent. a movement was started by Newman, Keble, and Pusey, whose leading principles they voiced in the famous *Tracts for the Times*. This was the Tractarian or High Church movement. The leading T. Societies are the Society for Promoting Christian Knowledge and the Religious Tract Society. In addition to religious t's there have been many of a political or otherwise controversial nature; more frequently known as Pamphlets (*q.v.*).

TRACTION, the transport of goods in wheeled vehicles.

ANIMAL TRACTION.—The animals used are chiefly horses, mules, donkeys, and oxen, camels and elephants. On the Continent dogs are sometimes harnessed to light carts, but their use in Britain is prohibited by Cruelty to Animals Act, 1854.

MECHANICAL TRACTION is generally accomplished by steam tractors or petrol wagons, may be used on railways (*q.v.*), tramways (*q.v.*), or roads. A road t. engine has four road wheels, having wide rims to prevent their sinking in loose roads. Various devices are in use to prevent skidding. The average speed of such machines loaded and with trailer, varies from 4 to 8 miles per hour. T. engines driven by compressed air are rare.

Cable t. is used on some mountain railways and on a few tramway systems, as New York, Edinburgh, etc. A moving steel cable is placed in a conduit below the level of the roadway, and is gripped by a device which hangs through a slot in the road.

Gasolene or petrol is used principally on road machines.

Electric Traction, haulage of goods or passengers by cars fitted with e. motors.

The first known e. motor, invented by the Abbé Salvatore dal Negro, 1830, carried 40–100 batteries. The question of power-supply, independent of overhead or underground wires, is still unsolved. The first e. railway of commercial value was erected at Lichterfelde (Germany), 1881, and was followed by Cleveland (Ohio), U.S.A., 1884, Richmond, Virginia (U.S.A.), 1887. The tunnel under Baltimore, on the Baltimore-Ohio Railway, was badly ventilated for steam locomotion, and the e. railway was installed.

TRACY, COMTE DE, ANTOINE LOUIS CLAUDE DESTUTT (1754–1836), Fr. philosopher and revolutionist; adhered to Condillac, whose doctrine of origin of ideas he termed 'ideology.'

TRADE.—The relation between the entrance into and exit from a country of money is expressed by the economic term, BALANCE OF TRADE. The theory—known as the 'Mercantile Theory'—that exports should exceed imports or at least 'balance' them, is the pretext for *protection*, and was acquiesced in until early XIX. cent., when Adam Smith, in *The Wealth of Nations*, showed that it was as advantageous to possess commodities as specie. See COMMERCE.

Trade, Board of, Brit. Department of State (dating from XVII. cent.) concerned with trade statistics, trade disputes (through Industrial Council, established 1911), Trade Boards, Labour Exchanges, Commercial Intelligence, Exhibitions, issue of Patents, registration and winding-up of companies, Bankruptcy, Standards of Weights and Measures, inspection of railways, harbours, merchant shipping, etc. The B. of T. has a large permanent staff, and its 'President' has usually a seat in the Cabinet.

Trade Mark, a mark used in connection with goods to indicate that they are the goods of a proprietor 'by virtue of manufacture, selection, certification, dealing with or offering for sale.' By the T. M's Act, 1905, a t. m. must consist of at least one of the following: (1) name of a company, individual, or firm, represented in a special or particular manner; (2) signature of applicant for registration, or some predecessor in his business; (3) an invented word or words; (4) a word, or words, having no direct reference to the character or quality of the goods, and not being according to its ordinary signification a geographical name or surname; (5) any other distinctive mark; but a name, signature, or word, or words, other than such as fall within the descriptions in the above, will not, except by order of the Board of Trade, or the Court, be deemed a distinctive word.

No infringement of a t. m. can be restrained unless it has been registered. An application form can be obtained at a post office for 10s. On this form a representation of the mark should be mounted, and particulars of the t. m. be set out. The applicant must state under which of the 50 classes of goods fixed by the Board of Trade he desires to register the mark. If the Comptroller of the Patent Office accepts the t. m., it is advertised in the official *T. M. Journal*, the applicant pays £1, and the certificate of registration is issued. The period of protection for a registered t. m. lasts 14 years. At the end of that time the registration may be renewed for another 14 years on payment of £1, and so on at the end of every 14 years.

A person entitled to a t. m. cannot transfer it except in connection with the goodwill of a business. Nor can he grant licences to others to use it, without forfeiting his claim to it. If a business is assigned with a t. m. the assignee should apply to the Comptroller to alter the register.

Special provision is made by the Act of 1905 for registration at Sheffield of t. m's on metal goods, and at Manchester for registration of cotton marks.

Trade Unions, combinations of wage-earners engaged in the same trade for purposes expressed in the registered rules and objects of the association. A modern t. u. is an organisation to secure for all its members the fair reward of their labour; to provide for the settlement of disputes between employer

and employed, so that a stoppage of work may be avoided; to secure the enforcement of Factory Acts, and other legislative enactments for the protection of labour; to afford pecuniary assistance to any member victimised or left without employment in consequence of a dispute or lock-out, or when disabled by accident. Stated objects of t. u's are: the abolition of piece-work, equal pay for equal work irrespective of sex, a control over the number of apprentices employed, provision of sick and burial funds, the establishment of healthy workshops, and the return to Parliament and to local governing bodies of working-class representatives. A decision in the law courts—THE OSBORNE JUDGMENT (1909)—makes it illegal for a t. u. to levy its members for political purposes.

T. u's are not derived from trade guilds of the Middle Ages; not till early XVIII. cent. are combinations of wage-earning workmen found, and not till the XIX. cent. have t. u's any character of endurance. From 1799 till 1824 all trade combinations of workmen were illegal associations; and after the Combination Acts had been repealed it was still doubtful in law whether workmen had the right to form t. u's for the purpose of raising wages or resisting a decrease. The T. U. Act of 1871 finally gave t. u's official existence. This Act requires the registration of all t. u's, and only such unions as are registered have any legal existence. Any persons can apply for registration as a union. The application must be made to the Registrar of Friendly Societies, upon a form to be obtained from the Registrar. This form must be signed by seven members of the union, and be accompanied by a copy of the rules, the names and titles of the officers, and the registered address of the union. The objects of the society must be clearly stated, and no disbursement of union funds may be made except in furtherance of such objects. The conditions under which members become entitled to benefit, and the method of appointing officers, committees, and trustees, and of effecting any alteration in the rules, the investment of funds—all these must be laid down in the rules.

When the certificate of registry is issued, the t. u. has been legally registered. So long as that certificate is not withdrawn, any court is bound to recognise it as a society amenable to the law. Every year the Registrar must be furnished with an annual report from each t. u., and this report must specify (1) assets and liabilities; (2) total receipts and expenditure; (3) expenditure on several branches of union work. Failure to make this return renders the responsible officer liable to a fine of £5.

Membership in t. u's in this country increased from a million and a half (1892) to over two millions (1911). The feeling is so strong against non-unionist labour in certain trades and in certain localities that trade unionists have refused to work in association with non-unionists, and have thereby compelled employers to discharge the latter or to face a strike. The strong t. u., however, generally relies rather on arbitration than on the strike for obtaining the conditions it seeks for its members. The formation of national t. u. federations (*e.g.* the Miners' Federation, covering all the miners' associations in Great Britain; the Transport Workers' Federation, covering the unions of dockers, stevedores, seamen and firemen, and carters; and of local federations such as the Building Trades Federation, covering bricklayers, carpenters, labourers, etc.) has been well marked in later t. u. history. America has proved a far more congenial soil than Great Britain for industrial unionists and universal federationists. Germany has *c.* 3,050,000 t. u. members; France *c.* 1,030,000, many of them Syndicalists; Italy *c.* 850,000. Other European countries are gradually developing trade unionism; Russia, where growth is hampered by autocracy, is least advanced. Australia has *c.* 240,000 members, Canada *c.* 134,000, New Zealand *c.* 55,000.

See STRIKES, SYNDICALISM.

Webb, *History of Trade Unionism*; *Industrial Democracy*.

TRADUCIANISM, see CREATIONISM.

TRAFALGAR, BATTLE OF (1805), victory gained by Brit. fleet under Nelson over Fr. and Span. fleets under Villeneuve. Brit. fleet included 27 sail of the line and the allies' 33. Fr. admiral having drawn up his fleet in a double line, Eng. attack was made in two lines, Collingwood heading for the centre with one squadron, while Nelson, on the *Victory*, headed his division to cut between enemy's van and centre. Battle began at noon and ended about five. Nelson, mortally wounded, lived long enough to know the day was won. Eighteen ships were captured by British.

TRAFFIC, see ROADS.

TRAGEDY, see DRAMA, GREECE (LITERATURE).

TRAIL, HENRY DUFF (1842-1900), Eng. writer; works include lives of Sterne, Coleridge, William III., Lord Salisbury, Lord Cromer, Shaftesbury, Franklin.

TRAJAN (53-117 A.D.), Rom. emperor; b. Italica, Spain; became prætor, 85 A.D.; consul, 91; subsequently consular legate of Upper Germany under Nerva, who in 97 adopted him as his son. The Senate acknowledged him as Nerva's successor, and he received titles of Imperator, Cæsar, and Germanicus. Became emperor, 98; reign marked by wars. First and second Dacian wars (101-2, 105-6) ended in victory for T., Dacia becoming a Rom. province. In 113 he waged war on Parthia, annexing various provinces in first campaign, and taking Ctesiphon, capital of Parthia, in second. His eastern campaigns ended in failure, and he had to withdraw from Hatra. In his absence, the Jews had seized the opportunity to revolt, and committed many massacres, which were punished by the Romans with great severity. T., who was seized by illness, took ship for Italy and d. on the way home at Selinus in Cilicia. He was a just and careful ruler, gaining name of Optimus. He lessened power of Senate and improved agriculture. He was opposed to Christianity, but a rescript in answer to a letter of Pliny the younger (*q.v.*) shows his moderation.

TRALEE (52° 17′ N., 9° 43′ W.), county town, seaport, on Lee, County Kerry, Ireland.

TRALLES (37° 48′ N., 27° 48′ E.), ancient town, near Mæander, Caria, Asia Minor.

TRAMINEÆ, see GRASS.

TRAMORE (52° 10′ N., 7° 9′ W.), town, seaside resort, on Tramore Bay, Waterford, Ireland.

TRAMP, see VAGRANCY.

TRAMWAY.—The word tram is of uncertain origin, but probably comes from the Old Swedish *tram*, a beam of wood, the earliest t's, used for coal haulage in the Tyne district, having a track of wooden beams (see RAILWAYS). It has no connection with Outram, the name of a tramway engineer. The first passenger t. was laid down in New York, 1832, but was abandoned. Another attempt in 1852 was more successful, and in 1855 a t. was opened in Philadelphia. The first passenger t. in England, 1860, was like that in Philadelphia, the rails being of wrought-iron, gauge 4 ft. 8½ in. In these t's a raised step-rail was used, and as this was found dangerous to other traffic the English t's were relaid with grooved rails, which, however, had the drawback of offering more resistance and of collecting dirt. The rails rested on timbers laid on a concrete foundation, side flanges and cast-iron chairs to carry the rails being added later. Steam traction was introduced about 1880, and the greater weight and higher speeds caused built-up rails to be superseded by solid girder rails. Cable t's were first used at San Francisco, 1873, and in England, 1884. They fell into disuse because of their great cost of construction and slow speed. The working cost is low and they are safe on steep inclines, but heavy traffic is required to recoup the initial outlay. Cable cars are still used in Edinburgh and Birmingham. The cable is sunk below the track and gripped by an arm carried by the car. Electricity is now almost

universally used. Accumulator cars were tried in Birmingham, 1890, but the cost of maintenance was found prohibitive. There are three electrical systems now in use: the overhead or trolley, the conduit, and the surface contact. In the overhead system, current is taken from a cable by a trolley-wheel fixed to an arm above the car. This system is rapidly superseding the others on account of its lower cost of construction and maintenance, greater reliability, and ease of repair. In the conduit system conductors carrying the current are placed in an underground conduit having a narrow slot at the top through which passes the current collector of the car. This has two slippers which make contact with the conductors and thus take current. This system is the most costly in construction and upkeep. The surface contact system has underground conductors, but contact is made by metal studs. When a car passes over a stud, magnets fixed beneath it operate a switch below the stud, connecting the latter to the conductors. The stud is then alive, and current is collected from it by sliding brushes carried by the car.

TRANCE, CATALEPSY, profound abnormal sleep, resembling hypnosis, except that it comes on spontaneously instead of being induced by another person; it may follow hysteria, exaltation, or mental or physical exhaustion, lasting for several hours or even, sometimes, days or weeks. There is complete loss of consciousness, the reflexes are lost or diminished, there is muscular relaxation and extreme pallor. Sometimes, however, the affected person knows what is happening around him but is quite unable to show that he is conscious, while the reflexes, instead of being lost, may be exaggerated. The action of the heart and the breathing are usually feeble, and the pulse and respiratory movements may be so slight that it seems that the person is dead. An attack ends gradually or suddenly, but may recur. See HYPNOTISM, HALLUCINATION.

TRANENT (55° 57′ N., 2° 57′ W.), town, Haddingtonshire, Scotland; collieries; quarries. Pop. (1911) 4369.

TRANI (41° 18′ N., 16° 25′ E.) (ancient *Turenum*), seaport, on Adriatic, Bari, Italy; cathedral; trade in wine, fruits. Pop. 33,000.

TRANQUEBAR (11° 1′ N., 79° 54′ E.), seaport, on Coromandel coast, Tanjore district, Madras, Brit. India. Pop. 13,300.

TRANSBAIKALIA (c. 53° N., 114° E.), province, Siberia; bounded N. by Yakutsk, W. by Irkutsk and Lake Baikal, S. by Mongolia, E. by Manchuria and Amur; area, 229,520 sq. miles. Surface is mountainous, crossed by Yablonoi Range; drained by Amur and its tributaries and by Vitim, Selenga, and other streams; capital, Tchita. Produces gold, tobacco, cereals; camels and other live stock reared. Pop. (1910) 833,400.

TRANSCASPIAN TERRITORY (35° to 45° N., 50° 30′ to 65° E.), region, Asiatic Russia; bounded N. by Uralsk, E. by Sea of Aral, Khiva, and Bokhara, S. by Afghanistan and Persia, W. by Caspian Sea; area, 213,855 sq. miles. Surface generally consists of desert and steppe-lands, with high plateaux in N., and Kopet-Dagh Mts. along the S. boundary; drained by Murghab, Atrek, and other rivers; chief town, Askhabad. Products include salt, gypsum, naphtha; cereals and cotton are grown and live stock reared; region is crossed by Transcaspian railway. The climate is subject to great extremes of heat and cold. Pop. (1910) 440,800.

TRANSCAUCASIA (41° N., 45° E.), division of the general government of the Caucasus, Russia; comprises the governments of Baku, Elisavetpol, Erivan, Kutais, Tiflis, and provinces of Daghistan, Kars, and Black Sea territory.

TRANSCENDENTALISM, explains possibility of *à priori* knowledge through certain fundamental concepts. See KANT.

TRANSEPT, in arch., transverse part of cruciform church; the arm of that part.

TRANSFORMER, any arrangement which produces by one electric current another different in form is called a transformer. The various devices are widely used in the transmission of electrical power. Generally a t. which raises voltage is called a *step-up*, one which lowers voltage a *step-down t.* Energy is always lost in the translation process—from 25 % downwards. An alternating current or *static t.* produces by one alternating current another alternating current of any magnitude or voltage and the same frequency. The arrangement consists of two insulated concentric cylindrical circuits, called the *primary* and *secondary*, wound on a closed iron core, formed of stampings *c.* ·015-inch thick, and varnished or covered with thin paper on one side to prevent eddy currents. The current passing in the primary induces a current in the secondary, the voltage of which depends on the relative number of turns in the two circuits. The whole is usually surrounded by a heavy insulating oil or other dielectric.

A *phase t.* is an arrangement of static or rotary t's so as to produce, *e.g.*, a polyphase alternating current from a 1-phase, a 3-phase from a 2-phase, etc. Again, a *continuous current t.* may consist of a motor and dynamo coupled together, *e.g.* a motor fed at 150 volts driving a dynamo which delivers at 10 volts (a motor-dynamo set). Clearly the same result is got from one machine with two commutators and two interwoven armature circuits (a rotary transformer). In the same way one machine may be constructed to create by a continuous current an alternating current 1-, 2-, or 3-phase, or *vice versa.*

Rectifiers, translating alternating current into continuous but varying current, fall under two heads: (i.) mechanical, (ii.) electrolytic. An example of the first is the *Ferranti Rectifier,* used in arc-lighting. An alternating current motor runs in step with the alternator supplying the current, and drives a commutator, the segments of which are joined alternately to two insulated rings. The brushes bringing the current to be rectified make contact with two adjacent segments of the commutator. Two other brushes collect the current from the slip-rings. An instance of the second class is two series of cells, with carbon and aluminium electrodes in alum solution, joined in parallel but in opposite senses. Each series passes a current in *one* direction only, and they therefore halve the alternating current. The *Nodon Valve* and *Mercury Vapour* rectifiers depend on the same property. See DYNAMO.

TRANSIT INSTRUMENT, a telescope, mounted on a horizontal axis, and free to move in the plane of the observer's meridian, across which it is desired to note the transit of any object. It is almost superseded now by the **Transit** or **Meridian Circle,** which, combining the functions of the t. i. and the mural circle, gives the declination of a star at the same time as its right ascension. It carries on its axis two graduated circles, 2 or 3 feet in diameter, one on each side and revolving with the telescope. Two other circles, firmly fixed to the piers, carry the reading microscopes and a pointer microscope, which replaces the metal pointer of the mural. The adjustments and corrections are the same as for the transit instrument.

TRANSKEIAN TERRITORIES, KAFFRARIA (c. 31° S., 29° E.), name applied to region, inhabited chiefly by Kaffirs, north of the Kei River, Cape Province, S. Africa; includes Griqualand East, Tembuland, Transkei, Pondoland, of which chief towns respectively are Kokstad, Umtata, Butterworth, Port St. John; total area, 18,181 sq. miles. Surface is level near coast, mountainous farther inland; watered by St. John's and other rivers; produces timber, cereals, bananas, oranges, lemons; cattle, sheep, and horses raised. Local government is in hands of a General Council (native chiefs, white officials, etc.). It was annexed to Cape Colony between 1879 and 1894. Pop. (1911) 888,460 (19,666 whites).

TRANSLATION is the turning of what is written

(or spoken) in one language into another. The translator's first commandment is 'Be faithful.' To understand the original and reproduce its sense exactly is what is required of the ordinary translator. But to rank as lit., t. must be more than a correct rendering of the sense; it must also show style. To translate plain straightforward prose may be easy; to translate a poem or an author with an individualistic style is quite another thing. Something of the original—rhythm, beauty of diction, or what not—is invariably lost in the process. T. when too literal is patently t. and not lit.; when too free it may be lit. (*e.g.* Pope's Homer) but it ceases to be t. The true course lies between; the spirit, form, style, as well as the meaning of the original must be preserved as far as possible; ideal t. should read like an original work (*e.g.* the Bible). Most men of letters since the time of Alfred the Great have attempted t's, but have too often taken liberties with the original. One of the most brilliant classical t's of modern times is Butcher and Lang's *Odyssey*, being at the same time faithful and artistic.

TRANSMIGRATION OF SOULS, see METEMPSYCHOSIS.

TRANSMISSION, POWER, see POWER TRANSMISSION.

TRANSPADANE REPUBLIC, see ITALY (HISTORY).

TRANSPORT AND SUPPLY.—An army cannot keep the field without food, and even when food can be collected in the theatre of operations, it must be distributed over a large area in which the bodies of troops are dispersed. The term 'supply' embraces not merely food but ammunition and bedding, cooking utensils, oil for lamps, and shoes for horses. The means of conveying supplies to the troops is known as 'transport,' whether vehicles, pack horses, or native carriers are employed. Until recently the organisation of wagons allotted to each division of the Brit. army was called a transport and supply column, but in future is to be known as the Divisional Train; the Train is replenished by another organisation called the Supply Park, and in countries where good roads exist mechanical traction will be employed. The Army Service Corps is enlisted and trained in all the duties appertaining to the collection and delivery of food and other necessaries, except ammunition; the supply of ammunition is entrusted to the Royal Artillery, who organise what are called ammunition columns for the purpose. Thus an infantry battalion needing a fresh supply of cartridges would indent upon the nearest brigade of artillery.

TRANSPORTATION, the act of sending criminals overseas to convict establishments, appears to have been first employed in James I.'s reign, but was in most active use under Charles II. and later rulers. Offenders were handed over to contractors, who shipped them to the Amer. plantations, and maintained a property in their labour. The system led to much abuse, for wholesale kidnapping and selling into slavery of innocent persons in all seaports became common, and continued into the XVIII. cent.

After the Amer. War of Independence (1776), Eng. convicts were sent out in large numbers to Botany Bay (New South Wales), and the neighbouring district, where they were drafted into one of three divisions: (1) road-making parties—from which they often escaped; (2) the chain-gangs; and (3) the isolated penal settlement, where the brutalising system was unspeakable. The root idea in sending convicts to Australia was to settle the continent, but strong protests were raised by the Colonial Government. The result was that from 1840 t. was diverted to Van Diemen's Land, where trouble arose, and the system was finally abandoned in 1846. Cayenne (Guiana) and New Caledonia have for years served as Fr. convict settlements, and Russ. prisoners are sent to Siberia.

TRANSUBSTANTIATION, R.C. doctrine, formulated at Lateran Council, 1215; belief that the substance of the sacred elements is transformed into the substance of the actual body and blood of Christ.

TRANSVAAL (22° 27′ S., 25° 32′ E.), inland province of Union of South Africa, between Vaal and Limpopo Rivers; bounded N. by Rhodesia, E. by Portug. East Africa and Swaziland, S. by Orange Free State, Natal, and Zululand, W. by Cape Province and Bechuanaland; length from N. to S., *c.* 400 miles; breadth, *c.* 700 miles; area, 110,426 sq. miles. The surface is an undulating plateau from 1000 to 7000 ft., traversed by mountain ranges and isolated hills known as *kopjes*; in E. are Drakensberg or Quathlamba Mountains, with Mauchberg, *c.* 8700 ft.; Waterberg and Zoutpansberg in N.; Libombo Mountains, forming boundary between T. and Portug. East Africa; Magaliesberg, W. of Pretoria, and Witwatersrand, *c.* 6000 ft., N.W. of Johannesburg. Large part of plateau, known as High Veldt, is generally covered with good pasture grass, but treeless; the Bush Veldt in N. and on E. border lies low, and is fairly well wooded.

Principal rivers are Limpopo (northern boundary), Vaal (southern boundary), Olefant, Komati, Usutu, Pongola, Great Marico, Great Letaba; none navigable; some shallow lakes. Climate is generally healthy, though hot and dry, and subject to numerous dust storms; Bush Veldt district in N. and E. is tropical; unhealthy during rainy season when malaria is very prevalent; mean maximum temperature of Pretoria during summer months, 89°; summer (Oct.–March) is rainy season, winter is dry; average annual rainfall *c.* 25 to 30 inches, greatest in E. Forests are only found in Bush Veldt and mountainous regions; trees include stinkwood, yellow-wood, iron-wood, Cape beech, mimosa, euphorbia, eucalpytus. Big game, such as elephant, lion, giraffe, rhinoceros, buffalo, are almost extinct, except in Reserve on Portug. border; but kudu, springbok, hartebeeste, waterbuck, jackal, hyena, aard-wolf, wild cat, ant-bear, wart-hog, etc., are still numerous; crocodiles and hippopotami abound in Limpopo and other streams; locusts and ants are very destructive, but former are being exterminated.

History.—Mosilikatze and his warriors, fleeing from Zululand, 1817, invaded T. and settled in W. region. A small party of Boers crossed Vaal, 1835, but were murdered by natives; another party, under Potgieter, dissatisfied with Brit. rule, left Cape Colony (the *Great Trek*) and settled on Vet River, 1836; several parties of whites were massacred by natives, which led to the complete defeat of Matabeles under Mosilikatze by Boers under Potgieter, 1837; the former fled across Limpopo, and Boers claimed abandoned country as their own; first permanent settlement made on Mooie River and Potchefstroom founded, 1838; later Potgieter and several Boer families trekked towards Delagoa Bay, seeking a non-Brit. outlet, and eventually some settled in Zoutpansberg, others in the E., founding the town of Leydenburg. Pretorius became commandant of the S. settlements, 1848, and by Sand River Convention, 1852, Britain recognised independence of Boer Republic. Pretorius and Potgieter died, 1853; the former's son, Marthinus Pretorius, united the several districts, 1856 (with exception of Leydenburg and Zoutpansberg, which refused to join), forming the SOUTH AFRICAN REPUBLIC, with President, *Volksraad* (Parliament) elected for two years, and Executive Council, Pretorius becoming first president. During the following years there ensued continuous internal quarrels and petty jealousies. Pretorius made several unsuccessful attempts at union with Orange Free State, and eventually tried to force matters by crossing the Vaal with a small commando, 1857, but was met by a large number of Free State burghers at Rhenoster River and forced to withdraw. Zoutpansberg and Leydenburg united with Republic, 1860, and Pretoria was founded and made capital; the same year Pretorius again visited Bloemfontein, making another effort for union; on his return, serious party quarrels having taken place, he resigned, and Grobelaar became president.

In 1864 Pretorius was again elected president, and Paul Kruger made commandant-general. E. boundary was fixed by Britain, 1869, which finally ended T.'s chance of securing a port. After discovery of Tati gold-fields western boundary was fixed by Keate Award, 1871. Burgers was elected president, 1872. During the past years the country had serious native troubles and great financial difficulties, and in 1877 the Republic was annexed to Britain by Sir Theophilus Shepstone with a virtual promise of home rule. Blundering by the Brit. Government, and Boer impatience for independence, inevitably led to trouble; two deputations headed by Kruger visited England unsuccessfully; the BOER WAR broke out, 1880, and British were defeated at *Bronkhorst Spruit, Laing's Neck* (Jan. 28, 1881), *Ingogo* (Feb. 7), and *Majuba* (Feb. 27), after which peace was made. The Pretoria Convention, 1881, gave Boers republican rights, under Brit. suzerainty as regards boundaries, native affairs, and foreign relations; the London Convention (1884) recognised the independence of the Republic, but Britain retained control of foreign relations. Kruger was elected president, 1882; after discovery of Witwatersrand gold mines, 1884, thousands of foreigners flocked to the country, and within ten years they vastly outnumbered the Boer population, which caused the Republic to exclude 'Uitlanders' from political rights; government monopolies and various internal abuses increased discontent; agitation was organised by mine-owners and Reform Committee, and in 1895 Dr. Jameson, with some 500 men in service of Brit. South African Co., invaded Transvaal, but were defeated by Boers, and Jameson was forced to surrender; leaders sentenced to various terms of imprisonment (afterwards commuted). The Uitlander question remained a bone of contention between Boers and Britons; eventually an abortive conference was held at Bloemfontein, May 31, 1899, between Sir Alfred Milner, Imperial High Commissioner, and Pres. Kruger, to consider franchise proposals. Transvaal suggested arbitration, which Brit. Government refused, insisting on her suzerainty and right of interference; mutual distrust and dissatisfaction grew rapidly, and war broke out, Oct. 11, 1899 (see SOUTH AFRICA); Johannesburg and Pretoria occupied by British, 1900; peace was signed at Vereeniging, 1902, and T. became a Crown colony. Chinese labour and Indian immigration questions were amongst chief problems prior to Union; responsible government granted, 1906; joined Union of South Africa, 1910; Swaziland was under T.'s administration, 1894–1900, since when it has been a Brit. Protectorate under High Commissioner.

Government.—The province is divided into 23 districts, administered by Administrator, Provincial Council (36 members elected for 3 years), Executive Committee (4 members). Principal towns are Johannesburg, Pretoria (provincial capital and administrative seat of Union), Potchefstroom, Heidelberg, Middleburg, Barberton. Dutch Reformed Church predominates; then Anglican, Presbyterian, Methodist, Jewish, and R.C. **Education** is generally compulsory for white children between 7–14; T. has Univ. College at Pretoria, College of Agriculture and School of Mines at Johannesburg. Railways radiate from Johannesburg and Pretoria, connecting Cape ports, Durban, Delagoa Bay, and Bulawayo (see SOUTH AFRICA).

T. is mainly a mining country, and is rich in gold, diamonds, iron ore, coal, silver, copper, lead, etc. The largest gold-fields are the Witwatersrand, around Johannesburg; other gold mines are De Kaap (Barberton Fields), Klerksdorp and Potchefstroom gold-fields, etc.; Premier Mine, near Pretoria, is the chief diamond mine; coal is mined at Middleburg, Boksburg (near Johannesburg), Vereeniging, etc.; other industries are engineering, brewing, pottery, tobacco, soap, candles, wagons, and important cattle-rearing; principal products are maize, wheat, oats, hay, Kaffir corn, tobacco; chief exports, minerals, ostrich feathers, cattle, hides, wool. Gold output (1910), 7,527,107 oz.; coal (1910), 3,974,376 tons; value of diamonds (1910), £1,328,630. Pop. (1911) 29,660 whites, 18,949 coloured.

Hatch and Chalmers, *The Gold Mines of the Rand* (1895); J. Bryce, *Impressions of South Africa* (1897); Theal, *History of South Africa* (1908).

TRANSYLVANIA (*c.* 46° 35′ N., 24° 30′ E.), region, Hungary; area, *c.* 21,500 sq. miles; surface is generally covered by spurs of Carpathians, densely forested; drained by Szamos, Maros, Kokils, Aluta; soil fertile; produces cereals, pulse, tobacco, fruits; cattle, horses, sheep, and pigs raised; minerals include gold, silver, salt, coal, iron, lead, copper. T. was principality under Turk. suzerainty, XVI. and XVII. cent's; whole has belonged to Hungary (*q.v.*) since 1867. Pop. 2,622,000.

TRANSYLVANIAN ALPS (45° 35′ N., 24° 30′ E.), range of the Carpathians on S. border of Transylvania and on frontier of Rumania.

TRAP, apparatus for ensnaring animals; earliest form, earth-covered hole in ground; lobster-pot is a similar device; spring-t. consists of jaws with centre-plate, pressure on plate snaps jaws together; in point-t's weights or spikes descend on victim, used for wild beasts; snare made of wire looped to catch animal's head.

TRAPA, genus of plants, order Onagrariaceæ; Singhara Nut (*T. bispinosa*) is common as food in Kashmir.

TRAPANI (38° 3′ N., 12° 32′ E.) (ancient *Drepanum*), city, seaport, Sicily; bp.'s see; exports salt, wine; was a Carthaginian stronghold; scene of naval victory over the Romans, 249 B.C. Pop. (1911) 59,365; (province) 275,967.

TRAPEZIUM, in geometry, figure bounded by four straight lines no two of which are parallel; **Trapezoid** has two parallel sides. See MENSURATION.

TRAPPISTS, brotherhood of Cistercian monks, so called after abbey of La Trappe (founded, 1140); founded by Armand de Rancé, 1664; the distinguishing feature of their rule is its severity; the name is the unofficial description of the Reformed Cistercians.

TRASIMENO, LAKE (43° 8′ N., 12° 5′ E.) (ancient *Trasimenus Lacus*), lake, Perugia, Italy; length, 10 miles; scene of victory of Hannibal over Romans, 217 B.C.

TRAÙ (43° 34′ N., 16° 12′ E.) (ancient *Tragurium*), seaport, on Adriatic, Dalmatia, Austria; cathedral (XIII.-cent.). Pop. 17,500.

TRAUN, OTTO FERDINAND (1677–1748), Austrian soldier; served in Wars of Span. and Austrian Succession.

TRAUNSTEIN (47° 50′ N., 12° 40′ E.), town, health-resort, Bavaria; saline springs. Pop. 7690.

TRAUTENAU (50° 35′ N., 15° 47′ E.), town, on Aupa, Bohemia; linen-weaving centre; scene of two battles between Austrians and Prussians, 1866. Pop. 16,100.

TRAVANCORE (10° N., 77° E.), native state, Madras, S. India. Pop. 3,000,000. Capital, Trivandrum.

TRAVE (53° 57′ N., 10° 43′ E.), river, Holstein and Lübeck, Germany; enters Baltic at Travemünde; length, 70 miles.

TRAVELLER'S JOY, see CLEMATIS.

TRAVELLER'S TREE (*Ravenala madagascariensis*), Madagascar tree, order Scitaminеæ; huge leaves arranged fan-wise; water is obtained by tapping sheaths of leaf-stalks, hence name.

TRAVEMÜNDE (53° 57′ N., 10° 51′ E.), seaport, watering-place, at mouth of Trave, Germany; herring fisheries.

TRAVERSE CITY (44° 45′ N., 85° 40′ W.), city, summer resort, on Boardman River, capital, Grand Traverse County, Michigan, U.S.A.; fruit-growing region; various manufactures. Pop. (1910) 12,115.

TRAVNIK (44° 10′ N., 17° 42′ E.), town, on Lasva, Bosnia. Pop. 6660.

TRAWLING, the process of dragging the sea-bottom for fish by a flat conical-shaped net. The beam-trawl was formerly the common form of net, and

it was worked by a small steam capstan, or even by a hand windlass. The deep-sea fishing in the distant waters of the North Sea, the Atlantic, and to the north of Russia is practically all done by steam t., Grimsby, Hull, Aberdeen, and Milford being the chief ports. Sailing-smacks, however, still trawl in the near home waters, especially in the North Sea, but near the land. It is customary for fleets of 50 or 60 boats, under the guidance of an 'admiral,' to fish together, 'carriers' being employed to take the catch to land.

Holdsworth, *Deep-Sea Fishing and Fishing-Boats* (1874).

TRAZ-OS-MONTES (41° 35′ N., 7° W.), province, N.E. Portugal; mountainous; comprises districts Villa Real and Braganza. Pop. 435,000. Capital, Braganza.

TREACLE, name for MOLASSES. See SUGAR.

TREAD-MILL, obsolete instrument of prison discipline, consisting of revolving wooden drum provided with steps; the weight of prisoners produced revolutions; sometimes utilised for industrial purposes.

TREASON, treachery against the State. In the early history of England, treachery was adjudged to be a crime against the sovereign, as representative of the State. In past Acts, t. was divided into high t. and petty t., but in 1828 the latter term was abolished. Petty t. embraced such offences as the killing of a superior—offences then punished with the rigour of the t. law, but now treated as ordinary murder. The basis of our criminal code in regard to t. is the Statute of T. of 1352, of which the following enactments are still in force as defining t's—compassing or imagining the death of the king, the queen, or their eldest son; seducing the queen, the king's eldest unmarried daughter, or the wife of the king's eldest son; levying war against the king in his realm; being adherent to the king's enemies in his realm; giving them aid and comfort in his realm or elsewhere; killing the chancellor, the treasurer, or judges in the execution of their offices. 'Levying war' embraces an attempt by force to overawe the sovereign or to overawe either House of Parliament. 'Imagining the king's death' must be proved by such overt acts as written counsels or commands. Additional laws on the subject have since been frequently made and annulled. In 1848 it was enacted that those who are guilty of the treason-felony of attempting to deprive the sovereign of any of his dominions shall suffer a maximum punishment of penal servitude for life. The punishment for high t. has always been death. In early times hanging was accompanied by drawing and quartering and other extreme refinements of punishment—a code to which Scots law in some respects still adheres. The punishment is now execution by hanging. The trial for t. must be prosecuted within three years after the offence, except in the case of attempted assassination of the sovereign, in which case the crime is treated as murder. The accused is furnished before the trial with a copy of the indictment and the names of the witnesses. Accessories before the fact in cases of t. are adjudged principal traitors. Accessories after the fact are liable to two years' imprisonment.

TREASURE-TROVE, money, coins, gold, silver, plate, or bullion found hidden in the earth, or in other private place (the owner being unknown), belongs to the Crown, as treasure-trove. Concealing it is punishable by fine or imprisonment.

TREASURY, state revenue department, administered by commissioners who have taken the place of the old Lord High Treasurer. The First Lord of the Treasury is by custom the Prime Minister, the second lord is the Chancellor of the Exchequer.

TREATIES, to be valid, must be made between sovereign states, and agreement must be expressed. There are no set forms, and the agreement may be verbal, and is sometimes accompanied by oaths and guarantees. In Britain, as in most monarchies, power of making treaties rests with the sovereign, who acts on advice of ministers. In republics it is generally vested in the executive council or the pres. Negotiations may be carried out by ambassadors, who must be fully empowered; and the agreement should be confirmed by the government.

Treaties may be of various kinds: political, such as treaties of peace, alliance, neutrality; commercial, concerning trade; and those referring to international postal arrangements, extradition, international law, etc. A transitory agreement differs from other treaties in that it takes effect at once, leaving no further obligations. A treaty for an indefinite time may be ended by public repudiation; and in war both definite and indefinite treaties are suspended, though such treaties as extradition and copyright would probably revive automatically on its cessation.

Hall, *International Law* (1905).

TREBBIA (45° N., 9° 40′ E.) (ancient *Trebia*), river, N. Italy; joins Po near Piacenza; length, 60 miles; scene of victory of Hannibal over Romans, 218 B.C.

TREBINJE (42° 43′ N., 18° 26′ E.) (ancient *Tribulium*), town, on Trebinjcica, Herzegovina.

TREBIZOND (41° N., 39° 45′ E.), port of Turkey, on Black Sea, in N.E. of Asia Minor; built on small elevated plateau, and encircled by old walls; has ancient castle and some old Byzantine churches, now used as mosques; moderate anchorage; exports nuts, carpets, cattle, hides, silks, tobacco, raisins, beans, maize; chief bazaars are in the Christian suburbs. Originally founded by Greeks; cap. of empire of T. from 1204–1461. Pop. *c.* 35,000.

TREBULA.—(1) (41° 14′ N., 14° 21′ E.) ancient town, Samnium. (2) **T. Mutusca** (42° 18′ N., 12° 50′ E.), ancient town of the Sabines. (3) **T. Suffena** (42° 35′ N., 12° 57′ E.), ancient town of the Sabines.

TREDEGAR (51° 46′ N., 3° 16′ W.), town, on Sirhowy, Monmouthshire, England; ironworks. Pop. (1911) 23,604.

TREE, see FORESTRY.

TREE-CREEPER (*Certhia familiaris*), a minute bird with strong tail-feathers which aid it in climbing trees in search of its insect food. Common in Britain, Europe, Asia, and N. America.

TREE-FERN, tropical *Filicineæ*, with stout, erect stems, clothed with adventitious roots, and bearing a crown of leaves apically. *Cyathea* and *Dicksonia* are typical.

TREE-WORSHIP has been common all over the world. It was a feature of primitive religion to put men, animals, and trees in the same or similar categories; trees, like other objects, seemed to be alive or possessed of spirits. A close connection was thought to exist between a person and a tree, and illness might be transferred to a tree and so got rid of. Another sacred association of trees is with oracles, *e.g.* the famous oak at Dodona. Some deities were specially connected with trees, *e.g.* Jupiter with the oak. Sacred groves existed in various places, and, as in ancient Canaan, were the scene of strange rites. Sacred trees existed, too, among the northern races before their conversion to Christianity, *e.g.* Prussians and Lithuanians.

Robertson Smith, *Religion of the Semites*; Philpot, *The Sacred Tree*.

TREFOIL, see CLOVER.

TREGELLES, SAMUEL PRIDEAUX (1813–75), Eng. Biblical scholar; did important work on text of New Testament.

TRÉGUIER (48° 49′ N., 3° 13′ W.), town, port, at junction of Guindy and Jaudy, Côtes-du-Nord, France; cathedral; birthplace of Renan. Pop. 3400.

TREITSCHKE, HEINRICH VON (1834–96), Ger. historian and politician; b. Dresden; ed. Leipzig and Bonn; wrote *Deutsche Geschichte in XIX. Jahrhundert, Historische und Politische Aufsätze, Politik*, etc.

TRELAWNEY, EDWARD JOHN (1792–1881), Eng. adventurer; deserted from navy and lived life of privateer in Malay Straits; met Shelley in Italy, 1822, and arranged for burning of his body; went to

Greece with Byron and fought in War of Independence; wrote *Adventures of a Younger Son* (1830), *Records of Shelley, Byron, and the Author* (1858).

TRELAWNY, SIR JONATHAN (1650–1721), Anglican divine; bp. of Bristol, 1685, of Winchester, 1707; one of 'Seven Bishops.'

TREMADOC SLATES, see CAMBRIAN SYSTEM.

TREMATODE WORMS (FLUKES, LIVER-FLUKES, etc.), generally of leaf-like shape, but rarely cylindrical, all of which live either as external or internal parasites. The group assumes considerable economic interest, since it includes one of the most destructive parasites of domestic animals—the Liver-Fluke—which, producing the disease 'liver-rot,' used to account for the loss of a million sheep a year in England. To the parasitic habit most of the characteristic structures of Trematodes are due. They have no external coat of cilia, as have the closely related Turbellarians, but all possess suckers or hooks for adhesion. Sense organs are rarely present, and the internal parasites have a thick 'cuticle' to resist the digestive juices of the animal in the food tract of which they live.

Trematodes fall into two main groups—the external and the internal parasites. The former, which occur on Crustacea, Fishes, Amphibia, and Reptiles, are furnished with strong hooks or suckers, and their life-history is simple, their development being direct and concerned with one host only, hence the group name—MONOGENEA.

The internally parasitic Trematodes, or *Digenea*, are most interesting on account of the complexity of their development, which exhibits an alternation of generations (*q.v.*). The sexual adult is parasitic in Vertebrates, the asexual forms occur in Molluscs and the encysted larva in various Invertebrates and Vertebrates. The destructive Liver-Fluke (*Distomum hepaticum*) belongs to this category.

Trematodes form one of the classes (*Trematoda*) of Flat Worms or Platyhelminthes (*q.v.*).

TREMOLITE, see AMPHIBOLE.

TRENCH, see FORTIFICATION.

TRENCH, RICHARD CHEVENIX (1807–86), Anglican divine; dean of Westminster, 1856; abp. of Dublin, 1864–84; wrote *Notes on the Parables*, *Notes on the Miracles*, and works on philology.

TRENCK, FRANZ (1711–49), Austrian soldier; b. Calabria; cavalry officer at seventeen, but compelled to leave Austrian army for duelling; settled in Russia, and with 1000 of his tenants (Pandours) routed Turk. frontier robbers; assisted Austria in Silesian wars, 1741–45; committed suicide in prison.

TRENDELENBURG, FRIEDRICH ADOLF (1802–72), Ger. philosopher; b. near Lubeck; prof. at Berlin; influenced by teleology of Aristotle; affirms motion the common essence of thought and thing, whence thought produces *à priori*, but agreeing with objective reality, space, time, the categories.

TRENT.—(1) TENTRO, TRIENT (46° 4′ N., 11° 7′ E.) (ancient *Tridentum*), fortified town, on Adige, capital of S. Tyrol, Austria; bp.'s see; cathedral; the church of Santo Maggiore was the meeting-place of the famous Council of Trent (1545–63). Pop. (1910) 30,049. (2) (53° 35′ N., 0° 44′ W.) river, England; rises N. Staffordshire; flows through Staffordshire, Derbyshire, Nottinghamshire, Lincolnshire; unites with Ouse to form Humber; length, 170 miles.

TRENT, COUNCIL OF (1545–63).—As a cure for the evils and abuses prevalent in the Church during the XV. cent., churchmen and laymen alike looked to the assembling of a General Council. The Councils at Basel (*q.v.*) and Constance (*q.v.*) had not only been irregular but abortive. The C. of T., considered by Roman Catholics the 19th œcumenical council of Church, sat intermittently from Dec. 13, 1545, to Dec. 4, 1563. Lutherans desired council of all Christians, laying stress on acceptance of Scriptures; emperor and some Catholic rulers aimed at reforming abuses in Church government; pope and court of Rome, while acknowledging necessity for reform, wished to strengthen power of Papacy and condemn new heresies, hence at first resisted formation of council lest these ends should be defeated. Finally convened by Paul III., 1536; and after many delays, met at Trent, 1545, under presidency of Del Monte, Corvinus, and Pole, papal legates. Temporarily removed to Bologna, 1547, it reopened at Trent, 1551; suspended in 1552. After this, was not revived until 1560, under Pius IV., who brought it to successful conclusion. Reforms were carried out, discipline enforced, and decrees concerning religious orders and education of priests were passed. Old doctrines concerning sacraments, purgatory, indulgences, etc., were reaffirmed.

J. Waterworth, *The Council of Trent* (Lond. 1848).

TRENTE ET QUARANTE, ROUGE ET NOIR, card game; six packs used; cards laid out till pips total 30 or over, similarly second row; row nearest 30 wins; played at Monte Carlo.

TRENTON.—(1) (40° 13′ N., 74° 15′ W.) city, capital of New Jersey, U.S.A.; Prot. and R.C. episcopal see; public buildings include city hall and state capitol; manufactures earthenware and pottery, iron and steel, woollens, etc.; rolling mills. Here British were defeated by Washington, 1776. Pop. (1910) 96,815. (2) (40° 4′ N., 93° 41′ W.) city, on Grand River, capital, Grundy County, Missouri, U.S.A.; flour-mills; railroad shops. Pop. (1910) 5636.

TREPANG, see under ECHINODERMATA.

TRES TABERNÆ (Three Taverns) (41° 35′ N., 12° 52′ E.), ancient village, on Via Appia, Latium; referred to in *Acts* 28[15] in connection with St. Paul's journey to Rome.

TRESHAM, FRANCIS (1568 ?–1605), last Gunpowder Plot conspirator to be initiated; is thought to have betrayed plot to Mounteagle; d. in prison, but was attainted, and corpse decapitated.

TRESPASS is an unauthorised entry on another man's ground, thereby doing damage. The owner must bring the action. A trespasser may be ejected, but, if unnecessary force is used, an action for assault against the ejectors may be brought.

TREVELYAN, SIR GEORGE OTTO, Bart. (1838–), Brit. author and nephew of Lord Macaulay. In 1862 he entered the Indian Civil Service. His great work is the *History of the American Revolution*.

TREVES, see TRIER.

TREVI (42° 50′ N., 12° 45′ E.) (ancient *Trebiæ*), town, Perugia, Italy. Pop. 5900.

TREVIGLIO (45° 31′ N., 9° 38′ E.), town, Bergamo, Italy; manufactures silk and wool. Pop. 15,300.

TREVISO (45° 40′ N., 12° 13′ E.) (ancient *Tarvisium*), town, Italy; manufactures iron, pottery; the cathedral contains Titian's *Annunciation*. Pop. (1911) 41,027; (province) 491,561.

TREVITHICK, RICHARD (1771–1833), Eng. engineer; b. Illogan, Cornwall; inventor of high-pressure steam engine; first applied iron to shipbuilding and used steam-power for agricultural implements.

TREVOR, BARONY OF.—Thomas T. (1658–1730), s. of Sir John T., kt. (1626–72), a prominent statesman under the Commonwealth, and Ruth, dau. of John Hampden, was made Chief Justice (1701), baron (1712), and Privy Seal (1726–30).

TREVOUX (45° 56′ N., 4° 46′ E.), town, on Saône, Ain, France; manufactures gold and silver wire.

TRIAL.—In all civil cases of slander, libel, false imprisonment, malicious prosecution, seduction, and breach of promise, either plaintiff or defendant may demand trial by judge and jury. In all criminal cases, where the magistrates do not convict summarily, the prisoner must be sent to trial before judge and jury at the next quarter sessions or assizes.

TRIANGLE, figure bounded by three lines. If a plane figure, lines are straight, three angles together equal two right angles, and area equals half-product of base and height. If figure is on surface of sphere, lines are arcs of great circles, and t. is called *spherical*.

TRIANGULATION, see PARALLAX.

TRIASSIC SYSTEM, lowest strata of the Second-

ary or Mesozoic system, rests on the Permian rocks and older Palæozoic strata, and is beneath the Jurassic (oolites and lias); well developed in central England, extends across Severn Valley into Devonshire. Also in central Europe, Vosges Mountains, Sweden, and North America. Generally classified—

KEUPER or	RHÆTIC.	Black shales, marls, and sandstones.
	UPPER TRIAS.	Marls, slates, sandstones (red and grey), and salines.
MIDDLE TRIAS or MUSCHELKALK.		Limestones, dolomites, and salines.
LOWER TRIAS or BUNTER.		Mottled sandstones, marls, and conglomerates.

Life of the period: plants (ferns, conifers, etc.). Reptiles, foraminifera, gasteropods, ammonites. Fishes (ganoids and placoids) and early mammalia. See also GEOLOGY.

TRIBE, originally group of individuals claiming descent from one male ancestor. See FAMILY, CLAN.

TRIBERG (48° 10′ N., 8° 12′ E.), town, health-resort, in Black Forest, Baden; clock-making centre. Pop. 3800.

TRIBONIAN, Rom. magistrate (fl. 530); held offices of quæstor, master of offices, and consul under Justinian; app. one of ten commissioners to draw up Codex of Imperial Constitutions, 528. Pres. of commission who compiled Pandects or Digesta (extracts from early law writings), 530. Head of commission which drew up Novellæ (changes in law).

TRIBUNE, a Rom. magistrate.—(1) Most important tribunes in Rome were t's of the plebs; originated in struggles between patricians and plebeians; first app. in 494 B.C., with object of protecting the latter against the former, which, however, they could only do within the city. At first two in number, they increased by 449 B.C. to ten. Their power was chiefly negative, consisting in the right of veto (*intercessio*), by which they could stop all business and prevent the magistrates carrying out decrees of Senate. The acts of all magistrates except dictators were liable thus to be vetoed. Gradually they acquired right to attend Senate, and soon after 367 B.C., to summon it. On the fall of the republic the tribunician became one of the chief powers attached to the emperor. (2) Military tribunes with consular power were sometimes app. by Senate (444–367 B.C.) instead of consuls.

TRICHINA, see under NEMATODA.

TRICHINOPOLY (10° 50′ N., 78° 44′ E.), district, Madras, Brit. India; seat of a R.C. college; noted for its cigars and cheroots. Pop. 1,445,000.

TRICHINOSIS, TRICHINIASIS, disease caused by parasitic worm, *Trichina spiralis*, conveyed to man by eating insufficiently cooked 'measly' pork; the larvæ, found in the diseased flesh, consist of capsules, translucent or with lime salts deposited in them, each containing one or two worms; when swallowed the capsules become digested in the intestine, and the embryos are set free, rapidly become mature, penetrate the intestinal walls, and then produce hundreds of embryos, which are carried to the muscles by the blood; there they become encapsulated, and may give rise to no further trouble. The earlier symptoms of the disease are diarrhœa and other gastro-intestinal disturbances when the parasites are in the intestine, and fever, pain, and swelling while the migration to the muscles is proceeding; there is a leucocytosis with great increase of eosinophil cells, which is a valuable aid to diagnosis. The treatment consists of calomel or filix mas or santonin to clear out the intestines, and opium for the muscular pain. The thorough cooking of pork kills the parasites and prevents the disease. See BLOOD.

TRICHOCEPHALUS, see under NEMATODA.

TRICLADIDA, a group of TURBELLARIAN WORMS (*q.v.*).

TRICOLEUR, see under FLAG.

TRICOUPIS, CHARILAOS (1832–96), Gk. statesman; attaché in London, 1852; Minister of Foreign Affairs, 1866; Prime Minister, 1875; retired, 1895.

TRICUSPID, see HEART.

TRICYCLE, three-wheeled development of bicycle, popular for short time before bicycles were improved; chief drawback is its weight; now ridden only by children and old men.

TRIDACNA, see under LAMELLIBRANCHIATA.

TRIDENT, three-pronged spear; emblem of Poseidon (Neptune); borne by Britannia on Brit. coinage.

TRIENNIAL ACT, see PARLIAMENT.

TRIER, TRÈVES (49° 44′ N., 6° 38′ E.), city of Rhenish Prussia, on Moselle; claims to be the oldest town in Germany; interesting Rom. remains, such as amphitheatre, Porta Nigra (III.-cent. town gate, 118 ft. long, 93 ft. high), brick basilica (IV. cent., now Prot. church), ruins of Rom. palace and baths, Igel column (75 ft. high; II.-cent. bas-reliefs), cathedral (XI.–XIII. cent's; contains 'Holy Coat'), Liebfrauenkirche, St. Matthias, Rathaus, museum, library. T. has manufactures of linen, cottons, woollens, leather, iron foundries, machinery, dyeing, stained glass, etc.; capital of Celtic *Treviri*, then Rom. *Augusta Trevirorum*, T. became residence of Rom. emperors, III.–IV. cent's; archbishopric established, 814; as Electors, abp's possessed great temporal power, XIV.-XVIII. cent's; annexed by France, 1801; Prussian since 1814. Pop. (1910) 54,836.

TRIESTE (45° 39′ N., 13° 47′ E.) (Rom. *Tergeste*), chief seaport and large trading centre of Austria, on Gulf of T., at head of Adriatic; consists of old and new town (Theresienstadt), separated by Corso (principal street); cathedral (XIV. cent.), San Niccola, Santa Maria Maggiore, Arco di Riccardo (Roman gate), Revoltella Miramar Castle, town hall, museums, Tergesteo; fine harbour; chief industries, shipbuilding, ironfounding, rope-making, tanning, rosoglio; naval arsenal, headquarters of Austrian-Lloyd line; taken by Venice, 1203; under Austrian rule, 1382; free port, 1719 till 1891. Pop. (1910) 229,510.

TRIFOLIUM, see CLOVER.

TRIFORIUM, in arch., the gallery of a church aisle, an arcade between the pier arches and clerestory.

TRIGGER FISHES (*Balistidæ*), laterally flattened bony fishes, mostly poisonous, with large, regularly placed scales. The name is due to the fact that the third spine of the dorsal fin on being touched sets upright or lowers the first. The species of Balistes are known as the Leather Jacket, the Old Wife, or Old Wench. Found in tropical and sub-tropical seas.

TRIGONOMETRY, primarily, the science dealing with methods of solving *triangles*; more generally includes investigation of all properties of circular functions (see FUNCTION), and their application to other branches of analysis.

I. **Plane Trigonometry.**—Consider origin O and fixed direction OA to right of O. A line OP, initially coincident with OA, turns about O in a counter-clockwise sense, which is regarded as *positive* direction of rotation. Angle POA may be of any magnitude, each complete rotation adding 360 *degrees* (360°); 1°=60 minutes (60′)=3600 seconds (3600″). For theoretical purposes the unit angle is the *radian*, the angle subtended at the centre of a circle by an arc equal in length to the radius. Hence 2π radians=360° where $\pi = 3{\cdot}1415926\ldots$.

The *circular functions* of an angle θ are defined thus:—

Let $\angle POA=\theta$. Take P any point in OP, and draw perpendicular PM to OA. Then we have—

$\sin\theta=MP/OP$, $\cos\theta=OM/OP$, $\tan\theta=MP/OM$, $\operatorname{cosec}\theta=OP/MP$, $\sec\theta=OP/OM$, $\operatorname{cotan}\theta=OM/MP$.

Taking usual notation for positive and negative directions horizontally and vertically, and regarding OP as always positive, the various functions have signs depending on the quadrant in which the angle lies. The

functions are connected by the relations $\sin\theta/\cos\theta = \tan\theta$; $\cos\theta = 1/\sec\theta$; $\sin^2\theta + \cos^2\theta = 1$, etc.

ADDITION FORMULÆ.—From the fundamental theorem of projections (that the sum of the projections on any straight line, of the sides, taken in order, of any closed polygon, is zero) we derive

$$\left.\begin{aligned}\sin(\alpha \pm \beta) &= \sin\alpha\cos\beta \pm \cos\alpha\sin\beta\\ \cos(\alpha \pm \beta) &= \cos\alpha\cos\beta \mp \sin\alpha\sin\beta\end{aligned}\right\} \quad \text{(i.)}$$

Hence by addition and subtraction, putting $(\alpha+\beta)=A$, $(\alpha-\beta)=B$.

$$\left.\begin{aligned}\sin A + \sin B &= 2\sin\tfrac{1}{2}(A+B)\cos\tfrac{1}{2}(A-B)\\ \sin A - \sin B &= 2\cos\tfrac{1}{2}(A+B)\sin\tfrac{1}{2}(A-B)\\ \cos A + \cos B &= 2\cos\tfrac{1}{2}(A+B)\cos\tfrac{1}{2}(A-B)\\ \cos B - \cos A &= 2\sin\tfrac{1}{2}(A+B)\sin\tfrac{1}{2}(A-B)\end{aligned}\right\} \quad \text{(ii.)}$$

Formulæ (i.) admit of extension for any number of angles.

TRIANGLES.—For a triangle ABC, sides a, b, c, from the definitions of sine and cosine we easily prove $a = b\cos C + c\cos B$, with two corresponding formulæ, $a/\sin A = b/\sin B = c/\sin C$. Hence we obtain $a^2 = b^2 + c^2 - 2bc\cos A$, with two similar formulæ. Then we have $\sin^2\frac{A}{2} = \frac{1-\cos A}{2}$, and hence by substitution for $\cos A$ we get $\sin^2\frac{A}{2} = \frac{(s-b)(s-c)}{bc}$ where $2s = a+b+c$. Similarly $\cos^2\frac{A}{2} = \frac{s(s-a)}{bc}$.

Again, $\sin A = 2\sin\frac{A}{2}\cos\frac{A}{2} = \frac{2}{bc}\sqrt{s(s-a)(s-b)(s-c)}$.

$\therefore$ Area of triangle $= \frac{1}{2}bc\sin A = \sqrt{s(s-a)(s-b)(s-c)}$.

From $\frac{\sin B}{b} = \frac{\sin C}{c} = \frac{\sin A}{a}$ we can derive the result $\tan\frac{B-C}{2} = \frac{b-c}{b+c}\cot\frac{A}{2}$, giving the values of B and C when the two sides b and c and the included angle A are known; for $B+C = 180° - A$. All the formulæ given above are used in the *solution* of triangles, *i.e.* given three parts, one of which must be a side, to find the remaining three parts. For the radii of the (i.) circumscribed, (ii.) inscribed, and (iii.) escribed circles of a triangle we easily find the following formulæ by drawing figures for the different cases: (i.) $R = \frac{1}{a}\operatorname{cosec}\frac{A}{2} = \frac{abc}{4S}$, where $S = \sqrt{s(s-a)(s-b)(s-c)}$; (ii.) $r = S/s$; (iii.) $r_a = S/(s-a)$, etc., where r_a is the radius of the circle touching side a externally.

II. **Spherical Trigonometry** deals with triangles on a spherical surface bounded by arcs of great circles; the angles between the tangent lines to the arcs where they meet are the angles of the triangle, the arcs themselves are the sides of the triangle. In the formulæ used it is understood that each side is restricted to be less than a semicircle, and hence any angle of a spherical triangle is less than two right angles. For the solution of spherical triangles the formulæ are more complicated than for plane triangles, since the sides are measured by the angles they subtend at the centre of the sphere. The following are a few of the simpler results, many of which, as will be seen, have analogous formulæ in plane trigonometry which may be easily derived from them:

$$\cos A = \frac{\cos a - \cos b\cos c}{\sin b\sin c}; \quad \frac{\sin A}{\sin a} = \frac{\sin B}{\sin b} = \frac{\sin C}{\sin c};$$

$\cot a\sin b = \cot A\sin C + \cos b\cos C$, with five others similar; $\sin^2\frac{A}{2} = \frac{\sin(s-b)\sin(s-c)}{\sin b\sin c}$, etc. Other formulæ may be obtained from these by changing the angles into the supplements of the corresponding sides, and at the same time the sides into the supplements of the corresponding angles, utilising the properties of the polar triangle. The results,

$\tan\frac{1}{2}(A+B) = \frac{\cos\frac{1}{2}(a-b)}{\cos\frac{1}{2}(a+b)}\cot\frac{1}{2}C$ and $\tan\frac{1}{2}(A-B) = \frac{\sin\frac{1}{2}(a-b)}{\sin\frac{1}{2}(a+b)}\cot\frac{1}{2}C$, with the two corresponding polar formulæ are known as *Napier's Analogies*. *Delambre Analogies* are—

$$\frac{\sin\frac{1}{2}(A+B)}{\cos\frac{1}{2}C} = \frac{\cos\frac{1}{2}(a-b)}{\cos\frac{1}{2}c},$$

$$\frac{\sin\frac{1}{2}(A-B)}{\cos\frac{1}{2}C} = \frac{\sin\frac{1}{2}(a-b)}{\sin\frac{1}{2}c},$$

with two others deducible from the polar triangle.

Hobson, *Plane Trigonometry*; Hall and Knight, *Plane Trigonometry*; Todhunter and Leathem, *Spherical Trigonometry*.

TRIKKALA (39° 33′ N., 21° 48′ E.) (ancient *Trika*), town, Greece; centre of trade in wheat. Pop. 18,100.

TRILEMMA, argument offering three alternatives, one of which must be accepted, yet all lead to results disagreeable to an opponent. See LOGIC.

TRILOBITES, fossil animals related to primitive Crustacea; vary from almost a pin's head in size to 2 ft. in length; range from the Lower Cambrian to the Carboniferous period when, except for one species, they died out.

TRIM (53° 33′ N., 6° 47′ W.), county town, on Boyne, County Meath; has a ruined castle (XII. cent.).

TRIMONTIUM (55° 34′ N., 2° 42′ W.), Rom. fort, at Newstead, near Melrose, Scotland; site of recent important excavations.

TRINCOMALEE (8° 34′ N., 81° 12′ E.), seaport, former naval station, Ceylon; fine harbour; taken by British from Dutch, 1795. Pop. 13,300.

TRING (50° 48′ N., 0° 40′ W.), market town, Hertfordshire, England; straw-plaiting industry. Pop. (1911) 4481.

TRINIDAD.—(1) (10° 30′ N., 61° 20′ W.) one of Brit. W. Indian Islands, at extreme S. of Windward group; area, 1754 sq. miles. Surface is hilly; extreme height of c. 3000 ft.; soil is fertile; climate healthy; large crops of sugar and cacao; exports sugar, cocoa, asphalt, rum, bitters, etc. Chief town, Port of Spain. Administration carried on by governor and executive and legislative councils; chief religions are Anglican and R.C. Pop. (1911—excluding Tobago (*q.v.*)) 309,331. (2) (37° 8′ N., 104° 30′ W.) city, on Las Animas, capital, Las Animas County, Colorado, U.S.A.; agricultural region; coal-mines. Pop. (1910) 10,204. (3) (21° 44′ N., 80° 2′ W.) seaport, Santa Clara, Cuba; exports sugar. Pop. 12,500. (4) (20° 30′ S., 29° 50′ W.) uninhabited island in S. Atlantic, claimed by Brazil.

TRINITARIANS, monastic order (now small), existing since 1198.

TRINITY HOUSE, corporation with considerable control over the mercantile marine of the U.K. by charter of 1514; quarters, T. H., Tower Hill, London.

TRINITY SUNDAY, the one succeeding Whitsunday.

TRIOLET, a form of verse invented by mediæval Fr. poets, the formula is—a b a a b a b a. The first line is identical with the fourth, and the last two lines repeat the opening couplet.

TRIPLE ALLIANCE, see ALLIANCE.

TRIPOLI.—(1) (*c.* 25° to 34° N., 11° 45′ to 25° 10′ E.) country, N. Africa; bounded by Mediterranean, Egypt, Sahara, Algeria, Tunis. Area, *c.* 398,900 sq. miles. Surface is mountainous, reaching an extreme height of 4000 ft.; in E. is sandy district, with plateau of Barca to N. No important rivers. Chief towns, Tripoli (capital), Benghazi, Derna. Climate varies; great heat in summer, little rain. T. belonged in turn to Carthaginians, Romans, Vandals, Berbers, Tunisians; independent in XIV. cent.; conquered by Spain, 1509; subsequently given to Knights Hospitallers, from whom it was taken by Turks in 1551. Home of pirates for about three cent's. Became Turk. vilayet, 1835, since when various unsuccessful risings against Turks have occurred. Invaded in Sept. 1911 by Italy, by whom decree of annexation was issued in Nov. 1911.

Turkey refused to recognise this annexation, and war resulted. By Treaty of Lausanne, Oct. 1912, Turkey granted full autonomy to T., and tacitly ignored, without recognising officially, Ital. sovereignty; Italy took over T.'s debt; Turkey, while retaining certain religious rights, ceased to have any political influence in T. Inhabitants chiefly Berbers; some Jews and negroes. Religion, Muhammadanism. Agriculture is principal industry; produces esparto grass, fruits, cotton, cereals; sheep and cattle raised; trades in ostrich feathers, ivory, gold dust. Pop. *c.* 1,000,000. (2) TARABULUS-EL-GHARB (32° 54′ N., 13° 11′ E.), seaport, on Mediterranean, capital of above; starting-point of caravans for interior; manufactures carpets. Pop. *c.* 29,000. (3) TARABULUS (34° 27′ N., 35° 50′ E.), town, vilayet Beirut, Syria; some trade with interior, exports silk; ancient Phœnician city *Tripolis*; besieged by Crusaders, 1104; taken, 1109. Pop. 32,000.

TRIPOLISTA, TRIPOLIS (37° 30′ N., 22° 22′ E.), town, capital, monarchy of Arcadia, Greece, near ancient Mantineia, Tegea, and Pallantium. Pop. 10,800.

TRIPTYCH, tablet of 3 painted leaves, which when folded present a new picture; term also applied to pictures in 3 parts, *e.g.* Rubens' *Descent from the Cross.*

TRIREME, galley with three banks of oars, one above another; superseded at time of Punic Wars by quinqueremes; rowers numbered *c.* 180.

TRISMEGISTUS, see HERMES TRISMEGISTUS.

TRISTAN, TRISTREM, famous hero of mediæval romance, in origin Cornish or Breton, but adopted by nearly every literature in W. Europe. It has been attached to the legend of Theseus, and become somewhat inexplicably involved in the Round Table legend. The chief older poems in which T. figures are *Béroul* (Fr., 1160, fragmentary), Gottfried von Strassburg's *Tristan und Isolde* (Germ., XIII. cent.), *Sir Tristrem* (Eng., XIII. cent.), *Don Tristan de Leonis* (Span., 1528). In modern times, either in its original or in its later, Round Table, setting, it has been used by Wagner, Matthew Arnold, Tennyson, and Swinburne. Its literary history is fully treated in Golther's *Die Sage von Tristan und Isolde.*

TRISTAN DA CUNHA (37° 6′ S., 12° 1′ W.), largest of group of islands, of volcanic formation, in S. Atlantic, the others being Nightingale and Inaccessible Islands and several small islets and rocks; area, *c.* 43 sq. miles; surface mountainous; produce potatoes and apples; cattle and sheep are raised. The islands have no form of government and crime is unknown. First discovered by Portug. admiral, from whom they take their name, 1506; annexed by Great Britain, 1816; garrisoned by Brit. force during Napoleon's exile in St. Helena.

TRITON (classical myth.), s. of Poseidon and Amphitrite; dwelt in golden palace at sea-bottom; quelled waves with a trumpet.

TRIUMPH, honour awarded to victor in ancient Rome by senate, who marched first, followed by spoils and distinguished captives, oxen for sacrifice, and the victor. Under the Empire, only the emperor could enjoy a triumph; last, Diocletian, 302 A.D. A general received an *Ovation* or lesser triumph.

TRIUMPHAL ARCH, structure erected to commemorate some victory. Temporary structures of this description seem to be common to all peoples, but the Romans were the first to make such structures permanent. Famous Rom. arches are those of Titus, Septimius Severus, and Constantine. Modern arches are represented by the Arc de l'Etoile in the Champs Élysées, Paris (1830), the Brandenburger Thor at Berlin, the Siegesthor of Münich, and the Marble and Wellington Arches in London.

TRIUMVIRATE, coalition of three magistrates to superintend foundation of colonies or the coinage; applied to control of state by Cæsar, Pompey, and Crassus; and, later, Antony, Octavius, and Lepidus.

TRIVANDRUM; TREVANDRUM (8° 29′ N., 76° 59′ E.), city, pilgrim resort, capital, Travancore, Madras, India; educational centre. Pop. 60,000.

TRIVIUM, scholastic term for the three arts, grammar, logic, rhetoric.

TRNOVO, TIRNOVO (43° 7′ N., 25° 28′ E.), city, on Yantra, Bulgaria; manufactures copper-ware. Pop. (1910) 12,649; (department) 448,197.

TROCHILIDÆ, see HUMMING-BIRD.

TROCHU, LOUIS JULES (1815-96), Fr. soldier; served in Algeria, Crimea, Lombardy; defended Paris when besieged by Germans, 1870.

TROGEN (47° 24′ N., 9° 27′ E.), town, canton Appenzell, Switzerland; manufactures muslins.

TROGLODYTIDÆ, WRENS (*q.v.*).

TROGONS (*Trogonidæ*), a family of Picarian Birds, with 55 species confined to the tropics of the Old and New Worlds; brightly coloured arboreal birds which feed on fruits and insects. They are the only birds in which the first and second toes are turned backwards, the third and fourth forwards. The LONG-TAILED TROGON or QUEZAL (*Pharomacrus*), with its metallic green and deep red plumage, excessively long tail-covert feathers, which trail far behind it in flight, and crested head, is a strikingly beautiful and shy inhabitant of Central American forests.

TROGUS, GNÆUS POMPEIUS, Rom. historian in Augustan age; principal work, *Historiæ Philippicæ,* an important authority on Eastern history.

TROIA (41° 20′ N., 15° 14′ E.) (ancient *Æcæ*), **town,** Foggia, **Italy.** Pop. 6750.

TROILUS AND CRESSIDA (classical myth.).—T. was s. of Priam of Troy, and Hecuba; his lover C. was dau. of Calchas the Soothsayer; legend used by Chaucer, Shakespeare, and others came from mediæval romances.

TROITSK (54° 1′ N., 61° 41′ E.), town, Orenburg, Russia; gold-mining district; manufactures iron; active trade. Pop. 26,000.

TROLLE, HERLUF (1516-65), Dan. naval hero; gained great victory over Swed. fleet off isle of Öland, 1563.

TROLLHÄTTAN (58° 16′ N., 12° 12′ E.), town, capital, län of Elfsborg, Sweden, on Göta, at falls of Trollhätten. Pop. 7920.

TROLLOPE, ANTHONY (1815-82), Eng. novelist; 3rd s. of Mrs. Francis T.; ed. Winchester and Harrow; post office clerk, 1834; post office surveyor in Ireland, 1841. First novels, *e.g. The Kellys and the O'Kellys* (1848), were unsuccessful financially; *The Warden* (1855) brought him fame, which increased when he pub. *Barchester Towers* (1857). Other novels are *Orley Farm, The Last Chronicle of Barset, Can You Forgive Her? Phineas Finn, An Old Man's Love.* He wrote too much to write excellently, but he had great power of character-drawing and society painting, *Autobiography* (1883).

TROMBONE, a brass musical instrument, the tube of which is capable of being lengthened by player so as to produce sounds of different pitch. Three varieties are used in modern orchestras—alto, tenor (most important of the three), and bass. The tone is grand and noble, especially rich and full in soft passages, and exceedingly effective in intensifying solemn situations. The older composers, like Bach and Handel, employed the trombone very sparingly, but since Weber's and Schubert's time it has been a constituent part of the ordinary full orchestra. It is seldom heard as a solo instrument, though Mozart provides a fine instance in his celebrated *Requiem.*

TROMP, famous Dutch admirals.—MARTIN HARPERTZOON T. (1597-1653), fought against England, 1652-53; fell at Scheveningen. CORNELIUS VAN T. (1629-91), fought against England and France, 1673.

TROMSO (69° 50′ N., 18° 32′ E.), seaport, on island of Tromso, Norway; exports furs, whale- and seal-oil. Pop. 7100; (amt, 1910) 82,193.

TRONDHJEM (63° 25′ N., 10° 23′ E.), city, seaport, on Trondhjem Fjord, Norway; exports lumber, fish; shipbuilding; the cathedral, dating from XI. cent., is place of coronation of the kings of Norway. Pop. (1910) 45,335; (amt) N. 84,948, S. 148,306.

TROON (55° 33′ N., 4° 40′ W.), seaport, watering-place, Ayrshire, Scotland; fine harbour; shipbuilding. Pop. (1911) 6628.

TROPÆOLUM, see NASTURTIUM.

TROPIC BIRDS, or BOATSWAIN BIRDS (*Phæthon*), form a genus and family of six Swimming Birds with four webbed toes; found on all the great oceans, often far from land; feed on fish.

TROPINE ($C_8H_{15}NO$), produced with tropic acid from atropine by alkali hydrolysis; M.P. 62°; B.P. 233°; forms esters with organic acids called tropeines, *e.g.* atropine (*q.v.*), possessing mydriatic action.

TROPPAU (49° 56′ N., 17° 55′ E.), town, on Oppa, capital, Austrian Silesia; manufactures machinery, woollen fabrics. Pop. (1910) 30,762.

TROPPAU, CONGRESS OF, 1820, Austria, Prussia, Russia, England, France, met to discuss Neapolitan revolution. First three decided on intervention, England protesting.

TROSSACHS (56° 13′ N., 4° 25′ W.), beautiful wooded pass, Perthshire Highlands, Scotland, between Lochs Achray and Katrine.

TROUBADOURS, poets of Spain, Italy, and S. France, who flourished from the XII. to the XIV. cent's. The ranks of this order of poets were chiefly recruited from the noble classes, and even kings turned t., *e.g.* Richard Cœur-de-Lion and Alfonso II. of Aragon, but there was also a professional class of lower caste. The t. poet was inspired by the sentiments of chivalry and love, and in many ways had a refining influence on mediæval society. T's for the most part led a wandering life, passing from country to country and from court to court. Sometimes they became attached as retainers to a house. In the XII. cent. there were no t. schools of poetry, but the poets became efficient in the art by attaching themselves to some skilled minstrel. The latter half of the XII. cent. and the beginning of the XIII. is the golden era of Provençal lyric. Among famous t's of this period may be mentioned Arnaut de Maruelh, Folquet, bishop of Marseilles, Arnaut Daniel, and Giraut de Bornelh. In the XIII. cent. may be mentioned Guiraut Riquier, the 'last of the t's.' The poetry of the t's was artificial in character. It was sometimes sung by the composer, but mostly by a professional accompanist, called a 'joglar' or 'jongleur.'

TROUSERS, see COSTUME.

TROUT, see under SALMON FAMILY.

TROUVÈRE, name applied to the mediæval poets of N. France and corresponding to the Troubadour of S. The t's were court poets who furnished the nobles of France with a species of artificial and sentimental poetry. During the first half of the XIII. cent. this type of poetry was most in vogue. The nobles themselves delighted in the pastime, and Thibaut IV. of Navarre, Louis of Blois, and John of Jerusalem were enrolled among the early t's. The theme was invariably the poet's love of some lady married and beyond his reach, but to whom he swore lifelong devotion.

TROUVILLE (49° 20′ N., 0° 7′ E.), seaport, seaside resort, on English Channel, Calvados, France. Pop. 6500.

TROWBRIDGE (51° 19′ N., 2° 12′ W.), market town, Wiltshire, England; manufactures woollen cloths. Pop. (1911) 11,822.

TROY.—(1) (39° 52′ N., 26° 17′ E.) famous city of legendary Gk. history, situated in the Troad, the name applied in ancient times to a district occupying N.W. of Asia Minor; archæologists differed as to its exact locality until Schliemann produced strong evidence that this was the site. Schliemann's excavations at Hissarlik, which were continued by Dörpfeld, showed that nine different towns or villages had been built here, one above the other; and of these the sixth, which obviously flourished in the Mycenæan age, is now generally acknowledged to be the Troy of Homer's epic; this town was surrounded by a great wall, the gates of which were defended by towers. The last or ninth city on this site was ruined by the Turks in 1306.

The 10 years' siege of Troy, in the reign of its last and greatest king, Priam, by an alliance of Gk. chieftains under Agamemnon, is the theme of Homer's *Iliad*; war was entered on by the Greeks on behalf of Menelaus, king of Sparta, whose wife, Helen, had been abducted by Paris, son of Priam. The city was finally taken by a ruse suggested by Ulysses. The Greeks, as if in despair, took to their ships, leaving behind a wooden horse in which Gk. heroes were concealed; the Trojans dragged this horse into the city, and at night the hidden men emerged and opened the city gates to their comrades, who had returned under cover of darkness. City was burned and Priam killed.

Schuchhardt, *Schliemann's Excavations* (trans. by Sellers, 1891).

(2) (42° 43′ N., 72° 42′ W.) city, capital, Rensselaer County, New York, U.S.A., on Hudson River; manufactures collars and cuffs, shirts, iron and steel goods; agricultural products; seat of Rensselaer Polytechnic Institute. Pop. (1910) 76,813.

(3) (40° 3′ N., 84° 14′ W.) city, on Great Miami, capital, Miami County, Ohio, U.S.A.; manufactures machinery, tobacco. Pop. (1910) 6122.

TROYES (48° 19′ N., 4° 6′ E.), town, on Seine, Aube, France; has cathedral dating in part from XIII. cent., and many interesting old churches; public buildings include town hall, library, museum, prefecture; manufactures hosiery, cotton and woollen textiles, yarn. Was important town under Counts of Champagne. Here was signed the treaty conferring succession to Fr. crown on Henry V. of England, 1420. Pop. (1911) 55,486.

TROY WEIGHT, see WEIGHTS AND MEASURES.

TRUCE OF GOD, name given to ecclesiastical efforts to reduce the misery of war, from X. cent. onwards. It began by forbidding attacks on certain persons, *e.g.* women and priests, and on ecclesiastical buildings. Then warfare was forbidden on festivals; spiritual penalties were pronounced against those who transgressed it. It was never much observed in England, where feudal evils were not so rampant, but was gradually enforced in France.

TRUCK ACTS (1831, 1874, 1887, 1896) compel employers to pay workmen in current coin of the realm, not in goods, and to put no restrictions on workmen's manner of expenditure; do not apply to domestic servants and menials.

TRUFFLE, the edible 'fruit bodies' of *Tuber*, a subterranean ascomycetous fungus; found under trees, the best coming from France and Italy, where they are searched for with specially trained dogs or pigs.

TRUJILLO.—(1) (39° 28′ N., 5° 54′ W.) town, Caceres, Spain; birthplace of Pizarro. Pop. 12,800. (2) TRUXILLO (8° 3′ S., 79° W.) city, Libertad, Peru; seat of univ.; manufactures cigars; formerly important commerce. Pop. 6600. (3) TRUXILLO (15° 55′ N., 80° 5′ W.) seaport, on N. coast, Honduras; exports dyewoods. Pop. 4200.

TRUMBULL, JOHN (1756–1843), artist; s. of the Amer. patriot, Jonathan T. His best pictures are connected with Washington and the War of Independence.

TRUMPET (Fr. *trompette, clarion*; Ger. *trompete*; Ital. *tromba*).—(1) brass wind-instrument used in ancient mediæval and modern times, consisting of a cup-shaped mouthpiece and a long narrow tube bent twice on itself and terminating in a bell. The tube is mostly cylindrical, but widens and becomes conical towards the bell. T. is a transposing instrument with brilliant, penetrating tone. The *natural t.*, without valves, side-holes, or slides, is generally used for military purposes and only gives the harmonic scale. In the XVII. cent. the *slide t.* was invented and improved so as to secure a chromatic compass. The modern *valve t.* (with three valves), which has almost entirely taken the place of the natural t., can play more or less perfectly the complete scale; it is made in F, sometimes in high B♭ and A♮, and worked like other valve instruments. In band and orchestra the t. has always had its place.

(2) metal or vulcanite tube with funnel-shaped end for collecting, directing, or intensifying sounds; with attachment for ear or mouth; first hearing trumpet said to have been made in Holland, XVI. cent.

TRUMPETERS (*Psophiidæ*), so called on account of their deep-toned cry; a family of Quail-like birds, found in flocks in the forests of South America; nest on ground; trained to protect domestic fowls.

TRUNK-FISHES, Cuckolds (*Ostraciidæ*), peculiar fishes with body enclosed in a bony box; inhabit shallow water of tropical seas.

TRURO.—(1) (50° 16′ N., 5° 3′ W.) seaport, on tidal Truro River, Cornwall, England; bp.'s see (1876); cathedral (1880); tin mines in neighbourhood. Pop. (1911) 11,325. (2) (45° 21′ N., 63° 18′ W.) town, on Cobequid Bay, Colchester County, Nova Scotia; engineering-works. Pop. 6500.

TRUSS, see Hernia.

TRUSTS.—Trusts may be created either expressly or by implication, and there is a third kind—the constructive trust—created by Courts of Equity to meet the justice of particular cases. The person who carries out a trust is called a *trustee*. T's of personal property may be created by word of mouth, but t's of land or of interests in land must be created by writing unless they are constructive t's. No particular form is required by law, but it should be stated clearly in writing who the trustees are, what property they are to deal with, how they are to deal with it, and for whose benefit they are to act. *Cy près* is an equitable doctrine by which Courts of Chancery, where it is impossible to carry out terms of a t., make an order whereby it is to be carried out as nearly as possible.

T's which in their carrying out involve any breach of the law, or tend to promote immorality, are void in law. By the Bankruptcy Act, 1883, voluntary settlements are void against the trustee in Bankruptcy if made less than 2 years before the Bankruptcy, and even within 10 years of the making, unless the parties claiming under it can prove that the settlor was solvent at the date of the settlement without the aid of the property comprised in the settlement, and had no pecuniary interest in the property. A t. for saying masses for the dead is also void in Britain.

Trustees are usually appointed by the instrument which creates the t., but when there has been an omission the Court of Chancery will always appoint them. The court may also appoint a 'judicial trustee' to act either as sole trustee or jointly with existing trustees.

Commercial trusts are formed by a number of firms or trading corporations, in the same kind of business, combining for the purpose of getting rid of competition amongst themselves, and thereby getting control of the market. Apart from the obvious saving in expenses of management by doing away with the trade rivalry, a successful t. can also dictate what price it will for the commodity it sells or for the means of transit it owns. The usual method of combining is for the various firms interested to be valued, and then their property and goodwill are transferred to the trustees appointed to govern the combination. In return, each firm that joins the amalgamation has a right to a share of the total earnings of the combine, in proportion to the value of the business which it brought. Where the t. is strong enough, it speedily wipes out its rivals; for it can afford to undersell them in the market. Then, all rivals having been driven out of the market, the t. promptly raises its prices without fear of competition, and so makes an enormous profit out of the community. In U.S.A., where the t. has grown more rapidly than elsewhere, legislation has been framed to check such concentration of capital. But the process is at work throughout the world (*e.g.* Amer. Meat T. obtained a footing in Australia, 1913), and on all sides the small industry is being absorbed by the larger. Some Socialists welcome the process as a step to nationalisation of industry; they hold that the State will be an ideal t. which will give the workers the profits now drawn by t. magnates.

J. P. Davis, *Corporations* (1905); F. W. Hirst, *Monopolies, Trusts, and Kartels* (1905); H. W. Macrosty, *Trust Movement in Brit. Industry* (1905).

TRYGON, see under Rays.

TRYON, SIR GEORGE (1832–93), Brit. admiral; commanded Mediterranean Fleet, 1891; gave mistaken order which led to sinking of the *Victoria* with himself on board.

TRYPANOSOMES, minute blood or body-fluid parasites belonging to the Flagellata or Mastigophora group of the Protozoa. To man they are of great importance, for although many harmless forms are known—parasitic in Fishes, Amphibia, Mammals, and other Vertebrates—there are others which cause serious or fatal diseases (trypanosomiases) to man and to his domesticated stock.

T's (genus *Trypanosoma*) are elongated transparent Protozoa, which exhibit, when suitably stained, a somewhat cylindrical body, pointed at the ends, with a large nucleus (*trophonucleus*), a single long flagellum attached along the body by an undulating membrane, but free at one end and sinking into the body at the other end in a small nucleus-like blepharoplast or kinetonucleus. They move in the blood-fluid with a forward, wriggling motion, generally with the free flagellum in front. Some idea of their minuteness may be gathered from the fact that the body of *T. gambiense*, the cause of sleeping-sickness, is only about $\frac{1}{1500}$th inch long.

T's occur in the blood or body-fluids in varying numbers at different times, owing usually to their cycles of reproduction by simple division or fission. From one land vertebrate to another they are borne by insects, such as Tse-tse flies, mosquitoes, fleas, lice, bugs, etc., or by ticks, whereas leeches act as intermediaries where aquatic vertebrates are concerned. In the 'carrier' distinct developmental stages sometimes occur.

The t's which occur in wild animals in nature appear to be harmless, and it is usually only where man or domesticated animals cross the path, as it were, of such species that disease conditions become possible. The t's in an unnatural host, be they few or many, set up processes of poisoning with which the host cannot cope, and the result is fever and often death. Some well-known types of trypanosomiasis are the fatal sleeping-sickness of the natives of Africa caused by *T. gambiense* and carried by a Tse-tse fly, *Glossina palpalis*; nagana or 'Tse-tse fly' disease, which renders great tracts of land in Africa impassible to cattle, caused by *T. brucii*, and carried by *Glossina morsitans*; 'surra' in horses, mules, and elephants in India, the Philippines, and West Indies; durine in horses; and 'mal de caderas' in South American horses, transmitted by a fly, *Stomoxys*.

TRYPSIN, see under Digestion.

TSAD, see Chad.

TSAIDAM, Tsädum (37° N., 95° E.), elevated region, Tibet; of a desert nature; inhabited by Mongols.

TSANA, Dembea (12° N., 37° 25′ E.), lake, Abyssinia; length, 45 miles; altitude, 5700 ft.; the Abai or Blue Nile issues from its S. extremity.

TSAR (less correctly Czar), Russ. form of Cæsar. Ivan III. called himself *Hospodar* (lord) of all Russia; his s., Vassili III. (1505–33), was the first Russian prince to assume the royal title of T.

TSARITSYN (49° N., 44° 30′ E.), town, river port, on Volga, Saratov, Russia; railway junction; important transit trade. Pop. (1910) 74,230.

TSARSKOYE SELO (59° 45′ N., 30° 23′ E.), town, summer resort, St. Petersburg, Russia; contains an Imperial residence. Pop. 24,000.

TSCHAÏKOWSKY, PETER ILJITSCH (1840–93), Russ. composer; studied under Anton Rubinstein at the Petersburg Conservatoire, where he was subsequently (1866–77) teacher of harmony. Then, devoting himself entirely to composition, he wrote operas, the best known of which is *Eugen Onegin*;

symphonics, including the famous *Pathetic*; and many other works. His style inclined towards the dark and melancholy.

TSCHETCHEN, KHISTS, Muhammadan people dwelling in the E. Caucasus, now subject to Russia.

TSCHUDI, GILES, SCHUDY (ÆGIDIUS) (1502–72), Swiss historian; b. Glarus; of distinguished family dating from XII. cent.; strong supporter of Counter-Reformation. **Johann Jakob T.** (1818–89), a naturalist and diplomatist, and **Friedrich** (1820–86), a scholar, were of the same family.

TSENG KUO-FAN (1811–72), Chin. soldier; put down several rebellions; became war commissioner, 1860; captured Nanking, 1864; retired in 1870.

TSE-TSE FLY, see under HOUSE-FLY.

TSE-TSE FLY DISEASE, see under TRYPANOSOMES.

TSU-SHIMA (34° N., 129° E.), island of Japan, in Strait of Korea. Pop. 45,000. In the strait of T. the Japanese, under Togo, crushed the Russ. Baltic fleet, under Rozhdestvensky, 1905.

TUAM (53° 32′ N., 8° 51′ W.), town, Galway, Ireland; seat of Anglican bp. and R.C. abp.

TUAREGS, TUARIKS, nomadic Berber race, living in Sahara, estimated at 300,000; perhaps descendants of ancient Gætulians; tall and long-lived; monogamist before Muhammadan invasion. The women go unveiled, and take part freely in public affairs.

TUAT, fertile district, Algerian Sahara, Africa; called T. Archipelago by French, and now administrative area consisting of T., Gurara, and Tidikelt. Taken by France, 1901. Pop. 134 Europeans and 49,873 natives, *c.* 20,000 of whom are Arabs.

TUATARA, see SPHENODON.

TUBA, a brass wind-instrument with valves, conical tube, and cup-funnel-shaped mouthpiece, forming the tenor and bass of the brass-winds in orchestras; Euphonium (tenor t.), Bombardon, and Helicon (bass t.) used in military bands.

TUBERCULOSIS, chronic infective disease, caused by a micro-organism, the *Bacillus tuberculosis*, the lesions in which are nodules (tubercles) or diffuse infiltrations which undergo a characteristic cascation. In addition to man, all domesticated animals may be attacked; it is particularly widespread among bovines, an important fact because their milk and flesh are so largely used as food. In Britain *c.* 10 % of the deaths per annum are due to t., but there is a progressive decrease in mortality. The discovery of the bacillus was announced by Koch in 1882, since when there has been little added to the facts regarding it, and it is found in all tuberculous lesions.

Badly drained and overcrowded districts predispose to t., while sunlight and fresh air are powerful preventive agents; damp, dark, ill-ventilated houses and workshops, built closely together, greatly increase the liability of their inhabitants to the disease. Delicate constitutions, debilitated conditions from any cause, irregular modes of life, indoor or unhealthy occupations, are all predisposing causes of t.; and chronic catarrh, measles, whooping-cough, influenza, typhoid fever, diabetes, pleurisy, chronic heart disease or kidney disease, injury to the chest, joints, or other part of the body, all predispose.

The bacillus may gain an entrance to the body in several different ways: (1) by way of the respiratory tract, moist particles of sputum from an infected person or dust containing bacilli being inhaled, and thus carried directly to the lungs; (2) being in the air or in food, by the tonsils or other lymphatic tissue in the neighbourhood of the pharynx, and carried by the lymphatics to the lymphatic glands in the neighbourhood, or even to those of the lungs; (3) by the alimentary canal, particularly the lower part of the ileum, being contained in milk or other articles of diet, infection of the intestine being particularly common in children. The bacillus once having entered the body, infection may spread along the air-passages or alimentary canal, along the lymphatic vessels, or by way of the blood vessels, chiefly by the veins.

T. of the *lungs* may take the form of *miliary t.*, in which infection is spread from a primary focus by way of the blood vessels or the lymphatics, or *broncho-pneumonic t.*, in which infection is spread along the air passages; t. is rarely primary in the pleura, or lining membrane of the lungs, extension usually taking place from diseased areas of the lungs, the pleura becoming thickened, with tuberculous points in it. The *lymphatic glands* may be affected in various regions: in the neck infection is conveyed by the lymphatics from the tonsils and other pharyngeal lymphatic structures; the bronchial lymphatic glands and those at the root of the lungs may become infected in the same way, or by extension from the lungs; the mesenteric glands, in the structures supporting the intestines, become infected by bacilli which have entered with the food and have been carried to them by the lymphatics. In the *alimentary canal* the most common tuberculous lesion is ulceration of Peyer's patches, which are masses of lymphatic tissue found chiefly in the lower part of the ileum, infection having come through the food; t. of the pharynx, œsophagus, stomach, and upper part of the small intestine is rare, and occurs usually only secondarily in advanced cases. T. of the *liver* and of the *spleen* is usually secondary to lesions elsewhere, particularly in connection with the alimentary canal and mesenteric glands. T. of the *kidney* is also usually secondary, infection being believed to be carried by the blood stream, while from the kidney infection may spread to other parts of the genito-urinary system; the disease may also originate in other parts of the genito-urinary system.

T. is a common disease of *bone*, injury predisposing to the disease, and infection being usually conveyed by the blood stream; t. of *joints* is usually secondary to lesions in bones. In the *brain* and *spinal cord* t. may occur, infection usually spreading from another tuberculous lesion in the body, *e.g.* a lymph gland or bone, or by extension from the bones of the skull; the disease usually occurs as an inflammation of the meninges or membranous coverings of the brain and spinal cord.

The diagnosis of t. depends largely on the naked eye and microscopical appearance of the lesion, and on the discovery of the specific bacilli, *e.g.* in the sputum, in t. of the lung; in addition, however, inoculation with Koch's tuberculin (made from filtered cultures of bacilli) produces a characteristic reaction, showing that t. is present somewhere in the body.

Treatment consists in enabling the patient to have as much sunlight and fresh air as possible. As long as fever continues he must be confined to bed, and must be exposed to the fresh air, suitably wrapped up. Residence in various favourable localities, cold and dry, at a high altitude, *e.g.* Davos Platz; warm and moist, *e.g.* Bournemouth; warm and dry, *e.g.* Egypt, as well as in sanatoria in bracing and healthy localities, is of much benefit; but efficient treatment can also be carried out at home. Suitable nourishment is as important as fresh air, and loss of appetite and gastro-intestinal troubles are very serious obstacles to recovery; milk, eggs, meat juice, and raw meat are among the most valuable articles of diet, and cod-liver oil or, where the stomach is unable to bear it, malt extract or cream, is very beneficial, less so, perhaps, in pulmonary cases than in others. Arsenic and the hypophosphites are the best tonics. Carefully regulated injections of tuberculin have proved beneficial in certain types of cases. The fever, sweating, cough, and other troublesome symptoms are treated as they arise.

TUBEROSE (*Polianthes tuberosa*), plant often grown for its highly scented flowers.

TÜBINGEN (48° 31′ N., 9° 3′ E.), town, on Neckar, Württemberg, Germany; with Stiftskirche, town hall (XV. cent.), Castle of Hohen-Tübingen, museum, famous univ. (1477); chemicals, scientific instruments, gloves, dyeing, etc. Pop. (1910) 19,075.

TUBUAI ISLANDS, AUSTRAL ISLANDS (23° 30′ S.,

149° 30′ W.), group in S. Pacific belonging to France.

TUBULARIA, see under HYDROMEDUSÆ.

TUCKER, ABRAHAM (1705-74), Eng. philosopher. His *Light of Nature Pursued* contains much sound psychological observation.

TUCSON (32° 12′ N., 110° 54′ W.), city, on Santa Cruz, capital, Pima County, Arizona, U.S.A.; seat of univ. of Arizona (1901); cathedral (R.C.); botanical observatory; mining industries. Pop. (1910) 13,193.

TUCUMAN (27° S., 66° W.), province, Argentina; mountainous; chief product, sugar. Pop. 310,000. Capital, **Tucuman**, SAN MIGUEL DE TUCUMAN (26° 50 S., 66° 2′ W.); cathedral and college; trade in oxen and mules. Pop. (1910) 66,000.

TUDELA (42° 7′ N., 1° 39′ W.) (Rom. *Tutela*), town, on Ebro, Navarre, Spain; scene of victory of French over Spanish, 1808. Pop. 9400.

TUDOR, a Welsh family, whose pedigree has been traced to Ednyfed Vychan, steward to Welsh prince Llewelyn, 1232; more immediate ancestor of Tudor sovereigns was Owen Tudor, a Welsh squire, whose s. by Catharine, widow of Henry V., m. Margaret Beaufort, their s. being Henry VII.

TUDOR PERIOD, see ARCHITECTURE.

TUFF, rock débris consisting of volcanic ashes and igneous rocks of fine-grained material; varieties: *Trachyte-tuff*, débris of trachyte or basalt, contains orthoclase, biotite, augite, and hornblende; *Basalt-tuff*, composed of basalt and found in Skye and Mull; *Pumice-tuff*, glassy fragments and pumiceous matter; *Rhyolite-tuff*, composed chiefly of rhyolite.

TUGELA (29° S., 31° 13′ E.), river, Natal; rises in Mont Aux Sources; flows with an E.S.E. course of 300 miles to Indian Ocean.

TUGGURT (33° 13′ N., 5° 53′ E.), town, oasis, Algerian Sahara.

TUG-OF-WAR, trial of strength; opposing teams stand on opposite sides of mark with rope in their hands, object of each being to drag other across mark; game popular in Scotland and navy; forms one of contests of the Olympic games.

TUGUEGARAO (17° 35′ N., 121° 40′ E.), town, capital, Cagayán province, Luzon, Philippine Islands. Pop. 16,500.

TUKE, WILLIAM (1732-1822), his s. **Henry** (1755-1814) and grandson **Samuel** (1784-1857) were members of a Yorkshire family, who devoted themselves to the treatment of insanity, William founding the York Retreat for lunatics. **Daniel Hack T.** (1827-95), a great-grandson, also made contributions to the study of insanity.

TULA (54° N., 37° 40′ E.), government, Central Russia; undulating; chief occupation, agriculture. Pop. (1910) 1,773,700. Capital, **Tula** (54° 11′ N., 37° 41′ E.), on Upa; manufactures rifles. Pop. (1910) 133,700.

TULARE LAKE, see CALIFORNIA.

TULCEA, TULTCHA (45° 12′ N., 28° 48′ E.), town, on arm of Danube, Dobrudja, Rumania. Pop. (1910) 21,411.

TULIP (*Tulipa*), a genus of Liliaceæ extensively cultivated in gardens, especially in Holland, where, at one period, fabulous sums were spent in its propagation. Some species are natives of Central Asia, and grow wild on the steppes. The cultivated form is usually grown from bulbs, and has a typical liliaceous flower of extremely variable colour. The fruit is a capsule, and the seeds, which are flattened, are only scattered by the agitation of the whole structure.

TULIP TREE (*Liriodendron tulipifera*), N. Amer. tree, order Magnoliaceæ; often over 100 ft. high; flowers are solitary and fragrant.

TULLAMORE (53° 17′ N., 7° 29′ W.), county town, King's County, Ireland.

TULLE (45° 16′ N., 1° 46′ E.) (Rom. *Tutela Lemovicum*), town, on Corrèze, capital, Corrèze, France; bp.'s see; manufactures firearms. Pop. 17,100.

TULLOCH, JOHN (1823-86), Scot. divine; moderator of Assembly of Church of Scotland, 1878; theologian of Liberal school.

TULSA (36° N., 96° W.), city, on Arkansas, capital, Tulsa County, Oklahoma, U.S.A.; coal, oil, and gas region; manufactures glass. Pop. (1910) 18,182.

TULSI DÁS (1532-1623), the greatest Hindu poet; noted also both in his own day and down to the present time as a deep religious thinker. His chief work is the poem *Rám-charit-mánas*, generally known as *Tulsi-Krit-Rámáyan*. So far as the Brahmins are concerned, at all events, it plays much the same rôle as the Bible in this country. It is universally quoted throughout India, and hundreds of his sayings have passed into the common speech of the people. It is based on the great Sanskrit epic of *Válmiki*, but differs greatly from it in treatment and in spirit. He produced eleven other works, most of which are fully extant.

TUMKUR (13° 17′ N., 77° 8′ E.), town, Mysore, India. Pop. 10,500; (district) 680,000.

TUMMEL (56° 42′ N., 3° 55′ W.), river, Perthshire, Scotland; joins the Tay.

TUMOUR, an abnormal swelling in the body, composed of new tissue and having no physiological function; it must be distinguished from increase in size due to simple hypertrophy, such as the heart undergoes to compensate for defective valves; from inflammatory swellings, due to a micro-organism (*e.g.* swollen tuberculous glands of the neck); and from cysts, swellings due to dilatation with fluid of a space already existing. It has been suggested that t's are the result of irritation or injury, and certain t's may follow such a condition, *e.g.* cancer of the tongue after constant irritation of a short clay pipe, but this certainly cannot be the cause in all cases; the theory of Connheim is that t's develop from embryonic cells or 'rests' within the tissues rendered active by some form of stimulus; another theory is that t. growth is due to a micro-organism which stimulates the cells of a tissue to abnormal proliferation.

T's may be classed, for convenience, under the headings of *innocent* and *malignant*; the former, having a local effect, are dangerous only because of the neighbourhood in which they grow, while the latter, in addition to their local effects, have serious results on the general condition of the affected person, and, unless efficient treatment is forthcoming, eventually cause his death. Innocent t's grow slowly; they are usually surrounded by a capsule of fibrous tissue from which they can be easily separated; and in structure they resemble the normal tissues of the body. Malignant t's, on the other hand, grow more rapidly, they possess no capsule and have an irregular margin more or less indefinitely marked off from the surrounding tissues, and in structure they differ from the normal tissues, being of a less highly developed and more embryonic nature. They have a tendency to invade the overlying tissues and thus ultimately to present an ulcerating surface; an affected person becomes sallow, wasted, and in a low condition of health.

Innocent t's may be further considered, according to the tissues in which they originate, as *connective-tissue t's* and *epithelial t's*. The former include the *lipoma*, a t. composed of fatty tissue, resembling the normal fatty tissues of the body, lobulated in structure, and most commonly situated about the shoulders, back, or buttocks. The *chondroma* is a t. composed of cartilage, firm and elastic, and found growing from bone; it may undergo calcification or ossification, or myxomatous degeneration, becoming soft and perhaps semiliquid, or it may develop a malignant tendency, being then classed as a *chondro-sarcoma*. The *osteoma* is a t. composed of bony tissue, and grows from the bones of the skeleton, being either of spongy or of compact bony tissue; it grows very slowly and does not usually cause any untoward symptoms; bony t's may also arise in the muscles, being ascribed to injury, *e.g.* ossification of the adductor longus muscle ('rider's bone'), caused by bruising of that muscle in

riding. The *odontoma* is a t. composed of one or more of the tissues taking part in the formation of the teeth, *e.g.* the enamel organ, developing in the early stages of the growth of a tooth. The *fibroma* is a t. composed of fibrous tissue, the fibres of which may be either loose in structure or arranged in close bundles, and t's of this type most frequently grow in the subcutaneous tissue or in the skin, particularly of the back and buttocks. The *myxoma* is a tumour composed of gelatinous, embryonic tissue, resembling the so-called 'Wharton's jelly' of the umbilical cord, and may be the degenerated condition of a t. of another kind; *e.g.* a chondroma may undergo myscomatous degeneration. The *angioma* is a t. composed of a dilated and tortuous blood vessel or blood vessels—capillary, venous, or arterial—or of a series of blood spaces developed usually from dilated capillaries; the most common situations of the angiomata are the skin and subcutaneous tissues, but the cavernous type may be situated in an internal organ. The *lymphangioma* is a t. consisting of a series of cavities and channels communicating with one another and filled with lymph, resulting from the dilatation of lymph channels; by further breaking down of the meshwork of channels, one or more cysts may be formed, the t. being then termed a cystic lymphangioma. The *myoma* is a t. composed of non-striped muscle fibres with a greater or less admixture of fibrous tissue, the most common situation being the uterus. The *neuroma* is a t. growing in nerves, the term being applied either to a t. growing from the fibrous nerve-sheath, from the connective tissue in the interior of the nerve, or it may be a plexiform arrangement of tortuous nerve cords. The *glioma* is a t. composed of neuroglia, the connective tissue of nervous structures, being found only in the central nervous system.

The innocent forms of epithelial t's include the *papilloma*, which is a projecting t. consisting of an outer covering of the epithelial cells of the skin or mucous membrane and an inner core supplied by blood-vessels; the ordinary *wart* is a common type of papilloma. The *adenoma* is a t. developing from a gland, *e.g.* the mammary gland or a salivary gland, and composed of glandular tissue with a greater or smaller admixture of fibrous tissue; the gland spaces of an adenoma may become greatly distended with fluid, the t. being then termed a cystic adenoma, examples of large size of this type being frequently found in connection with t's of the ovary.

Malignant t's may also be considered, according to the tissues in which they originate, as *connective-tissue t's* and *epithelial t's*. The term *sarcoma* is applied to t's of the former type, the structure of which is remarkable for the preponderance of the cellular over the intercellular elements, in which it resembles the structure of embryonic connective tissue. Sarcomata grow from any of the connective tissues, but are most commonly found growing from fascia, intermuscular tissue, periosteum, and skin. The blood vessels of sarcomata have no definite walls, being practically blood spaces among the cells, while such t's have no lymphatics. Parts of the t. may grow into the veins of the neighbourhood, and then, carried away to other parts of the body, become arrested in the smaller vessels again, and give rise to secondary growths. There are many different varieties of sarcomata, which may be classed according to the size and character of the cells, *small* and *large round-celled*, *small* and *large spindle-celled*, *mixed-celled*; a *lympho-sarcoma* has a structure like that of lymphatic tissue, and a *fibro-sarcoma* has a considerable admixture of fibrous tissue in it; *chondro-sarcoma*, *mysco-sarcoma*, *glio-sarcoma*, *osteo-sarcoma* are terms applied to sarcomata developing in innocent t's of those characters; *melanotic sarcoma* is the term applied to an extremely malignant type in which the cells are pigmented.

The term *carcinoma* (cancer) is applied to t's originating in epithelial tissue, and consisting of columns of cells, which originate from the proliferation of existing epithelial cells, varying with the character of the cells from which they arise, enclosed in alveolar spaces. Carcinomata are most commonly situated in the skin, in certain parts of the alimentary canal, in the breast, and in the uterus. In addition to invading the surrounding tissues, carcinomata have a tendency to give rise to secondary growths, usually in neighbouring lymphatic glands, to which infection is carried by the lymphatic vessels, while secondary growths may also arise in such organs as the liver, to which infection is carried by the blood stream. Of numerous varieties, the most important are *squamous epithelioma*, arising from the squamous epithelial cells of, for instance, the skin, or the mucous membranes of the mouth, lips, or gullet; *columnar epithelioma*, originating in the columnar epithelial cells of, for instance, the stomach and intestines; *glandular carcinoma*, originating in glands, *e.g.* the mammary gland, or the glands of the skin; *encephaloid* and *scirrhus carcinomata* are different types of glandular carcinoma, the former being soft, with large, scattered cells, the latter hard, with much fibrous tissue; *colloid carcinoma* is one which has undergone colloid degeneration; and *rodent carcinoma* arises from the sebaceous glands in the skin, and has a tendency to break down and ulcerate, being popularly termed 'rodent ulcer.' See CANCER.

TUN (33° 52′ N., 57° 27′ E.), town, Khorasan, Persia; produces cotton, opium. Pop. 8000.

TUNBRIDGE, see TONBRIDGE.

TUNBRIDGE WELLS (51° 8′ N., 0° 16′ E.), town, watering-place, Kent and Sussex, England; mineral springs; manufactures wooden (inlaid) wares; public school. Pop. (1911) 35,703.

TUNGABHADRA, TUMBUDRA (15° N., 76° E.), river, S. India; joins the Kistna.

TUNG-CHOW (39° 50′ N., 116° 40′ E.), city, on Peiho, Chi-li, China. Pop. *c.* 51,000.

TUNGSTEN (W=184·0), metallic element in chromium group; occurs in wolfram $(Fe,Mn)WO_4$; obtained by reduction of oxide with hydrogen or carbon; hard, grey; S.G. about 19; M.P. about 2800°; may be drawn into fine wire for metallic filament lamps. T. steel is used for cutting tools and magnets. Chief oxide: WO_3, forming *tungstates*.

TUNGUSES, Asiatic Ural-Altaic or Sibiric people, consisting of *northern Tungus* (on the Amur, and island of Saghalien), *southern Tungus*, *Golds* of the Amur, *Lamuts* of the Sea of Okhotsk, and *Manchus*.

TUNIC, term used of some kinds of short garment, and, ecclesiastically, of a Mass vestment.

TUNICATA, UROCHORDA (TUNICATES, ASCIDIANS, or SEA SQUIRTS), sessile, vegetative-looking, marine animals mostly to be found immovably fixed to rocks or weeds in shallow water; the majority are sac-shaped, although some colonial forms spread in a layer over the substratum, and all are characterised by the presence of a semitransparent, insensible test or tunic (hence 'Tunicate'), which covers the whole body and is composed of a material similar to the cellulose of plants. To look at the adult creatures one can scarcely believe that their development resembles that of the Lancelet (*Amphioxus*), and that they are lowly Chordate animals, but these truths the larva reveals.

An adult Sea Squirt of the simple fixed form has been compared to a leather bottle with two openings. At one of these, the mouth, or inhalent aperture, water enters, bearing with it its hordes of microscopic inhabitants. The water itself passes into and out through innumerable slits in a large sac-like pharynx or branchial chamber, whose walls are traversed by blood spaces. Thus it purifies the blood as it passes to a collecting or atrial chamber and hence to the exterior through the second or exhalent aperture, from which it spurts with such force, when the creature is touched, as to justify the name of Sea Squirt. But in the meantime the inhabitants of the water have been entangled in a mass of slime, swirled along a ciliated runnel within the pharynx, and hurried into the food

canal proper. So that the water which passes through the Sea Squirt serves at once as a respiratory agent and as a food provider. Apart from this complicated branchial and alimentary system, adult sessile Sea Squirts are simple animals. They have no eyes, sense organs, or limbs, the brain is represented by a single nerve ganglion between the two apertures, and the 'heart' is a mere dilated tube interesting only on account of its reversible action, for it drives the blood upwards for a period, then downwards, then upwards again, and so on. All sexual Tunicates are hermaphrodite.

Sea Squirts were not at all stages of life so simple as the adult form. The eggs are probably fertilised within the body, and passing out soon develop into a tadpole-like larva, which, besides possessing in rudiment the organs of its parent, has a strong swimming tail, a median eye and balancing otocyst, a brain and dorsal nerve cord, and a notochord which supports the tail. The two last structures in particular point to the relationship between Tunicates and Vertebrates. Only for a few hours, however, does the larva flaunt its pedigree: it gives up swimming and ordinarily fixes itself to rock or seaweed, soon to degenerate into an immobile Sea Squirt.

It must not be understood that all Tunicates are sessile when adult, for a comparatively small number of free-swimming forms exist, to be now mentioned below in a note on classification.

The Phylum TUNICATA or UROCHORDA (Gr. *oura*, tail; signifying the possession of a notochord in the tail) falls into three Orders, some of which are subdivided:—

Order I. ASCIDIACEA, solitary or colonial, fixed or free-swimming Tunicates, with neither tail nor notochord in adult, and with inhalent and exhalent apertures usually approaching each other.

Sub-Order I. MONASCIDIA or ASCIDIÆ SIMPLICES, solitary forms, which may be sessile (*Ascidia, Ciona*), stalked (*Boltenia*), or free (*Molgula*).

Sub-Order II. SYNASCIDIA or ASCIDIÆ COMPOSITÆ, fixed forms fused into colonies, which are encrusting (*Botryllus*) or stalked (*Colella*).

Sub-Order III. ASCIDIÆ LUCIÆ or ASCIDIÆ SALPÆFORMES, free-swimming, open-sea forms, in thimble-shaped colonies; strongly phosphorescent, e.g. *Pyrosoma*.

Order II. THALIACEA, solitary or social free-swimming Tunicates, with neither tail nor notochord in adult, and with inhalent and exhalent apertures at opposite ends of body. They have transparent tunics, are roughly barrel-shaped, with internal muscles girdling them like hoops, and have alternate sexual and asexual phases in their life histories, e.g. *Salpa, Doliolum*.

Order III. APPENDICULARIÆ, LARVACEA, or PERENNICHORDATA, minute, solitary, free-swimming forms, with tail and notochord in adult. They secrete gelatinous 'houses' which filter their microscopic food from the waters, e.g. *Appendicularia, Oikopleura*.

TUNIS (36° 50′ N., 10° 10′ E.), chief town, Tunisia, N. Africa; connected with sea by canal; encircled by walls; has an old citadel and is defended by several forts; seat of Muhammadan Univ.; contains Bey's palace and fine mosques; important trading centre; manufactures silk and woollen textiles, pottery, leather; exports olive oil, cereals, cattle and hides, ores, dates, morocco, fezes, gems, etc. Originally founded by Carthaginians; subsequently held in turn by Romans, Vandals, Byzantines, Arabs, Turks, and native rulers; taken by French in 1881. Pop. *c.* 170,000.

TUNISIA, LA TUNISIE (35° N., 9° E.), Fr. protectorate, North Africa; bounded N. by Mediterranean, W. by Algeria, S. by Sahara, E. by Tripoli and Mediterranean; length, *c.* 440 miles; breadth, 150 miles; area, *c.* 50,000 sq. miles; coastline over 500 miles, with several excellent harbours. Largest indentations are Gulfs of Hammamet and Gabes (E.), Bay of Tunis (N.). Cape Blanco (Ras-el-Abiad), in N., is most northerly point of African Continent. T. consists of four regions: (1) Tell, mountainous region N. of Majerda River; (2) Sahel, eastern coast region between Cape Bon and Tripoli; (3) central tableland (average elevation *c.* 2000 ft.); (4) Sahara in S., containing famous dried-up salt lakes (largest, Shott Kebir); country around the lakes is known as Belad-el-Geriad (land of dates). Surface generally is mountainous; ranges in N. and N.W. are continuations of Atlas Mountains of Algeria; highest peak in central plateau, Mount Sidi Ali bu Musine (*c.* 5700 ft.); Zaghuan (*c.* 4000 ft.). Flora and fauna are akin to Algeria. Soil is fertile and well watered in N.; large forests (chiefly cork-oak) and beautiful wild flowers; steppe-like vegetation in central region; many fine oases. Climate is hot, but healthy; annual temperature from 60° to 90° F.; rainfall from 10 to 50 in., heaviest in N. The only important perennial river is the Majerda. Principal towns are Tunis (capital), Sfax, Bizerta (large military port), Kairwan, Susa, Porto Farina.

Earliest history of T. coincides with that of Carthage (*q.v.*), which lay not far from Tunis. After the Punic Wars T. formed Rom. province *Africa* (native name is still *Ifrigiyah*); successively under Vandals, V. cent., Byzantine Empire, VI. cent., Saracens, VII. cent.; unsuccessfully attacked by Louis IX., 1270; independent state, XIV.–XVI. cent's; taken by Charles V., 1535; recovered by Turks, 1575. T. was long a stronghold of Corsairs (crushed by Blake, 1655). Beys owed allegiance to Sultan of Turkey, XVII. and XVIII. cent's; Husseim dynasty (still ruling), established 1705; Tunisian incursions into Algeria led to Fr. occupation, protectorate being proclaimed, 1881; now governed by Resident General under Fr. Foreign Office. Interesting Rom. remains survive at Dugga Ferina, Sbreitla, Gafsa, El Djem, etc.

Muhammadans predominate, then R.C's. There are public and private schools, several lycées and colleges, and a Muhammadan univ. at Tunis. Chief industry is agriculture; principal products and exports, cereals, olives, dates, wines, esparto grass, henna, cork, fruits, tobacco; manufactures of Morocco leather, pottery, carpets, rugs, and woollen fabrics; extensive fisheries (tunny, sardines, sponges); copper, lead, zinc mined; valuable phosphates; numerous hot springs. Pop. consists mainly of Bedouin Arabs, Kabyles, and Jews (65,000); European pop. *c.* 120,000; Italians, 103,000; Fr. civilians, 39,000; Maltese, 12,000.

Loth, *La Tunisie* (1907); Vivian, *Tunisia and the Modern Barbary Pirates* (1899).

TUNKERS, GERMAN BRETHREN (*q.v.*).

TUNNEL.—Probably the earliest-known t's are those under the pyramids, but t's proper date from the advent of modern engineering. In railway construction the t. is resorted to where obstacles present too steep an incline to be climbed by ordinary locomotives, or under rivers which are too wide, or otherwise unsuitable for bridging. T's through soft strata have to be lined with brick or masonry. The t's through the Alps are triumphs of engineering, and are: Mont Cenis (France and Italy), 8 miles, cost £226 per yard; St. Gothard (Switzerland), 9¼ miles, £243; Simplon (Italy and Switzerland), 12¼ miles, £148; Arlberg (Tirol), 6½ miles, £108. Both the Mont Cenis and St. Gothard t's took eight years to complete; the Simplon (finished, 1905) is a double t.

The longest t's in Great Britain are railway t's. The *Severn* (completed, 1886), beneath the River Severn, is 7665 yards in length; a t. under the *Mersey* connects Birkenhead with Liverpool. In America the *Hoosac* t., penetrating the Cascade Range, is important. Projects have been on foot at various times for tunnelling the Eng. Channel and also the River Humber. The longest canal t. is that of the Leeds and Liverpool Canal at Marsden near Huddersfield (3 miles).

In boring a t. the engineers commence operations at opposite ends, and boring and drilling machines—operated by compressed air—are used. Blasting is resorted to if necessary. The ventilating of t's,

both during and after construction, is one of the most difficult problems. Under great cities, like London, where the traffic is often very congested, it has been found practicable to bore t's, or *Tubes*, in which electric trains carry passenger traffic. Natural t's are sometimes formed by underground rivers boring their way through rock and other strata.

TUNNY (*Thynnus*), fish of mackerel family; may weigh 1000 lbs.; chief source is Mediterranean.

TUNSTALL (53° 3′ N., 2° 13′ W.), town, Staffordshire, England; ironworks, collieries, potteries; incorporated (1910) with Stoke-on-Trent (*q.v.*).

TUPELO (*Nyssa*), genus of N. Amer. trees, order Cornaceæ; includes Large T. (*N. tomentosa*), which bears a fruit like olives.

TUPPER, SIR CHARLES, Bart. (1821–), Brit. colonial statesman; held various offices of state in Canada; Sec. of State, and Prime Minister of Canada, 1896.

TURACOS, Touracous, Louris, Plantain-Eaters (*Musophagidæ*), a family of Picarian Birds related to Cuckoos, and comprising 35 species confined to the forests of Africa, where they live solely on fruits. The bright red of their plumage is a copper compound which is said to wash out when the birds immerse themselves in water.

TURBELLARIAN WORMS (Leaf Worms, Planarian Worms, etc.).—These are flattened, leaf-like worms, often beautiful in colour, and often, like the 'living film' (*Leptoplana*), to be seen gliding over rock surfaces on Brit. shores, so thin and delicate as to seem a transparent film of jelly. They frequent exceedingly diverse habitations. Some live in the sea, where they feed on molluscs and sea-worms, and these are usually broad and leaf-like, and may reach a length of 6 in. (e.g. *Leptoplana* and *Thysanozoon*). They swim or creep with easy graceful motion controlled by well-developed muscles, and by the coat of short fine filaments (*cilia*) which covers their bodies. Smaller forms (Planarians, e.g. *Planaria* and *Polycelis*), only half an inch in length, but narrower than the marine species in proportion to their length, and more 'worm'-like, live in freshwater ponds and streams. They are commonly to be seen gliding on the leaves of water plants or on the under-surfaces of stones, feeding on earthworms, snails, water-beetles, and such like. Some long worm-like forms (Land Planarians, e.g. *Geodesmus* and *Bipalium*), up to a foot in length, are terrestrial, living in moist places, where they lie concealed during the day under leaves or loose vegetation, whence they issue at night in search of worms, wood-lice, or slaters, and such small organisms for food. The tints of Land Planarians are brighter, and their colour patterns more pronounced, than those of aquatic forms, but their movements are less graceful. Nevertheless, they progress with an easy wavy motion due to the propelling power of strong cilia fringing a groove on the under-surface of the body. Turbellaria are carnivorous, and disable their prey, often much larger than themselves, by peculiar offensive rod-like weapons (*rhabdites*), which are shot in abundance from the skin.

Turbellarians lack any special respiratory or excretory organs, and have at best simple sense organs and nervous system; but even these are further reduced in some forms which are parasitic in the Shore Crab, in various Molluscs, and in Sea Cucumbers (e.g. *Anoplodium* and *Graffilla*).

From other types of Flat Worms (Platyhelminthes) (*q.v.*) Turbellarians may be distinguished by their free-living habit and by their delicate soft bodies, which are coated with short active filaments or cilia, and are furnished with microscopic rod-like offensive weapons (*rhabdites*, and sometimes *nematocysts*) on the surface, and with a muscular protrusible pharynx.

Amongst themselves, Turbellaria fall into three orders: 1. Small marine and freshwater forms, with a straight or slightly branched food canal—*Rhabdocœlida*, e.g. *Convoluta paradoxa*, common on seaweed off Brit. coasts. 2. Marine, freshwater, or land 'Planarians,' with long, flattened body, and food canal having three main branches—*Tricladida*, e.g. *Planaria lactea*, found in Brit. streams and ponds, or *Bipalium kewense*, native in the forests of Samoa, but occurring as an introduction in Brit. hothouses. 3. Large, marine, leaf-like Planarians, with many branches from the food canal—*Polycladida*, e.g. *Leptoplana teremellaris*, common on Brit. shore rocks.

TURBET I HAIDARI (35° 20′ N., 59° 10′ E.), town, Khorasan, Persia; commercial centre. Pop. *c.* 35,000.

TURBINE, see Engine.

TURBO, a Mollusc, see under Gasteropoda.

TURBOT (*Rhombus maximus*), a flat-fish (*q.v.*) found chiefly in N. Sea; eggs are buoyant.

TURCOMANS, see Turks.

TURDIDÆ, Thrush Family (*q.v.*).

TURENNE, VICOMTE DE, Henri de la Tour d'Auvergne (1611–75), marshal of France (1644); b. at Sedan; gained several brilliant victories in Thirty Years War; sided with rebels of the Fronde, 1650; but on being restored to favour in 1651, assumed command against them and their Span. allies under Condé; practically ended Civil War in 1652, defeated Condé at *Arras*, 1654, and won *Battle of the Dunes* against the Spanish, 1657. In the Dutch War which broke out in 1672, he was left in command by Louis XIV.; failed to outmanœuvre Montecuculi in 1673, but won battle of *Sinzheim*, 1674; again opposed to Montecuculi in 1675, but was killed at beginning of engagement. A great strategist, T. reformed the Fr. army.

TURGAI (49° N., 61° E.), province, general-government of the Steppes, Asiatic Russia; formerly part of Kirghiz Steppes; extends from Sea of Aral and Syr-Darya on S., to Orenburg on N.; consists largely of arid steppes studded with lakes; chief occupation, live-stock rearing; population mostly Kirghiz. Pop. (1910) 617,200. Capital, Turgai.

TURGOT, Anne Robert Jacques, Baron de l'Aulne (1727–81), Fr. statesman and economist; b. Paris; intendant of Limoges, 1761–74; pub. *Réflexions sur la formation et la distribution des richesses*; became Minister of Marine and Comptroller-General, 1774; established free trade in corn, and quelled bread riots, 1775; attempted reforms in royal household; abolished *corvée* system of enforced labour, and put down *jurandes* or *maitrises* (trade corporations), revised government contracts, and attacked privileges of nobles. T.'s aim was to restore finances of government by taxing all classes. His reforms made him unpopular with nobles, whose privileges he attacked, with clergy, who disliked his toleration of Protestants, and with merchants, whose trade he injured. Dismissed in 1776, he spent rest of life in study; belonged to physiocratic school of economists; man of high integrity; failed to avert or postpone Fr. Revolution.

Stephens, *Life and Writings* (1895).

TURGUENIEV, IVAN (1818–83), Russ. novelist; b. Orel; ed. Moscow, St. Petersburg, Berlin; wrote excellent stories, *A Nest of Nobles*, *Fathers and Children*, *Virgin Soil*, etc.

TURIN, Torino (45° 3′ N., 7° 41′ E.), city, northern Italy; capital of T. province, in Piedmont (*q.v.*); near junction of Po and Doria Riparia; has churches of San Giovanni Battista (XV. cent.), San Filippo, La Consolata, Corpus Domini, Superga (royal mausoleum) · Madama, Carignano, and royal palaces; Pinacoteca (picture-gallery), museums, library, univ.; ancient capital of the Taurini; then Rom. colony *Augusta Taurinorum*; under house of Savoy (*q.v.*) from XI. cent.; here Prince Eugene defeated French, 1706; large industrial centre—silks, cottons, woollens, carpets, gloves, machinery, glass, paper, furniture, pianos, tobacco. Pop. (1911) 427,733; (province) 1,215,844.

TURKESTAN (*c.* 36° to 54° N., 53° to 102° E.), general name for an extensive tract of Central Asia stretching from Caspian Sea to Gobi Desert and from Siberia to Persia, Afghanistan, Kashmir, and Tibet;

naturally divided into Eastern and Western T. by Pamir.

Eastern T., also called CHINESE T., is bounded by Tianshan Mts., Pamir, Kuenlun Mts., Kansu, and Gobi Desert. Most of this district belonged to China in II. cent. B.C.; it was under control of Tibet in VIII. cent. A.D., and at a later date was partly held by Turks; conquered by Mongols under Jenghiz Khan, *c.* 1219; formed part of Tamerlane's empire in XIV. cent.; has belonged to China, with some short interruptions, since 1758. The area is *c.* 432,000 sq. miles. Much of surface occupied by Takla Makan Desert in W., to N. of which flows the Tarim, ending in Lob Nor, a large marsh or lake. In S.E. the Altyn-Tagh Mts. stretch between Takla-Makan Desert and Kansu. Besides Tarim, chief rivers are Khotan Darya, Cherchen Darya, Keriya Darya, Kashgar Darya in W. and S.W. There are three passes into Western T. and two into India, trade with India being chiefly by way of Karakoran Pass. Climate has great extremes of heat and cold. Cereals, fruits, vegetables, wool, silk, are produced and exported. Indigenous animals include the yak, camel, wild ass. Population, including Mongols, Tartars, Chinese, Arabs, *c.* 2,000,000.



Western T., also called RUSSIAN T., is bounded by Caspian, Siberia, Pamir, Afghanistan, Persia. This district was partially overrun by Mongols in XI. cent., and in XIV. cent. formed part of Tamerlane's empire; it was afterwards divided into a number of independent states. In the XIX. cent. it came by degrees under Russ. control. It includes Turgai, Akmolinsk, Semipolatinsk, Trans-Caspian Province, Bokhara, Khiva, and the provinces of Samarkand, Ferghana, Syr Darya, and Semiryechensk, which are officially known as the governor-generalship of T. Area is *c.* 1,300,000 sq. miles. Surface is mountainous in S. and E.; W. and N. largely composed of desert. Sea of Aral is in W. between Syr Darya, Turgai, and Trans-Caspia, and in the E. is Lake Balkash. Chief rivers are Amu Darya, Syr Darya, Zarafshan, Murghab. Climate is hot and dry. There is great mineral wealth —gold, silver, lead, copper, iron, coal, salt. Wild animals include bears, foxes, tigers. Inhabitants are Uzbegs, Russians, Turks, Mongols, Persians; religion, Muhammadanism. Pop. *c.* 9,000,000.

Curtis, *Turkestan* (1911); Skrine and Ross, *The Heart of Asia* (1899).

TURKESTAN, HAZRET (31° 30′ N., 69° 20′ E.), town, pilgrim resort, on Syr Darya, Russ. Turkestan. Pop. 11,900.

TURKEY, THE OTTOMAN EMPIRE, an empire partly in Europe, partly in Asia, and partly in Africa; area, *c.* 1,600,000 sq. miles.

European T. (see separate headings, ASIA MINOR, TRIPOLI, etc.) lies between 26° 6′ and 29° 20′ E. and 39° and 41° 50′ N., and is bounded N. and W. by Bulgaria, the boundary line starting from Enos, following the Maritza to Adrianople, leaving this on S. crosses to Kirk-Kilisse which it also includes, and then runs to Midia. It is impossible as yet to compute the area; but it can hardly be less than 6000 or more than 10,000 sq. miles; E. by the Black Sea and the Bosporus; S. by the Sea of Marmora, the Dardanelles, and the Ægean Sea. There is low ground in the E. along the Ægean, but elsewhere the surface is mountainous. The Maritza alone is of importance for irrigation and navigable for small boats as far as Adrianople. The climate in the higher and more exposed districts is one of extremes, but in sheltered parts of E. and S. delightful. The rainfall varies between 25 in. in the E. and 28 in the S.

History.—According to tradition SULIMAN and his hordes of Turk. nomads, under pressure of Mongols, moved W. from Khorassan to Armenia in the early XIII. cent. His son Ertoghrul (d. 1288) assisted the Seljuk sultan of Iconium against the Mongols and received territory in Bithynia. His son OTHMAN or OSMAN I. (1288–1326), from whom the name *Ottoman* is derived, established his independence, taking the title sultan (1299). Othman's son ORKHAN (1326–59) won N.W. Asia Minor as far as the Sea of Marmora, divided his territory into the administrative districts called *sanjaks*, organised a standing army, and in particular established the Janissaries ('new corps'),

one of the most famous fighting bodies in the world's history. The Turks had already become the militant leaders of the Muhammadan world in the Arab decline, and were more brutal and less tolerant than the Arabs had ever been.

MURAD or AMURATH I. (1359–89) made the first permanent encroachment of the Turks on Europe; he made Adrianople the capital of European T. (1361). BAJAZET I. (1389–1403) established his authority over the rest of Asia Minor, Walachia, etc., and defeated a vast Christian host at *Nicopolis* (1396), but was captured by Tamerlane at *Ancyra*. MUHAMMAD I. (1403–21) was succeeded by MURAD II. (1421–51), who forced the Byzantine emperor to increase his tribute, and won several victories over the Hungarian confederacy. MUHAMMAD II. (1451–81) captured Constantinople in 1453, thus putting an end to the Byzantine empire and establishing the Turks in command of the Bosphorus. Hungary and Servia made heroic resistance against further advance, but Greece fell 1456–60, and Otranto 1480. BAJAZET II. (1481–1512) was deposed and poisoned by the Janissaries in favour of his son SELIM I. (1512–20), who overran Persia (1514), Syria (1515), and Egypt (1516); after defeating the last Abbasid caliph at Cairo, Selim assumed the title of *caliph*, which has since descended with T., the sultans being henceforth leaders of the Faithful.

The state came to its apogee under his son SULIMAN II. (1520–66), *the Magnificent*. He took Belgrade, 1521, Rhodes, 1522, and after defeating the Hungarians at *Mohacs Field* (1526) made Hungary into a Turk. province under the rule of his nominee, while Austria was forced to pay tribute. The Most Christian King, Francis I., eagerly courted the alliance of Suliman. He was the last of a long series of great Turk. leaders, and the Turks, unless driven to bay, can do nothing without a leader; Turk. statesmen and generals of talent have ever since had to contend with a slothful, suspicious despot. Under SELIM II. (1566–74) the Turks for the last time alarmed Europe by conquering Cyprus (1571). In the same year the fleet was destroyed by Don John of Austria before *Lepanto*. Under MURAD III. (1574–95) and MUHAMMAD III. (1595–1603) the Turks were expelled from Persia. AHMED I. (1603–17) resigned much of Hungary to Austria. MUSTAFA I. (1617–18) was deposed, OSMAN II. (1618–22) murdered by the Janissaries.

MURAD IV. (1623–40) revived the glories of T., again capturing Bagdad (1638). IBRAHIM I. (1640–48) was murdered by the Janissaries. Under MUHAMMAD IV. (1648–87) Muhammad Köprili and his son Ahmed restored internal order, and, though suffering early defeats at the hands of Venetians and Austrians, subdued Crete (1669) and Podolia. Kara Mustafa's invasion of Austria ended with the signal Turk. defeat before *Vienna* (1683); the Venetian conquest of Greece and the overthrow of Turk. rule in Hungary followed. Muhammad was then deposed in favour of SULIMAN III. (1687–91). AHMED II. (1691–95) and MUSTAFA II. (1695–1703) were defeated by the Austrians, and the latter, after ceding Transylvania and Hungary to Austria and other territories to Venice, Russia, and Poland, was deposed by the Janissaries.

AHMED III. recovered the Morea and, from Russia, the Azof district, but lost Belgrade (1718). MAHMUD I. (1730–54) recovered at the Treaty of Belgrade, after fresh wars with Russia and Austria, Belgrade, Servia, and Walachia. OSMAN III. (1754–57) was succeeded by MUSTAFA III. (1757–73) under whom the Russians inflicted a severe defeat on the Turk. fleet, and invaded Moldavia and the Crimea. They advanced farther under Abdul Hamid I. (1773–89), and, despite the Treaty of Kuchuk Kainardji of 1774, annexed the Crimea in 1783 and in 1788 invaded Georgia. SELIM III. (1789–1807) lost further territory to Russia, was deposed by the Janissaries, and murdered by MUSTAFA IV. (1807–8), deposed in favour of his bro. MAHMUD II. (1808–39), who abolished the Janissaries in 1826, and carried out various reforms. A new Russ. war (1806–12) led to further circumscription of territory, and after the War of Gk. Independence (1828–29) Greece was lost, while troubles with Egypt (see MEHEMET ALI) began.

ABDUL MEJID (1839–61), however, succeeded in opening the eyes of the Powers to the importance of T. as standing in the way of Russ. progress S., and in return for their support made a show of internal reform. Thus she received aid in the CRIMEAN WAR, 1853–55, and by the Treaty of Paris (1856) was admitted into the European concert. Her internal condition, however, went from bad to worse, and more and more the Powers saw their interest in interfering. ABDUL ASIS (1861–76), a wasteful despot, allowed the pasha of Egypt to become khedive, and sought Russ. friendship, but was murdered by the war party. His nephew, MURAD V. (1876), was deposed in favour of his bro., ABDUL HAMID II., who defeated the Servians and Montenegrins.

As T. rejected the decisions of the Conference of Constantinople of 6 Great Powers, Russia proceeded to a new war (1877–78), which would have seriously diminished Turk. territory but for the intervention of Britain at the *Berlin Congress* of 1878. T. recovered Rumelia, but was obliged to allow Austria to occupy Bosnia and Herzegovina and Britain to occupy Cyprus. In 1882 T. permitted the occupation of Egypt by Britain, and in 1885 E. Rumelia was united to Bulgaria. The Armenian 'atrocities' of 1895–96 led to fresh intervention of the Powers. In 1897 the Greeks vainly invaded Macedonia and T. occupied Thessaly, but was compelled by the Powers to receive a war-indemnity in exchange. Further wars of liberation now commenced on behalf of alien nationalities within the Turk. rule (see BALKANS).

A constitution was granted in 1876, suspended in 1878, but Abdul Hamid was forced by the Turk. army to promulgate it anew in 1908. Bosnia and Herzegovina were definitely annexed by Austria in 1908, when Bulgaria finally broke away; the independence of the latter was recognised in 1909. A change of ministry in 1909 followed a short passage of civil war; after the restoration of order Abdul Hamid was deposed in favour of his bro., MUHAMMAD V. (1909). The 'Young Turk' movement has acquired great importance. On the whole, the new parliament is considered extremely capable, but hampered not only by the revolts of its provinces, but by the ill-will of the sultans.

In August 1912 a massacre at Kotchana drew from Bulgaria a strong protest, and at the same time Montenegro raised trouble by a territorial dispute. The Balkan States had formed themselves into a definite league and demanded that Turkey should carry out reforms in Macedonia. In spite of European diplomacy war broke out, Oct. 8, on the refusal of Turkey to accede to the Allies' demands. For details of the struggle, see TURKO-BALKAN WAR.

The collapse of Turk. troops led to serious riots in Constantinople at the beginning of 1913. Nizam Pasha was assassinated and a new government formed.

Literature.—Like the Persians, the Turks sing of wine and roses, and sometimes of the deeds of Persian heroes like Bahram, Rustum, and Jamshid. The XVI. cent. was the great age of Turk. lit. as of Turk. history; among famous poets of this time are FUZULI, BAKI, and LAMI. NEDIM and SHEIK GHALIB are foremost poets of the XVIII. cent. Modern authors are SHINASI, HAMID BEY, EKREM, and RIF'AT BEY.

The **Government** is by a hereditary, absolute sultan or *padishah*, who is also the head of the Muhammadan world; he is controlled, like the Shah of Persia (*q.v.*), by the laws of Muhammad and also by the Hatt-i-Sherif, codes of law compiled in 1839. In 1876 T. received a Constitution; a Parliament was established with Senate and House of Representatives, the Senate to be replenished by the Sultan from public servants. The Prime Minister is known as the Grand Vizier. The empire is divided into governments (*vilayets*) under

governors-general (*valis*), and subdivided into provinces (*sanjaks*) which are divided into districts (*kazas*).

Army and Navy.—Many districts of the empire are exempt, but in most military service is compulsory (on Christians also since 1909). The peace strength of the army is estimated at 375,000. T. has about 42,000 *gendarmerie*, of whom about 16,000 are mounted. The navy is partly raised by conscription; there are about 30,000 sailors under command, and about 9000 marines. The chief fortresses are Constantinople, Erzerum, Adrianople, Kirk-Kilisse, and Smyrna. The chief towns are Constantinople (the capital, pop. *c.* 1,200,000), Damascus (350,000), Smyrna (350,000), Aleppo (210,000), Bagdad (200,000), Beirût (150,000), Brûssa (110,000). The total mileage of RAILWAYS is *c.* 3000, of which about 1300 miles are in the European part. The properly made ROADS (*c.* 1000 miles) are utterly inadequate for the needs of the country.

Products and Industries.—The soil is fertile, but Turk. implements and methods are primitive, and the present output of wheat, maize, rice, rye, oats, barley, sesame, fruits (apple, pear, apricot, peach, orange, lemon, olive, fig, vine, chestnut, walnut, almond), oil-seed plants, millet, opium, mulberry, roses, tobacco, madder, and cotton, might be largely increased. The considerable mineral wealth is little developed. Chrome, silver-lead, zinc, manganese, antimony, copper, borax, meerschaum, coal, and lignite, are worked on a small scale; iron, emery, asphalt, quicksilver, arsenic, and sulphur are known to exist. There are important coast fisheries and a sponge fishery on the Mediterranean. There are hand-loom manufactures of carpets, light dress materials, coarse cloth, laces, and trimmings; leather, saddlery, and other leather goods; filigree, brass, and copper work; manufacture of tobacco, and spinning of silk, cotton, and wool. The exports are valued at over £13,000,000; Great Britain takes 40 %, France over 29, and Austria-Hungary over 9. The exports received by Great Britain are chiefly mohair, wool, wheat, oats, barley, maize, linseed, and other seeds, olive oil, tobacco, manganese and other ores. The mercantile marine has a tonnage of some 200,000.

MUHAMMADANISM is the religion of nearly all the inhabitants of Asiatic T. and of half the population of T. in Europe; in the latter district there is a large proportion of Christians (mostly Gk. Orthodox or Rom. Catholics or Armenians), and a large number of Jews. Attached to nearly every mosque is an elementary school of which there are 1780 in the empire; education is free and compulsory for boys from 6 to 11, for girls from 6 to 10. The univ., founded at Constantinople (1900), exists as yet on paper only. There are an ancient Gk. National School and an imperial Art School and Medical School. The population of the empire is estimated at 35,400,000, that of European T. at 6,130,000.

Creasy, *Hist. of the Ottoman Turks* (1882); Curtis, *The Turk and his Lost Provinces* (1903); Freeman, *The Ottoman Power in Europe* (1877), *History and Conquests of the Saracens* (3rd ed., 1877); Lane-Poole, *Turkey* (1889, 'Story of the Nations' Series); Macdonald, *Turkey and the Eastern Question*.

TURKEYS (*Meleagridæ*), family of game-birds, comprising five species, confined to the table-lands and cañons of N. and Central America. From one of these, *Meleagris gallopavo*, found wild in the highlands of Mexico and the southern Amer. States, the domesticated T. is descended.

TURKO-BALKAN WAR (1912–13).—In spite of the declaration of the Great Powers that they would agree to no change of the *status quo* in S.E. Europe, the allied Balkan States (Bulgaria, Servia, Greece, and Montenegro) took opportunity afforded by Turko-Italian war and issued mobilisation orders. The immediate reason was the refusal of Turks to punish perpetrators of Kotchana massacre (Aug. 1912) and proposal to hold Turkish manœuvres near Bulgarian frontier.

Montenegro precipitated matters by declaring war, Oct. 8. Turkey declared war against Bulgaria and Servia, Oct. 17. The same day Servia, and the next day Bulgaria and Greece, declared war. Six days later KIRK-KILISSE fell to the Bulgarians, and KUMANOVO and Novibazar to the Servians. USKUB, the chief Servian ojective, fell two days later (Oct. 26); Adrianople, the chief Bulgarian objective, was shut in and the Turkish Macedonian forces were in full flight before Servians and Greeks to Monastir and Salonika The Turks were defeated at LULE BURGAS on Nov. 1, and the bombardment of Adrianople began. SALONIKA was invested by Greeks on Nov. 5, and fell three days later. MONASTIR fell to Servia on Nov. 15.

Macedonia had been taken as well as the whole of Thrace except Adrianople and a fragment 25 miles square, and most of the Ægean Islands had been seized by the Greeks. If the Bulgarians had followed up their victories of Lule Burgas and CHORLU (Nov. 6), it is almost impossible that Constantinople, but 25 miles distant, could have held out. But the outbreak of cholera in the troops made the victors pause. The assault on the CHATALJA LINES began Nov. 17.

Overtures for peace had been in the air since the beginning of November, and a first meeting of peace envoys was held at Chatalja on Nov, 25, and on Dec. 3



an armistice was signed by Bulgaria, Servia, Montenegro, and Turkey—Greece refused. A conference of delegates from the warring states was opened at St. James's Palace, London, on Dec. 16, and the next day a conference of foreign ambassadors met at the Foreign office to discuss the problem of Albania. Owing to Turkey's refusal to cede Adrianople, the peace conference was suspended Jan. 6, peace negotiations between the Allies and Turkey were formally broken off Jan. 29, and hostilities were resumed Feb. 3.

Turkey appealed to the Powers March 1, Adrianople fell March 26, and Turkey unconditionally accepted the Powers' suggestions as a basis for concluding peace April 1. Bulgaria signed a truce with Turkey April 14, and the Powers' terms for mediation were conditionally accepted by the Allies April 21. SCUTARI surrendered to Montenegro April 22. The peace conference was reopened, and the Allies, under pressure from the Powers, signed the TREATY OF LONDON May 30.

War between Allies.—By the treaty between Bulgaria and Servia, concluded before the war, Bulgaria was to have the bulk of N. Macedonia, and Servia the Sanjak of Novibazar and N. Albania. Early in the war the Powers of the Triple Alliance set themselves against Servia having a port on the Adriatic, and Austria supported the scheme for an autonomous Albania. Servia was thus to lose a

great part of her share of the spoil, while Bulgaria had gained what she had not expected, Thrace. Servia asked Bulgaria for a revision of the terms of distribution, proposing (May 26) a conference for that purpose or submission of the questions at issue to the Triple Entente. Friction between the armies of the Greeks and Bulgarians and the Servians and Bulgarians had been in evidence for some time, and at times small bodies of the troops were involved in skirmishes. Rumania, which had preserved neutrality, became now another disturbing factor. Her demands for compensation were not fully agreed to by Bulgaria, and the Rumanian army mobilised July 4.

Throughout June minor skirmishes took place between the Allies. Bulgaria invaded Servia (July 7), but by July 10 she was so far defeated by the Greeks and Servians that she appealed to Russia to stop the war. The same day Rumania invaded Bulgaria, but the latter attempted no resistance. The Bulgarian frontier was crossed by Servia and Greece, and on July 16 Turkey crossed the Enos-Midia line (fixed by the Powers), reaching Lule Burgas, six days later re-occupied Adrianople, and invaded Bulgaria. The Allies met at Bukharest (July 30), and the Treaty of Bukharest was signed on August 10, redistributing the Balkan peninsula as shown in the map. Turkey, however, refused to relinquish Adrianople; Bulgaria appealed to the Powers on Aug. 17, but entered into negotiations with Turkey on Sept. 4, and the protocol leaving Adrianople and Kirk-Kilisse to Turkey was signed Sept. 27. Meanwhile the Albanians had invaded Servia, and the latter retaliated but was peremptorily ordered by Austria to evacuate Albania.

TURKS, a general term for Tatars, Turcomans, and Ottomans. The last named, under the rule of the Sultan, are the most important branch of Tatar origin and Muhammadan faith. The Turks had a powerful empire in Western Asia, including Persia and Syria in the XI. cent. Osman, or Othman, a Turkish chieftain, added to this territory in 1299. In 1355 the Turks invaded Europe, conquered Macedonia, Albania, and Servia, captured Adrianople and made it their capital. Constantinople fell in 1453, and has remained to this day the capital of the Ottoman Empire. Under Sultan Suliman I. (1502–56) the Ottomans reached the height of their power. Belgrade, the great bulwark of the West, was captured by Suliman, Hungary was invaded and Buda taken, Rhodes and the finest islands of the Archipelago were added to the Ottoman Empire. On the death of Suliman corruption set in, and the Turks began to lose ground. It was not till the latter years of the XIX. cent. that Rumania, Servia, Bulgaria, and Montenegro were released from Turkish rule and the Ottoman Empire in Europe reduced to very small dimensions. In Africa, Tunis and Algiers have gone to France, Italy has annexed Tripoli, and Great Britain has established its authority over Egypt. In Europe the people of Albania and Macedonia have now obtained freedom from Turkish rule. While the Turks themselves are industrious, sober, and brave, the rule of the Sultans has everywhere been destructive of decency and civilisation, and corrupt and cruel. The Turks do not change. Never has Turkish conquest been followed by an improvement in social life, but always by barbaric massacre and general misery. For the last 300 years Europe has been slowly driving back the Turkish invaders.

TURK'S AND CAICOS ISLANDS (21° 26′ N., 71° 10′ W.), group, in Bahamas, Brit. W. Indies; salt. Pop. (1911) 5656.

TURMERIC, yellow dye obtained from dried and ground rhizome of *Curcuma longa* (*Zingiberaceæ*).

TURNER, JOSEPH MALLORD WILLIAM (1775–1851), most distinguished of English landscape painters; at first studied architecture, but became a pupil of the Royal Academy, and began exhibiting when only 15. By the age of 21 he had fully established himself as an artist; at 24 was elected Associate of the Royal Academy; at 28, Academician; at 33, professor of Perspective. His life remained somewhat obscure: his manners were eccentric; he was miserly to a degree, and when he died it was in a lodging at Chelsea under an assumed name. He travelled a good deal, both at home and abroad, generally in a furtive way; and altogether, as a man, had very little that was attractive in his character. As a landscape painter, he shares the foremost position with Claude and Corot. Ruskin, who greatly increased his reputation among the reading public, described him as 'the greatest painter of all time,' but that is an exaggeration. His knowledge of nature was certainly unrivalled, but though his water-colours are superb for delicacy and brilliant execution, his oils are not technically supreme. The main characteristic of all his work is an idealising of things, an overmastering faculty of realising the beautiful, the mysterious, and the sublime, in greater measure than they really exist. Hence his pictures, beautiful as they are, cannot be depended on for accuracy. He worked also in black and white, and as an etcher is well represented by the 71 plates of his *Liber Studiorum*.

Life, by P. G. Hamerton and by Cosmo Monkhouse.

TURNHOUT (51° 19′ N., 4° 57′ E.), town, Antwerp, Belgium; cloth. Pop. 24,000.

TURNIP (*Brassica campestris*), a biennial member of the Cruciferæ, which during its first year stores a reserve of food in the thickened tap-root, this being utilised during the following year for flowering.

TURNSTONES, see under PLOVER FAMILY.

TURNU MAGURELE (43° 40′ N., 24° 55′ E.), town, river port, on Aluta, Teleorman, Rumania; exports grain. Pop. 9000.

TURNU SEVERIN, TURNU SEVERNU (43° 44′ N., 24° 52′ E.), town, river port, on Danube, Rumania; shipbuilding-yards; Rom. antiquities. Pop. (1910) 20,506.

TURPENTINE, an essential oil or oleo-resin, occurring in stems of conifers; varieties: American (kind used in England), French (resembles American), Venetian (larch), Russian (used for making 'Sanitas' disinfectant), 'Canada balsam.' See also TERPENES.

TURPIN (d. 800 ?), abp. of Reims; long regarded as writer of *Historia Caroli Magni*.

TURPIN, DICK, see THEFT (HIGHWAYMEN).

TURQUOISE, TURKIS, TURQUEIS, gem stone of opaque greenish-blue colour; composed of phosphate of aluminium, iron oxide, and copper oxide; occurs in thin veins in slaty rock. *Oriental t.* is found only at Nish Apur, in Persia.

TURRETED-SHELLS, see under GASTEROPODA.

TURRIFF (57° 32′ N., 2° 27′ W.), town, Aberdeenshire, Scotland. Pop. of parish (1911) 4128.

TURRIS (40° 50′ N., 8° 30′ E.) (modern **PORTO TORRES**), ancient seaport town, Sardinia, on N. coast.

TURSHIZ (25° 10′ N., 58° 30′ E.), town, Khorasan, Persia. Pop. *c.* 22,000.

TURTLE, see under TORTOISES.

TURTON (53° 38′ N., 2° 24′ W.), town, Lancashire, England. Pop. (1911) 12,651.

TUSCALOOSA (33° 7′ N., 87° 39′ W.), city, capital, Tuscaloosa County, Alabama, U.S.A.; seat of Alabama Univ. (1831); coal, iron, and cotton. Pop. 8407.

TUSCANIA, TOSCANELLA (42° 40′ N., 11° 52′ E.), ancient town, Etruria, Italy.

TUSCANY, TOSCANA, W. central division of Italy, comprising eight provinces—Arezzo, Florence, Leghorn, Grosseto, Lucca, Massa-Carrara, Pisa, and Siena; Apennines to N. and E.; rivers Arno, Ombrone, Cecino, Serchio; area, 9287 sq. miles; principal towns, Florence, Siena, Pisa, Leghorn, Pistoja, Perugia, Lucca (*qq.v.*). In ancient times T. formed part of ETRURIA (*q.v.*); province of *Tuscia* under later empire, then Frankish county; divided up into separate city-states, 1115; Pisa first predominant, then Florence; Cosimo de Medici made Grand-Duke of T., 1569; T. conferred (1737) by Emperor of Austria on Francis of Lorraine (afterwards Francis I. of Austria); made appanage of second sons of Austrian emperor, 1763; republic, then kingdom of *Etruria*, created under

Louis de Bourbon, 1803; Austrian line restored, 1814; annexed to Italy, 1859; cradle of Ital. language and lit. Chief products are maize, wheat, wine, oil, chestnuts; rich in copper, lead, iron ore, mercury, marble, salt, lignite, Sienese earth; mineral and hot springs.

TUSCULUM (near modern Frascati) (41° 48′ N., 12° 44′ E.), ancient city, in Alban Mountains, Latium; said to have been founded by Telegonus, s. of Ulysses; on defeat of its chief, Mamilius (497 B.C.), became an ally of Rome; favourite residence of wealthy Romans (Cicero among others); birthplace of Cato; destroyed by Rome, 1191; has remains of Rom. amphitheatre.

TUSKEGEE (32° 25′ N., 85° 40′ W.), town, capital, Macon County, Alabama, U.S.A.; contains T. Normal and Industrial Institute (founded for the free industrial education of negroes; besides mechanical industries, agriculture, fruit-farming, and baking are taught; and there are some 1500 students in day and night schools, over 300 being women) and Alabama Conference Female College (Methodist-Episcopal). Pop. (1910) 2803.

TUSSAUD, MADAME, MARIE GROSHOLTZ (1760–1850), foundress of famous WAX-work, Baker Street, London.

TUSSER, THOMAS (*c.* 1515–80), Eng. versifier; wrote *Five Hundred Points of Good Husbandrie.*

TUSSILAGO, see COLT'S-FOOT.

TUTBURY (52° 52′ N., 1° 42′ W.), town, Staffordshire, England; manufactures glass; its ruined castle was twice the prison of Mary, Queen of Scots.

TUTICORIN (8° 48′ N., 78° 11′ E.), seaport, on Gulf of Manaar, Madras, Brit. India. Pop. 30,000.

TUTTLINGEN (47° 59′ N., 8° 49′ E.), town, on Danube, Württemberg; manufactures shoes; scene of defeat of French by Austrians and Bavarians, 1643. Pop. (1910) 15,862.

TUXEDO PARK (41° 15′ N., 74° 15′ W.), fashionable settlement, Orange County, New York, U.S.A.

TUY (42° 5′ N., 8° 35′ W.), city, on Miño, Pontevedra, Spain; cathedral; manufactures leather, liqueurs. Pop. 11,500.

TVER, government of European Russia; area, 24,975 sq. miles. Pop. (1910) 2,177,200. Its capital, **Tver** (pop. 60,900), manufactures cottons, woollens, and hardware.

TWAIN, MARK, pseudonym of S. L. CLEMENS (1835–1910), Amer. author; b. Florida, Missouri. His first important work was *The Innocents Abroad,* a description of a voyage to the Mediterranean ports. This was followed by numerous other volumes descriptive of Amer. life and full of Amer. humour.

TWEED (55° 47′ N., 2° W.), river, Scotland; rises in Peeblesshire, passes Abbotsford, Melrose, Dryburgh, etc.,—the land of Scott,—and enters Ger. Ocean at Berwick; length, 97 miles; tributaries, Gala, Ettrick, Leader, Teviot, Till, Whiteadder; salmon fisheries.

TWEED, WILLIAM MARCZ (1823–78), Amer. politician of the most corrupt type; first Tammany boss.

TWEEDDALE, MARQUESSATE OF, title held by HAY family since 1694, when William of Orange cr. 1st marquess; 2nd marquess, prominent in Scots politics; 4th, Sec. of State for Scotland; 8th, fought in Peninsular War.

TWELFTH DAY, see EPIPHANY, FEAST OF.

TWELVE TABLES, see ROME (LAW).

TWICKENHAM (51° 27′ N., 0° 20′ W.), residential town, on Thames, Middlesex, England; associated with Pope, Horace Walpole, and other celebrities; its manor is a Crown possession. Pop. (1911) 29,374.

TWILIGHT is due to reflection of sunlight from vapours, etc., in higher regions of atmosphere. In low latitudes there is little t.

TWILL, a woven cloth in double thread, giving appearance of diagonal ridges or ribs on the surface.

TWISS, SIR TRAVERS (1809–97), Eng. lawyer; draughted constitution of Congo Free State (1884); wrote valuable works on international law.

TYBURN, Eng. stream which once flowed to the Thames at Westminster; T. gallows stood near the present Marble Arch.

TYCHO'S STAR, see CASSIOPEIA.

TYLDESLEY WITH SHAKERLEY (53° 31′ N., 2° 28′ W.), town, Lancashire, England; cotton mills; collieries. Pop. (1911) 15,582.

TYLER (32° 20′ N., 95° 10′ W.), city, capital, Smith County, Texas, U.S.A.; cotton industries. Pop. (1910) 10,400.

TYLER, JOHN (1790–1862), 10th Pres., U.S.A.; b. Greenway, Virginia; originally Democratic, afterwards joined Whigs; Vice-Pres., 1841; Pres., 1841; vetoed National Bank Bill, 1841, causing cabinet to resign. Annexation of Texas occurred during his administration. T. was pres. of Peace Convention at Washington, 1861; sided with South in Civil War, and was member of Confederate Congress, 1861, till death.

TYLER, WAT (d. 1381), leader in Eng. rising of 1381; marched with insurgents to Smithfield, was met by Richard II., and demanded abolition of serfdom and free pardon for the rebels; slain by lord mayor.

TYLOPODA, a group of Even-Toed (*Artiodactyle*) Ungulates, comprising *Camelidæ* or CAMEL FAMILY.

TYMPANIC MEMBRANE, see EAR.

TYNDALE, WILLIAM (1492–1536), Eng. Prot. divine; translator of New Testament into English; persecuted and obliged to flee abroad; captured near Brussels and executed. His version formed the basis for subsequent work. See BIBLE, THE ENGLISH.

TYNDALL, JOHN (1820–93), Irish physicist; commenced life in Irish Ordnance Survey; master at Queenwood Coll., Hampshire; took his doctorate at Marburg Univ.; became prof. (1854) and director (1867) of Royal Institution; most lasting work was done in Heat; wrote *Heat as a Mode of Motion* (1863), pres. Brit. Association, 1874; friend of Huxley from 1850; had extraordinary power of popularising physics, and lectured much.

TYNDARIS (38° N., 15° E.), ancient city, Sicily, on N. coast; founded, 396 B.C.

TYNE (55° 1′ N., 1° 26′ W.), river, England; flows E. to North Sea at Tynemouth; length, 80 miles.

TYNEMOUTH (55° 1′ N., 1° 26′ W.), seaport, watering-place, at mouth of Tyne, Northumberland, England; contains ruins of a VII.-cent. priory and a castle (XI. cent.); shipbuilding; fisheries; manufactures ropes and sails. Pop. (1911) 58,822.

TYPE, see PRINTING (LETTERPRESS PRINTING).

TYPEMETAL, see ANTIMONY.

TYPEWRITER, writing-machine producing characters similar to printing. In 1714 Brit. patent was granted Miller; in America to Burt, 1829. In 1875 Sholes & Glidden brought out first practical machine, which was manufactured by Remington & Sons, gunsmiths, of New York. T. consists of keyboard, and pressure of keys causes corresponding types (carried at end of levers) to strike paper. Types are inked by pad, or more often strike inked ribbon, pressing it against the paper. The Elliott-Fisher machine is unique, for it writes in a book or ledger.

TYPHLOPIDÆ, a family of SNAKES (*q.v.*).

TYPHOID FEVER, ENTERIC, a specific infectious fever, characterised by an eruption on the skin, swelling of the spleen and lymph glands of the abdomen, and particularly by lesions in the intestine. The disease is caused by *Bacillus typhosus,* a short, thick rod, with rounded ends and numerous flagella, infection being most usually conveyed by water which has been contaminated by sewage, as the bacillus is present in the fæces of affected persons. Milk and shell-fish are other common carriers of infection. The incubation period of the disease is about 12–14 days, and the onset is gradual, the first symptoms being headache, shiverings, a feeling of tiredness and of abdominal discomfort, and, later, a gradual rise of temperature accompanied by diarrhœa. By the end of a week the temperature is high, the pulse is weak and rapid, the abdomen is distended, there may be diarrhœa or constipation, and the spleen and abdominal lymphatic glands are enlarged.

The rash appears on the 7th day in the form of

rose-coloured spots on the trunk, coming out in successive crops. By the 2nd and 3rd week the symptoms are more pronounced, the patient is flushed, wasted, the vitality feeble, there is severe diarrhœa, and there may be delirium. In the intestine there is at first inflammation of the lymphatic patches and follioles, then necrosis, and sloughing of the parts, leaving ulcers which eventually heal. At the end of 3 weeks, however, the temperature begins to go down, becoming normal in a week, and the other symptoms lessen in severity. Relapses, due to new infections of the intestine, and sometimes 2 or 3 in number, may occur. Hæmorrhage in the intestine is the most common and most serious complication, usually occurring about the 3rd or 4th week, when sloughs are coming away, and it may be so severe as to cause death immediately; perforation, followed by peritonitis, is another very serious complication, usually ending fatally; pneumonia, bronchitis, and thrombosis also frequently complicate the disease.

One of the most important aids to the diagnosis is *Widal's reaction*, the inoculating of diluted blood serum obtained from the patient with a typhoid bacillus culture, and if clumping or 'agglutination' of the bacilli takes place when a drop of the fluid is examined under the microscope, the case is one of t. f. The dilution of the serum must be at least 1 in 40.

The treatment consists of isolation, complete confinement to bed, liquid, nourishing food, with plenty of water to drink, and stimulants may be necessary. Opium is given with lead acetate for intestinal hæmorrhage and for severe diarrhœa, and severe constipation is treated with enemata, purgatives being harmful. Cooling baths or, when baths are impossible, ice-packs are employed to relieve high temperatures. The period of isolation is 4 weeks. In regard to preventive measures, a vaccine has been prepared from killed typhoid bacilli, inoculation by which diminishes susceptibility to disease, and experiments are being carried out, with considerable success, with an anti-typhoid serum. The urine and fæces of a person who is convalescent from typhoid fever must be carefully disinfected by a 1 in 20 solution of carbolic acid for some weeks after the period of isolation is over, as a preventive measure, as the bacillus may be present for some time in the excreta.

TYPHON, see EGYPT (RELIGION).

TYPHOON, see CYCLONE.

TYPHUS FEVER, a specific infectious fever, characterised by an eruption on the skin and nervous prostration, caused by a micro-organism which has not yet been discovered, infection being conveyed by contact with affected persons, and, it is believed, by fleas and similar parasites, while filth and unhealthy conditions are predisposing causes. The incubation period is about 12 days, and an attack comes on suddenly, with headache, pains in the back, shiverings, prostration, often vomiting and constipation. The temperature rises sharply, and the characteristic 'mulberry' rash appears about the 5th day, chiefly on the back of the trunk and limbs, and minute hæmorrhages develop at the spots. The pulse becomes weaker and more rapid, and by the 2nd week there is delirium, while prostration is intense. About the 14th day, however, the temperature usually falls by crisis, the pulse becomes stronger and slower, the patient perspires, sleeps easily, and generally improves. Serious complications may arise, *e.g.* pneumonia, pleurisy, thrombosis, or paralysis.

The treatment consists of isolation, careful and constant nursing, and the administration of nourishing fluid foods. Stimulants are usually required at one stage or another, ice is applied for headache and delirium, and complications are treated as they arise. The period of isolation is 5 weeks.

TYPOGRAPHY, see under PRINTING.

TYRANNUS, KING BIRD (*q.v.*).

TYRAS (46° 12′ N., 30° 20′ E.) (modern AKKERMAN), a Milesian colony, near mouth of Tyras (Dniester).

TYRCONNELL, ancient kingdom of Ireland, corresponding generally to the modern Donegal (*q.v.*).

TYRCONNELL, RICHARD TALBOT, EARL OF (1630–91), Irish Jacobite; representative of Roman Catholics in Ireland; became viceroy, 1678.

TYRE, TIRE, outer rim of wheel; iron band shrunk on a cart-wheel; steel rim of railway carriage wheels. Term usually applied to **pneumatic t.** of cycles and motor-cars; a tube containing compressed air forms a cushion on uneven road surfaces. The outer cover is made of woven canvas coated with para rubber; the inner tube is fitted with a valve which allows air, forced in by a hand- or foot-pump, to enter but not to escape. Outer covers have various devices—ribs, steel or rubber studs, chains, etc.—to prevent skidding.

The first cycle t's were thin and 'solid'; later 'cushion' t's were thick tubes of small bore.

A PUNCTURE is a hole made by glass, etc., in a pneumatic t. It is repaired by cementing a piece of rubber sheeting on the inner tube by a solution of india-rubber in naphtha or bisulphide of carbon. Motor-car t's are best repaired by vulcanising (see RUBBER), as friction with the road tends to loosen cemented patches.

TYRE (33° 17′ N., 35° 17′ E.) (modern SUR), ancient city, on coast of Phœnicia; one of the most flourishing maritime cities of ancient times; famous in Biblical history; fell to Alexander after a siege in 332 B.C.; occupied by the Crusaders, 1124–1291; finally destroyed by the Turks.

TYREE (56° 30′ N., 6° 56′ W.), island, Inner Hebrides, Argyllshire, Scotland; length, 12 miles; greatest breadth, 6 miles.

TYRNAU, see NAGY-SZOMBAT.

TYROL, TIROL (46° 50′ N., 7° 20′ E.), crown-land, Austria, between Bavaria, Salzburg, Carinthia, Italy, Switzerland, Vorarlberg; area, 10,300 sq. miles; magnificent Alpine scenery (Oezthaler, Zillerthal, Dolomites, and other chains), with perpetual glaciers; highest peak, Ortler, 12,800 ft.; immense forests; metal industries, cotton, silks, leather, wine, fruit, salines, sulphur, etc.; capital, Innsbruck; Trent and Bozen also on Brenner-pass route; chief rivers, Inn, Drave, Adige; health and sporting resort. T. was originally part of Rhætia; taken by Romans, 15 B.C.; passed to Austria, 1363; famous rising of Hofer (*q.v.*), 1809; reunited to Austria, 1815. Pop. (1910) 946,613.

TYRONE.—(1) (54° 37′ N., 7° 15′ W.) inland county, Ulster, Ireland; surface mostly hilly, rising into mountains in N. and S.; fertile and well-cultivated in low-lying districts; watered by branches of Foyle and Blackwater; chief pursuits, agriculture and cattle-rearing; linens and coarse woollens manufactured. Pop. (1911) 142,437. Capital, Omagh. (2) (40° 40′ N., 78° 14′ W.) town, on Little Juniata, Pennsylvania, U.S.A.; shipping station for an agricultural and lumber region. Pop. (1910) 7176.

TYRONE, LORDS OF, see O'NEILL.

TYRRELL, GEORGE (1861–1909), Irish theologian, became R.C., 1879; entered Soc. of Jesus, 1880; sympathetic with modernism; expelled from order, and suspended, 1906; wrote *Mediævalism*, *Lex Orandi, Lex Credendi, Christianity at the Cross Roads*.

TYRTÆUS (VII. cent. B.C.), Gk. elegiac poet who inspired with his war songs the Spartans so that they defeated the Messenians.

TYRWHITT, THOMAS (1730–86), Eng. editor of *Chaucer* and classics (Aristotle's *Poetics*, etc.); refuted Chatterton's 'Rowley' poems.

TYTLER, WILLIAM (1711–92), Scot. historian; b. Edinburgh; pub. *Inquiry, Historical and Critical*. His s. Alexander (1747–1813) wrote *Outlines* or *Elements of General History*.

TYUMEN, TIUMEN (56° 55′ N., 60° E.), town, on Tura, Tobolsk, Siberia; terminus of a railway from Perm; manufactures leather, carpets; active trade. Pop. (1910) 34,400.

TZETZES, JOHN (XII. cent.), Byzantine writer of *Iliaca*, a poem, and *Chiliades*, a collection of legends.

U, 21st letter of alphabet; Greeks developed *upsilon* from Phœnician equivalent of *f*; Rom. alphabet took *v*, from which *u* came (cf. M.E. *haue* = have).

UBANJI (1° N., 19° E.), river, Africa; formed by union of Mbomu and Welle; joins Congo; length, 1500 miles.

ÚBEDA (37° 1′ N., 3° 27′ W.), town, Jaen, Spain; trade in wine, agricultural produce. Pop. (1910) 23,394.

UDAIPUR (24° 35′ N., 73° 43′ E.), native state, Rajputana, India. Pop. (1911) 1,276,472. Capital, **Udaipur**. Pop. 47,000.

UDAL, allodial tenure. See ALLODIUM.

UDAL, NICHOLAS (1504–56), Eng. playwright; b. Hampshire; ed. Oxford; was headmaster of Eton, then of Westminster. He is notable for one work, *Ralph Roister Doister*, a great advance on the Interlude, for the author has combined the Interlude tradition with classical correctness. The 'Vice' of the Interlude, the gull, the braggart, the witty maids are all there, and their fun is delightful. The play is elementary, the vehicle—rhymed doggerel—is poor, but in the history of drama *Ralph Roister Doister* is of high importance.

UDINE (46° 10′ N., 12° 50′ E.) (ancient *Vedinum* or *Utinum*), town, Italy; manufactures silks; formerly capital of Friuli. Pop. (1911) 17,626; (province) 628,330.

UELZEN (53° N., 10° 31′ E.), town, on Ilmenau, Hanover, Prussia; manufactures sugar, flax. Pop. 9500.

UFA (55° N., 56° E.), government, E. Russia; traversed in E. part by chains of the Urals; drained chiefly by the Byelaya; minerals include iron, copper, coal; excellent pastures; produces large crops of cereals. Pop. (1910) 2,890,700. Capital, **Ufa** (54° 46′ N., 56° 8′ E.), at junction of Ufa and Byelaya; manufactures iron. Pop. (1910) 66,430.

UGANDA (in Bantu, BUGANDA), Brit. protectorate in E. Africa; bounded N. by line of 5° N. lat.; E. by line through middle of Lake Rudolf, N. boundary of E. African Protectorate, to shore of Victoria Nyanza; S. by line of 1° S. lat.; W. by north line from Mt. Sabyino to Mt. Nkabwe, river Ishasha to Lake Edward, across lake to Margherita Peak, Lamia River to Semliki River, Semliki to Albert Nyanza, middle of Albert Nyanza to Mahagi, and thence to 5° N. lat. by Congo-Indian boundary. Captain Speke was first European to visit Buganda (1862); welcomed by King Mutesa. Stanley, also well received (1875), was invited to send missionaries. These came, 1877, 1879, but Mwanga, Mutesa's successor, becoming suspicious, Christian massacres took place in 1885. U. was assigned to Great Britain by Anglo-German treaty (1890), and protectorate proclaimed, 1894. Mwanga rebelled, 1877, but was soon put down, and mutiny of Sudanese troops in same year quelled after some months' fighting. Sir H. Johnston, sent as Commissioner, 1899, reorganised protectorate.

U. is divided into five provinces: (1) Kingdom of Buganda, on W. shores of Victoria Nyanza; (2) W. province, on W. boundary; (3) N. province, along W. to N. boundary; (4) Rudolf province, from N. boundary down E. to (5) E. province, lying E. of Buganda and N. province.

U. contains head-waters of Nile, interference with which might greatly injure irrigation of Egypt. Surface is plateau, over 3000 ft., with mountains in S. and W. rising to height of 14,000 to 20,000. N. is forested; climate mild; rainfall, 47 inches. The Governor administers justice, raises revenue, and controls native chiefs, who, however, govern their own subjects. Europeans are tried in Brit. courts; there is a High and an Appeal Court (of judges from neighbouring protectorates). Islands in Victoria Nyanza are home of sleeping-sickness, and are now abandoned.

Several steamers of Uganda railway (584 miles, completed, 1902, at cost of over £5,000,000) ply on lakes; mail service by runners is in vogue, and telephones and telegraphs are being extended. Iron, china-clay, and copper abound; cotton and coffee grow wild; rubber, gum-plants, cocoa, sugar, vanilla, tea, and grain are among industries. Chief exports (amounting in 1911–12 to £392,591) are ivory, timber, cattle, gum, and hides; imports (1911–12, £624,537), provisions, textiles, machinery.

Chief native stock is Bantu (about ⅘th of total); nearly half are intelligent Buganda, and there are Sudanese and Masai. In 1909 over 36,000 scholars were in Anglican and 11,000 in R.C. schools. Brit. capital is Entebbe; native, Kampala. Area, 171,681 sq. miles. Pop. (1911) 2,843,325 natives, with 500 Europeans.

Lugard, *Rise of our E. African Empire*; Johnston, *The Uganda Protectorate*.

UGLICH (57° 33′ N., 38° 23′ E.), town, on Upper Volga, Yaroslavl, Russia; cathedral (XIII. cent.); paper- and flour-mills. Pop. 9800.

UGOLINO DELLA GHERARDESCA (c. 1220–89), count of Donoratico; Pisan noble active for Guelph faction; placed by Dante among traitors in lowest circle of *Inferno*.

UHLAND, JOHANN LUDWIG (1787–1862), Ger. poet and politician; b. Tübingen; wrote excellent volkslieder and ballads; also lyrics, and *Life of Walther von der Vogelwaide, Der Minnesang*, etc.

UIST, NORTH AND SOUTH (57° 35′ N., 7° 20′ W.) (57° 15′ N., 7° 20′ W.), two islands, Outer Hebrides, Inverness-shire, Scotland. Pops. (1911) 3677; 5383.

UITENHAGE (33° 46′ S., 25° 27′ E.), town, Cape Colony; railway-works; wool-washing industry. Pop. (1911) 11,574.

UJIJI (4° 50′ S., 29° 40′ E.), town, on Lake Tanganyika, Ger. E. Africa; trading centre; here Stanley found Livingstone, Oct. 28, 1871. Pop. 15,000.

UJJAIN (23° 11′ N., 75° 52′ E.), town, native state Gwalior, India; exports opium; was capital of ancient Malwa. Pop. 43,000.

UKASE, an edict from Tsar or Senate of Russia (*q.v.*).

UKRAINE (49° 40′ N., 30° 20′ E.), region, formerly on frontier between Russia and Poland; now included in Russian governments Kiev, Podolia, Poltava, and Kharkov.

ULCER, term applied to an open sore formed by a gradual breaking down of tissue in skin or mucous membrane; chief varieties are *simple*, due to gradual death of the tissue cells through lack of nutrition, or to traumatism; *specific*, due to the action of a specific micro-organism, *e.g.* of tuberculosis or syphilis; *malignant*, due to the replacement of the skin or mucous membrane by a malignant growth, *e.g.* epithelioma.

Treatment consists of rest, cleansing of the u. with mild antiseptic lotions, *e.g.* boracic lotion, and the application of antiseptic dressings, the part affected being raised to aid the return of venous blood; in chronic ulcer the pressure exerted by an india-rubber bandage is very advantageous; in malignant u. operative treatment is, of course, necessary at once.

ULEÅBORG (Finnish OULU) (67° N., 27° 30′ E.), län of N. Finland, including part of Lapland; largely

forest-covered. Pop. (1910) 328,311. Capital, **Uleåborg** (64° 57′ N., 25° 42′ E.), on Gulf of Bothnia; trade in timber. Pop. (1910) 16,114.

ULFILAS (311–83) (Little Wolf), Arian bp., called apostle of the Goths; his mission to the Goths has been called the noblest side of Arianism, and U. is its greatest name. He came to Constantinople to support the Arians; translated Bible into Gothic — earliest Teutonic version, and portions, of greatest importance to Teutonic philology, survive.

ULLATHORNE, WILLIAM BERNARD (1806–89), R.C. bp. of Birmingham, 1850–88.

ULLESWATER, see LAKE DISTRICT.

ULLMANN, KARL (1796–1865), Prot. divine; prof. at Halle (1829), Heidelburg (1836).

ULM (48° 24′ N., 9° 59′ E.), city, Württemberg, Germany; first-class fortress; magnificent Gothic cathedral (1377–1494), famous spire, Neu Bau (containing government offices), town hall; cottons, woollens, leather, flour-milling, distilling; here General Mack, with 28,000 Austrians, surrendered to Napoleon, 1805. Pop. (1910) 56,019.

ULRICH, DUKE OF WÜRTTEMBERG (1487–1550), driven from Württemberg, 1519; his attempt to recover duchy, on outbreak of Peasants' War, failed, 1525; restored by aid of Hesse, 1534; promoted Reformation, destroying monasteries and seizing Church property.

ULSTER (54° 40′ N., 7° 20′ W.), province, in N. of Ireland; contains counties of Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Londonderry, Monaghan, and Tyrone. Manufactures textiles and iron goods; bricks; shipbuilding and distilling are important. Pop. (1911) 1,587,572. U. as a whole is Protestant, and strenuously opposed to the Home Rule Bill, and threatens to resist by arms any attempt to enforce it. Her champion is Sir Edward Carson. See IRELAND, HISTORY.

ULSTER, EARLDOM OF, Irish honour, first held by Hugh de Lacy, 1205; successively held by De Burgh, Plantagenet, and Mortimer families, coming in 1425 to Richard, Duke of York, whose s. became Edward IV., 1461, since when held by royal family.

ULTIMATUM, final propositions presented by one side in an international dispute. If these are not accepted, diplomatic negotiations are broken off. Wars sometimes begin without formal submission and rejection of u.

ULTRAMARINE, a silicate of aluminium and sodium containing sulphur; is a blue pigment, natural form lapis lazuli; used for blueing clothes and paper.

ULTRAMONTANISM, school, party, tendency, and policy in R.C. Church, its existence as distinct from Catholicism being denied by Catholics as a whole. It is the inheritor of the mediæval opposition to secularism and is largely equivalent to the modern opposition to liberalism or 'modernism' of any kind. It really sums up the dominant tendencies in the R.C. Church and the policy of the Curia, is certainly opposed to secularism, rationalism, and nationalism, but tends to be a vague term flung at certain R.C. tendencies by those who do not agree with them. The formulation of the doctrine of Papal Infallibility at the Vatican Council of 1870 was certainly a triumph of U., and likewise later pronouncements against modernism.

Acton, Lord, *History of Freedom*.

ULVERSTON (54° 12′ N., 3° 5′ W.), town, on Morecambe Bay, Lancashire, England; ironworks; ships' iron, slates. Pop. (1911) 9552.

ULYSSES, see ODYSSEUS.

UMAN (48° 43′ N., 30° 20′ E.), town, Kiev, Russia; export trade in corn. Pop. (1910) 37,200.

UMARKOT (25° 21′ N., 69° 46′ E.), town, Thar and Parker, Sind, Brit. India. Pop. 5100.

UMBALLA, AMBALA (30° 21′ N., 76° 52′ E.), city, military station, Punjab, Brit. India. Pop. (1911) 18,131.

UMBELLIFERÆ, herbaceous dicotyledons, possessing stout, hollow stems, and sheathing, much divided leaves; inflorescence, cymose umbel, usually compound, though simple in *Astrantia*, *Bupleura*, and some others. Carrot, celery, caraway, and parsley are economically important.

UMBILICUS, see NAVEL.

UMBRELLA, used by women in Britain from XVII. cent.; first Englishman to use it habitually, Joseph Hancock, *c.* 1750; used by ancients; ceremonial significance in East.

UMBRIA, district in central Italy; ancient U. at one time embraced almost whole of central and N. Italy, but varied greatly in extent at different periods; was Sixth Region of Italy under Empire. Modern U., comprising province of Perugia, is bounded by Tuscany, Abruzzi, and Rome; capital, Perugia; region mountainous, but very fertile; contains many objects of artistic and architectural interest; until 1860 U. formed part of Papal States.

UMLAUT, word invented by Jacob Grimm (*q.v.*) to denote vowel change caused by the following vowel *i* (or *e*). *e.g.* Ger. *Mann* gives *Männlich*. In English the following vowel may have disappeared, cf. *Frank*, *French=Frankish*; man, men; fall, fell; mouse, mice.

UNALASKA, see ALEUTIAN ISLANDS.

UNAO (26° 32′ N., 80° 32′ E.), town, United Province, British India. Pop. 13,700.

UNCIAL, see PALÆOGRAPHY.

UNDERWRITER, see INSURANCE.

UNDULATORY THEORY, see LIGHT.

UNEMPLOYMENT.—Every fresh piece of labour-saving machinery invented necessitates at least temporary unemployment for displaced labour. Changes of fashion, and mistakes on the part of the employer causing loss of business are also regular causes. Some persons, through want of will, strength, or health, are permanently unemployable. Others dissatisfied with the conditions of labour are unemployed by choice. Legislation has been framed to mitigate the evil. The Insurance Act (1911) provides for u. in certain trades.

UNGAVA (56° N., 71° W.), unorganised territory, Canada, occupying N.W. side of Labrador peninsula.

UNGULATA, a great order of mammals comprising the HOOFED ANIMALS. Their main characteristic is the presence of hard blunt nails, or hoofs, encasing the toes, and fitting the animals especially for running. They include Hyrax, Elephants,—the PERISSODACTYLA,—Tapirs, Rhinoceroses, Horses,—the ARTIODACTYLA,—Pigs, and the RUMINANTS, all of which are discussed separately; but here we may mention an extinct group of gigantic forms—*Titanotherium* (*Brontotherium*) and its allies, which were apparently common in America in later Tertiary times. They were scarcely less than Elephants in size, and had a rhinoceros-like skull, with complex molar teeth (*brachydont*).

UNGULATE, see HORSE FAMILY.

UNGVAR (48° 38′ N., 22° 20′ E.), town, on Ung, Hungary; pottery, wine; health-resort. Pop. 15,200.

UNICORN, a fabulous animal mentioned by classical authors as existing in India and as having a long, single horn on the forehead. The animal was supposed to resemble the horse in build and swiftness, though the origin of the fable is probably the rhinoceros. James I. adopted the unicorn as the sinister supporter of royal arms at Union of the Crowns.

UNIFORMITY, ACT OF, see ENGLAND (HISTORY).

UNIFORMS.—Until the XVI. cent. soldiers were distinguished only by wearing the badges of their leaders. In 1707 the first *Clothing Regulations* for the Brit. army appeared. Scores of valuable works record the results of special study by artists of the professional dress of soldiers and sailors.

In 1742 an official *Representation of the Clothing of H.M. Household and of all the Forces upon the Establishments of Great Britain and Ireland* was issued. The typical military dress of the XVIII. cent. was a loose scarlet coat with skirts, looped up at the sides

to give freedom to the legs, a close-buttoned cloth waistcoat coming down to the thighs, breeches of red or blue nearly concealed by long white gaiters fastened at the knee by a black strap and reaching half-way up the thigh. The conical head-dress of cloth with brass insignia was replaced by a three-cornered hat. The coat was open at the collar and chest to display a white cravat and a shirt, and the cuffs were turned up to leave the wrists free; a broad buff belt hanging from left to right suspended a pouch, and a belt round the waist supported a bayonet and a small basket-hilted sword. The following dates mark important changes: 1800, a cylindrical shako with peak replaced the cocked hat; 1801, greatcoats issued; 1802, chevrons for N.C.O's introduced; 1808, queues dispensed with; 1811, trousers worn; 1833, narrow welt of red cloth placed down the outer seams of trousers; 1845, the Albert shako; 1855, tunic replaced coatee; 1871, glengarry forage cap; 1878, cork helmet replaced shako. In 1881 the distinctive facings for collars and cuffs of the tunic were abolished, and uniformity was gained by adopting white facings, except for 'royal' regiments, which retained blue facings.

In Trafalgar days the Brit. seamen wore pig-tails and the cocked hats of officers were often worn 'fore and aft.' Of the Fr. sailors of the period some were in blue jackets, white trousers, and red caps or straw hats, and of the Span. some wore brown and yellow jackets and caps. The dress of the Span. marines was light blue, with red cuffs and collars; the Fr. marines were dressed in dark, with red cuffs and collars and epaulettes. Both wore caps with brass plates denoting the number of the regiment.

The use of smokeless powder in South Africa, 1899–1902, caused the most violent change ever known in military costume, for smart uniforms (no longer screened by clouds of powder smoke) presented a favourable target. Hence the introduction of a 'service dress,' comfortable, durable, and invisible. As early as 1878 'Khaki' (dust-colour) clothing was adopted for service in Afghanistan.

The active service kit of the Brit. infantry soldier is as follows: *Ankle boots, *braces, water-bottle, *drawers, identity disc, helmet, jacket (service dress), *puttees, shirt, *trousers (service dress), waistcoat (cardigan), clasp knife. [Kilted rogiments substitute for articles marked *: Apron (kilt), gaiters (Highland), shoes (Highland), garters and rosettes, hose-tops.]

The haversack (weight 3 lb.) contains: (*a*) Rations; (*b*) knife, fork, and spoon. The pack (weight 12½ lb.) contains: Pay-book, mess tin and cover, cap (comforter), greatcoat, holdall (with razor, brushes, soap, etc.), housewife, socks, towel.

The French army is about to adopt a grey-blue cloth for greatcoat and tunic and kepi, but will retain the red trousers. Holland adopted 'grey-green' service dress for the manœuvres of 1913.

Ackermann's *Costumes of the Brit. and Ind. Armies, 1840–60*; Cannon's *Historical Records of the Brit. Army, 1834–53*; Spooner's *Costumes of the Brit. Army, 1840–44*, and *Military and Naval Uniforms, 1833–40*; Luard's *History of the Dress of the Brit. Soldier* (1852).

UNIO, Freshwater Mussel, see under LAMELLIBRANCHIATA.

UNION.—(1) (40° 45′ N., 74° 3′ W.) town, on Hudson River, Hudson County, New Jersey, U.S.A.; manufactures silk goods. Pop. (1910) 21,023. (2) (34° 43′ N., 81° 40′ W.) city, capital, Union County, S. Carolina, U.S.A.; cotton industries. Pop. (1910) 5623.

UNION JACK, see FLAG.

UNION LEAGUE OF AMERICA, THE, political organisation which existed 1862–70; caused permanent political opposition of blacks and whites.

UNIONTOWN (39° 53′ N., 79° 42′ W.), town, capital, Fayette County, Pennsylvania, U.S.A.; glass- and ironworks. Pop. (1910) 13,344.

UNIT CHARACTER, see MENDELISM.

UNITARIANISM, see under FREE CHURCHES.

UNITED BRETHREN IN CHRIST, Amer. denomination founded by Philip William Otterbein, 1726–1813; theologically they are Evangelical Protestants; a small conservative minority seceded, 1889.

UNITED FREE CHURCH OF SCOTLAND, Church formed by union of Free Church of Scotland and United Presbyterian Church. A Free Church minority refused to consent, and though the Court of Session upheld the majority, on appeal to House of Lords (1904) the Free Church minority obtained possession of all property. An Act of Parliament had to settle differences, as owing to its small numbers the Free Church was unable to retain and administer efficiently all the property.

UNITED KINGDOM OF GREAT BRITAIN AND IRELAND (50° to 70° 30′ N., 1° 44′ E. to 10° 30′ W.), includes England, Scotland, Ireland, and Wales (for geography, see these headings); total area, including Isle of Man and Channel Islands, 121,391 sq. miles. Pop. (1911) 45,365,599.

The ruling monarch is George V., whose right rests on the Act of Settlement (1701), by which succession was settled on Princess Sophia of Hanover and her heirs.

Government is a limited monarchy; executive power though nominally vested in sovereign is in reality held by the Cabinet, a council of Ministers of State, who hold office as a result of their party's having a majority in Lower House; at present the Cabinet consists of Premier, Chancellor of Exchequer, Lord President of Council, Lord High Chancellor, Foreign Secretary, Home Secretary, Colonial Secretary, War Secretary, Indian Secretary and Privy Seal, Secretary for Ireland, Secretary for Scotland, First Lord of Admiralty, Pres. of Board of Trade, Pres. of Local Government Board, Pres. of Board of Education, Pres. of Board of Agriculture and Fisheries, Postmaster-General, Chancellor of Duchy of Lancaster, First Commissioner of Works, and (as personal honour) Attorney-General. Legislative power is vested in a parliament of two Houses; HOUSE OF LORDS includes all English peers, who hold their seats by hereditary right or by creation of the Sovereign, archbishops and bishops of Church of England, and a number of elected Scots and Irish peers, the former being elected for each parliament, while the latter hold their seats for life. The HOUSE OF COMMONS consists of members elected by the various county, borough, and University constituencies throughout the kingdom. In 1911 changes in the Constitution came into force with the PARLIAMENT ACT; the duration of Parliament was limited to five years; money bills may become law without consent of Upper House, and other bills may also be passed without consent of the Lords if they are passed in the Lower House in three sessions in succession.

In 1911 also the payment of members of Lower House came into force. A bill for Home Rule in Ireland is at present (1913) under discussion. (For local government, justice, education, religion, etc., see articles on England, Scotland, and Ireland.)

The **revenue** of the U.K. in 1911 was £203,850,588, and the expenditure was £171,995,667; principal sources of national revenue are income-tax, customs duties, estate duties, post-office; and chief items of expenditure are charges on national debt, and the upkeep of army, navy, and civil services. The army, including regular forces, militia, territorials, reserve forces, and colonial and native Indian troops, numbers in all (1912) 735,767; and the navy in 1912 numbered in all 134,000. For naval figures, see under NAVY.

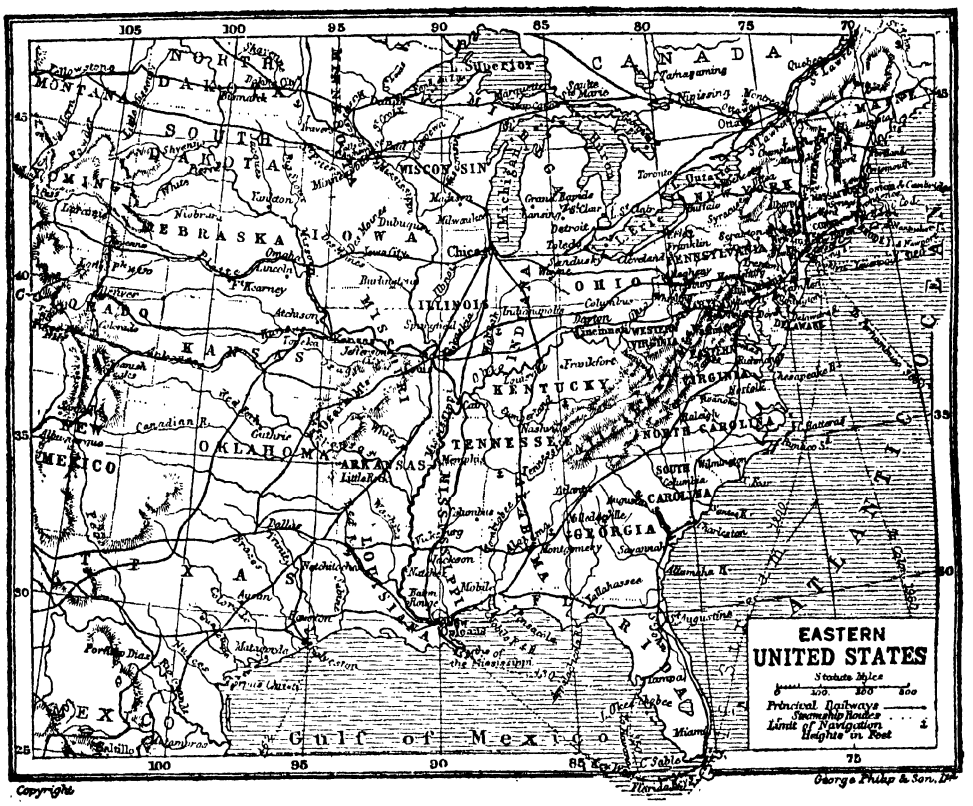
Industries, commerce, etc.—Agriculture is carried on; chief crops are, in Great Britain, oats, wheat, barley, potatoes; in Ireland, oats, potatoes, barley; live stock raised (in order of numerical importance); in Great Britain, sheep, cattle, pigs, horses; in Ireland, cattle, sheep, pigs, horses. Minerals include coal, iron, tin, lead, zinc, wolfram, copper, besides limestone, sandstone, oil shale, and gypsum. The principal manufactures are iron and steel goods, and cotton, woollen, and linen textiles. The foreign countries with which trade is most extensively carried on are

Germany, United States, France, and Russia; large trade is also carried on with India, Australia, Canada, and other British colonies. Value of exports (1911), £464,119,000; imports (1911), £680,157,000. Chief imports are cereals, live stock, food-stuffs, raw materials, including cotton, timber, wool, etc., and iron and steel goods; and the chief exports are coal, cotton goods, linen and woollen goods, iron and steel goods, fish. Shipping is one of most important industries; total net tonnage of British steam and sailing vessels engaged in foreign and home trade in 1911 was 18,213,620, and in same year the foreign vessels cleared at British ports had a tonnage of 28,636,846. Railway lines open in 1910 had mileage of 23,387.

Annual Register; Whittaker's *Almanac*; *Statesman's Year Book*; Welton, *England's Recent Progress* (1911).

Punjab; area, 107,164 sq. miles. Surface generally is a wide plain, with Himalayas on N. boundary; watered by Ganges, with Jumna and other affluents; chief towns are Allahabad (capital), Lucknow, Benares, Cawnpore, Agra, Meerut. Administration is carried out by a lieutenant-governor, who is assisted by a legislative council. Agriculture is extensively carried on; chief crops are wheat, rice, millet, barley, maize, and pulse, while cotton, sugar-cane, and oil-seeds are also cultivated. Climate in many parts is unhealthy. Principal religions, in order of numerical importance, are Hindu, Muhammadan, Christian, Jain, and Sikh. Pop. (1911) 47,182,044.

UNITED STATES.—Geography.—The U.S. is a federal republic, extending across N. America from E. to W., and is bounded N. by Canada, E. by the Atlantic, S. by the Gulf of Mexico and Mexico (Rio Grande del Norte, etc.), and W. by the Pacific (see



UNITED METHODIST CHURCH, body composed by amalgamation in 1907 of Methodist New Connexion, Bible Christians, and United Methodist Free Church.

UNITED METHODIST FREE CHURCHES, body formally begun in 1857, now amalgamated in United Methodist Church.

UNITED PRESBYTERIAN CHURCH, Scot. religious body existing under that name, 1847–1900. The **United Secession Church** had arisen, 1732, the occasion for schism being disputes over patronage. In 1847 they had 400 churches, when they united into the *Relief Church* (existing since 1761) to form the U.P. Church. After various abortive efforts this Church united with the Free Church to form the United Free Church (*q.v.*).

UNITED PROVINCES OF AGRA AND OUDH (*c.* 24° to 31° 30′ N., 77° to 84° 30′ E.), province, Brit. India; bounded N. by Punjab, Tibet, E. by Nepal, Bengal, S. by Bengal, Central India Agency, W. by Rajputana,

article on detached territory of ALASKA). The main portion lies between 25° (a few small islands are farther S.) and 49° N., and between 67° and 124° 30′ W. The extreme length N. to S. is *c.* 1660 miles, the mean breadth, *c.* 2700, the area (excluding Alaska), 3,000,000, the coastline over 13,000 sq. miles. The surface outlines are simple. Inland from the E. coast is the Atlantic Plain with average width of 200 miles and rising to the ridges of the Appalachians. W. of these the ground sinks to the great Central Plain with prairies rising W. into the Great Plains, a low plateau E. of the Rocky Mountains. W. follow the Rocky Mountains, succeeded by mountainous plateau, then by the Cascade Range and the Sierra Nevada (extreme height, 14,900 ft.) and the Coast Range and Sierra Madre, from which there is abrupt fall to the Pacific.

The larger proportion of the country W. of 98° W. is over 2000 ft. above sea-level, E. more than half is under 600 ft. The Central Plain is broken by the Ozark Mountains (extreme height, *c.* 2000 ft.), which curve

through S. Missouri, Arkansas, and the eastern part of Oklahoma; and across its N. by the rising ground known on the S. slope as the Great Divide, on the N. as the Height of Land. The latter has no great elevation, and so the cold N. winds and warm, moist S. winds are able to pass up the central hollow of the whole continent. The N.E. is drained by streams flowing to the Great Lakes and the St. Lawrence; the coastal strip by the Penobscot, Connecticut, Hudson, Delaware, Susquehanna, Potomac, James, Roanoke, Savannah, and smaller streams; the Central Plain by the Mississippi-Missouri system, the Alabama, Sabine, Trinity, and smaller streams flowing direct to the Gulf of Mexico; the S.W. by the Rio Grande del Norte (flowing into the Gulf of Mexico) and the Colorado (Gulf of California); the N.W. by the Columbia, which breaks across the coast mountains; short rivers run down to the Pacific from the W. coast mountains.

The great rivers of the Central Plain are navigable for long distances; the Hudson is navigable, but other E. rivers are chiefly important for manufacturing and harbour purposes; W. rivers mostly flow through deep gorges, and, except the Columbia, are of no commercial importance. The E. coast as far S. as Long Island is rocky and has many good harbours; farther S. it is low and sandy, and broken only by the great openings of the Delaware and Chesapeake; along the Gulf of Mexico it is low and swampy, fringed in places with shallow lagoons, with muddy bars at the river mouths, while near the middle the Mississippi delta projects some 50 miles out to sea. The long line of W. cliffs is broken only in extreme N. (between the boundary at Juan de Fuca Strait and the mouth of the Columbia River) and near centre of S. (at the Golden Gate at San Francisco).

Geology.—Rocks of every geological age are to be found. Archæan rocks appear in the W. hills, in New England, the Piedmont plateau, etc. Proterozoic and Palæozoic rocks are found near the Great Lakes, and the Lower Silurian system of Palæzoic soils appears in the Appalachian Mountains, while coal-measures are found in Pennsylvania, other parts of the E. states, the middle states, and occasionally in the W. Large tracts of Cretaceous rocks extend W. of the Great Lakes, and go S. at the E. foot of the W. hills to the S. boundary. E. follow Tertiary rocks, which also surround the Gulf of Mexico and occupy Florida and the S.E. coast. Volcanic rocks appear all along the W. coast.

Climate varies from the winter snows and cold of the N.E. to the mildness of the Pacific slopes and subtropical conditions of the S. and S.E. The lowest mean temperature in Jan., at ordinary heights, is at Duluth, c. 12° F., with a minimum range of 40°; at Chicago it is 26°, at New York, 30°; at San Francisco, 50°; in Florida, 70°. The means for July are: Duluth, 66°; Chicago, 73°; New York, 73°; San Francisco, 59°; Florida, 83°. The minimum in Jan. at New York often falls below zero, and the July maximum, all over the country, at ordinary heights reaches over 100°. Rainfall E. of 98° long. varies from over 60 to 25 inches; along the Pacific coast strip it ranges to nearly 90 inches; among W. hills and on W. plateau it is only 2 inches in some places.

History.—The U.S. were the first Eng. colonies. John Cabot departed from Bristol, 1497, with the charter of Henry VII. and planted the Eng. flag in Newfoundland, an incident on which England's claim to N. America was based; not until the close of Elizabeth's reign was Spain's power sufficiently curtailed to allow of Eng. colonisation.

VIRGINIA.—In 1584 Raleigh sent out colonists, who occupied the region named by Elizabeth, Virginia. Raleigh received proprietary rights and the power to make laws, but in 1603 Virginia was made a Crown colony. All the colonists had disappeared, and in 1606 the Virginia Co. was formed to make a fresh settlement; its charter gave it control of territory between 34° and 45° N. lat., and it was subdivided, the London Co. undertaking the S., a Plymouth Co. the N. The band of settlers sent out in Dec. 1606 finally founded Virginia (1607). The new settlers were nearly all unfit and were almost exterminated by Indians, but sufficient interest was taken in the colony in England to ensure its continuance; the Company, however, lost its charter in 1623.

A system of government by governor and council (app. by the proprietor, now the Crown) and House of Representatives had already been established, and was followed in the succeeding colonies. Long before the colonies became self-supporting, the Houses of Representatives made efforts to obtain the control of taxation, and harassed the governor by insisting on the privileges of the Eng. House of Commons. Almost from the first England obtained enormous profits from the tobacco trade, and stringent navigation laws to prevent foreign participation were from early days a grievance of the planter. Another important element in Amer. history, negro slavery, was introduced in 1619. The working out of social and political problems under entirely different conditions is chiefly responsible for the differentiation of Amer. from Eng. character, but the stream of religious and political recusants into N. America amounted to a selection of Eng. types. The South was far from being the aristocratic settlement formerly represented, but the North was the pre-eminently republican district.

NEW ENGLAND.—The Pilgrim Fathers landed from the *Mayflower* in 1620 and built New Plymouth, and in 1629 the Puritan colony of Massachusetts was incorporated. Different sects of Puritans founded New Haven, Connecticut (which received charter, 1662), Providence, Rhode Island (incorporated 1663), New Hampshire, Maine, and Vermont. Some of these were annexed to others, and in 1643 the four colonies of Massachusetts, Connecticut, New Haven, and Plymouth united in the confederation of New England.

MARYLAND was formed from Virginia in 1634, as a proprietary colony of the Calverts, Lords Baltimore, Rom. Catholics, to whom a patent was granted for the purpose in 1632.

Sir Robert Heath received in 1629 a large tract of land S. of Virginia, and called it CAROLINA, after Charles I.; it was divided between eight proprietors in 1663, and received a constitution, ascribed to Locke, which never came into force; the colony was divided into N. and S. in 1663. Disputes between the colonists and proprietors ended with the great rebellion of 1719 in the S., and in 1729 the proprietors surrendered their rights to the Crown.

The Dutch W. India Co. had in 1626 established the New NETHERLANDS round the Hudson valley; in 1664 England declared war on the United Provinces and seized this colony, ceded at Breda (1667); it was reoccupied by the Dutch in 1673, but finally ceded by the Treaty of Westminster (1674); it had already been granted to James, Duke of York, after whom it was named NEW YORK. James granted the territory out to proprietors, one of whom, Carteret, who held Jersey for the Crown during the Civil War, had called his portion NEW JERSEY (1665).

William Penn received land on S. bank of the Delaware, originally settled by Swedes, and established colony of PENNSYLVANIA, 1682. He gave it a curious constitution which never worked, but showed a statesman's gifts in the founding of Philadelphia. The Dutch settlements on the S. bank of the Delaware, now the state of DELAWARE, were also granted to Penn.

The 13th colony, GEORGIA, was founded in 1732 by James Oglethorpe, between Virginia and Florida; it was a philanthropic effort to find a sphere for destitute Englishmen, and it provided a buffer state between Brit. and Span. territories. After a brave struggle against Spain, the proprietors surrendered their charter to the Crown in 1752. Various attempts at federating the 13 colonies failed.

The long struggle of Britain and France in N. America ended in 1763 with the *Treaty of Paris*, by which France ceded Canada to Britain, and France and

Spain confirmed Brit. possessions E. of the Mississippi and N. of Florida.

American War of Independence (1775–83), definitely severed Britain from her colonies in N. America (except Canada). Since the middle of the XVIII. cent. relations had been strained owing to the policy of Grenville's ministry, supported by George III., in rigidly enforcing the laws which gave Britain a monopoly of Amer. trade. Smuggling was circumvented, and resentment led to political resistance to taxation by Britain. Rockingham in 1766 repealed Grenville's Stamp Act of 1765, but in 1767 some new duties were imposed. These were met with resistance, the Americans denying the right of the Eng. Parliament, in which they were not represented, to tax them, and declaring that they owed allegiance to the Crown alone. In 1773 Lord North repealed all duties except that on tea, which the India Company could send to America from England without Eng. duty so that the price in America was low. But the Americans were concerned with the principle, and the tea ships were boarded in Boston Harbour and their cargoes thrown overboard, Dec. 16, 1773. Boston was deprived of its charter and a volunteer Amer. army was raised.

On April 19, 1775, a body of Eng. troops on their way back to Boston after destroying some magazines at Concord were attacked at Lexington by the colonial volunteers; the local militia had the advantage, and Boston was blockaded. On June 17, General Gage dislodged the colonists from the neighbouring hills in the battle of Bunker's Hill. Washington was now app. general of the Amer. army by a Congress at Philadelphia, which issued on July 4, 1776, the famous DECLARATION OF INDEPENDENCE of the U.S.A. All the advantages were with the Americans owing to the smallness of the Eng. armies and the incompetence of their commanders. But at first the English had some success. Sir William Howe, successor to Gage, won the battle of Long Island, August 1776, the first fight in the open field, and New York became the Eng. headquarters. He won in 1777 the battles of Brandywine and Germantown, but neglected to attack Washington with his half-starved army in winter quarters at Valley Forge, and he did not co-operate with General Burgoyne, an equally indifferent commander, who, marching from Canada down Hudson Valley, surrendered to the Americans at Saratoga in October 1777. France now recognised Amer. independence, 1778, and sent help. Spain joined her in 1779. Paul Jones, an Amer. captain, plundered the Brit. coasts. Clinton, Howe's successor, conquered South Carolina in 1780; but Lord Cornwallis, the best of the Eng. generals who fought in this war, was forced to surrender to superior forces at Yorktown, October 17, 1781. This virtually ended the war, though Charleston held out for some time, and New York only surrendered when the Independence of America was recognised as the basis of the peace negotiations resulting in the *Treaty of Versailles*, 1783.

During the war the various states had accepted 'Articles of Confederation and Perpetual Union'; these were superseded by the national constitution drawn up by the Convention at Philadelphia in 1787; this constitution, with 15 amendments, remains, but the power of the nation has since grown considerably at the expense of the states. The question of 'states' rights' agitated the country until the Civil War. George Washington, the late commander-in-chief, became the first Pres. (1789), and showed remarkable ability in walking 'on untrodden ground.' He and his successor, John Adams, evaded, with difficulty, foreign war. There had already sprung up parties of Federalists and Republicans, the latter headed by Thomas Jefferson, for a time Washington's Sec. of State, and full of the individualistic ideas of the Fr. Revolution. Jefferson was a thorn in Washington's flesh, but as Pres. (1801–9) used his friendship with France to secure Louisiana (1803), admitted to the Union in 1812. The U.S. remained firmly neutral in the war against Napoleon until irritation at the restrictions on her carrying trade led to war with Britain, 1812. Britain, distracted by the Napoleonic struggle, had not desired war, suffered considerable naval damage, and was glad to make Treaty of Ghent (1814). This second war with Britain slew all lingering loyalism in the U.S., and gave the latter definite status as a Power.

The Federalist party disappeared, and an 'Era of Good Feeling' lasted throughout the administration of MONROE, whose name is associated with financial prosperity, the regulation of the currency, exploration and settlement in the west, the consequent admission into the Union of the five new states of Indiana, Illinois, Alabama, Mississippi, and Missouri (Kentucky had been admitted, 1791, Tennessee, 1796, and Ohio, 1802), the acquisition of the Floridas (1819), and the enunciation of the 'Monroe Doctrine' (*q.v.*).

Civil War.—The great struggle between N. and S. commenced with Adams's administration (1825). The S. planting states considered that their prosperity depended on negro slavery, while the manufacturing states of the N. did not require slaves, and determined to end the system throughout the Union; the question took political form as a struggle as to the amount of control possessed by the Union over the separate states. The first great flare was over the 'Tariff of Abominations' of 1828, passed entirely in the interests of the N. The 'South Carolina Exposition' declared the new Act unconstitutional, and proposed that the separate states should declare it null and void in their territories. A large party of Nullifiers (or States' Rights Party) was formed, and in 1832 S. Carolina nullified the Act. Pres. Jackson replied by the 'Force Act,' which empowered him to collect the revenues in question, and was in its turn nullified in S. Carolina. Jackson's treatment of the U.S. Bank led to the formation of a new party of Whigs pledged to resist despotism. Democracy first showed its strength in the west, and won a great triumph in the 'Log-Cabin' election of 1840.

SLAVERY was in 1787 prohibited in the N.W. Territory, and had died out in the E. and central states; importation of slaves into the U.S. was forbidden in 1808. It was necessary to admit Louisiana in 1812 as a slave state, but when Missouri was admitted in 1820 a compromise was made by which Missouri was admitted as a slave state, but all land N. of 36° 30′ declared free for ever. At this time there were 12 free, 12 slave, states. Numerous abolitionist societies were formed in the N. The annexation of Texas (admitted as a state) in 1845 brought about war with Mexico. After inflicting many defeats on the Mexicans and capturing their capital the U.S. dictated terms at Guadalupe Hidalgo (1848), acquiring New Mexico, California, and Texas. After a warm dispute as to the question of slavery in the newly acquired territories, it was prohibited in Oregon but left to the decision of the Territorial courts of California and New Mexico, a privilege thenceforth known by its opponents as 'squatter sovereignty.' In 1850 California was admitted to the Union as a free state. Gold was first discovered there in 1848; it was already thronged by miners, and the decision as to its constitution was a burning question. To appease the S. it was found necessary after the decision to make the 'Compromise of 1850,' which provided for the return of runaway slaves. In 1854 the Missouri Compromise was set aside by the KANSAS-NEBRASKA ACT for the creation of the territories of Kansas and Nebraska, the principle of squatter sovereignty being again recognised; the slave-states rejoiced, but after a fierce fight the free-states secured Kansas, which was admitted to the Union in 1861. A notable episode of the struggle was the DRED SCOTT CASE (1857) in which the question of slaves being carried by their masters into free territory was decided in favour of the slave-owner. Abraham Lincoln, head of the anti-slavery party, which

had now adopted the designation Republican, skilfully attacked this decision. The states' rights party had become the Democratic; it was a fatal blow to it that Lincoln was elected pres., 1860, and Republican power was to last without a break until 1885. The pitch of feeling in the N. against slavery is to be judged by Mrs. Stowe's *Uncle Tom's Cabin* (1852). Lincoln's election meant Abolitionist victory and the S. states at once seceded, adopting in 1861 the title of Confederate States of America. The S. had less than half population of N. and considerably fewer resources.

War commenced with the capture of Fort Sumter by the secessionists in April 1861. Lincoln immediately proclaimed the blockade of the Confederate ports (a deed which alienated foreign powers, especially Britain, which depended on the slave-states for cotton) and sent M'Clellan south. The latter recovered W. Virginia by the middle of June; a series of Federal reverses culminated at Bull Run in July. The appointment of M'Clellan as U.S. General-in-Chief and commander of the army of the Potomac bitterly disappointed Federal hopes, and at the close of 1862 he was directed to resign. He had succeeded, however, in driving Lee, the Confederate general, back from Maryland into Virginia. His successor Burnside advanced on Richmond, but was defeated at Fredericksburg, Dec. 1862. Lincoln proclaimed the emancipation of slaves in the rebel states except in parts occupied by federal forces from Jan. 1, 1863. Burnside was superseded by Hooker, defeated by Lee at Chancellorsville (May). Lee's second invasion of Maryland and Pennsylvania entirely failed, and after the terrible battle of Gettysburg (July) he was driven back by Meade over the Potomac; on the same day Vicksburg fell before the Federal troops. From this time the Confederate cause declined; the lack of supplies and soldiers made itself felt and the Federal officers had now gained experience.

Grant, now General-in-Chief of the Federals, won the battle of Chattanooga (Nov.), and, retaining Meade as commander of the army of the Potomac, gave Sherman the command in Tennessee and Georgia. In May, 1864, Grant advanced against Lee, who was moving towards Richmond, fought the bloody, indecisive battles of the Wilderness, Spottsylvania, and Cold Harbor, crossed the river James, and commenced the siege of Petersburg. Sheridan was operating in the Shenandoah Valley (*q.v.*), while Sherman occupied Atlanta in Sept., and, after destroying Atlanta in Nov., made his famous march through Georgia to Savannah where he re-established communications with the Federal fleet. Hood's army was destroyed at Nashville by the Federal general, Thomas (Dec.). The Confederates evacuated Charleston in Feb. 1865. Grant was still besieging Petersburg, and in April the Confederates made a desperate, successful sortie, but were stopped by Sheridan. Richmond also was evacuated. On April 9 Lee surrendered at Appomattox Court House to Grant. Johnston surrendered and the S. Pres., Jefferson Davis, was captured in May in Georgia. President Lincoln was assassinated by a Southern sympathiser, April 15. Throughout the war naval operations were of the greatest importance, and the Confederates considered the loss of Wilmington in 1865 a greater blow than the fall of Charleston. Warships were procured by the Confederates from Britain, a fact which caused considerable unfriendliness between the latter and the U.S. (see ALABAMA).

Reconstruction of the Union.—The 13th amendment to the constitution was proclaimed in Dec. 1865; it abolished slavery in the U.S. and places under their jurisdiction. Lincoln had wished that compensation should be given to the slave owners, but had been forced to give way. There was now a bitter dispute as to further punishment of the S. states. A still more difficult problem was that of dealing with the emancipated negroes, unused to practise personal liberty, and yet, according to a large northern party, rightful claimants of votes. Early in 1866 the Pres. vetoed a Freedman's Bureau bill and Enfranchisement bill, but the latter was nevertheless passed. The rebellion was formally declared in April 1866 to be at an end, all the states but Mississippi having accepted the 13th amendment and been received back into the Union. Johnson, Lincoln's successor, ultimately persuaded Congress that no unnecessary harshness should be shown to the S., utterly ruined by the war and the loss of their slaves, but was first forced to veto a bill for disfranchising those who had fought against the Union, and to carry out a political campaign in which he made a very bad impression by the violence of his attacks on Congress. The Radicals proposed a 14th amendment by which ex-Confederate officials were to be disfranchised, the Confederate debt repudiated, the equality of negroes universally recognised. The Reconstruction bills of 1867, passed by the requisite majority of Congress, but vetoed by Johnson, divided the S. into 5 military districts and embodied the 14th amendment. Johnson strove to upset these acts, and in 1868 the Lower House impeached him; he was saved by a majority of only 1 vote in the Senate, and was not re-elected, but had successfully accomplished his task.

General Grant now became pres., and Republicans were returned all along the line, the negro vote, already exercised in all the states except Mississippi, Texas, and Virginia, being Republican. Grant remained in office until 1877. The 15th amendment, passed in 1869, forbade disfranchisement on account of race, colour, or antecedent servitude; it was accepted by the 3 recalcitrant states, who were readmitted to the Union in 1870. The Alabama question (*q.v.*) was settled, Britain in 1872 agreeing to pay $15,500,000 compensation.

Alaska was purchased from Russia in 1867, but Congress showed itself for a long time averse to large schemes and fearful of war. Internal development during this period was extraordinary; railway speculation first appeared and corruption in public life became a scandal. Meanwhile in the S. the 4 million enfranchised negroes controlled political life; these people, without political or moral sense, were reducing the S. to anarchy, while N. officials, the notorious 'carpet-baggers,' inspired their votes and protected them from their previous masters. Under these conditions there was formed in S. Carolina the secret society known as the Ku Klux Klan, which performed illegal police duty in chastising and often murdering negroes and carpet-baggers, and practically brought to an end the farce of negro equality. Grant was, it is believed, personally incorrupt, but did nothing to prevent Republican outrages in the S., nor could redress be obtained by petition to Congress. Dissatisfaction in the Republican ranks led to the formation of a Liberal Republican party in 1872, under Brown, Schurz, Trumbull, Sumner, and others. It was short-lived, and Grant was re-elected in 1872, but in 1876 the Republican Hayes became pres. Hayes formed a cabinet of moderate Republicans and Democrats, proclaimed the reform of abuses, and sought to mitigate party strife, but the opposition of Congress proved too much for him. He successfully quashed 7 bills of Congress, but failed to cure the disease of Amer. politics. Trade and agriculture, however, improved, and in 1879 specie payments were resumed, a fact which did much to restore Republican credit.

The Republican Garfield became pres., 1881; a few months later, after some civil service reforms and reduction of the public debt, he was assassinated. His successor, Arthur, a Stalwart, did much to assuage party strife, though his name is connected with no great measure and he more or less connived at Republican corruption. The Democratic victory in the Congress election of 1882 led the Republicans to effect some reform in the Civil Service and pass a Tariff Act to reduce the surplus, but they fell in 1884 before a union of Democrats and Independents (Mugwumps). The Republican candidate was beaten by the Democratic

Cleveland. Cleveland was almost purely the candidate of the S. and had practically no supporters to commence with in the Congress, but, like Arthur, he was practical, moderate, and conciliatory, and gradually won over the Houses. The question to which he devoted his chief attention was Tariff Reform. Despite enormous pensions and expensive public works, the surplus revenue remained immense, and Cleveland pressed for reduction of taxes, urging the increase of national prosperity which would ensue. This was the issue at the election of 1888 when the Republican candidate Harrison was returned over Cleveland.

In 1890 the M'Kinley Act (named after the chairman of the Committee on Ways and Means) was passed, increasing the duties on foreign articles, especially those of Europe, while Amer. sugar-planters received a bounty. At the same time expenditure was increased, the 51st Congress obtaining the nickname of 'the Billion Dollars Congress' from the amount of its appropriations. The only result of restored Republicanism seemed to be increase of price of necessities of life. Nor did the ambitious Pan-Amer. Congress of 1889 bear much more fruit. Blaine, Sec. of State, organised this Congress at Washington as a means towards establishing the U.S. hegemony over the 'Three Americas.' The republic of Hawaii was annexed by the U.S. in 1892, and a treaty was made with Britain in that year for Bering Sea (*q.v.*) arbitration. The Democratic party obtained a large majority for Cleveland's re-election, and he returned to office in 1893. He had at once to face a great financial crisis, largely due to the Sherman Act of 1890, which obliged the Sec. of the Treasury to pay notes for silver up to the amount of 4,500,000 ounces of silver monthly, if offered, these notes to be redeemable, on demand, in gold or silver. Cleveland denounced this Act, which had dangerously lowered the gold reserve of the Treasury and the price of silver, and reformed both the currency and the tariff, and succeeded first in reducing the surplus and at last in producing a deficiency of revenue. The Sherman Act was repealed in 1894.

A commercial crisis, in which numerous railway companies and banks failed, led to the Chicago Riots and a march of the unemployed on Washington. Abroad, the dispute between Venezuela (*q.v.*) and Britain as to boundary led to U.S. intervention, Olney, Sec. of State, enunciating the old Monroe Doctrine. Cleveland recommended a Commission, strongly stating that if decision was given for Venezuela it would be the duty of the U.S. to support her claims to the uttermost. He voiced the wish for a more adventurous foreign policy, increasing the fleet, and pushing on the construction of the Nicaragua Canal, which he wished to be non-national, the gift of America to the world; at home he sought to strengthen Union control of the states. The currency was the question at issue in the presidential election of 1896; the Democratic party by adhering to silver had lost many of its members, and the gold standard Republicans succeeded in returning M'Kinley; Sherman became Sec. of State, and the Republican programme of activity abroad and increase of protective duties was carried out, the 'Populist' party (the extreme left of the Democrats and bigotedly silverite) resisting step by step. In 1899 the gold dollar was made the unit of value, and the banking laws were reformed.

The CUBAN QUESTION meant foreign war and extra-Amer. expansion (see SPANISH-AMERICAN WAR). M'Kinley was fortunate in the fact that the gold mines of Alaska were discovered at this time, and in the new methods of mining by means of which gold became plentiful, and in the new commercial and agricultural prosperity which put an end to labour unrest; the exploitation of the non-political poor remains, like the multi-millionaire, a characteristic of Amer. life. The great oil, railway, and banking trusts were built up at this time, and combinations of capitalists began to control production.

The Democrats opposed M'Kinley in 1900, and used as electioneering material the old silver question, the new trusts, and what they called the new 'imperialism,' but they were divided, and the Republicans again won. M'Kinley, however, was assassinated in 1901, and Vice-Pres. Roosevelt succeeded. Roosevelt continued the imperialistic policy, asserting in 1904 the right of the U.S. to 'international police power' in the W. hemisphere, and establishing U.S. control over San Domingo. He also participated with European Powers in interference in E. politics. His great aim, however, was international peace. He acquired from a Fr. company the right to construct the Panama Canal, and crushed the resistance of Colombia by aiding the republic of Panama to obtain its independence (1903). The canal, guaranteed neutral, was commenced in 1907. Roosevelt legislated against capitalistic combinations, and exposed Civil Service frauds, and yet kept his popularity with Republicans, while he won over Democrats. The result was his enormous majority in 1904. He afterwards lost Republican confidence, especially after the fall of the Knickerbocker Trust Co. (1907), although he showed great energy in the alarming financial panic. Reform of the tariff and many extreme Radical measures were on the Democratic programme of 1908, but the Republicans returned Taft by a large majority. Roosevelt's influence, however, had brought about the formation of a party of 'Progressive' Republicans, a fact which greatly weakened Taft. He was succeeded in March 1913 by Woodrow Wilson (Democratic). Taft's administration was marked by conferences at Ottawa (1910) and Washington (1911) of U.S. and Canada to discuss reciprocity in trade. The Arbitration Treaty with Britain desired by Cleveland was made in 1911, but has since been considerably modified. The chief events of 1911 were the dissolution of the Standard Oil and Amer. Tobacco Companies, and the bringing of a suit against the U.S. Steel Corporation Co.

Government.—The main portion of the republic consists of a federal district and 48 states. They were added to the original 13 in the following order: District of Columbia (1790–91), Vermont (1791), Kentucky (1792), Tennessee (1796), Ohio (1803), Louisiana (1812), Indiana (1816), Mississippi (1817), Illinois (1818), Alabama (1819), Maine (1820), Missouri (1821), Arkansas (1836), Michigan (1837), Florida (1845), Texas (1845), Iowa (1846), Wisconsin (1848), California (1850), Minnesota (1858; territory, 1849), Oregon (1859; territory, 1850), Kansas (1861; territory, 1854), West Virginia (1863), Nevada (1864; territory, 1861), Nebraska (1867; territory, 1854), Colorado (1876; territory, 1861), Dakota, N. and S. (1889; territory, 1861), Washington (1889; territory, 1853), Montana (1889; territory, 1864), Idaho (1890; territory, 1863), Wyoming (1890; territory, 1868), Utah (1896; territory, 1850), Oklahoma including Indian Territory (federal state, 1907), Arizona (1912), New Mexico (1912). The constitution of 1787, with 15 amendments, is in force. By it, executive, legislative, and judicial bodies were instituted. Executive power lies with a President, chosen for 4 years by votes of electors appointed by direct vote of citizens of each state; the number of electors equals the number of senators and representatives which each state is entitled to return to Congress (this depending on the population). The Pres., elected in Nov. of every 4th year, enters office on Mar. 4 following; he may veto any bill passed by less than two-thirds majority in both houses of Congress, and is commander-in-chief of army, navy, and federal militia. The President's salary is $75,000, and $25,000 for expenses. On his death the Vice-Pres. succeeds for remainder of term. The legislative power lies with Congress, which consists of a Senate (two members from each state, chosen by the state legislatures for 6 years) and House of Representatives (elected for 2 years; the electoral unit is about 174,000).

The salary of senators and representatives is $7500

yearly, with travelling expenses of 20 cents per mile. The Supreme Court, appointed by the constitution of 1787, consists of a Chief Justice and 8 justices appointed by the Pres. with advice and consent of the Senate, to hold office during good behaviour. There are 33 Circuit judges, and 91 judges of District Courts. Each state has a governor, senate, and house of representatives. There are 10 women-suffrage states—Wyoming (1869), Colorado (1893), Idaho (1896), Utah (1896), Washington (1910), California (1912), Arizona (1912), Kansas (1912), Oregon (1912), and Illinois (1913). In Iowa and Louisiana women have a tax-paying suffrage, while in New York, Delaware, Michigan, and Montana they have both tax-paying and school suffrage; 17 other states have school suffrage. Each state has sovereign power over its own local bodies, and the counties (parishes in Louisiana) into which the S. and W. states are divided have usually independent control of local affairs; the counties are divided into townships or 'precincts.' Counties are to be found in the N., but there the local unit is usually the township or municipality. The townships are symmetrical in size—about 6 sq. miles in area; their officers are known as trustees or supervisors; the school district is not always coincident with the township. Boroughs appear only in Connecticut, Rhode Island, and Vermont; the town of New England has town meeting and board ('select men'), of whom chief officers are the 'moderator' and town clerk; these towns are rapidly becoming split up for local government into 'urban centres.' Democratic opposition to ward representation was strong at Boston as it is at New York; numerous cities have recently adopted Commission Government, a system by which local government is scientifically simplified.

Law.—The law of U.S.A. is English in origin and nearly all technical terms and forms of procedure; Eng. decisions are quoted, and Eng. legislation is sometimes copied, *e.g.* Lord Campbell's Act and the Employers' Liability Act. Each state has its own laws, but certain subjects, *e.g.* disputes between states and residents of different states and offences against the coinage and the revenue laws, are dealt with by the federal courts. Progress in America has been principally in the direction of sweeping away complexities of the Eng. land laws and removing the disabilities of women. No state gives preference to males over females or to eldest sons. The landlord's right of distraint has been abolished in many states; and other states never recognised it. The entailing of land is made impossible in some states. Generally a wife is in the position of a spinster as regards property, and nearly everywhere a married woman has full power of contract.

Criminal law was always milder than in Britain. Some of the states have abolished capital punishment, and America was long before England in allowing criminal appeal. The criminal law of the U.S. and of most of the states has been codified, and there are several state civil codes.

Literature.—With the settlement of the Puritans there came into existence a class of lit. suited to their peculiar needs, and the earliest example was *The Bay Psalm Book* (1640), supposed to have been the first book printed in America. In another class was Mather's *Magnalia Christi Americana*, or *The Ecclesiastical History of New England from its First Planting in the Year 1620, unto the Year of our Lord 1698* (1702). During the XVIII. cent. there was a moderate amount of fiction and minor verse, now mostly forgotten; but it may be noted that the national hymn, *Hail, Columbia*, was written by Joseph Hopkinson in 1798; and the earliest Amer. play, Thomas Godfrey's tragedy, *The Prince of Parthia*, was produced at Philadelphia in 1767. Not until the early part of the XIX. cent. did America begin to develop a lit. of her own. Two examples of this new development are Washington Irving's *Sketch Book* (1819) and James Fenimore Cooper's *The Spy* (1821). To this period also belongs the poetry of William Cullen Bryant—*Thanatopsis* (1807) and *Poems* (1832)—the prose and verse of Nathaniel Parker Willis (1806–67), and the poetry and tales of EDGAR ALLAN POE (1809–49). The later writings both of Irving and Cooper added to their fame. Poe's short stories have never been surpassed in their kind, and his poems have secured a lasting place in lit.

Amer. romanticism was developed in the poetry of HENRY WADSWORTH LONGFELLOW (1807–82), and the New England stories of NATHANIEL HAWTHORNE (1804–64). Longfellow, whose first volume of verse, *Voices of the Night*, appeared in 1839, later produced lengthy poems upon national subjects (*Hiawatha, Evangeline, The Courtship of Miles Standish*). Another writer of influence was the Transcendentalist, RALPH WALDO EMERSON (1803–82), whose first book, *Nature*, was published in 1836. WALT WHITMAN (1819–92), author of *Leaves of Grass* (1855), is perhaps the most dominant figure in XIX.-cent. Amer. lit., and, though his formlessness repels many readers, his optimism has largely influenced thought.

Other writers are John Greenleaf Whittier, the Quaker poet (1807–92); Oliver Wendell Holmes, author of the 'Breakfast Table' Series (1809–94); James Russell Lowell (1819–91); Henry David Thoreau, nature-writer (1817–62); Mrs. H. B. Stowe (1811–96), author of *Uncle Tom's Cabin*; Francis Bret Harte, novelist and poet (1839–1902); Col. John Hay, author of *Pike Country Ballads* (1838–1905); and the great Amer. humorist, Samuel Langhorne Clemens ('Mark Twain') (1835–1910).

Amer. writers of history have been: George Bancroft (1800–91), author of *History of the United States*; William Hickling Prescott (1796–1859), author of *Conquest of Mexico, Conquest of Peru, Ferdinand and Isabella*; and John Lothrop Motley (1814–77), author of *Rise of the Dutch Republic*.

Bates, *Amer. Lit.* (1898); Brownell, *Amer. Prose Masters* (1910); Stedman, *Poets of America* (1885); Wendell, *A Literary History of America* (1901); Trent, *History of Amer. Lit.* (1903).

Finance.—The revenue in 1912 was *c.* $691,778,000, the expenditure, $654,554,000; the Public Debt amounted to $1,027,575,000 in 1912.

Army and Navy.—$94,210,000 was appropriated to the U.S. army and military schools for year 1911–12, but nearly twice that was spent; $120,000,000 was spent on the navy. The services are recruited by voluntary enlistment; the army, which may not number over 100,000, was composed in 1911 of 4281 officers, 73,454 men, while the Philippine Scouts amounted to 179 officers, 5401 men, and the State Militias mustered about 85,000. Besides 29 battleships, 15 armoured cruisers, and 19 protected cruisers (a large number on the new Dreadnought plan), torpedo-boat destroyers are being built at the rate of 20 per annum, and 20 submarines have already been constructed. In warship tonnage the U.S., it is estimated, comes next to Britain. A school for officers of U.S. navy was founded at Annapolis, 1845. The ages of candidates range from 15 to 20. The course lasts for four years, following two years' experience at sea. Little interest is taken in airships, although in 1912 Congress appropriated $125,000 for military aviation.

The NATIONAL PARKS of the U.S. have been formed by Congress with the idea of preserving remarkable natural sites for public use. The first and largest, Yellowstone Park, formed from Wyoming, Montana, and Idaho in 1872, is 2,142,720 acres in extent. Others of great size are Glacier in Montana, Yosemite, Sequoia, and General Grant (California), Mt. Ranier (Washington), Crater Lake (Oregon).

About 38 % of the population is actively employed; of this class nearly 40 % are engaged in agriculture, fishing, and mining, 22½ in manufacturing and mechanical industries, over 19 in domestic service, over 14 in trade and commerce. Over 25 % are gathered in

the 159 towns with more than 25,000 inhabitants. The capital is Washington. New York, Chicago, and Philadelphia are the largest cities, having in 1910 populations of 4,767,000, 2,185,000, and 1,549,000 respectively. The next in order of population are St. Louis (687,000), Boston (670,000), Cleveland (561,000), Baltimore (558,000), Pittsburg (534,000), Detroit (460,000), Buffalo (424,000), San Francisco (417,000), Milwaukee (374,000), Cincinnati (364,000), Newark (347,000), New Orleans (339,000), Washington (331,000), Los Angeles (319,000), and Minneapolis (301,000). Jersey City, Kansas City, Seattle, Indianapolis, Providence, Louisville, Rochester, St. Paul, Denver, and Portland (Ore.) have all a population over 200,000; Columbus, Toledo, Atlanta, Oakland, Worcester, Syracuse, New Haven, Birmingham, Memphis, Scranton, Richmond, Paterson, Omaha, Fall River, Dayton, Grand Rapids, Nashville, Lowell, Cambridge, Spokane, Bridgeport, and Albany contain over 100,000 inhabitants.

Railways.—The densely populated states have a network of convenient railway communications, being rapidly extended; in 1910 about 240,000 miles were worked. The chief lines are the New York Central, the Atlantic Coast Line, the Chicago, Burlington, and Quincy, the Pennsylvania, the Pacific Lines, the Southern, the Illinois Central, and the Rock Island.

Water Communication.—There is an enormous amount of water traffic on the Great Lakes (which have one-third of whole shipping trade of country) and on the canals connected with them—Sault Ste Marie, Erie, Hudson R., Hudson and St. Lawrence, Ohio to Susquehanna, and Lake Michigan to the Mississippi, etc., with total length of about 4000 miles. The Mississippi-Missouri system has one-sixth of total traffic, and is navigable for nearly 14,000 miles. The streams flowing into the Atlantic are navigable for over 5000 miles, those flowing into the Gulf for over 5000 miles, and those flowing into the Pacific for nearly 2000 miles. The length of public roads was in 1909 2,199,000 miles.

Resources and Industries.—The products of U.S.A. are so varied that the nation might easily be self-supporting and yet enjoy the luxuries of life. Agriculture is still of chief importance, but the importance of industries is multiplied every few years. Of a total of about 6,340,000 farms, some 45 % are (1910) between 100 and 500 acres, 26 between 50 and 100, 20 between 20 and 50, the bulk of the remainder still smaller. Of the country E. of 98° long. nearly two-thirds is under crop—the N. districts producing crops of the ordinary grains and green crops, the centre maize and tobacco, the S. cotton, with rice and sugar-cane in much smaller proportion. The chief grain crops are wheat and oats, the former covering an area of about 49,000,000 acres, the second over 35,000,000 acres; barley, flax, rye, buckwheat, and rice are also important crops. The chief wheat-growing states are Minnesota, Kansas, N. and S. Dakota, California, Nebraska, Missouri, Pennsylvania, Iowa, Illinois, Texas, Oregon, Washington, Indiana, and Ohio. Nebraska, Iowa, Kansas, Missouri, Illinois, Indiana, and Ohio chiefly grow the variety known as maize, the specialty of the U.S. The oats area is in the N.E. The grain surplus for export in 1910–11 was valued at $22,000,000, that of wheat flour, $49,000,000; this amounts to 38 % of the surplus supply of all the exporting countries in the world, and double that of the next in order, Russia.

In 1910 the U.S. produced 60 % of the cotton of the world. The great cotton states are Texas, Georgia, Mississippi, Alabama, N. and S. Carolina, Louisiana, and Arkansas, the most valuable area being the islands along the coast of S. Carolina, the long-stapled Sea Island fibre of which is very valuable. The area under cotton is over 28,000,000 acres; 1½ million acres were under tobacco in 1910, and the crop was over 984,000,000 lb. The chief tobacco states are Virginia, Kentucky, Maryland, N. Carolina, and Tennessee. Sugar-cane is grown in Louisiana, Texas, and Florida; the area has been greatly restricted since the abolition of slavery, the place of the cane product being taken by the beet-sugar of Nebraska, Kansas, New Jersey, Illinois, California, Colorado, and Utah; by the maple sugar of Vermont, New Hampshire, and other N.E. states; and by the sorghum sugar of Kansas. Sorghum is also grown for feeding cattle. In 1910, 723,000 acres were under rice; this is chiefly in S. Carolina, but rice is produced in N. Carolina, Georgia, Mississippi, and Louisiania.

Hops are grown in New York, Wisconsin, Washington, Oregon, and California; hemp, flax, and jute in Kentucky, Tennessee, and Missouri; flax for seed in Minnesota, Kansas, Nebraska, Iowa, and Missouri; the vine in California, New York, Ohio, and Missouri, but chiefly in California; apples, peaches, plums, pears, and other fruits of N. Europe in Pennsylvania and Delaware. The cultivation of many tropical and subtropical fruits is carried on in California and several S. states. W. of 98° long. stock is widely reared, the climate, soil, and grasses being specially suitable; crops produced are chiefly for feeding. The area of the ranching districts is estimated at over 1,350,000 miles, the value of the stock at nearly £640,000,000; Iowa comes first, Texas second in value of production. Cows are most plentiful in Vermont, Pennsylvania, New York, and Ohio, where there is considerable production of butter and cheese.

About 25 % of the U.S. is still under timber, but reckless clearing led to the Weeks Law of 1911, which aims at forest reservation and nationalisation. The largest tract (over 350,000,000 acres) is on the Atlantic side; the other great districts (each about 50,000,000 acres) are the Pacific coast, the Rocky Mountains, and the central W. states; varieties are pine (including redwood sequoia and giant big-trees), cedar, laurel, oak, and aspen in the W.; cactus, yuccas, mesquites, creosote bush, and sage brush in W. plateau; in the E., ordinary European trees, hemlock, cedar, cypress and hickory, chestnut oak and dyer's oak, valuable for tanning and dyeing purposes.

The salmon fishing of the W., the fishery of Great Bank of Newfoundland, and whale and seal fishing are valuable.

About two-thirds of the world's petroleum is produced in the U.S., which is very rich in all sorts of minerals. It was chief gold country until distanced by the Transvaal in 1898. Over $96,000,000 in value of gold was produced in 1911, over $30,000,000 silver; copper $142,000,000, lead $30,000,000, zinc $25,000,000, aluminium $7,000,000, white lead $18,000,000. Pig-iron is valued at $419,000,000, bituminous coal at $405,000,000, anthracite at $149,000,000, coke at $90,000,000. Brick-clay, salt, phosphates, limestone (for flux), gypsum, quicksilver, and pyrites are also found in large quantities. It is considered that the high protective duties have caused the sudden growth in importance of U.S. manufactures in N.E., especially in states of New York and Pennsylvania; while the cotton factories of S. are obtaining great success; in cottons the U.S. is second to Great Britain, but the industry is chiefly carried on in the N.E. states. Woollens, silks, leather, clothing, and iron and steel goods of all kinds are manufactured.

Commerce.—The leading exports are raw cotton, bread-stuffs, meat, and dairy products, iron and steel ore and goods, mineral oils, wood and its manufactures, copper, tobacco, and leather; but many other exports are of value. The chief imports are sugar, coffee, chemicals, manufactured goods.

Interstate Commerce is trade between members of different states, which, according to an article of the constitution, is under federal control. An Act called the I. C. Act was passed by Congress in 1887 for the regulation of trade between the states when carried on entirely or in part by rail; according to this Act, all common carriers engaged in interstate traffic are liable to regulation, and their charges must not be excessive; while preferences, rebates,

special rates, etc., are expressly forbidden. By this Act also an *I. C. Commission* was established; this consists of seven (originally five) members, who are nominated by the Pres. and are authorised to prosecute any one who violates the provisions of the Act, and to obtain all necessary information from the carriers; the commissioners are also empowered by the Act of 1906 to fix the rates of carriage when unjust charges are complained of. I. C. is considered to begin with the actual motion of the goods from one state to another. Before the year 1868 the imported goods were taxable only after the distribution or sale of the original cases in which they were delivered; but in that year it was decided that the state's power of taxation should begin with the delivery of the goods at their destination.

Judson, *Law of Interstate Commerce* (1905).

Education is free and compulsory from 6 to 14 in most states, and in all there are public elementary schools; in some, free education for those over 14 is provided. Where the state makes insufficient provision for education in any grade, the Union makes grants of land appropriated for that purpose; co-education is a great feature. The secondary schools are noted for excellence; univ's were established in the old colonial days, and the present bodies are excellently endowed.

Religion.—As far as exact details have been obtained, three-fifths of the population is Prot., the chief sects being Methodist and Baptist; Lutherans and Presbyterians (much less widely spread) following. The remaining two-fifths is nearly all R.C. Pop. (1910) 91,972,266.

Garner and Lodge, *History of the United States* (1906); Andrews, *History of the U.S.* (1895); Fiske, *The Amer. Revolution* (1891); Larned, *Literature of American History* (1902).

UNITS, PHYSICAL.—The magnitude of any measurable quantity is always expressed in terms of some definite quantity of the same kind, known as a *unit*, and the expression gives the number of times the unit is contained in the given quantity. The pure number so used is termed the *numeric* of the quantity. In the physical world we have to deal with three essentially different kinds of quantity, viz. length, mass, time. Each is independent of the other two, but any other physical quantity can be expressed in terms of one or more of them. Hence the units of these quantities are termed *fundamental*, while the unit of any other quantity expressed in terms of them is known as a *derived* unit. For example, a point moving uniformly over 10 centimetres in 2 seconds is said to have a velocity of 5 centimetres per second, and 1 centimetre per second is therefore a derived unit of velocity. This introduces the idea of *dimensions* in units. Thus the unit of area is the square of the unit of length, and the unit of volume is its cube. If L is the unit of length, the units of area and volume can be represented by L^2 and L^3 respectively. Or, we may say that area is of two, and volume of three, dimensions in length. Since the unit of velocity is a length divided by a time, it can be said to be of one dimension in length and *minus* one (-1) dimension in time, *i.e.* LT^{-1} $\left(\text{or } \frac{L}{T}\right)$. Similarly, acceleration is LT^{-2} $\left(\text{or } \frac{L}{T\times T}=\frac{L}{T^2}\right)$, force MLT^{-2}, energy ML^2T^{-2}, and so on. With regard to the choice of three quantities which shall serve as units of length, mass, and time respectively, we have chiefly to consider their convenience. But it is obvious that any standard must satisfy two conditions: (1) that the quantity chosen must be of unvarying value; (2) that its direct comparison with other quantities of the same kind is practicable at all times and places. In most scientific work the centimetre is chosen as the unit of length, the gramme as the unit of mass, and the second as the unit of time, and these form the centimetre-gramme-second, or C.G.S., system of units. The centimetre is one-hundredth part of the metre, which is defined as the length of a platinum bar, preserved in Paris, when it is at a temperature of 0° C. Originally the metre was intended to be one ten-millionth part of the distance from the North Pole to the Equator along the meridian through Paris. Later geodetic measurements have shown that the metre is not exactly this length, but the standard remains the same and the measurements referred to are expressed in terms of it. The gramme is one-thousandth part of the mass of platinum known as the 'Kilogramme des Archives,' which was intended to represent the mass of 1 cubic decimetre of water at 4° C. The second is the mean solar second, of which there are 86,400 in each mean solar day. It will be seen that none of these units are natural constants: all are arbitrary. It has been found possible, however, to find the length of the standard metre with great accuracy in terms of the wave-length of cadmium light, and this is as constant as any known quantity. The mean solar second is by no means an invariable interval of time, for the rate of the earth's axial rotation must be slowly changing so as to lengthen the second. It is, however, sufficiently constant for all practical purposes over long periods of time. For the definitions of British units see WEIGHTS AND MEASURES.

Everett, *Units and Physical Constants*.

Units, Dimensions of, powers in which fundamental units of length, mass, and time are involved in any unit of a physical quantity. The unit of area involves the product of two lengths; its *dimensions* are therefore 2 in length, 0 in mass, 0 in time—written $[L^2M^0T^0]$. Dimensions of other physical quantities are: Volume $[L^3M^0T^0]$; velocity $[L^1M^0T^{-1}]$; acceleration $[L^1M^0T^{-2}]$; force $[L^1M^1T^{-2}]$; work or energy $[L^2M^1T^{-2}]$; momentum $[L^1M^1T^{-1}]$. Two systems of units—the Eng. foot, pound, and second (F.P.S. system); the Continental centimetre, gramme, and second (C.G.S. system).

UNIVALVE MOLLUSCS, see GASTEROPODA.

UNIVERSAL LANGUAGES, the only approximately universal language there has ever been is Latin, the common educated and learned speech of Rom. and mediæval times. It was partly replaced by French for diplomatic and literary purposes. Nearest approach to-day is English for commercial and maritime use. From end of XVIII. cent. onwards efforts have been made to found an artificial universal language. Two chief attempts are *Volapük*, by M. Schleyer (1886), from Romanic and Germanic roots, rather like shortened English. *Esperanto* has been most successful. Invented, 1887, by Dr. Zamenhof, mainly Romanic, but also from Slav, Germanic, and Hellenic roots; has alphabet of 28 letters; simple to pronounce and construct. It is widely prevalent, with about 1900 groups for propagation and several journals, *e.g. British Esperantist*. Its practical use to universal extent has yet to be shown.

UNIVERSALIST CHURCH, Amer. religious denomination, founded 1774; has *c.* 1000 churches; principal doctrine is that good will ultimately triumph over evil, hence Universalists believe in the final salvation of all men; term 'Universalist' applied not only to members of the denomination but to Christians holding similar views, *i.e.* modern liberal religious thinkers and some in early Church, *e.g.* Origen.

UNIVERSITIES.—The four great mother-universities of Europe—*Bologna, Paris, Oxford,* and *Cambridge*—came into existence all about the same time, *c.* 1200. The XIII. cent. sprinkled the Romance countries with u's. The XIV. cent. witnessed the uprising of the old Teutonic u's. In the XV. cent. came Scotland's turn. In the XVI. the Reformation was responsible for a fresh crop of u's in Northern Europe. In the XVII. North America entered the u. field and set burning the Colonial torch of learning. The XVIII. cent. was one of stagnation for most u's and of extinction for many. The XIX. cent. began with the great Ger. revival, continued with Brit.

Colonial activity, and ended with *U. Extension* in many directions, particularly to women and to workingmen. The XX. cent. opened with a great civic u. outburst in England and the promise of u. reform and expansion in many quarters.

Of the mediæval u. little need be said here. Feudalism, the Church, the Crusades, travel, commerce, had widened men's learning and horizon. The Trade Guild must have suggested to scholars the advisability of forming guilds of their own. Masters and pupil could derive mutual profit and protection, associated in corporate life. Papal Bull or Imperial Charter gave them a legal footing as u's. Theology, Jurisprudence, Medicine, were their chief studies. The *Universitas* offered not an all-embracing curriculum, but world-wide citizenship. Each *Studium Generale* was a little cosmopolitan city, nurturing students of many lands, grouped accordingly for administrative purposes in so many 'nations.' Lat. was the academic tongue of all. Students and masters lived together monastic-fashion in boarding-houses. As numbers grew, this system became difficult to maintain, and was abandoned, save at Oxford and Cambridge, where the coll's not only survived as residences, but encroached on the u's' teaching domain. Thus the historic Eng. u's have attained unique social, if not intellectual, distinction. Other survivals of mediæval organisation and customs are to be found in most old u's.

British Universities. — ENGLAND. — *Oxford* and *Cambridge* U's originated in XII. or early XIII. cent., in two little country places, some 70 miles apart. For over 600 years these were the only u's in England. In France, however, u's were founded at *Caen* (1436) and *Bordeaux* (1442) under the Eng. régime. Oxford and Cambridge (*qq.v.*) enjoyed a monopoly for over 600 years. Proposals to establish u's in the North of England and Wales during the Commonwealth proved abortive. *Durham*, England's third u., was not founded till 1832. The U. of *London* followed in 1836. Durham copied the older u's, but London marked a new departure, being a purely examining and degree-conferring body, doing no teaching or research. Aspiring to imperial scope, London U. threw open its examinations and degrees to all comers. Residence was not required. This arrangement was largely due to scarcity of u's in England and Colonies, expensiveness and conservatism of Oxford and Cambridge, and disabilities under which Nonconformists laboured as regards u. titles (only removed by *U. Tests Act*, 1871). London early recognised the importance of modern subjects (science, etc.), and was first to grant degrees to women (1878).

During Queen Victoria's reign only two Eng. u's were founded—the *Victoria* U. (1880; dissolved 1903), a federal non-teaching u., which conferred degrees on students prepared by constituent coll's in Manchester, Liverpool, and Leeds. *Birmingham* (1900) was the first modern City U. in England—the precursor of *Liverpool* (1903), *Manchester* (1903), *Leeds* (1904), *Sheffield* (1905), *Bristol* (1909), and more to follow. It was the first Eng. Single-College, Teaching, 'Day' U. following Scot. and continental patterns. The new city u's, tokens of a municipal and national awakening, all teach, all promote research, all give Science, Pure and Applied, place of honour in their classrooms and try to combine idealism with industrialism. Their advent, coinciding with the partial conversion of the Examining U. of London into a true teaching u. (1900), marks a new era of untold promise in Brit. u. history.

WALES.—National not municipal aspirations called into being the federal U. of *Wales* (1893), an examining body superimposed on coll's at Aberystwyth, Bangor, and Cardiff.

SCOTLAND.—In the XV. cent. Scotland established three u's—*St. Andrews* (1411), *Glasgow* (1453), and *Aberdeen* (King's Coll., 1494). The Reformation added two more—Edinburgh (1582) and Marischal Coll., Aberdeen (1593). *Edinburgh*, the 'Tounis College,' was a municipal enterprise, anticipating modern city u's. Unlike the Early Eng. u's, the Scot. u's were founded in the largest towns. Political and financial reasons caused the adoption of continental models, instead of the Oxford and Cambridge collegiate system. In 1860 the two Aberdeen coll's amalgamated. Despite this decrease and the recent 'epidemic' of u's in England, the proportion of u's to population is still three times as great in Scotland as in England, and Scotland is to-day better provided with u's—quantity, quality, and availability combined—than any other part of the empire.

IRELAND.—In Ireland and Canada racial and religious quarrels have affected u. development. The U. of *Dublin* (founded 1591, largely on Cambridge models, with Trinity as its only coll.) left Catholics and Dissenters unprovided for. Hence *Queen's U.* was established (1850) to examine and confer degrees on students of coll's at Belfast, Cork, and Galway. The *Catholic* U., started in 1854, never got a charter. In 1880 Queen's U. was replaced by the *Royal* U. of Ireland, another examining body, which also failed to satisfy the people of Ireland. The Irish U's Act, 1908, abolished it and set up the *National* U. of Ireland (with constituent coll's at Cork, Galway, and Dublin) and *Queen's U. of Belfast*, a teaching u., intended primarily for Presbyterians and other Protestants, as the National U. is designed mainly for Catholics.

CANADA.—Language differences, disagreements of Catholics and Protestants, rivalries of Prot. sects, the Dominion's vast area, the absence of any Federal (national) authority in educational matters, and the conception (imported from England) of a u. as an examining institution as distinguished from the teaching institution, viz. the College, all combined to scatter broadcast throughout Canada degree-conferring bodies, many of which were—and are—unworthy of the name 'University.' Canada has a score of so-called u's, located as follows: ONTARIO: *Toronto* (with *Trinity* U. and *Victoria* U. affiliated), *Queen's* (Kingston), *M'Master* (Toronto), *Ottawa*, *Western* (London). QUEBEC: *M'Gill* (Montreal), *Laval* (Quebec and Montreal), U. of *Bishop's College* (Lennoxville). NOVA SCOTIA: *Dalhousie* (Halifax), *King's College* (Windsor), *Acadia* (Wolfville), *St. Francis Xavier* (Antigonish). NEW BRUNSWICK: *New Brunswick* (Fredericton), *Mount Allison* (Sackville). WESTERN PROVINCES (all XX.-cent. creations): U's of *Alberta*, *Saskatchewan*, *Manitoba*, *British Columbia*. These include 4 Anglican u's, 3 R.C., 2 Baptist, 2 Methodist, 1 Presbyterian; 7 unsectarian Provincial (*i.e.* State) u's (Toronto, New Brunswick, Dalhousie, Alberta, Saskatchewan, Manitoba, British Columbia; some teaching, some only examining; mostly with affiliated denominational coll's); and M'Gill (Independent; unsectarian but Prot. in atmosphere). The greatest Canadian u's are *Toronto*, *M'Gill*, *Dalhousie*, *Queen's* (Presbyterian), and *Laval* (Fr. R.C.). The oldest u. is *King's College* (N.S.), chartered 1802; the youngest, *British Columbia*, instituted 1912. NEWFOUNDLAND has no u. as yet.

AUSTRALIA.—Each State of the Commonwealth now has one and only one u. The three oldest and biggest bear names of cities—*Sydney* (founded 1850), *Melbourne* (1853), *Adelaide* (1876); the three youngest are called after States—*Tasmania* (1890), *Queensland* (1909), *Western Australia* (1911). All are teaching u's, centralised, State-endowed, non-sectarian (some have denominational residential coll's attached), following continental, Scot., or modern Eng. patterns, rather than Oxford and Cambridge residential collegiate system. Sydney and Melbourne have large teaching staffs, and have made names for themselves in the u. world. Tasmania (191,000 inhabitants) has one u.; so has New South Wales (1,650,000 inhabitants)—a remarkable distribution.

NEW ZEALAND.—The National U. of *New Zealand* is the sole degree-conferring body in that country. It has affiliated coll's in North and South Islands, including the U. of *Otago*, which suspended its degree-confer-

ring powers when the U. of New Zealand was founded (1870), provided the latter remained a purely examining and not a teaching body.

South Africa.—The Union of S. Africa has also only one u.—an examining board—the U. of the *Cape of Good Hope* (founded 1873). Seven or eight coll's in the various provinces prepare students for its examinations. The foundation of a National Central Teaching U. of South Africa at Groote Schuur (near Cape Town) is advocated, and large bequests have already been received (1913).

India.—Three examining u's were founded in 1857 in *Calcutta*, *Bombay*, and *Madras*; *Punjab* (Lahore, 1883) and *Allahabad* (1887) belong to the same type. Under this system Cram reigned supreme in India, non-descript affiliated institutions multiplied amazingly, and Higher Education was almost synonymous with Examination. The Indian U. Act (1904) permitted the u's to assume teaching functions and promote research—permission which is slowly being taken advantage of. A teaching U. at *Dacca* was authorised (1912), and U's at *Benares*, *Aligarh*, and U. of *Burma* at Rangoon are projected. Higher u. ideals seem at last to be gaining ground in India.

China.—A U. of *Hong Kong* was opened in 1912.

Malta.—The oldest u. in the Empire outside the Brit. Isles is the U. of *Malta* (1769), dating from before Brit. occupation.

United States.—North America has *c.* 1000 degree-conferring institutions calling themselves u's or coll's (Amer. 'colleges' are usually a transition stage between school and u.: pupils aged 17–21). Of these, some are great homes of learning, but many are utterly unworthy of their name. The Carnegie Foundation for the Advancement of Teaching is now sifting true from pseudo-u's. *Harvard*, America's *doyen* u., dates from 1636; *William and Mary*, 1693; *Yale*, 1701; *Princeton*, 1746. Unlike Eng. u's, Amer. u's progressed rapidly in XVIII. cent. They helped to found the Republic—'the Colleges united the Colonies.' State u's were established *c.* 1800 onwards; an ordinance of 1787 provided land-grants for u. purposes in N.W. Territory. The Morrill Act (1862) gave 30,000 acres for higher education to each State for each Senator and Representative in Congress. An influx of Ger. scholars (*c.* 1848) and Paris Exhibition (1873) also quickened the u. movement in America. By 1907 there were 39 State u's—democratic institutions, State-controlled, State-maintained. Private u's and coll's are mostly denominational, some aristocratic. Co-education is almost universal. Official statistics (1910) show over 600 u's and coll's, *c.* 80 % being private. States and individuals alike show extraordinary generosity towards u. education. Noted u's, besides aforementioned, are: *Boston*, *Brown* (R.I.), *Chicago*, *Columbia* (N.Y.), *Cornell*, *Johns Hopkins* (q.v.), *Leland Standford Jr.*, *New York*, *North Western* (Ill.), *Pennsylvania*, *Syracuse* (N.Y.), *Western Reserve* (Ohio); *California*, *Illinois*, *Indiana*, *Iowa*, *Kansas*, *Michigan*, *Minnesota*, *Missouri*, *Nebraska*, *Ohio*, *Virginia*, *Wisconsin* (State u's). U. of *State of New York* is purely administrative and non-teaching. Absence of Federal authority has hitherto prevented a National U. being established. Several u's provide for coloured students, e.g. *Howard* U. (District of Columbia).—Philippines: *St. Thomas U.* (Manila).

Germany has 21 u's, viz. *Heidelberg* (founded 1385), *Leipzig* (1409), *Rostock* (1419), *Greifswald* (1456), *Freiburg* (1457), *Tübingen* (1477), *Marburg* (1527), *Königsberg* (1544), *Jena* (1558), *Wurzburg* (1582), *Giessen* (1607), *Strassburg* (1621 and 1872), *Kiel* (1665), *Halle* (1694), *Breslau* (1702, 1811), *Göttingen* (1737), *Erlangen* (1743), *Münster* (1780), *Berlin* (1809), *Bonn* (1818), *Munich* (1826). Germany started later in the u. race than Italy, France, and England. The Renaissance was responsible for the XIV.–XV. cent. u's; Reformation and counter-Reformation account for those of XVI.–XVII. cent's. Halle was Germany's first modern u. Napoleon's wars wiped out almost a score of Ger. u's. Berlin U. marked the dawn of a new era, representing Prussia's determination to counterbalance military and territorial losses by intellectual conquests. In XIX. cent., Germany, so backward in Middle Ages, outstripped all rivals in u. progress. Her u's have greatly promoted Germany's national unity, international prestige, and industrial development.

Ger. u's are State institutions; the examinations for medical degrees, for instance, are State examinations. They enjoy limited autonomy and unlimited intellectual independence; *Lehr-* and *Lern-freheit* are u. watchwords. They are homogeneous; and students migrate freely from u. to u. A spirit of research and scientific investigation dominates every u. They are 'Day' u's—teaching institutions, without residential obligations or facilities, the unit being the faculty, not the coll. This type has been reproduced more or less successfully in Austria, Switzerland, Holland, Scandinavia. Ger. u. achievements have also given a great stimulus to Amer. and modern Eng. u's. The biggest Ger. u's are Berlin, Munich, Leipzig, Bonn.

Austria-Hungary.—*Prague* is the oldest u. in Central Europe, the first Teutonic u.; now a double u., German and Czech. Other famous u's are *Cracow* (Polish, 1349), *Vienna* (1365; great medical school). These are all State-maintained, as are modern *Czernowitz*, *Innsbruck*, *Graz*, *Lemberg*; *Budapest*, *Kolozsvar* (Magyar), *Zagreb* (Croatian).

Netherlands.—*Leyden* (1575) was once among most celebrated European u's; *Groningen* (1614), *Utrecht* (1636), are also State u's; *Amsterdam* has 2 u's, one municipal, one free.

Switzerland.—*Bâle* dates from 1460; *Lausanne*, 1537; *Geneva*, 1559; *Bern*, *Fribourg*, *Neuchâtel*, *Zürich* are modern; Swiss u's are Cantonal.

Scandinavia.—*Upsala* (1477), oldest Scandinavian u., was once most renowned in Europe; *Lund* (1666), *Stockholm* (1878), *Copenhagen* (1478), *Christiania* (1811).

Russia.—Imperial u's of *St. Petersburg* (1819) and *Moscow* (1755) are very large; smaller u's are *Dorpat* (1632), *Charkow*, *Kazan*, *Kiev*, *Odessa*, *Warsaw*, *Saratov*, *Tomsk*, *Shaniaosky* (Moscow). In Finland, u. founded in Abo (1640) was removed to *Helsingfors* (1828).

Belgium.—*Louvain* (1425) is a Catholic u.; *Ghent* and *Liège* (1816, 1817) are State u's, *Brussels* a free u.

France.—In XIII. cent. many coll's (first and foremost, the *Sorbonne*) gathered round the *U. of Paris*, and famous u's arose at *Toulouse*, *Montpellier*, *Orleans*, etc. These and later u's were all swept away by the Revolution. In their place Napoleon created the *U. of France* (1808), embracing all educational institutions of the empire. Thus u. came to mean an administrative system, not a teaching institution (cf. U's of *London* and *State of New York*). Independent u's were re-established, 1897, faculties being grouped again in local u's, instead of being attached to U. of France. Existing State u's are: *Paris*, *Lyons*, *Lille*, *Bordeaux*, *Toulouse*, *Montpellier*, *Nancy*, *Aix-Marseille*, *Caen*, *Dijon*, *Grenoble*, *Besançon*, *Poitiers*, *Rennes*, and *Clermont*; also *Algiers*. There are several free 'Faculties' in certain towns.

Italy in the Middle Ages was famous for its u's, taking the lead in many respects. *Bologna* (XII. cent.) is perhaps the oldest European u.; other State u's are *Padua* (1222), *Naples* (1224; now greatest), *Genoa* (1243), *Macerata* (1290), *Siena* (1300), *Rome* (1303), *Pisa* (1343), *Pavia* (1361), *Turin* (1412), *Catania* (1434), *Parma* (1502), *Messina* (1549), *Cagliari* (1626), *Sassari* (1677), *Modena* (1678), *Palermo* (1779). Free u's are *Perugia* (1308), *Ferrara* (1391), *Urbino* (1564), *Camerino* (1727); *Florence* has an Institute of Higher Studies.

Spain.—*Salamanca* (1243) enjoyed a great reputation in Middle Ages. *Valladolid* dates from 1346; *Barcelona* (1340), *Saragossa* (1474), *Valencia* (1501), *Seville* (1502), *Santiago* (1504), *Granada* (1531), *Oviedo* (1608); Alcala (1499) was removed to *Madrid*, now one of Europe's largest u's.

Portugal has one u.—*Coimbra*, originally founded at Lisbon (1290).

Other European u's are: GREECE—*Athens* (1837). RUMANIA—*Bucharest* (1864), *Jassy* (1860). BULGARIA—*Sofia* (1888). SERVIA—*Belgrade*. TURKEY—*Constantinople* (

Egypt.—*El Azhar* (Cairo: Moslem; 972 A.D.).

Japan.—State u's at *Tokio*, *Kioto*, *Tokohu*.

China.—*Imperial U. of Peking* and *U. of Tientsin*; 'Western' U. projected.

South America.—PERU—The oldest u. in Amer. Continent is *San Marcos* (Lima; 1551); others are *Arequipa*, *Cuzco*, *Trujillo*. ARGENTINE—National u's at *Cordoba*, *Buenos Aires*; Provincial at *La Plata*, *Santa Fé*, *Paraná*. CHILE—*Santiago*. ECUADOR—*Quito*. HONDURAS—*Tegucigalpa*. URUGUAY—*Montevideo*.

Rashdall, *U's of Europe in the Middle Ages* (1895), *Thriving U's of the World* (1911); *Minerva Lexicon* (annual: U. Directory); Eliot, *Univ. Administration*; Curzon, *Principles of Univ. Reform*; Paulsen, *The Ger. U's* (1906).

College Fraternities.—Societies in univ's of U.S.A. and Canada are also termed Gk. Letter Societies (e.g. *Phi-Beta-Kappa*). They are composed of men organised into lodges generally on a basis of common tastes. Members of all the four years of coll. are eligible; the lodges are nominally secret. In 1910 the number of men's general fraternities was 32, with 1068 living chapters and owning much valuable property. The first men's society was founded at the Coll. of William and Mary, at Williamsburg, Virginia, 1776; the first woman's soc. or sorority (*Kappa-Alpha-Theta*) was founded in 1870, at De Pauw Univ., and in 1910 there were 17 general sororities with some 300 active chapters. Their place in Amer. college life is invaluable, and takes the place to a great extent of the Eng. collegiate system.

UNLEAVENED BREAD, see PASSOVER, HOST, EUCHARIST.

UNNA (51° 32′ N., 7° 41′ E.), town, Westphalia, Prussia; iron- and salt-works. Pop. 17,380.

UNST (60° 45′ N., 0° 53′ W.), most northerly of Shetland Islands. Pop. (1911) 2077.

UNTERWALDEN (*c.* 46° 50′ N., 8° 20′ E.), canton, Switzerland; area, 295 sq. miles; comprises the two half-cantons of Obwalden and Nidwalden. Surface is mountainous, reaching extreme height of *c.* 10,600 ft. in Mt. Titlis; drained by Aa. Dairy-farming is carried on; fruit is cultivated and live stock raised. Chief town of Obwalden is Sarnen; of Nidwalden, Stanz. Pop. (1910) 30,919.

UNYAMWEZI, region, Ger. E. Africa, between Lakes Victoria and Tanganyika; inhabited by Bantus.

UNYORO (1° N., 31° E.), territory, Brit. E. Africa, between Uganda and Lake Albert Nyanza.

UPANISHADS, Brahmanical metaphysical treatises, the older forming part of the Vedas. See SANSKRIT LITERATURE.

UPAS TREE (*Antiaris toxicaria*), native to Malay Archipelago, yields a virulent poison (*upas*) used for poisonous arrows; formerly reputed to kill all animal life near it.

UPERNIVIK, see GREENLAND.

UPPER SIND FRONTIER (28° N., 69° E.), district, Sind, Bombay, India. Pop. 240,000. Capital, Jacobabad.

UPPINGHAM (52° 36′ N., 0° 43′ W.), town, Rutlandshire, England; famous public school (1584). Pop. (1911, rural district) 6735.

UPSALA (59° 51′ N., 17° 38′ E.), city, on Fyris, capital, län of Upsala, Sweden; seat of an abp. (Primate of Sweden) and of a univ. (1477); the cathedral (1260) contains monuments of some of the Swed. kings and of the naturalist Linnæus; 2 miles N. is site of the mediæval town of Old U. Pop. (1911) 26,586; (län) 129,404.

UPUPA, HOOPOES (*q.v.*).

UR (UR OF THE CHALDEES) (30° 50′ N., 46° 20′ E.), ancient city, Babylonia, now represented by the ruins of Mughair, on Euphrates; was native place of Abraham and residence of the earliest Babylonian kings; an important maritime and commercial city.

URÆMIA, condition resulting from failure of poisonous matter to pass from blood to urine.

URAL MOUNTAINS (51° to 68° N., 59° to 65° E.), series of ridges running in various directions, which form the physical boundary between European and Asiatic Siberia, with total length of *c.* 1500 miles; height, *c.* 1300 ft., in extreme N.; over 5500 ft. farther S., reaching extreme height of 5530 ft. in Murai-chakkl; 3000 to 5000 ft. in centre, and 3000 to 5400 ft. at S. end. Rich in minerals, gold, copper, iron, platinum, silver, coal, salt, malachite, precious stones. Many large forests on the slopes; crossed by railways from Perm to Ekaterinburg and Tiumen, and by Siberian railway between Samara and Ufa.

URAL-ALTAIC, a group of languages, sometimes called Turanian, of Eastern origin. The present-day languages directly attaching themselves to this group are Turkish, Mongolian, Manchu, Finnish, and Magyar. Theories have been advanced connecting with this group Japanese, old Etruscan, and the philologically mysterious language of the Basques of the Pyrenees. The whole group belongs to that class of languages mentioned under II. in the article on PHILOLOGY (*q.v.*), capable of a small degree of inflection, but in the main agglutinating.

URALSK (51° N., 51° E.), province, Asiatic Russia, in N. of Caspian Sea; belongs to the general-governorship of the Kirghiz Steppes. Pop. (1910) 775,400. Capital, **Uralsk** (51° 12′ N., 51° 24′ E.), on Ural; trade in cattle with the Kirghiz. Pop. (1910) 58,240.

URANIUM (U=238·5), white metal allied to chromium; occurs as U_3O_8 in pitchblende; S.G. 18·7, M.P. very high; radioactive, 'ancestor' of radium. Oxides and derivatives: UO_2, uranous salts, green: UCl_4, $U(SO_4)_2 9H_2O$; UO_3, uranyl salts, yellow, fluorescent: $UO_2(NO_3)_2 6H_2O$; uranates: $Na_2U_2O_7$ (uranium yellow, makes glass yellow, with green fluorescence); $U_3O_8 = UO_2.2UO_3$; UO_4.

URANUS, planet discovered by Sir William Herschel in 1781; distance from sun, 1780 million miles; diameter, about 32,000 miles; period, 84 years; four satellites, with nearly circular orbits, whose plane is inclined 82° to that of the ecliptic: satellites revolve contrary to usual direction in solar system; spectrum shows a dense atmosphere.

URA-TYUBE, ORA-TEPE (39° 50′ N., 68° 50′ E.), town, Syr-Darya, Russ. Turkestan; manufactures cotton goods. Pop. 23,500.

URBAN, name of 8 popes.—**Urban II.**, ODO DE LAGARY, pope, 1088–99; cardinal, 1078; succ. Victor III., and continued work of Gregory VII.; opposed Philip I. of France; presided at Council of Clermont which proposed First Crusade, 1095.—**Urban VI.**, BARTOLOMMEO PRIGNANO, pope, 1378–89; b. 1318; the Great Schism began with his pontificate.—**Urban VIII.**, MAFFEO BARBERINI, pope, 1623–44; b. 1568; a worldly man, suspected for relations with Protestants.

URBANA (40° 5′ N., 83° 42′ W.), city, capital, Champaign County, Ohio, U.S.A.; seat of U. univ. (Swedenborgian); manufactures furniture, agricultural machinery. Pop. (1910) 7739.

URBINO (43° 43′ N., 12° 39′ E.), town, Pesaro e Urbino, Italy; has a modern cathedral, several interesting old churches, and a ducal palace, built in XV. cent., and containing fine art collections; seat of free univ. (1564); birthplace of Raphael (*q.v.*); cheese, silks; formerly celebrated for majolica. Pop. 20,000.

URBS SALVIA (43° 12′ N., 13° 25′ E.), modern *Urbisaglia*, ancient town, Picenum, Italy.

URCHIN, see ECHINODERMATA.

UREA, $CO(NH_2)_2$, a crystalline substance, soluble in water; M.P. 132° C.; occurring in urine of mammals, carnivorous birds, and reptiles; human urine contains about 3 %; produced artificially by Wöhler, in 1828, by evaporating an aqueous solution of ammonium cyanate, which underwent isomeric change,

thus: $NH_4O.C:N \longrightarrow NH_2.CO.NH_2$. This was the first synthesis of an 'organic' compound from inorganic materials. U. is carbamide, *i.e.* amide of carbonic acid, and may be obtained, like other amides, by action of ammonia on chloride of the acid.

UREDINEÆ, see FUNGI.

URETHRA, DISEASES OF, see GYNECOLOGY.

URFA, see EDESSA.

URGA (47° 58′ N., 106° 40′ E.), city, on Tola, Mongolia; religious and commercial centre. Pop. *c.* 27,000.

URI (*c.* 46° 48′ N., 8° 40′ E.), E. central canton, Switzerland; bounded by Schwyz, Glarus, Grisons, Ticino, Valais, Bern, Unterwalden; area, 415 sq. miles. Surface is generally mountainous, except along valley of Reuss; highest points include Gallenstock, Sustenhorn, St. Gothard; chief town, Altdorf. Live stock raised; dairy-farming carried on. Formed league with Schwyz and Unterwalden, 1291, which was beginning of Swiss Federation. Pop. (1910) 22,113.

URIA, GUILLEMOT (*q.v.*).

URICONIUM (52° 41′ N., 2° 39′ W.), modern WROXETER, ancient town, Britain.

URIM AND THUMMIM, in Old Testament, were probably a kind of lot; important decisions were taken by means of them; only used in early times, and in the Priestly Code their precise form seems forgotten.

URINARY SYSTEM, the function of which concerns excretion of waste products from the body contained in the fluid termed the *urine*, comprises the *kidneys*, the *ureters*, the *urinary bladder*, and the *urethra*.

The KIDNEYS are a pair of glands of a characteristic bean-shaped form, having a convex outer border and a concave inner border, with somewhat bulging extremities, while their colour is a deep brownish red. They are about 4 in. long, 2 in. broad, and 1 in. thick, weighing about 4 to 6 oz. They are situated in the upper part of the back of the abdominal cavity, one on each side of the vertebral column, the left kidney placed rather higher than the right. The substance of the kidney consists of a vast number of minute lengthy and complicated tubules, with which are associated numerous small blood vessels. Each tubule begins from a small dilatation called a *Malpighian capsule*, into which a bunch of thin-walled capillary blood vessels projects, and through the walls of this bunch the water and salts of the fluid part of the blood, of which the *urine* is composed, easily pass by filtration into the capsule and proceed down the tubule. The tubules pour the urine into the *pelvis* of the kidney, which is a diluted part of the ureter in the interior of the kidney.

The URETER is a narrow tube, of comparatively thick walls, which conveys the urine from the pelvis of the kidney to the urinary bladder, passing downwards and inwards in the posterior wall of the abdomen, behind the peritoneum.

The URINARY BLADDER is a sac serving as a reservoir for the urine, which it receives from the kidneys by the ureters and expels from the body by the urethra. Its situation and its relations depend upon the amount of its distension; when empty it lies entirely within the pelvis, but when distended it rises up into the abdomen. When empty it is somewhat pyramidally shaped, the apex pointing downwards, where the urethra commences. The bladder is held in position mainly by ligaments attached from the pelvis to the apex or *neck*. The walls of the bladder are composed of an outer coat of peritoneum present, however, only on the upper parts of the organ, a middle coat of three layers of muscular fibres, and an inner coat of mucous membrane, much corrugated when the bladder is empty. As the bladder becomes distended rhythmic contractions of its muscular walls are set up, which increase in strength until the urine is expelled by the urethra.

The URETHRA is the canal by which the urine is conveyed from the bladder to the exterior. In the male it is about 8 or 9 inches in length, and also serves to convey the secretion of the reproductive glands or *testicles*; it passes through the *prostate* gland and through the *corpus spongiorum* of the penis, at the end of which organ it opens. In the female the urethra is about an inch and a half in length, directed downwards and forwards, and opening by a small slit immediately in front of the vagina.

See KIDNEY, BLADDER, BLOOD.

URMIA, URUMIAH.—(1) (37° 35′ N., 45° E.) town, near Lake Urmia, Azerbaijan, Persia; centre of missionary activity; exports dried fruit. Pop. *c.* 90,000. (2) (37° 40′ N., 45° 30′ E.) salt lake, Persia; contains numerous islands; shallow, no outlet; area, 1795 sq. miles.

URN, a vase of marble, glass, or clay, for ashes of the dead. See Sir Thomas Browne's *Urn-Burial*.

UROCHORDA, TUNICATA (*q.v.*).

UROTRICHUS, see under MOLE FAMILY.

UROTROPINE, colourless, granular crystalline substance prepared by the combination of ammonia with formaldehyde, and used medicinally as a urinary antiseptic, especially in cystitis (inflammation of the bladder), and to disinfect the urine in persons convalescent from typhoid fever (*q.v.*).

URQUHART, DAVID (1805–77), Eng. diplomatist; attached to embassy at Constantinople, 1835. Wrote *Turkey and its Resources* and other works. Introduced Turk. baths to England.

URQUHART, SIR THOMAS, of Cromarty (1611–60), Scot. writer and soldier; fought against Covenanters, fled to England, where Charles I. knighted him, 1641, in which year he pub. his *Epigrams*; taken prisoner by Roundheads at *Worcester*; in 1652 he wrote *The Jewel*, an encomium on the Scots, and *The Pedigree*, a history of his family from the creation; he pub. in 1653 an *Introduction to the Universal Language*, and his best work, a translation of *Rabelais*.

URSA MAJOR, THE GREATER BEAR, constellation in N. hemisphere; also called The Plough, Charles's Wain, or The Wagon; the two stars in line with the Pole Star are the Pointers.

Ursa Minor, THE LESSER BEAR, constellation in N. hemisphere, includes the Pole Star (*Ursæ Minoris*); also named Cynosure or Dog's Tail, because of its s.

URSINS, PRINCESS DES, MARIE ANNE DE LA TRÉMOILLE (1642–1722), lady of Span. court; as chief of household to queen of Spain, attained great power which ended on queen's death and king's remarriage.

URSULA, ST. (III. or V. cent.), a mythical saint with attendant maidens, in R.C. calendar; her day is Oct. 21; first mentioned in IX. cent.; associated with Cologne; legend reached most elaborate form in XI. cent. U. was the dau. of a king and was martyred with 11,000 virgin companions—the story probably a Christianised version of a Teutonic myth.

URSULINES, female monastic order, existing since 1535; nurses and teachers.

URTICARIA, see NETTLERASH.

URUGUAY (30° to 35° S., 53° 26′ to 57° 41′ W.), small republic, S. America, to N. of Rio de la Plata; bounded N.E. by Brazil, S.E. by Atlantic, S. by River Plate, W. by Argentina; area, 72,210 sq. miles. Surface is flat with low ridges of hills, reaching an extreme height of *c.* 2000 ft.; drained by Rio Negro and other tributaries of the Uruguay. Climate is healthy; temperature ranges from 35° to 90° F.

U. was discovered by Span. explorers early in XVI. cent.; was included in Span. dominions until 1811, and was subsequently seized by Portuguese; remained a province of Brazil until 1825, when it proclaimed itself an independent republic, being formally recognised as such three years later. Legislative power is vested in a Senate of 19 members and House of Representatives of 75 members. Executive power is held by the president.

Chief towns, Montevideo, Paysandu, Colonia, Minas. Principal industry is rearing of cattle and sheep; extensive exports of meat, wool, and animal pro-

ducts. Wheat and maize are chief crops, and grapes, olives, and tobacco are grown. Minerals include gold, copper, lead, silver, mercury. Education is free and obligatory. State religion, R.C. Pop. 1,178,000.

URUGUAYANA (29° 38′ S., 56° 59′ W.), town, river port, on Uruguay, Rio Grande do Sul, Brazil; trade in cattle. Pop. 15,000.

URUMIAH, see URMIA.

USEDOM (54° N., 14° E.), island, in Baltic, belonging to Pomerania, Prussia. Pop. 39,000.

USELIS (39° 47′ N., 8° 45′ E.) (modern USELLUS), ancient town, Sardinia.

USHAK (38° 40′ N., 29° 30′ E.), town, Asia Minor; manufactures 'Turkey' carpets. Pop. 12,000.

USHANT, OUESSANT (48° 28′ N., 5° 3′ W.), island of France, belonging to Finistère department.

USHER, JAMES (1581 – 1656), Anglican ecclesiastic; ed. Trinity Coll., Dublin; bp. of Meath, 1621; abp. of Armagh, 1625; came to England, 1640, and remained; author of numerous works; formulated chronological scheme often printed in margins of Eng. Authorised Version.

USK.—(1) (51° 42′ N., 2° 55′ W.) town, on Usk, Monmouthshire, England. (2) (51° 39′ N., 2° 54′ W.) river, Wales and England, joins estuary of Severn; length, 60 miles.

USKOKS, Uscocs, Christians of Bosnia and Herzegovina expelled by the Turk. invasion in XVI. cent. From Dalmatia and Croatia they waged war against the Turks and practised piracy; disbanded by Austria and established in interior of Croatia, 1617.

USKUB (42° 1′ N., 21° 45′ E.) (ancient *Scupi*; Servian SKOPLYE), town, on Vardar, capital, vilayet Kossova, Servia; strategic point; commercial centre; dyeing and weaving industries; was once capital of the Servian kings. Captured by Allies in Turko-Balkan War (*q.v.*), 1912. Pop. *c.* 31,000.

USTICA (38° 44′ N., 13° 12′ E.), mountainous island, in Mediterranean, belonging to Italy.

USTILAGINEÆ, see FUNGI.

USTYUG VELIKIY (61° N., 46° E.), town, on Sukhona, Vologda, Russia; manufactures woollens; exports grain. Pop. 12,500.

USURY was always condemned by R.C. Church, and was an offence against the law in England in Middle Ages. Elizabeth fixed the interest at 10 %, and in 1624 it became 8 %. The growth of commerce and the rejection of Catholic authority made the u. laws a dead letter, and in 1854 they were repealed. The distinction between u. and interest is that u. is living by the lending of money, while interest is accepting from another the profit that would

UTAH (37° to 42° N., 109° 2′ to 114° 2′ W.), inland western state, U.S.A., lying among western ridges of



Rocky Mountains; bounded N. by Idaho, Wyoming, E. by Wyoming, Colorado, S. by Arizona, W. by Nevada; area, 84,928 sq. miles; the Wahsatch Mountains, which run roughly N. and S., reach height of *c.* 13,000 ft., and the Uintah range in N.E. rises in highest point to *c.* 14,000 ft.; in N.W. is the Great Salt Lake; watered by Colorado R., with the Green, Grand, Fremont, San Juan and other tributaries, and by the Sevier and other streams. Climate is subject to great extremes in mountainous districts, healthy and temperate in valleys; rainfall very small and irregular; soil fertile wherever irrigation water can be obtained.

U. was transferred from Mexico to the U.S. in 1848, and was settled by the Mormons under Brigham Young; organised as a Territory, 1850; admitted to the Union, 1896. Executive power is vested in a governor who is assisted by 5 officers of state; legislature consists of a Senate of 18 members and House of Representatives of 46 members, elected respectively for 4 and 2 years by popular vote. For purposes of local administration the state is divided into 27 counties.

The chief towns are Salt Lake City (capital) and Ogden. Agriculture is successfully carried on in the fertile regions where water is obtainable; chief crops, wheat, oats, potatoes, hay; maize, barley, and rye are also cultivated, and sugar-beet is an important product. Various fruits and vegetables are grown, and horses, cattle, sheep, and pigs are raised. Minerals include silver, copper, lead, gold, coal, asphalt, salt. Industries of importance are copper-refining, flour-milling, fruit-canning, and the manufacture of boots and shoes, sugar, cheese, and butter. Railway mileage in 1910 was over 2000. Education is free and obligatory for children between the ages of 8 and 16. Salt Lake City is seat of State Univ., and there are Mormon univ's or colleges at Logan, Provo, and Salt Lake City. The principal religion is Mormonism, which is professed by about three-fourths of the entire population; other creeds are R.C., Presbyterian, Methodist. Pop. (1910) 373,351.

UTAKAMAND, see OOTACAMUND.

UTERUS, DISEASES OF, see GYNECOLOGY.

UTGARTH, see ASGARD.

UTICA.—(1) (37° 10′ N., 10° 10′ E.) (modern PORTO FARINA) city, at mouth of Bagradas, ancient Africa; founded by Phœnicians; took part with Rome in third Punic War; on the destruction of Carthage became chief town of the Rom. province of Africa; scene of Cato's death. (2) (43° 5′ N., 75° 16′ W.) city, on Mohawk, capital, Oneida County, New York, U.S.A.; manufactures hosiery, cotton goods; trade in cheese; noted for the number of its charitable institutions. Pop. (1910) 74,419.

UTILITARIANISM, the theory that the moral value of actions depends on their conduciveness to general happiness. See ETHICS.

UTOPIA, see MORE, SIR THOMAS.

UTRAQUISTS, see HUSSITES.

UTRECHT (27° 30′ S., 30° 26′ E.), town, Natal; coal-fields.

UTRECHT (52° 5′ N. 5° 7 E.), city, on Crooked Rhine, Holland; capital of U. province; strong fortress; city intersected by two canals, Oude and Nieuwe Gracht. Outstanding features are St. Martin's Cathedral (1254–67), R.C. cathedral (1524), Janskerk (begun XI. cent.), pope's house (1517), built by Adrian VI., picture-gallery, museums, univ. (1634), library, Maliebaan (fine triple avenue), Hoogeland park. In Middle Ages U. was centre of bp.'s see (see UTRECHT PROVINCE); passed to Spain, 1528; *Union of U.*, 1579, established Dutch independence; *Treaty of U.* (vide infra) signed here, 1713. Chief industries are printing, machinery, chemicals, woollens, silks, velvets, tobacco, cigars, plate-glass. Pop. (1911) 121,317.

Utrecht, Treaty of (1713), name of nine distinct treaties which ended War of Span. Succession. Most important results: England obtained Newfoundland, Nova Scotia, St. Kitts, Hudson's Bay, from France; Gibraltar and Minorca from Spain. Philip was recognised as king of Spain; gave up Sicily to Savoy, Milan, Naples, and Span. Netherlands to emperor. Guarantee given that Fr. and Span. crowns would not be united.

UTRECHT PROVINCE, smallest province of Holland, lies S. of Zuider Zee; watered by several branches of the Rhine delta; area, 534 sq. miles; capital, Utrecht (*q.v.*); agriculture, cheese (Gouda), butter, wheat, fruit, cattle-rearing, etc. U. was governed by bp's, VIII.–XVI. cent's; continual strife with burghers and powerful neighbours; bp.'s temporal power broken, XIV. cent.; sold to Charles V., 1528; rose against Spain, 1579; became centre of Jansenists, *c.* 1720; taken by Prussians, 1787, by French, 1795; restored to Holland, 1814. Pop. 295,000.

UTRERA (37° 10′ N., 5° 49′ W.), town, Seville, Spain. Pop. 15,700.

UTTARPARA (22° 41′ N., 88° 23′ E.), town, on Hugli, Bengal, Brit. India. Pop. 7300.

UTTOXETER (52° 54′ N., 1° 52′ W.), town, Staffordshire, England; manufactures agricultural implements. Pop. (1911) 5719.

UXBRIDGE (51° 34′ N., 0° 26′ W.), town, on Colne, Middlesex, England. Pop. (1911) 10,374.

UXMAL (20° 12′ N., 90° 2′ W.), deserted city, Yucatan, Mexico; remarkable Mayan ruins.

UZÈS (44° N., 4° 20′ E.), town, on Auzon, Gard, France; castle and cathedral; manufactures silk. Pop. 4100.

UZHITSE, UZICE (43° 50′ N., 19° 45′ E.), town, Servia. Pop. 7500.

UZZIAH, king of Judah; s. of Amaziah; in his reign Isaiah began to prophesy; the condition of the country under his rule is described in *Isaiah* 2.

V, the 22nd letter of the alphabet, a differentiated form of U. It was absent from the Anglo-Saxon alphabet, where its place was served by the symbol *f*.

VAAL (26° 30′ S., 24° 30′ E.), river, S. Africa; rises in Mount Klipstapel; flows with a winding S.W. course to the Orange River; length, 700 miles.

VACARIUS (1120–1200 ?), Ital. lawyer; first to teach Rom. law in England; brought to Canterbury to assist Abp. Theobald, 1146; lectured at Oxford; prominent ecclesiastical judge till end of XII. cent.

VACCINATION, the inoculation in human beings of cowpox, a disease of cattle, as a prevention against smallpox (*q.v.*). The practice of inoculation of smallpox in healthy persons, with the purpose of producing a slight attack of the disease with subsequent immunity to it, was introduced from the East into England by Lady Mary Wortley Montagu in 1721. Edward Jenner, a medical practitioner in Gloucestershire, found that there was a current belief in that part of the country that dairymaids and other persons who had contracted cowpox from cows could not take smallpox afterwards. In 1796 he inoculated a boy with cowpox and, some weeks later, inoculated him with smallpox, to find that he did not contract the latter disease. After further experiments, cowpox inoculation became widely practised, taking the place of smallpox inoculation.

The method which was followed for many years was arm-to-arm v., the matter being taken from a vesicle on the arm of one child and inoculated on the arm of another; glycerinated calf lymph is now, however, universally employed in Britain in v. The methods and practice of v. are regulated in Britain by various Acts of Parliament, the chief provisions at present being that every child must be vaccinated before the age of six months unless the parents satisfy a magistrate that they have a conscientious objection, on sufficient grounds, to v., or that a medical man certifies that v. would be prejudicial to the child's health, in which case the age limit may be extended; and v. is carried out at the home of the child.

Since the introduction of v. the case-mortality of smallpox has diminished from 37 % to 5 %, although it has been shown that in epidemics even at the present day the case-mortality among unvaccinated persons still reaches the former figure, this fact disproving the argument that the decreased case-mortality in smallpox is due to improved sanitation and care for the public health. Formerly, also, before the introduction of v., smallpox was a disease mainly of infancy, while to-day it is a disease mainly of adults, the infants being protected by v., the immunising power of which gradually grows less in adult life. In those countries where re-v. is compulsory, and in those particular classes of the community of other countries in which it is made compulsory, *e.g.* civil servants, soldiers, smallpox is practically unknown, and, in the former, when cases do occur they can be treated in the ordinary hospitals. Protection given by v. against smallpox gradually diminishes, from seven to ten years being the period for which it lasts, and re-v. is necessary to secure full protection, the re-v. of children at the age of ten having been shown to confer efficient protection for the remainder of life.

VACUUM TUBE, a glass tube from which the air has been exhausted, used for the study of the electric discharge through a gas at low pressure; inside the ends are sealed metal electrodes, which can be connected to an electric machine, and a spark thus produced in the tube. The exhaustion is carried out either by an air, water, or mercury pump, but the best results are given by Prof. Dewar's method, wherein the tube, after a preliminary exhaustion by pump, is put into connection with carbon, frozen by liquid air; the carbon will absorb air or gas still remaining. Its use has resulted in the discovery of Röntgen or X-rays, and radio-activity.

VACUUM-CLEANER, machine for removing dust by suction; driven by petrol or electricity; portable hand-driven v's common.

VACZ, WAITZEN (47° 47′ N., 19° 7′ E.), town, on Danube, Hungary; bp.'s see; trade in grapes. Pop. 17,200.

VAGINA, DISEASES OF, see GYNECOLOGY.

VAGRANCY, in law, is wandering abroad without visible means of subsistence, and has been a criminal offence from Henry VIII.'s time. Many repressive and penal measures have been passed against v., but no remedial legislation has been enacted. Remedial measures have been left to philanthropic agencies. While the dislocation of trade and other economic changes are responsible for much v., there are always certain persons of nomadic instinct to whom the life appeals.

VAIGACH (70° N., 60° E.), island of Russia, in Arctic Ocean, between mainland and Novaya Zemlya.

VAISON (44° 18′ N., 5° 10′ E.) (ancient *Vasio*), town, on Ouvèze, Vaucluse, France; Rom. remains.

VAISYA, see BRAHMANISM, HINDUISM.

VALAIS (46° 10′ N., 7° 40′ E.), border canton, Switzerland, to N. of Italy; area, 2027 sq. miles. Surface consists of a deep valley about 80 miles long and 2 broad, between Pennine and Bernese Alps; drained by Rhône; there are forests with valuable timber-trees on the mountain slopes, and a considerable area is covered with excellent pasturage; cattle raised; silkworms reared; wine produced. Chief town, Sion. V. is connected with Italy by the Simplon and Great St. Bernard Passes. Has been a member of Swiss confederation since 1815. Pop. (1910) 128,381.

VALDEMAR I. (1131–82), king of Denmark; formed alliance with Henry, Duke of Saxony, and defeated Wends of Baltic, conquering Rügen, 1168–69; with his minister, Absalom, greatly increased Dan. prosperity.

VALDEMAR II. (1170–1241), king of Denmark; acquired Holstein and Ger. territories N. of Elbe; led crusade against, and defeated, Esthonians, 1218; imprisoned by Henry, Count of Schwerin, 1223, and compelled to surrender Northalbingia and other possessions; tried to recover them, but was defeated at Bornhövede, 1227.

VALDEMAR IV., king of Denmark (c. 1320–75), recovered N. Zealand, 1344; sold Esthonia to Livonian order, 1346; regained rest of Zealand and S. islands, 1347. By 1361 had recovered Scania from Sweden, and most of old Dan. possessions; his conquest of Gotland, 1361, caused wars with Hanseatic League: had to make great concessions at Stralsund, 1370, but recovered most of Holstein.

VALDEPEÑAS (38° 50′ N., 3° 27′ W.), town, Ciudad Real, Spain; produces wine; mineral springs. Pop. (1910) 23,580.

VALDES, JUAN DE (1500–41), Span. author; pub. anonymously *Diálogo de Mercurio y Caron*, 1528, against ecclesiastical scandals, hence suspected by Inquisition; translated Scripture into Span.; writings tinged with mystic evangelicalism.

VALDIVIA (40° S., 73° W.), province, S. Chile. Pop. 140,000. Capital, **Valdivia**. Pop. 17,000.

VALDOSTA (30° 38′ N., 83° 18′ E.), town, capital, Lowndes County, Georgia, U.S.A.; manufactures cotton products. Pop. (1910) 7656.

VALENCE (44° 56′ N., 4° 53′ E.), town, France; capital of Drôme, on Rhône; cathedral (XI. cent.), Maison de Têtes (1531); foundries, tanneries, silks. Pop. 24,000.

VALENCIA.—(1) (39° 20′ N., 1° W.) province, Spain, bordering Mediterranean; fertile and well cultivated; chief rivers, Guadalaviar and Jucar; formerly an independent Moorish kingdom; conquered by Aragon, 1238. Pop. (1910) 884,298. (2) (39° 27′ N., 0° 20′ W.) chief town of V. province, Spain, on Guadalaviar; abp.'s see, has cathedral dating from XII. cent. and abp.'s palace; seat of univ.; exports olives and olive oil, various fruits; manufactures silks, tiles, linen, leather, cigars. V. was captured by French, 1812. Formerly fortified. Pop. (1910) 233,348. (3) (10° 9′ N., 68° 12′ W.) city, near Lake Valencia, capital, Carabobo state, Venezuela. Pop. 40,000.

VALENCIA DE ALCÁNTARA (42° 17′ N., 5° 36′ W.), fortified town, Cáceres, Spain; active commerce; Rom. relics. Pop. 9500.

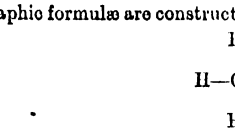
VALENCIENNES (50° 22′ N., 3° 30′ E.) (ancient *Valentianæ*), fortified town, at junction of Rhônelle and Scheldt, Nord, France; coal-mining centre; manufactures iron, sugar; formerly famous for its lace; taken by the Spaniards, 1567; by Louis XIV., 1677. Pop. (1911) 34,766.

VALENCY is the chemical value of an atom for purposes of combination or displacement. Consider the series—

$$HH\ HCl\ H_2O\ H_3N\ H_4C\ Cl_5P\ Cl_6W.$$

The chlorine atom in HCl is chemically equivalent to a hydrogen atom, for it has taken its place; the oxygen atom in H_2O is equivalent to two hydrogen atoms, with which it combines or displaces from two molecules of hydrogen. Similarly the nitrogen atom in H_3N is worth three hydrogen atoms.

Potentially, v. rises from 1 to 8 in the groups of the periodic system; actually it is variable, and often differs by 2 in different compounds of the same element, *e.g.* $SnCl_2$, $SnCl_4$. V. is represented by figures, *e.g.* C^{IV}, or by 'bonds,' *e.g.* —C—, by means of which graphic formulæ are constructed, *e.g.*—



Various theories of v. have been propounded to meet difficulties presented by numerous complex compounds. 'Molecular compounds' and the 'amines' are not explained by the usual conceptions. A theory supposes that units of v. are electrons, which form the bonds of chemical affinity.

VALENS, Byzantine emperor, 364–78 A.D.; reduced taxation, 366; persecuted orthodox Christians; fought against Persia, 373–75; waged war on Goths; was defeated and killed at battle of Adrianople.

VALENTIA, Valencia (51° 54′ N., 10° 25′ E.), island, off W. coast of Kerry, Ireland; terminus of several Atlantic cables.

VALENTIA, SIR FRANCIS ANNESLEY, Viscount (1585–1660), Brit. statesman; accused of corruption by Strafford; Sec. for Ireland during Commonwealth.

VALENTINE'S DAY, Feb. 14, formerly believed to be first day of birds' mating; hence custom of youths and maidens sending each other 'valentines'—usually humorous love-letters, caricatures, etc.; custom is almost dead in Britain; possibly connected with St. Valentine, martyred at Rome, Feb. 14, 271.

VALENTINIAN I., Flavius Gratianus Valentinianus, Rom. emperor, 364–75 A.D.; made his bro. Valens emperor of East, himself ruling West; waged war in Africa, Britain, Germany; defeated barbarian tribes, Alemanni, Saxons, and Burgundians; chief work was fortifying frontiers along Rhine; a Christian.

VALENTINUS is said to have been born in Egypt (Epiphanius), and to have begun his teaching in Cyprus; flourished in Rome during the times of Pius and Anicetus, A.D. 138–60 (Irenæus), and according to Tertullian apostatised on being refused a bishopric.

His disciples, the **Valentinians**, were of two schools: the Oriental, in Egypt and Syria, and the Ital., which spread from Rome to the Rhône; they developed the doctrine exoteric for ordinary church use, and esoteric for the initiated, and it is doubtful how much Valentinus himself taught. It was Platonic in foundation, Docetic and Dualist. The supreme Deity, called the Abyss or Unfathomable One, manifested Himself by sending forth a number of Æons, male and female, 30 in all, who constituted the Pleroma or Fulness of God. Christ was produced by the greatest of the Æons, to illumine the others, and the world was created by the Demiurge, an offspring of the last of the Æons, who also made man in His own image. Men were of three classes: spiritual, animal, and material. The spiritual (of whom the chief was Jesus, into whom Christ had entered at Baptism and departed just before the Crucifixion, and who was only apparently born of the Virgin Mary) were to be united with Christ, no matter what lives they led. The animal could not aspire to this, but might be translated to the regions of the Demiurge. The material, no matter how virtuous, were doomed to annihilation. Jesus was to be to mankind what Christ was to the Æons. Immorality resulted from the doctrine concerning the fate of the spiritual and material of humankind.

Smith and Wace, *Dictionary of Christian Biography.*

VALENZUELA, FERNANDO DE (1630–92), Span. statesman; app. Prime Minister by queen-regent of Spain; afterwards exiled to Philippines.

VALERA Y ALCALÁ GALIANO, JUAN (1824–1905), Span. novelist; b. Cabra; led an active public life, being frequently ambassador and councillor of state, senator, and member of the Spanish Academy, Madrid. Author of several fine romances.

VALERIA, VIA (42° N., 13° 30′ E.), ancient highway, Italy; continued the Via Tiburtina to Lake Fucinus and the country of the Marsi, thence to the Adriatic.

VALERIAN (*Valeriana officinalis*), plant with protandrous, asymmetrical flowers, possessing a nectariferous spur; there are only three stamens, two being suppressed. The fruit is plumed, pappus representing calyx.

VALERIUS, see Flaccus.

VALERIUS MAXIMUS (*fl. c.* 30 A.D.), Rom. author; wrote a collection of historical anecdotes.

VALET, a body-servant; in France word meant a 'youth,' but in later Middle Ages became an attendant who performed personal services of lower kind than the esquire.

VALETTA, Valletta (35° 54′ N., 14° 31′ E.), fortified seaport, capital, island of Malta; naval and coaling station; important transit trade; contains the palace of the old Masters of the Knights of Malta (governor's residence); cathedral (1576). Pop. (1911) 22,882.

VALHALLA (Scandinavian myth.), hall of the gods, and heaven of warriors slain in battle; the latter spent the day fighting.

VALLA, LORENZO (*c.* 1406–57), Ital. scholar of the Renaissance. His services to learning were exceptional; made excellent Lat. renderings of Xenophon, Herodotus, and Thucydides, and his *Elegentiæ* was long a standard text-book.

VALLADOLID.—(1) (40° 30′ N., 4° 40′ W.) province, Old Castile, Spain; traversed by Douro; chief industry, agriculture. Pop. (1910) 285,211. (2) (41° 36° N., 4° 43′ W.) town, at junction of Esgueva and

Pisuergo, capital, V. province, Spain; seat of univ. (1346) and archbishopric; has royal palace and an unfinished cathedral (1585); manufactures cloth; agricultural trade; Columbus died here, 1506, and Philip II. was born, 1527; capital of Spain till 1560. Pop. (1910) 71,066. (3) (20° 37′ N., 88° 18′ W.) town, Yucatan, Mexico; cotton goods. Pop. 14,500.

VALLE, PIETRO DELLA (1586–1652), Rom. noble who travelled in Turkey, Persia, and India, and wrote valuable accounts.

VALLEJO (38° 20′ N., 122° 20′ W.), city, seaport, on San Pablo Bay, Solano County, California, U.S.A.; exports fruit and grain; has a U.S. navy-yard. Pop. (1910) 11,340.

VALLEY FORGE (40° 7′ N., 75° 28′ W.), village, on Schuylkill, Chester County, Pennsylvania, U.S.A.; winter quarters of Washington and Amer. army, 1777–78.

VALLEYFIELD (45° 30′ N., 74° 20′ W.), town, port of entry, on St. Lawrence, Quebec, Canada; cotton- and paper-mills. Pop. 9000.

VALLISNERIA, genus of aquatic plants, order Hydrocharideæ; the only species, *V. spiralis* (Eel Grass), a common aquarium plant, has unisexual flowers; the male flowers follow the female flowers when they rise to surface.

VALLOMBROSA (43° 40′ N., 11° 30′ E.), famous XI.-cent. Benedictine monastery (now School of Forestry), Florence, Italy.

VALLS (41° 16′ N., 1° 8′ E.), town, Tarragona, Spain; textile industries. Pop. 12,900.

VALOIS, HOUSE OF, see FRANCE (HISTORY).

VALPARAISO.—(1) (33° S., 70° W.) province, Chile; mountainous; many fertile valleys; chief river, the Aconcagua. Pop. 310,000. (2) (33° 6′ S., 71° 40′ W.) fortified seaport, on Pacific Ocean, capital, V. province, Chile; chief commercial and manufacturing centre in Chile; most important seaport on Pacific coast of S. America; founded 1536, has several times been destroyed by earthquake; bombarded by Spaniards, 1866. Pop. 162,447. (3) (41° 26′ N., 86° 59′ W.) city, capital, Porter County, Indiana, U.S.A.; contains Valparaiso Univ. (1873). Pop. (1910) 6987.

VALS, VALS-LES-BAINS (44° 40′ N., 4° 20′ E.), watering-place, on Volane, Ardèche, France; mineral springs.

VALTELLINA, region, Italy, consisting of upper valley of Adda, in Sondrio province; enclosed by high ridges of Alps; chief towns, Sondrio, Tirano, Bormio; produces cereals, fruit, wines. Taken by Grisons, 1512, remaining in its possession until 1797 when Napoleon included it in Cisalpine Republic; was subsequently transferred to Austria, and has belonged to Italy since 1859.

VALUE, term in political economy applied to articles of wealth produced by human labour. The laws of supply and demand always affect the v. of commodities. V. is created by labour—the labour of the producer, artisan or agriculturist, and the distributor; and the amount of labour will settle the normal value. But if production is greater than demand, the v. will sink below the cost of production; just as scarcity will create a rise in value.

Utility must be considered. Much labour may be expended on articles of no usefulness to any one, and if this non-usefulness is recognised and there is no demand, there will be no value, however great the labour expended; but political economy is concerned with the transactions of ordinary people. V. may be defined as 'the power which an article confers upon its possessor, of commanding in exchange for itself, the labour, or the products of the labour, of others' (F. A. Walker, *Political Economy*). It is power-in-exchange. It is not the same as price, which expresses the exchange power in terms of one commodity—money. Neither v. nor utility must be confused with goodness. Destructive commodities have an economic value, since they can command a price.

Art works that cannot be reproduced are beyond the laws of supply and demand. V., in the case of a masterpiece of art, is governed by no law, and has no economic existence. Taste, caprice, and capacity to spend in others confer on the owner of a work of art that is demanded by these others the power to fix a price that has no relation to the cost of production, a 'fancy' price. The essence of economic v. is that the cost of production, or reproduction, is known. And the v. of ordinary articles of commerce is fixed by the knowledge of that cost, whether the articles be beneficial to mankind or otherwise.

J. S. Nicholson, *Principles of Political Economy*; C. F. Bastable, *Theory of International Trade*.

VALVE, apparatus designed to prevent back flow of fluid in a pipe (as in human intestine) or to control and regulate motion of fluid.

VALVES, or PISTONS, in music, see PISTONS.

VALYEVO, VALJEVO (44° 25′ N., 19° 50′ E.), town, Servia; plum-growing centre. Pop. 7000.

VÁMBÉRY, ÁRMINIUS (1832–), Hungarian traveller and scholar; b. Szerdahely, near Pressburg; travelled through Armenia and Persia, 1861–64; prof. of Oriental Languages at Budapest till 1905; author of many works on Turk. language, and autobiographical.

VAMPIRE BATS (*Phyllostomatidæ*), a large family of Bats, with about 150 species, distinguished either by a well-developed 'leaf' above the nose, or by skin folds or warts beneath the chin; the middle finger of the wing has three joints; they are confined to the tropical and subtropical regions of the New World, where they inhabit forest areas, the majority feeding on fruits, or on fruits and insects. Two nocturnal species, however (*Desmodus* and *Diphylla*), are blood-suckers.

VAMPYRELLA, an Amœboid Protozoon; see under PROTEOMYXA.

VAN (38° 30′ N., 43° 11′ E.), town, Armenia, Turkey-in-Asia; at S. face of high isolated rock, on which is inscription of Xerxes; has a citadel which probably dates from VIII. cent. B.C.; is encircled by walls. Several mosques and churches; some antiquities ascribed to Semiramis; in neighbourhood are orchards and vineyards; manufactures cottons. Pop. *c.* 30,000.

VAN BUREN, MARTIN (1782–1862), 8th pres. U.S.A.; b. Kinderhook, New York; elected to Senate, 1821; governor of New York State, 1828; vice-pres. of U.S.A., 1832; succ. Jackson as pres., 1837; retained most of his cabinet and continued his financial policy, to which the crisis of 1839, when many banks stopped payment, was attributed; was opposed to annexation of Texas, expressing his views in famous letter, pub. 1844; was defeated for presidency, 1844; stood unsuccessfully for election, 1848.

VAN DIEMEN'S LAND, TASMANIA (*q.v.*).

VAN DYCK, SIR ANTHONY (1599–1641), famous Dutch portrait painter; born at Antwerp. He received his earliest instruction in art under Hendrik van Baler. In 1615 he entered the studio of the great master Rubens, with whom he remained as an assistant till 1620. During this apprenticeship he was set to copy the Italian masters owned by Rubens, and later to transfer to canvas Rubens's designs and the paintings thereon for the master to finish. To such power did the pupil attain, that none can certainly say of many of the works of this time whether they were by Rubens or his pupil. On leaving Rubens, he studied in England under the patronage of James I., and subsequently in Italy. Among his early pictures are the 'Crucifixion' for St. Michael's, Ghent, and the 'St. Augustine' of Antwerp. In 1632 the painter was invited to England by Charles I., and styled 'principal painter in ordinary to their Majesties at St. James's.'

As a painter of historical subjects, he surpassed his master Rubens in the perfection of his detail, the refinement of his figures, and the exquisite purity of his colouring, though he fell far below him in grandeur of conception and fertility of invention. As a portrait painter he ranks next to Titian. V. D. was also a skilled etcher, as his remarkable portraits of Snyders and Vorsterman show. See *Van Dyck* (P. M. Turner).

VAN EYCK, see EYCK.

VAN WERT (40° 50′ N., 84° 40′ W.), city, capital, Van Wert County, Ohio, U.S.A.; railroad- and machine-shops. Pop. (1910) 7157.

VANADIUM (V=51·0), silvery, crystalline, rare metal in nitrogen group, occurring as lead vanadate in vanadinite; obtained by reduction of dichloride in hydrogen; permanent in air; S.G. 5·5; dissolved with difficulty; readily forms nitride VN. Oxides and derivatives: V_2O neutral; V_2O_3, VSO_4 (lavender); V_2O_3, VCl_3, $V_2(SO_4)_3$ and alums (green); V_2O_4, $V_2O_2(SO_4)_2+4H_2O$ (blue); $K_2V_4O_9+7H_2O$ (hypovanadate); V_2O_5, NH_4VO_3 (vanadate — yellow); HVO_4.

VANBRUGH, SIR JOHN (1664–1726), Eng. dramatist and architect; b. London; became soldier, went abroad, and was imprisoned in Bastille as suspected spy (1690); first play, *The Relapse* (1697); *The Provoked Wife* (1698); best work, *Confederacy* (1705); also adaptations of Molière, etc.; app. Clarencieux king-at-arms; knighted, 1714. U. is one of cloverest Restoration dramatists, his plays being marked by sparkling wit and originality, but marred by gross indecency, which occasioned fierce attack by Jeremy Collier (*q.v.*). His great abilities as architect are testified by Blenheim House and Castle Howard.

Works edit. by Ward, 1893.

VANCOUVER.—(1) (49° 30′ N., 123° W.) city, port, on Burrard inlet, Brit. Columbia; terminus of Canadian-Pacific Railway and of several lines of steamers; important lumber industry. Pop. (1911) 123,902. (2) (45° 39′ N., 122° 31′ W.) city, on Columbia, capital, Clarke County, Washington, U.S.A.; lumbering and fruit-packing industries. Pop. (1910) 9300.

VANCOUVER, GEORGE (d. 1798), Eng. sailor; accompanied Captain Cook, 1772–74, 1776–79; explored west coast of N. America. V. Island named after him.

VANCOUVER ISLAND (50° N., 126° W.), island belonging to the Canadian province of British Columbia; separated on E. and N.E. from the mainland by Strait of Georgia and Queen Charlotte Sound, and from United States by Strait of Juan de Fuca; mountainous and forest-clad; coal-fields and fisheries. Pop. 58,000. Capital, Victoria (*q.v.*).

VANDALS, a Teutonic race which played a prominent part in the disruption of the Rom. Empire in V. cent. They overran Gaul and Spain, and, crossing to Africa, established a kingdom there under Genseric, which lasted from 429 till 534 A.D.; wantonly destroyed works of art, monuments, and priceless treasures of lit. during the sack of Rome, 455 A.D., hence term 'vandalism.'

VANDERBILT, CORNELIUS (1794–1877), Amer. capitalist; s. of a small farmer; began business as a boy of sixteen by ferrying passengers and goods between New York and Staten Island; became successful boat-builder and owner of steamships; engaged in railroad ventures, 1863, and was pres. of New York central railroad, 1867; left $11,000,000.

VANDERDECKEN, see FLYING DUTCHMAN.

VANE, SIR HENRY (1589–1654), Eng. statesman; was sent to arrange peace between Spain and Holland, 1629, and to make terms with Gustavus Adolphus of Sweden, 1631; on dismissal from office, 1640, joined opposition.

VANE, SIR HENRY (1613–62), Eng. statesman; s. of above; ed. Westminster school and Oxford; in America two years, 1635–37; elected M.P. for Hull, 1639, and again in Long Parliament; leader of parliamentary party in Commons on Pym's death, 1644, till the Presbyterians, who mistrusted him, were in the majority, 1646. V. took no part in the king's trial and execution, but was an active servant of the Commonwealth; protested against Cromwell's expulsion of Long Parliament, 1653, retired to the country, and in 1656 was imprisoned by Cromwell till the end of the year for refusal to give a bond that he would not act against the Government. At Restoration, 1660, the House of Commons voted V.'s exclusion from Parliament. He was executed for high treason on June 14, on Tower Hill. V. was the author of several controversial, religious, and political pamphlets.

VANELLUS, LAPWING, see PLOVER FAMILY.

VANILLA, a genus of climber included in the Orchidaceæ and possessing aerial roots which have a special absorptive layer or velamen. *V. planifolia* is cultivated for its pods, which yield the aromatic fluid v., used in flavouring chocolate and confectionery.

VANISHING-POINT, see PERSPECTIVE.

VANNES (47° 41′ N., 2° 45′ W.) (ancient *Dariorigum* or *Civitus Venetorum*), seaport, Morbihan, France; cathedral; museum of Celtic and prehistoric antiquities; manufactures leather. Pop. 17,000.

VANSITTART, HENRY (1732–*c.*1771), Anglo-Ind. gov. of Fort William, 1760–64; tried to check corruption among East India Company's servants.

VAN'T HOFF, JACOBUS HENDRICUS (1852–1911), Dutch physical chemist; investigated oceanic salt deposits (Stassfurt), stereoisomerism, mass action; contributed to theory of solution.

VAPORISATION.—When a substance in liquid form is exposed so as to have a free surface above which there is either a vacuous space, or air, or a gas, particles of the substance pass out and constitute the vapour of the liquid. The process by which the vapour is formed is termed v. or evaporation.

Let a large vessel be emptied of air; admit a quantity of liquid, such as water, alcohol, or chloroform: evaporation begins and particles pass out of the liquid into the vacuous space above it. This process goes on until the pressure of the vapour on the interior walls of the vessel reaches a certain amount, which is dependent on two factors, viz. the temperature of the contents of the vessel and the nature of the liquid. Thus, if the temperature were 50° C. the pressure would, if the liquid were water, be equal to that of a column of mercury 9·2 centimetres high; if alcohol, 22 centimetres; if chloroform, 53·5 centimetres. When this maximum pressure has been reached for a given temperature, the vapour is said to be *saturated vapour* at that temperature, and the vapour and liquid are said to be in equilibrium at that temperature when the saturation pressure has been reached. V. does not cease at this stage. The molecules of the liquid are continually moving about through the mass, and are in frequent collision with neighbouring molecules. Each is surrounded by others whose attractions control its motions. In the interior of the liquid mass these attractions will, on the average, be nearly equal in all directions, and the motion of a particular molecule at any given instant will depend on the effect of the immediately preceding collision with a neighbouring molecule. Hence the molecular speed will vary from one molecule to another through a considerable range of speed. Near the surface of the liquid, however, the conditions are different. There the directive action of attraction is, on the whole, downwards, and a molecule will only succeed in passing outwards into the free space beyond if it approaches the surface with a perpendicular speed which is much above the average of other molecules in its neighbourhood. On passing through the surface, it moves about in the free space along with other molecules forming the vapour of the liquid. Some of these molecules will, in the course of their motion, return to the liquid. When the saturation pressure is reached, we have an equality in the rates at which the molecules pass out of, and return to, the liquid. It follows that the rate of evaporation will be increased by any cause which increases the speed of the molecules within the liquid. A rise in temperature has this effect, and hence evaporation takes place more rapidly at higher temperatures.

Now evaporation involves the removal from the liquid of those molecules whose speed is above the average, and this will tend to reduce the temperature.

Heat has therefore to be supplied at a certain rate if the temperature of the liquid is to remain steady. If supplied at a greater rate, the temperature rises, and if this goes on until the vapour pressure is equal to the pressure above the liquid, bubbles of vapour will form and rise to the surface. This stage is known as *ebullition* or boiling, and the temperature at which it takes place is known as the boiling point. The amount of liquid vaporised from a surface at a given temperature depends principally on the length of the perimeter of the surface.

Preston, *Theory of Heat*; Poynting and Thomson, *Heat*.

VAR (43° 25′ N., 6° 20′ E.), department, France; formed from part of ancient Provence; hilly or mountainous; chief river, the Argens; minerals include iron, coal, salt; the vine largely cultivated; capital, Draguignan; a part of V. was transferred to Alpes-Maritimes in 1860. Pop. (1911) 330,755.

VARALLO SESIA (45° 49′ N., 8° 17′ E.), town, on Sesia, Novara, Italy; contains Sacro Monte, a famous place of pilgrimage. Pop. 3300.

VARANGIANS, see VIKINGS.

VARANUS, see under LIZARDS.

VARASD, Ger. name of WARASDIN.

VAREN, BERNHARD (1622–50), Ger. geographer; his *Descriptio Regni Japonici* and *Geographia Generalis* were famous works of scholarship.

VARESE (45° 49′ N., 8° 50′ E.), town, Como, Italy; silk industry. Pop. 7800.

VARIA (42° 20′ N., 2° 20′ W.) (modern VICOVARO), ancient village, on Anio, and on Via Valeria, Italy.

VARIATIONS, in music, consist of transformations of a theme by changes in harmony, melody, rhythm, time, counterpoint; the same theme must persist throughout. An early form of v. merely introduced runs, grace-notes, and similar embellishments without any fundamental alterations; when the rhythm of each v. was systematically divided into quicker notes they were called *Doubles*, e.g. Händel's *Harmonious Blacksmith*. *Ground-bass*, i.e. the placing of a phrase in the bass and continual repetition thereof with new harmonies and ingenious counterpoint, was a form of v. highly developed in the XVII. cent. In his *Goldberg V.*, etc., Bach was unrivalled until Beethoven, Haydn, Mozart, and Brahms practised v.

VARIATIONS, see under EVOLUTION.

VARICOSE VEINS, a permanently dilated and tortuous condition of the veins, rarely occurring except in the lower limbs, the lowest part of the bowel (piles or hæmorrhoids), or the spermatic cord (varicocele); due to causes hindering flow of blood from lower parts of the body to heart, *e.g.* prolonged standing, pregnancy, while congenital deficiency of the valves of the veins is also an important factor; the treatment is to treat any existing cause of venous congestion, to wear a woven silk or worsted stocking, or bandage, put on to support the dilated vessels, while in painful or extreme cases operative treatment is necessary, the affected veins being removed.

VARIOLA, SMALLPOX (*q.v.*).

VARIOLITE, a green, basic, igneous rock having pale coloured spots which give it a pock-marked appearance.

VARLEY, JOHN (1778–1842), Eng. painter; a founder of Water-Colour Soc.; bro. *Cornelius* (1781–1873), water-colour painter, invented graphic telescope.

VARNA (43° 13′ N., 27° 54′ E.) (ancient *Odessos*), fortified seaport, on Black Sea, Bulgaria; export trade in cattle and grain; chief port in Bulgaria. Pop. (1910) 41,419; (department) 329,609.

VARNHAGEN VON ENSE, KARL AUGUST (1785–1858), Ger. biographer; b. Düsseldorf; wrote *Goethe in den Zeugnissen der Mitlebenden*, biographies of General von Seydlitz, Field-Marshal Schwerin, etc.

VARNISH, see PAINTS.

VARRO, MARCUS TERENTIUS (116–27 B.C.), Rom. writer; b. Reate; ed. Rome and Athens; rose to prætorship; saw military service under Pompey; treated kindly by Cæsar after Pharsalia; proscribed by Triumvirs; goods confiscated; compensated by Augustus. Most prolific writer, with vast store of knowledge; credited with over 600 books; his style is certainly vigorous but monotonous and with little elasticity; best-known work, *Antiquitates Rerum Humanarum et Divinarum*, forty-one books of closely packed information, an encyclopædia of Rom. knowledge. V. also wrote several poems which have perished; fragments of *Saturæ Menippeæ* remain; other extant works, *De lingua Latina* (partially), philological and grammatical treatise, and *De re rustica*, series of dialogues on husbandry.

VAS DEFERENS, see REPRODUCTIVE SYSTEM.

VASA, NIKOLAISTAD (63° 10′ N., 21° 45′ E.), seaport town, on Gulf of Bothnia, Finland. Pop. (1910) 21,819; (province) 514,940.

VÁSÁRHELY, see MAROS-VÁSÁRHELY, HÓDMEZŐ-VÁSÁRHELY.

VASARI, GIORGIO (1511–74), Ital. painter and architect; a pupil of Michelangelo. His paintings brought him some contemporary distinction, but he is remembered for his book, *Vite de' più excellenti Pittori, Scultori, e Architetti*, 1550.

VASCO DA GAMA, see DA GAMA, VASCO.

VASCULAR CRYPTOGAMS, see PTERIDOPHYTA.

VASCULAR SYSTEM of the body includes the CIRCULATORY SYSTEM (*q.v.*), which is a system of blood vessels conveying nourishment, by means of the blood, to all parts of the body; and the LYMPHATICS (*q.v.*), which are a system of lymph vessels bringing the lymph, or nutritive fluid derived from the blood, into intimate relation with the cells composing the tissues of the body.

VASELINE, a jelly left on distillation of petroleum; also manufactured from paraffin; semi-solid; insoluble in water, hence used for protecting steel from damp; an ingredient of some ointments.

VASILKOV (50° 13′ N., 30° 22′ E.), town, Kiev, Russia; trade in cattle and corn. Pop. 18,500.

VASLUI (46° 36′ N., 27° 40′ E.), town, at junction of Berlad and Vaslui, Rumania. Pop. 14,000.

VASO-MOTOR FIBRES, see NERVOUS SYSTEM.

VASSAL, in the feudal system, a follower of a lord, from whom he held land and to whom he vowed fidelity.

VASSAR COLLEGE, Poughkeepsie, a New York institution for the higher education of women; founded by Matthew Vassar, a wealthy brewer, 1861.

VASTO (42° 7′ N., 14° 45′ E.) (ancient *Histonium*), fortified town, Chieti, Italy. Pop. 10,200.

VATICAN COUNCIL, THE.—This, according to Roman Catholics the last œcumenical council, was convened by bull, *Æterni Patris*, 1868. When its main object of proclaiming Papal Infallibility became known, agitations broke out in France, Germany, and Italy, and many of higher clergy gave written expression of discontent. Council first met in December 1869. It soon became apparent that doctrine of Infallibility would not be carried without debate; early months of 1870 were devoted to discussion of points of church life and discipline wherein reforms were necessary. Lengthy discussions ensuing, it was found that matters progressed too slowly, and new procedure was decreed, whereby debates could be ended and motions carried if majority so willed it; the end in view was that Infallibility should be accepted by resolution, if not by unanimous consent.

Majority of council was in favour of dogmatising the doctrine; they were the Ultramontane party and numbered 480, while in the opposition were 136 bp's. Ultimately other questions were set aside, and Infallibility alone submitted to council. General debate, during which opposition made clear all their objections, began May 13, and ended June 3; special debate then ensued, and ended July 13, when doctrine was put to the vote, and voted for by 451 members, repudiated by 150. Opposition appealed to pope for modification, without success, and doctrine became dogma, July 18. Bp's who had protested then submitted.

Manning, *The True Story of the Vatican Council* (London).

VAUBAN, see FORTIFICATION.

VAUBAN, SÉBASTIEN LE PRESTRE DE (1633–1707), Fr. soldier; b. St. Léger de Foucher, Burgundy; served under Condé in war of Fronde; taken prisoner by French, and was persuaded by Mazarin to serve Fr. king; life passed chiefly in constructing fortresses and besieging places; his development of existing systems of attack and defence made Fr. school of fortification first in Europe; conducted forty sieges; fortified and reconstructed over 100 places, including Dunkirk, Strassburg. Wrote *Traité de l'attaque des places.*

VAUCLUSE (44° N., 5° 10′ E.), department of S.E. France in Provence, with four arrondissements—Avignon, Apt, Carpentras, and Orange; capital, Avignon; associated with Petrarch (*q.v.*); wine, potatoes, wheat, fruit; area, 1370 sq. miles. Pop. (1911) 238,656.

VAUD (*c.* 46° 35′ N., 6° 30′ E.), canton, in W. Switzerland, N. and E. of Lake of Geneva; area, 1244 sq. miles; surface mountainous, reaching height of over 10,600 ft. in Mt. Diablerets, but an extensive plain slopes down to Lakes of Geneva and Neuchâtel; chief town, Lausanne. Produces white wines; cattle raised; tanning, condensed milk, tobacco, clocks. Entered Swiss Confederation with present name in 1803. Pop. (1910) 317,457.

VAUDOIS, WALDENSES (*q.v.*).

VAUGHAN, HENRY (1622–95), Eng. poet and mystic; b. Newton, Brecknockshire. His poems and prose works are devotional in character. The best are the *Silex Scintillans* ('Sparks from the Flintstone'—a happy title) and *The Mount of Olives.*

VAUGHAN, HERBERT (1832–1903), R.C. cardinal (1893); bp. of Salford, 1872; abp. of Westminster, 1892; of ancient Catholic family.

VAUVENARGUES, LUC DE CLAPIERS, MARQUIS DE (1715–47), Fr. writer; served in army and died young; contrasts with usual writer of XVIII. cent., praising virtue, piety, etc.; his *Réflexions and Maximes* (1746), a foil to La Rochefoucauld's.

VAUXHALL, district in Lambeth, London, on S. bank of Thames; famous pleasure grounds, 1661–1859.

VECTOR.—A v. is a magnitude which has direction, such as a force or velocity, or any line of definite length and definite direction. V's are commonly the latter as representing the former. Many problems of dynamics can be treated simply by vectors; thus, if the line XY represents a force acting from X to Y in magnitude and direction, and the line YZ represents similarly a force, then the line XZ, joining them, represents the resultant in magnitude and direction.

V. Analysis combines most of the advantages of quaternions and Cartesian analysis. By the older methods v's were resolved into three components along three arbitrary axes, and the operations made upon these components. V. a. gives methods of manipulating vectors directly, without having recourse to initial resolution into components. The transformation, however, from vector to Cartesian notation is easy.

Bucherer, *Elemente der Vektor-Analysis*; J. G. Coffin, *Vector Analysis*; Henrici and Turner, *Vectors and Rotors*; Gibbs-Wilson, *Vector Analysis.*

VEDA, see BRAHMANISM.

VEDDAHS, inhabitants of Ceylon; supposed to be Dravidian (*q.v.*), but possibly earlier.

VEDETTE, Fr. mounted sentinel.

VEERE (51° 33′ N., 3° 40′ E.), town, on island of Walcheren, Zeeland, Netherlands.

VEGA CARPIO, LOPE FELIX DE (1562–1635), Span. dramatist and poet; b. Madrid; author of over 1500 plays. These may be divided into contemporary, historical, and legendary. As is to be expected in the case of so prolific a writer, his work is valuable not merely for the intrinsic worth of part at least of it, but for the mine of ideas it provided for others. Thus, his *Azero de Madrid* is obviously the inspirer of Molière's *Médecin malgré lui*, and his *Alcade de Zalamea* is clearly recognisable in one of Calderon's most famous plays. While some of the plays show considerable merit, there is a marked lack of originality about V. C.'s work. He may be termed rather a manufacturer of plays than a literary artist.

VEGA, GARCILASO DE LA (1503–36), Span. soldier; one of chief poets of Renaissance, which he introduced into Spain, writing sonnets in new manner.

VEGETABLE KINGDOM, see PLANTS.

VEGETARIANISM, abstinence from flesh-eating on dietetic or conscientious grounds; supporters affirm that vegetable diet produces highest human development in every way; opinion divided regarding eating of eggs and fish; medical views generally antagonistic to extreme principles of v. V. Society formed, 1847. Vegetarian cafés exist in most cities.

VEGETIUS, FLAVIUS RENATUS (fl. IV. cent.), author of *Epitoma rei militaris*; still used by writers on war.

VEGLIA (45° 5′ N., 14° 35′ E.), island, in Gulf of Quarnero, belonging to Istria, Austria.

VEII (42° N., 12° 25′ E.), ancient city, Etruria; one of the Etruscan League; frequently at war with Rome; taken by Camillus, 396 B.C.

VEINS, the blood vessels which convey the blood from the capillaries to the heart, gradually joining together to form larger vessels as they near that organ. The *pulmonary v's* lead from lung capillaries to the left auricle of the heart, conveying to it purified or 'arterial' blood, while the *portal v.* conveys venous blood from capillaries of the intestine to the liver, where it again breaks up into capillary v's; all the other v's, however, convey venous blood towards the heart, gradually forming larger v's until the ascending and descending *venæ cavæ* pour venous blood into the right auricle of the heart.

The walls of v's are composed of three coats, similar to those of the arteries, but much thinner and weaker—the internal coat, or *intima*, consisting of a layer of flattened cells forming the lining of the blood vessel, the middle coat, or *media*, of muscular and elastic fibres, and the external coat, or *externa*, of fibrous tissue and longitudinal elastic fibres, with, in certain of the larger v's, a network of muscular fibres. There are valves in the v's, most common in the v's of the extremities, composed of fibrous and elastic tissue with a coating of the flat cells of the intima, the purpose of the valves being to allow blood to be forced only towards the heart; there are no valves in the *venæ cavæ*, the pulmonary, portal, and certain other large v's.

See PHLEBITIS, VARICOSE VEINS, VASCULAR SYSTEM.

VEINS, cracks in rocks filled with substance different to that of rock in which they occur. Regular and irregular v's branch off into many smaller shoots and may be either metallic or non-metallic. They may be many yards wide and miles in length, and are caused by contraction of the rock during consolidation or cooling. They may also be caused by earth movements. V's occupied by ores are called lodes (see MINING), while some are of intrusive masses of igneous rock.

VEJÉR DE LA FRONTERA (36° 13′ N., 5° 55′ W.), town, on Barbate, Cadiz, Spain. Pop. 11,400.

VELA, see ARGO.

VELASQUEZ, DIEGO RODRIGUEZ DE SILVA (1599–1660), Span. painter; studied under Herrera and Pacheco at Seville, but was practically self-taught. Seville street-studies were among his first pictures, and one of these, the celebrated *Water-Carrier* (now in Apsley House), was presented by Ferdinand VII. to the Duke of Wellington. Introduced to Philip IV., he was commissioned to paint his portrait, and this was followed by some forty other portraits of the king. For many years he had a studio near the royal apartments, and Philip often

came to watch him at work. Charles, Prince of Wales, sat to him for his portrait in 1623; and in 1627 he was appointed Usher of the Chamber as the prize in a competition with other artists, for his picture, *The Expulsion of the Moriscos*. He made two visits to Italy—the first in 1629 to study Ital. art, the second (1648) on a commission to purchase works of art for the king. On his return in 1651 he was made Marshal of the Palace, and in this character superintended the arrangements connected with the marriage of Maria Teresa to Louis XIV. in 1659, the year before his death. The larger number of V.'s pictures remained royal property until transferred to the Prado Gallery at Madrid, where he can best be studied in all his varieties as a master of portrait, genre, landscape, and animal painting. His pictures are estimated to number 274, of which 121 are in Great Britain. One of the most famous is the so-called 'Rokeby' Venus, sold some years ago for £45,000.

VELEIA (44° 55′ N., 9° 42′ E.), ancient town, Liguria, Italy.

VELELLA, see under HYDROMEDUSÆ.

VÉLEZ-MÁLAGA (36° 46′ N., 4° 10′ W.), town, near mouth of Vélez, Málaga, Spain; produces fruit. Pop. (1910) 24,140.

VELIA (40° 15′ N., 15° 10′ E.) (modern CASTELLAMARE DELLA BRUCCA), ancient Gk. town, on Tyrrhenian Sea, Lucania, Italy.

VELLEIUS PATERCULUS, MARCUS (*c.* 19 B.C.–*c.* 31 A.D.), Rom. historian; his history begins with the myths, and is of little value until his own period, of which the account is over ornate, but often picturesque.

VELLETRI (41° 41′ N., 1 2° 47′ E.) (ancient *Velitræ*), town, Rome, Italy; cathedral; produces wine. Pop. 14,500.

VELLORE (12° 55′ N., 79° 10′ E.), town, military station, on Palar, N. Arcot, Madras, Brit. India. Pop. 46,000.

VELLOZIA, genus of plants, order Velloziaceæ; native of Brazil, Africa, Madagascar; best-known species are TREE LILIES, cultivated for their bell-shaped flowers.

VELLUM, see PALÆOGRAPHY.

VELOCIPEDE, vehicle propelled by rider, *e.g.* bicycle or tricycle.

VELOCITY is sometimes taken to mean *speed*, i.e. rate of change of position, or more strictly as speed in a constant and determined direction, viz. a straight line. Any other v. is variable, even with a constant speed.

VELVET, textile fabric formed by interweaving of silk threads to form nap or pile; first manufactured, XIV. cent.; introduced into England by Huguenots, 1536; **Velveteen** is similarly manufactured from cotton.

VENAFRUM (41° 30′ N., 14° E.) (modern VENAFRO), ancient town, Campania, Italy.

VENDACE, see under SALMON FAMILY.

VENDÉE (46° 40′ N., 1° 20′ W.), maritime department, France, formed from ancient Bas-Poitou; is divided into woodland ('Bocage') in the E., plain in the S., and marsh in the W.; chief products, grain and wine. Pop. (1911) 438,520. Capital, La Roche-sur-Yon.

Vendéan peasants during Fr. Revolution were greatly influenced by priests, who accused Republicans of heresy; and on introduction of conscription they rose in insurrection. Massacred Republicans at St. Florent and other places. Joined by Royalist nobles. Government sent three armies to Vendée. Vendéans at first successful, but afterwards defeated, and ultimately were utterly routed at Savenay, 1793.

VENDETTA, private vengeance for bloodshed; survives in Corsica, Sardinia, and in parts of U.S.A.

VENDÔME (47° 47′ N., 1° 1′ E.) (Rom. *Vindocinium*), town, on Loir, Loir-et-Cher, France; contains fine abbey church and the ruined castle (XI. cent.) of Dukes of V.; manufactures gloves. Pop. 7400.

VENEER, thin layer of expensive wood, glued to cheaper wood.

VENER (59° N., 13° E.), largest lake, Sweden; drained by the Göta to the Cattegat; area, 2150 sq. miles.

VENEREAL DISEASES, term applied to certain diseases which result most commonly, although not invariably, from impure sexual intercourse; they are three in number — gonorrhœa (*q.v.*), soft chancre, and syphilis (*q.v.*).

VENESECTION, opening a vein by operation; usually performed on a vein of arm, where pressure can be applied easily when stoppage of bleeding is required. See BLOOD-LETTING.

VENETI.—(1) a Celtic seafaring people, dwelling in Gallia, Celtica, and trading with Britain. Waging war against the Romans, 57 B.C., they were utterly defeated the following year. The town of Vannes, in the department of Morbihan, preserves their name. (2) a people of N. Italy inhabiting the territory called Venetia under the Rom. Empire; peaceful and commercial; famous horse breeders. On the fall of the Empire the inhabitants of some of the many towns destroyed by Attila fled to the islands of the lagoons, and thus Venice came into existence early in the IX. cent.

VENETIA (*c.* 45° to 46° 40′ N., 10° 40′ to 13° 30′ E.), division of N.E. Italy between Alps and Adriatic; divided into eight provinces, Verona, Vicenza, Venice, Padua, Belluna, Rovigo, Treviso, Udine; capital, Venice (*q.v.*); area, 9475 sq. miles; named after ancient *Veneti*.

VENEZUELA (1° 42′ to 12° 25′ N., 59° 40′ to 73° 30′ W.), republic, S. America; is bounded N. by Caribbean Sea and Atlantic, E. by Brit. Guiana, S. by Brazil, W. by Colombia; area, *c.* 393,976 sq. miles. Surface has low ground, partly swamp, partly forest, in N.W. round Lake Maracaibo; mountains (Sierra Nevada de Mérida, spur of E. Andes) running by S.E. to Lake Maracaibo and out to sea at Caracas; llanos between this and Orinoco; mountains to S. of Orinoco. Drained by Orinoco and its tributaries. Chief towns, Caracas, Valencia, Maracaibo, Ciudad Bolivar. Climate generally healthy; temperature varies with elevation, warmest along Orinoco; rainy season, May to Oct. or Nov.

European knowledge of V. dates from 1498 when it was discovered by Columbus. Span. navigators, Vespucci and Ojeda, further explored coast, 1499; country was subsequently annexed by Spain, under whose control it remained until 1810, when it rose in rebellion against mother country. Independence declared, 1811; ten years of war followed, in which Venezuelans were led by Bolivar (*q.v.*); Spain finally defeated, 1821, when V. became part of Colombian republic. This was broken up in 1830, when V. became an independent republic, being recognised as such by Spain in 1845. Its subsequent history is one of revolutions, civil wars, trade disputes with various European nations, and boundary disputes with surrounding countries.

Government is a federal Republic of 20 autonomous states; executive authority vested in pres., who is assisted by cabinet of seven ministers. Legislature consists of Congress of two houses. Senate of 40 members, two chosen by each State legislature, and Chamber of Deputies, members of which are elected by popular vote. State religion is R.C. Education is in backward state. Army numbers 9600 men, and military service is nominally compulsory.

V. is exceedingly rich in natural resources and has good means of developing them. Forests have fibre trees, rubber-plants, balsams, cinchona, gums, vanilla, sarsaparilla, dividivi, furniture- and dye-woods. Llanos provide pasture for large herds of cattle. Soil, extremely fertile, produces wheat, barley, cotton, cacao, indigo, rice, rubber, sugar-cane, coffee, tobacco, fruits. Minerals include gold, silver, copper, iron, coal, salt. Exports coffee, cocoa, hides, rubber, tobacco, etc. Imports provisions, cottons, hardware,

machinery. Railway mileage is over 500. Inhabitants include Spaniards, Indians, half-breeds. Pop. (1911) 2,713,703.

Keane, *Central and South America*, vol. i. (1909).



VENGURLA (15° 51′ N., 73° 40′ E.), seaport town, Ratnagiri, Bombay, India. Pop. 19,700.

VENICE, VENEZIA (45° 26′ N., 12° 18′ E.), fortified seaport, N. Italy; capital of province of V.; situated on 117 islands in the Lagune at head of Adriatic; traversed by *c.* 150 canals crossed by innumerable bridges. The city is divided into two main parts by Grand Canal (2 miles long and *c.* 200 ft. broad); connected with mainland by railway viaduct 2 miles long. The lagoons are protected from the sea by sand-hills and masonry work; shipping enters by several channels; aqueduct carries water-supply from mainland.

V. has numerous narrow, winding lanes, fine squares, mediæval houses (mostly built on piles), and magnificent churches and palaces, rich in painting, sculpture, and architecture (Tintoretto, Titian, Paul Veronese; Palladio, Sansovino, etc.). Notable features are magnificent Cathedral of St. Mark (begun 830; destroyed by fire and rebuilt, 976 onwards), with wonderful mosaics, four ancient bronze horses, fine spiral alabaster columns, etc.; opposite is the famous Campanile (322 ft. high; collapsed, 1902; rebuilt, 1911); Santa Maria dei Frari (1417), with Titian and Canova monuments; Giacomo di Rialto (*c.* 520), V.'s oldest church; San Sebastiano, with tomb of Paul Veronese; Santi Giovanni e Paolo, with tombs of Doges; San Salvatore, with Titian's *Annunciation*, etc.; Madonna dell' Orto (1460); Palace of the Doges (founded *c.* 814; rebuilt after fires, 976, 1105), with magnificent court (1485), Scala dei Giganti, great Council Hall, etc., and Bridge of Sighs connecting palace with prison; Royal Palace (formerly Procuratie Nuove) and Old Library; other fine palaces are Cá d'Oro, Farsetti, Loredan, Foscari, Pisani, Papadopoli, Grimani, Vendramin, Rezzonico, Corner Spinelli, Corner Cá Grande, etc., on Grand Canal; Procuratie Vecchie (palace of '9 procurators'), on Piazza of St. Mark; Academia di Belli Arti, Scuolo di San Rocco, Galleria Internationale d'Arte Moderna, Museo Civico, all rich in art collections; Rialto, fine old bridge across Grand Canal, lined with shops; Merceria (principal business street); Piazza of St. Mark, handsomest square in V., enclosed on three sides by magnificent buildings and arcades with shops and cafés; Zecca or Mint (between library and Royal Palace); Clock Tower (1496–99); Piazetta extending from the S.E. corner of Piazza of St. Mark to the Lagune, with two granite columns from Constantinople (erected XII. cent.; surmounted by Lion of St. Mark and Patron St. Theodore), formerly a place of execution, now a stand for gondolas; Ghetto Vecchio, long the Jewish quarters, with quaint mediæval houses and synagogue of Span. Jews; Lido (bathing-resort) on neighbouring Malamocco Island. Gondolas, the usual means of conveyance, were gorgeously decorated up to XV. cent., after which they were painted black by order of the Great Council.

History.—The Veneti, persecuted by Huns and Lombards, settled on the islands and marshes of the lagoons *c.* 586, and founded townships of Heraclea, Torcello, Burano, Malamocco, Chioggia, etc. The first Venetian Doge (*q.v.*) was elected, 697; seat of government removed from Heraclea to Malamocco, 707, and to Rialto (811), the origin of Venice. V. became a republic, XI. cent., and gradually extended her dominions along the Istrian and Dalmatian coasts, becoming mistress of the Mediterranean. Constantinople and other Byzantine possessions were taken, 1203–4, by famous Doge Enrico Dandolo; fierce wars waged against Genoese, who were finally defeated, 1380; Corfu, Argos, Durazzo, Crete, etc., taken, XIV. cent.; Vicenza, Verona, Padua, Brescia, Bergamo, Ravenna, Zante, and Kephallinia, 1483, Cyprus, 1489,

were added to her already extensive possessions, and V. was now at the zenith of her power.

V.'s mercantile prosperity declined after the discovery of the new sea-route (*via* Cape of Good Hope) to India, 1486. The League of Cambrai, 1508, was a new source of danger to the republic. Fierce and continuous struggles against the Turks ended with the surrender of Cyprus, 1571, Crete, 1666, Morea, 1718, and all her possessions except those of northern Italy. After this V.'s greatness ceased. She was completely crushed by Napoleon, and passed to Austria, 1797. V. declared herself a republic, 1848, but was forced to surrender, 1849; united to Italy, 1866. Before the Tiepoline conspiracy, 1310, the Great Council of nobles (*Maggiore Consiglio*) exercised supreme authority under the Doge; thereafter the oligarchical Council of Ten (*Consiglio dei Dieci*) wielded chief power. V. figured prominently in the history of art, especially in XV. and XVI. cent's (see PAINTING, ARCHITECTURE). From XII. to XVIII. cent. Doges annually threw ring from gorgeous barge *Bucintoro* into Adriatic ('wedding of Adriatic') in token of V.'s dominion of sea.

Chief industries are famous glass-ware and mosaics; gold and silver filigree work, embroidery, lace, damasks, brocades, *objets d'art*, chemicals, leather, cotton and woollen goods, shipbuilding, torpedoes. Pop. (1911) 160,727.

Erichsen, *The Story of Venice* (1905); Hazlitt, *The Venetian Republic: its Rise, its Growth, and its Fall* (1900); Ruskin, *Stones of Venice*.

VENLO (51° 23′ N., 6° 11′ E.), town, Limburg, Netherlands; formerly fortified; breweries, distilleries. Pop. 15,500.

VENN, HENRY (1725–97), Anglican clergyman; of Evangelical sympathy.

VENOSA (40° 58′ N., 15° 49′ E.) (Rom. *Venusia*), town, Potenza, Italy; cathedral and XI.-cent. abbey church. Pop. 8600.

VENTILATION, renewal of air of a room. Human breath and gas or oil lights discharge carbon dioxide (CO_2), which must be driven out and replaced by oxygen. Country air contains 2 to 3½ parts of CO_2 in 10,000; a room should not contain more than 6 in 10,000. Each person should have 3000 cub. ft. of fresh air per hour. In calculating air-space, 12 ft. is the maximum height reckoned; breathed air rises this height, loses its warmth and lightness, and sinks, hence windows should be opened from the top. Simple aids to v. are: *Perforated Bricks*, communicating with room by gratings which break current and prevent draughts; *Boyle's Valve*, in chimney near ceiling, an aperture with 2 talc flaps forming a valve which allows air to enter chimney, but prevents smoke from entering room; *Louvre Panes*, slips of glass placed obliquely in oblong opening in window pane.

The following devices strive to introduce cold air without causing draughts: *Hinckes-Bird's Ventilator*, the lower window sash is raised and blocked with a board, and air enters between the sashes and with an upward current; *Tobin's Tube*, a pipe whose lower end communicates with outside air, whilst upper end opens into room about 6 ft. from floor; *Sheringham Valve*, metal guard on aperture in wall, directs air upwards and can be closed on occasion; *Galton's Grate* has air-space behind chimney communicating below with outside air and above with room, the heat of chimney warming incoming air.

Bad air may be drawn off artificially by Boyle's self-acting air-pump ventilator, by shafts heated with gas jets or steam, or by electric fans.

VENTIMIGLIA (43° 48′ N., 7° 34′ E.), fortified seaport, Porto Maurizio, Italy. Pop. 3600.

VENTNOR (50° 36′ N., 1° 10′ W.), watering-place, Isle of Wight, England. Pop. (1911) 5787.

VENTRILOQUISM, art of producing voice sounds without movement of mouth; Greeks and Romans believed ventriloquist's voice came from the abdomen (Lat. *venter*, the belly).

VENUE, in Eng. law, the place or district where a cause of trial arises, and formerly where it must be tried. No 'local v.' for a trial now exists.

VENUS (classical myth.), see APHRODITE.

VENUS, second planet from sun, 67 million miles distant; diameter, 7700 miles; period, 224·7 days; probably has atmosphere denser than earth's, and spectroscope gives evidence of presence of water vapour; exhibits phases like moon. The transit of V. across the sun is used to compute the sun's distance from the earth.

VENUSIA (40° 58′ N., 15° 50′ E.) (modern VENOSA), ancient city, on Via Appia, Apulia, Italy; birthplace of Horace.

'VENUS'S FLOWER BASKET,' see under SPONGES.

VENUS'S FLY-TRAP (*Dionæa muscipula*), a carnivorous plant growing in the Carolina bogs. The upper parts of the leaves form an interlocking apparatus which catches and digests insects.

VERA CRUZ.—(1) (19° N., 96° 20′ W.) state, Mexico, on the Gulf; interior mountainous and fertile; coast low and sandy; products chiefly agricultural. Pop. (1910) 1,124,368. Capital, Jalapa. (2) (19° 11′ N., 96° 8′ W.) city, seaport, on Gulf of Mexico, Vera Cruz, Mexico; exports tobacco, coffee. Pop. 31,000.

VERBENA, a plant several species of which possess handsome and sweet-scented flowers. *V. officinalis*, the vervain, is indigenous to Britain.

VERCELLI (45° 20′ N., 8° 26′ E.) (ancient *Vercellæ*), town, on Sesia, Novara, Italy; abp.'s see; the cathedral contains a IV.-cent. MS. of the Gospels; Rom. antiquities; manufactures silk; export trade in rice. Pop. 18,500.

VERDEN (52° 56′ N., 9° 12′ E.), town, on Aller, Hanover, Prussia; manufactures agricultural machinery. Pop. 10,000.

VERDI, GIUSEPPE (1813–1901), Ital. composer; known almost solely by his operas; achieved success with *Rigoletto* (1851), *Il Trovatore* (1853), and *La Traviata* (1855). These closed his triumphs until his *Aïda* was produced at Cairo, 1871. His career ended brilliantly with *Othello* and *Falstaff*, the latter written when he was eighty.

VERDIGRIS, mixture of acetates of copper; used in making some green pigments; forms on brass and copper exposed to damp, and is highly poisonous.

VERDUN (49° 10′ N., 5° 22′ E.) (ancient *Verodunum*), fortified town, Meuse, France; XII.-cent. cathedral; bp.'s see; manufactures confectionery, hardware; capitulated to the Prussians, 1870; famous **Treaty of V.** was signed by the sons of Louis I., 843. Pop. 13,000. See GERMAN EMPIRE (HISTORY).

VERDY DU VERNOIS, JULIUS VON (1832–1910), Ger. soldier; lecturer at the Berlin Military Academy and author of masterly treatises on tactics.

VERE, Eng. family name; derived from Ver, near Bayeux; founded in England by Aubrey de V. on vast estates from William the Conqueror; held the Earldom of Oxford in male line for more than 500 years. Aubrey de V., 20th and last Earl of Oxford, died 1703. Also an Irish baronetcy of De V., to which family Aubrey De V., the poet (1814–1902), belonged.

VERE, SIR FRANCIS (1560–1609), Eng. soldier; served with Leicester in Holland, 1585, and was commander, 1589; officer in the Dutch army, 1593–1604, and rendered distinguished services in the war with Spain; negotiated treaty with Elizabeth; governor of Portsmouth, 1606.

VERESHCHAGIN, VASSILI (1842–1904), Russ. painter; began as a naval officer, and many of his pictures deal, very realistically, with fighting subjects.

VERGIL, POLYDORE (*c.* 1470–1555), historian; b. Urbino, Italy; came to England, 1501, and held various ecclesiastical appointments; pub. the first authoritative edit. of Gildas, 1525, and a *History of England*, 27th Book, bringing it down to 1538.

VERGIL, PUBLIUS VERGILIUS MARO (70–19 B.C.),

Rom. poet; b. near Mantua, in district of Andes; ed. Cremona, Milan, Rome, where he studied philosophy under the Epicurean Siron. In the confiscations after *Philippi*, V.'s father lost his farm, but V. succeeded in regaining it, largely by the influence of Asinius Pollio, who extended his patronage to him and introduced him to the literary coterie presided over by Mæcenas, where he was well received and became intimate with Horace, Gallus, and later with Augustus. He withdrew from Rome to S. Italy in 37, journeyed to Athens *c.* 24, and again in 19, but died shortly after returning to Italy with Augustus.

WORKS.—Several poems are ascribed to V.'s youth, but the authenticity of none has been definitely proved, though the *Culex*, written in hexameters, and the *Catelepta*, a collection of short poems, are probably his. His first important work was the *Eclogues*, written between 42 and 37 B.C., ten pastoral pieces in hexameters. They are imitations of the pastorals of Theocritus (*q.v.*), and are Gk. rather than Rom. in sentiment. Incidentally they describe scenes from the poet's early life, and are full of delicate pictures of the country of his boyhood. To the fourth a special significance was attached by the early Christians; in reality it commemorates Pollio's accession to the consulship (40), and tells of the prospective birth of a child (presumably Pollio's) who would attain to the highest honours and inaugurate a new era. This was interpreted to mean the birth of Christ, and is still called the *Messianic Eclogue*.

The *Georgics* (37–30) are four books dealing with husbandry, in imitation of Hesiod's *Works and Days*; they deal with the subject from the idealistic point of view, although the struggle between man and nature, a theme which pervades the whole poem, is realistically portrayed.

V.'s greatest masterpiece is the *Æneid*, which, though practically complete at his death, was never revised, as may be seen from the number of imperfect lines. V. desired to burn it, but the manuscript was happily saved. It is an epic, in twelve books, dealing with the fall of Troy and the wanderings of Æneas, the traditional founder of the Julian line, and contains some truly magnificent passages, such as Dido's speech (iv.). The unfortunate choice of a hero, who is frequently priggish and whose success is solely due to constant divine intervention, does not seriously mar the work. The influence of the *Æneid* on subsequent Rom. writers cannot be overestimated, and although it was inspired by the Homeric poems, was the greatest Rom. epic ever written.

V. is the greatest master of Rom. hexameter; this metre, rough if forceful in Lucretius, became graceful and polished in V.'s hands, capable of expressing every shade of emotion with beauty and yet with strength. He is not a great creative poet; his hero is far inferior to Achilles or Odysseus, but for purity of diction and grace of expression he is absolutely unsurpassed.

Trans., by Connington, Lonsdale and Lee, Mackail; Sidgwick, *Text and Notes*.

VERGNIAUD, PIERRE VICTURNIEN (1753–93), Fr. revolutionary; b. Limoges, France; called to Bar, 1782; represented Gironde in National Legislative Assembly, and became head of Girondist party. Threw himself eagerly into revolutionary movement, and by his orations greatly increased popular antagonism to monarchy. On attaining Louis's downfall, he denounced the massacres which had taken place. He was pres. at king's condemnation and voted for his death. He was afterwards accused of treason by Robespierre; imprisoned in La Force; guillotined, 1793.

VERHAEREN, ÉMILE (1855–), Belg. author; has published several volumes of poetry.

VERKHNE-UDINSK (51° N., 107° 30′ E.), town, at junction of Uda and Selenga, Transbaikalia, Siberia; trade in tea; important annual fair. Pop. 10,500.

VERLAINE, PAUL (1844–97), Fr. poet; leading member of the Symbolists; *Fêtes galantes* and *Sagesse* are among his 20 vol's of strange, original verse.

VERMICELLI, Ital. wheat-paste made up in solid wormlike threads (Lat. *vermis*, a worm); macaroni, of same composition, is in the form of a hollow tube.

VERMIGLI, PIETRO MARTIRE, 'Peter Martyr' (1500–62), Ital. Prot. theologian; Augustinian prior, but joined reformers; regius prof. of Divinity at Oxford, 1548; of Hebrew at Zürich, 1556; wrote several works specially on the Eucharist.

VERMILION, see PIGMENTS.

VERMONT (42° 44′ to 45° 1′ N., 71° 34′ to 73° 30′ W.), one of New England states of U.S.A.; bounded N. by Canada, E. by New Hampshire, S. by Massachusetts, and W. by New York, from which in the N.W. it is separated by Lake Champlain; area, 9565 sq. miles; surface generally undulating and hilly, reaching an extreme height of over 4000 ft.; among highest peaks are Mansfield (4380 ft.) and Camel's Hump (4100 ft.). Watered by Connecticut R., which forms E. boundary, and its tributaries, White, William, West; and by Otter Creek, Missisquoi. Climate is salubrious, but subject to intense cold in winter.

V. was first permanently settled in first half of XVIII. cent. by colonists from Massachusetts; and was admitted as a state to the Union in 1791. The executive is in the hands of a governor, who is assisted by various officers of state. Legislative power is vested in a Senate of 30 members and House of Representatives of 246 members. For local administration the state is divided into 14 counties. Sends two Senators and two Representatives to Federal Congress.

Chief towns are Montpelier (capital), Burlington, Rutland, Barre. Most important industry is agriculture; hay, oats, maize, wheat, and barley are cultivated, and potatoes and fruit are grown. Maple sugar is largely produced, and tobacco is cultivated. Cattle, horses, sheep, and pigs are raised, and dairy-farming is carried on. There are large forests, producing hardwood, and lumbering is an important industry. Woollens and flour are also manufactured. Marble, granite, and limestone are quarried. Railway mileage in 1912, 1071. Education is free and obligatory. Principal religions are R.C., Congregational, Methodist. Pop. (1910) 355,956.

VERNE, JULES (1828–1905), Fr. novelist; wrote a great number of much-read novels, in each of which plot works round scientific or physiological fact; many have forecasted recent developments, *e.g.* gramophone, cinematograph; translated into several languages and some staged; best known, *Round the World in Eighty Days*, *Michael Strogoff*, *Twenty Thousand Leagues under the Sea*, *The Mysterious Island*.

VERNET, three eminent Fr. painters. CLAUDE JOSEPH (1714–89) painted the sixteen chief seaports of France on a royal commission. CARLE (1758–1835) painted chiefly horses and dogs and battle-scenes. EMILE JEAN HORACE, his s. (1789–1863), also excelled with battle-pieces.

VERNEUIL (48° 45′ N., 0° 53′ E.), town, on Avre, Eure, France; manufactures machinery. Pop. 3700.

VERNEY, prominent Buckinghamshire family from time of Elizabeth. Sir Edmund (1590–1642), standard-bearer to Charles I.; slain at Edgehill. Sir Ralph, 1613–66, sat in Long Parliament. Sir Harry, 2nd baronet (1801–94), a Calvert; took name of V. on succeeding to estates.

VERNIER, PIERRE (*c.* 1580–1637), b. Ornans, Burgundy; invented instrument, the *vernier*, for accurately measuring fractions of small-scale divisions.

VERNON (49° 6′ N., 1° 27′ E.), town, on Seine, Eure, France; trade in stone. Pop. 7500.

VERNON, EDWARD (1684–1757), Eng. admiral; obtained command of expedition against Span. S. Amer. possessions, and took Porto Bello with squadron of six ships; attacked Cartagena without success, 1740; admiral, 1745; dismissed service, 1746, for publishing letters of official chiefs.

VEROLI (41° 45′ N., 13° 25′ E.) (ancient *Verulæ*), town, Rome, Italy; bp.'s see.

VERONA (45° 26′ N., 11° E.), city, N. Italy (Venetia),

on Adige, capital of V. province; first-class fortress. Rom. remains include fine amphitheatre (*c.* 290 A.D.), theatre, walls, gateways, etc.; many mediæval churches, palaces, and houses (by Sanmichele and others), with works by Paul Veronese, Titian, Tintoretto, Pisano, Giolfino, etc.; cathedral (XII. cent.); churches—San Zeno Maggiore (Romanesque XI. cent. onwards), Sant' Anastasia (1250–1450), Santa Maria in Organo (*c.* IX. cent.), San Fermo Maggiore (XIV. cent.), San Bernadino (XV. cent.), San Giorgia in Braida (rebuilt XVI. cent.); palaces—Pompei (now Museo Civico, with fine picture-gallery), Ragione (old court of justice), Consiglio, or La Loggia (town hall, 1476–93), with fine staircase; house of Capulets and Juliet's reputed tomb; magnificent tombs of Scaligers; Porta del Palio, etc. Chief industries are cotton, woollen, silk, iron goods, furniture, paper. V. became a Rom. colony, 89 B.C.; taken by Lombards, 568; headed Venetian League against Frederick Barbarossa; fierce struggles between Guelphs (*q.v.*) and Ghibellines; fl. under Scaligers (*q.v.*), XIII. and XIV. cent's; taken by Visconti of Milan, 1387; passed to Venetians, 1405; taken by French, 1796; awarded to Austria, 1814; recovered by Italy, 1866. Pop. (1911) 81,915; (province) 474,846.

Wiel, *Story of Verona* (1902).

Verona, Congress of, 1822.—Austria, Prussia, Russia, Britain, and France met to discuss Span. disorders. Britain protested against armed intervention; other powers decided to demand altered constitution in Spain; if unsatisfactory answer were returned, France was to invade Spain.

VERONAL, $(C_2H_5)_2C[CO{\cdot}NH]_2CO$, white crystalline powder, used medicinally as a hypnotic (10 to 15 grs.), inducing sleep without evil effects.

VERONESE, PAOLO, name by which PAOLO CALIARI or CAGLIARI (1528–88), Ital. painter, is known; was born at Verona (whence title). His f., a sculptor, was his first master, but his tastes inclining to painting, he was sent to study under Antonio Badile. Through Titian's influence he was commissioned to decorate Venetian ducal palace. Most famous painting, *Family of Darius before Alexander* (National Gallery, London).

VERONICA, see SPEEDWELL.

VERRES, GAIUS (d. 43 B.C.), Rom. governor; ruled Sicily, 73–71 B.C., by tyranny and oppression; prosecuted for extortion, 70 B.C.; denounced by Cicero in *Verrines.*

VERROCCHIO, ANDREA DEL (1435–88), Ital. sculptor and painter; started as goldsmith; executed important bronze statues, among which may be named the *David* and the *Unbelieving Thomas* at Florence, and the *Bartolommeo Colleoni* at Venice. A *Baptism of Christ,* in the Florentine Academy, is his only extant canvas.

VERS DE SOCIÉTÉ, light verse written for entertainment, on trifling and topical subjects, or relating to contemporary persons; many writers of it in France in XVIII. cent., and Prior (*q.v.*) is accredited first of Eng. poets in this line.

VERSAILLES (48° 47′ N., 2° 7′ E.), town, near Paris, France; capital of Seine-et-Oise department. Louis XIV., at cost of *c.* £20,000,000, converted (1661 onwards) V. hunting-seat—begun by Louis XIII.—into great palace (chief architect, Hardonin Mansard) with magnificent apartments; beautiful gardens, designed by Le Nôtre (1613–1700); noted fountains; in grounds stand *Grand Trianon* (built for Mme de Maintenon) and *Petit Trianon* (for Mme Du Barry). Treaty of V. ended Amer. War of Independence, 1783; V. witnessed initial scenes of Fr. Revolution (*q.v.*), 1788–89; palace made National Museum, 1833; king of Prussia proclaimed Ger. emperor here, 1871; presidential elections take place at V. Pop. (1911) 60,458.

VERSE, a line of a metrical composition; name used loosely for a stanza; v. may or may not be poetry, *e.g.* a *Limerick* is verse, not poetry. See POETRY, PROSODY, ELEGY, LYRICAL POETRY, SONNET, IAMBIC, ALCAICS, SAPPHIC METRE.

VERSECZ, WERSCHETZ (45° 8′ N., 21° 17′ E.), town, County Temes, Hungary; seat of Gk. bp.; red wine and brandy. Pop. (1910) 27,370.

VERTEBRATA (Lat. *vertebra,* 'joint'), CHORDATA, the great phylum of animals characterised primarily by the presence of a jointed internal axis supporting the body. In some of the less specialised forms, *e.g.* Tunicates and the Lancelet, this backbone or vertebral column is not developed, but in these its place is taken by a supporting unjointed and elastic rod—the notochord—which even in the higher forms precedes in development the backbone (hence the name Chordata). Besides this important feature, Vertebrates possess a nerve-chord embedded in the dorsal portion of the body (a contrast to the ventral nerve-chord of Invertebrates); and a series of openings leading from the fore-part of the food canal to the exterior, which sometimes become functional gill-slits or may remain embryonic vestiges of gill-slits.

The number of described species of Vertebrates falls little short of 40,000, and these form two great groups. The highest group—AMNIOTA—comprises Mammals (including man), Birds, and Reptiles, in all of which the embryo is protected by a 'water-jacket' membrane, the *amnion,* surrounding the embryo and keeping it suspended in a liquid medium. With the amnion is associated a second embryonic membrane—the *allantois* —the main function of which is respiratory. Such structures are absent from embryonic Fishes and Amphibians, which are therefore grouped together as ANAMNIA.

VERTIGO, giddiness, may be due to diseases of eyes or ears, dyspepsia, loss of blood, epilepsy, over-indulgence in alcohol or tobacco.

VERULAM, ST. ALBANS (*q.v.*).

VERVET MONKEY, see under CERCOPITHECIDÆ.

VERVIERS (50° 37′ N., 5° 52′ E.), town, on Vesdre, Liège, Belgium; manufactures woollen cloth. Pop. (1911) 46,948.

VESOUL (47° 37′ N., 6° 9′ E.), town, capital, Haute-Saône, France; manufactures files, tools. Pop. 9000.

VESPASIAN, TITUS FLAVIUS VESPASIANUS (9–79 A.D.), Rom. emperor; commanded legion in Britain and subdued Isle of Wight, 43–44. Consul, 51; governor of Africa, 63; of Judæa, 66; emperor, 69; suppressed Batavians, Gauls, and Jews; restored peace to Rome; continued conquest of Britain; erected new forum, baths, etc.; began Colosseum.

VESPERS, SICILIAN, revolution which broke out at time of vespers, Easter Tuesday, 1282, against tyrannical and oppressive government of Charles I. of Anjou; after riot near Palermo, a massacre of French took place, and republic was proclaimed; subsequently crown was given to Peter of Aragon, by whose aid Charles's attack on Messina was repulsed and his fleet twice destroyed.

VESPIDÆ, see WASPS.

VESPUCCI, AMERIGO (1451–1512), navigator; fitted out Columbus's third fleet; sailed for New World, 1499; explored Venezuelan coast; discovered All Saints' Bay, on Brazilian coast, 1503, afterwards sailing south to Cape Frio; became pilot-major of Spain, 1508; claimed to have reached America (named after him) before Cabot or Columbus.

VESTA, Rom. goddess of the hearth, and akin in attributes to the Gk. Hestia. As fire was symbolical of the permanent abode, V. was worshipped as guardian both of the home and the State, and colonists bore with them a portion of the fire of the State hearth. Thus Æneas brought with him from Troy portion of the sacred fire of V. The fire at Rome was tended by a company of maidens—VESTAL VIRGINS—of good birth and pure morality, and of whom absolute virginity was demanded.

VESTERAALEN, see LOFOTEN.

VESTERÅS, WESTERÅS (59° 36′ N., 16° 32′ E.),

town, on Lake Malär, capital, län of Vestermanland, Sweden; cathedral and castle; active trade; scene of defeat of Danes by Gustavus Vasa, 1521. Pop. (1911) 19,803.

VESTMENTS, ecclesiastical ceremonial robes. Use of special costume in public worship was part of Jewish religion; but clerical v. of R.C. Church are derived, not from Jewish priestly garments, but from ordinary dress of Rom. citizens during Empire, which the ecclesiastics retained unchanged, notwithstanding changes of fashion in outside world. Thus the dalmatic originated in *tunica dalmatica*, worn in Rome in II. cent.; alb, in *tunica alba*, worn until VI. cent.; and chasuble, in an overdress called the *pænula*, which in 382 was ordinary dress of senators. By IV. cent. v. were distinguished and kept apart from ordinary clothes; and about that time appeared a special garment for bp's, which in V. cent. was used by popes and called the *pallium*, while the stole (*orarium*) also became a recognised liturgical v. The institution was mainly developed between VI. and IX. cent's, towards end of which time a pope's v's consisted of the *camisia*, amice, dalmatic, alb, tunicle, stole, chasuble, and pallium. Further developments occurred between IX. and XIII. cent's, when pontifical gloves and shoes, mitres, and the *rationale* (a kind of pallium worn by certain Polish and Ger. bishops, or a jewelled clasp worn on breast) were introduced.

In modern R.C. Church a priest's v's consist of amice, alb, girdle, stole, maniple, and chasuble. A bp. has, in addition, the tunicle, pontifical gloves and shoes, mitre, staff, pectoral cross, and ring. An abp. has a crozier and may wear a pallium; and the pope wears the dalmatic, a *subcinctorum* and the *orale* (a sort of circular amice, with a hole for the head) in addition to bp.'s v's.

In XVI. cent. most of the Reformers set aside the v. as well as the ceremonies of the R.C. Church. The Lutherans retained the alb, but the Calvinists dispensed with all v. They were retained by the Swed. Church. In the Anglican Church their use has been the subject for endless discussion. The Ritualist movement has revived most of the R.C. v's in some places, not invariably without resistance. In 1870 the Privy Council declared them to be illegal, and in 1874 an Act was passed to enforce the decision. Many of the clergy refused to obey, and the Act gradually became ineffective. At the present time each clergyman uses his own discretion.

VESTRY, small building attached to church; used for robing and assembly of clergy, etc.

VESUVIANITE, **VESUVIAN**, **IDOCRASE**, mineral composed of silica, alumina, and lime; first found in dolomite blocks ejected from Vesuvius.

VESUVIUS (40° 48′ N., 14° 25′ E.), active volcano, 4200 ft. in height, situated S.E. of Naples at a distance of 7 miles. Its most destructive eruption (79 A.D.) buried Pompeii in deposit of mud and ashes, and Herculaneum by flow of lava; a great outburst occurred in 1871–72, but owing to fertility of soil the district was soon reoccupied and replanted with vineyards, only to be again devastated by greater eruption in 1906.

VETCH, or **TARE**, *Vicia*, a genus of Leguminosæ, climbing by means of leaf tendrils. *Vicia sativa* is largely cultivated as a fodder plant, and is also ploughed in as a fertiliser. In addition to *V. sativa* the following allied species are Brit.—*V. cracca*, tufted v.; *V. lutea*, yellow v.; and *V. sylvatica*, wood v.

VETERINARY SCIENCE.—V. medicine and surgery has existed from the time of the Egyptians, and there are MSS. in Greek and Latin which show some acquaintance with the main principles. Some progress was made in the Middle Ages, especially in the continental armies. The diseases of the horse very naturally and necessarily were especially studied, and English text-books of XVII. and XVIII. cent's show that efforts were made, and not wholly without success, to improve treatment. But the real study of v. s. is coincident with the rise of v. schools.

The first veterinary school was established a little over two centuries ago at Lyons; but it was not until 1792 that a school was opened in London (the Veterinary College of London, later the Royal Veterinary College) by a student of the Lyons school, and the Royal College of Veterinary Surgeons was not founded until 1844. Now there are schools all over the world, and students must qualify in chemistry, botany, zoology, anatomy, and physiology, stable management and shoeing, pathology, bacteriology, materia medica, hygiene, v. medicine and v. surgery, obstetrics, and meat inspection. Several universities now give the B.Sc. and D.Sc. in v. s.

Certain diseases attack **Horses** analogous to those in man. INFLUENZA is characterised by the suddenness of its onset; there is loss of appetite, quickened breathing, fever, the legs are swollen and stiff, and eyelids are swollen. A clean, loose, well-ventilated box, with water in which are dissolved two drams each of potassium nitrate and potassium chlorate are the only treatment, and in from 10 to 14 days the symptoms abate. But the stall should be thoroughly disinfected, as the disease is infectious.

TETANUS, caused by the bacillus gaining access to the body, usually through a wound, is first noticed by stiffness of muscles round the wound. The stiffness spreads, the animal champs his jaws, grinds his teeth, and at length the jaws become fixed. Injection of a serum, hyposulphite of soda, belladonna, are the best (but not very successful) remedies, and the animal must be kept in a cool, dark, quiet place.

COLIC, arising from indigestion, due to unwholesome food or organic disease. Symptoms: the animal shows signs of pain, paws ground with forefeet, lies down, rolls, gets up again, occasionally looks towards flank. Treated by draught containing chlorodyne, turpentine, spirits of ether nitrate and linseed oil, and enemata if necessary.

STRANGLES, a disease most common in young horses. Symptoms: loss of appetite, cough, difficulty in swallowing and breathing, swelling of glands between lower jaw, fever, discharge from nostrils. Treatment is directed to mature as quickly as possible abscesses likely to form in region of throat; throat is stimulated with embrocation or even blister; head is steamed with boiling water (containing eucalyptus oil) poured over hay or sawdust; feeding is mashes, gruels, carrots, and little hay; drink as in influenza; abscess is cleansed when it bursts.

GLANDERS AND FARCY is a disease under Diseases of Animals Act (see GLANDERS). The treatment of the disease being unsatisfactory, usually a case is at once isolated and the animal destroyed.

One of the most dreaded and infectious diseases of **Cattle** is TUBERCULOSIS, caused by the bacillus. The cow is commonest subject, chest being most frequently attacked, but also commonly the abdomen, udder, whence the bacillus passes to the milk. Koch's tuberculin is used as a diagnostic in cases of doubt, and diseased animals are at once slaughtered. ABORTION, caused by a micro-organism, is another great disease of cattle beasts. When a case occurs, it is advisable to segregate the animal, remove fœtus and membranes, and disinfect the place. In cases of FOOT-AND-MOUTH DISEASE all animals exposed to infection are slaughtered, and there are strict regulations as to moving cattle in affected areas. ANTHRAX, a blood disease caused by anthrax bacillus, is communicable to man. There are few recognisable symptoms, but when an animal is suddenly found dead, anthrax is commonly the cause. Cases have to be reported, and carcases must be buried 6 ft. below ground, or burned.

DISTEMPER is a troublesome disease affecting **Dogs**, most commonly under one year of age. Primary symptoms are those of catarrh; the dog shivers, is dull and restless, with dry nose, inflamed eyes, impaired appetite, thirst, and loss of flesh, and commonly a

skin eruption; a cough is present, at first dry and then moist; breathing is often quickened, and food forced on dog is at once rejected. Complications such as pneumonia may arise. Symptoms are treated as they arise; a vaccine has been advocated, but its curative value has yet to be seen.

RABIES OR MADNESS, a disease of brain and spinal cord, is uncommon in Brit. dogs. Symptoms are dullness, irritability, the animal seeks to be alone, snaps at anything, runs away, and wanders at a peculiar jog that is quite characteristic. Pasteur's vaccine cures people bitten by rabid dogs. Dogs also suffer from gastritis, skin diseases, pneumonia, and pleurisy.

All animals suffer from the effects of parasites, some causing mange and ringworm. Of internal parasites, worms are most troublesome—tape-worm in dogs, round-worm in horses, a liver-fluke in cattle and sheep.

Operations are frequently performed on horses: stripping of the ventricles for roaring, castration, ovariotomy. Local anæsthetics are used extensively in the smaller operations, such as removing tumours.

There are numerous text-books on the various divisions of v. s., as well as on the diseases of various animals.

VETO, any prohibition, especially applied to royal power of refusing assent to a Bill; not used since 1692, and now obsolete; gov. of a Brit. colony has power of v., or may reserve assent till Bill has been considered by the Crown; Pres. of Fr. Republic may refer back Bill passed by the Chambers for further discussion; Pres. of U.S.A. and governors of the different states have suspensory v. over legislation, but a ⅔ majority overrides v. The Brit. House of Lords absolute v. became a suspensory v. by Parliament Act, 1911.

VETTER, WETTER (58° 20′ N., 15° 30′ E.), lake, Sweden; drained by Motala to the Baltic; length, 80 miles.

VETULONIUM, VETULONIA (42° 54′ N., 11° E.), ancient town, Etruria; one of the Confederation.

VEVEY (46° 28′ N., 6° 51′ E.), town, on Lake Geneva, canton Vaud, Switzerland; tourist resort. Pop. (1912) 13,900.

VEXIÖ (56° 50′ N., 14° 52′ E.), town, on Lake Vexiö, län of Kronoberg, Sweden; cathedral; iron foundries. Pop. 8320.

VÉZELAY (47° 28′ N., 3° 43′ E.), small town, France; noted Benedictine abbey, founded IX. cent.

VIANDEN (49° 55′ N., 6° 10′ E.), town, on Our, Luxemburg.

VIANNA DO CASTELLO (41° 41′ N., 8° 43′ W.), seaport, on Atlantic, Portugal. Pop. 11,000.

VIAREGGIO (43° 25′ N., 10° 14′ E.), seaport, watering-place, Lucca, Italy. Pop. 15,500.

VIATICUM, Eucharist administered in Catholic Church when death is imminent.

VIAUD, LOUIS MARIE JULIEN, see LOTI, PIERRE.

VIBORG.—(1) (60° 47′ N., 28° 43′ E.) town, capital, län of Viborg, Finland; iron foundries; exports timber. Pop. (1910) 49,007. (2) (56° 27′ N., 9° 25′ E.) town, capital, Viborg amt, Jutland, Denmark; XII.-cent. cathedral. Pop. (1911) 10,885.

VIBURNUM, dried bark of tree *V. prunifolium* (N. America and India); employed medicinally in menorrhagia and dysmenorrhœa as an antispasmodic.

VICAR, title in Rom. Empire, now only ecclesiastical, meaning 'one who acts for another.' The pope has been called 'V. of Christ' since VIII. cent.; v's apostolic are app. in R.C. Church for certain episcopal functions, generally in missionary countries; in Anglican Church a v. nominally acts for a lay rector.

VICENTE, GIL, see PORTUGAL (LITERATURE).

VICENZA (45° 32′ N., 11° 32′ E.) (ancient *Vicetia*), town, at junction of Bacchiglione and Retrone, Italy; noted for its buildings by Palladio; Gothic cathedral (XIII. cent.); bp.'s see; manufactures silk; in latter part of Middle Ages was independent republic; passed to Venice, 1404; taken by the Austrians, 1848. Pop. (1911) 54,246; (province) 496,052.

VICH (41° 55′ N., 2° 11′ E.) (ancient *Ausa*), town, Barcelona, Spain; cathedral; textiles. Pop. 12,000.

VICHY (46° 7′ N., 3° 25′ E.), town, watering-place, on Allier, Allier, France; mineral springs. Pop. 14,700.

VICKSBURG (32° 21′ N., 90° 47′ W.), town, Warren County, Mississippi; situated on Mississippi R.; has fine public buildings, including town hall, Federal Government building, county court. An important trading centre; manufactures hardware, cotton-seed oil, machinery; exports cotton, lumber, etc. Was an important stronghold of Confederates during Civil War, and was eventually captured by Grant after a prolonged siege on July 4, 1863. Has magnificent park commemorating the V. campaign of 1862–63, and a national cemetery where many thousand Federal soldiers are buried. Pop. (1910) 20,814.

VICO, GIOVANNI BATTISTA (1688–1744), Ital. historian and philosopher; prof. of Rhetoric in Naples; app. historiographer-royal by Charles III. of Naples, 1735; denied hist. reality of characters in Græco-Rom. traditions; investigated problem of differences in legislative codes when the principle of justice is eternal and immutable. Held that God rules the world of nations by natural laws; law proceeds from the human conscience, at first confused and uncertain, embodied in palpable religious forms, then leading to abstract formulæ, and finally to the development of philosophical principles of law.

VICTOR AMEDEUS II. (1666–1732), duke of Savoy and 1st king of Sardinia; s. of Duke Charles Emmanuel II. and Jeanne de Savoie-Nemours; m. Anne, niece of Louis XIV. of France; the greater part of his reign was spent in throwing off the Fr. yoke.

VICTOR EMMANUEL II. (1820–78), succ. his f., Charles Albert, as king of Sardinia, 1849; joined England and France in an anti-Russ. alliance, 1855, and sent troops to the Crimea; joined by Napoleon III. in war against Austria, 1859, and defeated the Austrians; Tuscany, Parma, Modena, and Romagna joined Sardinia, 1860; the same year Garibaldi invaded and conquered Naples, and was joined by V., who accepted sovereignty of S. Italy, and annexed the majority of Papal States; proclaimed king of Italy at the first Ital. Parliament at Turin, 1861.

VICTOR EMMANUEL III. (1869–), King of Italy since assassination of his f., Humbert I., 1900; m. dau. of Nicolas, king of Montenegro.

VICTORIA.—(1) (34 to 39° 6′ S., 141° to 149° 58′ E.) state, S.E. Australia; bounded N. and N.E. by New South Wales, S.E. by Pacific, S. by Indian Ocean, W. by S. Australia; area, 87,884 sq. miles. Surface is generally mountainous, with a level tract in the N.W.; principal mountains are the Great Dividing Range, which crosses the country from E. to W., and reaches an extreme height of over 6500 ft. in Mt. Bogong; drained in N. by Murray, which forms N. boundary, and its tributaries Loddon, Goulburn, Ovens, and Mitta-Mitta; and in S. by Glenelg, Yarra, La Trobe, Michell, Tamba, and Snowy Rivers. There are many lakes, of which most important are Corangamite in S., Tyrrell and Hindmarsh in N.W., Wellington and Victoria in S.E. The region is chiefly of Archæan formation. Climate is healthy and temperate. Flora and fauna are those of Australia.

V. was discovered by Captain Cook, 1770; first permanently colonised by British, 1834; included in New South Wales until 1851, when it was constituted a distinct colony; discovery of gold led to great influx of population, 1851; joined Australian Commonwealth, 1901. V. is administered by a governor, nominated by Brit. Crown, and assisted by a Cabinet of 12 ministers; the Parliament consists of a Legislative Council of 34 members, and a Legislative Assembly of 65 members, elected respectively for 6 and 3 years by popular vote. Votes were given to women by Adult Suffrage Act in 1908. V. sends 21 Representatives to Federal Parliament.

Chief towns are Melbourne (capital), Ballarat, Bendigo, Geelong. Agriculture is an important industry, chief crops being wheat, oats, and barley; potatoes are widely grown; grapes and other fruits and tobacco are extensively cultivated. Horses, cattle, sheep, and pigs raised; dairy-farming carried on. There are large forests, producing valuable timber. Gold mines are an important source of wealth; other minerals are coal, tin, antimony, silver. Manufactures include machinery, hardware, textiles, wine. Chief exports are gold, wool, meat, live animals, cereals. Education is free and obligatory. There is no State religion; principal religions are Anglican, R.C., Presbyterian, Methodist. Pop. (1911) 1,315,551.

Turner, *History of Colony of Victoria* (1904); Gregory, *Geography of Victoria* (1907).

(2) (49° 30′ N., 123° W.) capital, Brit. Columbia, at S.E. end of Vancouver Island; formerly a post of the Hudson's Bay Company; 3 miles W. is Esquimalt, a fortified naval station. Pop. (1911) 31,600.

(3) (20° 15′ S., 49° 15′ W.) seaport, on Bay of Esperito Santo, capital, state Esperito Santo, Brazil; exports coffee. Pop. 10,500.

VICTORIA, see HONG-KONG.

VICTORIA (1819–1901), Queen of Great Britain and Ireland; dau. of the Duke of Kent and niece of William IV. As William IV. died without male issue, Victoria succeeded to the throne in 1837. In 1838 Lord Durham settled the revolt in Upper and Lower Canada and granted a popular constitution. At this time also the great Chartist movement broke out. The Queen m. her cousin Albert, s. of the Duke of Saxe-Coburg, 1840. War broke out in Afghanistan, 1841, and the Sikh War, 1845, resulting in the annexation of the Punjab, 1849. Important home measures were the adoption of penny postage and the institution of an educational department. In England religious unrest expressed itself in the Tractarian movement, and in 1843 the Disruption agitation in Scotland led to the secession of the Free Church. In 1846 Peel repealed the Corn Laws, the famine in Ireland of 1845 having led him to adopt this policy. Peel's ministry fell in 1846, and Lord John Russell's ministry succeeded. Lord Palmerston's sympathy with the European revolutionary movements led to a breach between him and the Sovereign, and he resigned, 1851. The year 1851 also witnessed the Great Exhibition, the outcome of England's industrial activity. Palmerston became Prime Minister, 1855; during his ministry war in the Crimea was brought to a successful issue, 1856. Minor wars were also waged in China and Persia. Palmerston's policy during the Indian Mutiny of 1857 again led to a breach with the Sovereign. In 1858 Palmerston's ministry fell, but he resumed office again, 1859, and continued in power till his death, 1865. The Prince Consort died, 1861. In 1868 Disraeli became Prime Minister, but his ministry was soon superseded by Gladstone's (1868–74), during whose administration important measures were passed. The Irish Church was disestablished, Army Purchase was abolished, and the Ballot and Judicature Acts were passed. The year 1874 marked a change in the political tide. There was a strong Conservative reaction, and Disraeli became Prime Minister. In 1876 the Queen received the additional title of Empress of India. In 1878 Lord Beaconsfield and Lord Salisbury represented Britain at the Berlin Congress. A war with the Zulus led to the annexation of Zululand, 1879. Gladstone again became Prime Minister, 1880. In 1881 the Boers acquired autonomy. The battle of Tel-el-Kebir, 1882, secured Britain's suzerainty in Egypt.

Home Rule agitations in Ireland became serious, and the Irish Land League was formed, 1879. In 1882 the Phœnix Park outrages were committed, in which Cavendish and Burke were murdered. Gladstone resigned (1885), and his resignation was followed by the brief administration of Lord Salisbury. At the close of the year Gladstone again became Prime Minister, but his Home Rule Bill was thrown out by the Lords. In 1892 Gladstone again became Premier, but the defeat of his second Home Rule Bill led to his resignation, 1894. Rosebery's Disestablishment Bill for Wales was defeated, and his ministry was succeeded by that of Lord Salisbury. In 1899 hostilities commenced between Britain and the Transvaal. In 1900 the Australian Commonwealth Bill was passed. Queen Victoria was an extraordinarily able ruler, and her reign was characterised by great colonial expansion and rapid growth of industry and commerce at home.

VICTORIA, genus of aquatic plants, order Nymphæaceæ; *V. regia*, the only species, a S. Amer. water-lily, has leaves 6 ft. in diameter, and white, fragrant flowers.

VICTORIA CROSS, see MEDAL.

VICTORIA FALLS (17° 59′ S., 25° 51′ E.), cataract of the Zambesi; height, 400 ft.; width, about 1 mile; discovered by Livingstone, 1855; is one of the great waterfalls of the world.

VICTORIA NYANZA (0°, 33° 15′ E.), large freshwater lake, Central Africa; northern part lies in Brit. territory, S. part is in Ger. E. Africa; area, *c.* 28,000 sq. miles; entered by the Kagera, Katonga, Rubana, Shimiu, and other rivers, and is the source of the Nile, to which it drains by way of Ripon Falls; first discovered by Speke in 1858. There are many islands, of which the most important are Ukerewe and Sesse. Contains numerous kinds of fish and molluscs, and is frequented by alligators and hippopotami.

VICTORIAHAVN, see NARVIK.

VICTORIAN ORDER, ROYAL, see KNIGHTHOOD.

VICTOR-PERRIN, CLAUDE, DUKE OF BELLUNO (1764–1841), Fr. marshal; b. La Marche; entered army as a private, but rose steadily, and Napoleon created him Marshal for the services at Friedland. After distinguished service in the Pruss. War he became governor of Berlin.

VICUGNA, see CAMEL FAMILY.

VIDIN, WIDIN (43° 59′ N., 22° 52′ E.) (Rom. *Bononia*), fortified town, river port, on Danube, Bulgaria; distilleries; exports cereals; active commerce. Pop. (1910) 16,450; (department) 237,571.

VIEIRA, ANTONIO (1608–97), Portug. Jesuit; won patronage of John IV.; combined the life of preacher with that of statesman, and improved economic condition of Portugal. V.'s ideal was the conversion of Amer. Indians and negro slaves, and from 1653 to 1661 he worked zealously in the cause.

VIENNA, WIEN (48° 14′ N., 16° 20′ E.), capital of Austria, on Danube; one of finest, largest, and most hist. cities of Europe, renowned for art, architecture, learning, industry, music. The Ringstrasse, on site of old fortifications (destroyed, 1858), claims to be the handsomest street in the world. Here are congregated, among other splendid structures, Votive Church (1856–79), univ. (founded, 1237), Rathaus, celebrated Burg Theater and Opera-House (seating 2347), Parliament House, Royal Natural History Museum, Art Gallery (one of the finest in Europe), the new wing of the Imperial Palace (Hofburg), Maria Theresia, Schiller, and Goethe monuments. Owing to stormy history mediæval buildings are rare, but include Stefansdom (completed, XV. cent.), with famous spire. Other notable buildings are Belvedere Castle and Karlskirche (baroque arch.). The Prater is a beautiful natural park. Schönbrunn palace and park lie near the city. V. is centre of Austrian trade and industry; chief manufactures being *objets-d'art*, blouses, hats, clothing, and furniture (including bentwood). In Rom. times V. was *Vindomina*, later *Vindobona*; founded by Claudius, I. cent. A.D., to command Danube; city restored by Leopold the Holy, 1136; flourished under Rudolf IV., 1365, who founded univ. and rebuilt Stefansdom; became permanent residence of Ger. emperors; besieged by Turks, 1529, 1683; absolute government abolished, 1848. V. gained civic autonomy, 1850; since then advanced by leaps and bounds. Pop. (1910) 2,031,498.

Vienna, Congress of (1814–15), attended by the chief powers of Europe, undid Napoleon's work. It restored King of Naples, Duke of Tuscany, Pope, and King of Sardinia to their former territories, and gave Milan and Venice to Austria. A new kingdom of the Netherlands was cr., with the Prince of Orange as king. George III. recovered Hanover. Poland was made a constitutional kingdom, under Russia. A Ger. Confederation was formed; the national feeling which overthrew Napoleon was disregarded, and the arrangements were entirely in the interests of the princes of Europe.

VIENNE.—(1) (46° 30′ N., 0° 30′ E.) department, France, formed chiefly from ancient Poitou; generally level; traversed by Vienne; produces grain, wine. Pop. (1911) 332,276. Capital, Poitiers. (2) (45° 32′ N., 4° 52′ E.) town, on Rhone, Isère, France; formerly abp.'s see; has Romanesque-Gothic cathedral, dating from XII. cent., and other old churches; Rom. remains include temple of Augustus and Livia, theatre, aqueducts. Manufactures textiles, hardware, leather, gloves; large trade in wine. Pop. 25,300. (3) (46° 10′ N., 0° 40′ E.) river, France, rises in department Corrèze, joins Loire; length, 220 miles.

VIENNE, COUNCIL OF, a R.C. synod, Oct. 1311 to May 1312, by which the Order of the Temple was suppressed as conflicting with the general weal.

VIERSEN (51° 17′ N., 6° 24′ E.), town, Rhineland, Prussia; manufactures velvets, silks. Pop. (1910) 30,172.

VIERWALDSTÄTTERSEE, see LUCERNE, LAKE OF.

VIERZON (47° 13′ N., 2° 3′ E.), town, Cher, France; manufactures agricultural machinery. Pop. 12,000.

VIETA, FRANÇOIS (1540–1603), Fr. mathematician; b. Fontenai-le-Comte, near La Rochelle; employed on State matters by Henry III. and IV.; made algebra a symbolic science and discovered trigonometrical relations of multiple angles.

VIEUXTEMPS, HENRI (1820–81), Belg. violinist and composer.

VIGAN (17° 30′ N., 120° 20′ E.), town, Luzon, Philippine Islands; manufactures cotton fabrics; fisheries. Pop. 16,000.

VIGEVANO (45° 18′ N., 8° 52′ E.), town, on Ticino, Pavia, Italy; cathedral; silk manufactures. Pop. (commune) 25,000.

VIGFUSSON, GUDBRAND (1828–89), Scandinavian scholar, for some years lector in Icelandic at Oxford. His works include an Icelandic dictionary and the *Corpus Poeticum Boreale.*

VIGIL, watch kept on eve of a religious feast.

VIGILANTIUS (fl. c. 400), author of a famous work denouncing the worship of martyrs, vows of celibacy and poverty, and many superstitious practices of his time.

VIGNY, ALFRED DE (1797–1863), Fr. poet; served during wars of the Empire; disciple of Romanticism from the beginning, frequenter of Victor Hugo's *salon,* and full of ardour of early movement; chief fame from poems, but novel *Cinq-Mars* (1826), though without interest of form, shows no inferiority of mind, and his dramas, an adaptation of Shakespeare's *Othello* (1829), *Stello* (1832), and *Chatterton* (1835), did great service to Romantic movement. See FRANCE (LITERATURE).

VIGO (42° 12′ N., 8° 43′ W.), seaport, naval station, on Ria de Vigo, Pontevedra, Spain; fisheries; important commerce. Pop. (1910) 41,213.

VIHÂRAS, see ARCHITECTURE, INDIAN.

VIJAYANAGAR, BIJANAGAR (15° 20′ N., 76° 30′ E.), ruined city, Madras, India; ancient capital of the kings of V.

VIKINGS (Icelandic *Vikingr,* sea-rover; not connected with 'king'), Scandinavian pirates who from VIII.–XI. cent. overran large parts of the Brit. Isles and Europe. The Viking Age reached its height in IX.–X. cent. One band of *Northmen* (Varanglans) under Rurik founded the Russian Empire, 862 (see RUSSIA), crossed Europe by the Dnieper valley, and even threatened Constantinople. Still more hist. are the Viking invasions of Britain and the European coast between the Rhine and Loire mouths. Towards end of VIII. cent. the Danes made first appearance on Eng. coast; colonising expeditions followed mere harrying raids; although checked by Alfred (*q.v.*) and Danegeld (*q.v.*), Danes secured permanent footing, Canute (*q.v.*) becoming king of all England, 1018 (see ENGLAND, HISTORY OF).

Northmen invaded N. and W. of Scotland (*q.v.*), IX.–X. cent.; western isles not recovered by Scot. king till 1263. V's landed in Ireland (*q.v.*), 795 onwards, and founded kingdoms of Dublin (852), Waterford, etc. On continent they seized river-mouths (*e.g.* Scheldt, Seine) and thence plundered or conquered surrounding country. In IX. cent. they repeatedly took Paris, ravaged Burgundy and Rhine districts, and even penetrated Mediterranean. Charles the Simple in 912 ceded Normandy (*q.v.*) as a peace-offering to Northmen under Rollo. Like their descendants, the Normans (*q.v.*), the Northmen or V. were able administrators as well as bold adventurers. In their small craft (several examples of which have been discovered) they scoured the seas, reaching Greenland and even N. America (see VINLAND) in X.–XI. cent.

Keary, *Vikings in Western Christendom* (1891).

VILLA DEL PILAR (26° 44′ S., 58° 15′ W.), city, river port, on Paraguay, Paraguay. Pop. 11,000.

VILLA REAL (41° 23′ N., 7° 39′ W.), town, on Corgo, Traz-os-Montes, Portugal; wine industry. Pop. *c.* 6500.

VILLA RICA (25° 48′ S., 56° 33′ W.), town, Paraguay; agricultural region; noted for tobacco. Pop. *c.* 26,000.

VILLACH (46° 37′ N., 13° 50′ E.), town, on Drave, Carinthia, Austria; lead-mining centre. Pop. 19,250.

VILLAFRANCA DI VERONA (45° 22′ N., 10° 50′ E.), town, Verona, Italy; silk industry. Pop. 10,100.

VILLAGE COMMUNITIES were originally family groups united for defence against hostile neighbours; hence came the tribe, and adjoining tribes united, *e.g.* in Teutonic countries. With feudalism came an overlord, but the land of the village community for nearly 1000 years consisted of open fields; the 'commons' are a survival of this. The break-up of the village common life began in England in late XV. cent., when lords of the manor, finding sheep were more profitable than peasants, set up enclosures. In spite of laws prohibiting enclosures the landowners continued to enclose, pulling down whole villages in the process. All through XVI. cent. the work went on. Agrarian revolt and denunciations of preachers and writers could not save the countryside. The landless peasantry drifted into the towns, or wandered homeless, to be punished by heavy statutes against vagrancy.

The commons enclosed in XV. and XVI. cent's were the open fields cultivated in common by the village. In XVIII. and XIX. cent's the common grazing lands—the 'commons'—were enclosed by Acts of Parliament, and more than a million acres passed into private hands. The economic defence of enclosures in England is the greater profit by the wool trade, and by the large farm. In other words, arable land pays better than tillage, and, whatever the suffering involved, national increase in wealth is generally held to have justified the change. In India, in Russia, and other Slavonic countries v. o's still exist.

Maine, *Village Communities*; Vinogradoff, *Growth of the Manor*; Seebohm, *English Village Communities.*

VILLALBA (43° 18′ N., 7° 40′ W.), town, Lugo, Spain. Pop. 14,300.

VILLANELLE, originally a round song of no specified formula, but which has become limited in form and shaped after a poem by Jean Passerat (XVI. cent.), *i.e.* a poem composed in tercets on two

hymes, the first and third line being repeated alternately in each tercet, and ending in a quatrain the last two lines of which repeat the first and third lines of the first tercet.

VILLANI, GIOVANNI (*c.* 1275–1348), Ital. chronicler; b. Florence. In 1316 he took an active part in the negotiations whereby Pisa, Lucca, and Florence became united, and became prior of the city; app. (1328) to take precautions against the spreading to Florence of the plague which ravaged Italy, and showed great wisdom in his choice of methods. It was this close intimacy with the administration of Florence that enabled him to execute so admirably his great *Chronicle* or History of Florence.

VILLANUEVA DE LA SERENA (39° N., 5° 45′ W.), town, on Guadiana, Badajoz, Spain. Pop. 13,600.

VILLANUEVA Y GELTRU (41° 15′ N., 1° 45′ E.), seaport, on Mediterranean, Barcelona, Spain; manufactures textiles, paper. Pop. 12,200.

VILLARI, PASQUALE (1827–), Ital. historian; wrote *Savonarola and his Times*, *Machiavelli and his Times*, and *First Two Centuries of Florentine History*.

VILLARREAL (39° 55′ N., 0° 7′ W.), town, Castellon de la Plana, Spain; orange-growing district. Pop. 16,100.

VILLARS, CLAUDE LOUIS HECTOR DE (1653–1734), Fr. soldier; served under Condé and Turenne; defeated by Marlborough at Ramillies, 1706, and Malplaquet, 1709, but was military genius of France in War of Span. Succession.

VILLAVICIOSA (46° 34′ N., 5° 24′ W.), small seaport, on Ria de Villaviciosa, Oviedo, Spain.

VILLEFRANCHE-DE-ROUERGNE (44° 21′ N., 2° 2′ E.), town, on Aveyron, Aveyron, France; cathedral; in vicinity, lead-mines, phosphate quarries. Pop. 8400.

VILLEFRANCHE-SUR-SAÔNE (45° 59′ N., 4° 43′ E.), town, Rhône, France; manufactures textiles; was capital of Beaujeais. Pop. 16,200.

VILLEHARDOUIN, GEOFFROY DE (*c.* 1150–*c.* 1212), Fr. historian; little known of his life; appears as marshal of Champagne and helped to arrange 4th Crusade (1202–4), of which he left account in first Fr. literary prose, *Chronique de la conquête de Constantinople*; previously histories were in Lat. or in verse of *chansons de geste* and romances; V. remained in East after crusade, and as grand marshal of Rumania helped to organise Lat. kingdom and received principality in Thessaly.

VILLEIN, VILLEINAGE, see SLAVERY.

VILLÈLE, COMTE DE, JEAN BAPTISTE GUILLAUME MARIE ANNE SÉRAPHIN (1773–1854), Fr. statesman; b. Toulouse; made fortune in West Indies; Minister of Finance, 1821; Pres. of Council and Minister of Foreign Affairs, 1822. An extreme royalist and reactionary, his policy, especially in press restrictions, was one of the provocations of the revolution of 1830; retired, 1828.

VILLENA (38° 36′ N., 0° 48′ W.), town, Alicante, Spain; manufactures silk, salt. Pop. 14,400.

VILLENEUVE, PIERRE CHARLES JEAN BAPTISTE SYLVESTRE (1763–1806), Fr. admiral; commander of combined Fr. and Span. fleets, 1803; Nelson's antagonist at Trafalgar; his ship, the *Bucentaure*, was taken, and he was carried prisoner to England; returned to France and committed suicide.

VILLENEUVE-LÈS-AVIGNON (43° 47′ N., 4° 48′ E.), town, on Rhône, Gard, France; manufactures silk; interesting mediæval remains.

VILLENEUVE-SUR-LOT (44° 23′ N., 0° 40′ E.), town, on Lot, Lot-et-Garonne, France; trade in prunes; remains of mediæval ramparts. Pop. 13,700.

VILLERS LA VILLE (50° 35′ N., 4° 32′ E.), town, Brabant, Belgium; ruined Cistercian abbey (XII. cent.).

VILLIERS DE L'ISLE ADAM, COMTE DE, PHILIPPE AUGUSTE MATHIAS (1838–89), Fr. poet; one of originators of Symbolist movement; in drama, *La Révolte* (1870), he attacked *bourgeois* conventionalism; his *Contes Cruels* (1883 and 1889) are short stories of fantastic and thrilling kind.

VILLIERS, GEORGE, see BUCKINGHAM, DUKE OF.

VILLIERS, GEORGE WILLIAM FREDERICK, see CLARENDON, 4TH EARL OF.

VILLINGEN (48° 5′ N., 8° 30′ E.), town, Baden, Germany; manufactures watches. Pop. (1910) 10,924.

VILLON, FRANÇOIS (1431–*c.* 1490), Fr. poet; b. Paris, of poor parents of name unknown; took name of protector, who had him carefully educated; but V. always led a gay, idle, vicious life, went to prison several times, and only escaped hanging through event of coronation of King Louis XI., 1461. His work is glory of Fr. mediæval poetry; chief poems are contained in *Petit Testament* and *Grand Testament*, legacies, mostly satirical, to friends and others; studded with *ballades* and *rondeaux*, the best known of which is *Ballade des dames du temps jadis*; unredeemed sadness, which is modern note.

R. L. Stevenson, *Familiar Studies of Men and Books*.

VILNA, WILNO (54° N., 26° E.), government, in Lithuania, Russia; surface level; much occupied by woods, lakes, and marshes. Pop. (1910) 1,926,900. Capital, **Vilna,** WILNO (54° 41′ N., 25° 17′ E.), on Vilia; ancient capital of Lithuania; formerly seat of a university; contains an imperial palace, Roman Catholic and Greek cathedrals; exports timber and grain. Pop. (1910) 186,200.

VILVORDE (50° 55′ N., 4° 27′ E.), town, Brabant, Belgium. Pop. 17,000.

VIMEIRO, see PENINSULAR WAR.

VINCENNES.—(1) (48° 49′ N., 2° 25′ E.) fortified town, Seine, France; manufactures chemicals; noted for its castle. Pop. (1911) 38,568. (2) (38° 41′ N., 87° 34′ W.), city, Indiana, U.S.A.; univ. (1806); great manufacturing and railway centre. Pop. (1910) 14,805.

VINCENT DE PAUL, ST. (1576–1660), Fr. priest; founded Lazarists (*q.v.*) and Sisters of Charity, and worked among galley slaves; canonised, 1737.

VINCENT FERRER, ST. (1355–1419), Dominican priest, famous for his preaching.

VINCENT OF BEAUVAIS (d. *c.* 1264), Fr. scholar; supposed to have joined the Dominicans in Paris, and afterwards at Beauvais; reader at monastery of Royaumont near Paris; enjoyed patronage of St. Louis of France and other rulers; wrote *Speculum Majus*, a great encyclopædia of mediæval knowledge, in three parts: (1) *Speculum Naturale*, a compendium of natural history, following order of creation given in *Genesis*; (2) *Speculum Doctrinale*, summary of scholastic knowledge; (3) *Speculum Historiale*, further treatise of sacred and secular history. Some editions include spurious Part IV., *Speculum Morale*.

VINCENT, ST., early Christian martyred for the faith by Diocletian.

VINCENT, ST., OF LERINS (d. *c.* 450 A.D.), monk of L.; wrote *Commonitorium*, wherein occurs famous dictums *quod ubique, quod semper quod ab omnibus creditum est*.

VINCENTIANS, see LAZARISTS.

VINCI, LEONARDO DA, see LEONARDO DA VINCI.

VINDELICIA (48° N., 10° 30′ E.), an ancient Rom. province; included N.E. Switzerland and the S. parts of Baden, Württemberg, and Bavaria.

VINDHYA (23° N., 76° E.), mountain range, India, forming N. boundary of the Deccan.

VINE (*Vitis*), climbing plant, the tendrils representing the modified main axis, the growth of the shoot being continued by the robust lateral branch nearest the apex. *Vitis vinifera*, the grape-v., is cultivated for its fruits, which yield wines and which when dried are raisins. The plant possibly came to England with the Christian era, and has since been grown under glass, especially in the south. V's flourish in all Mediterranean countries. The following selection includes many of the choicest varieties: Alicante, Appley Towers, Black Hamburgh, Black

Prince, Buckland Sweetwater, Duke of Buccleuch, Foster's Seedling, Gros Colman, Gros Guillaume, Lady Downs, Madresfield Court, Mrs. Pearson, Mrs. Pince, Muscat of Alexandria, and Muscat Hamburgh. V's require liquid manure, efficient ventilation, carefully watched temperature. V's are attacked by diseases, *e.g.* the incurable scourge, Phylloxera.

VINE INSECT, see PHYLLOXERA.

VINEGAR, impure, dilute acetic acid ($H.C_2H_3O_2$) generally made by acetons following alcoholic fermentation of the sweet wort of malt. Malt vinegar is brown, contains 3–6 % acetic acid, and yields 5–6 % extract; also made from wine, cider, glucose, etc. 'Wood vinegar' is pyroligneous acid.

VINEGAR HILL, battlefield near Enniscorthy. See IRELAND (HISTORY).

VINELAND (39° 28′ N., 75° 3′ W.), town, Cumberland County, New Jersey, U.S.A.; fruit-growing district; manufactures wine, boots and shoes. Pop. (1910) 5282.

VINET, ALEXANDRE RODOLPHE (1797–1847), Swiss author, theologian, and pulpit orator; founded Swiss Free Church, 1845.

VINGT-ET-UN, card game; one player holds bank; object is to make number 21; ace counts one or eleven, court-card ten; best hand 'natural,' ace and ten or court-card. Bank pays better hands than his own.

VINITA (36° 35′ N., 95° 12′ W.), city, capital, Craig County, Oklahoma, U.S.A.; bricks. Pop. (1910) 4082.

VINLAND, the name applied to a district in E. of N. America which was visited by various Norse explorers in early XI. cent.; first discovered by Bjarni Herjulfsen, who sighted it when driven out of his way by a storm in 986, but did not land. Partly explored by Leif Ericson in 1000; settlements were made in 1002 by Thorwald Ericson and in 1007 by Thorfinn Karlsefne, but owing to the enmity of the aboriginal inhabitants neither of these proved permanent. Received the name from the fact that vines grew wild there. The region is mentioned in various Icelandic works of the XII. and following centuries, and is generally believed to have been situated somewhere in Rhode Island or Massachusetts.

Reeves, *Finding of Wineland the Good* (1890).

VIOL, musical instrument, precursor of violin; had flat back, three to six strings, and deep bends in the sides.

VIOLA, genus of plants, order Violaceæ; species are Pansy or Heartsease (*V. tricolor*), Sweet Violet (*V. odorata*), Dog Violet (*V. canina*).

VIOLACEÆ, order of herbs and shrubs; in flowers calyx has 5 sepals, 5 petals, 5 stamens; Viola is a genus.

VIOLET (*Viola*) includes three Brit. species, *V. canina*, *V. odorata*, and *V. sylvestris*, the ordinary flowers of which seldom set seed, this being produced by cleistogamous forms.

VIOLIN, a musical instrument with four strings, played by a bow, too familiar to require description. Though a comparatively modern instrument, it may be regarded as the perfected evolution of many older forms of its class, such as the mediæval 'vielle' or 'fiddle,' the Troubadour rebec, and the viol. No actual inventor can be named, the fixing of the form having followed after many and varied experiments, carried on from about 1480 to 1530. During the period of development, the making of v's was restricted chiefly to the Tyrol and upper Italy; and it was in the hands of the XVII. and XVIII.-cent. Cremona makers, notably the Amatis, Guarnerius, and Stradivarius, that the instrument attained that perfection which has never since been surpassed. The perfected v.-model presents many points of technical interest—points of form and adjustment, of wood and varnish—which, as they cannot be briefly described, are best studied in expert works devoted to the subject. The first three strings, counting from the highest, are of gut; the fourth is covered with silvered copper wire, or silver or gold wire. The bow, made of horsehair, may be temporarily disused, and the strings plucked by the fingers. This is called *pizzicato* playing. For modifying the tone in a peculiar way, a *mute* is placed on the bridge supporting the strings. From the open note of the fourth to the highest possible note of the first strings there is an available compass of about three octaves and a half. Essentially the v. is an instrument of melody, but, by using one or more of the open strings and by what is technically termed *double stopping*, a limited harmony can be produced. It has long been the foundation instrument of the orchestra, where the division is into first and second v's; and as nearly all the great masters have written for it, its literature is exceptionally rich. The virtuosi of the v. are noticed under their respective names.

Haweis, *Old Violins* (1898); Ragster, *Chats on Violins* (1905).

VIOLLET-LE-DUC, EUGÈNE (1814–79), Fr. architect; restored many ancient buildings in France, and wrote several works, including a monumental *Dictionary of French Architecture*.

VIOLONCELLO, stringed instrument held between knees; signature generally bass clef; compass C of bass clef to A above treble clef.

VIONVILLE, MARS-LA-TOUR (49° 12′ N., 5° 53′ E.), village, Lorraine; scene of a battle between French and Germans, Aug. 1870.

VIPER, see under SNAKES AND SERPENTS.

VIPER'S BUGLOSS (*Echium*), genus of plants, order Boragineæ; Common V. B. (*E. vulgare*) has blue flowers, spotted stem, and prickly leaves.

VIRCHOW, RUDOLF (1821–1902), Ger. pathologist; b. Schivelbein, Pomerania; ed. Berlin (M.D., 1843), and lectured in the univ.; forced through his political views to leave Berlin, went as prof. of Pathological Anat. to Würzburg, but recalled as prof. of Pathological Anat. to Berlin in 1856. V. proved that the cellular theory applied to pathological as well as to physiological processes, made many important anatomical and pathological discoveries, and may be regarded as the founder of the modern science of pathology. He also made valuable researches in anthropology and archæology. An authority on hospital administration, he had a great share in the sanitary reformation of Berlin, and was an active politician, being for several years chairman of the finance committee in Pruss. Lower House, and later leader of the Opposition in the Reichstag against Bismarck.

VIRE (48° 51′ N., 0° 55′ W.), town, on Vire, department Calvados, France; manufactures woollens. Pop. 6500.

VIRGIN ISLANDS (18° 30′ N., 64° 40′ W.), group, W. Indies, belonging partly to Britain, Denmark, and U.S. Pop. of Brit. portion (1911), 5562.

VIRGIN MARY, see MARY (MOTHER OF JESUS).

VIRGINAL, see SPINET.

VIRGINIA (36° 30′ to 39° 28′ N., 75° 13′ to 83° 38′ W.), S. Atlantic state, U.S.A.; bounded N. by Maryland, E. by Maryland and Atlantic Ocean, S. by North Carolina and Tennessee, W. by Kentucky and W. Virginia; area, 40,125 sq. miles. Surface is greatly diversified, general slope being from E. to W.; in E. is a low-lying coastal region known as Tidewater; in centre is the Piedmont country, consisting of a wide plain in E. and a hilly region in W.; farther W. the Blue Ridge extends across the state from S.W. to N.E., highest points being Roger Mt. (5720 ft.) and White Top (5530 ft.). Between the Blue Ridge and the Alleghany Mountains farther W., lies the Great Valley of V., famed for its scenery. Watered by Potomac (with tributary Shenandoah), Rappahannock, York, James, Blackwater, Roanoke, Staunton, and by various affluents of Ohio. Climate varies with elevation, but is generally temperate and healthy, except in the marshy districts in the E. Flora includes oak, pine, cedar, and many valuable timber trees; fauna includes deer, and a great number of game birds.

History.—V. was first explored by Eng. travellers in 1584, and was named in honour of Queen Elizabeth; first permanently colonised by British, 1607, when a settlement was established at Jamestown by a number of emigrants sent out by the London Company, who had obtained a charter from James I. This charter was revoked in 1624, when V. was placed under the Crown. V. took the lead in resisting Lord North's taxation policy in 1765, and in the resulting struggle for independence. Seceded from Union, 1861, and was the scene of a great part of the struggle during the Civil War.

The executive power is vested in the governor, who is assisted by a lieutenant-governor and three officers of state. Legislation is in hands of a Senate and a House of Delegates. The Senate may have between 33 and 40 members, who are elected for 4 years by popular vote, and the Lower House 90 to 100 members, elected in the same way for two years. For purposes of local administration the state is divided into 100 counties. Sends 2 Senators and 10 Representatives to Federal Congress.

Chief towns are Richmond (capital), Norfolk, Roanoke, Portsmouth, Lynchburg, Newport News. Agriculture is carried on, the principal crops being maize, wheat, oats, and potatoes. Tobacco is very extensively cultivated, and cotton grown in considerable quantities. Various fruits are grown, and pea-nuts largely produced. Horses, cattle, sheep, and pigs are raised. There are excellent fisheries. Minerals include coal, iron, manganese, granite, slate, talc. Important industries are flour-milling, lumbering, manufacture of textiles, tobacco, leather, hardware. Railway mileage is about 4500. Education free; Richmond, Charlottesville, and Lexington are univ. towns. Principal religions are Baptist, Methodist, Presbyterian, R.C. Pop. (1910) 2,061,612.

Cooke, *Virginia, a History of the People*, in American Commonwealth Series (Boston, Mass., 1884).

VIRGINIA CREEPER, see AMPELOPSIS.

VIRGINIA, UNIVERSITY OF, opened, 1825, at Charlottesville, Virginia; formed under direction of Pres. Jefferson; received charter, 1819; has about 800 students.

VIRIDIAN GREEN, see PIGMENTS.

VIRTUES, see CARDINAL (CARDINAL VIRTUES).

VISBY, WISBY (57° 39′ N., 18° 6′ E.), seaport town, watering-place, capital, island Gotland, Sweden; an important commercial city in ancient times; later a member of the Hanseatic League; contains a cathedral (1190–1225) and ruined churches, towers, walls; taken by Waldemar III. of Denmark, 1361. Pop. (1911) 10,022.

VISCACHA, PAMPAS HARE (*Lagostomus trichodactylus*), S. Amer. rodent of family Chinchillidæ; gregarious burrow-dweller; *c.* 22 inches long; destroys pasture.

VISCHER, FRIEDRICH THEODOR (1807–87), Ger. author; b. Ludwigsburg; wrote *Aesthetik, Auch Einer* (novel), *Lyrische Gänge* (poems), etc.

VISCHER, PETER (1455–1529), Ger. artist in bronze; executed several notable works. His sons, Hermann, Hans, and Peter, were distinguished in the same line.

VISCONTI, Ital. families.—(1) Ottone, abp. of Milan, 1263; lord of the city, 1277–82; sovereignty of Milan in hands of the V. till 1447. (2) Antiquarian family—Giovanni Battista Antonio (1722–84), successor of Winkelmann; Ennio Quirino, his s. (1751–1818), conservator of Vatican Museum, and later surveyor of Museum of Antiquities, Paris. V. Gasparo, 1461–99, poet, and V. Giuseppe, 1570–1663, liturgist.

VISCONTI-VENOSTA, EMILIO, MARQUIS (1829–1906), Ital. statesman; Foreign Minister, 1863–64, 1866–67, 1869–76, 1896–98, 1899–1901; senator, 1896 onwards; caused Italy's accession to the *Dreikaiserbund*; wrote *Ricordi di Gioventù* (1904).

VISCOSITY, see HYDROMECHANICS.

VISCOUNT *(Lat. vice-comes), originally* **earl's deputy as gov. of county; first bestowed as title of honour (without office), 1440, by Henry VI.; most modern of all ranks in peerage; v's come after earls and before barons; title sparingly conferred.**

VISHNU, see HINDUISM.

VISIGOTHS, see GOTHS.

VISION, the act of seeing, is the function of the sense-organ of sight, or the eye (*q.v.*), and is due to the stimulation by waves of light of the *retina*, the sensory part of the eye, a special development of the nervous system connected by the optic nerve with the brain. Before a ray of light strikes the retina it passes through the *cornea*, the transparent outer coat of the front of the globe of the eye, the *aqueous humour*, a clear, watery fluid filling the anterior chamber of the eye, the *crystalline lens*, a transparent double-convex body, the posterior surface less convex than the anterior, held by ligaments between the anterior and the posterior chamber, and the *vitreous humour*, a soft, gelatinous, transparent substance filling the posterior chamber of the eye.

In front of the lens is the *iris*, which is a thin, pigmented, membranous curtain, perforated in the centre by an opening termed the *pupil*; the iris shuts off those rays of light which fall upon the outer part of the cornea, allowing those falling upon the central part to pass through the pupil and converge upon the lens. The size of the pupil can be increased or diminished according as the intensity of the light is less or greater, the amount of light entering the eye being modified so that the image brought to a focus upon the retina is sharply defined. The eye is accommodated for objects of varying distances, in order that exact images may be focussed upon the retina, by adjusting the lens, which is brought about by changing the curvature of its anterior surface through the ciliary muscles contracting and pulling upon the ciliary processes which suspend the lens. In accommodating the eye for near objects the curvature of the anterior surface and therefore the diameter of the lens is increased, and the pupil is contracted, while in accommodation for distant objects the curvature of the anterior surface and therefore the diameter of the lens is decreased, and the pupil is dilated.

An image is formed by the rays from an object impinging upon the lens, by which their convergence is increased, and an exact, inverted, image of the object is focused upon the retina. The retina is formed of several layers of nervous structures, that which receives the impressions being the layer of *rods* and *cones*, of which there are several millions over the whole extent of the retina, the rods being more numerous than the cones, except in the yellow spot in the centre of the retina, which is the most sensitive to light, and which has cones alone. The rods and cones are connected with the outer granular layer of the retina, and eventually with the optic nerve, by fine fibrils. That part of the retina where the optic nerve enters is insensitive to light, and is known as the 'blind spot.' On the surface of the rods and cones is a layer of cells, containing dark pigment, which send processes down among the rods and cones. When the eye is at rest these processes are very short, but under the stimulus of light they are sent more deeply among the rods and cones, and it is believed that the light causes decomposition of the pigment, the substances thus formed stimulating the rod and cone nerve-endings.

Colour perception is attributed to different colour rays causing different chemical changes and thus producing distinctive stimuli of the nerve-endings. Another explanation of colour perception is that, as the rays of different colours have undulations of varying rapidity, the different colour rays set up different rates of molecular vibration in the nerve-endings, and thus send different stimuli to the brain centres.

DEFECTS OF VISION.—In *myopia*, or short-sightedness, the globe of the eye is lengthened and the rays of light are brought to a focus in front of the retina, and consequently the image is blurred; while in *hypermetropia*, or long-sightedness, the globe of the

eye is shortened and the rays of light are brought to a focus behind the retina, the image in this case also being blurred. In *presbyopia* the ciliary muscle is weakened through old age, and is unable to bring about accommodation of the lens, which is also diminished in elasticity from the same cause. *Astigmatism*, in which the curvature of one meridian of the cornea or lens is greater than that of another, results in indistinct images being thrown upon the retina. All of the above conditions can be corrected by the use of suitable glasses. See EYE, BLINDNESS.

VISIONS, see APPARITION, SPIRITUALISM.

VISOKO (44° N., 17° 8′ E.), town, on Bosna, Bosnia; manufactures leather, carpets. Pop. 5200.

VISTULA, WEICHEL (50° N., 19° E.), river, Europe; rises in Carpathian Mountains, Austrian Silesia, and flowing northward through Galicia, Russ. Poland, and W. Prussia, divides into several branches, two of which empty into Frisches Haff; the main stream, turning westward, enters Baltic near Danzig; length, 650 miles; navigable to Cracow.

VITAL STATISTICS, see STATISTICS.

VITALIST THEORY OF DEVELOPMENT, see under EMBRYOLOGY.

VITEBSK (57° N., 20° E.), government, W. Russia; generally level; contains numerous lakes and marshes; chief river, the Duna. Pop. (1910) 1,833,900. Capital, **Vitebsk** (55° 14′ N., 30° 12′ E.), on Duna; trade in corn, flax. Pop. (1910) 85,800.

VITELLIUS, AULUS (15–69), Rom. emperor; favourite of four successive emperors of the Julian line; overthrew Galba, and after an evil reign of a few months was murdered.

VITERBO (42° 26′ N., 12° 7′ E.), city, Rome, Italy; noted for its fountains; among chief architectural features are the cathedral, containing tombs of several popes, an ancient bp.'s palace, and town hall; in vicinity are sulphur springs and Etruscan antiquities. Pop. 21,700.

VITI LEVU, see FIJI.

VITORIA (42° 52′ N., 2° 37′ W.), town, Álava, Spain; has cathedral, built in XII. cent., Jesuit schools, and some interesting houses; manufactures pottery, paper, woollens. Here the French, under Jourdan and Joseph Bonaparte, were defeated by allied English and Peninsular troops under Wellington, June 21, 1813. Pop. (1910) 32,893.

VITRÉ (48° 7′ N., 1° 12′ W.), town, on Vilaine, Ille-et-Vilaine, France; has a castle founded XI. cent. Pop. 9900.

VITRIFIED FORTS, stone enclosures on the summits of hills in certain parts of Europe, and of which there are several examples in the Brit. Isles. The stones of these forts are fused together with fire. It is difficult to understand the exact object the builders had in view in so consolidating the walls. Some have argued that the fusing is accidental and caused by watch-fires; others, that it indicates volcanic action. There are vitrified forts at Dunnideer and Tap o' Noath, Aberdeenshire, and Knockferrel, near Dingwall.

VITRIOL, see SULPHURIC ACID.

VITRUVIUS, POLLIO, a celebrated Rom. architect who was employed in that capacity and as a military engineer by Augustus. His name survives mainly by the ten books he wrote under the general title of *De Architectura*, the only extant Lat. treatise on architecture. Many editions have appeared from time to time.

VITRY-LE-FRANÇOIS (48° 45′ N., 4° 43′ E.), town, on Marne, Marne, France; manufactures cement, pottery. Pop. 8500.

VITTEL (48° 12′ N., 5° 57′ E.), watering-place, Vosges, France; mineral springs.

VITTORIA (36° 55′ N., 14° 30′ E.), town, Syracuse, Sicily; trade in wine. Pop. 33,000.

VITTORIA, TOMASO LUDOVICO DA (c. 1540–c. 1613), a Span. composer, whose professional life was spent in Rome, where he wrote chiefly masses and motets.

VITTORIO (45° 48′ N., 12° 19′ E.), town, on Meschio, Treviso, Italy; cathedral; silk industries; mineral springs. Pop. 20,000.

VITUS, ST., traditionally martyred in Diocletian persecution.

VITUS'S DANCE, ST., see CHOREA.

VIVERO (43° 37′ N., 7° 31′ W.), seaport, on Bay of Biscay, Lugo, Spain. Pop. 12,500.

VIVISECTION, term applied to experiments on living animals for the purpose of advancing the knowledge of medical science. Such experiments are in Britain regulated by an Act of Parliament (1876), the provisions of which are: every experimenter must hold a licence from the Home Sec., every applicant being recommended by two recognised authorities, such as certain univ. prof's and pres's of certain scientific soc's; all experiments must be carried out in registered places, which must be open to government inspectors. Under the licence the animal must be under an anæsthetic during the whole of the experiment, and if pain is likely to continue after the effect of the anæsthetic has passed away, or if any serious injury has been inflicted on the animal, it must be killed while under the anæsthetic.

As, however, by the first of these provisions, feeding experiments and inoculation by a hypodermic needle could not be carried out except under an anæsthetic, and, under the second, the keeping alive and observation of an animal which has had a secretory gland or a portion of the brain cortex removed (operations carried out under anæsthetics), would be illegal, although the animal is healthy and suffering no pain, supplementary certificates are granted by the Home Sec. to enable such experiments to be carried out, the Act dating from a time when such experiments were not dreamt of. An actual inoculation is not painful, the method being exactly the same as inoculation by a hypodermic needle, or as vaccination, while it is necessary for the success of experiments of the second type that the wound heals cleanly and that the animal recovers and is in a healthy condition, just as a human being after a slight or more serious surgical operation; but the wording of the certificates has given rise to the mistaken idea that painful cutting operations are carried out without anæsthesia and that animals are kept alive and watched in agony, the actual fact being that over 95 % of all experiments are inoculations. A Royal Commission was app. in 1906 to inquire into the whole subject.

Among the more valuable results obtained by experiments on living animals is our knowledge of the circulation of the blood, the working of the heart in health and disease, the physiology of the nervous system, the processes of digestion, the growth of bone; the cause and treatment of anthrax, cholera, diphtheria, hydrophobia, malaria, meningitis, myxœdema and cretinism, plague, sleeping-sickness, tetanus, tuberculosis, yellow fever; the action of such valuable drugs as aconite, amyl nitrite, chloral, cocaine, digitalis, ergot, strophanthus, strychnine, and many others.

The cause of anti-v. has been greatly harmed by ignorant advocates, but the anti-v. agitation has been valuable in curbing and preventing possible abuses. There are numerous anti-v. organisations, while the Research Defence Society defends and justifies experiments on animals in the interests of science.

VIZAGAPATAM (17° 42′ N., 83° 20′ W.), seaport, on Bay of Bengal, Madras, India. Pop. 41,000; (district) 3,000,000.

VIZEU, VISEU (40° 44′ N., 7° 48′ W.), city, Portugal; cathedral; noted annual fair. Pop. 8000.

VIZIADRUG (16° 34′ N., 73° 22′ E.), town, Ratnagiri, Bombay, India.

VIZIANAGRAM (18° 7′ N., 83° 27′ E.), town, *military station, Vizianagram, Brit. India*; has a college; residence of the Maharaja. Pop. 37,000.

VIZIER, VAKIB, see MUHAMMADANISM (INSTITUTIONS).

VIZZOLA (45° 35′ N., 8° 45′ E.), village, on Ticino,

Lombardy, Italy; one of the largest electrical stations in Europe.

VJVIDEK, Neusatz (45° 16′ N., 19° 33′ E.), town, on Danube, Bacs-Bodrog, Hungary; trade in cereals and wine. Pop. (1910) 33,590.

VLAARDINGEN (51° 54′ N., 4° 21′ E.), port, on Maas, S. Holland, Netherlands; centre of herring- and cod-fisheries. Pop. (1911) 22,452.

VLACHS, Wolochs, Walachs, Volokh, a race Latin by language, customs, tradition, and partly descended from Rom. governors of the province, numbering *c.* 10,000,000, dwelling in Rumania, Transylvania, Hungary, South Russia, and various parts of the Balkan Peninsula.

VLADIKAVKAZ (43° 3′ N., 44° 47′ E.), town, fortress, capital, province Terek, Caucasia, Russia; at foot of Caucasus Mountains. Pop. (1910) 72,300.

VLADIMIR (56° 10′ N., 40° 30′ E.), government, Russia; surface undulating; mostly unfertile; drained by Oka and its tributary, the Klyazma; chief minerals, alabaster and iron ore; manufactures cottons, linens; extensive domestic industries. Pop. (1910) 1,895,900. Capital, **Vladimir** (56° 7′ N., 40° 28′ E.), on Klyazma; has two ancient cathedrals; various manufactures. Pop. (1910) 32,710.

VLADIMIR, ST. (*c.* 956–1015), grand-duke of Kiev and of all Russia; youngest s. of Svyatoslav I. and his paramour Malushka. He conquered Kiev (980) and Galicia (981) and was proclaimed prince of all Russia. He committed endless pagan atrocities till he became a Christian in 988. From that day he was as energetic in the propagation of Christianity and civilisation.

VLADIMIR-VOLHYNSKIY (51° N., 24° 20′ E.), town, Volhynia, Russia. Pop. 10,500.

VLADIVOSTOK (43° 10′ N., 132° E.), seaport, naval station, Maritime Province, Russia, on Gulf of Peter the Great (Sea of Japan); naval and mechanical works. Pop. (1910) 90,160.

VLISSINGEN, Flushing (*q.v.*).

VODENA (40° 47′ N., 22° 3′ E.) (ancient *Edessa*), town, vilayet Salonica, European Turkey; manufactures tobacco. Pop. *c.* 13,500.

VOGEL, SIR JULIUS (1835–99), Brit. statesman; emigrated to Victoria goldfields, 1861; member of New Zealand House of Representatives, 1863; Prime Minister of New Zealand, 1870; agent-gen. in England, 1876.

VOGHERA (44° 59′ N., 9° 1′ E.) (ancient *Iria*), town, Pavia, Italy; manufactures silk fabrics. Pop. 21,500.

VOGLER, GEORG JOSEPH, Abt (1749–1814), Ger. organist, composer, and teacher; became Abbé at Rome, 1773; app. Court Chaplain, Mannheim, 1775; established music schools at Mannheim, Stockholm, Darmstadt; operas, masses, chamber-music.

VOGTLAND (Lat. *Terra Advocatorum*), district, Germany, comprising parts of W. Saxony, Reuss, Saxe-Altenburg, and Saxe-Weimar; governed in the Middle Ages by officials called Vogts.

VOICE, see Larynx.

VOIRON (45° 23′ N., 5° 34′ E.), town, on Morge, Isère, France; manufactures cloth. Pop. 13,000.

VOKHNA, see Pavlovskiy Posad.

VOLAPÜK, a so-called 'universal language,' invented by Johann Martin Schleyer, 1879. It has been superseded by Esperanto (*q.v.*).

VOLCANO ISLANDS (25° N., 141° 30′ E.), group of small islands in Pacific.

VOLCANOES are vents in the earth's crust from which molten rock, ashes, and steam are ejected. The lava tends in time to heap up a conical eminence round the vent, thus forming the *crater* or cup. They are of three kinds: (1) *extinct*, (2) *dormant* (*i.e.* temporarily inactive), or (3) *active*. Other minor varieties are *salses*, or mud v's, of the Crimea, *fumaroles*, or steam fissures, and the *solfataras* of Italy, where sulphur fumes escape through vents in the earth. The geysers (*q.v.*) of Iceland denote spent volcanic activity.

Notable active volcanoes are:—

Vesuvius, 4200 ft., 7 miles S.E. of Naples. Its most destructive eruption took place in 79 A.D., burying Pompeii and Herculaneum; in 1771–72 and 1906 serious outbreaks took place.

Etna, in Sicily, highest volcano in Europe; *c.* 10,800 ft.; over 90 eruptions on record; 16 occurring in XIX. cent.; most disastrous that of 1169, Catania and 15,000 inhabitants being destroyed.

The Peak of Teneriffe, 12,000 ft. high; situated on island of Teneriffe.

Stromboli, in Lipari Islands; over 3000 ft.; active since Homer's time; constantly sending out steam and occasionally showers of stones, which generally fall back into the crater.

Mount Pelé, in island of Martinique, was scene of violent eruption, 1902. St. Pierre, the capital, was destroyed and 30,000 perished. The side of the volcano was torn away.

Krakatoa, on K. island, Java, after being quiet for over 1000 years, burst into eruption, 1883, and 30,000 perished; the sound of the explosion was heard over nearly ¼th of the earth's surface, while the dust was carried round the earth many times before being dissipated; caused gorgeous sunrises and sunsets in all parts of the globe.

Mount Hecla, in Iceland, 5000 ft., has been in constant eruption since IX. cent.

There are active v's in Hawaii, in North Pacific Ocean, and in islands of Bourbon, Mada, and Mauritius.

Antarctic v's are: Erebus, 12,500 ft., active; Terror, 11,000 ft., extinct.

Volcanic action is ascribed to internal generation of vapours which have no room for expansion.

VOLCEIUM (40° 35′ N., 15° 20′ E.) (modern Buccino), ancient town, Lucania, Italy; capital of the Volceiani.

VOLCI, Vulci (42° 25′ N., 11° 35′ E.), ancient city, on Armina (*Fiora*), Etruria.

VOLE, see Mouse Family, Microtus Amphibius.

VOLGA (46° N., 48° 10′ E.), Russ. river, longest in Europe (*c.* 2400 miles); rises in Valdai plateau; flows E. as far as Kazan, then turns S. and enters Caspian Sea by innumerable mouths near Astrakhan; chief tributaries, Mologa, Oka, Sura, Sheksna, Sarpa Unsha, Vetluga, Kama, Samara; principal towns, Tver, Jaroslav, Kostroma, Nizhni-Novgorod, Kazan, Simbirsk, Samara, Saratov, Tsaritsyn, Astrakhan. Navigation begins near source; one of chief commercial rivers of the world; connected by fine system of canals with Baltic, Black, and White seas; also with rivers Dnieper, Dniester, Don, etc. Large sturgeon, pike, and other fisheries; ice-bound during winter.

VOLHYNIA (50° 40′ N., 27° E.) government, Russia, bordering Austrian Galicia; hilly in S., low and marshy in N.; forests; drained by Dnieper; produces large crops of grain, sugar-beet, tobacco. Pop. (1910) 3,846,500. Capital, Zhitomir.

VOLITION, see Psychology.

VOLKSRUST (27° 23′ S., 29° 56′ E.), town, Transvaal; agricultural centre.

VOLLENDAM, fishing village, N. Holland, Netherlands, on Zuider Zee, adjoining Edam.

VOLO (39° 24′ N., 22° 58′ E.), seaport town, on Gulf of Volo, Thessaly, Greece. Pop. 23,700.

VOLOGÆSES, the name of five Parthian kings, several of whom made war against the Rom. people. They are identified with Arsaces XXIII., XXVII., XXVIII., XXIX., and XXX. See Tacitus, *Annales*, xiv.

VOLOGDA (62° N., 50° E.), government, Russia; separated on E. from Siberia by Ural Mountains; surface flat; forest-covered; drained by Dvina and Petchora; cereals cultivated; chief mineral products, salt and iron ore. Pop. (1910) 1,625,200. Capital, **Vologda** (59° 12′ N., 39° 56′ E.), on Vologda; trade in flax, linseed. Pop. (1910) 31,520.

VOLSCI, warlike Ital. race, inhabiting Latium, and constantly at war with Latins and Romans from 460 B.C.

to *c.* 310 B.C.; defeated by Tarquins; allied with the Æqui against Rome; finally subdued by Rome, and admitted to enfranchisement towards end IV. cent. B.C.; merged henceforth in Rom. citizens.

VOLSINII, VULSINII (42° 40′ N., 12° E.) (modern BOLSENA), ancient town, Etruria; one of twelve cities of the Confederation; conquered by Romans, 280 B.C.

VOLSK, town, on Volga, Saratov, Russia; iron, flour, leather. Pop. *c.* 28,500.

VOLT, see ELECTRICITY.

VOLTA (7° N., 0°), river, W. Africa; flows S. to Gulf of Guinea at Adda; length, 900 miles.

VOLTAIRE, FRANÇOIS MARIE AROUET DE (1694–1778), Fr. poet and philosopher; s. of Parisian notary, Arouet; imbibed deism from earliest teachers; further ed. at *Collège Louis le Grand* by the Jesuits; imprisoned for a year in the Bastille, 1717, for literary attack on regent; wrote *Œdipe* and commenced *La Henriade*; assumed additional name de V., 1718; after a new imprisonment and release went to England, 1726, where he repub. *La Henriade* (1728), an epic poem on Henry of Navarre; made money and established friendship with Bolingbroke and free-thinking society. V. had written dramatic works in London: *Brutus* (played, 1730); *Eriphyle and Zaïre*, his masterpiece (1732); other noted plays are *La Mort de César* (1731), *Adélaïde du Gueschis* (1734), *Zulime* (1740), *Mahomet* (1741), *Mérope* (1743). In 1731 he pub. his *Lettres philosophiques* (praising Eng. institutions at expense of Fr.), which was burned by the *Parlement de Paris*. V. lived with the Marquise du Châtelet Lomont (1706–49) from 1733 to 1747. She was dau. of Baron de Breteuil, and married in 1725; a linguist, musician, mathematician, and philosopher, she wrote *Institutions de physique*, and translated Newton's *Principia*.

The tales *Zadig* (1747), *Micromégas* (1752), the famous *Candide* (1759), *L'Ingénu* (1767), *L'Homme aux Guarante écus* (1768), *La Princesse de Babylone* (1768), etc., are the best of his writings for wit and style, but imprudently malicious. V. entered Fr. Academy, 1746; he accepted often-repeated invitation to Berlin, 1750, where he pub. his best hist. work, *Le Siècle de Louis XIV.* (1751); the visit ended in quarrel with Frederick the Great; 'within V.,' says Saintsbury, 'there was always a mischievous and ill-behaved child'; one-sided historian, but tells his tale in light, easy manner. Other hist. works are—*History of Charles XII.* (1731), *History of Peter the Great* (1759), *Précis du Siècle de Louis XV.* (1768), *Histoire du Parlement de Paris* (1769), *Essay on the Manners and Spirit of Nations* (1769). V. settled at Ferney, 1760, near Geneva, where he lived until 1778; often called 'The Patriarch of Ferney'; at height of his influence and exercised enormous power over European thought; from Ferney he rehabilitated the memory of Calas, unjustly condemned by the *Parlement* of Toulouse; built model village, where he established watch-making industry, a church (with inscription, *Deo erexit V.*), a theatre, entertained many guests, and never ceased writing. Among works is long poem, *La Pucelle*, of which savour was audacious iconoclasm and happy epigram; literary excellence of V. (allowed by all) not that of poet in any sense, but that of wit and *esprit moquer*; one of leaders of the *Encyclopédists* (*q.v.*) and father of free thought of France; returned to Paris, 1778; tremendous reception hastened his death; left vast *Correspondance* of first-rate kind, in which may be read his character and that of the rationalistic century of which he was the guiding spirit.

Life, by Lord Morley (1886), Tallentyre (3rd edit., 1905).

VOLTERRA (43° 33′ N., 10° 51′ E.) (ancient *Volaterræ*), town, Italy; cathedral; museum with Etruscan antiquities; manufactures alabaster; in ancient times one of chief cities of Etruria. Pop. 13,500.

VOLTMETER, electrical instrument for measuring differences of potential. For high voltages of 1000 or more the instrument—*electrostatic voltmeter*—is, in principle, the quadrant electrometer (*q.v.*) connected idiostatically. For low voltages, the *multicellular voltmeter* is used. This consists of a vertical row of horizontal vanes moving between a similar row of fixed quadrants, so that each vane moves between two quadrants; deflection of the vanes is shown by a pointer and gives required measure of voltage.

VOLTRI (44° 26′ N., 8° 45′ E.), town, Liguria, Italy; iron, shipbuilding, paper, cotton. Pop. 15,200.

VOLTURNO (41° 2′ N., 14° E.) (ancient *Vulturnus*), river, Italy; enters Mediterranean; length, 10 miles.

VOLUNTEERS, originally persons who join an army at their own expense, to serve without pay for the duration of a campaign; amateurs, not professional soldiers. Wellington's army in the Peninsula contained many, and some were granted commissions; later, the term was applied to the body of Brit. civilians who in 1859 took arms when invasion was threatened. A certain number of middle-class men provided themselves with uniforms and were self-supporting, weapons alone being lent by the government. They elected their officers and adopted titles from their place of origin; this force was replaced by citizens unable to pay subscriptions or buy uniform, and gradually the so-called volunteers became a subsidised force. As they reserved many privileges of the original force, including the right to absent themselves from training, they were reconstituted (1907–8) as the TERRITORIAL FORCE, consisting of men regularly enlisted and paid for service. V. of the old type exist in India, Bermuda, Ceylon, the Isle of Man.

VOLUTE, in arch., spiral ornament of Ionic capital.

VOLVOX, genus of Flagellate Protozoa, closely related to simplest plants; form minute globes composed of sometimes as many as 22,000 individuals, in fresh water.

VONDEL, JOOST VAN DEN (1587–1679), Dutch poet; his play, *Lucifer* (1654), is believed by Gosse and other critics to have influenced Milton's *Paradise Lost*.

VORAGINE, DOMINICAN JACOBUS DE, see GOLDEN LEGEND.

VORARLBERG (47° 15′ N., 9° 50′ E.), mountainous province, Austria, bordering Lake of Constance; constitutionally included in Tyrol, of which it forms the W. extremity. Pop. (1910) 145,408.

VORONEZH (51° N., 39° 30′ E.), government, S. Russia; level or undulating; drained by Don; fertile, producing grain, sugar-beets; horses and cattle reared; woollens manufactured. Pop. (1910) 3,355,800. Capital, **Voronezh** (51° 46′ N., 39° 13′ E.), on Voronezh; has a military school; commercial centre; manufactures woollens. Pop. (1910) 90,630.

VORONTSOV, see WORONZOV.

VORÖSMARTY, MICHAEL (1800–55), Hungarian poet and dramatist; composer of Hungarian National Anthem.

VORTEX, see HYDROMECHANICS.

VORTICELLA, see under INFUSORIA.

VORTIGERN (*V.* cent.), Brit. chief traditionally held to have invited aid from Saxons against Picts and Scots.

VOSGES.—(1) (48° 10′ N., 6° 30′ E.) department, E. France, formed chiefly of old province of Lorraine; traversed in E. by Vosges Mountains and in S. by the chain of the Faucilles; forests; numerous mineral springs; saw-mills; textile industries. Pop. (1911) 433,914. Capital, Epinal. (2) (48° N., 7° E.) mountain range in N.E. of France and W. of Germany; highest point, Ballon de Guebioiller, 4680 ft.; W. slopes thickly wooded, E. slopes vine-clad; excellent pasturage; noted for cattle.

VOSS, JOHANN HEINRICH (1751–1826), Ger. poet; b. Sömmersdorf, Mecklenburg; best works are *Luise* (idyllic poem) and excellent translations of Homer's *Odyssey*, Vergil's *Georgics*, etc.

VOSSEVANGEN, Voss (60° 40′ N., 6° 24′ E.), town, Sondre-Bergenhus, Norway; tourist centre.

VOSSIUS, GERHARD JOHANN (1577–1649), Dutch scholar; prof. of History, Amsterdam; wrote *Historia Pelagiana* (1618), an apology for Arminianism.

VOTE, see ELECTION.

VOTING-MACHINES, see ELECTION.

VOTKINSK (57° 20′ N., 53° 40′ E.), town, Vyatka, Russia; manufactures agricultural machinery. Pop. 22,000.

VOW, a solemn promise of a human being to the Deity; has many instances in Old Testament, and recognised in New Testament by St. Paul (*Acts* 18[18]); always obtained in R.C. Church, especially vows of poverty, chastity, and obedience. A *solemn* v. of chastity renders marriage null and void, a *simple* v. makes it unlawful. Dispensations can release from v's in either case.

VOWEL, see ALPHABET.

VOZNESENSK (47° 36′ N., 31° 26′ E.), river port, on Bug, Kherson, Russia; cathedral; distilleries, breweries. Pop. 13,500.

VRANYA, VRANJA (42° 27′ N., 22° 7′ E.), town, on Morava, Servia; rope-making industry. Pop. (1910) 10,487; (district) 257,087.

VRATZA (43° 12′ N., 22° 36′ E.), town, Bulgaria; manufactures wine. Pop. (1910) 15,230; (department) 312,460.

VRYHEID (27° 49′ S., 30° 44′ E.), town, Natal; rich deposits of coal, copper, gold.

VULCAN, see HEPHÆSTUS.

VULCANO, see LIPARI ISLANDS.

VULGATE, see BIBLE.

VULTURE FAMILY (*Vulturidæ*), large day-flying birds of prey (ACCIPITRINES, *q.v.*), with the crown of the head and often the neck bare and destitute of true feathers. An exception is the large BEARDED VULTURE or LAMMERGEIER (*Gypaëtus barbatus*), with well-feathered head, found in the mountains in Southern Europe and Asia, where it feeds mainly on carrion. The true Vultures (*Vultur*, *Neophron*, *Gyps*) are confined to the warm regions of the Old World, four species occurring in Southern Europe. On account of their appearance and their habit of feeding on garbage and carrion, on which they gorge to repletion, they are the most repulsive of birds of prey.

VULVA, DISEASES OF, see GYNECOLOGY.

VYATKA, VIATKA (58° N., 50° E.), government, N.E. Russia; surface is an undulating plateau; low hills in N.E.; much occupied by forests, lakes, and marshes; watered by Vyatka; soil fertile in parts, produces cereals, flax; iron ore found; cattle reared. Pop. (1910) 3,747,000. Capital, **Vyatka** (58° 17′ N., 49° 57′ E.), river port on Vyatka; manufactures leather; trade in corn. Pop. 43,500.

VYAZMA (55° 15′ N., 34° 15′ E.), town, on Vyazma, Smolensk, Russia; cathedral; active trade. Pop. 15,700.

VYERNYI, formerly ALMATY (43° 16′ N., 76° 33′ E)., fortified town, capital, Semiryechensk, Asiatic Russia; trade in cereals. Pop. 26,000.

VYRNWY (52° 47′ N., 3° 4′ W.), river, Wales; rises in N.W. Montgomeryshire; joins Severn above Shrewsbury; the chief reservoir of Liverpool water-supply is on its course.

VYSHNIY-VOLOCHOK, VISHNII-VOLOCHOK (57° 35′ N., 34° 30′ E.), town, on Vyshniy, Tver, Russia; cotton-mills. Pop. 17,500.

W, 23rd letter of alphabet, is a double *u*; its consonantal use remains in *queer*; the Normans, having no *w* in their alphabet, used *gu*, hence Eng. *ward* became Fr. *guard*.

WA, Burmese race, probably aboriginal in N. Siam; formerly great head-hunters, constructing groves of human skulls outside their villages, to protect against evil powers.

WABASH (40° 47′ N., 85° 46′ W.), city, on Wabash, capital, Wabash County, Indiana, U.S.A.; manufactures furniture; ironworks. Pop. (1910) 8687.

WACE, HENRY (1836–), prof. of Ecclesiastical History, King's Coll., London, 1875; principal, 1883; dean of Canterbury, 1903.

WACO (31° 30′ N., 96° 55′ W.), city, on Brazos, capital, M'Lennan County, Texas, U.S.A.; manufactures flour, woollens. Pop. (1910) 26,425.

WAD MEDANI (14° 25′ N., 33° 30′ E.), town, on Blue Nile, Anglo-Egyptian Sudan; dépôt for grain; oil- and soap-works. Pop. 19,000.

WADAI (*c.* 13° 30′ N., 19° 30′ E.), native state, Africa; situated between Darfur on E., and Baghirmi and Lake Chad on W.; area, *c.* 170,000 sq. miles. Surface is generally desert land; several oases and dense forests; capital, Abeshr; inhabited by Arabs and negroes; produces rice, wheat; cattle, camels, and horses raised. Under Fr. protection since 1903. Pop. *c.* 3,000,000.

WADDINGTON, WILLIAM HENRY (1826–94), Fr. diplomatist; Minister of Public Instruction, 1873, 1876–77, of Foreign Affairs, 1877–79; Premier, 1879; ambassador to England, 1883.

WADE, traditional builder of ancient castles and roads of Yorkshire and the Scot. border.

WADE, GEORGE (1673–1748), Brit. general; put down 1715 rebellion, and made military roads in the Scot. Highlands; failed in 1745 revolt.

WADE, SIR THOMAS FRANCIS (1818–95), Brit. ambassador in China; wrote on Chin. empire and speech.

WADEBRIDGE (50° 31′ N., 4° 49′ W.), seaport town, on Camel, Cornwall, England.

WADELAI (2° 40′ N., 31° 20′ E.), village, on Upper Nile, Brit. Uganda Protectorate; was the chief station of Emin Pasha.

WADHWAN (22° 42′ N., 71° 44′ E.), town, capital, Wadhwan state, Kathiawar, Bombay, India. Pop. 15,800; (state) 45,000.

WADI HALFA (21° 53′ N., 31° 20′ E.), town, on Nile, Anglo-Egyptian Sudan, below second cataract. Pop. 3100.

WAFER.—(1) flat disc of isinglass, gummed, for securing flaps of envelopes; (2) thin biscuit eaten with ices. W. sometimes replaces sacramental bread in Eucharist.

WAGER, contract between two persons that one shall pay the other an agreed sum, or some stated object, according as a certain future event will turn out; not enforced by law, hence termed 'debts of honour.'

WAGES are the payment made in return for services or labour. They are paid out of the wealth labour produces, and will rise and fall with supply of labour. W. are a necessary charge on the cost of production. While the tendency is for w. to sink to the level of subsistence, civilisation and social life are raising that level by increasing the common standard of comfort. By the many Truck Acts between 1831 and 1896; w. must be paid in current coin of the realm, without any restrictions or reductions, and no part may be paid in goods. W. may not be paid in public-houses to miners or other workmen (Payment of Wages in Public-Houses Act, 1883). The master of domestic servants is bound to supply in addition the necessary food and lodging, and neglect to do this resulting in loss of health is punishable by penal servitude. In the case of an apprentice the necessary medical attendance must also be supplied. The term w. is restricted to the remuneration of the manual labourer. The clerk and public servant receive a 'salary'; medical or legal advisers take a 'fee'; soldiers and sailors draw their 'pay'; while clergymen receive a 'stipend.' The Brit. Coal Mines Act, 1912, fixes a minimum wage for all miners, and the Labour Party wants to extend the principle to all industries.

F. A. Walker, *The Wages Question and Political Economy*; Arnold Toynbee, *Industrial Revolution*; H. M. Thompson, *Theory of Wages*; A. Marshall, *Principles of Economics*.

WAGGA-WAGGA (35° 10′ S., 147° 18′ E.), town, on Murrumbidgee, Wynyard County, New South Wales; pastoral and gold-mining region. Pop. 5700.

WAGNER, ADOLF (1835–), political economist; ed. Heidelberg; prof. of Political Economy at Vienna, Hamburg, Dorpat, Freiburg, and Berlin, 1870.

WAGNER, RUDOLF (1805–64), Ger. physiologist; b. Bayreuth; prof. of Zool. at Erlangen (1832) and Göttingen (1840); made important researches and observations in anat. and physiology, particularly in embryology, discovering the germinal vesicle of the human ovum; wrote a standard text-book on physiology.

WAGNER, WILHELM RICHARD (1813–83), Ger. dramatic composer; b. Leipzig, d. suddenly at Venice. An atmosphere of the theatre pervaded the family circle, and his first interests were purely dramatic. Awakening to musical sense, he wrote several things now without value; and in 1834 entered on a series of engagements as operatic conductor, which included Magdeburg, Königsberg, and Riga. He conceived the idea of writing a grand opera, and went to Paris with *Rienzi*, only to have it declined. He had m. by this time and was in the direst straits of poverty. *Rienzi* was accepted for Dresden, where he went, 1842, as conductor of the opera, and where, next year, *The Flying Dutchman* was produced. From that time onwards W. and his music were subjects of heated discussion throughout musical Europe, his ideas of opera being conceived on entirely new lines. *Tannhäuser*, *Lohengrin*, *Tristan and Isolde*, *The Mastersingers*, *The Nibelung's Ring* (a colossal work, including the four dramas of *The Rhinegold*, *The Valkyrie*, *Siegfried*, and *The Dusk of the Gods*), and *Parsifal* followed in the order named, 1849–82. In 1848 he became involved in revolutionary politics, and was driven into exile for some years. His prospects were still of the poorest, and he had to depend largely on charity.

In 1864, Ludwig, the 'mad king' of Bavaria, provided him with a home and an income; and presently the festival theatre at Bayreuth, where ideal performances of his great operas could be given, became possible. W.'s professional activity showed itself in two directions: in the reforms he effected on the opera, and in his prose writings, which are more voluminous than those of any other composer.

He created an entirely new form of opera. Hitherto opera had been conventional, designed for displaying 'star' vocalists, pretty costumes, and scenery. Text and music had no necessary connection; and the

librettos were often either absurd or unintelligible. With W. (who wrote all his own librettos), text, music, action, and scenery must unite in a common purpose, so that the drama should stand or fall as one piece. Again, there must be no mere artificial set of arias, duets, quartets, ballets, ensembles, and so on, with breaks for applause or encores. W. also made an essential feature of the 'leading motive'—a short, striking, and easily recognised musical phrase, associated with some particular character or some special idea or incident in the drama. In all these respects he has influenced later composers of grand opera.

Wagner, *My Life*; *Life*, by Henderson (1902), Lidgey (1899); Hadden, *The Operas of W.* (1908); Newman, *A Study of W.* (1899).

WAGRAM, village, a few miles N.E. of Vienna, Austria, where Napoleon severely defeated the Austrians on July 6, 1809, the victory being followed by the Treaty of Schönbrunn.

WAGTAIL (*Motacilla*), genus of Passerine Birds; Pied W. (*M. lugubris*) is a common Brit. species; it feeds on the ground, and runs swiftly; other species are White W. (*M. alba*), Grey W. (*M. melanope*), Yellow W. (*M. rayi*), Blue-Headed W. (*M. flava*).

WAHHABIS, members of Muhammadan religious movement originating in XVIII. cent.; attempted to restore primitive simplicity of Islam.

WAI (15° 57′ N., 73° 56′ E.), town, pilgrimage resort, on Kistna, Satara, Bombay, India. Pop. 13,900.

WAIBLINGEN (48° 50′ N., 9° 20′ E.), town, on Rems, Württemberg, Germany; manufactures silk goods; pottery. Pop. 6930.

WAIGATZ ISLAND, see Novaya Zemlya.

WAINGANGA (22° N., 80° E.), river, Central Provs., Brit. India; unites with Wardhá to form Pranhitá.

WAITZ, GEORG (1813–86), Ger. historian; b. Flensburg; best works are *Jahrbücher des Deutschen Reiches unter Heinrich I.*, *Deutsche Verfassungsgeschichte*, *Schleswig-Holsteins Geschichte*, etc.

WAKE, name given to ancient custom of watching by the dead; a night service in church followed by a festival.

WAKE, WILLIAM (1657–1737), bp. of Lincoln, 1705; abp. of Canterbury, 1716.

WAKEFIELD.—(1) (53° 42′ N., 1° 30′ W.) city, on Calder, W. Riding, Yorkshire, England; manufactures agricultural machinery; trade in grain; cathedral church; grammar school (1591), town hall, fine arts institute, and corn exchange; bp.'s see (1888); scene of a battle between Lancastrians and Yorkists in which Duke of York was slain (1460). Pop. (1911) 51,516. (2) (42° 30′ N., 71° 4′ W.), town, Middlesex County, Massachusetts, U.S.A.; manufactures rattan, boots and shoes. Pop. (1910) 11,404.

WAKEFIELD, EDWARD GIBBON (1796–1862), Brit. statesman; first attached to the British Embassy at Turin, 1814–16, and then at Paris, 1820–26; imprisoned, 1826–29, for abducting an heiress, marriage was annulled by law; for 20 years urged reforms in administration of Australia; emigrated to New Zealand, 1853.

WAKEFIELD, GILBERT (1756–1801), Eng. cleric; Anglican, then Unitarian; a great controversialist.

WAKHAN, see Badakshan.

WAKKERSTROOM (27° 19′ S., 30° 11′ E.), town, Transvaal; agricultural region.

WALACHIA, Wallachia (44° 30′ N., 26° E.), division, Rumania; part of ancient Dacia; united with Moldavia in 1859 to form principality of Rumania.

WALAFRIED STRABO (d. 849), Ger. ecclesiastical writer; abbot of Fulda, 838; wrote *Glosa ordinaria*, a mine of reference to mediæval scholars.

WALCH, JOHANN GEORG (1693–1775), Ger. scholar; prof. of Poetry, Rhetoric, and Theology at Jena.

WALCHEREN (51° 30′ N., 3° 35′ E.), island, Zeeland, Holland; fertile. Area, 81¼ sq. miles.

WALDECK-PYRMONT (51° 18′ N., 8° 50′ E.), principality and state, German Empire; consists of Waldeck, enclosed by Pruss. provinces of Westphalia and Hesse-Nassau, and of Pyrmont, surrounded by Hanover, Lippe, and Brunswick; hilly and mountainous; in basin of Weser; administered by Prussia; capital, Arsolen; Pyrmont is noted for its mineral waters. Pop. (1910) 61,707.

WALDECK-ROUSSEAU, PIERRE MARIE RENÉ ERNEST (1846–1904), Fr. statesman; b. Nantes; Prime Minister, 1899, with composite cabinet for maintaining the Republic; carried amnesty for Dreyfus case, 1900, and Act for Suppression of Religious Orders, 1901. Resigned, 1902.

WALDEGRAVE, SIR EDWARD (1517–61), officer of Queen Mary, imprisoned by Elizabeth; ancestor of James, 1st Earl of W. (1685–1741), and of William W. (1753–1825), first Lord Radstock.

WALDEN, ROGER, treasurer of England, 1395; abp. of Canterbury, 1397–99; bp. of London, 1405.

WALDENBURG (50° 47′ N., 16° 17′ E.), town, on Polnitz, Silesia, Prussia; centre of a coal-mining district; manufactures porcelain. Pop. 16,440.

WALDENSES, religious body living in Waldensian (Fr. Vaudois) valleys, near Turin, since XII. cent. Their origin lies in Manichæism, which came from the East, and produced the Cathari (in E. Europe, IX. cent.). These held a dualistic view of the universe and a view of Church order which struck at the roots of the sacerdotalism of Catholic Christianity. Peter Waldo preached at Lyons in 1170 and had a following. The W. disapproved of oaths, capital punishment, and held the Rom. Church was not Christian. They were persecuted by members of the Dominican Order forming the Inquisition, and they were crushed but not exterminated. Their teaching influenced Wycliffe and Huss, but on the outbreak of the Reformation they were absorbed into the general Prot. movement. Again persecuted in XVII. cent., they were protected by Cromwell, and Milton wrote his famous sonnet about them. They now number *c.* 20,000.

Lea, *History of the Inquisition of the Middle Ages*; Gilly, *Researches on the Waldensians*.

WALDERSEE, ALFRED, COUNT VON (1832–1904), Pruss. general; commander-in-chief of the allied armies in Boxer riots, China, 1900.

WALENSEE, Lake of Walenstadt (47° 7′ N., 9° 12′ E.), lake, between cantons St. Gall and Glaurus, Switzerland; length, 9½ miles; width, 1½ mile.

WALES (*c.* 51° 25′ to 55° 25′ N., 3° to 5° 20′ W.), principality of United Kingdom, projecting from centre of England; bounded N. by Irish Sea, W. by St. George's Channel, S. by Bristol Channel, E. by Cheshire, Salop, Hereford, and Monmouth; area, 7434 sq. miles. Country is divided into N. and S.W., each containing six counties; in former, Flint is smallest and Montgomery largest; and in latter, Radnor is smallest and Carmarthen largest. Most important county is Glamorgan, which contains nearly half the population. In N.W., Anglesey forms an island cut off from mainland by Menai Strait. Only two large towns are Cardiff and Swansea, in Glamorgan. Coast-line broken in N. by opening of Dee and mouths of Clwyd and Conway, on W. by Carnarvon and Cardigan Bays, on S.W. by St. Bride Bay and Milford Haven, and on S. by Carmarthen and Swansea Bays. Drainage is carried off in N. by upper waters of Severn and Dee, and by Clwyd, Conway, and other streams; in W. by Dovey, Teifi; and in S. by upper waters of Wye and Usk, and by Taff, Tawe, and Towy. Anglesey is low and undulating, and there is a good deal of low ground in S.W. peninsula, but elsewhere the country is uniformly hilly, rising to many peaks of from 2000 to over 3000 ft., and reaching extreme height of 3560 ft. in Snowdon, the highest peak in United Kingdom outside Scotland. Climate resembles that of England, except that rainfall is greater.

Arable land covers 800,000 acres, and nearly 1,950,000 acres are under permanent pasture; crops are in rotation—grasses, oats, barley, turnips, potatoes; horses, cattle, and sheep raised. Great wealth lies in minerals and

connected industries, especially in coal; there are two coal-fields, one in N., in Denbigh and Flint, and one in S., in Glamorgan, Carmarthen, Brecon, and Pembroke; there is also large production of slate, limestone, fire-clay, and a small quantity of lead, silver-lead, zinc, gold, and copper; extensive smelting of iron, copper, and tin in S.; flannels manufactured at Newtown and Montgomery; Swansea is centre of tin and copper industries.

History.—The tribes inhabiting the districts of modern W. figured prominently in the wars of the Romans in Britain, and Welsh mineral resources were extensively exploited by Roman speculators. But Welsh history proper begins with the overthrow of the Romano-Brit. states by the Anglo-Saxon tribes (V.–VII. cent.), despite the efforts of Cunedda in the north and Ambrosius Aurelianus and Mælgwn Gwynedd in the west. In 577 West W. fell away with the advance of the West Saxons under Ceawlin, while in 613 Ethelfrith of Northumbria drove the North Welsh behind the Dee by the victory of Chester. Their misfortune plunged the Welsh into chronic anarchy, which was prolonged by the attacks of Mercia, especially under Offa, and the predatory inroads of the Scandinavians in the IX. cent.; although Rhodri the Great (844–78), and Howel the Good (918–50), the Welsh lawgiver, sometimes enforced a transient unity.

The Normans, unable to conquer W. by campaigning, increased disunion by a process of gradual penetration from Chester, Shrewsbury, and Hereford, the prototypes of the Welsh lordships marches. But under Griffith ap Cynan (1075–1137) a consolidating tendency set in, having the warlike and inaccessible kingdom of Gwynedd (Snowdonia) as its nucleus, and Henry I. and Henry II. invaded the country in vain. Griffith's descendants, Owen Gwynedd (1135–70), and especially Llewelyn ap Iorwerth (1188–1240), who obtained special concessions in Magna Carta, ruled over large tracts of middle W. as well as Gwynedd, and established a strong kingdom.

But 'the last of the Welsh Princes,' Llewelyn ap Griffith, who had a wider rule in W. than any post-Norman prince, played into the hands of Edward I. by his restless ambition. He was twice beaten (1277 and 1282), and was killed in a skirmish. W. was incorporated in England and became an appanage of the king's eldest son. Edward also set up the shires of Flint, Anglesey, Carnarvon, Merioneth, Cardigan, and Carmarthen. English influence was secured by castles and boroughs filled with Englishmen, but Welshmen played an important part in the English wars in Scotland and France (they were the first soldiers to wear a uniform), until the oppressions of individuals almost enabled Owen Glendower to regain Welsh independence in the XV. cent. His failure allowed Henry VIII. to finish the work of Edward I. by shiring the whole of W. and giving it parliamentary representation.

Welsh history then became merged into English, although the Welsh national spirit has always remained strong.

The principality is administered with England, and has the same system of education; the Univ. was founded in 1893 and includes three colleges, at Aberystwith, Bangor, and Cardiff. The State Church is the Church of England, but a Bill for its disestablishment was passed by Commons and rejected by Lords (1913), thus coming under operation of the Parliament Act. Most of the inhabitants are Nonconformists. Language belongs to Celtic group, and is generally spoken; it closely resembles the language spoken in Brittany. Pop. (1911) 2,032,193.

WALFISH BAY (22° 30′ S., 14° E.), harbour, on coast of Ger. S.W. Africa, belonging to Britain.

WALKER, FRANCIS AMASA (1840–97), Amer. soldier and political economist; served in the army of the Potomac, 1861–65; general, 1865; author of *Political Economy*—still the text-book at Oxford Univ.

WALKER, FREDERICK (1840–75), Eng. subject-painter; studied in London, and was first known as a wood-engraver. As a painter he worked successfully in both water-colours and oils.

WALKER, GEORGE (*c.* 1618–90), defender of Londonderry; b. Tyrone. Entered the Church, but when the Revolution broke out gathered an army for the defence of Londonderry, and throughout the siege his strenuous bravery upheld the resistance of the inhabitants. He became bp. of Londonderry, but fell in the battle of the Boyne; wrote a book on his experiences, entitled *A True Account of the Siege*.

WALKER, WILLIAM (1824–60), Amer. adventurer; b. Nashville, Tennessee; commanded piratical expedition in N. Mexico, 1853; became Pres. of Nicaragua, 1855. He surrendered to the British, was handed over to his enemies, and shot.

WALL, RICHARD (1694–1778), an Irishman who became a Span. statesman; served in Span. navy, 1718; sec. to the Span. Embassy at St. Petersburg, 1727. After arranging Peace of Aix-la-Chapelle, 1747–48, became Span. ambassador in London; Foreign Minister and Sec. of State, 1754–64.

WALLA WALLA (46° 8′ N., 118° 50′ W.), city, on Mill Creek, capital, Walla Walla County, Washington, U.S.A.; centre of wheat region; agricultural machinery. Pop. (1910) 19,364.

WALLACE, ALFRED RUSSEL (1823–), Eng. traveller and naturalist; has made bot., zool., and geol. his life's work. In 1848 W. travelled and collected on the Amazon, and from 1854 to 1862 in the Malay Archipelago; made important discoveries regarding geographical distribution of animals; formulated theory of the survival of the fittest, and of natural selection as a whole. Wrote *My Life* (1905).

WALLACE, SIR RICHARD, Bart. (1818–90), Eng. art collector; natural s. of Marchioness of Hertford; 4th Marquess of Hertford left him his art collection, bequeathed to nation by W.'s widow, 1897.

WALLACE, SIR WILLIAM (*c.* 1270–1305), Scot. patriot; s. of Malcolm Wallace of Elderslie; organised Scot. insurrection against Eng. Edward I., 1297, and for a time was successful; defeated by Edward at Falkirk, 1298; withdrew to France, 1299, and sought help in vain from France and the pope; engaged in guerilla warfare against England, 1303–5, and outlawed by Edward I.; taken prisoner by treachery, brought to London, and executed as a traitor, 1305.

WALLACE, WILLIAM VINCENT (1814–65), Brit. composer; b. Waterford, Ireland; after adventurous career in the East, settled in Europe, 1853, his opera *Maritana* (1845) is still popular.

WALLACHIA, see WALACHIA.

WALLAROO (33° 57′ S., 137° 56′ E.), seaport, Dalny County, S. Australia; copper-mining centre; large smelting-works. Pop. 4000.

WALLASEY (53° 25′ N., 3° 5′ W.), town, Cheshire, England. Pop. (1911) 78,514.

WALLENSTEIN, ALBRECHT WENZEL EUSEBIUS VON, WALDSTEIN, Duke of Friedland, etc. (1583–1634), Ger. general; s. of a noble but unimportant Bohemian family; served in Rudolph II.'s army in Hungary; m., 1606, an elderly widow whose estates fell to him on her death, 1614; formed regiment for support of Emperor Ferdinand in Thirty Years War, and subsequently raised an army of 50,000 men. Hated by the German princes, W. was dismissed by the emperor (1630); recalled on Gustavus Adolphus's invasion of Germany. W. worked for a united Germany, and saw this could only be done by religious toleration. He entered into negotiations with the Protestants to carry out his own plans, was suspected by the emperor, and murdered at Eger; greatest leader in the Thirty Years War.

WALLER, EDMUND (1606–87), Eng. poet and Royalist. A plot in which he was implicated on the king's behalf miscarried, and Waller betrayed the conspirators, and he himself was banished. His verse is of a light, witty, occasional nature.

WALLER, SIR WILLIAM (*c.* 1597–1668), Eng. soldier; served in Bohemia; sat in Long Parliament;

after commanding with success Parliamentary army in W. England, was removed by 'Self-Denying Ordinance,' 1650; worked for restoration of monarchy; imprisoned by Cromwell.

WALLFLOWER (*Cheiranthus*), genus of plants, order Cruciferæ; Common W. (*C. cheiri*) is yellow when wild.

WALLINGFORD.—(1) (51° 35′ N., 1° 8′ W.) town, on Thames, Berkshire, England; has ruined Norman castle; was a Rom. stronghold. (2) (40° 29′ N., 72° 50′ W.) town, Newhaven County, Conn., U.S.A.; manufactures silver and plated goods. Pop. (1910) 8690.

WALLIS ARCHIPELAGO (13° S., 176° W.), group of islands in S. Pacific, belonging to France.

WALLIS, REV. JOHN, D.D. (1616–1703), Eng. mathematician; b. Ashford; ed. for Church; brilliant career, Cambridge; Parliamentarian during Civil War; prof. of Geom., Oxford; edit. mathematical and musical works of Greeks.

WALLON, HENRI ALEXANDRE (1812–1904), Fr. historian and politician; wrote *History of Slavery in Antiquity*, *Jeanne d'Arc* (crowned by French Academy), and *History of the Tribunal Révolutionnaire*.

WALLOONS, people of Ardennes region of Belgium, descended from the Gallic Belgæ, commingled with Lat. and Teutonic blood. A number fled into Holland, 1581, and formed the Walloon Prot. Church, which still holds its services in French, and now numbers 10,000.

WALLS, frequently built for military purposes, *e.g.* Hadrian's W., from Tyne to Solway Firth; Antonine Wall, from Forth to Clyde. Best example, Great Wall of China, 1500 miles in length.

WALLSEND (54° 59′ N., 1° 30′ W.), town, on Tyne, Northumberland, England, at E. end of Hadrian's Wall; collieries. Pop. (1911) 41,464.

WALMER (51° 12′ N., 1° 23′ E.), watering-place, Kent, England; the Duke of Wellington died here, 1852. Pop. (1911) 5347.

WALNUT (*Juglans regia*), a tree bearing unisexual, catkinate inflorescences; when ripe the kernel is edible, constituting the familiar w. of dessert. The unripe nuts make excellent pickles and a good ketchup. W. wood is esteemed for its beautiful markings, lightness, and its freedom from liability to split or warp.

WALPOLE, HORACE (1717–97), Eng. author; 4th s. of Sir Robert W.; ed. Eton and King's Coll., Cambridge; app. by his father to several sinecures, one in the customs being worth £1000 a year; travelled considerably, and lived the life of a man of literary taste, setting up a private printing-press for pleasure. M.P. for some years, but of no account as politician; chief works were the *Castle of Otranto*, *Memoirs* of reigns of George II. and George III. As a letter writer W. is excellent.

WALPOLE, ROBERT, see Orford, Earl of.

WALPURGIS, ST. (VIII. cent.), of Eng. birth, became abbess of Heidenheim.

WALRUSES (*Odobenidæ*), a family in the Pinnipedia group of Carnivora (*q.v.*). Large seal-like animals with upper canines developed to form huge tusks. They feed chiefly on molluscs, and occur only in the Arctic regions, the most familiar form being the Common W. or Morse (*Odobenus rosmarus*), found in both Old and New Worlds. Their tusks are valued as ivory, their hides for leather, and their bodies for oil.

WALSALL (52° 36′ N., 1° 59′ W.), town, Staffordshire, England; manufactures iron and brass; in neighbourhood of coal, lime, and iron mines. Pop. (1911) 92,130.

WALSINGHAM, SIR FRANCIS (*c.* 1530–90), Eng. statesman; s. of London lawyer; a Prot., he remained abroad in Mary's reign, returned on Elizabeth's accession; became Cecil's confidential agent, and was ambassador in Paris, 1570, working for an alliance with France. In 1573 W. became Elizabeth's Sec. of State, and was M.P. for Surrey till his death; maintained a large army of spies both on the Continent and in England, and was the strongest opponent of Spain and Catholicism. W. was the chief agent in execution of Mary, Queen of Scots.

WALTER, HUBERT (d. 1205), Eng. statesman; companion of Richard I. on First Crusade; Justiciar of England, 1193; compelled to resign by Pope Innocent III.; abp. of Canterbury, 1193–1205.

WALTER, JOHN (1738–1812), Eng. journalist; started *Universal Daily Register*, Jan. 1, 1785, and renamed it *The Times*, 1788. Succ., 1803, by his s. John, whose management lasted till 1847.

WALTHAM (42° 21′ N., 71° 12′ W.), city, on Charles River, Middlesex County, Massachusetts, U.S.A.; watch-making. Pop. (1910) 27,834.

WALTHAM ABBEY, Waltham Holy Cross (51° 40′ N., 0°), town, on Lea, Essex, England; remains of an abbey, said to have been founded by King Harold; gunpowder mills. Pop. (1911) 6796.

WALTHAMSTOW, suburb of London, in Essex, England, 7 miles N.E. of St. Paul's. Pop. (1911) 124,597.

WALTHARIUS, a Latin poem, written by Ekkehard, a monk of St. Gall, and dealing with the exploits of Walter of Aquitaine, a Gothic prince, during his captivity among the Huns.

WALTHER VON DER VOGELWEIDE (*c.* 1170–1230), Ger. mediæval lyric poet and minnesinger; b. Tyrol; lived at Austrian court, Vienna, 1180–98; successfully took part in the great minnesinger contest at the Wartburg, 1204; wrote fine love lyrics, and also political poetry; edit's of his works by Lachmann (1827), Pfeiffer (1864), Wilmanns (1883).

WALTON, BRIAN (1600–61), Anglican divine; famous for Bible in nine languages, 1657; supported by Cromwell; bp. of Chester, 1660.

WALTON, IZAAK (1593–1683), Eng. author and authority on angling; b. Stafford. He seems to have made a modest fortune as a linen-draper. After his retiral he spent most of his life visiting various country parsonages. He wrote an admirable *Life* of his friend Donne. *The Compleat Angler*, his masterpiece, is a dissertation on angling interspersed with entertaining reflections on life and nature.

WALTON-LE-DALE, town, Lancashire, England, 2 miles S.E. of Preston; cotton-mills. Pop. (1911) 12,352.

WALTON-ON-THAMES (51° 23′ N., 0° 25′ W.), market town, Surrey, England. Pop. (1911) 12,858.

WALTON-ON-THE-NAZE (51° 51′ N., 1° 16′ E.), watering-place, Essex, England.

WALTZ, see Dance.

WAMPUM, beads made of shells; in two colours, purple and white, cylindrical shape, the colour deciding the money value; recognised in Massachusetts, 1640; strung together used as belts, etc.

WANDERING JEW, see Jew, the Wandering.

WANDIWASH (12° 30′ N., 79° 30′ E.), town, N. Arcot district, India; scene of victory of British over French, 1760. Pop. 6100.

WANDSBECK, Wandsbek (53° 40′ N., 10° 5′ E.), town, Schleswig-Holstein, Prussia; residence of Claudius (*Asmus*), editor of the *Wandsbecker Bote*. Pop. (1910) 35,212.

WANDSWORTH, suburb of London, England, on Thames, 5½ miles S.W. of St. Paul's. Pop. (1911) 311,402.

WANGANUI (39° 57′ S., 175° 6′ E.), town, port, on Wanganui, N. Island, New Zealand; exports wool, grain. Pop. (1911) 10,929.

WANGARATTA (36° 21′ S., 146° 19′ E.), town, Victoria, Australia; agricultural district, flour-mills. Pop. 3600.

WANSTEAD (51° 35′ N., 0° 2′ E.), town, Essex, England; N.W. suburb of London. Pop. (1911) 13,831.

WANTAGE (51° 26′ N., 1° 26′ W.), market town, Berkshire, England; ironworks; birthplace of Alfred the Great. Pop. (1911) 3628.

WAPITI, see under Deer Family.

WAR is 'the only means by which a nation can assert against challenge its conception of right.'

There are wars of conquest, due to the need of a

growing population to expand and colonise like Cæsar's invasion of Gaul, and there have been purely defensive wars like those waged in the Tyrol by Andreas Hofer, in Russia (1812), and in the Peninsula by the Spaniards against Napoleon. A people's war, peasant war, or other irregular or guerrilla war waged against a disciplined army must be favoured by geography, and thus irregular wars occur usually in mountainous, forest, or desert regions, where nature has set a barrier against the passage of large bodies of troops accompanied by impedimenta. The South African *veldt* proved a greater obstacle than the Boer forces to Lord Roberts' march to Pretoria in 1900.

The methods of war have altered with the development of civilisation, the spread of Christianity, and the invention of firearms. The struggles of nations of tribesmen, shepherds, husbandmen, and hunters in early times were marked by extreme ferocity; nothing short of a complete victory was aimed at; the enemy's country was devastated, its inhabitants carried off into slavery, and its warriors butchered. In Europe the custom of paying a ransom for prisoners survived the Middle Ages, and was only put an end to by the peace of Munster in 1648. By slow stages a method has been evolved of deciding the issue by the theoretical destruction as a fighting machine of the enemy's main army. A modern government if victorious in war will not push matters to extremes and run the risk of a people's war, and if defeated will seek terms of peace before the whole of its resources are exhausted. Turkey's war with Italy and the Balkan States (1912) exemplifies this principle fully. The theory is upheld that military success can always be won eventually at a price, and so warlike operations are meant to ascertain whether the price of potential success will be too great to pay, and in this connection it is an important factor that the population of the invaded country must not be injured in regard to its industries, since the payment of a war indemnity will depend upon the recuperative power of the vanquished. The menace of war is often as effective as war itself, and in order that the threat of hostilities shall not be ignored, governments maintain large armies at a high state of efficiency. The immunity of Britain from attack has been hitherto secured by her assumed naval supremacy.

The preparations to take the field now occupy but a few days, since mobilisation arrangements are completed in peace to the minutest detail, and in W. Europe troops can be massed on the frontiers by railway in a few hours. The degree of completeness of all preparations for war is deemed the real strength of a country, and, according to Goltz, if the French were able to mobilise five days earlier than the Germans, the latter would be reduced to defensive action at the outset. Even in Britain, where the military is subordinated to the naval power, it is understood that within ten days a force of six divisions could be provided complete in every respect to embark for foreign service, and on the Continent probably ten times as large a force could be got ready in the same time.

WARANGAL (17° 58′ N., 79° 40′ E.), decayed town, Hyderabad, India; the ancient capital of Telingana.

WARASDIN, Varasd (46° 18′ N., 16° 20′ E.), town, on Drave, capital, County Warasdin, Hungary. Pop. 12,800.

WARBECK, PERKIN (c. 1474–99), claimed to be the younger of the two princes murdered by Richard III. in the Tower. The pretender was supported by the Duchess of Burgundy, and won over many adherents in Ireland and France. He made several unsuccessful attempts to land in England, but eventually landed in Cornwall, was taken prisoner, and executed in the Tower.

WARBLERS (*Sylviidæ*), a family of thrush-like Perching Birds, distinguished by their smaller size, delicate bills and toes, and duller plumage. They feed on insects, and are very migratory. More than 500 species are scattered over the Old World, to which, with one Alaskan exception, they are confined. Brit. examples are the Whitethroat (*S. rufa*), a spring visitor; the sweet-singing Blackcap (*S. atricapilla*), and many 'Warblers'; the Chiffchaff (*Phylloscopus collybita*), and the Willow- and Wood-W's (*P. trochilus* and *sibilatrix*), known as the Willow Wren and Wood Wren.

WARBURTON, WILLIAM (1698–1779), Anglican divine; dean of Bristol, 1757; bp. of Gloucester, 1759; wrote *Divine Legation of Moses demonstrated on the Principles of a Religious Deist*, and *Doctrine of Grace*.

WARD, see Feudalism, Chancery Division.

WARD, ARTEMUS, see Artemus Ward.

WARD, MARY AUGUSTA, Mrs. Humphry Ward (1851–), Brit. novelist; b. Hobart, Tasmania; grand-dau. of Dr. Arnold of Rugby. In 1872 m. Thomas Humphry Ward, editor of *The English Poets*, etc. Her name was made by the psychological novel, *Robert Elsmere*, the high standard of which she has preserved in most of her subsequent works.

WARD, SETH (1617–89), distinguished mathematician and professor of Astronomy at Oxford; bp. of Exeter, 1662, Salisbury, 1667.

WARD, WILLIAM GEORGE (1812–82), R.C. theologian, of Anglican training; able mathematician and student of philosophy and metaphysics; upheld Ultramontanist as against Liberal Catholic position.

WARDHA (20° 45′ N., 78° 40′ E.), town, Nagpur, Central Provs., Brit. India; centre of cotton trade. Pop. 9900; (district) 400,000.

WARE.—(1) (51° 49′ N., 0° 3′ W.) town, on Lea, Hertfordshire, England; trade in malt. Pop. (1911) 5842. (2) (42° 15′ N., 72° 15′ W.) town, on Ware, Hampshire County, Massachusetts, U.S.A.; manufactures cottons, woollens. Pop. (1910) 8774.

WAREHAM (50° 41′ N., 2° 7′ W.), town, Dorsetshire, England; trade in clay.

WAREHOUSE, BONDED, see Bonded Warehouse.

WARENNE, EARLDOM OF—William de Warenne received title and lands in Surrey and Sussex. William de W., 4th earl (succ. 1202), was a favourite of King John; prominent in reign of Henry III.; his son John (succ. 1240) was a famous soldier.

WAR-GAME (Ger. *Krieg-spiel*), indoor 'game'; officers engage in imaginary operations under rival leaders, using large-scale maps and blocks of metal to represent troops; tactical scheme is drawn up, a military situation is assumed, and a certain time is allotted for each move in the game.

WARGLA, Ouargla (31° 58′ N., 5° 11′ E.), town, Fr. military post, in oasis of Wargla, Algerian Sahara. Pop. 4000.

WARHAM, WILLIAM (1450–1532), Eng. cleric; bp. of London, 1502; abp. of Canterbury and Lord Chancellor, 1504; did not approve of all Henry VIII.'s ecclesiastical legislation, but feared the king.

WARKWORTH (55° 21′ N., 1° 37′ W.), town, at mouth of Coquet, Northumberland, England; interesting remains of antiquity.

WARMINSTER (51° 13′ N., 2° 11′ W.), town, Wiltshire, England; manufactures silk. Pop. (1911) 5492.

WARNER, CHARLES DUDLEY (1829–1900), Amer. author; works include *Lives* of Captain John Smith and Washington Irving.

WARNSDORF (50° 52′ N., 14° 33′ E.), town, Bohemia, Austria; seat of textile industry. Pop. (1910) 23,220.

WARORA (20° 20′ N., 79° E.), town, Chanda district, Central Provs., Brit. India; cotton industry. Pop. 11,300.

WARRANT, an order in writing instructing an officer to bring a person before a court. W's are issued by Privy Council, Judges of the High Court, Justices of the Peace, and Coroners. A w. of arrest cannot be issued for civil debt. Arrests can be made without w. when (1) there is suspicion of felony, (2) a breach of the peace is likely to occur, (3) malicious

injury is being done to property, (4) an indictable offence is being committed at night, (5) street gambling is taking place, (6) by Criminal Law Amendment Act, 1912, when procuration is suspected.

WARRANTY, a promise, expressed or implied, that in case of failure to perform the terms of a contract the party injured shall be entitled to compensation.

WARREN.—(1) (41° 14′ N., 80° 51′ W.) city, on Mahoning, capital, Trumbull County, Ohio, U.S.A.; manufactures iron and steel. Pop. (1910) 11,081. (2) (41° 51′ N., 79° 19′ W.) town, on Allegheny, capital, Warren County, Pennsylvania, U.S.A.; natural gas and oil region; oil refineries. Pop. (1910) 11,080.

WARREN, GOUVERNEUR KEMBLE (1830–82), Amer. general and explorer; distinguished as commander in Civil War; wrote accounts of Dakota and Nebraska.

WARREN, SAMUEL (1807–77), Welsh novelist; famous for his *Ten Thousand a Year* (1841).

WARRENPOINT (54° 6′ N., 6° 15′ W.), seaport, watering-place, on Carlingford Lough, County Down, Ireland.

WARRENSBURG (38° 50′ N., 93° 45′ W.), city, capital, Johnson County, Missouri, U.S.A.; sandstone quarries. Pop. (1910) 4689.

WARRINGTON (52° 23′ N., 2° 36′ W.), town, on Mersey, Lancashire, England; manufactures leather, cotton, iron. Pop. (1911) 72,178.

WARRISTON, ARCHIBALD JOHNSTON, LORD (1611–63), Scot. statesman; helped to frame the Scot. National Covenant; procurator of the Kirk, 1638; became Lord W. as lord of Session, 1641; opposed neutrality in Eng. affairs; prominent in Westminster Assembly, and a member of Scot. Committee in London, 1644. Named King's Advocate by Charles I., 1646; member of Cromwell's House of Lords, and as a leading 'remonstrant' was renamed Lord Clerk Register by Cromwell, 1657. Arrested at Rouen; tried before Scot. Parliament after Restoration, and hanged in Edinburgh.

WARRNAMBOOL (38° 24′ S., 142° 28′ E.), seaport town, on Warrnambool Bay, Villiers County, Victoria, Australia. Pop. (1911) 7010.

WARSAW.—(1) (52° N., 21° E.) government, Russ. Poland, bordering Prussia on W.; surface low and flat. Pop. (1910) 2,482,000. (2) (52° 13′ N., 21° 7′ E.) city of Russ. Poland, on Vistula; capital of government of W., formerly of Poland (*q.v.*); fortified by Alexander Citadel and 15 forts; Cathedral of St. John, XIII. cent.; churches of Holy Virgin, 1419, St. Anne, 1454; former palace of Polish kings; Krasinski, Belvedere, and other fine palaces; national theatre, town hall, univ., etc.; great commercial and industrial centre; machinery, chemicals, musical instruments, silver-plate, leather goods, carriages, tobacco, beer, etc. W. was an important city in Middle Ages as residence of Dukes of Mazovia. Poles defeated by Charles X. of Sweden, 1656; surrendered to Charles XII., 1703; treaty between Russia and Poland, 1768; unsuccessful revolutions, 1830, 1862; serious rioting, 1905–6. Pop. (1910) 855,900. (3) 41° 15′ N., 85° 50′ W.) city, capital, Kosciusko, Indiana, U.S.A.; contains Winona Agricultural and County Technical Institute. Pop. (1910) 4430.

WART (*Verruca*), growth of skin owing to lengthened papillæ; w's on hands generally disappear unaccountably, but acetic acid or silver nitrate (caustic stick) may be applied.

WARTBURG, THE (50° 52′ N., 10° 17′ E.), ancient castle, Eisenach, Germany; once the residence of the Landgraves of Thuringia; Luther spent ten months here, 1521–22.

WARTHE, WARTA (52° 40′ N., 16° 30′ E.), river, Poland and Prussia; joins Oder at Küstrin, Brandenburg; length, 450 miles.

WART-HOGS, see PIG FAMILY.

WARTON, JOSEPH (1722–90), Eng. critic and poet; editor of Pope's works and champion of Elizabethan imaginative poetry against 'Correct' school of Pope.

WARTON, THOMAS (1728–90), Eng. poet-laureate. At Oxford he read widely in mediæval literature, and the romantic influence is seen in his *Poems*. His great work was *The History of English Poetry*, an exhaustive treatise.

WARWICK.—(1) (52° 17′ N., 1° 36′ W.) county town, on Avon, Warwickshire, England; manufactures gelatine and bricks; the famous castle contains many art treasures, including the Warwick vase, from Hadrian's villa, at Tivoli; was an ancient Rom. fortress; rebuilt later by Ethelfleda. Pop. (1911) 11,858. (2) (41° 42′ N., 71° 22′ W.) town, on Narragansett Bay, Kent County, Rhode Island, U.S.A.; manufactures cotton. Pop. (1910) 26,629. (3) (28° 12′ S., 152° 4′ E.) town, on Contadamine, Queensland Australia; agricultural district; wine industries. Pop. 4500.

WARWICK, EARLDOM OF, Eng. title. Henry de Newburgh or Beaumont, a Norman, was 1st earl, cr. by William II. Earldom held by Beauchamp family —8 earls—till 1439. Richard Neville, the 'King-maker,' succ. in right of his wife, 1449; title extinct on execution of Edward, s. of George, Duke of Clarence; revived with John Dudley, Duke of Northumberland, 1502–53; again extinct, 1658. Present earldom dates from 1759, and belongs to Greville family.

WARWICK, RICHARD BEAUCHAMP, EARL OF (1382–1439) Eng. noble; general and ambassador of Henry V.; his dau. m. Richard Neville, 'the King-maker.'

WARWICK, RICHARD NEVILLE, EARL OF (1428–71), called the 'King-maker.' In 1455 he was under the command of the Duke of York, and distinguished himself at the battle of St. Albans. For his services he was made governor of Calais, and subsequently Commander of the Seas. He was again fighting for the Yorkists against great odds in 1459; he joined forces with Edward, Earl of March, in 1460. The combined armies were victorious, and Edward was proclaimed king at London. Warwick subsequently sided with Henry against Edward, and with the help of Queen Margaret had him proclaimed Henry VI. and crowned. But Edward gathered an army, and at the battle of *Barnet* Warwick fell.

WARWICKSHIRE (52° 20′ N., 1° 31′ W.), W. midland county of England; county town, Warwick; bounded by Stafford, Leicester, Northamptonshire, Oxon, Gloucester, Worcester; area of administrative county, nearly 880 sq. miles. Surface is generally flat or slightly rolling, with low hills in S.; drained by Avon, Tame, Alne, Itchen, and other rivers; has canal communication with Severn, Mersey, Trent, Thames; in N. was the Forest of Arden. Was included in kingdom of Mercia in early times; within the county was fought the battle of Edgehill during the Civil War of the XVII. cent. Various traces of Rom. occupation occur, and there are several ruined monasteries. There is a small coal-field, with fire-clay, limestone, ironstone; orchards; agriculture carried on; cattle and sheep raised. Pop. (1911) 408,291.

WASAU (44° 57′ N., 89° 40′ W.), city, on Wisconsin, capital, Marathon County, Wisconsin, U.S.A.; lumber. Pop. (1910) 16,560.

WASH, THE (53° N., 0° 20′ E.), arm of North Sea, between Norfolk and Lincoln, England.

WASHBURN (46° 42′ N., 90° 52′ W.), city, summer resort, on Lake Superior, capital, Bayfield County, Wisconsin, U.S.A.; lumber industries. Pop. (1910) 3830.

WASHINGTON.—(1) (45° 30′ to 49° N., 117° to 124° 20′ W.) N.W. state, U.S.A.; bounded N. by Canada, E. by Idaho, S. by Oregon, W. by Pacific Ocean; area, 66,127 sq. miles. Surface is crossed from N. to S. by Cascade Mountains, to E. of which is a high plateau, while in the W. the country generally is mountainous and heavily wooded, with a number of fertile prairies and valleys; watered by Columbia and its affluents and by a number of less important

streams. The S.E. is of recent geological formation, but in the N. and N.E. Archæan rocks occur, while the W. is of Carboniferous, Cretaceous, and Tertiary formation. Climate varies, generally temperate in W., extreme in E.

Early history of W. is identical with that of Oregon, of which it formed part until 1853. It was then organised as a territory, and in 1889 it was admitted as a state to the Union. Executive is vested in governor, who is assisted by a lieutenant-governor and various officers of state, all of whom are elected for 4 years. Legislative power is vested in Senate and House of Representatives; number of Representatives varies from 63 to 99, and number of Senators may be from one-third to half the number of Representatives. Sends 2 Senators and 5 Representatives to Federal Congress.

Chief towns are Seattle, Spokane, Tacoma, Bellingham, Everett, Olympia (capital). Agriculture is carried on; chief crops—wheat, barley, oats; horses, cattle, and sheep raised; dairy-farming; fruit largely grown; large area forested; lumbering an important industry. There are excellent salmon, oyster, and other fisheries. Minerals include coal, gold, silver, copper, lead, granite, marble. Meat-packing, flour-milling, brewing, fish-canning are important industries.

Education is free and obligatory. Seattle is seat of State Univ. Chief religions are R.C., Methodist, Presbyterian, Lutheran, Baptist. Pop. (1910) 1,141,990.

Meany, *History of State of Washington* (1909).

(2) (38° 53′ N., 77° 2′ W.) city, capital of U.S.A., is situated on the Potomac, in District of Columbia, with which it is coextensive; is regularly laid out on a plan originally designed by Major Pierre Charles L'Enfant in 1791, and its development has been guided so as to leave ample open spaces; has fine wide streets and many splendid public buildings. Almost in the centre stands the Capitol, where Congress meets, Supreme Court sits; it is a fine building of white stone and marble, crowned with a dome supporting a bronze figure of Liberty. Other important buildings are the White House, a simple but dignified two-storey house, the official residence of the President of the U.S.; the Library of Congress, which communicates by an underground passage with the Capitol; and the National Observatory (1842). Many educational institutions, including George Washington Univ., established (as Columbian Univ.) in 1821, Carnegie Institution (1902), Howard Univ. for negroes, Catholic Univ., Georgetown College, and Amer. Univ. There are numerous philanthropic establishments, including a Soldier's Home and various public and private hospitals and asylums. The most important monument is a white marble obelisk dedicated to the memory of George Washington. Fine parks and Botanic Gardens. There are no manufactures. Administered by three commissioners nominated by President of U.S. Pop. (1910) 331,069.

Forbes-Lindsay, *Washington* (1908).

(3) (40° 8′ N., 80° 19′ W.) city, on Chartiers Creek, capital, Washington County, Pennsylvania, U.S.A.; coal and oil region; manufactures iron; seat of Washington and Jefferson Presbyterian College. Pop. (1910) 18,788. (4) (38° 40′ N., 87° 11′ W.) city, capital, Daviess County, Indiana, U.S.A.; agricultural, stock-raising, and coal-mining region; manufactures bricks and tiles. Pop. (1910) 7854. (5) WASHINGTON COURT-HOUSE (39° 30′ N., 83° 19′ W.), city, capital, Fayette County, Ohio, U.S.A.; manufactures furniture. Pop. (1910) 7277.

WASHINGTON, GEORGE (1732-99), 1st Pres., U.S.A.; b. Wakefield, Virginia, U.S.A., 1732; s. of prosperous planter, who d. when the boy was eleven; major of Virginia militia, raised to resist claims of the French, 1754; m. Martha Custis, 1759, became a member of the Virginia legislature, and settled down at Mount Vernon as a country gentleman. Though deprecating revolt against Britain, W. supported the resistance to Stamp Act, 1765, and was a delegate to 1st Congress of Amer. colonies, 1774. After *Lexington* and *Bunker's Hill*, 1775, W. became general of the Amer. army, drove General Howe from Boston, 1776, but was defeated, 1777, and driven back in Pennsylvania. The army was disbanded, 1783, and W. retired to private life at Mount Vernon. W. presided at the convention, 1787, when the constitution of U.S.A. was drawn up, and was elected Pres., 1789. Issued proclamation of Neutrality, on the outbreak of the great European war, 1793, despite an alliance with France, made in 1778. Retired from the presidency after a second term of office, 1796.

Life, by H. C. Lodge (1889), Woodrow Wilson (1897), J. A. Harrison (1906).

WASHSTAND, table to hold washing utensils; came into general use, XVIII. cent.; sometimes fitted with drawers and shelves, or made collapsible.

WASPS.—There are distinguished SOLITARY W'S (*Eumenidæ*), SOCIAL W'S (*Vespidæ*), and FOSSORIAL or DIGGING W'S (*Scoliidæ*, *Pompilidæ*, and *Sphegidæ*), whose names indicate their habits. The first build single cells in walls, claypits, sandstone cliffs, or in plant stems, and lay eggs therein, supplying grubs and caterpillars upon which the larvæ when hatched may feed.

Social W's build papery nests of chewed fragments of wood, within which the larva-bearing combs are built. A w. society lasts only for a year, the queen alone surviving to start a new colony in the succeeding spring.

The habits of the Digging W's differ considerably. The Soleciidæ usually simply lay their eggs on a caterpillar, upon which the young feed, while the remaining two families generally dig burrows, tunnels, or cells, in which eggs are laid, and which are stored with live but paralysed locusts, grasshoppers, crickets, spiders, etc., upon which the larvæ when they develop may feed.

WASTE, Eng. legal term with three distinct usages: (1) 'W. of a manor' is that portion of the estate subject to rights of common; (2) 'Year, day, and w.' was a royal privilege whereby a king attained the profits of freehold property of those convicted of felony and treason for the period of 346 days, with right of diminishing its value; (3) an unauthorised act of a tenant which impairs the value of a freehold estate.

WATCH.—The construction of pocket timepieces was first made possible by the invention of the mainspring as a substitute for suspended weights. The early history of w's is uncertain, but probably they were first made at Nuremberg about the beginning of the XVI. cent. These w's had only an hour-hand, the minute-hand being added late in the XVII. cent. The flat, round form was introduced early in the XVII. cent., and repeating w's were invented in 1676. The practice of setting the pivots in precious stones originated about 1700. The force of a mainspring weakens as the spring uncoils, and, to equalise this force, the 'fusee' was invented about 1530. In most Eng. w's the fusee is now superseded by the going-barrel, which is cheaper to make and more suitable for the popular, keyless type. The motion of a w. is regulated principally by the escapement and balance-wheel. Variations in temperature affect w's even more than clocks, and to compensate for these the balance-wheel is constructed partly of brass and partly of steel, on the lines of the 'gridiron' pendulum (see CLOCK). The vertical escapement was first used, but was found inaccurate owing to the recoil, and was followed by Graham's horizontal escapement. In Eng. w's the lever escapement is largely used. Chronometers are simply w's made with special accuracy, and are usually fitted with the detached escapement. High-class w's are tested at Kew Observatory and certified according to accuracy.

WATER (H_2O), hydrogen monoxide, H : O = 1 : 7·94 weight, 2 : 1 volume; formed by burning hydrogen and substances containing it. Clear, taste-

less, bluish-green in bulk, almost incompressible, bad conductor of heat and electricity, temperature of maximum density 4° C.; M.P. 0° C.; B.P. 100° C. The natural solvent (see SOLUTION); consequently natural w's contain various dissolved impurities, some of which (*e.g.* $Ca(HCO_3)_2$, $CaSO_4$) constitute hardness. Contained in many salts as w. of crystallisation, *e.g.* $Na_2CO_3 + 10H_2O$.

Water Rights, a prescriptive right to the free and uninterrupted flow of water over a neighbour's land may be acquired, when the water flows in a defined permanent channel; and the fact that the channel may be underground does not disturb that right. Such a stream must not be diverted. Where water simply percolates through undefined channels no prescriptive right exists.

Water Supply.—The daily consumption of water by an adult should be on an average three pints, though allowance must be made for variation in the amount of water lost in perspiration and other ways. The amount required in childhood is proportionately greater; hence there should be care in limiting the quantity consumed by a child. Water, by promoting cleanliness, is invaluable in checking the outbreak of infectious disease. Practical sanitarians find that not less than 17 gallons per head should daily be delivered to each house, and that 10 more should be allowed for trade and municipal purposes. The quantity supplied in London greatly exceeds this.

The DANGERS of water are due to its impurities, which include: (1) germs, in especial of typhoid, dysentery, cholera, and some varieties of diarrhœa; (2) eggs of certain parasitic worms; (3) mineral matter in excess—promoting dyspepsia and probably gravel; (4) lead, which may cause lead-poisoning.

The origin of these impurities is due, in cases (1) and (2), to pollution from sewage; (3) is due to the rocks, especially limestone and chalk, through which the water percolates; whilst (4) is caused by lead pipes or a lead cistern. Hard water is not nearly so easily tainted by lead as soft water. The water most easily infected by lead is soft water from a peat district, such water being rich in vegetable acids that dissolve the lead rapidly.

Excessive hardness is diminished by chemical means, and water of such a nature as to make lead-poisoning a danger is treated by filtration through beds of flint and chalk, by which it acquires the necessary hardness. When the water is derived from a river into which sewage has been discharged higher up the stream, it is drawn off as far as possible from the source of pollution, and filtered and aerated under scientific supervision. In all cases care has to be taken that the water does not become polluted after leaving the reservoir. Two sources of danger have to be guarded against: (1) aqueducts and sewers are apt to communicate through slight leaks if they are laid side by side; (2) cisterns are liable to become filthy through neglect, or to be left uncovered.

Water derived from wells is by no means safe from pollution: if a well is shallow the risk of sewage contamination is often considerable. A well should be deep, and have its sides protected by some waterproof material to prevent entrance of surface water. The best wells are those driven right through the first impervious stratum, so as to tap the one lying below. The water thus obtained, by travelling a considerable distance in the earth, has been thoroughly filtered. In London, for instance, by boring through the London clay into the chalk beneath, water is reached which has percolated through the chalk of the Surrey Downs.

The further purification of water drawn from the tap in great towns is unnecessary. When, however, the only water obtainable comes from an unknown or suspicious source, some means of purification is desirable. Three remedies exist: (1) filtration (see FILTER), (2) boiling, (3) chemicals. Alcohol has obvious drawbacks of its own, and many chemicals that kill germs either make the water poisonous or nauseous; thus Condy's fluid has been tried unsuccessfully in the army. The best device is Nesfield's, consisting of a small tablet made in two halves, one of which is coated with gelatine so that its contents are not dissolved by the water until the gelatine has been first absorbed. On dropping this tablet into water one-half at once dissolves and sets free chlorine that kills the germs; within a few minutes the gelatine coating of the other half is dissolved, and this half then acts on the chlorine and changes it to a harmless chloride. The result is that within ten minutes the germs have been destroyed, the chlorine removed, and the water kept safe and palatable.

As a *curative agent* water is used largely both internally and externally. Externally, it is chiefly useful as a means of applying heat or cold. Internally, pure water is a valuable stimulant to the process of excretion. It is the safest diuretic we possess, and is thus largely used in the treatment of gout and of renal disease; its effect differs according to the time of day it is taken: a glass of cold water on rising acts as a laxative; hot water sipped before meals stimulates digestion.

Woodward, *The Geology of Water Supply* (1910).

WATER BEETLES, see under CARABOIDEA.

WATER IN THE HEAD, HYDROCEPHALUS (*q.v.*)..

WATER OR MOOR HEN, see RAIL FAMILY.

WATERBURY (41° 33′ N., 73° W.), city, on Naugatuck, New Haven County, Connecticut, U.S.A.; manufactures brass, and 'Waterbury' watches. Pop. (1910) 73,141.

WATER-CLOCK, see CLOCK.

WATER-CLOSET should be flushed by a special cistern of its own; *pan closets* and *long-hopper closets* are dangerous; *wash-out closets* and *valve closets* are best.

WATER-CRESS, see CRESS.

WATER-CURE, see HYDROPATHY.

WATER-DROPWORT (*Œnanthe*), genus of poisonous plants, order Umbelliferæ; Common W. (*Œ. fistulosa*) and Hemlock W. (*Œ. crocata*) are common Brit. riverside plants.

WATERFALL.—The greatest and grandest w. in the world is the Victoria Falls (*q.v.*), Rhodesia; the second, Niagara (*q.v.*), N. America; these, however, are far exceeded in height by others in America and Europe; the highest w. is the Yosemite Falls, California; in Europe the highest falls are in Norway, Finland, and the Alps. Their water-power is of great commercial value.

WATER-FLEAS, see under ENTOMOSTRACA.

WATERFORD.—(1) (52° 15′ N., 7° 6′ W.) maritime county, Munster, Ireland; surface largely mountainous; chief rivers, the Blackwater and Suir; minerals include copper and marble; cattle-breeding and dairy-farming. Pop. (1911) 83,776. (2) (52° 15′ N., 7° 6′ W.) county town, on Suir, County Waterford, Ireland; has Prot. and R.C. cathedrals; exports agricultural produce; breweries, fisheries; was an ancient Dan. stronghold; taken by Strongbow, 1171. Pop. (1911) 27,430. (3) (42° 47′ N., 73° 42′ W.) village, on Hudson River, Saratoga County, New York, U.S.A.; manufactures paper, knitted goods. Pop. (1910) 3245.

WATER-HEN, see RAIL FAMILY.

WATERING-POT SHELL, see under LAMELLIBRANCHIATA.

WATER-LILY, a term including *Nuphar luteum* (yellow w.-l.) and *Nymphæa alba* (white w.-l.), both characterised by large floating leaves.

WATERLOO (42° 29′ N., 92° 23′ W.), city, on Red Cedar River, capital, Blackhawk County, Iowa, U.S.A.; agricultural region; canning and packing industries. Pop. (1911) 26,693.

WATERLOO, village 11 miles south of Brussels, headquarters of Wellington, 1815, when he encountered Napoleon for the first and last time, and after resisting his attacks from noon till sunset enabled the Pruss. army, under Marshal Blücher, to drive Napoleon from the field. In its tactical aspect it must be considered a very moderate performance, indeed, Wellington himself most aptly described it as a mere 'pounding-match.'

The events of June 1815 may be outlined as follows: Napoleon, having escaped from Elba, took the field at the head of a small but perfectly organised army, with the object of crushing the armies of Wellington and Blücher before they could be supported by those of Austria and Prussia. It was known that Wellington was defending the frontiers of Belgium from the sea to the river Sambre, and that Blücher prolonged the line of defence eastward along the Meuse. Napoleon's plan was to invade Belgium and detach from the Coalition the newly raised Dutch-Belgian army. He hoped to reach Brussels after defeating one or both of the armies immediately opposed to him on June 15, and he succeeded in crossing the frontier at Charleroi, a point which enabled him to interpose between the forces of Wellington and Blücher and thus prevent their aiding each other.

On June 16, Napoleon, with his main army, attacked the Prussians at Ligny, while a detachment under Marshal Ney attacked Wellington's force at Quatre Bras. The battle of Ligny resulted in the retreat of the Prussians, but the battle of Quatre Bras was indecisive. On June 17, therefore, Napoleon sent a detachment under Marshal Grouchy to pursue the Prussians, and himself proceeded with the main army to Quatre Bras, with the object of overthrowing Wellington, who, having ascertained that Blücher was retreating westward from Ligny to Liège, himself made a corresponding movement to the rear by the high road from Quatre Bras to the village of Mont St. Jean. Napoleon, having followed Wellington beyond Genappe, also halted for the night. Both armies prepared for battle on the morrow, and, meanwhile, Blücher had promised to come to Wellington's assistance. Napoleon wrongly believed that Marshal Grouchy had driven Blücher eastward, and that by no possibility could Blücher operate against him on Sunday, June 18. His left wing attacked the country house of Hougomont, which was garrisoned by the British Guards and supported by Wellington's right wing. Napoleon's right wing attacked, with the object of destroying Wellington's left wing astride the high road. Napoleon also attacked Wellington's centre with masses of heavy cavalry, but in no case did the French attacks cause Wellington's army to yield ground; the troops stoically endured heavy losses, while Blücher's army was marching through a difficult country to their assistance.

Napoleon's forces were almost spent when Blücher at last appeared and engaged the French reserve, and by nightfall Napoleon realised that he was defeated at every point; he then quitted the field with his staff and left his army to shift for itself. During the night of June 18, and on the following days, the remnant of the Fr. army was making its way back towards Paris in a state of great disorder, but at the end of the week Marshal Soult succeeded in gathering the force together and some further opposition was made to the advance of the allies on Paris. But, meanwhile, Napoleon's fate had been decided by the Fr. government, and since the war had been waged for Napoleon's overthrow, no political object was to be gained by a continuance of hostilities. A convention was therefore signed by which the Fr. army retired behind the river Loire, while the allies occupied Paris and recalled King Louis, who was again placed upon the Fr. throne.

WATERLOO-WITH-SEAFORTH, watering-place, Lancashire, England, at mouth of Mersey, 4 miles N.W. of Liverpool. Pop. (1911) 26,399.

WATER-MOTORS, instruments for the application of water-power to machinery. This is done by means of water-wheels and turbines. Water-wheels are adapted so as to utilise either the weight of water (*e.g.* a fall) or its momentum (*e.g.* a swift stream). In either case the wheel is rotated and the power transmitted by shafts and driving-belts. The turbine is practically a horizontal water-wheel.

WATER-OUZELS, see DIPPERS.

WATER-POLO, popular swimming-game; sides consist of seven players; the object is to place ball in opponents' goal. Length of play, usually seven minutes each way, with time taken off for interruptions; length of pond, 19–30 yds.; maximum breadth, 20 yds.

WATER-RAT, a Vole; see MICROTUS AMPHIBIUS.

WATER-SOLDIER (*Stratiotes aloides*), aquatic plant of order Hydrocharideæ; flowers are white.

WATERS, TERRITORIAL, see FISHES (FISHERIES).

WATER-SHREW, see SHREW FAMILY.

WATERSPOUT, see WHIRLWIND.

WATER-THYME (*Elodea*), a Canadian fresh-water plant naturalised throughout W. Europe.

WATERTOWN.—(1) (43° 57′ N., 75° 59′ W.) city, on Black River, capital, Jefferson County, New York; carriage and wagon works. Pop. (1910) 20,730. (2) (43° 12′ N., 88° 40′ W.) city, on Rock River, Jefferson and Dodge Counties, Wisconsin, U.S.A.; manufactures agricultural implements; seat of North-Western Univ. (Lutheran). Pop. (1910) 8829. (3) (42° 22′ N., 71° 12′ W.) town, Middlesex County, Massachusetts, U.S.A.; has a U.S. arsenal; manufactures paper; suburb of Boston (*q.v.*). Pop. (1910) 12,875.

WATERVILLE (44° 34′ N., 69° 40′ W.), city, on Kennebec, Kennebec County, Maine, U.S.A.; seat of Colby Univ.; manufactures cottons, woollens. Pop. (1910) 11,458.

WATERVLEIT, formerly WEST TROY (42° 44′ N., 73° 44′ W.), city, on Hudson River, Albany County, New York, U.S.A.; U.S. arsenal. Pop. (1910) 15,074.

WATFORD (51° 39′ N., 0° 24′ W.), town, on Colne, Hertfordshire, England; brewing and malting industries. Pop. (1911) 40,953.

WATKIN, SIR EDWARD WILLIAM, 1st Bart. (1819–1901), Eng. railway manager; chairman of S. Eastern Railway.

WATKINS (42° 22′ N., 76° 58′ W.), village, on Seneca Lake, capital, Schuyler County, New York; mineral springs.

WATLING STREET, great Rom. road in England, which extended from London, *via* St. Albans, Dunstable, etc., to Wroxeter on the Severn.

WATSON, RICHARD (1737–1816), prof. of Chemistry; regius prof. of Divinity, Cambridge; bp. of Llandaff, 1782.

WATSON, THOMAS (*c.* 1557–92), Eng. lyricist pub. Lat. trans. of *Antigone* (1581). His *Passionate Centurie of Love* is a collection of 100 pseudo-sonnets. His best work is *The Tears of Fancy*, or *Love Disowned*.

WATSON, WILLIAM (1858–), Eng. poet; b. Burley-in-Wharfedale, Yorkshire. His first poem of real merit was *Wordsworth's Grave*. In 1898 were published his *Collected Poems* and a new volume entitled *The Hope of the World*.

WATT, JAMES (1736–1819), Scot. engineer; originator of steam-engine; b. Greenock; s. of a merchant; ed. at public schools; app. mathematical instrument maker to Glasgow Univ.; acted as civil engineer, making surveys for the harbours of Ayr, Port-Glasgow, and Greenock, for deepening the Forth and Clyde Canal, and for the Caledonian Canal.

W. invented a letter-copying press, air-pump, condenser, steam jacket for cylinders, double-acting engine, sun and planet motion, expansion principle of double engine, parallel motion, smokeless furnace, and steam-engine governors; went into partnership with Matthew Boulton, 1774, and carried on a successful business at the Soho Iron Works, Birmingham, retiring in 1800. See ENGINE (STEAM-ENGINE).

Life, by Smiles (ed. 1878), Pemberton (1905).

WATTEAU, ANTOINE (1684–1721), Fr. painter; went to Paris, where he endured some hardships; was employed with Audran, the decorator of the Luxembourg, and in 1711 entered the Academy as a student. He became famous for his landscapes, mostly of small size, charming in colour and graceful in design. A large collection of his pictures made by Frederick the Great is now in possession of the Ger. Emperor.

WATTIGNIES (50° 10′ N., 4° E.), village, Nord,

France; scene of defeat of French by Austrians, 1793.

WATTMETER, instrument for measuring electric power, consists of two separate coils, one surrounding the other, of which the inner (a few turns of thick wire) is fixed and the outer (fine wire on a non-metallic frame) movable. A quadrant electrometer (*q.v.*) may serve as a w.

WATTS, GEORGE FREDERICK (1817–1904), Brit. painter and sculptor; b. London, of parents of Celtic origin; was practically self-taught, his real instructors being the Elgin Marbles. He exhibited first at the Academy, 1837. In 1842 he won a prize of £300 for a fresco, and went for four years to Italy, where he learnt the old masters' secrets of brilliant colour and effects. He worked without much recognition for many years, and it was not till 1867 that he was elected an Associate of the Academy. He developed into a master of symbolic painting, and his imaginative pictures, poetic in subject and treatment, deal with the great yet common things of life—love, death, and judgment. As a portrait painter he had many notable sitters, including Gladstone, Browning, Tennyson, Carlyle, George Meredith, and Cardinal Manning.

WATTS, ISAAC (1674–1748), Nonconformist divine, minister in London; famous for his hymns and metrical versions of psalms, many of which are still sung, *e.g.* 'O God, our help in ages past.'

WATTS-DUNTON, WALTER THEODORE (1832–), Eng. critic and novelist; intimate friend of Rossetti and Swinburne; long connected with *Athenæum*; his *Aylwin*, a poetic romance, proclaimed the 'Renascence of Wonder.'

WAUGH, EDWIN (1817–90), Lancashire dialect poet; also wrote humorous prose, e.g. *Besom Ben Stories.*

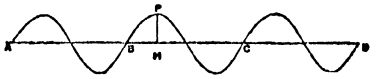
WAUKEGAN (42° 23′ N., 87° 50′ W.), city, on Lake Michigan, capital, Lake County, Illinois, U.S.A.; mineral springs; manufactures iron. Pop. (1910) 16,069.

WAUKESHA (43° N., 88° 11′ W.), city, watering-place, capital, Waukesha County, Wisconsin, U.S.A.; medicinal springs. Pop. (1910) 8740.

WAUSAU (45° 9′ N., 89° 32′ W.), city, Wisconsin, U.S.A.; leather, paper, machinery. Pop. (1910) 16,560.

WAVE.—This term may be applied generally to any periodically recurring displacement or disturbance from a condition of stable equilibrium. It has, therefore, a large number of applications in physics. In gases, sound w's consist of compressional and rarefactional disturbances of a periodic kind travelling through air or other gaseous medium. There may also occur w's on a large scale, such as those which constitute the diurnal variation of the barometer, and those produced by the explosions at the eruption of Krakatoa in 1883, which travelled thrice round the globe before becoming imperceptible. In liquids, there are the ordinary w's produced by gravitation on the surface of large bodies of water, and also the ripples produced by surface tension. The trains of w's set up by the motion of a ship, and easily observed on a smooth sea, may also be mentioned. The beat of the pulse is another form of liquid w. The tides are a w.-system on a large scale, produced by the gravitational effects of the sun and moon on the oceans. In solids, a variety of w's are possible. We may have w's due to periodical compressional, torsional, or shearing stresses applied to a body. The fact that sound can travel through solids, and that earthquake w's pass through the earth, is evidence of this. There are also displacement w's in the luminiferous medium or ether. When these are extremely short, they are known as ultra-violet light; when longer, they form visible light; longer still, they produce radiant heat w's; beyond that they form the Hertzian w's employed in wireless telegraphy. Another example of w. is afforded if one end of a metallic bar is heated steadily for a given time, then allowed to cool for the same or another given time, and this process of heating and cooling be continued. A series of temperature w's will then pass along the bar. Similarly, if the intensity and direction of an electric current in the bar be made to change periodically, we have an alternating current which is virtually a w.-like motion among the electrons whose steady drift in one direction constitutes a steady current. A telegraphic signal sent through a cable is an example of an isolated w. of electric potential.

All such w.-motions have several features in common, and these may be illustrated by reference to some typical w. Suppose a long rope be fastened at one end to a fixed support, stretched horizontally, while the other end (held in the hand) is given a rapid up-and-down oscillation. A series of displacement w's will be seen travelling along the rope. These can be studied in two distinct ways. We may consider what happens, *first*, to a given point of the rope at different times; *second*, at the same given instant to different points of the rope. The latter is, perhaps, easier of comprehension, for it could be represented by an instantaneous photograph of the whole rope while in a state of vibration. Such a photograph would give a figure such as that shown,



and it will be noticed that any part such as AB can be exactly superposed on other parts such as BC, CD, etc. Each such part forms one w. It has a definite length AB, termed the *wave-length*, which may be defined as the distance from the crest (or trough) of one w. to the crest (or trough) of the next. The extent of the greatest displacement (PM), upwards or downwards, is known as the *amplitude*, popularly known as half the height of the w. The time taken for a single w. to pass any given point (or the time taken by any point of the rope to execute one complete oscillation) is known as the *period*. The speed with which a w. travels is obviously equal to its length divided by its period. These quantities, length, amplitude, and period, are the leading characteristics of any w. The actual shape, or profile, of w's vary of course in different cases. The effects of varying value in the three characteristics may, however, be noted; *e.g.* when sound w's are greater or less in length, they produce notes which are lower or higher in pitch, while an increase in amplitude means a louder sound. The effects of varying length in light w's has already been noted: here, increased amplitude means greater intensity of light. Cases occur in which the amplitude of a w. changes with time. For example, if a stone be thrown into water whose surface is at rest, a ring-shaped w. spreads out from the point at which the stone entered the water. As the w.-circle increases, the energy of the original disturbance is spread over a greater length of w., and consequently the amplitude gradually diminishes. The same is true of the diminished audibility of sound when heard at increasing distances. In suitable conditions, w's may be reflected, refracted, and may interfere with each other, and these phenomena are frequently illustrated by sea w's.

Daniell, *Principles of Physics.*

WAVERLY (42° 2′ N., 76° 40′ W.), village, on Cayuta Creek, Tioga County, New York, U.S.A.; railway centre; coal-mining interests. Pop. (1911) 4855.

WAVRE (50° 43′ N., 4° 36′ E.), town, Brabant, Belgium; scene of a battle between French and Prussians, June 18, 1815. Pop. 8600.

WAX, fatty substances, generally animal or vegetable matter (with exception of paraffin w.); used in candle-making, insulatives, and as basis for various mixtures.

WAX TABLETS, see PALÆOGRAPHY.

WAX-CLOTH, FLOORCLOTH (*q.v.*).

WAXWINGS (*Ampelidæ*), small, silky-plumaged birds, having some wing feathers with a red horny

tip which resembles wax; mostly American, but one species (*Ampelis garrulus*) is a frequent winter visitor to Britain.

WAYCROSS (31° 12′ N., 82° 20′ W.), city, capital, Ware County, Georgia, U.S.A.; railway-shops; manufactures lumber. Pop. (1910) 14,485.

WAYLAND THE SMITH, in Teutonic romance, akin in character to the Gk. Hephæstus as being the hero of the forge. He also bears some resemblance to Dædalus, in that he contrived to fly by means of a feather robe. The legend was for long popular, with numerous variations, in the S. of England.

WAYNE, ANTHONY (1745–96), Amer. soldier; ed. Philadelphia; a brilliant general, under Washington, 1776–82; fought at Brandywine, Germantown, Monmouth, Stony Point, and Green Springs; defeated Indians, 1793–95.

WAYNESBORO (39° 45′ N., 77° 35′ W.), town, Franklin County, Pennsylvania, U.S.A.; manufactures machinery. Pop. (1910) 7199.

WAYNFLETE, WILLIAM (1395–1486), Eng. Churchman; b. Wainfleet, Lincolnshire; ed. Winchester and New Coll., Oxford; founder of Magdalen Coll., Oxford, and second provost of Eton; bp. of Winchester, 1447; treated with Cade at Southwark, 1450, on the close of rebellion; app. chancellor by Henry VI., 1456; actively Lancastrian in Civil War; pardoned by Edward IV., 1466, and compelled to purchase another pardon in 1471. W. supported Richard III., and retired from public life, 1485. Bequeathed money and lands to Winchester, Magdalen, and New Coll., and did much for learning. As chancellor he was upright, and his influence moderated the strife of Wars of Roses.

WAZIRABAD (32° 27′ N., 74° 10′ E.), town, Gujranwala district, Punjab, British India; manufactures steel and iron. Pop. 19,000.

WAZZAN (35° N., 5° 40′ W.), sacred town, Morocco; residence of the Grand-Sherif. Pop. *c.* 10,500.

WEALD, THE (51° 5′ N., 0° 10′ E.), district between the N. and S. Downs, England; comprises portions of Kent, Surrey, and Sussex.

WEALDEN, strata (seen in Weald) of the Lower Cretaceous system; fresh-water and estuarine deposit; fossil remains—fresh-water shell-fish, dinosaurs and pterodactyls, plants and reptiles.

WEALTH, articles that are material, transferable, limited in quantity, and useful; poisons, instruments of destruction, etc., are 'wealth' to the political economist, because there is a demand for them.

WEANING, see BABY.

WEAR (54° 55′ N., 1° 22′ W.), river, Durham, England; flows into North Sea at Sunderland; length, 60 miles.

WEASEL FAMILY (*Mustelidæ*), a family of Carnivora (*q.v.*), the members of which are distinguished by their long, slim, cylindrical bodies, slung between short legs, their long necks and slender heads, and their mode of walking on their toes and not on the sole of the foot proper. Their species, to the number of about 175, are found all over the world except in the Australian region. The true Weasels (*Putorius*) are perhaps the most familiar of Brit. species, the small COMMON WEASEL (*P. vulgaris*) and its close relative, the larger STOAT or ERMINE (*P. erminea*), being found throughout Europe, Northern Asia, and northern N. America. Both are ferocious and bloodthirsty animals, feeding on small mammals, such as rats, mice, moles, and on birds and frogs, and in their northern ranges the fur of both becomes white in winter, that of the latter forming the royal ermine. Similar in habits and distribution is the closely related POLECAT (*P. fœtidus*), an albino variety of which has been domesticated as the FERRET, used in rabbit-hunting. The MINK (*P. lutreola*), which furnishes valuable fur, is semi-aquatic, and has partially webbed feet. Larger than these, and of stouter build, is the WOLVERINE or GLUTTON (*Gulo luscus*), found in the woods of N. Europe, Asia, and America. It is exceedingly strong, and has been known to attack reindeer and even horses.

The MARTENS (*Mustela*) form another group, less active than true Weasels, though none the less bloodthirsty. They are arboreal in habit, and the fur of some—such as the Northern Asiatic SABLE and the AMERICAN SABLE—is very valuable. Martens are confined to the northern hemisphere, the PINE MARTEN being a native of Britain.

Still another group includes the BADGERS (*Meles*) of Europe and Asia, the American SKUNKS (*Mephitis* and *Conepatus*), and the Indian and African RATELS (*Mellivora*). These are heavily built nocturnal animals, given to burrowing, and in the colder areas to hibernation. The Badger is a disappearing member of the British fauna, and like its relatives is carnivorous, insectivorous, or even vegetarian, as necessity arises.

Lastly come the OTTERS, with webbed feet and aquatic habits, whose depredations cause much damage to well-stocked trout and salmon streams, and whose fur is of considerable value. True Otters (*Lutra*) are found almost all the world over, except in Australia, Madagascar, and some smaller islands, but the SEA OTTER (*Latax*) occurs only on the shores of the northern Pacific.

WEATHER, see METEOROLOGY.

WEAVER BIRDS (*Ploceidæ*), a family of Old World finch-like Passerine Birds, with about 500 species, many of which build elaborate, flask-shaped nests; social in habit; especially common in Africa.

WEAVING, the process of interlacing yarn threads or similar flexible filaments by means of a loom, thus producing cloth or other fabric. Two sets of threads are used, crossing each other at right angles, the longitudinal set being called the *warp*, and the transverse set the *weft*. Besides fabrics made from one warp and one weft, there are others with two warps and one weft or two wefts and one warp; two, three, and other ply fabrics constructed from two or more warps and wefts; tapestries and similar fabrics made by intersecting two or more warps and wefts in a special manner; and gauzes in which one part of the warp is twisted round another part. In fabrics such as velvets, plushes, or Turkey carpets, a part of the weft or warp stands up vertically from the ground.

The operation of weaving consists essentially in first setting up the warp, and then working the weft-threads into it by means of a shuttle. The hand-loom consists of a rectangular framework of four vertical posts, strengthened by cross ties. Two rollers are placed at opposite ends of the frame. Upon one, called the 'yarn-beam,' is wound the warp, sufficient of the threads being left unwound to reach the other roller, to which they are attached. This second roller is known as the 'cloth-beam,' and upon it the cloth is wound as it is woven. Every other thread of the warp is raised, and a smooth, wooden rod is inserted between the equal sets thus formed. Each warp-thread also passes through a small loop in the middle of a vertical thread called the 'heald.' In plain weaving there are two sets of healds, the warp-threads passing through one heald alternating with those passing through the other. The raising of one heald lifts up every alternate warp-thread, and the depressing of the other heald pulls down the remaining threads, and this combined action produces a space between the two sets of threads. Through this space, which is called the shed, the shuttle carrying the weft-thread is thrown. The healds are now reversed, so that the upper and lower sets of warp-threads exchange places, and the shuttle passes back again through the shed. After each passage of the shuttle the weft-thread is driven home to the web by the 'reed,' which consists of a narrow frame, having cross wires far enough to allow the passage of a single thread. The weft is wound upon a freely revolving bobbin placed inside the shuttle, the end passing out through a hole in the side of the shuttle. The shuttle was formerly thrown by hand, but in 1738 KAY invented the 'picker' arrangement, in which the shuttle was driven backwards and forwards by pieces of wood called pickers, actuated by the jerking of a cord attached to them. In the power-loom the

shuttle is driven across the warp by a picking-stick connected to a picker by a leather strap, and placed at the end of a box into which the shuttle flies after completing its journey, only to be driven out again immediately, and sent through the shed into the opposite shuttle-box. The power-loom was invented in 1785 by EDMUND CARTWRIGHT, an Eng. clergyman. Modern power-looms embody practically the same principles as the hand-loom. They are provided with arrangements for automatically stopping the loom when a thread breaks, or when the shuttle fails to act properly. There are also automatic contrivances for ejecting empty shuttles, and for bringing into use full ones, or replenishing the empty ones. When two or more colours are to be used in the weft, two or more shuttles are placed in a rotating box, which automatically brings a shuttle of the right colour into position for being thrown at the right time. The most intricate patterns can be woven by the Jacquard loom. In this loom the healds are arranged so that each is independent of the others, in order that any desired combination of warp-threads can be raised or lowered at any time, the actual combination being determined by the arrangement of a series of perforations in an endless band of cards, the holes being pierced in accordance with the pattern to be woven.

WEBB CITY (37° 5′ N., 94° 30′ W.), city, Jasper County, Missouri, U.S.A.; centre of lead and zinc region. Pop. (1910) 11,817.

WEBER, CARL MARIA FRIEDRICH ERNEST VON (1786–1826), Ger. composer; b. Eutin; d. in London. He studied under Abbé Vogler (of Browning's poem), and, in 1821, inaugurated purely Ger. opera, as opposed to the traditional and prevailing Ital. type, with his *Der Freischütz*, a work gaining for him the title, 'Father of the Romantic School'; produced the operas *Euryanthe* (Vienna, 1825) and *Oberon* (London, 1826). He was far advanced in consumption when he travelled to conduct the latter work, and was found dead in bed shortly after the first performance. Buried in London, his remains were removed to Dresden, on Wagner's initiative, 1844. Besides his operas, W. wrote a large number of pianoforte and other compositions, including the *Jubel* overture for the jubilee of Friedrich August.

WEBER, WILHELM EDUARD (1804–91), Ger. physicist; b. Wittenberg; graduated Halle; prof. at Halle, Göttingen, Leipzig; originated system of measuring electrical quantities.

WEBER'S LAW.—A light weight, easily felt by itself, is scarcely noticed if added to a heavy weight; a candle seems scarcely to add to the illumination of sunlight; a voice, audible in quiet, is lost in roaring traffic. Weber's Law states that the least difference of stimulus which will produce a noticeable difference of sensational intensity, bears a constant proportion to the magnitude of the original stimulus—for light $\frac{1}{100}$th, for sounds $\frac{1}{3}$rd, for lifted weights $\frac{1}{30}$th, etc. The law does not hold good of very weak or very intense stimuli.

WEBSTER (42° 4′ N., 71° 53′ W.), town, on French River, Webster County, Massachusetts, U.S.A.; manufactures cottons, woollens. Pop. (1910) 11,509.

WEBSTER, DANIEL (1782–1852), Amer. statesman; b. New Hampshire; ed. as a lawyer; entered Congress, and quickly won fame both at the Bar and in Congress. More than once averted war between Britain and America, and was chiefly responsible, as Sec. of State, for negotiating famous Ashburton Treaty, 1842, which, by settling the frontier between Canada and Maine, made Canada secure. His influence in N. States was weakened by his failure to accept the Anti-Slavery position, but he died before the question reached acutest stage. Although W. accepted, in 1850, the repeal of MISSOURI COMPROMISE (*q.v.*), he made the U.S. jointly responsible, by the *Treaty of Washington*, 1842, for watching and suppressing the African slave trade. W.'s fame rests mainly on his oratory.

H. C. Lodge, *Life* (1886).

WEBSTER, JOHN (fl. 1602–24), Eng. dramatist, about whose life scarcely any authentic facts are known. The first great tragedy he composed was the *White Devil*, a drama of astonishing power and pathos. This was followed by *The Duchess of Malfi*, whose supreme tragic excellence Lamb so well extolled. *The Devil's Law Case* is inferior in plot and style.

WEBSTER, NOAH (1758–1843), Amer. journalist and lexicographer; b. Hartford, Conn.; was admitted to the Bar, 1781, and augmented the proceeds from his legal practice by journalism. His great work is the *American Dictionary of the English Language*.

WECHEL, see under PRINTING.

WEDDERBURN, JOHN (1500–66), Scot. divine; probably wrote most of *Compendious Book of Psalms and Spiritual Songs*.

WEDGE, piece of metal (occasionally wood) triangular in section and tapering; point inserted into wood required to be split; broad end driven in; wood splits with grain.

WEDGWOOD, JOSIAH (1730–95), celebrated for his pottery. He began business at Burslem, Staffordshire, where his father was also a potter; and so improved the materials and the form and decoration of his products that *Wedgwood ware* became famous as the tangible representation of a fine art.

WEDNESBURY (52° 33′ N., 2° 1′ W.), town, Staffordshire, England; iron and coal-mining centre; manufactures iron and steel. Pop. (1911) 28,108.

WEEHAWKEN (40° 47′ N., 74° 2′ W.), town, on Hudson River, Hudson County, New Jersey, U.S.A. Pop. (1910) 11,228.

WEEK, see CALENDAR, CHRONOLOGY.

WEEVILS, see under RHYNCHOPHOROUS BEETLES.

WEIGHING-MACHINES.—The commonest and most accurate type is the equal-armed balance—a beam supported in the middle and carrying at each end a scalepan. The beam is rested upon polished planes by means of knife-edges of hardened steel, and the scalepans hang by chains from hooks also resting upon knife-edges. The beam should be horizontal when the pans are removed, and these, with their chains, should be exactly equal in weight. Other things being equal, the longer the arms of the balance, the smaller the weight of the beam, and the nearer the centre of gravity of the beam to the point of support, the greater will be the sensitiveness of the balance. For retail trade purposes, where rapidity is more important than minute accuracy, the counter machine, which has scalepans above and resting upon two beams cast in one piece or locked together, is most convenient, given free access to the scalepans.

Another common form is the steelyard or unequal-armed balance, also known as the Rom. balance. This consists of a lever moving freely upon a suspended fulcrum. The short arm carries a scalepan, and the long arm has a sliding weight, which is moved along the arm until the lever is horizontal, and the weight of a body is read by means of graduated divisions marked along the arm. There is also a form of steelyard called the Dan. balance, which has the weight fixed at the end of the lever, the fulcrum being movable. The steelyard is used for weighing railway luggage and loaded carts, and in the penny-in-the-slot automatic weighing-machines. The most portable w.-m. is the spring balance, which determines weight by the amount of compression of a spiral spring, as indicated upon a dial by a finger worked by rack and pinion. The spring is usually made with equal parts of right-hand and left-hand spiral, to prevent its turning round its axis; temperature affects the spring and the balance, and readings should be checked frequently. There are also various types of automatic machines for weighing large quantities of goods, totalling the day's weighing, giving value of parcels at so much per pound, etc.

WEIGHTS AND MEASURES.—Measurements of length, area, volume, mass, etc., are made by finding how often the unknown contains a fixed quantity or

unit, really arbitrary. The fixed unit is derived from a *Standard*. Thus the Brit. Standard of Length, the Imperial *Yard*, is the distance between two marks on a platinum bar kept by the *Standards Department* of the Board of Trade. Other standards are the *pound avoirdupois* and the *gallon*, which is the volume occupied by 10 lb. avoirdupois distilled water; the temperature of measurement is 62° F., the height of the barometer 30 inches. In the METRIC SYSTEM, in use in almost every civilised country, the International Standard is the distance between two marks on an X-shaped platinum-iridium bar at 0° C. at Paris. This standard is copied from the original in the Archives, supposed to be one-ten-millionth of the earth's quadrant from the North Pole to the Equator. The international *kilogram* equals one thousand *grammes* where one *gramme* is the mass of a cubic centimetre of distilled water at 4° C. Forty standard copies of the metre and kilogram were made for distribution among the nations.

The chief British systems are :—

Measures of Length.

12 inches (in. or ″)	. =1 foot (ft. or ′).
3 feet . .	. =1 yard.
5½ yards . .	. =1 rod, pole, or perch.
40 poles . .	. =1 furlong.
1760 yards=8 furlongs	. =1 statute mile.

MISCELLANEOUS.—22 yards=100 links of 7·92 inches =1 Gunter's chain; 3 miles=1 league; 1 knot or geographical mile=6082·66 feet; 1 degree=60 knots =69·121 miles; 1 Admiralty knot=6080 feet; 1 nautical mile=1870 yards; 1 nail=2¼ inches; 1 hand=4 inches; 1 palm=3 inches; 1 span=9 inches; 1 ell=1·25 yards.

Measures of Area.

144 sq. inches .	. =1 sq. foot.
9 sq. feet . .	. =1 sq. yard.
30¼ sq. yards .	. =1 sq. rod, pole, or perch.
40 sq. poles. .	. =1 rood.
4840 sq. yards=4 roods	. =1 acre.
640 acres . .	. =1 sq. mile.

For conversion to the metric system :—

1 inch lineal .	. =25·39954 millimetres.
1 sq. foot .	. =0·092898 sq. metres.

Measures of Capacity.

4 gills. .	. =1 pint.
2 pints .	. =1 quart.
4 quarts .	. =1 gallon.
2 gallons .	. =1 peck.
4 pecks .	. =1 bushel.
8 bushels .	. =1 quarter.
36 bushels .	. =1 chaldron.
1728 cubic inches	. =1 cubic foot.
27 cubic feet.	. =1 cubic yard.

Measures of Weight.

16 drams (dr.) .	. =1 ounce (oz.).
16 ounces . .	. =1 pound (lb.)=7000 grains.
28 pounds . .	. =1 quarter.
14 pounds . .	. =1 stone.
4 quarters . .	. =1 hundredweight (cwt.).
20 hundredweights .	. =1 ton=1016·0 kilogrammes.

For gold, silver, and precious stones the troy ounce =480 grains, is used.

Troy Weight.

24 grains . .	. =1 pennyweight (dwt.).
20 pennyweights .	. =1 ounce (oz.).
12 ounces . .	. =1 pound (lb.).
100 pounds . .	. =1 hundredweight (cwt.).

Apothecaries' Measures.

20 grains. .	. =1 scruple (℈ i).
3 scruples .	. =1 drachm (ʒ i).
60 minims (♏)	. =1 drachm.
8 drachms .	. =1 ounce (oz. Apoth.).

In the metric system we have :—

MEASURES OF LENGTH.—1 metre (m.)=1000 millimetres (mm.)=100 centimetres (cm.)=10 decimetres (dm.).

10 metres . . .	=1 dekametre (dam.).
10 dekametres . .	=1 hectometre (hm.).
1000 metres=10 hectometres	=1 kilometre (km.) (=0·6214 mile).

A micron (μ)=·001 mm., a micromillimetre ($\mu\mu$)= ·000001 mm., are used in sciences.

MEASURES OF AREA.—100 sq. millimetres=1 sq. centimetre; 10,000 sq. centimetres=1 sq. metre; 1 million sq. metres=1 sq. kilometre=0·386 sq. mile; 100 sq. metres=1 are; 100 ares=1 hectare=2·4711 acres.

MEASURES OF WEIGHT.—1000 milligrams (mg.)= 100 centigrams (cg.)=10 decigrams (dg.)=1 gramme (gm.); 1000 grammes=1 kilogramme (kg.)=2·20462 lb.; 1000 kilogrammes=1 metric ton=·9842 tons. The *Centner*, the cwt. of several continental countries, is now fixed at 50 kilogrammes.

MEASURES OF CAPACITY.—1000 cubic centimetres= 1 litre=0·8799 quart; 1000 litres=1 cubic metre.

Angular Measurement.

SEXAGESIMAL.

1 right angle .	. =90 degrees (°).
1 degree . .	. =60 minutes (′).
1 minute . .	. =60 seconds (″).

The French CENTESIMAL SYSTEM divides a right angle into 100 grades (g.), a grade into 100 minutes (′), a minute into 100 seconds (″). In CIRCULAR MEASUREMENT the unit is the radian, the angle subtended at the centre of a circle by an arc equal to the radius, and equals 57·2958 degrees.

Units of measurement of velocity, acceleration, work, and other physical quantities involve the fundamental units of length, mass, and time. Of the two systems—the *foot-pound-second* (F.P.S.) and the *centimetre-gramme-second* (C.G.S.)—the former is used in engineering, the latter in general scientific and electrical measurements.

WEIGHT-THROWING, see HAMMER-THROWING, PUTTING THE WEIGHT.

WEI-HAI-WEI (37° 35′ N., 122° 13′ E.), territory, N.E. China, extending 10 miles along the coast-line of Bay of Wei-hai-Wei, and also including several islands in the bay; leased by Britain in 1898; contains the city of Wei-hai-Wei; naval and coaling station. Pop. (1911) 147,177.

WEILBURG (52° 9′ N., 8° 14′ E.), town, on Lahn, Hesse-Nassau, Prussia; has a castle, formerly the residence of dukes of Nassau-Weilburg. Pop. 4000.

WEIMAR (50° 59′ N., 11° 19′ E.), city, on the Ilm, capital of Saxe-Weimar-Eisenbach, Germany; contains grand-ducal palace and Court theatre, in front of which is Rietschel's famous Goethe-Schiller monument; chiefly famous for its associations with Goethe, who lived here (1782–1832), and Schiller, who passed his last years here; has large building containing archives of the two poets. Pop. (1910) 34,582.

WEINHEIM (49° 33′ N., 8° 43′ E.), town, Baden, Germany; manufactures leather. Pop. (1910) 13,896.

WEINSBERG (49° 5′ N., 9° 5′ E.), town, Württemberg, Germany; scene of victory of Emperor Conrad over Count Welf, 1140. Pop. 3270.

WEIR, barrier placed across river to raise the water-level. Used for mill races and purposes of navigation. Saxons used arrangements of stakes and twigs as fish traps and water dams. When water wheels were a source of power w's were used to divert the current to the wheel. W's are generally of three types: *solid*, watertight dams of earthwork, simple, strong, and durable; *drawdoor*, by which the discharge of the river may be regulated by sluice gates; and *movable*, consisting of iron frames in beds of masonry.

WEISMANN, AUGUST (1834–), German biologist; app. prof. of Zool. at Freiburg, 1866;

wrote *Studies in the Theory of Descent* (1882), *Essays on Heredity* (1892), *The Germ-Plasm* (1893), *Evolution Theory* (1904).

WEISS, BERNHARD (1827–), New Testament critic; prof. at Königsberg and Berlin.

WEISSE, CHRISTIAN HERMANN (1801–66), Ger. Prot. theologian.

WEISSENBURG (49° 2′ N., 7° 48′ E.), town, on Lauter, Alsace-Lorraine; manufactures paper. Pop. 6770.

WEISSENBURG-AM-SAND (49° 2′ N., 9° 58′ E.), town, Middle Franconia, Bavaria; mineral spring; various industries. Pop. 7200.

WEISSENFELS (51° 12′ N., 11° 58′ E.), town, on Saale, Pruss. Saxony; manufactures machinery. Pop. (1910) 33,581.

WELD, Wood, Dyer's Rocket (*Reseda Luteola*), plant of order *Resedaceæ*; flowers are yellow, and resemble Mignonette; formerly used in dyeing.

WELDING, the joining of metallic surfaces by pressure while in a partly fused state. The first essential is absolute cleanliness, both chemical and mechanical. The temperature varies with different metals, but in every case it must be high enough to bring the surfaces to a pasty condition, yet not enough to oxidise them. *Thermic* w. depends upon the affinity of powdered aluminium for metallic oxides, sulphides, or chlorides, which may be employed for the reduction of metals with which oxygen, sulphur, or chlorine combine. Finely granulated aluminium is mixed with iron oxides and ignited, and an exceedingly high temperature is produced by the rapid oxidation of the aluminium. The process is used for tramway rails, steel girders, broken castings, etc. In *electric* w. the heat of the electric arc is used. Considerable heat is wasted and the process is slow. In the so-called electric blowpipe the arc is magnetically deflected. The Thomson process is electric w. in which the resistance of the metal itself is utilised. A current of low voltage but extremely high amperage is sent through the pieces to be welded, which are pressed together. By this process almost all metals and alloys can be welded.

WELDON, WALTER (1832–85), Eng. technical chemist; inventor of manganese recovery process.

WELL, see Water, Artesian Wells.

WELLESLEY (42° 18′ N., 71° 18′ W.), town, Norfolk County, Massachusetts, U.S.A.; seat of Wellesley Coll. (for women). Pop. (1910) 5413.

WELLESLEY, MARQUESS OF, Richard Colley Wesley (1760–1842), Brit. statesman; elder bro. of Duke of Wellington; ed. Eton, and Christchurch, Oxford; entered Parliament, 1787; Gov.-Gen. of India, and Baron W., 1797; marquis, 1799. Maintained and extended Brit. predominance in India; recalled, 1805; Lord-Lieut. of Ireland, 1821–28 and 1833–34.

WELLHAUSEN, JULIUS (1844–), theologian and philologist; prof. at Greifswald, 1872, Halle, 1882, Marburg, 1885, Göttingen, 1892; has written brilliant works on Old and New Testament and on Muhammadanism.

WELLINGBOROUGH (52° 19′ N., 0° 42′ W.), town, Northamptonshire, England; manufactures boots and shoes. Pop. (1911) 19,758.

WELLINGTON.—(1) (41° 16′ S., 174° 18′ E.) capital of New Zealand, in N. Island, on Cook Strait; seat of Victoria University College; important trade. Pop. (1911) 70,729. (2) (52° 43′ N., 2° 31′ W.) town, Shropshire, England; manufactures agricultural implements. Pop. (1911) 7820. (3) (50° 58′ N., 3° 14′ W.) town, Somersetshire, England; from it the Duke of Wellington took his title. Pop. (1911) 7634.

WELLINGTON, DUKE OF, Arthur Wellesley, 1st Duke (1769–1852), b. Ireland; s. of Lord Mornington; joined the army under the purchase system and passed through several regiments until at 24 he commanded the 33rd Foot, still known as the Duke of W.'s regiment. His first experience of active service was in the Low Countries under Duke of York; he afterwards accompanied his regiment to India, and through his brother's influence obtained important commands which enabled him to display his great abilities; his name is particularly associated with the battles of *Assaye* and *Argaum.*

He returned in 1805 and was placed in command of an expedition which had for its object the expulsion of the French from Lisbon; he succeeded in defeating Marshal Junot at *Vimiero* and *Rolica*, but was then ordered back to England, and the operations against Napoleon were conducted by Sir John Moore. After Moore's death, in 1808, W. again appeared in the Peninsula with enlarged powers which enabled him to control not only the tactics and the strategy but the policy of the war. He remained until he had expelled the French from Spain and his army was in actual occupation of Fr. territory between Bayonne and Toulouse in 1814, when Napoleon fell from power and the war ended. W. served as ambassador at Paris until Napoleon reappeared at the head of a Fr. army. In 1815, W. was placed in command of the forces maintained by Britain (then in alliance with the Prussians, Austrians, and Russians), with the object of crushing Napoleon's power for ever. He conducted the defensive operations south of Waterloo on June 18, 1815, and, aided by Blücher's army, dispersed Napoleon's forces and occupied Paris.

W.'s later career was associated with politics; he opposed many domestic reforms which have since been carried out; he was a member of the government and Prime Minister in 1828. Among the dignities which had been showered on this great Englishman during his long life was that of Warden of the Cinque Ports; he d. at Walmer Castle and was buried in St. Paul's Cathedral.

WELLS (51° 12′ N., 2° 39′ W.), town, Somerset, England, situated at foot of Mendip Hills; bp.'s see (with Bath); has very beautiful cathedral, dating from XIII. cent.; the west front, with its host of figures, is unsurpassed, and the chapter-house and Lady-Chapel are perfect examples of Early Eng. architecture; has episcopal palace. Pop. (1911) 4655.

WELLS, CHARLES JEREMIAH (1798 ?–1879), Eng. poet; b. in London, and unjustly neglected. The extraordinary richness of imagery and beauty of language of his dramatic poem, *Joseph and His Brethren*, were justly commended by Swinburne.

WELLS, DAVID AMES (1828–98), Amer. economist; chairman of national revenue commission, 1865.

WELLS, HERBERT GEORGE (1866–), Eng. novelist and socialist; began with imaginative fiction, e.g. *The Time Machine, The Invisible Man, The War of the Worlds*; but in later novels—*Kipps, The History of Mr. Polly, Ann Veronica, The New Machiavelli, Marriage*—he proved himself a true humorist and a clever psychologist; his *Mankind in the Making, New Worlds for Old, First and Last Things, A Modern Utopia*, like his novels, deal with sociology.

WELLS, SIR THOMAS SPENCER, Bart. (1818–97), Eng. surgeon; b. St. Albans; ed. St. Thomas's Hospital, London, and elsewhere (M.R.C.S., 1841); surgeon to Samaritan Free Hospital for Women and Children; Hunterian prof. of Surgery and Pathology (1878), and pres. (1882) Royal Coll. of Surgeons; a famous gynæcologist and surgeon, introducing various new operative procedures.

WELLSTON (39° 10′ N., 82° 33′ W.), city, Ohio, U.S.A.; iron and cement works. Pop. (1910) 6875.

WELLSVILLE (40° 41′ N., 80° 42′ W.), city, Columbiana County, Ohio, U.S.A.; coal, gas, and oil region; iron manufactures. Pop. (1910) 7769.

WELS (48° 9′ N., 14° 1′ E.), town, on Traun, Upper Austria; manufactures copper, brass. Pop. 15,470.

WELSBACH MANTLE, see Lighting.

WELSHPOOL (52° 40′ N., 3° 16′ W.), town, on Severn, Montgomeryshire, Wales; near it is Powys Castle (XII. cent.). Pop. (1911) 5917.

WEM (52° 42′ N., 2° 44′ W.), town, Shropshire, England.

WEMBLEY, town, Middlesex, England, 9 miles W.N.W. of St. Paul's. Pop. (1911) 10,697.

WEMYSS, pronounced 'Weems' (56° 9′ N., 3° 5′ W.), parish, on Firth of Forth, Fifeshire, Scotland; contains villages of Buckhaven, East W. and West W., Methil, Innerleven; coal-mining industry. Pop. (1911) 23,104.

WEMYSS, EARLDOM OF, honour held by Scot. family. Sir John W. was created Baron W. of Elcho, 1625; David, Lord Elcho (1721–87), s. of 4th earl, was a Jacobite in '45 rising and was attainted. Francis Charteris, 10th earl (1818–), founded volunteer movement when Lord Elcho.

WENCESLAUS (1361–1419), king of Bohemia and Germany; s. of Emperor Charles IV. In 1363 he was crowned king of Bohemia, and in 1378 he became king of Germany. He roused the enmity of the nobles and was imprisoned; forced to abdicate in favour of his brother Sigismund, 1411.

WÊN-CHOW-FU (28° N., 120° 20′ E.), city, treaty port, Che-kiang, China. Pop. (1910) 100,000.

WENDEN (57° 19′ N., 25° 16′ E.), town, Livonia, Russia; has a ruined castle (XIII. cent.) and a fine mediæval church. Pop. 6700.

WENDOVER (51° 46′ N., 0° 44′ W.), town, Buckinghamshire, England.

WENDS, Slavs of Lusatia (Saxony and Prussia); also called SORBS. At one time occupied territory from the Vistula to the Elbe, and were gradually absorbed by the Germans. Speakers of Wendish grow fewer every year. See SLAVS.

WENDT, HANS HINRICH (1853–), Liberal Prot. prof. of Theology, Heidelberg, 1885, Jena, 1893; voluminous writer.

WENER, LAKE, see VENER, LAKE.

WENLOCK, MUCH WENLOCK (52° 37′ N., 2° 34′ W.), town, Shropshire, England; agricultural district; limestone quarries. Pop. (1911) 15,244.

WENLOCK GROUP, subdivision of Silurian system which underlies the Ludlow rocks (*q.v.*); well developed at Wenlock.

WENS, small cysts on skin of face and scalp; remove by squeezing. See SCALP.

WENSLEYDALE (54° 10′ N., 1° 40′ W.), the part of the valley of the Ure, Yorkshire, England, from its head to Jervaulx Abbey; traversed by a branch of the N.E. Railway.

WENTLETRAP (*Scalaria*), genus of Gasteropoda showing relationship with *Turritella*; native to southern seas; shells, lustrous white, are spiral; shells of Precious W. (*S. pretiosa*), the largest, at one time realised high prices.

WENTWORTH, THOMAS (1501–51), cr. by Henry VIII. 1st Baron W. of Nettlestead; descendant of old Yorkshire family at Wentworth-Woodhouse; ancestor of W's of Oxfordshire, conspicuous on side of Parliament in Civil War, and of Earls of Cleveland. Thomas W., 1st Earl of Strafford, was e. s. of Sir William, elder branch of family.

WENTWORTH, THOMAS, see STRAFFORD, EARL OF.

WEPENER (29° 47′ S., 26° 50′ E.), town, Orange Free State.

WERDAU (50° 44′ N., 12° 23′ E.), town, Saxony, Germany; wool-spinning industry, dyeing, machinery. Pop. (1910) 20,830.

WERDEN (54° 22′ N., 7° 3′ E.), town, on Ruhr, Rhineland, Prussia; manufactures cloth; contains a church of a Benedictine abbey, founded 800. Pop. 12,740.

WEREGILD (O.E. *wer*, 'a man,' and *geld*, 'payment of money'), a sum of money paid, in accordance with early Teutonic law, in expiation of homicide or injury. Payment varied with the injured person's rank. In the case of murder, the relatives of deceased were paid *man-wyrth*. A later phase was the interference of the State, which demanded weregild in addition to that paid to the dead man's relatives. Overlords received *manbote*, i.e. compensation for a vassal slain. W. has some kinship with Vendetta (*q.v.*).

WERGELAND, HENRIK ARNOLDUS (1808–45), Norweg. poet; advocate of emancipation of Jews.

WERMELSKIRCHEN (51° 10′ N., 7° 12′ E.), town, Rhineland, Prussia; textile industries. Pop. 16,380.

WERNER, ABRAHAM GOTTLOB (1750–1817), Ger. geologist; b. Wehrau, Lusatia; prof. of Mineralogy, Freiberg, 1775; a brilliant scientist. See GEOLOGY.

WERNIGERODE (51° 50′ N., 10° 47′ E.), town, on Holzemme, Pruss. Saxony; manufactures cigars and brandy; was capital of Stolberg-Wernigerode. Pop. 18,370.

WERTH, JOHANN, COUNT VON (*c.* 1595–1652), Ger. soldier; b. Büttgen, near Jülich; distinguished cavalry leader in Bavarian army; made a baron and lieut.-marshal after Nördlingen; took part in battles of *Rheinfelden*, *Tuttlingen*, *Jankau*, *Mergentheim*, and *Allersheim*.

WERTHER, see GOETHE.

WERWOLF, WEREWOLF, according to a superstition widely disseminated in Europe in mediæval times, a man who had power to transform himself into a wolf. In such tales the w. is sometimes a powerful warrior and sometimes a bloodthirsty monster who spreads destruction broadcast. Nor is the w. unknown in classical times; in the 8th Eclogue of Vergil, Mœris transforms himself into a wolf by means of magic herbs. Lycanthropy (*q.v.*) has been the subject of much scientific discussion. It has an obvious relation to Metempsychosis and Totemism.

WESEL (51° 39′ N., 6° 36′ E.), fortified town, at junction of Lippe and Rhine, Rhineland, Prussia; manufactures metal goods. Pop. 24,450.

WESEL, JOHANN RUCHRAT VON (d. 1481), Ger. divine; prof. at Erfurt; as 'reformer,' tried and sentenced to imprisonment in a convent.

WESER (53° 42′ N., 8° 18′ E.) (ancient *Visurgis*), river, Germany; formed by union of Werra and Fulda at Münden; flows northwards through Prussia and enters North Sea; length, 270 miles; navigable to Münden.

WESLEY, CHARLES (1707–88), Eng. religious leader; brother of John Wesley (*q.v.*); ed. Westminster and Oxford; wrote over 6000 hymns, best known being *Jesu, Lover of my soul*, and *O for a thousand tongues to sing*.

WESLEY, JOHN (1703–91), Eng. religious leader and founder of Wesleyanism; ed. Charterhouse and Oxford; ordained deacon, 1725, becoming fellow of Lincoln Coll., 1726. For some time he preached in parish churches near Oxford, but his spiritual power only developed gradually. In 1735 he and his bro. Charles went to Georgia and evangelised there. W. pub. his *Collection of Psalms and Hymns*, 1737. His intense conviction of the forgiveness of his own sin took place at London, 1738. His theology was Arminian, not Calvinistic. Gradually his work became separate from the Anglican Church. When he ordained, separation had already began, though he had striven to avert it. His preaching, zeal, and his power of popular appeal were enormous.

Life, by Telford (1899), R. Southey (ed. 1871), Overton (1891).

WESLEYAN METHODISTS, see under FREE CHURCHES.

WESSEL, JOHAN (1420–89), Dutch divine; studied at Deventer, Cologne, Paris, and Rome: prof. at Heidelberg, 1476; opposed to the ecclesiastical corruptions of his time, he in some ways anticipated Reformers' views.

WESSEX, in ancient times, the kingdom of W. Saxons, England; included counties of Somerset, Dorset, Wilts, Hants, and Berks, and in later times, Devon and Cornwall; founded, 519, by Cerdic; converted to Christianity in VII. cent.; in 800 Egbert succeeded as king, and 27 or 30 years later he became ruler of the whole of Britain.

WEST AFRICA.—*British*—NIGERIA, LAGOS, GOLD COAST, ASHANTI, SIERRA LEONE, GAMBIA; *French*—FRENCH WEST AFRICA; *German*—GERMAN SOUTH-WEST AFRICA, KAMERUN, TOGOLAND; *Portuguese*—PORTUGUESE GUINEA, ANGOLA, KABINDA; *Spanish*—FERNANDO PO, RIO DE ORO, SPANISH GUINEA.



WEST BAY CITY, BAY CITY (*q.v.*).

WEST, BENJAMIN (1738–1820), Anglo-Amer. painter; b. Springfield, Pennsylvania. Settling in London, he attained fame by his historical pictures, and was honoured with burial in St. Paul's Cathedral.

WEST BROMWICH (53° 32′ N., 1° 59′ W.), town, Staffordshire, England; manufactures metal goods. Pop. (1911) 68,345.

WEST CHESTER (39° 57′ N., 75° 40′ W.), town, capital, Chester County, Pennsylvania, U.S.A.; dairy-farming; market-gardening; manufactures dairy implements. Pop. (1910) 11,767.

WEST HAM (51° 30′ N., 0° 3′ E.), eastern suburb of London, in Essex, England. Pop. (1911) 289,102.

WEST HAVEN (41° 17′ N., 72° 57′ W.), town, on New Haven Harbor, New Haven County, Connecticut, U.S.A.; manufactures pianos, wire goods. Pop. (1910) 8543.

WEST HOBOKEN (40° 45′ N., 74° 4′ W.), town, Hudson County, New Jersey, U.S.A.; manufactures silk goods. Pop. (1910) 35,403.

WEST INDIES (10° to 27° N., 60° to 85° W.), islands to N. and E. of Caribbean Sea, extending from Yucatan and Florida to Gulf of Paria, N. coast of Venezuela; area, *c.* 96,000 sq. miles; comprise the Bahamas; the four large islands of Cuba, Jamaica, Haiti, and Porto Rico, known as the Greater Antilles; the Virgin, Leeward, and Windward Islands, which form group known as Lesser Antilles; and Trinidad, off Venezuelan coast. Of these, Cuba and Haiti are independent; Bahamas, Barbados, Jamaica, Leeward and Windward Islands, and Trinidad belong to Great Britain; Porto Rico to U.S.A., and others to Denmark, France, and Holland. Most of the islands are mountainous in character, being the projecting summits of a sub-oceanic ridge of mountains running between N. and S. America; others are of coral formation. The climate generally is tropical and the soil fertile. The islands produce and export sugar, cotton, coffee, cocoa, ginger, guano, sponges, arrow-root, tobacco, etc. First discovered by Columbus, 1492; subsequently occupied by Spaniards during XVII. and XVIII. cent's. Inhabitants are Europeans, half-castes, Chinese, Indians, and negroes. Pop. *c.* 7,000,000. For further particulars, see articles on the various islands and groups.

WEST, NICHOLAS (1461–1533), bp. of Ely, 1515.

WEST ORANGE (40° 18′ N., 74° 17′ W.), residential town, Essex County, New Jersey, U.S.A.; manufactures phonographs. Pop. (1910) 10,980.

WEST POINT (41° 23′ N., 73° 58′ W.), village, Orange County, New York, U.S.A.; strongly fortified; has an observatory; chiefly remarkable as the site of U.S. Military Academy (1802); education here is free, and the most rigorous discipline obtains; the buildings of the Academy include a magnificent library, officers' quarters, a riding hall, and a hospital.

WEST PRUSSIA, WESTPREUSSEN (53° 40′ N., 18° 20′ E.), province, on Baltic Sea, Prussia; surface level or hilly, rising in its highest point to 1086 ft.; traversed by Vistula; agricultural region; was Polish possession from 1466 to 1772, when it passed to Prussia. Capital, Danzig. Pop. (1910) 1,703,474.

WEST SPRINGFIELD (42° N., 72° 40′ W.), town, Hampden County, Massachusetts, U.S.A.; railway-shops. Pop. (1910) 9224.

WEST TROY, WATERVLIET (*q.v.*).

WEST VIRGINIA (37° 14′ to 40° 38′ N., 77° 40′ to 82° 36′ W.), eastern state of U.S.A.; bounded N. by Pennsylvania and Maryland, E. and S. by Virginia, W. by Kentucky and Ohio; area, 24,715 sq. miles. Surface is generally mountainous, especially in E., where it is crossed by various ranges of the Allegheny Mountains, reaching an extreme height of 4860 ft. in Spruce Knob; drained by the Ohio (which forms N.W. boundary, separating W. V. from Ohio) and its affluents. The state is chiefly of Carboniferous formation. Climate is healthy and temperate.

W. V. was included in the state of Virginia until the outbreak of the American Civil War; but when Virginia seceded in 1861, the W. part declared its independence of the rest of the state, and remained loyal to Union; organised as a separate state, 1863. Executive power is vested in a governor, who is elected for 4 years and assisted by various officers of state. Legislature consists of Senate of 30 members and House of Delegates of 86 members, elected for 4 and 2 years respectively. Sends two Senators and six Representatives to Federal Congress. For purposes of local administration is divided into 55 counties.

Chief towns are Charleston (capital), Wheeling, Parkersburg, Huntington. Agriculture is important industry; chief crops—wheat, maize, oats, tobacco; fruit cultivated; live stock raised. Large area forested, lumbering being chief industry. Minerals include coal, petroleum, iron, sandstone. Industries include meat-packing, flour-milling, manufacture of leather, hardware, pottery. Education is free and obligatory; State Univ. at Morgantown. Chief religions are Methodist, Baptist, R.C. Pop. (1910) 1,221,119.

WESTALL, RICHARD (1765–1836), Eng. artist; chiefly celebrated for his historical water-colours and book illustrations.

WESTBORO (42° 17′ N., 71° 40′ W.), town, Worcester County, Massachusetts, U.S.A.; manufactures boots and shoes. Pop. (1910) 5446.

WESTBROOK (43° 40′ N., 70° 25′ W.), city, Cumberland County, Maine, U.S.A.; manufactures silks. Pop. (1910) 8281.

WESTBURY (51° 17′ N., 2° 7′ W.), town, Wiltshire, England. Pop. (1911) 3433.

WESTBURY, RICHARD BETHELL, 1ST BARON (1800–73), Brit. statesman; Solicitor-Gen., 1852; Attorney-Gen., 1856; Lord Chancellor, 1861; tried to abolish distinction between law and equity; attacked bp's in 'Essays and Reviews' question.

WESTCOTT, BROOKE FOSS (1825–1901), Eng. bp.; b. near Birmingham; ed. King Edward's School, Birmingham, and Trinity Coll., Cambridge; distinguished career at Cambridge; fellow of Trinity, 1849; assistant master at Harrow, 1852–67; canon of Peterboro', 1869; regius prof. of Divinity, Cambridge, 1870; canon of Westminster, 1883; bp. of Durham, 1890. A member of the company responsible for REVISED VERSION OF THE NEW TESTAMENT. Pub., with Hort, *The New Testament in Greek*, 1881. He encouraged study of social questions in Church of England, and was first pres. of Christian Social Union. Chief publications—commentaries on various books of the New Testament, and sermons.

WESTERLY (41° 23′ N., 71° 49′ W.), town, Washington County, Rhode Island, U.S.A.; granite quarries; manufactures cottons, woollens. Pop. (1910) 8696.

WESTERN AUSTRALIA (13° 30 to 35° S., 112° 51′ to 129° E.), western state of Australia; bounded N. by Indian Ocean, E. by S. Australia, S. by Southern Ocean, W. by Indian Ocean; area, 975,920 sq. miles; coast deeply indented in N.W.; surface is generally a tableland, with mountain ranges on the W. coast, reaching an extreme height of 3640 ft. in Bluff Knolls; drained by Ord, Fitzroy, De Grey, Fortescue, Ashburton, Gascoigne, Murchison, Greenough, and other streams; climate is healthy and dry, very hot in the N.

W. A. was first colonised by British, 1829; obtained responsible government, 1890; two years later the discovery of gold at Coolgardie led to a great influx of population; in 1901 the colony became one of the states of the Australian Federation. The executive is vested in a governor nominated by Brit. Crown and assisted by 8 ministers of state; legislature consists of a Council of 30 members and Assembly of 50 members, who are elected respectively for six and three years by popular vote.

Largest towns are Perth (capital), Fremantle, Boulder, Kalgoorlie, Midland Junction. Agriculture is carried on, chief crops being wheat, oats, and barley, while fruit is cultivated; horses, cattle, sheep, and pigs raised; minerals include gold (chief source of wealth), silver, copper, tin. There are large forests, with much valuable timber. Chief exports are gold, timber, hides, wheat, flour, wool, pearls. Education is free and obligatory. Chief religions, Anglican, R.C., Wesleyan, Presbyterian. Pop. (1911) 283,986.

WESTERN ISLES, see HEBRIDES.

WESTFIELD (42° 3′ N., 72° 46′ W.), town, Hampden County, Massachusetts, U.S.A.; manufactures whips. Pop. (1910) 16,044.

WESTGATE-ON-SEA (51° 23′ N., 1° 22′ E.), watering-place, Kent, England.

WESTHOUGHTON (53° 33′ N., 2° 32′ W.), town, Lancashire, England; textiles, coal. Pop. (1911) 15,046.

WESTMACOTT, SIR RICHARD (1775–1856), Eng. sculptor; prof. of Sculpture, Royal Academy, 1827–56; statues include Pitt, Fox, Addison, in Westminster Abbey; Abercromby, Captain Cook, Collingwood, in St. Paul's. His s. **Richard** (1799–1872) succ. him as prof. of Sculpture; his busts include Lord John Russell and Newman.

WESTMEATH (53° 30′ N., 7° 30′ W.), county, Leinster, Ireland; surface varied with hill, valley, and lake, interspersed with bog; drained chiefly by the Shannon; occupations mainly agricultural. County town, Mullingar. Pop. (1911) 59,182.

WESTMEATH, EARL OF, title held by the family of Nugent since 1621, and with which the marquessate was associated from 1822 to 1871. The marquessate lapsed when the earldom passed from the direct male line to a branch line in 1805.

WESTMINSTER (51° 31′ N., 0° 6′ W.), metropolitan borough, London, extending from banks of Thames to Hyde Park; includes within its bounds Hyde Park, St. James's Park, and the Green Park, and contains the Houses of Parliament, Westminster Hall, Westminster Abbey, the churches of St. Margaret, St. John, St. Martin-in-the-Fields, and others, Buckingham Palace, and St. James's Palace. In former times W. was separated from the City of London by Temple Bar (*q.v.*). The Abbey is one of finest examples of Early Eng. architecture; at the E. end are nine chapels, including the Lady Chapel, built by Henry VIII., and the chapel of St. Edward the Confessor; it is the burial-place of 18 sovereigns of England, and of many of the most distinguished men of the nation. Houses of Parliament were built, 1840. Hitherto St. Stephen's Chapel had been used by the Commons from 1547 on, and House of Commons is still familiarly known as St. Stephen's. Pop. (1911) 160,277.

WESTMINSTER, DUKEDOM OF, held by a noble house dating back to the Conquest. The founder of the family was Gilbert le Grosvenor.

WESTMINSTER, SYNODS OF, embrace ecclesiastical councils held in the Chapter-House of old St. Paul's, the Chapel of St. Catherine, and Westminster Abbey, and include those of Lanfranc, Anselm, etc.

WESTMORLAND (54° 29′ N., 2° 40′ W.), inland county, N. England; bounded N. and N.W. by Cumberland, W. by Lancs., S. by Lancs., E. by Yorkshire and Durham; area of administrative county, 789 sq. miles. Surface is generally hilly, with moorlands and deep valleys between the ridges; highest points, Helvellyn, Bow Fell, Dun Fell; drained by Eden, Kent, Lune, Leven, and other streams; in W. is famous Lake District, with Lakes Ullswater and Windermere on the Cumberland and Lancashire borders respectively, and Grasmere, Rydal Water, and others entirely within the county. County town, Appleby. Principal geological formations are Carboniferous and Silurian rocks. W. produces coal, fireclay, lead, slate, gypsum. Chief crops, oats, barley, wheat; cattle and sheep raised; manufactures woollens. Has ruins of several castles and monasteries. Pop. (1911) 63,575.

WESTMORLAND, EARLDOM OF.—Ralph Neville, 1st earl, 1364–1425; Marshal of England and famous soldier under Henry IV. and Henry V.; earldom became extinct with the death of Charles

Neville, 6th earl, in 1601. Revived, 1624, when Francis Fane, Baron Burghers, was cr. Earl of W. The present earl, Anthony Mildmay Julian Fane, is the 13th of present line.

WESTON-SUPER-MARE (51° 21′ N., 2° 58′ W.), watering-place, on Bristol Channel, Somerset, England. Pop. (1911) 23,235.

WESTPHALIA (c. 51° 42′ N., 8° 15′ E.), province, W. central Prussia; area, 7804 sq. miles; surface mountainous in S., with extreme height of over 2700 ft., and with hills stretching to N., whence they slope down into Great N. German Plain; drained by Ems, Weser, Lippe, Ruhr, and other streams; large area forested; flax and hemp grown; hams produced; coal, iron, zinc, etc.; manufactures of iron, steel, etc. Pop. (1910) 4,125,096. Capital, Münster.

Westphalia, Treaty of (1648), concluded Thirty Years War, making a return on the Continent to the conditions of 1618. General toleration in religion was secured; Protestants and Catholics were to retain possessions held in 1624. This left S. Germany to Catholics and N. to Protestants. The Ger. princes achieved a sovereignty, which left the Empire Austrian. Brandenburg began its march to power, and France obtained the Rhine for frontier, and was left the first military power in Europe.

WESTPORT (53° 48′ N., 9° 31′ W.), seaport, on Westport Bay, watering-place, County Mayo, Ireland. Pop. 3780.

WESTWARD HO, watering-place, Devonshire, England, 2½ miles N.W. of Bideford; named from Charles Kingsley's novel; golfing centre.

WETHERSFIELD (40° 42′ N., 72° 40′ W.), town, Hartford County, Connecticut, U.S.A.; manufactures small tools. Pop. (1910) 3178.

WETSTEIN, JOHANN JAKOB (1693–1754), Swiss divine; devoted himself specially to text of New Testament, collecting MSS.; friend of Bentley; deprived of curacy for unorthodox views, 1730; pub. *Novum Testamentum Græcum*, 1751–52.

WETTER, LAKE, see VETTER, LAKE.

WETTIN, electors of Saxony, 1423; divided, 1485, into Ernestine and Albertine branches; to the former belong grand-dukes of Saxe-Weimar and dukes of Altenburg, Coburg-Gotha, and Meiningen, to the latter the kings of Saxony.

WETZLAR (50° 34′ N., 8° 31′ E.), town, Rhineland, Prussia; cathedral founded XI. cent.; manufactures iron. Pop. 13,390.

WEXFORD.—(1) (52° 30′ N., 6° 35′ W.) coast county, Leinster, Ireland, with chief town of same name; area, 574,000 acres; surface generally level; highest point, Mt. Leinster; watered by Slaney and other rivers; has excellent grazing and large export of agricultural produce, butter, pigs, cattle, poultry, eggs; valuable fisheries on coast. Pop. (1911) 102,287. (2) (52° 20′ N., 6° 27′ W.) seaport, at mouth of Slaney, county town, County Wexford, Ireland; ship-building; fisheries; trade in agricultural produce; taken by Fitzstephen, 1169; stormed by Cromwell, 1649; was headquarters of the rebels, 1789. Pop. (1911) 11,455.

WEYBRIDGE (51° 22′ N., 0° 27′ W.), residential town, at junction of Wey and Thames, Surrey, England. Pop. (1911) 6286.

WEYLER Y NICOLAU, VALERIANO, MARQUESS OF TENERIFFE (1839–), Span. general and statesman; successively Captain-Gen. of the Canary Islands, Balearics, and Philippines; much criticised for actions in Cuba (1895).

WEYMAN, STANLEY JOHN (1855–), Eng. writer of hist. novels—e.g. *The Gentleman of France, Under the Red Robe, The House of the Wolf, Count Hannibal.*

WEYMOUTH (42° 15′ N., 70° 58′ W.), town, Norfolk County, Massachusetts, U.S.A.; manufactures boots and shoes. Pop. (1910) 12,895.

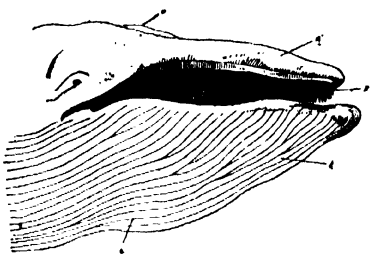
WEYMOUTH AND MELCOMBE REGIS (50° 37′ N., 2° 27′ W.), seaport, watering-place, on Weymouth Bay, Dorsetshire, England; boat-building; stone quarries; scene of several engagements in Civil War. Pop. (1911) 22,325.

WHALE LICE, see under MALACOSTRACA.

WHALE OIL, see OIL.

WHALEBONE, see under WHALES.

WHALES form two sub-orders of the large Mammal tribe of CETACEA (*q.v.*): (1) The MYSTACOCETI, or *Whalebone W's*, and (2) the ODONTOCETI, or *Toothed W's*. The Whalebone W's, or Right W's, belonging to the family BALÆNIDÆ, found in all oceans, are distinguished by the presence of whalebone, which, far from being bone, consists of horny baleen plates fringed on one border, and hanging down edgewise from the palate. The baleen, of which there may be as many as 300 plates, sometimes 10–15 ft. in length, may be present in the mouth of an adult animal, and serves as a strainer for food. Of other Whales belonging to the Balænidæ, the GREAT RORQUAL W. (*Balænoptera sibbaldi*) may be mentioned; it is the largest animal now in existence, sometimes measuring 80 ft. in length, and in common with the LESSER RORQUAL (*Balænoptera rostrata*) is distinguished by a dorsal fin, a characteristic which has given rise to the sailor's name of Finner Whales. Of the Toothed Whales, or Odontoceti, the SPERM WHALES (*Physeteridæ*) are found in all seas; the best-known species is the great square-headed Sperm W. (*Physeter macrocephalus*), with many large, similar teeth on the lower jaw, although the smaller of the invisible teeth of the upper jaw are sometimes also functional. It frequents the equatorial oceans in schools. The Sperm W. is valued for the spermaceti oil contained in a mass of loose cells on the upper surface of its head, and for ambergris, prized for the manufacture of perfumes. Belonging to the same family, the BOTTLE-NOSED W. (*Hyperoodon rostratus*) is confined to the N. Atlantic and sometimes makes it appearance off British coasts. Baleen W's feed mainly on the minute floating organisms of the sea, such as the Sea Butterflies or Pteropods, and medusan Swimming-Bells, whereas Toothed W's prefer a more substantial diet, the Sperm feeding almost exclusively on Cuttle-fishes.



COMMON RORQUAL OR FIN WHALE (*Balænoptera musculus*), showing eye, upper jaw, lower jaw, and throat-grooves.

Whale fishery is of great antiquity, the Norwegians being expert whale fishers over 1000 years ago, while the French and Spanish were interested in the industry in the X.–XVI. cent's, supplying Europe with oil and whalebone. The Dutch, Eskimos, Japanese, and Americans have all at one time or another engaged in the trade. The whale hunted from X.–XVI. cent's was probably the Atlantic right whale, but so great was the slaughter that they were almost exterminated. In later times Greenland became a popular base for whale fishing. The Dutch had a station there, and in 1680 they had 266 ships and 14,000 men engaged in the trade, but at the close of the XVIII. cent. Dutch whale fishing had almost ceased.

From 1732–1824 the Brit. Government offered a bonus for each ton of blubber, but only 164 Brit. ships were engaged in the trade in 1815. In 1828 89 ships killed 1197 whales, from which 13,966 tons of oil and 802 tons of whalebone were obtained. Whale fishing in the South Seas was at its height in 1790. The vessels were of about 300 tons burden, and were manned by a crew of 28 to 35 officers and men. Each carried

6 boats, with room for 4 rowers, a steerer, and a header. The whale was pursued by the boats, and the header drove home the harpoon and then attacked it with a lance in the vital parts; animal was pulled to side of parent vessel, and the blubber (*q.v.*) cut out and stored in casks. Dundee is the Brit. whale-fishing centre.

WHALLEY, EDWARD (*c.* 1615–75), Eng. regicide; woollen-draper; distinguished officer in Cromwell's army; custodian of Charles I. at Hampton Court, 1648; sat as judge at king's trial and signed the death-warrant; sat in Cromwell's Commons and Lords; escaped to New England, 1660.

WHARTON, EDITH N. (1862–), Amer. novelist; author—*House of Mirth, The Custom of the Country*, etc.

WHARTON, PHILIP WHARTON, DUKE OF (1698–1731), Brit. politician; raised to peerage, 1718, for supporting the Government; joined Pretender; fought on Span. side at siege of Gibraltar.

WHATELY, RICHARD (1787–1863), Eng. theological writer; b. London. At Oxford he met Newman, and in the *Apologia* Newman acknowledges his indebtedness. His first important work was a series of contributions on Logic to the *Encyclopædia Metropolitana*. In 1831 he was made a bp. of Dublin. In his religious views W. was very liberal, favouring Catholic emancipation and unsectarian religious instruction.

WHAUP, see CURLEW.

WHEAT (*Triticum vulgare*), a gramineous plant, the seeds of which form one of the staple sources of food of the civilised world. The flowers are borne in a dense, compound spike, popularly known as an 'ear,' this being composed of a number of spikelets closely packed upon the flower stalk. Each spikelet bears basally two sterile boat-shaped glumes, enclosing from two to five florets, each of which gives rise to a single grain. The origin of cultivated w. is unknown, as it is not connected with any similar wild species. The plant has been cultivated since prehistoric times and was introduced into this country by the Romans. The following are among the most important subspecies grown nowadays: *Triticum durum*, hard w., chiefly cultivated in tropical countries, and characterised by its large proportion of gluten; *T. polonicum*, Polish w.; *T. spelta*, spelt, the type originally grown in the Mediterranean region; *T. monococcum*, *T. dicoccum*, *T. turgidum*, turgid w., and *T. amyleum*, starch w. The subspecies grown in temperate climates, as contrasted with the tropical hard w's, are rich in starch, and the two are often blended in commercial flours.

W.-growing is general throughout the subtropics and the southern half of the temperate zone, as well as in certain parts of the tropics, but is replaced in more northerly latitudes by the hardier oats and rye. A clayey soil is most suitable for its successful culture, with a climate that is neither too damp nor too dry (*e.g.* Canada). Among its more important fungous diseases are 'Rust,' so called from its appearance on infected leaves as orange, or dark brown rusty-looking streaks, and Bunt or Smut, which attacks the ears, causing abortion of the 'berry,' and replacing this by a black evil-smelling mass of spores. Rust has been largely checked by the removal of barberry bushes, on which the parasite lives during one part of its life cycle, whilst bunt is destroyed by treating the seeds, before sowing, with formalin, 1 lb. to 50 galls. of water.

WHEATEAR, see under THRUSH FAMILY.

WHEATSTONE, SIR CHARLES (1802–75), Eng. physicist; b. Gloucester; manufacturer of musical instruments and scientist; prof., King's Coll., London; pioneer of telegraphy; invented stereoscope and many scientific instruments; wrote numerous scientific papers.

Wheatstone's Bridge (instrument for measuring electrical resistance), consists of a uniform iridio-platinum wire, 1 metre long, connected with a known resistance, a battery, and a galvanometer, in such a way as to make the ratio between two lengths of the wire equal to the ratio between the known and unknown resistances. The *Post-Office Box* is a compact form.

WHEEL AND AXLE, see MECHANICS.

WHEELING (40° 3′ N., 80° 48′ W.), town, on Ohio, capital, Ohio County, West Virginia, U.S.A.; coal and gas region; manufactures iron and steel; capital of the state, 1673–70 and 1875–85. Pop. (1910) 41,641.

WHELK (*Buccinum*), the Scot. 'Buckie,' belongs to the GASTEROPODA (*q.v.*).

WHETSTONE, HONE (*q.v.*).

WHEWELL, WILLIAM (1794–1866), master, Trin. Coll., Cambridge; pub. *History of Inductive Sciences* 1837; held that all knowledge develops from experience; induction not only the collection of facts, but their grouping under an appropriate conception, already present in the inquirer's mind.

WHICKHAM (54° 56′ N., 1° 41′ W.), town, Durham, England; collieries, ironworks. Pop. (1911) 18,332.

WHIG, originally 'Whigamore,' a nickname, arising *c.* 1680, for the Presbyterian peasantry of Scot. W. lowlands, who were considered rebels; applied to supporters of Revolution, 1688; supplanted by 'Radical' at time of Reform Bill. See LIBERAL PARTY.

Whig Party, in U.S.A., offshoot of Republican (Democratic) Party, founded by Pres. John Quincy Adams and Henry Clay, 1824–25; chief aims were the maintenance of the republican character of the Union, and the building up of independent and Amer. political institutions and civilisation. The assent to the Fugitive Slave Law by Daniel Webster, and the Whig Convention, 1852, broke up the party, which ceased to exist after 1854. Abraham Lincoln grew up in the W. P.

WHIMBRELS, see under PLOVER FAMILY.

WHIN, see FURZE.

WHINCHAT, see under THRUSH FAMILY.

WHIP SCORPIONS (*Pedipalpi*, an order of ARACHNIDA), small, carnivorous Arachnids found in the warm regions of both hemispheres, some of which have a whip-like 'tail.'

WHIP WORM, see under NEMATODA.

WHIP-POOR-WILL (*Antrostomus vociferus*), species of Goatsucker (*q.v.*); it is 10 inches long, has a white collar, stiff bristles at base of bill; name received from its cry.

WHIRLIGIG BEETLES, see under POLYMORPHA.

WHIRLPOOL, an eddy or vortex in water, caused by bank or another current interfering with course of a current, and by wind.

WHIRLWIND, TORNADO, circular rush of air caused by two winds meeting; of less area and continuance than hurricane (*q.v.*). A w. at sea is known as a *Waterspout*, a rotating pillar of water-spray.

WHISKERS, see HAIR.

WHISKY, see SPIRITS.

WHIST, card game for four players developed from XVI.-cent. game called 'trump,' which in England was elaborated into 'ruff-and-honours,' the direct ancestor of w. 'Long w.,' in which there were ten points for game, was popular till beginning of XIX. cent., when points were reduced to five; still played in U.S.A. Modern 'short' whist is played as follows: after arranging partners by cutting (two highest and two lowest play together), player who draws lowest card deals full pack, and turns up his last card to indicate trumps; dealer's left-hand opponent leads; players must, if possible, follow suit, the penalty for 'revoke' being deduction of three tricks from offending side, or addition of three to opponent's score. Five points constitute game, every trick over six scoring; six tricks called 'book.' Ace, king, queen, and knave of trumps count as 'honours' (separately from tricks); four points for four, two for three; seldom counted in U.S.A. Main rules are—lead from strength, return partner's lead, when second in hand play low, when third, high.

Dummy w., played by three players, with one hand exposed; *progressive w.*, played by several tables, winners generally moving to next table, losers remaining.

WHISTLER, JAMES ABBOT M'NEILL (1834–1903), Amer. artist; b. Lowell, Mass.; studied in Paris; settled in London, and in 1859 began to exhibit at the Royal Academy. He painted many portraits, includ-

ing those of Carlyle, Irving, and Sarasate; many figure subjects and views; worked in pastels; was eminent as etcher, dry-pointer, and purely decorative artist. His style in all departments was strikingly original. Ruskin attacked him savagely in *Fors Clavigera* in 1877, and a libel suit followed. As to this, see Whistler's *The Gentle Art of Making Enemies*.

WHISTON, WILLIAM (1667–1752), Anglican theologian and scientist; prof. of Math's at Cambridge, 1703, but deposed for Arianism; though unorthodox, opposed to rationalism in religion.

WHITBY (54° 29′ N., 0° 37′ W.), seaport, at mouth of Esk, watering-resort, E. Riding, Yorkshire, England; manufactures jet; important fisheries; boat-building; ruins of an abbey founded by St. Hilda, VII. cent. The famous **Synod of Whitby** (664) settled the differences between the Celtic and Rom. Churches. Wilfrid (*q.v.*) persuaded the king to favour Rom. tradition, and the Church of England thus became part of the European religious movement. Pop. (1911) 11,139.

WHITCHURCH (52° 58′ N., 2° 42′ W.), town, Shropshire, England. Pop. (1911) 5757.

WHITE, ANDREW DICKSON (1832–), Amer. diplomat; prof. of History, Michigan Univ., 1857–63; pres., Cornell Univ., 1866–85; U.S.A. ambassador to St. Petersburg, 1892–94, to Berlin, 1897–1903.

WHITE ANTS, see TERMITES.

WHITE, GILBERT (1720–93), Eng. naturalist; b. at Selborne, Hants; ed. Oxford; settled at Selborne as curate, 1755; pub. *Natural History of Selborne*, 1789, a charming book by a keen and kindly observer of nature.

WHITE HORSE, VALE OF, see BERKSHIRE.

WHITE, HUGH LAWSON (1773–1840), Amer. judge of Supreme Court of N. Carolina, 1801–7, 1809–15; commissioner to settle differences with Spain, 1820.

WHITE MOUNTAINS (44° 10′ N., 71° 30′ W.), portion of Appalachian system, New Hampshire, U.S.A.; highest point, Mount Washington, 6279 ft.

WHITE PLAINS (41° 3′ N., 73° 45′ W.), residential village, capital, Westchester County, New York, U.S.A.; scene of victory of British over Americans, 1776. Pop. (1910) 15,949.

WHITE RACES, see RACES OF MANKIND.

WHITE, RICHARD GRANT (1821–85), Amer. Shakespearean scholar.

WHITE, SIR WILLIAM ARTHUR (1824–91), Brit. diplomatist; consul at Danzig, 1864–75, and afterwards envoy to Servia, Rumania, and Turkey; ambassador-extraordinary to Turkey, 1886.

WHITE, THOMAS (1628–98), bp. of Peterborough.

WHITE WHALE, see DOLPHIN FAMILY.

WHITEBAIT, see under HERRING FAMILY.

WHITE-EYELID MONKEYS, see under CERCOPITHECIDÆ.

WHITE-EYES (*Zosteropidæ*), a family of Perching Birds, most of whom have a ring of white feathers surrounding the eye. They are honey-suckers, and occur in Africa, S.E. Asia, and Australia.

WHITEFIELD, STAND, town, Lancashire, England; cotton. Pop. (1911) 6967.

WHITEFIELD, GEORGE (1714–70), Eng. divine; ed. Oxford; joined new Methodist movement; became a very fervid preacher; preached in Scotland and Ireland; sometimes spoke 60 hours a week; d. at Newburyport, Mass., U.S.A.

WHITEFISH (*Coregonus clupei formis*), Amer. lake fish, valuable as a table dainty.

WHITEHALL (43° 35′ N., 73° 23′ W.), village, at S. end Lake Champlain, on Champlain Canal, Washington County, New York, U.S.A.; trade in lumber. Pop. (1910) 4917.

WHITEHAVEN (54° 33′ N., 3° 35′ W.), seaport, near entrance to Solway Firth, Cumberland, England; coal and iron mines. Pop. (1911) 19,048.

WHITEHEAD, WILLIAM (1715–85), Eng. poet-laureate of little merit; succ. Colley Cibber.

WHITELOCKE, BULSTRODE (1605–75), Eng. statesman; b. London; ed. Merchant Taylors' School, and St. John's, Oxford. M.P. in Long Parliament, 1640; prominent in impeachment of Strafford. Commissioner of Great Seal, 1648; ambassador to Sweden, 1653; Speaker of Cromwell's 3rd Parliament. Retired to Wilts at the Restoration. Author of important *Memorial of English Affairs*.

WHITE-THROAT, see WARBLERS.

WHITGIFT, JOHN (1530–1604), prof. of Divinity at Cambridge, 1563; repressor of Puritanism, particularly proceeding against Thomas Cartwright; bp. of Worcester, 1577; abp. of Canterbury, 1583; favourite of Queen Elizabeth.

WHITHORN (54° 44′ N., 4° 25′ W.), town, Wigtownshire, Scotland; ancient ruined cathedral; at one time a famous pilgrim resort.

WHITING (40° 42′ N., 87° 30′ W.), town, shipping point, on Lake Michigan, Lake County, Indiana, U.S.A. Pop. (1910) 6587.

WHITING POUT, see POUT.

WHITLOW, PARONYCHIA, inflammation of the fingers generally leading to suppuration; may be due to pin-prick or other wound; treated by poulticing and incision.

WHITMAN, MARCUS (1802–47), medical missionary in U.S.A.; preached to Amer. Indians; aroused opposition, and was killed together with his wife.

WHITMAN, WALT (1819–92), Amer. poet; b. Long Island; editor of the *Long Islander* (1839), of the *Brooklyn Eagle* (1846), of the *Freeman* at Boston (1851). His book of poems, *Leaves of Grass*, was pub. in 1855, a book of epoch-making originality in thought and style. In 1860 the book was republished with the new section, *Calamus*, added. From 1862 to 1865 he served with great distinction in the Civil War. The new section, called *Drum-Taps*, revealed his keen sympathy with the ideals for which he sacrificed so much. W.'s genius was vast—too vast for any tradition to confine.

WHITNEY, ELI (1765–1825), Amer. inventor; b. Westborough, Mass.; invented the cotton gin—a machine for separating the seed from the cotton, and also made some great improvements in the manufacture of firearms.

WHITNEY, WILLIAM DWIGHT (1827–94), Amer. philologist; b. Northampton, Mass. As a philologist, his most important work is on Sanskrit. His *Sanskrit Grammar* is the best treatise on the subject.

WHITSTABLE (51° 26′ N., 1° 1′ E.), watering-place, on Swale, Kent, England; oyster-beds. Pop. (1911) 7894.

WHITSUNDAY, Christian festival commemorating the coming of the Holy Spirit on the Church, or the Jewish Feast of Pentecost, by which name it is sometimes called.

WHITTIER, JOHN GREENLEAF (1807–92), Amer. poet and man of letters; b. Haverhill, Mass.; became a journalist and strong Abolitionist agitator. His prose, while earnest and forceful, seldom rises above the level of good journalism, but there is a freshness, individuality, and sustained note of truth in his verse which ensures it a lasting place in Amer. literature, even though its quantity be small. Part of it, like most of his prose, is devoted to the political purpose of Slavery Abolition, but in his more spiritual poems he reaches an exceedingly high level. In 1889 a complete edition of his poetical works appeared in 7 volumes, and a reprint was issued in England in 1899.

Life, by Pickard (1899).

WHITTINGTON (53° 16′ N., 1° 26′ W.), town, Derbyshire, England; manufactures earthenware; collieries; ironworks. Pop. (1911) 17,218.

WHITTINGTON, RICHARD (d. 1423), s. of Sir William W., probably of Pauntley, Gloucestershire; mercer in London, 1379; member of Common Council, 1385, 1387; Alderman, 1393; Sheriff, 1394; Lord Mayor, 1397–98, 1406–7, 1419–20. M. Alice, dau. of Sir Ivo Fitzwarren; advanced loans to Richard II., Henry IV., and Henry V.; left considerable benefactions; knighted by Henry V.; the 'cat' legend has no foundation in history.

WHITTLESEA, WILLIAM (d. 1374), bp. of Rochester, 1360, Worcester, 1362; abp. of Canterbury, 1368.

WHITTLESEY (52° 33′ N., 0° 8′ W.), town, Cambridgeshire, England; brick- and tile-works.

WHITWORTH (53° 39′ N., 2° 11′ W.), town, Lancashire, England; cotton, slate. Pop. (1911) 8872.

WHITWORTH, SIR JOSEPH, Bart. (1803–87), Eng. engineer; toolmaker, Manchester, 1833; b. Stockport. Noted experimenter in rifle and cannon manufacture; inventor of compressed steel casting. His business is now represented by the amalgamated company, Armstrong, Whitworth & Co. Ltd.

WHOOPER, see under DUCK FAMILY.

WHOOPING-COUGH, HOOPING-COUGH, highly contagious disease of children; commences like a cold in the chest, and in a fortnight severe coughing with 'whoop' begins; patients are kept in warm room, well ventilated, the bowels are kept open; disease is usually mild, but complications—pleurisy, bronchitis, etc., result from careless treatment.

WHORTLEBERRY, see BILBERRY.

WHYMPER, EDWARD (1840–1911), Brit. explorer; b. London; trained as a draughtsman; sent to sketch Alpine peaks by a London publisher, 1860; climbed the Matterhorn, 1865—till then inaccessible; visited the Andes, 1879–80, and Great Divide Region of Canada, 1901–5.

WHYTE, ALEXANDER (1837–), Presbyterian minister; prof. at New College, Edinburgh, 1909.

WICHITA (37° 42′ N., 97° 12′ W.), city, on Arkansas, capital, Sedgwick County, Kansas, U.S.A.; railroad-shops; meat-packing establishments. Pop. (1911) 52,450.

WICK (58° 27′ N., 3° 6′ W.), county town, seaport, on North Sea, Caithness, Scotland; herring-fishing centre. Pop. (1911) 9086.

WICKLOW (52° 57′ N., 6° 23′ W.), coast county, Leinster, Ireland, with chief town of same name; lies along E. coast, between Dublin and Wexford; area, 781 sq. miles. Surface is generally mountainous, with deep ravines between the hills; several lakes; watered by Liffey, Slaney, and other streams; has good sheep pasture; manufactures cordite; oyster-beds at Arklow in S.E. Pop. (1911) 60,603. **Wicklow,** county town, has chemical works and a good harbour. Pop. *c.* 3000.

WICLIFFE, see WYCLIFFE.

WIDDIN, VIDIN (*q.v.*).

WIDDRINGTON, BARONY OF, Eng. honour; created for Sir William Widdrington, 1643, for his services to Royalist cause; became extinct, 1774.

WIDGEON, see under DUCK FAMILY.

WIDNES, town, Lancashire, England; soap, paint, iron. Pop. (1911) 31,544.

WIDOW, see under MARRIAGE.

WIDUKIND OF CORVEY (late X. cent.), Saxon chronicler; monk of Corvey; wrote *Res Gestæ Saxonicæ.*

WIEDEMANN, GUSTAV HEINRICH (1826–99), Ger. physicist; devoted attention to physical chemistry, and especially to electricity, electrical endosmosis and resistance, and magnetism.

WIELAND, CHRISTOPH MARTIN (1733–1813), Ger. poet; b. Oberholzheim, near Biberach; ed. at the monastery of Bergen, near Magdeburg; lived at Weimar court, 1772 onwards, and formed friendships with Goethe and Herder; best works are *Oberon* (heroic poem), *Die Abderiten, Aristipp,* etc. (historical romances), *Neuste Gedichte* (narrative poems), besides political articles and Gk. and Lat. translations; edit. the *Teutsche Merkur* (review).

WIELICZKA (50° N., 20° 8′ E.), town, Galicia, Austria; salt mines have subterranean town and churches. Pop. 7120.

WIENER-NEUSTADT (47° 48′ N., 16° 7′ E.), town, Lower Austria; manufactures locomotives; contains the ducal castle of the Babenbergs. Pop. (1910) 32,874.

WIENIAWSKI, HENRI (1835–80), Hungarian violinist and composer.

WIEPRECHT, WILHELM FRIEDRICH (1802–72), Ger. musical director; designed an improved contra-bass bassoon, and was joint-inventor of the bass tuba.

WIESBADEN (50° 4′ N., 8° 13′ E.), town, watering-place, Hesse-Nassau, Prussia; hot saline springs. Pop. (1910) 109,002.

WIFE, see under MARRIAGE.

WIG, artificial hair headdress, worn from earliest times as covering for baldness, disguise, or ornament; found on Egyptian mummies; alluded to by classical writers; popular in France from XIV. cent., in Eng. from reign of Queen Anne; long ringlets were worn by nobility, plainer form by bishops and lawyers, horse-hair w's still worn by barristers and judges.

WIGAN (53° 32′ N., 2° 38′ W.), town, on Douglas River, Lancashire, England; collieries; cotton manufactures; foundries, forges. Pop. (1911) 89,171.

WIGHT, ISLE OF (50° 40′ N., 1° 17′ W.), island, in Eng. Channel, off coast of Hants, S. England; separated from mainland by Spithead and Solent; area, *c.* 146 sq. miles; surface generally undulating; reaches extreme height of *c.* 800 ft. in St. Boniface Down; off extreme W. are the high chalk cliffs known as 'The Needles'; drained by Medina. Fine climate, favourite winter and summer resort. Chief towns are Newport, Ryde, Cowes, Ventnor, Shanklin. Produces wheat; sheep raised; manufactures cement. Returns one M.P. Pop. (1911) 88,193.

WIGTOWN (54° 52′ N., 4° 27′ W.), county town, royal burgh, and seaport, on Wigtown Bay, Wigtownshire, Scotland.

WIGTOWNSHIRE (54° 53′ N., 3° 45′ W.), coast county, S.W. Scotland, with chief town of same name; lies along Irish Sea and North Channel; coast broken by Loch Ryan and Luce Bay; area, 487 sq. miles; surface generally low-lying and comparatively level, with low hills in N.; drained by Luce, Bladenoch, Cree, and other streams; many lakes; chief towns, Wigtown (county town), Stranraer, Newton-Stewart, Whithorn. Agriculture is carried on; chief crops, oats and turnips; cattle and sheep are raised; dairy-farming is an important industry; there is no mineral wealth, and manufactures are unimportant. Exports wool, cheese, live stock. Pop. (1911) 31,990.

WILBERFORCE, SAMUEL (1805–73), Eng. bp.; 3rd s. of William W.; B.A., Oxford, 1826; ordained, 1830; chaplain to Prince Albert, 1841; bp. of Oxford, 1845–69; active in revival of convocation; bp. of Winchester, 1869; killed by a fall from his horse.

WILBERFORCE, WILLIAM (1759–1833), Eng. philanthropist; s. of a wealthy merchant; M.P. for Hull, his native town, 1780, and a few years later, on conversion to strong religious views, leader of anti-slavery party. Bill carried for abolition of slave trade in Brit. dominions, 1807, but W. did not live to see bill carried for abolition of slavery itself.

WILDBAD (48° 45′ N., 8° 33′ E.), town, watering-place, Württemberg, Germany, in valley of Ens; thermal springs. Pop. 4070.

WILDE, OSCAR O'FLAHERTIE WILLS (1856–1900), Irish dramatist and poet; went to Oxford, where, influenced by Pater and Ruskin, he became the Apostle of the Æsthetic Movement; works include *Lord Arthur Savile's Crime, Dorian Gray, Intentions* (a volume of essays), and the plays, *The Importance of being Earnest* (1895), *Lady Windermere's Fan* (1894), *Salome* (1893) in French. Imprisoned, 1896–98, for unnatural vice, he wrote in prison the *Ballad of Reading Gaol* and *De Profundis.* W. was a master of words; his plays scintillate with brilliant dialogue and epigram. He was a cruel critic of middle-class stupidity and conventionality.

WILDENBRUCH, ERNST VON (1845–1909), Ger. poet, dramatist, and novelist; wrote historical plays and stories showing knowledge of child-psychology.

WILDERNESS (*c.* 38° 18′ N., 77° 45′ W.), district,

covered with woods, in N. Virginia, U.S.A., to S. of Rapidan R. Here a battle was fought on May 4–6, 1864, between the Federals under Grant and the Confederates under Lee; neither side gained a decisive victory, but the Federal casualities amounted to about 18,000, the Confederate loss being about 11,000.

WILFRID (634–709), saint; Eng. churchman; abp. of York, 664; several times ousted from his see and restored; preached in Frisia; helped to build churches of York, Ripon, Hexham; his work of supplanting Celtic by Roman tradition important. See WHITBY, SYNOD OF.

WILHELMSHAVEN (53° 32′ N., 8° 9′ E.), seaport, watering-place, on North Sea, Hanover, Prussia; station for German North Sea fleet; large dockyard; fine harbours, with a separate section for torpedo-boats; strongly fortified. Pop. (1910) 35,044.

WILKES, CHARLES (1798–1877), Amer. sailor and explorer; b. New York. In an expedition (1838–42) he discovered the Antarctic continent—an expedition he described in his *Narrative*. He also pub. *Western America* (1849) and *Theory of the Winds* (1856).

WILKES, JOHN (1727–97), Eng. politician; ed. Leiden; High Sheriff of Bucks, 1754; M.P., Aylesbury, 1757, 1761; arrested for libel on George III., 1763, for article in No. 45 of the *North Briton* (Wilkes' paper); discharged, but expelled the House of Commons. Thrice elected M.P. for Middlesex, 1768, 1769, 1774, but elections annulled by House of Commons; Sheriff of London and Middlesex, 1771; Lord Mayor, 1774; disreputable in private life, but contributed greatly to freedom of election.

WILKES-BARRE (41° 12′ N., 75° 59′ W.), city, capital, Luzerne County, Pennsylvania, U.S.A., in Wyoming valley, on N. branch of Susquehanna; anthracite coal region; manufactures machinery. Pop. (1910) 67,105.

WILKIE, SIR DAVID (1785–41), Scot. artist; b. Cults, Fifeshire; after studying in Edinburgh and London, had a great success with his picture, *The Village Politicians*, exhibited at the Royal Academy, 1806. In 1809 he was elected A.R.A., and in 1811 R.A. His pictures of Scot. character and manners in humble life, such as *Rent Day*, *Blind Man's Buff*, and *The Penny Wedding*, have long been familiar by engravings. He worked in other styles, but it was this style which chiefly distinguished him.

WILKINSBURG (40° 27′ N., 79° 52′ W.), residential town, Alleghony County, Pennsylvania, U.S.A. Pop. (1910) 18,924.

WILKINSON, JAMES (1757–1825), Amer. soldier and administrator; colonel in Washington's army; endeavoured to set up separate republic in the west through Span. aid, 1788–91; governor of Louisiana, 1805; tried, 1811, for complicity in treason, but acquitted; discharged from Amer. army, 1815.

WILL, TESTAMENT, a person's disposition of property to take effect after his or her death; testator must sign w. in presence of two witnesses, but in Scotland a w. in testator's handwriting is valid without witnesses. Lunatics and infants cannot make valid w's. A w. may be revoked at any time; a testator's marrying after the w. is made revokes the w. A *Codicil* is a supplement to a w. See *Everyday Law* (People's Books, 1913).

WILL, in psychology, the active side of consciousness, as distinguished from feeling and intellect; in a narrower sense, the phase of active consciousness immediately preceding action. Feeling, intellect, will, are in general opposed to each other, *e.g.* strong feeling prevents calm reasoning or regulated action; yet no complete isolation is possible. Willing depends on feeling for its motive, and on knowledge for guidance. The w. develops continuously from the simple to the complex, from immediate responses to sense-impressions, to complex movements involving intricate processes of deliberation and choice, with a corresponding development of feeling and accumulation of knowledge. The fundamental element in w. is desire, either for pleasure or for removal of pain. Desire contains a representative factor (object of desire) and a feeling; it is essentially an active phenomenon, whether mental or physical. To convert desire into a voluntary act of w. (*volition*) the further representation is required of some action leading to the realisation of the desired object; knowledge both of end and means is gained from practical experience. The first movements were spontaneous, purposeless (actions of newly-born children), with no psychical accompaniment; later, reflex actions (breathing, swallowing) arise from sensory stimulation, and involve excitation of both sensory and motor nerves. More complex are instinctive actions (building of cells by bees), distinctively purposive, directed to some end outside the present field of consciousness, and accompanied by some sort of feeling. These primitive forms are developed by imitation and association into definitely voluntary operations. Volition proper is characterised by ideas of end and means to its realisation, and by a strong feeling of the worth of that end. Hence its growth implies increasing foresight and feeling, which, as above, is the impelling force. The motives to action are increased, and rivalry between several impulses leads to deliberation and choice before action. Hence the metaphysical and ethical question of free-will, a discussion complicated by various meanings given to 'freedom.' Freedom may mean absence of political or physical restraints; by Kant is applied to action under the guidance of reason. According to Wundt, freedom equals a capacity to be determined by a reflective choice between motives. With Green, a mere natural want is not a motive, which implies the action of self-consciousness on the want, the adoption of an end by a self-conscious subject, which tries to realise it. Determinism is to be distinguished from fatalism (Westermarck). It regards the person himself as the product of causes; fatalism affirms the constraint of the w. by external causes.

In a metaphysical sense, w. has been taken by Schopenhauer (*q.v.*) as a world-principle, expressed not only in conscious human volitions, but in the ceaseless striving which animates all things.—Stout, *Manual of Psychology*; Green, *On the Different Senses of Freedom*.

WILLAERT, ADRIAN, see MUSIC.

WILLARD, FRANCES ELIZABETH (1839–98), Amer. temperance reformer; one of the organisers of the Prohibition Party.

WILLEMSTAD, see CURAÇAO.

WILLESDEN, suburb of London, Middlesex, England, 7 miles N.N.W. of St. Paul's. Pop. (1911) 154,267.

WILLIAM I., THE CONQUEROR (1027 or 1028–87), king of England; natural s. of Robert the Devil, Duke of Normandy, whom he succ., 1035. On Harold's seizing Eng. throne, which Edward the Confessor had probably promised to William, invaded England; defeated and killed Harold at Hastings, 1066; suppressed several insurrections; reduced York, 1069; put down Hereward's rebellion by successful siege of Ely, 1071; led successful expedition against Malcolm III. of Scotland, 1072; reduced Maine, 1073; suppressed revolt of earls of Hereford and Norfolk, 1075; quarrelled with s. Robert. Compiled Domesday Book; reformed Church; checked power of barons; established central authority, compelling landholders to swear fealty to him.

J. H. Round, *Feudal England* (1895); *Life*, by Freeman (1888), Stenton (1908).

WILLIAM II., RUFUS (*c.* 1056–1100), king of England; succ., 1087; put down risings in Norfolk, Somerset, and rebellion led by Odo of Bayeux, 1087; invaded Normandy and acquired lands there, 1091; invaded Scotland, seized Carlisle and other Scot. territories in Cumberland; defeated and killed Malcolm III. at Alnwick, 1093; tried, unsuccessfully, to conquer Wales; invaded Normandy, 1094; suppressed Eng. baronial rising, 1095; obtained Normandy in pledge, 1096; regained Maine, 1099; quarrelled with Anselm, abp. of Canterbury; killed by arrow in New Forest.

WILLIAM III., OF ORANGE (*c.* 1650–1702), king of England; prince of Orange; s. of W. II. of Orang

and Mary, dau. of Charles I. of England; made Stadtholder after murder of De Wits, 1672; opposed Louis XIV. of France; defeated at St. Omer, 1677, at Mons, 1678; m. Mary, dau. of James II. of England. Invited to deliver England from Stewarts, 1688; landed at Torbay; after James's flight, proclaimed king, 1689; passed Acts of Toleration and Indemnity, 1690; won *Battle of the Boyne*, 1690; victory off Cape La Hogue, 1692. Under him England joined League of Augsburg; led expedition to Netherlands against French; lost Namur; defeated at Steinkirk, 1692; retook Namur, 1695; agreed to peace of Ryswick, 1697; formed Grand Alliance against France, 1701, between emperor, Ger. princes, Holland, and England.

Macaulay, *Essays* and *History*.

WILLIAM IV. (1765–1837), king of England; entered navy; present at battle off Cape St. Vincent, 1780; Lord High Admiral, 1827; became king, 1830. Reign marked by emancipation of slaves, and passing of Reform Bill, 1832, after great political agitation; dismissed Melbourne, 1834; summoned Peel; succ. by niece, Queen Victoria.

WILLIAM I. (1772–1843), 1st king of Netherlands; s. of William, last Stadtholder of Dutch Republic; commanded the army against France, 1793–95. Held commission in Prussian army, was captured at Jena, and fought in the Austrian army. Proclaimed king, March, 1815, by Act of Congress of Vienna; abdicated, 1840, taking title of Count of Nassau.

WILLIAM II. (1792–1849), king of the Netherlands; s. of William I.; studied at Berlin and Oxford, and took part with the Brit. army in Peninsular War. Commander of Dutch army; wounded at Waterloo. Became king, 1840; accepted constitutional changes in direction of democracy, 1848.

WILLIAM I. (1797–1888), king of Prussia and Ger. Emperor; second s. of Frederick William III.; took part in campaigns, 1814–15, against Napoleon. Fled to England, 1848, but was subsequently elected to Pruss. National Assembly; regent, 1858, and king of Prussia, 1861; commanded in war against Austria, 1866, and at Gravelotte and Sedan, 1870. Absolutist in politics; proclaimed Emperor of Germany, 1871. Had Bismarck (*q.v.*) for his minister from 1862.

WILLIAM II. (1859–), 9th king of Prussia and 3rd Ger. Emperor; s. of the Emperor Frederick and Princess Victoria of England; grandson of Queen Victoria; ed. Cassel and Bonn Univ.; succ., 1888, after the short reign of his father, and soon showed that his intention was to rule as well as reign. The dismissal of Bismarck was a sign of the new era. His determination to make Germany a naval power, and to promote colonial expansion, is well known; m., 1881, Augusta Victoria, Duchess de Slesweig-Holstein, a niece of Prince Christian, and has 6 children. Emperor William aims at personal government in a manner unusual in an age of constitutionalism.

WILLIAM I. (1781–1864), king of Württemberg; distinguished in the War of Liberation against France. On his accession to the throne (1816) he adopted a policy which had as its aim the reduction of class privileges and the improvement of commerce and education.

WILLIAM II. (d. 1189), king of Sicily; s. of W. I. and Marguerite of Navarre; at home indulged in a semi-Muslim life at Palermo, but his foreign policy was brilliant and victorious.

WILLIAM (1533–84), Prince of Orange; called William the Silent by reason of his taciturnity concerning his plans and intentions in the struggle of the Netherlands against Spain. He lived to see Holland emerge into national independence, but was assassinated before the end of the struggle with Spain. Joined the Reformed Church, collected an army against Alva in 1568, and became the leader of the Dutch against Spain, acknowledged as Stadtholder by Holland, Zealand, Friesland, and Utrecht, in 1572; commander-in-chief and dictator, 1574. Founded the Dutch Republic by the Union of Utrecht (Holland, Zealand, Utrecht, Gelderland, Friesland, Groningen, Overyssel), 1579—the sovereignty of Philip of Spain being nominally retained until 1581. On William's murder, his s. Maurice succ. him as Stadtholder.

WILLIAM (abp.) **OF TYRE** (*c.* 1130–*c.* 1190), Fr. chronicler; one of the greatest mediæval historians; wrote *Belli sacri Historia* (pub. 1549), a history of the Crusades and Latin kingdom of Jerusalem from 1095 to 1184; chief authority for time in which he lived.

WILLIAM OF MALMESBURY (*c.* 1090–1143), Eng. chronicler; a monk and librarian at Malmesbury Abbey. Author of *Gesta Regum Anglorum*, 1125; *Historia Novella*, 1142; *Gesta Pontificum Anglorum*, 1125; and *De Antiquitate Glastoniensis Ecclesiæ*, 1129–39—all important hist. works.

WILLIAM OF ST. CALAIS (d. 1096), bp. of Durham, 1081; planned Durham Cathedral.

WILLIAM OF WYKEHAM (1324–1404), Eng. Churchman and statesman; b. Wickham, Hampshire; ed. Winchester, and entered the service of Edward III. as king's chaplain; became joint-surveyor of Windsor forest, and chief warden and surveyor of royal castles of Windsor, Leeds, Dover, and Hadleigh, 1359; prebendary of Lichfield the same year; Keeper of the Privy Seal, 1364; bp. of Winchester, 1367–1404; chancellor, 1368–71. Prominent in opposition to John of Gaunt in 'Good Parliament,' 1373. Charged unjustly with malversation and misgovernment during his chancellorship by the Council at Westminster, where his Lancastrian enemies prevailed. W. was deprived of his temporal rights, 1373; on the accession of Richard II. he was at once pardoned; obtained a papal bull for the endowment of Winchester Coll., 1378, and issued a charter for the foundation of New Coll., Oxford, which was built and finished by 1386. Placed on the commission of regency, 1386, he took no part in the proceedings; chancellor for the second time, from 1389 till 1391, when he retired from political life. A generous, warm-hearted man, more a statesman than a man of learning, yet a noble servant of education.

G. H. Moberley, *Life of Wykeham*; A. F. Leach, *History of Winchester*.

WILLIAM THE LION (1143–1214), king of Scotland; succ. his bro., Malcolm IV., in 1165. Henry II. had compelled Malcolm to cede Northumberland, and W., in order to recover the territory, joined the rebellion of the Eng. barons. W.'s plans failed, and he was compelled to hold Scotland as a vassal. Richard I. released him from this burden.

WILLIAMS, JOHN (1582–1650), Anglican divine; promoted by James I., tried to mediate between Charles I. and Puritans; abp. of York, 1641; in Civil War, Royalist then Parliamentarian.

WILLIAMS, JOHN (1796–1839), Eng. Nonconformist divine; went as missionary to Society Islands, 1816; murdered in New Hebrides.

WILLIAMS, ROGER (*c.* 1604–83), Eng. clergyman; b. Wales; ed. Charterhouse, and Pembroke, Cambridge; minister at Salem; preacher of toleration. Banished for unorthodoxy, he settled amongst the Indians, from whom he purchased Rhode Island. Obtained charter from England, 1644. Pres. of colony, 1654–58.

WILLIAMS, ROWLAND (1817–70), Anglican divine; lecturer at St. David's Coll., Lampeter; prosecuted for literal views on Biblical criticism.

WILLIAMSBURG (37° 13′ N., 74° 36′ W.), independent city, between James and York Rivers, formerly capital, James City County, Virginia, U.S.A.; seat of William and Mary Coll.; was capital of Virginia, 1705–79; scene of defeat of Confederates, 1862.

WILLIAMSON, WILLIAM CRAWFORD (1816–95), Eng. geologist, zoologist, and botanist, whose researches on Palæozoic and Mesozoic plants gave impetus to the study of Brit. palæobotany; solved the relationships of several groups of plants.

WILLIAMSPORT (41° 13′ N., 77° 8′ W.), city, summer resort, on W. branch of Susquehanna, capital, Lycoming County, Pennsylvania, U.S.A.; extensive lumber industry. Pop. (1910) 31,860.

WILLIAMSTOWN.—(1) (37° 52′ S., 144° 55′ E.) town, port, at mouth of Yarra Yarra, Bourke County, Victoria, Australia; shipbuilding; meat-freezing works; suburb of Melbourne. (2) (42° 43′ N., 73° 13′ W.) town, summer resort, Berkshire County, Massachusetts, U.S.A.; seat of Williams College; manufactures cottons, woollens. Pop. (1910) 3708.

WILLIBRORD, ST. (657–738), Eng. missionary; preached to Frisians for 50 years; abp., 696.

WILLIMANTIC (41° 46′ N., 71° 58′ W.), town, on Willimantic, Windham County, Connecticut, U.S.A.; manufactures thread. Pop. (1910) 11,230.

WILLIS, NATHANIEL PARKER (1806–67), Amer. author; b. Portland, Maine. His best work was contributed to the *Home Journal*, a paper which he mainly established. His style is easy and graceful.

WILLIS, THOMAS (1621–75), Eng. physician; ed. Christ Church, Oxford (M.B., 1646); Sedlian prof. of Natural Philosophy, 1660; practised med. in London, 1666, with much success; made observations on anat. of the brain (in which the arterial circle of Willis is called after him).

WILL-O'-THE-WISP, JACK-O'-LANTERN, IGNIS FATUUS, pale-bluish light seen over graveyards and swamps; probably gas from decaying animal matter.

WILLOW (*Salix*), an arborescent dicotyledon with lanceolate leaves. The numerous species are extremely variable, with many intermediate hybrid forms. The tree prefers a moist situation, and propagates freely by means of suckers. The catkins are exceptional, possessing nectaries and being insect-fortilised.

WILLOW WREN, see WARBLERS.

WILLOW-WARBLER, see WARBLERS.

WILLS, WILLIAM JOHN (1834–61), see AUSTRALIA (HISTORY).

WILMINGTON.—(1) (39° 45′ N., 75° 35′ W.) city, port of entry, at junction of Brandywine and Christiana Creeks with Delaware, capital, New Castle County, Delaware, U.S.A.; manufactures leather, gunpowder. Pop. (1910) 87,411. (2) (34° 17′ N., 77° 59′ W.) city, port of entry, on Cape Fear River, capital, New Hanover County, North Carolina, U.S.A.; largest and most commercial city in the state; exports cotton, lumber, naval stores. Pop. (1910) 25,748.

WILSON, ALEXANDER (1766–1813), Scot. ornithologist; resided in America; pub. the *Amer. Ornithology*, an elaborate work of 9 volumes.

WILSON, SIR DANIEL (1816–92), Scot. archæologist; works include *Prehistoric Man* (1862), *Caliban: the Missing Link* (1877), *Anthropology* (1885).

WILSON, HENRY (1812–73), Amer. statesman; as Abolitionist and Republican became U.S. senator, 1855; vice-pres., 1873; wrote *History of the Rise and Fall of the Slave Power in America.*

WILSON, HORACE HAYMAN (1786–1860), Eng. scholar; prof. of Sanskrit, Oxford.

WILSON, JAMES (1742–98), Amer. statesman; b. Scotland; emigrated, 1763; sat in Pennsylvania Convention, 1775, and signed Declaration of Independence; director of Bank of N. America, 1781; member of Congress, 1775, 1785–90; helped to draw up constitution; prof. of Law, Philadelphia, 1790.

WILSON, JOHN, 'CHRISTOPHER NORTH' (1785–1854), Scot. man of letters; friend of Wordsworth, Coleridge, Southey, De Quincey, Scott, Ettrick Shepherd, etc.; b. Paisley; ed. Glasgow and Oxford; losing most of private means, went to Edinburgh, joined staff of *Blackwood's*, and held chair of Moral Philosophy; earlier writings, verses and stories. For many years W. was life and soul of 'Maga,' contributing imaginative and spirited essays, best-known examples being series of dialogues, *Noctes Ambrosianæ* (1822–35).

WILSON, JOHN MACKAY (1804–35), Scot. writer; famous for *Tales of the Borders*, issued weekly.

WILSON, RICHARD (1714–82), Brit. landscape painter; celebrated for his *Niobe*, and a *View of Rome from the Villa Madama.* Nine of his pictures are in the National Gallery, London.

WILSON, SIR ROBERT THOMAS (1777–1849), Brit. soldier; M.P. for Southwark, 1818, 1826, 1830; governor of Gibraltar, and Commander-in-Chief, 1842; wrote various military works and an autobiography.

WILSON, THOMAS WOODROW (1856–), 28th Pres. of U.S.A. (Democratic; elected Nov. 1912); b. Staunton, Virginia; of Scoto-Irish descent; s. of Presbyterian divine; graduated, Princeton, 1879; LL.B. of Virginia Univ., 1882; distinguished in oratory; Ph.D., Johns Hopkins Univ.; wrote *Congressional Government*, 1886; prof. of Political Science, Bryn Mawr Coll. (Penn.), 1886–88; prof. of History and Pol. Economy, Wesleyan Univ., Middletown, Connecticut, 1888–90; pub. *The State—Elements of Historical and Practical Politics*; prof. of Jurisprudence and Pol. Economy, Princeton Univ., 1890–1902; wrote *History of Amer. People* and other standard works; pres. of Princeton Univ., introducing many reforms, 1902–10. Leaving academic field and entering politics, he stood as Democratic candidate for governorship of New Jersey and won by force of character and sincerity, quickly undeceiving Democratic 'bosses,' who thought to find him a pliant tool. As recognised champion of social reform, purity of administration, and truly popular government he rose to fame with amazing rapidity, and was chosen Democratic candidate for Presidency of U.S.A., 1912. The split in the Republican ranks owing to Mr. Roosevelt's breaking with Mr. Taft helped to ensure Dr. Woodrow Wilson's triumph, already prepared by his eloquence, ability, and integrity, and discontent with long Republican régime (1897–1912). The Pres. advocates a low tariff for revenue purposes only, not Protection; war against 'graft,' political corruption, injurious trusts; and real government for the people, by the people. His tenure of office marks a new epoch in Amer. politics.

WILSON, SIR WILLIAM JAMES ERASMUS (1809–84), Eng. surgeon; b. London; ed. St. Bartholomew's Hospital and at Aberdeen; specialised in skin diseases; advocated bathing, and helped to introduce Turk. bath into Britain; founded chair of Dermatology in Royal Coll. of Surgeons, and Pathology in Aberdeen Univ.; brought Cleopatra's Needle from Egypt to London.

WILTON (51° 4′ N., 1° 52′ W.), town, Wiltshire, England; manufactures carpets.

WILTSHIRE (51° 18′ N., 1° 55′ W.), inland county, England; bounded N. by Gloucester, E. by Berks and Hants, S. by Dorset, W. by Somerset and Gloucester; area of administrative county, 1350 sq. miles. Surface is generally undulating; crossed by various ranges of hills, including the Marlborough Downs; among highest points are Inkpen Beacon (1010 ft.) and Alfred's Tower (800 ft.). Drained by head-waters of Thames, and by Salisbury Avon, Bristol Avon, Kennet, and other streams. Chalk is the principal formation. Agriculture is carried on; chief crops are wheat and barley; cattle, sheep, and pigs extensively raised; bacon-curing and dairy-farming are carried on. Manufactures include woollens, silks, carpets. Minerals include iron, freestone. W. was part of Rom. Britain, and was frequently invaded by Danes in IX. and XI. cent's; took part in the Civil War of the XVII. cent., and in the Revolution of 1688. There are ruins of several religious houses in the county, which also contains the famous stone circles at Stonehenge. Pop. (1911) 286,876.

WILTSHIRE, EARL OF, WILLIAM LE SCROPE (c. 1350–99), s. son of 1st Lord Scrope; plotted on behalf of Richard II.; executed.

WIMBLEDON (51° 26′ N., 0° 14′ W.), town, Surrey, England; its common was the meeting-place of the Rifle Association, 1860–89; scene of victory, Ceawlin of Wessex over Ethelbert of Kent, 568. Pop. (1911) 54,876.

WIMBORNE-MINSTER (50° 48′ N., 1° 59′ W.), town, at junction of Allen and Stour, Dorsetshire, England; noted for its minster. Pop. (1911) 3711.

WINBURG (28° 29′ S., 27° 2′ E.), town, Orange Free State, Union of S. Africa; trade centre for a grain and cattle district.

WINCHCOMB (51° 58′ N., 1° 58′ W.), town, Gloucestershire, England; flour- and paper-mills.

WINCHELSEA (50° 55′ N., 0° 43′ E.), decayed town, on English Channel, Sussex, England; one of the Cinque Ports.

WINCHELSEA, ANNE FINCH, COUNTESS OF (d. 1720), Eng. poetess; chief poem, *Spleen*, appeared, 1701.

WINCHELSEA, ROBERT (d. 1313), Eng. ecclesiastic; student at Paris and Oxford; abp. of Canterbury, 1292; quarrelled with Edward I., reconciled, 1297; after king's death opposed Edward II.; noble character.

WINCHESTER.—(1) (51° 3′ N., 1° 19′ W.) town, Hants, England; bp.'s see; has large cathedral, dating in part from XI. cent., and remarkable for the splendour of its interior decorations; has an old episcopal palace now used as Diocesan Church House; site of W. public school, established by William of Wykeham, 1387; there are remains of Wolvesey Castle and of an old royal castle, both of which were ruined during the Civil War of Charles I.'s reign, and of Hyde Abbey, the burial-place of King Alfred. In the neighbourhood is the hospital of St. Cross (XII. cent.). W. was capital of England in Saxon and Norman times, and parliaments were held here at various dates in the XIII., XIV., and XV. cent's; it was much damaged by Roundheads in Civil War. Pop. (1911) 23,380. (2) (42° 27′ N., 71° 8′ W.) residential town, Middlesex County, Massachusetts, U.S.A.; manufactures leather. Pop. (1910) 9309. (3) (37° 58′ N., 84° 12′ W.) town, capital, Clark County, Kentucky, U.S.A.; seat of Kentucky Wesleyan Coll.; manufactures flour. Pop. (1910) 7156. (4) (39° 8′ N., 78° 8′ W.) independent city, seat of justice of Frederick County, Virginia, U.S.A.; scene of several engagements in Civil War. Pop. (1910) 5864.

WINCHESTER, EARLDOM AND MARQUESSATE OF.—The title of Earl of W. was created by King John, 1207, and conferred on Saier de Quincy; the earldom reverted to the Crown (1264); was revived (1322), and again reverted (1326). The title was given to Louis de Bruges, 1472, but was surrendered in 1499. The marquessate was created, 1551, and first borne by William Paulet, a favourite of four sovereigns. The title has descended in the male line, and the present marquis, Henry William Montague Paulet, is the sixteenth possessor. The 5th marquess, John Paulet (1628–74) is remembered for his great zeal in the cause of Charles I.

WINCKELMANN, JOHANN JOACHIM (1717–68), Ger. art critic; wrote *Anmerkungen über die Baukunst der Alten* (1762), on ancient architecture, and *Geschichte der Kunst des Alterthums* (1764), a history of ancient art, a book of great influence.

WIND.—All weather processes depend ultimately on air-motion, *i.e.* wind, and w. naturally blows from regions of high barometric pressure to those of low pressure, but not directly. If pressure is set out on isobars the w. is almost parallel to them, but slightly inclined to the regions of lower pressure. The force of w. is measured on the Beaufort scale from 1 to 12, the lowest and highest grades being easy to assess, but the intermediate demand experience. Speed of w. is detected by the anemometer; a speed of 40 miles per hour would cause damage to property, w's of beyond 70 miles per hour are rarely experienced in Gt. Britain. Wind force is inversely proportional to the distance between isobars. The upper air has been increasingly studied in recent years (see METEOROLOGY).

Dry and wet seasons in India follow the *monsoons*—the prevailing w. in the N. Indian Ocean being N.E. in January causes the dry season, and the S.W. wind of July with the S.W. monsoon causes the wet season. The *mistral* is a strong N.W., cold, dry wind in Gulf of Lyons and neighbourhood; the *simoon* (called in Algiers *sirocco*), a hot, dry wind in deserts of Africa and Arabia, which raises great clouds of dust and almost suffocates wayfarers. See also SQUALL.

WIND INSTRUMENTS, general name for that section of the orchestra where the tone is produced by blowing. They are spoken of familiarly as 'wood winds' and 'brass winds,' according to the material of which the instrument is made.

WINDAU, VINDAVA (57° 23′ N., 21° 33′ E.), seaport, on Baltic, Courland, Russia. Pop. 15,400.

WINDERMERE (54° 20′ N., 2° 56′ W.), largest lake in England; on borders of Westmoreland and Lancashire; length, 10½ miles; greatest width, 1 mile.

WINDFLOWER, WOOD ANEMONE (*Anemone nemorosa*), a delicate white flower tinged with purple, is a species of genus Anemone, order Ranunculaceæ; grows in Brit. woods.

WINDHAM, WILLIAM (1750–1810), Eng. statesman; ed. at Eton, Glasgow Univ., and Univ. Coll., Oxford; Chief Sec. for Ireland, 1783. War Sec. under Pitt, 1794–1801; War and Colonial Sec. under Grenville, 1806–7.

WINDMILL, mill which utilises wind-pressure as motive-power for mechanical work, such as grinding corn, pumping water, or sawing wood. The wind gives a rotary motion to four sails mounted on tower. Sails are fixed to shaft, which transfers motion by cogwheels to vertical main shaft. Sails always face wind by automatic device, top of mill rotating. W's have been displaced in modern times by steam-engine and other automatic power, but in Holland, America, and Australia they are still extensively used for pumping purposes. In the two latter countries steel has replaced wood in construction of w's.

WINDOW, orifice in wall to admit air and light; in ancient times small; either closed with shutters or furnished with plates of horn or mica; classical temples were without windows, lighted by apertures in roof; window-glass introduced, IV. cent.; Norman architecture characterised by small, stunted w.; the long-pointed Gothic w. familiarised by ecclesiastical use; glazed paper still used in China and Japan instead of w.-glass.

WINDPIPE, or trachea, the tube conveying air from the larynx to the bronchi and lungs.

WINDSOR.—(1) (51° 28′ N., 0° 36′ W.) town, on Thames, Berkshire, England; site of Windsor Castle, which was built (or rebuilt) in reign of William the Conqueror, restored and enlarged by William of Wykeham in reign of Edward III.; additions were made from time to time by various sovereigns, and it was completely restored and renovated in reigns of George IV. and William IV.; it includes the Round Tower, two courts known as the Upper and Lower Wards, St. George's Chapel, containing many royal tombs, and the Albert Chapel, restored by Queen Victoria in memory of Prince Consort. W. is connected with Eton by a bridge across river. Public buildings include town hall, dating from 1686. Pop. (1911) 12,681. (2) (42° 20′ N., 83° 9′ W.) city, on Detroit, port of entry, Essex County, Ontario, Canada; agricultural and fruit-growing region; salt industries. Pop. (1911) 17,829. (3) (41° 52′ N., 72° 39′ W.) town, on Connecticut, Hartford County, Connecticut, U.S.A.; manufactures cigars, paper.

WINDTHORST, LUDWIG (1812–91), Ger. politician; b. Kaldenhof, Westphalia; leader of Ultramontanes in Hanover against Pruss. domination; pres. of Lower House of Hanover, and Minister of Justice, 1851–53, 1862–65. On incorporation of Hanover in Prussia, led the opposition, and was chief of Catholic Centre Party.

WINDWARD ISLANDS (14° N., 63° W.), group forming part of the Lesser Antilles, West Indies; belong to Britain principal are Grenada, St. Vincent, St. Lucia. Pop. (1911) 157,264.

WINE.—The fermented product of grape juice or of any fruit or plant, such as ginger, date, plum, etc., but when any of these latter varieties of w. are spoken of, they are referred to by the association of the particular fruit, as 'date w.'; the word w. used alone always means the product of the juice of the grape.

History.—Art of viniculture for purpose of making w. is of very ancient origin—in fact, it dates back as far as historical records exist. The Nabateans were not allowed to cultivate the vine for fear they should depart from their traditional nomadic habits. Most celebrated w's of early times were Chalybon, manufactured near Damascus; the Lesbos, Chios, and Cos w's, from the Gk. Islands; and the Falernian and Cecuban w's of the Romans. The vine was probably brought to Spain by the Phœnicians and to Italy by the Greeks. In these early days w. was held in skins or hides, later in earthenware vessels, and in modern times in wooden casks and glass bottles. W.-making at the present time is much in advance of the art of olden days, for then foreign properties were often introduced into the liquid, such as salts, spices, etc., whereas the w. of to-day is unpolluted—except, of course, in the case of sham w's, which are generally nothing more nor less than crude spirit sweetened and coloured. W. is distinguished by colour, hardness or softness to palate, bouquet or aroma, flavour, and stillness or effervescence. Quality depends largely on the locality in which vine is grown, the species of vine, climate, treatment of grapes, and mode of manufacture. The vine is grown in practically all places where climate and soil are suitable, in countries extending from California to Persia and from Germany to the Cape. Each district has its own characteristics; for instance, the w's of Italy and Greece possess great strength, while those of France and Germany are noted for their flavour and delicacy.

Wine-making is a complicated process, though not so complicated as the making of beer or spirits. When the grapes are ripe they are gathered by hand and the stalks removed. They are then taken to the press-house, where is situated the w.-press. Presses are of all varieties, from the early wedge and lever press to the powerful hydraulic press of modern times. Sometimes presses are dispensed with, and the juice of the grapes pressed out by workmen who trample them underfoot. Again, very special w's, such as the celebrated essence of Tokay, are made by allowing the weight of grapes above to press out the juice of those underneath. When the liquid has been squeezed out it is known as '*must*,' and is a viscid fluid of sweet taste. The must is now allowed to ferment; this takes place quite spontaneously, without the addition of any fermenting agent whatever. If the w. is to be a red one, the grape skins—from which the colour is obtained—are left in the juice while fermenting, but in white w's they are removed. Fermentation requires much time and attention; at first the process is a slow one, but as time goes on it rapidly quickens. Sweet w's—such as Tokay, port, etc.—have the fermentation stopped when they reach a certain stage, by the addition of raw spirits. The first fermentation being finished, the w. is run into casks or vats, so that the second fermentation may take place. This is even a slower process than the first; carbonic acid gas is given off and escapes through the bung-hole or by means of a water valve, which allows the escape of gases from the vat while preventing any from entering from outside. Deposits are also thrown down by the w., and these are known as *argol* or *lees*. They are mainly composed of cream of tartar and albuminous matters. All sediment sinks to the bottom, thus leaving the w. more or less clear. After four or five months in the vats it is 'racked,' or separated from the deposits, and poured into clean casks which have been carefully sterilised. This process of racking is repeated four or five times with an interval of a few months between each. Even then the w. is not absolutely free from particles, and often gelatine or isinglass is added to make it brighter.

After these processes are completed, the w. is matured for three or four years, and is then ready for bottling. Some w's, such as port, are not bottled as a rule, but kept in the wood.

Varieties of Wine.—WHITE WINES are free from both colouring matter and tannin, and are in consequence less likely to upset the digestion; for this reason they are often recommended for medicinal purposes. W's in which all the sugar has been changed to alcohol before bottling are called *dry w's*. Those in which fermentation continues after bottling are *effervescing w's*—and to this class champagne belongs. The bouquet or aroma of a w. is caused by the compound ethers the w. contains; they develop as it matures, and medical men say it is these rather than the alcohol that cause gout. W's may be classified as follows:—

(1) *Spirituous w's*, rich in alcohol and sugar, as port, sherry, Madeira, Marsala, and containing about 15 % of alcohol.
(2) *Liqueur w's*, rich in sugar; alcohol between 10 % and 15 %, as Tokay, Malaga.
(3) *Acid w's*, rich in acid tartarate of potash; alcohol about 10 %. The red w's with tannin include claret, Bordeaux, and Burgundy, while the white wines, without tannin, are hock, Moselle, and Chablis.
(4) *Sparkling w's*, rich in sugar and carbonic acid, as champagne and sparkling hock.

Much of the port and sherry on the market is sham wine, being crude spirit coloured and sweetened.

Wine-producing Countries.—The total w. produce of the world per annum is roughly 3000 million gallons. *France* has an average yield of something like 1000 million gallons, and no less than 77 departments are engaged in the industry, of which Bordeaux is the centre. A remarkable variety of wines are obtained, including the red wines of Gironde and Burgundy, and the white wines of Sauternes, Graves, and Chablis. *Spain* is characterised by three main types—sherry, Tarragona (Spanish port), and wines of the claret type. *Portugal* is chiefly noted for the production of port, which is made in the locality of Oporto, hence the name. *Germany* is famous for the Rhine wines and moselle; *Italy* produces wines of a poor quality. *Hungary* is chiefly known by its Tokay, of which the finest variety is the *essence*. Wines from the *Cape* and *U.S.A.* are of fair quality, chiefly because scientific methods are employed in their production. The red wines of *Australia* resemble the wines of France, being something of the claret or Burgundy type; Australian white wines resemble the Sauternes or Chablis wines.

Diseases of the Vine are many, and due to a variety of causes, including micro-organisms, moulds, bacteria, and insects. The commonest is *phylloxera*, which is a most destructive pest, being caused by an insect of the green-fly type, which destroys, not only the vine leaves, but the roots as well. A great epidemic ran through the French vineyards in 1882–85.

Diseases of Wine.—Commonest is perhaps *tourne* or *casse*, caused by the wine being made from mildewed grapes (see also FERMENTATION).

WINEBRENNER, JOHN (1797–1860), founded religious community called Church of God.

WINER, GEORG BENEDIKT (1789–1858), New Testament philologist; prof. at Leipzig, 1832.

WINFIELD (47° 10′ N., 97° W.), city, capital, Cowley County, Kansas, U.S.A.; manufactures flour. Pop. (1910) 6700.

WINGATE, SIR FRANCIS REGINALD (1861–), Brit soldier; Sirdar, Egyptian army, and Gov.-Gen. of Sudan since 1899.

WINGED SNAIL, see GASTEROPODA.

WINKELRIED, ARNOLD VON, Swiss patriot; a leader in the struggle for national independence. According to tradition, at battle of Sempach, near Lucerne, 1386, the Austrians formed a phalanx the

Swiss could not break. W. rushed on the Austrian spears, and, by giving his life, made an opening for his comrades.

WINNIPEG.—(1) (49° 59′ N., 97° W.) chief town, Manitoba, Canada, at confluence of Assiniboine and Red R.; seat of provincial Parliament; has Anglican and R.C. cathedrals, and univ. Centre of rail and river trade; has great grain elevators and flour-mills; chief workshops of Canadian Pacific Railway between Montreal and Pacific are here. Pop. (1911) 135,430. (2) (53° N., 98° W.) lake, Manitoba and Keewatin, Canada; length, 250 miles; breadth, 55 miles; drained by Nelson into Hudson Bay. (3) (50° N., 97° W.) river, Manitoba, Canada; issues from the Lake of the Woods, flows W. to Lake Winnipeg.

WINNIPEGOSIS, Little Winnipeg (52° 20′ N., 100° 30′ W.), lake, Canada, W. of Lake Winnipeg, into which it empties.

WINONA (44° 6′ N., 91° 38′ W.), city, on Mississippi, capital, Winona County, Minnesota, U.S.A.; exports grain, lumber. Pop. (1910) 18,583.

WINSFORD (51° 7′ N., 3° 34′ W.), town, Cheshire, England; salt works. Pop. (1911) 10,772.

WINSLOW, EDWARD (1595–1655), Eng. colonial governor; sailed with the Puritan exiles, 1620, for America, and became their elected governor; wrote several pamphlets.

WINSOR, JUSTIN (1831–97), Amer. historian; author of *Columbus* (1891), *Memorial History of Boston* (1880–81), *The Narrative and Critical History of America* (8 vols., 1884–90).

WINSTED (41° 55′ N., 73° 5′ W.), town, Litchfield County, Connecticut, U.S.A.; manufactures cloth. Pop. (1910) 7754.

WINSTON-SALEM (36° 4′ N., 80° 8′ W.), city, capital, Forsyth County, North Carolina, U.S.A.; manufactures tobacco; Winston and Salem are contiguous towns. Pop. (1910) 17,167.

WINTERFELDT, HANS KARL VON (1707–57), Pruss. soldier; b. Pomerania; personal aide-de-camp to Frederick William I., and friend of the crown prince, afterwards Frederick II.; commanded grenadiers at Mollwitz and Rothscloss, 1741; confidential staff officer to Frederick, and disliked by Prince William (Frederick's brother), Zieten, and other generals. Killed in a skirmish near Görlitz.

WINTERGREEN (*Gaultheria procumbens*), N. Amer. plant of order Ericaceæ; red berries are used for flavouring beer, for hair-washes, tooth-powders; *Oil of W.*, a tonic, is used in perfumery.

WINTERTHUR (47° 29′ N., 8° 44′ E.), town, canton Zürich, Switzerland; important commercial and manufacturing centre; cottons, machinery, wine. Pop. (1912) 25,700.

WINTHROP (42° 22′ N., 70° 58′ W.), town, summer resort, on Massachusetts Bay, Suffolk County, Massachusetts, U.S.A. Pop. (1910) 10,132.

WINTHROP, JOHN (1588–1649), Eng. administrator; b. Suffolk, England; appointed governor of Massachusetts by the company in London; founded Boston, 1630; strong Puritan; governor, 1637–40, 1642–44, 1646–49; pres. of New England confederation.

WINTHROP, JOHN (1606–76), administrator; obtained union of Connecticut and New Haven and formation of United Colonies of New England.

WINZET, NINIAN, Wingate (1518–92), Scot. cleric; controversialist on R.C. side; *Certain Tractates* reprinted, 1891, by Scot. Text Soc.

WIRE, a thin, long, circular metal rod, used in innumerable ways; its manufacture is limited to few metals and alloys, the principal being brass, copper, gold, iron, platinum, silver, steel; made by drawing or pulling the metal through a plate or die made of hard steel and having a hole of the requisite size, or by drawing the metal through a series of such dies, in each of which the hole decreases in size continuously. Wire-drawing was introduced into England in XVII. cent.

WIRE-WORM, a name most commonly applied to the round, hard-skinned larvæ, or grubs, of the Click Beetle (*Elateridæ*), which live underground and cause much damage to crops by gnawing their roots. A species of Millipede destructive to crops, also known as 'wire-worm,' can be readily distinguished from the 'grub' by its many pairs of legs.

WIRKSWORTH (53° 5′ N., 1° 35′ W.), town, Derbyshire, England. Pop. (1911) 3888.

WISBECH (52° 40′ N., 0° 7′ E.), town, river port, on Nen, in Isle of Ely, Cambridgeshire, England.

WISCONSIN (42° 30′ to 47° 3′ N., 86° 50′ to 92° 54′ W.), N. central state, U.S.A.; bounded N. by Lake Superior, Michigan State, E. by Lake Michigan, S. by Illinois, W. by Iowa and Minnesota; area, 56,040 sq. miles. Surface generally is an undulating plain with an elevation of from 600 to 1000 ft.; in the N. are mountains reaching a height of c. 18,000 ft., and in the S. are prairie lands; drained mainly by Mississippi on W. boundary, and its tributaries, St. Croix, Chippewa, Black, and Wisconsin; there are numerous lakes, of which the largest is Lake Winnebago in the E., others being Lake Poygan, Green Lake, and those in Madison County, noted for beautiful scenery. The greater part of state belongs to a very old geological period; most of the N. is Archæan, while in the S. Silurian and Cambrian rocks occur. The climate is not subject to great extremes, although the winters are both long and cold. Annual rainfall is from 30 to 31 inches. Flora includes a number of coniferous trees.

W. was first visited by Fr. explorers in the first half of the XVII. cent., and a Fr. mission was established on the N. coast, 1665. The region came into the possession of Great Britain in 1763, and after the close of the War of American Independence was included in the dominions of the U.S. It was organised as a territory in 1836, and admitted to the Union as a state in 1848. It remained faithful to the Union during the Civil War, when it contributed over 91,000 troops to the Federal force. Executive power is vested in a governor, who is assisted by a lieutenant-governor and three other officials of state; legislature consists of a Senate of 33 members elected by popular vote for 4 years, and an Assembly of 100 members elected in the same way for 2 years. Sends 2 Senators and 11 Representatives to Federal Congress.

The chief towns are Madison (capital), Milwaukee, Superior, Racine, Oshkosh, and La Crosse. Agriculture is an important industry; large crops of wheat, maize, oats, and barley are produced, and potatoes, rye, sugar-beet, and tobacco are cultivated; cattle, sheep, horses, mules, and pigs are raised in large numbers. There are dense forests, with pine, oak, and other valuable timber trees. Minerals found include zinc, lead, granite, petroleum, graphite, limestone, sandstone. Principal manufactures are flour, butter and dairy produce, hardware, lumber products, agricultural tools, furniture, leather, malt liquors, paper, textiles; and meat-packing is carried on. Railway mileage about 7400.

Education is free and obligatory; Madison, Appleton, and Milwaukee are univ. towns. Chief religions are R.C., Lutheran, Methodist, Congregationalist, and Baptist. Pop. (1910) 2,333,860.

Thwaites, *Story of Wisconsin* (1890); Campbell, *Wisconsin in Three Centuries* (1906).

WISCONSIN, UNIVERSITY OF, at Madison, U.S.A.; opened 1850; great increase of students since 1885; co-educational throughout; coll's of Letters and Science, Law, Agriculture, and Engineering; free tuition to all students from the state of Wisconsin, except for Law; more than 5500 students; twenty large buildings and famous library.

WISDOM LITERATURE, the name given to a group of writings consisting of Proverbs, Job, and Ecclesiastes in the Old Testament, Ecclesiasticus and the Wisdom of Solomon in the Apocrypha (*qq.v.*). They are a distinct branch of Hebrew lit., differing markedly in standpoint and treatment from the prophetic books. Their theme is the problem of human life and conduct.

Solomon had been renowned for his 'wisdom'; in later Jewish thought 'Wisdom' was personified.

Wisdom, Book of, often called 'Wisdom of Solomon,' one of most important of apocryphal books of Old Testament; shows influence of Gk. philosophy on later Hebrew thought; falls into two parts, chapters 1–9 and 10–19, possibly by different authors; written in Greek, but tinged with Hebrew expressions; written about time of Christ, and referred to in New Testament.

WISE, ISAAC MAYER (1819–1900), introduced reforms in Judaism in U.S.A.

WISEMAN, NICHOLAS PATRICK STEPHEN (1802–65), cardinal abp. of Westminster; b. Seville, of Irish parents; ed. at Ushaw, and at the Eng. Coll., Rome; ordained priest, 1825; helped to found the *Dublin Review*, 1836; pres. of Oscott, and bp., 1840; diplomatic envoy from Pius IX. to Palmerston, 1848; vicar-apostolic, 1849; abp. of Westminster and cardinal, 1850; won considerable reputation, not only as an ecclesiastic, but as a lecturer on social and literary subjects. Had considerable influence on the Oxford High Church movement, and in the revival of Catholicism in England.

WISHART, GEORGE (*c.* 1511–46), Scot. martyr; schoolmaster at Montrose (1538), and charged with heresy for teaching Gk. New Testament; spent some time abroad, and wrote *The Confession of Faith of the Churches of Switzerland*; in 1543 resided in Corpus Christi Coll., Cambridge; returned to Scotland, 1543, preached often, and, being arrested at Ormiston, was tried at St. Andrews and there hanged and burned by Cardinal Beaton's orders.

WISHAW (55° 47′ N., 3° 55′ W.), town, Lanarkshire, Scotland; coal-mines; ironworks. Pop. (1911) 25,263.

WISMAR (53° 52′ N., 11° 28′ E.), seaport, on Baltic, Mecklenburg-Schwerin, Germany; excellent harbour; contains several Gothic churches and the Renaissance Fürstenhof; was an important Hanse town; belonged to Sweden, 1648–1803. Pop. (1910) 24,378.

WISTARIA, genus of climbing plants, order Leguminosæ; flowers are blue and in racemes; varieties are *W. chinensis* and *W. frutescens*.

WITAN, WITENAGEMOT, Anglo-Saxon national council; bp's, ealdormen, the king's thanes, abbots (and abbesses), and (in the earliest days) all free men were invited. All laws, civil and ecclesiastical, grants of land, peace and war, the raising of taxes, were settled at the W.

WITCHCRAFT, the art of producing malignant supernatural effects by the agency of evil spirits. Belief in the reality of w. is very ancient, and is still prevalent amongst many savages. It was not until the Renaissance that judicial proceedings with torture were taken against witches. The bull of Pope Innocent IV., 1484, encouraged the Inquisition to take action, and, later, Protestants were equally alert. It is estimated that 300,000 persons were put to death as witches in 200 years. Puritan Scotland and New England were particularly conspicuous in persecution of witches in XVII. cent., and disbelief in witches was accounted atheism as late as 1768 by John Wesley. The last trial for w. in England took place in 1712, the last execution in Scotland, 1722; statute of 1603 repealed, 1735.

WITHAM (51° 48′ N., 0° 38′ E.), town, Essex, England. Pop. (1911) 3480.

WITHER, GEORGE (1588–1667), Eng. satirist and poet; b. Bentworth, Hampshire. For *Abuses Stript and Whipt*, he was imprisoned, and wrote the delightful pastoral, *Shepherds Hunting*, during his imprisonment. His finest poem is *Fair Virtue, or The Mistress of Philarete*, but W. is popularly remembered by his lyric beginning, 'Shall I, wasting in despair?'

WITHERSPOON, JOHN (1723–94), Scot. theologian; went to America, 1768, becoming pres. of Coll. of New Jersey; after Declaration of Independence held various political appointments.

WITNESS, one who gives sworn testimony in court of law; evidence of children and lunatics, if taken, is considered of little weight. The accused cannot be called as a witness for the prosecution in a criminal charge, but may be a witness for the defence, if he wishes to be called. The husband or wife of an accused person can only be compelled in certain cases (*e.g.* treason, injuries inflicted by other party, rape, indecent assault) to give evidence for the prosecution, but may always be called for the defence. They may be cross-examined, but cannot be compelled to disclose confidential communications made to them by their consorts during marriage.

WITNEY (51° 47′ N., 1° 29′ W.), town, on Windrush, Oxfordshire, England; manufactures blankets. Pop. (1911) 3529.

WITOWT, WITOLD (1350–1430), grand-duke of Lithuania; fluctuated between alliance with Poland and with the Teutonic order; finally confirmed agreement with Poland, 1401; crushed Teutonic Knights at Tannenberg, 1410; and made Poland-Lithuania a great power.

WITT, JAN DE, see DE WITT, JAN.

WITTE, SERGE JULIEVICH, COUNT (1849–), Russ. statesman; b. Tiflis; managed transportation of troops in Russo-Turk. War, 1877–78; chief of Imperial Railway Dept., 1888; Minister of Communications and Minister of Finance, 1892; conducted peace negotiations with Japan on behalf of Russia, 1905; Prime Minister, 1905–6.

WITTELSBACH, Ger. noble family, dating from X. cent. Otto V. settled at Wittelsbach, and took the name of the place, 1124 A.D. His descendants held the Palatinate of the Rhine and upper Palatinate of Bavaria from 1329, and included Maximilian I. of Bavaria, 1799, margraves of Brandenburg, kings of Sweden, and three kings in Germany—Louis IV., Rupert, and Charles II.

WITTEN (51° 27′ N., 7° 20′ E.), town, on Ruhr, Westphalia, Prussia; manufactures iron and steel. Pop. (1910) 37,450.

WITTENBERG (51° 52′ N., 12° 39′ E.), town, on Elbe, Prussia, Saxony; manufactures machinery; famous for its connection with Luther and the Reformation (1517); the Schlosskirche contains the tombs of Luther and Melanchthon; was capital of the Electorate of Saxony; stormed by the Prussians, 1814; its once famous univ. was united with that of Halle, 1815. Pop. 22,410.

WITTENBERGE (53° N., 11° 59′ E.), town, on Elbe, Brandenburg, Prussia; railway workshops. Pop. 20,610.

WITTENGAU, TREBON (49° N., 14° 43′ E.), town, Bohemia; the castle of Prince Schwarzenburg contains valuable archives. Pop. 5280.

WITU, VITU (2° 10′ S., 41° E.), sultanate, Brit. E. Africa, on coast, at mouth of Tana. Pop. 16,000. Capital, Witu; trade in rubber. Pop. 6500.

WITWATERSRAND, see JOHANNESBURG.

WIVELISCOMBE (51° 3′ N., 3° 19′ W.), town, Somersetshire, England.

WLADISLAUS I., LADISLAUS, WLADISLAW (1260–1333), king and reconstructor of Poland, which was split up into a number of independent principalities; chosen, 1296, while prince of Cujavia, to rule, it was not till 1305 he achieved any unity; crowned king, 1320, after a long struggle with the Teutonic order.

WLADISLAUS II., JAGIELLO (1350–1434), s. and successor of the grand-duke of Lithuania, 1377; married Jadwiga, Queen of Poland, 1386 (thereby becoming ruler of Poland); established Catholicism in Lithuania; succeeded in raising Poland to a great power, after breaking strength of the Teutonic order.

WLADISLAUS III. (1424–44), s. of W. II.; king of Poland, elected king of Hungary, 1440; led successful crusade against Turks, 1443, but was slain and his army destroyed, 1444.

WLADISLAUS IV. (1595–1648), s. of Sigismund and Anne of Austria; king of Poland, 1632; warred successfully against Russia, but failed to rouse Poland to its dangers.

WOAD (*Isatis*), genus of plants, order Cruciferæ;

Dyer's W. (*I. tinctoria*) was much used by early Britons for dyeing their bodies blue.

WOBURN.—(1) (51° 59′ N., 0° 37′ W.) town, Bedfordshire, England; near it is Woburn Abbey (XII. cent.), now seat of Duke of Bedford. (2) (42° 49′ N., 71° 12′ W.) city, Middlesex County, Massachusetts, U.S.A.; manufactures leather. Pop. (1910) 15,308.

WODEN, ODIN, chief god of early Teutons; ruler of heaven and earth and god of war; Frigga was his queen and Balder his son.

WÖHLER, FRIEDRICH (1800–82), Ger. chemist; worked with Liebig on the radical 'benzoyl,' prepared urea artificially; first prepared pure aluminium.

WOKING (51° 18′ N., 0° 33′ W.), town, Surrey, England; crematorium. Pop. (1911) 24,810.

WOKINGHAM (51° 25′ N., 0° 49′ W.), town, on border Windsor Forest, Berkshire, England. Pop. (1911) 4352.

WOLCOT, JOHN, PETER PINDAR (1738–1819), Eng. writer of poetical satires and pamphlets, e.g. *The Lousiad.*

WOLCOTT, ROGER (1679–1767), Amer. soldier and governor; successful in business; J.P., 1710; commissary of Connecticut forces in expedition against Canada, 1711, and commanded Connecticut forces against Louisburg, 1745; chief judge of Supreme Court, 1741, and deputy governor; governor, 1750–54.

WOLF, see DOG FAMILY.

WOLF, FRIEDRICH AUGUST (1759–1824), Ger. critic and philologist, and greatest classical scholar of his age; b. Hainrode, near Nordhausen. His masterpiece was his *Prolegomena ad Homerum*, in which he expounded his ballad theory of epic origin.

WOLF, HUGO (1860–1903), Austrian composer; studied at Vienna Conservatoire, 1875; became musical critic to Vienna *Salonblatt*, 1886; d. insane; song-writer with exceptional poetic power and remarkable style; composed 51 *Goethe Lieder*, 20 *Eichendorf Lieder*, *Italienisches Liederbuch*, etc.

WOLFE, CHARLES (1791–1823), Irish clergyman; author of *The Burial of Sir John Moore.*

WOLFE, JAMES (1727–59), Brit. general; b. Westerham, Kent; served in the Rhine campaign, in the rising of the 'Forty-five,' and in the Flanders campaigns. But his fame rests on his brilliant victory and noble death on the Heights of Abraham in the Quebec expedition.

WOLFENBÜTTEL (52° 9′ N., 10° 31′ E.), town, on Oker, Brunswick, Germany; has an ancient castle and a famous library; scene of defeat of Austrians by Swedes, 1641. Pop. (1910) 18,934.

WOLFF, CASPAR FRIEDRICH (1733–94), Ger. anatomist and physiologist; b. Berlin; ed. Halle; lectured on anat. and physiology in St. Petersburg Academy; his researches on the development of the chick founded the science of embryology.

WOLFF, CHRISTIAN (1679–1754), Ger. philosopher and mathematician; b. Breslau; prof. at Halle. Systematised and modified doctrines of Leibnitz; denied perception to all monads except souls; pre-established harmony only a permissible hypothesis, natural interaction of soul and body possible; adhered to optimism and determinism of Leibnitz.

WOLFF, JOSEPH (1795–1862), Anglican divine; originally Ger. Jew, converted, 1812; preached in East; f. of Sir Henry Drummond W. (1830–1908).

WOLF-FISH, see BLENNIES.

WOLFRAM VON ESCHENBACH (1170–1220), Ger. mediæval poet; b. near Anspach, Bavaria; enjoyed the patronage of Landgrave Hermann of Thuringia; wrote the famous epic *Parzival*, besides *Willehalm* (completed by Ulrich von Türheim), *Titurel* (2 fragments), and love songs; translated into modern High Ger. by Simrock (1883), Sante-Marte (1886).

WOLFSBANE, see ACONITE.

WOLGAST (54° 3′ N., 13° 44′ E.), seaport, on Peene, Pomerania, Prussia; formerly fortified; manufactures tobacco. Pop. 8210.

WOLLASTON, WILLIAM HYDE (1766–1828), Eng. chemist and physicist; worked on platinum; isolated palladium and rhodium; investigated columbium (niobium); observed dark lines in solar spectrum, and electromagnetic phenomena; invented reflecting goniometer.

WOLLIN (53° 32′ N., 14° 33′ E.), island, Pomerania, Prussia, at mouth Oder. Chief town, Wollin. Pop. 4550.

WOLLONGONG (34° 22′ S., 150° 52′ E.), seaport, Camden County, New South Wales; exports coal. Pop. 4000.

WOLLSTONECRAFT, MARY, see GODWIN, MARY.

WOLSELEY, GARNET JOSEPH WOLSELEY, 1ST VISCOUNT (1833–1913), Brit. soldier; b. Dublin County; entered Brit. army, 1852; wounded in Burmese War, 1852–53, and in Crimean War; captain in Ind. Mutiny, and lieut.-colonel in Chin. expedition, 1860; commanded Red River (Canada) expedition, 1870, and in Ashanti War, 1873–74; organised government in Zululand, 1880; defeated Arabi Pasha at Tel-el-Kebir, 1882; in command of Sudan campaigns, 1884–85; field-marshal, 1894; Commander-in-Chief, 1895–1900. Author of several books, military and autobiographical. Buried in St. Paul's Cathedral.

WOLSEY, THOMAS (*c.* 1475–1530), Eng. churchman and statesman; by repute s. of a butcher at Ipswich; graduated at Oxford, and elected a fellow of Magdalen, 1497; chaplain to Henry VII., 1507; almoner to Henry VIII., 1509, and early admitted to the king's counsels. Abp. of York, 1514, and chief statesman in England; cr. cardinal, 1515, and app. Lord Chancellor; attended Henry to the Field of the Cloth of Gold, and worked for the treaty of alliance with France; unable to prevent the war that followed, he was responsible for the advantageous treaty at its close; hated by Anne Boleyn, and by the lords for his pomp and magnificence, and unable to assist Henry in divorcing Catherine of Arragon, he fell from royal favour, 1529, and resigned the Great Seal. A bill of attainder was passed against him, and he was arrested; but sickness delayed his journey to London, and he died at Leicester Abbey.

Life, by Creighton (1888).

WOLVERHAMPTON (52° 37′ N., 2° 8′ W.), town, Staffordshire, England; centre of coal- and iron-mining district; manufactures hardware, machinery. Pop. (1911) 95,333.

WOLVERINE, see WEASEL FAMILY.

WOLVERTON (52° 3′ N., 0° 50′ W.), town, Buckinghamshire, England; railway-works.

WOMB, see REPRODUCTIVE SYSTEM.

WOMBATS, see under MARSUPIALS.

WOMBWELL (53° 42′ N., 1° 24′ W.), town, W. Riding, Yorkshire, England; collieries. Pop. (1911) 17,538.

WOMEN.—In law, by the Interpretation Act, 1889, words in any Act of Parliament passed after 1850 signifying the masculine gender apply equally to the feminine unless the contrary is declared. Factory and Workshop Acts referring to 'women' mean women of eighteen years of age or upwards. All employment of w. in mines in Great Britain is illegal.

Various public offices may be held by w.; notably parish sexton, churchwarden, governor of a workhouse, overseer or guardian of the poor, membership of county, borough, and parish council, and of a school board in Scotland. A woman may be chosen mayor or appointed magistrate; Dr. Garrett Anderson was the first woman mayor in England, at Aldborough, 1908. In the Middle Ages w. have been sheriffs and high constables; and as landed proprietors, with the rights of the lordship of the manor, or as abbesses, they were certainly summoned to the king's council. A woman may be queen, and a peeress in her own right, and may appoint to Church of England benefices. She may vote (if a householder) at municipal elections, and may be chairman of a municipal council, board of guardians, or school board. But she is expressly excluded from the

parliamentary franchise by the Act of 1832, and may not even vote for a member of Parliament of a Scot. University of which she is a graduate. Throughout Australia and New Zealand, in certain of the United States, Finland, and Norway, w. now possess the parliamentary vote.

The medical profession is now open to women in the United Kingdom (the restrictions being withdrawn, 1876–1908), as it is in America, the Colonies, and in all the chief European countries. But the law is closed to her, except in France, U.S.A., Finland, Norway, Netherlands, and Queensland. The pulpit is open to w. in certain Prot., Congregational, Primitive Methodist, and Unitarian Churches, and the Religious Orders in the Catholic Church have always offered an alternative to life in the world.

While all the modern univ's accept w. on equal terms with men as students and as graduates, Oxford and Cambridge only permit w. to sit for examination, and still refuse degrees.

A. R. Cleveland, *Women under English Law*; J. S. Mill, *Subjection of Women*; C. C. Stopes, *British Free Women*.

WONDERS, SEVEN, see SEVEN WONDERS.

WOOD, ANTHONY A, (1632–95), Eng. antiquary; b. Oxford; life was devoted to antiquarian studies of Oxford. His *History and Antiquities of the University of Oxford* was bought and translated by the University. He then recast the work in two parts.

WOOD GREEN, suburb of London, in Middlesex, England; 7 miles N. of St. Paul's. Pop. (1911) 49,372.

WOOD, MRS. HENRY, ELLEN PRICE (1814–87), Eng. novelist; best-known work is *East Lynne* (1861), a melodramatic novel.

WOOD, SIR HENRY EVELYN (1838–). Brit. soldier; fought in Crimea, Ind. Mutiny, Ashanti War (1874), Zulu War (1879), Transvaal War (1880–81).

WOOD WREN, see WARBLERS.

WOODBINE, see HONEYSUCKLE.

WOODBRIDGE (52° 7′ N., 1° 15′ E.), market town, on Debden estuary, Suffolk, England. Pop. (1911) 4623.

WOODBURY (39° 40′ N., 75° 9′ W.), city, capital, Gloucester County, New Jersey, U.S.A.; manufactures paper, glass. Pop. (1910) 4642.

WOODCOCK, see under PLOVER FAMILY.

WOODFORD (51° 36′ N., 0° 1′ E.), town, Essex, England. Pop. (1911) 18,497.

WOOD-LICE, SLATERS, flattened Crustacea which live on land and breathe air; common in damp places, under stones and bark. See MALACOSTRACA.

WOODPECKERS, insect-eating birds with powerful beaks by means of which they can excavate holes in trees for nesting, food, etc.; long tongue with hooked tip and sticky saliva for searching bark crevices, and stiff, fanlike tail; often brightly coloured with metallic, lustrous plumage.

WOODRUFF (*Asperula*), genus of plants, order Rubiaceæ; Sweet W. (*A. odorata*) has small white flowers, and in Germany flavours *May-drink*.

WOODS, LEONARD (1774–1854), Amer. divine; prof. at Andover Theological Seminary; f. of **Leonard W.** (1807–78), theologian and philologist.

WOODSTOCK.—(1) (51° 52′ N., 1° 22′ W.) town, on Glyme, Oxfordshire, England; manufactures gloves; formerly a royal residence; near it is Blenheim Park. (2) (43° 10′ N., 80° 46′ W.) town, port of entry, on Thames, Oxford County, Ontario, Canada; manufactures musical instruments. Pop. 10,000.

WOOD-WARBLER, see WARBLERS.

WOOL is a species of hair, distinguished by its fine, soft, and wavy structure. Sheep were domestic animals in Britain at a very early date, but the manufacture of w. was introduced by the Romans. Brit. w. became celebrated for its fineness and was much sought after by continental weavers, who were more skilful than the Eng. workers. From time to time expert Flemish weavers settled in England, and the industry gradually improved. Edward III. forbade the export of Eng. w. with the object of assisting the native industry, but he only succeeded in partially crippling the trade and in encouraging smuggling. In Elizabeth's reign export restrictions were removed, but in 1660 export again was stopped, and this state of things continued until 1825, when the prohibition was finally removed. Sheep were introduced into America in 1609, but the woollen industry was not really established until the end of the XVIII. cent. Spanish merino sheep, which produced specially fine wool, were taken to America about 1802. A few years earlier, merinos were introduced into Australia, and after some early failures the breed became thoroughly established. Since then Australian w.-farming has developed with extraordinary rapidity. At first the sheep were valued simply for their w., but when the frozen meat trade sprang up more attention was given to the carcass. Larger-bodied sheep resulted, and inferior cross-bred w. took the place of merino w., but more recently the quality of the w. has been greatly improved. South America runs Australia very close as a w.-producing country. Merinos were introduced there rather later than to Australia, and the growth of the meat trade has had similar results in each country. Merinos were taken to South Africa by the Dutch. W.-growing has not developed so rapidly in South Africa as in Australia and South America, but it undoubtedly has a promising future. Eng. w. is characterised by its length and its lustre, but by crossing with merinos a finer, shorter w. also has been produced. Welsh w. is used for flannels, Cheviot w. for tweeds, and Scotch w. for carpet yarns. Shetland w. is noted for its specially soft nature. White w. is the commonest and most suitable for manufacture, but there are also grey, yellow, brown, and black w's. Under the microscope w. is distinguished from hair by its serrated structure. In the finest w's there may be as many as 2800 serrations to the inch, while poor w's may have as few as 500.

The first step in woollen manufacture is the sorting or 'stapling' of the raw w. The stapler works at a frame covered with wire netting, through which the dirt falls while the w. is being sorted into different qualities. It is then put through a 'scouring-machine,' which cleanses it thoroughly by means of a hot soap solution. It is then spread over a framework of wire netting and dried by hot air. Drying-machines are often used to obtain more rapid and uniform drying. The w. is now teased in a 'willeying-machine,' in which two sets of teeth, working in opposite directions, disentangle it and throw it out in loose fibres. At this stage some w's require treatment by dilute sulphuric acid or in a 'burring-machine,' to remove burrs, seeds, or other adhering vegetable matter. The w. is then blended with other w's, or more commonly with cotton and other materials, oiled and beaten, and is then ready for carding. This is done by passing it through a 'scribbling-machine,' an intermediate, and a 'condensing-machine,' during which treatment it becomes perfectly interblended. It comes from the condensing-machine in the form of fluffy strips called 'slivers,' which are ready to be spun into yarn in the spinning-mule. This machine draws out the slivers, at the same time twisting them slightly to strengthen them and prevent them from breaking, gives the final amount of twist, and winds the yarn thus produced on spindles. This single yarn is now ready for weaving in the loom. The dividing-line between woollen and worsted yarns is not always well defined, but, generally speaking, woollen yarns are made from short, and worsted yarns from long, lustrous w's. Again, in the preparation of woollen yarn the fibres are crossed and interlaced, but in worsted yarn they are brought into a uniform parallel condition. In preparing worsted yarns the long w., after scouring, goes through a process called 'gilling,' which consists in passing it through a number of gill-boxes containing gills or combs which separate and straighten the fibres, and the w. comes out in a long

sliver. It is then put through a 'combing-machine,' from which it issues in a fine sliver called 'top.' This is then drawn out to a fine roving, from which is spun the yarn. On leaving the loom (see WEAVING) the woollen fabric is mended and scoured, and then soaped and milled by beating with large hammers or by compression in a 'milling-machine,' to eliminate the thread structure. It is again scoured, and taken to the 'tentoring-machine,' where it is hooked, while damp, to a frame which passes into a heated room, and dried while thus stretched. It is then teased to raise the pile, steamed, and pressed. Worsted cloth is finished on very similar lines. The centre of the woollen industry is in Yorkshire, Leeds, and Bradford district. West of England all-w. cloth is still made, and Scotch tweeds are made in the Hawick and Galashiels district.

WOOLMAN, JOHN (1720–72), Amer. preacher; persuaded Quakers to abandon slavery; wrote *Journal*.

WOOLNER, THOMAS (1825–92), Brit. sculptor and poet; executed several ideal works, and statues or portrait busts of many of his distinguished contemporaries. His volume of poems, *My Beautiful Lady*, has gone through several editions.

WOOLSACK, seat of Lord Chancellor in House of Lords; name believed to originate from a bag of wool being placed for the Chancellor in Edward III.'s reign to remind him of England's chief wealth.

WOOLSORTERS' DISEASE, see ANTHRAX.

WOOLSTON, THOMAS (1669–1731), Eng. deist; considered Bible allegorical; became a bitter controversialist; d. in prison.

WOOLWICH (51° 29′ N., 0° 3′ E.), town, on Thames, London, England; chief arsenal in Great Britain; contains factories for guns, gun-carriages, torpedoes, and ammunition; vast storehouses; barracks and military hospital; seat of a royal college for engineering and artillery. Pop. (1911) 121,403.

WOOLWICH AND READING BEDS, argillaceous and sandy deposits of Lower Eocene system found in London and Hampshire basins.

WOONSOCKET (42° N., 71° 31′ W.), town, on Blackstone, Providence County, Rhode Island, U.S.A.; manufactures cottons, worsteds. Pop. (1910) 38,152.

WOOSTER (40° 50′ N., 81° 58′ W.), city, on Killbuck Creek, capital, Wayne County, Ohio, U.S.A.; seat of Wooster Univ.; manufactures foundry products. Pop. (1910) 6136.

WOOTTON BASSETT (51° 32′ N., 1° 53′ W.), town, Wiltshire, England; agricultural trade.

WORCESTER.—(1) (52° 11′ N., 2° 12′ W.) county town, on Severn, Worcestershire, England; bp.'s see since VII. cent.; has fine cathedral, principally Early English and Perpendicular in architecture, and dating in part from XI. cent.; several old churches, and two grammar schools of Tudor foundation; manufactures porcelain, chemicals, gloves, iron goods; was scene of Cromwell's final defeat of Charles II., 1651. Pop. (1911) 47,987. (2) (42° 16′ N., 71° 49′ W.) town, Massachusetts, U.S.A., 44 miles W.S.W. of Boston; seat of Clark Univ. (1887); some fine public buildings and many beautiful parks; railway centre; important manufactures of wine, boots and shoes, metal goods, machinery, carpets, and other woollens. Pop. (1910) 145,986. (3) (32° 50′ S., 20° 50′ E.) town, Cape Colony; wine-growing region; tanning and wagon-building. Pop. (1911) 7963.

WORCESTER, EARLDOM AND MARQUISATE OF.—Sir Thomas Percy was 1st Earl of W., 1397; but present line is descended from Charles Somerset—a Beaufort—1514. Marquisate cr., 1642. Forty years later the Marquis of W. became Duke of Beaufort.

WORCESTER, JOHN DE TIPTOFT, EARL OF (1427–70), Lord Deputy of Ireland (1467–68); Chamberlain of the Exchequer (1470); author of learned works; beheaded as Yorkist.

WORCESTERSHIRE (52° 17′ N., 2° 13′ W.), inland county of W. central England, with county town of same name; bounded by Salop, Stafford, Warwick, Gloucester, and Hereford; area, 738 sq. miles; surface varied; crossed by several ranges of hills; watered by Severn, Avon, Stour, Teme, and other rivers; agriculture and market-gardening are important industries; chief crops are wheat and barley; cattle and sheep raised. Minerals include coal, iron, salt, limestone; manufactures iron and steel goods, china, carpets, glass, gloves, etc. W. was part of kingdom of Mercia; it supported king in Civil War of XVII. cent., and suffered greatly at hands of Parliamentarians. Has several ruined monasteries. Pop. (1911) 427,064.

WORDSWORTH, CHRISTOPHER (1774–1846), Anglican clergyman; master of Trinity Coll., Cambridge, 1841.

WORDSWORTH, CHRISTOPHER (1807–85), headmaster of Harrow, 1836–44; bp. of Lincoln, 1869.

WORDSWORTH, DOROTHY (1771–1855), Eng. writer; sister of William Wordsworth (*q.v.*). Her *Journal* has been an invaluable storehouse of information on the inner life of her bro., and the importance of her influence on his literary taste cannot be exaggerated.

WORDSWORTH, WILLIAM (1770–1850), Eng. poet; b. (April 7) Cockermouth, Cumberland; solicitor's son; ed. Hawkshead Grammar School (Lancs) and St. John's Coll., Cambridge; a moody child and bookish youth; visited France, 1790, 1791–92, and enthusiastically upheld Fr. Revolution. A legacy (£900 from his friend, Raisley Calvert), the post of distributor of stamps for Westmoreland (1813–42), a Civil List pension, 1842, and the Poet Laureateship (1843–50) enabled W. to live a long, quiet, meditative life, the only 'events' being several visits to Scotland and the Continent, and the publication of his books. With his talented and devoted sister, Dorothy W. (*q.v.*), he settled at Grasmere, 1799; in 1802 he m. Mary Hutchinson (his 'Phantom of Delight'); from 1813 till death he lived at Rydal Mount. From the start W. dedicated his life to poetry; *Descriptive Sketches* and *Evening Walk* (1793) appeared when he was only twenty-three; *The Borderers*, a tiresome tragedy, followed, 1795; then *Lyrical Ballads*, written in conjunction with his new friend, Coleridge (*q.v.*), 1798 (republished in 2 vol's, 1800); two vol's of miscellaneous verse (including 'Intimations of Immortality,' 'Sonnet to Liberty,' and other masterpieces), 1807; *The Excursion*, 1814, part of meditated larger work, *The Recluse* (begun 1799); *White Doe of Rylstone* (long narrative poem), 1815; *Peter Bell*, 1819; *The Prelude* or *Growth of a Poet's Mind* (part of *The Preludes*) was published posthumously.

Chief of the Lake poets and Leader of the Romantic Movement, W. made Nature—and Man as part of Nature—his great poetic theme. Poetic diction he banned; the poet, he held, should prefer the language of peasants. Poetry he defined as 'emotion recollected in tranquillity.' Few poets have produced such perfect gems; perhaps no great poet has fallen to such depths of banality. He succeeded best when he forgot his theories. W. is pre-eminently the poet of the contemplative lover of nature.

Matthew Arnold's *Selection*; *Works*, edit. by Knight (1896); Legouis, *Early Life of Wordsworth*; Monographs by Myers (1885), Raleigh (1903), Rosaline Masson (1913); Hereford, *Age of Wordsworth* (1897).

WORK, see under ENGINE.

WORKHOUSE, see POOR LAW.

WORKINGTON (54° 38′ N., 3° 33′ W.), seaport, at mouth of Derwent, Cumberland, England; iron and steel manufactures; coal mines. Pop. (1911) 25,099.

WORKMEN'S COMPENSATION ACT, see EMPLOYERS' LIABILITY ACTS, COMPENSATION, LABOUR.

WORKSOP (53° 18′ N., 1° 8′ W.), town, Nottinghamshire, England; chief industry, malting. Pop. (1911) 20,387.

WORLD, see PLANET.

'WORM,' general name for number of related animals—see PLATYHELMINTHES (*Flat-Worms*); TURBELLARIAN WORMS; TREMATODE WORMS (*Flukes*);

TAPEWORMS (*Cestoda*); NEMATOMORPHA (*Hair-Worms*); and CHETOPODA (*Bristle Worms*, including *Sea Worms* and *Earth Worms*).

WORMS occur in intestines of children; presence of small thread-worms leads to wasting, itching of anus, irritation at the nose, and a strong salt-and-water enema is given every second night for a week; if no improvement, castor oil is necessary; mercurial ointment is applied to anus. Round-worms may be 10 inches long; the symptoms are much the same as above, and a doctor must be summoned.

WORMS (49° 39′ N., 8° 21′ E.), town, on Rhine, Hesse-Darmstadt, Germany; has magnificent Romanesque cathedral, dating from XII. cent., and other old churches. Has important river trade; manufactures Liebfrauenmilch wine, artificial wool, bone dust, tobacco, patent leather, furniture, machinery. W. was one of Charlemagne's residences. Here in 1521 Luther defended his theological position at *Diet of W.* Pop. (1910) 46,819.

WORMWOOD, an aromatic extract obtained from *Artemisia absinthium*, a composite; used in preparation of absinthe and as a tonic.

WORONZOV, MIKHAIL, VORONTSOV (1714–67), Russ. imperial chancellor under Elizabeth and Catherine II. His nephew, ALEXANDER ROMANOVICH (1741–1805), was ambassador and afterwards imperial chancellor. Another nephew, SEMEN ROMANOVICH (1744–1832), was ambassador in London; and his s., MIKHAIL SEMENOVICH (1782–1856), was a brilliant soldier and successful administrator of southern provinces.

WORSBOROUGH (53° 31′ N., 1° 28′ W.), town, W. Riding, Yorkshire, England; iron- and steel-works; collieries. Pop. (1911) 12,754.

WORSLEY (53° 30′ N., 2° 23′ W.), town, Lancashire, England; cotton, coal. Pop. (1911) 13,906.

WÖRTH (48° 56′ N., 7° 44′ E.), village, Alsace, Germany, where on Aug. 6, 1870, the Germans under Frederick William, Crown Prince of Prussia, defeated the French under MacMahon.

WORTHING (50° 49′ N., 0° 22′ W.), watering-place, Sussex, England. Pop. (1911) 32,320.

WOTTON, SIR HENRY (1568–1639), Eng author; ed. Winchester and Oxford; ambassador at Venice, 1604–12, 1616–19, 1621–24; diplomatic envoy at Paris, 1612, The Hague, 1614, Vienna, 1620. Author of poems (notably *Character of a Happy Life*), etc.

WOUND may be *incised*, a clean-cut opening in which the length is greater than the depth, and bleeding is usual; *lacerated*, in which the opening is irregular, the edges torn, and bleeding less; *punctured*, in which the depth is greater than the length, and danger may arise from injury to deep structures in the vicinity; *gunshot*, in which the opening of entrance is smaller than the opening of exit, and danger depends on the structures involved, bleeding being usually slight. W's are treated by cleaning with carbolic lotion, removing dirt, etc., stopping bleeding, dressing with gauze, and bandaging. *Bruises* are injuries to deeper layers of the skin or tissues, but without open wound; treated with ice, massage, lead and opium lotion.

WOUNDWORT, see STACHYS.

WOUWERMAN, PHILIP (1619–68), Dutch painter of cavalry scenes; famous for 'white horse' in many pictures.

WRANGEL, FRIEDRICH HEINRICH ERNST, COUNT VON (1784–1877), Pruss. soldier; distinguished in Napoleonic wars; commanded in Schleswig-Holstein, 1848, during Berlin riots, 1848, and nominally in Denmark, 1864.

WRANGLER, SENIOR, one passing highest in maths. in Cambridge B.A. exam.

WRASSES (*Labridæ*), thick-lipped, rock-loving, brightly coloured bony fishes, with strong, crushing teeth; distribution world-wide; over 500 species known, 7 being British.

WRAXALL, SIR NATHANIEL WILLIAM (1751–1831), Eng. hist. writer; wrote *Hist. Memoirs of My Own Time* (1815), *Memoirs of Valois Kings* (1777).

WRAY, JOHN, see RAY, JOHN.

WRECK.—Only goods cast upon the land, after a shipwreck, are 'wreck'; at sea they are not 'wreck,' but are within the jurisdiction of the Admiralty. By the Merchant Shipping Act of 1894, all 'jetsam, flotsam, and derelict found in or on the shores of the sea or any tidal water' are 'wreck,' and are to be handed over to the proper custody of district receivers. The claims of the owners are recognised for a year, and the Crown has a title to unclaimed wreck, except where royal licence has given a revenue of wrecks, a thing frequently done in the past. To plunder or steal goods from vessels wrecked or cast on shore is a felony, and persons in possession of shipwrecked goods are liable to imprisonment. The coroner certifies whether there has been a wreck or not, and who is in possession of the goods.

WREDE, KARL PHILIPP, PRINCE VON (1767–1838), Bavarian general; led Bavarian contingent in Napoleon's army until 1813; after Bavaria's desertion headed contingent of allies.

WREN, SIR CHRISTOPHER (1632–1723), Eng. architect; was devoted as an Oxford student to mathematics, astronomy, chemistry, and anatomy. Architecture came, however, to engage his chief interest, and he had his great opportunity when London was laid in ruins by the fire of 1666. He was the architect of the new St. Paul's Cathedral, and of some 50 other churches to replace those destroyed. Many other notable structures, including Temple Bar (*q.v.*), were of his design.

WRENS (*Troglodytidæ*), a family of minute Perching Birds, almost 300 in number. Although most abundant in S. America, several species occur in N. America, Europe, and Asia. The Common Wren (*Troglodytes vulgaris*) is British.

WRESTLING, ancient and widespread sport, mentioned frequently in classical lit.; prominent feature of Olympic games. Various styles practised in Britain; commonest is Lancashire style, known as *catch-as-catch-can*; both shoulders on ground at the same time constitute a throw; in Cumberland mode the competitor who falls first loses; in Cornish, two hips and a shoulder, or a hip and two shoulders, must be on the ground simultaneously for a throw. The Japanese have a peculiar style of wrestling, *Ju-jitsu* (q.v.).

WREXHAM (53° 2′ N., 3° W.), town, Denbighshire, Wales; breweries, tanneries. Pop. (1911) 18,379.

WRIGHT, THOMAS (1810–77), Eng. antiquary; helped to found Brit. Archæological Association, Percy Soc., Shakespeare Soc.; voluminous writer.

WRIST, the joint uniting the hand with the forearm. See SKELETON.

WRIT, the legal instrument for enforcement of authority of a court of law, and the judicial process for summoning an offendor. The commencement of every action in the High Court is by the issue of a w. of summons, which may be issued in London or at District Registries, which are established in provincial towns to facilitate proceedings in cases which arise outside the Metropolitan area, and they are under the direction of the District Registrar. W's are issued on the application of the plaintiff or his solicitor. In London the place of issue is the W. Department, at the central office of the High Court of Justice. The fee is 10s. The w. is issued in duplicate, the duplicate being filed at the Court. The form of the w. is prescribed, and on the back of it there must be an endorsement, usually very brief, setting forth the ground of complaint, or the nature of relief which the plaintiff seeks. A true copy of the w. of summons must be served personally on each defendant at any hour of day or night, except on Sundays. The w. commands the defendant to 'cause an appearance to be entered' within eight days, and must be obeyed either by the defendant or his solicitor. A w. of elegit is issued when land is taken to satisfy a judgment. A w. of sequestration is used to enforce the judgments of the Court of Chancery. A w. of

attachment requires the sheriff to arrest and lodge the defendant in gaol.

WRITER'S CRAMP, see CRAMP.

WRITERS TO THE SIGNET, Scot. solicitors who prepare Crown writs; formerly prepared all summonses and writs of the Supreme Court of Justice.

WRITING, the earliest type of w. among primitive peoples is pictorial. Those who are prevented by distance or time from communicating their ideas to others by word of mouth naturally resort to the use of symbolical pictures. Soon these pictorial symbols become conventional, and each word has its definite symbol. A great step is taken when an attempt is made to represent grammatical changes. New symbols are then invented to express syllables. Finally the symbols become phonetic, *i.e.* individual sounds are represented by individual letters. But while verbal and syllabic symbols are common achievements among primitive peoples, the creation of the phonetic alphabet is a rare invention. The oldest known alphabet is the Semitic, dating from about 1000 B.C., and from it most known alphabets are derived.

WROTHAM (51° 19′ N., 0° 17′ E.), town, Kent, England. Pop. (1911) 4169.

WRY-NECK, TORTICOLLIS, is a deformity caused by an affection of the sterno-mastoid muscle, and may be *acute*, due to exposure to cold; *congenital*, due to arrested development or to injury to the sterno-mastoid muscle at birth—treated by massage, and, if necessary, division of the muscle; or *spasmodic*, due to nervous derangement—treated by bromides and application of electricity.

WUCHANG (30° 27′ N., 114° 46′ E.), city, on Yangtse-kiang, Hu-peh, China; cotton mills. Pop. *c.* 66,000.

WUCHOW (23° 30′ N., 111° 15′ E.), treaty port, on Si-kiang, Kwang-Si, China. Pop. (1911) 59,000.

WUHU (31° 20′ N., 118° 30′ E.), treaty port, on Yangtse-kiang, Ngan-hui, China; exports rice. Pop. (1911) 122,000.

WULFENITE, mineral consisting of lead molybdate; found in lead ore.

WULFSTAN (d. 1023), bp. of Worcester, 1003–1016; abp. of York, 1003–23; various homilies bear his name.

WULFSTAN, ST. (1012–75), bp. of Worcester, 1062; last Anglo-Saxon bp.

WUNDT, WILHELM MAX (1832–), Ger. philosopher; b. Neckarau; studied med., and lectured at Heidelberg; assistant prof. (1864); prof. of Philosophy at Zürich (1874) and Leipzig (1875), where he founded an Institute of Experimental Psychology; wrote on physiology, psychology, logic, and ethics, *System der Philosophie* (1899).

WUNTHO (23° 56′ N., 95° 45′ E.), petty native state, Upper Burma; came under Brit. administration, 1891. Pop. 160,000. Capital, Wuntho.

WUPPER (51° 13′ N., 77° E.), river, Rhineland, Prussia; joins Rhine below Cologne.

WÜRTTEMBERG (47° 35′ to 49° 35′ N., 8° 15′ to 10° 30′ E.), kingdom, S. Germany; bounded N. by Baden and Bavaria, E. by Bavaria, S. by Switzerland, W. by Baden; area, 7534 sq. miles. Surface is generally undulating, reaching an extreme height of over 3780 ft. in Mt. Baiersbronn in the Black Forest region in W.; drained by Danube, Neckar, and other streams; large area forested.

W. was raised to a duchy for Eberhard I. by the Emperor Maximilian, 1495; became an electorate, 1803; and, having supported France against Austria, was raised to the rank of a kingdom by the Treaty of Pressburg, 1805. Constitution is a limited monarchy reigning sovereign, Wilhelm II. (1848–), king since 1891; legislative power is vested in a Parliament of two chambers. W. is represented by four members in the Bundesrath and seventeen members in the Reichstag. Its military force, of about 24,500 men, forms the XIII. corps of German army.

Chief towns are Stuttgart (capital), Ulm, Heilbronn, Esslingen. Chief industry is agriculture; live stock is extensively raised; wheat, oats, rye, potatoes, turnips, and other crops cultivated; minerals include salt, iron, limestone; manufactures textiles, paper, leather, hardware, tobacco, beer, spirits, firearms, gunpowder, etc. Exports cereals, live stock, timber, gunpowder, textiles, etc.

Education is free and obligatory; Tübingen is seat of a univ. Religions are Prot., R.C., Jewish. Pop. (1910) 2,437,574.

WURTZ, CHARLES ADOLPHE (1817–84), Fr. chemist; discovered phosphorus, oxychloride, and phosphorous acid; converted alkyl isocyanates into amines; showed sodium action on alkyl halides; prepared ethylene oxide and glycols; explained constitution of glycerine; studied condensation of aldehyde to aldol.

WÜRZBURG (49° 47′ N., 9° 56′ E.), town, on Main, Bavaria, Germany; dates from VII. cent.; famous cathedral (XI. cent. onwards), Romanesque Church of St. Burkart, Neumünster (XI. cent.); royal castle (1720–44), univ. (refounded, 1582), with celebrated medical school; mathematical, surgical, and musical instruments, machinery, printing-presses, breweries, tobacco. Pop. (1910) 84,496.

WURZEN (51° 22′ N., 12° 44′ E.), town, on Mulde, Saxony; manufactures machinery. Pop. 17,200.

WYANDOTTE (42° 12′ N., 83° 10′ W.), city, on Detroit, Wayne County, Michigan, U.S.A.; shipyards; manufactures salt, chemicals. Pop. (1910) 8287.

WYANDOTTE CAVE, cave, 5 miles N.E. of Leavenworth, Crawford County, Indiana, U.S.A.; noted for its immense chambers and its stalagmites and stalactites.

WYATT, SIR THOMAS (1503–42), Eng. poet and diplomatist; held court appointments under Henry VIII.; P.C., 1533; lover of Anne Boleyn; ambassador to Charles V., 1537–39; imprisoned in Tower, but released, 1541. Author of 'Certain Psalmes' done into English metre, 1549, and many rondeaus and lyrics, pub. as *Songes and Sonettes*, 1557; introduced sonnet from Italy, and with Surrey (*q.v.*) reformed Eng. verse.

WYATT, SIR THOMAS (d. 1554), Eng. rebel who led the national opposition to Queen Mary's marriage; advanced with troops as far as Ludgate Hill, but was forced to disband; beheaded.

WYCHERLEY, WILLIAM (c. 1640–1716), Eng. dramatist; b. Clive; ed. Oxford, admitted to Inner Temple; entered army, and may have seen service at sea against Dutch; m. (secretly) Countess of Drogheda; lost court favour; a friend of Pope and other literary lions of his day. W. is one of the leading Restoration dramatists; a master of intrigue, but less brilliant and imaginative than Congreve. His best comedies are *Love in a Wood* (1671), *The Gentleman Dancing-Master* (1672), *The Plain Dealer* (1674) (adapted from Molière's *Le Misanthrope*), and *The Country Wife* (1675). A collection of poems appeared, 1704; and posthumous works were pub., 1728.

Edition by Ward (1893).

WYCLIFFE, JOHN (*c.* 1320–84), Eng. Reformer; b. near Richmond, Yorkshire; fellow and master of Balliol Coll., Oxford, 1356–60; presented to the Crown living of Lutterworth, 1374; recognised as a popular preacher in London, and as the friend of John of Gaunt; hostile critic of Papacy in State matters; pub. *De civili dominio*, in which he maintained that Church should not meddle with temporal affairs, the clergy should not hold property, it was lawful for the State to deprive unworthy clergy of property. W. was summoned to appear before the abp. of Canterbury at St. Paul's, 1377; John of Gaunt's supporters broke up the trial, and a riot ensued. Pope Gregory XI. condemned 18 'conclusions' from W.'s writings, 1378. Meantime W. had been engaged (with Nicholas Hereford and John Purvey) on an Eng. translation of the Bible from the Lat. Vulgate, and in organising

a band of secular priests as itinerant preachers. In 1379 he pub. *De officio regis*, declaring the king's to be above the pope's jurisdiction. Two years later in *De eucharistia* he questioned doctrine of Transubstantiation. (For the Peasant Revolt in 1381 W. cannot be held responsible. His works were in Lat., and were unknown to the peasant leaders, who, however, were hotly opposed to John of Gaunt, W.'s protector.) In 1382 a court, called by the abp. of Canterbury, and consisting of bishops and theologians, condemned 10 articles in W.'s works as heretical and 14 as erroneous, but W. was unmolested. He retired to Lutterworth, and d. there of a stroke while hearing Mass. His followers were few, and his influence in England had ceased within a hundred years. But in Bohemia John Huss was a disciple, and made a national religion of W.'s doctrines.

G. M. Trevelyan, *England in the Age of Wycliffe*; Gairdner, *Lollardry and the Reformation*.

WYCOMBE, Chepping or High Wycombe (51° 38′ N., 0° 45′ W.), town, Buckinghamshire, England; manufactures chairs. Pop. (1911) 20,390.

WYE (51° 57′ N., 2° 37′ W.), river, England; rises in Plinlimmon; joins estuary of Severn; length, 130 miles.

WYKEHAM, WILLIAM OF, see William of Wykeham.

WYLIE, ALEXANDER (1815–87), missionary in China and learned in Chinese lore.

WYMONDHAM (52° 34′ N., 1° 7′ E.), town, Norfolk, England.

WYNAAD, Wainad (11° 45′ N., 76° E.), tableland of W. Ghats, Malabar, Madras, Brit. India; gold mines; tea and coffee plantations.

WYNTOUN, ANDREW OF (d. *c.* 1420), Scot. rhyming chronicler; his *Orygynale Cronykle of Scotland* is of great value philologically.

WYOMING (41° to 45′ N., 104° 3′ to 111° 3′ W.), one of the N.W. centre states of the U.S. Bounded N. by Montana, E. by S. Dakota and Nebraska, S. by Colorado and Utah, W. by Utah, Idaho, and Montana; area, 97,914 sq. miles; the surface on either side of the Rocky Mountains (main range, 12,200 to 13,800 ft.) forms plateau of from 7000 to 8000 ft. above sea-level; chief ranges are the Wind River, Teton, Salt River, Owl Creek, and Laramie Mountains, and among the highest peaks are Frémont Peak (13,790 ft.), Grand Teton (c. 13,700 ft.), Gannett Peak (13,770 ft.), and Chauvenet Peak (13,000 ft.); watered by Green, Snake, Yellowstone, Big Horn, Powder, N. Platte, and other streams. There are pine forests among the hills, and in the N.W. is Yellowstone National Park (*q.v.*). The climate is temperate and healthy in the lower districts, more severe in the mountains.

W. was not permanently settled by white men until the second half of the XIX. cent.; the discovery of gold caused a great influx of population in 1867–68, and the country was organised as a territory, 1869; admitted to Union as a state, 1890. Executive power is vested in a governor, assisted by various officers of state; legislative power is in hands of a Senate of 27 members and a House of Representatives of 56 members, elected for four and two years respectively by popular vote.

Chief towns are Cheyenne (capital), Laramie, Sheridan. Large area is covered with valuable timber; there is excellent grazing land, and large numbers of cattle and sheep are raised. Mining is most important industry, minerals found including coal, gold, silver, copper, iron, tin, soda, limestone, salt, petroleum. Railway mileage about 1620. Education is free and obligatory. Principal religions are R.C., Mormon, Protestant Episcopal. Pop. (1910) 145,965.

Raine, *Wyoming* (New York, 1909).

WYOMING VALLEY (41° N., 104° W.), fertile valley, Luzerne County, Pennsylvania, U.S.A.; 20 miles long and 3–4 miles wide; traversed by the N. branch of the Susquehanna; contains anthracite coal deposits; scene of Campbell's 'Gertrude of Wyoming.'

WYSE, SIR THOMAS (1791–1862), Irish statesman; m. Lætitia, dau. of Lucien Bonaparte; worked for R.C. emancipation and other patriotic measures; Brit. ambassador to Greece, 1849.

WYTTENBACH, DANIEL ALBERT (1746–1820), classical scholar; b. Bern; ed. Marburg, Göttingen, and Leiden. At Leiden he fell under influence of Ruhnken; app. prof. of Greek at the Coll. of the Remonstrants in Amsterdam, 1771; prof. of Philosophy at the Athenæum, 1779; succ. Ruhnken at Leiden, 1799. His wife, who survived him, wrote several books, and in 1827 was given the degree of Doctor in Philosophy at Marburg. W.'s chief works include an edition of Plutarch's *Moralia* (pub. Oxford), *Life of David Ruhnken* (in Lat.), an edition of Plato's *Phædo*. Mahne, *Life* (1823).

X, 24th letter of alphabet; descended from Semitic *Samech* through Gk. *xi*; pronounced *ks*, but *z* when initial consonant, e.g. *Xenophon*.

XANTHI, Eskije (41° 12′ N., 24° 53′ E.), town, on Eskije, vilayet Adrianople, European Turkey; noted for tobacco. Pop. *c.* 13,000.

XANTHIC ACID ($C_2H_5O.CS.SH$), heavy organic acid, decomposing at 25° C.; the cupric salt is yellow, whence name (Gk. *xanthos*, yellow).

XANTHINE, Xanthin ($C_5H_4N_4O_2$), is an organic substance found in muscle, the liver and pancreas, and in urine; oxidises to urea when treated with HCl or $KClO_3$; when oxised with chromic acid it gives **Xanthone** ($C_{13}H_8O_2$),—white crystalline needles; M.P. 174° C.; B.P. 350° C.,—which is the parent of several dyestuffs.

XANTHIPPE, wife of Socrates; traditionally notorious as a virago.

XANTHOXYLUM, genus of trees and shrubs, order Rutaceæ; species is Prickly Ash or Toothache Tree (*X. fraxineum*).

XANTHUS (36° 20′ N., 29° 25′ E.), ancient city, on Xanthus, Lycia, Asia Minor; besieged and destroyed by the Persians under Harpagus, *c.* 545 B.C., and by the Romans under Brutus, 43 B.C.

XAVIER, FRANCIS (1506–52), Catholic saint, of Span. birth; ed. Paris; became friend of St. Ignatius Loyola; set sail for India, 1540; preached at Goa, Travancore, Ceylon, Malay Archipelago, Japan, Malacca, Singapore; d. of fever on St. John Island; canonised, 1621; miracles were attributed to him; in person he was short and fair, and like other mystics was very practical; of undoubted power of evangelisation.

XENARTHRA, a sub-order of the Edentates (*q.v.*).

XENIA (39° 40′ N., 83° 52′ W.), city, capital, Greene County, Ohio, U.S.A.; seat of Xenia Theological Seminary; manufactures cordage, twine. Pop. (1910) 8706.

XENOCRATES OF CHALCEDON (396–314 B.C.), Gk. philosopher; disciple of Plato, on whose death he accompanied Aristotle to the court of Hermeias of Atarneus and Assus; returning to Athens, he succ. Speusippus as head of the Academy.

XENOPHANES OF COLOPHON (fl. VI. cent. B.C.), a satiric poet who attacked the anthropomorphism of popular religion; sometimes, but without sufficient reason, regarded as the founder of the Eleatic school (*q.v.*).

XENOPHON (*c.* 430–355 B.C.), Gk. historian; joined Gk. mercenaries, who followed Cyrus against Persia. Cyrus was slain and Xenophon led the 'Retreat of the Ten Thousand' through Armenia to the Black Sea; subsequently attached himself to Agesilaus, king of Sparta. Late in life wrote his masterpieces—mainly reminiscences: the *Anabasis*, a narrative of the retreat of the 10,000; the *Memorabilia*, reminiscences and memorials of Socrates — whom he revered; *Agesilaus*, a memoir; and *Hellenica*, which covers 49 years of Gk. history.

XENOPHYOPHORA, see under Rhizopoda.

XERES, see Jerez de la Frontera.

XERXES I. (*c.* 519–465 B.C.), king of Persia (485); led the great expedition against Greece, which was withstood at Thermopylæ by the immortal 300. The Persian fleet was destroyed at Salamis, and he retired after destroying Athens; murdered by Artabanus, he was succ. by his s., X. II.

XIMENES DE CISNEROS, FRANCISCO, Jimenes (1436–1517), Span. (Castilian) ecclesiastic and statesman; chaplain to Cardinal Mendoza, 1480; became Franciscan monk, 1483; famous for austerities; confessor to Queen Isabella, 1492; provincial of Franciscan order, 1494; reformed monastic system; abp. of Toledo, 1495; regent, 1506; cardinal, 1507; subsequently inquisitor-gen.; led expedition to N. Africa, captured Oran, 1509; regent of Castile, 1516; dismissed by Charles V., 1517.

XIPHOSURA, see Arachnida, King-Crab.

X-RAYS, see Röntgen Rays.

XYLOCOPA, see Carpenter Bees.

Y, 25th letter of alphabet; derived from Gk. *upsilon*; ȝ in M.E. *g* and *y* were confused, hence use of *y* as consonant in *yard* (O.E. *geard*).

YABLONOI (53° N., 115° E.), range of mountains, E. Siberia, extending from Urga, N.E. to Chita; highest point, Mount Sokhondo, 8040 ft.

YACHOW-FU (29° 58′ N., 102° 55′ E.), town, on Ya, Sze-chuen, China; tea. Pop. 38,000.

YACHTING, cruising or racing in boat built for pleasure; first known yacht was built for Queen Elizabeth (1588) at Cowes; first race on record was between Charles II.'s yacht and the Duke of York's (1662); first club founded was *Cork Harbour Water Club* (1720), existing still as the Royal Cork Yacht Club The *Yacht Club* was founded at Cowes, 1812, and became the Royal Yacht Squadron, 1820. There are now nearly 50 yacht clubs in Great Britain, and the sport has spread to France, U.S.A., Germany, Belgium, Spain, and other countries. In 1844 the New York Yacht Club was formed, which has remained the leading Amer. club. The type of boat used as a racer has gradually changed, especially since 1850; the schooner has given place to the cutter both for racing and cruising. The chief European racing centres are Cowes, Kiel, the Clyde, Nice, Ostendo, and San Sebastian. The chief international race is for the America Cup, won in 1851 by the *America*. Repeated unsuccessful attempts have been made since to bring back the cup to Britain, notably by Lord Dunraven (1893–94–95) and Sir Thomas Lipton (1899, 1901–3). The latter's challenge has again been accepted by America, 1913.

Steam has largely displaced sails for large cruising yachts, or has been added as an auxiliary.

Latterly, motor boats of considerable size have come into favour for cruising, and for some years past Monte Carlo has been famous for its motor-boat races. Yachting has produced a large literature both of books and treatises, and of periodicals, the leading ones being *Yachting*, *Le Yacht*; see also the annual Lloyd's *Yacht Register* and *The Yacht-Racing Calendar*.

YAK, see Ox Group.

YAKUB KHAN, see Afghanistan.

YAKU-SHIMA (30° 20′ N., 130° 30′ E.), island of Japan, S. of Kiushiu.

YAKUTSK (54° to 72° 30′ N., 104° to 170° E.), province, Siberia; area, 1,520,253 sq. miles; bounded N. by Arctic Ocean, W. by Yeniseisk, Irkutsk, S. by Transbaikalia, Amur, E. by Primorskaya. Surface level in N., mountainous in S.; drained by Lena and its affluents, Yana, Indighirka, Kolyma; produces rye, barley; cattle raised; exports furs, walrus-teeth; minerals include gold, salt, iron. Pop. (1910) 315,600. Capital, **Yakutsk** (61° 58′ N., 129° 44′ E.), near Lena; furs. Pop. 7500.

YALE UNIVERSITY, New Haven, Connecticut, U.S.A.; founded 1701; named after Elihu Yale, a Boston benefactor, in 1718; third oldest univ. in U.S.A. Calvinistic theology was the doctrinal basis of teaching; half the corporation is still clerical, and daily attendance at prayers is obligatory. The second professorship of Math's and Natural Philosophy was established, 1770, Medical School, 1813, Modern History, 1847, Law School, 1843. There are now 4 chief departments: arts, theology, med., and law. Degrees were thrown open to women, 1892. The arts and medical course each take 4 years, divinity and law, 3 years. There are also schools of forestry (2 years) and science (5 years, for engineering). The number of tutors, lecturers, etc., is 496, and there are 3000 students.

YALTA (44° 28′ N., 34° 7′ E.), seaport, resort, Taurida, Russia. Pop. 15,100.

YALU (40° 23′ N., 125° E.), river, forming boundary between Korea and Manchuria. For Battles of Y., see Japan (Russo-Japanese War) and China (History).

YAM, tuberous root of species of *Dioscorea*, used as food in tropics.

YAMBOLI (42° 29′ N., 26° 33′ E.), town, on Tunja, Bulgaria; agricultural district. Pop. (1910) 15,956.

YAMETHIN (20° 27′ N., 96° 9′ E.), district, Upper Burma. Pop. 245,000. Capital, **Yamethin**. Pop. 9200.

YANAON, Yanam (16° 44′ N., 82° 15′ E.), Fr. settlement, Godavari, Madras, India; area, 5 sq. miles. Pop. 5200.

YANCEY, WILLIAM LOWNDES (1814–63), Amer. barrister, newspaper editor, and member of Congress; active supporter of secession policy in S. States; sent as commissioner to Europe, 1861–62, to obtain recognition of Confederate States; sat in Confederate Senate, Richmond.

YANG-CHOW-FU (32° 25′ N., 119° 22′ E.), city, on Grand Canal, Kiang-su, China. Pop. *c.* 100,000.

YANGTSE-KIANG (31° 15′ N., 121° 45′ E.), largest river of China and chief commercial highway of the country; rises in the mountains of Tibet; traverses all the central provinces of China, and after a tortuous course of 3200 miles enters the Yellow Sea above Shanghai; receives numerous tributaries; communicates by the Grand Canal with Hoang-ho River; navigable to I-chang.

YANINA, see Janina.

YANKEE, supposed corruption of word 'English' by N. Amer. Indians; term applied to New Englanders during War of Amer. Independence; now slang for native of U.S.A.

YANKTON (42° 57′ N., 97° 20′ W.), city, on Missouri, Yankton County, S. Dakota, U.S.A.; grain-elevators; seat of Yankton Coll. Pop. (1910) 3787.

YAPOCK, see under Marsupials.

YARD, see Weights and Measures.

YARKAND (38° 24′ N., 77° 22′ E.), town, on Yarkand Darya, Chin. Turkestan; rich oasis; important trade centre; manufactures leather. Pop. *c.* 95,000.

YARMOUTH.—(1) Great Yarmouth (52° 36′ N., 1° 44′ E.), port, on Yare, Norfolk, England; has fine parish church; great centre of herring and deep-sea fishing; noted for Y. bloaters. Y. Roads is a large anchorage off the port, protected by sandbanks. Pop. (1911) 55,808. (2) (50° 42′ N., 1° 29′ W.) small seaport, on Solent, Isle of Wight, England. (3) (43° 49′ N., 66° 6′ W.) seaport, port of entry, Yarmouth County, Nova Scotia, Canada. Pop. 6600.

YARN, fibrous matter made into thread for weaving, by process of cleaning, bleaching, spinning into 'hanks,' and finally by dehydrating; warp y. stronger and more elastic than weft y.; best cotton yarn weighs 1 lb. for every 588,000 yds. of thread; ordinary, 250,000 yds. per lb.; fine linen thread weighs 1 lb. for 180,000 yds.; ordinary, 60,000 yds. per lb.; woollen thread is much heavier.

YAROSLAVL (58° N., 39° E.), government, central Russia; consists of a broad depression traversed by Volga; much occupied by marshes and forests; soil not very fertile; flax widely grown; manufactures cotton, linen, flour, tobacco. Pop. (1910) 1,218,300. Capital, **Yaroslavl** (50° 36′ N., 40° 12′ E.), at junction of Volga and Kotorost; cotton-mills. Pop. (1910) 81,100.

YARRELL, WILLIAM (1784–1856), Brit. natural-

ist; b. London; entered business as newspaper agent; wrote *History of British Fishes* (1836), *History of British Birds*; famous as angler and shot.

YARROW (55° 33′ N., 3° 3′ W.), stream, Selkirkshire, Scotland; issues from St. Mary's Loch and joins Ettrick near Selkirk.

YASSY, see JASSY.

YATES, EDMUND (1831-94), Eng. novelist and journalist; founder of *The World*.

YATSAUK, LAWKSAWK (21° 15′ N., 96° 50′ E.), Shan State, Burma. Pop. *c.* 27,800. Capital, Yatsauk (Lawksawk).

YATUNG (28° N., 88° 40′ E.), trade-market, on Sikkim frontier, Tibet.

YAUCO (18° N., 66° 50′ W.), city, Porto Rico; coffee and tobacco region. Pop. 28,000.

YAWS, contagious tropical disease, characterised by a granulomatous eruption, running a very chronic course and caused by a micro-organism, *Spirochæta pertenuis*; the first symptoms are fever, digestive disturbances, and pains, then the eruption appears in the form of papules, which grow and burst through the surface of the skin, having a raspberry appearance and a white slough around them, the eruption appearing in successive crops; the treatment is isolation of patient, antiseptic dressings on eruption, hot baths to bring eruption out, and potassium iodide, arsenic, or iron internally.

YEADON (53° 52′ N., 1° 41′ W.), town, Yorkshire; wool. Pop. (1911) 7442.

YEAR, see CALENDAR, CHRONOLOGY.

YEAST, see BREWING.

YEATS, WILLIAM BUTLER (1865-), Irish author; s. of artist; b. Dublin. He is one of the leaders of the 'Celtic' movement, and has established an Irish literary theatre.

YECLA (38° 36′ N., 1° 6′ W.), town, Murcia, Spain. Pop. 20,000.

YEDO, TOKYO (*q.v.*).

YEISK (46° 38′ N., 38° 18′ E.), town, on Sea of Azov, Kuban, Russia; exports grain, flax. Pop. (1910) 46,310.

YELL, see SHETLAND ISLANDS.

YELLOW FEVER, acute specific disease occurring in tropical climates and sometimes in seaports, characterised by fever, jaundice, gastro-intestinal disturbances, and a state of prostration; caused by a specific micro-organism, conveyed by a mosquito, while unhealthy conditions predispose to the disease. The incubation period is short and the onset usually sudden, the temperature rising and remaining elevated for three or four days; albumen is present in urine; jaundice and vomiting, both of which may be very severe, come on soon; symptoms usually begin to diminish about 4th day, and recovery takes place in 2 or 3 weeks, but patient may become prostrated, symptoms increase in severity, and death ensues. Treatment consists in first clearing the bowels with a laxative, and then administering salines; a light fluid diet is given, milk and water only, at first; ice is given for the vomiting, and stimulants, *e.g.* brandy diluted with water, may be necessary; a serum which kills the micro-organisms must be given in early stages of the disease to have successful results.

YELLOW RACES, see RACES OF MANKIND.

YELLOW RIVER, see HOANG-HO.

YELLOW-HAMMER, see EMBERIZIDÆ.

YELLOWSTONE NATIONAL PARK (*c.* 44° 35′ N., 110° 30′ W.), in N.W. corner of Wyoming, a wonderful region of cañons, cataracts, hot springs, geysers, and mud volcanoes; Yellowstone River passes through Grand Cañon, and near it towards S. of park stands a calcareous mass of terraces with many-coloured rocks, known as White Mountain. Geysers are finest in world, and are most remarkable feature of district. Most of area is thickly forested. Region was set apart as a national park by Congress, 1872, and a body of cavalry is employed to prevent destruction of forests and wild animals; result is that many species of animals which have elsewhere been exterminated have found refuge here.

YEMEN (12° 30′ to 17° 30′ N., 42° 30′ to 46° E.), S.W. province, Arabia, Asiatic Turkey; area, 73,800 sq. miles; borders on Red Sea. Surface is generally mountainous, with low plains along Red Sea coast; chief towns are Mocha, Sana, Damar, Hodeida. Live stock raised; produces coffee. Has been nominally subject to the Porte since 1872. Pop. *c.* 750,000.

YENIKALE, see KERCH.

YENIPAZAR, see NOVIBAZAR.

YENISEI (67° N., 87° E.), river, Siberia; rises in N.W. part of Mongolia and flows generally N., to Arctic Ocean; length, 3000 miles.

YENISEISK (52° to 77° N., 79° to 115° E.), government, Siberia, lying between Arctic Ocean and Mongolia; area, 981,607 sq. miles. Surface is level or undulating in N., mountainous in S.; watered by Ob, Yenisei, and other streams; large area covered with dense forests; has gold and silver mines; produces cereals Pop. (1910) 859,100. Capital, **Yeniseisk** (58° 27′ N., 92° 16′ E.), on Yenisei; gold-mining centre. Pop. 12,500.

YEOLA (20° 4′ N., 74° 31′ E.), town, Nasik, Bombay, Brit. India; cotton manufactures. Pop. 17,200.

YEOMAN, a freeholder, but sometimes free or customary tenant; estimated at 35,474 in Domesday Book; diminished in XVI. and again in XVIII. cent. when enclosures and large holdings squeezed out the small proprietor.

YEOMANRY, IMPERIAL, Brit. volunteer cavalry force now part of Territorials; each regiment has 4 squadrons and a machine-gun section. See ARMY, VOLUNTEERS.

YEOMEN OF THE GUARD.—A candidate for appointment must have served in the army as a warrant-officer or N.C.O. not under the rank of sergeant; he must be of exemplary character, under 50 years of age, not less than 5 ft. 10 in. in height, and in possession of at least one medal for field service. On state occasions the Yeomen of the Guard, dressed in the uniform of Henry VIII.'s time, form part of the royal procession. Permanent employment is afforded to many of the Yeomen at the Tower of London, where they act as guides to visitors; are popularly known as 'The Beefeaters.'

YEOTMAL (20° 23′ N., 78° 11′ E.), town, Berar, India. Pop. 12,000; (district) 600,000.

YEOVIL (50° 57′ N., 2° 37′ W.), town, on Yeo, Somersetshire, England; manufactures gloves. Pop. (1911) 13,760.

YETHOLM (55° 33′ N., 2° 16′ W.), village, on Bowmont Water, Roxburghshire, Scotland; headquarters of a tribe of gipsies.

YEW (*Taxus baccata*), a coniferous tree with poisonous evergreen foliage; female flower on fertilisation produces a hard seed surrounded by a red, succulent aril; timber of considerable value and formerly used for bows; attains great age; common in churchyards.

YEZD (32° 5′ N., 54° 46′ E.), city, capital, province Yezd, Persia; on several important caravan routes; manufactures silk, cotton. Pop. *c.* 55,000.

YEZO, Ezo, HOKKAIDO (41° 30′ to 45° 30′ N., 139° 50′ to 146° 8′ E.), one of main islands of Jap. empire, lying between Sakhalin and Hondo; area, 36,299 sq. miles; surface generally mountainous, reaching extreme height of *c.* 8200 ft. in Tokachi-Dake, in N. Has some active volcanoes; covered with thick forests; chief towns, Hakodate, Otaru. Produces coal, gold; game abundant. Administered by governor. Pop. 1,150,000.

YIDDISH, see HEBREW LANGUAGE.

YO-CHOW-FU (29° 28′ N., 113° E.), city, on Yangtse-kiang, Hu-nan, China. Pop. *c.* 21,000.

YOKOHAMA (35° 30′ N., 139° 35′ E.), treaty-port, on Tokyo Bay, E. coast of Hondo, Japan; large trade. Pop. 395,000.

YOKOSUKA, YOKOSHA (35° 10′ N., 139° 40′ E.),

seaport, naval station, on Hondo, Japan; shipbuilding yards, arsenals, dockyards. Pop. 75,000.

YOLA (9° 10′ N., 12° 11′ E.), province, Brit. Nigeria Protectorate; fertile; watered by Benue. Pop. *c.* 320,000. Capital, Yola.

YONGE, CHARLOTTE MARY (1823–1901), Eng. novelist; popular works are *Heir of Redcliffe*, *Daisy Chain*.

YONKERS (40° 59′ N., 73° 54′ W.), city, on Hudson, Westchester County, New York, U.S.A.; residential suburb of New York; carpets, sugar, hats. Pop. (1910) 79,803.

YONNE (47° 50′ N., 3° 30′ E.), department, France, formed from parts of ancient Burgundy, Champagne, and Gâtinais; hilly and undulating; forests in N.; chief river the Yonne; very fertile, producing cereals, wine. Pop. (1911) 303,889. Capital, Auxerre.

YORCK VON WARTENBURG, COUNT, HANS DAVID LUDWIG (1759–1830), Pruss. soldier; broke alliance with France, and withdrew the Pruss. army from invasion of Russia, 1812; conspicuous in the campaigns against France, 1813–14, notably at Dannekow, Bautzen, Wartenburg, and Leipzig; retired after Waterloo.

YOREDALE SERIES, part of Lower Carboniferous rocks of N. England; typically developed in Yoredale, Yorkshire.

YORK.—(1) (53° 58′ N., 1° 4′ W.) county town, W. Riding, Yorkshire, England, standing at junction of Foss and Ouse; still has its old walls and several old gates; abp.'s see; fine cathedral dating in part from XII. cent., and has some mediæval stained glass in the east window; several other interesting old churches, and ruins remain of Benedictine monastery; archiepiscopal palace is at Bishopthorpe, 3 miles to S. Y. is important railway and agricultural centre; manufactures flour, beer, hardware. In Rom. times Y. (*Eboracum*) was capital of the N., a position it continued to hold in Middle Ages; during Civil War of XVII. cent. it was besieged by Roundheads, to whom it eventually surrendered in 1644. Pop. (1911) 82,297. (2) (39° 54′ N., 76° 49′ W.) city, capital, York County, Pennsylvania, U.S.A.; manufactures agricultural implements, cars. Pop. (1910) 44,750. (3) (40° 50′ N., 97° 38′ W.) city, capital, York County, Nebraska, U.S.A.; manufactures flour, foundry products. Pop. (1910) 6235. (4) (43° N., 70° 40′ W.) town, summer resort, on Atlantic coast, York County, Maine, U.S.A.

YORK, DUKEDOM OF.—Edmund, 5th s. of Edward III. was cr. Duke of Y. in 1385, and his s. Edward succ. to the title. Richard, the s. of Edward's younger bro. Richard, on Edward's death at Agincourt succ., and as he was the nephew of Edmund Mortimer, great-grandson of Lionel, Duke of Clarence (3rd s. of Edward III.), he inherited a nearer title to the throne than Henry VI. (great-grandson of the 4th s. of Edward III.). His claim, in a period of misgovernment, gave rise to the WARS OF THE ROSES, and Richard fell at Wakefield, 1460. The HOUSE OF YORK began in him, and the YORK DYNASTY in his s. Edward IV., the dynasty becoming merged in the HOUSE OF TUDOR by the marriage of Henry VII. with Edward's daughter.

YORK, EDWARD, DUKE OF (*c.* 1373–1415), eld. s. of Edmund, Duke of York; chief adviser of Richard II. and was implicated in the murder of Gloucester; involved in several plots during the reign of Henry IV. and was killed at Agincourt.

YORK, FREDERICK AUGUSTUS, DUKE OF (1763–1827), second s. of George III.; cr. Duke of York and Albany and Earl of Ulster, 1784; m. Princess Frederica of Prussia, 1791; became commander-in-chief, 1798.

YORK, RICHARD, DUKE OF (1411–60), claimant to Eng. throne. His first important command was as lieutenant-general of France and Normandy, but he resigned command as the home-support did not further his efforts (1437); took up the command for a second time, 1441, but with the same result. By the death of Humphrey of Gloucester, Y. became heir-apparent, and in 1450 asserted his claims by arms, but was reconciled to the king. At the birth of a prince of Wales, Y. became protector; followed up his victories at St. Albans, etc., with moderation, but he had to reassert his position with force until he was proclaimed heir-apparent (1460). He was, however, finally surprised at Wakefield by the Lancastrians and slain.

YORKE, CHARLES (1722–70), Eng. lawyer; Bencher of Lincoln's Inn, and K.C., 1754; M.P., 1747; Attorney-Gen., 1762; resigned, 1763; left Pitt for Rockingham Whigs, and again Attorney-Gen., 1765–67; Chancellor, 1770.

YORKSHIRE (53° 18′ to 54° 40′ N., 0° 10′ E. to 2° 39′ W.), largest county of England; bounded N.W. by Westmoreland, N. by Durham, E. by North Sea, S. by Lincoln, Notts, and Derbyshire, S.W. by Cheshire, W. by Lancashire; area, 6067 sq. miles. Surface undulates upwards from coast to extensive stretches of moorland stretching westward to the Pennine Chain, which has here an extreme height of nearly 2600 ft.; the centre of the county is a plain known as the Vale of York; drained by the Hull, Derwent, Swale, Ure, Nidd, Yorkshire Ouse, Wharfe, and Aire (all of which belong to the basin of the Ouse itself), and by the Don, both Ouse and Don entering Humber estuary; in N. a small portion drains to Tees, and along N.E. some small streams flow direct to sea. County is divided into three Ridings (from O.E. *thridding*, 'third part'); in E. Riding the industries are mainly centred about Hull; in N. Riding there is coal, iron, salt, lead, barytes; and W. Riding has a large coal-field, with manufactures of woollens, linen, cutlery, hardware, as well as iron-smelting. Agriculture is carried on, especially in E. Riding; chief crops are oats, barley, and wheat; horses, cattle, and sheep are raised. Chief towns are York (capital), Leeds, Sheffield, Bradford, Huddersfield; chief ports, Hull, Whitby, Middlesborough, Scarborough. Y. was conquered by Romans in I. cent.; suffered from Dan. invasions in IX. and XI. cent's, and at hands of Normans at the Conquest; was scene of various battles in Wars of the Roses and Civil War of XVII. cent. Has many remains of religious houses. Pop. (1911) 2,054,729.

YORKTOWN (37° 8′ N., 76° 37′ W.), town, on York River, capital, York County, Virginia, U.S.A.; scene of surrender of Cornwallis to Washington, 1871.

YORUBALAND (6° 20′ to 9° N., 2° to 6° E.), region, S. Nigeria, W. Africa; comprises the old kingdoms of Itschin and Ife; area, *c.* 70,000 sq. miles; produces palm oil, ivory, cotton, shea butter; chief port is Lagos, whence a railway runs to Jebba in N. Nigeria. Natives are negroes of low stature. Pop. *c.* 2,000,000.

YOSEMITE (37° N., 118° W.), valley, in W. slope of Sierra Nevada Mountains, California, U.S.A.; length, 6 miles, width, ½–1 mile; enclosed by walls of rock rising 3000–6000 ft.; traversed by Merced; magnificent scenery; discovered, 1851; granted as a State park, 1864.

YOUGHAL (51° 57′ N., 7° 51′ W.), seaport, watering-place, on Blackwater, County Cork, Ireland; exports corn; fisheries. Pop. 5350.

YOUNG, ARTHUR (1741–1820), Eng. agricultural writer. In actual practice his experiments were very unsuccessful, but through his writings agriculture was raised to the level of a science. His more notable works are *A Six Months' Tour through the North of England* and *The Farmer's Calendar*. He was editor of *The Annals of Agriculture*.

YOUNG, BRIGHAM (1801–77), see under MORMONS.

YOUNG, EDWARD (1683–1765), Eng. poet; b. Upham, Hampshire. His first poem of consequence was an *Epistle* to George Grandville, which is saturated with his characteristic flattery. In 1719 his bombastic tragedy, *Busiris*, was produced at Drury Lane, and at this period he was financed by the dissolute Marquis of Wharton. In 1721 his tragedy, *The Revenge*, was pro-

duced, with little success. His *Satires* were much more successful. But it is as the author of *Night Thoughts* that he is now remembered.

YOUNG, JAMES (1811–83), Scot. industrial chemist; produced oil from bitumen and shale.

YOUNG, THOMAS (1773–1829), Eng. physician and physicist; discovered interference of light; contributed much to undulatory theory and theory of colour perception.

YOUNG MEN'S CHRISTIAN ASSOCIATION (Y.M.C.A.), founded in London, 1844, by Sir George Williams; membership about 500,000; its members have to be orthodox Christians and of good character.

YOUNGSTOWN (41° 7′ N., 80° 42′ W.), city, on Mahoning, Mahoning County, Ohio, U.S.A.; iron and steel manufactures. Pop. (1910) 79,066.

YPRES (40° 50′ N., 2° 53′ E.), town, on Yperlée, W. Flanders, Belgium; cathedral; manufactures linen, lace. Pop. 16,900.

YPSILANTI (42° 15′ N., 83° 40′ W.), city, on Huron, Washtenaw County, Michigan, U.S.A.; seat of State normal coll.; manufactures paper. Pop. (1911) 6230.

YPSILANTI, ALEXANDER, HYPSILANTI (1725–1805), a Phanariot Greek, hospodar of Wallachia and Moldavia, was executed at Constantinople. His s. CONSTANTINE, and grandson ALEXANDER, were actively anti-Turkish, and the latter proclaimed independence of Greece, 1821, but d. in exile at Vienna. DEMETRIUS (1793–1832) commanded the Gk. army, 1828–30.

YSAŸE, EUGENE (1858–), Belg. violinist; app. prof., Brussels Conservatorium, 1890; the greatest violinist in the world.

YSTAD (55° 25′ N., 13° 44′ E.), seaport, on Baltic, län of Malmöhus, Sweden. Pop. (1911) 11,459.

YSTRADYFODWG, RHONDDA (*q.v.*).

YTTERBIUM, NEOYTTERBIUM (Yb=172·0), a rare earth metal.

YTTRIUM (Yt=89·0), rare earth metal; oxide Yt_2O_3, fractionated into different components by Crookes.

YUCATAN (17° 30′ to 21° 40′ N., 87° to 92° 30′ W.), peninsula, Mexico, Central America; area, *c.* 53,290 sq. miles; surface generally flat, with Sierra de Y. crossing centre; few rivers; produces maize, rice, cotton, tobacco, sisal hemp, sugar cane; has fine forests, with mahogany and other valuable trees; capital, Merida. Y. was formerly a state, and is now divided into the two states of Y. and Campeachy. Pop. (1910) 339,613; Campeachy, 86,706.

YUCCA, a tree-like liliaceous plant growing in the drier parts of Mexico and Central America.

YUCHI, YUE-CHI, YUEH-CHIH, a nomadic, warlike Asiatic tribe; called also Indo-Scythians; conquered Bactria in II. cent. B.C.; a confederacy of five tribes, including the Kushans; annexed N. India *c.* A.D. 150, but were subsequently driven back; found in Afghanistan, A.D. 430. Much of their history is conjecture.

YUKON.—(1) (63° N., 135° W.) territory, Canada, N. of Brit. Columbia; created a district when the extensive gold deposits were discovered in the valley of Klondike (*q.v.*); more or less mountainous; drained by Yukon. Capital, Dawson City. Pop. (1911) 8512. (2) (65° N., 140° W.) river, Alaska; formed by the union of Lewes and Pelly at Fort Selkirk; flows N.W., then S.W.; empties by delta into Bering Sea; receives Stewart, M'Queston, Indian, and Klondike; length, 1500 miles.

YULE, old name for Christmas (*q.v.*).

YULE, SIR HENRY (1820–89), Brit. Orientalist; sec. to Indian Public Works Department, 1858–62; works include *Book of Ser Marco Polo*, *Hobson-Jobson, an Anglo-Indian Glossary.*

YUN-NAN (24° 40′ N., 101° E.), province, S.W. extremity, China; central part consists of a lofty plateau sloping towards S.E. and studded with lakes; very mountainous in N. and W.; traversed by Yang-tse-kiang, Mekong, Salwin, and Songkoi; rich mineral resources (copper, tin, coal, etc.); agricultural products include rice, maize; manufactures iron and steel, textiles. Pop. *c.* 12,100,000. Capital, Yun-nan Fu.

YUN-NAN FU (25° 2′ N., 102° 45′ E.), walled city, capital, Yun-nan, China; active commerce. Pop. *c.* 50,000.

YURIEV (formerly DORPAT) (58° 17′ N., 26° 47′ E.), town, Livonia, Russia; seat of a univ. (1632). Pop. (1910) 43,940.

YUZGAT, YOZGAD (39° 50′ N., 35° E.), town, vilayet Angora, Asia Minor; noted for its horses. Pop. *c.* 16,000.

YVERDON (46° 46′ N., 6° 38′ E.), town, Vaud, Switzerland; has old castle used by Pestalozzi (*q.v.*) as school; sulphur baths. Pop. 8630.

YVETOT (49° 37′ N., 0° 45′ E.), town, Seine-Inférieure, France; manufactures cotton goods; formerly seat of a petty monarchy. Pop. 6300.

Z, last letter of Eng. alphabet, corresponding to the Gk. *zeta* and the Semitic *Zayin*. It occurs very seldom in English, except in words of Gk. or Hebrew origin.

ZAANDAM, Saardam (52° 26′ N., 4° 49′ E), town, on Zaan, N. Holland, Netherlands; paper-works; noted for numerous windmills. Pop. (1911) 25,305.

ZABERN, Saverne (48° 45′ N., 7° 40′ E.) (Rom. *Tres Tabernæ*), town, Alsace-Lorraine, Germany; manufactures agricultural implements. Pop. 8600.

ZABRZE (50° 48′ N., 18° 47′ E.), town, Silesia, Prussia; coal mines. Pop. (1910) 63,373.

ZACATECAS (23° N., 103° W.), state, Mexico, belonging to the central plateau; rich in minerals, silver, gold, iron. Pop. (1910) 477,556. Capital, **Zacatecas** (22° 47′ N., 102° 27′ W.); silver mines. Pop. (1910) 25,905.

ZACHARIÄ VON LINGENTHAL KARL SALOMO (1769–1843), Ger. jurist; prof. of Law at Wittenberg and Heidelberg (1797–1807); important legal works.

ZACHARIAS, ST., pope, 741–52; his correspondence with St. Boniface, which has been preserved, is of historical importance.

ZAGAZIG (30° 30′ N., 32° E.), town, capital, province Sharkia, Egypt. Pop. 36,000.

ZAHRINGEN (47° 59′ N., 7° 51′ E.), village, Baden, Germany; ancient seat of the Dukes of Zahringen.

ZAILA, Zeyla (*q.v.*).

ZAIRE, former name of the Congo River.

ZAISAN, Zaisansk.—(1) (48° N., 84° E.) town, Semipalatinsk, Russ. Central Asia. Pop. 5000. (2) (48° N., 84° E.) lake, Russ. Central Asia; length, 70 miles; the Irtysh issues from it.

ZALEUCUS (fl. *c.* 660 B.C.), Gk. lawyer; traditional drawer-up of first Gk. code of laws, so strict as to become proverbial.

ZALMOXIS, ancient Thracian hero.

ZAMAKHSHARI (1074–1143), Arab scholar.

ZAMBEZI, large river, E. Africa; generally regarded as northern limit of S. Africa; rises in N.W. Rhodesia, near Congo and Portug. frontier, in 11° 21′ 3″ S., 24° 32′ E.; general course S.E.; flows through Portug. W. Africa, Rhodesia, Portug. E. Africa; enters Ind. Ocean by several branches (most important Chinde). Length over 2000 miles; navigable for *c.* 1700 miles; navigation is interrupted by Supuma Cataract, Gonye Falls, Katima Molilo Rapids, Victoria Falls (*q.v.*), in Rhodesia; Kebrabasa Rapids, in Portug. E. Africa, and silting at mouths. Principal tributaries are: Lungwebungu, Luanginga, Lumbi, Machili, Kwando, Ungwesi, Shiré; different parts of Z. known as Jambeshe, Liambeshe, Liambai, etc. Explored by Livingstone, 1851, 1853, 1856, 1858–60; Serpa Pinto, Rankin, St. Hill, Gibbons. Maugham, *Zambezia* (1910).

ZAMBOANGA (7° 11′ N., 122° 2′ E.), town, port of entry, Mindanao, Philippine Islands. Pop. 3600.

ZAMINDAWAR (32° 30′ N., 64° 30′ E.), district, on Helmund River, Afghanistan; chief town, Musa Kala.

ZAMORA (41° 40′ N., 5° 40′ W.), province, in Leon, Spain; generally level. Pop. (1910) 273,045. Capital, **Zamora** (41° 32′ N., 5° 47′ W.); fine cathedral; wine, wheat. Pop. 16,500.

ZAMOYSKI, JAN, Zamojski (1541–1605), Polish soldier and statesman; commander-in-chief of Polish army against Russia, 1580–82; defended the frontiers against Turks, Cossacks, and Swedes. Patron of lit. and author.

ZANARDELLI, GIUSEPPE (1826–1903), Ital. statesman; took part in rising against Austria (1848–49); assisted Garibaldi.

ZANDER, see Perches.

ZANESVILLE (39° 57′ N., 81° 59′ W.), city, at junction of Licking and Muskinghum, capital, Muskinghum County, Ohio, U.S.A.; manufactures pottery; was capital of the state, 1810–12. Pop. (1910) 28,026.

ZANGWILL, ISRAEL (1864–), Eng. novelist and playwright; pres., Jewish Territorial Organisation.

ZANTE (37° 47′ N., 20° 55′ E.) (ancient *Zacynthus*), island of the Ionian group, Greece; surface is a fertile plain with hills in W.; produces currants, olives; subject to earthquakes. Pop. 45,500. Capital, **Zante,** on E. coast. Pop. 13,500.

ZANZIBAR.—(1) (6° S., 39° 20′ E.) Brit. protectorate, off Ger. E. Africa, consisting of islands of Z. and Pemba; area, 1020 sq. miles (Z., 640 sq. miles; Pemba, 380). Of coral formation; surface generally undulating; chief town, Zanzibar; climate hot and damp; hot season, Jan. to March; soil fertile; produces cloves, copra, lemons, bananas, and other fruits; exports wax, hides, rubber, ebony, cloves, copra, orchil, copal, tortoise-shell. Has been under Brit. protection since 1890, and is administered by Brit. officials nominated by the native Sultan. Pop. (1911) 198,914. (2) (5° S., 38° 30′ E.) town, on W. coast of Z. island, capital of above; principal port on E. seaboard of Africa; excellent harbour; contains the palaces of the Sultan, fort and barracks, hospitals, Prot. and R.C. missions; exports cloves, ivory. Pop. *c.* 37,000.

ZAPUS, Jumping Mice, see Jerboas.

ZARA (44° 7′ N., 15° 14′ E.) (Rom. *Jadera*), seaport, on Adriatic, capital, Dalmatia, Austria; manufactures maraschino; cathedral (XIII. cent.); seat of Catholic abp. and Gk. bp. Pop. (1910) 36,595.

ZARAFSHAN, see Bokhara.

ZARAGOZA, see Saragossa.

ZARATHUSTRA, see Zoroaster.

ZARHUN, sacred town, Morocco, 9½ miles N. of Mekines; near it is the tomb of Mulai-Idris.

ZARIA (11° 5′ N., 7° 18′ E.), town, capital, Zaria, Brit. Protectorate, N. Nigeria; cotton-producing region. Pop. 260,000.

ZARLINO, GIOSEFFO (1517–90), Ital. musician; b. Chioggia; *maestro di capella* of St. Mark's, Venice.

ZEA, see Ceos.

ZEALAND, Seeland, Sjaelland (55° 30′ N., 12° E.), largest island, Denmark, between Cattegat and Baltic; surface level or undulating; fertile and well-cultivated; contains Copenhagen, and is divided into 5 amter. Pop. 980,000.

ZEBRA, see under Horse Family.

ZEBU, Brahmin Ox (*Bos indicus*), Indian ox having hump on withers; used as beast of burden. Sacred bulls of Hindus are of this breed.

ZECHARIAH, Old Testament prophet; his book, in the minor prophets, falls into two portions of different authorship—chapters 1–8 and 9–14. 1–8 are the work of Z. himself and written under Darius Hystaspis of Persia, 520–18 B.C., and are visionary and symbolic. 9–11 are a prophecy which may belong to the VIII. cent., but more probably IV. cent., and 12–14 are probably also post-exilic. 9–14 are attributed by scholars to a compiler.

Minor Prophets, vol. ii. (*Century Bible*).

ZECHSTEIN, see Permian.

ZEEHAN (42° S., 145° 20′ E.), town, Montagu County, Tasmania; centre of a silver-lead mining district. Pop. 5300.

ZEELAND, Zealand (51° 30′ N., 3° 50′ E.), pro-

vince, Netherlands; comprises islands of Schouwen, Duiveland, N. and S. Beveland, Walcheren, and others, together with a strip of land along W. bank of Scheldt; surface flat and mostly below sea-level; soil fertile. Pop. 235,000. Capital, Middelburg.

ZEERUST (26° 36′ S., 26° 6′ E.), town, Marico, Transvaal; in neighbourhood of lead, zinc, silver, and gold mines.

ZEITUN (37° 40′ N., 36° 42′ E.), town, vilayet Aleppo, Asiatic Turkey; iron mines. Pop. *c.* 10,500.

ZEITZ (51° 4′ N., 12° 9′ E.), town, on White Elster, Pruss. Saxony; manufactures textiles. Pop. (1910) 33,093.

ZELAYA, see MOSQUITO COAST AND RESERVE.

ZELLER, EDUARD (1814–1908), Ger. philosopher; returned to Kant in epistemology; author of a recognised text-book on Gk. philosophy.

ZENANA, part of house where Indian women are secluded; cf. Harem of Muslims.

ZEND, see PERSIA (LANGUAGE and LITERATURE).

ZEND-AVESTA, see AVESTA.

ZENGG, SENJ, SEGNA (44° 59′ N., 14° 55′ E.), town, on Adriatic, Lika-Krbava, Croatia-Slavonia, Hungary. Pop. 3300.

ZENITH, point in heavens directly above spectator.

ZENJAN (36° 21′ N., 48° 32′ E.), town, on Zenjan, Khamseh, Persia; trade in carpets. Pop. *c.* 25,500.

ZENO OF CITIUM, see STOICS.

ZENO OF ELEA, see ELEATIC SCHOOL.

ZENOBIA, Queen of Palmyra after her husband's death; asserted independence of Rom. suzerainty, and claimed to be 'Queen of the East,' A.D. 266; defeated and brought to Rome by Emperor Aurelian.

ZENTA (45° 57′ N., 20° 7′ E.), town, on Theiss, Bács-Bodrog, Hungary; scene of victory of Imperialists over Turks, Sept. 1697. Pop. (1910) 29,666.

ZEOLITES, mineral group; hydrated silicates of alkalies; generally contain alumina; found in basalt, porphyrite, granite, and gneiss in numerous varieties.

ZEPHANIAH, Old Testament prophet; his book, one of the minor prophets, was written during the reign of Josiah. Chapter 1 prophesies a 'Day of Jehovah'—a judgment on Israel for its sins, in which the heathen will triumph. In 2 and 3 the prophet prophesies like judgment on the heathen nations; then a denunciation of the sins of Jerusalem; at the end is the divine promise for the faithful remnant.

Minor Prophets, vol. ii. (*Century Bible*).

ZEPHYRINUS, ST., pope, 198–217.

ZEPPELIN, COUNT VON (1838–), see under BALLOON.

ZERBST (51° 58′ N., 12° 4′ E.), town, on Nuthe, Anhalt, Germany; manufactures jewellery, machinery. Pop. (1910) 19,210.

ZERMATT (46° 2′ N., 7° 44′ E.), village, at foot of Matterhorn, canton Valais, Switzerland; tourist centre.

ZEULENRODA (50° 38′ N., 12° E.), town, principality Reuss-Greig, Germany; manufactures hosiery. Pop. (1910) 10,389.

ZEUS, the greatest of the Gk. gods, corresponding to Rom. Jupiter or Jove. All three words, with parallels in other Aryan languages, signify 'bright,' and have to do with the day. Hence Zeus is the sky-god; his worship is very old, undoubtedly dating before the coming of the Hellenes into Greece; Z. is supreme among the gods in Homer. In Crete his worship was assimilated to an older deity corresponding to Dionysus. His worship in Greece was never monotheistic, but had many noble conceptions in it. On its lower side it was connected with various animal worships which show traces of old sacrificial cults—particularly with the wolf and the ox. In early times human sacrifice was offered to him. At Dodona he was worshipped at the sacred oak—a feature of old Aryan religion. His worship declined before the end of paganism.

Farnell, *Cults of the Gk. States*.

ZEUXIS (fl. 420–390 B.C.), a celebrated Gk. painter; he excelled with female figures, his masterpiece in this line being the *Helen* painted for the city of Croton.

ZEYLA, ZEILA (11° 18′ N., 43° 24′ E.), town, on Gulf of Aden, Brit. Somaliland, Africa. Pop. *c.* 6000.

ZHELEZNOVODSK (44° 10′ N., 43° E.), village, health-resort, Stavropol, Russia; warm mineral springs.

ZHITOMIR (50° 15′ N., 28° 43′ E.), town, on Teterev, capital, Volhynia, Russia; seat of a Gk. abp. and R.C. bp.; trade in corn, timber; manufactures tobacco. Pop. (1910) 78,300.

ZHOB (31° 30′ N., 69° E.), river and valley, Brit. Baluchistan; gives name to a district controlled by a political agent.

ZIARAT (36° 40′ N., 54° 30′ E.), town, sanatorium, Baluchistan; mineral springs.

ZIERIKSEE (51° 39′ N., 3° 56′ E.), port, on island of Schouwen, Zeeland, Holland; salt refineries. Pop. 7006.

ZIETEN, HANS JOACHIM VON (1699–1786), Pruss. field-marshal of Frederick the Great; won fame in Silesian and Seven Years Wars.

ZIMBABWE, remarkable ruins in Mashonaland, near Salisbury, S. Africa; according to theory of Bent and Hall the work of pre-Muhammadan Arabians; according to M'Iver about XVI.-cent. work. (Bent, *Ruined Cities of Mashonaland*, 1902; M'Iver, *Medi-æval Rhodesia*, 1906.)

ZINC, SPELTER (Zn=65·37), metallic element allied to magnesium, occurring as *calamine* ($ZnCO_3$) and blende (ZnS).

METALLURGY.—Ores are roasted to oxide, which is reduced by carbon whilst the metal distils.

PROPERTIES AND USES: bluish white, crystalline, ductile, and may be rolled into foil between 100° and 150° C.; brittle and may be powdered at 205° C.; S.G. 6·9, M.P. 419° C., B.P. 918° C.; vapour monatomic, burns with bluish white flame forming oxide; divalent; dissolved by dilute and concentrated mineral acids, slowly attacked by dilute sulphuric and hydrochloric acids when pure; dissolved also by caustic soda, hydrogen being evolved. Gradually attacked by moist air with formation of basic carbonate. Used for making brass, galvanising iron, desilverising lead, for preparation of hydrogen ($Zn+H_2SO_4=ZnSO_4+H_2$), for electric batteries, for precipitating gold in the cyanide process, as zinc dust for reducing purposes.

COMPOUNDS: oxide (ZnO), zinc white, used as a pigment and medicinally; chloride ($ZnCl_2$), waxlike, used as a caustic, as a dehydrating agent, and for weighting cotton. Basic chloride solution dissolves silk; sulphide (ZnS), a white precipitate, crystals are phosphorescent; sulphate ($ZnSO_4+7H_2O$), white vitriol, crystalline, soluble, used as emetic; carbonate, a white precipitate, generally basic.

ZINCITE, crystalline mineral consisting of zinc-oxide.

ZINDER (13° 47′ N., 8° 42′ E.), town, capital, Zinder district, Fr. Sahara; trade in cottons, silks; military post. Pop. 15,500.

ZINNIA, in botany, genus of compositæ; white, yellow, scarlet, crimson, and purple.

ZINZENDORF, NICOLAUS LUDWIG, COUNT VON (1700–60), Ger. reformer; founder of the famous Moravian settlement at Herrnhut; bp. of Lutheran Church; sent missionaries to Greenland, 1730; travelled through N. America and W. Indies, and visited England, founding Moravian missions; banished for some years from Saxony. Author of hymns and short religious works.

ZION, Hebrew word, of uncertain derivation, applied to citadel of Jerusalem (now known to be E. and not S.W. part of city), thence to Jerusalem as a whole, and metaphorically for Israel.

ZIONISM, name to Jewish movement aiming at the return to Palestine and the setting up of a Jewish national state. Jewish Messianic hope has always been bound up with national feeling, but in the Middle Ages, when the Jews were persecuted, there was no real hope of returning to the Holy Land. The idea took shape in the XVI. and XVII. cent's. Sabbatai Zevi claimed Messiahship at Smyrna in 1666, and had a large

following, but he proved an impostor. Another movement was started by Moses Mendelssohn in 1778. His work was continued by Sir Moses Montefiore and others. National Jewish feeling was encouraged by fanatical outbursts of anti-Semitism. Schemes were suggested of starting a Jewish settlement in Palestine with the consent of the Ottoman government. Fresh impetus was given by Dr. Herzl (d. 1904). Zionist congresses were held, 1897–1910. The Brit. government offered land in East Africa for a Jewish state, but the scheme fell through. A 'Jewish Territorial Organisation' was founded by Mr. I. Zangwill, but Z. tends to be given up as impracticable.

ZIRCON, mineral composed of silicate of zirconium; found in Ceylon. Varieties: hyacinth, jargon, *noble or precious z.*, a gem stone occurring in basic eruptive rocks; colourless, red, brown, or green.

ZIRCONIUM (Zr=90·6), rare metal in tin group, occurring as zircon (*q.v.*), ($ZrSiO_4$); S.G. 4·08, very hard; oxide ZrO_2 (employed for Nernst lamp), basic and acidic; other compounds $ZrCl_4$, $Zr(SO_4)_2$, $Zr(NO_3)_4$, Na_2ZrO_3.

ZIRKEL, FERDINAND (1838–), Ger. geologist; prof., Lemberg (1863), Kiel (1868), Leipzig (1870).

ZITHER, a musical instrument, with from 30 to 42 strings, stretched over a flat sound-box. The Tyrol is its native country.

ZITTAU (50° 53′ N., 14° 47′ E.), town, Saxony, Germany; manufactures damasks; coal mines in vicinity. Pop. (1910) 37,078.

ZITTEL, KARL ALFRED VON (1839–1904), Ger. geologist and palæontologist; awarded Wollaston medal by Geological Soc., London, 1894.

ŽIŽKA VON TROCNOW, JOHN (c. 1376–1424), Bohemian Hussite; leader of Taborite section of Hussites; defeated Emperor Sigismund, 1420 and 1422; waged war against other Hussites (Calixtines), and destroyed monasteries; d. of plague while besieging castle of Pribslav; ferocious and skilful soldier.

ZLATOUST (55° 30′ N., 59° 40′ E.), town, Ufa, Russia; cathedral; observatory; mining centre; ironworks. Pop. 21,000.

ZNAIM (48° 53′ N., 16° 3′ E.), town, on Thaya, Moravia, Austria; has remains of the castle of the Margraves of Moravia; manufactures pottery. Pop. 17,000.

ZODIAC, a belt of the sky bounded by circles about 9° on each side of the ecliptic or apparent path of the sun, contains also the paths of the moon and the principal planets. It is divided into 12 *signs*, each 30°, corresponding to 12 full moons in the year, and the stars in each are grouped into *constellations*. One excepted, these are named after living things (Greek *zodion*=a little animal), and with their symbols are in order from west to east; north of the celestial equator —*Aries* (Ram) ♈, *Taurus* (Bull) ♉, *Gemini* (Twins) ♊, spring signs; *Cancer* (Crab) ♋, *Leo* (Lion) ♌, *Virgo* (Virgin) ♍, summer signs; south of the equator —*Libra* (Balances) ♎, *Scorpio* (Scorpion) ♏, *Sagittarius* (Archer) ♐, autumnal signs; *Capricornus* (Goat) ♑, *Aquarius* (Water-bearer) ♒, *Pisces* (Fishes) ♓, winter signs. At the spring equinox the sun is said to be at the first point of Aries. This position does not now lie in Aries, but in Pisces, due to the shift of the series westward by precession (Gyroscope, *q.v.*). The old Chin. z. has 12 sections also, the Mexican 20. The history of our z. is obscure. The symbols appear about the X. cent. A.D., but Assyrian inscriptions and astronomical evidence date its construction not later than 2000 B.C.

There is also a lunar z. of Hindu origin with 27 or 28 divisions named after the Vedic deities and dating back to c. 2000 B.C. The Hindu system influenced the later Chin. z. and the Arab. mansions of the moon.

The zodiacs are associated with astrology rather than with astronomy.

Zodiacal Light, a luminous tract of elongated triangular shape, lying nearly on the ecliptic, its base being on the horizon, and its apex at varying altitudes, seen at certain seasons of the year either in W. after sunset or in E. before sunrise. After sunset in spring it may often be seen about latitude 40° N. as a faint cone of light proceeding from the place where the sun has set, and reaching 70° or 80° eastward. It appears with greatest brilliance within the tropics, where it sometimes rivals the *Milky Way*, and has been seen to stretch right across the sky. Its spectrum is a faint, continuous one. Its cause is supposed to consist of a ring of meteoric or nebulous matter surrounding the sun and shining by reflected sunlight.

ZOISITE, rock-forming mineral of basic calcium and aluminium silicate.

ZOLA, ÉMILE ÉDOUARD CHARLES ANTOINE (1840–1902), Fr. novelist; s. of Ital. engineer by Fr. woman; publisher's clerk until his first book, *Contes d Ninon*, was accepted, 1864. First vol. of *Rougon-Macquart* series appeared, 1871; Z. conceived idea of family as an artistic as well as pathological unity, and the 20 separate novels in this series are linked by chief characters of family of Rougon-Macquart; rest of life is history of continuous literary labour (which met with immense success) until his support of Dreyfus led to his flight to London, 1898–99; returned for second trial; accidentally asphyxiated.

Z. was a mixture of sciontist, realist, social reformer, and poet; the first three aspects are sometimes predominating, as in *Lourdes*, *Rome*, *Paris*, *Nana*; *Lourdes* is a patient and painful description of diseases, *Nana* a monotonous laying bare of social sores, *Paris* a long study of political conditions; in none of them is there any attraction of romance or beauty; but in the *Rougon-Macquart* series, despite the study in heredity, there are characters and situations of the highest art; in year of producing *La Terre* (1888), Z. wrote *Le Rêve*, delicate romance with mediæval background; *La joie de vivre* is blend of imagination and pathology; into none of his writings, however, has mirth any entrance; pessimistic outlook on social conditions; in private life honest, courageous, self-sacrificing reformer.

Monograph, by Sherard (1893); Vizetelly, *With Z. in England*.

ZÖLLNER, JOHANN KARL FRIEDRICH (1834–82), Ger. astronomer; wrote on comets, photometry, and spectrum analysis.

ZOLLVEREIN, see GERMAN EMPIRE (HISTORY).

ZOMBOR (45° 46′ N., 19° 3′ E.), town, Bács-Bodrog, Hungary; centre of trade in cereals and cattle. Pop. (1910) 30,593.

ZOOGLŒA, see BACTERIOLOGY.

ZOOLOGICAL GARDENS, areas set aside for the exhibition of living animals, which may represent in the main the wild fauna of the country in which the garden is situated, or may afford a consensus of the animal life of the world. Z. g's, besides affording spectacular show, offer the only means of studying the development and habits of many kinds of wild creatures, and give to the artist otherwise unattainable opportunities of sketching life poses and movements. In the older gardens, erected often in crowded areas of large cities, it was the custom to exhibit the inmates in pens or cages scarcely larger than was necessary to give the animal moving room, but a new development endeavours to place each creature in its own appropriate natural setting. Great z. g's are those in London and New York, which in the past have mainly followed the old style, while the later development finds expression in Hagenbeck's garden near Hamburg, and will form the main feature of a garden in process of being created in Edinburgh. The great natural reservations of wild animals in America and Africa display the ideal of a national zoological garden on an infinitely grand scale.

ZOOLOGY (Gk. *zoon*, 'animal'; *logos*, 'science, account'), the comprehensive science which deals with animals and their lives. Along with the science of plants—Botany—it forms the great science of life—Biology.

The study of animals must have been one of the earliest to which man, almost unconsciously, turned his attention, for the necessities of finding food must have determined that he who best acquainted himself with the habits of deer or of wild ox became the most efficient and most prosperous hunter. The accuracy and acuteness of the observations of prehistoric man are amply proved by the relics still left to us in cave pictures, and in the wonderful carved bones and antlers from the caves of Vasère and Dordogne, whereon are depicted fishes, birds, ponies, and even the mammoth, the last scratched on the ivory of the great creature's tusks. This period of random and haphazard observation, which continued for long ages, was succeeded by a classical period when zoology first became the object of systematic study. Its greatest representatives were ARISTOTLE (384–322 B.C.), the 'father of natural history,' who, during a comparatively short residence on the Ægean coast, began observations which resulted in the description of some 500 different animals; and PLINY THE ELDER (23–79 A.D.), who collected indiscriminately all manner of current animal lore in his *Historia Naturalis*. Following the Classical Period came a period of decline—the Legendary Period—when absurd scraps of folklore and impossible travellers' tales passed as current z. Typical of this period are the volumes of allegorical stories known as *Bestiaries*, and the more or less symbolical figures of animals sculptured by the early Christians on standing stones scattered throughout the north-eastern areas of Scotland.

It was not till the Renaissance and the invention of printing in the XV. cent. that a period of revival was initiated which laid the foundations of present-day z. Fact and fancy were still inextricably mixed, but the keynote of the revival was an earnest attempt at fresh and first-hand investigation.

So successful has this search after knowledge been that the facts of z. have become too many for any single man to compass, and accordingly the science has been split into several branches each dealing especially with a particular aspect of animal life. Thus we have EMBRYOLOGY (*q.v.*), dealing with the early stages in development; MORPHOLOGY (*q.v.*), with crude structure, the forms of animals; HISTOLOGY, with the fine structures of cell tissues; PHYSIOLOGY (*q.v.*), with the internal workings of animals; PALÆONTOLOGY (*q.v.*), or more strictly palæozoology, with their fossilised remains; Bionomics, with their habits; and Ecology, with their life relationships to their neighbours or environment; while the great branch which endeavours to arrange animals in natural groups, to classify them, is known as SYSTEMATIC Z. But there is a constant interchange between these many branches, for none is independent of the others, and all are involved in the theoretical unities of zoological facts, which are sometimes included in the term 'philosophic z.'

It is interesting to remember that the development of zoological knowledge has followed a natural evolution along the two closely connected lines of structure and function. First was studied the external form of an animal, and with this was associated its life habits; then followed the closer study which distinguished organs, and the part they played in life; further discrimination discovered tissues in the organs, and with a particular tissue-structure peculiar functions came to be associated; the microscope revealed cells as the basis of tissues, and the study of cell-activities followed; and finally attention became focussed on the active cell-substance, the living protoplasm, and its properties of change or METABOLISM.

Mention must also be made of the latest advance of the science—the rapid development of ECONOMIC Z.—a branch especially valuable in that it is concerned with animal life only so far as this relates to the welfare of man. Economic z. may be divided into constructive economics and destructive economics. In the former division falls such a study as that of fisheries, whereby through the scientific investigation of fish habits, artificial culture of fishes, etc., attempts are made which aim ultimately at the increase of the fish-supply of the world. Into the latter class fall researches concerning the harmful parasites of man and of his domestic stock, and concerning those creatures which damage his crops or possessions—the former study being known as Parasitology, the latter falling mainly under the head of Economic Entomology. Such investigation is of economic value only so far as it leads to knowledge which will enable man to cope with the pests, by reducing chances of infection, by checking their ravages, or by utterly destroying them. See ANIMALS.

ZOOPHYTES, see under HYDROMEDUSÆ.

ZOO-PLANKTON, see under PLANKTON.

ZORNDORF (52° 41′ N., 14° 37′ E.), village, Brandenburg, Prussia; scene of defeat of Russians by Prussians, 1758.

ZOROASTER, founder of religion Zoroastrianism, was a Persian prophet; the original form of his name is *Zarathustra*. His religion is known to us from several sources—the Gathas, the later Zend-Avesta, and notices in classic writers. Owing partly to the legends in later accounts, partly to the distance of time at which he was placed by Gk. writers who misunderstood Persian chronology, his historicity has been doubted by Darmesteter and others, but without adequate reason. Like other great religions, Zoroastrianism must have had a personality behind it. His date is uncertain, but must be between 1000 and 600 B.C. His system is dualistic—a good power, Ahura Mazda, and an evil, Angra Mainyu. It is a lofty monotheism with future rewards and punishments. The spirituality of the founder was not maintained, and Zoroastrianism degenerated. It was the dominant religion of Persia till the Muhammadans overthrew the native power in XVII. cent. A.D. It has now only a few followers in Porsia, but is represented in India by the Parsees. Its thought was mainly derived from ancient Aryan sources. It had some influence on later Judaism, owing to the captivity under a Persian (and Zoroastrian) power, and therefore through that on Christianity.

Jackson, *Zoroaster* (1899).

ZOSTEROPIDÆ, White-Eyes (*q.v.*).

ZOUAVES, body of Fr. troops; name derived from Zwawa, a tribe of Kabyles in Algeria; practice of enlisting Frenchmen and Kabyles in same regiment ceased in 1840, and Z. are now Frenchmen in semi-Moorish uniform.

ZOUTPANSBERG (23° S., 31° E.), district, Transvaal; goldfields. Chief town, Pietersburg.

ZRINYI, MIKLÓS (NIKLAS), **COUNT** (1620–64), Hungarian soldier, poet and statesman; presided over Croatian diet, and was a brilliant Lat. scholar of European fame; defeated Turks several times; killed by wild boar.

ZSCHOKKE, JOHANN HEINRICH DANIEL (1771–1848), Ger. writer; b. Magdeburg; wrote *Bilder aus der Schweiz* (stories), *Stunden der Andacht* (poems), besides numerous other works.

ZSCHOPAU (50° 44′ N., 13° 4′ E.), town, on Zchopau, Saxony; iron foundries; textile industries. Pop. 7000.

ZUCCARO, the name of two Ital. painters. TADDEO (1529–66) painted several undistinguished frescoes and easel pictures. His bro. FREDERIGO (1543–1609) decorated the Escorial for Philip II. of Spain; executed many frescoes in Florence and elsewhere; and painted, among others, portraits of Queen Elizabeth and Mary Queen of Scots.

ZUG.—(1) (47° 9′ N., 8° 30′ E.) canton, Switzerland; mountainous in S. and S.E.; highest point, the Kaiserstock (8258 ft.); watered by Reuss and Sihl; inhabitants mainly German-speaking and R.C.; entered the Confederation, 1352. Pop. (1910) 28,156. (2) (47° 9′ N., 8° 30′ E.) (ancient *Tugium*), town, capital, canton Zug, on Lake of Zug; manufactures enamel and metal articles. Pop. 8040. (3) (47° 9′ N., 8° 30′ E.) lake, in S.W. of canton Zug; discharges by the Lorze into the Reuss; length, 9 miles; width, 2¼ miles.

ZUIDER ZEE (52° 35′ N., 5° 30′ E.), inlet of North Sea, Netherlands; originally a small inland lake (Rom. *Flevo*); united to North Sea by inundations in XIII. cent.; length, 80 miles; greatest width, *c.* 35 miles.

ZULA (15° 12′ N., 39° 36′ E.), town, on Red Sea, Eritrea; occupies site of ancient *Adulis*.

ZULULAND (26° 51′ to 29° 13′ S., 30° 35′ to 32° 55′ E.), N.E. province of Natal, Africa; includes Amatongaland, and has area of *c.* 10,400 sq. miles. Surface generally mountainous with low plains in N. and E. Drained by Tugela, which forms part of S.W. boundary, Umfolosi, Umkuzi, Pongola, and other streams. Chief lake, St. Lucia. Climate unhealthy on coast.

Importance dates from early XIX. cent., when the Zulus waged war against and conquered great number of surrounding tribes. Under Chaka, king, 1800–28, the conquered tribes were welded together into a strong and united nation, and Zulu control was established over whole country between Cape Colony and Zambezi. In 1838, Dingaan, bro. and successor of Chaka, excited hostility of early Boer settlers in Natal by his treacherous murder of many of their number. War ensued, resulting in complete Zulu defeat in Dec. 1838; and two years later Dingaan was deposed in favour of his bro., Panda, and was murdered. Panda, who reigned until 1872, made an agreement in 1843 yielding certain districts to Britain. Both he and his successor, Cetywayo, engaged in various boundary disputes with Boers of Transvaal.

In 1879 war broke out between Zulus and British, on occasion of Cetywayo's failure to reply to an ultimatum sent by Sir Bartle Frere, in Dec. 1878, demanding various concessions which were designed to reduce Zulu power. British, under General Thesiger, invaded country in Jan. 1879, in which month Zulus gained great victory at Isandula; but they were defeated at Ulundi in July, upon which they submitted to British. Brit. government, however, refused then to annex country, part of which was subsequently taken by Boers; in 1887 the remainder was annexed to Britain, being incorporated with Natal in 1898. In 1906 a Zulu rising was suppressed.

Produces cereals, sugar, coffee, tobacco; cattle and sheep raised. Gold and coal exist, but are little worked. There is a railway line of about 100 miles. Inhabitants chiefly Zulus. Pop. *c.* 245,000.

ZUMALA-CARREGUI, THOMAS (1788–1835), Span. soldier; entered Span. army under Mina, 1808, on Fr. invasion; joined Quesada, 1822, in cause of Don Carlos, and became commander-in-chief. After many victories died of wounds at siege of Bilbao.

ZURBARAN, FRANCISCO (1598–1662), Span. painter; dealt mainly with religious subjects. His greatest work is an altar-piece in the museum at Seville.

ZÜRICH.—(1) (47° 30′ N., 8° 40′ E) canton, Switzerland; contains a large part of Lake of Zürich and several smaller lakes; belongs to basin of Rhine; surface hilly (highest point, 3012 ft.); fertile valleys; manufactures cotton, silk; inhabitants mostly German-speaking Protestants; joined the Confederation, 1351. Pop. (1910) 503,915. (2) (47° 22′ N., 8° 33′ E.), chief commercial and industrial city of Switzerland, capital of Z. canton, on Lake Z., consists of Grosse and Kleine stadt, separated by river Limmat. Old part with narrow streets and lofty houses presents a picturesque appearance. New part contains broad streets, fine buildings, and extensive quays along lake. Among chief features are Grossmünster (Romanesque cathedral, begun XI. cent.); Fraumünster (founded IX. cent.); Wasserkirche (containing old town library); St. Peter (XIII. cent.); national museum (with rich Swiss antiquities of art collection); town hall and Postalozianum; univ.(opened, 1833) and Polytechnic; fine bridges, etc.; grand panorama of Alps from Ütliberg. Chief industries are silk-weaving, cotton-spinning machinery, paper mills, etc. Originally a lake-dweller settlement, Z. was founded by Romans; free imperial city, 1210; joined Helvetian union, 1351; long struggled against Austria; Zwingli preached Reformation, 1516; French, under Masséna, defeated Russians, 1799; by treaty of Z., 1859, Austria ceded Lombardy and paved way for Ital. union; birthplace of Pestalozzi (*q.v.*). Pop. (1912) 192,200. (3) (47° 22′ N., 8° 34′ E.) lake, Switzerland, chiefly in canton Zürich; length, 25 miles; greatest width, 2½ miles.

ZUTPHEN, ZUTFEN (52° 8′ N., 6° 12′ E.), town, Gelderland, Holland; tanneries; trade in grain, timber. Pop. 19,500.

ZVENIGORODKA, town, Kiev, Russia; tobacco. Pop. 17,000.

ZWEIBRÜCKEN, Fr. DEUX-PONTS (40° 15′ N., 7° 21′ E.), town, Rhine Palatinate, Bavaria; formerly capital of the duchy of Zweibrücken. Pop. 15,000.

ZWICKAU (50° 43′ N., 12° 30′ E.), town, on Zwickauer Mulde, Saxony, Germany; coal-fields; manufactures machinery, chemicals; birthplace of Schumann. Pop. (1910) 73,542.

ZWINGLI, HULDREICH (1484–1531), Swiss reformer; ed. Basle and Vienna and ordained a Catholic priest; attracted to Luther's teaching, and converted Zürich to the Prot. Confession of Faith while preacher in the cathedral, 1524; soon joined by the chief towns of N. Switzerland; at variance with the Lutherans on the questions of the Eucharist and Baptism, holding that the sacrament of the Lord's Supper was merely a symbolical rite, and denying the efficacy of baptism. A republican in politics, Z. laboured to establish a Swiss confederacy. In 1531 the R.C. cantons and the Prot. cantons of Zürich and Bern were at civil war, and in a skirmish a few miles from Zürich, Zwingli, marching with his fellow-citizens, was slain. A powerful and influential preacher in his day, Z.'s theological system was less definite than Calvin's, and more radical than Luther's.

ZWITTAU (49° 46′ N., 16° 27′ E.), town, Moravia, Austria; linen, cotton. Pop. 9660.

ZWOLLE (52° 31′ N., 6° 7′ E.), town, Overyssel, Netherlands; manufactures cotton; boatbuilding; Thomas à Kempis died here, 1471. Pop. (1911) 33,727.

ZYGOBRANCHIATA, an order of GASTEROPODA (*q.v.*).

ZYMOTIC DISEASES, term applied to certain more common infectious diseases, including cholera, diphtheria, erysipelas, measles, scarlet fever, smallpox, typhoid fever, typhus fever, whooping-cough.

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